State Level Environment Impact Assessment Authority-Karnataka

(Constituted by MoEF, Government of India, under section 3(3) of E(P) Act, 1986)

No SEIAA 32 IND 2009

Date : 20-11-2014

To,

The Commissioner
Bengaluru Development Authority
T Chowdaiah Road, Kumarapark West
Bengaluru – 560 020
Ph. No.: 080 2334 5799
E-mail: bda@vsnl.com

Sir,

Sub: Development of Eight Lane Peripheral Ring Road – Phase – I, connecting Tumkur Road to Hosur Road (crossing Bellary Road & Old Madras Road) of total 65 Kms by the Bengaluru Development Authority, Bengaluru - Issue of Environmental Clearance – Reg.

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This has reference to your application No.BDA/EM/TA3/PRR/EIA/T333/09-10 dated 10th September, 2009 addressed to the SEIAA seeking prior Environmental Clearance for the above project under the EIA Notification, 2006. The proposal has been appraised as per prescribed procedure in the light of the provisions under the EIA Notification, 2006 on the basis of the mandatory documents enclosed with the application viz., the Form 1, EMP and the additional clarifications furnished in response to the observations of the SEAC, Karnataka, in its meetings held on 21st November, 2009; 5th April, 2013; 9th June, 2014; 12th August, 2014 & 14th November, 2014. SEAC has recommended for issue of Environmental Clearance.

2. The proposal is for development of Eight Lane Peripheral Ring Road: Phase – I, connecting Tumkur Road to Hosur Road (crossing Bellary Road & Old Madras Road) of total 65 Kms.

3. The proposed project will have the provision for 69 box culverts and 4 Nos. of minor bridges for crossing of rajakaluve, nalas etc. The project authority have proposed 36 structures for major crossing of NH/SH/MDR/VR etc.

4. The project proposal has been considered by SEAC and ToRs were issued on 18th December, 2009 for conducting Environment Impact Assessment Study with Public Hearing. The EIA has been conducted by EIA Consultant namely M/s. Ramky Enviro Engineers Limited (Consultancy

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e-mail: msseiaakarnataka@gmail.com Website : http://seiaa.kar.nic.in

Division), Rajbhavan Road, Somajiguda, Hyderabad, Andhra Pradesh – 500 082 and Public Hearing has been conducted by the Karnataka State Pollution Control Board, Bengaluru at Bilishivale Village, Bidarahalli Hobli, Bengaluru East Taluk, Bengaluru Urban District on 6th February, 2014.

5. The project proposal has been considered by SEIAA in its meeting held on 18th November, 2014 and the Environmental Clearance is hereby accorded to the said project under the provisions of Environment Impact Assessment Notification, 2006 subject to implementation of the following terms and conditions:-

(A) Specific Conditions:

1. The Project Authorities shall construct 3 lane Service Road for the proposed Peripheral Ring Road on either side of the road which would be helpful to all the inhabitants of 65 villages and the access shall be toll free.
2. Adequate drainage facility should be provided to ensure that road is not flooded during any part of the year. The number of cross drainage works may be increased for free flow of water during floods as the alignment passes through micro drainage areas and flood passage areas.
3. Protecting walls should be constructed along the slopes to prevent the land slides.
4. Noise barriers shall be provided at appropriate locations particularly in the areas where the alignment passes through inhabited areas schools/hospitals, so as to ensure that the noise levels do not exceed the prescribed standards.
5. R&R shall be as per the norms laid down by the concerned agencies.
6. Large quantity of fill materials and blue metal are required for the construction of the road. The location and details of the quarries and borrow pits should be provided to the SEIAA, Karnataka within six months from the date of issue of this letter.
7. The Project Authorities should undertake social improvement measures by training some of the local communities for monitoring/implementing the environmental conditions along the road. The Bengaluru Development Authority, Bengaluru should take up construction of dispensaries and schools at required locations.
8. Footpath should be provided on both sides of the road shoulders for local communities.
9. Accident severity index to be taken into account and accordingly safety measures as per IRC to be included.
10. The Project Authority should undertake plantation along the road to be as per the guidelines laid down by IRC in lieu of the trees cut.
11. The Project Authority should set up facilities for harvesting rainwater. The details of the rainwater harvest system may be provided to this Authority within 3 months from the date of receipt of this letter.
12. Solid waste shall be used for filing the burrow areas and construction of the road.

13. To prevent damage to the agricultural land, the drainage flow should be diverted to the natural course avoiding the agricultural land.
14. The road profile should be raised on the low lying structures to prevent flooding of road.
15. Green belt development may be undertaken as per the Environmental Management Plan.
16. The Project Authority should obtain necessary permission from the competent authorities before drawing water for the purpose of the proposed construction activity. No groundwater should be drawn for the project, if this is essential, permission from the concerned Authority should be taken in this regard.
17. The Project Authorities shall use the tertiary treated water for development of road to the maximum extent possible as per G.O. No. FEE 188 ENV 2003 dated 14th August, 2003.
18. The embankments/slopes and the slopes left after cutting will be provided with vegetative turfing to avoid soil erosion.
19. Detailed plan for use of fly ash in the project may be made and submitted to the Authority. In any case, fly ash utilisation as per provisions under Notification S.O. 763 (E) dated 14.9.1999 as amended vide S.O. 797 (E) dated 27.8.2003 must be adhered to.
20. Longitudinal drains should be provided all along the project road to ensure proper drainage of the area. In addition, adequate number of under passes and culverts to act as cross drainage structures should also be provided.
21. The hot mix plant should be located at least 500 mts away from habitation and on the barren land to avoid its adverse impact on the human population.
22. Necessary permission for tree felling from the concerned department should be obtained before commencement of the project work and copies of the same should be submitted to this Authority and the compensatory avenue plantation shall be undertaken at the rate of 200 trees per km length of road.
23. Recommendation of international conference for the restriction on the use of carcinogens in the process of road making, such as the Benzenes which are likely to cause Leukemia should be strictly complied with and the prescribed safety equipment should be provided to the labourers. Blood examination of labourers should be taken up in the beginning & repeated every 6 months.
24. Walk way should be provided for over bridges.
25. Awareness campaigns on road safety should be got done.
26. In critical areas, especially villages, under pass should be provided.
27. The Project Authorities shall use the forest land if any only after obtaining due clearance for diversion of forest land for non forest purposes from the competent authority following due procedure of law.
28. The Project Authorities shall address all the concerns expressed during the public hearing as committed and report be submitted.

(B) General Conditions:

1. Adequate provision for infrastructure facilities including water supply fuel and sanitation shall be ensured for construction workers during the construction phase of the project in order to avoid any damage to the environment.
2. Appropriate measures shall be taken while undertaking digging activities to avoid any likely degradation of water quality.
3. Borrow sites for earth, quarry sites for road construction material and dump sites shall be identified keeping in view the following:
   (a) No excavation or dumping on private property shall be carried out without written consent of the owner.
   (b) No excavation or dumping shall be allowed on wetlands, forest areas or other ecologically valuable or sensitive locations.
   (c) Excavation work shall be done in consultation with the Soil Conservation and Watershed Development Agencies working in the area; and
   (d) Construction spoils including bituminous material and other hazardous materials shall not be allowed to contaminate water courses and the dump sites for such materials must be secured so that they shall not leach into the ground water.
4. The construction material shall be obtained only from approved quarries. In case new quarries are to be opened, specific approvals from the competent authority shall be obtained in this regard.
5. Adequate precautions shall be taken during transportation of the construction material so that it does not affect the environment adversely.
6. Borrow pits and other scars created during the road construction shall be properly levelled and treated.
7. The project-affected people, if any, shall be adequately rehabilitated and the details in this regard shall be furnished to the Authority, there is resettlement involved.
8. Adequate financial provision must be made in the project to implement the aforesaid safeguards.
9. The Project Authority will set up separate environmental management cell for effective implementation of the stipulated environmental safeguards under the supervision of a Senior Executive.
10. Full support shall be extended to the officers of SEIAA, Karnataka, the APCCF, Regional Office of MoEF at Bengaluru/KSPCB/CPCB/ Department of Ecology and Environment, Government of Karnataka, M.S. Building, Bangaloer - 560 001 by the project proponents during their inspection of the project for monitoring purposes by furnishing full details and action plan including action taken reports in respect of mitigative measures and other environmental protection activities.
11. Half yearly monitoring report shall be submitted to the SEIAA and the APCCF, Regional Office, MoEF, Bengaluru regarding the implementation of the stipulated conditions.

12. The Authority may stipulate any other conditions or environmental safeguards, subsequently, if deemed necessary, which shall be complied with.
13. The Authority reserves the right to revoke this clearance if any of the conditions stipulated are not complied with to the satisfaction of the Authority.
14. In the event of a change in project profile or change in the implementation agency, a fresh reference shall be made to the Authority.
15. The Project Authorities shall inform the SEIAA - Karnataka, the APCCF, Regional Office of MoEF at Bengaluru /KSPCB/CPCB/Department of Ecology and Environment, Government of Karnataka, M.S. Building, Bangaloer-560 001/ the date of financial closure and final approval of the project by the concerned authorities and the date of start of the project.
16. A copy of the clearance letter shall be marked to concerned Panchayat/local NGO, if any, from whom any suggestion/representation has been received while processing the proposal.
17. Safety provision such as bus bays, service roads intersection improvement etc., will be carried out by the project proponent. The project proponent shall provide adequate facilities as per IRC norms/guidelines.
18. Karnataka State Pollution Control Board shall display a copy of the clearance letter at the Regional Office, District Industries Centre and Deputy Commissioners Office/Tehsildar`s officer for 30 days.
19. The Project Authority shall inform the public that the project has been accorded Environmental Clearance by the SEIAA and copies of the clearance letter are available with the KSPCB and may also be seen at Website of the State Environment and Ecology department at http://seiaa.kar.nic.in. This shall be advertised within seven days from the date of issue of the clearance letter, at least in two local newspapers that are widely circulated in the region of which one shall be in the vernacular language of the locality concerned and a copy of the same shall be forwarded to the APCCF, Regional Office of MoEF at Bengaluru/KSPCB/ CPCB/Department of Ecology and Environment, Government of Karnataka, M.S. Building, Bangaloer - 560 001.
20. Any appeal against this Environmental Clearance shall lie with the National Green Tribunal, if preferred, within a period of 30 days as prescribed under Section 16 of the National Green Tribunal Act, 2010.
21. These stipulations would be enforced among others under the provisions of Water (Prevention and Control of Pollution) Act, 1974, the Air (Prevention and Control of Pollution) Act, 1981, the Environment (Protection) Act, 1986, the Public Liability (Insurance) Act, 1991 and EIA Notification 1994 including the amendments and rules made thereafter.
22. The Project Authorities shall display the conditions prominently at appropriate places of the project site on a suitable size board for the information of the public.

23. Concealing factual data or submission of false/fabricated data and failure to comply with any of the conditions mentioned above may result in withdrawal of this clearance and attract action under the provisions of Environmental (Protection) Act, 1986.

Yours faithfully,

(RAMACHANDRA) 20/11/14
Member Secretary,
SEIAA, Karnataka.

Copy to:

1. The Secretary, Ministry of Environment, Forests and Climate Change, Indira Paryavaran Bhavan, Jor Bagh Road, Aliganj, New Delhi - 110 003.
2. The Secretary, Department of Environment and Ecology, Government of Karnataka, Bengaluru.
3. The Member Secretary, Karnataka State Pollution Control Board, Bengaluru.
4. The APCCF, Regional Office, Ministry of Environment & Forests (SZ), Kendriya Sadan, IVth Floor, E & F wings, 17th Main Road, Koramangala II Block, Bengaluru-560 034.
5. Guard File.

RAPID ENVIRONMENTAL IMPACT ASSESSMENT REPORT

(As per MoEF notification S.O.1533 dt.14th September 2006 for obtaining EC)

For
Proposed Peripheral Ring Road project (PRR)
by
Bangalore Development Authority (BDA)

Submitted to
SEAC,
Department of Ecology and Environment
M.S. Building, Bengaluru

Proponent

Bangalore Development Authority,
T. Chowdaiah Road, Kumarapark west,
Bangalore, Karnataka – 560 020

Prepared By

Ramky Enviro Engineers Limited.
Hyderabad
(QCI/NABET Approved - Certificate No. NABET/EIA/1013/016)

October, 2014

Terms of Reference (TOR)

By Speed Post

No. SEIAA 32 IND 2009

STATE LEVEL EXPERT APPRAISAL COMMITTEE, KARNATAKA

Department of Ecology and Environment
M.S. Building, Bangalore
Dated: 18th December 2009.

To,

The Engineer Member,
Bangalore Development Authority,
T. Chowdaiah Road,
Kumarapark West,
Bangalore -560 020.

Sir,

Sub: Development of eight lane peripheral ring road Phase I. The peripheral ring road is the connect Tumkur Road, Bellary Road, Old Madras Road & Hosur Road by Bangalore Development Authority - ToR reg.

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Kindly refer to your letter No. BDA/EM/TA-3/PRR/EIA/T-333 dated 10.09.2009 along with Form-I and proposed ToRs as per the EIA Notification, 2006.

2. The proposal is for development of eight lane peripheral ring road Phase I. The peripheral ring road is the connect Tumkur Road, Bellary Road, Old Madras Road & Hosur Road.

3. The State Expert Appraisal Committee, Karnataka considered the project during its 46th meeting held on 21.11.2009. Based on the consideration of the documents submitted and the presentation made by the project proponent, the Committee prescribed the following Terms of Reference (ToRs) for preparing EIA report for the above mentioned project:

1.0 Executive Summary

The EIA Report should start invariably with an Executive Summary giving a brief account of all the aspects dealt in the EIA study condensed to ten A-4 size pages at the maximum. It should necessarily cover and brief the following chapters of the full EIA report.

- Background information

- Project Description
- Environmental Examination
- Environmental Risk Assessment (ERA) and Disaster Management Plan (DMP)
- Additional Studies
- Project Benefits
- Environmental Management Plan and Post Project Monitoring Program

2.0 Background Information

The chapter on back ground information should include the following aspects:

- Purpose of the project, goals and objectives of the proposed project, Significance of the project both at local and national level
- Relevance of the project in light of the existing development plans of the region
- Background information and overall scenario of the Proposed Activity in the Indian Context
- Profile of the Project Proponent, name and contact address, Implementing Organization, Organizational Chart, project consultants etc.,
- Project coverage, master plan, phasing and scope
- Estimated cost of development of the project, environmental cost, funding agencies, whether governmental or on the basis of BOT etc,
- Resources, manpower, time frame etc., required for project implementation
- Procedures and criteria adopted for selection of the site, alternative sites considered, if any, details of land acquisition involved, rehabilitation of villages/communities if any, proposed methods there of etc.,
- Description of existing National and International Environmental Laws/ Regulations on the proposed Activity with Annexure giving references of such Acts. Overall suitability of the site and the proposed activity in light of the existing Environmental Acts and serious deviations, if any
- Details of regulatory clearances and their status. Any litigation pending against the project proposed site and/ or any direction/ order passed by any court of law against the project, if so, details thereof
- In case of expansion/ modernization of the project, the environmental compliance status for the existing project shall be explained

3.0 Project Description

This chapter shall contain the broader details of the need of the project, basic activities, location, alignment and alternatives examined, implementation schedule. Following are some of the details considered relevant.

- Road alignment plan with the help of satellite imagery (NRSA) of project area of 1:50,000 scale, and surrounding area covering 10 KM radial distance, from project boundary showing the details: (i) Protected Areas notified under the Wild Life (Protection) Act, 1972, (ii) Critically polluted areas as notified by the Central Pollution Control Board from time to time, (iii) Notified Eco-sensitive areas, (iv) Inter-state boundaries.
- Location map on a standard zoning atlas, GIS / Satellite imagery map, site layout and boundary of the project With Latitude and Longitude and survey of India map number village, Taluk, District and State, Elevation above mean sea level - min. and max
- Total area proposed for the project, Nature of terrain (plain, rolling, hilly), details of villages, taluk, districts, latitude and longitude for important locations
- Requirement of natural resources and their sources
- Technologies involved for design, construction, equipment and operation
- *Details of land with all the Survey numbers.*
- *Justification of the project with reference to the Environmental sustainability.*
- *Updated spatial map indication number of village/tank coming in the project area.*

Site Preparation

- If the proposed route is passing through low lying areas, details of fill materials and initial and final levels after filling above MSL
- If the proposed route involves stripping, the details of the area to be stripped, locations, volume and quantity of earth to be removed, type of soil and proposal for utilization of removed top soil with location of dump site to be provided
- If the proposed route involves cutting of earth, the details of area to be cut, depth of cut, locations, soil type, volume and quantity of earth and other materials to be removed with location of dump site to be provided
- If the proposed route involves tunneling, the details of the tunnel and locations of tunneling with geological structural fraction should be provided
- If the proposed route requires cutting of trees, then the information should be provided for number of trees to be cut, their species and whether it also involved any protected or endangered species

4.0 Environmental Examination

This Chapter on environmental examination should include:

- Description of Baseline conditions
- Analysis of potential environmental impacts

- Consideration of alternatives
- Assessment of impacts for different compounds in the environment
- Impacts during different stages of the project
- Development of mitigate measures

Details of the study area both with reference to the boundaries of the area of activity and boundaries of the area to be affected by the proposed activity. In general baseline data of different parameters viz Land, Air Quality, Water, Noise, biological will be collected up to 2 KM from the either side of the center of the site of the proposed project, however these specifications may vary depending upon ecological conditions of the land area around the alignment of the road.

4.1 Land Environment

4.1.1 Baseline

- Data of the proposed land and its availability is to be ascertained from local authorities, revenue records etc. Details of the alternatives considered. Justification of the proposed quantum of the area and alignment
- Description of the existing situation of the land along the alignment. Study of the land use pattern, habitation, cropping pattern, forest area, environmentally sensitive places, notified industrial areas, sand dunes, nature of the terrain (plain, rolling, hilly), river, lake etc. by employing remote sensing techniques (if available) and ground truthing and also through secondary data sources
- Details of villages, survey numbers of the area elevation above mean sea level & latitude and longitude of important locations
- Road factors:(i) Land width available, (ii) Geometrics - Curvature, Gradient, and pavement width etc.(iii) structural condition of road and road structures
- Traffic factors: (I) traffic volume- vehicles per day, (ii) traffic composition (iii) average speed of travel, (iv) time delays at railway crossings, (v) presence of road intersection - nos./km, (vi) access control, (vii) accidents - fatal and injury accidents per year
- Geology: rock types, history of any volcanic activity, seismicity and associated hazards
- Study about the trend of change in land use pattern, if any, with reasons thereof for the last 10 years based on remote sensing technique data and it's extrapolation to next ten years with and without the proposed project
- Soil – soil cover and condition, physical and chemical properties
- *Mobility with respect to land use and land use change.*

4.1.2 Anticipated Impacts

- The road itself – land consumption, removal of vegetation, fragmentation of natural habitat, removal of buildings and severance of form land causes, direct impacts. The most immediate and obvious effect of road development on soil is the elimination of the productive capacity of soil covered by the roads
- Impact of the project construction leading to soil erosion, destabilization of slopes, side- tipping of spoils material, loss of properties, loss of fertile lands and diversion of natural surface water flows are to be studied in detail

4.1.3 Mitigation Measures

- The extent of environmental impacts in construction, operation and post operation is largely determined during planning and route or site selection. Early consultation and determination of alternatives can substantially reduce the potential environmental impacts of these projects
- While selecting new road alignments attention must be paid to avoid areas prone to land slides, soil erosion, fertile agricultural lands, environmental sensitive areas and other damaging features
- Before finalizing the alignment erosion potential of each alternative should be carefully examined and the one involving least disturbance to the natural ground should be preferred
- Balancing filling and cutting requirements through alignment choice to reduce the need for borrow pits and to minimize excess spoil material generation is to be examined
- Drainage improvement requirements to minimize water logging and flooding due to disturbance of the natural drainage pattern are to be examined
- Afforestation plan to compensate for the cutting of the trees during the proposed road construction activity
- Integration with the local area master plans

4.2. Air Environment

- Activities during the construction and the vehicular emissions are likely sources of air emissions. In addition, release of hazardous gases due to explosions/leak from the hazardous chemicals carrying transport trucks on the near by habitation is a matter of concern even though they may be categorized as low probability risk

4.2.1 *Base Line*

- Ambient air quality needs to be assessed at all sensitive locations along the alignment of the project to determine if it falls under the National ambient air quality standards as notified by MoEF. Monitoring of the parameters –SPM, RSPM, Sulphur dioxide, oxides of nitrogen as NO_2, lead, hydrocarbons & carbon monoxide are essential. Care shall be taken while selecting the monitoring locations in order to reflect the ambient air quality such as near by residential area, notified sanctuaries etc
- Estimation of present traffic volume, traffic composition, speed of traffic, different fuel consumption by the vehicles, composition of the fuel and the air emissions on burning of the fuel and for the projected traffic flows
- Annual rainfall, snowfall, maximum and minimum temperatures, wind speed and direction. Frequency of tropical cyclones and associated hazards
- *The air quality at the toll plaza.*

4.2.2 *Anticipated Impacts*

- Anticipated impacts during the construction stage and operation stage should be predicted. The immediate surroundings may have a greater impact. The existing surrounding features such as habitation, hospitals, schools, notified sanctuaries etc. up to 1 Km and impact on them shall be addressed separately
- Impact during construction activities due generation of fugitive dust from crusher units, and air emissions from hot mix plants and vehicles used for transportation of materials
- *Impact of the functional air pollution*

4.2.3 *Mitigation Measures*

Mitigative measures are to be proposed during the construction stage as well as the operation stage of the project for all the identified impacts. Some measures to be listed include:

- -Selecting road alignment, which avoids passing close to housing, schools and work places; providing sufficient capacity to avoid traffic congestion, even with projected increase in traffic flow
- Planting tall leafy and dense vegetation between roads and human settlements to filter pollutants
- Water sprinkling and transporting construction materials with tarpaulin coverage during the construction stage. Purchasing road metal from the crushing units, which are complaining SPCB norms

- Integration with the local government awareness campaign programmes on good practices of vehicle maintenance etc. to reduce the air emissions discharge
- Environmental specifications for contractors should cover the required safeguards during the design and construction stage

4.3. Water Environment

4.3.1. Base line

- Determine the sensitivity of the study zone and identify the main potential impacts, working from basic data on the drainage basin, nature and frequency of flooding, water quality, water use, fauna species and habitats. Assess likely modification of baseline conditions arising from the project.
- Details of lakes, reservoirs with in 2 km of radius of the proposed road site.
- Fix-up the locations of representative monitoring stations along the proposed project road for surface and ground water resources and document them.
- Samples should be collected for both surface and ground water and examined for physico-chemical, heavy metal and bacteriological parameters.
- Delineation of water sheds and water drainage pattern in the study area using remote satellite imageries

4.3.2. Anticipated Impacts

- Impact on surface water flow modification
- Impact on ground water table modification
- Impact on water quality degradation (surface & ground water)
- Impact due to discharge of wastewater generation from the temporary project offices.
- *Impact on hydrological characteristics of the project area.*

4.3.3. Mitigation Measures

Mitigative measures are to be proposed during the construction stage as well as the operation stage of the project for all the identified impacts. Some measures to be listed include:

- Avoiding alignments which are susceptible to erosion, such as those crossing steep slopes
- Minimizing the number of water crossings wherever possible

- Leaving buffer zones of undisturbed vegetation (with increased in proportion to slope) between road sites and bodies of water
- Mitigative measures such as providing adequate drainage modifications, settling basins, paving, infiltration ditches etc. is to be examined
- Environmental specifications for contractors should cover the required safeguards during the design and construction stage
- Adequate sanitation facilities and hygiene at construction workers colony should be provided
- Proper Landscaping on either side of the road shall help to avoid water logging and surface runoffs
- Environmental specifications for contractors should cover the required safeguards during the design and construction stage

4.4. Noise Environment

- Identify project activities during construction and operation phases, which will affect the noise levels and the potential for increased noise resulting from this project. Discuss the effect of noise levels on near by habitation during the construction and operational phases of the project. Identify noise reduction measures and traffic management strategies

4.4.1. Base line

- Select the locations of monitoring stations along the alignment of the project covering sensitive locations such as residential, hospitals, schools, sanctuaries etc. Monitoring should be done for 24 hrs at each location

4.4.2. Anticipated Impacts

- Noise levels may increase during construction activity, due to operation of various machines and equipments
- Noise levels may increase during operation of the proposed project due to increased activities. Prediction of noise levels should be done by using mathematical modeling at different representative monitoring stations
- Impact of vibrations during blasting activity, if any

4.4.3. Mitigation Measures

Mitigative measures are to be proposed during the construction stage as well as the operation stage of the project for all the identified impacts. Some measures to be listed include:

- Development of bypass roads to avoid road alignment through noise sensitive areas
- Adoption of proper surface design and maintenance

- Provision of noise barriers. Specifications for building noise protection devices clearly indicating the location, design and material, and should account for future road maintenance requirements
- Environmental specifications for contractors should cover the required safeguards during the design and construction stage
- Planting tall leafy and dense vegetation between roads and noise sensitive areas
- Integration with the local government and vehicular manufacturers to conduct awareness campaign programmes on good practices of vehicle maintenance etc. to reduce the noise emissions

4.5. Biological Environment

- Conduct an inventory, map and describe the existing terrestrial, wetland and aquatic vegetation. Include any rare vascular and non-vascular plant species and rare plant communities in the study areas. Describe and assess potential impacts of the project construction and operation on vegetation (abundance, diversity, health, rare species and rare plant communities) in the study areas. Describe and discuss measures to be implemented to mitigate and monitor potential impacts of the project

4.5.1 Base line

- Assessment of plant species with respect to dominance, density, frequency, abundance, density index, importance value index.
- Quantitative estimation of forest and non-forest flora
- Assessment of fauna and avid- fauna indicating endangered and endemic species with respect to schedule of the wild life protection act
- Location of national parks, sanctuary and wildlife migratory routes with in 15 km radius of proposed project
- Information on dependence of local people on minor forest products
- Photographs showing the vegetation in the area
- Biodiversity- terrestrial and aquatic

4.5.2 Anticipated Impacts

- A road project may have impacts on the ecology of the area directly or indirectly by causing
- Loss of wildlife habitat and biodiversity due to change in land use
- Fragmentation of wildlife habitat and territories
- Changes in water quality, soil profile, noise, light and air pollution, which may affect the nature and character of habitats

- Pressure on habitats wildlife as a result of increased access provided by roads
- Loss of forest resources, economically important plants, medicinal plants and threat to rare, endemic and endangered species

4.5.3 Mitigation Measures

Mitigative measures are to be proposed during the construction stage as well as the operation stage of the project for all the identified impacts. Some measures to be listed include:

- Identification of sensitive natural environments in the early planning stage so that alternative routes, changes in width of the road can be examined
- Possibility of twin new road corridors with previously established transport rights-of-way, such as railway lines
- Provision of animal crossings in identified areas
- Compensate the loss of forest coverage by appropriate plantation programme
- Development of green belt along the alignment
- Regeneration of rare plants of economic importance including medicinal plants and wildlife species
- Conservation plan for conservation and protection of flora and fauna, wildlife migratory species and medicinal plants
- Institutional arrangements for implementation and monitoring of various mitigating measures
- Environmental specifications for contractors should cover management of work forces (control of poaching and fire wood collection), machinery (speed, noise, and traffic), and prevention of erosion and contamination during construction

4.6. Socio Economic And Health Environment

- Proper planning calls for recognition that road projects can lead to modifications in the community environment surrounding the road, influencing various aspects of lifestyles, travel patterns and socio as well as economic activities.

4.6.1 Baseline

- Details of the properties, houses, businesses etc. activities likely to be effected by land acquisition and their financial loses annually. Applicable R & R rules and regulations
- Data on notified settlements and applicable legislations, if any

- Identification and prioritization of historical and archeological sites
- Accident data and diseases in the locality and existing health care facilities
- Data on demography including traditional skills and sources of livelihood along the proposed site
- Data relating to historically, culturally, archeologically and ecologically important places in the study area
- Socio-economic profile of the people on both sides of the boundaries of the proposed site

4.6.2 Anticipated Impacts

- Analysis of positive and negative impacts on the present status of livelihood
- Displacement of human settlement from proposed site. Impact on livelihood and loss of properties
- Impact on community resources
- Impact on historical and archeological sites
- Impact on the existing travel parts due to faster traffic, access controls and median barriers
- Increase in road accidents
- Impact due to the gentrification effect
- Impact due to accelerated urbanization

4.6.3 Mitigation Measures

- Rehabilitation plan for land outees, homestead outees, and for displaced persons. Institutional arrangement for effective implementation be assessed, if necessary, strengthened
- Criteria and method of Calculation of compensation for loss of land and crops. Proper counseling for guiding systematic financial planning with the compensation package
- Training to local people for employing them in the proposed project
- Employment opportunity and access to other amenities such as primary education and health care facilities for local people
- Integration with the local master plan for the accelerated urbanization
- Road safety management plan, especially the road passes through the developed area
- Institutional arrangements for road safety and to deal the road accidents are assessed, if necessary, strengthened
- Stipulation of environmental specifications for contractors

4.7. Solid Waste Disposal

- Waste generated during construction may impact soil, agriculture and water quality.
- Waste generated from workers' camps may impact surface and ground water quality and agriculture.
- Oil spillage/ leakage from machines and vehicles may contaminate earth
- Proper environmental specifications to be stipulated in the contacts.

5.0. Additional Studies

- Feasibility of utilizing construction materials such as fly ash to comply fly ash notification issued under EP Act, 1986
- Specific studies requirement depending up on the site and activity proposed shall be discussed
- Public consultation (during EIA as well as public hearing) with the issues raised by the public and the response of the project proponent in the tabular form

6.0. Environment Management Plan (EMP) & Post Project Monitoring Programme

- Administrative and technical set up for the management of environment
- Summary matrix of EMP and costing of EMP, during construction and operation stage
- Summary matrix of Environmental monitoring, during construction and operation stage
- Institutional arrangements proposed with other organizations/Govt. authorities for effective implementation of environmental measures proposed in the EIA
- Safeguards/mechanism to continue the assumptions/field conditions made in the EIA, for arriving the site suitability
- *Specific Social Commitment plan with name of the place/work, budget allocation and time frame.*

The ToRs prescribed by the State Expert Appraisal Committee, Karnataka should be considered for the preparation of EIA / EMP report for the above mentioned project in addition to all the relevant information as per the Generic Structure of EIA given in Appendix III and IIIA in the EIA Notification, 2006. On finalization of EIA/ EMP prepared as per ToRs and addressing and incorporating all concerns raised during public hearing / public consultation, the same should be submitted to the SEAC for prior environmental clearance.

Yours faithfully

(G. Selva Kumar, I.F.S)
Secretary,
SEAC.

Copy to:-

1. The Secretary, Department of Ecology and Environment, Govt. of Karnataka, Bangalore
2. Chairman, Karnataka State Pollution Control Board, KSPCB, Parisar Bhavan, 4th & 5th Floor, church street it is requested that the public hearing/consultation of the above project may be conducted within stipulated period in accordance to the procedure laid in the EIA notification, 2006
3. Guard File.

Terms of Reference (TOR) Compliance

Terms of Reference (TOR) Compliance as per
State Level Expert Appraisal Committee Karnataka, No. SEIAA 32 IND 2009

TOR Point No.	Description of Terms of Reference	Compliance Status
1.0	**Executive Summary** • Background information • Project Description • Environmental Examination • Environmental Risk Assessment (ERA) and Disaster Management Plan (DMP) • Additional Studies • Project Benefits • Environmental Management Plan and Post Project Monitoring Program	The Executive Summary containing background information, project description, environmental examination, additional studies, project benefits, environmental management plan is given in beginning of the report.
2.0	Purpose of the project, goals and objectives of the proposed project, significance of the project both at local and national level.	The main goal and objective of the project is for smooth flow of traffic, to reduce the traffic congestion, pollution intensity and travel time, there is a need to augment the road network system by diverting the intracity traffic through a ring road beyond the existing Outer Ring Road (ORR) with “Peripheral Ring Road (PRR)”.
	Relevance of the project in light of the existing development plans of the region.	The proposed PRR is going to circumnavigate the city linking the major highways – Tumkur, Mysore, Old Madras, Hosur and district roads, thereby creating a direct corridor passage round the city. Most of the intra-city heavy trucks would prefer this corridor instead of the Outer Ring Road (ORR).

	Background information and overall scenario of the proposed activity in the Indian Context	The Bangalore Development Authority (BDA) has proposed to develop an 8 Lane Peripheral Ring Road (Phase - I). The project envisages formation of 65 km long Peripheral Ring Road (PRR) consisting of 8 lanes starting from Tumkur (Chainage 0.0 km) Road and ending at Hosur Road (Near Begur at Chainage 64.65 km) connecting Balavakere, Hesarghatta, Yelahanka, Bettahalasuru, Thanisandra, Bhagaluru, Avalahalli, Sadaramangala, Whitefield, Varthur, Dhommasndra and Electronic City.
	Profile of the Project Proponent, name and contact address, Implementing Organization, Organizational Chart, project consultants etc.,	Bangalore Development Authority, T. Chowdaiah Road, Kumarapark west, Bangalore, Karnataka – 560 020
	Estimated cost of development of the project, environmental cost, funding agencies whether governmental or on the basis of BOT etc,	Total cost of the project is Rs. 930 crores and **Chapter 10**; **Section 10.3** describes the environmental cost of the project. It is a governmental project proposed by Bangalore Development Authority.
	Resources, manpower, time frame etc., required for project implementation	**Chapter 2, Section 2.6 to 2.9** describes about the resources and the manpower required during the construction phase for project implementation.
	Procedures and criteria adopted for selection of the site, alternative sites considered, if any, details of land acquisition involved, rehabilitation of Villages/communities if any, proposed methods there of etc.,	**Chapter 2**, **Section 2.2** describes the terrain and topography of the alignment, **Tables 2.2**, **2.2a & 2.2b** describes the land acquisition involved, rehabilitation of Villages/communities.

	Description of existing National and International Environmental Laws/ Regulations on the proposed Activity with Annexure giving references of such Acts. Overall suitability of the site and the proposed activity in light of the existing Environmental Acts and serious deviations, if any.	**Chapter 1**, **Section 1.10** describes all the applicable environmental regulations relevant to this project.
	Details of regulatory clearances and their status. Any litigation pending against the project proposed site and/ or any direction / order passed by any court of law against the project, if so, details thereof	**Chapter 1**, **Section 1.10** presents a table with all the Environmental Permits / Approvals required for the project.
	In case of expansion/ modernization of the project, the environmental compliance status for the existing project shall be explained	Not applicable
3.0	**Project Description** Road alignment plan with the help of satellite imagery (NRSA) of project area of 1:50,000 scale, and surrounding area covering 10 KM radial distance, from project boundary showing the details: (i) Protected Areas notified under the Wild Life (Protection) Act, 1972 (ii) Critically polluted areas as notified by Central Pollution Control Board from time to time, (iii) Notified Eco-sensitive areas, (iv) Inter-state boundaries.	The road alignment plan with the help of satellite imagery (NRSA) of project area and 10km buffer is given in **Chapter 7, Figure 7.1,** There are no Protected Areas notified under the Wild Life (Protection) Act, 1972, Critically polluted areas as notified by Central Pollution Control Board from time to time, Notified Eco-sensitive areas, Inter-state boundaries. There is an forest area (Jarakabande kaval , Yelahanka village (763m length) in survey no 59.
	Location map on a standard zoning atlas, GIS / Satellite imagery map, site layout and boundary of the project with Latitude and Longitude and survey of India map number village, Taluk, District and State, Elevation above mean sea level – min. and max	The location map of the project area is given in **Chapter 2**, **Figure 2.2** Longitude 77^0 35' up to 77^0 40' East and Latitude 12^0 58' up to 12^0 50' North. PRR start - Tumkur Road at CH.Km 0.00 on NH4 & terminates at Hosur road near Begur CH.64.65 Km (65 Km)

	Total area proposed for the project, Nature of terrain (plain, rolling, hilly), details of villages, taluk, districts, latitude and longitude for important locations	**Chapter 2**, **Section 2.2** describes the terrain and topography of the project area. **Table 2.2** describes the details of all the villages / settlements / habitations from which the PRR is passing through.
	Requirement of natural resources and their sources	**Chapter 2**, **Section 2.6** - **2.9** describes the resources requirement.
	Technologies involve for design, construction, equipment and operation	**Chapter 2**, **Section 2.5** describes the design considerations of the project.
	Details of land with all the Survey numbers	**Chapter 2**, **Table 2.3** describes about the salient features of the PRR.
	Justification of the project with reference to the Environmental sustainability	The development of the proposed project will decongest the traffic on existing roads, reduces the pollution intensity, and saves time of travel, usage of fuel.
	Updated spatial map indication number of village/tank coming in the project area.	The details of all the villages / settlements / habitations from which the PRR is passing through is given in **Chapter 3, Table 2.3,** the landuse and land cover map is given in **Chapter 7, Figure 7.2**.
	Site preparation: If the proposed route is passing through low lying areas, details of fill materials and initial and final levels after filling above MSL.	In 65 km length of the proposed project around 69 cross drainage structures are provided, and the fill material required for maintaining level of the road will be taken from nearby sources (quarries).
	If the proposed route involves stripping, the details of the area to be stripped, locations, volume and quantity of earth to be removed, type of soil and proposal for utilization of removed top soil with location of dumpsite to be provided	The proposed project route is nearly flat with few undulations. Based on site observations, approximately 50-60% of the land requires grading. The road formation level will be so decided to optimally balance the cutting and filling of the earth. Based on the topographic survey, plateau / terrace concept of site grading would be used to reduce the
	If the proposed route involves cutting of earth, the details of area to be cut,	

	depth of cut, locations, soil type, volume and quantity of earth and other materials to be removed with location of dumpsite to be provided	requirement of earth getting from nearby sources.
	If the proposed route involves tunneling, the details of the tunnel and locations of tunneling with geological structural fraction should be provided	The proposed route does not involve any tunneling.
	If the proposed route requires cutting of trees, then the information should be provided for number of trees to be cut, their species and whether it also involved any protected or endangered species	The summary of the trees in the proposed route which requires to be cut are given in **Chapter 2, Table 2.2(C)**.
4.0	**Environmental Examination** • Description of Baseline conditions • Analysis of potential environmental impacts • Consideration of alternatives • Assessment of impacts for different compounds in the environment • Impacts during different stages of the project • Development of mitigate measures	Baseline environmental conditions in and around the proposed project are given in **Chapter 3** under **sections 3.3 to 3.8.** No alternatives were considered for this project. Assessment of impacts during different states of project and mitigate measures were described in **Chapter 4** under **sections 4.1 to 4.10**.
	4.1 Land Environment **4.1.1 Baseline** • Data of the proposed land and its availability is to be ascertained from local authorities, revenue records etc. Details of the alternatives considered. Justification of the proposed quantum of the area and alignment • Description of the existing situation of the land along the	Details of the proposed land and its availability are described in **Chapter 2** under **sections 2.3.1 to 2.3.3**. Land use/ land cover details up to 10km buffer zone on either side of the

	alignment. Study of the land use pattern, habitation, cropping pattern, forest area, environmentally sensitive places, notified industrial area, sand dunes, nature of the terrain (plain, rolling, hilly), river, lake etc. by employing remote sensing techniques (if available) and ground truthing and also through secondary data sources	proposed road had been discussed in **Chapter 7** under **Sections 7.2.3.1 to 7.2.3.6 and Figure 7.2** **Table 7.1** Land Use / Land Cover Statistics of 10km buffer zone. The pie diagrams of 10km buffer zone and 2km buffer zone are shown in **Figure 7.3 & 7.4**.
	• Details of villages, survey numbers of the area elevation above mean sea level & latitude and longitude of important locations	Details of villages are described in **Chapter 2** under **Tables 2.1 & 2.2** and Salient features of Peripheral Ring Road are described in **Table 2.3.**
	• Road factors: (i) Land width available, (ii) Geometrics – Curvature, Gradient, and pavement width etc. (iii) structural condition of road and road structures	Details of design consideration are described in **Chapter 2** under **Section 2.5.**
	• Traffic factors: (i) traffic volume – vehicles per day, (ii) traffic composition, (iii) average speed of travel, (iv) time delays at railway crossings, (v) presence of road intersection – no's / km, (vi) access control, (vii) accidents – fatal and injury accidents per year	Proposed peripheral ring road (phase 1) to circumnavigate the Bangalore city by connecting 4 National highways, 6 State highways having 5 railway crossings.
	• Geology : rock types, history of any volcanic activity, seismicity and associated hazards	The Bangalore district and the surrounding areas which fall within the project area are entirely underlain by Precambrain granite and gneiss of the Indian Precambrain Shield and which are part of the Peninsular granite complex. Migmatite and gneiss are dominant, minor areas of chamokite occur in the far south western part of
	• Study about the trend of change in land use pattern, if any, with reasons thereof for the last 10 years based on	

	remote sensing technique data and it's extrapolation to next ten years with and without the proposed project • Soil – soil cover and condition, physical and chemical properties • Mobility with respect to land use and land use change.	the district, and there are some small elongated bodies of amphibolite and schist aligned along a north south trend through the central part. As per BIS Seismic hazard map of 2000, the Bangalore city lie in Zone II (**Annexure 1**). Soil conditions were described in **Chapter 3** under **Section 3.9** and **Table 3.14** describes the Soil properties.
	4.1.2. Anticipated Impacts • The road itself – land consumption, removal of vegetation, fragmentation of natural habitat, removal of buildings and severance of form land causes, direct impacts. The most immediate and obvious effect of road development on soil is the elimination of the productive capacity of soil covered by the roads • Impact of the project construction leading to soil erosion, destabilization of slopes, side-tipping of spoils material, loss of properties, loss of fertile lands and diversion of natural surface water flows are to be studied in detail	The top soil removed from the road construction path will be used for development of greenbelt**,** the impact on top soil is discussed in **Chapter 4**, **Section 4.5.1**. To reduce the soil erosion turfing of road embankment slopes with herbs, shrubs and grasses will be taken up at necessary places, the impact and mitigation measures on soil erosion are discussed in **Chapter 4**, **Section 4.5.2**.
	4.1.3 Mitigation Measures • The extent of environmental impacts in construction, operation and post operation is largely determined during planning and route or site	Two corridors were selected for alternative studies and the best one was ultimately chosen considering adequate care for the requisite factors like terrain conditions, general

	selection. Early consultation and determination of alternatives can substantially reduce the potential environmental impacts of these projects • While selecting new road alignments attention must be paid to avoid areas prone to land slide, soil erosion, fertile agricultural lands, environmental sensitive areas and other damaging features • Before finalizing the alignment erosion potential of each alternative should be carefully examined and the one involving least disturbance to the natural ground should be preferred • Balancing filling and cutting requirements through alignment choice to reduce the need for borrow pits and to minimize excess spoil material generation is to be examined • Drainage improvement requirements to minimize water logging and flooding due to disturbance of the natural drainage pattern are to be examined • Afforestation plan to compensate for the cutting of the trees during the proposed road construction activity • Integration with the local area master plans	hydrological conditions, geographical aspects, land use / land cover pattern, environmental issues, etc by keeping the following considerations. • To keep the road short, safe with regards to maneuverability. • To avoid obligatory land use like dense settlement, industrial and religious area. • To optimally utilize existing major roads. • To follow topography and to avoid steep, uneven terrain. • To keep no. of curves, drains, cutting / filling at minimum. • To safeguard potential agriculture, plantation and forest area. • To suit further development The road formation level will be so decided to optimally balance the cutting and filling of the earth. Based on the topographic survey, plateau / terrace concept of site grading would be used to reduce the requirement of earth getting from nearby sources To minimize water logging and flooding and maintain natural drainage, cross drainage structures are provided at 69 locations. Afforestation plan will taken along the road corridor by planting trees, and minimum of three plants will be planted against each plant uprooted along the path of the road Impacts and mitigation measures on environment during construction and operational phase are given in **Chapter 4**.

	4.2 Air Environment **4.2.1 Baseline** • Ambient air quality needs to be assessed at all sensitive locations along the alignment of the project to determine if it falls under the National ambient air quality standards as notified by MoEF. Monitoring of the parameters – SPM, RSPM, Sulphur dioxide, oxides of nitrogen as NO_2, lead, hydrocarbons & carbon monoxide are essential. Care shall be taken while selecting the monitoring locations in order to reflect the ambient air quality such as nearby residential area, notified sanctuaries etc • Estimation of present traffic volume, traffic composition, speed of traffic, different fuel consumption by the vehicles, composition of the fuel and the air emissions on burning of the fuel and for the projected traffic flows	Ambient Air Quality Monitoring (AAQM) stations were set up at ten locations as indicated in **Table 3.5** and a summary of monitoring parameters for each location is presented in **Table 3.6.** The estimated traffic on the proposed Peripheral Ring Road (PRR) from the existing arterial roads is given in **Chapter 4 Table 4.4.** Due to growth oriented policies of Government, there is significant economic growth and the impact on road traffic on National Highways is of the order 10 to 12% each year, while on State Highways, it is 12 to 15%. The general assumption of 7.5% in traffic growth, city's roads need widening, strengthening to match the current and future traffic demands, besides, new roads are to be built to improve accessibility, reduce travel time and decongest the existing roads. The air emissions for the projected traffic flow considering 5% growth in the traffic in a decade (as most of the traffic gets diverted to proposed project) are presented in **Tables 4.5 and 4.6** respectively. Metrological conditions are described in

	• Annual rainfall, snowfall, maximum and minimum temperatures, wind speed and direction. Frequency of tropical cyclones and associated hazards • The air quality at the toll plaza.	**Chapter 3** under **sections 3.3 & 3.4**. Wind data is presented in **Tables 3.1 to 3.4.** Ambient air quality in the study area are given in **Chapter 3, Table 3.6**.
	4.2.2 Anticipated Impacts • Anticipated impacts during the construction stage and operation stage should be predicted. The immediate surroundings may have a greater impact. The existing surrounding features such as habitation, hospitals, schools, notified sanctuaries etc. up to 1 Km and impact on them shall be addressed separately • Impact during construction activities due generation of fugitive dust from crusher using and air emissions from hot mix plants and vehicles used for transportation of materials • Impact of the functional air pollution	The major impacts due to proposed project on Air Environment are due to the particulate matter on the immediate surrounding during construction phase, the impacts will be on existing habitations, they are discussed in **Chapter 4** under **section 4.7.** Necessary air pollution control measures will be taken up to minimize the impacts from crusher and hot mix plants.
	4.2.3 Mitigation Measures • Selecting road alignments which avoids passing close to housing, schools and work places; providing sufficient capacity to avoid traffic congestion, even with projected increase in traffic flow	Special attention should be given in the sections where the alignment passes through sensitive areas such as schools, hospitals and urban areas. As soon as construction is over the surplus earth should be utilised to fill up low-lying areas. In no case, loose earth should be allowed to pile up along the alignment. Vehicles delivering material should be

	• Planting tall leafy and dense vegetation between roads and human settlements to filter pollutants • Water sprinkling and transporting construction materials with tarpaulin coverage during the construction stage. Purchasing road metal from the crushing units, which are complaining SPCB norms • Integration with the local government awareness campaign programmes on good practices of vehicle maintenance etc. to reduce the air emissions discharge • Environment specifications for contractors should cover the required safeguards during the design and construction stage	covered. Plantation will be taken up by planting tall leafy and dense vegetation between roads and human settlements to filter pollutants as suggested by CPCB (**Annexure 2**). Sprinkling of water will be carried out twice a day on a regular basis during the entire construction period; all vehicles carrying construction material will be instructed to use tarpaulin cover to minimize the dust pollution. All vehicle carrying construction material will be asked to carry pollution under control certificate for vehicle, regular awareness programs will be organized under CSR activities on good practices of vehicle maintenance, etc., All contractors engaged will be briefed in the starting about existing environmental guidelines and the rules and regulations to be followed to meet the guidelines.
	4.3 Water Environment **4.3.1 Baseline** • Determine the sensitivity of the study zone and identify the main potential impacts, working from basic data on the drainage basin, nature and frequency of flooding, water quality, water use, fauna species and habitats. Assess likely modification of baseline conditions arising from the project. • Details of lakes, reservoirs	**Chapter 3,** a **section 3.7 & 3.8** describes the surface water quality and ground water quality of the project corridor respectively. **Section 3.11.3** describes the fauna in the study area and **Table 3.16** presents the fauna details. **Chapter 3, Table 3.9** presents the

	within 2 km of radius of the proposed road site • Fix up the locations of representative monitoring stations along the proposed project road for surface and ground water resources and document them • Samples should be collected for both surface and ground water and examined for physico-chemical, heavy metal and bacteriological parameters. • Delineation of water sheds and water drainage pattern in the study area using remote satellite imageries	major surface water bodies along the project corridor. **Chapter 3, Tables 3.9 & 3.11** presents the surface water and ground water monitoring locations respectively. **Chapter 3, Tables 3.10 & 3.12** demonstrates the water quality analysis for surface and ground water bodies respectively. Landuse & land cover map of the 10 km buffer zone is given in **Chapter 7, Figure 7.2**.
	4.3.2 Anticipated Impacts • Impact on surface water flow modification • Impact on ground water table modification • Impact on water quality degradation (surface & ground water) • Impact due to discharge of wastewater generation from the temporary project offices • Impact on hydrological characteristics of the project area	Impacts on surface flow modifications are described in **Chapter 4, Section 4.6.1**. As the proposed project does not require any major amount of water during operation period, hence the impacts on water table and water quality will be very little. The wastewater from the temporary project offices will be treated in septic tank / soak pit or portable STP. The hydrological characteristics of the project area are discussed in **Chapter 7, Section 7.4.**
	4.3.3 Mitigation Measures • Avoiding alignments which are susceptible to erosion, such as those crossing steep slopes • Minimizing the number of water	Most of the stretch has ruling gradient except between Bannerghatta and Kanakapura road, where deep cut and fill is to be done (falls in Phase II) Except natural streams there are no

	crossings wherever possible • Leaving buffer zones of undisturbed vegetation (with increased in proportion to slope) between road sites and bodies of water • Environmental specifications for contractors should cover the required safeguards during the design and construction stage • Adequate sanitation facilities and hygiene at construction workers colony should be provided. • Proper landscaping on either side of the road shall help to avoid water logging and surface runoffs.	major rivers in phase 1. Undisturbed buffer zones will be left between road and bodies of water where ever possible. All contractors engaged will be briefed in the starting about existing environmental guidelines and the rules and regulations to be followed to meet the guidelines. Construction laborers' camps shall be located away from the habitation and from major water bodies. Adequate sanitary facilities, drainage, washing and toilet facilities with septic tanks and refuse collection and disposal should be provided to the workers. The provision of water supply and toilet facilities should be made as per the stipulated guidelines in the Indian Labour Act. Plantation and landscaping will be done on either side of the road to avoid water logging and surface runoffs.
	4.4 Noise Environment **4.4.1 Baseline** • Select the location of monitoring stations along the alignment of the project covering sensitive locations such as residential, hospitals, schools, sanctuaries etc. Monitoring should be done for 24 hrs at each location	The noise monitoring locations details along the alignment are given in **Chapter 3, Table 3.7**. Noise levels at all the monitoring stations are presented in **Table 3.8**.
	4.4.2 Anticipated Impacts • Noise levels may increase during construction activity, due to operations of various machines and equipments	**Chapter 4, Section 4.8** describes the impacts on noise levels.

	• Noise levels may increase during operation of the proposed project due to increased activities. Prediction of noise levels should be done by using mathematical modeling at different representative monitoring stations • Impact of vibrations during blasting activity, if any	Predicted noise levels with barrier and without barrier are presented in **Chapter 4 Table 4.9 & 4.10.** Not applicable for this project.
	4.4.3 Mitigation Measures • Development of bypass roads to avoid road alignment through noise sensitive areas • Adoption of proper surface design and maintenance • Provision of noise barriers. Specifications for building noise protection devices clearly indicating the location, design and material, and should account for future road maintenance requirements • Environmental specifications for contractors should cover the required safeguards during the design and construction stage • Planning tall leafy and dense vegetation between roads and noise sensitive areas • Integration with the local government and vehicular manufactures to conduct awareness campaign programmes on good practices of vehicle maintenance etc. to reduce the noise emissions	While selecting the corridor following considerations were considered Avoided dense settlements, industrial & religious areas, steep slopes, uneven trains, etc. Noise generating equipment will be placed away from (500m) settlements, operated during day time only, noise barriers will be provided near sensitive areas like dispensaries, religious places and schools, Contractors will be advised to use the BIS certified machinery meeting CPCB guidelines for noise generation. Tall leafy and dense vegetation will be taken up between roads and noise sensitive areas to minimize the noise impacts. During construction period regular awareness programs will be organized under CSR activities on good practices of vehicle maintenance, etc. with integration of local government officials and vehicular manufactures.

	4.5 Biological Environment **4.5.1 Baseline** • Assessment of plant species with respect to dominance, density, frequency, abundance, density index, importance value index. • Quantitative estimation of forest and non- forest flora • Assessment of fauna and avid-fauna indicating endangered and endemic species with respect to schedule of the wild life protection act • Location of rational parks, sanctuary and wildlife migratory routes with in 15km radius of proposed project • Information on dependence of local people on minor forest products • Photographs showing the vegetation in the area • Biodiversity – terrestrial and aquatic	The details of flora and fauna are covered in **Chapter 3 Section 3.10**. The proposed project is not passing though any rational parks, sanctuary and wildlife migratory routes. The project is not passing through any major forest area except a stretch of 763m of Jarakabande kaval Forest in Yelahanka, hence there are no minor forest projects which local people are dependent. Photographs of the proposed project are given in **Annexure 3**

	4.5.2 Anticipated Impacts • A road project may have impacts on the ecology of the area directly or indirectly by causing • Loss of wildlife habitat and biodiversity due to change in land use • Fragmentation of wildlife habitat and territories • Charges in water quality, soil profile, noise, light and air pollution which may affect the nature and character of habitats • Pressure on habitats wildlife as a result of increased access provided by roads • Loss of forest resources, economically important plants, medicinal plants and threat to rare, endemic and endangered species.	Impact on ecology of the area will be minimum since most of the trees are of common occurrence. Loss of trees will lead to Increase in soil erosion, loss of shade and other benefits of trees, and decline in air quality. The impacts on wildlife habitat will be bare minimum as the project is around Bangalore city. Fragmentation of wildlife habitat and territories will be bare minimum as the project is around Bangalore city. Charges in water quality, soil profile, noise, light and air pollution which may affect the nature & character of habitats will be minimum as project is around Bangalore city. No major wildlife habitats are disturbed, and several places cross drainage structures and minor bridges are proposed which can be used by wildlife movement. Around 519 plants are felled for the project; the minimum of three times the number of felled plant will be replanted in the nearby areas.
	4.5.3 Mitigation Measures • Identification of sensitive natural environments in the early planning stage so that alternative routes, changes in width of the road can be examined • Possibility of twin new road corridors with previously established transport rights-of-way, such as railway lines	Two corridors were identified; the one which is list environmental sensitive one is selected by avoiding dense settlement, potential agriculture, and plantation and forest areas. Animal crossings will be provided at

	• Provision of animal crossings in identified areas • Compensate the loss of forest coverage by appropriate plantation programme • Development of green belt along the alignment • Regeneration of rare plants of economic importance including medical plants and wildlife species • Conservation plan for conservation and protection of flora and fauna, wildlife migratory species and medicinal plants • Institutional arrangements for implementation and monitoring of various mitigation measures • Environmental specifications for contractors should cover management of work forces (control of poaching and fire wood collection), machinery (speed, noise and traffic) and prevention of erosion and contamination during construction	identified areas of animals movements Trees shall be transplanted wherever possible to minimize the impacts of loss of trees. Areas of tree plantation cleared will be replaced according to Compensatory Afforestation Policy under Forest Conservation Act-1980. A greenbelt will be developed on both sides of the road alignment. Under CSR activities under coordination with forest officials regeneration of rare plants of economic importance including medial plants will be taken up on conservation and protection of flora and fauna Necessary budget will be allotted annually for implementation and monitoring of various mitigation measures. Contractors will be about environmental conservation measures especially about control of poaching, fire wood collection, control of speed, noise and traffic of vehicles, etc., at the time of allotting contracts of the works.
	4.6 Socio Economic and Health Environment **4.6.1 Baseline** • Details of the properties, houses, businesses etc. activities likely to be effected by land acquisition and their financial loses annually.	Except bits in conurbation areas, the alignment runs in semiurban and rural areas. It runs in cropland predominantly (60%) and less extent in Agriculture plantation (17%), commercial plantation (16%). Land acquisition will be as per prevailing government R&R rules.

	Applicable R&R rules and regulations • Data on notified settlements and applicable legislations, if any • Identification and prioritization of historical and archeological sites • Accident data and diseases in the locality and existing health care facilities • Data on demography including traditional skills and source of livelihood along the proposed site • Data relating to historically, culturally, archeologically and ecologically important places in the study area • Socio- economic profile of the people on both sides of the boundaries of the proposed site	No historical and archeological sites are acquired for the proposed project. The most common diseases are Dysentary, Diarrhea and Asthma in the study area, the medical facilities available in the study area are given in **Chapter 3, Table 3.22**. The demography of study area is given in **Chapter 3, Table 3.17 to 3.20**. The major study area falls in Bangalore North Taluk, Bangalore district. Bangalore district is is the most advanced district in Karnataka. It had a population of 6,537,124 of which 88.11% is urban as of 2001. As of Census 2011, its population has increased to 9,588,910, with a sex-ratio of 908 females/males, the lowest in the state and its density is 4,378 people per square km.
	4.6.2 Anticipated Impacts • Analysis of positive and negative impacts on the present status of livelihood • Displacement of human settlement from proposed site. Impact on livelihood and loss of	The PRR alignment runs in 45% built up and is at some places lesser than 1 Km. from the existing ORR. The main objectives is to run the PRR alignment with least disturbance to the built up (residential / commercial / industrial) and at the same time giving maximum functional use for heavy volumes of motor traffic at high speeds. Around 639 properties will be acquired from private commercial (130), private residential (502) and others like

	properties	temples, chruches, etc. (7), and one government property will be acquired, necessary compensation as per existing R&R scheme will be paid.
	• Impact on community resources • Impact on historical and archeological sites	All necessary control measures will be taken up to minimize the impacts on community resources, no historical and archeological sites are nearby the proposed project site.
	• Impact on the existing travel parts due to faster traffic, access controls and median barriers	Service roads are provided for slow traffic and village traffic all along the proposed project, several under and above passes are proposed for convenience of local villagers.
	• Increase in road accidents	To minimize the road accidents, caution boards will be provided at strategic places, curves, etc. speed restrictions will be kept on lanes.
	• Impact due to the gentrification effect • Impact due to accelerated urbanization	To minimize the impacts of the proposed road on nearby habitats, greenbelt will developed, noise barriers will be erected at sensitive areas.
	4.6.3 Mitigation Measures	
	• Rehabilitation plan for land outees, homestead outees and for displaced persons. Institutional arrangement for effective implementation be assessed, if necessary strengthened	All acquired properties owners will be adequately compensated with existing R&R policy.
	• Criteria and method of calculation of compensation for loss of land and crops. Proper counseling for guiding systematic financial planning with the compensate on package	Method of calculation of compensation will be based on the type of property land, construction, commercial value, etc..
	• Training local people for	Training will be provided to local people for employing them in the proposed

	employing them in the proposed project • Employment opportunity and access to other amenities such as primary education and health care facilities for local people • Integration with the local master plan or the accelerated urbanization • Road safety management plan, especially the road passes through the developed area • Institutional arrangements for road safety and to deal the road accidents are assessed, if necessary strengthened • Stipulation of environmental specifications for contractors	project. Under CSR activities of the BDA primary education, health care facilities of the local villages will be taken up. CSR activities will be taken up by integrating with local admiration setup. Road safety management plan will be part of the project all along the road to avoid road accidents. Cause of Road accidents will be studies and if required Institutional arrangements will be strengthened to minimize the accidents. Contractors will be informed about the environmental specifications to be followed for meeting the standard prescribed.
	4.7 Solid Waste Disposal • Waste generated during construction may impact soil, agriculture and water quality • Waste generated from workers camps may impact surface and ground water quality and agriculture • Oil spillage/ leakage from machines and vehicles may contaminate earth • Proper environmental specifications to be stipulated in the contacts	The construction waste will be segregated and disposed for land leveling operations in low elevation areas. Waste generated from workers camps will be collected and disposed in nearby municipal waste bins. Oil spillage / leakage from machines will be attended immediately, in case contaminations, the contaminated soil will be disposed to local authorities for further treatment. Contractors will be informed about the environmental specifications to be followed for meeting the standard prescribed.

5.0	**Additional Studies** • Feasibility of utilizing construction materials such as fly ash to comply fly ash notification issued under EP Act,1986 • Specific studies requirement depending up on the site activity proposed shall be discussed • Public consultation (during EIA as well as public hearing) with the issues raised by the public and the response of the project proponent in the tabular form	Cement manufactured using fly ash as per the fly ash notification issued under EP act, 1986 will be used for proposed project activities. Depending upon the site requirements necessary control measures will be taken up. Public Hearing (consultation) was held on 06.02.2014 at 11.00 am in Connection with the Proposed· Peripheral Ring Road Development, the response of the project proponent in the tabular form is enclosed as **Annexure 4**.
6.0	**Environment Management Plan (EMP) & Post Project Monitoring Programme** • Administrative and technical set up for the management of environment • Summary matrix of EMP and costing of EMP during construction and operation stage • Summary matrix of Environmental monitoring during construction and operation stage • Institutional arrangements proposed with other organizations/ Govt. authorities for effective implementation of environmental measures proposed in the EIA • Safeguards/ mechanism to continue the assumptions/ field	Post project EMP is discussed **Chapter 10**. The summary of the matrix of EMP snf cost are given in **Chapter 10, Table 10.1** and **Table 10.3**. The summary of the environmental monitoring plan is discussed in **Chapter 10, Table 10.2**. BDA will coordinate with other organizations and government authorities for effective implementation of environmental measures proposed. BDA will take up CSR activities in coordination with Bangalore North Taluk and Bangalore District authorities for effective implementation of funds

	conditions made in the EIA, for arriving the site suitability • Specific social communities plan with name of the place/work budget allocation and time frame	under this project in the vicinity of the project area.

Annexure 1

Seismic Map of India – BIS Updated in 2014

Annexure 2
Trees Tolerant to Pollution

Botanical Name	Popular name	Family name	Tolerant
Citrus Lemon	Lemon	Rutaceae	Coal dust
Calotropis procera	Akund	Asclepiadaceae	Polluted Conditions
Mangifera Indica	Mango	Anacardiaceae	Dust collector
Ficus benghalensis	Desoending tree	Moraceae	Dust collector
Pithecolobium Dulce	Manila tamarind	Mimosaceae	Dust collector
Azadirachta indica	Neem	Meliaceae	Sulphur diioxide
Cicer arietinum	Bengal gram	Papilionaceae	Sulphur dioxide, Ozone
Acacia arabica	Babul	Mimosaceae	Sulphur dioxide
Tectona grandis L	Indian Oak tree	Verbenaceae	Dust collector
Hellanthus annus	Sunflower	Compositae	Fly ash
Opuntia monocantha	Prickly pear	Cactaceae	Sulphur dioxide
Caesalpinia pulcherima	Peacock flower	Caesalpinaceae	Sulphur dioxide, dust
Source: Guidelines for development Greenbelt – CPCB –PROBES/75/199-2000			

Annexure 3
Project Photographs

Alignment crossing Bangalore Doddaballapura Railway line at CH: 19/400 from Bangalore city station.

Picture I

Picture IV

Picture II

Picture III

Alignment crossing Bangalore- Tumkur Railway line near Soladevanahalli Station at CH:15/657 from Bangalore city station

PRR Crossing Old Madras road (NH4, CH:312.578Km) at CH:37.020Km

PRR Cutting across MRPL gas pipeline

Annexure 4

Response of the project proponent for issues raised in Public Hearing

Sl. No	Gathered public details	Pubic Query	Compliance
1.	Sri, Suresh, Soraunse Village	It has been informed that approximately 200 trees will be cut, however in his 2.5 acres orchard there are about 30 sapota plants and 60 coconut trees, what is the basis that 200 plants have been estimated to be cut. He has further said that they are earning their livelihood by way of practicing sericulture and horticulture. Development of the road would deprive them of their livelihood along with increase in air and noise pollution. Since he feels that road project does not create any new job opportunities, and hence the project should be dropped.	BDA through their forest Department conducted tree counting survey in the month of January 2014 and classified the trees as plantation trees and wild trees separately. BDA decided to compensate where ever plantation trees to be cut.
2.	Smt. Rina Mahendra, Avalahalli	It was questioned that EIA report was prepared in 2010 and already three years have elapsed and whether this report can be considered. She also pointed out that the EIA report is silent on whether the road alignment passes through Thipagondanhalli Reservoir catchment area, existing gas pipeline and forest area.	Even though EIA report was prepared in 2010 BDA has asked to EIA consultants to modify the report as per the requirement of MoEF regulations. Other information sought by this public has been detailed in the EIA Report.

3	PRR-1 affected housing welfare samiti, No.108,Naganada nilaya, Yelahanka, Bangalore 64	There is no information regarding felling of trees and also due to project religious places, forest affects and there is no DPR for this proposed project.	Recently tree survey counting has been made and DPR is also prepared by the BDA
4	Villagers, Venkatala, Kotigenahalli and Kogilu Bangalore	Due to proposed project, vehicles ply on the road with high speed and make this place vulnerable to noise and dust pollution.	Vehicles speed will be controlled and green belt will be provided to reduce noise and air pollution
5	A Bhartiya Bharthi farm Yelahanka,Bangalore	what is the source of water for plantation	BWSSB treated water will be used for plantation
6	Sudhakar Hegade Dodda Gubbi	Petronet M.B.H.Ltd have installed gas pipe line along the Bilishivale, Rampura and Adur and due to this project, there is a chance of breaking a pipe line and leakage and causes disaster.	Proposed project is away from (500M) the petronet gas pipe line and there is no anticipation of any disaster.
7	Siddappa, Bilishivale	The proposed project, affects Thippagondanahalli reservoir catchment area and also affects due to cutting of trees	The drainage pattern will not be altered and storm water will be connected to the natural contours will not be disturbed and hence no problem for catchment area of Thippagondanahalli reservoir and afforestation will be undertaken to compensate the cutting trees.

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CHAPTER 1
INTRODUCTION

1.1 INTRODUCTION

Rapid Environmental Impact Assessment Report (REIA) is prepared for the proposed Peripheral Ring Road project (PRR), being developed by Bangalore Development Authority (BDA) in order to identify the baseline environmental status of the project area; assessment of impact due to the proposed project on various environmental parameters and preparation of Environmental Management Plan (EMP) to mitigate the negative impact on these parameters.

1.2 Need Of The Project & Study

The proposed PRR is being developed to divert Intra-city Traffic through it around the Bangalore City beyond the existing Outer Ring Road (ORR). It's going to circumnavigate the city linking the major highways – Tumkur, Mysore, Old Madras, Hosur and district roads, thereby creating a direct corridor passage round the city. A plenty of commercial hubs and housing localities would come up along the Peripheral Ring Road (PRR). Most of the intra-city heavy trucks would prefer this corridor instead of the Outer Ring Road (ORR).

For every aspect of road projects, there are associated some significant positive and negative impacts on nearby communities and the natural environment. Some of the major environmental impacts of this project include loss of productive agricultural lands, water bodies, green cover, change in land use, accelerated urbanization etc. Keeping in view of the above impacts, environmental assessment was carried out for the present assignment in order to identify the base-line environmental profile of the project's area of influence due to the proposed development of the road and also to prepare Environmental Management Plan (EMP) in order to mitigate the identified adverse impact on the environmental components during the design, construction and operation stages of the project road.

1.3 Scope Of The Study

The Government of India has made it mandatory for all development/constructional projects to prepare a detailed Rapid Environmental Impact Assessment Report (REIA) i.e., to study and predict the impacts with a suitable management plan. The detailed methodology and planning for the study is as follows:

The scope of study includes detailed characterization of existing status of environment in the study area with the proposed project for various environmental components viz. air, noise, water, land, biological and socio-economic components. The scope of Rapid Environmental Impact Assessment Report (REIA) is as follows:

- To assess the present status of air, noise, water, land, biological and socio-economic components of environment
- Identification and quantification of significant impacts from the proposed project operations on various components of environment
- Evaluation of proposed pollution control facilities
- Preparation of a sound Environmental Management Plan (EMP) outlining additional control technologies to be adopted for mitigation of adverse impacts, if any
- Delineation of the post-project environmental quality monitoring program to be followed.

1.4 Objective of the Study

The heterogeneous flow of vehicular traffic along the road resulted in the reduction of the operating level of service at various mid block section and almost at all major intersections of Outer Ring Road (ORR). Hence there is an immediate need to augment the road network system by diverting the intracity traffic through a ring road beyond the existing Outer Ring Road (ORR) with “Peripheral Ring Road (PRR)”.

The objective of the study is to carry out the preliminary reconnaissance survey in order to identify environmentally sensitive issues relating to the project and base-line condition.

- Assessment of potential impacts of the project on the base-line conditions;
- Formulation of mitigation measures to offset the identified adverse impacts;
- Formulation of Environment Management Plan (EMP) incorporating appropriate mitigation measures and monitoring plan

(EMP will cover the issues caused by severance and on other features deemed "sensitive" along the alignment)

The environmental studies have been confined to the situation around the deemed areas of direct influence caused by construction and operational facilities of the proposed project.

1.5 Project Components

The proposed Peripheral Ring Road (PRR) project alignment starts from - Tumkur Road at CH.17A (distance of 16-20 km from the Bangalore city railway station) on NH4 & terminate at Hosur Road near Begur CH.64.65 km (65 km) for a smooth flow of traffic, to reduce the traffic congestion, pollution intensity and travel time.

The various components and objectives involved in the project include design process and construction activities. some of the major activities likely to take place to implement the proposed project are: site clearing and grubbing, earth work, pavement removal, granular sub-base, water bound macadam sub-base/base, bituminous pavement layers, pavement widening, drainage, safety measures, bridge and culvert improvement, waste material management, equipment staging and materials, aggregate and sand quarries etc. These major activities have been taken into account while finalizing the methodology for the impact assessment of the project.

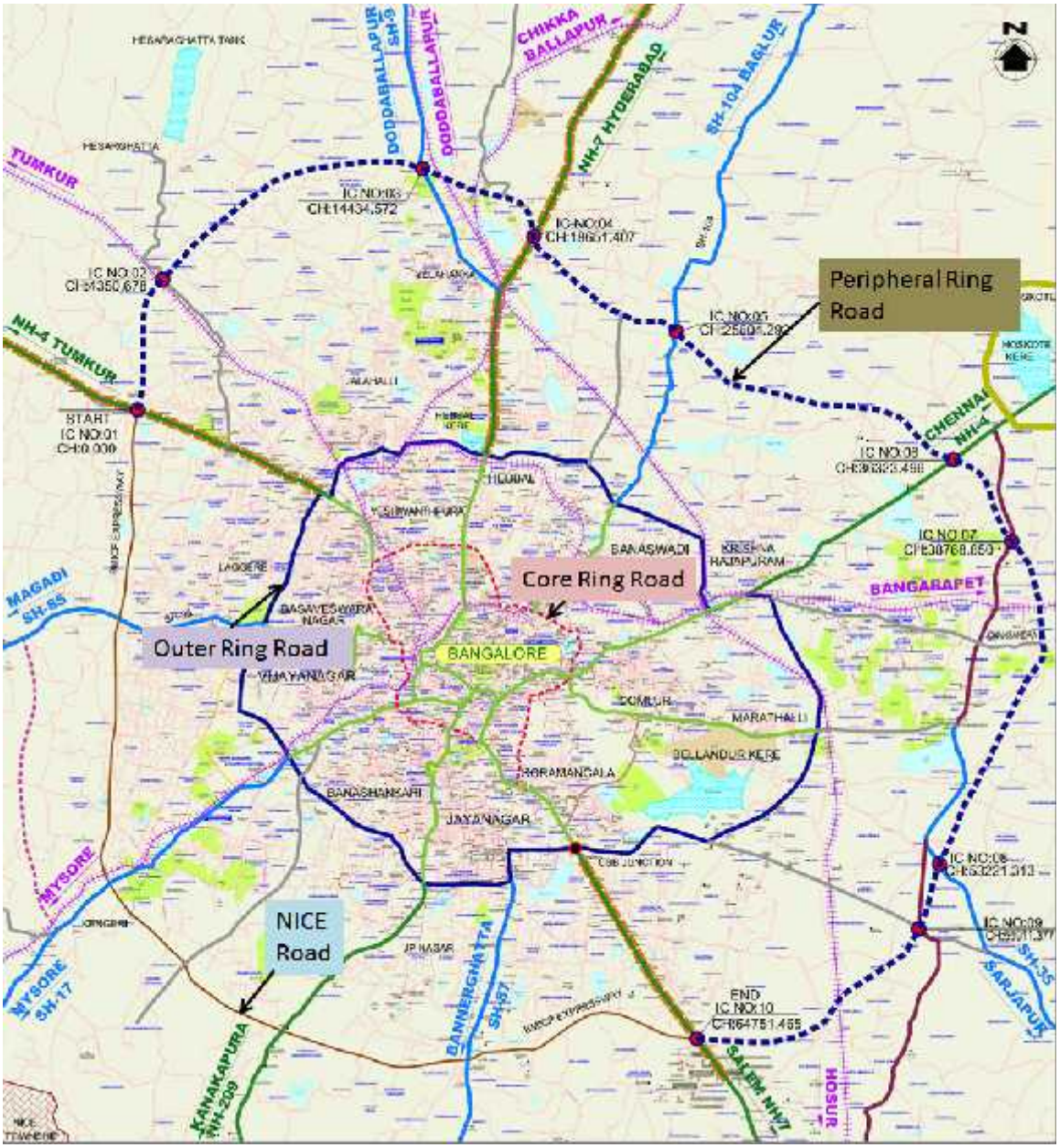


Figure 1-1: Key Plan of Existing Major Road Networks

1.6 Project Influence Area

1.6.1 Direct Area of Influence

The direct influence area of the project is restricted to proposed Right of Way (RoW) only, since the project development involves road formation and all construction and operation stage activities will be contained within it.

1.6.2 Indirect Area of Influence

As per MoEF guidelines for conducting EIA study (EIA notification, S O 1533 dated 14th Sept, 2006); the geographical area for highway projects for major environmental features like National Park, Wildlife Sanctuary, Critically Polluted Area, Notified Eco-Sensitive Zone, Inter-state Boundaries and International Boundaries, Coastal Zones, Areas protected under international conventions, defence installations etc. were studied/ recorded within 2 km radius of the project road.

1.7 Methodology

The study of impacts from the proposed project activities on environmental components can be quantified through Rapid Environmental Impact Assessment (REIA) within the impact zone. The results of Rapid Environmental Impact Assessment (REIA) studies form the basis for the preparation of a viable Environmental Management Plan (EMP) for mitigation of the adverse impacts. The Rapid Environmental Impact Assessment (REIA) studies for the proposed project deals with detailed studies for various environmental components viz. air, noise, water, land, biological and socio-economic environment.

1.8 Study Period

To prepare the Rapid Environmental Impact Assessment (REIA) report for the proposed project, the data was collected from **December to February (2009-2010)** in the study area. Micro meteorological parameters were recorded such as wind speed; wind direction and relative humidity on hourly basis during the study period.

1.9 Study Area

For the Rapid Environmental Impact studies (REIA), an area of about 2 km on either side of the Peripheral Ring Road (PRR) was identified as study area (Impact Zone). Geographical area was considered 2 km radius as indirect influence area of impact. The studies were conducted on each component and the details are reported in subsequent chapters.

a. Air Environment

In order to estimate the existing pollution levels in the region and to arrive at a baseline value for estimating the increase in the pollution load due to the proposed project activity, the air quality monitoring parameters such as PM_{10}, $PM_{2.5}$, SO_2 & NO_X were carried out for representing the baseline status of ambient air quality within the study area.

b. Noise Environment

An excessive noise levels can cause adverse effects on human beings and associated environment. Hence the noise survey was carried out at the site on either side of the proposed road up to 2 km to nearby areas.

c. Water Environment

Samples were collected at existing water bodies (surface & ground) at different selected locations in the study area. The parameters for water quality studies were selected for the physico-chemical characteristics of the water samples namely pH, EC, TDS, Alkalinity, Hardness etc.

d. Land Environment

The soil samples were also collected nearby areas on either side of the road up to 2 km distance, (impact zone) and determined the physico–chemical characteristics of the soil.

e. Eco-System

Information on eco-system within 2 km Impact zone was collected from the state Agriculture and Forest departments. The important flora species native to the area was also enumerated.

f. Socio-Economic Status

A field study was done on either side of the road up to 2 km distance, the impact zone from the proposed project. The data was collected from affected villages and available secondary sources for socio economic status of the study area.

1.10 Legal Framework

A review of the applicable environmental regulations and institutions relevant to this project has been discussed in this section.

1. EIA notification 2006 and its amendments:

The EIA notification dated 14th September, 2006 imposes certain restrictions and prohibitions on new projects or activities, or on the expansion or modernization of existing projects or activities based on their potential environmental impacts as indicated in the schedule to the notification, being undertaken in any part of India, unless prior environmental clearance has been accorded in accordance with the objectives of National Environment Policy as approved by the Union Cabinet on 18th May, 2006 and the procedure specified in the notification, by the Central Government or the State or Union territory Level Environment Impact Assessment Authority (SEIAA).

The notification has listed out the Projects or activities requiring prior environmental clearance under Category “A” and “B” based on the spatial extent of potential impacts, and the intensity of those impacts on human health and natural and manmade resources. Category “A” projects require prior environmental clearance from MoEF on the recommendations of an Expert Appraisal Committee (EAC) and Category “B” projects require prior environmental clearance from State or Union territory Level Environment Impact Assessment Authority (SEIAA) on the recommendations of a State or Union Territory Level Expert Appraisal Committee (SEAC). In the absence of a duly constituted SEIAA or SEAC, a category “B” project shall be treated as a Category “A” project. New National Highways and expansion of National Highways

greater than 30 km, involving additional right of way greater than 20 m involving land acquisition is categorized as "A." All New State Highway projects; and State Highway expansion projects in hilly terrain (above 1,000 m AMSL) and or ecologically sensitive areas are categorized as "B." Any project specified in Category 'B' will be treated as Category A, if located in whole or in part within 10 km from the boundary of: (i) Protected Areas notified under the Wild Life (Protection) Act, 1972, (ii) Critically Polluted areas as notified by the Central Pollution Control Board from time to time, (iii) Notified Eco-sensitive areas and (iv) inter-State boundaries and international boundaries.

The proposed project being a new state highway having 65 km length with Right of Way of 75 m the project falls under Category "B" in the Schedule of EIA Notification 2006 and requires environmental clearance from SEIAA.

Further, recently MoEF, GOI amended EIA notification 2006, through notification #S.O.2559 (E) dated: 22nd August 2013. The recent amendment with reference to the proposed project is as follows.

Expansion of NH greater than 100 km involving additional right of way or land acquisition greater than 40m on existing alignments and 60 m on realignments or by-passes.

Additional Requirements under EIA Notification, 2006:

For the projects to be located within 10 km of the National Parks, Sanctuaries, Biosphere Reserves, Migratory corridors of wild animals, the project proponent shall submit the map duly authenticated by Chief Wildlife Warden showing these features vis-à-vis the project location and the recommendations or comments of Chief Wildlife Warden thereon (at the stage of EC).2. Since there is no National Parks, Sanctuaries, Biosphere Reserves or any migratory corridor of wild animals located within 10 km from the project road, this provision is not applicable to the present project.

The Forest (Conservation) Act, 1980:

The Forest (Conservation) Act, 1980 prohibits diversion of forestland for non-forest use. As amended in 1988, no State Government or Authority shall make such diversions except with the prior approval of the Central Government.

Section 2 of the Act restricts the State Government on the de-reservation of forests or use of forestland for non-forest purpose. Section 3 of the Act empowers the Central Government to constitute an Advisory Committee (to advice the Government on the proposals received by it for the use of forestland for non-forest purposes).

Applicability of Forest (Conservation) Act to Roadside Strip Plantations:

Large-scale plantations have been taken up by different state governments under social forestry and other programmes along the linear strips of lands, which had been acquired by Government Departments like Railway, Irrigation, PWD, etc. for specific purposes like laying of roads, railway lines and canals. In order to have a better control and management of these linear patches, in many places these have been notified as protected forests. In the case of road projects, although the land is under the control of the highways department, due to its protected status, clearance is required to cut road side trees. Applicability of the provisions of the Forest (Conservation) Act, 1980 to the linear (road or canal side) plantations was modified by a notification from the GoI, MoEF, dated 18th February 1998. The new notification recognizes that the spirits behind the Forest (Conservation) Act was conservation of natural forests and not strip plantations.

In the case of roadside plantations notified to be protected, the clearance now may be given by the concerned Regional Offices of the MoEF, irrespective of the area of plantation lost. While issuing the approval, in place of normal provision for compensatory afforestation, the Regional Offices will stipulate a condition that for every tree cut at least three trees should be planted. If the concerned Regional Office does not accord the decision within 30 days of the receipt of fully completed application, the proponent agency may proceed with the widening / expansion under intimation to the State Forest Department and MoEF.

In the case of roadside plantations not yet notified as protected forests, it will not attract the provisions of Forest (Conservation) Act, 1980 for the purposes of widening or expansion or re-alignment. However, permission from Deputy Conservator of Forests (DCFs) of Territorial Forest Division of each district is required for the cutting and transportation of trees along the road.

Since around 519 major trees along the existing road require cutting permission from concerned DCFs, this provision is applicable.

The Water (Prevention and Control of Pollution) Act, 1974

The project requires consent for establishment (CFE) from the State Pollution Control Board of Karnataka pursuant to the Water (Prevention and Control of Pollution) Act, 1974, since the project activity involves in discharge wastewater from labour camps.

The Air (Prevention and Control of Pollution) Act, 1981

The project requires consent for establishment (CFE) from the State Pollution Control Board of Karnataka as per the Air (Prevention and Control of Pollution) Act, 1981, since project involves operation of Hot Mix Plants and Diesel Generator Sets.

The other legislations relevant to the project include Noise Pollution (Regulation and Control) Rules, 2000, The Motor Vehicles Act, 1988, Workmen Compensation Act, 1923, The Public Liability Insurance Act, 1991, Contract Labour (Regulation & Abolition) Act, 1970, Minimum Wages Act, 1948, Payment of Wages Act, 1936, Equal Remuneration Act, 1979, Child Labour (Prohibition & Regulation) Act, 1986, The Building & Other Construction Workers (Regulation of Employment & Conditions of Service) Act, 1996 and the Cess Act of 1996.

Environmental Permits / Approvals required for the project:

S. No	Type of clearance	Statuary Authority	Applicability	Project stage	Responsibility
1	Prior Environmental Clearance under EIA Notification, 2006	**SEIAA**	Applicable	Pre construction	BDA
2	Forest Clearance Under Forest Conservation Act, 1980	**Karnataka State Forest Dept & MoEF**	Not applicable	Pre construction	BDA
3	Tree felling permission under The Karnataka Forest Produce Transit Rules, 1969 / The Karnataka Preservation of Trees Act, 1976.	**Karnataka State Forest Dept**	Felling of avenue trees	Pre construction	BDA
4	CFE (Consent for Establishment) under The Air (Prevention & Control of Pollution) Act, 1981	**KSPCB**	For establishing hot mix plants, crushers and batching plants	Construction (Prior to work initiation)	Concessionaire / Contractor
5	CFE (Consent for Establishment) under The Water (Prevention & Control of Pollution) Act, 1974	**KSPCB**	For discharging of domestic waste water through soak pit	Construction (Prior to work initiation)	Concessionaire / Contractor
6	PUC certificate for vehicles for construction under Central Motor and Vehicle Act 1988	**Transport Dept**	For all construction vehicles	Construction (Prior to work initiation)	Concessionaire / Contractor
7	Quarry lease deeds and license under The Mines Act, 1958	**Mines and Geology Department of Karnataka**	Quarrying and borrowing operations	Construction (Prior to work initiation)	Concessionaire / Contractor

The application was made in the proforma specified (Form 1) at Appendix I of the said notification and along with feasibility report for finalising the Terms Of Reference (TOR) and based on TOR, a Rapid Environmental Impact Assessment (REIA) Report is prepared in accordance with the guidelines issued by the Government of India, Ministry of Environment and Forests (MoEF).

1.11 Additional Terms of Reference (TOR) for REIA Study Report

The SEAC, Karnataka considered the project during its 46th meeting held on 21.11.2009 based on the consideration of the documents submitted vide reference

letter no.BDA/EM/TA-3/PRR/EIA/T-333 dated 10.09.2009 along with Form-1 and proposed TORs as per the EIA notification 2006 and presentation made by the project proponent.

The State Level Expert Appraisal Committee (SEAC) vide ref. No:. SEIAA 32 IND 2009, Department of Ecology and Environment, M.S. Building, Bangalore dated 18th December 2009 communicated the finalized TORs for the preparation of REIA report for the development of eight lanes Peripheral Ring Road (PRR) from Tumkur Road, Bellary Road, Old Madras Road and Hosur road.

After preparing the draft EIA (as per the generic structure prescribed in Appendix- III of the EIA Notification, 2006) covering the above mentioned issues, the proponent take further necessary action for obtaining environmental clearance in accordance with the procedure prescribed under the EIA Notification, 2006.

1.12 Environmental Management Components

The various components which are considered for the environmental management aspects and to be included in the environmental management plan, broadly consists of environmental mitigation aspects, environmental performance indicators to be monitored and reporting system, environmental enhancement measures, Horticulture and landscaping aspects, financial aspects required for the effective implementation of the environmental management plan and institutional strengthening and training of the project implementation unit. These are discussed in the report herein.

1.13 Schedule

The time schedule required to complete the proposed project components is described in Table 1.1 briefly hereunder.

Table 1.1: Time schedule (from the date of publication of pre-qualification notice)

Step No.	Procedure	Total days required	Days	
			From	To
1	Issue of Pre-qualification blank forms	20	01	20
2	Receipt of completed pre-qualification application	20	21	40
3	Short-listing procedure and communicating bidders	30	41	70
4	Pre-bid meeting & issue of blank bid document to short-listed bidders	30	71	100
5	Receipt of final offers from short listed bidders	30	101	130
6	Evaluation, acceptance of offer and the contract agreement	30	131	160
7	Mobilization	25	161	186
8	Construction phase	912	187	1099
9	Opening of facility to traffic	7	1100	2199

1.14 Contents of the REIA /EMP report

With ref to the EIA notification of the MoEF, GOI dated 14th September 2006; the generic structure adopted for the preparation of the EIA Report as detailed below.

Chapter 1: Introduction

This chapter contains the general information about the proposed Peripheral Ring Road (PRR) and other details of the environmental clearance process.

Chapter 2: Project Description

This chapter contains the description of the project, such as, need for the project, project location, project layout, implementation schedule, and estimated cost of the project.

Chapter 3: Description of Environment

This chapter contains the baseline status of the proposed project area.

Chapter 4: Anticipated Environmental Impacts & Mitigation Measures

This chapter covers the Anticipated Environmental Impacts & Mitigation Measures.

Chapter 5: Analysis of Alternatives (Technologies)

This chapter contains the details of various alternatives both in respect of location of site and technologies to be deployed, in case the initial scoping exercise considers such a need.

Chapter 6: Environmental Monitoring Programme

This chapter includes the Environmental Monitoring Program and technical aspects of monitoring for the effectiveness of mitigation measures

Chapter 7: Additional Studies

This chapter include the details of the additional studies required and necessary needs which are applicable to the proposed project.

Chapter 8: Project Benefits

This chapter will cover the benefits accruing to the locality, neighborhood, region and nation as a whole. It should bring out details of benefits by way of improvements in the physical infrastructure, social infrastructure, employment potential and other tangible benefits.

Chapter 9: Environmental Cost Benefit Analysis

This chapter will cover the Environmental Cost Benefit Analysis of the proposed project.

Chapter 10 : Environnemental Management Plan (EMP)

This chapter will comprehensively present the Environmental Management Plan (EMP), which includes the administrative and technical set-up, summary matrix of EMP, the cost involved to implement the EMP, both during the construction and operational phases.

Chapter 11: Summary & Conclusions

It would provide the overall justification for implementation of the project explaining how the adverse effects are proposed to be mitigated.

Chapter 12: Disclosure of Consultants Engaged

This chapter include the names of the consultants engaged with their brief resume, expertise and nature of consultancy rendered.

CHAPTER 2
PROJECT DESCRIPTION

2.1 Peripheral Ring Road (PRR)

The Proposed Peripheral Ring Road (PRR) takes off at CH 17A on Bangalore Pune (NH4) about 150m distance from major bridge across Arkavathy River. The 65 km Peripheral Ring Road (PRR) is planned by Bangalore Development Authority (BDA) to circumnavigate the city. The project will be under taken starting from CH. km 0.000 to CH: km 64.5 (65). The project linking the major Highways, district roads right from Tumkur road, Mysore road, Old Madras road and Hosur Road.

2.2 Terrain and Topography

The Peripheral Ring Road (PRR) alignment passes through plain and rolling terrain and Greenfield site cutting across the major roads of Bengaluru. There are low lying areas along the project road stretch marked by a series of tanks. The Arkavati River flows past the proposed road at a distance of about 300 m towards Tumkur from the starting point of the project.

2.3 Resource Requirement

The following resources are required for the development of Peripheral Ring Road (PRR).

2.3.1 Land

The village wise land acquisition details of Peripheral Ring Road (PRR) will be earmarked for the development of Peripheral Ring Road (PRR). The land acquisition details are given in the following Table 2.1**.**

Table 2.1:Village-Wise Land Acquisition Details for Peripheral Ring Road

S.No	Planning District No	Name	Population 2001 (Lakh)	Area (Sq.km)	# Gross Population Density (No./ Sq Km)	Proposed major land use as per revised Master Plan – 2015
1	305	Bavalakere	0.12	27.31	439	Residential
2	306	Heserghatta	0.18	42.29	426	Green area
3	307	Yelahanka	0.98	38.71	2532	Residential
4	308	Bettaalasuru	0.21	35.30	595	Green area
5	309	Tanisandra	0.32	45.83	698	Residential
6	310	Bagaluru	0.21	48.44	430	Agricultural/Residential
7	312	Avalahalli	0.26	37.70	690	Residential/Commercial/ Industrial
8	314	Sadar Mangala	0.29	20.10	1443	Residential/Industrial
9	315	Whitefield	0.91	38.84	2343	Residential/ High-tech
10	316	Varthur	0.35	52.00	673	Residential/High tech
11	317	Dommasandra	0.20	41.69	480	Agricultural/Green area
12	319	Electronic city	0.46	36.60	1257	High tech
Total			**4.41**	**464.81**		

2.3.2 Land Requirement

The Peripheral Ring Road (PRR) runs in a cropland predominantly (60%) and less extent in Agriculture plantation (17%), commercial plantation (16%). The extent of land required for Peripheral Ring Road (PRR) including enabling services and interchanges is given hereunder.

65 km Road requires 1810 acres of land. Alignment of the proposed road passes through major junctions as listed in the table 2.1a.

Table 2.1(a): Major Junctions

Tumkur Road (NH- 4):	CH:00.00 km
Hesarghatta Road (SH):	CH: 04.99 km
Doddaballapura Road (SH) :	CH: 15.08 km
Bellary Road (NH):	CH:19.30 km
Hennur Road:	CH: 26.25km
Old Madras Road:	CH: 36.95 km
White Field Road:	CH: 41.13 km
Hoskote- Anekal Road:	CH:53.41km
Sarjapur Road:	CH: 56.09km
Hosur Road:	CH: 64.65km

The alignment of the road between Tumkur and Old Madras roads passes through agricultural / open land for substantial length and predominantly land use along the corridor can be considered as agricultural with an extent of residential. Between Old Madras and Hosur roads, the alignment passes through semi urban sections at isolated places. The alignment crosses the conurbation areas at 5 locations and avoids forest land in most of the places except at 1 location i.e., Jarakabande kaval at Yelehanka. (chainage 12.00 to 12.50)

2.3.3 Abutting Land Use

The alignment of the road between Tumkur and Old Madras roads passes through agricultural / open land for substantial length and predominantly land use along the corridor can be considered as agricultural with an extent of residential. Between Old Madras and Hosur roads, the alignment passes through semi urban sections at isolated places. The list of some of the villages /settlements / habitations along the project corridor is given in Table 2.2.

Table 2.2: List of Villages /Settlements / Habitations

S. No	Village/Settlement	Chainage, km From	To
1	Madanayakanahalli	0	1050
2	Hanumantha sagara	1050	1630
3	Kudaregere	1630	2920
4	Tammenahalli	2920	4190
5	Soladevanahalli	4190	5100
6	Chikkabanavara	5100	5600
7	Kempapura	5600	7060
8	Kalathammanahalli	7060	7920
9	Kasagattapura	7060	8380
10	Byalakere	8380	10030
11	Mavallipura	10030	11875
12	Jarakabande kaval	11875	13065
13	Ramagondanahalli kavalu	13065	13456
14	Avalahalli	13456	14986
15	Harohalli	14986	16643
16	Kenchenahalli	16643	17089
17	Vasudevapura	17089	17581
18	Manchenahalli	17581	18365

19	Vaderapura	18365	19013
20	Venkatala	19013	19813
21	Kattigenahalli	19813	20105
22	Kogilu	20105	21867
23	Agrahara	21867	22861
24	Tirumanahalli	22861	23850
25	Chokkanahalli	23850	25111
26	Nagareswara nagenahalli	25111	25546
27	Kottanuru	25546	25867
28	Bairati	25867	26475
29	Chikkagubbi	26475	26686
30	Doddagubbi	26686	28534
31	Bileshivali	28534	29911
32	Vaderahalli	29911	30435
33	Rampura	30435	32030
34	Aduru	32030	33126
35	Bidarahalli	33126	34107
36	Herandahalli	34107	36177
37	Chimsandra	36177	36727
38	Avalahalli	36727	37520
39	Bidarena agrahara	37520	38447
40	Doddabanahalli	38447	38831
41	Kannamangala	38831	39364
42	Chikkabanahalli	39364	40253
43	Sigehalli	40253	42484
44	Kadgodi	42484	44312
45	Channasandra	44312	45401
46	Nagagondanahalli	45401	46582
47	Hagadur	46582	47306
48	Khanekandaya	47306	47432
49	Belandur amanikere	47432	47951
50	Sorahunse	47951	50073
51	Varthur	50073	51411
52	Gunjur	51411	53214
53	Kachamaranahalli	53214	55248
54	Sulakunte	55248	57938
55	Kodathi	57938	58028
56	Chokkasandra	58028	58276
57	Avalahalli	58276	59626
58	Gattihalli	59626	60481
59	Huskur	60481	61346
60	Gulimangala	61346	63537
61	Hebbagodi	63537	64877
62	Shingenaagrahara	63357	63710
63	Veerasandra	64877	

Table 2.2(a): Details of Properties to be Acquired for the Project

Requirement of the properties for the Bangalore Development Authority (BDA)			
Properties to be acquired (Numbers)			
Details	Number of properties		
	Developed	Vacant	Total
Private Commercial	130	0	130
Private Residential	502	0	502
Others like temples, churches, etc.	7	0	7
Total Number of private commercial, residential & other properties			639
Total number of Government, Defence & public sector properties			1
Total number of Government, Defence, public sector, private & community properties			640

Diversion of Forest land:

The project road passes through Reserve forest at one location. Hence, sufficient care has been taken during design stage to minimize the impact on forest land by restricting the proposed RoW to the existing RoW available. As per the proposed design, the total forest land to be diverted is estimated to be 1.5 Ha and the chainage wise details of the same are presented as Table 2.2

Table 2.2(b): Details of Forest Area proposed to be diverted for the Project Road

S. No	Proposed Chainage	Length (km)	Forest	Village	Survey no.	Area of the forest to be diverted in Ha
1	Ch12.000 to 12.500	763 m	Jarakabande kaval	Yelahanka	59	1.5

Tree Cutting:

Enumeration of trees along the project road was carried out during December 2013 to January 2014. Total number of bigger trees to be felled for the project is around 519 nos.

As presented in Table 2.2 C below, about 519 trees are expected to be removed from the right of way of the project road.

Table 2.2(c): Summary of the Trees Proposed to be cut

Chainage	Type of trees		Number of Trees in cm (Stem)						
	Local Name	Botanical Name	<80 cm	<100 cm	<200 cm	<300 cm	<400 cm	<500 cm	Sub Total
0-15000	Banyan	Ficus benghalensis			2	4	14		
	Teakwood	Tectona grandis		12	4				
	Jalimara		2	10					
	Jackfruit	Artocarpus heterphyllus		1		10			
	Mango	Mangifera indica		2					
	Tamarind	Tamarindus indica				51	2		
	Neem	Azadirachta indica		2	15				
	Honge	Pongemia pinnata	35	9	18	2	1		
	Silveroak	Grevillea robusta	75						
	Others		3			2	2		
	Total		**115**	**36**	**39**	**69**	**19**	**0**	**278**
15000-26000	Banyan	Ficus benghalensis		2					
	Teakwood	Tectona grandis							
	Jalimara								
	Jackfruit	Artocarpus heterphyllus							
	Mango	Mangifera indica							
	Tamarind	Tamarindus indica			1				
	Neem	Azadirachta indica		7					
	Honge	Pongemia pinnata		9					
	Silveroak	Grevillea robusta		21					
	Others		2					1	
	Total		**2**	**39**	**1**	**0**	**0**	**1**	**43**
26000-59000	Banyan	Ficus benghalensis				4		1	
	Teakwood	Tectona grandis							
	Jalimara				1				
	Jackfruit	Artocarpus heterphyllus			1				
	Mango	Mangifera indica				1			
	Tamarind	Tamarindus indica			2	2			
	Neem	Azadirachta indica	2			1			
	Honge	Pongemia pinnata	3						
	Silveroak	Grevillea robusta		6					
	Others		8	2	1	1			
	Total		**13**	**8**	**5**	**9**	**0**	**1**	**36**
59000-65000	Banyan	Ficus benghalensis			5				
	Teakwood	Tectona grandis		80					
	Jalimara								
	Jackfruit	Artocarpus heterphyllus							
	Mango	Mangifera indica		15					
	Tamarind	Tamarindus indica							
	Neem	Azadirachta indica		30					
	Honge	Pongemia pinnata	5						
	Silveroak	Grevillea robusta		26					
	Others				1				
	Total		**5**	**151**	**6**	**0**	**0**	**0**	**162**
								Total	**519**

2.4 Design Standards & Features of the PRR Project

The Peripheral Ring Road (PRR) are pass transit, carrying high volumes of traffic with considerable speed in which, the entrances and exits are controlled by interchanges, it is being connected with other ways and arterial roads by grade-separated intersections. The project serves further for heavy loaded cargo trucks or to connect important areas within the city.

The advantage of the project is access controlled in future by and thus preserving the highway capacity, higher speeds and improved safety for the road users.

The following features of the project designed as a high-speed expressway corridor.

- Access controlled intersections.
- Right Of Way (ROW) of 75 m.
- Design as 8 lane dual carriageway with service roads.
- Provision of space for additional carriageways foreseeing the future traffic without being uneconomical.
- Provision for Bus Rapid Transit System (BRTS) lanes.
- Design of carriageway widths, capacities, design speeds and other geometric elements will be based on trucks and other fast moving vehicles.

2.4.1 Guidelines

All the project activities related to field studies, design have been done as per the latest guidelines/ circulars of MoSRT&H and relevant publications of the Indian Roads Congress (IRC) and Bureau of Indian Standards (BIS) and also the international standards for designs referred, especially the AASHTO publication, “A Policy on Geometric Design of Highways and Streets”.

The following codes of practice were referred while the preparation of the design standards for the construction of Peripheral Ring Road (PRR) as listed below.

- IRC: 73:1980, Geometric design standards for rural (Non-Urban) Highways

- AASHTO publication, A policy on Geometric Design of Highways and Streets, 2001
- IRC: 38:1988, Guidelines for design of horizontal curves for highways & design tables (First Revision)
- IRC: 52:2001, Recommendations about the alignment survey & geometric design of hill roads
- IRC: 62:1976, Guidelines for control of access on highways
- IRC: SP: 23:1993, Vertical curves for highways.

Figure 2.1: Topo Map of the Study Area

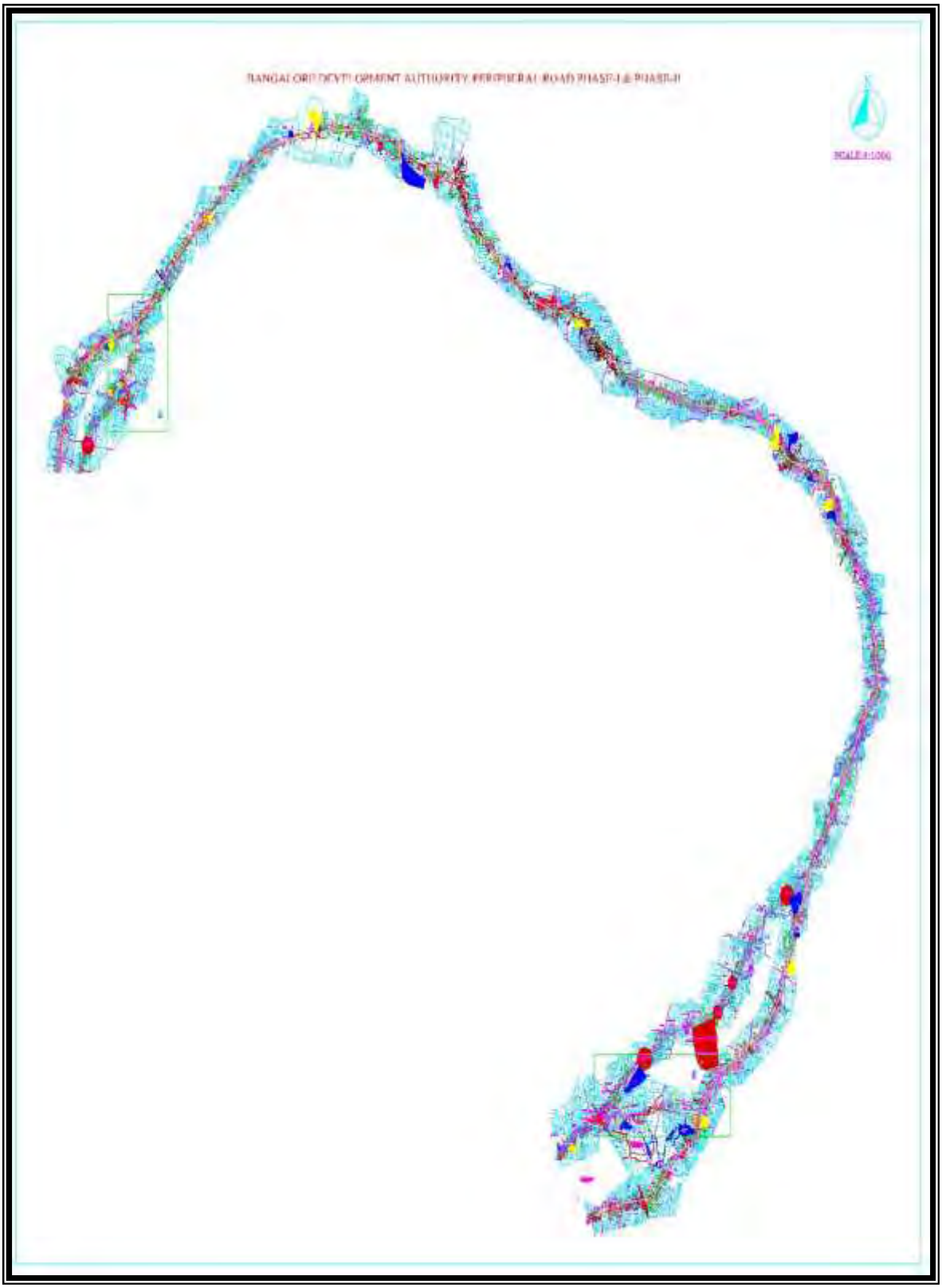
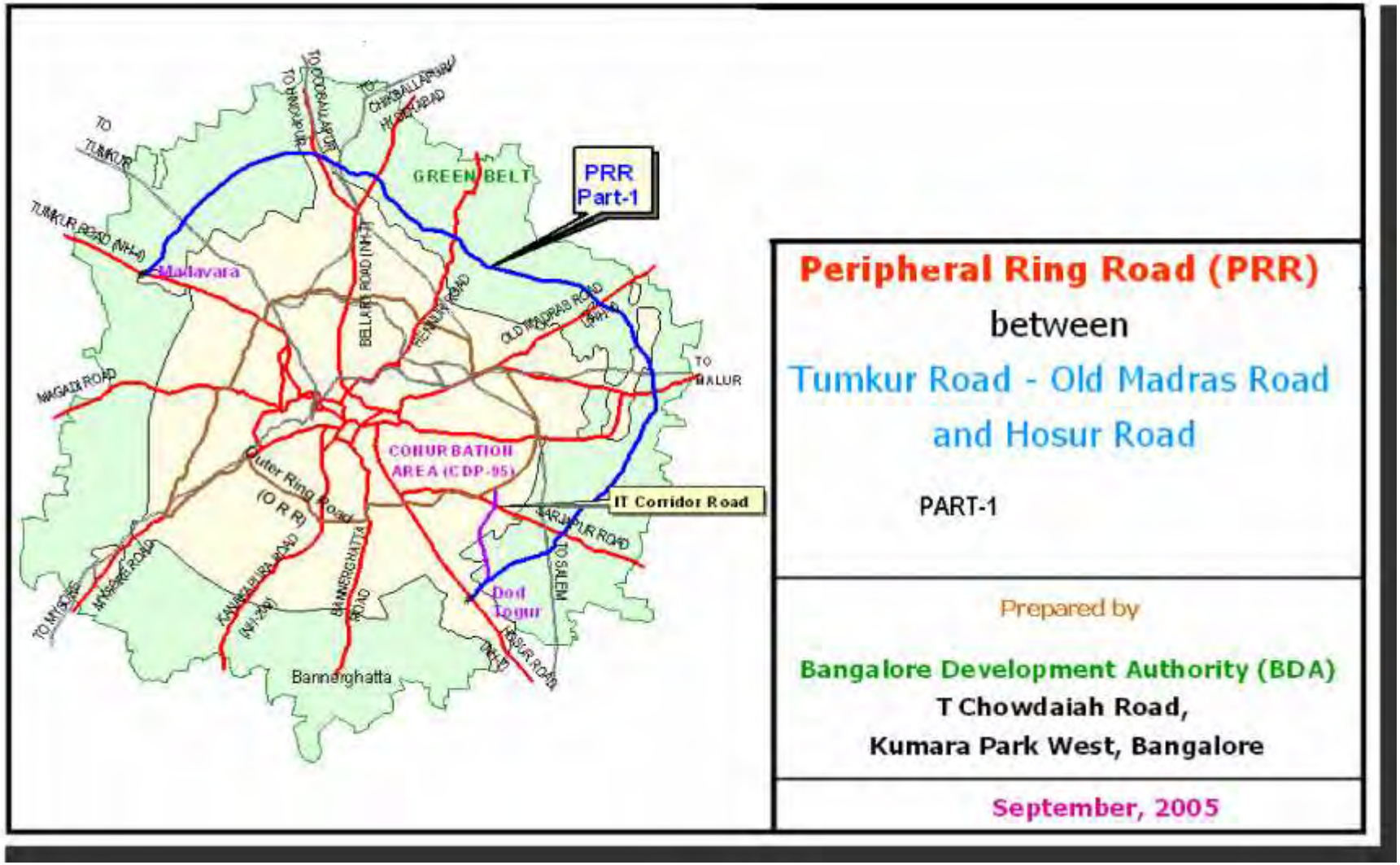


Figure 2.2: Location details of the project



2.5 Design Considerations

2.5.1 Alignment of Peripheral Ring Road (PRR)

The Alignment of Peripheral Ring Road (PRR) features are given in Table 2.3**.** The alignment crosses the conurbation areas at 5 locations and avoids forest land in most of the places except at 1 location.

Table 2.3: Salient features of Peripheral Ring Road (PRR)

S. No	Description	Technical Details
I.	**General Features**	
1	**Length**	**65** km
2	**Location**	14-22 km from the city center & 2.8 – 11.5 km from the existing Outer Ring Road (ORR).
3	**Crossing**	10 major roads: There are 5 Primary road networks NH-4 towards Pune on West, NH-7 towards Hyderabad on North, NH-4 towards Chennai on East, NH-7 towards Salem on South and NH-209 towards Dindigual towards South-West. In addition there are 5 radial Secondary roads – SH-9 towards Doddaballapur on North-West, SH-17 towards Mysore on South- West, SH-85 towards Magadi on West, SH-87 towards Bannerghatta towards South and SH- 104 towards Hennur.5 railway lines, 8 water bodies
4	**Drainages**	48 major with one river Vrishabhavathi at CH 87.45 km & 20 minor water bodies.
II. Terrain aspects		
5	**Elevation**	Highest: RL 941 m above MSL about 1 km W of Pillaganahalli
6	**Lowest**	RL780 m above MSL 1 km West of Hemmigepur.
III. Alignment running in existing land use		
1	**Passing on existing roads**	2.90 km
2	**Conurbation area**	8.92 km (5 locations)
3	**Forest area**	0.50 km
4	Most of the stretch has ruling gradient except between Bannerghatta and Kanakapura road, where deep cut and fill is to be done.	

2.5.2 Terrain Classification

Terrain is the basic designing parameter that determines the geometry of the road. The Peripheral Ring Road (PRR) project falls under Plain/Rolling classification as specified in the Table 2.4 as per IRC Standards.

Table 2.4: Terrain Classification

S. No	Terrain Classification	Percent cross slope of the country
1	Plain	0 - 10
2	Rolling	10 - 25
3	Mountainous	25 - 60
4	Steep	Greater than 60

2.5.3 Design Traffic Volume

The Peripheral Ring Road (PRR) Project designed for a 20-year period to accommodate the traffic as per AASHTO international standards for design of high ways and streets.

2.5.4 Level of Service

The Peripheral Ring Road (PRR) Project designed for level of service as per AASHTO recommendations for the freeway and their auxiliary facilities (i.e. ramps, mainline weaving sections) in urban and developing areas.

2.5.5 Lane Width

The Peripheral Ring Road (PRR) constructing each single lane width at about 3.50 m as per Geometric design standards for rural Highways for Multi-lane pavements (IRC 73 1980).

2.5.6 Kerb Placement

In Peripheral Ring Road (PRR), a kerb shying at a distance of 0.50 m on each side of the central median would be adopted throughout the main carriageway as per AASHTO standards (0.30-0.60 m).

2.5.7 Cross Slope/Cross fall of Pavement

The Cross slope / Cross fall of the PRR Project designed as per IRC: 73:1980 standards given in Table 2.5**.**

Table 2.5: Camber / Cross fall values for different road surface types

S. No	Surface Type	Cross slope / Cross fall
1	High type bituminous surfacing or cement concrete	1.7 - 2.0 percent (1 in 60 to 1 in 50)
2	Thin bituminous surfacing	2.0 - 2.5 percent (1 in 50 to 1 in 40)
3	Water bound macadam, gravel	2.5 - 3.0 percent (1 in 40 or 1 in 33)
4	Earth	3.0 - 4.0 percent

2.5.8 Road Way Crowning and Shoulder

As per AASHTO standards, a cross section with each road way crowning to be constructed separately and also the paved shoulder of 1.5 m in width to an extended width of main road.

2.5.9 Horizontal and Vertical Design

The Peripheral Ring Road (PRR) is designed for high-volume and high-speed operation for smooth flowing at horizontal and vertical curves.

2.5.10 Horizontal Curve

The Peripheral Ring Road (PRR) designed and restricted the super elevation up to 5% at horizontal and vertical curves as per IRC standards (7%).

2.5.11 Minimum Curve Radius

The Peripheral Ring Road (PRR) designed for minimum curve radii based on the following equation (e+f) = V2/ (127 R) Considering a friction factor, f=0.15,

The minimum curve radius required for the horizontal geometry design for a super elevation of 5% and 7% with respect to design period are given in Table 2.6.

Table 2.6

Minimum Radii required for various speeds along with 5% Super Elevation

S. No	Design Speed, Kmph	Minimum Radii required, m	
		Super elevation 5%	Super elevation 7%
1	80	260	230
2	100	400	360

2.5.12 Super elevation & Transition curve

The Super elevation is the inward tilt given to the surface of the road to prevent the vehicle from skidding. The Super elevation during the construction of Peripheral Ring Road (PRR) designed & calculated by the formulae = V2 / 225R, as per IRC standards.

The minimum length of transition curve required for the Peripheral Ring Road (PRR) designs have been worked out as per the guidelines of IRC: 38.

2.5.13 Gradients

The gradients for the design of vertical curves chosen, keeping in view of design speed, terrain conditions and nature of traffic expected on the Peripheral Ring Road (PRR).

2.5.14 Minimum gradients for drainage

The minimum gradient provided for efficient drainage and pavement is provided with kerbs. The desirable minimum gradient for this purpose is given in Table 2.7 as per IRC: 73:1980.

Table 2.7: Desirable Minimum Gradient for Side Drains

S. No	Description	Minimum gradient
1	For lined slide drains	0.5%
2	For unlined side drains	1.0%

2.5.15 Stopping Sight Distance

During the construction of Peripheral Ring Road (PRR), the sight distance should be of sufficient length to stop a vehicle traveling at design speeds. The stopping sight distance arrived as per IRC: 73:1980 are given in Table 2.8

Table 2.8: Stopping Sight Distances

S No	Speed	Perception and brake reaction		Braking Coefficient longitudinal	Safe stopping sight distance m		
	(V) kmph	Time, Sec	Distance, m	Coefficient of longitudinal fiction, f	Distance m D2=v2/254f	Calculated values	
						d1+d2	Round off
1	80	2.5	56	0.35	72	128	130
2	100	2.5	70	0.35	113	183	190

2.5.16 Minimum Vertical Curve

During the construction of Peripheral Ring Road (PRR), the minimum length of vertical curves to be provided is 0.6 times the design speed as per AASTO and IRC:SP: 23 designed standards. The minimum length of vertical curves are calculated and given in Table 2.9.

Table 2.9: Minimum Length of Vertical Curve

S. No	Design speed, kmph	Minimum length of Vertical Curve
1	65	40
2	80	50
3	100	60

2.5.17 Horizontal Clearance to Obstructions

Horizontal clearance is a relatively flat area provided beyond the edge of the traveled way for the recovery of errant vehicles. During the construction of Peripheral Ring Road (PRR), This zone will be of 3.0 m distance and meet the AASTO and IRC: SP: 23 designed standards.

2.5.18 Road Designs

In Peripheral Ring Road (PRR), BDA has conceptualized 8-lane expressway with service roads and BRTS (exclusive public bus transport system) on both directions. Also provision is made along the central median (which is 12m wide) for providing the mono/metro rail facility.

2.5.19 Highway Design

The proposed Peripheral Ring Road (PRR) alignment has been designed for a speed of 100 kmph where ever possible. However, at a few locations the designs have been carried out for 80 kmph owing to restrictions at site. The vertical curves are designed as per the guidelines of IRC SP: 23. The summit curves are designed for the stopping site distance with a minimum vertical curve length of 73.6A and valley curves are designed for headlight distance with a minimum vertical curve length of 41.5A; where A is the algebraic difference in grades expressed as percentage.

2.5.20 Interchanges

An interchange is a grade separated intersection with connecting roadways for turning traffic between highway and approaches. The intersections are designed during the construction of Peripheral Ring Road (PRR) after contemplating the guidelines and schemes given in AASHTO and IRC: 92 guidelines. The proposals at interchanges are depicted in Table 2.10.

Table 2.10: Proposals at Interchanges

S. No.	Chainage	Intersecting Road	Type of Proposal
1	0	Tumkur Road (NH-4)	cloverleaf interchange
2	4+344.969	Hesarghatta Road	Flyover along PRR
3	14+422.500	Doddaballapur	Vehicular underpass along PRR and 6 lane Flyover along Doddaballapura road
4	18+637.242	Bellary Road (NH-7)	Vehicular underpass along PRR and 6 lane flyover along Bellary road.
5	25+596.788	Hennur Road	Vehicular underpass along PRR and 4 lane flyover along Hennur road.
6	36+233.070	Old Madras Road (NH-4)	Cloverleaf interchange

7	38+558.606	Whitefield-Hoskote Road	Flyover along PRR and Vehicular underpass along Whitefield- Hoskote road.
8	54+023.348	Hosekote-Anekal Road	Flyover along PRR and Vehicular underpass along Hoskote-Anekal road.
9	56+710.979	Sarjapur Road	Vehicular underpass along PRR and 4 lane flyover along Sarjapura road.
10	65+548.420	Hosur Road (NH-7)	Cloverleaf interchange

2.5.21 Treatment for Junctions

All the major junctions which Peripheral Ring Road (PRR) intersects are grade separated as per IRC: 92. The Tables from 2.11 to 2.13 gives the various proposals put forth at the various important road crossings, rail crossings and water bodies.

Tables 2.11: Important Road Crossings

S. No	Intersecting Road	PRR Chainage
1	Tumkur Road (NH 4)	0
2	Hesarghatta Road (SH)	4992.807
3	Doddaballapur (SH 9)	15085.349
4	Bellary (NH 7)	19301.547
5	Hennur Road	26254.711
6	Old Madras Road (NH 4)	36955.967
7	Whitefield Road	41134.516
8	Hosekote – Anekal	53410.008
9	Sarjapur Road	56098.277
10	Hosur (NH 7)	64654.694

Tables 2.12: Important Railway crossings

S. No	Railway Crossing	PRR Chainage	Railway Chainage
1	Bangalore - Tumkur	4861.919	15/657 from Bangalore city station
2	Bangalore – Doddaballapur	15808.266	19/400 from Bangalore city station
3	Bangalore – Chikkaballapur	16711.309	002/642 from Yelahanka station
4	Bangalore - Chennai	43306.384	331/652 from Chennai station
5	Bangalore – Salem	59386.421	189/187 from Salem station

Tables 2.13: Major Water bodies along the PRR alignment

S. No.	Water bodies	Chainage (Km)	Distance (Kms)
1	Jarukabande Kaval Tank	14.43 – 18.65	8kms
2	Yalahanka Tank	18.65 – 25.60	4kms
3	Thirumanahalli Tank	25.60 – 36.32	4kms
4	Bidarena agrahara Tank	36.32 – 38.76	10kms
5	Chikkabanahalli Lake	43.13 – 53.22	8kms
6	Gunjur Lake	53.22	1.2kms
7	Kachamaranahalli Tank	53.53 – 55.9	6.0kms
8	Chikkanagamangala Lake	59.2 – 64.72	3.0kms

2.5.22 Accessibility

The Peripheral Ring Road (PRR) is speculated as a toll road. Provisions are provided for toll booths for tolling the road system. Accessibility to Peripheral Ring Road (PRR) is restricted to the following categories of roads

- National Highways;
- State Highways;
- Major District Roads.

2.5.23 Toll Plaza

The proposed Toll plaza to be located after the main carriage way for capturing the traffic exiting on Peripheral Ring Road (PRR) main carriage way. The service road will be discontinued at all the toll plaza locations and a traffic lane of 5.5m will be provided along the side of the toll plaza for BRTS movements. All the traffic passing through the toll plaza section of road will have to pay toll. The public bus transport buses will be exempted from paying the toll. For the locals using the service road, separate pass can be provided for gaining entry through the toll plaza. By providing the toll plaza away from the main carriageway, the main carriageway traffic is not disrupted. The toll plaza locations have been identified and given in Table 2.14**.**

Table 2.14: Toll Plaza locations:

S. No		Design Chainage (m)	Location	Toll able length (m)
1	Tumkur Road Interchange	1035.000	Main road toll plaza	4090
2	Hessarghatta ROB / Grade Separator	5125.000	Entry and Exit plaza - right side of interchange	
3	Doddaballapur road grade separator	14000.000	Entry and Exit plaza - left side of interchange	12965
4		16640.000	Entry and Exit plaza - right side of interchange	
5	Belalry road grade separator	18025.000	Entry and Exit plaza - left side of interchange	4025
6		19525.000	Entry and Exit plaza - right side of interchange	
7	Hennur road grade separator	24600.000	Entry and Exit plaza - left side of interchange	5075
8		26435.000	Entry and Exit plaza - right side of interchange	
9	Old Madras road grade separator	35080.000	Entry and Exit plaza - left side of interchange	10480
10		36835.000	Entry and Exit plaza - right side of interchange	
11	Whitefield road grade separator	38200.000	Entry and Exit plaza - left side of interchange	3120
12		39800.000	Entry and Exit plaza - right side of interchange	
13	Hosakote Sarjapura road grade separator	53380.000	Entry and Exit plaza - left side of interchange	15180
14		5490.000	Entry and Exit plaza - right side of interchange	
15	Banglore Sarjapura road grade separator	56100.000	Entry and Exit plaza - left side of interchange	2720
16		57530.165	Entry and Exit plaza - right side of interchange	

2.5.24 a) Rest Areas:

Rest areas are proposed at 3 locations, one each in each section. These are proposed to be located near to interchanges. The exact location of rest area will be dependent on land acquisition extends proposed by BDA. Typically, rest area will include facilities like toilets, dormitory, rest rooms, medical shops, dispensary, ATMs. In addition, rest area will also comprise of sufficient working area and space for repair shops, vulcanizing shops, service centre, spare parts shops, telephone booth, hotels and light refreshments with first aid facilities can be provided. Rest area will be adequately lit with high mast lighting. Th whole area will be elaborately landscaped to provide a pleasing environment.

2.5.25 Vehicular Underpass

The proposed Peripheral Ring Road (PRR) is designed as an access controlled expressway. The underpass provides a two lane divided carriageway. The vertical clearance for the underpass is kept as 5.50 m as per IRC 54 requirements. Also the vehicular underpass is provided with a 2.00m wide footpath.

2.5.26 Pedestrian Underpass

Pedestrian underpasses are provided at an interval not greater than 1000m unless there are restrictions due to site constraints. A rectangular subway section is adopted with the minimum width of pedestrian subway as 4.00m and the vertical clearance of 2.50m as per IRC: 103. The floor of the underpass is cambered to fall to channels on each side at a slope of 1 in 30.Provision is made to trap water entering from the ramps or steps.

2.5.27 Corridor Pavement and Drainage

The Corridor Pavement and drainage design consider for minimum of 15 years design life. With the increasing traffic and incidence of overloading, design traffic of greater than 30 msa is assumed pending traffic study and axle load survey: Using sub-grade soil having CBR of 2% min, the pavement composition as

adopted for Outer Ring Road (ORR) and as being presently used for Bangalore Development Authority (BDA) works is assumed. The min. general composition is assumed as per MOST standards as under:

- Sub-grade : 500 mm
- Granular sub-base : 300 mm
- Wet mix macadam : 300 mm
- Dense Bituminous macadam : 110 mm
- Semi-dense Bituminous macadam: 25 mm

For the provision of adequate drainage of rain water from the viaduct portion, drainage spouts with 50m dia stainless steel drain pipes shall be provided at an interval of 1.5 m c/c on either sides of carriageway in a staggered manner. The water on the earth filled portion shall be allowed to flow over the surface till the cross drain provided at the foot of the grade separator on either side of grade separator and then this water shall be taken to the road side drains through NP3 type RCC pipe of suitable size which shall be laid 600 mm below the road formation level over PCC bedding. The drainage arrangements shall be provided in the landscaping areas as well and then this water shall also be taken to the road side drains through NP3 type RCC pipe of suitable size which shall be laid 600 mm below the road formation level over PCC bedding.

2.6 Source of Water & Storage

The total water requirement for the Peripheral Ring Road (PRR) constructional activities, utilities and green belt requirement is estimated around 3.5 MLD. The source of water is BWSSB treated water and canal water which is transported through tankers over to the designated places of the project.

The desired storage capacity of water proposed to be around 2000 m^3. To ensure 24 hour water supply in zone, a 25 m^3 capacity of Storage Reservoir (SR) has been planned at constructing area of Peripheral Ring Road (PRR).

2.7 Manpower

The manpower requirement during the construction stage is basically the construction labor. The total labor requirement is estimated as follows given in Table 2.16 and the manpower requirements during operations are local persons.

Table 2.16

Manpower – During Construction Phase

Development Year	Construction Labour
Year 1	575
Year 2	1000

2.8 Power Source

During operational process of the Peripheral Ring Road (PRR) an SPV distribution to all Individual activities will be undertaken. Initially power would be sourced from KPTCL to provide Uninterrupted Power Supply to the contractor during constructional phase.

2.9 Raw Material

The Raw materials required for the construction of Peripheral Ring Road (PRR) are as follows.

Sub-grade: 500 mm, Granular sub-base: 300 mm, Wet mix macadam : 300 mm, Dense Bituminous macadam : 110 mm, Semi-dense Bituminous macadam: 25 mm.

CHAPTER 3

DESCRIPTION OF ENVIRONMENT & SOCIO-ECONOMIC STUDIES

3.1 Preamble

Baseline Environmental status in and around the proposed Peripheral Ring Road (PRR) project located in Bangalore city depicts the existing conditions of Air, Water, Noise, Soil and Socio-economic environment. The baseline data was collected for various environmental components viz. Air, Noise, Water, Land and Socio-economics so as to compute the impacts that are likely to be arising out of the constructional activities covering an area of 2 km radially from the proposed project Peripheral Ring Road (PRR). In keeping with the legislative requirements, EIA Consultants M/s RAMKY Enviro Engineers Ltd, Hyderabad have carried out REIA (Rapid Environmental Impact Assessment) study based on the monitoring data of Air, Water, Noise and Soil collected for the Winter Season (December (2009) to February (2010) and collected the data through primary and secondary sources. The prediction of impacts on the base line environment due to the proposed project development has been carried out for this season based on the meteorological data collected from the Indian Meteorological Department (IMD).The details of the baseline study are presented in this chapter and also an Environmental Management Plan (EMP) has been prepared to manage and mitigate anticipated impacts.

3.2 Site Description

The proposed Peripheral Ring Road (PRR) takes off at CH 17A on Bangalore Pune NH4 about 150 m from major bridge across Arkavathy River. This 65 km peripheral road is planned by Bangalore Development Authority (BDA). It will be linking the major highways and the district roads right from Tumkur Road, Mysore Road, Old Madras Road and Hosur Road. The upcoming of Peripheral Ring Road (PRR) is expected to instigate vast developments along the corridor.

3.3 Location of the Project

The proposed Peripheral Ring Road (PRR) falls between the following geographic coordinates:

Latitude: 12^0 51' 03.6" to 13^0 07' 44.4'' E

Longitude: 77^0 28' 48" to 77^0 46' 51.6'' N

The project area is covered in Bangalore District. The buffer zone of project site covered in Survey of India Topo sheet No: 57 G/8, 57 G/12, 57 G/16, 57 H/5, 57 H/9 and 57 H/13. The proposed project is falling adjacent to the catchment area of Thippagondanahalli reservoir and also the Gas pipe line installed by the M/s. Petronet MBH Pvt. Ltd., care has been taken to avoid disturbance to the catchment area where natural flow of storm water. Regarding Gas pipe line, the proposed project is away from the pipe line installed (500 m). Hence there is no disaster anticipated.

Meteorological conditions

The study of meteorological conditions forms an intrinsic part of the Rapid Environment Impact Assessment (REIA) Study. The meteorological conditions of an area and the constructional activities are both intertwined and each has a definite influence over the other. Favorable weather conditions and the surroundings help the successful operation of project, while the construction activity influences the weather in both positive as well as negative ways.

The dispersion/dilution of the released pollutant over a large area will result in considerable reduction of the concentration of a pollutant. The dispersion in turn depends on the weather conditions like the wind speed, direction, temperature, relative humidity, mixing height, cloud cover and also the rainfall in the area.

A) Climate

The climate in the study region is generally hot and humid and is characterized with seasonal variations;

Winter	Dec to Feb
Summer	March to May
Monsoon	June to August
Post Monsoon	Sep to Nov

The climate setting of the area has been arrived by collecting the existing secondary data from IMD station Bangalore and by generation of primary data to ascertain the values.

Summary of the climatological data is presented here under. The data has been ascertained by establishment of a micro-meteorological station in the project area.

B) Temperature

The district has differing climatic condition in different areas on account of elevation and vegetation. April to June is warmest months. The temperature Bangalore gets down with the onset of South West monsoon and North East tumbles to a minimum of 15^0C by January after which there is reversal trend till the temperature reaches maximum of 34^0C.

C) Humidity

The air is generally humid in the region during the monsoon season when the relative humidity at 0830 hr was observed to be with a minimum and a maximum of 58% and 70% respectively. Similarly, at 1730hr, the value was observed to be with a minimum and maximum of 35% and 65% respectively. Generally, the weather during the other seasons was observed to be dry.

D) Rainfall

The district annual normal rainfall is 859 mm of which South-West monsoon account for 59.3% of the normal while North-East monsoon contributes 24.7% of the normal rainfall.

Predominant rainy season (Monsoon)	: July and October
Most rainy Month	: October
Most number of rainfall occurrences	: October

3.4 Meteorological Scenario

Regional meteorological scenario helps to understand the trends of the climatic factors. It also helps in determining the sampling stations in predicting the post project environmental scenario. Meteorological Scenario exerts a critical influence on Air Quality as the pollution arises from the interaction of atmospheric contaminants with adverse meteorological conditions such as temperature inversions, atmospheric stability and topographical features.

The critical weather elements that influence air pollution are wind speed, wind direction, temperature, which together determines atmosphere stability. Hence it is an indispensable part of any Air Pollution Studies and required for interpretation of base line information.

Wind speed and direction data recorded during the study period is useful in identifying the influence of meteorology on the air quality of the area. The meteorological data was collected at the site by installing an automatic weather station.

3.5 Monitoring Period

Meteorological data was collected for the study area during the months of winter (December, January and February (2009 - 2010), Wind Speed, Wind Direction, Temperature, and Relative Humidity were recorded on hourly basis for the total

study period. Wind roses on sixteen-sector basis (N, NNE, NE, ENE, E, ESE, SE, SSE, S, SSW, SW, WSW, W, WNW, NW, NNW) have been drawn for 00-08, 09-16, 17-24 and 00-24 hours. The details of the wind pattern along with the wind speed for the study period are presented in the following sections.

3.5.1 Wind Pattern during December - 2009

December month wind in various speed categories was calculated on the basis of total number of observations recorded in that particular wind speed category during the study period and is given in Table 3.1**.** The wind rose for the month of December 2009 is shown in Figure 3.1**.**

A glance at the average 24-hour wind rose diagram for the month of December 2009 reveals that the most dominant wind direction is E followed by NE,N,NNE and ENE during this time period with percentage of 41.4 %, 27.69 %, 10.48%, 3.63% and 2.15% respectively. Calm conditions prevailed for 9.41% of the total time.

3.5.2 Wind Pattern during January 2010

The daily-recorded data was processed and for the 00-24 hour's average data was also calculated. In, January occurrence of wind in various speed categories was calculated on the basis of total number of observations recorded in that particular wind speed category during the study period is tabulated in Table 3.2. The wind rose diagram for the month of January 2010 is given in Figure 3.2.

On keen analysis of the data recorded for this time duration reveals that the most predominant wind direction was E with the winds blowing for 38.71 % of the total time which is followed by SE, NE, N and NNE with a percentage frequency recording of , 13.44, 11.83, 5.38, 5.24. Wind was also recorded from other all directions which were comparatively. Calm conditions prevailed for 9.68 % of the total time.

3.5.3 Wind Pattern during February 2010

The daily-recorded data was processed and for the 00-24 hour's average data was also calculated. The May occurrence of wind in various speed categories was calculated on the basis of total number of observations recorded in that particular wind speed category during the study period and given in Table 3.3. The wind roses for the month of February 2010 are shown in Figure 3.3.

Keen observation of the data recorded for this period reveals that the most predominant wind direction was E with the winds blowing for 45.98 % of the total time which is followed by N,NE,ENE and SE with a percentage frequency recording are 18.45%, 13.39%, 3.57%, 2.83% respectively. Calm conditions prevailed for 9.82 % of the total time.

3.5.4 Wind pattern during monitoring of Winter Season 2009

The meteorological data-recorded for 00-24 hours with hourly interval with reference to wind speed and wind direction and the average data is interpreted and shown in the table 3.4. The wind rose for winter season (2009-10) monitoring is shown in Figure 3.4.

Table 3.1: Frequency Distribution Table for 00-24 hours for December 2009

Wind Direction	Wind Speed m/sec					Total
	0.3 - 1.4	1.4 - 2.7	2.7 - 4.1	4.1 - 5.4	>= 5.4	
N	7.12	2.96	0.27	0.13	0.00	10.48
NNE	2.96	0.67	0.00	0.00	0.00	3.63
NE	21.10	5.91	0.67	0.00	0.00	27.69
ENE	1.48	0.54	0.13	0.00	0.00	2.15
E	30.51	10.08	0.81	0.00	0.00	41.40
ESE	0.67	0.27	0.13	0.00	0.00	1.08
SE	0.94	0.94	0.27	0.00	0.00	2.15
SSE	0.67	0.13	0.00	0.00	0.00	0.81
S	0.54	0.27	0.00	0.00	0.00	0.81
SSW	0.00	0.00	0.00	0.00	0.00	0.00
SW	0.27	0.13	0.00	0.00	0.00	0.40
WSW	0.00	0.00	0.00	0.00	0.00	0.00
W	0.00	0.00	0.00	0.00	0.00	0.00
WNW	0.00	0.00	0.00	0.00	0.00	0.00
NW	0.00	0.00	0.00	0.00	0.00	0.00
NNW	0.00	0.00	0.00	0.00	0.00	0.00
						90.59
Calms <0.3m/s)						9.41
Total	66.26	21.91	2.28	0.13	0.00	100.00

Note: All values are in percentages

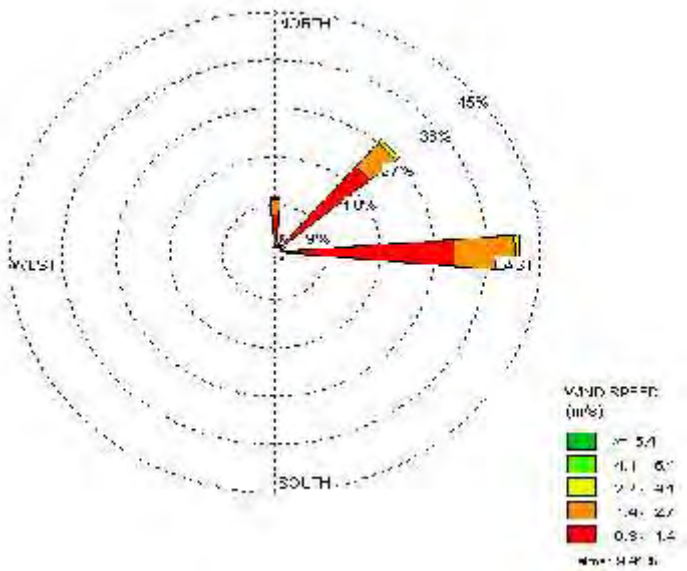


Figure 3.1: Wind Rose for the Month of December 2009 (00-24 Hours)

Table 3.2: Frequency Distribution for 00-24 hours for January 2010

Wind Direction	Wind Speed m/sec					Total
	0.3 - 1.4	1.4 - 2.7	2.7 - 4.1	4.1 - 5.4	>= 5.4	
N	3.76	1.34	0.27	0.00	0.00	5.38
NNE	3.23	1.75	0.27	0.00	0.00	5.24
NE	8.33	2.82	0.67	0.00	0.00	11.83
ENE	3.63	1.08	0.27	0.00	0.00	4.97
E	23.12	12.37	3.23	0.00	0.00	38.71
ESE	1.88	0.94	0.13	0.00	0.00	2.96
SE	6.99	4.97	1.48	0.00	0.00	13.44
SSE	2.55	0.94	0.27	0.00	0.00	3.76
S	1.48	0.27	0.13	0.00	0.00	1.88
SSW	0.00	0.00	0.00	0.00	0.00	0.00
SW	0.67	0.13	0.27	0.00	0.00	1.08
WSW	0.00	0.00	0.00	0.00	0.00	0.00
W	0.67	0.27	0.13	0.00	0.00	1.08
WNW	0.00	0.00	0.00	0.00	0.00	0.00
NW	0.00	0.00	0.00	0.00	0.00	0.00
NNW	0.00	0.00	0.00	0.00	0.00	0.00
						90.32
Calms <0.3m/s)						9.68
Total	56.32	26.88	7.12	0.00	0.00	100.00

Note: All values are in percentages

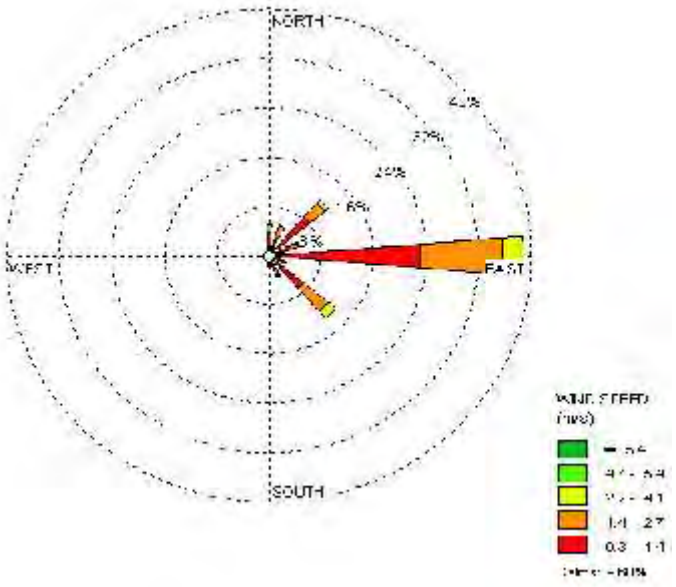


Figure 3.2: Wind Rose for the Month of January 2010 (00-24 Hours)

Table 3.3: Frequency Distribution for 00-24 Hours for February 2010

Wind Direction	Wind Speed m/sec					Total
	0.3 - 1.4	1.4 -2.7	2.7 - 4.1	4.1 - 5.4	>= 5.4	
N	15.33	2.83	0.30	0.00	0.00	18.45
NNE	1.34	0.30	0.00	0.00	0.00	1.64
NE	9.82	3.42	0.15	0.00	0.00	13.39
ENE	3.13	0.45	0.00	0.00	0.00	3.57
E	35.57	10.12	0.30	0.00	0.00	45.98
ESE	2.38	0.00	0.00	0.00	0.00	2.38
SE	1.79	1.04	0.00	0.00	0.00	2.83
SSE	0.00	0.00	0.00	0.00	0.00	0.00
S	0.89	0.00	0.00	0.00	0.00	0.89
SSW	0.00	0.00	0.00	0.00	0.00	0.00
SW	0.15	0.15	0.00	0.00	0.00	0.30
WSW	0.00	0.00	0.00	0.00	0.00	0.00
W	0.30	0.15	0.00	0.00	0.00	0.45
WNW	0.30	0.00	0.00	0.00	0.00	0.30
NW	0.00	0.00	0.00	0.00	0.00	0.00
NNW	0.00	0.00	0.00	0.00	0.00	0.00
						90.18
Calms <0.3m/s)						9.82
Total	70.98	18.45	0.74	0.00	0.00	100.00

Note: All values are in percentages

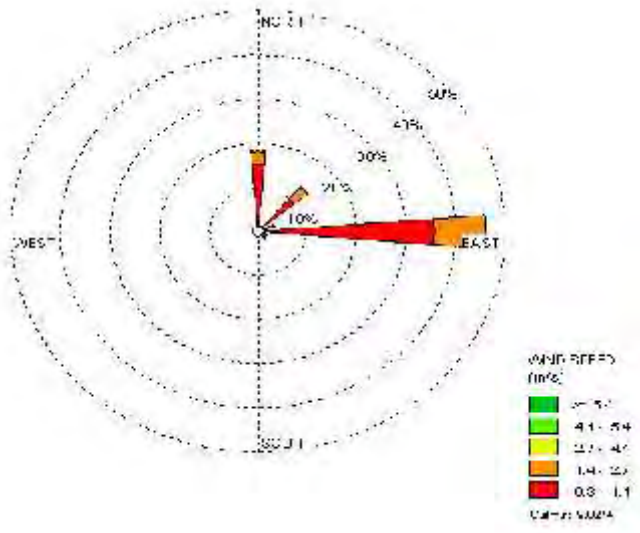


Figure 3.3: Wind Rose for the Month of February 2010 (00-24 Hours)

Table 3.4: Frequency Distribution Table for 00-24 Hours for winter (2009-10)

Wind Direction	Wind Speed m/sec					Total
	0.3 - 1.4	1.4 - 2.7	2.7 - 4.1	4.1 - 5.4	>= 5.4	
N	7.12	2.96	0.27	0.13	0.00	10.48
NNE	2.96	0.67	0.00	0.00	0.00	3.63
NE	21.10	5.91	0.67	0.00	0.00	27.69
ENE	1.48	0.54	0.13	0.00	0.00	2.15
E	30.51	10.08	0.81	0.00	0.00	41.40
ESE	0.67	0.27	0.13	0.00	0.00	1.08
SE	0.94	0.94	0.27	0.00	0.00	2.15
SSE	0.67	0.13	0.00	0.00	0.00	0.81
S	0.54	0.27	0.00	0.00	0.00	0.81
SSW	0.00	0.00	0.00	0.00	0.00	0.00
SW	0.27	0.13	0.00	0.00	0.00	0.40
WSW	0.00	0.00	0.00	0.00	0.00	0.00
W	0.00	0.00	0.00	0.00	0.00	0.00
WNW	0.00	0.00	0.00	0.00	0.00	0.00
NW	0.00	0.00	0.00	0.00	0.00	0.00
NNW	0.00	0.00	0.00	0.00	0.00	0.00
						90.59
Calms <0.3m/s)						9.41
Total	66.26	21.91	2.28	0.13	0.00	100.00

Note: All values are in percentages

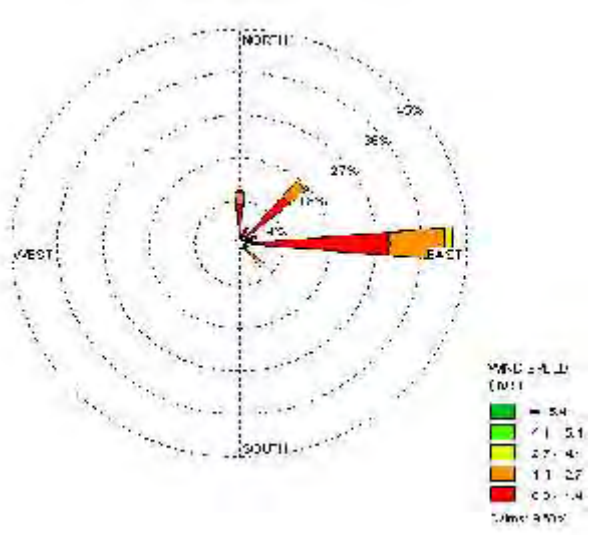


Figure 3.4: Wind Rose for the Month of winter (2009 – 10) (00-24 Hours)

3.6 Ambient Air Quality

Ambient air quality in the proposed project area is moderately good due to semi urban nature, no major polluting industries and existing plantation in that area.

Secondary information is not available on ambient air quality of the project area. No major sources of air pollution were identified during the field surveys; the traffic flow is expected to have some impact on air quality. The air quality status nearby the project corridor is presented**:** Since the project area is of rural nature, the collected baseline data has been compared with Residential/Rural/other areas.

The base-line status of the ambient air-quality was assessed using a scientifically designed ambient air-quality monitoring network. The design of this network was based on the following:

- Meteorological conditions
- Assumed regional influences on background air quality
- Areas where impact would most likely to be greatest
- Present land use along the proposed alignment
- Traffic congestion points.

Ambient Air Quality Monitoring (AAQM) stations were set up at ten locations as indicated in Table 3.5 below.

Table 3.5: Ambient Air Quality Monitoring (AAQM) stations

Code	Location	Description of the sampling location
AAQ1	Start point @ Tumkur Road	The monitoring was undertaken 50 m away from proposed road construction. The sampler was set on a Commercial building and vehicular traffic flow on the highway was heavy.
AAQ2	End point @ Hosur Road	The monitoring was undertaken 20 m away. The sampler was set on a building and vehicular traffic flow on the highway was heavy.
AAQ3	Veerasandra Industrial Area	The monitoring was undertaken 50 m away. The sampler was set on a Commercial building and vehicular traffic flow on the highway was heavy.
AAQ4	Hosur Road to Old	The monitoring was undertaken 30 m away. The sampler was

	Madras Road Junction	set on Hotel building and vehicular traffic flow on the highway was moderate.
AAQ5	Old Madras Road to Hosur Road Junction	The monitoring was undertaken 50 m away on a Hotel building and the traffic flow on the highway was moderate.
AAQ6	Old Madras Road to Bellary Road Junction	The monitoring was undertaken 10 m away from the project. The sampler was set on a Residential building and vehicular traffic flow on the highway was moderate.
AAQ7	Bellary Road to Old Madras Road Junction	The monitoring was undertaken 10 m away. The sampler was set on a Residential building and vehicular traffic flow on the highway was moderate.
AAQ8	Bellary Road to Tumkur Road Junction	The monitoring was undertaken 10 m away. The sampler was set on a Residential building and vehicular traffic flow on the highway was moderate.
AAQ9	Tumkur Road to Bellary Road Junction	The monitoring was undertaken 10 m away. The sampler was set on a Residential building and vehicular traffic flow on the highway was moderate.
AAQ10	Forest area	The monitoring was undertaken 10 m away. The sampler was set in an ambient air

At each of the ten locations monitoring was undertaken for two days a week over a four Weeks period (as per National Ambient Air Quality Monitoring (NAAQM) guidelines) Data for the following parameters were collected.

- Particulate Matter (PM_{10} & $PM_{2.5}$)
- Sulphur Dioxide (SO_2)
- Oxides of Nitrogen (NO_x)

Sampling of Particulate Matter (PM_{10} & $PM_{2.5}$) SO_2 & NO_x was undertaken on a 24-hourly basis while three 8- hourly samples were collected for PM, SO_2 & NO_x were monitored using M/s Enviro tech Instruments; Reparable Dust Sampler (APM 460) along with gaseous attachment (Model APM 415 & 411). Whatman GF/A filter papers were used for PM.

A summary of results for each location is presented in **Table 3.6**. These are compared with the standards prescribed by the Central Pollution Control Board (CPCB) for residential and rural zone.

Table 3.6. Results compared with the standards prescribed by the Central Pollution Control Board (CPCB) for Residential, Industrial & Rural zone

Name of Monitoring Equipment used			**Respirable Dust Sampler (RDS)**											
Equipment sensitivity			**PM 10 (µg/m3) (Gravimetric method)**			**PM 2.5(µg/m3) (Gravimetric Method)**			**SO2(µg/m3) (Ultraviolet Fluorescence Method)**			**Nox(µg/m3) (Modified Jacob & Hochheiser (Na Arsenic Method)**		
Permissible AAQ standard Industrial/Rural/ /Residential and other area			**100 µg/m3 (24 hourly)**			**60 µg/m3 (24 hourly)**			**80 µg/m3 (24 hourly)**			**80 µg/m3 (24 hourly)**		
Ecologically sensitive area (Notified by central government)			**100 (24 hourly)**			**60 (24 hourly)**			**80 (24 hourly)**			**80 (24 hourly)**		
Monitoring Location	**No. of Samples Drawn**	**Category* (R, I, S)**	**Min.**	**Max.**	**98% percentile**	**Min.**	**Max.**	**98% percentile**	**Min.**	**Max.**	**98% Percentile**	**Min.**	**Max**	**98% percentile**
AAQ1	24	I	81.8	84.2	82.5	44.2	47.2	46.2	12.7	20.6	20.1	20.5	27.8	27.8
AAQ2	24	I	85.3	84.2	82.5	41.3	45.3	44.3	12.8	18.4	18.0	20.4	22.5	22.5
AAQ3	24	I	85.3	83.6	82.0	41.5	45.9	44.9	12.6	13.2	12.8	20.9	22.8	22.8
AAQ4	24	I	80.0	86.5	84.7	41.1	42.8	41.9	12.6	14.0	13.7	20.1	23.4	22.9
AAQ5	24	I	82.6	84.7	83.0	47.4	47.4	46.4	12.8	16.1	15.7	20.2	28.5	28.2
AAQ6	24	I	83.9	88.6	86.8	46.1	48.1	47.1	12.1	17.6	17.2	20.6	28.8	28.7
AAQ7	24	R	81.5	89.4	87.6	44.8	46.6	45.6	12.3	15.4	15.0	20.8	24.3	23.8
AAQ8	24	R	80.4	83.3	81.6	43.6	45.8	43.2	12.4	14.8	14.5	20.3	23.6	22.7
AAQ9	24	R	81.2	85.3	83.5	42.5	45.2	44.8	12.7	16.6	16.2	20.6	24.6	24.0
AAQ10	24	R	58.1	69.4	68.0	43.8	45.1	44.1	8.5	10.1	9.8	20.7	26.3	24.5

The PM_{10} concentration was ranged from 80.5 to 89.0 µg/ m^3, $PM_{2.5}$ is 40.4 to 46.8 µg/ m^3, NO_x ranged from 22.6 to 32.5 µg/ m^3, SO_2 ranged from 12.4 to 19.6 µg/ m^3. However, all parameters in ambient air were within the recommended air quality standards prescribed by the CPCB.

3.7 Noise Levels

With the project road carrying traffic passing through semi urban areas, the noise levels of the region were expected to be high. However no secondary information was available in this regard.

A preliminary reconnaissance survey was therefore undertaken to identify noise generating sources and sensitive receptors such as schools, built-up areas. Noise levels were monitored in the selected 10 locations listed in Table 3.7

Table 3.7 : Ambient Noise Monitoring (ANM) stations

Code	Location	Description of the sampling location
AN1	Start point @ Tumkur Road	The monitoring was undertaken 50 m away. The sampler was set on a Commercial building and vehicular traffic flow on the highway was heavy.
AN2	End point @ Hosur Road	The monitoring was undertaken 20 m away. The sampler was set on a building and vehicular traffic flow on the highway was heavy.
AN3	Veerasandra Industrial Area	The monitoring was undertaken 50 m away. The sampler was set on a Commercial building and vehicular traffic flow on the highway was heavy.
AN4	Hosur Road to Old Madras Road Junction	The monitoring was undertaken 30 m away. The sampler was set on Hotel building and vehicular traffic flow on the highway was moderate.
AN5	Old Madras Road to Hosur Road Junction	The monitoring was undertaken 50 m away from Hotel building and the traffic flow on the highway was moderate.
AN6	Old Madras Road to Bellary Road Junction	The monitoring was undertaken 10 m away. The sampler was set on a Residential building and vehicular traffic flow on the highway was moderate.
AN7	Bellary Road to Old Madras Road Junction	The monitoring was undertaken 10 m away. The sampler was set on a Residential building and vehicular traffic flow on the highway was moderate.
AN8	Bellary Road to Tumkur Road Junction	The monitoring was undertaken 10 m away. The sampler was set on a Residential building and vehicular traffic flow on the highway was moderate.
AN9	Tumkur Road to Bellary Road Junction	The monitoring was undertaken 10 m away. The sampler was set on a Residential building and vehicular traffic flow on the highway was moderate.
AN10	Forest area	The monitoring was undertaken 10 m away. The sampler was set on open scrub and vehicular traffic flow on the highway was moderate.

3.7.1 Methodology

At each of the 10 locations, Sound Pressure Level (SPL) measurements were taken at an interval of 1 minute using a sound level meter of Lutron make Digital Sound Level Meter. At all 10 locations, day time noise levels were monitored during the period 6 am to 10 pm and night-time noise levels during the period 10 pm to 6 am.

Noise readings, with setting at 'A' response - slow mode, were recorded. The readings were tabulated and a frequency distribution table prepared from which 24 hourly, hourly,

L10, L50,

L90, Leq, Lday, Lnight, and Ldn were calculated.

L10, L50, L90, Leq, Lday, Lnight, Ldn are statistical indicators.

L10 - is the noise level exceeded 10 percent of the time;

L50 - is the noise level exceeded 50 percent of the time; and

L90 - is the noise level exceeded 90 percent of the time.

Leq - is the continuous equivalent sound level providing the same sound energy as the actual fluctuating sound measured in the same period (Leq is significant when sounds fluctuate) – it is calculated as: (L10 - L90)

Leq (hrly) = L50 + ---------- n

Where n is the number of readings taken over a period of one hour, 60 in the present Case.

Lday - is the Logarithmic average of hourly Leq's for day-time hours from 6 am to 10 pm; Lnight- is the Logarithmic average of hourly Leq's for night-time hours from 10 pm to 6am; and Ldn – is the Day-Night Sound Level, the noise rating developed by CPCB for the specification of acceptable community noise levels from all sources - a 24 Hr equivalent sound level.

During night-time (10 pm to 6 am) a 10 dB (A) weighting penalty is added to the instantaneous sound level before computing the 24-hr average. This night-time

penalty accounts for the fact that night-time noise when people are sleeping is judged as more annoying than the same noise during the Daytime.

3.7.2 Presentation of Results

Day-time noise levels were found to vary between 54.2 dB (A) and 82.4 dB (A). The maximum day-time noise level of 82.4 dB (A) was observed. It is observed that at most of the locations the day-time noise levels exceeded the permissible limit of 55 dB (A) specified by CPCB for residential areas. This noise is mainly from vehicular traffic and local domestic/commercial activities.

Table 3.8 : Ambient Noise level leq dB(A)

Ambient Noise level leq dB(A)	**Noise level dB (A)**	
Location of sampling station	**Day Time - dB (A)**	**Night Time - dB (A)**
CPCB - Standards	**55**	**45**
AN1	82.4	62.2
AN2	75.2	63.2
AN3	54.2	41.8
AN4	56.2	41.0
AN5	80.3	58.6
AN6	79.0	55.0
AN7	60.2	52.6
AN8	58.1	40.4
AN9	81.1	59.6
AN10	56.2	40.3

Night-time noise levels were found to vary between 40.3 dB (A) and 63.2 dB (A). The maximum night time noise level of 63.2 dB (A) was observed. Most of the locations are surrounded by residential houses. It is observed that from 10 locations, 4 were within the permissible limits and 6 exceeded the permissible limit specified by CPCB for residential areas. The main noise sources were vehicular traffic and local domestic / commercial activities.

3.8 Surface Water Quality

Major surface water bodies exist along the project corridor are listed in Table 3.9 and selected to monitor the quality levels and the results are shown in table 3.10.

Table 3.9 : Surface water monitoring stations

S. No	Location	Sample code	Location description
1	Jaraka Bande Kaval Kere	**SW1**	Water was collected from 2 m depth
2	Yelahanka Tank	**SW2**	Water was collected from 4 m depth
3	Tirumanahalli Tank	**SW3**	Water was collected from 1.5 m depth
4	Biderana Agrahara Tank	**SW4**	Water was collected from 2 .5m depth
5	Chikkabanahalli Tank	**SW5**	Water was collected from 2 m depth
6	Gunjur Tank	**SW6**	Water was collected from 4 m depth
7	Kacharakanahalli Tank	**SW7**	Water was collected from 3 m depth
8	Chikkanagamangala Tank	**SW8**	Water was collected from 2.5 m depth

Table 3.10: Surface water Analysis

Parameters	SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8	IS:10500(2012) Standards	
									Acceptable	Permissible
Temperature (°C)	32	33	31	30	33	31	33	32	--	--
pH	7.5	7.4	7.4	7.2	7.3	7.5	7.5	7.5	6.5-8.5	No Relaxation
Conductivity	1200	1280	1140	1080	900	1360	1450	1620	--	--
Nitrogen (Nitrate) mg/l	0.4	0.7	0.6	0.5	0.4	0.6	0.7	0.3	45	No relaxation
Dissolved Oxygen mg/l	6.0	6.2	6.1	6.1	6.6	5.6	6.0	6.5	> 6 mg/l	--
BOD mg/l	4.5	3.5	4.5	4.5	5.2	4.4	4.5	5.9	< 3 mg/l	--
Fecal Coliform (MPN/100ml)	20	15	14	24	12	14	15	15		---
Total Coliform (MPN/100ml)	174	180	178	184	182	184	172	168	< 50	----

3.9 Ground Water Quality

The groundwater occurrence for the project section is in mainly laterites formations. In laterites, the inherent porosity, jointed nature and fractures control water bearing capacity. In granites and granite gneiss formation ground water occurs under unconfined, Semi-confined and confined conditions in weathered and fractured zones.

Following table gives chemical quality of lateritic and Gneissic aquifers as given by Central Ground Water Board (CGWB), New Delhi. The information regarding the ground water quality along the project section is unavailable and hence a generalized quality is considered depending on the aquifers available in the project section. 8 locations listed in Table 3.11 were selected to monitor ground water quality.

Table 3.11: Ground Water Sample Location

S. No	Location	Sample code	Location description
1	Madanayakanahalli	**GW1**	Water was collected from 60m depth bore well used for drinking and domestic purposes.
2	Hebbagudi	**GW2**	Water was collected from 60 - 70 m depth bore well used for drinking and domestic use.
3	Veerasandra	**GW3**	Water was collected from 80 m depth bore well used for drinking and domestic purposes.
4	Gunjur	**GW4**	Water was collected from 95 m depth bore well used for drinking and domestic purposes.
5	Kadgodi	**GW5**	Water was collected from 85 - 75 m depth bore well used for drinking and domestic purposes.
6	Doddagubbi	**GW6**	Water was collected from 65 - 80 m depth bore well used for drinking and domestic purposes.
7	Bairati	**GW7**	Water was collected from 65 - 70 m depth bore well used for drinking and domestic purposes.
8	Avalahalli	**GW8**	Water was collected from 60 m depth bore well used for drinking and domestic purposes.

Table 3.12: Groundwater Analysis Report

Parameters	GW1	GW2	GW3	GW4	GW5	GW6	GW7	GW8	IS:10500(2012) Standards	
									Acceptable	Permissible
pH	7.59	7.28	7.58	7.42	7.95	7.36	7.58	7.65	6.5-8.5	No Relaxation
Conductivity	1360	1234	1248	1360	1460	1360	1320	1420	----	-----
Ca mg/l	2	12	13	24	14	28	32	28	75	200
Mg mg/l	5.8	4.8	4.2	5.2	3.1	5.4	5.8	5.3	30	100
Na mg/l	4.8	2.8	4.8	4.6	3.8	4.2	4.4	4.5		
K mg/l	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6		
CO_3 mg/l	140	126	118	132	98	124	110	310		
$HC0_3$ mg/l	112	128	110	128	132	142	108	112		
CL mg/l	180	140	128	132	146	152	142	132	250	1000
SO_4 mg/l	28	22	20	16	28	24	20	28	200	400
NO_3 mg/l	11	14	10	14	12	08	10	14	45	No relaxation
Fe mg/l	0.12	0.14	0.16	0.22	0.21	0.18	0.24	0.24	0.3	No relaxation

Ground water quality observation: chlorides are within permissible limits and bicarbonates predominate over sulphates and nitrates. Ground water quality is also free from fluoride and alkali hazards.

In order to establish baseline conditions, 8 surface-water and 8 groundwater samples were collected. The sampling locations were selected after the field reconnaissance and physical observation of all the water bodies / resources in the influence area. Samples were collected as per IS- 2488 (Part I-V). Baseline information on the quality of surface and ground water sources along the alignment of proposed road is required before predictions of impacts. In order to represent the true profile of the project area, samples from all the major surface water sources through which the project road runs were collected and analysed (as per IS- 2488 (Part I-V)). Grab samples were collected from these locations and analysed for various parameters as per the procedures laid down in the APHA and BIS. Atomic Absorption Spectrophotometer and UV/VIS Spectrophotometer were used for analysis of water samples according to the necessity.

3.10 Land Environment

The main objective of interpreting soil for engineering purposes is to assess its suitability for various engineering practices on a sustained basis. But under the purview of this study only environmental properties of soil have been studied. The soil of the project region is lateritic, alluvial and marshy. The lateritic soils are predominant along the project section and characterized by high organic content, less of calcium and phosphorus. The soils are well drained from surface and acidic in nature. The alluvial soils occur in patches and are characterized by poor organic matter, and low calcium, phosphorus and potash content. These soils are well drained and acidic in nature. A marshy soil found in few sections of project area is subject to frequent flooding and show high water table. Soil samples were collected from 8 locations close to the project road and shown on Table 3.13.

Table 3.13: Soil monitoring locations

S. No	Location	Sample code	Location description
1	Madavara lake	**SQ1**	The sample was taken from marshy area
2	Doddathogur lake	**SQ2**	The sample was taken from agricultural area
3	Yelahanka lake	**SQ3**	The sample was taken from commercial area
4	Tirumalahalli tank	**SQ4**	The sample was taken from agriculture area
5	Biderenahalli lake	**SQ5**	The sample was taken from commercial area
6	Gunjur lake	**SQ6**	The sample was taken from agricultural area
7	Chikkabanahalli lake	**SQ7**	The sample was taken from commercial area
8	Soladevanahalli lake	**SQ10**	The sample was taken from forest area

The samples were collected by ramming a core-cutter into the soil up to a depth of 100 cm and soil samples were collected from three different depths viz. 30 cm, 60 cm and 90 cm below the surface. The samples from three different depths were homogenized and packed in a polythene plastic bag and sealed. The sealed samples were sent to laboratory for the analysis of physical, chemical parameters and heavy metal concentrations. The samples were then analyzed as per standard procedures. Results are presented in Table 3.14 and compared with the standard classifications of the Indian Council of Agricultural Research (ICAR).

Table 3.14: Soil Analysis Report

Parameters	SQ1	SQ2	SQ3	SQ4	SQ5	SQ6	SQ7	SQ8
Texture	Sandy	Sandy	Sandy	Sandy	Sandy clay	Sandy clay	Loam	sandy
pH	7.0	7.3	7.1	7.5	7.1	7.3	7.7	7.3
Moisture (%)	11.3	18.3	3.92	13.0	7.58	7.18	7.28	7.38
Organic Carbon (%)	0.58	0.68	0.22	0.33	0.82	0.82	0.82	0.82
Chloride (as Cl), mg/kg	3752	530	33	310	64	60	58	52
Nitrogen (as N), mg/kg	587	387	205	195	240	348	420	580
Phosphorus (as P), mg/kg	33	427	77	410	184	148	176	142
Potassium (as K), mg/kg	189	420	56	348	1043	1025	1040	1012
Alkalinity (as $CaCO_3$)	120	Nil	12	Nil	Nil	Nil	Nil	Nil
Electrical Conductivity, mS/cm	8920	1425	39	41	90	84	76	58
Sodium Absorption ratio	6.2	2	0.4	1.4	0.1	0.8	0.9	1.3

The soil results are compared with soil *classification* given in the Hand Book of Agriculture, Indian Council for Agricultural Research (ICAR), New Delhi. The analysis shows that the soil in the study area is sandy in five locations, sandy clay in two locations and sandy clay loamy in one location of the study area. The

bulk density varies from 1.32 gm/cm3 to 1.54 g/cm3 which indicate that the soil consists of mineral content. pH ranges from 7.0 to 7.7, which indicates that the soil is moderately alkaline.

Nutrients: Soil quality was tested for nutrients. Nitrogen values range from 195 to 587 mg/kg which indicates that medium to high nitrogen is available in soil for vegetation. Potassium and Phosphorus are found to be available in sufficient quantity to support vegetation whereas Calcium, Magnesium was available in low to medium quantities.

It was observed that, the soil samples were neutral in nature, with a pH range of 7.0 to 7.7. The percent of moisture content in the soil (3.92%) was the lowest among other samples. The essential parameters like nitrogen and phosphorous are fond to be better and sufficient respectively. For potassium the samples shows a wide range of 56 to 1043 mg/kg.

The base line environmental profile concludes that the project area under consideration is an environmentally sensitive area and would likely to affect the flora and fauna of the area. However, the impacts would be lower in these areas and could be termed as moderate.

In rest of the section, the construction and its associated components expected to cause a few temporary impacts during construction. Chapter 7 of this report identifies potential impacts of the project based on the environmental monitoring and available secondary information.

3.11 Details Of Flora And Fauna In The Study Area

The vegetation of Bangalore district in general is regarded as deciduous jungle type with the exception of the valleys and a majority of species inhabiting these areas exhibit xenomorphic. The Bannerghatta forests in Anekal taluk represent the original flora typical of this region, which includes dry deciduous and thorny shrub forests. Most of the area is under cultivation for several centuries and now there has been

felling of all woody plants for fuel resulting in the growth of scrub vegetation. Vast areas are covered by thickets of extensive growth of lantana and other xenomorphic thorny shrubs rendering the area impenetrable and forming a most striking feature of the vegetation. The topographical and climatic features of the district are subjected to small regional variations and are, by and large, favorable for the growth of a variety of plants, shrubs and trees. The last few decades have witnessed an almost unabated denudation of forest due to over-exploitation and the simultaneous expansion of agriculture and industry. The natural vegetation of the district may be broadly grouped into seasonal vegetation, roadside and avenue trees which are planted and cultivated flora.

3.11.1 Seasonal Vegetation

Seasonal vegetation is common in open waste lands and cultivated fields. This type of vegetation is active during the major part of the year and remains dormant only for a few months, starting from November or December and extending to May. After the first showers of monsoon in May, the ground, 'which is barren, becomes covered completely by green grass, and a few pioneer members such as Cassia hirsuta (kadu uttarani in Kannada), Cassia kleinii (procumbent herb), Cleome gynandra (hispid herb), Cleome monophylla (koli kalu gida), Cynodon dactylon (garike hullu, perennial herb), Cyperus iria (dabbe-jambu hullu,glabrous annual herb), Ch(lmaesyce hirta (achchegida), Heliotropium scabrum (spreading villous herb), Mullugo penphylla (spreading herb), Priva cordifolia (pubescent herb) and Tribulus terrestris (sannan'eggilu). As the monsoon advances, the ground vegetation becomes dominant and completely covered by many annual weeds which continue to flower till late in November or December.

There are several small puddles on the plateau on top of Bannerghatta which retain certain amount of rain water. These puddles are mostly inhabited by Aponogeten natans (acquatic tuberous herb). During September, October and November, these puddles are completely covered by Aponogetentans and the thick mat of floating leaves along with other aquatic plants like Nymphaea, nouchali (kendavare,

rhizomatous herb), (Nymphoides indicum (rhizomatous herb with floating branches) and Nelumbo nucifera (tavare) for a pleasant sight There are certain characteristic formations. on account of its thick mat of floating leaves. Its eradication is a problem. There are few tanks and puddles here and there, where one notices a pure association of Typha angustata (anejondu, common water weed) and Polygonum glabrum (niruganigalu, stoloniferous herb) or Nelumbo nucifera and Polygonum lanigerum (branched marsh herb). Polygonum plebejum (kempunellakki prostrate herb) is a common weed in waste places, roadsides and cultivated fields.

The following are the major plants species found at Study zone area are

Table No – 3.15: Flora details

1. Pycus Tamentes	*2. Sapindus Trifoliatus*
3. Bengalicncy	*4. Zizziphus Jajuba*
5. Religiosa	*6. Cordia Myxo.*
7. Butia Monosperma	*8. Manogedera indica*
9. Dalbergia	*10. Psyatium Gua*
11. Albezzia Amara	*12. Scmicanpus Anaeodium*
13. Albezzia Odorttissima	*14. Anacardium Occidetale.*
15. Albezzia Lebbeck	*16. Pongamia Pimata.*
17. Bombax Malabariean	*18. Cassia Celiota*
19. Ingadelse	*20. Cossia Nodosa.*
21. Aeacia Arabica	*22. Tabubca Gyeana*
23. Aeacia Lueophlio	*24. Tccoma Urgentio.*
25. Aeacia Chundra	*26. Sweithenis Mohogoul.*
27. Phonex Spp.	*28. Miehelia Cham Poica*
29. Palmairah Spp.	*30. Samtalum Albaum.*
31. Diospyrus tupra	*32. Strictunx Potatosum.*
33. Eucalyptus & Cassurrima Plus.	*34. Azadirecta indica*
35. Acacia aurieuli formies.	*36. Melia dudea*
37. Denolro calamus Strictus	*38. Melia Azadereah.*
39. Bambooja Bamboo.	*40. Bahunia Purpurea.*
41. Eruthrina inticaq.	*42. Bahunia raccmosa.*
43. Peltophorum Encrmies	*44. Thespesia Papulania*
45. Ficus Raccmosa	*46. Susbemia Spp.*
47. Fieus hispida.	*48. Murraiaha Spp.*
49. Gravellia Robusta	*50. Mimusopu elengi*

51. Jectona Grandies.	*52. Madhuea indica*
53. Tamarindua Indiea	*54. Albezzia dactiloidies.*
55. Emblica officinalis	*56. Samamea Saman.*
57. Harduikia binata	*58. Sapota, verities of mango, verities of Goa, & Pomegranate*
59. Ficus Mysorensis	*60. Grapes*
61. Terminalia Arjuna	*62. Grass & Verities of Grass.*

3.11.2 Cultivated Plants

The common roadside trees planted in the district and villagers plant several species as protective hedges around their huts and cultivated fields. In such hedges are found Acacia famesiana (kasturijali, thorthy bush), Agave americana (bhutale), Euphorbia milii (spiny herb), Euphorbia tirucalli (kolukalli), Flacourtia circumscissa {miradi}, Jatropa gossypifolia (chikkakadu haralu), Kiraganellia reticulata (straggling herb), Lanatana tiliaefolia (rojanhuvu), Opuntia dillenii (papasu kalli), Pedilanthus tithymalaoides and synadenium grantii (yelekalli).

During the monsoon, the common climbers found straggling on these hedges are Argyreia cuneata (ka//anahambu, pubescent shrub), Boerhavia chinensis (bekkinahejjeballi, straggling herb), Cardiospermum halicacabum (agni balli, climbing pubescent herb), Cissampelos pariera (twining herb), Coccinia cordifolia (tondebalJi, scandent herb), Cocculus hirsutus (kagemari, straggling herb), Cuscuta rejlexa (badanike, parasitic herb), Dregea volubilis (kadehalballi, twining herb), Ichnocarpus frutescens (karehambu, twining r.lsty villous herb), Ipomoea maxima (talikiresoppu, twining herb), Ipomoea nil (gouribija, climbing villous herb), Melothria mucronata (scandent herb), Pergularia daemia (talavaranabalJi, climbing herb), and Trichosanthes bracteata (kagemariballi, scandant herb).

Parthenium, a new pernicious week, is a native of tropical South and North America. It is a herb growing to a height of one to two metres and possess tendency to attain perennial habit. The seeds are easily blown by wind and are carried by rainwater

besides moving along the blast associated with vehicular traffic and other agencies. This has moved gradually Tom one place to the other and could be seen along the highways, petrol bunks, on both sides of railway tracks and bus stops on the roadsides. Having reached to the city areas, it has moved to agricultural lands through city wastes lifted by the farmers and through rainwater and seepage water. In the residential areas, it has covered most of the vacant lands. From a few plants in Bangalore in 1973, it has spread all over the city and its surroundings now, Parthenium (Parthenium hysterophorous) occupied about 8,200 ha of which 1,600 ha was under cropped areas during 1977. This weed is rampant in uncultivated areas and is observed to suppress the useful vegetation like grasses. It has also been observed to be hazardous to the health of human beings and animals. Apart from chemical control, other integrated control measures have to be adopted to check the spread and growth of the weed. Considering the hazards of parthenium, it has been included under the Karnataka Agricultural Pests and Diseases Act of 1969 since 1975. **Source:** Agricultural University, Bangalore.

3.11.3 Fauna In The Study Area

Since the forest cover is quite sparse and most of the forest areas are small and are surrounded by agricultural lands, very few species of wild animals are found in the forests of the district occasionally, herd of elephants make an appearance in the forests and villages of Anekal taluk from forests of neighboring district. The larger game consisting mainly of cheetah or panther and the wild dog and animals such as the porcupine, jackal, wild cat, etc. are mostly confined to the forests of Anekal taluk. Among the smaller animals, field rats are numerous. Domestic animals consist principally of horses, cows, bullocks, buffaloes, sheep, goat, asses, pigs, dogs and cats. Following are the major animals found at study Area.

The alignment crosses the conurbation areas at 5 locations and avoids forest land in most of the places except at 1 location i.e., Jarakabande kaval at Yelehanka (chainage 12.00 to 12.50). Length of road through forest is about 500

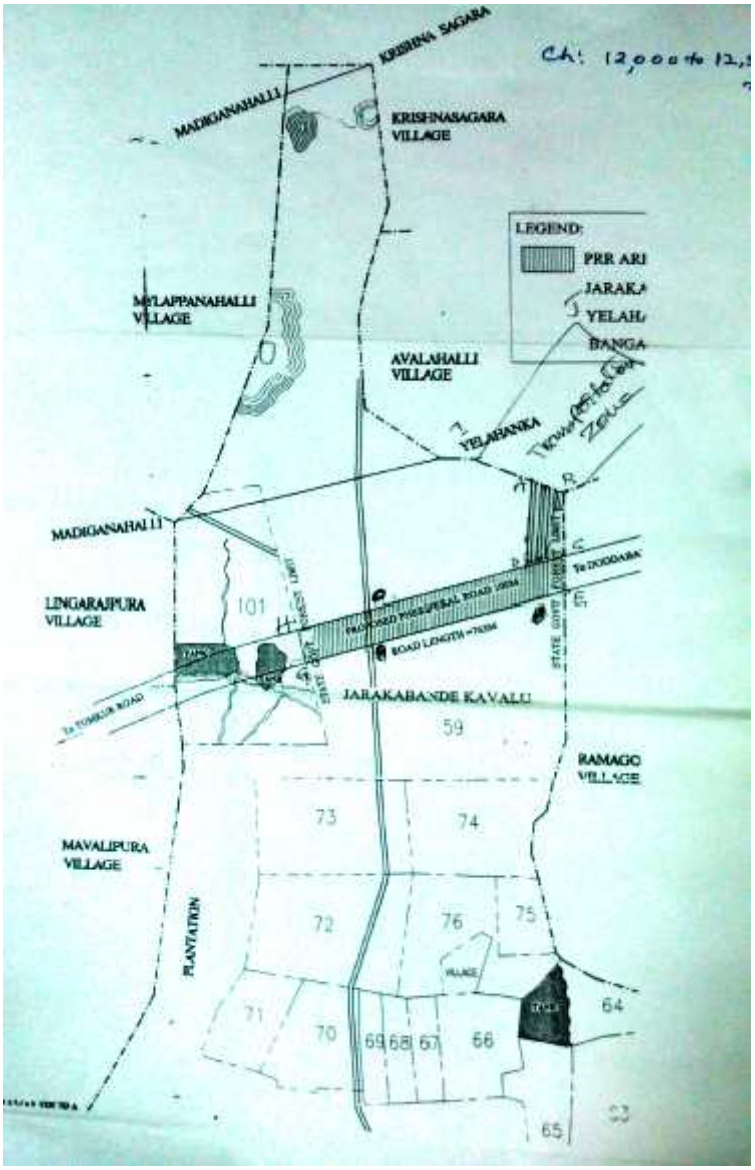
m; drawing showing the alignment crossing the forest is shown in Figure 3.5 below.

Description of forest (categorisation like RF, PF, social forest etc.,) under jurisdiction of which division of the Forest Department, total area of forest at these location, area of forest that will be diverted for the project and the species present.

Table No.3.16: Fauna Details

1. Cow & Variety of Cows	2. Ox
3. Buffalo	4. Bison.
5. Goats	6. Sheep's.
7. Pig	8. Monkey.
9. Peacock.	10. Parrot.
11. Crows.	12. Eagle.
13. Swan.	14. Gubbi.
15. King Fisher.	16. Snakes
17. Hare.	18. Frogs
19. White Ants.	20. Ants
21. Fishes	22. Centipede.
23. Flies	24. Squirrels.
25. Doga.	26. Forest Dogs.
27. Rats & Variety of Rats.	28. Earth Warms.
29. Soil Snakes.	30. Tortoise
31. Horses.	32. Ass
33. Sweet Crows.	34. Pigeon
35. Cat	36. Forest cat
37. Bees	38. Honey Bees
39. Rock Bees	40. Trice Driller
41. Dung Worm	42. Fox.
43. Wolf.	

Figure 3.5: Drawing showing the alignment crossing the forest



3.12 Socio Economic Environment

Any developmental activity will have impact on the socio-economic conditions of the population in the region and there by on the quality of life. Socio-Economic Impact Assessment, to get an idea of changes on social, economic and cultural status. Baseline data for Demographic characteristics, Occupational status, and Health amenities existing in the study area has been collected.

Bangalore is the capital city of Karnataka State and it was famous as Garden city and now Silicon City also in India. It is centre of the state where all the policies of the state are finalized here itself and it has pleasant weather and by which it attracts the people from all the parts of the India. Bangalore city is the fastest growing city in the Asia Continent. Bangalore city had prestigious industries, Research institutes and Universities which plays important role in the development of city as well as state also.

3.12.1 Reconnaissance Study

Detailed socio-economic survey was carried out within 2 kms either side of the proposed PRR site and which falls Bangalore Urban & Rural district to assess the baseline status. Information on Socio-Economic profile of the Bangalore city and villages were collected from Taluk Offices, District Statistics and Primary Health Centers. Test check survey was also carried out by conducting interviews with local people and village heads.

3.12.2 Administration

Bangalore Urban district has four Taluks and 17Hoblies. To enhance better administration practices, Bangalore North Taluka was reorganized as Bangalore North (Additional) Taluka by adding some parts of Yelahanka region.

3.12.3 Population And Geographical Area

The total geographical area of the district is 2196 Sq km and it is small district in Karnataka, even though it stood first in terms of population (96.21 Lakhs). The population density of the district as per 2011 census was 4381 per Sq km. Out of total population 96.21 Lakhs, 50.22 Lakhs are of Males and 45.98 Lakhs are of Females. There was change of 47.18 percent in the population compared to population as per 2001. In the previous census of India 2001, Bangalore District recorded increase of 35.09 percent to its population compared to 1991.

As per 2011, census 9.06% of the population lives in rural areas. Out of total population 13.01% are of schedule caste and 1.31% is of schedule tribes.

3.12.4 Administrative Details Of The Study Area

The study area encompasses the villages and its hamlets of Bangalore North taluk, Bangalore district. The administrative details of the Taluks present in study area are given in Tables 3.17 to 3.20.

a. Area and Population

Table No 3.17

S. No	Taluka	Area in Sq km	Total	Male	Female	Urban	Rural	Density	Sex Ratio
1	Anekal	524	517575	282006	235569	352425	165150	988	835
2	Bangalore North	487	352420	185978	166442	270195	82225	724	895
3	Bangalore South	380	205274	109255	96019	154523	50751	540	879
4	Bangalore East	96	102607	53699	48908	94464	8143	1069	911
5	Bangalore City	709	9621551	5022661	4598890	871607	8749944	13571	916
	TOTAL	**2196**	**10799427**	**5653599**	**5145828**	**1743214**	**9056213**	**2196**	**10799427**

b. SC & ST POPULATION

Table No 3.18

S. No	Taluka	Scheduled Caste		Scheduled Tribe	
		Male	Female	Male	Female
1	Anekal	56387	53695	7482	6294
2	Bangalore North	33896	32919	6482	6034
3	Bangalore South	18431	17659	18431	17659
4	Bangalore East	12642	12429	1207	1123
5	Bangalore City	607725	590660	99164	91075
	TOATL	**729081**	**707362**	**132766**	**122185**

c. Classification of workers

Table No 3.19

S. No	Taluka	WORKERS		Non workers	Cultivators			Agricultural Labors		
		Main	Marginal		Male	Female	Total	Male	Female	Total
1	Anekal	230485	26374	260716	18237	4378	22615	10620	6849	17469
2	Bangalore North	137405	17557	197458	15463	3973	19436	6292	4004	10296
3	Bangalore South	87316	10260	107698	8235	2844	11079	5869	3522	9391
4	Bangalore East	38923	6213	57471	3851	988	4839	1876	1016	2892
5	Bangalore City	3858342	388585	5374624	60149	20261	80410	51519	25775	77294
	TOTAL	4352471	448989	5997967	105935	32444	138379	76176	41166	117342

Table No 3.20

S. No	Taluka	Workers in house hold Industries			Other workers			Total Workers		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
1	Anekal	4517	1684	6201	140254	43946	184200	188471	68388	256859
2	Bangalore North	2044	1001	3045	80566	24062	104628	114416	40546	154962
3	Bangalore South	1710	808	2518	48208	16120	64328	69956	27620	97576
4	Bangalore East	1178	432	1610	22760	6822	29582	33128	12008	45136
5	Bangalore City	64162	26699	90861	2718123	891654	3609777	3115361	1131566	4246927
	TOATL	73611	30624	104235	3009911	982604	3992515	3521332	1280128	4801460

3.12.5 Literacy Levels

The literacy levels is given in Table 3.21

Table No 3.21

Taluka	Literate population (Rural)	Literate population (Urban)	Total Literates	Total Population	Literates %
Anekal	244810	125102	369912	517575	71
Bangalore North	188782	63151	251933	352420	71
Bangalore South	103328	38822	142150	205274	69
Bangalore East	65939	5148	71087	102607	69
Bangalore City	602859	6909417	7512276	9621551	78

3.12.6 Electrification And Water Facilities

Most of the houses in the city and villages are electrified, while some villages are benefited by the electric supply scheme for agriculture provided by the State government. The main sources of water supply in the area are public water supply by BWSSB, CMC'S and very few cases of hand pumps in villages. Few houses have latrines. The main difficulties expressed by the respondents are mosquito nuisance, improper drainage, in adequate sanitation facilities as the main issues raised during one to one meeting.

Almost all the villages in the study area are electrified. Firewood, cow dung cakes and cooking gas both LPG & Bio-Gas are the chief sources of cooking fuels.

3.12.7 Medical Facilities

People in the study area generally appear to be healthy compared to the people in the urban areas. However around 25% of the villages do not have medical facilities and the villagers have to travel 1 to 5 kms for getting proper medical aid. The most common prevailing diseases are Dysentery, Diarrhea and Asthma. Table 3.22 shows the facilities available in the Bangalore urban district.

Table 3.22

S. No	Description	Bangalore North
1	Allopathy	03
2	Ayurvedic	00
3	Private nursing homes	200
4	Primary health centers	355
5	Main health centers	87
6	Dispensaries	05
7	Family health centers	71
8	Medical shops	2000
9	Allopathy colleges	10
10	Dental colleges	06

3.12.8 Market, Post Offices & Police Stations

Daily and weekly market facilities are available in most of the villages. Leather items making are the main industrial activity in this area. Communication facilities in the villages are quite good with all villages having Post offices and having Telephones booths. Police stations are present in all Taluk head quarter and Towns.

3.12.9 Roads & Monuments

All the parts of the Bangalore Urban were well connected with small roads, State highways, National Highways and Express ways. Villages are also approachable by Kacha or pukka road. Government and Private Bus services are available for approaching the all villages. Buses are connecting almost all villages in the study area. There are no important Monuments and Archeological places in the study area. Project awareness amongst respondents is good in the nearby villages.

Table-3.23

S No	Taluka	Road length in kms			Road length in kms		
		National Highway	State Highway	MDR	Male	Female	Total
1	Anekal	26	69	103	253.6	253.6	-
2	Bangalore North	43	64	120	226.76	226.76	-
3	Bangalore South	74	27	188	264.75	264.75	-
4	Bangalore East	-	11	45	48.27	48.27	4
5	Bangalore City	-	-	-	-	-	-
	Total	**143**	**171**	**458**	**793.38**	**793.38**	**4**

3.12.10 Housing

The term “House Hold” is defined in census as a group of persons who live together and would take their meals from a common kitchen. There are 162080 households in the study area as per the 2001 census. Main occupation of the residents is agriculture and allied activities. There is a great demand for houses due to the yearly increase in population. The density of the people is around 2985 per sq.km and 5.1 persons per house.

Housing requirements directly depend on expected household sizes. If for instance, five persons per dwelling unit are normal, then the number of houses required can be calculated at least ten years in advance directly from this. Consideration is needed to be given for any possibility of residential sprawl and the area of land which might be affected because of the subsequent impacts on agriculture and other activities. Expansion of commercial and industrial activities will also have implications on land use. Considering the existing density, the demand for houses is not alarming.

3.12.11 Agriculture & Industry

Because of the closeness to the city of Bangalore, a number of industries have got established which are concentrated on either side of Bangalore –Tumkur and Bangalore –Doddaballapura road. Industrialization is the major sector for occupation and Agriculture is still exists as industry. Farming is mainly based on raising dry crops. There are about 465 tanks, 217 Open wells and 10300 Bore wells in the Bangalore Urban district. There is no irrigation land fed by tanks, however 60,814ha of land was cultivated with the help of seasonal rains and bore wells. Principle crop growing is Ragi, Fruits, vegetables and Flowers. Grape cultivation has gained in tempo exploiting ground water. Progressive farming with well laid out plots by application of modern methods of irrigation like sprinkler irrigation system are adopted in the taluk.

The land utilization details and types of industries exists in the taluk are tabulated in the table no.3.24 & 3.25.

Table 3.24: Land Utilization

S. No	Taluka	Area in Ha								
		Geographical area	Forest	Land not available for cultivation			Other uncultivated lands			
				Agricultural	Barren	Total	Cultivable waste	Permanent Pasture	Trees and Groves	Total
1	Anekal	53518	2215	21396	1322	22718	1465	1552	2381	5398
2	Bangalore North	78411	1145	38484	1994	40478	965	1197	3607	5769
3	Bangalore South	55609	1345	34804	1037	35841	854	1852	1029	3735
4	Bangalore East	29872	350	16752	558	17310	1160	1073	481	2741
5	Bangalore City	-	-	-	-	-	-	-	-	-
	Total	**217410**	**5055**	**11436**	**4911**	**116347**	**4444**	**5674**	**7498**	**17643**

Table 3.25: Industries and employment

S. No	Taluka	Area in Ha					Employees
		Textiles	Chemical	Engineering	Others	Total	
1	Anekal	14	76	324	591	1005	78660
2	Bangalore North	34	91	912	759	1796	124400
3	Bangalore South	-	15	184	594	793	87969
4	Bangalore East	1	10	40	54	105	12381
5	Bangalore City	77	40	851	1679	2647	282707
	Total	**126**	**232**	**2311**	**3677**	**6346**	**586117**

CHAPTER 4

ANTICIPATED ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

4.1 Assessment of Potential Environmental Impacts

The environmental impacts caused due to the development of the Peripheral Ring Road (PRR) project can be categorized as Primary (direct) and Secondary (indirect) impacts. Primary impacts are those which are induced directly by the project where as the secondary impacts are those which are indirectly induced and typically include the associated investment and changing patterns of social and economic activities due to the proposed action. Interaction of the project activities with environmental attributes is presented as activity-Impact matrix in Table 4.1**.** Potential direct and indirect impacts of the project during construction phase will be the following.

- ✓ Filling in low-lying areas for embankments of the road
- ✓ Loss of vegetation due to the cutting of trees
- ✓ Loss of Topsoil due to Clearing & Grubbing of new alignment, Borrow area and Construction of Camp, Material Stacking yard.
- ✓ Temporary impacts in terms of polluted environment on flora and fauna due to the construction activities.
- ✓ Impact on the drainage pattern due to raised embankment, introduction of new culverts and bridge constructions.
- ✓ Impact on Traffic Management System.
- ✓ Increased air pollution (including dust) during project road construction.
- ✓ Increased noise level due to the movement of vehicles and construction activities
- ✓ Increased soil erosion.
- ✓ Spillage of oils and other hazardous materials.
- ✓ Pollution of surface and sub-surface water sources.

- ✓ Pollution due to generation of Spoils and Solid Waste.
- ✓ Loss of trees & construction activities and impacts on tranquility of protected areas.

Potential direct and indirect impacts of the project during operation phase are the following.

- ✓ Increased noise pollution due to the vehicular movement
- ✓ Impact on natural drainage pattern of the project area
- ✓ Pollution of water bodies and impacts on its ecosystem due to hazardous
- ✓ Chemical or oil spillage into the water bodies.

The positive impacts of the project will be

- ✓ Reduced air pollution due to better service levels of the road
- ✓ Improved safe and efficient connectivity to Bangalore
- ✓ Generation of local employment during road construction
- ✓ Improvement of local economy due to better infrastructure facilities

Table 4.1

Activity - Impact Identification Matrix

S. No	Activities	Impacts on Physical Environment			Biological Environment		Geology		Topography
		Air	Water	Noise	Flora	Fauna	Natural drainage	Soil	
A. Construction Phase									
1	Labour Camp Activities		-ve/t						
2	Quarrying	-ve/t		-ve/t	-ve/t	-ve			-ve/p
3	Material Transport & storage	-ve/t		-ve/t					
4	Drilling and Blasting	-ve/t		-ve/t	-ve/t	-ve/t			
5	Earthwork						-ve/p	-ve/t	-ve/t
6	Pavement Works	-ve/t	-ve/t	-ve/t	-ve/t			-ve/t	-ve/p
7	Use of Construction Equipment	-ve/t	-ve/t	-ve/t		-ve/t			
8	Plantation	+ve/p		+ve/p	+ve/p				
9	Drainage Works						+ve/p		
10	Toll Plaza Construction	-ve/t		-ve/t					
11	Culvert and Bridge Construction		-ve/t	-ve/t			-ve/p		
12	Stripping of Topsoil							-ve/t	
13	Debris Generation					-ve/t		-ve/t	
14	Oil & Grease							-ve/t	
15	Construction	-ve/t	-ve/t	-ve/t	-ve/t	-ve/t	-ve/p	-ve/p	-ve/p
16	Destruction of Ecosystem	-ve/t	-ve/t	-ve/t	-ve/p	-ve/p	-ve/p	-ve/p	
B. Operational Phase									
1	Vehicular Movement	-ve/p		-ve/p	-ve/p	-ve/p			
2	Impact on forest areas	-ve/p		-ve/p	-ve/p	-ve/p			
3	Toll Collection	-ve/p	-ve/p						

Note: t - Temporary; p - Permanent. Impacts indicated in bold letters are Significant Impacts.

The impacts caused due to proposed project activity are discussed in the following sections.

4.2 Impacts on Topography

During construction of the project, there would be cutting of slopes and filling which would change topography at some parts of the road. Earthwork for this would alter the existing topography although the impact of the same would be negligible. Removal of soil and earth strata at bridge approaches will cause changes in topography. Further, extraction of construction materials from selected borrow area, quarry location and sand mining areas will alter the terrain, affects the aesthetics of landscape and alters the contours of the geographical region. In addition, the section from Tumkur Road (NH4) to Hosur (NH7) is Plain/Rolling terrain and prone to landslide due to geological nature of the terrain. Protection measures need to be taken through construction, which might alter the topography at a localized level.

Precaution measures:

- ✓ Care shall be taken during embankment construction and cutting process, so that the natural drainage pattern in the areas will not be affected and adjacent flora should not be affected.
- ✓ Rehabilitation of borrow area and quarry area shall be carried out in order to control the water logging problem and to avoid the soil erosion and landslides of the adjacent area

4.3 Impacts on Surface Water Drainage

Eight water bodies, 48 major and 20 minor drainages with one river Arkravathi at ch 87.45 km crossing the project road. Minor impacts are anticipated on the surface water drainage in the project area during the construction phase due to the diversion of waterway. In addition, any embankment work in low lying areas shall have provisions for cross drainage for natural drains to ensure that flow is not affected during construction phase.

Precautions would be taken during the construction work of culverts and bridges across these drains and rivulets that these do not get blocked which may affect the cross drainage.

4.4 Impact on Climate

As the present project is to improve the road network, no changes in climatic conditions are anticipated. Moreover, landscaping is envisaged in the area along the entire length of the road, which will help in improving the overall microclimate of the area. In addition, the comparison of regional data on temperature and relative humidity of the project road does not show any appreciable variation. This implies that the improvement works envisaged in the existing road does not have any significant micro-climatic impacts.

4.5 Impacts on Soil Environment

4.5.1 Impact on Top Soil

The impact on soil due to the project will be in terms of topsoil erosion and it will not cause significant soil erosion. Soil pollution would take place to a negligible extent due to spillage of construction material, oil, fuel, grease and asphalt around the construction yards. Care should be taken to minimise spillages of construction materials. Loss of productive soil, during the construction stage, is envisaged at locations of workers' camps, stockyards, storage godowns etc if these are located on fertile areas. The Environment Management Plan (EMP) can ensure that no productive areas are used for these purposes and avoid adverse impact. In any case, though it would be a direct impact, it would be reversible and insignificant in nature. The soils in the RoW alignment are of lateritic and red soil type, capable of producing high yields, Soils both within and outside the RoW may be negatively impacted due to the proposed project. The loss of productive topsoil due to road construction is a direct adverse long-term impact. Since a major portion of the proposed alignment does not utilize agriculture land, there will be minimum permanent loss of agriculture soil and

land due to the road construction. In addition to this there will be temporary impact on productive soil at diversions, and labour camp due to leasing of land for construction period. Hence, the impact on soil during construction phase has to be controlled by strictly implementing the Environment Management Plan (EMP) suggested for the project. During the operation phase of the proposed project, no impact on the productive top soil is envisaged.

4.5.2 Soil Erosion

The soil in the study area varies from alluvial to red soil. Therefore the potential for erosion varies along the alignment. Soil erosion will be aggravated if the vegetation is removed from the sides since roots are known to hold soil together. However it will be of temporary in nature. It is not possible to construct the project road without removing trees and therefore erosion will be unavoidable.

Mitigation measures such as turfing of road embankment slopes with herbs, shrubs and grasses will take care of soil erosion in to a considerable extent. In borrow pits, the depth of the pit should be regulated so that the sides of the excavation will have a slope not steeper than 1 vertical to 4 horizontal from the edge of the final section of bank, The device for checking soil erosion include the formulation of sediment basins, slope drains etc, Cutting of trees in phases, will minimise the impact. No soil erosion is envisaged when the road is in operation as all the slopes and embankments of the project road shall be stabilized through turfing and pitching.

4.5.3 Contamination of Soil

Contamination of soil during construction stage is primarily due to construction and allied activities. The sites where construction vehicles are parked and serviced are likely to be contaminated because of leakage or spillage of fuel and lubricants. Pollution of soil can also occur in hot-mix plants from leakage or spillage of asphalt or bitumen. Refuse and solid waste from labour camps can also contaminate the soil. Contamination of soil during construction might be a

major long-term residual negative impact. Unwarranted disposal of construction spoil and debris will add to soil contamination. This contamination is likely to be carried over to water bodies in case of dumping being done near water body locations. However, by following mitigative measures such as maintenance of vehicles and machines and fuel refilling is carried out in a confined area can avoid contamination of soil to a great extend. The provision for oil interception chamber is suggested in Environmental Management Plan (EMP) for treating the waste water generated from vehicle washing, refilling and maintenance areas. Fuel storage and refilling sites should be kept away from cross drainage structures and important water bodies. All spoils shall be disposed off as desired and the site shall be fully cleaned before handing over. These measures are expected to minimise the impact on soil contamination. During the operation stage, soil pollution due to accidental vehicle spills or leaks is a low probability but potentially disastrous to the receiving environment, if they occur. These impacts can be long term and irreversible depending upon the extent of spill. The nearest fire service stations and facilities for risk management should be upgraded in order to meet the risks during the operation phase of highway.

4.6 Impacts on Water Resources Environment

4.6.1 Impact on Surface Water Quality

The proposed road is not expected to alter the existing water quality on a permanent basis. There are various water bodies, which cross the section of road including rivers, backwaters, lakes and drainage channels. Some impacts are anticipated on the water quality of these water bodies during the construction phase. Silt load in the streams and canals at the culvert and bridge locations may increase during construction and the spillage of hazardous chemicals during accidents may pollute the waters there by affecting the ecosystem. The issue of blocking of cross drainage should be taken care throughout the project stretch. Care needs to be taken during the construction of culverts and bridges across canals. In case of any water supply system at the down stream of the bridge

location, prior information should be made to the concerned department on the bridge construction across the river and the construction activities should avoid discharge of any hazardous chemicals in to the river water.

Degradation of water quality is also possible due to accidental discharges into watercourses from drainage of workers' camps and from spillage in vehicle parking and/or fuel and lubricant storage areas. However mitigation measures such as construction works close to the streams and other water bodies shall be avoided, especially during monsoon period, disposal of waste arising from the project activities as per norms of SPCB norms and collecting and storing of bituminous wastes and taking it to approved disposal sites will minimise the impact. During the operation phase, the possibility of degradation of water quality is very remote. The impact on the surface water quality during operation can be expected due to accidental spillage. However the probability of such accidents is minimal since enhancement of road safety measures such as improvement of curves other pedestrian facilities are taken care of in the design stage.

4.6.2 Impact on Ground Water Quality

No activities of the project construction or operation are expected to have any major impact on the ground water quality of the region and hence the impacts on the ground water quality are negligible.

4.7 Impacts on Air Environment

Vehicular emissions are one of the major sources of air quality impacts of highway projects. As the project envisages improvement of road conditions for smooth traffic flow, the project will have beneficial impact on air quality of the region during its operation. However, when viewed with respect to the existing ambient air quality or with respect to compliance of ambient air quality standards during the post improvement phase of the road stretch, due to the increase in the traffic volume, the impact on air quality along the project road is likely to be minor.

Impacts on air quality during the construction phase of the project will be considerable as the amount of work involved in improvement of the road is significant, but any possible impacts will be temporary. However, provision of adequate air pollution control equipment, like dust filters and measures like dust suppression by water sprinkling and planting of green belt may further help to significantly reduce the impact.

Emission of CO_2 and NO_X due to the combustion of diesel will be a principal cause of air pollution during the construction phase. The data on fuel utilization rates of units likely to be in operation during the road improvement are provided in Table 4.2.

Table 4.2: Fuel Utilization Rates

Machines	Fuel Consumption (Litres/Hour)
Cement concrete mixer	7
Truck	8
Bulldozer	20
Grader	12
Roller	20
Dumpers & Tippers	18
Water Tanker	8
Paver	12

Due to ground level temperature inversion at site during winter months, meteorological conditions after the sunset tend to become stable. The overall meteorological parameters thus constitute adverse conditions for dispersion of ground based air pollution emissions. Under adverse meteorological conditions, it may be possible that the NO_X standards (80 µg/m^3 for 24 hourly average) may be violated only if the construction work is carried out round the clock.

However, this scenario is not envisaged, as the construction is not proposed to be carried out throughout the day. There will also be a rise in PM levels due to construction activities. The PM standards, however, are not expected to be

exceeding the permissible limits as the background levels are very low and the particulates tend to settle during low wind and stable conditions. However, implementation of mitigation measures as given in the Environmental Management Plan (EMP) will mitigate or minimise these impacts.

After improvement of the road, the traffic is expected to move smoothly at higher designed speeds, which will assure lower emissions of gaseous pollutants, further improving air quality in the region and hence not expected to affect the air quality adversely. The rate of emissions of various types of vehicles is presented in **Table 4.3**. However, the extent of these impacts, at any given time will depend upon the rate of vehicular emission within a given stretch of the road; and the prevailing meteorological conditions. The impacts will have strong temporal dependence as both of these factors vary with time. The temporal dependence would have diurnal, seasonal, as well as long-term components.

Table 4.3: Rate of vehicles emissions

Emissions	**Emission Factors in gm/km/Vehicle**					
1. For Diesel Vehicles						
	Speed (km/hr)					
	30	**40**	**50**	**60**	**70**	**80**
CO	12.53	9.40	7.52	6.27	5.37	4.70
2. For Petrol Vehicles						
	Vehicle/ Car	**2 Wheeler**	**3 Wheeler**			
CO	2.72	2.0	4.0			

4.7.1 Prediction of Carbon Monoxide (CO) Concentration Using CALINE 4

4.7.1.1 Dispersion Model along the Project Road.

The air quality model CALINE 4 was performed to predict the air quality after the road improvement. The methodology used for conducting the model is elaborated briefly in the following paragraphs.

4.7.1.2 Environmental Significance of Carbon Monoxide (CO)

Carbon Monoxide is colorless and odorless gas, chemically inert under normal conditions and has an estimated atmospheric mean life of about two and half months. CO is emitted by incomplete burning of fossil fuel. The National Ambient Air Quality Standard (CPCB) prescribes standard limit for CO in the ambient air as 2 mg/m^3. At higher concentrations, i.e. above 5 mg/m^3, it can seriously affect human aerobic metabolism, owing to its high affinity for hemoglobin and thus would affect the central nervous system, impairing a person's time -interval discrimination and brightness discrimination and over 10 mg/m^3, concentration would result in cardiac, pulmonary functional changes / failure leading to death.

4.7.2 Approach and Methodology

Based on the traffic volume, land type and environmental setup, the project corridor has been divided into two sections. These sections are further divided in to three segments. For the CO dispersion study the project road is considered as Rural and Sub-urban and sections carrying various traffic volume.

4.7.2.1 CALINE 4 Dispersion model

The objective of the study is to predict CO concentration in the ambient air on project road by 2015, 2025 and 2035 using CALINE 4 dispersion model. The Ministry of Environment and Forests (MoEF) has made CO concentration study as mandatory and recommends CALINE 4 model for Highway projects.

CALINE 4 (Caltras, 1989) is a dispersion model that predicts CO impacts near roadways. CALINE 4 is a simple line source Gaussian plume dispersion model.

Terminology used in CALINE 4 models

The model is broadly divided into five screens such as Job Parameters, Link Geometry, Link Activity, Run Condition, and Receptor Positions

Job Parameters: contains general information that identifies the job, defines general modeling parameters, and sets the units (feet or meters) that will be used to input data on the Link Geometry and Receptor Positions Screens.

Run Type: determine averaging times (for CO concentrations) and how the hourly average wind angle(s) will be determined. Most common is the “worst-case wind angle" run type to estimate 1-hour average CO concentration.

Aerodynamic Roughness Coefficient: determine the amount of local air turbulence that affects plume spreading. CALINE 4 offers the following 4 choices for aerodynamic roughness Coefficient:

- Rural: Roughness Coefficient = 10 cm
- Suburban: Roughness Coefficient = 100 cm
- Central Business District: Roughness Coefficient = 400 cm

Link/Receptor Geometry Units: the geometry of the roadway links and receptor positions are defined in meters. Meteorological inputs always require inputs with metric units.

Emission factors are always defined in terms of grams / mile. Emission Factor is arrived using standard values prescribed by Society of Indian Automobile Manufactures

Altitude above Sea Level: Define the altitude above mean sea level. This input is used to determine the rate of plume spreading. It does not affect the Link Geometry or Receptor Positions.

Link Geometry: defines the roadway network to be modeled. Each row in the matrix defines a single link. Up to 20 links may be entered. Links are defined as straight-line segments. The distance between the centerline of the curved

roadway, and the straight-line link should be no greater than 3 meters. For bridges, link length must be grater than roadway width.

Link Type: 5 choices available such as At Grade, Fill, Depressed, Bridge and Parking lot. In this particular model study At Grade and Bridge link type are used. Except bridge links all other links are assumed to be At grade type.

Endpoint Coordinates: The endpoint coordinates, (x1, y1) and (x2, y2), define the positions of link endpoints. Link geometry and receptor positions are defined with a Consistent Cartesian coordinate system.

Link Height: For all link types except bridges, Link Height represents the height of the link above the surrounding terrain.

Mixing Zone Width: Mixing zone is defined as the width of the roadway, plus 3 m on either side. The minimum allowable value is 10 m, or 32.81 feet. (Width of Roadway including shoulders)

Link Activity: defines the level of traffic and auto emission rate observed at each link.

Traffic Volume: The hourly traffic volume anticipated to travel on each link, in units of vehicles per hour.

Emission Factor: The weighted average emission rate of the local vehicle fleet, expressed in terms of grams / mile per vehicle.

The Run Conditions screen contains the meteorological parameters needed to run CALINE4.

Wind Speed: Expressed in meters per second.

Wind Direction: The direction the wind is blowing from, measured clockwise in degrees from the north.

Wind Direction Standard Deviation: The statistical standard deviation of the Wind Direction.

Atmospheric Stability Class: A measure of the turbulence of the atmosphere. Values 1 through 7 correspond to the standard definitions for stability class A through E. Stability class E (or 7) represents the most stable conditions.

Mixing Height: The altitude to which thermal turbulence occurs due to solar heating of the ground, Standard mixing height is assumed as 1000 meter.

Ambient Pollutant Concentration: This measure reflects the pre-existing background level of Carbon Monoxide, expressed in parts per million (ppm).

Ambient Temperature: The ambient air temperature significantly affects vehicle CO emissions. A temperature that reflects wintertime conditions should be selected, expressed in degrees Celsius.

The Receptor Positions Screen: contains the data inputs for all receptor positions, and also displays a diagram of the link geometry and receptor positions. Receptors should be defined with the same Cartesian coordinate system and units of measure as the link geometry.

Receptor Height-Z**:** coordinate standard 1.8 m assumed.

Averaging Interval**-** 1-hour average CO concentration at the receptors

For estimating the project, that is vehicles going to ply on Peripheral Ring Road (PRR) on the base year, the entire project road is sub-divided into 3 sections.

- Section-I: Hosur road NH-07 – Old Madras Road NH-04
- Section-II: Old Madras Road NH-04 - Bellary road NH-07
- Section-III: Bellary road NH-07 -Tumkur road NH-04

The traffic is estimated on 2 steps, (i) the diversion of through traffic from the arterials to the proposed Peripheral Ring Road (PRR), and also (ii) the generation of traffic from the nearby areas or settlements to Peripheral Ring Road (PRR), The **Table 4-4** gives the estimated traffic on the proposed Peripheral Ring Road (PRR) at the base year.

Table – 4.4: Estimated Traffic on the proposed Peripheral Ring Road (PRR)

Section	Direction of Traffic	Traffic in the order of Trucks + Cars + TW (Vehicles/day)
Section-I	Hosur Road to OMR	387+2637+2143
	OMR to Hosur Road	442+2945+2143
Section-II	OMR to Bellary Road	519+1920+1870
	Bellary Rd to OMR	204+1953+1870
Section-III	Bellary Rd to Tumkur	254+1540+1200
	Tumkur to Bellary Rd	393+1399+1200

4.7.2.2 Results and Inferences

CALINE 4 CO dispersion model software was run by using data on link geometry, traffic volume and environmental receptors given in the table above. The output CO results at specified locations along the project road for projected years 2015, 2025 and 2035 respectively are presented in **Table 4.5** below.

4.7.2.3 Conclusion

The predicted CO concentrations including ambient level at all locations are well within the National Ambient Air Quality standards (NAAQ) for the projected years 2015, 2025 and 2035 are presented in **Table 4.6** below.

Table 4.5: CO dispersion study - (Rural and Sub-urban and sections carrying various traffic volume)

Segments	Chainage Road	Aerodynamic Roughness Coefficient	Traffic Volume in / AD (VPH)			Ambient 'CO' Conc. (PPM)	Average Temp ^{o}C	Emission Factor (gm/Mile)			Avg. Alt. above MSL (meter)	Mixing Zone Width (meter)
			2015	2025	2035			2015	2025	2035		
Section-I	Hosur Road to OMR	Rural	5167	5425	5697	1.2	24- 34	4.2	4.0	3.8	167	68
	OMR to Hosur Road	Rural	5530	5807	6097	1.6	24- 34	3.9	3.7	3.5	167	68
Section-I	OMR to Bellary Road	Rural	4309	4524	4751	1.5	24- 34	4.8	4.6	4.4	167	68
	Bellary Rd to OMR	Rural	3823	4014	4215	1.2	24- 34	4.4	4.2	4.0	167	68
Section-I	Bellary Rd to Tumkur	Rural	2994	3144	3301	1.0	24- 34	4.5	4.3	4.1	167	68
	Tumkur to Bellary Rd	Rural	2992	3142	3299	1.8	24- 34	4.3	4.2	4.0	167	68

Table 4.6: Predicted CO Concentrations for Years 2015, 2025, and 2035

Chainage	Name of Receptor (Ambient Air Quality Monitoring Location) (Interchanges/Road and Rail crossings)	Distance from Center Line of Road in meters	Area Type	Predicted 'CO' Conc. in µg/m^3 Including Ambient level for year 2015	Predicted 'CO' Conc. in µg/m^3 Including Ambient level for year 2025	Predicted 'CO' Conc. in µg/m^3 Including Ambient level for year 2035	NAAQ Standard for CO in µg/m^3 for Residential, Rural & Other areas	Remarks
Section-I	Hosur Road to OMR	50	Residential/Rural /Other	3476	3650	3832	4000	Within Limit
	OMR to Hosur Road	50	Residential/Rural	3276	3440	3612	4000	Within Limit
Section-2	OMR to Bellary Road	50	/Other	3276	3440	3612	4000	Within Limit
	Bellary Rd to OMR	50	Residential/Rural	3176	3335	3502	4000	Within Limit
Section-3	Bellary Rd to Tumkur	50	/Other	2987	3136	3293	4000	Within Limit
	Tumkur to Bellary Rd	50	Residential/Rural	2842	2984	3133	4000	Within Limit

4.8 Impacts on Ambient Noise Level

During construction phase of the road, the major sources of noise pollution are vehicles transporting the construction material to the construction yard and the noise generating activities at the yard itself. Mixing, casting and material movement are primary noise generating activities in the yard and will be uniformly distributed over the entire construction period. Construction activities are anticipated to produce noise levels in the range of 80 - 95 dB (A). The construction equipment will have high noise levels, which can affect the personnel operating the machines. Use of proper Personal Protective Equipment (PPE) such as earmuffs will mitigate any adverse impact of the noise generated by such equipment.

The noise levels in the working environment are compared with the standards prescribed by Occupational Safety and Health Administration (OSHA-USA) which in-turn are being enforced by Government of India through model rules framed under the Factories Act. The acceptable limit for each shift being of 8-hour duration; the equivalent noise level exposure during the shift is 90 dB (A). Hence, noise generated due to various activities in the construction camps may affect workers, if equivalent 8-hour exposure is more than the safety limit. ACGIH (American Conference of Government Industrial Hygienists) proposed an 8-hour Leq limit of 85 dB (A). Exposure to impulses or impact noise should not exceed 140 dB (A) (Peak acoustic pressure). Exposure to 10,000 impulses of 120 dB (A) is permissible per day. The noise likely to be generated during excavation, loading and transportation of material will be in the range of 90 to 105 dB (A) and this will occur only when all the equipment operate together and simultaneously. This is however, is a remote possibility. The workers in general are likely to be exposed to an equivalent noise level of 80 to 90 dB (A) in an 8-hour shift, for which all statutory precautions should be taken into consideration. However, careful planning of machinery selection, operations and scheduling of operations can reduce these levels. As the project road passes through populated areas at villages and urban areas and several sensitive receptors. To avoid significant

impacts on human health, it is recommended to avoid construction work at these sections during night times and ensure that only minimum required machinery is deployed on the site. Uninterrupted movement of heavy and light vehicles at high speeds may cause increase in ambient noise levels on the project road. It may have negative environmental impacts on the sensitive receptors close to the project road.

With the proposed improvement of the project road, the residential areas along the stretch on either side are likely to experience day and night-time noise levels. These noise levels significantly vary with vehicle speed as presented in **Table 4.7.** However, the proposed avenue plantation is expected to minimise the impacts on the immediate influence area of the project road.

Table 4.7: Variation of noise level with vehicle speed

Speed (km/hr)	Noise Levels in dB (A) at 15 m			
	Cars*	**Trucks**	**Buses**	**2/3 Wheelers**
40	59.00	76.00	76.00	61.00
50	63.00	80.00	80.00	66.00
60	65.00	81.00	81.00	68.00
70	68.00	81.50	81.50	70.00
80	70.00	82.00	82.00	72.00
90	72.00	83.00	83.00	74.00
100	74.00	83.50	83.50	71.00

The project road has been divided into three sections based on traffic volume. The results obtained for projected traffic for years 2015, 2025 and 2035 are presented in **Table 4.8** and **Table 4.9**

4.8.1 Conclusions

4.8.1.1 Without Barrier

Noise levels during day-time and night-time at all the sensitive receptors considered are exceeding the CPCB standards for the projected years 2015, 2025, and 2035.

4.8.1.2 With Barrier

Noise levels during day-time and night-time at all the sensitive receptors considered are exceeding the CPCB standards for the projected years 2015, 2025, and 2035.It is revealed from the modeling results for the project influencing area for all the projected years that, noise levels without barrier condition is comparatively higher than with barrier condition, so suitable mitigation measures such as construction of minimum 6m high noise barrier (3m concrete wall and plantation of Ashok tree at 1.5m interval behind the wall)) along the Sensitive receptor locations. For tree plantation to be effective atleast 3-4 rows of trees need to be planted.

Table 4.8: Predicted Noise Levels at Sensitive Receptors without Barrier Condition

Chainage	Sensitive Receptors	Distance from CL	Predicted Noise levels for Day Time			CPCB Standard for Day Time	Predicted Noise levels for Night Time			CPCB Standard for Night Time
			2015	**2025**	**2035**	50	**2015**	**2025**	**2035**	40
Section 1	Hosur Road to OMR	35m towards LHS	**70**	71	72	50	63	64	65	40
	OMR to Hosur Road	45m towards LHS	71	72	73	50	64	65	66	40
Section 2	OMR to Bellary Road	35m towards LHS	69	70	71	50	62	63	64	40
	Bellary Rd to OMR	45m towards LHS	69	69	70	50	62	62	63	40
Section 3	Bellary Rd to Tumkur	35m towards LHS	70	70	71	50	63	63	64	40
	Tumkur to Bellary Rd	45m towards LHS	71	72	73	50	64	65	65	40

Table 4.9: Predicted Noise Levels at Sensitive Receptors with Barrier condition

Chainage	Sensitive Receptors	Distance from CL	Predicted Noise levels for Day Time			CPCB Standard for Day Time	Predicted Noise levels for Night Time			CPCB Standard for Night Time
			2015	**2025**	**2035**		**2015**	**2025**	**2035**	
Section 1	Hosur Road to OMR	35m towards LHS	56	57	57	50	51	51	52	40
	OMR to Hosur Road	45m towards LHS	57	58	58	50	51	52	52	40
Section 2	OMR to Bellary Road	35m towards LHS	56	56	57	50	50	50	51	40
	Bellary Rd to OMR	45m towards LHS	55	55	56	50	49	50	50	40
Section 3	Bellary Rd to Tumkur	35m towards LHS	56	56	57	50	50	51	51	40
	Tumkur to Bellary Rd	45m towards LHS	57	58	58	50	51	52	52	40

4.9 Solid Waste Impacts

Various construction activities such as demolition of structures, cutting of earth and rock mass for widening in some sections of project road, scarification of existing pavement will results to generation of huge quantity of construction waste. Further, substantial amount of domestic waste will also generate from workers camps. Improper disposal of these wastes may obstruct water flow resulting in reduction in water carrying capacity of the water body. Improper collection waste from construction site may leads to traffic congestion and inconvenience for commuters. No impact is envisaged during operation phase of the project.

Mitigation measures

Waste shall be collected, stored and taken to approve disposal sites as per prevailing disposal norms.

- Earth, stone or any other construction material should be properly disposed off
- Construction waste and other materials should be cleared immediately after completing the work so that traffic can move without any constraint.
- Domestic solid waste generated from workers camps shall collected in waste bins and disposed as per the guidelines of Municipal Solid Waste (Management and Handling) Rules, 2000.
- Contractor should strictly adher to other clauses and guidelines detailed out in the EMAP for debris disposal and waste disposal

4.10 Impacts on Fauna, Flora and Ecological Environment

4.10.1 Impact on Fauna and Flora

The increased activities of vehicle movement disturb the sensitive movements of fauna. The impacts are expected to be more severe during the times of accidents of vehicles carrying hazardous chemicals. In the absence of proper accident management mechanisms, such accidents will be very hazardous to flora and fauna of the region.

Initial portion of the Highway is along protected forest areas. From the site visits and discussion with officials it is inferred that there are no noticeable habitats or wild or endangered animal habitats along close vicinity of the project road. This can be inferred due to the operation of an existing road along this stretch. Further, noise due to construction machineries and increased vehicular movement for raw material transportation for road construction will disturb the wild life along the area during construction phase. Due care should be taken in the construction stage that human activities should be completely restricted to the proposed RoW such that there should not be any human ingress in to forest areas for poaching of animals / any other items. It was observed that that there is no endangered flora / fauna in the project influence area and hence the impact of the loss of vegetation will not be very severe.

Cutting of a large number of avenue trees is envisaged along both sides of the project road. As present small, medium and large trees have to be cut down along the proposed RoW. However, compensatory avenue plantation with thrice the number of trees to be cut is proposed as a part of Environmental Management Plan. The tress lost in the forest areas will be compensated with compensatory afforestation plan in equal area of land to be acquired in forest areas. Site specific indigenous tree species have been selected for compensatory afforestation and will be implemented through State Forest Department. The tree species that can be replanted in the project

4.10.2 Removal of Trees and Landscaping

Tree cutting is envisaged during construction of road. Broad guidelines or Mitigation measures are listed below

Following measures can be taken for the mitigation of impacts due to the removal of trees:

Double the number of plants should be planted for each tree felled/removed as a part of compensatory plantation. The compensatory plantation should be done in consultation with the forest department of the area. Adequate care of the compensatory plantation should be taken up so as to achieve over 90% survival rate.

Landscaping should be done with a lag of 3 to 4 months from the start of the work on any section. The section should be deemed to be complete when the landscaping is over.

• Survival rate of plants must be included in the contract specifications so as to ensure that the compensatory plantation achieves the objective of compensating lost trees.

• Indigenous and endemic tree species suitable for the area should be planted at the onset of monsoon season. The plants should be provided with adequate protection from animals and proper monitoring should be carried out to ensure their growth.

A study on the local flora and existing avenue trees has been carried out as part of the field surveys to enable a choice of the suitable species for avenue trees. The criteria for selection of species for choice as avenue tree is that the species is indigenous and suited to the soil and rainfall of the area, and hardy and needs no attention after the maintenance period. The lists of some of the species that are suitable for roadside plantation are given in **Table 4.10.**

Table 4.10: Proposed Plant Species

Plant Species - Trees	Common Names	Physical Description	Growth	HT
Azardirecta Indica	Bevu Neem	Evergreen foliage/medicinal/scented	Moderate	12M(40ft)
Tecoma splendons	Gante hoovu	Evergreen foliage & flowering tree	Moderate	7M(23ft)
Roystonea regia	Royal palm	Evergreen	Fast	12M(40ft)
Tabebuia rosea		Evergreen	Fast	15M(50ft)
Michelia champak a	Sampige	Evergreen, foliage & flowering tree	Moderate	12M(40ft)
Jacaranda mimosifolia	Neeli padri	Evergreen, foliage & flowering tree	Moderate	15M(50ft)
Grevillea robusta	Silver oak	Evergreen, foliage tree	Moderate	10M(33ft)
Plumeria alba/rubra	Temple tree	Evergreen, foliage & flowering tree	Slow	7M(23ft)
Pongamia pinnata	Honge	Evergreen, foliage / scented/shady	Moderate	10M(33ft)
Nyentanthus arbor trissus	Parijatha	Evergreen, Windbreak	Moderate	12M(40ft)
Delonix regia	Gulmohar	Evergreen, foliage & flowering tree	Moderate	7M(23ft)
Millintonia hortensis	Akash mallige	Evergreen, foliage & flowering tree	Fast	7M(23ft)
Phyllanthus emblica	Bettada Nellikaayi	Evergreen, foliage fruit bearing	Moderate	7M(23ft)
Spathodia campunalata	Neeru kaayi	Evergreen, foliage & flowering tree	Moderate	10M(33ft)
Achrus sapota	Sapota	Evergreen, foliage, fruit bearing	Moderate	10M(33ft)
Cassia fistula	Kakke mara	Evergreen, foliage & flowering tree	Moderate	7M(23ft)
Casuarinas equisitifolia		Wind break	Fast	12M(40ft)
Ziziphus jujube	Elachimara	Evergreen & fruit shrub	Moderate	
Syzygium cumini	Nerale	Evergreen, fruit bearing tree	Moderate	10M(33ft)
Syzijium jambos	Pannerale	Evergreen, fruit bearing tree	Moderate	10M(33ft)
Tabebuia rosea		Flowering tree	Moderate	7M(23ft)
Tabebuia avalanidae		Flowering tree	Moderate	7M(23ft)
Oscimum Sanctum	Tulasi	Scented		
Psidium guava	Sibekaayi	Evergreen, fruit bearing tree	Moderate	7M(23ft)
Nerium oleanders	Kanagalu hoova	Evergreen, flowering shrub	Moderate	

CHAPTER 5

ANALYSIS OF ALTERNATIVES

5.1 Site Selection

The proposed Peripheral Ring Road (PRR) is being developed to divert the Intercity Traffic through Peripheral Ring Road (PRR) around the Bangalore City beyond the existing Outer Ring Road (ORR).

The Peripheral Ring Road (PRR) is connected to outer to Outer Ring Road (ORR) at important destinations, major localities, National Highways. The composition of vehicles that are plying on Outer Ring Road (ORR) comprises of various vehicular categories including personalized vehicles like cars, jeeps, vans, two wheelers, auto rickshaws, commercial vehicles, trucks and slow moving vehicles like pedal cycles.

Bangalore Development Authority (BDA) has been entrusted with the responsibility to take up the development of Peripheral Ring Road (PRR) in phases for a smooth flow of traffic, to reduce the traffic congestion, pollution intensity cum travel time and there is no proposal of other alternative to it.

CHAPTER 6

ENVIRONMENTAL MONITORING PROGRAM

6.1 Environmental Monitoring

Environmental Monitoring Program is to prevent environmental damage and ensure mitigation measures to various environmental parameters that are being affected. The adverse environmental impacts identified during the EIA process of the proposed project may increase further during the construction as well as during post-construction phase. Monitoring of environmental factors and constraints will enable agencies to identify the changes in the environmental impacts at particular locations, application of mitigative measures and utilization of standard design guidelines for finalization of alignment design. Monitoring will also ensure that actions taken are in accordance with the construction contract and specifications. It provides a basis for evaluating the efficiency of mitigation and enhancement measures, and suggests further actions needed to be taken to achieve the desired effect.

To ensure the effective implementation of the Environmental Management Plan (EMP), an effective monitoring programme has to be designed.

6.2 Objectives

The broad objectives of the monitoring plan are

- Performance evaluation of mitigation measures proposed.
- Evaluating the adequacy of environmental impact assessment
- Suggesting improvements in management plan, if any
- Enhancing the environmental quality
- Satisfying the legal and community obligations

6.3 Responsibilities for monitoring

The responsibility for monitoring the Environmental Management Plan (EMP) rest with the Environmental management in charge of BDA. Mitigation and enhancement measures adopted in final design will be exactly identified under the bill of quantity so that performance and completion is readily documented.

The BDA will visually assess the progress of Environmental Management and the work of contractors. If the level of impact is determined to be high, further monitoring will be done by a recognized A category laboratory of concern SPCB and assessed for the verification of the increased or decreased emission level and pollutants along the project road, and if found more appropriate control measures would be exercised.

6.4 Performance indicators

In order to evaluate the effectiveness of Environmental Management Plan (EMP) at project level, certain physical, biological and social components identified. The components analysed based on project specific conditions and data generated. The key quality components include air quality, water quality, noise levels around sensitive locations and plantation/re plantation.

6.5 Routine Monitoring

During the construction and post-construction phase, ambient air quality, water quality, effluent and noise level will be monitored as and when required depending up on the type, nature and duration of the project using standardized monitoring methodologies and laboratory testing facilities/techniques.

6.6 Site Selection

Monitoring stations have been identified based on observation/site conditions such as nature of construction, diversions, congestion, parking places, bus/taxi stands, number and frequency of vehicles, sources of pollutants (industrial/commercial/residential),environmental features and existence of sensitive and critical areas i.e., educational institutions, hospitals, archaeological / cultural sites. The frequency and duration of testing/sampling of air, water, noise

levels and effluent quality with in the ROW is to be fixed as per allotted time frame of the project and requirements of SPCB/CPCB and MoEF.

6.7 Methodology

Standard methodology as described in manuals, guidelines etc. is to be followed as outlined in **Table 6.1.**

Table 6.1: Testing of Environmental parameters and Standard protocol

S. No	Parameters to be monitored	References
1	**Ambient Air Quality**	**As per CPCB Standards**
	$PM_{2.5}$	
	PM_{10}	
	NO_X	
	SO_2	
2	**Water and Effluent**	
	Surface water	**As per APHA and CPCB Standards**
	Ground water	
3	**Noise level**	**As per CPCB Standards**

6.8 Ambient Air Quality Monitoring (AAQM)

The air quality parameters i.e. PM_{10} & $PM_{2.5}$, SO_2, & NO_X will be regularly monitored at designated locations and analyzed in accordance with the National Ambient Air Quality Standards (NAAQS) given in **Table 6.2.** The location, duration and pollution parameters to be monitored and the responsible institutional arrangements are detailed out in environmental monitoring plan.

Table 6.2: National Ambient Air Quality Standards

National Ambient Air Quality Standards
(Ministry of Environment & Forests, Notification, New Delhi 16th November 2009, Schedule VII)

S. No	Pollutant	Time weighted average	Concentration in Ambient Air		Method of Measurement
			Industrial, residential, rural and other area	Ecological sensitive area (Notify by Central Govt.)	
1	Sulphur Dioxide	Annual *	50	20	Improved West & Gaeke Method
	SO_2 µg/m^3	24 hrs**	80	80	Ultraviolet Fluorescence
2	Nitrogen Dioxide	Annual*	40	30	Modified Jacob & Hochheiser (Na-Arsenic)
	NO_2 µg/m^3	24 hrs**	80	80	Chemiluminescence
3	Particulate Matter	Annual *	60	60	Gravimetric
	Size Less Than 10 µm Or PM_{10} µg/m^3	24 hrs**	100	100	TOEM Beta Attenuation
4	Particulate Matter Size less Than 2.5 µm Or $PM_{2.5}$ µg/m^3	Annual *	40	40	Gravimetric
		24 hours**	60	60	TOEM Beta Attenuation
5	Ozone O_3 µg/m^3	8 Hour**	100	100	UV Photometric
		1 Hour**	180	180	Chemiluminescence Chemical Method
6	Lead Pb µg/m^3	Annual *	0.50	0.50	AAS/Icp method after sampling on EPM 2000 or equivalent filter paper.
		24 hours**	1.0	1.0	ED XRF using Teflon Filter
7	Carbon Monoxide CO mg/m^3	8 Hours**	02	02	Non Dispersive Infra Red (NDIR)
		1 Hour**	04	04	Spectroscopy
8	Ammonia NH_3 µg/m^3	Annual *	100	100	Chemiluminescence
		24 hrs**	400	400	Indophenol Blue Method
9	Benzene (C_6H_6) µg/m^3	Annual*	05	05	Gas Chromatography based Continuous Analyzer Adsorption and desorption followed by GC analysis
10	Benzo(α) Pyrene (BaP) Particulate Phase only ng/m^3	Annual*	01	01	Solvent Extraction followed by HPLC/GC analysis
11	Arsenic As ng/m^3	Annual*	06	06	AAS/ICP method after sampling on EPM 2000 or equivalent filter paper
12	Nickel Ni ng/m^3	Annual*	20	20	AAS/ICP method after sampling on EPM 2000 or equivalent filter paper

* Annual arithmetic mean of minimum 104 measurements in a year at a particular site taken twice a week 24 hourly at uniform intervals.

** 24hourly or 8 hourly or 1 hourly monitoring values, as applicable shall be complied with 98% of the time in a year 2% of the time, they may exceed the limits but not on two consecutive days of monitoring.

NOTE: Whenever and Wherever monitoring results on two consecutive days of monitoring exceed the limits specifies above for the respective category, it shall be considered adequate reason to institute regular or continuous and further investigation.

6.9 Water Quality Monitoring (WQM)

Water quality parameters such as pH, Dissolved Oxygen, Total Dissolved Solids, Phosphate, Calcium, Sulphate, Chlorides, Iron etc., will be monitored at all identified locations during construction stage as per standards prescribed by the CPCB and the water specifications presented in **Table 6.3**. The location, duration and pollution parameters to be monitored and the responsible institutional arrangements are detailed out in environmental monitoring plan given in **Table 6.4.**

Table 6.3: Primary Water Quality Standards

S. No.	Designated Best Use	Class of Water	Criteria
1	Drinking Water source (with conventional treatment)	A	• Total Coliform MPN/100 ml shall be 50 or less • pH between 6.5 to 8.5 • Dissolved Oxygen 6 mg / L or more • Biochemical Oxygen demand (BOD) 5 days 200C 2 mg/L or less
2	Outdoor bathing (organised)	B	• Total Coliform MPN/100 ml shall be 500 or less • pH between 6.5 to 8.5 • Dissolved Oxygen 5 mg / L or more • Biochemical Oxygen demand (BOD) 5 days 200C 3 mg/L or less
3	Drinking Water source (without conventional treatment)	C	• Total Coliform MPN/100 ml shall be 5000 or less • pH between 6 to 9 • Dissolved Oxygen 4 mg / L or more • Biochemical Oxygen demand (BOD) 5 days 200C 3 mg/L or less
4	Propagation of Wildlife	D	• pH between 6.5 to 8.5 for fisheries • Dissolved Oxygen 4 mg / L or more • Free Ammonia (as N) 1.2 mg/L or less
5	Irrigation, Industrial Cooling, Controlled Waste	E	• pH between 6.0 to 8.5 • Electrical Conductivity at 250C µmhos/cm Max. 2250 • Sodium absorption rations Max. 26 • Boron, Max.2 mg/L

Ref: CPCB (1999). Bio mapping of rivers, Parivesh New Letter, 5 (iv), Central Pollution Control Board, Delhi, PP.20.

Table 6.4: Indian Standard - Drinking Water Specifications IS 10500: 2012

S. No.	Substance / Characteristics	Requirement (Acceptable limit)	Permissible limit in the absence of alternate source	Methods of Test (ref. To Part of IS 3025)	Remarks
1	Colour, Hazen Units, Max.	5	15	Part 4	Extended to 15 only, if toxic substances are not suspected in absence of alternate sources
2	Odour	Agreeable	Agreeable	Parts 5	(a) Test cold and when heated. (b) Test at several dilution
3	PH value	6.5 to 8.5	No relaxation	Part 11	
4	Taste	Agreeable	Agreeable	Part 7 & 8	Test to be conducted only after safety has been established
5	Turbidity NTU, Max.	1	5	Part 10	
6	Total Dissolved solids, mg/l Max.	500	2000	Part 16	
7	Total hardness (as CaCo3) mg/l, Max.	200	600	3025 (part 21): 1983	
8	Iron (as Fe) mg /l Max.	0.3	No relaxation	3025 (part 21): 1983	Total concentration of Manganese (as Mn) and iron (as Fe) shall not exceed 0.3mg/l
9	Chlorides (as CI) mg/l Max.	250	1000	3025 (part 32): 1988	
10	Residual, free chloride, mg/l Min.	0.2	1	3025 (part 26): 1986	To be applicable only when water is chlorinated. Tested at consumer end. When protection against viral

S. No.	Substance / Characteristics	Requirement (Acceptable limit)	Permissible limit in the absence of alternate source	Methods of Test (ref. To Part of IS 3025)	Remarks
					infection is required, it should be Min. 0.5 mg/1
11	Calcium (as Ca) mg/l Max.	75	200	IS 3025 (Part 40)	
12	Magnesium (as Mg) mg/l, Max.	30	100	IS 3025 (Part 46)	
13	Copper (as Cu) mg/l Max.	0.05	1.5	IS 3025 (Part 42)	
14	Manganese (as Mn) mg/l, Max.	0.1	0.3	IS 3025 (Part 59)	Total concentration of Manganese (as Mn) and iron (as Fe) shall not exceed 0.3mg/l
15	Sulphate (as 200 So2), mg/l, Max.	200	400	IS 3025 (Part 24)	May be extended up to 400 provided (as Mg) does not exceed 30
16	Nitrate (as No2) mg/l, Max.	45	No relaxation	IS 3025 (Part 34)	To be tested when pollution is suspected
17	Fluoride (as F) mg/l, Max.	1	1.5	IS 3025 (Part 60)	To be tested when pollution is suspected
18	Phenolic compounds (as C6H5OH) mg/l, Max.	0.001	0.002	IS 3025 (Part 43)	To be tested when pollution is suspected
19	Mercury (as Hg) mg/l, Max.	0.001	No relaxation	IS 3025 (Part 48) / Mercury analyzer	To be tested when pollution is suspected
20	Cadmium (as cd), mg/l, Max.	0.003	No relaxation	IS 3025 (Part 41)	To be tested when pollution is suspected
21	Selenium, (as Se). mg/l, Max.	0.01	No relaxation	IS 3025 (Part 56) or IS 15303	To be tested when pollution is suspected
22	Arsenic (As) mg/l, Max.	0.01	0.05	IS 3025 (part 37)	To be tested when pollution is suspected

S. No.	Substance / Characteristics	Requirement (Acceptable limit)	Permissible limit in the absence of alternate source	Methods of Test (ref. To Part of IS 3025)	Remarks
23	Cyanide (as CN) mg/l, Max.	0.05	No relaxation	IS 3025 (part 27)	To be tested when pollution is suspected
24	Lead (as Pb), mg/l, Max.	0.01	No relaxation	IS 3025 (Part 47)	To be tested when pollution is suspected
25	Zinc (as Zn) mg/l, Max.	5	15	IS 3025 (Part 49)	-
26	Anionic detergents (as MBAS) mg/l, Max.	0.2	1.0	Annex K of IS 13428	-
27	Total chromium (as Cr), mg/l, Max.	0.05	No relaxation	IS 3025 (Part 52)	-
28	Poly nuclear aromatic hydra carbons (as PAH) mg/l, Max.	0.0001	No relaxation	APHA 6440	-
29	Mineral oil mg/l, Max.	0.5	No relaxation	Clause 6 of IS 3025 — (Part 39) Infrared	-
30	Pesticides mg/1, Max.	Absent	No relaxation	-	-
31	Radioactive material				
	Alpha emitters bq/l, Max.	0.1	No relaxation	Part 2	-
	Beta emitters bq/l, Max.	1.0	No relaxation	Part 1	-
32	Aluminium (as Al) mg/l, Max.	0.03	0.2	IS 3025 (Part 55)	-
33	Boron mg/l, Max.	0.5	1.0	29 of 3029:1964	-

Source: Indian Standard Drinking Water Specification – IS 10500, 2012

6.10 Noise Quality Monitoring

The ambient noise levels will be monitored at already designated locations in accordance with the Ambient Noise Quality Standards given in **Table 6.5** the location, duration and noise pollution parameters to be monitored and the responsible institutional arrangements are detailed out in environmental monitoring plan

Table 6.5 : National Ambient Noise Quality Standards

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

Note: (1) Day time shall mean from 6.00 a.m. to 10.00 p.m. (2) Night time shall mean from 10.00 p.m. to 6.00 a.m. (3) Silence zone is an area comprising not less than 100 metres around hospitals, educational institutions, courts, religious places or any other area which is declared as such by the competent authority (4) Mixed categories of areas may be declared as one of the four above mentioned categories by the competent authority.

6.11 Environmental Monitoring Plan

Monitoring plan for various performance indicators at construction and monitoring stage is summarized in **Table 6.6**

Table 6.6: Environmental Monitoring Plan

Environmental Component	Project Stage	Monitoring						Institutional Responsibility	
		Parameters	Special Guidance	Standards	Location	Frequency	Duration	Implementation	Supervision
Air	Construction Stage	PM_{10}& $PM_{2.5}$ SO_2, NO_X, Fugitive emissions from Hot mix plants	Respirable Dust sampler to be located 50 m from the plant in the downwind direction. Use method specified by CPCB for analysis	Air (Prevention and Control of Pollution) Rules, CPCB	Hot mix Plant / Batching Plant, Quarry sites	Three seasons annually	Continuous 24 hours / or for 1 full working day	Contractor through approved monitoring agency	Site Engineer
	Construction Stage	PM_{10}& $PM_{2.5}$	Respirable Dust sampler to be located 40 m from the earthworks site downwind direction. Use method specified by CPCB for analysis	Air (Prevention and Control of Pollution) Rules, CPCB,	Stretch of the road where construction is in progress near settlement / habitation area	Moves with progress of construction	Continuous 24 hours/or for 1 full working day	Contractor through approved monitoring agency	Site Engineer,

Environmental Component	Project Stage	Monitoring						Institutional Responsibility	
		Parameters	Special Guidance	Standards	Location	Frequency	Duration	Implementation	Supervision
Water Quality	Construction Stage	pH, TSS, TDS, Turbidity, Cl, Hardness, Coliform, Fe, Fluorides BOD, COD, Oil & Grease and (initially) NO3,	Grab sample collected from source and analyse as per Standard Methods for Examination of Water and Wastewater	Water quality standards by CPCB	At locations identified by the engineer	End of summer / before the onset of monsoon every year	-	Contractor through approved monitoring agency	Site Engineer
	Operation Stage	pH, TSS, TDS, Turbidity, Oil & Grease Cl, Hardness, Coliform, Fe, Fluorides BOD, COD	Grab sample collected from source and analyse as per Standard Methods for Examination of Water and Wastewater	Water quality standards by CPCB	At locations identified by the engineer	End of summer / before the onset of monsoon in the first year	-	Engineer	Site Engineer

Environmental Component	Project Stage	Monitoring						Institutional Responsibility	
		Parameters	Special Guidance	Standards	Location	Frequency	Duration	Implementation	Supervision
Noise Levels	Construction Stage	Noise levels on dB (A) scale	Free field at 1 m from the equipment whose noise levels are being determined.	Noise standards by CPCB	At construction yards	As required by the Engineer	Readings to be taken at 15 seconds interval for 15 minutes every hour and then averaged	Contractor through approved monitoring agency	Site Engineer
		Noise levels on dB (A) scale	Equivalent Noise levels using an integrated noise level meter kept at a distance of 15 m from edge of Pavement within settlements	Noise standards by CPCB	As directed by the Engineer (At maximum 20 locations)	Thrice a year	Readings to be taken at 15 seconds interval for 15 minutes every hour and then averaged.	Contractor through approved monitoring agency	Site Engineer
Soil Erosion	Construction Stage	Turbidity in Storm Water Silt load in water courses		Water quality standards	At locations identified by the engineer	Pre-monsoon and post-monsoon seasons		Supervision Consultant	Site Engineer

Environmental Component	Project Stage	Monitoring						Institutional Responsibility	
		Parameters	Special Guidance	Standards	Location	Frequency	Duration	Implementation	Supervision
Construction Sites and Construction Camps	Construction Stage	Monitoring of: Storage Area Drainage arrangements Sanitation in Construction Camps	The parameters mentioned are further elaborated in the reporting formats. These are to be checked for adequacy.	To the satisfaction of the standards	As storage area and construction camps	Quarterly in the construction stage		Engineer	Site Engineer

6.12 Environmental Management Division (EMD)

The Bangalore Development Authority (BDA) is responsible for implementation of Environmental Management Plan (EMP) and interaction with the environmental regulatory agencies and Karnataka State Pollution Control Board (KSPCB) for reviewing policy and planning. The Authority also interacts with local people to understand their problems

Environmental Management Division of BDA (EMD) will undertake periodic environmental monitoring to evaluate performance of pollution control measures and to ensure compliance with the prescribed standards. Environmental monitoring will consist of both in house and outsource to recognized laboratories. Environmental Management Division (EMD) will be responsible for the following functions:

The attributes, which merit regular monitoring, are specified underneath

- Continual monitoring & assessment of environmental parameters & regulations.
- To work for continuous & regular improvement in environmental performance.
- To develop & maintain green belt.
- To keep close liaison with environmental regulating authorities.
- To conduct yearly monitoring and submit statement to KSPCB.
- To manage post project-monitoring plan as per approved REIA & EMP.
- To follow proper documentation, monitoring practices and procedures, this will facilitate the company for effective implementation environmental management system.

6.13 Cost of Environmental Monitoring

Project specific Environmental Management Plan (EMP), stating the various impacts, mitigation measures, is formulated to avoid /minimise anticipated impacts. The responsibility of implementing suggested mitigation measures lies

mainly with Contractor and, Project/Design Consultant. A Monitoring Plan is also proposed to evaluate the efficiency of mitigation measures recommended in the EMP and facilitate management decisions for the project. The break up for the cost is presented in **Chapter 10.**

CHAPTER 7

ADDITIONAL STUDIES

7.1 Land Use / Land Cover Pattern Studies

7.1.1 Introduction

The proposed Peripheral Ring Road (PRR) takes off at CH 17A on Bangalore-Pune NH4 about 150 m from major bridge across Arkavathy River. This 116 Km ring road is planned by Bangalore Development Authority (BDA) and it will circumnavigate the city. The project will be undertaken in two phases – Phase I starting from CH. km 0.000 to CH: km 64.5 and Phase II covering the remaining length. It will be linking the major highways and the district roads right from Tumkur Road, Mysore Road, Old Madras Road and Hosur Road. The upcoming of Peripheral Ring Road (PRR) is expected to instigate vast developments along the corridor.

The scope of the study involves preparation of the report on land use/ land cover details up to 10km buffer zone on either side of the proposed PRR using IRS Resource sat P 6, LISS III data base.

7.1.2 Tools and Resources

In order to meet the project requirements, Ramky has acquired the following satellite data for the study area from National Remote Sensing Centre (NRSC), Indian Space Research Organization (ISRO), Department of Space, Hyderabad.

7.1.3 Data base

The Satellite data details:

Satellite:	IRS Resource sat P 6
Sensor:	LISS III
Path:	0100 Row: 064
Orbit:	033291

Date of Pass	07 Mar 2010
Spatial Resolution:	24m
Bands:	2,3,4,5

The IRS P VI Satellite LISS III data and Land use / Land cover pattern upto 10km Buffer is shown in the **Figure 7.1 & 7.2**

The road alignment has been taken as per the information provided by the client. The Survey of India Toposheets 57 G/8, 57 G/12, 57 G/16, 57 H/5, 57 H/9 and 57 H/13 have been used for the spatial referencing purpose.

7.1.4 Limitations

The limitations of Remote Sensing, Image Processing, Geographical Information Systems, cartography and GPS are applicable in this study.

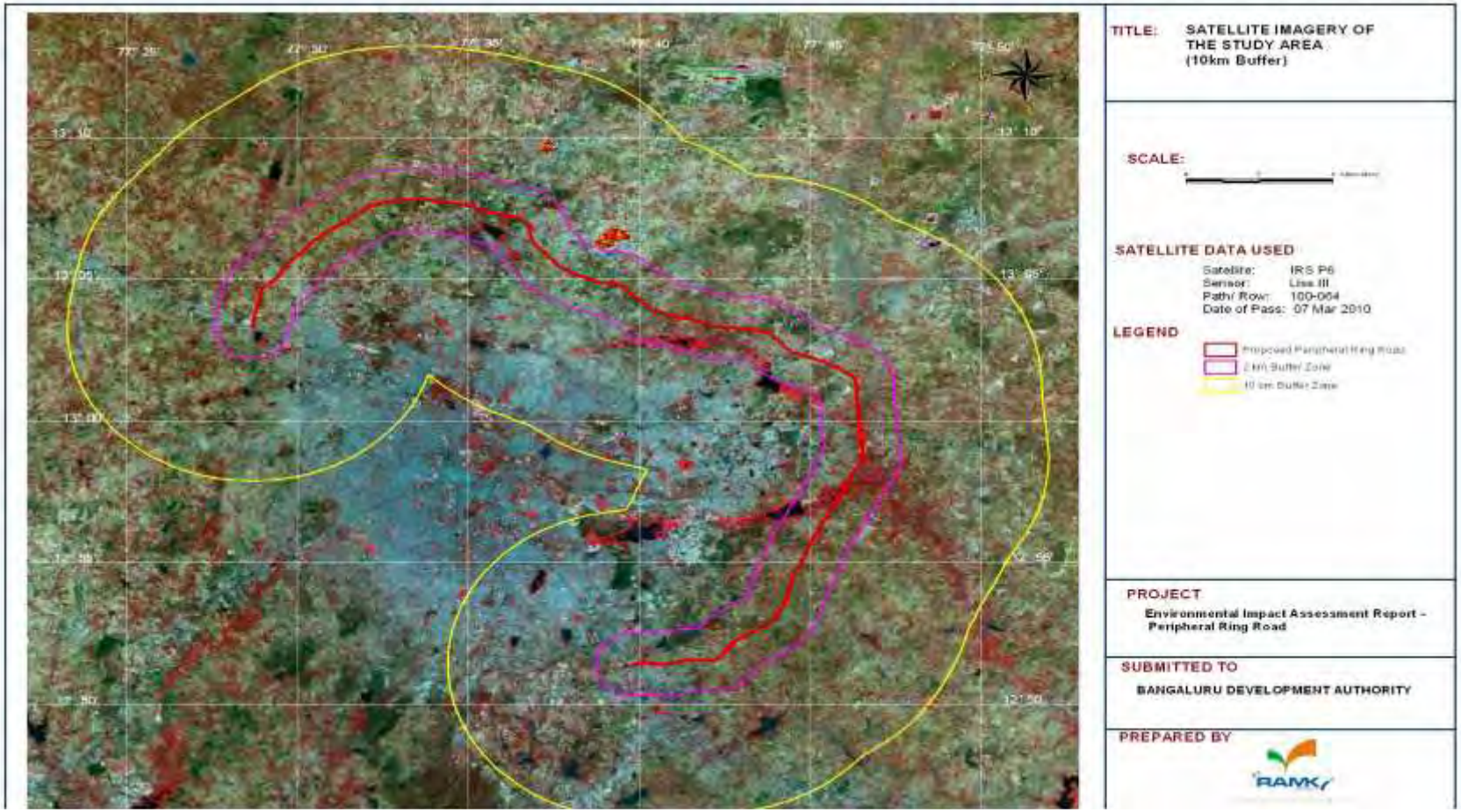
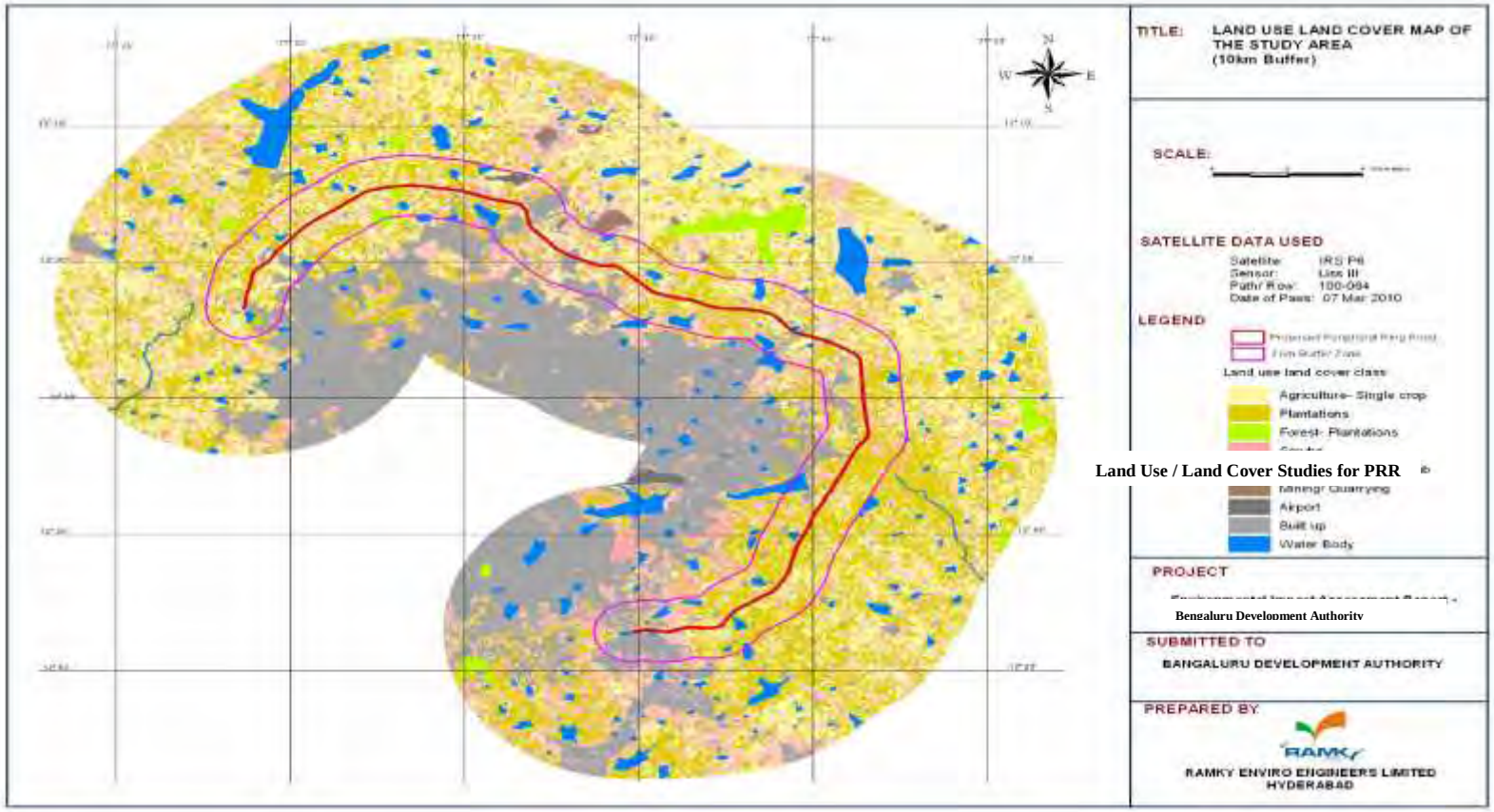


Figure 7.1 IRSP VI Resource sat LISS III data upto 10 KM Buffer



Land Use / Land Cover Studies for PRR

Figure 7.2: Land Use / Land Cover pattern up to 10km Buffer

7.2 Methodology

7.2.1 Pre-Processing Of Data

The Digital Image Processing has been performed using ERADS Imagine software tools and Garmin GPS has been used for Ground truthing.

All the topo sheets of the study area have been geometrically corrected to geographical coordinates using the ground control points (GCPs). The IRS P VI LISS III data has been geometrically corrected with respect to Survey of India topo-sheets. To carry out the geo-referencing, ground control points (GCPs) were identified on the maps and raw satellite data.

The coefficients for two co-ordinate transformation equations were computed based on polynomial regression between GCPs on map and satellite data. Alternate GCPs were generated till the Root Mean Square (RMS) error was less than 0.5 pixel and then both the images were co-registered.

This IRS - PVI LISS III data has been used for the Land Use Land Cover Analysis of buffer Zone. The satellite image is analyzed digitally by the method of supervised classification with necessary Ground truthing using the reference map as well as GPS instrument.

The classified imagery has been converted in to vector format and analyzed using GIS application software.

7.2.2 Land Use / Land Cover Classification for Buffer Zone

Digital image processing was carried out to delineate various land use / land cover categories in 10 km buffer Zone viz. build up area, crop areas, forests, Forests, land with or without scrub, water bodies by assigning necessary training sets, which were identified based on tone, texture, size, shape pattern and location information. Necessary care has been taken to identify proper land use class, where there is conflict between signatures of various classes. The interpreted map was verified on ground at limited points and final land use / land cover map was prepared.

7.2.3 Various Land Use Classes

The buffer zone can be broadly identified into forest areas, built-up areas, agriculture areas and other land with or without Scrub. The definitions of various land use classes are given below.

7.2.3.1 Forest Cover

All the areas declared as reserve forest and state forest areas are shown in this class. The forests can be classified based on density into following classes

- **Closed Forest:** Forests with tree canopy coverage above 70%
- **Dense Forest:** Forests with tree canopy coverage between 40%-70%
- **Open Forest:** Forests with tree canopy coverage between 10%-40%
- **Dense Scrub:** Forests with tree canopy coverage between 5%- 10%.
- **Open Scrub:** Forests with tree canopy coverage between 1%- 5%.
- **Forest Blanks:** Forests with tree canopy coverage less than 1%. Forest encroachments and illegal agriculture would be considered in this class.
- **Forest Plantations:** The plantations raised with in the reserve forest boundaries would be considered in this class.

Conclusion: The Reserve forest and State forest are seen in the study area. These areas are covered with Forest plantations with some shrubs.

7.2.3.2 Agricultural Area

- **Double Crop Land:**The areas where farmers practice cultivation for two seasons (Rabi and khariff) in a year.
- **Single Crop Land:** The areas where farmers practice cultivation for single season in a year.
- **Plantations:** The private areas with horticulture/ other plantations. **Conclusion:** Only Single crop lands and plantations are available in the study area.

7.2.3.3 Waste Lands

Scrubs:

Generally waste lands- non agriculture, non-forest areas covered with dense scrubs.

Areas with/ without Scrub:

Generally waste lands- non agriculture, no forest areas covered with or without scrubs.

Conclusion: The above classes are available in the study area.

7.2.3.4 Built-up Area

Built up land: The cities/ towns/ villages/ colonies/ Industries/ Airports are considered in this class.

Conclusion: The part of Bangalore City is covered in the buffer zone along with other habitations. Yelhanka Airport falls within the 2 km buffer zone.

7.2.3.5 Mining Areas

The areas, where the mining activity is being carried out/ has been done are considered in this class.

Conclusion: Granite quarries are observed in the buffer zone

7.2.3.6 Water Bodies

The oceans, rivers, streams, lakes, tanks, reservoirs, canals etc will be identified in this class.

Conclusion: Few streams and tanks are observed in the study area.

7.3 Land Use / Land Cover Details of Buffer Zone

The image of the study area up to 10 km. from the proposed ring road as captured by satellite is presented in **Figure 7.1.** The Land use land cover in this study area (buffer zone 10 & 2 km) is depicted in **Figure 7.2.** The various classes and their respective areas with percentage of coverage are given below in **Table 7.1.** And the area statistics of 2 km buffer zone has given in the **Table**

7.2. The pie diagrams of 10km buffer zone and 2km buffer zone are shown in **Figure 7.3 & 7.4**.

Table 7.1: Land Use / Land Cover Statistics of 10km buffer zone

S. No	Land use land cover class		Area in Ha	Area in %
	Class	Sub class		
1	Forest Cover	a. Forest- Plantations	1920.08	1.21
2	Agriculture Area	a. Agriculture- Single crop	41834.99	26.33
		b. Plantations	36566.23	23.02
3	Waste Lands	a. Scrubs	3378.51	2.12
		b. Land with/ without scrub	28748.59	18.10
4	Built up area	a. Built up land	37998.87	23.92
		b. Airport - Yelahanka	328.60	0.21
5	Mining Areas	a. Mining/ Quarrying	538.49	0.34
6	Water Bodies	a. Water Body	7544.47	4.75
			158858.83	100.00

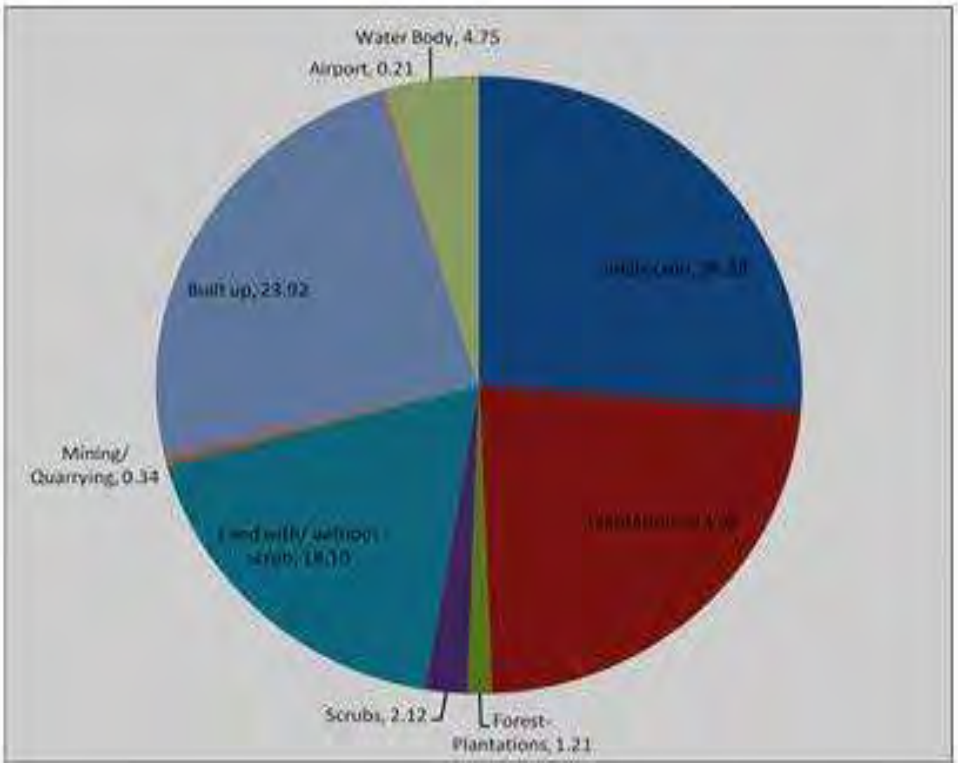


Figure 7.3: Land Use / Land Cover pattern of 10km buffer zone

Table 7.2: Land Use / Land Cover Statistics of 2 km buffer zone

S No	Land use/ land cover class		Area in Ha	Area in %
	Class	Sub class		
1	Forest Cover	a. Forest- Plantations	146.78	0.53
2	Agriculture Area	a. Agriculture- Single crop	7277.51	26.19
3		b. Plantations	8808.67	31.71
4	Waste Lands	a. Scrubs	713.50	2.57
5		b. Land with/ without scrub	5787.00	20.83
6	Built up area	a. Built up land	111.23	0.40
7		b. Airport	3912.77	14.09
8	Mining Areas	a. Mining/ Quarrying	45.96	0.17
9	Water Bodies	a. Water Body – Yelahanka	974.99	3.51
Total			27778.41	100.00

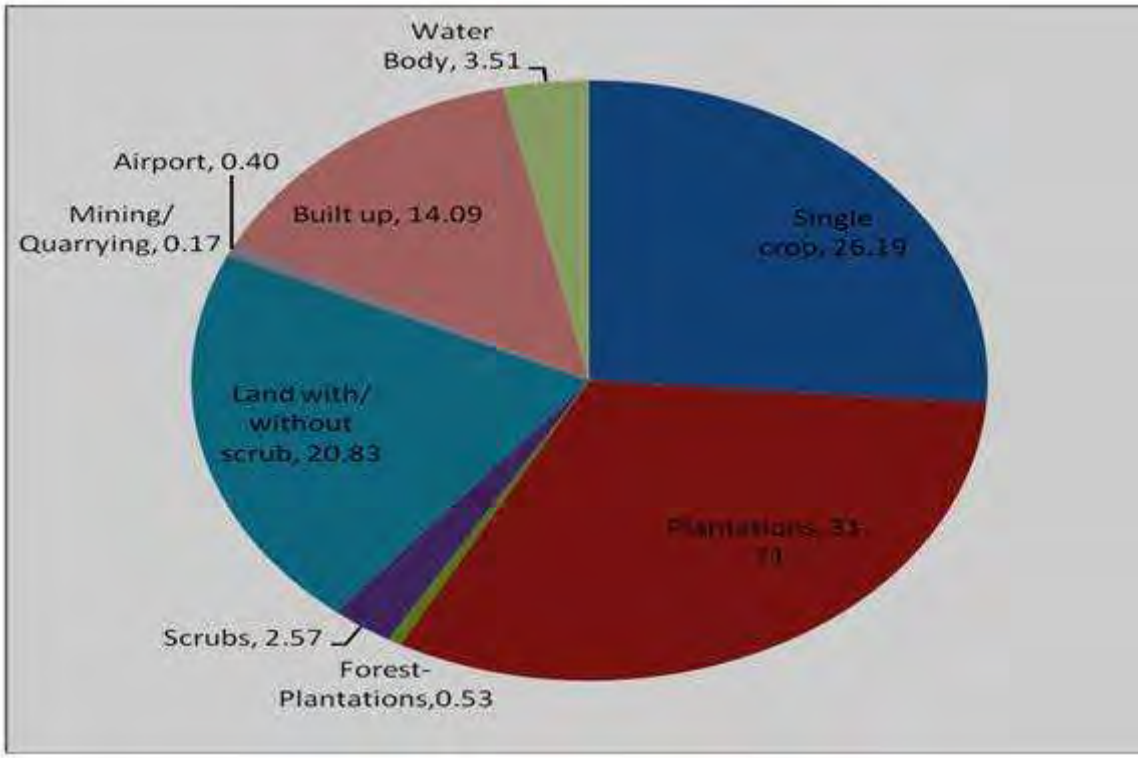


Figure 7. 4: Land Use / Land Cover pattern of 2 km buffer zone

7.4 HYDROLOGICAL STUDIES

The Peripheral Ring Road (PRR) is crossing a number of water bodies in its run. As such it is a pre-requisite that the cross drainage structures should be safe and capable of allowing the peak flood discharge smoothly at the particular location.

Hydraulic design of bridges involves two sequential activities, namely the estimation of peak flood flow and design of suitable structure to accommodate it. The studies has been carried out by STUP consultants Pvt.Ltd., The study covering:

- Topographical data and maps of stream system in the area
- Rainfall pattern of the project area
- Other relevant data, like, catchment characteristics, slope etc

This section describes about the procedures and standards that have been adopted in the hydraulic, geometric and pavement crust design. The relevant IRC codes were referred for carrying out the computations.

7.4.1 Catchment Area

The catchment area has been obtained from the “Topo” sheet / maps of Survey of India. For the present project topo maps of scale 1:50000 have been used. The catchment area is calculated by tracing the ridge line of the watershed between the respective streams. The respective bridge location is identified in the topo-sheet and the watershed is marked in the scanned scaled topo-sheet.

7.4.2 Hydraulic Design (IRC SP 13)

The hydraulic designs have been carried out as per the procedures given in IRC SP 13.

7.4.3 Discharge Calculation

Calculation using Empirical formula from catchment area

The design discharge has been calculated using Ryve’s formula (IRC SP: 13, Cl. 4.3). In this method the maximum flood discharge (Q) of a river is expressed as a function of the catchment area.

$Q = CM2/3$

Where,

Q= the peak run-off in m3/s and M is the catchment area in sq.km

C = Constant, mainly depending on the distance of the area from the coast.

M = Catchment area in sq. km

In this project the value of constant C is adopted to be 10.

7.4.4 Design Procedure

The nalas crossing the Peripheral Ring Road (PRR) are identified on the catchment area sheet. For each nala crossing, the catchment areas are demarcated and the same is adopted for estimating the design discharge. The hydraulic designs have been carried out as per the guidelines of IRC: SP: 13. The design discharge considered for designing the size of the culverts is 1.5 times the estimated discharge for providing a higher factor of safety. The Peripheral Ring Road (PRR) cuts across most of the nalas at an angle. To reduce the amount of nala training works required, most of the culverts are proposed at a skew. Wherever nala path is available in survey plan but nala could not be traced on the Topo sheet, a single cell box culvert of 1.5 x 1.5m has been provided.

7.5 Summary of Hydrological and Hydraulic Design

The chainages referred to in this section are along the proposed road reference centerline. The detail given in **Table 7.3** has to be ascertained at the time of detailed engineering through collecting additional topographical investigations at individual culvert locations.

Table 7.3: Topographical investigations

Sl. No.	Chainage, m	Catchment area in Sq.Km	Discharge Calculated, $Q = CM^{2/3}$	Design Discharge, Q	Size (No. of cells x Width x Height)	Skew Angle
1	559.812	1.07741075	10.509894	15.765	2 x 3 .0 x 2.5	26.316°
2	1625.117	0.657192	7.5578931	11.337	1 x 4.0 x 3.0	43.915°
3	2330.000	0.2951	4.4306706	6.646	1 x 3.0 x 2.5	20.532°

Sl. No.	Chainage, m	Catchment area in Sq.Km	Discharge Calculated, $Q = CM^{2/3}$	Design Discharge, Q	Size (No. of cells x Width x Height)	Skew Angle
4	2425.687	0.255675	4.0265034	6.04	1 x 3.0 x 2.5	40.993°
5	3132.838	0.2951	4.4306706	6.646	1 x 3.0 x 2.5	24.269°
6	3282.002	1.531495	13.288382	19.933	2 x 4.0 x 2.5	28.375°
7	3717.819	Catchment area is less to be demarcated			1 x 1.5 x 1.5	35.569°
8	4831.661	Catchment area is less to be demarcated			1 x 1.5 x 1.5	16.247°
9	5240.000	1.374285	12.362242	18.543	1 x 4.0 x 4.0	13.046°
10	6452.919	0.33945	4.8643797	7.297	1 x 3.0 x 2.5	26.452°
11	7974.702	0.15	2.8213234	4.232	1 x 2.0 x 2.5	24.069°
12	8179.540	0.15	2.8213234	4.232	1 x 2.0 x 2.5	0.000°
13	8409.623	0.15	2.8213234	4.232	1 x 2.0 x 2.5	0.000°
14	9278.624	0.05	1.3558542	2.034	1 x 1.5 x 1.5	20.180°
15	10039.601	2.5925	18.877758	28.317	2 x 4.0 x 4.0	32.920°
16	10882.409	0.647125	7.4804739	11.221	1 x 4.0 x 3.0	34.520°
17	11296.221	0.679025	7.7244542	11.587	1 x 4.0 x 3.0	30.670°
18	12020.000	0.291315	4.3926846	6.589	2 x 3.0 x 2.5	0.000°
19	13500	1.1665	11.081846	16.623	2 x 3.5 x 3.0	0.000°
20	20695.626	Catchment area is less to be demarcated			1 x 1.5 x 1.5	0.000°
21	22860.415	Catchment area is less to be demarcated			1 x 1.5 x 1.5	31.180°
22	24693.871	Catchment area is less to be demarcated			1 x 1.5 x 1.5	0.000°

Sl. No.	Chainage, m	Catchment area in Sq.Km	Discharge Calculated, $Q = CM^{2/3}$	Design Discharge, Q	Size (No. of cells x Width x Height)	Skew Angle
23	25137.426	Catchment area is less to be demarcated			1 x 1.5 x 1.5	0.000°
24	27157.981	Catchment area is less to be demarcated			1 x 1.5 x 1.5	35.138°
25	29228.032	Catchment area is less to be demarcated			1 x 1.5 x 1.5	26.759°
26	31481.50	1.6625	14.036151	21.054	2 x 4.0 x 4.0	35.000°
27	32333.375	Catchment area is less to be demarcated			2 x 4.0 x 3.0	35.912°
28	32866.824	Catchment area is less to be demarcated			2 x 4.0 x 3.0	0.000°
29	33115.657	Catchment area is less to be demarcated			1 x 1.5 x 1.5	30.490°
30	33889.164	2.575	18.792687	28.189	2 x 4.0 x 4.0	30.787°
31	35398.457	0.1	2.1527817	3.229	1 x 2.0 x 2.5	29.025°
32	36297.731	2.4	17.930851	26.896	2 x 4.0 x 4.0	38.000°
33	36993.841	Catchment area is less to be demarcated			1 x 1.5 x 1.5	0.000°
34	37229.903	Catchment area is less to be demarcated			1 x 1.5 x 1.5	26.342°
35	38107.367	Catchment area is less to be demarcated			1 x 1.5 x 1.5	0.000°
36	39655.549	Catchment area is less to be demarcated			1 x 1.5 x 1.5	0.000°
37	42218.497	0.2325	3.7792389	5.669	1 x 3.0 x 3.0	0.000°
38	43247.391	Catchment area is less to be demarcated			1 x 2.0 x 2.5	39.356°
39	43348.739	Catchment area is less to be demarcated			1 x 2.0 x 2.5	4.414°
40	43712.761	0.625	7.3088992	10.963	1 x 4.0 x 3.0	13.244°
41	44544.421	0.625	7.3088992	10.963	1 x 4.0 x 3.0	9.754°

Sl. No.	Chainage m	Catchment area in Sq.Km	Discharge Calculated, $Q = CM^{2/3}$	Design Discharge, Q	Size (No. of cells x Width x Height)	Skew Angle
42	45214.727	0.625	7.3088992	10.963	1 x 4.0 x 3.0	13.352°
43	45600.874	Catchment area is less to be demarcated			1 x 1.5 x 1.5	3.791°
44	46241.077	Catchment area is less to be demarcated			1 x 2.0 x 2.5	0.000°
45	46492.020	0.3625	5.0822783	7.623	1 x 3.0 x 2.5	12.112°
46	46910.008	Catchment area is less to be demarcated			1 x 3.5 x 2.5	0.000°
47	47012.883	1.3375	12.140539	18.211	2 x 4.0 x 2.5	24.155°
48	47111.613	Catchment area is less to be demarcated			1 x 2.0 x 2.5	0.000°
49	47180.284	Catchment area is less to be demarcated			1 x 2.0 x 2.5	47.505°
50	47552.608	0.25	3.9666692	5.95	1 x 3.0 x 2.5	36.900°
51	48023.702	0.5375	6.6094061	9.914	1 x 4.0 x 3.0	11.689°
52	48164.930	Catchment area is less to be demarcated			1 x 1.5 x 1.5	32.130°
53	49186.716	0.5375	6.6094061	9.914	1 x 4.0 x 3.0	16.626°
54	50252.726	Catchment area is less to be demarcated			2 x 3.0 x 2.5	0.000°
55	50457.229	Catchment area is less to be demarcated			1 x 2.0 x 2.5	0.000°
56	50703.655	1.4875	13.032532	19.549	2 x 4.0 x 2.5	31.634°
57	51355.274	0.125	2.4982677	3.747	1 x 2.0 x 2.5	14.423°
58	51596.037	0.07	1.6969943	2.545	1 x 2.0 x 2.5	10.367°
59	51666.360	0.07	1.6969943	2.545	1 x 2.0 x 2.5	0.000°
60	52226.470	Catchment area is less to be demarcated			2 x 4.0 x 2.5	29.306°

Sl. No.	Chainage, m	Catchment area in Sq.Km	Discharge Calculated $Q = CM^{2/3}$	Design Discharge, Q	Size (No. of cells x Width x Height)	Skew Angle
61	52755.377	1.525	13.250766	19.876	2 x 4.0 x 2.5	35.780°
62	53259.494	Catchment area is less to be demarcated			1 x 4.0 x 4.0	0.000°
63	53575.380	2.2040505	16.940599	25.411	2 x 4.0 x 3.0	31.067°
64	55482.903	Catchment area is less to be demarcated			2 x 3 .0 x 2.5	9.450°
65	55650.952	0.22515275	3.6991533	5.549	2 x 3 .0 x 2.5	16.720°
66	55970.412	Catchment area is less to be demarcated			2 x 4.0 x 2.5	6.728°
67	56781.630	Catchment area is less to be demarcated			2 x 4.0 x 2.5	3.980°
68	56955.857	2.92225	20.447183	30.671	2 x 4.0 x 4.0	34.280°
69	58715.674	0.27922875	4.2702707	6.405	1 x 3.0 x 2.5	37.090°
70	59367.892	0.730425	8.1097029	12.165	1 x 4.0 x 4.0	31.200°
71	60405.825	0.24392775	3.9021434	5.853	1 x 3.0 x 2.5	17.970°
72	60532.696	Catchment area is less to be demarcated			1 x 1.5 x 1.5	16.937°
73	60634.413	2.7475	19.823273	29.435	2 x 5.0 x 3.0	0.000°
74	61823.321	1.997375	15.963776	23.796	2 x 3 .0x 2.5	0.000°

**Source: STUP consultants Pvt.Ltd.*

7.6 Public Hearing

Proceedings of the Environmental Public Hearing held on 06.02.2014 at 11.00 am in Connection with the Proposed· 8 Lane Peripheral Ring Road Development (Phase-I) Project which Starts from Chainage 0.00 km to Chain age 64.5 (65) km Connecting Tumkur Road with Hosur Road through Old Madras Road is enclosed as **Annexure.**

CHAPTER 8
PROJECT BENEFITS

8.1 Employment Potential

Bangalore Development Authority (BDA) has been entrusted with the responsibility to take up the development of Peripheral Ring Road (PRR) in phases for a smooth flow of traffic, to reduce the traffic congestion, pollution intensity and travel time.

The main objective of the project is to provide safe and efficient service levels to growing traffic movements and better connectivity to the region. The industry and other users of the road will be benefited from the proposed improvement on account of comfort, safety and reduced vehicle operating costs.

A significant economic benefit of the improvement project is generation of employment opportunities in the construction activities, which will be available to the people, including affected community. Besides, they will also draw benefits from the economic activities as a result of increased traffic flow and movement of vehicles.

8.2 Concluded Benefits of the Project

- To accelerate regional economic development in terms of industry, tourism and agriculture,
- To reduce vehicle operating and maintenance costs by improving road conditions,
- To reduce travel time by minimizing congestion in urban stretches and providing a four lane facility over there,
- To minimize road accidents by increasing road widths, improving intersections and road geometry
- The project may also generate local employment opportunities through the construction activities and local business.
- Abatement of ambient air and noise pollution in comparison to a do-nothing situation.

- Increase in safety due to construction of median in urban sections between two directions of traffic flow.
- Construction of Road Over Bridge (ROBs) shall reduce travel time and enhance smooth flow of the traffic and Project facilities included in the project preparation are Bus Bays, Truck Lay Bye, Road Street Lighting etc.

CHAPTER 9

ENVIRONMENTAL COST BENEFIT ANALYSIS

9.1 Environmental Cost - Benefit Analysis

Evaluation of environmental costs of a project is to estimate its relative merits and demerits known as environmental cost benefit analysis.

9.2 Cost Benefit Analysis and the Environment

The Potential Environmental benefits envisaged from the proposed Peripheral Ring Road (PRR) project are summarized below:

- Removal of excavated material and extensive plantation developed on either side of the Peripheral Ring Road (PRR).
- There will be negligible impact on water environment and the rainwater will be diverted in to the paved areas.
- The domestic effluent will be generated which will be treated and disposed off in septic tanks and soak pits. Adopting scientifically enhanced solar lighting system & other energy efficient strategies to conserve energy for road lighting will mitigate the natural resource depletion.
- Prevent & spreading of fugitive dust and other atmospheric pollutants such as $PM_{2.5}$, PM_{10}, NO_X and SO_2 generated during construction and operation of the Peripheral Ring Road (PRR).
- Purchase of larger, more energy efficient construction equipment
- Improved maintenance of construction machinery and transport locomotives
- More efficient use of equipment by optimizing truck cycle times and reducing idling times

CHAPTER 10

ENVIRONMENTAL MANAGEMENT PLAN

10.1 Development of Environmental Management Plan

The Environmental Management Plan (EMP) is the synthesis of all proposed mitigative and monitoring actions, set to a time-frame with specific responsibility assigned and follow-up actions defined. It contains all the information for the proponents, the contractors and the regulatory agencies to implement the project within a specified time-frame.

The Environmental Management Plan (EMP) is a plan of action for avoidance, mitigation and management of the negative impacts of the project. The Environment Enhancement is also an important component of Environmental Management Plan (EMP).

The Environmental Management Plan (EMP) refers to all implemental tasks at different stages of project, namely,

- Construction Phase
- Operation Phase

The Environmental Management Plan (EMP) includes a list of all project-related activities & impacts and schedule. The Environmental Management Plan (EMP) has been presented in the **Table 10.1.**

Table 10.1 : Environnemental Management Plan (EMP)

Activity	Environmental Impact	Mitigation Measures	Responsibility
Pre – construction phase			
Land Acquisition, clearing encroachments and R&R	Loss of buildings	The land acquisition would be in accordance with the RAP and entitlement framework. All R&R activities are to be completed before starting the construction.	NGOs, PIU
Relocation of Utilities and common property resources (CPR)	Damage to utilities, Inconvenience to Public	All the utilities and common property resources being impacted due to the project will have to be relocated with prior approval of the concerned Departments/Agencies before construction starts.	Contractor, PIU
Debris disposal site identification	loss of productive lands or natural habitats	Selection of the disposal sites will be carried out in consultation with the State Pollution Control Board, Revenue Department and Forest Department in order to ensure that no natural drainage, productive lands or natural habitat is adversely impacted due to disposal. Preferably, debris disposal site would be identified in barren, infertile land.	Contractor, PIU
Establishment of Stone Crushers, Batching Plants, Hot-mix plants	Air, water, noise and soil pollution	Specifications of Stone crushers, hot mix plants and batching plants to be established for the project should comply with the requirements of the relevant State/Central Pollution control Board legislations.	Contractor
Selection of construction vehicles, machinery and equipments	Air and noise pollution	All the vehicles, machinery and equipments to be engaged for the construction work should be attached with the latest, advanced pollution control measures available in the country and those should conform to the relevant Indian standards.	Contractor, PIU
Materials (Sand, earth and aggregates)	Loss of productive land, noise and air	Contractor should procure materials from licensed sources.	Contractor , PIU

sourcing	pollution	Every detail (Location, ownership, agreement, redevelopment Plan) of the material sourced should be intimated to CSC for periodic inspections so that appropriate measures are implemented at site towards safe operation and minimizing impacts.	
Haul roads maintenance	Air and noise pollution	During the inception of the project, Contractor should identify the network of roads (especially the village roads) to be used for haulage of construction materials. Strategy for the maintenance of identified haul road stretches is to be prepared so that regular maintenance is carried out to those stretches by the Contractor for easy plying of construction vehicles as well as the regular local commuters.	Contractor, CSC, PIU
Selection of Borrow areas	Air, water and noise pollution, loss of productive lands	Compliance to all the State norms towards operation and environmental protection of borrow areas is the sole responsibility of the Contractor. CSC will inspect locations intended for operation and mitigation measures will be instructed towards satisfactory redevelopment. Inspection to the borrow areas will be carried out by raising Request for Inspection (RFI) by the Contractor for each of the borrow areas and obtain subsequent approval from CSC.	Contractor and CSC
Selection of Stone Quarries	Air and noise pollution, loss of productive lands	Contractor will identify the stone quarries in consultation with the Mining Department. A comprehensive Quarry Management Plan need to be prepared incorporating Environmental and Safety Management Plan with special emphasis to Quarry redevelopment for approval from CSC.	Contractor
Construction Phase			
1. Impact on Soil Quality			
Removal of vegetation cover, Excavations of borrow pits	Increased soil erosion, loss of top soil.	Turfing of road embankment slopes, development of compensatory afforestation and	Contractor and CSC

		Borrow area rehabilitation has to be done as preventive measures for soil erosion. Further Top soil from borrow areas has to be stripped to a specified depth and stored in stockpiles of height not exceeding 2 meters with proper covering. This shall be restored for rehabilitation of borrow pits. In borrow pits, the depth of the pit should be regulated so that the sides of the excavation will have a slope not steeper than 1 vertical to 4 horizontal from the edge of the final section of bank. The device for checking soil erosion include the formulation of sediment basins, slope drains etc. Such works and maintenance thereof will be deemed as incidental to the earthwork. Cutting of trees will be carried out in phases and compensatory afforestation to start at the earliest with sufficient protection measures.	
Acquiring of extra RoW and construction of realignments, Use of productive lands for storing, stock yards and workers camp, Borrowing of earth	Loss of Productive topsoil	The topsoil from all areas of cutting and areas of storing and stock yards and workers camp have shall be stripped to a specified depth of 150 mm and stored in stockpiles of height not exceeding 2 meters with proper covering. The stored topsoil will be spread back to restore the productivity of the exhausted borrow areas. Also the accumulated soil will be utilized for developing median plantation and raising turfs in the embankment slopes. The exhausted borrow areas could be developed into water bodies for local use, practicing fishery.	Contractor and CSC
Movement of Heavy Vehicles	Compaction of productive top soil	Construction vehicles, machinery and equipment shall move, or be stationed in pre-identified designated areas only. If operating from temporarily hired land, it will be ensured that the topsoil for agriculture	Contractor and CSC

		remains preserved & not get compacted.	
Spillage of fuel, lubricants and hazardous chemicals	Contamination of soil and negative impact on the growth of the floral vegetation and faunal distribution.	Vehicles and machinery are maintained and refilled in such a fashion that fuel spillage does not contaminate the soil. Fuel storage and refilling sites should be kept away from cross drainage structures and important water bodies. All spills shall be disposed off as desired and the site shall be fully cleaned before handing over. Soil quality monitoring should be conducted as per Environmental Monitoring Plan to ascertain level of contamination.	Contractor and CSC
Disposal of construction wastes	Loss of productive lands	The construction wastes should be dumped in selected pits, developed on infertile land. All applicable waste disposal norms to be followed. Waste land to be preferred for construction debris disposal.	Contractor and CSC
2. Impact on Water Quality			
Surface runoff from the construction site, dumping of construction debris in or nearby water bodies	Increased turbidity of water. Deterioration of Water quality of Community water sources. Adverse impact on aquatic ecosystem.	No labour camps, stone crushers, hot mix plants and other heavy machinery should be located near to water bodies. No discharge from such establishments should follow their path into nearby water bodies. Dumping of debris in or nearby water bodies to be strictly avoided. Waste products must be collected, stored and taken to approved disposal sites as per prevailing disposal norms. Runoff from the construction site should be passed through silt traps. Pitching, stabilization of soil and slope protection measures should be taken up to reduce erosion of soils. Water quality monitoring should be conducted as per Environmental Monitoring Plan so that appropriate measures are taken up towards abatement of pollution.	Contractor and CSC

Spillage of fuels and lubricants, spillage of hazardous chemicals	Deterioration of water quality of community water sources. Adverse impact on aquatic ecosystem.	Appropriate drainage arrangements with catch drains and catch pits designed to safely drain out the hazardous chemicals should be provided. To avoid spillage of fuel and lubricants, the vehicles and equipment shall be properly maintained and repaired. Maintenance to be carried out on impervious platforms with spill collection provisions. Surface run off from vehicle parking, washing and fueling areas and hot mix plant areas has to be passed through oil interception chambers and the oil will be skimmed off manually from the chamber and will be disposed off in approved landfill sites. The Schematic drawing of Oil interception chamber is enclosed as **Annexure.** Water quality monitoring should be conducted as per Environmental Monitoring Plan to detect any contamination or spillage.	Contractor and CSC
Acquisition of water sources like wells, tube wells & ponds	Loss of drinking water and irrigation water sources.	Any source of water for the community such as ponds, wells, tube-wells etc. lost incidentally shall be replaced immediately.	Contractor and CSC
Construction of bridges across major water bodies	Water shortage in down stream water users.	The construction of bridges across major water bodies has to be done by serving prior notice to the users. Care should be taken to avoid mixing of construction materials with water channel such that it may affect the down stream users or water supply schemes.	Contractor and CSC
Construction of embankments	Blocking of cross drainage and resultant flooding.	Earth, stone or any other construction material should be properly disposed off so that the flow of water in cross drainage channels is not blocked.	Contractor and CSC
Absence of proper	Contamination of water	Construction laborers‘ camps shall be located	Contractor

sanitation and waste disposal in construction camps	bodies and spreading of water-borne diseases. Health risk to workers & public	away from the habitation and from major water bodies. Adequate sanitary facilities, drainage, washing and toilet facilities with septic tanks and refuse collection and disposal should be provided to the workers. The provision of water supply and toilet facilities should be made as per the stipulated guidelines in the Indian Labour Act. Water quality monitoring should be conducted as per Environmental Monitoring Plan.	and CSC
Use of water for construction from community water sources	Scarcity of water to the community	Arrangement for supply and storage of water will be made by the contractor in such a way that the water availability and supply to nearby communities remain unaffected. If a new tube-well is to be bored, proper sanction and approval by Ground Water Department is needed. The wastage of water during the construction should be minimized. In case of tapping water from community sources, consent to be obtained from local Administration for the same.	Contractor and CSC
Construction of Impervious bituminous pavement and drains	Reduction in area for ground water recharge	Rain water harvesting pits will be constructed at average distance of 500 m. The pits should be atleast 3 - 5 m above the highest ground water table. The schematic diagram of Rain water harvesting pit is enclosed as Annexure.	Contractor and CSC
3. Impact on Air Quality			
Gaseous emission from construction vehicles and machinery	Deterioration of ambient air quality and adverse health impacts.	All vehicles, equipment and machinery used for construction should be fitted with latest air pollution control equipments and should be regularly maintained to ensure that the emission levels are as per norms of PCB. Idling of delivery trucks or other equipment should not be permitted during periods of unloading or when they are not in active use. The human settlements should be at least 500	Contractor and CSC

		m down windward direction of Hot (asphalt) mix plant. The construction operations during nights, especially in the winter season should be carried out under restricted conditions. Air quality monitoring should be conducted as per Environmental Monitoring Plan to detect any deterioration in air quality due to the construction activities.	
Dust generation due to material handling, operation of crushers and hot mix plants, movement of construction vehicles and construction activities	Dust emissions will have adverse effect on the health of construction workers as well as the public in the surrounding Communities. Dust settled on leaves may reduce growth rate of the plants.	All precautions to reduce the level of dust emissions from the hot mix plants shall be taken. The hot-mix plants should be sited at least 500 m from the nearest habitation and from major water bodies. They should be fitted with dust extraction units. Water should be sprayed on the earth mixing sites, asphalt mixing site and service roads. During sub grade construction, sprinkling of water should be carried out at least twice a day on a regular basis during the entire construction period especially in the winter and summer seasons. Special attention should be given in the sections where the alignment passes through sensitive areas such as schools, hospitals and urban areas. As soon as construction is over the surplus earth should be utilised to fill up low-lying areas. In no case, loose earth should be allowed to pile up along the alignment. Vehicles delivering material should be covered. Air quality monitoring should be conducted as per Environmental Monitoring Plan.	Contractor and CSC
4. Impact on Noise Levels			
Noise generated from construction vehicles, asphalt plants and equipments	Since the noise Generating activities are localized and intermittent, no serious	Construction contract should clearly specify the use of equipment emitting noise of not greater than 90 dB(A) for the eight hour operation shift. The citing of construction yards should be done	Contractor and CSC

	impact on human health is anticipated. Residential areas nearby the construction site may experience increase in night time ambient noise levels.	leaving at least 100 m distance from any residential areas which will allow noise to attenuate. The main noise producing sources such as the concrete mixers, generators, grader etc. should be provided with noise shields around them. The noise shields can be any physical barriers, which is effective in adequate attenuation of noise levels. A 3 m high enclosure made up of brick and mud with internal plastering of a non-reflecting surface will be very effective in this regard. For protection of construction workers, earplugs should be provided to those working very close to the noise generating machinery. At construction sites within 150 m of human settlements, noisy construction should be stopped between 10:00 pm and 8:00 am Noise level monitoring should be conducted as per Environmental Monitoring Plan.	
5. Impact on Flora and Fauna			
Removal of trees for Construction of road and construction of realignments.	Biodiversity will be negligible since most of the trees are of common occurrence. Loss of trees will lead to Increase in soil erosion, loss of shade and other benefits of trees, and decline in air quality.	Small trees shall be transplanted wherever possible to minimise the impacts of loss of trees. Trees should be removed in phases. Areas of tree plantation cleared will be replaced according to Compensatory Afforestation Policy under Forest Conservation Act-1980. The compensatory plantation should be carried out in consultation with the State Forest Department. Adequate care of the compensatory plantation should be taken up so as to achieve optimum survival rate. Landscaping should be done with a lag of 3 to 4 months from the start of the work on any section. The section should be deemed to be complete when the landscaping is over. Survival rate of plants must be included in the	Contractor and CSC

		contract specifications so as to ensure that the compensatory plantation achieves the objective of compensating lost trees. Indigenous and endemic tree species suitable for the area should be planted at the onset of monsoon season. The plants should be provided with adequate protection from animals and proper monitoring should be carried out to ensure their growth.	
6. Impact on Protected Areas			
Construction of highway / Raw Material handling within protected areas	Impact on soil Impact on air quality Impact on noise levels Impact on tranquility of protected areas due to human influence within protected area.	Borrow areas should not be located in protected areas. Debris dumping should be completely avoided. No labour camps / material stocking yard should be located within protected area. Construction material, especially hazardous material handling should be done with due care to avoid spillage within protected area limits. Minimum construction machineries should be deployed within protected area limits. Mixing of raw materials should be completely avoided within protected areas. Simultaneous working of construction machineries should be avoided in protected areas to have least noise level due to the activities. Least minimum number of machineries should be deployed along the construction site falling within protected areas. Noisy construction should be completely avoided during night time (10.00 pm – 6.00 am) Human activities should be completely restricted to the proposed RoW such that there should not be any ingress in to forest areas for poaching of animals / any other items.	Contractor and CSC
7. Impact on Health and Safety of Workers			
Poor maintenance of machines and vehicles, poor	Accident risk to workers from construction	To ensure safe construction environment, lighting devices and safety signal devices shall	Contractor and CSC

light conditions at the work place, carelessness and poor management of work	activities.	be installed. Traffic rules and regulations to be strictly followed. Safety of workers undertaking various operations during construction should be ensured by providing them helmets, masks, safety goggles etc. Regular tool talks, mock drills, training programmes to be organized towards educating workers towards adopting safe working methods. The electrical equipment should be checked regularly to avoid risks to workers. At every work place, a readily available first aid unit including an adequate supply of dressing materials, a mode of transport (ambulance), nursing staff and an attending doctor to be provided.	
Unhygienic conditions at work place and camp sites, Non-availability of good drinking water.	Health problems to workers	Adequate drainage, sanitation and waste disposal to be provided at workplaces. First Aid facility to be made available at each work locations. Periodical medical checkup facility to be provided to all the workers. At every workplace, good and sufficient water supply shall be maintained to meet the daily chore of the residing population. Measures to be implemented so that waste water is collected in septic tanks/soak pits. No surface stagnation of water will be allowed to avoid vector outburst.	Contractor and CSC
8. Impact on Cultural Properties and Amenities			
Construction at culturally or archaeologically important locations.	Damage or loss of cultural properties	All necessary and adequate care should be taken to minimise the impact on cultural properties If articles such as fabrics, coins, artifacts, structures or other geographically or archaeologically important materials are discovered, the excavation should be stopped	Contractor and CSC

		and the Archaeological Department should be intimated.	
Roadside landscaping	Improved aesthetics	Avenue plantation to be carried out with foliage, shady trees mixed with flowering trees, shrubs and scented plants as per detailed designs. Rest areas for travelers at specified chainages to be developed with landscaping so as to avail shade.	Contractor and CSC
Improvement of roadside amenities	Improved comfort level of travellers	Restoration and improvement of bus shelters, bus bays and truck stoppage sites to be carried out as per detailed design. Road furniture like footpaths, railings, traffic signs etc. shall be erected as per design.	Contractor and CSC
Enhancement of cultural properties	Harmony, goodwill and coherence Amongst communities	Enhancement of all cultural properties and access road shall be completed as per the design.	Contractor and CSC
Operational Phase			
Improvement of road geometry and pavement condition	Less chances of accidents.	Proper implementation of traffic rules by the traffic Police. Proper maintenance of traffic signs and implementation of accident care facilities along the road by the project implementation agency.	Contractor, PIU and Police
Improvement of road surface and its maintenance	Reduced dust generation from road. Increased Vehicular emissions due to increased traffic.	Proper implementation of vehicular emission control rules by the Motor Vehicles Department. Roadside tree plantation to be restored and maintained as per the compensatory plantation plan. PM_{10}, $PM_{2.5}$, SO_2, and NO_x to be monitored as per Environmental Monitoring Plan.	Contractor, PIU and Motor Vehicles Department
Increase in traffic	Increase in the Ambient noise levels, especially during night time along the project road.	Development of greenbelt comprising selected species of trees with high canopy along the project road for attenuation of noise. Use of horns should be restricted at sensitive locations like schools and hospitals through the use of appropriate signboards along the road. Use of air horns should be minimised during night.	Contractor, PIU and Police

		Noise barriers should be provided along the road at sensitive locations such as hospitals, schools, residential areas, courts etc. Noise monitoring should be conducted as per Environmental Monitoring Plan.	
Increase in embankment height and Improvement of flood water drains.	Water logging during monsoon will not take place.	The cross drainage system and the flood water drains should be periodically cleared.	Contractor and PIU
Construction of Rain water harvesting pits at an average distance of 500m.	Enhanced ground water recharge.	The rain water harvesting pit opening should be periodically cleaned during operation phase such as to ensure enhanced ground water recharge. The schematic diagram of Rain water harvesting pit is presented as	Contractor / BDA.
Compensatory plantation	Improved biodiversity and aesthetics	The re-plantation scheme, containing Indigenous and endemic tree species suitable for the area, should be strictly implemented.	Contractor and PIU
Mangrove plantation and maintenance	Restoration of mangrove areas	The re-plantation and maintenance scheme at mangrove locations should be strictly followed.	Contractor and PIU
Movement of vehicles with higher speed along protected forest areas	Impact of traffic on wild animals.	Drivers should be warned with proper sign boards for speed restriction within the forest areas especially along the possible animal crossing locations and about the major wildlife habitats near by the highway. Usage of air horns should be completely avoided within protected forest areas both during day and night time. Forest officials should carry out frequent patrolling along the road in the protected areas to avoid exploitation of forest resources / teasing of animals by road commuters.	BDA/ State Forest Department
Spillage of hazardous chemicals due to accidents	Soil and water bodies nearby the accident site may get	The rules as defined in Environmental (Protection) Act, 1986 should be complied For delivery of hazardous substances, three certificates namely permit license, driving	Motor Vehicles Department, Police

	contaminated. Safety risk to the public nearby the accident area.	license and guarding license issued by Transport Department should be maintained. Vehicles carrying hazardous substances should display mandatory safety signs. In case of spillage, it should be reported to relevant department and their instructions should be followed Cleaning of the spills at the accidental site should be carried out as per regulations.	
Improved safety measures and improved traffic management	The chances of accidents would be reduced	Traffic management plan to be developed, especially in congested locations. Traffic control measures including speed limits to be enforced strictly. RoW should be properly marked and further encroachment of RoW should be strictly prevented. Road side vendors should be restricted to designated areas only.	PIU, Motor Vehicles Department and Police

10.2 Environmental Compliance Monitoring Plan

The purpose of the monitoring programme is to ensure that the envisaged purpose of the project is achieved and results in desired benefits to the environment and population affected. To ensure the effective implementation of the Environmental Management Plan (EMP), it is essential that an effective monitoring programme be designed and carried out.

The broad objectives are

- To evaluate the performance of mitigation measures proposed in the EMP
- To evaluate the adequacy of Environmental Impact Assessment (EIA)
- To suggest improvements in management plan, if required
- To enhance environmental quality; and
- To satisfy the legal and community obligations.

Various physical, biological and social components identified as of particular significance in affecting the environment at critical locations in various stages of the project have been suggested as Performance Indicators (PIs) listed below shall be the focus for monitoring.

- Air quality with respect to PM_{10}, $PM_{2.5}$, SO_2, and NO_x
- Water quality with respect to DO, BOD and Coliform count
- Noise levels around sensitive locations; and
- Replantation success / survival rate.

For each of the environmental components, the monitoring plan specifies the parameters to be monitored; location of monitoring sites; frequency and duration of monitoring. The monitoring plan also specifies the applicable standards, implementation and supervising responsibilities.

Table 10.2: Environmental Monitoring Plan

Air Quality Monitoring	
Project stage	Construction and operation stage
Parameter	PM_{10}, $PM_{2.5}$, SO_2, and NO_x
Sampling Method	Respirable Dust Sampler to be located 50 m from the plant in the downwind direction. Use method specified by CPCB for analysis
Standards	Air (Prevention and Control of Pollution) Rules, CPCB
Frequency	Once every season for three seasons (except monsoon) per year for each year of construction
Duration	Continuously for 24 hours / or for 1 full working day
Location	One monitoring station near each construction related facility namely, hot mix plant, labour camp, staff quarters, borrow location and quarry location, and at sensitive locations along the project road at an average distance of 10 km during construction stage. Monitoring should be done at each additional construction related facility, if present. At sensitive locations along the project road at an average distance of 10 km during operation stage.
Measures	Wherever air pollution parameters increase above specified standards, additional measures as decided by the engineer shall be adopted
Implementation	Contractor through approved monitoring agencies
Supervision	Bangalore Development Authority (BDA)
Water Quality Monitoring	
Project stage	Construction
Parameter	pH, BOD, COD, TDS, Oil & Grease and Detergents for Surface water: pH, TDS, Total hardness, Sulphate, Chloride, Fe, Pb for groundwater
Sampling Method	Grab sample collected from source and analysis as per Standard Methods for Examination of water and Waste water
Standards	Indian standards for Inland Surface Water (IS; 2296, 1982) and for Drinking water (IS; 10500,2012)
Frequency	Thrice a year (covering all season except monsoon) during the construction period
Duration	Grab sampling
Location	At major water bodies along the road at an average distance of 25 km
Measures	At locations with chances of increase in water pollution, all inflow channels shall be checked from pollution loads and channel delivering higher pollution load shall be terminated from disposal into the water source and other methods of disposal shall be adopted
Implementation	Contractor through approved monitoring agencies
Supervision	Bangalore Development Authority (BDA)
Soil Quality Monitoring	
Project stage	Construction
Parameter	Monitoring of Pb, SAR and Oil & Grease

Sampling Method	Sample of soil collected to be acidified and analyzed using Atomic Absorption Spectrophotometer
Standards	Threshold for each contaminated set by IRIS database of USEPA until National Standards are promulgated
Frequency	During the pre monsoon post monsoon seasons each year for the entire construction period
Duration	Grab sampling
Location	At productive agriculture lands abutting traffic detours and traffic diversions and major intersections at an average distance of 10 km along the road.
Measures	At location of increased in pollution levels, source shall be identified and shall be diverted from future disposal
Implementation	Contractor through approved monitoring agencies
Supervision	Bangalore Development Authority (BDA)
Noise Level Monitoring	
Project stage	Construction and operation stages
Parameter	Noise level on dB (A) scale
Special guidance	Free field at 1 m from the equipment whose noise level is being determined. Equivalent noise levels using an integrated noise level meter kept at a distance of 15m from edge of pavement
Standards	MoEF
Frequency	Once every season (except monsoon) for each year of construction
Duration	Reading to be taken at 15 seconds interval for 15 minutes every hour for 24 hours and then averaged
Location	Near the hot mix plant and near sensitive locations such as school hospital etc. along the road at an average distance of 10 km during Construction stage. Monitoring should be done at each additional hot mix plant, if present. Near sensitive locations such as school hospital etc. along the road at an average distance of 10 km during operation stage
Measures	Incase of noise levels causing disturbance to the sensitive receptors, management measures as suggested in the EMP shall be carried out.
Implementation	Contractor through approved monitoring agencies
Supervision	Bangalore Development Authority (BDA)

10.3 Block Cost Estimates for Environmental Protection

The cost of implementing mitigation measures works out to Rs. 902 Lakhs during Construction phase. The operational cost of the same is estimated for the first three years is around Rs. 16 lakhs.

Table 10.3: Cost Estimates for Environmental Management Plan

Item	Assumptions	Cost in Lakhs
A. Total Cost During Construction Phase		
Provision of Sewage and sanitation facilities for the construction camps, including maintenance for 3 years	Lump Sum	330.00
Provision of Water Supply Facilities for the construction camps	Lump Sum	1.20
Compensatory avenue plantation of thrice the number of trees to be cut and their fencing and maintenance for three years	Rs.900/Tree x 10311 Trees x 3	278.00
Shrub plantation in the median for the entire corridor @500 saplings/km and their fencing and maintenance for 3 years	Rs. 500/Shrub x 500 Shrubs x 65 km	162.50
Air Quality Monitoring at sensitive locations at an average distance of 10 km	Rs. 2000/location x 10 locations x 3 seasons x 3 years	1.08
Water Quality Monitoring at major water bodies at an average distance of 25 km	Rs. 2500/location x 10 locations x 2 seasons x 3 years	1.50
Noise Monitoring at sensitive locations at an average distance of 10 km	Rs. 500/location x 10 locations x 3 seasons x 3 years	0.45
Soil Quality Monitoring at sensitive locations at an average distance of 10 km	Rs. 2000/location x 10 locations x 2 seasons x 3 years	1.20
Mobilization Charges	Rs. 75000/season x 3 seasons x 3 years	6.75
Dust Suppression at Site	Lump sum	0.50
Severances & Others (including	Rs 28,500/structure x 2	37.05

training, workshops, awareness campaigning etc.)	structure/km x 65 km	
Rainwater Harvesting Structures	Rs 28,500/structure x 2 structure/km x 65 km	37.05
Cost for plantation In equal area of forest area to be diverted.	Rs 162746.83/Ha* 1.5 ha	24.42
NPV Vale for Forest Areas	Rs. 1043000 x 1.5 ha	15.65
Construction of Sedimentation Tanks in construction yard near to Concrete mix plant and Hot mix plant	Rs 50000/unit x 2 units in a construction yard x 2 locations	2.00
Provision for oil interception chambers in construction yard near to vehicle parking, fueling and washing area and 2) hot mix plant	Rs 10000/unit x 2 units in a construction yard x 2 locations	0.40
Mangrove nursery establishment, maintenance, transplantation to site and maintenance up to maturing for thrice the area of mangrove area lost	Rs. 50000/hectare * 1.50 ha * 3	2.25
Total cost during construction phase		**902.00 lakhs**
B. Annual Cost During Operational Phase during First Three Years		
Environmental Monitoring	Rs. 2000/location x 20 locations x 3 seasons	10.20
Air Pollution Monitoring at sensitive locations at an average distance of 10 km	Rs. 500/location x 20 locations x 3 seasons	1.5
Noise Monitoring at sensitive locations at an average distance of 10 km	Rs. 75000/season x 3 seasons	2.25
Mobilisation Charges	Rs. 75000/season x 3 seasons	2.25
Rs.16.00 lakhs		

The compliance monitoring and the progress reports on environmental components may be clubbed together and submitted quarterly during the implementation period. The operation stage monitoring reports may be annual or biannual provided the Project Environmental Completion Report shows that the implementation was satisfactory. Otherwise, the operation stage monitoring reports will have to be prepared as specified in the said Project Environmental Completion Report. During the implementation period, a compliance report may include

description of the items of Environmental Management Plan (EMP), which were not complied with by any of the responsible agencies. It would also report the management and field actions taken to enforce compliance. It may however, be noted that certain items of the Environmental Management Plan (EMP) might not be possibly complied with in the field due to a various reasons. The intention of the compliance report is not to suppress these issues but to bring out the circumstances and reasons for which compliance was not possible (such as jurisdictional issues). This would help in rationalizing the implementation of the Environmental Management Plan (EMP) during the remaining duration of implementation. Solutions for further effective implementation should also come out as a result of the compliance monitoring reports.

10.4 Afforestation Plan

- Affected Area – Around 1.50 Ha.
  - Area proposed to be afforested – 4.5 Ha (three times the affected area).
- Afforestation Program will be implemented through the Forest Department, BDA and regular monitoring will be ensured.
  - Land will be identified in consultation with state Forest Department, Bangalore.

• Species proposed for afforestation plan are *Avicennia officinalis*, *Avicennia alba,* Rhizophora *mucronata* and *Rhizophora aciculate* etc, but the final species list shall be carried out in consultation with State Forest Department.

10.4.1 Afforestation Procedure

- Spacing and estimation of planting stock will be done. Normal spacing of 1.5 m x 1.5 m will be followed – About 18430 Nos. of plants can be planted in 4.5 Ha. of land.
- Three times the quantity of planting stock (81935 Nos.) will be produced in a nursery.
- Nursery will be maintained for 3 yrs to ensure sufficient growth to cover the proposed afforested land.
- Seedlings will be then transferred to the identified sites.
- Planting will be carried out during appropriate season (i.e. after heavy monsoons).
- The survival of the plants will be periodically assessed & their growth will be monitored.

10.4.2 Cost Estimates of Afforestation

Cost of Afforestation including sourcing, maintaining in the nursery for 3 years and transplantation to the site and further maintenance up to maturing.

Total cost for Afforestation Program (4.50 Ha) - Rs. 25, 00, 00.00.

CHAPTER 11

SUMMARY and CONCLUSION

11.1 Introduction

The Proposed Peripheral Ring Road (PRR) starts at CH 17 on Bengaluru - Pune National Highway (NH4) which is about 15om from a major bridge across Arkavathy River. The 116 Km Peripheral Ring Road (PRR) is planned by Bengaluru Development Authority (BDA) to circumnavigate the city. The project will be undertaken in two phases - Phase | starting from CH. Km o.ooo to CH: Km 64.5 (65) and Phase II covering the remaining length. The project links the major highways, district roads right from Tumkur, Mysore, Old Madras and Hosur Roads.

The Peripheral Ring Road (PRR) alignment passes through plain and rolling terrain and Greenfield site cutting across the major roads of Bengaluru. There are low lying areas along the project road stretch marked by a series of tanks. The Arkavati River flows past the proposed road at a distance of about 300 m towards Tumkur from the starting point of the project.

Table 11.1:Village-Wise Land Acquisition Details for Peripheral Ring Road (PRR)

S.No	Planning District No	Name	Population 2001 (Lakh)	Area (Sq.km)	# Gross Population Density (No./ Sq Km)	Proposed major land use as per revised Master Plan – 2015
1	305	Bavalakere	0.12	27.31	439	Residential
2	306	Heserghatta	0.18	42.29	426	Green area
3	307	Yelahanka	0.98	38.71	2532	Residential
4	308	Bettaalasuru	0.21	35.30	595	Green area
5	309	Tanisandra	0.32	45.83	698	Residential
6	310	Bagaluru	0.21	48.44	430	Agricultural/Residential
7	312	Avalahalli	0.26	37.70	690	Residential/Commercial/ Industrial
8	314	Sadar Mangala	0.29	20.10	1443	Residential/Industrial
9	315	Whitefield	0.91	38.84	2343	Residential/ High-tech
10	316	Varthur	0.35	52.00	673	Residential/High tech
11	317	Dommasandra	0.20	41.69	480	Agricultural/Green area
12	319	Electronic city	0.46	36.60	1257	High tech
Total			**4.41**	**464.81**		

Figure 11.1: Project Key Plan and Location Map (Phase I & II)

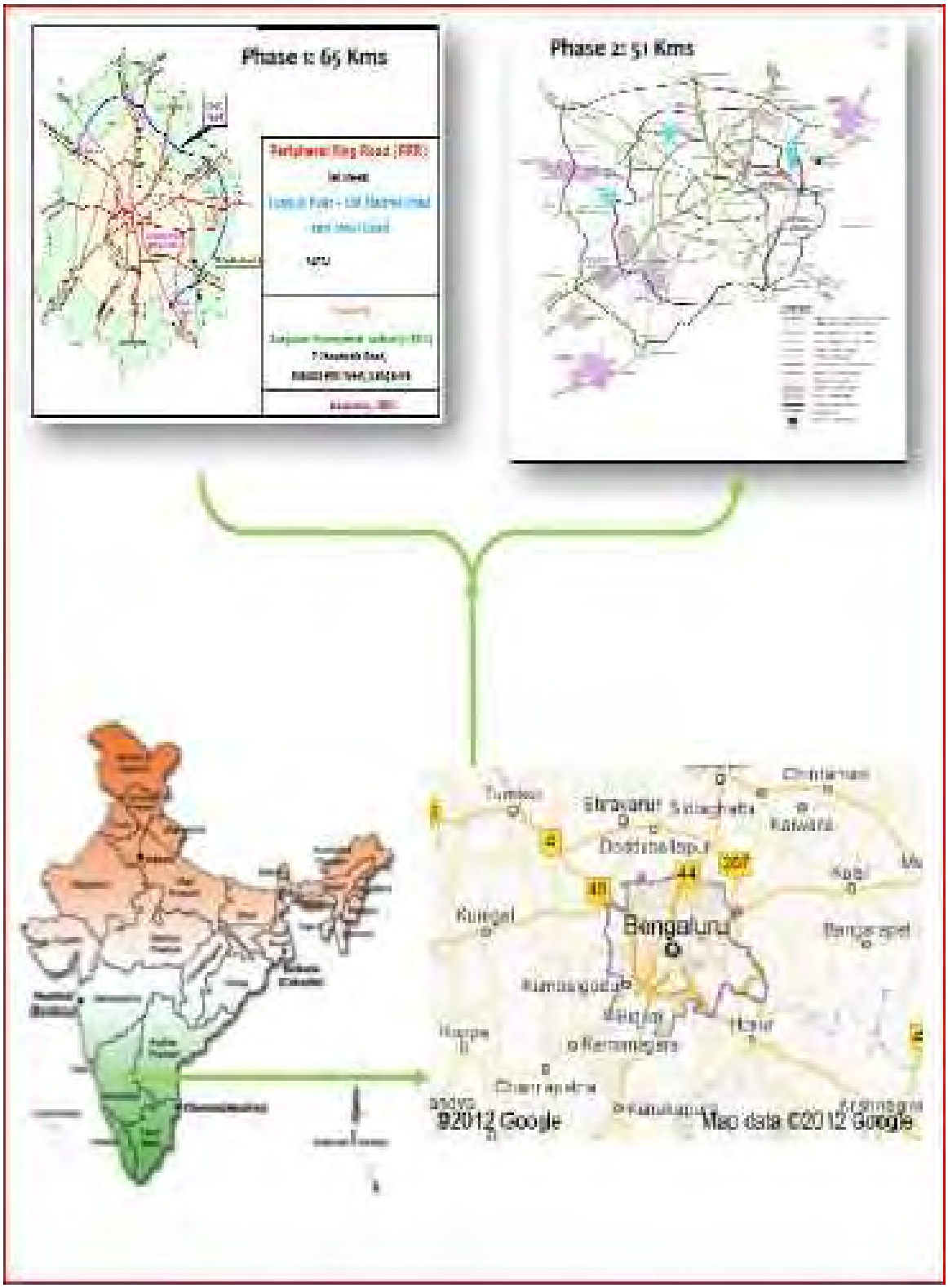


Figure 11.2: Proposed Peripheral Ring Road around Bangalore

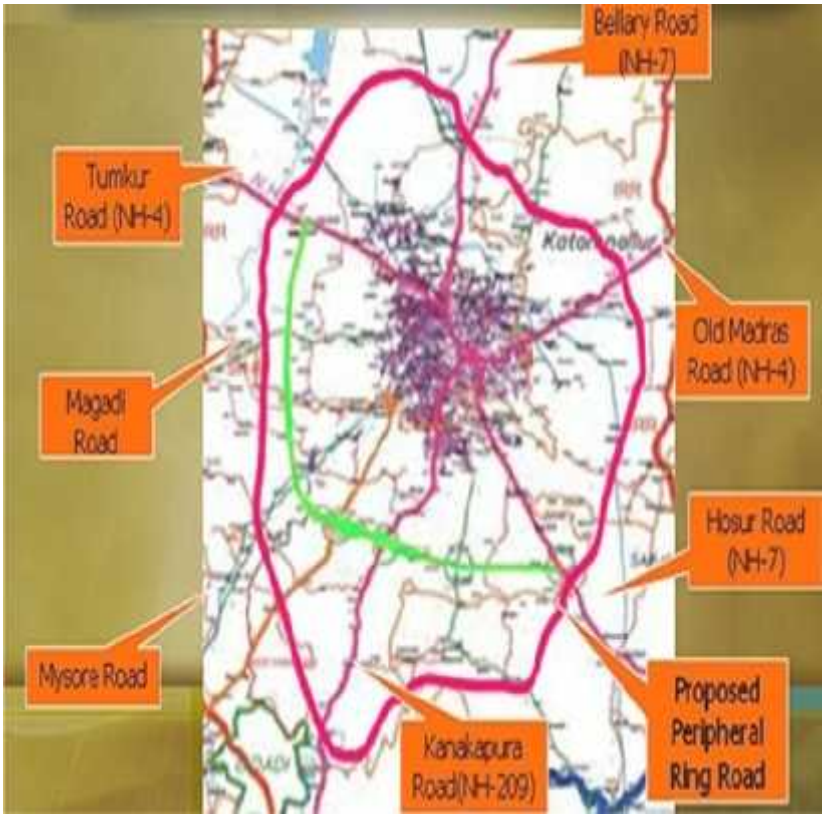
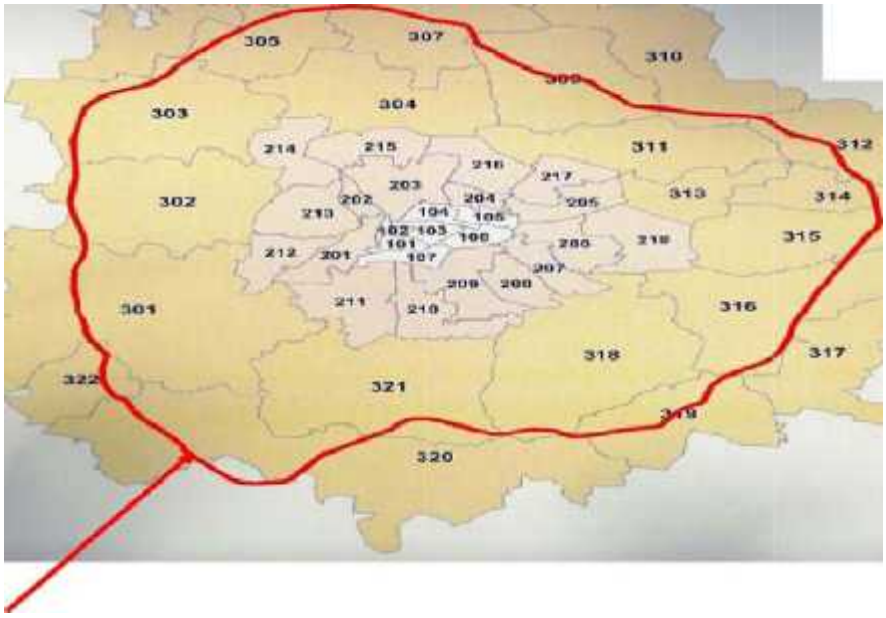


Figure 11.3: Planning Districts along with PRR Alignment (Phase I & II)



Peripheral Ring Road

11.2 Need of the Project

The need of the project is as follows:

- Bangalore Development Authority (BDA) has proposed to divert the Intracity Traffic through Peripheral Ring Road (PRR) around the Bangalore City beyond the existing Outer Ring Road (ORR)
- To reduce the traffic congestion, Pollution Intensity and Travel time

11.3 Land Requirement

The Peripheral Ring Road (PRR) runs in a cropland predominantly (60%) and less extent in Agriculture plantation (17%), commercial plantation (16%). The extent of land required for Peripheral Ring Road (PRR) including enabling services and interchanges is given hereunder.

65 Km: 975 acres of land (15 acres / Km)

Interchanges

- Major road crossings: 12 at 18 Acres/Each: 216
- Minor road crossings: 60 at 1 Acre/Each: 60
- Rail crossings: 6 at 9 Acres/Each: 54 Truck terminals at 10 Km. interval: 12 at 7 Acres/Each: 84 Total: 2049 Acres

11.4 Alignment of Peripheral Ring Road

The Alignment of Peripheral Ring Road (PRR) features are given in **Table 1.2.** The alignment crosses the conurbation areas at 5 locations and avoids forest land in most of the places except at 2 locations. The alignment chosen is away from the BMIC Corridor (NICE) with sufficient distance.

Table 11.2: Features of Peripheral Ring Road (PRR)

S. No	Description	Technical Details
I. General Features		
1	**Length**	65 Km 1st phase
2	**Location**	14-22 Km. from the city center & 2.8 – 11.5 Km from the existing Outer Ring Road (ORR).
3	**Crossing**	10 major roads, 5 railway lines, 8 water bodies
4	**Drainages**	48 major with lone river vrishabhavathi at ch 87.45 Km. & 20 minor.
II. Terrain aspects		
6	**Elevation**	Highest: RL 941 m above MSL about 1 Km Wof Pillaganahalli
7	**Lowest**	RL780 m above MSL 1 Km Westof Hemmigepur.
III. Alignment running in existing land use		
1	**Passing on existing roads**	2.90 Km.
2	**Conurbation area**	8.92 Km. (5 locations)
3	**Forest area**	1.50 Km. (2 locations)
4	Most of the stretch has ruling gradient except between Bannerghatta and Kanakapura road, where deep cut and fill is to be done.	

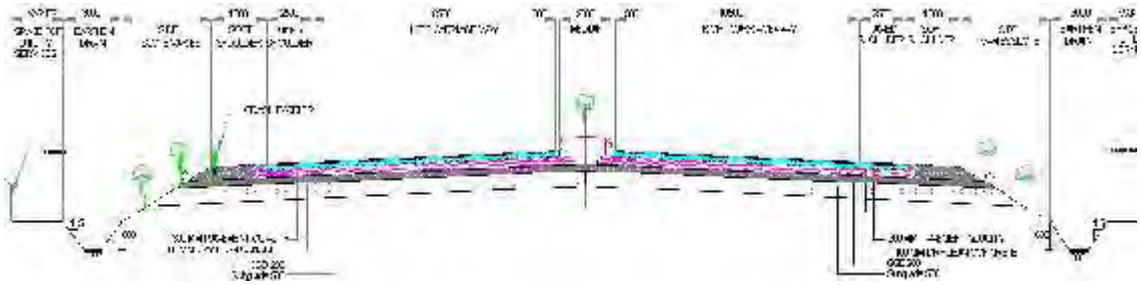


Figure 11.4: Cross section of Six Lane carriageway

11.5 Lane Width

The Peripheral Ring Road (PRR) each single lane width is about 3.50 m as per Geometric design standards for rural Highways for multi-lane pavements (IRC 73 1980). Proposals at interchanges, important road crossings, important rail crossings & water bodies are shown in the table 1.3, 1.4, 1.5 & 1.6.

Table 11.3: Proposals at Interchanges

S. No	Chainage	Intersecting Road Name	Type o f Proposal
1	0	Tumkur Road	2 level Flyover + surface level rotary
2	4992.807	Hesarghatta Road	Grade separator + surface level rotary
3	15085.349	Doddaballapur	Flyover + partial cloverleaf structure + ramps
4	19301.547	Bellary Road	Flyover Underpass + surface level rotary
5	26254.711	Hennur Road level road	Underpass with cloverleaf structure + surface
6	37028.187	Old Madras Road	Flyover with Cloverleaf structure
7	41110.030	Whitefield-Hoskote Road	Underpass Road
8	5 3486.300	Hosekote-Anekal Road	Elevated road with Cloverleaf structure
9	56174.569	Sarjapur Road	Flyover + Underpass
10	64730.987	Hosur Road	Flyover with Cloverleaf structure

Table 11.4: Important Road Crossings

S. No	Intersecting Road	PRR Chainage
1	Tumkur Road (NH 4)	0
2	Hesarghatta Road (SH)	4992 .807
3	Doddaballapur (SH 9)	15085.349
4	Bellary (NH 7)	19301.547
5	Hennur Road	2625 4.711
6	Old Madras Road (NH 4)	3695 5.967
7	Whitefield Road	41134.516
8	Hosekote – Anekal	53410.008
9	Sarjapur Road	56098.277
10	Hosur(NH 7)	64654.694

Table 11.5: Important rail crossings

S. No	Railway Crossing	PRR Chainage	Railway Chainage
1	Bangalore - Tumkur	4861.919	15/657 from Bangalore city station
2	Bangalore - Doddaballapur	15808.266	19/400 from Bangalore city station
3	Bangalore - Chikkaballapur	16711.309	002/642 from Yelahanka station
4	Bangalore - Chennai	43306.384	331/652 from Chennai station
5	Bangalore - Salem	59386.421	189/187 from Salem station

Table 11.6: Water bodies

S. No	Name of the Water Body
1	Jaraka Bande Kavalu Kere
2	Yelahanka Tank
3	Tirumanahalli Tank
4	Biderana Agrahara Tank
5	Chikkabanahalli Tank
6	GunjurTank
7	Kacharakanahalli Tank
8	Chikkanagamangala Tank

11.6 Source of Water & Storage

The total water requirement for the Peripheral Ring Road (PRR) constructional activities, utilities and green belt requirement is estimated around 3.5 MLD. The source of water is from Bore well water and canal water which is transported through tankers over to the designated places of the project. The desired storage capacity of water proposed to be around 2000 m3. To ensure 24 hour water supply in zone, a 25 m3 capacity of Storage Reservoir (SR) has been planned at constructing area of Peripheral Ring Road (PRR).

11.7 Man Power

The manpower requirement during the construction stage is basically the construction labour.

Table 11.7: Manpower – During Construction Phase

Development Year	Construction Labour
Year1	575
Year 2	1000

11.8 Power Source

Initially power would be sourced from KPTCL to provide Uninterrupted Power Supply to the contractor during constructional phase.

11.9 Raw Material

The Raw materials required for the construction of Peripheral Ring Road (PRR) at Benguluru would fall under the categories of constructional activities which would be used as follows. Sub-grade: 500 mm, Granular sub-base: 300 mm, Wet mix macadam: 300 mm, Dense Bituminous macadam: 110 mm, Semi-dense Bituminous macadam: 25 mm.

11.10 Description of the Environment

The baseline data was collected for various environmental components viz. Air, Noise, Water, Land and Socio-economic so as to compute the impacts that are likely to be arising out of the constructional activities covering an area of 10 km radially from the proposed Peripheral Ring Road (PRR) project. Ramky Enviro Engineers Ltd has performed an REIA (Rapid Environmental Impact Assessment) study based on the monitoring data of Air, Water, Noise and Soil collected for the Winter Season (December (2009) to February (2010) and also collected the data through primary and secondary sources.

The proposed Peripheral Ring Road (PRR) falls between the following geographic coordinates:
Latitude: 12^0 51' 03.6" to 13^0 07' 44.4"E
Longitude: 77^0 28' 48" to 77^0 46' 51.6"N

11.10.1 Air Environment

Wind Speed & Direction

A glance at the average 24-hour wind rose diagram for the month of December 2009 reveals that the most dominant wind direction is E followed by NE,N,NNE and ENE during this time period with percentage of 41.4 %, 27.69 %, 10.48%, 3.63 %, and 2.15% respectively. Calm conditions prevailed for 9.41% of the total time.

On keen analysis of the data recorded for the month of January 2010 reveals that the most predominant wind direction was E with the winds blowing for 38.71 % of the total time which is followed by SE, NE, N and NNE with a percentage frequency recording of , 13.44, 11.83, 5.38, 5.24. Wind was also recorded from other all directions which were comparatively. Calm conditions prevailed for 9.68 % of the total time.

Keen observation of the data recorded for the month of February 2010 reveals that the most predominant wind direction was E with the winds blowing for 45.98 % of the total time which is followed by N,NE,ENE and SE with a percentage frequency recording are 18.45%, 13.39%, 3.57%, 2.83% respectively. Calm conditions prevailed for 9.82 % of the total time.

Air Quality

The PM_{10} concentration ranges from 80.5 to 89.0 µg/m^3, $PM_{2.5}$ from 40.4 to 46.8 µg/m3, NOx ranges from 22.6 to 32.5 µg/m^3, SO2 ranges from 12.4 to 19.6 µg/m^3. However, all parameters in ambient air are within the recommended air quality standards prescribed by the CPCB.

11.10.2 Noise Environment

Day-time noise levels were found to vary between 50.1 dB (A) and 79.0 dB (A). The maximum day-time noise level of 79.0 dB (A) was observed. It is observed that at most of the locations the day-time noise levels exceeded the permissible limit of 55 dB (A) specified by CPCB for residential areas. This noise is mainly from vehicular traffic and local domestic/commercial activities.

Night-time noise levels were found to vary between 40.2 dB(A) and 55 dB(A). The maximum night time noise level of 55.0 dB (A) was observed. Most of the locations are surrounded by residential houses. It is observed that at all the locations, the nighttime noise levels exceeded the permissible limit specified by CPCB for residential areas. The main noise sources were, again, vehicular traffic and local domestic / commercial activities.

11.10.3 Water Environment

The groundwater occurrence for the project section is in mainly laterites formations. In laterites, the inherent porosity, jointed nature and fractures control water bearing capacity. In granites and granite gneiss formation ground water occurs under unconfined, Semi-confined and confined conditions in weathered and fractured zones. Chloride content of the ground water is within permissible limits and bicarbonates predominate over sulphates and nitrates. Ground water quality is also free from fluoride and alkali hazards.

11.10.4 Land Environment

The soil of the project region is lateritic, alluvial and marshy. The lateritic soils are predominant along the project section and characterized by high organic content, less of calcium and phosphorus. The soils are well drained from surface and acidic in nature. The alluvial soils occur in patches and are characterized by poor organic matter, and low calcium, phosphorus and potash content. These soils are well drained and acidic in nature.

It was observed that, the soil samples were neutral in nature, with a pH range of 7.0 to 7.7. The percent of moisture content in the soil (3.92%) was the lowest among other samples. The essential parameters like nitrogen and phosphorous are fond to be better and sufficient respectively. For potassium the samples shows a wide range of 56 to 1043 mg/kg.

11.11 Environmental Management Plan

Environmental Management Plan for the proposed project is as shown in the table 1.8.

Table 11.8: Environmental Management Plan (EMP)

Activity	Environmental Impact	Mitigation Measures	Responsibility
Pre – construction phase			
Land Acquisition, Clearing encroachments and R&R	Loss of buildings	The land acquisition would be in accordance with the RAP and entitlement framework. All R&R activities are to be completed before starting the construction.	NGOs, PIU
Relocation of Utilities and common property resources (CPR)	Damage to utilities, Inconvenience to Public	All the utilities and common property resources being impacted due to the project will have to be relocated with prior approval of the concerned Departments/Agencies before construction starts.	Contractor, PIU
Debris disposal site identification	loss of productive lands or natural habitats	Selection of the disposal sites will be carried out in consultation with the State Pollution Control Board, Revenue Department and Forest Department in order to ensure that no natural drainage, productive lands or natural habitat is adversely impacted due to disposal. Preferably, debris disposal site would be identified in barren, infertile land.	Contractor, PIU

Establishment of Stone Crushers, Batching Plants, Hot-mix plants	Air, water, noise and soil pollution	Specifications of Stone crushers, hot mix plants and batching plants to be established for the project should comply with the requirements of the relevant State/Central Pollution control Board legislations.	Contractor
Selection of construction vehicles, machinery and equipments	Air and noise pollution	All the vehicles, machinery and equipments to be engaged for the construction work should be attached with the latest, advanced pollution control measures available in the country and those should conform to the relevant Indian standards.	Contractor, PIU
Materials (Sand, earth and aggregates) sourcing	Loss of productive land, noise and air pollution	Contractor should procure materials from licensed sources. Every detail (Location, ownership, agreement, redevelopment Plan) of the material sourced should be intimated to CSC for periodic inspections so that appropriate measures are implemented at site towards safe operation and minimizing impacts.	Contractor, PIU

Haul roads maintenance	Air and noise pollution	During the inception of the project, Contractor should identify the network of roads (especially the village roads) to be used for haulage of construction materials. Strategy for the maintenance of identified haul road stretches is to be prepared so that regular maintenance is carried out to those stretches by the Contractor for easy plying of construction vehicles as well as the regular local commuters.	Contractor, CSC, PIU
Selection of Borrow areas	Air, water and noise pollution, loss of productive lands	Compliance to all the State norms towards operation and environmental protection of borrow areas is the sole responsibility of the Contractor. CSC will inspect locations intended for operation and mitigation measures will be instructed towards satisfactory redevelopment. Inspection to the borrow areas will be carried out by raising Request for Inspection (RFI) by the Contractor for each of the borrow areas and obtain subsequent approval from CSC.	Contractor and CSC

Selection of Stone Quarries	Air and noise pollution, loss of productive lands	Contractor will identify the stone quarries in consultation with the Mining Department. A comprehensive Quarry Management Plan need to be prepared incorporating Environmental and Safety Management Plan with special emphasis to Quarry redevelopment for approval from CSC.	Contractor
Construction Phase			
1. Impact on Soil Quality			
Removal of vegetation cover, Excavations of borrow pits	Increased soil erosion, loss of top soil.	Further Top soil from borrow areas has to be stripped to a specified depth and stored in stockpiles of height not exceeding 2 meters with proper covering. This shall be restored for rehabilitation of borrow pits. In borrow pits, the depth of the pit should be regulated so that the sides of the excavation will have a slope not steeper than 1 vertical to 4 horizontal from the edge of the final section of bank. The device for checking soil erosion include the formulation of sediment basins, slope drains etc. Such works and maintenance thereof will be deemed as incidental to the earthwork.	Contractor and CSC

		Cutting of trees will be carried out in phases and compensatory afforestation to start at the earliest with sufficient protection measures.	
Acquiring of extra RoW and construction of realignments, Use of productive lands for storing, stock yards and workers camp, Borrowing of earth	Loss of Productive topsoil	The topsoil from all areas of cutting and areas of storing and stock yards and workers camp have shall be stripped to a specified depth of 150 mm and stored in stockpiles of height not exceeding 2 meters with proper covering. The stored topsoil will be spread back to restore the productivity of the exhausted borrow areas. Also the accumulated soil will be utilized for developing median plantation and raising turfs in the embankment slopes. The exhausted borrow areas could be developed into water bodies for local use, practicing fishery.	Contractor and CSC
Movement of Heavy Vehicles	Compaction of productive top soil	Construction vehicles, machinery and equipment shall move, or be stationed in pre-identified designated areas only. If operating from temporarily hired land, it will be ensured that the topsoil for agriculture remains preserved & not get compacted.	Contractor and CSC

Spillage of fuel, lubricants and hazardous chemicals	Contamination of soil and negative impact on the growth of the floral vegetation and faunal distribution.	Vehicles and machinery are maintained and refilled in such a fashion that fuel spillage does not contaminate the soil. Fuel storage and refilling sites should be kept away from cross drainage structures and important water bodies. All spills shall be disposed off as desired and the site shall be fully cleaned before handing over. Soil quality monitoring should be conducted as per Environmental Monitoring Plan to ascertain level of contamination.	Contractor and CSC
Disposal of construction wastes	Loss of productive lands	The construction wastes should be dumped in selected pits, developed on infertile land. All applicable waste disposal norms to be followed. Waste land to be preferred for construction debris disposal.	Contractor and CSC

2. Impact on Water Quality			
Surface runoff from the construction site, dumping of construction debris in or nearby water bodies	Increased turbidity of water. Deterioration of Water quality of Community water sources. Adverse impact on aquatic ecosystem.	No labour camps, stone crushers, hot mix plants and other heavy machinery should be located near to water bodies. No discharge from such establishments should follow their path into nearby water bodies. Dumping of debris in or nearby water bodies to be strictly avoided. Waste products must be collected, stored and taken to approved disposal sites as per prevailing disposal norms. Runoff from the construction site should be passed through silt traps. Pitching, stabilization of soil and slope protection measures should be taken up to reduce erosion of soils. Water quality monitoring should be conducted as per Environmental Monitoring Plan so that appropriate measures are taken up towards abatement of pollution.	Contractor and CSC

Spillage of fuels and lubricants, spillage of hazardous chemicals	Deterioration of water quality of community water sources. Adverse impact on aquatic ecosystem.	Appropriate drainage arrangements with catch drains and catch pits designed to safely drain out the hazardous chemicals should provided. To avoid spillage of fuel and lubricants, the vehicles and equipment shall be properly maintained and repaired. Maintenance to be carried out on impervious platforms with spill collection provisions. Surface run off from vehicle parking, washing and fueling areas and hot mix plant areas has to be passed through oil interception chambers and the oil will be skimmed off manually from the chamber and will be disposed off in approved landfill sites. The Schematic drawing of Oil inter caption chamber is presented as **Figure 10.1.** Water quality monitoring should be conducted as per Environmental Monitoring Plan to detect any contamination or spillage.	Contractor and CSC
Acquisition of water sources like wells, tube wells & ponds	Loss of drinking water and irrigation water sources.	Any source of water for the community such as ponds, wells, tube-wells etc. lost incidentally shall be replaced immediately.	Contractor and CSC

Construction of bridges across major water bodies	Water shortage in downstream water users.	The construction of bridges across major water bodies has to be done by serving prior notice to the users. Care should be taken to avoid mixing of construction materials with water channel such that it may affect the downstream users or water supply schemes.	Contractor and CSC
Construction of embankments	Blocking of cross drainage and resultant flooding.	Earth, stone or any other construction material should be properly disposed off so that the flow of water in cross drainage channels is not blocked.	Contractor and CSC
Absence of proper sanitation and waste disposal in construction camps	Contamination of water bodies and spreading of water-borne diseases. Health risk to workers & public	Construction laborers' camps shall be located away from the habitation and from major water bodies. Adequate sanitary facilities, drainage, washing and toilet facilities with septic tanks and refuse collection and disposal should be provided to the workers. The provision of water supply and toilet facilities should be made as per the stipulated guidelines in the Indian Labour Act. Water quality monitoring should be conducted as per Environmental Monitoring Plan.	Contractor and CSC

Use of water for construction from community water sources	Scarcity of water to the community	Arrangement for supply and storage of water will be made by the contractor in such a way that the water availability and supply to nearby communities remain unaffected. If a new tube-well is to be bored, proper sanction and approval by Ground Water Department is needed. The wastage of water during the construction should be minimized. In case of tapping water from community sources, consent to be obtained from local Administration for the same.	Contractor and CSC
Construction of Impervious bituminous pavement and drains	Reduction in area for ground water recharge	Rain water harvesting pits will be constructed at average distance of 500 m. The pits should be atleast 3 - 5 m above the highest ground water table. The schematic diagram of Rain water harvesting pit is presented as **Figure 10.2**.	Contractor and CSC

3. Impact on Air Quality			
Gaseous emission from construction vehicles and machinery	Deterioration of ambient air quality and adverse health impacts.	All vehicles, equipment and machinery used for construction should be fitted with latest air pollution control equipments and should be regularly maintained to ensure that the emission levels are as per norms of PCB. Idling of delivery trucks or other equipment should not be permitted during periods of unloading or when they are not in active use. The human settlements should be at least 500 m down windward direction of Hot (asphalt) mix plant. The construction operations during nights, especially in the winter season should be carried out under restricted conditions. Air quality monitoring should be conducted as per Environmental Monitoring Plan to detect any deterioration in air quality due to the construction activities.	Contractor and CSC

Dust generation due to material handling, operation of crushers and hot mix plants, movement of construction vehicles and construction activities	Dust emissions will have adverse effect on the health of construction workers as well as the public in the surrounding Communities. Dust settled on leaves may reduce growth rate of the plants.	All precautions to reduce the level of dust emissions from the hot mix plants shall be taken. The hot-mix plants should be sited at least 500m from the nearest habitation and from major water bodies. They should be fitted with dust extraction units. Water should be sprayed on the earth mixing sites, asphalt mixing site and service roads. During sub grade construction, sprinkling of water should be carried out at least twice a day on a regular basis during the entire construction period especially in the winter and summer seasons. Special attention should be given in the sections where the alignment passes through sensitive areas such as schools, hospitals and urban areas. As soon as construction is over the surplus earth should be utilised to fill up low-lying areas. In no case, loose earth should be allowed to pile up along the alignment. Vehicles delivering material should be covered. Air quality monitoring should be conducted as per Environmental Monitoring Plan.	Contractor and CSC

4. Impact on Noise Levels			
Noise generated from construction vehicles, asphalt plants and equipments	Since the noise Generating activities are localized and intermittent, no serious impact on human health is anticipated. Residential areas nearby the construction site may experience increase in night time ambient noise levels.	Construction contract should clearly specify the use of equipment emitting noise of not greater than 90 dB (A) for the eight hour operation shift. The citing of construction yards should be done leaving at least 100 m distance from any residential areas which will allow noise to attenuate. The main noise producing sources such as the concrete mixers, generators, grader etc. should be provided with noise shields around them. The noise shields can be any physical barriers, which is effective in adequate attenuation of noise levels. A 3m high enclosure made up of brick and mud with internal plastering of a non-reflecting surface will be very effective in this regard. For protection of construction workers, earplugs should be provided to those working very close to the noise generating machinery. At construction sites within 150 m of human settlements, noisy construction should be stopped between 10:00 pm and 8:00 am Noise level monitoring should be conducted as per Environmental Monitoring Plan.	Contractor and CSC
5. Impact on Flora and Fauna			

Removal of trees for Construction of road and construction of realignments.	Biodiversity will be negligible since most of the trees are of common occurrence. Loss of trees will lead to Increase in soil erosion, loss of shade and other benefits of trees, and decline in air quality.	Small trees shall be transplanted wherever possible to minimise the impacts of loss of trees. Trees should be removed in phases. Areas of tree plantation cleared will be replaced according to Compensatory Afforestation Policy under Forest Conservation Act-1980. The compensatory plantation should be carried out in consultation with the State Forest Department. Adequate care of the compensatory plantation should be taken up so as to achieve optimum survival rate. Landscaping should be done with a lag of 3 to 4 months from the start of the work on any section. The section should be deemed to be complete when the landscaping is over. Survival rate of plants must be included in the contract specifications so as to ensure that the compensatory plantation achieves the objective of compensating lost trees. Indigenous and endemic tree species suitable for the area should be planted at the onset of monsoon season. The plants shouldbe provided with adequate protectionfrom animals and proper monitoring should be carried out to ensure their growth.	Contractor and CSC

Operational Phase			
Improvement of road geometry and pavement condition	Less chances of accidents.	Proper implementation of traffic rules by the traffic Police. Proper maintenance of traffic signs and implementation of accident care facilities along the road by the project implementation agency.	Contractor, PIU and Police
Improvement of road surface and its maintenance	Reduced dust generation from road. Increased Vehicular emissions due to increased traffic.	Proper implementation of vehicular emission control rules by the Motor Vehicles Department. Roadside tree plantation to be restored and maintained as per the compensatory plantation plan. PM 10, 2.5, CO, HC, SO2, and NOx to be monitored as per Environmental Monitoring Plan.	Contractor, PIU and Motor Vehicles Department

Increase in traffic	Increase in the Ambient noise levels, especially during night time along the project road.	Development of greenbelt comprising selected species of trees with high canopy along the project road for attenuation of noise. Use of horns should be restricted at sensitive locations like schools and hospitals through the use of appropriate signboards along the road. Use of air horns should be minimised during night. Noise barriers should be provided along the road at sensitive locations such as hospitals, schools, residential areas, courts etc. Noise monitoring should be conducted as per Environmental Monitoring Plan.	Contractor, PIU and Police
Increase in embankment height and Improvement of flood water drains.	Water logging during monsoon will not take place.	The cross drainage system and the flood water drains should be periodically cleared.	Contractor and PIU
Construction of Rain water harvesting pits at an average distance of 500m.	Enhanced ground water recharge.	The rain water harvesting pit opening should be periodically cleaned during operation phase such as to ensure enhanced ground water recharge. The schematic diagram of Rain water harvesting pit is presented as	Contractor / BDA.
Compensatory plantation	Improved biodiversity and aesthetics	The re-plantation scheme, containing Indigenous and endemic tree species suitable for the area, should be strictly implemented.	Contractor and PIU

Mangrove plantation and maintenance	Restoration of mangrove areas	The re-plantation and maintenance scheme at mangrove locations should be strictly followed.	Contractor and PIU
Movement of vehicles with higher speed along protected forest areas	Impact of traffic on wild animals.	Drivers should be warned with proper sign boards for speed restriction within the forest areas especially along the possible animal crossing locations and about the major wildlife habitats near by the highway. Usage of air horns should becompletely avoided within protected forest areas both during day and night time. Forest officials should carry out frequent patrolling along the road in the protected areas to avoid exploitation of forest resources / teasing of animals by road commuters.	BDA/ State Forest Department
Spillage of hazardous chemicals due to accidents	Soil and water bodies nearby the accident site may get contaminated. Safety risk to the public nearby the accident area.	The rules as defined in Environmental (Protection) Act, 1986 should be complied For delivery of hazardous substances, three certificates namely permit license,driving license and guarding license issued by Transport Department should be maintained. Vehicles carrying hazardous substances should display mandatory safety signs. In case of spillage, it should be reported to relevant department and their instructions should be followed Cleaning of the spills at the accidental site should be carried out as per regulations.	Motor Vehicles Department, Police

Improved safety measures and improved traffic management	The chances of accidents would be reduced	Traffic management plan to be developed, especially in congested locations. Traffic control measures including speed limits to be enforced strictly. RoW should be properly marked and further encroachment of RoW should be strictly prevented. Road side vendors should be restricted to designated areas only.	PIU, Motor Vehicles Department and Police

11.12 Benefits of the Project

- To accelerate regional economic development in terms of industry, tourism and agriculture,
- To reduce vehicle operating and maintenance costs by improving road conditions,
- To reduce travel time by minimizing congestion in urban stretches and providing a four lane facility over there,
- To minimize road accidents by increasing road widths, improving intersections and road geometry,
- The project may also generate local employment opportunities through the construction activities and local business.
- Abatement of ambient air and noise pollution in comparison to a do-nothing situation.
- Increase in safety due to construction of median in urban sections between two directions of traffic flow.
- Construction of Road Over Bridge (ROBs) shall reduce travel time and enhance smooth flow of the traffic and Project facilities included in the project preparation are Bus Bays, Truck Lay Bye, and Road Street Lighting etc.

CHAPTER 12
DISCLOSURE OF CONSULTANTS

The consultants for this project are Ramky Enviro Engineers Ltd, a Sci-Tech organization involved in areas of Environmental Consultancy, Waste Management and provision of Integrated Environmental Services to Industries and Industrial Parks.

The Company has over 2000 employees in various sectors of which over 600 employees are post graduates and about 15 employees are Ph.D.s
The present report was carried out under the guidance of:

1. Dr. K.S.M.Rao, Ph.D. (Chemistry)
2. Dr. B. Chakradhar, Ph.D. (Chemical Engineering)

Dr. K.S.M.Rao who served in NEERI, Nagpur from 1977 to 1990 has worked as Director at Vimta Labs Ltd., Hyderabad and SGS India Ltd., Hyderabad, Mumbai and Delhi. He has an experience of conducting over 350 EIA reports, Designing over 50 ETPs and over 25 Risk assessment reports. He is a lead Environmental Auditor for ISO 14000, ISO 9000, OHSAS 18001, SA 8000, SQF 2000.

Dr. B. Chakradhar served as Scientist in NEERI Nagpur (1981 to 1995) and later as Deputy Director at Regional Research Laboratory, Bhopal (1995 to 2008). He has an experience of conducting over 200 EIA reports, over 40 Risk assessment reports for various chemical industries and has experience in conducting environmental Audits.

Project team involved in this report was:

1. Dr.G. Dasaratha Ram, Ph.D. (Envi. Science)
2. Mr.V.Vijay Kumar M.Sc (Chemistry), M.Sc (Envi. Science)
3. Mr.Hemanth Rajkumar MTech., (Env)
4. Ms. Sushama Mtech (Env)
5. Mr. Girish BE (Env)

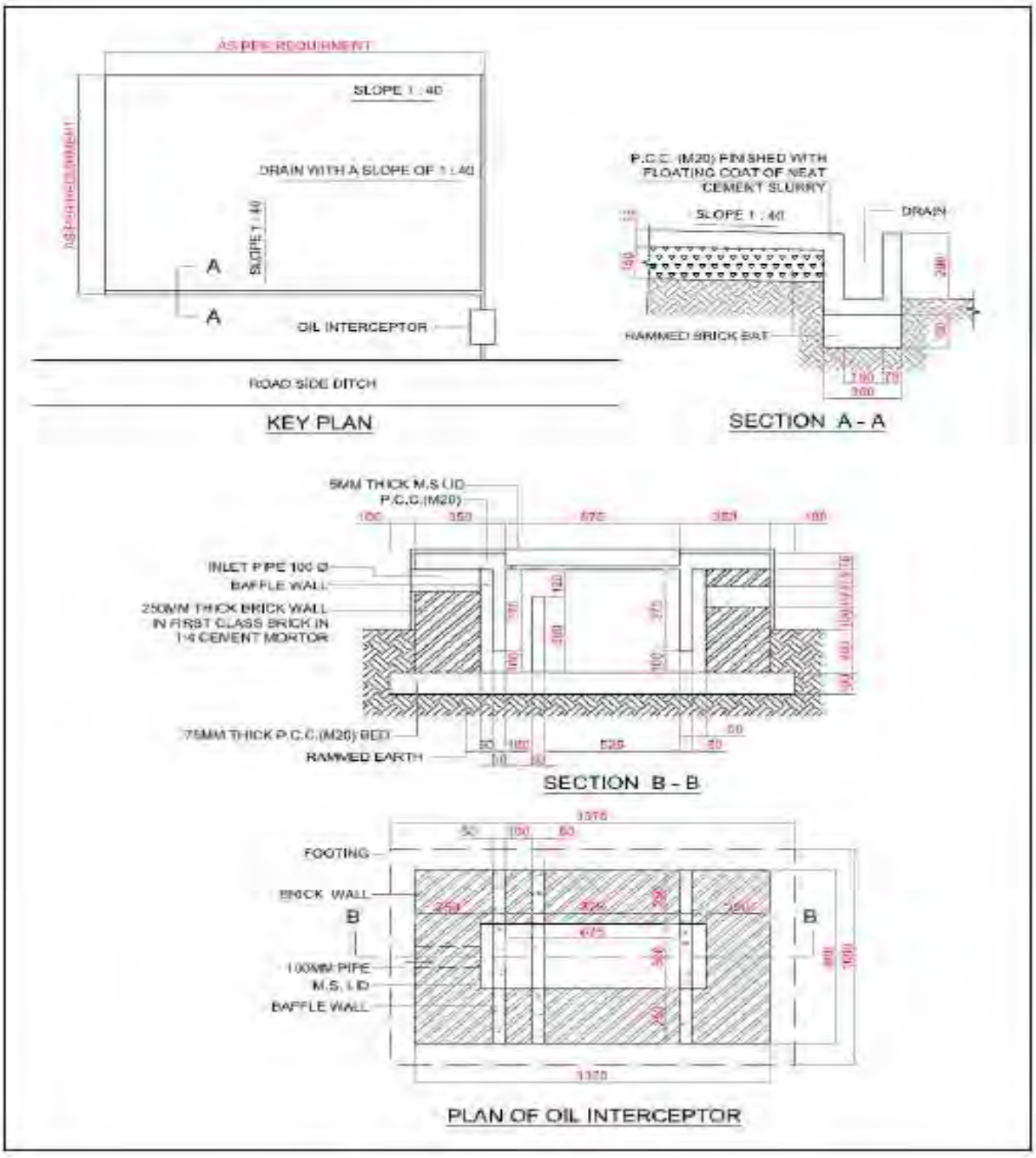
The Analysis was carried out in the Laboratory of Hyderabad Waste Management Project (HWMP) a subsidiary company under Ramky Enviro Engineers Ltd which is recognized by Ministry of Environment and Forests vide notification dated 9th January 2008 as Environmental Laboratory under the EP-Act 1986 (29 of 1986). Team involved in the analysis of air, water, soil and other samples are:

1. Mr. Tiwary M.Sc. (Biochemistry)
2. Mr. Vishwanath M.Sc. (Chemistry)

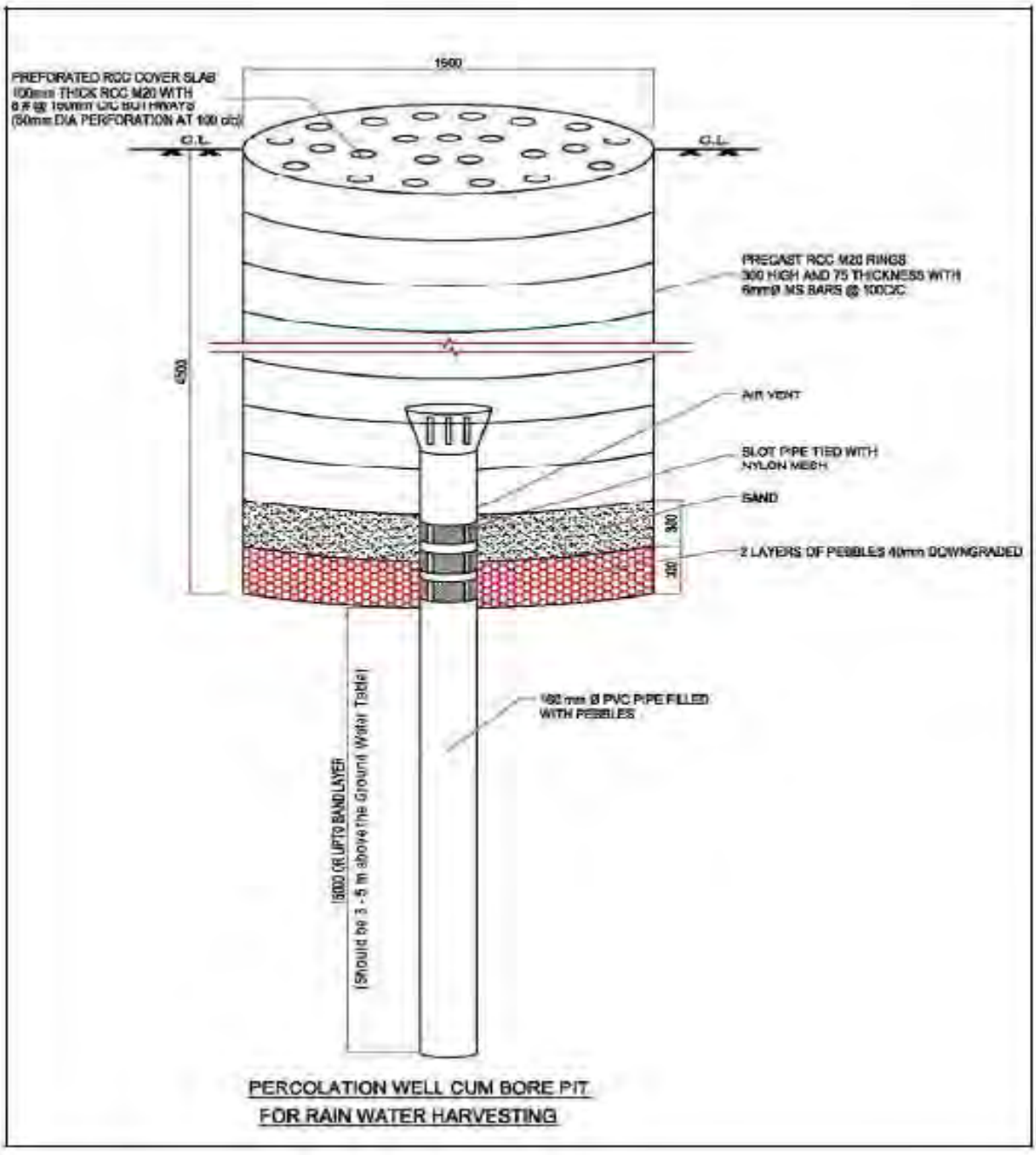
The complete report has been carried out by the above team taking help of some external consultants in the areas of socio-economics and flora-fauna studies.

In this present REIA report, the prescribed TOR's have been complied and the data submitted is factually correct.

Annexures



Schematic Diagram of Oil Interception Chamber



Schematic Drawing of Rain Water Harvesting Pit

Public Hearing

ದಿನಾಂಕ **06.02.2014** ರಂದು ಪೂರ್ವಹ್ನ **11.00** ಗಂಟೆಗೆ ಬೆಂಗಳೂರು ನಗರ ಅಭಿವೃದ್ಧಿ ಪ್ರಾಧಿಕಾರದಿಂದ ಪ್ರಸ್ತಾಪಿತ - ತುಮಕೂರು ರಸ್ತೆಯಿಂದ ಬಳ್ಳಾರಿ ರಸ್ತೆ, ಹಳೆ ಮದ್ರಾಸ್ ರಸ್ತೆ ಹಾಯ್ದು ಹೊಸೂರು ರಸ್ತೆ ಸಂಪರ್ಕಿಸುವ ಎಂಟು ಲೇನ್ ಪೆರಿಫರಲ್ ರಿಂಗ್ ರಸ್ತೆ (ಹಂತ-1) ರ ರಿಂಗ್ ರಸ್ತೆಯ ಚೈನೇಜ್ **0.00** ಕಿ.ಮಿ ಯಿಂದ ಚೈನೇಜ್ **64.5 (65)** ಕಿ.ಮಿ) ಸಂಪರ್ಕಿಸುವ ರಸ್ತೆಯ ನಿರ್ಮಾಣದ ಪರಿಸರ ಸಾರ್ವಜನಿಕ ಸಭೆಯ ನಡವಳಿಗಳು.

ಪರಿಸರ ಸಾರ್ವಜನಿಕ ಸಭೆ ನಡೆದ ಸ್ಥಳ	ಬಿಳಿಶಿವಾಲೆ, ಬಿದರಹಳ್ಳಿ ಹೋಬಳಿ, ಬೆಂಗಳೂರು ಪೂರ್ವ ತಾಲ್ಲೂಕು ಬೆಂಗಳೂರು
ಹಾಜರಿದ್ದ ಪರಿಸರ ಸಾರ್ವಜನಿಕ ಸಭೆ ಸಮಿತಿಯ ಸದಸ್ಯರುಗಳು	
ಡಾ. ಜಿ.ಸಿ. ಪ್ರಕಾಶ್, ಭಾ.ಆ.ಸೇ, ಜಿಲ್ಲಾಧಿಕಾರಿ, ಬೆಂಗಳೂರು ನಗರ ಜಿಲ್ಲೆ. ಬೆಂಗಳೂರು, ಕರ್ನಾಟಕ ಸರ್ಕಾರ.	ಅಧ್ಯಕ್ಷರು
ಶ್ರೀ. ಎಮ್ .ಕೆ. ಪ್ರಭುದೇವ್, ಹಿರಿಯ ಪರಿಸರ ಅಧಿಕಾರಿ, ಕರ್ನಾಟಕ ರಾಜ್ಯ ಮಾಲಿನ್ಯ ನಿಯಂತ್ರಣ ಮಂಡಳಿ, ಬೆಂಗಳೂರು ಪೂರ್ವ, ಬೆಂಗಳೂರು.	ಕರ್ನಾಟಕ ರಾಜ್ಯ ಮಾಲಿನ್ಯ ನಿಯಂತ್ರಣ ಮಂಡಳಿಯ ಪ್ರತಿನಿಧಿ
ಶ್ರೀ. ಷಣ್ಮುಖಪ್ಪ , ಪರಿಸರ ಅಧಿಕಾರಿ, ಕರ್ನಾಟಕ ರಾಜ್ಯ ಮಾಲಿನ್ಯ ನಿಯಂತ್ರಣ ಮಂಡಳಿ, ಬೆಂಗಳೂರು ಮಹದೇವಪುರ	ಸಂಚಾಲಕರು
ಹಾಜರಿದ್ದ ಅಧಿಕಾರಿಗಳು ಹಾಗೂ ಇತರರು	
ಅಧಿಕಾರಿಗಳ ಪಟ್ಟಿ	ಅನುಬಂಧ-1
ಯೋಜನೆಯ ಪ್ರವರ್ತಕರು ಹಾಗೂ ಅವರ ಸಮಾಲೋಚಕರು	ಅನುಬಂಧ-2
ಭಾಗವಹಿಸಿದಂತಹ ಸಾರ್ವಜನಿಕರ ಪಟ್ಟಿ	ಅನುಬಂಧ-3

ಪೀಠಿಕೆ:

ಬೆಂಗಳೂರು ನಗರ ಅಭಿವೃದ್ಧಿ ಪ್ರಾಧಿಕಾರವು ತುಮಕೂರು ರಸ್ತೆಯಿಂದ ಬಳ್ಳಾರಿ ರಸ್ತೆ, ಹಳೆ ಮದ್ರಾಸ್ ರಸ್ತೆ ಹಾಯ್ದು ಹೊಸೂರು ರಸ್ತೆ ಸಂಪರ್ಕಿಸುವ ಎಂಟು ಲೇನ್‌ಗಳನ್ನು ಹೊಂದಿರುವ ಪೆರಿಫರಲ್ ರಿಂಗ್ ರಸ್ತೆಯ (ಹಂತ-1ರ) ನಿರ್ಮಾಣದ ಯೋಜನೆಯನ್ನು ಪ್ರಸ್ತಾಪಿಸಿದ್ದು, ಸದರಿ ಯೋಜನೆಯು ಸಮಾರು 65 ಕಿ.ಮೀ. ರಸ್ತೆಯನ್ನು ನಿರ್ಮಾಣವನ್ನು ಒಳಗೊಂಡಿದ್ದು (ಚೈ, ಕಿ.ಮೀ. 0.00) ತುಮಕೂರು ರಸ್ತೆಯಿಂದ (ಚೈ, ಕಿ.ಮೀ. 64.65) ಹೋಸೂರು ರಸ್ತೆಯವರೆಗೆ (ಬೇಗೂರು ಹತ್ತಿರ), ಬಾಲವಕೆರೆ, ಹೆಸರಘಟ್ಟ, ಯಲಹಂಕ, ಬೆಟ್ಟಲ್ಲಸೂರು, ತಣಿಸಂದ್ರ, ಬಾಗಲೂರು, ಅವಲಹಳ್ಳಿ, ಸದರಮಂಗಳ, ವೈಟ್‌ಫೀಲ್ಡ್, ವರ್ತೂರು, ದೊಮ್ಮಸಂದ್ರ ಮತ್ತು ಎಲೆಕ್ಟ್ರಾನಿಕ್ ಸಿಟಿಯ ಪ್ರದೇಶದಲ್ಲಿ ಹಾದು ಹೋಗುತ್ತದೆ.

ಬೆಂಗಳೂರು ನಗರ ಅಭಿವೃದ್ಧಿ ಪ್ರಾಧಿಕಾರದವರು ಕೇಂದ್ರ ಪರಿಸರ ಮತ್ತು ಅರಣ್ಯ ಸಚಿವಾಲಯ ಹೊರಡಿಸಿರುವ 2006 ನೇ ಇಸವಿಯ ಪರಿಸರ ಆಘಾತ ಅಂದಾಜಿಕರಣ ಅಧಿಸೂಚನೆ ಪ್ರಕಾರ ಪರವಾನೆಗೆಗಾಗಿ ಅರ್ಜಿಯನ್ನು ಸಲ್ಲಿಸಿರುತ್ತಾರೆ. ಅದರಂತೆ ರಾಜ್ಯ ಪರಿಸರ ಆಘಾತ ಅಂದಾಜಿಕರಣ ಪ್ರಾಧಿಕಾರ, ಕರ್ನಾಟಕ ಸರ್ಕಾರ ಇವರು 18 ಡಿಸೆಂಬರ್ 2009 ರಂದು ಉಲ್ಲೇಖಿದ ನಿಭಂದನೆಗಳನ್ನು ಜಾರಿಗೊಳಿಸಿ ಕರ್ನಾಟಕ ರಾಜ್ಯ ಮಾಲಿನ್ಯ ನಿಯಂತ್ರಣ ಮಂಡಳಿಯನ್ನು 2006 ರ ಅಧಿಸೂಚನೆಯ ಪ್ರಕಾರ ಪರಿಸರ ಸಾರ್ವಜನಿಕ ಸಭೆ / ಸಮಾಲೋಚನೆಯನ್ನು ನೆರವೇರಿಸುವಂತೆ ಕೋರಿ ನಡವಳಿಗಳನ್ನು ಸಲ್ಲಿಸುವಂತೆ ಸೂಚಿಸಿರುತ್ತಾರೆ.

ಪರಿಸರ ಆಘಾತ ಅಂದಾಜಿಕರಣ ಅಧಿಸೂಚನೆಯ ಪ್ರಕಾರ ಕರ್ನಾಟಕ ರಾಜ್ಯ ಮಾಲಿನ್ಯ ನಿಯಂತ್ರಣ ಮಂಡಳಿಯವರು ಸದರಿ ಪ್ರಕ್ರಿಯೆಯನ್ನು ಆರಂಭಿಸಿ ಪರಿಸರ ಸಾರ್ವಜನಿಕ ಸಭೆ / ಸಮಾಲೋಚನೆಯನ್ನು ಆಯೋಜಿಸಿರುತ್ತಾರೆ. ಇದರನ್ವಯ ಮಂಡಳಿಯವರು ಮುಂಚೂಣಿಯಲ್ಲಿರುವ " ವಿಜಯ ಕರ್ನಾಟಕ", "ಡೆಕ್ಕನ್ ಹೆರಾಲ್ಡ್" ಮುಂತಾದ ಕನ್ನಡ ಮತ್ತು ಆಂಗ್ಲ ಪತ್ರಿಕೆಗಳಲ್ಲಿ ದಿನಾಂಕ 06.01.2014 ರಂದು ಕನ್ನಡ ಮತ್ತು ಆಂಗ್ಲ ಪತ್ರಿಕೆಗಳಲ್ಲಿ ಪ್ರಕಟಣೆಯನ್ನು ನೀಡಿರುತ್ತಾರೆ. ಕನ್ನಡ ಮತ್ತು ಆಂಗ್ಲ ಭಾಷಾ ಅವತರಣಿಕೆಯಲ್ಲಿ ಸಿದ್ದ ಪಡಿಸಿದ ಕರಡು ಪರಿಸರ ಆಘಾತ ವರದಿಯನ್ನು ಸೀಗೆಹಳ್ಳಿ, ಕಾಡುಗೋಡಿ, ಚಿಕ್ಕಜಾಲ, ಹೆಸರಘಟ್ಟ, ಬಿದರಹಳ್ಳಿ, ಆವಲಹಳ್ಳಿ, ಕಣ್ಣೂರು ಮತ್ತು ದೊಡ್ಡಬನಹಳ್ಳಿ ಮುಂತಾದ ಗ್ರಾಮ ಪಂಚಾಯಿತಿಯ ಕಛೇರಿಗಳಲ್ಲಿ ಸಾರ್ವಜನಿಕರು ಹಾಗೂ ಆಸಕ್ತರ ಅವಗಾಹನೆಗಾಗಿ ಇಡಲಾಗಿತ್ತು.

2006 ನೇ ಇಸವಿಯ ಪರಿಸರ ಆಘಾತ ಅಂದಾಜಿಕರಣ ಅಧಿಸೂಚನೆಯ ಪ್ರಕಾರ, ದಿನಾಂಕ 06.02.2014 ರಂದು 11.00 ಗಂಟೆಗೆ ಬಿಳಿಶಿವಾಲೆ, ಬಿದರಹಳ್ಳಿ ಹೋಬಳಿ, ಬೆಂಗಳೂರು ಇಲ್ಲಿ ಡಾ.ಜೆ.ಸಿ.ಪ್ರಕಾಶ್, ಭಾ.ಆ.ಸೇ., ಜಿಲ್ಲಾಧಿಕಾರಿ ಬೆಂಗಳೂರು ನಗರ ಜಿಲ್ಲೆ, ಇವರ ಅಧ್ಯಕ್ಷತೆಯಲ್ಲಿ ಸಾರ್ವಜನಿಕ ಸಭೆಯನ್ನು ನಡೆಸಲಾಯಿತು. ಶ್ರೀ. ಎಮ್ .ಕೆ. ಪ್ರಭುದೇವ್, ಹಿರಿಯ ಪರಿಸರ ಅಧಿಕಾರಿ, ಕರ್ನಾಟಕ ರಾಜ್ಯ ಮಾಲಿನ್ಯ ನಿಯಂತ್ರಣ ಮಂಡಳಿ, ಬೆಂಗಳೂರು ಪೂರ್ವ, ಬೆಂಗಳೂರು ಇವರು ಜಿಲ್ಲಾಧಿಕಾರಿಯವರನ್ನು ಮತ್ತು ನೆರೆದಿದ್ದವರನ್ನು ಸ್ವಾಗತಿಸುತ್ತಾ ಸಭೆಯನ್ನು ಆರಂಭಿಸಿದರು. ಇವರು ಆಘಾತ ಅಂದಾಜೀಕರಣದ ಅಧಿಸೂಚನೆಯನ್ನು ಕ್ಲುಪ್ತವಾಗಿ ವಿವರಿಸುತ್ತಾ ಸಭಿಕರಲ್ಲಿ ತಮ್ಮ ಸಲಹೆ, ಸೂಚನೆ ಅಭಿಪ್ರಾಯ ಇತ್ಯಾದಿಗಳನ್ನು ಸೂಚಿಸುವಂತೆ ಕೋರಿದರು. ಶ್ರೀ. ಷಣ್ಮುಖಪ್ಪ , ಪರಿಸರ ಅಧಿಕಾರಿ, ಶ್ರೀ. ಕೆ.ಎಮ್.ರಮೇಶ್, ಉಪ ಪರಿಸರ ಆಧಿಕಾರಿ, ಡಾ.ಹೆಚ್.ಆರ್.ಮಟ್ಟರಾಜು, ಸಹಾಯಕ ಪರಿಸರ ಅಧಿಕಾರಿ ಕರ್ನಾಟಕ ರಾಜ್ಯ ಮಾಲಿನ್ಯ ನಿಯಂತ್ರಣ ಮಂಡಳಿ, ಬೆಂಗಳೂರು ಮಹದೇವಪುರ, ಇವರುಗಳು ಸಭೆಯನ್ನು ನಡೆಸಲು ಸಹಾಯ ಮಾಡಿದರು. ಸಭೆಗೆ ಮೊದಲು ಮತ್ತು ಸಭೆಯು ನಡೆಯುವ ಸಮಯದಲ್ಲಿ 12 ಪತ್ರಗಳು ಸ್ವೀಕೃತಗೊಂಡಿದ್ದು ಅವುಗಳ ವಿವರ ಈ ಕೆಳಕಂಡಂತಿದೆ.

ಸದರಿ ಪತ್ರಗಳ ಫೋಟೋ ನಕಲನ್ನು ಅನುಭಂದ -4 ರಲ್ಲಿ ಲಗತ್ತಿಸಿಲಾಗಿದೆ.

ಕ್ರಮ ಸಂಖ್ಯೆ.	ಹೆಸರು ಮತ್ತು ವಿಳಾಸ	ಕ.ರಾ.ಮಾ.ನಿ.ಮಂ, ಕೇಂದ್ರ ಕಛೇರಿಯಲ್ಲಿ ಸ್ವೀಕರಿಸಿದ ದಿನಾಂಕ	ಕ.ರಾ.ಮಾ.ನಿ.ಮಂ, ಪ್ರಾದೇಶಿಕ ಕಛೇರಿ ಮಹದೇವಪುರದಲ್ಲಿ ಸ್ವೀಕರಿಸಿದ ದಿನಾಂಕ	ವಿಷಯ
1	ಶ್ರೀಮತಿ. ರೀನಾ ಮಹೆಂದ್ರ, ಆವಲಹಳ್ಳಿ, ಎಸ್ಟೇಟ್ ಯಲಹಂಕ ಪೋಸ್ಟ್, ಬೆಂಗಳೂರು-560064	09-01-2014	24-01-2014	ಸಾರ್ವಜನಿಕ ಸಭೆಯನ್ನು ನಾಲ್ಕು ವಲಯಗಳಲ್ಲಿ ಪ್ರತ್ಯೇಕ ದಿನಗಳಲ್ಲಿ ನಾಲ್ಕು ಕಡೆ ಸಭೆ ನಡೆಸಲು ಮನವಿ.
2	ಪಿಆರ್‌ಆರ್-1, ತೊಂದರೆಒಳಗಾದ ನಿವಾಸಿಗಳ ಹಿತರಕ್ಷಣಾ ಸಮಿತಿ, ನಂ. 108, ನಾಗಾನಂದ ನಿಲಯ, ವಿಶ್ವ ಪ್ರಕೃತಿ ಲೇಔಟ್, ಮಾರುತಿನಗರ, ೨ನೇ ಹಂತ, ಯಲಹಂಕ, ಬೆಂಗಳೂರು-560064	15-01-2014	24-01-2014	ಪರಿಸರ ಆಘಾತ ಅಧ್ಯಯನ ವರದಿಯಲ್ಲಿ ಎಷ್ಟು ಮರಗಳು ಹಾಳಗುತ್ತವೆ ಎಂಬುದರ ಬಗ್ಗೆ ಮಾಹಿತಿ ಇರುವುದಿಲ್ಲ ಹಾಗೂ ರಿಂಗ್ ರಸ್ತೆಯಿಂದ ಪರಿಸರದ ಹಾನಿಯಾಗುತ್ತದೆ ಹಾಗೂ ಹಲವಾರು ಕೆರೆಗಳು, ಅರಣ್ಯ ಪ್ರಧೇಶಗಳು, ದೇವಸ್ಥಾನಗಳು, ಚರ್ಚಗಳು, ಸ್ಮಶಾನಗಳು, ಮುಖ್ಯ ರಸ್ತೆಯಲ್ಲಿ ಸಿಲುಕಿರುತ್ತವೆ. ೭೫ ಮೀಟರ್ ರಸ್ತೆಯ ಅಗಲದ ಮಾರ್ಗಕ್ಕೆ ಡಿ.ಪಿ.ಆರ್ ಮತ್ತು ಫಿಸಿಬಲಿಟಿ ರಿಪೋರ್ಟನ್ನು ಕ್ರೂಡಿಕರಿಸಿರುವುದಿಲ್ಲ.
3	ಶ್ರೀ. ಮಹೇಂದ್ರ ಆರ್. ಆವಲಹಳ್ಳಿ ಎಸ್ಟೇಟ್ ಯಲಹಂಕ ಪೋಸ್ಟ್, ಬೆಂಗಳೂರು-560064	27-01-2014	04-02-2014	ಉದ್ದೇಶಿತ ಫೆರಿಫರಲ್‌ರಿಂಗ್ ರಸ್ತೆ ಡಿ.ಪಿ.ಆರ್ ಮಾಡಿರುವುದಿಲ್ಲ ಮತ್ತು ಪರಿಸರ ಆಘಾತ ಅನ್ವಯ ಅಧಿಸೂಚನೆ ಉಲ್ಲಂಘನೆಯಾಗುತ್ತಿರುವ ಬಗ್ಗೆ.
4	ಶ್ರೀ. ಸಿ. ಕಾಮನಿ ನಂ.35, ಕಿಂಗ್ ಸ್ಟೈನ್ ಟವರ್ಸ್, 6&7, ಕಿಂಗ್ಸ್ ರಸ್ತೆ, ಅಲಸೂರ್ ಕೆರೆ, ಬೆಂಗಳೂರು-560042	27-01-2014	04-02-2014	ಪರಿಸರ ಆಘಾತ ಅಧ್ಯಯನ ವರದಿಯನ್ನು ಮಾಡಿರುವ ರ‍್ಯಾಮ್ಸಿ ಸಂಸ್ಥೆ, ಇವರು ನಡೆಸುತ್ತಿರುವ ಘನ ತ್ಯಾಜ್ಯ ವಸ್ತುಗಳ ವಿಲೇವಾರಿಯನ್ನು ಮಾವಳ್ಳಿಪುರ ಬೆಂಗಳೂರು ಇಲ್ಲಿ ನಡೆಸುತ್ತಿದ್ದು ಇದರ ವಿರುದ್ದ ಈಗಾಗಲೇ ಅವರ ಮೇಲೆ ಘನ ತ್ಯಾಜ್ಯ ವಸ್ತುಗಳನ್ನು ವಿಲೇವಾರಿ ಮಾಡದಿದ್ದರಿಂದ ಮಾನ್ಯ ಉಚ್ಚ ನ್ಯಾಯಾದಲ್ಲಿ ಕೇಸು ನಡೆಯುತ್ತಿದ್ದು ಪರಿಸರ ಆಘಾತ ವರದಿಯನ್ನು ನಂಬುದಕ್ಕೆ ಅರ್ಹರಿರುವುದಿಲ್ಲ.
5	ಗ್ರಾಮಸ್ಥರು , ವೆಂಕಟಾಲ, ಕೊಟಿಗೇನ ಹಳ್ಳಿ, ಕೋಗಿಲು ಗ್ರಾಸ್ಥರು, ಬೆಂಗಳೂರು	27-01-2014	04-02-2014	ಉದ್ದೇಶಿತ ಫೆರಿಫರಲ್‌ರಿಂಗ್ ರಸ್ತೆಯಿಂದ ವಾಹನಗಳು ಅತಿವೇಗವಾಗಿ ಚಲಿಸುತ್ತವೆ, ಅದರಿಂದ ದೋಳಿನ ಅಂಶಗಳು ಉತ್ಪತ್ತಿಯಾಗುತ್ತದೆ ಮತ್ತು ಗದ್ದಲದ ವತಾವರಣವು ಕಲುಶಿತವಾಗಿ ಹಾನಿಯಾಗಿ ಬಡಾವಣೆಗಳಲ್ಲಿ ವಾಸಿಸುವ ಸಾರ್ವಜಿನಿಕರಿಗೆ ತೊಂದರೆಯಾಗುತ್ತದೆ.

6	ಹೆಸರು ಮತ್ತು ವಿಳಾಸ ಇಲ್ಲದ ಅರ್ಜಿ ಬೆಂಗಳೂರು	14-01-2014	04-02-2014	ಉದ್ದೇಶಿತ ಫೆರಿಫರಲ್‌ರಿಂಗ್ ರಸ್ತೆಯಿಂದ ಪರಿಸರ ಮಾಲಿನ್ಯದ ಬಗ್ಗೆ ಹಾಗೂ ಕೇಸುಗಳು ನಡೆಯುತ್ತಿರುವ ಬಗ್ಗೆ.
7	ಎ. ಬಾರ್‌ಟಿಯ, ಬಾರತಿ ಫಾರಂ, ರಾಮಗೊಂಡನಹಳ್ಳಿ, ಯಲಹಂಕ ಹೋಬಳಿ, ಬೆಂಗಳೂರು.	27-01-2014	05-02-2014	1 ಕಿ.ಮೀ. ಗೆ ಬೇಕಾಗುವ ನೀರಿನ ಬಳಕೆಯ ಬಗ್ಗೆ ಹಾಗೂ ಯಾವ ಮೂಲದಿಂದ ನೀರನ್ನು ಬಳಸುತ್ತಾರೆ.
8	ಸುದಾಕರ್ ಹೆಗ್ಗಡೆ, ನಂ. 948, 6ನೇ ಕಾಸ್, ಆಶಾ ಟೌನ್ ಶಿಪ್, ದೊಡ್ಡಗುಬ್ಬಿ ಪೋಸ್ಟ್, ಬೆಂಗಳೂರು.	01-02-2014	05-02-2014	ಪೆಟ್ರೋನೆಟ್ ಎಮ್ ಬಿ ಹೆಚ್ ಲಿ., ನವರು ಪೆಟ್ರೋಲಿಯಂ ಪೈಪ್‌ಲೈನ್ನು ಬಿಳಿಶಿವಾಲೆ, ರಾಂಮರ ಅಡೂರು ಮುಂತಾದ ಸ್ಥಳಗಳಲ್ಲಿ ಹಾದು ಹೋಗಿದ್ದು ಈ ಪ್ರೋಜೆಕ್ಟ್‌ನಿಂದ ಪೆಟ್ರೋಲಿಯಂ ಪೈಪ್‌ಹೊಡೆದು ಡಿಸ್‌ಆಸ್ಟರ್ ಸಾದ್ಯತ ಹೆಚ್ಚುರುತ್ತದೆಂದು ಮನವಿ ಸಲ್ಲಿಸಿರುತ್ತಾರೆ.
9	ಸಿದ್ದಪ್ಪ, ಬಿಳಿಶಿವಾಲೆ, 1ನೇ ಮಹಡಿ, ಕುರುಬರ ಸಂಘ, 2ನೇ ಮುಖ್ಯ ರಸ್ತೆ, ಗಾಂದಿನಗರ ಬೆಂಗಳೂರು.	03-02-2014	05-02-2014	ಸದರಿ ಪ್ರೋಜೆಕ್ಟ್ ನಿಂದ ತಪ್ಪಗೊಂಡನಹಳ್ಳಿ ಜಲಾಶಯದ ಹಾಗೂ ಸದರಿ ಸ್ಥಳಗಳಲ್ಲಿರುವ ಕೆರೆಗಳ ಮೇಲೆ ದುಷ್ಪರಿಣಾಮ ಬೀರುತ್ತದೆ ಹಾಗೂ ಮರಗಳನ್ನು ಕಡಿಯುವುದರಿಂದ ಪರಿಸರದಲ್ಲಿ ಬದಲಾಗುವ ಸಾದ್ಯತ ಇರುತ್ತದೆ.
10	ಡಿ.ಎಂ. ದ್ವಾರಕಯ್ಯ, ನಂ.222, 1ನೇ ಮಹಡಿ, 4ನೇ ಕ್ರಾಸ್, (ಸಿ.ಎಂ.ಆರ್) ಕಲ್ಯಾಣನಗರ, ಬೆಂಗಳೂರು-560043.	ಪರಿಸರ ಸಾರ್ವಜನಿಕ ಆಲಿಕೆ ಸಭೆಯಲ್ಲಿ ನೀಡಿರುವುದು	06-02-2014	ಉದ್ದೇಶಿತ ಫೆರಿಫರಲ್ ರಿಂಗ್ ರಸ್ತೆಯಿಂದ ಪರಿಸರ ಮಾಲಿನ್ಯದ ಬಗ್ಗೆ ಹಾಗೂ ಕೇಸುಗಳು ನಡೆಯುತ್ತಿರುವ ಬಗ್ಗೆ.
11	ವಿ. ಸುರೇಶ್, ಸ/ಆಪ್ ಲೇಟ್ ಶ್ರೀ ವೆಂಕಟಸ್ವಾಮಿ ರೆಡ್ಡಿ ಮತ್ತು ಇತರರು, ಸೋರಹುಣಸೆ ವಿಲೇಜ್, ವರ್ತೂರು ಪೋಸ್ಟ್, ಬೆಂಗಳೂರು-87.	ಪರಿಸರ ಸಾರ್ವಜನಿಕ ಆಲಿಕೆ ಸಭೆಯಲ್ಲಿ ನೀಡಿರುವುದು	06-02-2014	ಉದ್ದೇಶಿತ ಫೆರಿಫರಲ್ ರಿಂಗ್ ರಸ್ತೆಯಿಂದ ಪರಿಸರ ಮಾಲಿನ್ಯದ ಬಗ್ಗೆ ಹಾಗೂ ಕೇಸುಗಳು ನಡೆಯುತ್ತಿರುವ ಬಗ್ಗೆ.
12	ಚೆರಿಯನ್ ಸೆಬಾಸಟ್ಯೆನ್, ನೆಲಮಹಡಿ, ನಂ. 74, 1ನೇ ಅಡ್ಡ ರಸ್ತೆ, ತ್ಯಾಗರಾಜ ಲೇಔಟ್, ಜೈ ಭಾರತ್ ನಗರ, ಬಾನಸವಾಡಿ ರೋಡ್, ಬೆಂಗಳೂರು-560033.	ಪರಿಸರ ಸಾರ್ವಜನಿಕ ಆಲಿಕೆ ಸಭೆಯಲ್ಲಿ ನೀಡಿರುವುದು	06-02-2014	ಉದ್ದೇಶಿತ ಫೆರಿಫರಲ್ ರಿಂಗ್ ರಸ್ತೆಯನ್ನು 10 ರಿಂದ 15 ಕಿ.ಮೀ. ದೂರಕ್ಕೆ ಸ್ಥಳಾಂತರಿಸುವ ಬಗ್ಗೆ.

ಮುಂದುವರಿದು ಬೆಂಗಳೂರು ನಗರ ಅಭಿವೃದ್ಧಿ ಪ್ರಾಧಿಕಾರದ ಪರವಾಗಿ ಅದರ ಸಮಾಲೋಚಕ ಸಂಸ್ಥೆಯಾದ ಮೆ॥ ರಾಮ್ಕಿ ಎನ್‌ವಿರೋ ಇಂಜಿನಿಯರ್ಸ್ ಲಿ., ಬೆಂಗಳೂರು ಇದರ ಪ್ರತಿನಿಧಿಯಾದ ಶ್ರೀ. ಹೇಮಂತ್ ರಾಜ್ ಕುಮಾರ್‌ರವರು ಈ ರಸ್ತೆ ಯೋಜನೆಯ ರೂಪುರೇಶೆ, ವಿವರಗಳು ಮುಂತಾದವಿಗಳನ್ನು Power point presentation ನ ಮೂಲಕ ಪ್ರಸ್ತುತ ಪಡಿಸಿದರು. ಪ್ರಸ್ತುತ ಪಡಿಸಿದ ಯೋಜನೆಯ ಪ್ರಮುಖ ಅಂಶಗಳು ಈ ಕೆಳಕಂಡಂತಿದೆ.

- ರಸ್ತೆಯ ಉದ್ದ – 56 ಕಿ.ಮೀ. (ಹಂತ-1).
- ಯೋಜನೆಯ ಅಂದಾಜು ವೆಚ್ಚ 930 ಕೋಟಿ.
- 8 ಲೇನ್‌ಗಳ ನಿರ್ಮಾಣ, ಪ್ರತಿಯೊಂದು ಲೇನಿನ ಅಗಲ 3.5 ಮೀಟರ್.
- ತುಮಕೂರು ಮತ್ತು ಹೊಸೂರು ರಸ್ತೆಯ ಜೊಡಣೆ ಹಳೆಯ ಮದ್ರಾಸು ರಸ್ತೆಯ ಮೂಲಕ.
- ಹೆಸರಘಟ್ಟ, ದೊಡ್ಡಬಳ್ಳಾಪು, ಬಳ್ಳಾರಿ, ಹೆಣ್ಣೂರು ಮುಖ್ಯ ರಸ್ತೆಗಳ ಪರಿಛೇದನೆ.
- 3.5 ಎಮ್ ಎಲ್ ಡಿ ನೀರಿನ ಬಳಕೆ.
- ಅಗತ್ಯ ಜಲ ಮತ್ತು ವಾಯು ಮಾಲಿನ್ಯ ನಿಯಂತ್ರಣ ಸಾದನಗಳ ಬಳಕೆ.

ಯೋಜನೆಯನ್ನು ಪ್ರಸ್ತುತ ಪಡಿಸಿದ ಬಳಿಕ ಜಿಲ್ಲಾಧಿಕಾರಿಗಳು ಸಭಿಕರನ್ನು ಅವರ ಅಹವಾಲು, ಸಲಹೆ, ಸೂಚನೆ ಮುಂತಾದವುಗಳನ್ನು ಪರಿಸರಕ್ಕೆ ಸಂಬಂದಿಸಿದಂತೆ ತಿಳಿಸಿದರು. ಸಭೆಯಲ್ಲಿ ವ್ಯಕ್ತವಾದಂತಹ ಅಭಿಪ್ರಾಯ ಅಹವಾಲು ಇವುಗಳನ್ನು ಈ ಕೆಳಗಿನಂತೆ ಕ್ರೂಡೀಕರಿಸಿದೆ.

ಮುಂದುವರೆದು, ಸಭೆಯಲ್ಲಿ ಹಾಜರಿದ್ದ ಈ ಕೆಳಕಂಡವರು ಸಲಹೆ ಹಾಗೂ ಅಹವಾಲುಗಳನ್ನು ಈ ಕೆಳಕಂಡಂತೆ ವ್ಯಕ್ತಪಡಿಸಿದರು.

1. <u>ಶ್ರೀ. ಸತ್ಯ ಬಾಬು, ಹರೂಹಳ್ಳಿ ಗ್ರಾಮ, ಯಲಹಂಕ ಹೋಬಳಿ :</u>

ಸದರಿಯವರು ಸ್ವಾಧೀನ ಪಡಿಸಿಕೊಂಡ ಜಮೀನುಗಳ ಹಾಗೂ ಕಟ್ಟಡಗಳ ಮಾಲೀಕರಿಗೆ ಯಾವ ರೀತಿಯ ಪರಿಹಾರ ಧನವನ್ನು ನೀಡಲಾಗುತಿದೆ ಎನ್ನುವುದರ ಬಗ್ಗೆ ಸರಿಯಾದ ಮಾಹಿತಿ ಇರುವುದಿಲ್ಲವೆಂದರು. ಈ ಯೋಜನೆಯು 2005 ರಲ್ಲಿ ಪ್ರಾರಂಭವಾಗಿದ್ದು ನಂತರದ ದಿನಗಳಲ್ಲಿ ಯಾವ ರೀತಿಯಿಂದಲೂ ಚರ್ಚೆ, ಸಭೆ ಹಾಗೂ ಪತ್ರಿಕೆಗಳಲ್ಲಿ ಜನರಿಗೆ ತಿಳುವಳಿಕೆಗಳನ್ನು ಪ್ರಾಧಿಕಾರವು ನೀಡಿರುವುದಿಲ್ಲವೆಂದರು. ಈ ಯೋಜನೆಯಲ್ಲಿ ಪೂರ್ಣಗೊಳಿಸಲು ಇನ್ನೂ ಎಷ್ಟು ವರ್ಷಗಳ ಕಾಲ ಬೇಕಾಗುವುದೆಂದು ಬಿ.ಡಿ.ಎ ಅವರನ್ನು ಪ್ರಶ್ನಿಸಿದರು. ರಸ್ತೆಯನ್ನು ಮಾಡುವುವುದರಿಂದ ಈ ಪ್ರಾಂತ್ಯದಲ್ಲಿ ವಾಹನ ದಟ್ಟಣೆ ಹೆಚ್ಚಾಗಿ ಮಾಲಿನ್ಯದ ಮಟ್ಟವು ಕೂಡ ಹೆಚ್ಚಾಗುವ ಸಾಧ್ಯತೆ ಇರುವುದರಿಂದ ಸದರಿ ರಸ್ತೆಯ ಜೋಡಣೆಯನ್ನು ಬದಲಾಯಿಸಬೇಕೆಂದು ಕೋರಿದರು.

2. <u>ಶ್ರೀ. ಪವನ್, ಬಿಳಿಶಿವಾಲೆ :</u>

ಬಿ.ಡಿ.ಎ ದವರು ರಸ್ತೆಯ ಜೋಡಣೆಯನ್ನು ಬದಲಾಯಿಸಿರುವುದರಿಂದ ಪರಿಹಾರ ಧನವನ್ನು ಯಾವ ಜೋಡಣೆಗೆ ನೀಡುತ್ತೀರಾ ಎಂಬುದರ ಬಗ್ಗೆ ಸ್ಪಷ್ಟಪಡಿಸುವಂತೆ ಕೋರಿದರು. ಮುಂದುವರೆದು ರಸ್ತೆಯ ಜೋಡಣೆಯು ಪದೇ ಪದೇ ಬದಲಾವಣೆಯಾಗಿರುವುದರಿಂದ ತಮ್ಮಗಳ ಜಮೀನುಗಳು ಬೇರೆ ಯಾವುದೇ ಚಟುವಟಿಕೆಗೆ ಭೂ ಪರಿವರ್ತನೆಯಾಗುತ್ತಿಲ್ಲವೆಂದು ವ್ಯಕ್ತಪಡಿಸಿದರು.

3. <u>ವಿ. ಸುರೇಶ್, ಸೋರಹುಣಸೆ ಗ್ರಾಮ:</u>

ಇವರು ಸುಮಾರು 200 ಮರಗಳನ್ನು ಕತ್ತರಿಸಲಾಗುವುದೆಂದು ತಿಳಿಸಲಾಗಿದೆ, ಆದರೆ ನನ್ನ ತೋಟದಲ್ಲೇ ಸಮಾರು 30 ಸಪೋಟ ಗಿಡಗಳು ಹಾಗೂ 60 ತೆಂಗಿನ ಮರಗಳು ಇದ್ದು ಯಾವ ಆದಾರದ ಮೇಲೆ ಮರಗಳನ್ನು ಕಡಿಯಲು ಅಂದಾಜನ್ನು ಮಾಡಲಾಗಿದೆ ಎಂದರು. ಮುಂದುವರೆದಂತೆ ತಮ್ಮ ಜೀವನವು ತೋಟಗಾರಿಕೆ ಹಾಗೂ ರೇಷ್ಮೆಗಾರಿಕೆಯಿಂದ ನಡೆಯುತ್ತಿದ್ದು ರಸ್ತೆ ನಿರ್ಮಾಣದಿಂದ ಅದಕ್ಕೆ ಕುತ್ತು ಬಂದಿರುವುದಾಗಿ ತಿಳಿಸಿ ಸದರಿ ಯೋಜನೆಯಿಂದ ವಾಯು ಮತ್ತು ಶಬ್ದಮಾಲಿನ್ಯದಿಂದ ಹೆಚ್ಚಾಗುವುದೆಂದು ಸಹ ಹೇಳಿದರು. ರಸ್ತೆಯ ಯೋಜನೆಯು ಹೊಸ ಉದ್ಯೋಗವಕಾಶ ಸೃಷ್ಟಿಸದೇ ಇರದ ಕಾರಣ ಇಂತಹ ಯೋಜನೆಯನ್ನು ಕೈಬಿಡಬೇಕೆಂದು ಕೋರಿದರು.

4. <u>ಶ್ರೀ.ಶ್ಯಾಮ , ಬಿಳಿಶಿವಾಲೆ:</u>

ಹಣ್ಣೂರಿನಿಂದ ರಸ್ತೆ ಜೊಡಣೆಯ ಬಗ್ಗೆ ಹಾಗೂ ಸದರಿ ಜೊಡಣೆಯು ಯಾವ ಯಾವ ಸರ್ವೆ ನಂಬರುಗಳ ಮೇಲೆ ಪರಿಣಾಮ ಬೀಳುವುದು ಎಂಬುದನ್ನು ವಿವರವಾಗಿ ತಿಳಿಸಿಕೊಡುವಂತೆ ಕೋರಿಕೊಂಡರು. ರಸ್ತೆಯ ಅಲೈನ್‌ಮೆಂಟ್‌ಅನ್ನು ಹೇಗೆ ಮತ್ತು ಯಾವ ರೀತಿ ಮಾಡಲಾಗಿದೆ ಎಂದು ಕೇಳಿರುತ್ತಾರೆ.

5. <u>ಶ್ರೀ.ಮಹೇಶ್, ಬಿಳಿಶಿವಾಲೆ:</u>

ಸದರಿಯವರು ರಸ್ತೆ ನಿರ್ಮಾಣ ಉದ್ದೇಶವು ಒಳ್ಳೆಯದಾಗಿದ್ದು ತಮ್ಮ ಹಳ್ಳಿಗೆ ಯಾವುದೇ ರೀತಿಯ ತೊಂದರೆ ಇರುವುದಿಲ್ಲ, ರಸ್ತೆ ನಿರ್ಮಾಣದಿಂದ ಆರ್ಥಿಕ ಅಭಿವೃದ್ಧಿಯಾಗುತ್ತದೆ ಮತ್ತು ದೊರೆಯುವ ಪರಿಹಾರ ಧನದಿಂದ ಅನೇಕರ ತೊಂದರೆಗಳು ಬಗೆಹರಿಯುತ್ತವೆ. ಬೆಂಗಳೂರು ನಗರದ ಅಭಿವೃದ್ಧಿಗೆ ರಸ್ತೆಯ ನಿರ್ಮಾಣವು ಅತ್ಯಗತ್ಯವಾದುದರಿಂದ ಈ ಯೋಜನೆಯನ್ನು ಕೈಬಿಡಬೇಡಿ ಎಂದು ಸೂಚಿಸುತ್ತಾ ಎಲ್ಲರೂ ಇಂತಹ ಯೋಜನೆಯನ್ನು ಬೆಂಬಲಿಸಬೇಕೆಂದು ಕೋರುತ್ತಾ ಸೂಕ್ತ ರೀತಿಯ ಪರಿಹಾರ ಧನವನ್ನು ನೀಡಬೇಕೆಂದು ಕೋರಿದರು.

6. <u>ಶ್ರೀ.ರಾಜನ್, ವೆಂಕಟಾಲ, ಯಲಹಂಕ:</u>

ಇವರು ಪರಿಸರ ಆಘಾತ ವರದಿಯನ್ನು 2010 ರಲ್ಲಿ ತಯಾರಿಸಿದ್ದು (ಮೂರು ಮತ್ತು ನಾಲ್ಕು ವರ್ಷಗಳ ಹಿಂದೆ) ಈ ಪ್ರಸ್ತುತ ಇದು ವಿಶ್ವಾಸರ್ಹವೇ ಎಂದು ಕೇಳಿದರು. ರಸ್ತೆಯ ನಿರ್ಮಾಣಕ್ಕಾಗಿ ಜಮೀನು ಕಳೆದುಕೊಂಡವರಿಗೆ ಮೆನಯನ್ನು ಕಟ್ಟುಲು ಜಮೀನಿನ ಮರುಹಂಚಿಕೆಯ ಬಗ್ಗೆ ವಿವರಕೊಡುವಂತೆ ಕೋರಿದರು. ರಸ್ತೆಯ ಜೋಡಣೆಯು ಮೂರು ನಾಲ್ಕು ಬಾರಿ ಸಮಾಜದ ಕೆಲವರ್ಗದ ಹಾಗೂ ಶ್ರೀಮಂತರ ಅನುಕೂಲಕ್ಕಾಗಿ ಬದಲಾವಣೆಗೊಳಿಸಿದ್ದಾರೆಂದು ಕಳವಳ ವ್ಯಕ್ತ ಪಡಿಸಿದರು ಬಿ.ಡಿ.ಎ ತಯಾರಿಸಿರುವ ರಸ್ತೆಯ ನೀಲ ನಕ್ಷೆಯು ಸರಿಇಲ್ಲವೆಂದು ದೋರುತ್ತಾ ಬಿ.ಡಿ.ಎ ವತಿಯಿಂದ ಸೂಕ್ತ ಸಮಂಜಸಕರ

ಮಾರುತ್ತರವು ದೊರೆಯುತ್ತಿಲ್ಲ, ಹಾಗಾಗಿ ಈ ಸಂಪೂರ್ಣ ಯೋಜನೆಯು ಕ್ರಮಬದ್ಧವಾಗಿಲ್ಲವೆಂದು ನುಡಿದರು. ಹಾಗಾಗಿ ಈ ಯೋಜನೆಯನ್ನು ಸದರಿ ಸ್ಥಳದಲ್ಲಿ ಕೈಬಿಟ್ಟು ಬೇರೆ ಕಡೆ ಬೃಹತ್ ಬೆಂಗಳೂರು ಮಹಾ ನಗರ ಪಾಲಿಕೆಯ ಎಲ್ಲೆಯಿಂದ ಹೊರಗೆ ಕೈಗೆತ್ತಿಕೊಳ್ಳುವಂತೆ ಕೋರಿದರು. ಹಲವು ಭೂ ಮಾಲಿಕರು ಕೋರ್ಟಿನಲ್ಲಿ ಹೂಡಿರುವ ದಾವೆಗಳು ಇತ್ಯರ್ಥವಾಗುವವರೆಗೂ ಯೋಜನೆಯನ್ನು ಕೈಗೆತ್ತಿಕೊಳ್ಳದಂತೆ ತಿಳಿಸಿದರು.

7. <u>ಶ್ರೀ. ಅಶೋಕ್, ಬಿಳಿಶಿವಾಲೆ:</u>

ಹಾಲಿ ಇರುವ ವರ್ತುಲ ರಸ್ತೆ ಹಾಗೂ ಈಗಿನ ಪ್ರಸ್ತಾವಿತ ರಸ್ತೆಯ ನಡುವಿನ ಅಂತರವು ಕೇವಲ 6 ಕಿ.ಮಿ. ಇರುವುದರಿಂದ ಸದರಿ ಯೋಜನೆಯನ್ನು ಕೈಬಿಡುವಂತೆ ಕೋರಿದರು. ಹಾಲಿ ಮತ್ತು ಪ್ರಸ್ತಾವಿತ ರಸ್ತೆಯ ನಡುವಿನ ಅಂತರವನ್ನು 10-15 ಕಿ.ಮೀ. ಇರುವಂತೆ ಕಾಪಾಡಿಕೊಳ್ಳುತ್ತಾ ಜೋಡಣೆಯನ್ನು ಮಾಡಬೇಕೆಂದು ಸಲಹೆ ನೀಡಿದರು.

8. <u>ಶ್ರೀ. ಆನಂದಕುಮಾರ್, ಬಿಳಿಶಿವಾಲೆ:</u>

ಈ ಫೆರಿಫರಲ್ ರಿಂಗ್ ರಸ್ತೆಯ ಯೋಜನೆಯು ಸುಮಾರು ವರ್ಷಗಳಿಂದ ಚರ್ಚೆಯಲ್ಲಿದ್ದು ಆದಷ್ಟು ಬೇಗನೆ ಸಮಯ ಬದ್ಧವಾಗಿ ಕೈಗೆತ್ತಿಕೊಳ್ಳಬೇಕಾಗಿ ವಿನಂತಿಸಿದರು.

9. <u>ಶ್ರೀ.ರಾಮ ಸ್ವಾಮಿ, ಕ್ಯಾಲ್ಲನಹಳ್ಳಿ:</u>

ರಸ್ತೆ ಜೋಡಣೆಯ ಶುರುವಿನಿಂದ ಮುಕ್ತಾಯದವರೆಗೆ ಒಳಗೊಳ್ಳುವ ಗ್ರಾಮಗಳು ಮತ್ತು ಸರ್ವೆ ನಂ.ಗಳ ಮಾಹಿತಿಯನ್ನು ತಿಳಿಸಿಕೊಡಬೇಕಾಗಿ ಕೋರಿದರು.

10. <u>ಶ್ರೀ. ಚರಿಯನ್, ಕಾಕ್ಸ್‌ಟಾನ್, ಬೆಂಗಳೂರು:</u>

ಇವರು ಈ ಫೆರಿಫರಲ್ ರಸ್ತೆಯ ಮಾದರಿಯನ್ನು 1995 ನೇ ಇಸವಿಯ ಸಮಗ್ರ ಅಭಿವೃದ್ಧಿ ಯೋಜನೆ (ಸಿ.ಡಿ.ಪಿ) ಯಲ್ಲಿ ಅನುಮೋದಿಸಿದ್ದು, 2004 ನೇ ಇಸವಿಯಲ್ಲಿ ಬಿ.ಡಿ.ಎ ರವರು ಈ ಯೋಜನೆಯನ್ನು ಕೈಬಿಟ್ಟಿದ್ದು ಇದಕ್ಕೆ ಕಾರಣ ತೀರ್ವಗತಿಯಲ್ಲಿ ನಗರ ಬೆಳೆಯುತ್ತಿರುವುದರಿಂದ ಎಂದು ತಿಳಿಸಿರುತ್ತಾರೆ. ನಂತರ ಸಿ.ಡಿ.ಪಿ, 2007 ರ ಪರಿವೀಕ್ಷಣಾ ವರದಿಯಲ್ಲಿ ಹಾಗೂ ಡ್ರಾಪ್ಟ್ ಫ್ಯಿಸೀಜಿಬಲಿಟಿ ವರದಿಯ ಪ್ರಕಾರ ಸದರಿ ರಸ್ತೆಯ ನಿರ್ಮಾಣವು ಹಳೆಯ ವರ್ತುಲ ರಸ್ತೆಯಿಂದ 5 ಕಿ.ಮೀ. ಅಂತರದಲ್ಲಿರುತ್ತದೆ. ಮುಂದುವರೆದು ಬೆಂಗಳೂರು ನಗರ ಜಿಲ್ಲೆಯು ತ್ವರಿತವಾಗಿ ಬೆಳೆಯುತ್ತಿರುವುದರಿಂದ ಹಾಗೂ ಮಾಲಿನ್ಯ ನಿಯಂತ್ರಣ ದೃಷ್ಟಿಯಿಂದ ಹಳೆಯ ವರ್ತುಲ ರಸ್ತೆ ಮತ್ತು ಯೋಜನೆ ನಿರ್ಮಾಣದ ರಸ್ತೆಯ ಅಂತರ 10 ರಿಂದ 15 ಕೀ.ಮೀ. ಆಗಿರಬೇಕು ಎಂದು ಸ್ಟೂಪ್ ಕಂನ್ಸಲ್ಟೆಂಟ್ ವರದಿಯನ್ನು ಸಲ್ಲಿಸಿರುತ್ತಾರೆ. ಇದೆಲ್ಲವನ್ನೂ ಪರಿಗಣಿಸಿ ಮುಂದಿನ ಹಲವು ವರ್ಷಗಳ ಬೆಳವಣಿಗೆಯ ದೂರದೃಷ್ಟಿ ಇಟ್ಟುಕೊಂಡು ರಸ್ತೆಯ ಪಥವನ್ನು ಮರು ಜೋಡಣೆ ಮಾಡಬೇಕೆಂದು ತಿಳಿಸಿರುತ್ತಾರೆ.

11. <u>ಶ್ರೀಮತಿ. ರೀನಾ ಮಹೆಂದ್ರ, ಆವಲಹಳ್ಳಿ:</u>

ಇವರು, ಇದು ಪರಿಸರ ಸಾರ್ವಜನಿಕ ಸಭೆಯಾದುದ್ದರಿಂದ ಕೇವಲ ಪರಿಸರದ ಬಗ್ಗೆ ಮಾತ್ರ ಚರ್ಚಿಸಿದರೆ ಒಳ್ಳೆಯದು ಹಾಗೂ ಯಾವುದೇ ರೀತಿಯ ಪರಿಹಾರ ವಿಷಯದ ಬಗ್ಗೆ ಮಾತನಾಡುವುದು ಈ ಸಭೆಯಲ್ಲಿ ಸೂಕ್ತವಲ್ಲವೆಂದು ಸೂಚಿಸಿದರು ಹಾಗೂ ಅಂತಹ ವಿಚಾರಕ್ಕೆ ಬೇರೆಯದೆ ಆದ ಸಭೆಯನ್ನು ರಚಿಸತಕ್ಕದ್ದು ಎಂದು ಬೆಂಗಳೂರು ಅಭಿವೃದ್ಧಿ ಪ್ರಾಧಿಕಾರಕ್ಕೆ ಮನವಿ ಮಾಡಿದರು.

ಪರಿಸರ ಆಘಾತ ಅಧ್ಯಯನ ವರದಿಯು 2010 ನೇ ಇಸವಿಯಲ್ಲಿ ತಯಾರಿಸಿದ್ದು ಈಗಾಗಲೇ 3 ವರ್ಷ ಕಳೆದಿತ್ತದೆ. ಆದುದ್ದರಿಂದ ಈಗಲೂ ಈ ವರದಿಯನ್ನು ಪರಿಗಣಿಸಲು ಸೂಕ್ತವೇ ಎಂದು ಪ್ರಶ್ನಿಸಿದರು. ರಸ್ತೆಯು ತಿಪ್ಪಗೋಂಡನ ಹಳ್ಳಿ ಜಲಾಶಯದ ಅಚ್ಚುಕಟ್ಟು ಪ್ರದೇಶದಲ್ಲಿ ಬರುವುದೇ, ಹಾಲಿ ಇರುವ ಅನಿಲ ಪೈಪ್‌ಲೈನ್ ಪಕ್ಕ ಮತ್ತು ಅರಣ್ಯ ಪ್ರದೇಶದಿಂದ ಹಾದುಹೋಗುವುದೇ ಎಂಬುದರ ಬಗ್ಗೆ ಸದರಿ ವರದಿಯಲ್ಲಿ ಮಾಹಿತಿ ನೀಡಿರುವುದಿಲ್ಲವೆಂದು ತಿಳಿಸಿದರು.

12. <u>ಶ್ರೀ. ಪ್ರಭಾಕರ್, ಅಗ್ರಹಾರ, ಯಲಹಂಕ:</u>

ಮೊದಲ ಬಾರಿಗೆ 2006 ನೇ ಇಸವಿಯಲ್ಲಿ ಸರ್ವೆಯನ್ನು ಮಾಡಿದ್ದು ತದನಂತರ 4 ರಿಂದ 5 ಬಾರಿ ಪುನರ್ ಸರ್ವೆಯನ್ನು ಮಾಡಿರುವುದರಿಂದ ಯೋಜಿತ ರಸ್ತೆಯ ಪಥವು ಬದಲಾವಣೆಯಾಗುತ್ತಿದ್ದು, ಈಗ ತಮ್ಮ ಮನೆಯನ್ನು ಕಳೆದುಕೊಳ್ಳುವ ಭೀತಿಯಿದೆ, ಆದುದರಿಂದ ದಯವಿಟ್ಟು ಈ ಯೋಜನೆಯನ್ನು ಇಲ್ಲಿಯೇ ನಿಲ್ಲಸಬೇಕೆಂದು ಕೋರಿದರು.

13. <u>ಶ್ರೀ.ಸುಕುಮಾರ್, ಕೊತ್ತನೂರು, ದೊಡ್ಡಗುಬ್ಬಿ:</u>

ಇವರು ಪರಿಸರ ಸಾರ್ವಜನಿಕ ಸಭೆಯನ್ನು ಏರ್ಪಡಿಸುರುವುದಕ್ಕೆ ವಂದಿಸುತ್ತಾ, ಇಂತಹ ಸಭೆಯು ಸಾರ್ವಜನಿಕರ ಕುಂದುಕೊರತೆ, ಅಹವಾಲು ಹಾಗೂ ಸಲಹೆಗಳನ್ನು ನೀಡಲು ಹಾಗೂ ಸೂಚಿಸಲು ಒಂದು ಉತ್ತಮ ವೇದಿಕೆಯಾಗಿದೆ ಎಂದು ನುಡಿದರು. ಯೋಜನೆಯು ಅನಗತ್ಯವಾಗಿ ವಿಳಂಬವಾಗಿದ್ದು ಇದರ ಬಗ್ಗೆ ಆಸಕ್ತರಿಗೆ ಹಾಗೂ ಬಾದಿತರಿಗೆ ಯಾವುದೇ ರೀತಿಯ ಮಾಹಿತಿಯನ್ನು ಒದಗಿಸಿರುವುದಿಲ್ಲ ಎಂದರು. ತಾವು ಕೋಲಾರ ಜಿಲ್ಲೆಯ ನಾಗರೀಕರಾಗಿದ್ದು ಇಲ್ಲಿ ಮನೆಕಟ್ಟುವ ಉದ್ದೇಶದಿಂದ ಜಾಗವನ್ನು ತೆಗೆದುಕೊಂಡಿದ್ದು ಕಳೆದ 8 ವರ್ಷಗಳಿಂದ ರಸ್ತೆ ಯೋಜನೆಯು ಕಾರ್ಯಗತವಾಗದೆ ಇರುವುದರಿಂದ ಮನೆಯನ್ನು ಕಟ್ಟಲೂ ಆಗದೆ ಬಿಡಲೂ ಆಗದೆ ಇರುವಂತಹ ಪರಿಸ್ಥಿತಿ ಎದುರಾಗಿದೆ ಎಂದು ಕಳವಳ ವ್ಯಕ್ತಪಡಿಸರು. ಯೋಜನೆಯ ಪ್ರಗತಿಯ ಬಗ್ಗೆ ಯಾವುದೇ ರೀತಿಯ ಲಿಖಿತ ಮಾಹಿತಿ ತಮಗೆ ದೂರೆಯುತ್ತಿಲ್ಲದ ಕಾರಣ ಸದರಿ ಯೋಜನೆಯು ಕಾರ್ಯ ರೂಪಕ್ಕೆ ಬರುತ್ತದೆಯೋ ಇಲ್ಲವೂ ಎನ್ನುವುದು ತಿಳಿದು ಬರುತ್ತಿಲ್ಲ ಇದರಿಂದ ನಮ್ಮ ಕನಸುಗಳು ನಾಶವಾಗಿದೆ ಎಂದು ದುಃಖಿಸಿದರು.

14. <u>ಶ್ರೀ. ಮಂಜುನಾಥ, ರಾಮಮರ ಗ್ರಾಮ:</u>

ಇವರು ಈ ರಸ್ತೆ ಯೋಜನೆಯ ಬಗ್ಗೆ ಒಲವನ್ನು ವ್ಯಕ್ತಪಡಿಸಿ ಈ ರೀತಿಯ ಯೋಜನೆಯನ್ನು ಯಾವುದೇ ಸ್ಥಳದಲ್ಲಿ ಹಮ್ಮಿಕೊಂಡರು ಸಹಾ ಇಲ್ಲಿ ಆಗುವಂಥಹ ಪರಿಣಾಮ ಅಲ್ಲಿಯು ಸಹ ಆಗುವುದು ಎಂದರು. ಯೋಜನೆಯ ಪ್ರಗತಿಯು ಮಂದಗತಿಯಲ್ಲಿ ಸಾಗಿದ್ದು ಇದನ್ನು ತ್ವರಿತಗೊಳಿಸ ಬೇಕು ಅಥವಾ ಕೈಬಿಡಬೇಕು ಎಂದು ಹೇಳಿದರು.

15. <u>ಶ್ರೀ. ವೇಣು. ರಾಮಮರ:</u>

ಸದರಿಯವರು ಭೂಸ್ವಾಧಿನ ಪಡಿಸಿಕೊಂಡು 8 ವರ್ಷಗಳಾಗಿವೆ ಇವರೆಗೆ ಯಾವ ಕಾಮಗಾರಿಯೂ ನಡೆದಿಲ್ಲ ಈ ತರಹದ ದೋರಣೆತರವಲ್ಲ, ಭೂಸ್ವಾಧಿನ ಮಾಡಿಕೊಂಡ ಒಂದು ಅಥವಾ ಎರಡು ವರ್ಷಗಳ ಅವಧಿಯಲ್ಲಿ ಯೋಜನೆಯನ್ನು ಕೈಗೆತ್ತಿಕೊಂದು ಸಂಪೂರ್ಣಗೊಳಿಸಬೇಕು. ಇಲ್ಲವಾದಲ್ಲಿ ಭಾದಿತವಾಗುವುದು ಸಾಮಾನ್ಯ ಜನತೆ ಮಾತ್ರವೇ ಎಂದು ಹೇಳುತ್ತಾ ಅತಿ ಶೀಘ್ರವಾಗಿ ಯೋಜನೆಯನ್ನು ಪೂರ್ಣಗೊಳುಸಬೇಕೆಂದು ಅಧಿಕಾರಿಗಳನ್ನು ಕೋರಿದರು.

16. <u>ಶ್ರೀಮತಿ ಜಮುನಾ, ದೊಡ್ಡಗುಬ್ಬಿ:</u>

ಬಿ.ಡಿ.ಎ ದವರು ಸೂಕ್ತ ಸ್ಥಳಗಳಲ್ಲಿ ಯಾವ ಜಮೀನು ಮತ್ತು ಎಷ್ಟು ಭೂಸ್ವಾಧಿನಗೊಳ್ಳುತ್ತದೆ ಎಂಬ ವಿವರಗಳ್ಳು ಫಲಕಗಳನ್ನು ಪ್ರದರ್ಶಿಸುವುದರಲ್ಲಿ ವಿಫಲವಾಗಿದೆ ಎಂದರು. ಇದರಿಂದಾಗಿ ಗೊಂದಲದ ವಾತಾವರ್ಣ ನಿರ್ಮಾಣವಾಗಿದ್ದು ಕಳೆದ ಹಲವಾರು ವರ್ಷಗಳ ಹಿಂದೆಯೇ ಜಮೀನು ಖರೀದಸಿದ್ದರು ಸಹಾ ತಮ್ಮ ಕನಸಿನ ಮನೆಯನ್ನು ಸಕಾರಗೊಳಿಸಲು ಸಾಧ್ಯವಗುತ್ತಿಲ್ಲ ಎಂದು ಹೇಳಿದರು.

17. <u>ಶ್ರೀ. ರವಿ, ಬಿಳಿಶಿವಾಲೆ ಗ್ರಾಮ:</u>

ಇವರು ಉತ್ತಮ ರಸ್ತೆಯ ಸಂಪರ್ಕದಿಂದಾಗಿ ಆರ್ಥಿಕ ಅಭಿವೃದ್ದಿಯನ್ನು ಸಾದಿಸಬಹುದು ಈಗಾಗಿ ಉತ್ತಮ ರಸ್ತೆಗಳ ಅವಶ್ಯಕತೆ ಕಂಡುಬರುತ್ತದೆ ಎಂದು ಹೇಳಿದರು. ರಸ್ತೆಗೆಂದು ವಶಪಡಿಸಿಕೊಂಡ ಜಮೀನುಗಳ ಬದಲಾಗಿ ಆ ಜಮೀನಿನ ಮಾಲೀಕರಿಗೆ ಬೇರೆ ಕಡೆ ಜಾಗವನ್ನು ದೊರಕಿಸಿಕೊಟ್ಟಲ್ಲಿ ಭೂಸ್ವಾಧಿನ ಪ್ರಕ್ರಿಯೆಯು ಸ್ವಯಿಚ್ಛೆಯಿಂದ ಆಗುತ್ತದೆ ಎಂದರು. ಮುಂದುವರೆದು ತುಂಬಾ ಬೇಗನೆ ನಗರ ಬೆಳೆಯುತ್ತಿರುವುದರಿಂದ ಈಗಾಗಲೇ ವಾಹನಗಳ ದಟ್ಟಣೆ ಅಧಿಕವಾಗಿದ್ದು ಅತಿ ಶೀಘ್ರವಾಗಿ ರಸ್ತೆ ನಿರ್ಮಾಣವಾಗಬೇಕಾಗಿದೆ, ಬೇಗ ಪರಿಹಾರ ಧನ ನೀಡಿದರೆ ಅವರವರ ಜೀವನವನ್ನು ಅವರವರು ರೂಪಿಸಿಕೊಳ್ಳುತ್ತಾರೆ ಎಂದು ತಿಳಿಸಿದರು. ಈಗ ನಿಗದಿ ಪಡಿಸಿದ ರಸ್ತೆಯ ಪಥದಲ್ಲಿ ಅಂಥಹ ದೊಡ್ಡ ಪ್ರಮಾಣದ ಮರಗಳನ್ನು ಕಡಿಯುವ ಸಂದರ್ಭ ಬರುವುದಿಲ್ಲ, ಬೇರೆ ಎಲ್ಲೇ ಹೋದರು ಸಹ ಸಣ್ಣ ಪುಟ್ಟ ಮರಗಳನ್ನು ಕತ್ತರಿಸಲೇಬೇಕಾಗುವ ಪ್ರಮೇಯ ಬರುತ್ತದೆ ಎಂದು ಹೇಳುತ್ತಾ ರಸ್ತೆ ಅಭಿವೃದ್ಧಿಯ ಕಾಮಗಾರಿಯನ್ನು ಬೇಗನೆ ಆರಂಭಿಸಲು ಯಾವುದೇ ರೀತಿಯ ಆಕ್ಷೇಪಣೆಯನ್ನು ಮಾಡಬೇಡಿ ಎಂದು ನೆರೆದಿದ್ದವರನ್ನು ಉದ್ದೇಶಿಸಿ ವಿನಂತಿಸಿದರು.

ಅಧಿಕಾರಿ ವರ್ಗದವರಿಂದ ಮಾರುತ್ತರ:

ಶ್ರೀ. ರವಿ, ಕಾರ್ಯ ನಿರ್ವಾಹಕ ಅಭಿಯಂತರ, ಪಿ.ಆರ್.ಆರ್. ವಿಭಾಗ, ಬೆಂಗಳೂರು ನಗರ ಅಭಿವೃದ್ಧಿ ಪ್ರಾಧಿಕಾರ:

ಸಭೆಯನ್ನು ಉದ್ದೇಶಿಸಿ ಮಾತನಡಿದ ಇವರು ಇಲ್ಲಿ ನಡೆದರತಕ್ಕಂತಹ ಸಭೆಯು ಪರಿಸರದ ಬಗ್ಗೆಯಾಗಿದೆ ಆದರೆ ಇಲ್ಲಿ ಹೆಚ್ಚಿನ ಅಹವಾಲುಗಳು ಭೂಮಿಯ ಪರಿಹಾರದ ಬಗ್ಗೆ ನಡೆದಿರುತ್ತದೆ, ಇಲ್ಲಿ ಪರಿಸರದ ಬಗ್ಗೆ ತಮ್ಮ ಅಹವಾಲುಗಳನ್ನು ವ್ಯಕ್ತಪಡಿಸಲು ಈ ಸಭೆಯನ್ನು ಆಯೋಜಿಸಿದ್ದೇವೆ, ಭೂಸ್ವಾಧೀನದ ಬಗ್ಗೆ ಜನವರಿ 29ನೇ ತಾರೀಖು ನಡೆದ ಸಭೆಯಲ್ಲಿ ರೈತ ಮುಖಂಡರು ಮತ್ತು ಜಮೀನಧಾರರು ಎಲ್ಲಾ ಹಳ್ಳಿಯಿಂದ ಬಂದಿದ್ದು ಅವರಿಗೆ ಭೂಸ್ವಾದಧೀನದ ಪ್ರಕ್ರಿಯೆಯ ಬಗ್ಗೆ ವಿವರವಾಗಿ ತಿಳಿಸಿದ್ದು ಬೆಂಗಳೂರು ಪ್ರಾಧಿಕಾರದ ಆಯುಕ್ತರು ಜನರಿಗೆ ಕೆಲವೊಂದು ಆಶ್ವಾಸನೆಯನ್ನು ನೀಡಿರುತ್ತಾರೆಂದು ತಿಳಿಸಿದರು. ಯಾವ ರೀತಿಯಿಂದ ಪರಿಹಾರವನ್ನು ನೀಡಬೇಕೆಂದು ಸರ್ಕಾರದ ಜೊತೆ ಮಾತನಾಡಿ ಆದಷ್ಟು ಬೇಗ ಅದನ್ನು ಸರಿಯಾದ ರೀತಿಯಲ್ಲಿ ಕಾರ್ಯರೂಪಕ್ಕೆ ತರಲ್ಲಿದ್ದೇವೆ ಎಂದರು. ಭೂಸ್ವಾಧೀನ ಪ್ರಕ್ರಿಯೆಯ ಬಗ್ಗೆ ತಿಳುವಳಿಕೆಯನ್ನು ಪಡೆಯಲು ಸಂಬಂಧ ಪಟ್ಟ ಭೂಸ್ವಾಧೀನ ಅಧಿಕಾರಿಗಳಲ್ಲಿ ಚರ್ಚಿಸಿ ಸೂಕ್ತ ಪರಿಹಾರ ನೀಡಲಾಗುವುದು ಎಂದರು. ಪರಿಸರ ಆಘಾತ ಅಧ್ಯಯನ ವರದಿಯಲ್ಲಿ 2010 ರಿಂದ 2014 ರವರೆಗೆ ಮಾಹಿತಿಯನ್ನು ಅಳವಡಿಸಿಕೊಳ್ಳಲಾಗಿದೆ ಎಂದು ತಿಳಿಸಿದರು. ಇತ್ತೀಚಿಗೆ ಮರಗಳ ವಿವರಗಳನ್ನು ಸಂಗ್ರಹಿಸಿದ್ದು ತೆಂಗಿನ ಮರ ಹಾಗೂ ನೀಲಗಿರಿ ಮರಗಳನ್ನು ಹೊರತುಪಡಿಸಿ ಸಮಾರು 500 ಮರಗಳನ್ನು ಕಡಿಯುವ ಸಂಧರ್ಭ ಎದುರಾಗಬಹುದು ಎಂದು ತಿಳಿಸಿದರು. ಒಟ್ಟು ಸುಮಾರು 6000 ಮರಗಳನ್ನು ಈ ಉದ್ದೇಶಿತ ರಸ್ತೆಯ ಪಥದಲ್ಲಿ ಕಡಿಯಬೇಕಾಗಿರುವುದರಿಂದ ಅರಣ್ಯ ಇಲಾಖೆಯ ಸಂಪರ್ಕಿಸಿ ಅವರ ಸಲಹೆಯ ಮೇರೆಗೆ ಮರಗಳನ್ನು ಕತ್ತರಿಸಲಾಗುವುದೆಂದು ತಿಳಿಸಿದರು.

ಶ್ರೀ. ನರಸಿಂಹಪ್ಪ , ವಿಶೇಷ ಭೂ ಸ್ವಾಧೀನ ಅಧಿಕಾರಿ, ಬೆಂಗಳೂರು ನಗರ ಅಭಿವೃದ್ಧಿ ಪ್ರಾಧಿಕಾರ:

ಇವರು, ಪ್ರಥಮ ಅಧಿಸೂಚನೆ ಅಥವಾ ಅಂತಿಮ ಅಧಿಸೂಚನೆಯ ಗೊಂದಲವಿಲ್ಲದೆ ಮಾರುಕಟ್ಟೆ ದರವನ್ನು ಪ್ರಥಮ ಅಧಿಸೂಚನೆಯ ದಿನಾಂಕದಿಂದ ಪರಿಗಣಿಸಬೇಕೆಂದು ಹೊಸ ಭೂಕಾಯ್ದೆ ತಿಳುವಳಿಕೆ ನೀಡಿದೆ ಹಾಗೂ ಹೊಸ ನಿರ್ದೇಶನದ ಪ್ರಕಾರ ಪರಿಹಾರ ಧನವನ್ನು ನೀಡಬೇಕಾಗಿದೆ ಹಾಗೂ ಇದು ಕಡ್ಡಾಯವಾಗಿದೆ. ತಮ್ಮ ಸಮಸ್ಯೆಗಳಿಗೆ ಸರಿಯಾದ ರೀತಿಯಿಂದ ಪರಿಹಾರ ನೀಡುವುದು ತಮ್ಮ ಆದ್ಯ ಕರ್ತವ್ಯವಾಗಿದ್ದು, ಮಾರುಕಟ್ಟೆ ದರ ಒಂದು ಹಳ್ಳಿಯಿಂದ ಇನ್ನೊಂದು ಹಳ್ಳಿಗೆ ಬದಲಾಗುತ್ತಿದ್ದು ಅದನ್ನು ಸಮಂಜಸವಾಗಿ ಪರಿಗಣಿಸಿ, ಪರಿಶೀಲಿಸಿ ಪರಿಹಾರ ನೀಡಲಾಗುವುದು ಎಂದು ತಿಳಿಸಿದರು.

ಡಾ.ಜಿ.ಸಿ. ಪ್ರಕಾಶ್,ಭಾ.ಆ.ಸೇ. ಜಿಲ್ಲಾಧಿಕಾರಿ, ಬೆಂಗಳೂರು ನಗರ ಜಿಲ್ಲೆ:

ಸಭೆಯಲ್ಲಿ ವ್ಯಕ್ತವಾದ ಅನಿಸಿಕೆಗಳು, ಸಲಹೆಗಳು, ಅಹವಾಲು ಮುಂತಾದವುಗಳನ್ನು ರಾಜ್ಯ ಪರಿಸರ ಆಘಾತ ಅಂದಾಜಿಕರಣ ಪ್ರಾಧಿಕಾರಕ್ಕೆ ಕಳುಹಿಸಿಕೊಡಲು ಕರ್ನಾಟಕ ರಾಜ್ಯ ಮಾಲಿನ್ಯ ನಿಯಂತ್ರಣ ಮಂಡಳಿಗೆ ಕಳುಹಿಸಿಲಾಗುವುದು ಎಂದು ತಿಳಿಸುತ್ತಾ ನರೆದಿದ್ದ ಸಬಿಕರಿಗೆ ವಂದನೆಗಳನ್ನು ಸಲ್ಲಿಸಿ ಸಭೆಯನ್ನು ಮುಕ್ತಾಯಗೊಳಿಸಿದರು.

ಡಾ.ಜಿ.ಸಿ.ಪ್ರಕಾಶ್, ಭಾ.ಆ.ಸೇ
ಜಿಲ್ಲಾಧಿಕಾರಿ, ಬೆಂಗಳೂರು ನಗರ ಜಿಲ್ಲೆ
ಕರ್ನಾಟಕ ಸರ್ಕಾರ

ಅನುಬಂಧ-1

ಹಾಜರಿದ್ದ ಅಧಿಕಾರಿಗಳು :

1. ಶ್ರೀ. ರಮೇಶ್, ಉಪ ಪರಿಸರ ಅಧಿಕಾರಿ, ಕಾ.ರಾ.ಮಾನಿ.ಮಂ, ಬೆಂಗಳೂರು ಮಹದೇವಪುರ.
2. ಶ್ರೀ. ಡಾ॥ ಪುಟ್ಟರಾಜು, ಸಹಾಯಕ ಪರಿಸರ ಅಧಿಕಾರಿ , ಕಾ.ರಾ.ಮಾನಿ.ಮಂ, ಬೆಂಗಳೂರು ಮಹದೇವಪುರ.

ಅನುಬಂಧ-2

ಯೋಜನೆಯ ಪ್ರವರ್ತಕರು ಹಾಗೂ ಅವರ ಸಮಾಲೋಚಕರ ಪಟ್ಟಿ:

1. ಶ್ರೀ. ಪಿ.ಎನ್. ನಾಯಕ್, ಅಭಿಯಂತರ ಸದಸ್ಯರು.
2. ಶ್ರೀ. ರವೀಂದ್ರ, ಅಭಿಯಂತರ ಅಧಿಕಾರಿ.
3. ಶ್ರೀ. ರವಿ, ಕಾರ್ಯ ನಿರ್ವಾಹಕ ಅಭಿಯಂತರ .
4. ಶ್ರೀ. ಕಾಂತರಾಜು, ಸಹಾಯಕ ಕಾರ್ಯ ನಿರ್ವಾಹಕ ಅಭಿಯಂತರ.
5. ಶ್ರೀ. ಮರಿಯಪ್ಪ, ಸಹಾಯಕ ಅಭಿಯಂತರ.
6. ಶ್ರೀ. ಅಜಿತ್, ಸಹಾಯಕ ಅಭಿಯಂತರ.
7. ಶ್ರೀ. ನರಸಿಂಹಪ್ಪ, ವಿಶೇಷ ಭೂ ಸ್ವಾಧೀನ ಅಧಿಕಾರಿ.
8. ಶ್ರೀ. ಹೇಮಂತ್ ರಾಜ್‌ಕುಮಾರ್, ರಾಮ್ಕಿ ಎನ್ವಿರಾನ್ಮೆಂಟಲ್ ಇಂಜಿನಿಯರ್ಸ್ ಲಿಮಿಟೆಡ್.
9. ಶ್ರೀ. ಗಿರೀಶ್, ರಾಮ್ಕಿ ಎನ್ವಿರಾನ್ಮೆಂಟಲ್ ಇಂಜಿನಿಯರ್ಸ್ ಲಿಮಿಟೆಡ್.
10. ಶ್ರೀಮತಿ/ಕುಮಾರಿ. ಶುಷ್ಮಾ, ರಾಮ್ಕಿ ಎನ್ವಿರಾನ್ಮೆಂಟಲ್ ಇಂಜಿನಿಯರ್ಸ್ ಲಿಮಿಟೆಡ್.

ಅನುಬಂಧ-3

ಸಭೆಯಲ್ಲಿ ಹಾಜರಿದ್ದ ಸಾರ್ವಜನಿಕರ, ಆಸಕ್ತರು ಇವರ ಪಟ್ಟಿಯ ಫೋಟೂ ನಕಲನ್ನು ಇದರೊಂದಿಗೆ ಲಗತ್ತಿಸಿದೆ.

Proceedings of the Environmental Public Hearing held on 06.02.2014 at 11.00 am in Connection with the Proposed 8 Lane Peripheral Ring Road Development (Phase-I) Project which Starts from Chainage 0.00 km to Chainage 64.5 (65) km Connecting Tumkur Road with Hosur Road Through Old Madras Road.

Place of Environmental Public Hearing	**Bilishivale Village, Bidarahalli Hobli, Bangalore East Taluk, Bangalore.**
Environmental Public Hearing Panel Members Present	
1. Dr. G.C. Prakash IAS Deputy Commissioner Bangalore Urban Dist Bangalore Government of Karnataka.	Chairperson
2. Sri.M.K.Prabhu dev Senior Environmental Officer Karnataka State Pollution Control Board Bangalore East Region Bangalore.	Representative of KSPCB
3. Sri. Shanmukhappa, Environmental Officer Karnataka State Pollution Control Board Regional Office Bangalore Mahadevapura Bangalore.	Convener
Officers & Others Present	
List of Officers	Annexure - I
List of Project Proponents & their Consultants	Annexure - II
List of Participants	Annexure - III

Preamble:

The Bangalore Development Authority (BDA) has proposed to develop an 8 Lane Peripheral Ring Road (Phase – I). The project envisages formation of 65 km long Peripheral Ring Road (PRR) consisting of 8 lanes starting from Tumkur (Chainage 0.0 km) Road and ending at Hosur Road (Near Begur at Chainage 64.65 km) connecting Balavakere, Hesarghatta, Yelahanka, Bettahalasuru, Thanisandra, Bhagaluru, Avalahalli, Sadaramangala, Whitefield, Varthur, Dhommasndra and Electronic City.

The BDA Authorities have applied for Environmental Clearance from the Ministry of Forests and Environment, Government of India, as per the Environmental Impact Assessment (EIA) Notification, 2006. Accordingly the State Environmental Impact Assessment Authority (SEIAA), Karnataka, has issued Terms of Reference (ToR) dated 18.12.2009 and requested the Karnataka State Pollution Control Board to conduct Environmental Public Consultation / Public Hearing as per the EIA Notification, 2006 and submit the minutes of the meeting.

As per the guidelines stipulated in the EIA Notification, the KSPCB has initiated action and has arranged this Public Hearing / Consultation Meeting. The KSPCB has issued paper notification on 06.01.2014 in leading news papers viz., Deccan Herald (English), Vijaya Karnataka (Kannada) for wide publicity. Draft EIA report was kept in Local Gram Panchayath Offices viz., Shigehalli, Kadugodi, Chikkajala, Hesaraghatta, Bidarehalli, Avalahalli, Kannur and Doddabanaahalli.

As per the EIA Notification, 2006, the Public Hearing was conducted at Bilishivale, Bidarahalli Hobli, Bangalore on 06.02.2014 at 11.00 AM under the Chairmanship of Dr. Prakash IAS, Deputy Commissioner, Bangalore Urban District. The representative of the KSPCB, Sri. M.K. Prabhudev, Regional Senior Environmental Officer, Bangalore East Region, initiated the Public Hearing Program by welcoming Deputy Commissioner and Chairman of Public Hearing Committee and all other representatives from different organization. He briefly explained the EIA Notification & requested the Public to express their views, suggestion, objections etc. Sri. Shanmukhappa, Environmental Officer, Sri. K.M. Ramesh, Deputy Environmental Officer, Dr. H.R. Putttaraju, Assistant Environmental Officer, KSPCB, Regional Office Mahadevapura, Bangalore, have assisted in conducting the meeting. Prior to and during the meeting 12 numbers of communications were received and are as follows:

Photo Copies of the same are enclosed vide Annexure-VI.

ಕ್ರಮ ಸಂಖ್ಯೆ.	ಹೆಸರು ಮತ್ತು ವಿಳಾಸ	ಕ.ರಾ.ಮಾ.ನಿ.ಮಂ, ಕೇಂದ್ರ ಕಛೇರಿಯಲ್ಲಿ ಸ್ವೀಕರಿಸಿದ ದಿನಾಂಕ	ಕ.ರಾ.ಮಾ.ನಿ.ಮಂ, ಪ್ರಾದೇಶಿಕ ಕಛೇರಿ ಮಹದೇವಪುರದಲ್ಲಿ ಸ್ವೀಕರಿಸಿದ ದಿನಾಂಕ	ವಿಷಯ
1	ಶ್ರೀಮತಿ. ರೀನಾ ಮಹೇಂದ್ರ, ಆವಲಹಳ್ಳಿ ಎಸ್ಟೇಟ್ ಯಲಹಂಕ ಪೋಸ್ಟ್, ಬೆಂಗಳೂರು-560064	09-01-2014	24-01-2014	ಸಾರ್ವಜನಿಕ ಸಭೆಯನ್ನು ನಾಲ್ಕು ವಲಯಗಳಲ್ಲಿ ಪ್ರತ್ಯೇಕ ದಿನಗಳಲ್ಲಿ ನಾಲ್ಕು ಕಡೆ ಸಭೆ ನಡೆಸಲು ಮನವಿ.
2	ಪಿಆರ್‌ಆರ್-1, ತೊಂದರೆಒಳಗಾದ ನಿವಾಸಿಗಳ ಹಿತರಕ್ಷಣಾ ಸಮಿತಿ, ನಂ. 108, ನಾಗಾನಂದ ನಿಲಯ, ವಿಶ್ವ ಪ್ರಕೃತಿ ಲೇಔಟ್, ಮಾರುತಿನಗರ, ೨ನೇ ಹಂತ, ಯಲಹಂಕ, ಬೆಂಗಳೂರು-560064	15-01-2014	24-01-2014	ಪರಿಸರ ಆಘಾತ ಅಧ್ಯಯನ ವರದಿಯಲ್ಲಿ ಎಷ್ಟು ಮರಗಳು ಹಾಳಗುತ್ತವೆ ಎಂಬುದರ ಬಗ್ಗೆ ಮಾಹಿತಿ ಇರುವುದಿಲ್ಲ ಹಾಗೂ ರಿಂಗ್ ರಸ್ತೆಯಿಂದ ಪರಿಸರದ ಹಾನಿಯಾಗುತ್ತದೆ ಹಾಗೂ ಹಲವಾರು ಕೆರೆಗಳು, ಅರಣ್ಯ ಪ್ರದೇಶಗಳು, ದೇವಸ್ಥಾನಗಳು, ಚರ್ಚ್‌ಗಳು, ಸ್ಮಶಾನಗಳು, ಮುಖ್ಯ ರಸ್ತೆಯಲ್ಲಿ ಸಿಲುಕಿರುತ್ತವೆ. ೭೫ ಮೀಟರ್ ರಸ್ತೆಯ ಅಗಲದ ಮಾರ್ಗಕ್ಕೆ ಡಿ.ಪಿ.ಆರ್ ಮತ್ತು ಫಿಸಿಬಲಿಟಿ ರಿಪೋರ್ಟನ್ನು ಕ್ರೂಡಿಕರಿಸಿರುವುದಿಲ್ಲ.
3	ಶ್ರೀ. ಮಹೇಂದ್ರ ಆರ್. ಆವಲಹಳ್ಳಿ ಎಸ್ಟೇಟ್ ಯಲಹಂಕ ಪೋಸ್ಟ್, ಬೆಂಗಳೂರು-560064	27-01-2014	04-02-2014	ಉದ್ದೇಶಿತ ಫೆರಿಫರಲ್‌ರಿಂಗ್ ರಸ್ತೆ ಡಿ.ಪಿ.ಆರ್ ಮಾಡಿರುವುದಿಲ್ಲ ಮತ್ತು ಪರಿಸರ ಅಘಾತ ಅನ್ವಯ ಅಧಿಸೂಚನೆ ಉಲ್ಲಂಘನೆಯಾಗುತ್ತಿರುವ ಬಗ್ಗೆ.
4	ಶ್ರೀ. ಸಿ. ಕಾಮನಿ ನಂ.35, ಕಿಂಗ್ ಸ್ಪೆನ್ ಟವರ್ಸ್, 6&7, ಕಿಂಗ್ಸ್‌ನ್ ರಸ್ತೆ, ಅಲಸೂರ್ ಕೆರೆ, ಬೆಂಗಳೂರು-560042	27-01-2014	04-02-2014	ಪರಿಸರ ಆಘಾತ ಅಧ್ಯಯನ ವರದಿಯನ್ನು ಮಾಡಿರುವ ರ್ಯಾಮ್ಕಿ ಸಂಸ್ಥೆ, ಇವರು ನಡೆಸುತ್ತಿರುವ ಘನ ತ್ಯಾಜ್ಯ ವಸ್ತುಗಳ ವಿಲೇವಾರಿಯನ್ನು ಮಾವಳ್ಳಿಪುರ ಬೆಂಗಳೂರು ಇಲ್ಲಿ ನಡೆಸುತ್ತಿದ್ದು ಇದರ ವಿರುದ್ಧ ಈಗಾಗಲೇ ಅವರ ಮೇಲೆ ಘನ ತ್ಯಾಜ್ಯ ವಸ್ತುಗಳನ್ನು ವಿಲೇವಾರಿ ಮಾಡದಿದ್ದರಿಂದ ಮಾನ್ಯ ಉಚ್ಚ ನ್ಯಾಯಾದಲ್ಲಿ ಕೇಸು ನಡೆಯುತ್ತಿದ್ದು ಪರಿಸರ ಆಘಾತ ವರದಿಯನ್ನು ನಂಬುದಕ್ಕೆ ಅರ್ಹರಿರುವುದಿಲ್ಲ.
5	ಗ್ರಾಮಸ್ಥರು , ವೆಂಕಟಾಲ, ಕೊಟಿಗೇನ ಹಳ್ಳಿ, ಕೋಗಿಲು ಗ್ರಾಸ್ಥರು, ಬೆಂಗಳೂರು	27-01-2014	04-02-2014	ಉದ್ದೇಶಿತ ಫೆರಿಫರಲ್‌ರಿಂಗ್ ರಸ್ತೆಯಿಂದ ವಾಹನಗಳು ಅತಿವೇಗವಾಗಿ ಚಲಿಸುತ್ತವೆ, ಅದರಿಂದ ದೋಳಿನ ಅಂಶಗಳು ಉತ್ಪತ್ತಿಯಾಗುತ್ತದೆ ಮತ್ತು ಗದ್ದಲದ ವತಾವರಣವು

				ಕಲುಶಿತವಾಗಿ ಹಾನಿಯಾಗಿ ಬಡಾವಣೆಗಳಲ್ಲಿ ವಾಸಿಸುವ ಸಾರ್ವಜನಿಕರಿಗೆ ತೊಂದರೆಯಾಗುತ್ತದೆ.
6	ಹೆಸರು ಮತ್ತು ವಿಳಾಸ ಇಲ್ಲದ ಅರ್ಜಿ ಬೆಂಗಳೂರು	14-01-2014	04-02-2014	ಉದ್ದೇಶಿತ ಫೆರಿಫರಲ್ ರಿಂಗ್ ರಸ್ತೆಯಿಂದ ಪರಿಸರ ಮಾಲಿನ್ಯದ ಬಗ್ಗೆ ಹಾಗೂ ಕೇಸುಗಳು ನಡೆಯುತ್ತಿರುವ ಬಗ್ಗೆ.
7	ಎ. ಬಾರ್‌ಟಿಯ, ಬಾರತಿ ಫಾರಂ, ರಾಮಗೊಂಡನಹಳ್ಳಿ, ಯಲಹಂಕ ಹೋಬಳಿ, ಬೆಂಗಳೂರು.	27-01-2014	05-02-2014	1 ಕಿ.ಮೀ. ಗೆ ಬೇಕಾಗುವ ನೀರಿನ ಬಳಕೆಯ ಬಗ್ಗೆ ಹಾಗೂ ಯಾವ ಮೂಲದಿಂದ ನೀರನ್ನು ಬಳಸುತ್ತಾರೆ.
8	ಸುದಾಕರ್ ಹೆಗ್ಗಡೆ, ನಂ. 948, 6ನೇ ಕಾಸ್, ಆಶಾ ಟೌನ್ ಶಿಫ್, ದೊಡ್ಡಗುಬ್ಬಿ ಪೋಸ್ಟ್, ಬೆಂಗಳೂರು.	01-02-2014	05-02-2014	ಪೆಟ್ರೋನೆಟ್ ಎಮ್ ಬಿ ಹೆಚ್ ಲಿ., ನವರು ಪೆಟ್ರೋಲಿಯಂ ಪೈಪ್‌ಲೈನ್ನು ಬಿಳಿಶಿವಾಲೆ, ರಾಂಪುರ ಅಡೂರು ಮುಂತಾದ ಸ್ಥಳಗಳಲ್ಲಿ ಹಾದು ಹೋಗಿದ್ದು ಈ ಪ್ರೋಜೆಕ್ಟ್‌ನಿಂದ ಪೆಟ್ರೋಲಿಯಂ ಪೈಪ್‌ಹೊಡೆದು ಡಿಸ್‌ಆಸ್ಟರ್ ಸಾದ್ಯತೆ ಹೆಚ್ಚುರುತ್ತದೆಂದು ಮನವಿ ಸಲ್ಲಿಸಿರುತ್ತಾರೆ.
9	ಸಿದ್ದಪ್ಪ, ಬಿಳಿಶಿವಾಲೆ, 1ನೇ ಮಹಡಿ, ಕುರುಬರ ಸಂಘ, 2ನೇ ಮುಖ್ಯ ರಸ್ತೆ, ಗಾಂದಿನಗರ ಬೆಂಗಳೂರು.	03-02-2014	05-02-2014	ಸದರಿ ಪ್ರೋಜೆಕ್ಟ್ ನಿಂದ ತಪ್ಪಗೊಂಡನಹಳ್ಳಿ ಜಲಾಶಯದ ಹಾಗೂ ಸದರಿ ಸ್ಥಳಗಳಲ್ಲಿರುವ ಕೆರೆಗಳ ಮೇಲೆ ದುಷ್ಪರಿಣಾಮ ಬೀರುತ್ತದೆ ಹಾಗೂ ಮರಗಳನ್ನು ಕಡಿಯುವುದರಿಂದ ಪರಿಸರದಲ್ಲಿ ಬದಲಾಗುವ ಸಾದ್ಯತೆ ಇರುತ್ತದೆ.
10	ಡಿ.ಎಂ. ದ್ವಾರಕಯ್ಯ, ನಂ.222, 1ನೇ ಮಹಡಿ, 4ನೇ ಕ್ರಾಸ್, (ಸಿ.ಎಂ.ಆರ್) ಕಲ್ಯಾಣನಗರ, ಬೆಂಗಳೂರು-560043.	ಪರಿಸರ ಸಾರ್ವಜನಿಕ ಆಲಿಕೆ ಸಭೆಯಲ್ಲಿ ನೀಡಿರುವುದು	06-02-2014	ಉದ್ದೇಶಿತ ಫೆರಿಫರಲ್ ರಿಂಗ್ ರಸ್ತೆಯಿಂದ ಪರಿಸರ ಮಾಲಿನ್ಯದ ಬಗ್ಗೆ ಹಾಗೂ ಕೇಸುಗಳು ನಡೆಯುತ್ತಿರುವ ಬಗ್ಗೆ.
11	ವಿ. ಸುರೇಶ್, ಸ/ಆಪ್ ಲೇಟ್ ಶ್ರೀ ವೆಂಕಟಸ್ವಾಮಿ ರೆಡ್ಡಿ ಮತ್ತು ಇತರರು, ಸೋರಹುಣಸೆ ವಿಲೇಜ್, ವರ್ತೂರು ಪೋಸ್ಟ್, ಬೆಂಗಳೂರು-560087.	ಪರಿಸರ ಸಾರ್ವಜನಿಕ ಆಲಿಕೆ ಸಭೆಯಲ್ಲಿ ನೀಡಿರುವುದು	06-02-2014	ಉದ್ದೇಶಿತ ಫೆರಿಫರಲ್ ರಿಂಗ್ ರಸ್ತೆಯಿಂದ ಪರಿಸರ ಮಾಲಿನ್ಯದ ಬಗ್ಗೆ ಹಾಗೂ ಕೇಸುಗಳು ನಡೆಯುತ್ತಿರುವ ಬಗ್ಗೆ.
12	ಚೆರಿಯನ್ ಸೆಬಾಸಟ್ಯೆನ್, ನೆಲಮಹಡಿ, ನಂ. 74, 1ನೇ ಅಡ್ಡ ರಸ್ತೆ, ತ್ಯಾಗರಾಜ ಲೇಔಟ್, ಜೈ ಭಾರತ್ ನಗರ, ಬಾನಸವಾಡಿ ರೋಡ್, ಬೆಂಗಳೂರು-560033.	ಪರಿಸರ ಸಾರ್ವಜನಿಕ ಆಲಿಕೆ ಸಭೆಯಲ್ಲಿ ನೀಡಿರುವುದು	06-02-2014	ಉದ್ದೇಶಿತ ಫೆರಿಫರಲ್ ರಿಂಗ್ ರಸ್ತೆಯನ್ನು 10 ರಿಂದ 15 ಕಿ.ಮೀ. ದೂರಕ್ಕೆ ಸ್ಥಳಾಂತರಿಸುವ ಬಗ್ಗೆ.

On behalf of BDA, Sri. Hemanth Rajkumar, representing M/s. Ramky Enviro Engineers Limited, Bangalore, explained the public and officials regarding PRR project, its alignment & significance, through power point presentation. Salient feature of the project presented is as given below.

- Total Length of PRR - 65 km (Phase - I).
- Cost of the project 930 Crores.
- Consists 8 Lane with single Lane width of 3.5 m.
- Area Coverage 975 acres (15 Acres per km).
- Connects Tumkur Road with Hosur Road passing through Old Madras Road.
- Intersects at Hessarghatta Road, Doddaballapur, Bellary Road & Hennur Road.
- Water requirement for road formation - 3.5 MLD.
- Requisite Water Pollution, Air Pollution Control measures to be adopted.

After presentation, the Deputy Commissioner requested the public gathered in the meeting to submit their representations, objections / grievances / advices related to the environmental issues in connection with the PRR Development. Suggestions, views, objections, expressed by the gathered public are summarized below:

1. **Sri. Satya Babu, Harohalli Village Yelahanka Hobli:**
   He said that there is no proper information regarding compensation to be paid in respect of acquired land or building. He also stated that this project was initiated in 2005 and thereafter no meeting, discussion or information are provided by the BDA. He also questioned the BDA that how many more years are required to complete the project. He has said pollution level in the area increases due to formation of Proposed Peripheral Ring Road as it leads to increase of vehicular movement on the road and requested to change the alignment of the proposed road.

2. **Sri. Pawan, Bilishivale:**
   He requested the BDA authorities to clarify on the compensation to be paid for the land aligned as the BDA has changed the alignment. Further due to change in the alignment of PRR frequently, their lands are not converted for any other activity.

3. **Sri. Suresh, Soraunse Village:**
   He said that it has been informed that approximately 200 trees will be cut, however in his 2.5 acres orchard there are about 30 Sapota Plants and 60 Coconut Trees, what is the basis that 200 plants have been estimated to be cut. He has further said that they are earning their livelihood by way of practicing sericulture and horticulture. Development of the road would deprive them of their livelihood along with increase in air and noise pollution. Since he feels that road project does not create any new job opportunities, and hence the project should be dropped.

4. **Sri. Shyam, Bilishivale:**
   He requested to clarify on the alignment of the road and also requested to clarify on the villages along with Sy Numbers that will not be affected by this PRR from Hennur Road.

5. **Sri. Mahesh, Bilishivale:**
   He said that it's a good objective that the road development is taken up which does not pose any threat to their village, but instead it will result in economic development and alleviation of many problems. Construction of road is paramount for development of city of Bangalore, as such, he requested everybody to support the project and requested for suitable compensation.

6. **Sri Rajan Venkatala, Yelahanka:**
   He expressed that the EIA report which was prepared during 2010 (3-4 years back) has no credibility. He sought clarification on the allotment of land for construction of house to those who loose their entire land for road work. He expressed his deep concern that the alignment has changed 3-4 time in order to suit certain class of society and rich people. He said the road alignment blue prints are improper and BDA is not coming up with suitable convincing reply, hence the whole proposal does not seem to be in order. So he as requested to drop the project in present location and take up the same outside BBMP limit. He further quipped not to take up the project until the court cases filed by many land lords (Through whose land present road alignment is take up) are disposed off.

7. **Sri Ashok, Bilishivale:**
He has requested to drop the project as the distance between old ring road and the proposed road is only 6 km. He suggested realigning the road keeping 10 - 15 km distance between the present and the proposed roads.

8. **Sri Anand Kumar, Bilishivale:**
He has requested to take up the project as soon as possible which just has been in discussions from many years with time bound schedule.

9. **Sri Ramaswamy, Kyalasanahalli:**
He sought information on beginning and ending of this road alignment along with details of villages and survey numbers it encompasses.

10. **Sri Cherian, Cocks town, Bangalore:**
He stated that proposed peripheral ring road first phase was approved in 1995 CDP and BDA has dropped this project during 2004 owing to fast paced development of Bangalore. Subsequently in CDP, Inspection Report of September 2007 and as per draft feasibility report, proposed road development is at the distance of 5km from the existing ring road. Further, M/s. Stup Consultant have submitted the report that distance between present and proposed roads shall be 10-15 km keeping rapid growth of Bangalore city and from the point of view of pollution control, he said. So he has requested to realign the road keeping aforesaid and growth of Bangalore.

11. **Smt. Rina Mahendra, Avalahalli:**
She said that this public hearing is organized for discussion of environment related issues only in respect of the proposed road and urged to discuss only such issues. She requested BDA to organize separate meeting to discuss other issues including compensation.
She also questioned that EIA report was prepared in 2010 and already three years have elapsed and whether this report can be considered. She also pointed out that the EIA report is silent on whether the road alignment passes through Thipagondanhalli Reservoir Catchment Area, existing Gas Pipeline and Forest Area.

12. **Sri Prabhakar, Agrahara, Yelahanka**:
He said that first survey has been done during 2006 and redone 4-5 times subsequently leading to change in the alignments due to which they are in fear of losing the house. So he has requested to shelve the project.

13. **Sri Sukumar, Kothanur, Dhodda Gubbi:**
He thanked for having organized environmental public hearing which he said would provide them a good opportunity to express their grievance, indicate suggestions. The project has been inordinately delayed without giving any information to the interested and affected, he said. Further, he has told that he is from Kolar District and procured land here with intention of constructing a house which dream he is not been able to realize from the past 8 years due to impending road project. He has expressed his anxiousness about not availability of project progress in writing.

14. **Sri Manjunath, Rampura Village:**

He has said that he is in favor of road project development and is of the opinion that even if they shift the alignment to some other place, the same impact will be felt at that place also. He also state that the progress of the project development is very slow and it is to be speeded up or otherwise the same may be dropped.

15. **Sri Venu, Rampura:**

He said that no civil work has begun even though the land has been acquired 8 years ago, this is not proper, the work has to been taken up within a year or two after acquisition and work be completed. Otherwise it is common man who is at the receiving end suffers, He requested officers to execute the project and complete it at the earliest.

16. **Smt. Jamuna, Dodda Gubbi:**

She expressed that the BDA has failed to put up suitable boards indicating the extent and exact land for acquisition. This has created lots of confusion among people to take up construction of their own house even though they had purchased land long back. She said it is a basic dream of every person to have an own house.

17. **Sri Ravi, Bilishivale:**

He has said that economic development can be achieved through good connectivity of roads, therefore need of good roads appears very prominent. Therefore provide the alternative land to the land losers so that acquisition of land for development works can be consented one, he said. The project has to be taken up quickly as city is witnessing rapid growth and increase in density of vehicles. He urged to disburse the compensation at the earliest so that people do not suffer. He further said that wherever road work is taken up some amount of tree chopping will have to be encounter, in the present alignment this is at minimal, as such, he requested the public not to pose objection to the project.

Reply from Officers:

Sri Ravi, Executive Engineer, PRR Division BDA:

He said that this public hearing has been organized to discuss environmental issues however more issues related to acquisition and compensation of land is being discussed. He brought before the forum that on January 29th process related to land acquisition and has been explained in detail to the participant land lord and heads of farmers along with certain assurances by BDA commissioner. He said that land compensation issue is under discussion with Government and suitable decision will be taken and implemented. To gain more knowledge on land acquisition process, a discussion will be held with the concerned land acquisition officers to disburse suitable compensation, he said. Further, he said that this environmental impact analysis encompasses information related to the years 2010 to 2014. It is estimated that approximately

500 trees, excluding eucalyptus and coconut trees, are required to be cut during execution of project, he said. Totally about 6000 tress may have to be cut in the proposed road alignment which will be done in consultation with forest department.

Sri Narasimhappa, Special Land Acquisition Officer, BDA:

He said that as per The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013, market rate has to be considered from the date of preliminary notification of land acquisition and there is no ambiguity such as preliminary or final notification and it is mandatory to consider the prevailing market rate. He also said that it is their prime duty to consider and disburse compensation properly as per the market rate. He added that the prevailing market rate of the land varies from village to village which will be considered while disbursing applicable compensation.

Dr.G.C. Prakash IAS, Deputy Commissioner, Bangalore Urban District:

He concluded that suggestions/opinions/requests that are expressed during the meeting will be forwarded to KSPCB for onward transmission to SEIAA as per the EIA Notification.

Dr.G.C. Prakash IAS
Deputy Commissioner
Bangalore Urban District, GoK

Annexure 1

Officers Present:

1. Sri. K.M.Ramesh, Deputy Environmental Officer, KSPCB, RO- Bangalore Mahadevapura.
2. Dr.H.R.Puttaraju, Assistant Environmental Officer, KSPCB, RO- Bangalore Mahadevapura.

Annexure II

List of Project Proponents & their Consultants:

1. Sri. P.N. Nayak, Engineer Member.
2. Sri. Ravindra, Engineer Officer.
3. Sri. Ravi, Executive Engineer.
4. Sri. KanthaRaju, Asst Executive Engineer.
5. Sri Mariyappa, Asst Engineer.
6. Sri. Ajith, Asst Engineer.
7. Sri. Narasimhappa, Special Land Acquisition Officer.
8. Sri. Hemanth Rajkumar, Ramky Environmental Engineers Limited.
9. Sri. Girish, Ramky Environmental Engineers Limited.
10. Ms. Sushma, Environmental Engineers Limited.

Annexure III

List of Participants

Photocopy of the list is enclosed herewith.