ANNEXURE-1

सत्यमेव जयते

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.

*****

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: mssejaakarnataka@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,

20/11/14

(RAMACHANDRA)
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.

ANNEXURE-2

Item No. 01

BEFORE THE NATIONAL GREEN TRIBUNAL
PRINCIPAL BENCH, NEW DELHI
(Through Video Conferencing)

Appeal No. 27/2015 (SZ)

Shri Sudhakar Hegde & Anr. — Appellant(s)

Versus

State Environment Impact Assessment Authority & Ors. — Respondent(s)

Date of hearing: 08.02.2019

CORAM: **HON'BLE MR. JUSTICE ADARSH KUMAR GOEL, CHAIRPERSON**
HON'BLE MR. JUSTICE S.P. WANGDI, JUDICIAL MEMBER
HON'BLE MR. JUSTICE K. RAMAKRISHNAN, JUDICIAL MEMBER
HON'BLE DR. NAGIN NANDA, EXPERT MEMBER

For Appellant(s): Mr. Nikhil Nayyar, Mr. Divyanshu, Advocates

For Respondent (s): Mr. Devraj Ashok, Advocate for State of Karnataka

ORDER

1. This appeal has been preferred against the order dated 20.11.2014 granting Environmental Clearance by respondent No.1 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 by the Bengaluru Development Authority (BDA), Bangalauru.

2. Principal grounds on which the Environmental Clearance is being questioned are that there is inordinate delay in furnishing of the Environment Impact Assessment (EIA) Report with reference to the date of study of data. The application was filed before the State Environment Impact Assessment Authority (SEIAA) on 10.09.2009. Terms of Reference (ToR) were prepared on 21.11.2009. Primary data was collected in December 2009 and February 2010. EIA was placed before SEIAA in June 2014. The Environmental Clearance was

granted on 20.11.2014. Thus, the primary data was more than three years prior to the EIA Report. There are omissions in the EIA Report with regard to data of forest land as well as the provisions of revised Master Plan, 2015 prepared by the BDA. Thippagondanahalli Reservoir (TGR) catchment area has been suppressed in the EIA report. Green cover particulars have been overlooked. Further objection is that there is proximity of the area to the petroleum pipelines and land earmarked for petroleum pipelines overlaps the project. According to the appellant, Stage-I Forest Clearance was not obtained as required. The EIA consultant was non-accredited. Public hearing was not proper which vitiated the decision by the State Expert Appraisal Committee (SEAC).

3. Learned Counsel for the SEIAA has supported the impugned order and opposed the objections.

4. It is not necessary to adjudicate on the contentions raised, having regard to the patent fact that there was substantial delay in EIA and a period of almost five years has passed even thereafter. This Tribunal, vide order dated 15.04.2015, considered the issue. In view of the fact that there was an error in noting the number of trees cut and that the impact of potential leakage of the pipeline was not considered and that it was assumed that the Forest Clearance was not necessary, stayed the Environmental Clearance which order been operative for the last four years.

It will, thus, be in the interest of justice that a fresh rapid EIA is conducted. If the project is found viable, after incorporating due abatement measures, including the suggestions of the appellant, the same can be taken up without further delay. It is made clear that the project proponent will not proceed on the basis of the impugned Environmental Clearance.

We order accordingly. The appeal is disposed of.

Adarsh Kumar Goel, CP

S.P. Wangdi, JM

K. Ramakrishnan, JM

Dr. Nagin Nanda, EM

February 8, 2019
Appeal No. 27/2015 (SZ)
DV

ANNEXURE-3

सत्यमेव जयते

State Level Environment Impact Assessment Authority-Karnataka

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

No. SEIAA 40 IND 2019 Date: 21-01-2020

To,

Executive Engineer
Bangalore Development Authority
T. Chowdaiah Road,
Kumara Park West
Bangalore-560020

Sir,

Sub: Development of Eight Lane Pheripherial Ring Road- Phase –I. Connecting Tumkur Road To Hosur Road (Crossing Bellary Road and Old Madrass Road) by Bangalore Development Authority - issue of ToRs and additional ToRs Regarding.

Ref: Proceedings of the 235 th SEAC meeting held on 02nd December 2019
Proceedings of the 180th SEIAA meeting held on 23rd December 2019

* * * *

This has reference to your online application dated 13th November 2019 bearing proposal No.SIA/KA/MIS/46396/2019 addressed to SEIAA, Karnataka on the subject mentioned above along with Form-1, PFR, and Draft ToRs as per the EIA Notification, 2006.

2. It is a proposal seeking Environmental clearance for proposed Construction of Proposed Peripheral Ring Road connects the existing ORR intersecting 10 major Highways namely Tumkur Road (NH-4), Hesaraghatta Road (SH-39), Doddaballapura Road (SH-09), Bellary Road (NH-7), Hennur–Baglur Road (SH-104), Old Madras Road (NH-4), Hoskote-Anekal Road (SH-35), Sarjapur Road and Hosur Road (NH-7) Project with proposed length of 65.5 Km and Right of way of 100 m at Bengaluru City, Bangalore Urban District by Bangalore Development Authority This is a project covered under Sl.No.7(f) of the Schedule of EIA Notification 2006 and amendments made there on.

3. It is inter-alia, noted that Bangalore Development Authority have proposed for Development of Peripheral Ring Road connects the existing ORR intersecting 10 major Highways namely Tumkur Road (NH-4), Hesaraghatta Road (SH-39),

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

Doddaballapura Road (SH-09), Bellary Road (NH-7), Hennur-Baglur Road (SH-104), Old Madras Road (NH-4), Hoskote -Anekal Road (SH-35), Sarjapur Road and Hosur Road (NH-7) Project at Bengaluru City with a total Length of 65.5 Km and Right of way of the project is 100 m . Total water requirement for the Domestic Purpose is 22.5 KLD. The project cost is Rs.13,685.95 Crores.

4. The State Expert Appraisal Committee (SEAC), Karnataka has considered the proposal during its meeting held on 2nd December 2019. Based on the consideration of the documents submitted and the presentation made by you and the Environmental consultant M/s Environmental Health and Safety Consultants Pvt Ltd, Bangalore who have been accredited from NABET or QCI vide certificate No: NABET /EIA/1821/RA 0107, dated 19/11/2018 the Committee prescribed the following Terms of Reference (ToR) for preparing EIA/EMP report with latest one season baseline data for the above mentioned project.

5. The SEIAA Karnataka after due consideration of the relevant documents submitted by the project proponent, and the recommendation of the SEAC have in its meeting held on 23rd December 2019 and decided to accord the Standard Terms of Reference (TOR) along with additional Terms of Reference, in accordance with the provisions of Environmental Impact Assessment Notification-2006 and its subsequent amendments made there on.

STANDARD TERMS OF REFERENCE FOR CONDUCTING ENVIRONMENT IMPACT ASSESSMENT STUDY FOR HIGHWAYS AND INFORMATION TO BE INCLUDED IN EIA/EMP REPORT

1) Examine and submit a brief description of the project, project name, nature, size, its importance to the region/state and the country.
2) In case the project involves diversion of forests land, guidelines under OM dated 20.03.2013 may be followed and necessary action taken accordingly.
3) Details of any litigation(s) pending against the project and/or any directions or orders passed by any court of law/any statutory authority against the project to be detailed out.
4) Submit detailed alignment plan, with details such as nature of terrain (plain, rolling, hilly), land use pattern, habitation, cropping pattern, forest area, environmentally sensitive places, mangroves, notified industrial areas, sand dunes, sea, river, lake, details of villages, teshils, districts and states, latitude and longitude for important locations falling on the alignment by employing remote sensing techniques followed by ground truthing and also through secondary data sources.
5) Describe various alternatives considered, procedures and criteria adopted for selection of the final alternative with reasons.
6) Submit Land use map of the study area to a scale of 1: 25,000 based on recent

satellite imagery delineating the crop lands (both single and double crop), agricultural plantations, fallow lands, waste lands, water bodies, built-up areas, forest area and other surface features such as railway tracks, ports, airports, roads, and major industries etc. and submit a detailed ground surveyed map on 1:2000 scale showing the existing features falling within the right of way namely trees, structures including archeological & religious, monuments etc. if any.

7) If the proposed route is passing through any hilly area, examine and submit the stability of slopes, if the proposed road is to pass through cutting or embankment / control of soil erosion from embankment. Landslide, rock fall protection measures to be indicated.

8) If the proposed route involves tunneling, the details of the tunnel and locations of tunneling with geological structural fraction should be provided. In case the road passes through a flood plain of the river, the details of micro drainage, flood passages and information on high levels flood periodicity at least of last 50 years in the area should be examined.

9) The projects is located within 10km. of the sanctuary a map duly authenticated by Chief Wildlife Warden showing these features vis-a-vis the project location and the recommendations or comments of the Chief Wildlife Warden thereon should be furnished at the stage of EC.

10) Study regarding the Animal bypasses / underpasses etc. across the habitation areas shall be carried out. Adequate cattle passes for the movement of agriculture material shall be provided at the stretches passing through habitation areas.

11) The information should be provided about the details of the trees to be cut including their species and whether it also involves any protected or endangered species. Measures taken to reduce the number of the trees to be removed should be explained in detail. Submit the details of compensatory plantation.
Explore the possibilities of relocating the existing trees. Animal and wild life crossings to be provided in areas inhabited by wild life.

12) Necessary green belt shall be provided on both sides of the highway with proper central verge and cost provision should be made for regular maintenance.

13) If the proposed route is passing through a city or town, with houses and human habitation on the either side of the road, the necessity for provision of bypasses/diversions/under passes shall be examined and submitted. The proposal should also indicate the location of wayside amenities, which should include petrol station/service centre, rest areas including public conveyance,etc.Noice reduction measures should also be indicated.

14) Submit details about measures taken for the pedestrian safety and construction of underpasses and foot-over bridges along with flyovers and interchanges. If any.

15) Assess whether there is a possibility that the proposed project will adversely

affect road traffic in the surrounding areas (e.g. by causing increases in traffic congestion and traffic accidents). Specific care be also taken to ensure that by passes have a sufficient buffer to prevent unwanted obstructions defying the purpose of the by pass

16) Examine and submit the details of use of fly ash in the road construction, if the project road is located within the 100 km from the Thermal Power Plant.

17) Examine and submit the details of sand quarry, borrow area and rehabilitation.

18) Explore the possibilities of utilizing the debris/ waste materials available in and around the project area.

19) Submit the details on compliance with respect to Research Track Notification of MoRTH

20) Examine and submit the details of sand quarry and borrow area as per OM and latest amendment on Rationalization of procedure for Environmental Clearance for Highway Projects involving borrow areas for soil and earth"

21) Climate and meteorology (max and min temperature, relative humidity, rainfall, frequency of tropical cyclone and snow fall); the nearest IMD meteorological station from which climatological data have been obtained to be indicated.

22) The air quality monitoring should be carried out as per the new notification

23) 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 proposed highway. Identify noise reduction measures and traffic management strategies to be deployed for reducing the negative impact if any. Prediction of noise levels should be done by using mathematical modeling at different representative locations.

24) Examine the impact during construction activities due to generation of fugitive dust from crusher units, air emissions from hot mix plants and vehicles used for transportation of materials and prediction of impact on ambient air quality using appropriate mathematical model, description of model, input requirement and reference of derivation, distribution of major pollutants and presentation in tabular form for easy interpretation shall be carried out.

25) Also examine and submit the details about the protection to existing habitations from dust, noise, odour etc. during construction stage. IRC guidelines to be followed for traffic safety while passing through the habitat.

26) 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 disposal/ dump site along with necessary permission.

27) If the proposed route is passing through low lying areas, details of fill materials and initial and final levels after filling above MSL, should be examined and submit.

28) Examine and submit the water bodies including the seasonal ones within the

corridor of impacts along with their status, volumetric capacity, quality likely impacts on them due to the project.

29) Examine and submit details of water quantity required and source of water including water requirement during the construction stage with supporting data and also categorization of ground water based on the CGWB classification.

30) Examine and submit the details of measures taken during constructions of bridges across river/ canal/major or minor drains keeping in view the flooding of the rivers and the life span of the existing bridges. Provision of speed breakers, safety signals, service lanes and foot paths should be examined at appropriate locations through out the proposed road to avoid the accidents.

31) If there will be any change in the drainage pattern after the proposed activity, details of changes shall be examined and submitted.

32) Rain water harvesting pit should be at least 3 - 5 m. above the highest ground water table. Provision shall be made for oil and grease removal from surface runoff.

33) If there is a possibility that the construction/widening of road will cause impact such as destruction of forest, poaching, reductions in wetland areas, if so, examine the impact and submit details.

34) Submit the details of road safety, signage, service roads, vehicular under passes, accident prone zone and the mitigation measures.

35) IRC guidelines shall be followed for widening &upgradation of road.

36) Submit details of social impact assessment due to the proposed construction of road.

37) Examine road design standards, safety equipment specifications and Management System training to ensure that design details take account of safety concerns and submit the traffic management plan.

38) Accident data and geographic distribution should be reviewed and analyzed to predict and identify trends - incase of expansion of the existing highway and provide Post accident emergency assistance and medical care to accident victims.

39) If the proposed project involves any land reclamation, details to be provided for which activity land to reclaim and the area of land to be reclaimed.

40) Details of the properties, houses, businesses religious and social placesetc. activities likely to be effected by land acquisition and their financial loses annually.

41) Detailed R&R plan with data on the existing socio-economic status of the population in the study area and broad plan for resettlement of the displaced population, site for the resettlement colony, alternative livelihood concerns/employment and rehabilitation of the displaced people, civil and housing amenities being offered, etc and the schedule of the implementation of the project specific

42) Submit details of Corporate Social Responsibility. Necessary provisions should

be made in the budget.

43) Estimated cost of the project including environmental monitoring cost and funding agencies, whether governmental or on the basis of BOT etc and provide details of budget provisions (capital & recurring) for the project specific R&R Plan.

44) Submit environmental management and monitoring plan for all phases of the project viz. construction and operation.

4 5) Details of blasting if any, methodology/technique adopted, applicable regulations/permissions, timing
of blasting, mitigation measures proposed.keeping in view mating season of wild life.

46) In case of river/ creek crossing, details of the proposed bridges connecting on either banks, the design and traffic circulation at this junction with simulation studies.

47) Details to ensure free flow of water in case the alignment passes through water bodies/river/ streams etc.

48) In case of bye passes, the details of access control from the nearby habitation/habitation which may come up after the establishment of road.

49) Bridge design in eco sensitive area / mountains be examined keeping in view the rock classification hydrology etc.

50) Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.

51) The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out.

52) In case of alignment passing through coastal zones

a) HTL/LTL map prepared by authorized agencies superimposed with alignment and recommendation of Coastal Zone Management Authority

b) Details of CRZ-I (I) areas, mangroves required to be removed for the project along with the compensatory afforestation, area and location with budget

c) Details of road on stilt in CRZ-I areas, design details to ensure free tidal flow

d) Details of Labour camps, machinery location,

53) Any further clarification on carrying out the above studies including anticipated impacts due to the project and mitigative measure, project proponent can refer to the model ToR available on Ministry website "http://moef.nic.in/Manual/Highways".

The consultants involved in the preparation of EIA/EMP report after accreditation with Quality Council of India/National Accreditation Board of Education and Training (QCI/NABET) would need to include a certificate in this regard in the EIA/EMP reports prepared by them and the data provided by other

State Level Environment Impact Assessment Authority-Karnataka
(Constituted by MoEF, Government of India under section 3(3) of E(P) Act, 1986)

SEIAA 40 IND 2019

Construction of Peripherial Ring Road Project
By Bangalore Development Authority

Additional TOR:

1) Details of the Kharab land and its position on the village survey map may be detailed and submitted.

2) Surface hydrological study of surrounding area may be carried out and the carrying capacity of the natural nalas may be worked out in order to ascertain the adequacy in the carrying capacity of the nalas.

3) The applicability of the recent Hon'ble Supreme court order on buffer zone for water bodies and nalas may be studied and submitted.

4) Documents related to possession of land to be incorporated in the EIA.

5) The Proponent should carry out social impact assessment that the project as per OM Dated: 21-8-2014 issued by the Ministry regarding guidelines on environment sustainability & enterprise social commitment(Esc) related issued. The social impact assessment studies so carried out should form part of EIA & EMP report.

6) The details to balance cutting and filling earthwork quantities all along the alignment in order to avoid import and export of earthwork from the project site.

The consultants involved in the preparation of EIA/EMP report after accreditation with Quality Council of India/National Accreditation Board of Education and Training (QCI/NABET) would need to include a certificate in this regard in the EIA/EMP reports prepared by them and the data provided by other Organization(s)/Laboratories including their status of approvals etc. In this regard Office Memorandum No. F. No. J-11013/77/2004-IA.II(I) dated 30th June, 2011 available on the MoEF, GoI website http://www.moef.nic.in may please be referred.

The Terms of Reference (ToR) prescribed by the State Expert Appraisal Committee (SEAC), 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 and interms of the orders of the Hon'ble NGT in appeal No. 27/2015 (SZ) dated 8-2-2019

The proponent shall get the public hearing conducted in accordance with the procedure prescribed under the EIA Notification, 2006 and all the concerns raised during public consultation shall be addressed and incorporated in the Final EIA report.

The ToRs prescribed will be valid for a period of three years for submission of the EIA/EMP report and are subjected to order of the Hon'ble NGT in Appeal No. 27/2015 (SZ) and final orders of the Hon'ble Supreme Court in Civil Appeal No 2566/2019

Yours faithfully,

(Vijayakumar Gogi)

Member Secretary,

SEIAA, Karnataka.

Copy to:-

1. Chairman, Karnataka State Pollution Control Board, KSPCB, Parisara Bhavan, 4th & 5th Floor, church street, Bangalore for information.

2. Guard File.

ANNEXURE-4

REPORTABLE

IN THE SUPREME COURT OF INDIA
CIVIL APPELLATE JURISDICTION

Civil Appeal No 2566 of 2019

Bengaluru Development Authority ...Appellant

Versus

Mr Sudhakar Hegde & Ors. ...Respondents

JUDGMENT

Dr Dhananjaya Y Chandrachud, J

Index

G Deficiencies in the EIA report

G.1 Accreditation of the EIA consultant

G.2 Forest land

G.3 Trees

G.4 Pipeline

H Appraisal by the SEAC

I Courts and the environment

J Directions

J Directions

83. Bearing in mind the need to bring about a requisite balance, we propose to issue the following directions under Article 142 of the Constitution:

(i) The appellant is directed to conduct a fresh rapid EIA for the proposed PRR project;

(ii) The appellant shall, for the purpose of conducting the rapid EIA, hire a sector-specific accredited EIA consultant;

(iii) The appellant shall have due regard to the various deficiencies noted in the present judgment as well as ensure that additional precautions are taken to account for the prevailing state of the environment;

(iv) The appellant shall ensure that the requisite clearances under various enactments have been obtained and submitted to the SEAC prior to the consideration by it of the information submitted by the appellant in accordance with the OMs issued by the MoEF-CC from time to time;

(v) The SEAC shall thereafter assess the rapid EIA report and other information submitted to it by the appellant in accordance with the role assigned to it under the 2006 Notification. If it is of the opinion that the appellant has complied with the 2006 Notification as well as the directions issued by this Court, only then shall it recommend to the SEIAA the grant of EC for the proposed project. The SEAC and the SEIAA would lay down appropriate conditions concerning air, water, noise, land, biological and socioeconomic environment and other conditions it deems fit; and

(vi) The appellant shall consult the requisite authority to ensure that no potential damage is caused by the project to the petroleum pipelines over which the proposed road may be constructed.

84. In moulding the above directions, this Court has factored into its decision-making calculus the fact that the appeal from the judgment of the NGT was filed by the project proponent and no appeal was filed by the respondents. The order of the NGT directing the appellant to conduct a rapid EIA is upheld, though for the reasons which we have indicated above. We clarify that no other Court or Tribunal shall entertain any challenge to the ultimate decision of the SEAC or the SEIAA. Liberty is granted to the parties to approach this Court upon any grievance from the decision of the SEAC or the SEIAA pursuant to the order of this Court.

85. The appeal is disposed of in the above terms. There shall be no order as to costs.

Pending application(s), if any, shall stand disposed of.

.....J.
[Dr Dhananjaya Y Chandrachud]

.....J.
[Hemant Gupta]

New Delhi;
March 17, 2020.

ANNEXURE-5

ಬೆಂಗಳೂರು ಅಭಿವೃದ್ಧಿ ಪ್ರಾಧಿಕಾರ

Bangalore Development Authority

GST : 29AAALB0060D1ZS

ಸಂಖ್ಯೆ :
No. : **BDA/Commr/EM/PRR/T-122/2020-21**

ದಿನಾಂಕ :
Date : 07/09/2020

To,

The Director & Member Secretary,
Expert Appraisal Committee,
Infrastructure & Miscellaneous Projects,
Ministry of Environment, Forests and Climate Change,
Government of India,
Indira Paryavaran Bhavan,
Lodhi Road, New Delhi-110003.

Sir,

Sub:- Proposed Eight Lane Peripheral Ring Road (PRR) to Bangalore City by Bangalore Development Authority, Government of Karnataka – Clarification on Hon'ble Supreme Court of India Order Dated:-17.03.2020 – reg.

* * * * * *

1. Bangalore City has 2 existing circular ring roads viz., Inner Ring Road (IRR) of 29km length, Outer Ring Road (ORR) of 65 km length with crowded development on either side of the Row. Hence, further augmentations of these roads are techno-economically not feasible for the growing traffic. In view of this, it is essential to develop an alternative road facility away from ORR for movement of commercial and personalized vehicles entering the city. The city should have a circular ring road beyond ORR to connect all Primary & Secondary roads to reduce traffic congestion on all radial roads. By using the existing access controlled NICE road and to complete the circle of road to fulfil the demands of existing and growing traffic, it is proposed to implement Peripheral Ring Road (PRR) of 65.50 km with 8 lane configurations to Bangalore City. The purpose of the PRR is to relieve the traffic congestion in the metropolitan region and to provide linkage to the radial and arterial roads within the city. This project also aims at connecting new urban nodes outside the city and also provides quick access to Bangalore International Airport from various parts of the city. Map showing the proposed PRR is enclosed as **Annexure-1.**

2. According to EIA Notification, 2006 and its subsequent amendments, the project was not categorised under the schedule of the Notification. Meanwhile, BDA on its motion, approached the SEIAA and obtained Environmental clearance (EC) for the project form SEIAA vide letter No.SEIAA 32 IND 2009 Dated:-20.11.2014 (Annexure-2).

3. Subsequently, the EC was challenged (Appeal No.27/2015 (SZ)) before the National Green Tribunal (NGT), South Zone, Chennai due to the deficiencies found in the EIA Report and the Tribunal vide order dated:-15.04.2015 (Annexure-3) granted the interim stay order to the EC issued for the project.

4. IN the absence of full time. Judicial Member at Chennai Bench, the case was transferred to Principal Bench of NGT at New Delhi. The Tribunal in its order Dated:-08.02.2019 (Annexure-4). Directed to conduct the fresh EIA studies.

5. BDA has challenged the order of the NGT dated:-08.02.2019 before the Hon'ble Supreme Court of India (CA No:-2566/2019) The hearing was completed on 20.05.2019 and reserved for judgment.

6. Subsequently, BDA without prejudice to the orders of the Hon'ble Supreme Court of India and as per the directions of the NGT it is order dated:-08.02.2019 submitted an application to the SEIAA on 13.11.2019 for issue of Terms of Reference (ToRs) for the project. Accordingly, SEAC appraised the project in its meeting held on 02.12.2019 and SEIAA issued the ToRs on 21.01.2020 (Annexure-5). The baseline data collection period for the EIA study was considered from 01.12.2019 to 28.02.2020.

7. Meanwhile, the Hon'ble Supreme Court of India Pronounced its judgement on 17.03.2020 (Annexure-6), wherein it was clarified that the project is qualified to be an 'expressway' and directed to obtain the EC as per Schedule 7 (f) of the EIA Notification, 2006 and its amendments (Para 34). The Hon'ble Supreme Court of India also directed SEAC and SEIAA to appraise the project in accordance with the Notification.

8. Further, based on the ToRs of SEIAA and MOEF&CC guidelines, the Draft EIA report has been prepared and submitted to Karnataka State Pollution Control Board for conducting Environmental Public Hearing for the Project. Accordingly, the Public Hearing has been completed on 18.08.2020. In addition, as per the suggestions of the elected representatives, civic bodies and public, virtual conference is also scheduled on 23.09.2020 for receiving comments form the public on the project.

9. Now, as per the Hon'ble Supreme Court of India directions dated:-17.03.2020, the project is qualifying under 7(f) of the EIA Notification 2006 and its amendments and 'General Conditions' are also applicable. Peenya Industrial Area and Jigani-Bommansandra Industrial Area which are notified as severely polluted area and critically polluted areas by CPCB are located at a distance of 3.4km and 4 km respectively from the proposed project alignment. Further, Puttenahalli Bird Conservation Reserve Notified under the Wildlife (Protection) Act, 1972 is located at a distance of 1.49 km from the project alignment.

10. As per the direction given in "J, Direction Para 83" of the order of the Hon'ble Supreme Court of India it was directed to the SEIAA/SEAC to appraise the project in accordance with EIA Notification, 2006 for onward reconsideration for issue of EC since the earlier EC was issued by the SEIAA, it is also issued a direction to SEIAA to re-verify the earlier deficiencies found the EIA report based on which EC was stayed.

11. In view of the above circumstances, it is requested for clarification whether final EIA Report can be submitted to MOEF&CC as per General Condition or to SEIAA as per Hon'ble Supreme Court of India directions for appraisal and onward reconsideration for issue of EC.

Thanking you.

Your's Sincerely

Encl: Annexure 1 to 6.

Commissioner.
Bangalore Development Authority.
Bangalore.

ANNEXURE-6

IN THE HIGH COURT OF KARNATAKA AT BENGALURU

DATED THIS THE 23RD DAY OF FEBRUARY, 2021

PRESENT

THE HON'BLE MR.ABHAY S. OKA, CHIEF JUSTICE

AND

THE HON'BLE MR.JUSTICE SACHIN SHANKAR MAGADUM

WRIT PETITION NO.10178 OF 2020 (GM-POL-PIL)

BETWEEN:

1. ANUSHKA GUPTA
AGED 19 YEARS,
R/A 32/203, MANTRI RESIDENCY
BANNERGHATTA ROAD
BANGALORE-56007

2. P.B.SASHAANKH
AGED 21 YEARS
R/AT B-97, 1ST FLOOR
NEETI BAGH
NEW DELHI-110 049.

3. PRATIK KUMAR
AGED 21 YEARS
R/AT 1305, REGALIA HEIGHTS
SHIPRA SUNCITY
INDIRAPURAM
GHAZIABAD-201 014.

... PETITIONERS

(BY SHRI SUSHAL TIWARI N. AND
SHRI NISHAN GK, ADVOCATES)

AND:

1. KARNATAKA STATE POLLUTION
CONTROL BOARD
PARISARA BHAVAN
#49, CHURCH STREET,
SHANTALA NAGAR

BANGALORE-560 001
REPRESENTED BY ITS CHAIRMAN.

2. BANGALORE DEVELOPMENT AUTHORITY
KUMARA PARK WEST
T.CHOWDAIAH ROAD
BENGALURU-560 020
REPRESENTED BY ITS CHAIRMAN.

... RESPONDENTS

(BY SHRI GURURAJ JOSHI, ADVOCATE FOR R-1;
SHRI K.KRISHNA, ADVOCATE FOR R-2)

THIS WRIT PETITION IS FILED UNDER ARTICLE 226 OF THE CONSTITUTION OF INDIA, PRAYING TO ISSUE AN APPROPRIATE WRIT QUASHING THE ORDER DATED 31.08.2020 (ANNEXURE-A) INSOFAR AS IT DIRECTS FOR A MANDATORY PUBLIC HEARING ON 23.09.2020 THROUGH ZOOM APPLICATION, AND ETC.

THIS PETITION COMING ON FOR PRELIMINARY HEARING THROUGH VIDEO CONFERENCING THIS DAY, ***CHIEF JUSTICE*** MADE THE FOLLOWING:

ORDER

The learned counsel appearing for the first respondent states that a fresh public hearing in the physical form will be conducted by the first respondent on the proposal Development of Eight-Lane Peripheral Ring Road connecting Tumakuru Road and Hosur Road (Crossing Bellari Road and Old Madras Road), Bengaluru Urban District, Bengaluru. He states that adequate publicity will be given to the proposed public hearing. He states that the

public hearing will be conducted after following all the protocols which are required to be followed for dealing with the situation of COVID-19.

2. A perusal of the prayers made in the petition shows that the objection of the petitioners was to the conduct of the hearing by virtual mode. In view of the aforesaid statement made by the learned counsel for the first respondent, now it is not necessary to consider the said grievance.

3. By accepting the assurance given by the learned counsel for the first respondent regarding the conduct of public hearing in the physical form, we dispose of the petition.

Sd/-
CHIEF JUSTICE

Sd/-
JUDGE

vgh*

ANNEXURE-7

EM

F. No. 19-53/2020-IA.III
Government of India
Ministry of Environment, Forest and Climate Change
(IA-III Section)

3rd Floor, Vayu Wing,
Indira Paryavaran Bhawan
Jor Bag Road, New Delhi - 3

Dated: 4th December, 2020

To

The Bangalore Development Authority
BDA Office, T. Chowdaiah Road, Kumarapark West,
Bangalore-560020

Sub: Proposed Eight lanes Peripheral Ring Road (PRR) to Bangalore City by Bangalore Development Authority of Karnataka - clarification of Hon'ble High Court of India- reg.

Sir,

This has reference to your letter no. BDA/Commr/EM/PRR/F122/2020-21, dated 7th September, 2020 regarding the aforementioned subject, requesting for clarification whether final EIA report shall be submitted to the Ministry as per General Condition or to be submitted at SEIAA as per Hon'ble Supreme Court of India direction, for appraisal and reconsideration of EC.

2. The matter was perused in the Ministry. The Hon'ble Supreme Court of India vide judgement dated 17.03.2020 clarified that the project is qualified to be an 'expressway' and directed to obtain the EC as per Schedule 7(f) of EIA Notification, 2006. Hon'ble Court also directed SEAC and SEIAA to appraise project in accordance with the role assigned to it under the EIA Notification 2006.

3. As per the provisions of EIA Notifications 2006 and it amendments, General Conditions are applicable in case of the proximity of, *inter-alia*, Protected Areas notified under Wildlife (Protection) Act, 1972 and Critically Polluted Areas, as notified by CPCB, within 5 kms of any project or activity. Accordingly, the said project or activity specified in Category 'B' shall be appraised at the Central Level as Category 'A'.

4. In view of above, it is suggested that further action may be taken by the PP as per the directions of Hon'ble Supreme Court of India and in case SEAC/ SEIAA are satisfied with the applicability of General Conditions, they may transfer the proposal to Ministry for its appraisal at Central Level in accordance with the provisions of EIA Notification 2006.

This issues with approval of the competent authority

Yours faithfully,

(Amardeep Raju)
Scientist 'E'

ANNEXURE-8

IN THE HIGH COURT OF KARNATAKA AT BENGALURU

DATED THIS THE 22ND DAY OF SEPTEMBER, 2021

PRESENT

THE HON'BLE MR.SATISH CHANDRA SHARMA,
ACTING CHIEF JUSTICE

AND

THE HON'BLE MR. JUSTICE SACHIN SHANKAR MAGADUM

WRIT PETITION NO.10342/2008 (LA-BDA-PIL)

BETWEEN

1. LT. COL. P. R. RAI, B.A., B.E., AMIE, FIV, FIIRA,
S/O. LATE DASA RAI
AGED ABOUT 89 YEARS
R/AT NO. 40, ASIANA,
SANKEY ROAD CROSS, HIGH GROUNDS
BANGALORE - 560 052

2. MR SRIVATSAN C.
S/O. LATE K.C.R. CHAKRAVATHI
AGED ABOUT 62 YEARS
R/AT 28/29, MAHATMA GANDHI RAOD
BANGALORE - 560 001

3. DR. SHYAM PRASAD SHETTY B.,
FRCS (CARDIO THORACIC SURGERY)
FRCS (ENG.) FRCS (EDIN)
S/O. LATE K.N.MAHABALA SHETTY
AGED ABOUT 45 YEARS
R/AT NO.784 A, 8TH CROSS,
10TH MAIN, INDIRANAGAR II STAGE
BANGALORE - 560 038

4. MR K.N.VITTAL SHETTY
S/O. LATE AMMU SHETTY
AGED ABOUT 63 YEARS
R/AT NO.3442, 4TH CROSS
10TH MAIN, 2ND STAGE,
INDIRANAGAR, BANGALORE - 560 038

5 . DR. V SHRINIVAS M.D., DCP
S/O. LATE DR M.T.VENKATAPPA
AGED ABOUT 52 YEARS
R/AT NO.492, 5TH MAIN
WEST OF CHORD ROAD
BANGALORE – 560 086

6 . MR B.GOPALKRISHNA RAI
S/O M.RAMANNA RAI
AGED ABOUT 55 YERAS,
R/AT NO.243, BASAPPA LAYOUT,
HENNUR, KALYANAGAR, P.O.,
BANGALORE 560 043

7 . MR SATHYAMURTHY V.
S/O VENUGOPAL,
AGED ABOUT 35 YEARS,
R/AT NO.1081, VSB NIVAS,
BEHIND MARAPPA BLOCK, VIJINAPURA,
DOORAVANINAGAR P.O.
BANGALORE- 560 016

8 . MR VINOD KUMAR R.
S/O RAJARATHNAM
AGED ABOUT 34 YEARS,
R/AT NO.3, MARUTHI STREET,
POST OFFICE ROAD,
RAMAMURTHYNAGAR,
DOORAVANINAGAR P.O.,
BANGALORE 560 016

9 . MR RAFIQ AYUB
S/O AYUB SAIT
AGED 51 YEARS,
R/AT NO.35, 2ND CROSS,
XAVIER LAYOUT,
BANGALORE 560 047

10 . MRS LILLIAN XAVIER
W/O LATE MR.S.V.XAVIER,
AGED ABOUT 63 YEARS,
R/AT NO."MANJULA",
33/5, VICTORIA ROAD,
BANGALORE -560 047

11 . MR G.SURENDRANATH
S/O. LATE G GOPALA PILLAI
AGED ABOUT 50 YEARS
R/AT NO.B-15, K H B COLONY
PUTTENHALLI, YELAHANKA HOBLI
BANGALORE – 560 064

... PETITIONERS

(BY SRI ARUN KUMAR K. ADV. FOR
M/S.CREST LAW PARTNER, ADV. FOR P2, P4, P10
SMT.MANEESHA KONGOVI, ADV. FOR
M/S ARGUS PARTNERS, ADVOCATES FOR P5, P9, P11)

AND:

1 . STATE OF KARNATAKA
URBAN DEVELOPMENT DEPARTMENT
M.S. BUILDING, BANGALORE -- 560 001
REP BY ITS SECRETARY

2 . BANGALORE DEVELOPMENT AUTHORITY
T CHOWDAIAH ROAD,
KUMARAPARK WEST,
BANGALORE -- 560 020
REP. BY ITS COMMISSIONER

3 . SPECIAL LAND ACQUISITION OFFICER
BANGALORE DEVELOPMENT AUTHORITY
T CHOWDAIAH ROAD,
KUMARAPARK WEST,
BANGALORE – 560 020

4 . NATIONAL HIGHWAY AUTHORITY OF INDIA
(MINISTRY OF SHIPPING,
ROAD TRANSPORT AND HIGHWAYS)
G5-6, SECTOR-10, DWARKA,
NEW DELHI - 110 075
REP. BY ITS CHAIRMAN

... RESPONDENTS

(BY SRI S.S.MAHENDRA, AGA FOR R1
SRI SACHIN B.S., ADV. FOR R2 AND R3
SMT.SHILPA SHAH, ADV. FOR
M/S.SINGHANIA & PARTNERS, ADV. FOR R4)

THIS WRIT PETITION IS FILED UNDER ARTICLES 226 & 227 OF THE CONSTITUTION OF INDIA PRAYING TO QUASH THE NOTIFICATIONS DT: 23.09.2005, 15.11.2006 AND FINAL NOTIFICATION DT: 29.06.2007 VIDE ANNEXURE-H,J AND M RESPECTIVELY AND ETC.

THIS WRIT PETITION COMING ON FOR ORDERS THIS DAY, **ACTING CHIEF JUSTICE,** MADE THE FOLLOWING:

ORDER

The present petition has been filed as a Public Interest Litigation(PIL) by the petitioners challenging the construction of Peripheral Ring Road (PRR) in and around the township of Bengaluru. Various grounds have been raised by the petitioners and the following prayers have been made in the writ petition:

a. Issue a Writ of Certiorari or any other appropriate Writ, order or any other appropriate Writ, order or direction quashing the notifications No.BDA / Commr / DC (LA) / SALAO/79/ 2005-06 dated 23-9-05, BDA/Commr/DC(LA)/SALAO/79/ 2006-07 dated 15-11-06, and final notification no UDD/399/MNX/2006 dated 29-6-2007 vide Annexure 'H', 'J', and 'M' respectively.

b. Issue a Writ of Certiorari or any other appropriate Writ, order or direction quashing the approval granted by the Government UDD/399/MNX 2006, dated 23-4-07 at Annexure 'L'.

c. Grant such other relief of reliefs this Hon'ble Court deems fit in the facts and circumstances of the case.

2. The petitioners are also challenging the land acquisition proceedings in the instant PIL. So far as the

acquisition of land is concerned, any individual who is aggrieved by the land acquisition proceedings does have a right to take recourse to the remedies available under the law. So far as other aspects of the case are concerned, the same project was subjected to judicial scrutiny before the Hon'ble Supreme Court and the Hon'ble Supreme Court in the case of **Bengaluru Development Authority v. Mr.Sudhakar Hegde & Ors.** in Civil Appeal No.2566/2019 has laid down certain parameters for construction of Peripheral Ring Road, Phase-I and issued various directions in paragraphs-83, 84 and 85, which are reproduced as under:

> **"83.** Bearing in mind the need to bring about a requisite balance, we propose to issue the following directions under Article 142 of the Constitution:
>
> (i)The appellant is directed to conduct a fresh rapid EIA for the proposed PRR project;
>
> (ii)The appellant shall, for the purpose of conducting the rapid EIA, hire a sector-specific accredited EIA consultant;
>
> (iii)The appellant shall have due regard to the various deficiencies noted in the present judgment as well as ensure that additional precautions are taken to account for the prevailing state of the environment;
>
> The appellant shall ensure that the requisite clearances under various enactments have been obtained and submitted to the SEAC prior to the consideration by it of the information submitted by the appellant in

accordance with the OMs issued by MoEFCC from time to time;

The SEAC shall thereafter assess the rapid EIA report and other information submitted to it by the appellant in accordance with the role assigned to it under the 2006 Notification. If it is of the opinion that the appellant has complied with the 2006 Notification as well as the directions issued by this Court, only then shall it recommend to the SEIAA the grant of EC for the proposed project. The SEAC and the SEIAA would lay down appropriate conditions concerning air, water, noise, land, biological and socio-economic environment and other conditions it deems fit; and

The appellant shall consult the requisite authority to ensure that no potential damage is caused by the project to the petroleum pipelines over which the proposed road may be constructed.

84. In moulding the above directions, this Court has factored into its decision-making calculus the fact that the appeal from the judgment of the NGT was filed by the project proponent and no appeal was filed by the respondents. The order of the NGT directing the appellant to conduct a rapid EIA is upheld, though for the reasons which we have indicated above. We clarify that no other Court or tribunal shall entertain any challenge to the ultimate decision of the SEAC or the SEIAA. Liberty is granted to the parties to approach this Court upon any grievance from the decision of the SEAC or the SEIAA pursuant to the order of this Court.

85. The appeal is disposed of in the above terms. There shall be no order as to costs.

Pending application(s), if any, shall stand disposed of."

3. In the considered opinion of this Court, as the same project, which is the subject matter of the present writ petition, has been minutely scrutinized by the Hon'ble Supreme Court. The directions issued by the Hon'ble

Supreme Court are to be complied with and therefore, the present petition stands **disposed of** with a direction to the respondents to comply all the directions issued by the Hon'ble Supreme Court.

4. It is needless to mention as aforesaid that if any person is aggrieved by the land acquisition, he shall be free to seek recourse to the remedies available in law.

Pending IAs., if any, stand disposed of.

SD/-
ACTING CHIEF JUSTICE

SD/-
JUDGE

TL

ANNEXURE-9

REPORTABLE

IN THE SUPREME COURT OF INDIA

CIVIL APPELLATE JURISDICTION

MISCELLANEOUS APPLICATION NO(S).1614-1616 OF 2019
IN
MISCELLANEOUS APPLICATION NO(S).1346-1348 OF 2019
IN
CIVIL APPEAL NO(S).7661-7663 OF 2018

BANGALORE DEVELOPMENT AUTHORITY & ANR. ... **APPELLANTS**

VERSUS

THE STATE OF KARNATAKA & ORS. ... **RESPONDENTS**

ORDER

S. Abdul Nazeer, J.

I.A.No.147134 of 2021

(1) A peripheral ring road (for short, 'PRR') encircling Bangalore City for the length of 116 Kms. was proposed vide Letter dated 27.11.2006 by the Bangalore Development Authority ('BDA' for short) to the State Government. The scheme was sanctioned by the Government of Karnataka vide UDD 399 MNX 2006 Bangalore dated 23.04.2007. This PRR is to provide connectivity to various destinations in all the

directions for onward traffic without entering the city of Bangalore and thus minimising the congestion on the outer ring road as well as on the internal roads of the city. The affidavit filed by the Additional Chief Secretary before this Court dated 09.11.2021 highlights the importance of construction of PRR as under:

> "PROJECT NECESSITY
>
> 2. At the outset it is submitted that the Bengaluru City needs the Peripheral Ring Road (PRR) more than ever in view of the phenomenal growth of the city in all directions. The geographical extent of the city has grown to 2196 sq. kms. The vehicle count as of 2019 was over 80 lakhs. Bengaluru being the capital city, thousands of vehicles come in every day from various parts of the state as well as outside the state. There is enormous pressure on city roads and public transport system is overstressed. The PRR will greatly reduce the stress and congestion in the city roads. The Government is very keen to facilitate the early execution of the PRR."

2. Notifications, both preliminary and final, have been issued by the BDA for acquisition of the lands for the PRR and several writ petitions were filed before the High Court of Karnataka challenging these notifications. One such writ petition was W.P.No.4550 of 2008 (**Sri Sudhakar Hegde and others vs. the State of Karnataka and others**). Several other similar

matters were clubbed along with the said writ petition. Learned Single Judge of the Karnataka High Court decided these matters on 22.07.2014. The questions formulated in the said cases were as under:

> "(a) Whether the repeal of the Land Acquisition Act 1894, has the effect of frustrating any proceedings with reference to Section 36 of the BDA Act.
>
> (b) Whether the acquisition proceedings can be said to have lapsed by virtue of the Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013 having come into force."

3. On the first question, learned Single Judge held that the provisions of the Land Acquisition Act, 1894 (for short, 'LA Act') that are made applicable to the BDA, are in the nature of legislation by reference. It was further held that in view of the repeal of the LA Act by coming into force of Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013 (for short, '2013 Act') during the pendency of the writ petitions, it would be the corresponding provisions under the 2013 Act in so far as they are applicable which would regulate the acquisition proceedings. Learned Judge further held that the repeal of LA Act and coming into force of 2013 Act would not frustrate

further proceedings under the Bangalore Development Authority Act (for short 'the BDA Act').

4. However, on the second question, the Court observed that "it cannot therefore be said that by virtue of Section 24 of 2013 Act, the proceedings stood lapsed." The Court held that the procedure that would regulate the proceedings would be as per the provisions of 2013 Act in so far as they are applicable. This would include the determination of compensation in accordance with the 2013 Act as no award had been passed in the present proceedings.

5. BDA has filed the above application contending that the direction in the above cases has totally upset the budget calculation of the project. It is further contended that the High Court has failed to refer and to consider the Constitution Bench judgment of this Court in **Offshore Holdings Private Limited v. Bangalore Development Authority and others**[1]. It is also contended that Section 36 of the BDA Act clearly mandates legislation by incorporation. BDA has filed this application seeking mainly the following relief:

> "Hold that the 2013 Act is not applicable to the BDA Act and the Judgment of the learned Single Judge dated 11/07/2014 in WP

1(2011) 3 SCC 139

4550/2008 and connected matters is per in-curium, otiose and unenforceable."

6. We have heard the learned counsel for the parties.

7. The BDA Act was enacted by the Legislature of the State of Karnataka to provide for the establishment of a Development Authority for the development of city of Bangalore and the areas adjacent thereto and for matters connected therewith. The objects and reasons for enacting the Bangalore Development Act, 1976 are as under:

"STATEMENT OF OBJECTS AND REASONS

KARNATAKA ACT, NO.12 OF 1976

Karnataka Gazette, Extraordinary, dated 5-2-1976

At the conference of the Ministers for Housing and Urban Development held at Delhi in November, 1971, it was agreed that a common Authority for the development of metropolitan cities should be set up.

Bangalore City with its population (as per last census) is a Metropolitan City. Different Authorities like the City of Bangalore Municipal Corporation, the City Improvement Trust Board, the Karnataka Industrial Area Development Board, the Housing Board and the Bangalore City Planning Authority are exercising jurisdiction over the area. Some of the functions of these bodies like development, planning, etc., are overlapping creating thereby avoidable confusion, besides hampering co-ordinated development. It is, therefore, considered necessary to set up a single authority like the Delhi Development Authority for the city areas adjacent to it which in course of time will become part of the city.

For the speedy implementation of the above said objects as also the 20-point programme and for establishing a co-ordinating Central Authority, urgent action was called for. Moreover, the haphazard and irregular growth would continue

unless checked by the Development Authority and it may not be possible to rectify or correct mistakes in the future.

It was therefore necessary to issue the measure in the form of an Ordinance.

The Bill seeks to replace the said Ordinance."

8. Section 14 of the BDA Act underlines the object of the Authority in the below terms:

"14. **Objects of the Authority**:- The objects of the authority shall be to promote and secure the development of the Bangalore Metropolitan Area and for that purpose the authority shall have the power to acquire, hold, manage and dispose of movable and immovable property, whether within or outside the area under its jurisdiction, to carry out building, engineering and other operations and generally to do all things necessary of expedient for the purpose of such development and for purposes incidental thereto."

9. Chapter III of the BDA Act provides for the power of the Authority to take up execution of development schemes for the development of the Bangalore Metropolitan area. Section 15 empowers the BDA to frame development schemes with the previous permission of the government to execute the same. Section 16 enumerates the particulars to be provided in such schemes. After preparation of the scheme under Section 17, the Authority shall draw up a notification furnishing the particulars of the scheme and the place where the lands proposed for acquisition. Within 30 days, notice shall be issued to the concerned persons inviting objections, if any, for the proposed

acquisition. After considering the representations received in that regard, the scheme shall be submitted to the government for sanction with modifications, if any, together with the plan, estimates and other particulars. After considering the proposals, the Government has to sanction the same. Upon sanction of the scheme under Section 19, the Government shall publish declaration that the lands are required for the public purpose. These are the formalities required to be complied with before proceeding further in the matter of execution of the scheme.

10. Chapter IV of the BDA Act deals with "Acquisition of Land". This chapter contains Sections 35 and 36. The relevant provision for the purpose of the present case is sub-section (1) of Section 36 which is as under:

> "**36. Provisions applicable to the acquisition of land otherwise than by agreement** – (1) The acquisition of land under this Act otherwise than by agreement within or without the Bangalore Metropolitan Area shall be regulated by the provisions, so far as they are applicable, of the Land Acquisition Act. 1894."

11. Sub-section (3) of Section 36 of the BDA Act states that after the land vests in the Government under Section 16 of the LA Act, then the Government upon payment of cost of acquisition and upon the Authority agreeing to pay any further

cost which may be incurred on the acquisition, shall transfer the land to the Authority whereupon it shall vest in the Authority.

12. The primary object of the BDA Act is to carry out a planned development and acquisition, is merely incident of such planned development. It is also clear that the provisions of the LA Act would be attracted only insofar as they are applicable to the BDA Act. Where there are specific provisions under the BDA Act, the provisions of the LA Act will not be attracted. The BDA Act has provided a complete process for determination of rights. For the purpose of the claims in regard to the matters which are not specifically dealt with in the BDA Act, reference to the LA Act in terms of Section 36 has been made. The intention of the Legislature is to take recourse for the provisions of the LA Act to a limited extent and subject to the supremacy of the provisions of the BDA Act. This is evident from the expression "so far as they are applicable" employed in sub-section (1) of Section 36. In **Offshore Holdings Private Limited** (supra), a Constitution Bench of this Court, after considering the scheme of the BDA Act and having regard to the language employed in Section 36, held that it is a legislation by incorporation.

13. Incorporation of an earlier Act into the later Act is a legislative device for the sake of convenience in order to avoid verbatim reproduction of the provisions of the earlier Act into the later Act. Once the incorporation is made, the provisions of incorporated statute become an integral part of the statute in which it is transferred and thereafter there is no need to refer to the statute from which incorporation is made and any subsequent amendment made in it has no effect on the incorporating statute. (See: **C.N. Paramasivam and Another vs. Sunrise Plaza Through Partner and Others**[2])

14. In **Offshore Holdings Private Limited** (supra), it was held as under:

> **"43.** All these provisions show that the BDA Act has provided for a complete adjudicatory process for determination of rights and claims. Only in regard to the matters which are not specifically dealt with in the BDA Act, reference to the Land Acquisition Act, in terms of Section 36, has been made, for example, acquisition of land and payment of compensation. This also is a pointer to the BDA Act being a self-contained Act.
>
> XXX XXX XXX
>
> **50.** Applying the above principle to the facts of the case in hand, it will be clear that the provisions relating to acquisition like passing of an award, payment of compensation and the legal remedies available under the Central Act would have to be applied to the acquisitions under the State Act but the bar contained in Sections 6 and 11-A of the Central Act cannot be made an integral part of the State Act as the State Act itself has provided specific time-frames under its various provisions as well

2 2013 (9) SCC 460

as consequences of default thereto. The scheme, thus, does not admit such incorporation.

XXX XXX XXX

57. The *sequitur* to the above principle is that the BDA Act has already been held to be a valid law by this Court not repugnant to the Land Acquisition Act as they operate in their respective fields without any conflict. For the reasons aforereferred as well as the detailed reasons given by us in *Girnar Traders (3)*[5], which reasoning would form part of this judgment, we have no hesitation in concluding that the BDA Act is a self-contained code. The language of Section 36 of the BDA Act clearly mandates legislation by incorporation and as per the scheme of the two Acts, effective and complete implementation of the State law without any conflict is possible. The object of the State law being planned development, acquisition is merely incidental thereto and, therefore, such an approach does not offend any of the known principles of statutory interpretation."

(emphasis supplied)

15. In **Special Land Acquisition Officer, KIADB, Mysore and Another vs. Anasuya Bai (dead) by Legal Representatives and others**[3] this Court was considering an identical question. There it was held that Section 11-A of the LA Act and Section 24(2) of 2013 Act are not applicable for acquisition made under KIADB Act. It was held thus:

"30. Having regard to the aforesaid raison d'être for non-application of the old LA Act, on the parity of reasoning, provision of Section 24(2) of the new LA Act making Section 11-A of the old LA Act would, obviously, be not applicable. We would like to refer to the judgment in *State of M.P.* v. *M.V. Narasimhan*[4] in this behalf where following proposition is laid down: (SCC p. 385, para 15)

"*15.* ... 'Where a subsequent Act incorporates provisions of a previous Act, then the borrowed provisions become an integral and independent part of the subsequent Act and are totally

3 2017 (3) SCC 313
4 2011 (3) SCC 1

unaffected by any repeal or amendment in the previous Act. This principle, however, will not apply in the following cases:

(*a*) where the subsequent Act and the previous Act are supplemental to each other;

(*b*) where the two Acts are in pari materia;

(*c*) where the amendment in the previous Act, if not imported into the subsequent Act also, would render the subsequent Act wholly unworkable and ineffectual; and

(*d*) where the amendment of the previous Act, either expressly or by necessary intendment, applies the said provisions to the subsequent Act.'"

16. On 3.12.2020 this Court in this very case has held as under:

> "Needless to state that the acquisition of the land under the BDA Act is regulated by the provisions of the LA Act so far as they are applicable. (See: Section 36 of the BDA Act). The borrowed provisions of LA Act, became an integral part of the BDA Act and are totally unaffected by the repeal of the LA Act. In other words, the provisions of the LA Act are incorporated into the BDA Act so far as they are applicable. Of course, the bar contained in Section 6 and 11-A of the LA Act, are not applicable to the BDA Act. We have discussed this aspect of the matter in our main judgment dated 03/08/2018. It is also clear that the provisions of the Right of Compensation and Transparency in Land Acquisition, Rehabilitation & Resettlement Act, 2013 are not applicable for the acquisition made under the BDA Act. Final notification has also been issued after the pronouncement of judgment by this Court in Civil Appeal No(s). 7661-7663 of 2018 dated 03/08/2018. We direct the BDA to proceed with the acquisition of the land as proposed in the notification."

17. Therefore, the provisions of the LA Act continue to apply for acquisitions made in the BDA Act so far as they are applicable as it is a legislation by incorporation having regard to Section 36 of the BDA Act.

18. The question may also be examined from a different angle. Section 24 of the 2013 Act expressly refers to the land acquisition proceedings initiated under the LA Act. Sub-section (1) of Section 24 of the 2013 Act is as under:

> **"24. Land acquisition process under Act No. 1 of 1984 shall be deemed to have lapsed in certain cases -** (1) Notwithstanding anything contained in this Act, in any case of land acquisition proceedings initiated under the Land Acquisition Act, 1894,--
>
> (a) where no award under section 11 of the said Land Acquisition Act has been made, then, all provisions of this Act relating to the determination of compensation shall apply; or
>
> (b) where an award under said section 11 has been made, then such proceedings shall continue under the provisions of the said Land Acquisition Act, as if the said Act has not been repealed.
>
> (2) Notwithstanding anything contained in sub-section (1), in case of land acquisition proceedings initiated under the Land Acquisition Act, 1894 (1 of 1894), where an award under the said section 11 has been five years or more prior to the commencement of this Act but the physical possession of the land has not been taken or the compensation has not been paid the said proceedings shall be deemed to have lapsed and the appropriate Government, if it so chooses, shall initiate the proceedings of such land acquisition afresh in accordance with the provisions of this Act:
>
> Provided that where an award has been made and compensation in respect of a majority of and holdings has not been deposited in the account of the beneficiaries, then, all beneficiaries specified in the notification for acquisition under section 4 of the said Land Acquisition Act, shall be entitled to compensation in accordance with the provisions of this Act."

19. The 2013 Act repeals only the LA Act and not any other Central or State enactment dealing with acquisition. Therefore,

what is sought to be saved under Section 24 of the 2013 Act is only acquisitions which had been initiated under the LA Act and not those acquisitions which had been initiated under any other Central or State enactment. The expression contained in Section 24 of the LA Act cannot be given extensive interpretation by adding words into the provision, in the absence of the provision itself giving rise to any such implication. We are of the view that 2013 Act would not regulate the acquisition proceedings made under the BDA Act.

20. Section 105 of the 2013 Act states that the provisions of the 2013 Act shall not apply to the enactments in the Fourth Schedule or are to apply with modifications in terms of notification issued by the Central Government under Section 105(3) of the 2013 Act. Section 105 does not apply to the present case.

21. Recently, a Division Bench of the Karnataka High Court in **Sri. L. Ramareddy vs. the State of Karnataka and Ors.**[5] has considered identical questions in great detail and has concluded as under:

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5 W.A. No.1415/2018 (LA-BDA) disposed of on 1st December, 2020

> "**44.** In the circumstances, it is concluded and held that Section 24 does not take within its scope nor does it apply to acquisitions which have been initiated under the provisions of any other enactment particularly, State enactment, such as, BDA Act. The said Section is restricted to only those acquisitions which have been initiated under the provisions of the LA Act, 1894 only. Subject to compliance of the conditions mentioned under sub-section (2) of Section 24, the land owner would be entitled to the deeming provision regarding lapse of acquisition and not otherwise."

We are in complete agreement with this judgment of the High Court.

22. We may also notice here that the learned Single Judge of the High Court has not followed the judgment in **Offshore Holdings Private Limited** (supra) wherein it was clearly held that the provisions of the LA Act are applicable to the BDA Act by incorporation.

23. In view of the above, the Learned Judge of the High Court in **Sri Sudhakar Hegde** (supra) was not justified in holding that the provisions of LA Act that are made applicable to the BDA Act are in the nature of legislation by reference. The learned Judge has also erred in holding that in view of the repeal of LA Act by coming into force of 2013 Act, the corresponding provisions of 2013 Act would regulate acquisition proceedings under the BDA Act and that this would include determination of compensation in accordance with 2013 Act. It

is hereby clarified that since LA Act has been incorporated into the BDA Act so far as they are applicable, the provisions of 2013 Act are not applicable for the acquisitions made under the BDA Act. Therefore, the judgment of the learned Single Judge of the High Court in **Sri Sudhakar Hegde** (supra) and other connected matters is hereby overruled.

24. Application is accordingly disposed of.

.....J.
(S. ABDUL NAZEER)

.....J.
(SANJIV KHANNA)

New Delhi;
January 20, 2022

ANNEXURE-10

सत्यमेव जयते

State Level Environment Impact Assessment Authority-Karnataka

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

SEIAA 40 IND 2019 Date: 25.02.2022

CORRIGENDUM

The following corrections shall be incorporated in the Terms of Reference Letter No. SEIAA 40 IND 2019 dated 21.01.2020 issued to the Executive Engineer, Bangalore Development Authority, T. Chowdiah Road, Kumara Krupa West, Bangalore - 560020 for Proposed Development of Eight Lane Peripheral Ring Road-Phase-I connecting Tumkur Road to Hosur Road (Crossing Bellary Road and Old Madras Road) Project.

"The 2nd Para at Page-1 and 3rd Para at Page-2, the length of the project shall be corrected and read as 73.30 Km".

Rest of the contents and the Terms of Reference letter No. SEIAA 40 IND 2019 dated 21.01.2020 remains unchanged.

(Vijay Mohan Raj V.)
Member Secretary
SEIAA, Karnataka

To,
The Executive Engineer,
Bangalore Development Authority,
T. Chowdiah Road,
Kumara Krupa West,
Bangalore - 560020.

Copy to:

1. Chairman, Karnataka State Pollution Control Board, Parisara Bhaan, 4th and 5th Floor, Church Street, Bangalore - 560001 for information
2. Guard File.

Room No. 706, 7th Floor, 4th Gate, M.S. Building, Bangalore - 560 001 Phone : 080-22032497 Fax : 080-22254377
Website : http://environmentclearance.nic.in http://seiaa.karnataka.gov.in e-mail : msseiaakarnataka@gmail.com

ANNEXURE-11

Hosur Road - Near KonappanaAgrahara (12°50'58.46"N 77°40'12.98"E)														
MONTH/YEAR	DATE	WEEK	PM_{10}, µg/ m^3	$PM_{2.5}$, µg/ m^3	SO_2, µg/ m^3	NO_2, µg/ m^3	Pb, µg/ m^3	Ni, ng/ m^3	As, ng/ m^3	CO, mg/ m^3	O_3, µg/ m^3	NH_3, µg/ m^3	C_6H_6, µg/ m^3	BaP, ng/ m^3
December 2019	02.12.2019	I	60.7	21.5	9.07	30.67	0.022	2.87	BDL	0.67	2.09	5.61	BDL	BDL
	07.12.2019		72.4	14.1	9.63	32.21	0.05	2.21	BDL	0.79	3.63	5.87	BDL	BDL
	11.12.2019	II	77.8	24.5	9.17	32.54	0.04	2.2	BDL	0.72	3.52	5.57	BDL	BDL
	14.12.2019		77.5	24.2	5.93	14.95	0.026	2.21	BDL	0.65	3.12	4.87	BDL	BDL
	16.12.2019	III	67.3	22.4	5.22	15.72	0.034	4.49	BDL	0.57	3.46	4.18	BDL	BDL
	19.12.2019		72.1	23.9	5.88	14.18	0.048	2.18	BDL	0.62	3.79	4.05	BDL	BDL
	24.12.2019	IV	76.4	24.9	5.72	22.21	0.011	5.17	BDL	0.74	3.88	3.87	BDL	BDL
	27.12.2019		79.5	25.5	5.52	19.57	0.041	11.01	BDL	0.82	2.98	3.8	BDL	BDL
January 2020	03.01.2020	I	83.1	27.7	5.83	29.35	0.061	3.72	BDL	0.59	2.35	3.98	BDL	BDL
	06.01.2020		82	23.3	5.52	24.08	0.022	1.96	BDL	0.65	3.61	3.58	BDL	BDL
	11.01.2020	II	85.2	24.9	5.48	16.04	0.048	6.68	BDL	0.76	4.12	3.86	BDL	BDL
	13.01.2020		86.3	25.1	5.79	17.35	0.051	5.88	BDL	0.89	4.47	4.24	BDL	BDL
	16.01.2020	III	81.4	25.9	11.22	25.86	0.078	8.84	BDL	0.95	4.58	4.46	BDL	BDL
	21.01.2020		80.4	24.2	10.06	27.49	0.038	8.91	BDL	1.08	4.81	4.78	BDL	BDL
	25.01.2020	IV	79.5	24.9	7.74	35.24	0.115	8.13	BDL	1.21	4.27	4.05	BDL	BDL
	29.01.2020		77.6	27.7	6.48	28.69	0.069	5.88	BDL	1.05	3.79	3.82	BDL	BDL
February 2020	05.02.2020	I	80.2	28.4	7.41	26.08	0.025	5.13	BDL	0.66	2.64	4.32	BDL	BDL
	08.02.2020		82.3	26.6	6.79	29.21	0.03	7.34	BDL	0.79	3.84	3.75	BDL	BDL
	10.02.2020	II	85.4	25.6	6.74	19.53	0.074	5.13	BDL	0.86	4.65	4.03	BDL	BDL
	13.02.2020		87.7	24.6	6.58	21.16	0.153	11.81	BDL	0.99	4.78	3.63	BDL	BDL
	18.02.2020	III	7.09	23.6	11.11	27.27	0.027	5.15	BDL	0.91	4.05	4.25	BDL	BDL
	21.02.2020		78	22.3	9.11	27.06	0.038	2.92	BDL	0.9	4.94	4.61	BDL	BDL
	24.02.2020	IV	81.9	24.9	8.21	34.8	0.06	5.13	BDL	0.79	3.85	4.36	BDL	BDL
	27.02.2020		84.1	23.1	7.42	30.66	0.055	3.66	BDL	0.72	4.23	4.69	BDL	BDL

Note: BDL- Below Detectable Limit

Gattahalli Village (12°52'5.19"N 77°42'13.35"E)														
MONTH/YEAR	DATE	WEEK	PM_{10}, µg/ m^3	$PM_{2.5}$, µg/ m^3	SO_2, µg/ m^3	NO_2, µg/ m^3	Pb, µg/ m^3	Ni, ng/ m^3	As, ng/ m^3	CO, mg/ m^3	O_3, µg/ m^3	NH_3, µg/ m^3	C_6H_6, µg/ m^3	BaP, ng/ m^3
December 2019	02.12.2019	I	73.2	17.1	8.46	27.48	0.028	8.95	BDL	0.59	4.08	4.51	BDL	BDL
	07.12.2019		61.1	22.8	9.52	25.61	0.026	BDL	BDL	0.75	3.82	4.85	BDL	BDL
	11.12.2019	II	65.7	24.7	9.37	24.63	0.018	2.25	BDL	0.83	3.06	4.63	BDL	BDL
	14.12.2019		55.9	23.3	6.43	31.11	0.049	2.27	BDL	0.73	2.72	3.93	BDL	BDL
	16.12.2019	III	44.8	7.9	6.13	29.13	0.024	5.13	BDL	0.67	3.03	4.05	BDL	BDL
	19.12.2019		52.8	14.3	6.54	29.02	0.065	6.87	BDL	0.57	3.15	3.86	BDL	BDL
	24.12.2019	IV	58.4	18.9	6.38	41.77	0.04	6.56	BDL	0.66	3.64	4.27	BDL	BDL
	27.12.2019		68.7	19.8	5.98	23.2	0.035	5.97	BDL	0.69	3.49	3.85	BDL	BDL
January 2020	03.01.2020	I	80.6	25.7	5.67	17.48	0.026	3.73	BDL	0.49	3.85	3.82	BDL	BDL
	06.01.2020		71.5	17.9	4.31	13.08	0.061	7.41	BDL	0.63	3.45	3.64	BDL	BDL
	11.01.2020	II	69.7	22	4.9	14.4	0.035	4.47	BDL	0.67	3.22	3.65	BDL	BDL
	13.01.2020		65.5	22.6	5.21	15.93	0.052	4.4	BDL	0.8	3.57	4.01	BDL	BDL
	16.01.2020	III	69.3	23.1	9.95	19.31	0.035	8.96	BDL	0.88	3.89	4.08	BDL	BDL
	21.01.2020		80.6	21.5	11	29.67	0.062	7.38	BDL	1.01	4.12	4.36	BDL	BDL
	25.01.2020	IV	81.6	24.6	9.42	24.11	0.104	8.86	BDL	1.14	3.72	3.58	BDL	BDL
	29.01.2020		80.7	23.6	8.16	20.84	0.097	6.7	BDL	0.98	3.1	3.35	BDL	BDL
February 2020	05.02.2020	I	83.5	22.7	7.14	20.75	0.03	5.16	BDL	0.56	4.14	4.16	BDL	BDL
	08.02.2020		79.1	24.2	5.47	20.28	0.048	5.9	BDL	0.77	3.68	3.81	BDL	BDL
	10.02.2020	II	81.2	25.1	5.95	17.35	0.068	2.2	BDL	0.77	3.75	3.83	BDL	BDL
	13.02.2020		79.5	23.3	6.27	19.31	0.035	9.48	BDL	0.9	3.88	3.43	BDL	BDL
	18.02.2020	III	70.1	20.1	9.37	21.6	0.031	5.89	BDL	0.79	4.12	3.87	BDL	BDL
	21.02.2020		65.6	18.4	9.27	30.33	0.162	3.7	BDL	0.83	4.25	4.19	BDL	BDL
	24.02.2020	IV	68.4	21.2	9.9	30.11	0.152	9.51	BDL	0.72	3.3	3.94	BDL	BDL
	27.02.2020		76.3	19.4	9.11	21.93	0.271	5.15	BDL	0.67	3.54	4.22	BDL	BDL

Note: BDL- Below Detectable Limit

Sarjapur Road- Near Sulikunte Village (12°53'30.13"N 77°43'44.54"E)														
MONTH/YEAR	DATE	WEEK	PM_{10}, µg/ m^3	$PM_{2.5}$, µg/ m^3	SO_2, µg/ m^3	NO_2, µg/ m^3	Pb, µg/ m^3	Ni, ng/ m^3	As, ng/ m^3	CO, mg/ m^3	O_3, µg/ m^3	NH_3, µg/ m^3	C_6H_6, µg/ m^3	BaP, ng/ m^3
December 2019	02.12.2019	I	77.7	25.3	8.11	29.13	0.028	3.68	BDL	0.66	3.49	5.09	BDL	BDL
	07.12.2019		72.2	33.7	7.65	30.78	0.076	11.07	BDL	0.8	3.89	5.22	BDL	BDL
	11.12.2019	II	73.8	28.1	7.4	28.58	0.036	5.97	BDL	0.84	2.5	4.9	BDL	BDL
	14.12.2019		51.6	27	6.54	32.32	0.022	9.54	BDL	0.79	2.08	4.2	BDL	BDL
	16.12.2019	III	63.3	15.2	6.13	34.52	0.025	5.87	BDL	0.74	2.82	4.55	BDL	BDL
	19.12.2019		55.6	19.4	6.74	27.59	BDL	4.49	BDL	0.73	2.98	4.62	BDL	BDL
	24.12.2019	IV	70.2	22.3	7.35	37.16	0.038	10.9	BDL	0.61	2.65	4.77	BDL	BDL
	27.12.2019		69.7	24.4	6.43	24.74	0.031	4.43	BDL	0.53	2.32	4.07	BDL	BDL
January 2020	03.01.2020	I	68.9	17.5	7.09	23.53	0.023	8.83	BDL	0.57	3.51	3.23	BDL	BDL
	06.01.2020		80.8	23.6	4.26	24.08	0.061	5.85	BDL	0.64	3.35	3.07	BDL	BDL
	11.01.2020	II	73.2	23.6	8.21	26.73	0.086	6.64	BDL	0.63	3.37	3.22	BDL	BDL
	13.01.2020		69.3	24.3	8.53	28.04	0.067	4.4	BDL	0.76	3.72	3.48	BDL	BDL
	16.01.2020	III	75.2	24.2	9.42	24.98	0.065	11.07	BDL	0.72	3.65	3.54	BDL	BDL
	21.01.2020		76.2	22.6	8.79	22.47	0.035	8.07	BDL	0.85	3.88	3.84	BDL	BDL
	25.01.2020	IV	78.1	21.6	7.11	19.2	0.048	5.16	BDL	0.98	3.34	3.07	BDL	BDL
	29.01.2020		69.8	18.7	5.84	15.93	0.161	6.64	BDL	0.82	2.86	2.84	BDL	BDL
February 2020	05.02.2020	I	69.4	19.1	7.32	26.8	0.029	5.13	BDL	0.64	3.8	3.57	BDL	BDL
	08.02.2020		68.3	17.9	5.68	27.03	0.039	7.5	BDL	0.78	3.58	3.24	BDL	BDL
	10.02.2020	II	69.4	18.8	7.58	23.67	0.069	5.13	BDL	0.73	3.9	3.38	BDL	BDL
	13.02.2020		70.6	18	7.48	21.16	0.031	7.24	BDL	0.86	4.03	2.98	BDL	BDL
	18.02.2020	III	67.9	17.3	8.79	27.93	0.026	6.6	BDL	0.77	3.15	3.34	BDL	BDL
	21.02.2020		71.1	21.2	7.79	20.84	0.034	5.2	BDL	0.67	3.41	3.67	BDL	BDL
	24.02.2020	IV	73.9	20.1	8.06	25.09	0.063	9.6	BDL	0.56	3.92	3.37	BDL	BDL
	27.02.2020		66.8	16.9	6.79	17.89	0.059	2.92	BDL	0.62	3.64	3.71	BDL	BDL

Note: BDL- Below Detectable Limit

Muthsandra Village (12°56'20.66"N 77°47'13.15"E)														
MONTH/YEAR	DATE	WEEK	PM_{10}, µg/ m^3	$PM_{2.5}$, µg/ m^3	SO_2, µg/ m^3	NO_2, µg/ m^3	Pb, µg/ m^3	Ni, ng/ m^3	As, ng/ m^3	CO, mg/ m^3	O_3, µg/ m^3	NH_3, µg/ m^3	C_6H_6, µg/ m^3	BaP, ng/ m^3
December 2019	02.12.2019	I	83.9	28.7	9.17	24.74	0.159	11.36	BDL	0.72	3.71	4.37	BDL	BDL
	07.12.2019		76.7	30.7	9.93	26.93	0.155	4.41	BDL	0.91	4.16	5.01	BDL	BDL
	11.12.2019	II	77.8	31.3	9.78	26.82	0.136	8.35	BDL	0.94	3.76	4.82	BDL	BDL
	14.12.2019		79.8	37.4	5.72	28.36	0.103	9.71	BDL	0.84	3.25	4.12	BDL	BDL
	16.12.2019	III	75.1	28.2	5.32	27.15	0.02	2.97	BDL	0.77	3.29	4.34	BDL	BDL
	19.12.2019		76.3	22.7	5.67	27.04	0.065	5.91	BDL	0.7	3.69	4.02	BDL	BDL
	24.12.2019	IV	69.1	26.8	7.3	43.42	0.086	7.42	BDL	0.63	3.77	4.08	BDL	BDL
	27.12.2019		76.1	25.5	5.27	24.63	0.085	8.9	BDL	0.57	3.47	3.93	BDL	BDL
January 2020	03.01.2020	I	81.3	27	5.62	21.11	0.023	7.32	BDL	0.62	3.37	3.91	BDL	BDL
	06.01.2020		74.8	29.2	4	26.7	0.011	BDL	BDL	0.8	3.09	4.04	BDL	BDL
	11.01.2020	II	76.9	20.3	5.79	14.73	0.087	5.92	BDL	0.82	2.44	3.92	BDL	BDL
	13.01.2020		78.3	21.3	6.11	16.04	0.067	5.11	BDL	0.95	2.79	4.31	BDL	BDL
	16.01.2020	III	79.8	26.6	11.11	27.16	0.058	8.81	BDL	1.05	2.93	4.32	BDL	BDL
	21.01.2020		81.6	25.5	9.16	39.71	0.407	8.07	BDL	1.18	3.16	4.62	BDL	BDL
	25.01.2020	IV	80.9	30.4	7.53	28.69	0.098	9.61	BDL	1.31	2.62	3.85	BDL	BDL
	29.01.2020		77	19.8	6.27	24.33	0.147	8.87	BDL	1.15	2.14	3.62	BDL	BDL
February 2020	05.02.2020	I	78.8	26.3	6.16	24.38	0.199	5.19	BDL	0.69	3.66	4.25	BDL	BDL
	08.02.2020		72.8	27.3	5.32	30.08	0.019	8.26	BDL	0.94	3.32	4.21	BDL	BDL
	10.02.2020	II	74.2	26.6	7.06	16.8	0.068	2.2	BDL	0.92	2.97	4.09	BDL	BDL
	13.02.2020		75.1	21.7	7.79	18	0.109	8.05	BDL	1.05	3.1	3.69	BDL	BDL
	18.02.2020	III	80.6	19.9	9.74	29.46	0.029	9.6	BDL	0.94	3.67	4.12	BDL	BDL
	21.02.2020		61.9	16.5	8.16	34.15	0.039	3.66	BDL	1	3.29	4.46	BDL	BDL
	24.02.2020	IV	64.7	17.3	8.95	34.58	0.093	10.99	BDL	0.89	3.25	4.15	BDL	BDL
	27.02.2020		69.9	15.8	7.21	26.29	0.043	5.07	BDL	0.9	2.58	4.49	BDL	BDL

Note: BDL- Below Detectable Limit

Near Channasandra Main Road (12°59'2.55"N 77°46'24.50"E)														
MONTH/YEAR	DATE	WEEK	PM_{10}, µg/ m^3	$PM_{2.5}$, µg/ m^3	SO_2, µg/ m^3	NO_2, µg/ m^3	Pb, µg/ m^3	Ni, ng/ m^3	As, ng/ m^3	CO, mg/ m^3	O_3, µg/ m^3	NH_3, µg/ m^3	C_6H_6, µg/ m^3	BaP, ng/ m^3
December 2019	02.12.2019	I	80.1	25	9.42	29.68	0.18	4.46	BDL	0.88	4.66	4.63	BDL	BDL
	07.12.2019		83.3	28.1	10.28	27.7	0.248	6.05	BDL	0.98	5.09	5.87	BDL	BDL
	11.12.2019	II	85.2	31.8	9.22	26.93	0.401	3.75	BDL	0.9	4.67	5.3	BDL	BDL
	14.12.2019		79.9	20.3	6.13	34.03	0.035	7.57	BDL	0.82	3.83	4.61	BDL	BDL
	16.12.2019	III	87	30	5.88	31.44	0.025	6.62	BDL	0.9	3.76	4.47	BDL	BDL
	19.12.2019		85.2	28.2	6.48	27.92	0.046	3.7	BDL	0.95	3.82	4.3	BDL	BDL
	24.12.2019	IV	79	19.6	6.18	33.42	0.021	8.86	BDL	1.02	4.02	4.7	BDL	BDL
	27.12.2019		78.2	20.7	5.88	22.65	0.027	11.74	BDL	1.33	3.56	4.12	BDL	BDL
January 2020	03.01.2020	I	73.8	23.7	6.84	15.72	0.041	11.01	BDL	0.92	4.38	3.47	BDL	BDL
	06.01.2020		73.9	20.3	5.67	17.48	0.028	8.06	BDL	0.85	4.67	3.68	BDL	BDL
	11.01.2020	II	75.5	23.8	4.84	16.69	0.079	7.5	BDL	0.91	4.84	3.55	BDL	BDL
	13.01.2020		78.5	14.4	5.16	18	0.027	7.38	BDL	1.04	5.19	3.82	BDL	BDL
	16.01.2020	III	80.1	21	10.06	21.06	0.208	7.33	BDL	1.23	5.37	3.81	BDL	BDL
	21.01.2020		91.5	22.8	11.43	25.75	0.034	10.26	BDL	1.36	5.6	4.11	BDL	BDL
	25.01.2020	IV	88.3	25.9	9.53	20.18	0.104	7.34	BDL	1.49	5.06	3.6	BDL	BDL
	29.01.2020		72.8	21.7	8.27	16.91	0.017	8.7	BDL	1.33	4.58	3.36	BDL	BDL
February 2020	05.02.2020	I	81.4	24.5	7.95	18.99	0.028	8.14	BDL	0.99	4.67	3.81	BDL	BDL
	08.02.2020		83.5	23.1	6.72	24.68	0.06	11.29	BDL	0.99	4.9	3.72	BDL	BDL
	10.02.2020	II	84.2	22.7	6.11	19.64	0.058	7.32	BDL	1.01	5.37	3.72	BDL	BDL
	13.02.2020		80.6	21.4	6.74	21.27	0.091	7.34	BDL	1.14	5.5	3.31	BDL	BDL
	18.02.2020	III	67.7	19.4	9.42	24	0.0176	11.16	BDL	1.15	5.03	3.61	BDL	BDL
	21.02.2020		72.9	17.7	10.37	26.4	0.059	9.64	BDL	1.18	5.73	3.94	BDL	BDL
	24.02.2020	IV	75.7	19.2	9.64	26.07	0.011	8.17	BDL	3.89	4.64	1.07	BDL	BDL
	27.02.2020		79.6	18.5	9.21	22.15	0.093	5.9	BDL	0.96	5.22	4.23	BDL	BDL

Note: BDL- Below Detectable Limit

Old Madras Road-Near Avalahalli (13°02'11.06"N 77°44'8.69"E)														
MONTH/YEAR	DATE	WEEK	PM_{10}, µg/ m^3	$PM_{2.5}$, µg/ m^3	SO_2, µg/ m^3	NO_2, µg/ m^3	Pb, µg/ m^3	Ni, ng/ m^3	As, ng/ m^3	CO, mg/ m^3	O_3, µg/ m^3	NH_3, µg/ m^3	C_6H_6, µg/ m^3	BaP, ng/ m^3
December 2019	02.12.2019	I	67.9	22.3	9.37	25.5	0.022	6.64	BDL	0.75	2.36	4.98	BDL	BDL
	07.12.2019		79	23.8	8.56	22.43	0.017	3.69	BDL	0.88	3.34	5.18	BDL	BDL
	11.12.2019	II	76.5	28.5	8.16	21.33	0.061	1.47	BDL	0.85	3.14	4.96	BDL	BDL
	14.12.2019		79.3	25.9	5.78	37.93	0.033	8.91	BDL	0.77	2.72	4.26	BDL	BDL
	16.12.2019	III	62.4	26.4	4.86	35.18	BDL	3.69	BDL	0.72	2.86	4.49	BDL	BDL
	19.12.2019		68	22.9	5.32	33.2	0.043	3.66	BDL	0.84	3.35	4.25	BDL	BDL
	24.12.2019	IV	72.4	23.2	5.67	27.04	0.093	13.95	BDL	0.86	3.69	4.28	BDL	BDL
	27.12.2019		77.1	14.6	6.59	18.58	0.176	1.46	BDL	0.95	3.25	3.98	BDL	BDL
January 2020	03.01.2020	I	80.5	24.6	6.79	22.65	0.055	2.2	BDL	0.66	2.49	3.7	BDL	BDL
	06.01.2020		78.4	24.1	5.02	15.17	0.032	8.04	BDL	0.78	2.97	3.5	BDL	BDL
	11.01.2020	II	77.6	13.6	5.95	15.6	0.024	6.7	BDL	0.68	3.11	3.71	BDL	BDL
	13.01.2020		71.1	13.9	6.27	16.91	0.043	7.44	BDL	0.81	3.46	3.98	BDL	BDL
	16.01.2020	III	64.3	13.6	8.06	20.62	0.026	6.54	BDL	0.74	3.35	3.66	BDL	BDL
	21.01.2020		57.1	13.2	9.27	36.22	0.062	8.24	BDL	0.87	3.58	3.91	BDL	BDL
	25.01.2020	IV	77.2	21.3	7.53	30.66	0.202	8.3	BDL	1	3.14	3.26	BDL	BDL
	29.01.2020		80.5	27	6.27	27.38	0.082	8.25	BDL	0.84	2.56	2.9	BDL	BDL
February 2020	05.02.2020	I	76.9	23.8	7.84	24.72	0.029	11.06	BDL	0.73	2.78	4.04	BDL	BDL
	08.02.2020		79	22.9	6.28	22.37	0.181	5.13	BDL	0.92	3.2	3.67	BDL	BDL
	10.02.2020	II	79.9	23.8	7	18.55	0.108	10.4	BDL	0.78	3.64	3.89	BDL	BDL
	13.02.2020		82	22.8	7.63	20.18	0.078	5.16	BDL	0.88	3.77	3.48	BDL	BDL
	18.02.2020	III	68.6	20.5	7.42	23.56	0.029	6.74	BDL	0.82	2.98	3.46	BDL	BDL
	21.02.2020		73.7	19.1	8.32	33.6	0.033	5.2	BDL	0.69	3.71	3.74	BDL	BDL
	24.02.2020	IV	76.5	22.2	8	32.4	0.011	4.36	BDL	0.58	2.84	3.44	BDL	BDL
	27.02.2020		75.4	20.9	7.21	29.35	0.036	9.48	BDL	0.8	3.16	3.77	BDL	BDL

Note: BDL- Below Detectable Limit

Near Hennur Road-Bharatiya City (13°5'0.29"N 77°38'31.07"E)														
MONTH/YEAR	DATE	WEEK	PM_{10}, µg/ m^3	$PM_{2.5}$, µg/ m^3	SO_2, µg/ m^3	NO_2, µg/ m^3	Pb, µg/ m^3	Ni, ng/ m^3	As, ng/ m^3	CO, mg/ m^3	O_3, µg/ m^3	NH_3, µg/ m^3	C_6H_6, µg/ m^3	BaP, ng/ m^3
December 2019	02.12.2019	I	78.3	22.6	8.66	26.82	0.096	6.02	BDL	0.83	4	4.48	BDL	BDL
	07.12.2019		69.8	24.8	8.21	29.57	0.118	6.63	BDL	0.96	4.12	4.93	BDL	BDL
	11.12.2019	II	76.2	27.4	8.46	29.35	0.075	5.21	BDL	1.03	3.32	4.79	BDL	BDL
	14.12.2019		54.7	24.3	6.28	20.23	0.165	1.48	BDL	0.92	2.98	4.09	BDL	BDL
	16.12.2019	III	64.2	17.6	5.93	22.1	0.049	2.23	BDL	0.88	3.12	4.22	BDL	BDL
	19.12.2019		67.4	18	6.38	25.72	0.067	6.06	BDL	0.85	2.76	4.25	BDL	BDL
	24.12.2019	IV	75.7	23.4	6.79	28.69	0.107	2.93	BDL	0.76	2.58	4.63	BDL	BDL
	27.12.2019		71.8	21.5	6.23	22.21	0.161	7.38	BDL	0.79	2.19	4.18	BDL	BDL
January 2020	03.01.2020	I	79.7	23.5	5.52	19.46	0.011	3.69	BDL	0.76	3.26	3.55	BDL	BDL
	06.01.2020		75.4	18.9	4.66	13.63	0.022	4.43	BDL	0.83	3.09	3.71	BDL	BDL
	11.01.2020	II	72.7	22.4	6.48	14.73	0.052	4.46	BDL	0.89	3.18	3.6	BDL	BDL
	13.01.2020		65.8	21.8	6.79	16.47	0.238	5.3	BDL	1.02	3.53	3.86	BDL	BDL
	16.01.2020	III	72	15.2	10.53	18.87	0.041	6.69	BDL	0.86	3.19	4.1	BDL	BDL
	21.01.2020		61.6	15	9.9	19.2	0.104	8.91	BDL	0.99	3.42	4.38	BDL	BDL
	25.01.2020	IV	74.8	25.2	7.85	17.89	0.049	4.52	BDL	1.12	2.88	3.61	BDL	BDL
	29.01.2020		75.4	26	6.58	16.36	0.11	9.58	BDL	0.96	2.4	3.15	BDL	BDL
February 2020	05.02.2020	I	77.1	20.2	7.1	22.73	0.019	7.33	BDL	0.83	3.55	3.89	BDL	BDL
	08.02.2020		74.6	19.6	6.06	19.96	0.028	8.06	BDL	0.97	3.32	3.78	BDL	BDL
	10.02.2020	II	72.4	20.3	7.74	16.91	0.058	9.48	BDL	1.11	3.71	3.76	BDL	BDL
	13.02.2020		71.7	19.7	7.9	18.55	0.029	4.45	BDL	1.24	3.84	3.36	BDL	BDL
	18.02.2020	III	71.8	16.8	9.64	21.82	0.035	8.92	BDL	0.8	3.01	3.9	BDL	BDL
	21.02.2020		62.2	20.5	8.9	18.98	0.044	5.89	BDL	0.81	3.55	4.05	BDL	BDL
	24.02.2020	IV	65	21.6	8.58	23.78	0.044	5.9	BDL	0.7	2.46	3.91	BDL	BDL
	27.02.2020		70.9	17.5	7.53	18.33	0.031	4.43	BDL	0.79	3.52	4.02	BDL	BDL

Note: BDL – Below Detectable Limit

Bellary Road - Near VinayakaNagara (13°07'15.1"N 77°36'36.2"E)														
MONTH/YEAR	DATE	WEEK	PM_{10}, µg/ m^3	$PM_{2.5}$, µg/ m^3	SO_2, µg/ m^3	NO_2, µg/ m^3	Pb, µg/ m^3	Ni, ng/ m^3	As, ng/ m^3	CO, mg/ m^3	O_3, µg/ m^3	NH_3, µg/ m^3	C_6H_6, µg/ m^3	BaP, ng/ m^3
December 2019	02.12.2019	I	81.8	28	10.18	24.19	0.032	9.9	BDL	1.04	3.42	4.83	BDL	BDL
	07.12.2019		87.2	35.6	10.64	35.18	0.257	5.22	BDL	1.4	5.2	6.06	BDL	BDL
	11.12.2019	II	87.8	39.7	11.15	36.5	0.058	2.87	BDL	1.58	4.65	5.63	BDL	BDL
	14.12.2019		78.5	31.1	5.98	18.14	0.036	8.63	BDL	1.25	3.78	4.93	BDL	BDL
	16.12.2019	III	77.6	26.1	5.57	18.8	0.024	10.2	BDL	1.08	3.86	4.33	BDL	BDL
	19.12.2019		84.9	24.2	6.84	17.81	0.041	3.74	BDL	1.14	4.21	4.37	BDL	BDL
	24.12.2019	IV	81.5	25.8	5.93	23.31	0.021	8.12	BDL	1.09	4.56	4.37	BDL	BDL
	27.12.2019		83.9	26.3	6.94	29.9	0.052	6.69	BDL	1.34	3.29	4.01	BDL	BDL
January 2020	03.01.2020	I	88.7	28.6	4.96	18.14	0.168	6.19	BDL	0.96	3.64	4.15	BDL	BDL
	06.01.2020		83.2	26	5.17	15.28	0.018	7.62	BDL	1.05	3.31	3.85	BDL	BDL
	11.01.2020	II	86.5	28.9	6.06	24.44	0.016	8.04	BDL	1.29	3.55	3.9	BDL	BDL
	13.01.2020		87.6	31.1	6.37	25.75	0.164	10.4	BDL	1.42	3.9	4.17	BDL	BDL
	16.01.2020	III	81.5	24.5	8.64	15.16	0.13	10.07	BDL	1.66	4.29	4.3	BDL	BDL
	21.01.2020		87.8	23.4	8.58	20.73	0.055	10.49	BDL	1.79	4.52	4.63	BDL	BDL
	25.01.2020	IV	91.1	26.3	6.48	28.47	0.091	7.37	BDL	1.92	3.9	3.98	BDL	BDL
	29.01.2020		79.9	26.4	5.21	23.02	0.067	7.87	BDL	1.76	3.5	3.74	BDL	BDL
February 2020	05.02.2020	I	83.7	30.8	5.96	21.41	0.279	7.63	BDL	1.03	3.93	4.49	BDL	BDL
	08.02.2020		85.3	29.8	6.38	22.48	0.03	4.73	BDL	1.19	3.54	4.02	BDL	BDL
	10.02.2020	II	88.3	30.4	7.32	27.38	0.05	5.87	BDL	1.39	4.22	4.18	BDL	BDL
	13.02.2020		90.2	29.7	7.95	29.02	0.045	7.5	BDL	1.52	4.35	3.7	BDL	BDL
	18.02.2020	III	85.2	28.5	9	22.26	0.084	5.99	BDL	1.35	4.84	4.1	BDL	BDL
	21.02.2020		81.6	27.7	7.74	23.46	0.086	10.47	BDL	1.61	4.65	4.47	BDL	BDL
	24.02.2020	IV	84.4	26.9	6.95	29.78	0.041	6.62	BDL	1.42	3.48	4.28	BDL	BDL
	27.02.2020		86.6	25.9	6.16	24.98	0.049	3.92	BDL	1.39	3.84	4.61	BDL	BDL

Note: BDL- Below Detectable Limit

Near Indian Institute of Horticultural Research Centre (13°7'49.9"N 77°32'29.2"E)														
MONTH/YEAR	DATE	WEEK	PM_{10}, µg/ m^3	$PM_{2.5}$, µg/ m^3	SO_2, µg/ m^3	NO_2, µg/ m^3	Pb, µg/ m^3	Ni, ng/ m^3	As, ng/ m^3	CO, mg/ m^3	O_3, µg/ m^3	NH_3, µg/ m^3	C_6H_6, µg/ m^3	BaP ng/ m^3
December 2019	02.12.2019	I	47.4	13.9	8.05	21.22	0.095	8.77	BDL	0.42	1.98	4.7	BDL	BDL
	07.12.2019		52	16.4	7.9	18.91	0.102	2.92	BDL	0.72	2.08	4.15	BDL	BDL
	11.12.2019	II	60.1	21.9	7.9	19.35	0.029	6.17	BDL	0.88	1.78	3.89	BDL	BDL
	14.12.2019		45.7	12.1	5.83	16.49	0.044	3.06	BDL	0.76	1.25	3.65	BDL	BDL
	16.12.2019	III	59.6	9.6	6.03	19.13	0.014	9.09	BDL	0.69	1.33	3.97	BDL	BDL
	19.12.2019		61.2	13.4	6.43	19.79	0.089	3.05	BDL	0.72	1.55	4.16	BDL	BDL
	24.12.2019	IV	68.7	19.8	6.18	27.04	0.028	12.03	BDL	0.79	1.84	4.17	BDL	BDL
	27.12.2019		72.6	14.9	5.83	17.7	0.0104	6.61	BDL	0.67	1.54	3.82	BDL	BDL
January 2020	03.01.2020	I	65	21.2	5.42	14.29	0.142	5.31	BDL	0.38	1.74	3.89	BDL	BDL
	06.01.2020		69.8	18.1	4.81	13.85	0.046	4.34	BDL	0.44	2.89	3.69	BDL	BDL
	11.01.2020	II	45.7	15.2	9.27	14.51	0.054	5.87	BDL	0.49	2.92	3.64	BDL	BDL
	13.01.2020		58.4	12.1	9.58	15.82	0.048	6.61	BDL	0.62	3.27	3.96	BDL	BDL
	16.01.2020	III	68.1	17.2	10.48	13.86	0.11	6.82	BDL	0.72	3.72	4.14	BDL	BDL
	21.01.2020		73.8	13.8	10.11	18.11	0.03	10.32	BDL	0.85	3.95	4.53	BDL	BDL
	25.01.2020	IV	81.8	9.6	7.53	16.04	0.108	8.94	BDL	0.98	3.41	3.76	BDL	BDL
	29.01.2020		51.8	16	6.27	13.75	0.035	8.14	BDL	0.82	2.93	3.53	BDL	BDL
February 2020	05.02.2020	I	63.9	20.7	6.53	18.44	0.015	6.6	BDL	0.45	2.03	4.23	BDL	BDL
	08.02.2020		62.7	19.8	6.13	21.05	0.219	7.34	BDL	0.58	3.12	3.69	BDL	BDL
	10.02.2020	II	66.5	21.3	8.95	17.46	0.042	5.16	BDL	0.66	3.45	3.81	BDL	BDL
	13.02.2020		71.1	19.2	9.06	18.76	0.061	5.89	BDL	0.79	3.58	3.39	BDL	BDL
	18.02.2020	III	75.5	16.6	9.85	17.89	0.024	5.2	BDL	0.75	3.19	3.94	BDL	BDL
	21.02.2020		67.4	15.6	9.16	18.76	0.034	5.18	BDL	0.67	4.08	4.37	BDL	BDL
	24.02.2020	IV	70.2	18.2	8.06	21.93	0.065	6.6	BDL	0.56	2.99	4.06	BDL	BDL
	27.02.2020		68.2	16.4	7.21	15.71	0.047	5.95	BDL	0.51	3.37	4.4	BDL	BDL

Note: BDL- Below Detectable Limit

Hesaraghatta Road-Near Mavallipura (13°6'49.4"N 77°31'29.0"E)														
MONTH/YEAR	DATE	WEEK	PM_{10}, µg/ m^3	$PM_{2.5}$, µg/ m^3	SO_2, µg/ m^3	NO_2, µg/ m^3	Pb, µg/ m^3	Ni, ng/ m^3	As, ng/ m^3	CO, mg/ m^3	O_3, µg/ m^3	NH_3, µg/ m^3	C_6H_6, µg/ m^3	BaP, ng/ m^3
December 2019	02.12.2019	I	56	16.7	8.87	20.01	0.06	10.68	BDL	0.64	2.42	5.42	BDL	BDL
	07.12.2019		53.1	22.6	7.24	22.98	0.074	2.73	BDL	0.84	2.35	4.78	BDL	BDL
	11.12.2019	II	79.6	28.7	7.65	24.08	0.089	3.77	BDL	0.98	2.14	4.54	BDL	BDL
	14.12.2019		55	24.6	6.08	25.5	0.09	3.78	BDL	0.9	1.68	3.84	BDL	BDL
	16.12.2019	III	62.6	12.6	5.42	25.5	0.026	1.52	BDL	0.75	1.96	4.07	BDL	BDL
	19.12.2019		66.5	16.7	5.83	24.74	0.137	6.03	BDL	0.77	2.13	4.29	BDL	BDL
	24.12.2019	IV	57.8	20.7	6.28	29.68	0.073	2.28	BDL	0.82	2.57	4.58	BDL	BDL
	27.12.2019		53.6	22.6	7.09	30.56	0.071	3.06	BDL	0.75	2.32	4.08	BDL	BDL
January 2020	03.01.2020	I	76.2	24.2	5.67	29.24	0.04	3.8	BDL	0.53	2.05	3.56	BDL	BDL
	06.01.2020		50.4	20.4	4.66	16.82	0.022	5.32	BDL	0.59	2.37	3.38	BDL	BDL
	11.01.2020	II	55.8	17.6	6.21	14.95	0.042	6.03	BDL	0.66	2.72	3.25	BDL	BDL
	13.01.2020		60.6	20.6	6.53	16.26	0.14	5.87	BDL	0.79	3.07	3.76	BDL	BDL
	16.01.2020	III	65.7	22.5	8.74	20.18	0.081	4.53	BDL	0.85	3.35	4.24	BDL	BDL
	21.01.2020		68.9	20.8	8.64	17.24	0.052	7.65	bdl	0.98	3.58	4.38	BDL	BDL
	25.01.2020	IV	77.4	17.3	6.69	15.06	0.087	8.37	BDL	1.11	3.04	3.61	BDL	BDL
	29.01.2020		69.4	19.3	5.95	12.87	0.065	9.07	BDL	0.95	2.56	3.37	BDL	BDL
February 2020	05.02.2020	I	75.4	22.2	6.84	28.59	0.018	4.53	BDL	0.6	2.34	3.9	BDL	BDL
	08.02.2020		72.4	21	5.92	24.02	0.073	2.26	BDL	0.73	2.6	3.55	BDL	BDL
	10.02.2020	II	74.8	19.6	6.06	18.33	0.04	5.18	BDL	0.76	3.25	3.42	BDL	BDL
	13.02.2020		73.6	18.9	6.69	20.4	0.033	8.31	BDL	0.78	3.38	3.02	BDL	BDL
	18.02.2020	III	72.5	17.7	8.37	23.13	0.023	6.93	BDL	0.89	3.55	4.04	BDL	BDL
	21.02.2020		69.7	18.8	7.16	17.89	0.029	BDL	BDL	0.8	3.71	4.21	BDL	BDL
	24.02.2020	IV	72.5	16.9	7	20.95	0.027	BDL	BDL	0.69	2.62	3.91	BDL	BDL
	27.02.2020		75.3	15.1	6.9	16.91	0.046	4.41	BDL	0.7	3	4.24	BDL	BDL

Note: BDL- Below Detectable Limit

Table 2: Ambient Air Quality Monitoring Results

Tumkur Road-Near Madvara (13°3'17.8"N 77°28'22.9"E)														
MONTH/YEAR	DATE	WEEK	PM_{10}, µg/ m^3	$PM_{2.5}$, µg/ m^3	SO_2, µg/ m^3	NO_2, µg/ m^3	Pb, µg/ m^3	Ni, ng/ m^3	As, ng/ m^3	CO, mg/ m^3	O_3, µg/ m^3	NH_3, µg/ m^3	C_6H_6, µg/ m^3	BaP, ng/ m^3
December 2019	02.12.2019	I	75.9	23.9	9.42	22.43	0.072	9.2	BDL	0.71	2.24	5.18	BDL	BDL
	07.12.2019		87.4	30.2	8.36	19.35	0.059	6.03	BDL	0.93	3.18	5.64	BDL	BDL
	11.12.2019	II	84.5	35.6	8.76	19.57	0.164	5.29	BDL	1.12	2.89	5.5	BDL	BDL
	14.12.2019		66.1	27	6.18	34.85	0.029	9.02	BDL	0.86	2.56	4.8	BDL	BDL
	16.12.2019	III	73.4	17.9	5.78	32.21	0.061	8.34	BDL	0.82	2.78	4.11	BDL	BDL
	19.12.2019		75.1	18.7	7.09	30.01	0.1	7.49	BDL	0.89	3.02	4.13	BDL	BDL
	24.12.2019	IV	69.2	21.5	5.83	27.7	0.03	11.31	BDL	0.91	3.26	4.41	BDL	BDL
	27.12.2019		71	20.4	6.33	31.55	0.019	6.68	BDL	0.99	3.09	3.91	BDL	BDL
January 2020	03.01.2020	I	67.1	23.3	5.88	23.42	0.106	8.83	BDL	0.65	2.69	3.43	BDL	BDL
	06.01.2020		74.6	22.5	5.72	16.05	0.071	8.83	BDL	0.75	3.26	3.52	BDL	BDL
	11.01.2020	II	79	20.4	5.9	22.47	0.024	9.76	BDL	0.83	3.26	3.61	BDL	BDL
	13.01.2020		78.4	22.1	6.27	21.6	0.047	8.37	BDL	0.96	3.61	3.93	BDL	BDL
	16.01.2020	III	81.3	21.1	8.11	21.93	0.053	8.24	BDL	1.08	3.78	4.01	BDL	BDL
	21.01.2020		71.7	24.8	8.95	25.09	0.05	11.24	BDL	1.21	4.01	4.31	BDL	BDL
	25.01.2020	IV	87.2	22.5	7	19.53	0.079	5.96	BDL	1.34	3.47	3.32	BDL	BDL
	29.01.2020		79.6	23	5.74	16.26	0.136	7.36	BDL	1.18	2.99	3.08	BDL	BDL
February 2020	05.02.2020	I	70.9	21.3	7.06	24.62	0.082	10.24	BDL	0.72	3.12	3.77	BDL	BDL
	08.02.2020		76.1	22.6	6.83	23.14	0.06	7.34	BDL	0.89	3.49	3.69	BDL	BDL
	10.02.2020	II	78.5	23.3	6.95	23.67	0.094	6.56	BDL	1.03	4.02	3.77	BDL	BDL
	13.02.2020		81.1	20.7	7.53	25.31	0.044	8.83	BDL	1.16	4.15	3.5	BDL	BDL
	18.02.2020	III	79.2	21.7	7.74	24.87	0.061	7.34	BDL	0.95	3.26	3.81	BDL	BDL
	21.02.2020		77.4	24.5	8.06	22.8	0.019	BDL	BDL	1.03	4.14	4.14	BDL	BDL
	24.02.2020	IV	80.2	23.9	7.48	24.98	0.015	1.47	BDL	0.92	3.05	3.62	BDL	BDL
	27.02.2020		82.2	22.1	6.69	20.4	0.05	8.19	BDL	0.87	3.43	3.95	BDL	BDL

Note: BDL- Below Detectable Limit

AMBIENT AIR QUALITY MONITORING STATIONS, RESULTS & ISOPLETHS

Table 1: Details of Ambient Air Quality Monitoring stations

Sl. No.	Location	Distance in Mtr & Direction from Project Area	Latitude	Longitude	Criteria
1	Tumakuru Road-Near Madvara	350 Mtr, West	13° 3'17.8"N	77° 28' 22.9"E	Proposed alignment and intersecting highway
2	Hesaraghatta Road-Near Mavallipura	450 Mtr, South-East	13° 6'49.4"N	77° 31' 29.0"E	Proposed alignment and intersecting highway
3	Near Indian Institute of Horticultural Research Centre	298 Mtr, North	13° 7' 49.9"N	77° 32' 29.2"E	Near proposed alignment/ study area
4	Bellary Road - Near Vinayaka Nagara	421 Mtr, North	13° 07' 15.1"N	77° 36' 36.2"E	Near Proposed alignment and intersecting highway
5	Near Hennur Road-Bharatiya City	172 Mtr, North-East	13° 5' 0.29"N	77° 38' 31.07"E	Proposed alignment and intersecting highway
6	Old Madras Road-Near Avalahalli	315 Mtr, South-West	13° 02' 11.06"N	77° 44' 8.69"E	Proposed alignment and intersecting highway
7	Near Channasandra Main Road	50 Mts, East	12° 59' 2.55"N	77° 46' 24.50"E	Proposed alignment and intersecting highway
8	Muthsandra Village	3.38 Kms,East	12° 56' 20.66"N	77° 47' 13.15"E	Near proposed alignment/ study area
9	Sarjapur Road- Near Sulikunte Village	377 Mtr, West	12° 53' 30.13"N	77° 43' 44.54"E	Near Proposed alignment and intersecting highway
10	Gattahalli Village	232 Mtrs, West	12° 52' 5.19"N	77° 42' 13.35"E	Near Proposed alignment and intersecting highway
11	Hosur Road - Near Konappana Agrahara	1042 Mtr, South	12° 50' 58.46"N	77° 40' 12.98"E	Near Proposed alignment and intersecting highway
12	Jigani Bommasandra Industrial Area	4430 Mtr, South	12° 49' 5.10"N	77° 40' 55.43"E	Industrial area close to the proposed alignment

ANNEXURE-15

CH,m	Package	RSR : FRL,m	RSR : GL,m	Right Service Road								
				Cut Section Details					Fill Section Details			
				Type	Avg Cut Width,m	Avg Cut Depth,m	Avg Cut Area,Sqm	Avg Cut Volume, Cum	Avg Fill Width,m	Avg Fill Depth,m	Avg Fill Area,Sqm	Avg Fill Volume, Cum
45000	III	860.25	857.996	Fill	0	0	0	0	28.324	1.204	283.24	341
46000	III	858.741	858.249	Cut	27.607	0.513	276.07	142	0	0	0	0
47000	III	857.872	855.578	Fill	0	0	0	0	28.347	1.227	283.47	348
48000	III	863.915	863.689	Cut	27.083	1.037	270.83	281	0	0	0	0
49000	III	879.375	878.825	Cut	27.553	0.567	275.53	156	0	0	0	0
50000	III	870.822	870.808	Cut	27.095	1.025	270.95	278	0	0	0	0
51000	III	885.994	887.014	Cut	25.9375	2.1825	259.375	566	0	0	0	0
52000	III	878.325	874.692	Fill	0	0	0	0	29.681	2.561	296.81	760
53000	III	880.562	877.813	Fill	0	0	0	0	28.9105	1.7905	289.105	518
54000	III	895.914	901.993	Cut	21.0095	7.1105	210.095	1494	0	0	0	0
55000	III	900.005	897.632	Fill	0	0	0	0	28.337	1.217	283.37	345
56000	III	895.576	893.515	Fill	0	0	0	0	28.088	0.968	280.88	272
57000	III	912.612	908.383	Fill	0	0	0	0	30.2825	3.1625	302.825	958
58000	III	898.755	895.617	Fill	0	0	0	0	29.1005	1.9805	291.005	576
59000	III	891.119	887.069	Fill	0	0	0	0	16.544	2.924	165.44	484
60000	III	899.386	899.078	Cut	27.377	0.743	273.77	203	0	0	0	0
61000	III	910.195	906.327	Fill	0	0	0	0	29.837	2.717	298.37	811
62000	III	903.657	917.89	Cut	12.758	15.362	127.58	1960	0	0	0	0
63000	III	905.543	914.95	Cut	17.732	10.388	177.32	1842	0	0	0	0
64000	III	906.732	905.232	Fill	0	0	0	0	33.76	0.44	337.6	149
64747.36	III	914.104	912.604	Fill	0	0	0	0	0	0	0	0

CH,m	Package	RSR : FRL,m	RSR : GL,m	Right Service Road								
				Cut Section Details					Fill Section Details			
				Type	Avg Cut Width,m	Avg Cut Depth,m	Avg Cut Area,Sqm	Avg Cut Volume, Cum	Avg Fill Width,m	Avg Fill Depth,m	Avg Fill Area,Sqm	Avg Fill Volume, Cum
20000	II	897.842	891.901	Fill	0	0	0	0	31.958	4.838	319.58	1546
21000	II	910.209	909.702	Cut	27.556	0.564	275.56	155	0	0	0	0
22000	II	903.083	903.774	Cut	26.416	1.704	264.16	450	0	0	0	0
23000	II	911.442	909.924	Fill	0	0	0	0	27.4545	0.3345	274.545	92
24000	II	911.3	904.275	Fill	0	0	0	0	33.089	5.969	330.89	1975
25000	II	911.372	907.738	Fill	0	0	0	0	29.7625	2.6425	297.625	786
26000	II	905.227	904.861	Cut	27.7235	0.3965	277.235	110	0	0	0	0
27000	II	893.73	896.371	Cut	24.3555	3.7645	243.555	917	0	0	0	0
28000	II	895.615	896.047	Cut	26.686	1.434	266.86	383	0	0	0	0
29000	II	876.57	874.139	Fill	0	0	0	0	28.509	1.389	285.09	396
30000	II	895.388	894.008	Fill	0	0	0	0	27.402	0.282	274.02	77
31000	II	875.98	874.2	Fill	0	0	0	0	27.8615	0.7415	278.615	207
32000	II	872.629	870.198	Fill	0	0	0	0	28.4855	1.3655	284.855	389
33000	II	871.639	869.396	Fill	0	0	0	0	28.2455	1.1255	282.455	318
34000	II	876.988	876.255	Cut	27.853	0.267	278.53	74	0	0	0	0
35000	II	889.881	886.239	Fill	0	0	0	0	29.6675	2.5475	296.675	756
36000	III	874.815	869.82	Fill	0	0	0	0	31.0555	3.9355	310.555	1222
37000	III	878.976	882.172	Cut	23.978	4.142	239.78	993	0	0	0	0
38000	III	888.664	887.338	Fill	0	0	0	0	27.4185	0.2985	274.185	82
39000	III	871.437	868.597	Fill	0	0	0	0	28.977	1.857	289.77	538
40000	III	871.363	869.534	Fill	0	0	0	0	27.8745	0.7545	278.745	210
41000	III	864.892	861.503	Fill	0	0	0	0	29.445	2.325	294.45	685
42000	III	858.496	855.726	Fill	0	0	0	0	28.8395	1.7195	288.395	496
43000	III	859.358	855.227	Fill	0	0	0	0	30.161	3.041	301.61	917
44000	III	858.26	858.038	Cut	27.7005	0.4195	277.005	116	0	0	0	0

CH,m	Package	RSR : FRL,m	RSR : GL,m	Right Service Road								
				Cut Section Details					Fill Section Details			
				Type	Avg Cut Width,m	Avg Cut Depth,m	Avg Cut Area,Sqm	Avg Cut Volume, Cum	Avg Fill Width,m	Avg Fill Depth,m	Avg Fill Area,Sqm	Avg Fill Volume, Cum
-367.781	I	860.38	858.88	Fill	0	0	0	0	0	0	0	0
-300	I	860.315	858.815	Fill	0	0	0	0	31.905	0.44	319.05	140
-200	I	861.289	859.789	Fill	0	0	0	0	31.905	0.44	319.05	140
-100	I	863.761	863.471	Cut	8.5	0.9345	85	79	0	0	0	0
-10	I	865.351	858.267	Fill	0	0	0	0	8.5	6.4235	85	546
0	I	865.376	857.493	Fill	0	0	0	0	8.5	6.615	85	562
1000	I	859.441	867.945	Cut	18.672	9.448	186.72	1764	0	0	0	0
2000	I	862.565	869.949	Cut	19.7105	8.4095	197.105	1658	0	0	0	0
3000	I	867.184	865.268	Fill	0	0	0	0	27.9565	0.8365	279.565	234
4000	I	878.364	871.285	Fill	0	0	0	0	19.6895	6.0695	196.895	1195
5000	I	861.489	861.003	Cut	27.4825	0.6375	274.825	175	0	0	0	0
6000	I	871.455	867.223	Fill	0	0	0	0	30.383	3.263	303.83	991
7000	I	881.965	882.088	Cut	26.9475	1.1725	269.475	316	0	0	0	0
8000	I	892.344	895.865	Cut	23.2095	4.9105	232.095	1140	0	0	0	0
9000	I	879.66	879.233	Cut	27.5385	0.5815	275.385	160	0	0	0	0
10000	I	888.688	887.005	Fill	0	0	0	0	27.742	0.622	277.42	173
11000	I	898.899	905.801	Cut	20.0085	8.1115	200.085	1623	0	0	0	0
12000	I	920.643	920.274	Cut	27.3935	0.7265	273.935	199	0	0	0	0
13000	I	925.049	923.452	Fill	0	0	0	0	27.5775	0.4575	275.775	126
14000	I	924.512	925.68	Cut	25.872	2.248	258.72	582	0	0	0	0
15000	I	904.651	912.474	Cut	26.5	9.0495	265	2398	0	0	0	0
16000	I	888.148	897.11	Cut	26.5	10.0305	265	2658	0	0	0	0
17000	I	893.927	904.063	Cut	26.5	11.219	265	2973	0	0	0	0
18000	I	903.935	901.011	Fill	0	0	0	0	28.899	1.779	288.99	514
19000	II	912.158	910.448	Fill	0	0	0	0	27.718	0.598	277.18	166

CH,m	Package	LSR : FRL,m	LSR : GL,m	Left Service Road								
				Cut Section Details					Fill Section Details			
				Type	Avg Cut Width,m	Avg Cut Depth,m	Avg Cut Area,Sqm	Avg Cut Volume, Cum	Avg Fill Width,m	Avg Fill Depth,m	Avg Fill Area,Sqm	Avg Fill Volume, Cum
44000	III	858.153	855.49	Fill	0	0	0	0	28.6785	1.5585	286.785	447
45000	III	860.304	857.115	Fill	0	0	0	0	29.2405	2.1205	292.405	620
46000	III	858.035	857.793	Cut	27.4275	0.6925	274.275	190	0	0	0	0
47000	III	858.389	855.597	Fill	0	0	0	0	28.8625	1.7425	288.625	503
48000	III	863.915	866.03	Cut	24.8895	3.2305	248.895	804	0	0	0	0
49000	III	880.647	880.52	Cut	27.085	1.035	270.85	280	0	0	0	0
50000	III	871.188	870.528	Cut	27.7305	0.3895	277.305	108	0	0	0	0
51000	III	885.55	888.693	Cut	23.966	4.154	239.66	996	0	0	0	0
52000	III	878.319	875.816	Fill	0	0	0	0	28.6435	1.5235	286.435	436
53000	III	880.619	878.131	Fill	0	0	0	0	28.5235	1.4035	285.235	400
54000	III	895.903	902.3	Cut	20.6755	7.4445	206.755	1539	0	0	0	0
55000	III	904.343	900.294	Fill	0	0	0	0	29.848	2.728	298.48	814
56000	III	895.654	894.018	Fill	0	0	0	0	27.7005	0.5805	277.005	161
57000	III	912.41	908.428	Fill	0	0	0	0	30.0665	2.9465	300.665	886
58000	III	898.769	896.656	Fill	0	0	0	0	28.235	1.115	282.35	315
59000	III	891.159	886.161	Fill	0	0	0	0	17.709	4.089	177.09	724
60000	III	899.419	897.589	Fill	0	0	0	0	28.289	1.169	282.89	331
61000	III	907.148	904.288	Fill	0	0	0	0	28.869	1.749	288.69	505
62000	III	903.634	918.193	Cut	12.549	15.571	125.49	1954	0	0	0	0
63000	III	905.544	914.237	Cut	18.273	9.847	182.73	1799	0	0	0	0
64000	III	907.173	905.673	Fill	0	0	0	0	33.76	0.44	337.6	149
64747.36	III	913.944	912.444	Fill	0	0	0	0	33.76	0.44	248.3386	109

CH,m	Package	LSR : FRL,m	LSR : GL,m	Left Service Road								
				Cut Section Details					Fill Section Details			
				Type	Avg Cut Width,m	Avg Cut Depth,m	Avg Cut Area,Sqm	Avg Cut Volume, Cum	Avg Fill Width,m	Avg Fill Depth,m	Avg Fill Area,Sqm	Avg Fill Volume, Cum
19000	II	910.716	909.628	Fill	0	0	0	0	27.2005	0.0805	272.005	22
20000	II	897.848	893.461	Fill	0	0	0	0	30.592	3.472	305.92	1062
21000	II	909.825	909.77	Cut	27.1105	1.0095	271.105	274	0	0	0	0
22000	II	905.948	904.654	Fill	0	0	0	0	27.3225	0.2025	273.225	55
23000	II	911.569	914.285	Cut	25.0855	3.0345	250.855	761	0	0	0	0
24000	II	911.122	908.699	Fill	0	0	0	0	28.6305	1.5105	286.305	432
25000	II	911.369	908.841	Fill	0	0	0	0	28.6065	1.4865	286.065	425
26000	II	903.78	903.989	Cut	26.804	1.316	268.04	353	0	0	0	0
27000	II	893.726	894.661	Cut	26.134	1.986	261.34	519	0	0	0	0
28000	II	893.38	895.051	Cut	25.2565	2.8635	252.565	723	0	0	0	0
29000	II	876.522	874.696	Fill	0	0	0	0	27.7705	0.6505	277.705	181
30000	II	896.982	894.755	Fill	0	0	0	0	28.261	1.141	282.61	322
31000	II	876.093	874.844	Fill	0	0	0	0	27.335	0.215	273.35	59
32000	II	872.386	871.265	Fill	0	0	0	0	27.1965	0.0765	271.965	21
33000	II	871.639	869.607	Fill	0	0	0	0	28.1485	1.0285	281.485	290
34000	II	876.686	876.14	Cut	27.5795	0.5405	275.795	149	0	0	0	0
35000	II	889.867	887.126	Fill	0	0	0	0	28.839	1.719	288.39	496
36000	III	874.44	870.359	Fill	0	0	0	0	29.9835	2.8635	299.835	859
37000	III	878.977	883.39	Cut	22.5445	5.5755	225.445	1257	0	0	0	0
38000	III	890.097	887.748	Fill	0	0	0	0	28.362	1.242	283.62	352
39000	III	871.459	868.862	Fill	0	0	0	0	28.689	1.569	286.89	450
40000	III	870.432	870.185	Cut	27.2865	0.8335	272.865	227	0	0	0	0
41000	III	864.907	862.117	Fill	0	0	0	0	28.867	1.747	288.67	504
42000	III	858.477	855.713	Fill	0	0	0	0	28.7965	1.6765	287.965	483
43000	III	859.322	855.369	Fill	0	0	0	0	30.2105	3.0905	302.105	934

CH,m	Package	LSR : FRL,m	LSR : GL,m	Left Service Road								
				Cut Section Details					Fill Section Details			
				Type	Avg Cut Width,m	Avg Cut Depth,m	Avg Cut Area,Sqm	Avg Cut Volume, Cum	Avg Fill Width,m	Avg Fill Depth,m	Avg Fill Area,Sqm	Avg Fill Volume, Cum
-367.781	I	857.713	856.213	Fill	0	0	0	0	0	0	0	0
-300	I	858.241	856.741	Fill	0	0	0	0	31.905	0.44	319.05	140
-200	I	853.925	852.425	Fill	0	0	0	0	31.905	0.44	319.05	140
-100	I	863.761	863.58	Cut	8.5	0.955	85	81	0	0	0	0
-10	I	865.351	859.89	Fill	0	0	0	0	8.5	3.8215	85	325
0	I	865.376	864.786	Cut	4.25	0.235	42.5	10	4.25	2.2005	42.5	94
1000	I	859.441	868.3	Cut	18.101	10.019	181.01	1814	0	0	0	0
2000	I	865.129	871.461	Cut	20.693	7.427	206.93	1537	0	0	0	0
3000	I	867.505	867.439	Cut	27.147	0.973	271.47	264	0	0	0	0
4000	I	877.831	865.774	Fill	0	0	0	0	24.531	10.911	245.31	2677
5000	I	861.441	860.38	Fill	0	0	0	0	27.1885	0.0685	271.885	19
6000	I	871.453	867.194	Fill	0	0	0	0	30.308	3.188	303.08	966
7000	I	881.54	879.688	Fill	0	0	0	0	27.985	0.865	279.85	242
8000	I	892.568	895.22	Cut	24.6385	3.4815	246.385	858	0	0	0	0
9000	I	882.401	877.07	Fill	0	0	0	0	31.0885	3.9685	310.885	1234
10000	I	888.107	885.592	Fill	0	0	0	0	28.5345	1.4145	285.345	404
11000	I	897.567	899.047	Cut	25.768	2.352	257.68	606	0	0	0	0
12000	I	920.376	922.438	Cut	25.011	3.109	250.11	778	0	0	0	0
13000	I	925.035	923.974	Fill	0	0	0	0	27.2255	0.1055	272.255	29
14000	I	925.457	924.139	Fill	0	0	0	0	27.427	0.307	274.27	84
15000	I	905.198	911.662	Cut	26.5	7.403	265	1962	0	0	0	0
16000	I	888.134	895.818	Cut	26.5	8.7455	265	2318	0	0	0	0
17000	I	893.891	905.663	Cut	26.5	12.822	265	3398	0	0	0	0
18000	I	903.982	901.239	Fill	0	0	0	0	28.839	1.719	288.39	496

CH,m	FRL,m	GL @ Median CL,m	GL @LCW,m	GL @RCW,m	Package	Right Main Carriageway								
						Cut Section Details					Fill Section Details			
						Type	Avg Cut Width,m	Avg Cut Depth,m	Avg Cut Area,Sqm	Avg Cut Volume, Cum	Avg Fill Width,m	Avg Fill Depth,m	Avg Fill Area,Sqm	Avg Fill Volume, Cum
44000	865.37	857.321	856.36	856.947	III	Fill	0.000	0.000	0.000	0	24.000	7.042	240.000	1690
45000	860.291	857.477	857.263	857.710	III	Fill	0.000	0.000	0.000	0	26.790	1.580	267.898	423
46000	862.133	858.134	857.895	857.928	III	Fill	0.000	0.000	0.000	0	25.997	2.891	259.970	751
47000	858.383	855.636	855.684	855.668	III	Fill	0.000	0.000	0.000	0	25.444	1.652	254.435	420
48000	863.915	865.043	865.762	864.497	III	Cut	24.284	1.927	242.835	468	0.000	0.000	0.000	0
49000	870.134	880.1	880.12	879.291	III	Cut	15.459	10.751	154.588	1662	0.000	0.000	0.000	0
50000	878.985	870.866	870.731	871.011	III	Fill	0.000	0.000	0.000	0	24.000	7.004	240.000	1681
51000	895.643	887.696	888.545	887.648	III	Fill	0.000	0.000	0.000	0	24.000	7.010	240.000	1682
52000	878.321	875.39	875.653	874.967	III	Fill	0.000	0.000	0.000	0	27.287	2.077	272.868	567
53000	883.412	878.076	878.038	877.848	III	Fill	0.000	0.000	0.000	0	24.000	4.417	240.000	1060
54000	895.91	902.183	902.396	902.198	III	Cut	18.805	7.405	188.045	1393	0.000	0.000	0.000	0
55000	899.985	899.043	899.6	898.550	III	Fill	13.015	0.090	130.150	12	12.647	0.042	126.468	5
56000	895.041	893.857	893.732	893.726	III	Fill	0.000	0.000	0.000	0	25.318	0.108	253.183	27
57000	912.586	908.484	908.512	908.498	III	Fill	0.000	0.000	0.000	0	28.208	2.997	282.075	846
58000	898.769	895.804	896.442	895.662	III	Fill	0.000	0.000	0.000	0	27.255	2.044	272.545	557
59000	891.136	886.681	886.399	886.899	III	Fill	0.000	0.000	0.000	0	37.500	3.399	375.000	1275
60000	899.389	898.398	897.908	898.560	III	Cut	26.036	0.175	260.355	45	0.000	0.000	0.000	0
61000	901.658	904.919	904.343	903.843	III	Cut	22.271	3.939	222.710	877	0.000	0.000	0.000	0
62000	903.646	918.193	918.225	918.104	III	Cut	10.613	15.597	106.130	1655	0.000	0.000	0.000	0
63000	905.546	914.821	914.327	914.959	III	Cut	15.692	10.518	156.915	1651	0.000	0.000	0.000	0
64000	913.029	905.028	906.175	904.999	III	Fill	0.000	0.000	0.000	0	17.800	6.837	178.000	1217
64747.36	908.777	912.787	912.044	912.214	III	Cut	17.800	4.997	130.937	654	0.000	0.000	0.000	0

CH,m	FRL,m	GL @ Median CL,m	GL @LCW,m	GL @RCW,m	Package	Right Main Carriageway								
						Cut Section Details					Fill Section Details			
						Type	Avg Cut Width,m	Avg Cut Depth,m	Avg Cut Area,Sqm	Avg Cut Volume, Cum	Avg Fill Width,m	Avg Fill Depth,m	Avg Fill Area,Sqm	Avg Fill Volume, Cum
19000	906.379	910.053	909.742	910.154	II	Cut	21.311	4.899	213.110	1044	0.000	0.000	0.000	0
20000	897.843	891.788	892.934	891.875	II	Fill	0.000	0.000	0.000	0	30.101	4.891	301.013	1472
21000	916.809	909.808	909.93	909.851	II	Fill	0.000	0.000	0.000	0	24.000	5.773	240.000	1386
22000	908.2	904.015	903.955	903.638	II	Fill	0.000	0.000	0.000	0	24.000	3.294	240.000	791
23000	910.451	909.969	910.402	910.280	II	Cut	25.585	0.625	255.850	160	0.000	0.000	0.000	0
24000	911.121	905.807	906.072	904.490	II	Fill	0.000	0.000	0.000	0	30.105	4.895	301.055	1474
25000	911.37	908.149	908.244	907.859	II	Fill	0.000	0.000	0.000	0	27.430	2.220	274.295	609
26000	898.397	904.394	904.861	904.607	II	Cut	18.919	7.291	189.190	1379	0.000	0.000	0.000	0
27000	893.722	895.593	895.347	896.264	II	Cut	22.978	3.232	229.780	743	0.000	0.000	0.000	0
28000	887.178	895.521	895.224	895.782	II	Cut	16.592	9.618	165.915	1596	0.000	0.000	0.000	0
29000	876.522	874.425	874.495	874.162	II	Fill	0.000	0.000	0.000	0	26.299	1.089	262.988	286
30000	887.123	894.768	894.884	894.060	II	Cut	17.819	8.391	178.188	1495	0.000	0.000	0.000	0
31000	876.718	874.416	874.533	874.177	II	Fill	0.000	0.000	0.000	0	26.480	1.269	264.795	336
32000	873.974	870.679	870.812	870.252	II	Fill	0.000	0.000	0.000	0	24.000	2.517	240.000	604
33000	871.638	869.465	869.512	869.382	II	Fill	0.000	0.000	0.000	0	26.356	1.146	263.555	302
34000	878.583	876.202	876.215	876.293	II	Fill	0.000	0.000	0.000	0	24.000	1.324	240.000	318
35000	889.869	886.731	886.535	886.285	II	Fill	0.000	0.000	0.000	0	27.499	2.288	274.985	629
36000	879.428	869.712	869.899	869.808	III	Fill	0.000	0.000	0.000	0	24.000	8.461	240.000	2031
37000	878.977	882.882	882.875	882.123	III	Cut	21.458	4.752	214.582	1020	0.000	0.000	0.000	0
38000	880.947	887.522	887.476	887.346	III	Cut	18.506	7.704	185.058	1426	0.000	0.000	0.000	0
39000	871.451	868.62	868.625	868.471	III	Fill	0.000	0.000	0.000	0	26.985	1.775	269.850	479
40000	876.218	869.904	869.962	869.553	III	Fill	0.000	0.000	0.000	0	24.000	5.249	240.000	1260
41000	864.895	861.947	861.611	861.591	III	Fill	0.000	0.000	0.000	0	27.269	2.059	272.690	561
42000	858.498	855.722	855.75	855.789	III	Fill	0.000	0.000	0.000	0	26.847	1.637	268.465	439
43000	859.341	855.214	855.387	855.037	III	Fill	0.000	0.000	0.000	0	28.351	3.141	283.513	891

CH,m	FRL,m	GL @ Median CL,m	GL @LCW,m	GL @RCW,m	Package	Right Main Carriageway								
						Cut Section Details					Fill Section Details			
						Type	Avg Cut Width,m	Avg Cut Depth,m	Avg Cut Area,Sqm	Avg Cut Volume, Cum	Avg Fill Width,m	Avg Fill Depth,m	Avg Fill Area,Sqm	Avg Fill Volume, Cum
-367.781	859.984	859.365	853.963	856.630	I	Fill	0.000	0.000	0.000	0	0.000	0.000	0.000	0
-300	859.038	858.17	854.491	856.565	I	Fill	0.000	0.000	0.000	0	19.655	0.576	196.550	113
-200	860.265	859.735	850.175	857.539	I	Fill	0.000	0.000	0.000	0	19.655	0.474	196.550	93
-100	863.761	864.074	861.566	863.382	I	Cut	12.000	0.985	120.000	118	0.000	0.000	0.000	0
-10	865.351	861.446	857.351	861.625	I	Fill	0.000	0.000	0.000	0	12.000	2.638	120.000	317
0	865.376	864.068	857.925	857.942	I	Fill	0.000	0.000	0.000	0	12.000	2.988	120.000	359
1000	859.441	868.152	868.533	867.508	I	Cut	16.608	9.602	166.078	1595	0.000	0.000	0.000	0
2000	869.441	870.563	871.651	870.505	I	Cut	23.785	2.425	237.853	577	0.000	0.000	0.000	0
3000	866.051	866.648	866.655	865.429	I	Cut	25.183	1.027	251.828	259	0.000	0.000	0.000	0
4000	877.793	868.63	867.342	870.992	I	Fill	0.000	0.000	0.000	0	37.500	6.828	375.000	2561
5000	861.453	861.306	860.502	860.919	I	Cut	25.523	0.687	255.228	175	0.000	0.000	0.000	0
6000	871.453	867.872	867.496	867.590	I	Fill	0.000	0.000	0.000	0	27.729	2.518	277.285	698
7000	889.01	881.1	880.752	881.879	I	Fill	0.000	0.000	0.000	0	24.000	6.508	240.000	1562
8000	892.577	896.092	895.626	895.590	I	Cut	21.918	4.292	219.178	941	0.000	0.000	0.000	0
9000	887.993	879.408	879.322	879.322	I	Fill	0.000	0.000	0.000	0	24.000	7.500	240.000	1800
10000	888.691	886.304	886.804	886.804	I	Fill	0.000	0.000	0.000	0	24.000	1.030	240.000	247
11000	910.822	901.875	900.835	905.224	I	Fill	0.000	0.000	0.000	0	24.000	6.327	240.000	1518
12000	930.402	921.384	921.625	920.355	I	Fill	0.000	0.000	0.000	0	24.000	8.401	240.000	2016
13000	931.388	923.638	923.618	923.470	I	Fill	0.000	0.000	0.000	0	24.000	6.903	240.000	1657
14000	922.438	924.971	924.832	925.574	I	Cut	22.313	3.897	223.130	870	0.000	0.000	0.000	0
15000	903.628	911.964	911.819	912.371	I	Cut	16.077	9.634	160.765	1549	0.000	0.000	0.000	0
16000	888.138	896.545	896.305	896.999	I	Cut	15.928	9.782	159.280	1558	0.000	0.000	0.000	0
17000	893.933	904.894	905.162	904.185	I	Cut	13.977	11.733	139.770	1640	0.000	0.000	0.000	0
18000	903.933	900.997	901.079	901.099	I	Fill	0.000	0.000	0.000	0	27.098	1.888	270.983	512

CH,m	FRL,m	GL @ Median CL,m	GL @LCW,m	GL @RCW,m	Package	Left Main Carriageway								
						Cut Section Details					Fill Section Details			
						Type	Avg Cut Width,m	Avg Cut Depth,m	Avg Cut Area,Sqm	Avg Cut Volume, Cum	Avg Fill Width,m	Avg Fill Depth,m	Avg Fill Area,Sqm	Avg Fill Volume, Cum
43000	859.341	855.214	855.387	855.037	III	Fill	0.000	0.000	0.000	0	28.189	2.978	281.885	840
44000	865.37	857.321	856.36	856.947	III	Fill	0.000	0.000	0.000	0	24.000	7.457	240.000	1790
45000	860.291	857.477	857.263	857.710	III	Fill	0.000	0.000	0.000	0	27.018	1.808	270.175	488
46000	862.133	858.134	857.895	857.928	III	Fill	0.000	0.000	0.000	0	26.016	2.918	260.163	759
47000	858.383	855.636	855.684	855.668	III	Fill	0.000	0.000	0.000	0	25.451	1.655	254.513	421
48000	863.915	865.043	865.762	864.497	III	Cut	23.561	2.649	235.610	624	0.000	0.000	0.000	0
49000	870.134	880.1	880.12	879.291	III	Cut	15.021	11.189	150.210	1681	0.000	0.000	0.000	0
50000	878.985	870.866	870.731	871.011	III	Fill	0.000	0.000	0.000	0	24.000	7.149	240.000	1716
51000	895.643	887.696	888.545	887.648	III	Fill	0.000	0.000	0.000	0	24.000	6.536	240.000	1569
52000	878.321	875.39	875.653	874.967	III	Fill	0.000	0.000	0.000	0	26.975	1.765	269.748	476
53000	883.412	878.076	878.038	877.848	III	Fill	0.000	0.000	0.000	0	24.000	4.358	240.000	1046
54000	895.91	902.183	902.396	902.198	III	Cut	18.722	7.488	187.215	1402	0.000	0.000	0.000	0
55000	899.985	899.043	899.6	898.550	III	Cut	25.501	0.709	255.005	181	0.000	0.000	0.000	0
56000	895.041	893.857	893.732	893.726	III	Fill	13.092	0.013	130.923	2	12.676	0.071	126.758	9
57000	912.586	908.484	908.512	908.498	III	Fill	0.000	0.000	0.000	0	28.209	2.999	282.088	846
58000	898.769	895.804	896.442	895.662	III	Fill	0.000	0.000	0.000	0	26.807	1.597	268.065	428
59000	891.136	886.681	886.399	886.899	III	Fill	0.000	0.000	0.000	0	37.500	3.649	375.000	1369
60000	899.389	898.398	897.908	898.560	III	Fill	0.000	0.000	0.000	0	25.536	0.326	255.358	83
61000	901.658	904.919	904.343	903.843	III	Cut	22.021	4.189	220.210	922	0.000	0.000	0.000	0
62000	903.646	918.193	918.225	918.104	III	Cut	10.571	15.639	105.712	1653	0.000	0.000	0.000	0
63000	905.546	914.821	914.327	914.959	III	Cut	15.991	10.219	159.910	1634	0.000	0.000	0.000	0
64000	913.029	905.028	906.175	904.999	III	Fill	0.000	0.000	0.000	0	17.800	6.232	178.000	1109
64747.36	908.777	912.787	912.044	912.214	III	Cut	17.800	4.827	130.937	632	0.000	0.000	0.000	0

CH,m	FRL,m	GL @ Median CL,m	GL @LCW,m	GL @RCW,m	Package	Left Main Carriageway								
						Cut Section Details					Fill Section Details			
						Type	Avg Cut Width,m	Avg Cut Depth,m	Avg Cut Area,Sqm	Avg Cut Volume, Cum	Avg Fill Width,m	Avg Fill Depth,m	Avg Fill Area,Sqm	Avg Fill Volume, Cum
17000	893.933	904.894	905.162	904.185	I	Cut	13.503	12.207	135.033	1648	0.000	0.000	0.000	0
18000	903.933	900.997	901.079	901.099	I	Fill	0.000	0.000	0.000	0	27.108	1.898	271.078	514
19000	906.379	910.053	909.742	910.154	II	Cut	21.516	4.694	215.162	1010	0.000	0.000	0.000	0
20000	897.843	891.788	892.934	891.875	II	Fill	0.000	0.000	0.000	0	29.598	4.388	295.978	1299
21000	916.809	909.808	909.93	909.851	II	Fill	0.000	0.000	0.000	0	24.000	5.746	240.000	1379
22000	908.2	904.015	903.955	903.638	II	Fill	0.000	0.000	0.000	0	24.000	3.102	240.000	744
23000	910.451	909.969	910.402	910.280	II	Cut	25.525	0.685	255.250	175	0.000	0.000	0.000	0
24000	911.121	905.807	906.072	904.490	II	Fill	0.000	0.000	0.000	0	29.254	4.044	292.543	1183
25000	911.37	908.149	908.244	907.859	II	Fill	0.000	0.000	0.000	0	27.268	2.057	272.675	561
26000	898.397	904.394	904.861	904.607	II	Cut	18.792	7.418	187.920	1394	0.000	0.000	0.000	0
27000	893.722	895.593	895.347	896.264	II	Cut	23.414	2.796	234.138	655	0.000	0.000	0.000	0
28000	887.178	895.521	895.224	895.782	II	Cut	16.883	9.327	168.828	1575	0.000	0.000	0.000	0
29000	876.522	874.425	874.495	874.162	II	Fill	0.000	0.000	0.000	0	26.134	0.924	261.340	241
30000	887.123	894.768	894.884	894.060	II	Cut	17.463	8.747	174.625	1528	0.000	0.000	0.000	0
31000	876.718	874.416	874.533	874.177	II	Fill	0.000	0.000	0.000	0	26.323	1.112	263.225	293
32000	873.974	870.679	870.812	870.252	II	Fill	0.000	0.000	0.000	0	24.000	2.247	240.000	539
33000	871.638	869.465	869.512	869.382	II	Fill	0.000	0.000	0.000	0	26.298	1.088	262.980	286
34000	878.583	876.202	876.215	876.293	II	Fill	0.000	0.000	0.000	0	24.000	1.364	240.000	327
35000	889.869	886.731	886.535	886.285	II	Fill	0.000	0.000	0.000	0	27.374	2.163	273.735	592
36000	879.428	869.712	869.899	869.808	III	Fill	0.000	0.000	0.000	0	24.000	8.365	240.000	2008
37000	878.977	882.882	882.875	882.123	III	Cut	21.115	5.095	211.152	1076	0.000	0.000	0.000	0
38000	880.947	887.522	887.476	887.346	III	Cut	18.422	7.788	184.218	1435	0.000	0.000	0.000	0
39000	871.451	868.62	868.625	868.471	III	Fill	0.000	0.000	0.000	0	26.941	1.731	269.405	466
40000	876.218	869.904	869.962	869.553	III	Fill	0.000	0.000	0.000	0	24.000	5.054	240.000	1213
41000	864.895	861.947	861.611	861.591	III	Fill	0.000	0.000	0.000	0	27.181	1.971	271.810	536
42000	858.498	855.722	855.75	855.789	III	Fill	0.000	0.000	0.000	0	26.859	1.649	268.590	443

EARTHWORKS, CUT AND FILL DETAILS

CH,m	FRL,m	GL @ Median CL,m	GL @LCW,m	GL @RCW,m	Package	Left Main Carriageway								
						Cut Section Details					Fill Section Details			
						Type	Avg Cut Width,m	Avg Cut Depth,m	Avg Cut Area,Sqm	Avg Cut Volume, Cum	Avg Fill Width,m	Avg Fill Depth,m	Avg Fill Area,Sqm	Avg Fill Volume, Cum
-367.781	859.984	859.365	853.963	856.630	I	Fill	0.000	0.000	0.000	0	0.000	0.000	0.000	0
-300	859.038	858.17	854.491	856.565	I	Fill	0.000	0.000	0.000	0	19.655	1.613	196.550	317
-200	860.265	859.735	850.175	857.539	I	Fill	0.000	0.000	0.000	0	19.655	4.000	196.550	786
-100	863.761	864.074	861.566	863.382	I	Cut	12.000	0.181	120.000	22	0.000	0.000	0.000	0
-10	865.351	861.446	857.351	861.625	I	Fill	0.000	0.000	0.000	0	12.000	5.090	120.000	611
0	865.376	864.068	857.925	857.942	I	Fill	0.000	0.000	0.000	0	12.000	4.061	120.000	487
1000	859.441	868.152	868.533	867.508	I	Cut	16.095	10.115	160.953	1628	0.000	0.000	0.000	0
2000	869.441	870.563	871.651	870.505	I	Cut	23.287	2.923	232.873	681	0.000	0.000	0.000	0
3000	866.051	866.648	866.655	865.429	I	Cut	24.536	1.674	245.363	411	0.000	0.000	0.000	0
4000	877.793	868.63	867.342	870.992	I	Fill	0.000	0.000	0.000	0	37.500	8.666	375.000	3250
5000	861.453	861.306	860.502	860.919	I	Cut	25.815	0.395	258.150	102	0.000	0.000	0.000	0
6000	871.453	867.872	867.496	867.590	I	Fill	0.000	0.000	0.000	0	27.872	2.662	278.720	742
7000	889.01	881.1	880.752	881.879	I	Fill	0.000	0.000	0.000	0	24.000	7.091	240.000	1702
8000	892.577	896.092	895.626	895.590	I	Cut	21.896	4.314	218.958	945	0.000	0.000	0.000	0
9000	887.993	879.408	879.322	879.322	I	Fill	0.000	0.000	0.000	0	24.000	7.603	240.000	1825
10000	888.691	886.304	886.804	886.804	I	Fill	0.000	0.000	0.000	0	24.000	1.200	240.000	288
11000	910.822	901.875	900.835	905.224	I	Fill	0.000	0.000	0.000	0	24.000	8.601	240.000	2064
12000	930.402	921.384	921.625	920.355	I	Fill	0.000	0.000	0.000	0	24.000	7.780	240.000	1867
13000	931.388	923.638	923.618	923.470	I	Fill	0.000	0.000	0.000	0	24.000	6.828	240.000	1639
14000	922.438	924.971	924.832	925.574	I	Cut	22.675	3.535	226.748	802	0.000	0.000	0.000	0
15000	903.628	911.964	911.819	912.371	I	Cut	16.376	9.334	163.755	1529	0.000	0.000	0.000	0
16000	888.138	896.545	896.305	896.999	I	Cut	16.237	9.473	162.370	1538	0.000	0.000	0.000	0

ANNEXURE-14

L. Details of land identified for Compensatory Afforestation

(i). Whether non-forest or Revenue forest land is required to be provided by User Agency?: Yes

(ii). Whether the area of non-forest land or Revenue forest land required to be provided by User Agency for raising Compensatory Afforestation is less than area of forest land proposed to be diverted ?: No

(iii). No. of districts involved for raising Compensatory Afforestation: 1

(iv). No. of patches: One

District 1. : Bangalore Urban
(a). Village: Matapa (b). Area(in ha.): 15.35 (c). Copy of KML file of the patch: View File (d). Khasra details: Sy No 156 (e). Present owner: User Agency (f). Copy of Ownership proof:

(v). Scanned copy of the map of the land identified for creation of Compensatory Afforestation prepared by using GPS ot Total Station:

(vi). Copy of Survey of India Toposheet in 1:50,000 scale indicating location of the land identified for creation of Compensatory Afforestation:

Additional information Details

Documents		
S.No	**Documents**	**Remarks**
1		Project Report
2		Survey Sketch
3		Survey Sketch1
4		Govt. Approval
5		undertaking

(ii). Nature of the Project: Linear

(b). No. of Segments : One

Segment wise details		
Segments	**Segment Area(in ha.)**	**Kml File of Segments** (To view KML file on google the same may be downloaded and then open if in google earth install in your computer).
1.	10.117	View File

(iii). Copy of Survey of India Toposheet indicating boundary of forest land proposed to be diverted: Map

(iv). Scanned copy of the Geo-referenced map of the forest land proposed to be diverted prepared by using GPS or Total Station: Map

D. Justification for locating the Project in forest land and details of alternatives examined:

(i). Copy of note containing justification for locating the Project in forest land:

(ii). Whether a copy of map indicating location of alternative examine is required to be provided: No

(a). Reason for not providing such map: It is Approved by the Govt of Karnataka for said a

E. Employment likely to be generated

(i). Whether the Project is likely to generate employment ?: Yes

(ii). Permanent/Regular Employment(Number of persons): 2000

(iii). Temporary Employment(Number of person-days): 3000

F. Displacement of People due to the Project, if any

(i). Whether Project involves displacement?: No

G. Details of Cost-Benefit analysis for the Project

(i). Whether the Project requires Cost-Benefit analysis?: Yes

(a). Copy of Cost-Benefit analysis:

H. Status of Environmental Clearance

(i). Whether the Project requires Clearance under the Environment (Protection) Act 1986 ? : No

I. Status of Wildelife Clearance

(i). Whether the Project or a part thereof is located in any Protected Area or their Eco sensitive zone? : No

J. Applicability of special provisions governing Scheduled Areas

(i).Whether the Project or a part thereof is located in a Scheduled Area? : No

K. Status of settlement of rights under the Forest Rights Act,2006 on the forest land proposed to be diverted

(i). Whether the process for settlement of Rights under the Forest Rights Acts 2006 on the forest land proposed to be diverted has been completed? : No

(xii). Landmark: BDA Head Office

(xiii). Email Address: aemegacitybda@gmail.com

(xiv). Landline Telephone No.: 80-23442273

(xv). Fax No.: NIL

(xvi). Mobile No.: 9449377654

(xvii). Copy of documents in support of the competence/authority of the person making this application to make application on behalf of the User Agency:

B. Details of land required for the Project

B-1. Details of proposal seeking prior approval of Central Government under the Act for diversion of forest land for the Project already submitted in the past

List of proposal submitted in Past							
S.no	Proposal Status.	Proposal No.	Moef File No.	Area Proposed for Diversion(Ha.)	Area Diverted(Ha.)	Date of In-Principle Approval	Date of Final Approval
NIL							

B-2. Details of forest land proposed to be diverted

B-2.1 Details of Divisions involved

Details of Divisions involved			
S.no	Division Name	Forest Land(ha.)	Non-Forest Land(ha.)
1.	Bangalore Urban	10.117	722.567
Total		10.117	722.567

B-2.2 Details of Districts involved

District wise breakup			
S.no	District Name	Forest Land(ha.)	Non-Forest Land(ha.)
1.	Bangalore Urban	10.117	722.567
Total		10.117	722.567

B-2.3 Village wise breakup

Villages wise breakup			
S.no	Village	Forest Land(ha.)	Non-Forest Land(ha.)
1	Jarakbande Kaval Sy No 59	10.117	722.567
Total		**10.117**	**722.567**

B-2.4 Component wise breakup

Component wise breakup			
S.no	Component	Forest Land(ha.)	Non-Forest Land(ha.)
1	Road	10.117	722.567
Total		**10.117**	**722.567**

C. Maps of forest land proposed to be diverted

Division 1. : Bangalore Urban
(i). Area of forest land proposed to be diverted(in ha.) : 10.117

FORM - A

Form for seeking prior approval of Central Government under section 2 of the Forest(Conservation) Act,1980 for Diversion of fresh forest area

PART - I

(To be filled up by User Agency)

A. General Details

A-1. Project Details

(i). **Proposal No. :** FP/KA/ROAD/45790/2020

(ii). **Name of Project for which Forest Land is required :** Construction of Eight lane Peripheral Ring Road to Bangalore City

(iii). **Short narrative of the proposal and Project/scheme for which the forest land is required :** The proposed PRR takes off on Tumkur road and terminates at Hosur road totaling 65 Kms. Bangalore city has radial road connected to ORR, it is necessary to develop an alternative concentric road around the city beyond ORR. Hence, it is advantageous to make use of existing access controlled NICE roa

(iv). **State :** Karnataka

(v). **Category of the Proposal :** Road

(vi). **Shape of forest land proposed to be diverted :** Linear

(vii). **Estimated cost of the Project(Rupees in lacs) :** 1511142

(viii). **Area of forest land proposed for diversion(in ha.):** 10.117

(ix). **Non-forest land required for this project(in ha.):** 722.567

(x). **Total period for which the forest land is proposed to be diverted(in years):** 5

A-2. Details of User Agency

(i). **Name :** BDA

(ii). **Address1 :** Executive Engineer Infrastructure Division, Banaglore Development Autority, Kumarapark West, T Chowdaiah Road

(iii). **Address2 :** NIL

(iv). **State :** Karnataka

(v). **District :** Bangalore Urban

(vi). **Pin :** 560020

(vii). **Landmark :** BDA Head Office

(viii). **Email address :** baemegacitybda@gmail.com

(ix). **Landline Telephone No. :** 80-23360843

(x). **Fax No. :** 80-

(xi). **Mobile No. :** 9341952991

(xii). **Website (if any) :** bdabengaluru.org

(xiii). **Legal status of User Agency :** State Government

A-3. Details of Person Making Application

(i). **First Name:** Suresh

(ii). **Middle Name:** NIL

(iii). **Last Name:** Engineer

(iv). **Gender:** Male

(v). **Designation:** Esecutive Engineer

(vi). **Address 1:** Bangalore Development Autority, Kumara Park West, T Chowdaiah Road Bangalore - 560020

(vii). **Address 2:** NIL

(viii). **State:** Karnataka

(ix). **District:** Bangalore Urban

(x). **Tehsil:** Bangalore South

(xi). **Pin:** 560020

ANNEXURE-13

(2) ಕೈಬಿಟ್ಟಿರುವ ಲಿಂಕ್‌ಗಳು, ಟೋಲ್ ಪ್ಲಾಜಾ, ಶೀಗೇಹಳ್ಳಿ ಮತ್ತು ಪೆಟ್ರೋನೆಟ್ ಪೈಪ್‌ಲೈನ್ ಬಳ ಪರ್ಯಾಯ ಜೋಡಣೆ, ನೈಸ್ ಇಂಟಗ್ರೇಷನ್, ಸಂಯೋಜನೆಯ ನಂತರ ಕ್ಲೋವರ್ ಲೀಫ್ ಅಳವಡಿಕೆಯಿಂದಾಗಿ ಬದಲಾವಣೆಗೆ ಅಗತ್ಯವಿರುವ ಜೋಡಣೆಯ ಮಾರ್ಪಾಡಿತ ಪಂಕ್ತಿಕರಣಕ್ಕೆ ಅಗತ್ಯವಿರುವ ಭೂಮಿಯನ್ನು ಪಿಆರ್‌ಆರ್ ನಿರ್ಮಾಣಕ್ಕಾಗಿ ಅಧಿಸೂಚನೆ ಹೊರಡಿಸುವುದು.

(3) ನಿಯಮಾನುಸಾರ ಭೂಸ್ವಾಧೀನ ಪ್ರಕ್ರಿಯೆಯನ್ನು ಪಾಲಿಸಿದ ನಂತರ ಐ-ತೀರ್ಮ ಒಪ್ಪಂದದ ಮುಖಾಂತರ ಅಥವಾ ಭೂಸ್ವಾಧೀನ ಪ್ರಕ್ರಿಯೆ ಮೂಲಕ ಸಚಿವ ಸಂಪುಟವು ನಿರ್ಧರಿಸುವ ದರದಲ್ಲಿ ಪರಿಹಾರ ನೀಡಲು ಅವಾರ್ಡ್ ಮಾಡಲು ಹಾಗೂ ಸದರಿ ಮೊತ್ತವನ್ನು ರಿಯಾಯಿತಿದಾರರು ಬೆಂಗಳೂರು ಅಭಿವೃದ್ಧಿ ಪ್ರಾಧಿಕಾರದ ಎಸ್ಕ್ರೋ ಖಾತೆಗೆ ಜಮಾ ಮಾಡುವ ಮೊತ್ತದಿಂದ ಭೂ ಮಾಲೀಕರಿಗೆ ಪರಿಹಾರ ನೀಡಿ ಪಿ.ಆರ್.ಆರ್. ಯೋಜನೆಗೆ ಅಧಿಸೂಚಿಸಿರುವ ಜಮೀನನ್ನು ಸ್ವಾಧೀನಕ್ಕೆ ಪಡೆಯುವುದು.

(4) ಪಿಪಿಪಿ ಮಾದರಿಯಲ್ಲಿ ಟೆಂಡರ್ ಕರೆಯುವುದು ಮತ್ತು ಬೆಂಗಳೂರು ಅಭಿವೃದ್ಧಿ ಪ್ರಾಧಿಕಾರದೊಂದಿಗೆ ಆದಾಯವನ್ನು ಹಂಚಿಕೆ ಮಾಡಿಕೊಳ್ಳುವ ಆಧಾರದ ಮೇಲೆ ರಿಯಾಯಿತಿದಾರರನ್ನು ಆಯ್ಕೆ ಮಾಡುವುದು.

(5) ಸದರಿ ರಸ್ತೆಯನ್ನು 50 ವರ್ಷಗಳ ಅವಧಿಗೆ ಗುತ್ತಿಗೆಗೆ ನೀಡಲು ಹಾಗೂ ರಿಯಾಯಿತಿದಾರರು ಬೆಂಗಳೂರು ಅಭಿವೃದ್ಧಿ ಪ್ರಾಧಿಕಾರದೊಂದಿಗೆ 50 ವರ್ಷಗಳ ಅವಧಿಗೆ ಆದಾಯವನ್ನು ಹಂಚಿಕೆ ಮಾಡಿಕೊಳ್ಳುವುದು.

ಸದರಿ ಆದೇಶವನ್ನು ದಿನಾಂಕ: 08.02.2022ರ ಸಚಿವ ಸಂಪುಟದ ಪ್ರಕರಣ ಸಂಖ್ಯೆ: ಸಿ-63/2022ರ ತೀರ್ಮಾನದನ್ವಯ ಹೊರಡಿಸಲಾಗಿದೆ.

ಕರ್ನಾಟಕ ರಾಜ್ಯಪಾಲರ ಆದೇಶಾನುಸಾರ
ಮತ್ತು ಅವರ ಹೆಸರಿನಲ್ಲಿ,

(ಎಸ್. ವೀಣಾ)
ಸರ್ಕಾರದ ಅಧೀನ ಕಾರ್ಯದರ್ಶಿ,
ನಗರಾಭಿವೃದ್ಧಿ ಇಲಾಖೆ.

ಇವರಿಗೆ,

1. ಮಹಾಲೇಖಪಾಲರು, ಕರ್ನಾಟಕ, ಬೆಂಗಳೂರು.
2. ಸರ್ಕಾರದ ಅಪರ ಮುಖ್ಯ ಕಾರ್ಯದರ್ಶಿ, ಆರ್ಥಿಕ ಇಲಾಖೆ, ವಿಧಾನಸೌಧ, ಬೆಂಗಳೂರು.
3. ಸರ್ಕಾರದ ಪ್ರಧಾನ ಕಾರ್ಯದರ್ಶಿ, ಕಂದಾಯ ಇಲಾಖೆ, ಬೆಂಗಳೂರು.
4. ಆಯುಕ್ತರು, ಬೆಂಗಳೂರು ಅಭಿವೃದ್ಧಿ ಪ್ರಾಧಿಕಾರ, ಬೆಂಗಳೂರು.
5. ಆಯುಕ್ತರು, ಬೃಹತ್ ಬೆಂಗಳೂರು ಮಹಾನಗರ ಪಾಲಿಕೆ, ಬೆಂಗಳೂರು.
6. ಅಭಿಯಂತರ ಸದಸ್ಯರು, ಬೆಂಗಳೂರು ಅಭಿವೃದ್ಧಿ ಪ್ರಾಧಿಕಾರ, ಬೆಂಗಳೂರು.
7. ಉಪ ಆಯುಕ್ತರು (ಭೂಸ್ವಾಧೀನ), ಬೆಂಗಳೂರು ಅಭಿವೃದ್ಧಿ ಪ್ರಾಧಿಕಾರ, ಬೆಂಗಳೂರು.

ಪ್ರತಿ:

1. ಸರ್ಕಾರದ ಜಂಟಿ ಕಾರ್ಯದರ್ಶಿ, ಸಚಿವ ಸಂಪುಟ ಶಾಖೆ, ವಿಧಾನಸೌಧ, ಬೆಂಗಳೂರು.
2. ಮಾನ್ಯ ಮುಖ್ಯಮಂತ್ರಿಯವರ ಪ್ರಧಾನ ಕಾರ್ಯದರ್ಶಿಯವರ ಆಪ್ತ ಕಾರ್ಯದರ್ಶಿ, ವಿಧಾನಸೌಧ, ಬೆಂಗಳೂರು.
3. ಮಾನ್ಯ ಮುಖ್ಯ ಕಾರ್ಯದರ್ಶಿಯವರ ಆಪ್ತ ಕಾರ್ಯದರ್ಶಿ, ವಿಧಾನಸೌಧ, ಬೆಂಗಳೂರು.
4. ಸರ್ಕಾರದ ಅಪರ ಮುಖ್ಯ ಕಾರ್ಯದರ್ಶಿ ರವರ ಆಪ್ತ ಕಾರ್ಯದರ್ಶಿ, ನಗರಾಭಿವೃದ್ಧಿ ಇಲಾಖೆ.
5. ಶಾಖಾ ರಕ್ಷಾ ಕಡತ/ಹೆಚ್ಚುವರಿ ಪ್ರತಿ.

ಮೇಲೆ ಓದಲಾದ ಕ್ರಮ ಸಂಖ್ಯೆ: (9)ರ ದಿನಾಂಕ: 01.01.2020ರ ಆದೇಶದಲ್ಲಿ ಪಿ.ಆರ್.ಆರ್. ನಿರ್ಮಾಣಕ್ಕಾಗಿ ಭೂಸ್ವಾಧೀನ ವೆಚ್ಚಕ್ಕಾಗಿ 2019-20ನೇ ಸಾಲಿನ ಲೆಕ್ಕಶೀರ್ಷಿಕೆ 6217-60-800-0-06-loans ರಿಂದ ರೂ.10000.00 ಲಕ್ಷಗಳ ಮೊತ್ತವನ್ನು ಸಾಲದ ರೂಪದಲ್ಲಿ ಬಿಡುಗಡೆಗೊಳಿಸಲು ಅನುಮೋದನೆ ನೀಡಲಾಗಿತ್ತು.

ಮೇಲೆ ಓದಲಾದ ಕ್ರಮ ಸಂಖ್ಯೆ: (10)ರ ದಿನಾಂಕ: 07.06.2021ರ ಪತ್ರದಲ್ಲಿ ಆಯುಕ್ತರು, ಬೆಂಗಳೂರು ಅಭಿವೃದ್ಧಿ ಪ್ರಾಧಿಕಾರ ರವರು ದಿನಾಂಕ: 23.02.2021ರ ಪ್ರಾಧಿಕಾರದ ಸಭೆಯ ವಿಷಯ ಸಂಖ್ಯೆ: 17/2021ರನ್ವಯ Swiss Challenge ಮಾದರಿಯಲ್ಲಿ ಪಿ.ಪಿ.ಪಿ. ಅನ್ನು ಅಳವಡಿಸಿ ಕ್ರಮ ಕೈಗೊಳ್ಳಲು ರಾಜ್ಯ ಮಟ್ಟದ ಏಕಗವಾಕ್ಷಿ ಸಮಿತಿಯ ಸಭೆಯಲ್ಲಿ ಮಂಡಿಸುವ ಸಲುವಾಗಿ ದಿನಾಂಕ: 08.04.2021ರ ಪತ್ರದೊಂದಿಗೆ ಸರ್ಕಾರಕ್ಕೆ ಪ್ರಸ್ತಾವನೆ ಸಲ್ಲಿಸಲಾಗಿದ್ದು, ಈ ಮಧ್ಯೆ ಐ.ಓ.ಟಿ.ಸಿ. ಗ್ರೂಪ್ ರವರು ಪಿ.ಆರ್.ಆರ್. ಯೋಜನೆಯನ್ನು ಅನುಷ್ಠಾನಗೊಳಿಸಲು ಆಸಕ್ತಿ ತೋರಿ ವಿವರವಾದ ಪ್ರಸ್ತಾವನೆ ಸಲ್ಲಿಸಿರುವುದರಿಂದ, ಸದರಿ ವಿಷಯದ ಬಗ್ಗೆ ಮುಂದಿನ ಪ್ರಾಧಿಕಾರದ ಸಭೆಯಲ್ಲಿ ಮಂಡಿಸಿ ಅಗತ್ಯ ಪ್ರಸ್ತಾವನೆಯನ್ನು ಸಲ್ಲಿಸುವಂತೆ ಸರ್ಕಾರದ ಪತ್ರ ದಿನಾಂಕ: 01.04.2021 ರಲ್ಲಿ ತಿಳಿಸಲಾಗಿತ್ತು.

ಪಿ.ಆರ್.ಆರ್. ಯೋಜನೆಯನ್ನು ಅನುಷ್ಠಾನಗೊಳಿಸಲು ಎರಡು ಕಂಪನಿಗಳು ಆಸಕ್ತಿ ತೋರಿರುವುದರಿಂದ Swiss Challenge ಮಾದರಿಯಲ್ಲಿ ಅನುಷ್ಠಾನಗೊಳಿಸಲು ಸಾಧ್ಯವಿಲ್ಲವಾದ್ದರಿಂದ, ಪಿ.ಆರ್.ಆರ್. ಯೋಜನೆಯನ್ನು ಕಾರ್ಯಗತಗೊಳಿಸಲು ಪಿ.ಪಿ.ಪಿ. ಅಡಿಯಲ್ಲಿ (DBFOT) ಮಾದರಿಯಲ್ಲಿ ಭೂಸ್ವಾಧೀನ ವೆಚ್ಚ ಒಳಗೊಂಡಂತೆ ತುರ್ತಾಗಿ ಬಿಡಿಎ ವತಿಯಿಂದ ಜಾಗತಿಕ ಟೆಂಡರ್ ಆಹ್ವಾನಿಸಲು ಹಾಗೂ ಎಸ್.ಪಿ.ವಿ.ಗೆ ಭೂಸ್ವಾಧೀನಪಡಿಸಿಕೊಳ್ಳುವ ಅವಕಾಶವಿಲ್ಲದ ಕಾರಣ ಎಸ್.ಪಿ.ವಿ.ಯನ್ನು ರದ್ದುಗೊಳಿಸಲು ದಿನಾಂಕ: 17.05.2021ರ ಪ್ರಾಧಿಕಾರದ ಸಭೆಯ ವಿಷಯ ಸಂಖ್ಯೆ: 44/2021 ರಲ್ಲಿ ಸರ್ಕಾರಕ್ಕೆ ಶಿಫಾರಸ್ಸು ಮಾಡಲು ತೀರ್ಮಾನಿಸಲಾಗಿರುತ್ತದೆ. ಅದರಂತೆ, ಸದರಿ ಯೋಜನೆಯನ್ನು ಕಾರ್ಯಗತಗೊಳಿಸಲು ವಿಳಂಬವಾಗಿದ್ದು, ಯೋಜನಾ ವೆಚ್ಚ ಹೆಚ್ಚಾಗಿರುವುದರಿಂದ ಪಿ.ಪಿ.ಪಿ. ಅಡಿಯಲ್ಲಿ DBFOT ಮಾದರಿಯಲ್ಲಿ ಭೂಸ್ವಾಧೀನ ವೆಚ್ಚ ಒಳಗೊಂಡಂತೆ ತುರ್ತಾಗಿ ಬಿಡಿಎ ವತಿಯಿಂದ ಜಾಗತಿಕ ಟೆಂಡರ್ ಆಹ್ವಾನಿಸಲು ಹಾಗೂ ಎಸ್.ಪಿ.ವಿ. ರದ್ದುಗೊಳಿಸಿ ಬಿ.ಡಿ.ಎ. ವತಿಯಿಂದ ಯೋಜನೆಯನ್ನು ಅನುಷ್ಠಾನಗೊಳಿಸಲು ಸರ್ಕಾರದ ಅನುಮೋದನೆ ಕೋರಿರುತ್ತಾರೆ.

ಆಯುಕ್ತರು, ಬೆಂಗಳೂರು ಅಭಿವೃದ್ಧಿ ಪ್ರಾಧಿಕಾರ ರವರ ದಿನಾಂಕ: 07.06.2021ರ ಪತ್ರದಲ್ಲಿನ ಪ್ರಸ್ತಾವನೆಯನ್ನು ಹಾಗೂ ಮೇಲೆ ಓದಲಾದ ಸರ್ಕಾರದ ಆದೇಶಗಳನ್ನು ಪರಿಶೀಲಿಸಿ, ಸರ್ಕಾರವು ಈ ಕೆಳಕಂಡಂತೆ ಆದೇಶಿಸಿದೆ.

<u>ಸರ್ಕಾರದ ಆದೇಶ ಸಂಖ್ಯೆ: ನಅಇ 214 ಎಂಎನ್‌ಜೆ 2018, ಬೆಂಗಳೂರು ದಿನಾಂಕ: 21.02.2022</u>

ಮೇಲೆ ವಿವರಿಸಿರುವ ಅಂಶಗಳ ಹಿನ್ನೆಲೆಯಲ್ಲಿ, ಒಟ್ಟು 2567-22.5 ಎಕರೆ ವಿಸ್ತೀರ್ಣದಲ್ಲಿ ಬೆಂಗಳೂರು ಪೆರಿಫೆರಲ್ ರಿಂಗ್ ರಸ್ತೆ ನಿರ್ಮಾಣ ಮಾಡುವ ಯೋಜನೆಯನ್ನು ಈ ಕೆಳಕಂಡ ಅಂಶಗಳನ್ವಯ ಅನುಷ್ಠಾನಗೊಳಿಸಲು ಸರ್ಕಾರದ ಅನುಮೋದನೆ ನೀಡಿದೆ.

(1) ಪಿಪಿಪಿ-ಡಿಬಿಎಫ್‌ಓಟಿ (ಸಾರ್ವಜನಿಕ ಖಾಸಗಿ ಸಹಭಾಗಿತ್ವ-ವಿನ್ಯಾಸ, ನಿರ್ಮಾಣ, ಆರ್ಥಿಕ, ನಿರ್ವಹಣೆ ಹಾಗೂ ವರ್ಗಾವಣೆ) ಮಾದರಿಯಲ್ಲಿ ರಿಯಾಯಿತಿದಾರರಿಂದ ಪಿ.ಆರ್.ಆರ್ ಅನ್ನು ಸಂಪೂರ್ಣ ಧನಸಹಾಯದ ಯೋಜನೆಯಾಗಿ (ಭೂಸ್ವಾಧೀನ ಮತ್ತು ನಿರ್ಮಾಣ ನಿರ್ವಹಣೆ ಮತ್ತು ಕಾರ್ಯಾಚರಣೆಯ ವೆಚ್ಚ) ಕಾರ್ಯಗತಗೊಳಿಸುವುದು.

ಮೇಲೆ ಓದಲಾದ ಕ್ರಮ ಸಂಖ್ಯೆ (4) ರ ದಿನಾಂಕ: 11.07.2016ರ ಆದೇಶದಲ್ಲಿ ಪೆರಿಫೆರಲ್ ರಿಂಗ್ ರಸ್ತೆ ಯೋಜನೆಯ ಪರಿಷ್ಕೃತ ಅಂದಾಜು ವೆಚ್ಚ ರೂ.11950 ಕೋಟಿ (ರೂ.8100 ಕೋಟಿ ಭೂಸ್ವಾಧೀನಕ್ಕಾಗಿ ಮತ್ತು ರೂ.3850 ಕೋಟಿ ರಸ್ತೆ ನಿರ್ಮಾಣಕ್ಕಾಗಿ Intelligent Transport System ಒಳಗೊಂಡಂತೆ) ವೆಚ್ಚದಲ್ಲಿ ಅನುಷ್ಠಾನಗೊಳಿಸಲು ಹಾಗೂ ಪೆರಿಫೆರಲ್ ರಿಂಗ್ ರಸ್ತೆ ಯೋಜನೆಯನ್ನು Special Purpose Vehicle (SPV) ಮೂಲಕ ಅನುಷ್ಠಾನಗೊಳಿಸಲು ಅನುಮೋದನೆ ನೀಡಲಾಗಿತ್ತು.

ಮೇಲೆ ಓದಲಾದ ಕ್ರಮ ಸಂಖ್ಯೆ: (5) ರ ದಿನಾಂಕ: 06.12.2016 ರ ಆದೇಶದಲ್ಲಿ ಪೆರಿಫೆರಲ್ ರಿಂಗ್ ರಸ್ತೆಯನ್ನು ಅನುಷ್ಠಾನಗೊಳಿಸಲು SPV ನ್ನು ಕಂಪನೀಸ್ ಆಕ್ಟ್ 2013ರ ಅಡಿಯಲ್ಲಿ ಅಳವಡಿಸಿಕೊಳ್ಳಲು ಸರ್ಕಾರದ ಅನುಮೋದನೆ ನೀಡಲಾಗಿರುತ್ತದೆ.

ಮೇಲೆ ಓದಲಾದ ಕ್ರಮ ಸಂಖ್ಯೆ: (6) ರ ದಿನಾಂಕ: 24.11.2018ರ ಆದೇಶದಲ್ಲಿ ಪೆರಿಫೆರಲ್ ರಿಂಗ್ ರಸ್ತೆಯನ್ನು ರಾಜ್ಯ ಸರ್ಕಾರದ ಸಂಪೂರ್ಣ ಹಣದಿಂದ ಭರಿಸಲಾಗುವ ಯೋಜನೆಯಾಗಿ ಅನುಷ್ಠಾನಗೊಳಿಸಲು ಹಾಗೂ ಪಿ.ಆರ್.ಆರ್. ಯೋಜನೆಯನ್ನು ಅನುಷ್ಠಾನಗೊಳಿಸಲು 2018–19ನೇ ಸಾಲಿನಲ್ಲಿ ರೂ.1000 ಕೋಟಿಗಳು, 2019–20ನೇ ಸಾಲಿನಲ್ಲಿ ರೂ.2000 ಕೋಟಿಗಳು, 2020–21ನೇ ಸಾಲಿನಲ್ಲಿ ರೂ.3500 ಕೋಟಿಗಳು ಮತ್ತು 2021–22 ನೇ ಸಾಲಿನಲ್ಲಿ ರೂ.3500 ಕೋಟಿಗಳು, 2022–23ನೇ ಸಾಲಿನಿಂದ 2032–33 ರವರೆಗೆ ಉಳಿದ ಹಣವನ್ನು ವರ್ಷವಾರು ಪ್ರಮಾಣದಲ್ಲಿ ಮೂಲಸೌಲಭ್ಯ ನಿಧಿಯಿಂದ ರಾಜ್ಯ ಸರ್ಕಾರದ ಸಾಲ ಒದಗಿಸಲು ಸರ್ಕಾರದ ಅನುಮೋದನೆ ನೀಡಲಾಗಿತ್ತು.

ಮೇಲೆ ಓದಲಾದ ಕ್ರಮ ಸಂಖ್ಯೆ: (7)ರ ದಿನಾಂಕ: 03.10.2019ರ ಆದೇಶದಲ್ಲಿ ಪಿ.ಆರ್.ಆರ್. ರಸ್ತೆ ನಿರ್ಮಾಣಕ್ಕಾಗಿ ಭೂಸ್ವಾಧೀನ ಪಡಿಸಿಕೊಂಡಿರುವ ಜಮೀನಿನ ಭೂಪರಿಹಾರ ಮೌಲ್ಯವನ್ನು ಮಾನ್ಯ ಉಚ್ಚ ನ್ಯಾಯಾಲಯದ ನಿರ್ದೇಶನದಂತೆ ಭೂಸ್ವಾಧೀನ ಕಾಯ್ದೆ 2013ರಡಿ ನಿರ್ಧರಿಸಿ ಭೂಪರಿಹಾರವನ್ನು ನಗದು / ಟಿ.ಡಿ.ಆರ್. ರೂಪದಲ್ಲಿ ನೀಡಲು, ಸದರಿ ಯೋಜನೆಗೆ ಅಗತ್ಯವಿರುವ ಸರ್ಕಾರಿ ಜಮೀನನ್ನು ಉಚಿತವಾಗಿ ಎಸ್.ಪಿ.ವಿ.ಗೆ ಹಸ್ತಾಂತರಿಸಲು, ಮಂಡಳಿ ಮತ್ತು ನಿಗಮಗಳಿಗೆ ಸೇರಿದ ಜಮೀನುಗಳಿಗೆ ಮಾರ್ಗಸೂಚಿ ದರಕ್ಕೆ ಸಮನಾದ ಭೂಪರಿಹಾರ ನೀಡಲು, ಡಿ.ಪಿ.ಆರ್. ಸಿದ್ಧಪಡಿಸಲು, ಈ ಯೋಜನೆಗೆ ಭೂಸ್ವಾಧೀನ ವೆಚ್ಚವನ್ನು ಸರ್ಕಾರದಿಂದ ಸಾಲದ ರೂಪದಲ್ಲಿ ನೀಡುತ್ತಿರುವುದರಿಂದ ರಸ್ತೆ ನಿರ್ಮಾಣಕ್ಕಾಗಿ ಅಗತ್ಯವಿರುವ ಮೊತ್ತವನ್ನು ಜೈಕಾದಿಂದ ಸಾಲದ ರೂಪದಲ್ಲಿ ಪಡೆಯಲು ಹಾಗೂ ಜೈಕಾದಿಂದ ಸಾಲದ ರೂಪದಲ್ಲಿ ಪಡೆದ ಮೊತ್ತವನ್ನು ಮರುಪಾವತಿಸಲು ಎಸ್.ಪಿ.ವಿ. ಜವಾಬ್ದಾರಿಯಾಗಿರುತ್ತದೆ ಎಂದು ಡಿ.ಪಿ.ಆರ್. ಸಿದ್ಧಪಡಿಸುವಾಗ ವಿವರವಾದ ವಿಧಾನಗಳನ್ನು ರಚಿಸಲು ಅನುಮೋದನೆ ನೀಡಲಾಗಿರುತ್ತದೆ.

ಮೇಲೆ ಓದಲಾದ ಕ್ರಮ ಸಂಖ್ಯೆ: (8)ರ ದಿನಾಂಕ: 24.12.2019ರ ಆದೇಶದಲ್ಲಿ ಪಿ.ಆರ್.ಆರ್. ನಿರ್ಮಾಣಕ್ಕಾಗಿ ಅಗತ್ಯವಿರುವ ಅಂದಾಜು ವೆಚ್ಚ ರೂ.5616.41 ಕೋಟಿಗಳ ಪೈಕಿ ಶೇ.16 ರಷ್ಟು ಮೊತ್ತವನ್ನು ರಾಜ್ಯ ಸರ್ಕಾರದ ಪಾಲಾಗಿ ನಗರಾಭಿವೃದ್ಧಿ ಇಲಾಖೆಗೆ ನೀಡಲು, ಇನ್ನುಳಿದ ಶೇ.84 ರಷ್ಟು ಮೊತ್ತವನ್ನು ಜೈಕಾ ಸಂಸ್ಥೆಯಿಂದ ಸಾಲದ ರೂಪದಲ್ಲಿ 3 ಹಂತಗಳಲ್ಲಿ ಪಡೆಯಲು, ಭೂಸ್ವಾಧೀನ ಪ್ರಕ್ರಿಯೆಯನ್ನು 3 ಹಂತಗಳಲ್ಲಿ ಕೈಗೊಳ್ಳಲು ಹಾಗೂ ಸದರಿ ಯೋಜನೆಯ ಪ್ರಾಥಮಿಕ ಯೋಜನಾ ವರದಿಯನ್ನು ಭಾರತ ಸರ್ಕಾರದ ಅನುಮೋದನೆಗೆ ಸಲ್ಲಿಸಲು ಅನುಮೋದನೆ ನೀಡಲಾಗಿತ್ತು.

ಕರ್ನಾಟಕ ಸರ್ಕಾರದ ನಡವಳಿಗಳು

ವಿಷಯ: **ಪೆರಿಫೆರಲ್ ರಿಂಗ್ ರಸ್ತೆ ಅನುಷ್ಠಾನ – ಪೆರಿಫೆರಲ್ ರಿಂಗ್ ರಸ್ತೆಯನ್ನು ಹಲವು ಮಾರ್ಪಾಡುಗಳೊಂದಿಗೆ ನಿರ್ಮಾಣ ಮಾಡುವ ಪ್ರಸ್ತಾವನೆಗೆ ಅನುಮೋದನೆ ನೀಡುವ ಕುರಿತು.**

ಓದಲಾಗಿದೆ:

1. ಸರ್ಕಾರದ ಆದೇಶ ಸಂಖ್ಯೆ: ನಅಇ 399 ಎಂಎನ್ಎಕ್ಸ್ 2006, ದಿನಾಂಕ: 23.04.2007.
2. ಸರ್ಕಾರದ ಅಧಿಸೂಚನೆ ಸಂಖ್ಯೆ: ನಅಇ 399 ಎಂಎನ್ಎಕ್ಸ್ 2006, ದಿನಾಂಕ: 29.06.2007.
3. ಸರ್ಕಾರದ ಆದೇಶ ಸಂಖ್ಯೆ: ನಅಇ 345 ಬೆಂಆಸೇ 2013, ದಿನಾಂಕ: 20.09.2013.
4. ಸರ್ಕಾರದ ಆದೇಶ ಸಂಖ್ಯೆ: ನಅಇ 345 ಬೆಂಆಸೇ 2013, ದಿನಾಂಕ: 11.07.2016.
5. ಸರ್ಕಾರದ ಆದೇಶ ಸಂಖ್ಯೆ: ನಅಇ 345 ಬೆಂಆಸೇ 2013, ದಿನಾಂಕ: 06.12.2016.
6. ಸರ್ಕಾರದ ಆದೇಶ ಸಂಖ್ಯೆ: ನಅಇ 214 ಬೆಂಆಸೇ 2018, ದಿನಾಂಕ: 24.11.2018.
7. ಸರ್ಕಾರದ ಆದೇಶ ಸಂಖ್ಯೆ: ನಅಇ 214 ಬೆಂಆಸೇ 2018, ದಿನಾಂಕ: 03.10.2019.
8. ಸರ್ಕಾರದ ಆದೇಶ ಸಂಖ್ಯೆ: ನಅಇ 214 ಬೆಂಆಸೇ 2018, ದಿನಾಂಕ: 24.12.2019.
9. ಸರ್ಕಾರದ ಆದೇಶ ಸಂಖ್ಯೆ: ನಅಇ 214 ಬೆಂಆಸೇ 2018, ದಿನಾಂಕ: 01.01.2020.
10. ಆಯುಕ್ತರು, ಬೆಂಗಳೂರು ಅಭಿವೃದ್ಧಿ ಪ್ರಾಧಿಕಾರ ಇವರ ಪತ್ರ ಸಂಖ್ಯೆ: ಬೆಂಅಪ್ರಾ/ಆಯುಕ್ತರು/ಅಸ/ಪಿಆರ್ಆರ್/49/2021–22, ದಿನಾಂಕ: 07.06.2021.
11. ಆಯುಕ್ತರು, ಬೆಂಗಳೂರು ಅಭಿವೃದ್ಧಿ ಪ್ರಾಧಿಕಾರ ಇವರ ಪತ್ರ ಸಂಖ್ಯೆ: ಬೆಂಅಪ್ರಾ/ಆಯುಕ್ತರು/ಅಸ/ಪಿಆರ್ಆರ್/ಟಿ–132/2021–22, ದಿನಾಂಕ: 31.08.2021.

ಪ್ರಸ್ತಾವನೆ:

ಮೇಲೆ ಓದಲಾದ ಕ್ರಮ ಸಂಖ್ಯೆ (1) ರ ಆದೇಶದಲ್ಲಿ ಪೆರಿಫೆರಲ್ ರಿಂಗ್ ರಸ್ತೆ ಭಾಗ–1ರ ಯೋಜನೆಗೆ ಸರ್ಕಾರದ ಅನುಮೋದನೆ ನೀಡಲಾಗಿತ್ತು. ತದನಂತರ ಮೇಲೆ ಓದಲಾದ ಕ್ರಮ ಸಂಖ್ಯೆ (2) ರ ಅಧಿಸೂಚನೆಯಲ್ಲಿ ಪ್ರಸ್ತಾವಿತ ಪೆರಿಫೆರಲ್ ರಿಂಗ್ ರಸ್ತೆ ನಿರ್ಮಾಣಕ್ಕಾಗಿ ಅವಶ್ಯಕವಾದ 1810 ಎಕರೆ 18.5 ಗುಂಟೆ ಜಮೀನನ್ನು ಭೂಸ್ವಾಧೀನ ಪಡಿಸಿಕೊಳ್ಳಲು ಅಂತಿಮ ಅಧಿಸೂಚನೆಯನ್ನು ಹೊರಡಿಸಲಾಗಿರುತ್ತದೆ.

ಮೇಲೆ ಓದಲಾದ ಕ್ರಮ ಸಂಖ್ಯೆ (3) ರ ಆದೇಶದಲ್ಲಿ ಪಿ.ಆರ್.ಆರ್. ನಿರ್ಮಾಣ ಯೋಜನೆಯ ಒಟ್ಟಾರೆ ಅಂದಾಜು 5800 ಕೋಟಿಗಳಾಗಿದ್ದು, ಇದರಲ್ಲಿ ರೂ.3870 ಕೋಟಿ ಮೊತ್ತದ ಐ.ಟಿ.ಎಸ್. ಅನ್ನು ಒಳಗೊಂಡ ಪಿ.ಆರ್.ಆರ್. ನಿರ್ಮಾಣಕ್ಕೆ ಜೈಕಾ ಸಂಸ್ಥೆಯಿಂದ ಆರ್ಥಿಕ ಸಹಾಯ ಪಡೆದು ಬೆಂಗಳೂರು ಅಭಿವೃದ್ಧಿ ಪ್ರಾಧಿಕಾರದ ವತಿಯಿಂದ ಅನುಷ್ಠಾನಗೊಳಿಸಲು, ಬೆಂಗಳೂರು ಮತ್ತು ಮೈಸೂರು ನಗರಗಳಿಗೆ ಐ.ಟಿ.ಎಸ್. ಯೋಜನೆಯನ್ನು ತಯಾರಿಸುವ ಕುರಿತು ಜೈಕಾ ಸಂಸ್ಥೆಯಿಂದ ತಾಂತ್ರಿಕ ಸಹಾಯ ಪಡೆಯಲು ಹಾಗೂ ಐ.ಟಿ.ಎಸ್. ಯೋಜನೆಯನ್ನು ತಯಾರಿಸಲು ನಗರ ಭೂಸಾರಿಗೆ ನಿರ್ದೇಶನಾಲಯವನ್ನು ನೋಡಲ್ ಏಜೆನ್ಸಿಯಾಗಿ ನೇಮಿಸಲು ಮತ್ತು ಈಗಾಗಲೇ ನಿರ್ಮಿಸಿರುವ ನೈಸ್ ರಸ್ತೆಗೆ ಪಿ.ಆರ್.ಆರ್. ಅನ್ನು ಸೇರಿಸಲು ಸರ್ಕಾರದ ಅಪರ ಮುಖ್ಯ ಕಾರ್ಯದರ್ಶಿರವರ ಅಧ್ಯಕ್ಷತೆಯಲ್ಲಿ ಯೋಜನಾ ಮೇಲುಸ್ತುವಾರಿ ಸಮಿತಿಯನ್ನು ರಚಿಸಲು ಸರ್ಕಾರದ ಮಂಜೂರಾತಿ ನೀಡಲಾಗಿತ್ತು.

ANNEXURE-12

3. It is further submitted that, based on the To Rs of SEIAA and MoEF&CC guidelines, the Draft EIA report was prepared and submitted to Karnataka State Pollution Control Board for conducting Environmental Public Hearing for the Project. Accordingly, the Public Hearing has been completed on 18.08.2020. In addition, as per the suggestions of the elected representatives, civic bodies and public, a virtual Public Hearingwas also conducted on 03.09.2020 for receiving comments from the public on the project.

4. It is further submitted that, Peenya Industrial Area and Jigani-Bommasandra Industrial Area which are notified as severely polluted area and critically polluted areas by CPCB are located at a distance of 3.4 Km and 4 km respectively from the proposed project alignment. Further, Puttenahalli Bird Conservation Reserve notified under the Wildlife (Protection) Act, 1972 is located at a distance of 1.49 Km from the project alignment. Therefore, the project attracts the General Conditions of EIA Notification, 2006. In view of the Hon'ble Supreme Court directions Dt: 17.03.2020 and the applicability of General Conditions, a clarification letter was submitted to MoEF&CC on 07.09.2020 (Ref-3) pertaining to categorization of the project.

5. The MoEF&CC vide its letter Dt: 04.[illegible]2020 provided clarification stating that said project or activity specified in Category 'B' shall be a[illegible]aised at the Central Level as Category 'A'. It was also suggested that further action may be tak[illegible] by the PP as per the directions of the Hon'ble Supreme Court of India and in case the SEAC/SEIAA are satisfied with the applicability of General Conditions, they may transfer the proposal to Ministry for its appraisal at Central Level in accordance with the provisions of the EIA Notification, 2006 (Ref-4).

6. Further, due to change in total land requirement for the project from 733 Ha to 1036.51 Ha due to change in length of the project from 65.5 km to 73.5 km due to realignment and inclusion of cloverleaf structures at chainages CH 0+000 km to CH 3+400 km (NICE integration at Tumkur Road), 28+843.36 km to CH 31+896.76 km (Near Bilishivale), CH 37+996.76 km to CH 44+400 km (Near Sigehalli) and CH 60+619.92 km to CH 64+700 km (NICE integration at Hosur Road). An application seeking Amendment to ToRs for submitted to SEIAA, Karnataka and the Corrigendum to ToRs was issued by SEIAA, Karnataka vide letter Dt: 25.02.2022 (Ref-5).

7. Mean while, the validity of the Virtual Public Hearing held on 23.09.2020 was challenged by the public at the Hon'ble High Court of Karnataka. After detailed deliberations, the Hon'ble High Court of Karnataka vide its Judgement Dt:23.02.2021 (Ref-6) disposed off the case with a direction to conduct a fresh public hearing in the physical form. In view of this, the Revised Draft EIA/EMP report was prepared and submitted to KSPCB for conducting Public Consultation and simultaneously, a fresh Public Consultation in physical form was [illegible]nducted on 13.07.2022.

Now, in view of the MoEF&CC Clarification [illegible]er, it is hereby requested to transfer the file to MOEF&CC due to applicability of General Co[illegible]itions so that the Final EIA/EMP report can be submitted to MoEF&CC for further appraisal for [illegible]ue of Environmental Clearance.

Yours faithfully,

26/7/22

Executive Engineer,
Infrastructure Division-3
Bangalore Development Authority,
Bengaluru.

ಬೆಂಗಳೂರು ಅಭಿವೃದ್ಧಿ ಪ್ರಾಧಿಕಾರ

Bangalore Development Authority

ಸಂಖ್ಯೆ : BDA/EE/ID-3/PRR/99/2022-23
No.

ದಿನಾಂಕ : 08/07/2022
Date :

To,
The Member Secretary,
Karnataka State Environment Impact
Assessment Authority (SEIAA),
Dept., of Forest, Ecology and Environment,
7th Floor, M.S Building,
Bangalore - 560001.

01/08/22

Sir,

Sub: Development of Eight Lane Peripheral Ring Road – Phase –I connecting Tumakuru Road to Hosur Road (crossing Ballari Road and Old Madras Road)by Bangalore Development Authority, Government of Karnataka (File No.: SEIAA 40 IND 2019)– request for transfer of file to MoEF&CC – reg.,

Ref:
1. Terms of References issued by State Level Environment Impact Assessment Authority (SEIAA), Karnataka vide letter No.: SEIAA 40 IND 2019 Dt: 21.01.2020.
2. The Hon'ble Supreme Court Judgement Dt: 17.03.2020
3. BDA clarification letter to MoEF&CC Dt: 07.09.2020
4. MoEF&CC Clarification letter No.: F. No. 19-53/2020-IA.III Dt: 04.12.2020
5. Corrigendum to Terms of References (ToRs) issued by SEIAA, Karnataka vide letter No.: SEIAA 40 IND 2019 Dt: 25.02.2022
6. The Hon'ble High Court of Karnataka Judgement Dt:23.02.2021

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1. Bangalore city has 2 existing circular ring roads viz., Inner Ring Road (IRR) of 29 Km length, Outer Ring Road (ORR) of 65 Km length with crowded development on either side of the RoW. Hence, further augmentations of these roads are techno-economically not feasible for the growing traffic. In view of this, it is essential to develop an alternative road facility away from ORR for movement of commercial and personalized vehicles entering the city. The city should have a circular ring road beyond ORR to connect all Primary and Secondary roads to reduce traffic congestion on all radial roads. By using the existing access controlled NICE road and to complete the circle of road to fulfil the demands of existing and growing traffic, it is proposed to implement Peripheral Ring Road (PRR) of 65.50 Km with 8 lane configurations to Bangalore city. The purpose of the PRR is to relive the traffic congestion in the metropolitan region and to provide linkage to the radial and arterial roads within the city. This project also aims at connecting new urban nodes outside the city and also provides quick access to Bangalore International Airport from various parts of the city. In view of this, an application seeking To Rs for the project was submitted and the ToRs was issued by SEIAA, Karnataka on 21.01.2020 (Ref-1).

2. Further, the Hon'ble Supreme Court pronounced its judgment on 17.03.2020, wherein it was clarified that the project is qualified to be an 'expressway' and directed to obtain the EC as per Schedule 7(f) of the EIA Notification, 2006 and its amendments (Para 34). The Hon'ble Supreme Court also directed SEAC and SEIAA to appraise the project in accordance with the EIA Notification, 2006 and its subsequent amendments (Ref-2).

Jigani Bommasandra Industrial Area (12°49'5.10"N 77°40'55.43"E)														
MONTH/YEAR	DATE	WEEK	PM_{10}, µg/ m^3	$PM_{2.5}$, µg/ m^3	SO_2, µg/ m^3	NO_2, µg/ m^3	Pb, µg/ m^3	Ni, ng/ m^3	As, ng/ m^3	CO, mg/ m^3	O_3, µg/ m^3	NH_3, µg/ m^3	C_6H_6, µg/ m^3	BaP, ng/ m^3
December 2019	02.12.2019	I	88.9	33	10.39	28.47	0.104	3.69	BDL	1.24	5.11	5.21	BDL	BDL
	07.12.2019		86.8	32.8	9.27	24.85	0.14	1.49	BDL	1.32	4.9	5.56	BDL	BDL
	11.12.2019	II	82	34.1	8.97	23.53	0.052	2.96	BDL	1.24	3.48	5.07	BDL	BDL
	14.12.2019		86.5	37.2	6.64	47.27	0.033	6.02	BDL	1.05	3.23	4.37	BDL	BDL
	16.12.2019	III	84.6	26.9	6.03	43.86	0.035	1.46	BDL	1.23	3.58	4.16	BDL	BDL
	19.12.2019		87.3	25.8	6.64	41.01	0.03	2.2	BDL	1.34	3.47	4.16	BDL	BDL
	24.12.2019	IV	80.6	26	5.62	51.12	0.052	5.87	BDL	1.26	3.05	4.33	BDL	BDL
	27.12.2019		85.8	28.2	5.78	25.72	0.08	2.24	BDL	1.72	2.48	3.94	BDL	BDL
January 2020	03.01.2020	I	58.6	18.6	5.78	16.71	0.01	8.08	BDL	1.17	4.35	3.58	BDL	BDL
	06.01.2020		77.1	25	4.46	14.84	0.045	5.78	BDL	1.29	4.28	3.13	BDL	BDL
	11.01.2020	II	81.6	23.1	5.48	12.55	0.038	7.32	BDL	1.43	4.56	3.31	BDL	BDL
	13.01.2020		87.4	28.3	5.79	14.29	0.036	6.49	BDL	1.56	4.91	3.57	BDL	BDL
	16.01.2020	III	90.9	26	9.95	16.47	0.08	8.01	BDL	1.65	4.57	3.72	BDL	BDL
	21.01.2020		84.8	26.8	9.37	27.27	0.205	8.82	BDL	1.78	4.8	4.02	BDL	BDL
	25.01.2020	IV	90.1	28.3	8	21.71	0.116	10.29	BDL	1.91	4.26	3.25	BDL	BDL
	29.01.2020		82.1	25	6.74	18.44	0.119	9.44	BDL	1.75	3.78	3.02	BDL	BDL
February 2020	05.02.2020	I	58.9	25.4	7.36	19.98	0.037	8.07	BDL	1.24	4.64	3.92	BDL	BDL
	08.02.2020		73.6	26.4	5.78	22.04	0.051	9.55	BDL	1.43	4.51	3.3	BDL	BDL
	10.02.2020	II	77.2	27.5	6.74	15.49	0.2	10.27	BDL	1.53	5.09	3.47	BDL	BDL
	13.02.2020		79.3	25.9	7.48	19.42	0.171	12.33	BDL	1.42	5.22	3.18	BDL	BDL
	18.02.2020	III	84.7	24.6	10.21	20.51	0.026	5.87	BDL	1.46	4.44	3.52	BDL	BDL
	21.02.2020		86.5	23.9	8.48	27.93	0.048	5.88	BDL	1.51	4.93	3.85	BDL	BDL
	24.02.2020	IV	89.3	24.1	8.74	27.82	0.046	3.67	BDL	1.35	3.84	3.55	BDL	BDL
	27.02.2020		87.5	22.3	7.69	20.4	0.045	7.34	BDL	1.29	4.22	3.89	BDL	BDL

Note: BDL- Below Detectable Limit

Table 3: Results of Particulate Matter (PM_{10}) – Percentile

LOCATION	MAX	MIN	AVG	SD	GM	PERCENTILE			
						98	85	50	35
A1	87.4	66.1	76.96	5.76	76.75	87.31	81.80	77.90	75.14
A2	79.6	50.4	66.45	9.04	65.84	78.59	75.36	69.15	62.76
A3	81.8	45.7	63.63	9.62	62.89	78.90	71.93	65.75	61.28
A4	91.1	77.6	84.78	3.59	84.71	90.69	88.08	85.05	83.71
A5	79.7	54.7	70.88	6.06	70.62	79.06	75.98	71.90	70.94
A6	82	57.1	74.22	6.47	73.93	81.31	79.63	76.70	73.79
A7	91.5	67.7	79.91	5.60	79.72	90.03	85.20	80.00	78.53
A8	83.9	44.8	75.98	5.29	75.79	82.84	80.77	76.80	75.15
A9	80.8	51.6	70.13	6.34	69.81	79.56	75.75	70.00	69.40
A10	83.5	44.8	70.16	10.24	69.37	82.63	80.66	69.90	68.42
A11	87.7	7.09	76.08	15.92	71.30	87.06	84.71	79.85	77.81
A12	90.9	58.6	82.17	8.45	81.69	90.53	88.27	84.75	82.01

Table 4: Results of Particulate Matter ($PM_{2.5}$) – Percentile

LOCATION	MAX	MIN	AVG	SD	GM	PERCENTILE			
						98	85	50	35
A1	35.6	17.9	23.13	3.67	22.88	33.12	24.67	22.50	21.72
A2	28.7	12.6	19.9208	3.45	19.63	26.81	22.60	20.00	18.81
A3	21.9	9.6	16.375	3.55	15.98	21.62	20.30	16.40	15.22
A4	39.7	23.4	28.4042	3.64	28.20	37.81	30.97	27.85	26.31
A5	27.4	15	20.99	3.34	20.73	26.76	24.58	21.00	19.73
A6	28.5	13.2	21.4542	4.52	20.93	27.81	25.32	22.85	21.35
A7	31.8	14.4	22.65	4.08	22.31	30.97	28.30	22.20	20.72
A8	37.4	15.8	25.12	5.26	24.57	34.59	29.86	26.45	22.84
A9	33.7	15.2	21.70	4.26	21.33	31.12	24.90	21.40	19.12
A10	25.7	7.9	21.01	3.98	20.51	25.42	24.42	22.30	20.16
A11	28.4	14.1	24.325	2.76	24.14	28.08	26.29	24.75	24.20
A12	37.2	18.6	26.8833	4.04	26.60	35.77	30.78	26.00	25.42

Table 5: Results of Sulphur di-oxide (SO_2) - Percentile

LOCATION	MAX	MIN	AVG	SD	GM	PERCENTILE			
						98	85	50	35
A1	9.42	5.72	7.07	1.11	6.99	9.20	8.25	6.98	6.35
A2	8.87	4.66	6.77	1.08	6.69	8.81	8.05	6.69	6.21
A3	10.48	4.81	7.61	1.66	7.43	10.31	9.44	7.72	6.44
A4	11.15	4.96	7.17	1.74	6.99	10.92	8.84	6.66	6.17
A5	10.53	4.66	7.45	1.47	7.31	10.24	8.79	7.32	7.09
A6	9.37	4.86	7.05	1.28	6.94	9.32	8.25	7.11	6.30
A7	11.43	4.84	7.81	1.95	7.57	10.94	9.87	7.40	6.49
A8	11.11	4	7.26	1.88	7.03	10.57	9.48	7.14	6.11
A9	9.42	4.26	7.30	1.15	7.20	9.13	8.39	7.38	7.09
A10	11	4.31	7.50	1.95	7.25	10.52	9.48	6.84	6.28
A11	11.22	5.22	7.40	1.87	7.19	11.17	9.42	6.77	5.96
A12	10.39	4.46	7.39	1.70	7.20	10.31	9.33	7.05	6.64

Table 6: Results of Nitrogen di-oxide (NO_2) – Percentile

LOCATION	MAX	MIN	AVG	SD	GM	PERCENTILE			
						98	85	50	35
A1	34.85	16.05	23.91	4.72	23.48	33.64	28.97	23.28	22.43
A2	30.56	12.87	21.50	5.09	20.91	30.16	27.20	20.68	18.41
A3	27.04	16.91	17.91	3.09	17.67	24.69	20.48	18.00	16.54
A4	36.5	15.16	23.98	5.61	23.37	35.89	29.44	23.39	22.27
A5	29.57	13.63	20.93	4.49	20.53	29.47	26.33	19.71	18.88
A6	37.93	15.17	25.46	6.79	24.60	37.14	33.42	24.14	22.37
A7	34.03	15.72	23.70	5.34	23.13	33.75	28.89	23.33	21.07
A8	43.42	14.73	26.72	6.83	25.87	41.71	32.32	26.88	24.82
A9	37.16	15.93	25.84	5.03	25.36	35.95	30.04	25.91	24.11
A10	41.77	13.08	23.68	6.57	22.84	36.87	29.91	22.57	20.75
A11	35.24	14.18	25.08	6.49	24.20	35.04	31.52	26.57	22.30
A12	51.12	12.55	25.07	10.62	23.28	49.35	35.37	21.88	20.00

Table 7: Results of Lead (Pb) – Percentile

LOCATION	MAX	MIN	AVG	SD	GM	PERCENTILE			
						98	85	50	35
A1	0.164	0.015	0.06	0.04	0.05	0.15	0.10	0.06	0.05
A2	0.14	0.018	0.06	0.03	0.05	0.14	0.09	0.06	0.04
A3	0.219	0.0104	0.06	0.05	0.05	0.18	0.11	0.05	0.04
A4	0.279	0.016	0.08	0.07	0.06	0.27	0.15	0.05	0.04
A5	0.238	0.011	0.07	0.06	0.06	0.20	0.11	0.05	0.04
A6	0.202	0.011	0.06	0.05	0.05	0.19	0.10	0.04	0.03
A7	0.401	0.011	0.08	0.09	0.05	0.33	0.15	0.04	0.03
A8	0.407	0.011	0.10	0.08	0.07	0.31	0.15	0.09	0.07
A9	0.161	0.022	0.05	0.03	0.04	0.13	0.07	0.04	0.03
A10	0.271	0.018	0.06	0.06	0.05	0.22	0.10	0.04	0.04
A11	0.153	0.011	0.05	0.03	0.04	0.14	0.07	0.04	0.04
A12	0.205	0.01	0.07	0.06	0.06	0.20	0.13	0.05	0.05

Table 8: Results of Nickel (Ni) - Percentile

LOCATION	MAX	MIN	AVG	SD	GM	PERCENTILE			
						98	85	50	35
A1	11.31	1.47	7.91	2.11	7.48	11.28	9.59	8.24	7.35
A2	10.68	1.52	5.28	2.43	4.72	10.00	8.21	4.86	4.01
A3	12.03	2.92	6.50	2.24	6.12	11.24	8.86	6.39	5.87
A4	10.49	2.87	7.34	2.25	6.96	10.48	10.14	7.56	6.62
A5	9.58	1.48	5.83	2.21	5.35	9.53	8.53	5.90	4.55
A6	13.95	1.46	6.53	3.11	5.68	12.62	9.22	6.67	5.16
A7	11.74	3.7	7.89	2.23	7.55	11.53	10.67	7.54	7.34
A8	11.36	2.2	7.21	2.53	6.68	11.20	9.61	8.05	5.92
A9	11.07	2.92	6.75	2.38	6.35	11.07	9.57	6.29	5.23
A10	9.51	2.2	5.95	2.29	5.46	9.50	8.92	5.90	5.14
A11	11.81	1.96	5.36	2.82	4.68	11.44	8.52	5.13	3.76
A12	12.33	1.46	6.38	3.03	5.49	11.39	9.50	6.26	5.87

Table 9: Results of Carbon monoxide (CO) – Percentile

LOCATION	MAX	MIN	AVG	SD	GM	PERCENTILE			
						98	85	50	35
A1	1.34	0.65	0.95	0.17	0.94	1.28	1.14	0.93	0.89
A2	1.11	0.53	0.79	0.14	0.77	1.05	0.93	0.78	0.75
A3	0.98	0.38	0.66	0.16	0.64	0.93	0.81	0.68	0.62
A4	1.92	0.96	1.36	0.26	1.34	1.86	1.64	1.37	1.25
A5	1.24	0.7	0.90	0.13	0.90	1.18	1.03	0.87	0.83
A6	1	0.58	0.80	0.10	0.79	0.98	0.88	0.81	0.77
A7	3.89	0.82	1.18	0.61	1.10	1.77	1.33	1.00	0.96
A8	1.31	0.57	0.89	0.18	0.87	1.25	1.05	0.91	0.82
A9	0.98	0.53	0.72	0.11	0.71	0.92	0.83	0.73	0.66
A10	1.14	0.49	0.75	0.15	0.74	1.08	0.89	0.74	0.67
A11	1.21	0.57	0.81	0.17	0.79	1.15	0.97	0.79	0.72
A12	1.91	1.05	1.42	0.22	1.41	1.85	1.69	1.39	1.29

Table 10: Results of Ozone (O_3) – Percentile

LOCATION	MAX	MIN	AVG	SD	GM	PERCENTILE			
						98	85	50	35
A1	4.15	2.24	3.28	0.50	3.24	4.15	3.91	3.26	3.09
A2	3.71	1.68	2.70	0.56	2.64	3.65	3.37	2.59	2.37
A3	4.08	1.25	2.67	0.89	2.51	4.02	3.52	2.93	2.03
A4	5.2	3.29	4.02	0.53	3.99	5.03	4.61	3.90	3.78
A5	4.12	2.19	3.21	0.50	3.17	4.06	3.64	3.23	3.09
A6	3.77	2.36	3.14	0.40	3.12	3.74	3.61	3.15	2.99
A7	5.73	3.56	4.76	0.61	4.72	5.67	5.37	4.76	4.66
A8	4.16	2.14	3.23	0.48	3.19	3.98	3.70	3.27	3.10
A9	4.03	2.08	3.33	0.55	3.28	3.98	3.89	3.45	3.34
A10	4.25	2.72	3.61	0.41	3.58	4.20	4.10	3.66	3.49
A11	4.94	2.09	3.81	0.76	3.73	4.88	4.62	3.85	3.64
A12	5.22	2.48	4.24	0.73	4.17	5.17	4.92	4.40	4.22

Table 11: Results of Ammonia (NH_3) - Percentile

LOCATION	MAX	MIN	AVG	SD	GM	PERCENTILE			
						98	85	50	35
A1	5.64	3.08	4.05	0.66	4.00	5.58	4.62	3.92	3.77
A2	5.42	3.02	3.98	0.55	3.94	5.13	4.47	3.98	3.76
A3	4.7	3.39	3.98	0.32	3.97	4.62	4.31	3.95	3.82
A4	6.06	3.7	4.38	0.55	4.35	5.86	4.74	4.29	4.15
A5	4.93	3.15	4.01	0.43	3.99	4.87	4.44	3.97	3.86
A6	5.18	2.9	3.94	0.55	3.90	5.09	4.40	3.83	3.70
A7	5.87	1.07	3.95	0.87	3.82	5.61	4.62	3.82	3.72
A8	5.01	3.62	4.20	0.33	4.19	4.92	4.48	4.14	4.08
A9	5.22	2.84	3.79	0.71	3.73	5.16	4.70	3.56	3.37
A10	4.85	3.35	4.00	0.36	3.98	4.75	4.32	3.94	3.85
A11	5.87	3.58	4.34	0.63	4.30	5.75	4.83	4.21	4.03
A12	5.56	3.02	3.88	0.66	3.83	5.40	4.35	3.79	3.55

ISOPLETHS

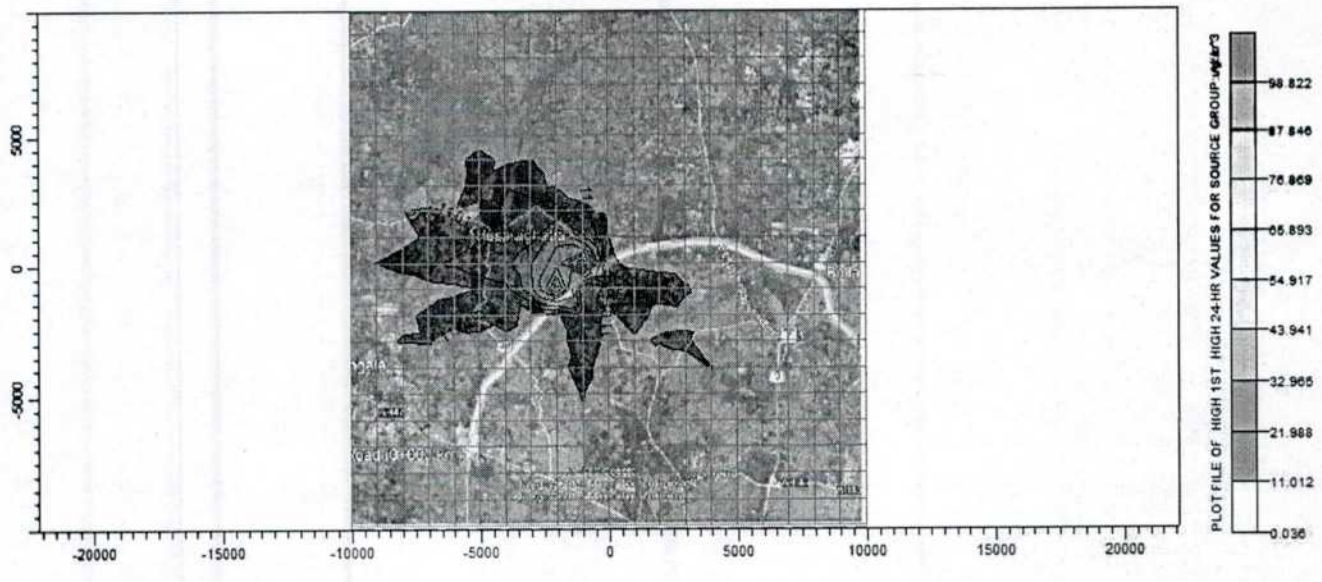


Fig 1: Isopleth drawn for PM in Section 1 of PRR alignment without mitigation measures (Construction phase)

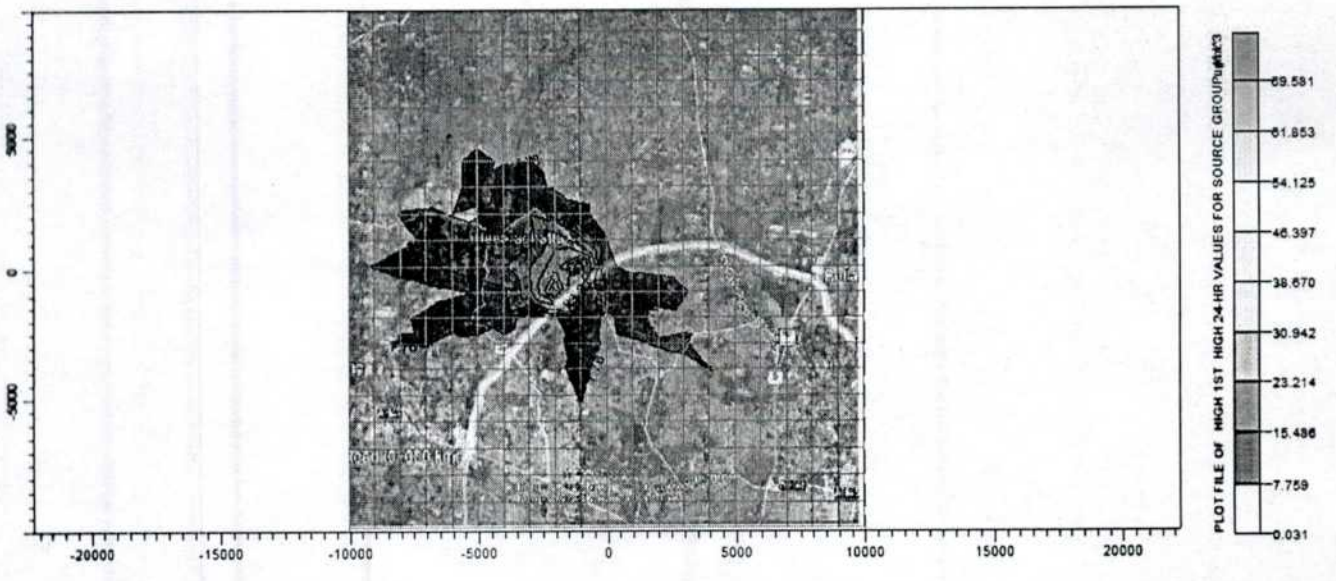


Fig 2: Isopleth drawn for PM in Section 1 of PRR alignment with mitigation measures (Construction phase)

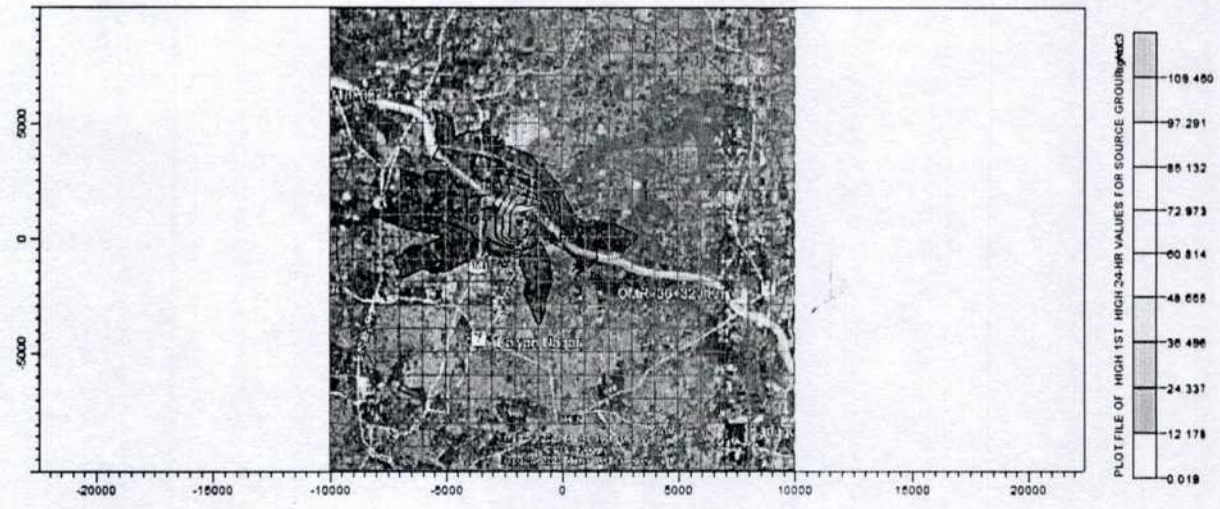


Fig 3: Isopleth drawn for PM in Section 2 of PRR alignment without mitigation measures (Construction phase)

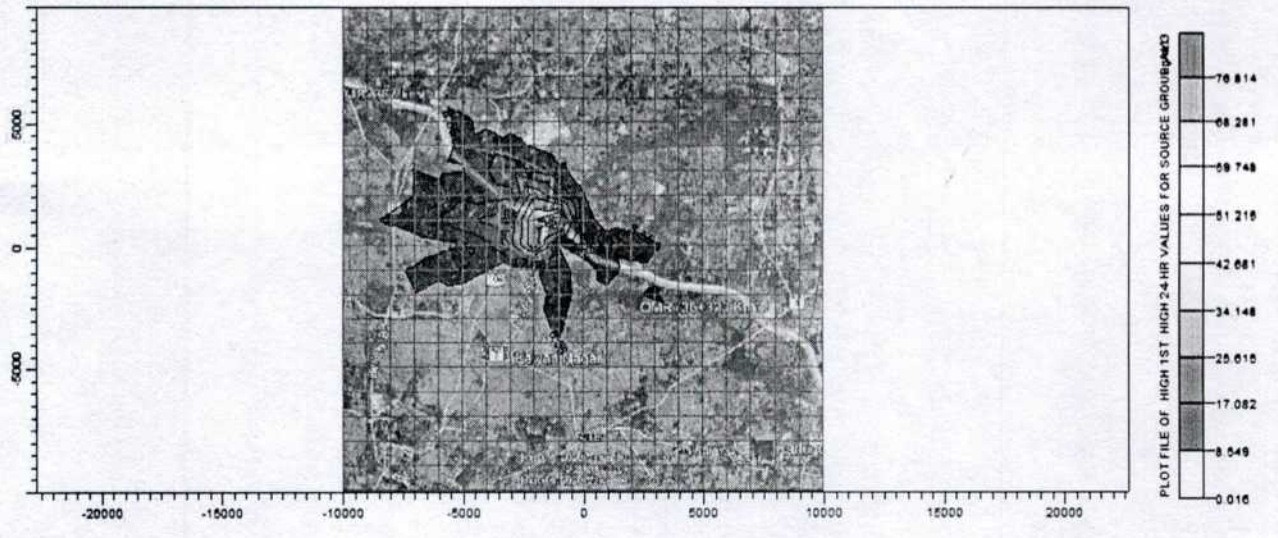


Fig 4: Isopleth drawn for PM in Section 2 of PRR alignment with mitigation measures (Construction phase)

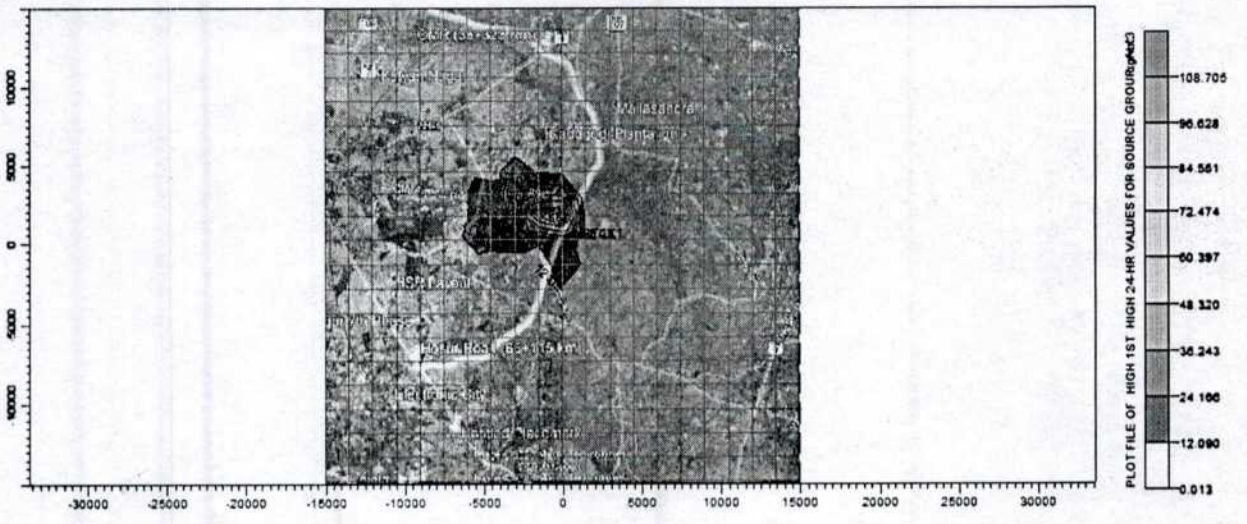


Fig 5: Isopleth drawn for PM in Section 3 of PRR alignment without mitigation measures (Construction phase)

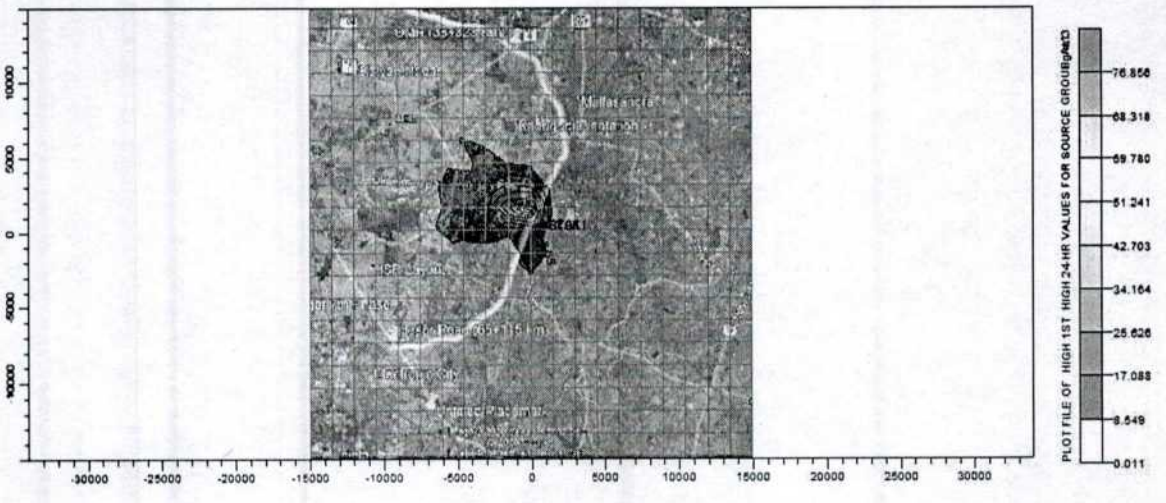


Fig 6: Isopleth drawn for PM in Section 3 of PRR alignment with mitigation measures (Construction phase)

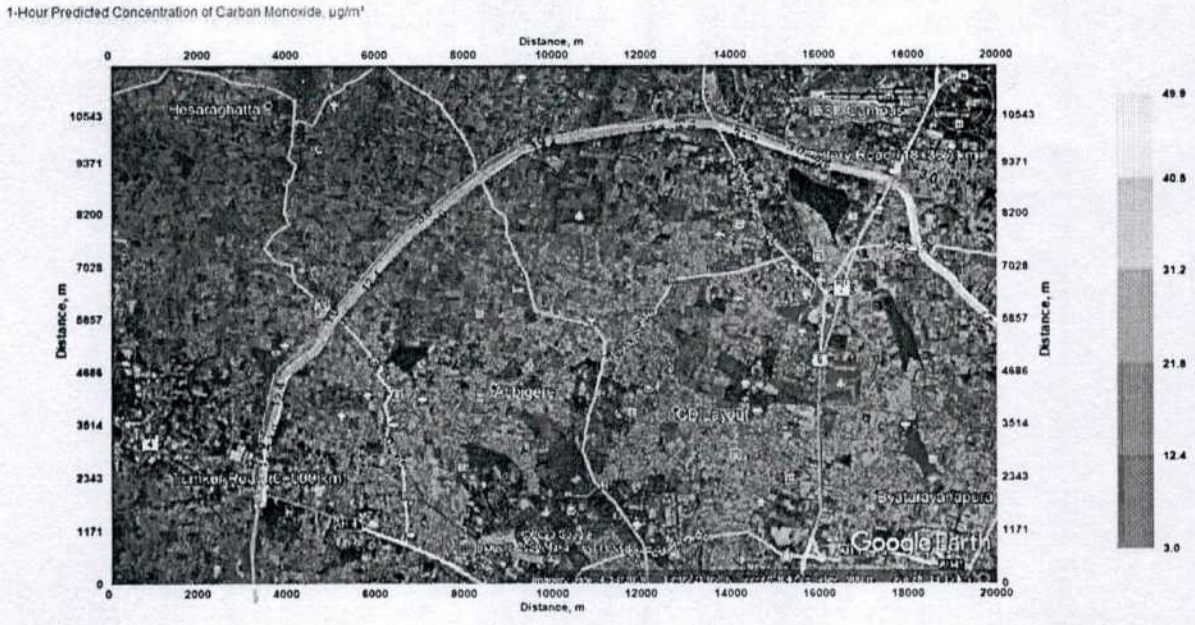


Fig 7: Isopleth showing predicted concentration of CO in Section 1 of PRR alignment during the year 2022 (Operation phase)

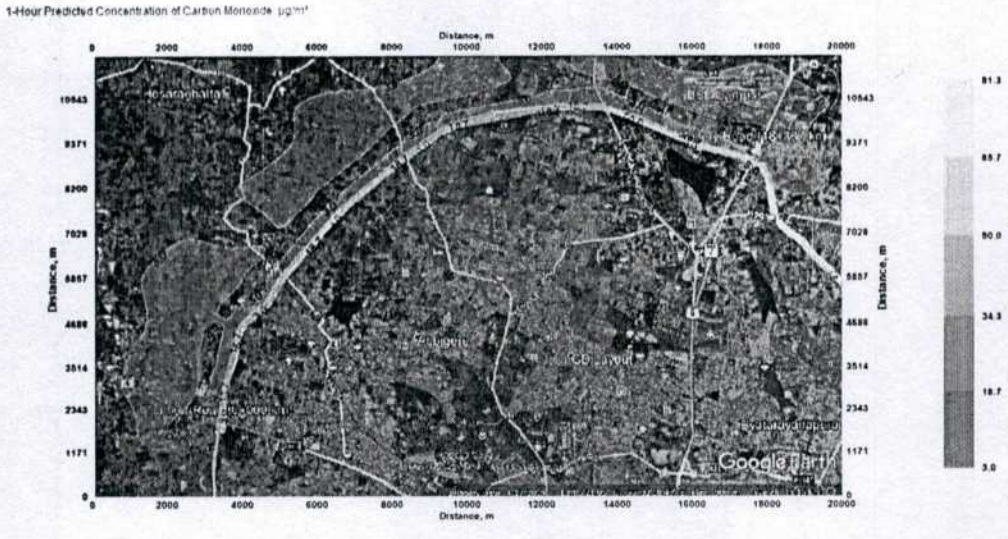


Fig 8: Isopleth showing predicted concentration of CO in Section 1 of PRR alignment during the year 2032 (Operation phase)

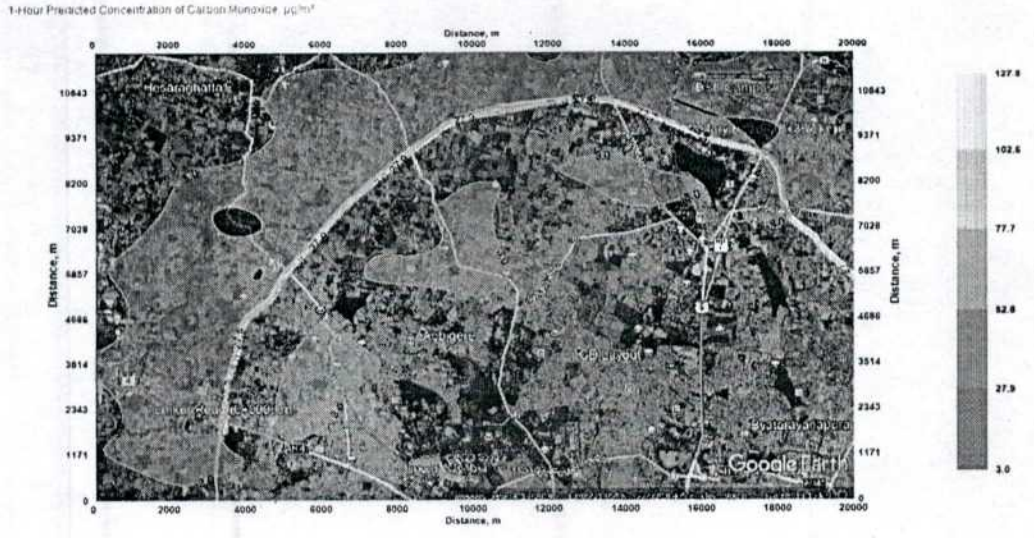


Fig 9: Isopleth showing predicted concentration of CO in Section 1 of PRR alignment during the year 2042 (Operation phase)

Fig 10: Isopleth showing predicted concentration of CO in Section 2 of PRR alignment during the year 2022 (Operation phase)

Fig 11: Isopleth showing predicted concentration of CO in Section 2 of PRR alignment during the year 2032 (Operation phase)

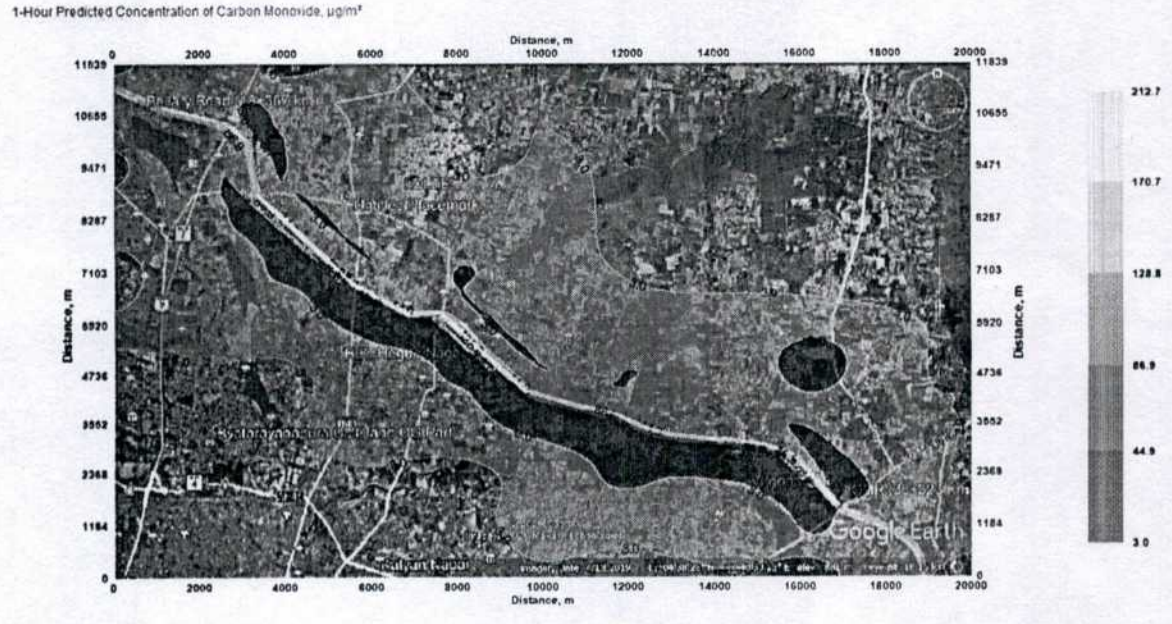


Fig 12: Isopleth showing predicted concentration of CO in Section 2 of PRR alignment during the year 2042 (Operation phase)

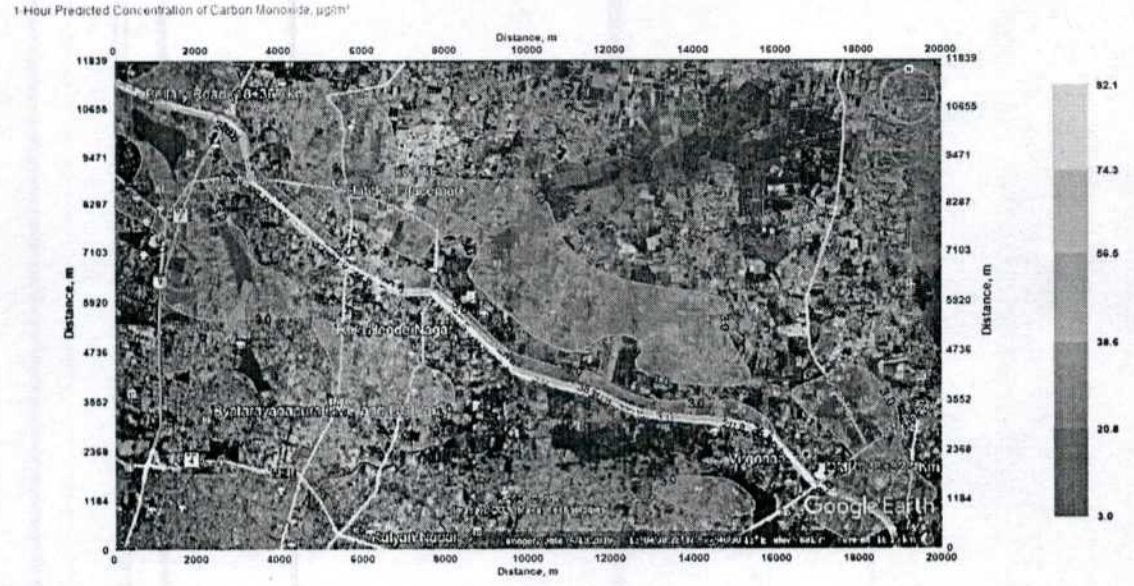


Fig 13: Isopleth showing predicted concentration of CO in Section 3 of PRR alignment during the year 2022 (Operation phase)

Fig 14: Isopleth showing predicted concentration of CO in Section 3 of PRR alignment during the year 2032 (Operation phase)

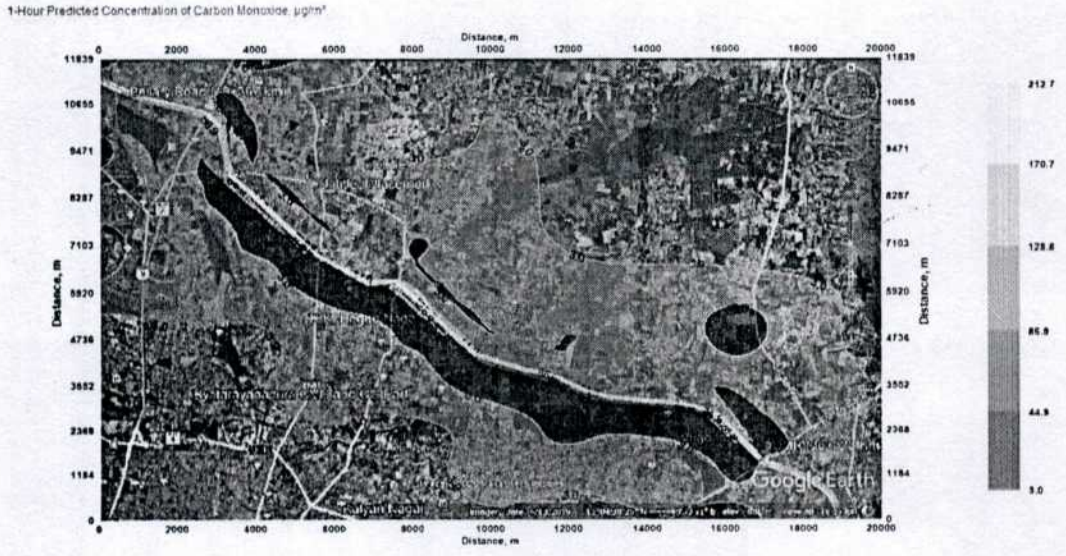


Fig 15: Isopleth showing predicted concentration of CO in Section 3 of PRR alignment during the year 2042 (Operation phase)

ANNEXURE-16

AMBIENT NOISE LEVEL MONITORING LOCATIONS & RESULTS

Table 1: Details of Ambient Noise Level Monitoring locations

Sl.No.	Location	Latitude	Longitude	Criteria
1	Tumakuru Road Near Madavara Junction	13° 3' 22.9" N	77° 28' 27.6"E	Proposed alignment and intersecting highway
2	Near Kuduregere	13° 04' 06.9" N	77° 28' 35.1"E	Proposed alignment and agricultural land use
3	SH 39 Near SBM Layout	13° 05' 25.7" N	77° 29' 33.7"E	Proposed alignment and intersecting highway
4	Near Kasaghattapura	13° 06' 39.30" N	77° 29' 38.16"E	Proposed alignment and intersecting road
5	Near Chikkabyalakere (Hesaraghatta Road)	13° 07' 11.0" N	77° 31' 17.4"E	Proposed alignment and intersecting road
6	Jarakabande RF	13° 07' 50.0" N	77° 32' 29.4"E	Proposed alignment and Reserve forest
7	Doddaballapur Road Near Nagenahalli	13° 07' 44.2" N	77° 34' 19.6"E	Proposed alignment and intersecting highway
8	Bangalore-Hyderabad Highway (NH7)-Near Venkatala (Bellary Road)	13° 06' 42.7" N	77° 36' 17.2"E	Proposed alignment and intersecting highway
9	Thanisandra Main Road Near Chokkanahalli	13° 05' 05.0" N	77° 38' 05.1"E	Proposed alignment and intersecting road
10	Hennur Main Road Near Chikkagubbi	13° 04' 38.7" N	77° 39' 11.2"E	Proposed alignment and intersecting road
11	Avalahalli main road Near Adur	13° 03' 18.3" N	77° 42' 13.8"E	Proposed alignment and intersecting road
12	Banglore-Tirupati Highway Near Avalahalli (OMR)	13° 02' 11.2" N	77° 44' 11.0"E	Proposed alignment and intersecting highway
13	Whitefield - Hoskote Road Near Chikkabanahalli Lake	13° 00' 49.3" N	77° 45' 40.2"E	Proposed alignment and nearby highway
14	Channasandra Main Road Near Channasandra	12° 59' 02.3" N	77° 46' 24.4"E	Proposed alignment and intersecting road
15	Varthur	12° 56' 17.37" N	77° 44' 48.61"E	Residential area nearby proposed alignment
16	SH 35, Near Gunjur Village	12° 55' 9.20" N	77° 44' 10.70"E	Proposed alignment and intersecting road
17	Sarjapur Road Near Sulikunte	12° 53' 29.99" N	77° 43' 44.36"E	Proposed alignment and intersecting road
18	Gattahalli Road Near Gattahalli	12° 52' 3.54" N	77° 42' 11.49"E	Proposed alignment and intersecting road
19	Kanyakumari Road Near Chikkatogur lake (Hosur Road)	12° 50' 56.96" N	77° 40' 6.09"E	Proposed alignment and intersecting road
20	Jigani Bommasandra Industrial Area	12° 49' 5.19" N	77° 40' 55.01"E	Industrial area close to the proposed alignment

Table 2: Ambient Noise Level Monitoring Results (January 2020)

Sl. No.	Locations	GPS Coordinates	Leq day dB(A)	Leq night dB(A)	CPCB Standards	
					Day in dB(A)	Night in dB(A)
1	Tumkur Road Near Madavara Junction	13° 3' 22.9" N, 77° 28' 27.6"E	68.3	58.38	65	55
2	Near Kuduregere	13° 04' 06.9" N, 77° 28' 35.1"E	71.63	36.82	65	55
3	SH 39 Near SBM Layout	13° 05' 25.7" N, 77° 29' 33.7"E	75.16	62.54	55	45
4	Near Kasaghattapura	13° 06' 39.30" N, 77° 29' 38.16"E	80.78	33.9	55	45
5	Near Chikkabyalakere (Hesaraghatta Road)	13° 07' 11.0" N, 77° 31' 17.4"E	57.82	43.3	55	45
6	Jarakabande RF	13° 07' 50.0" N, 77° 32' 29.4"E	64.47	49.37	50	40
7	Doddaballapur Road Near Nagenahalli	13° 07' 44.2" N, 77° 34' 19.6"E	76.56	41.26	65	55
8	Bangalore-Hyderabad Highway (NH7)- Near Venkatala (Bellary Road)	13° 06' 42.7" N, 77° 36' 17.2"E	72.73	62.54	65	55
9	Thanisandra Main Road Near Chokkanahalli	13° 05' 05.0" N, 77° 38' 05.1"E	74.12	53.43	65	55
10	Hennur Main Road Near Chikkagubbi	13° 04' 38.7" N, 77° 39' 11.2"E	72.47	60.75	65	55
11	Avalahalli main road Near Adur	13° 03' 18.3" N, 77° 42' 13.8"E	72.7	53.41	50	40
12	Banglore-Tirupati Highway Near Avalahalli (OMR)	13° 02' 11.2" N, 77° 44' 11.0"E	62.15	54.09	65	55
13	Whitefield - Hoskote Road Near Chikkabanahalli Lake	13° 00' 49.3" N, 77° 45' 40.2"E	70.5	54.05	65	55
14	Channasandra Main Road Near Channasandra	12° 59' 02.3" N, 77° 46' 24.4"E	79.77	56.25	65	55
15	Varthur	12° 56' 17.37" N, 77° 44' 48.61"E	71.43	53.63	55	45
16	SH 35, Near Gunjur Village	12° 55' 9.20" N, 77° 44' 10.70"E	74.03	62.87	65	55
17	Sarjapur Road Near Sulikunte	12° 53' 29.99" N, 77° 43' 44.36"E	72.6	54.74	65	55
18	Gattahalli Road Near Gattahalli	12° 52' 3.54" N, 77° 42' 11.49"E	63.76	52.25	65	55
19	Kanyakumari Road Near Chikkatogur lake (Hosur road)	12° 50' 56.96" N, 77° 40' 6.09"E	71.4	63.58	65	55
20	Jigani Bommasandra Industrial Area	12° 49' 5.19" N, 77° 40' 55.01"E	66.46	59.19	65	55

Note: dB-Decibel

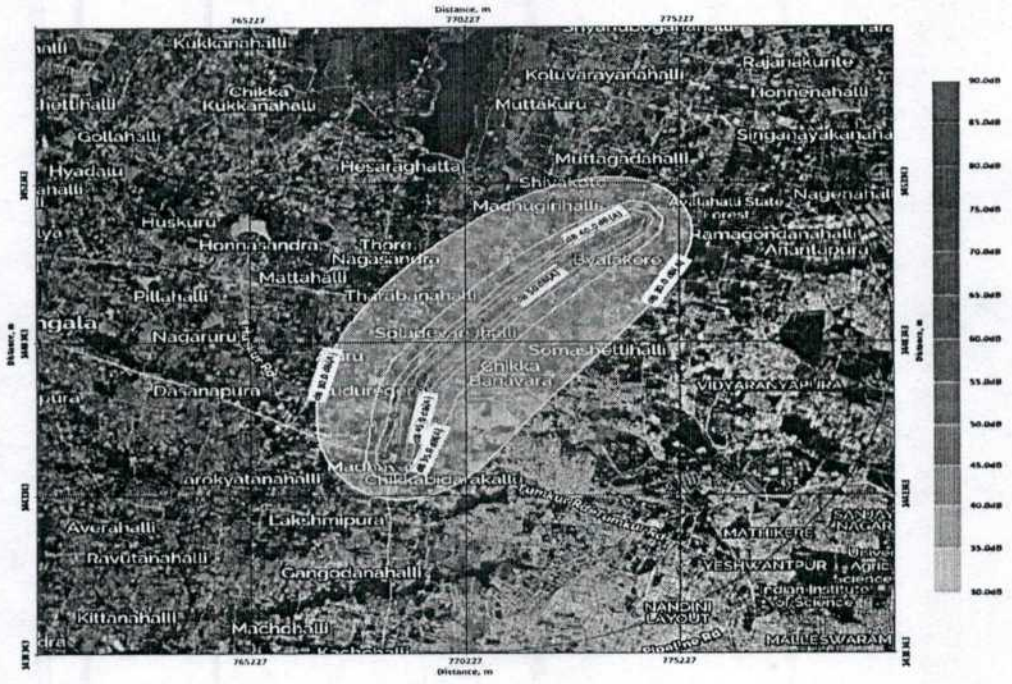


Fig 1: Predicted noise Levels without Barrier from Tumkuru road- Jarakbande RF (0+000-11+600 Chainage) during day time

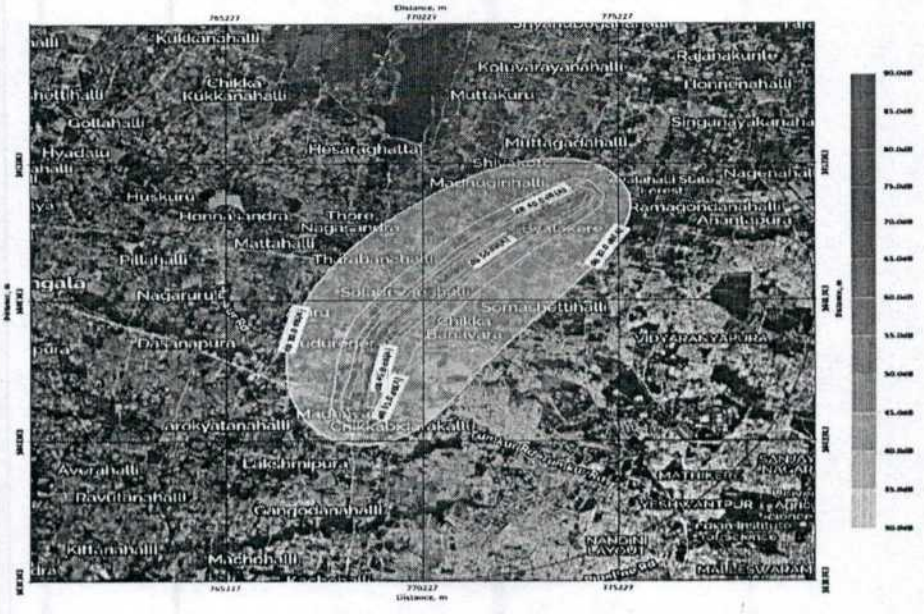


Fig 2: Predicted noise Levels with Barrier from Tumkuru road- Jarakbande RF (0+000-11+600 Chainage) during day time.

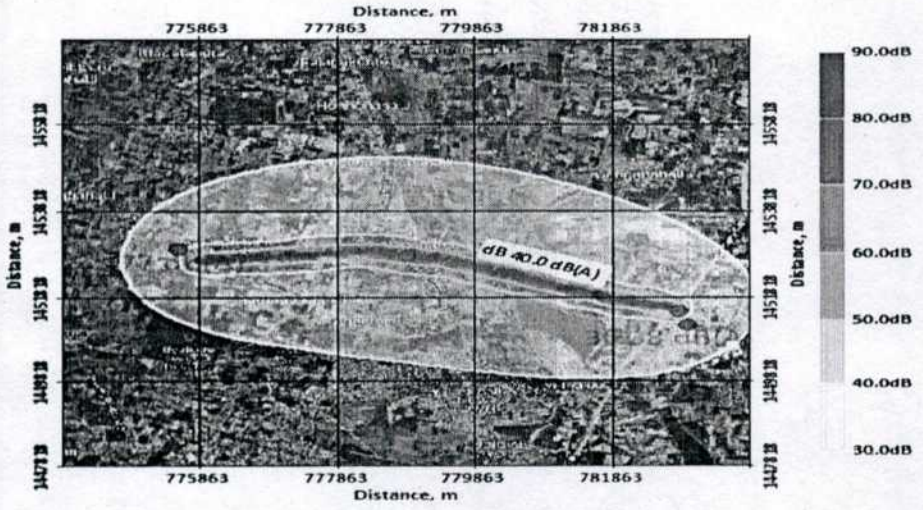


Fig 3: Predicted noise Levels without Barrier from Jarakbande RF – Bellary Road (11+600 – 18+900Chainage) during day time.

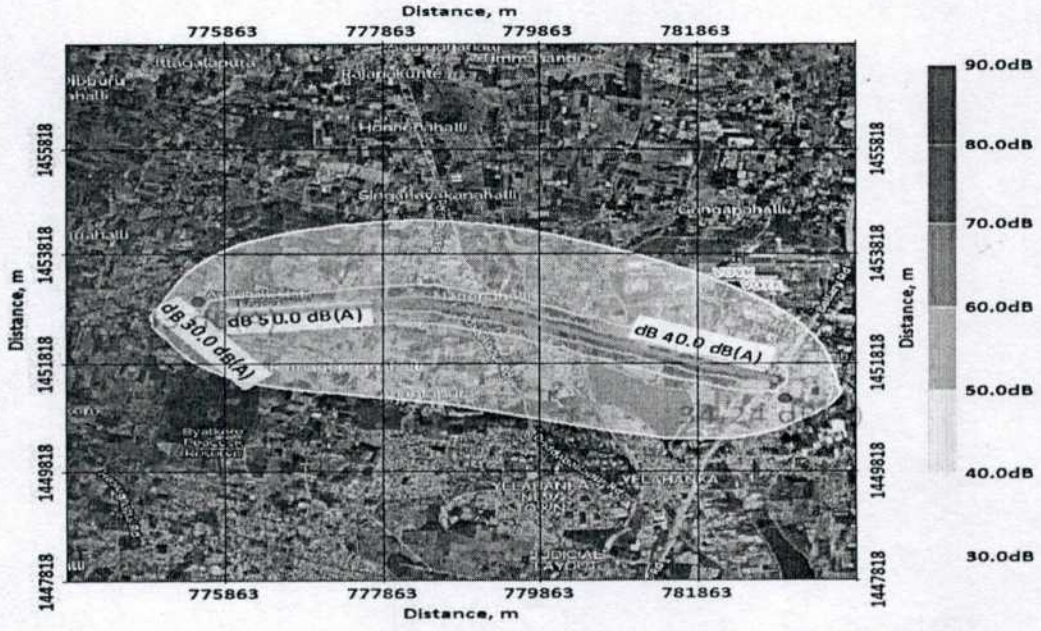


Fig 4: Predicted noise Levels with Barrier from Jarakbande RF – Bellary Road (11+600 – 18+900 Chainage) during day time.

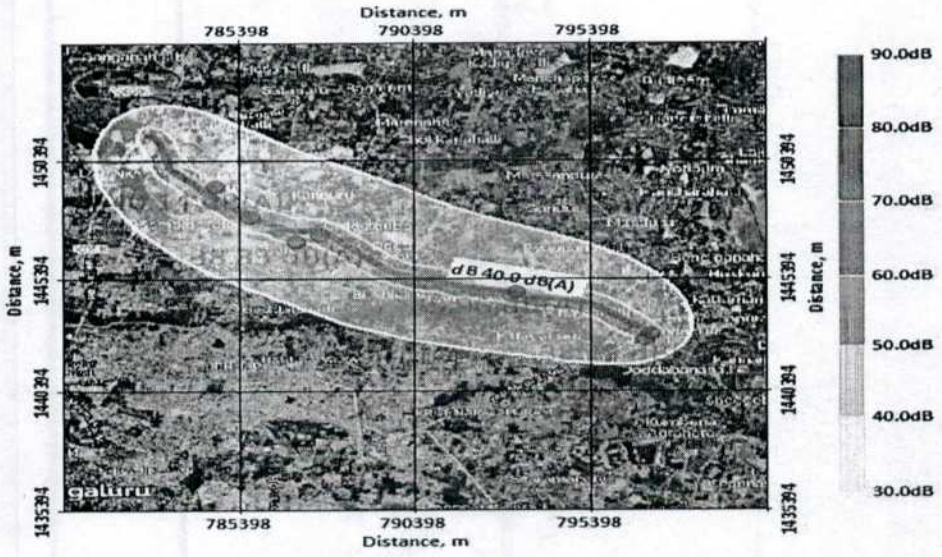


Fig 5: Predicted noise Levels without Barrier from Bellary Road- Old Madras road (18+900 – 36+500 Chainage) during day time.

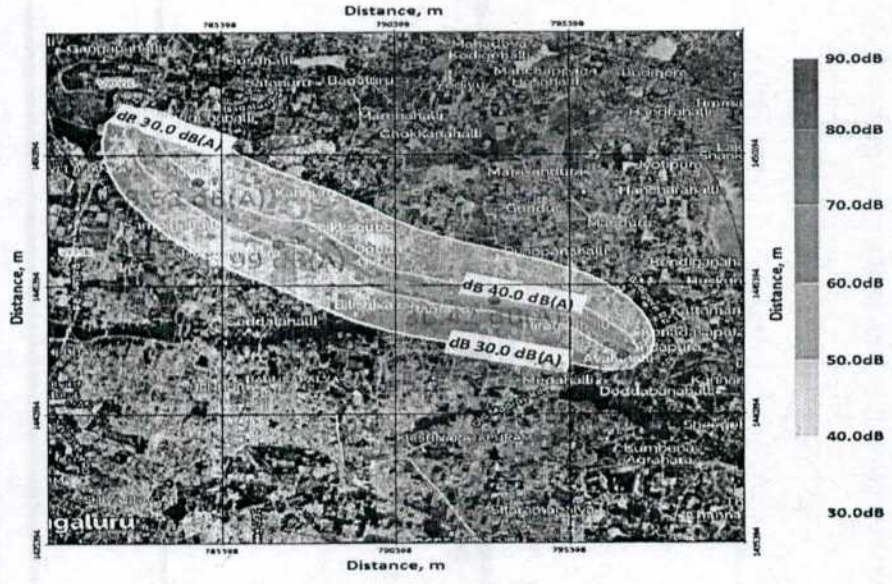


Fig 6: Predicted noise Levels with Barrier from Bellary Road- Old Madras road (18+900 –36+500 Chainage) during day time.

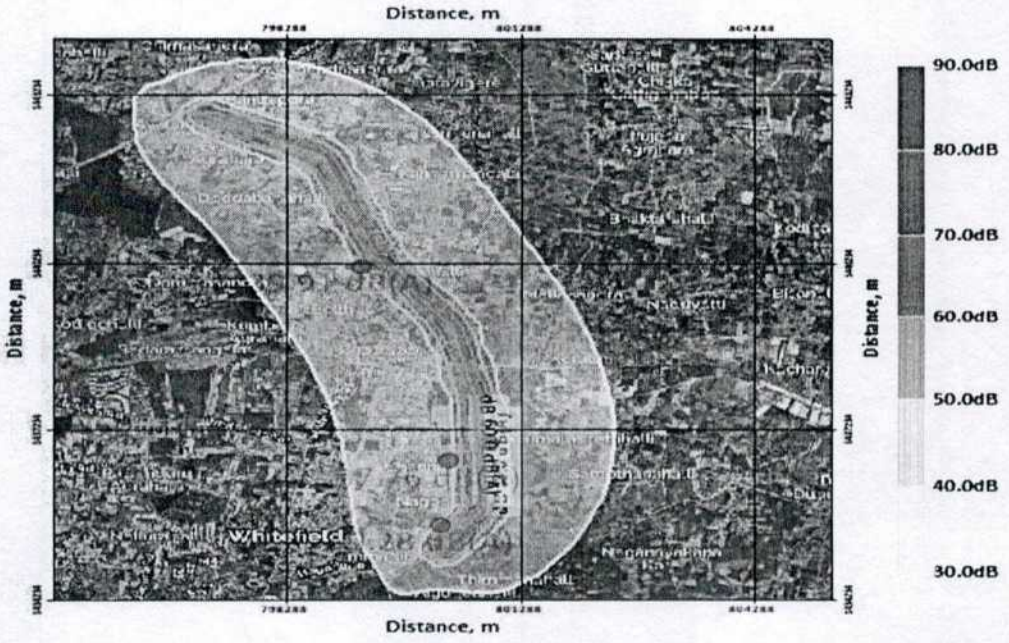


Fig 7: Predicted noise Levels without Barrier from Old Madras road – Near Immadihalli (36+500 – 46+ 000Chainage) during day time.

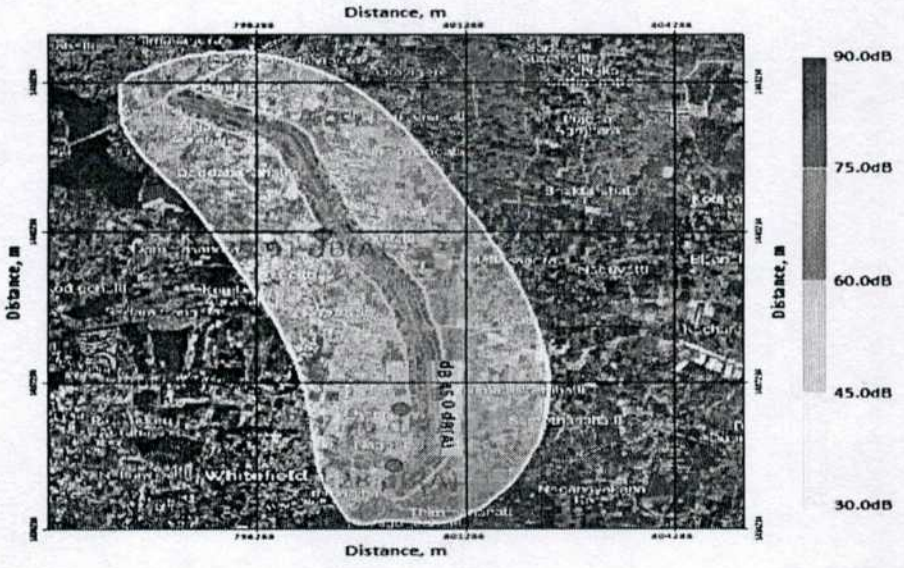


Fig 8: Predicted noise Levels with Barrier from Old Madras road – Near Immadihalli (36+500 – 46+ 000Chainage) during day time.

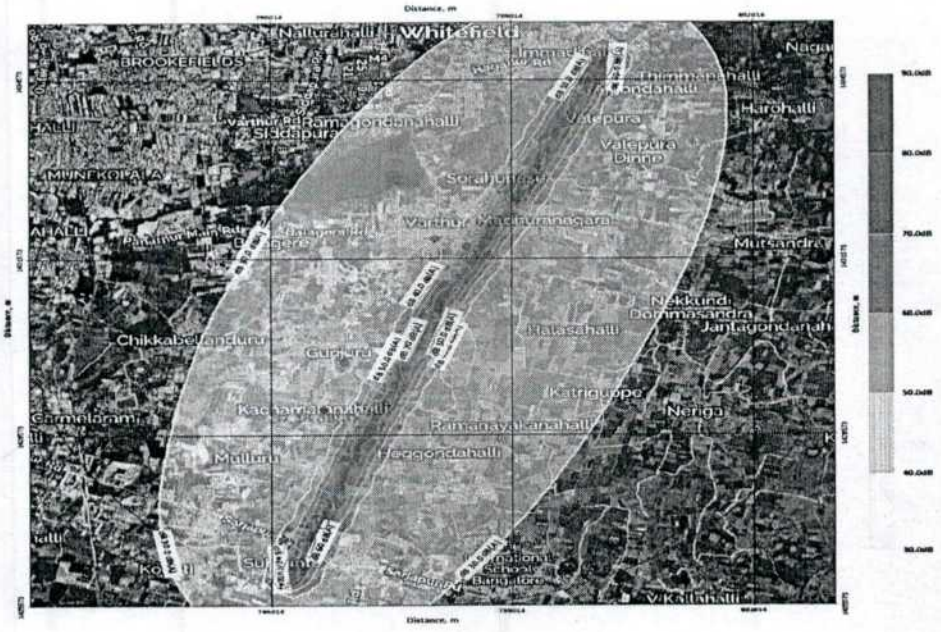


Fig 9: Predicted noise Levels without Barrier from Near Immadihalli – Sarjapura Road (Near Sulikante) (46+000 – 55+800 Chainage) during day time.

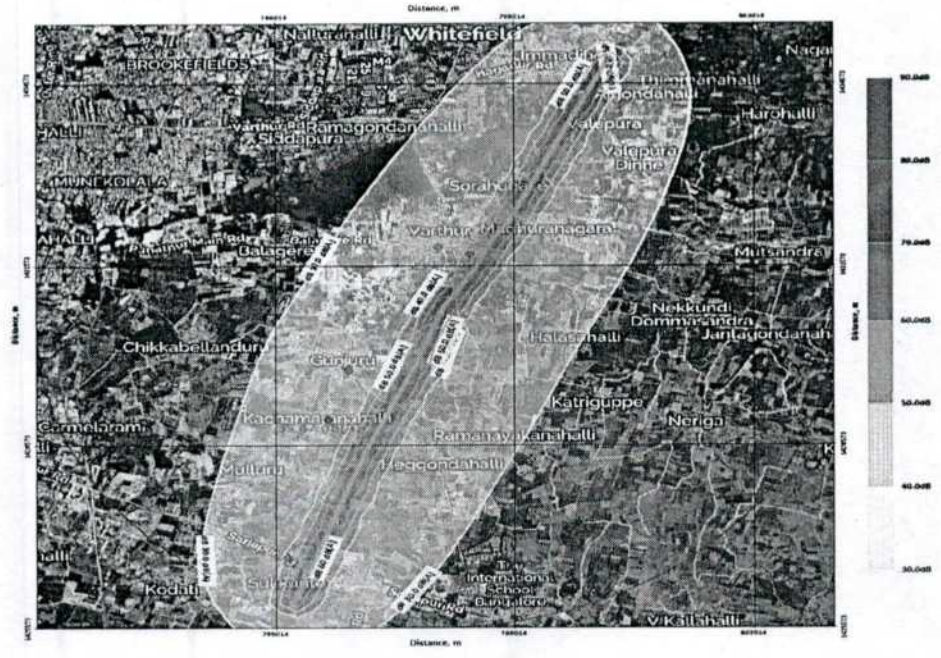


Fig 10: Predicted noise Levels with Barrier from Near Immadihalli – Sarjapura Road (Near Sulikante) (46+000 – 55+800 Chainage) during day time.

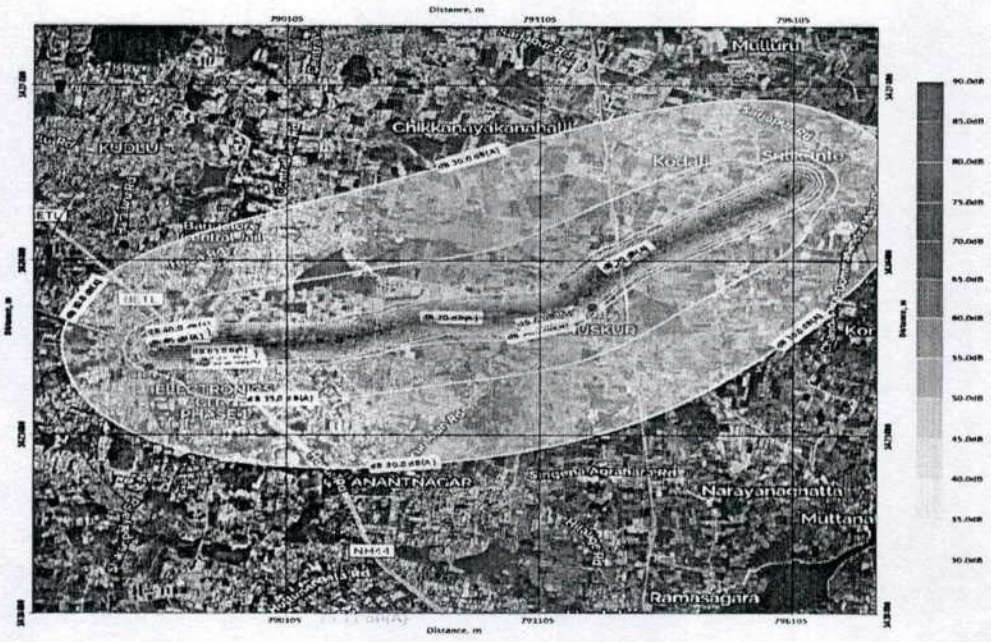


Fig 11: Predicted noise Levels without Barrier from Sarjapura Road (Near Sulikante)- Hosuru Road (55+800-64+500 Chainage) during day time.

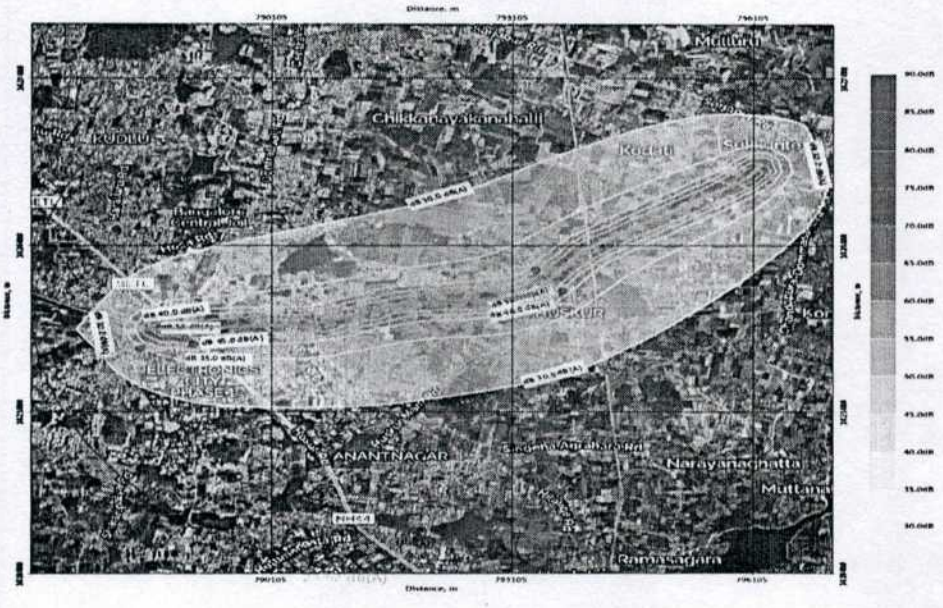


Fig 12: Predicted noise Levels with Barrier from Sarjapura Road (Near Sulikante)- Hosuru Road (55+800-64+500 Chainage) during day time.

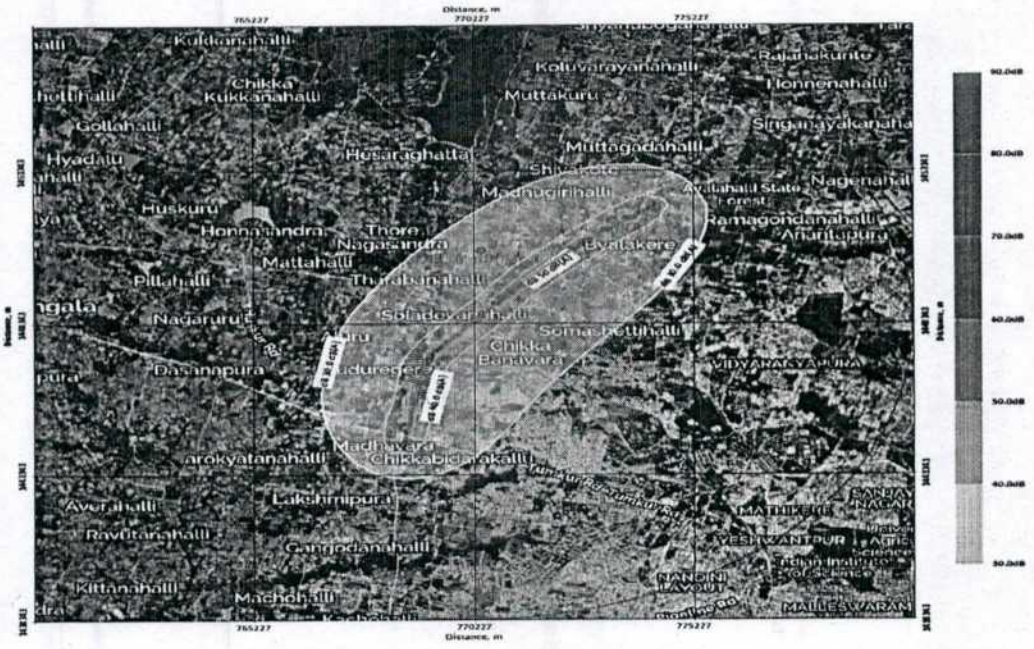


Fig 13: Predicted noise Levels without Barrier from Tumkuru road- Jarakbande RF (0+000-11+600 Chainage) during night time.

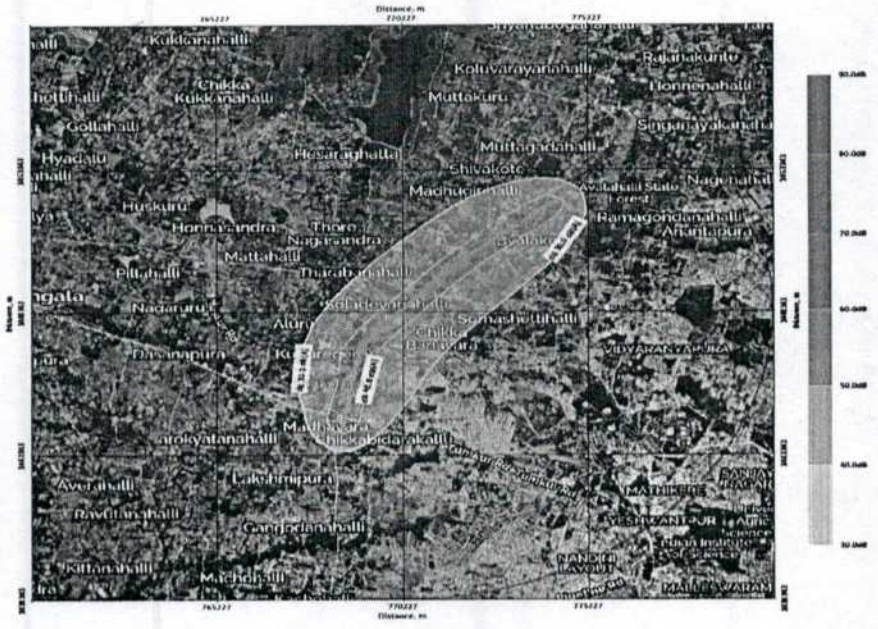


Fig 14: Predicted noise Levels with Barrier from Tumkuru road- Jarakbande RF (0+000-11+600 Chainage) during night time.

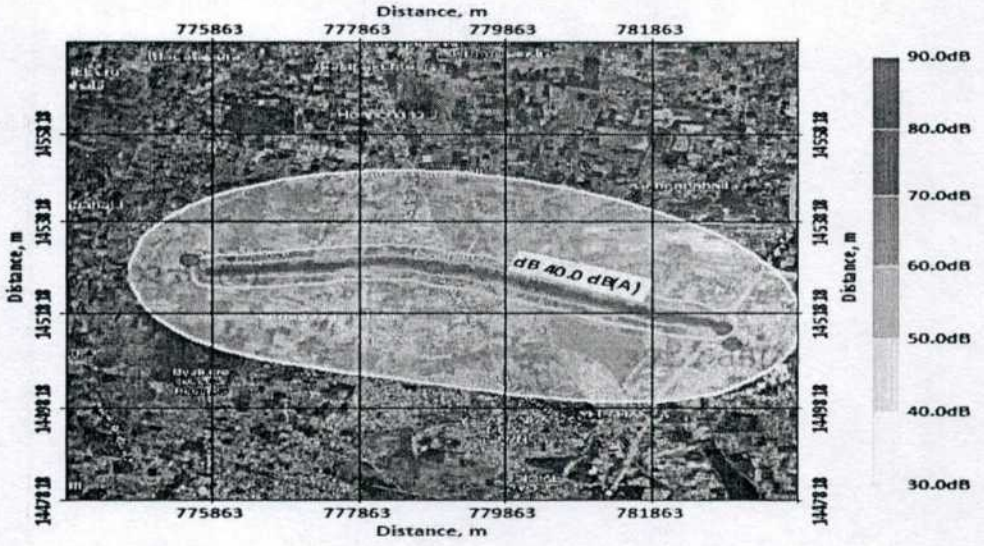


Fig 15: Predicted noise Levels without Barrier from Jarakbande RF – Bellary Road (11+600 – 18+900Chainage) Usi during night time.

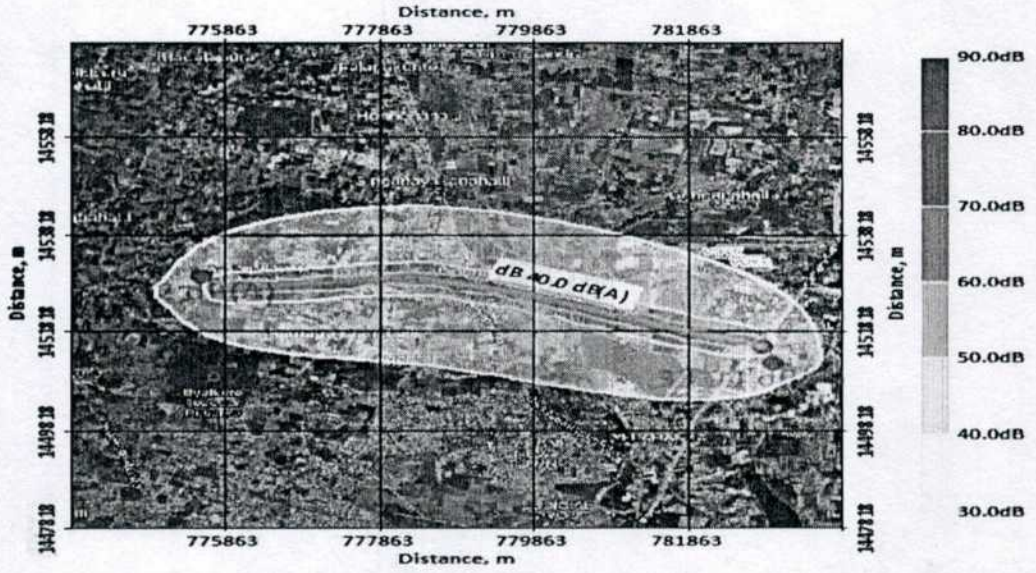


Fig 16: Predicted noise Levels with Barrier from Jarakbande RF – Bellary Road (11+600 – 18+900Chainage) during night time.

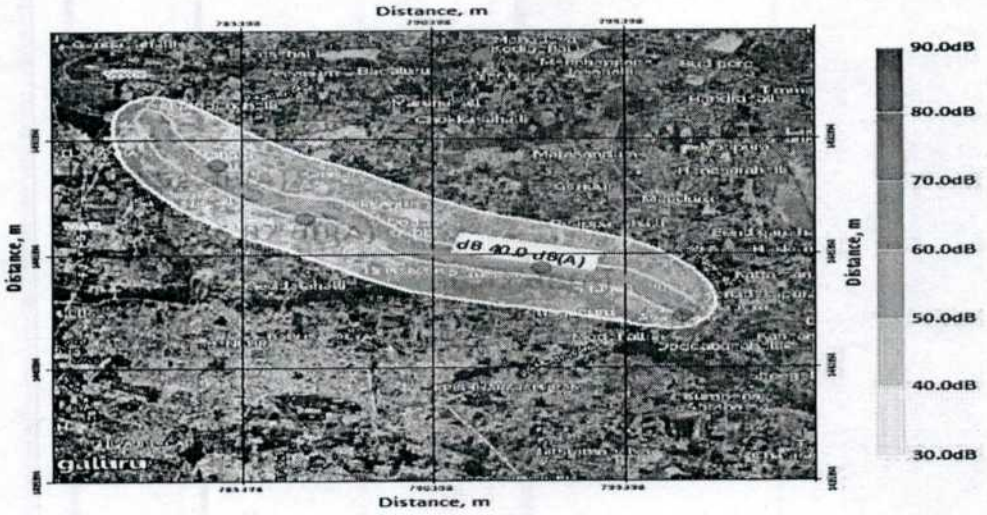


Fig 17: Predicted noise Levels with Barrier from Bellary Road- Old Madras road (18+900 – 36+500 Chainage) during night time.

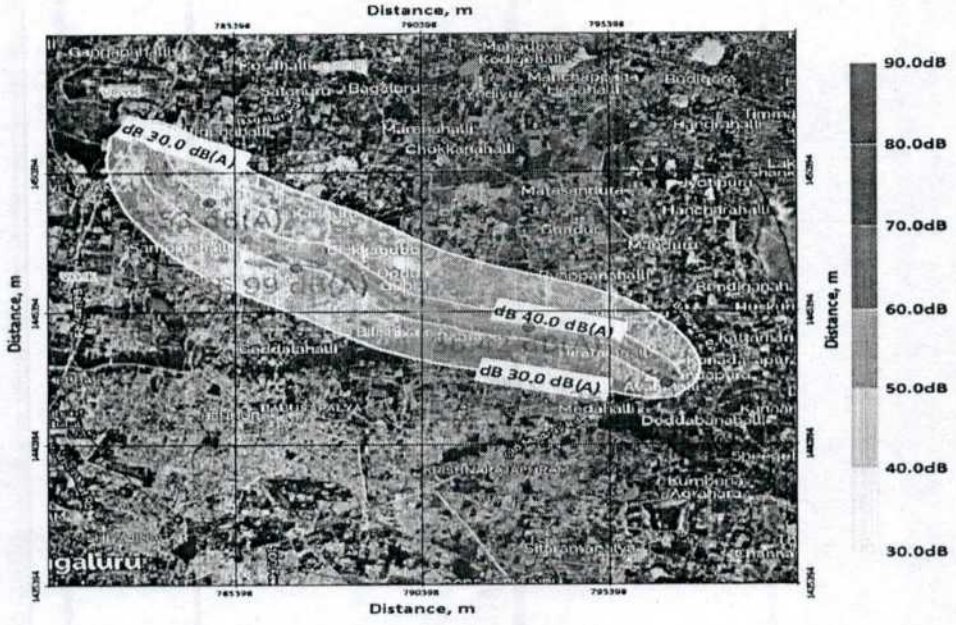


Fig 18: Predicted noise Levels without Barrier from Bellary Road- Old Madras road (18+900 – 36+500 Chainage) during night time.

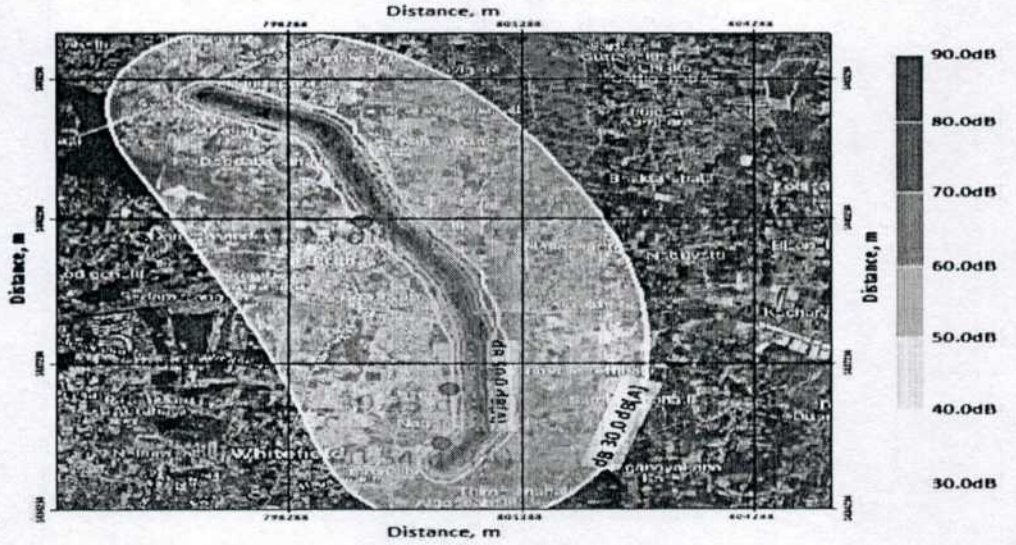


Fig 19: Predicted noise Levels with Barrier from Old Madras road – Near Immadihalli (36+500 – 46+ 000Chainage) during night time.

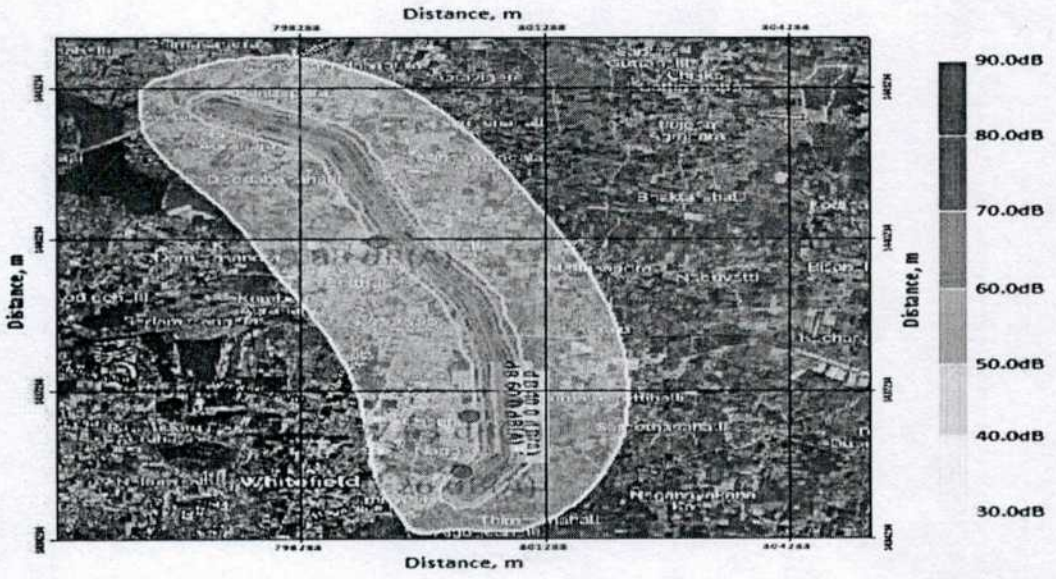


Fig 20: Predicted noise Levels without Barrier from Old Madras road – Near Immadihalli (36+500 – 46+ 000Chainage) during night time.

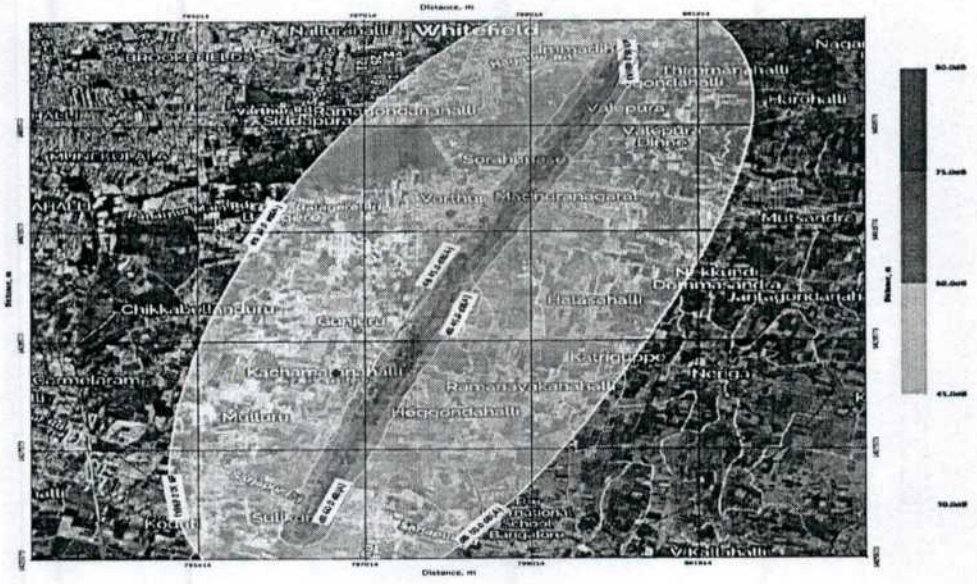


Fig 21: Predicted noise Levels with Barrier from Near Immadihalli – Sarjapura Road (Near Sulikante) (46+000 – 55+800 Chainage) during night time.

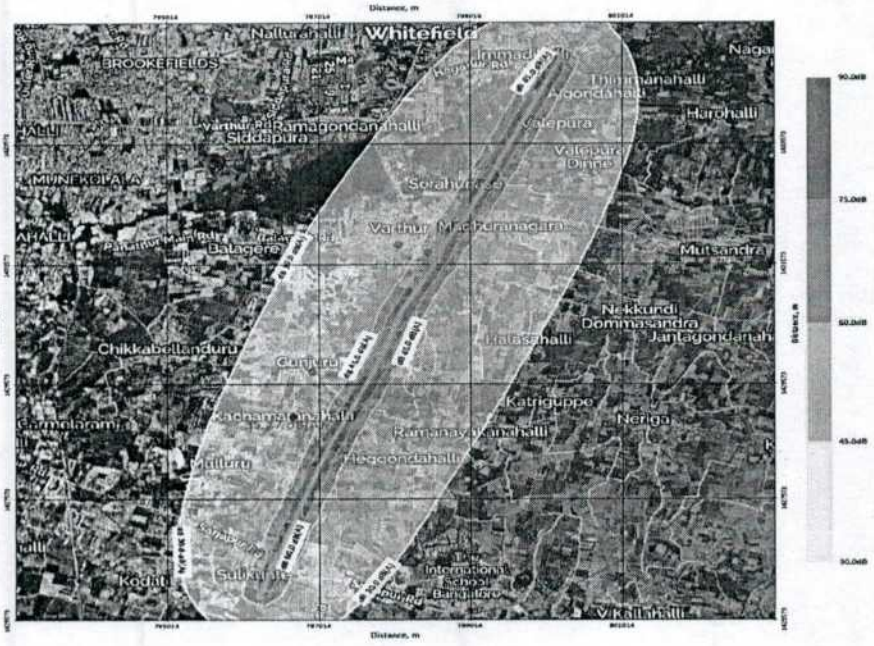


Fig 22: Predicted noise Levels without Barrier from Near Immadihalli – Sarjapura Road (Near Sulikante) (46+000 – 55+800 Chainage) during night time.

ANNEXURE-17

GEOLOGY, GEOMORPHOLOGY & STRUCTURAL MAP

[illegible] ROAD TO HOSUR ROAD

CROSSING BELLARY ROAD AND OLD MADRAS ROAD

Scale : 1:50,000

LEGEND

15 Km RADIUS	PEDIMENT
PROPOSED PRR	PEDIMENT INSELBERG COMPLEX
100.0 m BUFFER ZONE	INSELBERG
500.0 m BUFFER ZONE	PEDIPLAIN SHALLOW WEATHERED
RESIDUAL HILL	INFERRED LINEAMENT

STATIGRAPHY

Gravel	-	Cainozoic
Laterite		
Dolerite Dyke	-	Proterozoic
Pink & Grey Granite, Granodiorite	Closepet Granite	Archaean
Magmatite Granite	Peninsular Gneissic Complex (PGC)	
Grey Granite		
Banded Biotite Gneiss & Hornblende Gneiss		
Granitoid Gneiss		
Ultramafic Schist	Sargur Group	

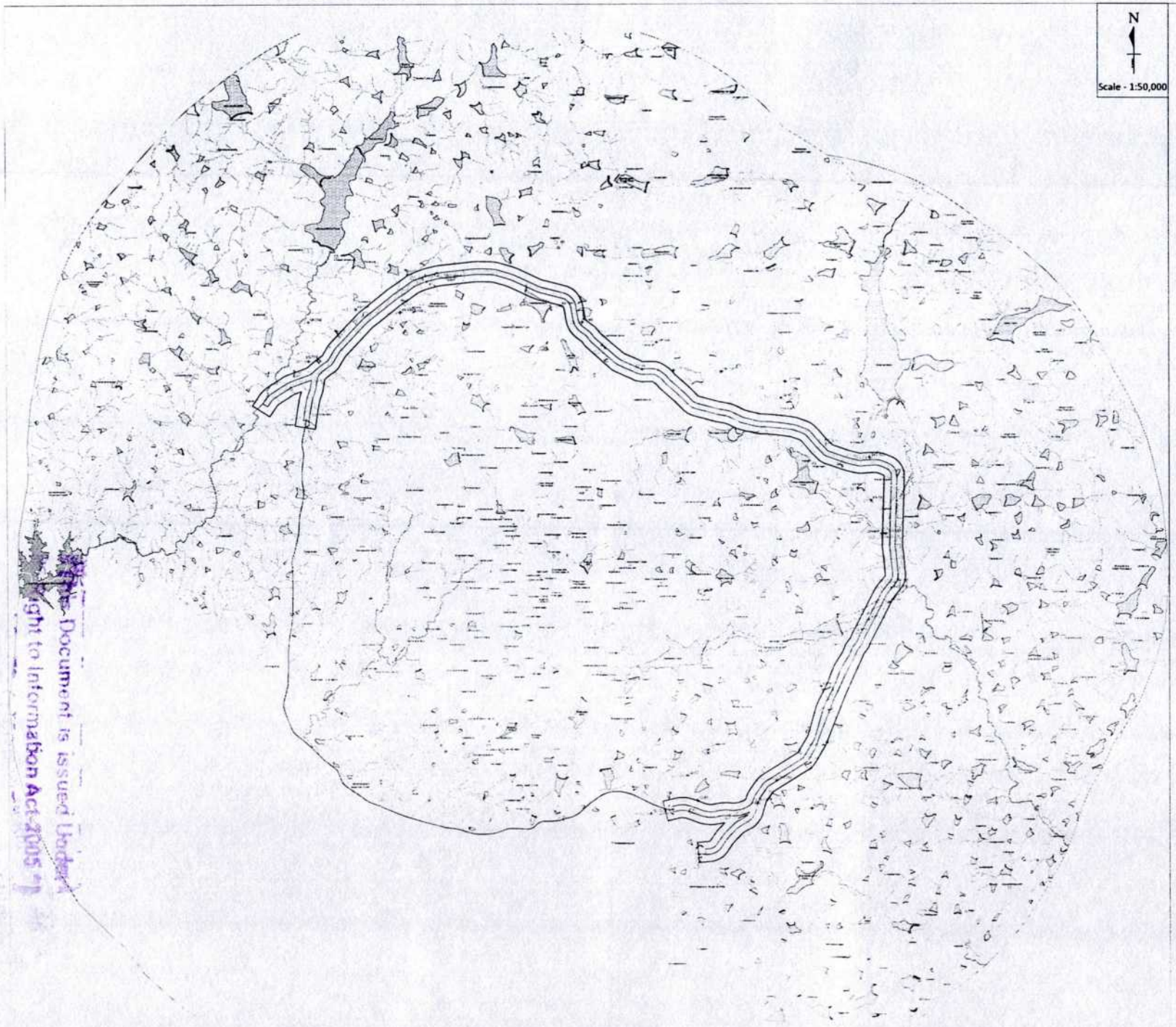
Source: Published GSI Quadrangle Map, 1994

(E.V. NARESH KUMAR)
FAE Geo & HG

PLATE - 3

DRAINAGE MAP

DEVELOPMENT OF EIGHT LANE PERIPHERAL RING ROAD - PHASE-I,
CONNECTING TUMKUR ROAD TO HOSUR ROAD
(CROSSING BELLARY ROAD AND OLD MADRAS ROAD)



LEGEND

- 15 Km RADIUS
- PROPOSED PRR
- 100.0 m BUFFER ZONE
- 500.0 m BUFFER ZONE
- HABITATIONS
- STREAM
- TANK
- BUND
- CARTRACK
- CANAL
- RAILWAY LINE
- POWER LINE
- RESERVED FOREST
- DIST. BOUNDARY
- NH ROAD
- ROAD
- WELLS INVENTORIED

WELLS INVENTORIED

Sl No	VILLAGE	NORTH LATITUDE	EAST LONGITUDE
WI-1	Near Tammenahalli	N 13° 05' 04.8"	E 77° 38' 42.5"
WI-2	Tarabanahalli	N 13° 06' 16.0"	E 77° 39' 41.7"
WI-3	Kasagattapura	N 13° 06' 39.3"	E 77° 30' 07.8"
WI-4	Dodda Byalakere	N 13° 06' 33.6"	E 77° 31' 28.7"
WI-5	Jarasabande K.P.	N 13° 07' 35.4"	E 77° 32' 10.1"
WI-6	Venkatala	N 13° 06' 45.7"	E 77° 33' 19.2"
WI-7	Kogilu	N 13° 08' 15.2"	E 77° 33' 03.1"
WI-8	Nagareshwaranagenahalli	N 13° 04' 49.3"	E 77° 38' 50.7"
WI-9	Kannuru	N 13° 05' 38.4"	E 77° 39' 16.6"
WI-10	Chikka Gubbi	N 13° 04' 47.6"	E 77° 39' 47.4"
WI-11	Kadagrahara	N 13° 04' 45.2"	E 77° 41' 12.4"
WI-12	Near Bidarahalli	N 13° 03' 57.6"	E 77° 42' 59.5"
WI-13	Beyappanahalli	N 13° 04' 29.1"	E 77° 43' 07.3"
WI-14	Kannamangala Gate	N 13° 02' 13.9"	E 77° 45' 34.6"
WI-15	Chikka Banhalli Road	N 13° 00' 55.9"	E 77° 45' 36.9"
WI-16	Chikka Banhalli Tank	N 13° 01' 38.0"	E 77° 45' 13.3"
WI-17	Kadigoli	N 12° 59' 50.4"	E 77° 46' 07.3"
WI-18	Govt. BW, Kadigoli	N 12° 59' 50.1"	E 77° 46' 00.7"
WI-19	Chikka Togur	N 12° 53' 30.3"	E 77° 46' 18.3"
WI-20	Nagondanhalli	N 12° 56' 21.3"	E 77° 46' 23.6"
WI-21	Immadahalli	N 12° 58' 11.5"	E 77° 46' 17.8"
WI-22	Huskur	N 12° 57' 45.6"	E 77° 46' 13.8"
WI-23	Valagurki	N 12° 57' 13.8"	E 77° 45' 38.4"
WI-24	Suntur	N 12° 55' 10.1"	E 77° 44' 11.3"
WI-25	Chikka Togur	N 12° 51' 21.2"	E 77° 39' 04.8"
WI-26	Nagarathapura	N 12° 52' 29.8"	E 77° 40' 30.3"
WI-27	Dodda Nagamangala	N 12° 51' 44.6"	E 77° 40' 19.2"
WI-28	Huskur	N 12° 51' 41.7"	E 77° 42' 13.9"
WI-29	Avanahalli	N 12° 52' 21.6"	E 77° 42' 50.9"
WI-30	Kaggalipura	N 12° 51' 30.1"	E 77° 43' 34.6"
WI-31	Sulakunte	N 12° 51' 25.2"	E 77° 44' 11.1"

(K V. NARESH KUMAR)
EE (HQ & HS)

HYDROLOGY STUDIES

Table 1: Results of Ground water quality analysis

Sl. No.	Parameters	Unit	Standards IS 10500:2012 (Second Revision)		Results			
			AL	PL	Agricultural pumping, Kannamangala Gate (13° 02' 13.9" N 77° 45' 34.6"E)	Tanker Water, Nagondanahalli Kadugodi (12° 58' 21.3" N 77° 46' 23.6"E)	Doddanagamangala Village (12° 51' 44.6" N 77° 40' 28.2"E)	Sulikunte village (12° 53' 25.2" N 77° 44' 15.1"E)
1	pH	-	6.5-8.5		7.96	7.4	7.34	7.71
2	Electrical Conductivity	µS/cm	Not specified		1421	3030	1543	1360
3	Total Hardness as $CaCO_3$	mg/L	200	600	504	740	520	450
4	Calcium as Ca	mg/L	75	200	116.8	212	142.4	112
5	Magnesium as Mg	mg/L	30	100	51.51	51.03	39.85	41.31
6	Sulphate as SO4	mg/L	200	400	30.86	85.08	55.2	169.68
7	Nitrate as NO3	mg/L	45		14.13	10.22	5.85	31.1
8	Chloride as Cl	mg/L	250	1000	25.62	473.04	240.46	148.89
9	Iron as Fe	mg/L	0.3		ND	ND	ND	ND
10	Sodium as Na	mg/L	Not specified		60.4	166.2	59.8	82
11	Potassium as K	mg/L	Not specified		6.04	4.13	4.94	4.36
12	Fluoride as F	mg/L	1	1.5	0.7	0.63	0.49	0.22
13	Total Dissolved Solids	mg/L	500	2000	972	1944	1039	1092
14	Bicarbonate	mg/L	Not specified		224	480	260	332
15	Carbonate	mg/L	Not specified		48	ND	ND	ND
16	*Total coliform*	MPN/100 ml	Not specified		<1.8	<1.8	<1.8	<1.8

Note: ND-Not Detected

Table 2: Details of wells inventoried

Sl. No.	Name	Geo Coordinates	Type of Well	P/NP	DTWL/TD (m)	Remarks
01	Sri. Basavaraju, Near Tammenahalli	N 13° 05' 04.8" E 77° 28' 42.5"	BW	P	85/170	Poor yield, Slightly Brackish
02	Govt BW Tarabanahalli	N 13° 06' 16.0" E 77° 28' 41.7"	BW	P	50/240	6 1/2" , Colony supply
03	Kasgattapura	N 13° 06' 39.3" E 77° 30' 07.8"	BW	P	40/160	6 1/2", Dwindle in summer
04	Dodda Byalakere	N 13° 06' 33.6" E 77° 31' 28.7"	BW	P	48/190	6 1/2" , Village supply
05	Jarakbande R.F	N 13° 07' 35.4" E 77° 32' 10.1"	DW	P	Dry/6	Dry
06	Venkatala	N 13° 06' 45.7" E 77° 36' 19.2"	BW	P	82 / 168	1 1/2" , Fluctuation in Summer
07	Kogilu	N 13° 06' 15.2" E 77° 37' 01.1"	BW	P	65/80	High Exploitation zone, Poor Zone
08	Nageshwaranagenahalli	N 13° 04' 49.3" E 77° 38' 50.7"	BW	P	60/90	6 1/2" , On sheet rock
09	Kannur (v)	N 13° 05' 38.4" E 77° 39' 16.6"	BW	P	90/120	6 1/2" , Dry in summer
10	Chikka Gubbi (v)	N 13° 04' 47.6" E 77° 39' 47.4"	BW	P	130/165	6 1/2" , 2" yield
11	Bande Bommasandra	N 13° 04' 45.2" E 77° 41' 12.4"	BW	P	95/130	--
12	Near of Bidarahalli	N 13° 03' 57.6" E 77° 42' 59.5"	BW	P	86/95	--
13	Baiappanahalli	N 13° 04' 27.1" E 77° 43' 07.3"	BW	P	137 / 198	6 1/2" , 1 1/2" yield
14	Kannamangala Gate	N 13° 02' 13.9" E 77° 45' 34.6"	BW	P	137 / 183	6 1/2" , 1 1/2" yield
15	Govt BW, Chikbanahalli Road	N 13° 00' 55.9" E 77° 45' 36.9"	BW	P	80/160	--
16	Chikbanahalli Tank	N 13° 01' 18.0" E 77° 45' 13.3"	BW	P	68/86	2" yield, 3 BW at one place for village supply.

Sl. No.	Name	Geo Coordinates	Type of Well	P/NP	DTWL/TD (m)	Remarks
						OH Tank
17	Near Kasivishweshwara Swamy Temple, Kadugadi (v)	N 12° 59' 50.4" E 77° 46' 07.3"	BW	P	115 / 183	6 1/2" , 2" yield, Water being supplied to Tankers
18	Govt BW Kadugodi (V)	N 12° 59' 50.1" E 77° 46' 00.7"	BW	P	Dry/80	Supply through tankers
19	Chiktogur	N 12° 53' 30.3" E 77° 46' 18.3"	BW	P	62/90	2" yield, good zone, village supply
20	Govt BW , Nagondenahalli (V)	N 12° 58' 21.3" E 77° 46' 23.6"	BW	P	52/100	For tanker supply
21	Immadivalli (v)	N 12° 58' 11.5" E 77° 46' 17.8"	BW	P	145 / 259	Fractures Encountered granite gneiss
22	Huskur	N 12° 57' 45.6" E 77° 46' 13.6"	BW	P	46/60	Tanker Supply Fracture controlled
23	Valepura (v)	N 12° 57' 13.8" E 77° 45' 38.4"	BW	P	137 / 213	Tanker Supply, FRR / GG
24	Gunjur (v)	N 12° 55' 12.1" E 77° 44' 11.3"	BW	P	82/96	--
25	Chikka Togur (v)	N 12° 51' 21.2" E 77° 39' 04.8"	BW	P	152 / 274	1" yield, Fluctuation is Summer
26	Naganathapura (v)	N 12° 52' 29.9" E 77° 40' 10.3"	BW	P	58/95	2" yield, poor zone, Dry in Summer
27	Govt BW, Dodda Nagamangala (v)	N 12° 51' 44.6" E 77° 40' 28.2"	BW	P	52/85	Pump Fitted, Village Supply
28	Huskur (v)	N 12° 51' 41.7" E 77° 42' 13.8"	BW	P	152 / 229	--
29	Avalahalli (v)	N 12° 52' 21.6" E 77° 42' 50.9"	BW	P	183 / 259	Poor yield Dry in summer
30	Kagalipura (v)	N 12° 51' 30.1" E 77° 43' 54.6"	BW	-	62/75	Poor yield
31	Sulikunte	N 12° 53' 25.2" E 77° 44' 15.1"	BW	P	46/80	GG

ANNEXURE-18

SURFACE WATER QUALITY LOCATIONS & RESULTS

Table 1: Details of Surface water quality sampling locations

Sl. No.	Locations	Latitude	Longitude	Field Observations	Parameters analyzed
1	Anchepalya Lake	13° 03' 07.2"N	77° 28' 40.0"E	This water being used for agricultural plantations by the villagers.	pH, Temperature, Dissolved Oxygen, BOD, Chemical Oxygen Demand, Electrical Conductivity, Total Suspended Solids, Total Dissolved Solids, Total Hardness as $CaCO_3$,Oil & Grease, Alkalinity as $CaCO_3$, Nitrate as NO_3, Chloride as Cl, Sulphate as SO_4, Potassium as K, Calcium as Ca, Magnesium as Mg, Fluoride as F, Phenolic Compounds, Lead as Pb, Residual Sodium Carbonate, Arsenic as As, Silica as SiO_2, Cadmium as Cd, Hexavalent Chromium as Cr^{+6} , Total Chromium, Copper as Cu, Zinc as Zn, Iron as Fe, Mercury as Hg, Nitrite as NO_2 , Carbonate as CO_3, Bicarbonate as HCO_3, Sodium as Na, Total Phosphate as PO_4, Total coliform at 9 locations.
2	Jakkur Lake	13° 04' 56.1"N	77° 36' 49.9"E	This water being used for maintenance of gardens.	
3	Rampura Lake	13° 02' 59.0"N	77° 41' 45.7"E	This water being used for agricultural plantations by the villagers.	
4	Yella Mallappa Chetty Lake	13° 01' 30.9"N	77° 43' 26.2"E	This water being used for plantations by the villagers.	
5	Chikkabanahalli Lake	13° 01' 21.9"N	77° 45' 14.7"E	This water being used for agricultural plantations by the villagers including washing and cleaning of vehicles.	
6	Lake near Koralur Village	12° 59' 06.5"N	77° 46' 36.7"E	This water being used for washing/cleaning of cattles/vehicles by the nearby villagers.	
7	Varthur Lake	12° 56' 43.4"N	77° 44' 47.1"E	No usage.	
8	Rayasandra Lake	12° 52' 02.4"N	77° 40' 34.0"E	This water being used for agricultural plantations by the villagers including washing and cleaning of vehicles.	
9	Chikkatogur Lake	12° 59' 29.9"N	77° 39' 34.4"E	This water being used for washing/cleaning of cattles/vehicles by the nearby villagers.	

Table 2: Surface water quality results

Sl. No.	Parameters	Unit	Water Quality Criteria					Results				
			A	B	C	D	E	Anchepalya Lake (13° 03' 07.2"N, 77° 28' 40.0"E)	Jakkur Lake (13° 04' 56.1"N, 77° 36' 49.9"E)	Rampura Lake (13° 02' 59.0"N, 77° 41' 45.7"E)	Yella Mallappa Chetty Lake (13° 01' 30.9"N, 77° 43' 26.2"E)	Chikkabanahalli Lake (13° 01' 21.9"N, 77° 45' 14.7"E)
1	pH	-	6.5-8.5					7.55	8.31	7.32	7.46	7.71
2	Temperature	0°C	-	-	-	-	-	23.1	26.2	23.7	25.4	25.3
3	Dissolved Oxygen	mg/L	6	5	4	4	-	4.8	5.1	4.6	4.7	4.9
4	BOD	mg/L	2	3	3	-	-	19	12	88	44	12
5	Chemical Oxygen Demand	mg/L	-	-	-	-	-	60	41.6	416	160	44
6	Electrical Conductivity	µs/cm	-	-	-	1000	2250	477	1142	1627	1608	1365
7	Total Suspended Solids	mg/L	-	-	-	-	-	76	82	64	36	32
8	Total Dissolved Solids	mg/L	500	-	1500	-	2100	350	772	1097	1066	928
9	Total Hardness as $CaCO_3$	mg/L	-	-	-	-	-	92	204	284	288	336
10	Oil & Grease	mg/L	-	-	-	-	-	ND	ND	ND	ND	ND
11	Alkalinity as $CaCO_3$	mg/L	-	-	-	-	-	84	264	480	460	280
12	Nitrate as NO_3	mg/L	20	-	50	-	-	6.46	30.84	23.67	15.16	7.04
13	Chloride as Cl	mg/L	250	-	600	-	600	52.6	169.5	185.27	203.01	236.52
14	Sulphate as SO_4	mg/L	400	-	400	-	1000	55.9	49.79	40.82	53.36	65.41
15	Potassium as K	mg/L	-	-	-	-	-	10.3	19.3	26	22.64	22.92
16	Calcium as Ca	mg/L	-	-	-	-	-	19.2	48	64	76.8	60.8
17	Magnesium as Mg	mg/L	-	-	-	-	-	10.69	20.41	30.13	23.32	44.71
18	Fluoride as F	mg/L	1.5	1.5	1.5	-	-	0.6	0.66	0.23	0.53	0.4
19	Phenolic Compounds	mg/L	-	-	-	-	-	ND	ND	ND	ND	ND
20	Lead as Pb	mg/L	0.1	-	0.1	-	-	ND	ND	0.013	0.013	ND
21	Residual Sodium Carbonate	meq/L	-	-	-	-	-	ND	ND	ND	ND	ND

Sl. No.	Parameters	Unit	Water Quality Criteria					Results				
			A	B	C	D	E	Anchepalya Lake (13° 03' 07.2"N, 77° 28' 40.0"E)	Jakkur Lake (13° 04' 56.1"N, 77° 36' 49.9"E)	Rampura Lake (13° 02' 59.0"N, 77° 41' 45.7"E)	Yella Mallappa Chetty Lake (13° 01' 30.9"N, 77° 43' 26.2"E)	Chikkabanahalli Lake (13° 01' 21.9"N, 77° 45' 14.7"E)
22	Arsenic as As	mg/L	0.05	0.2	0.2	-	-	0.019	ND	0.007	ND	0.006
23	Silica as SiO_2	mg/L	-	-	-	-	-	3.9	5.19	9.82	8.25	9.78
24	Cadmium as Cd	mg/L	-	-	-	-	-	0.009	ND	0.007	ND	BDL
25	Hexavalent Chromium as Cr^{+6}	mg/L	-	-	-	-	-	ND	ND	ND	ND	ND
26	Total Chromium	mg/L	-	-	-	-	-	0.006	ND	0.134	ND	0.119
27	Copper as Cu	mg/L	1.5	-	1.5	-	-	0.007	0.007	0.053	0.015	0.02
28	Zinc as Zn	mg/L	15	-	15	-	-	0.01	0.013	0.149	0.02	0.007
29	Iron as Fe	mg/L	0.3	-	50	-	-	0.505	0.06	2.678	3.943	0.766
30	Mercury as Hg	mg/L	-	-	-	-	-	ND	ND	ND	ND	ND
31	Nitrite as NO_2	mg/L	-	-	-	-	-	ND	0.31	0.02	0.57	0.02
32	Carbonate as CO3	mg/L	-	-	-	-	-	ND	64	ND	ND	ND
33	Bicarbonate as HCO3	mg/L	-	-	-	-	-	84	200	480	460	280
34	Sodium as Na	mg/L	-	-	-	-	-	49	126	133.1	137.2	105.5
35	Total Phosphate as PO4	mg/L	-	-	-	-	-	0.56	2.8	5.79	11.17	4.06
36	*Total coliform*	MPN/ 100 ml	50	500	5000	-	-	2200	2400	540 X 10^4	430 X 10^4	2100
							Class	**D**	**E**	**E**	**E**	**E**

Note: ND- Not Detected

Sl. No.	Parameters	Unit	Water Quality Criteria					Results			
			A	B	C	D	E	Lake near Koralur Village (12° 59' 06.5"N, 77° 46' 36.7"E)	Varthur Lake (12° 56' 43.4"N, 77° 44' 47.1"E)	Rayasandra Lake (12° 52' 02.4"N, 77° 40' 34.0"E)	Chikkatogur Lake (12° 51' 29.9"N, 77° 39' 34.4"E)
1	pH	-	6.5-8.5					7.61	7.43	7.77	7.47
2	Temperature	0°C	-	-	-	-	-	24.8	22.4	25.5	24.4
3	Dissolved Oxygen	mg/L	6	5	4	4	-	5.2	4.6	4.8	4.7
4	BOD	mg/L	2	3	3	-	-	48	94	40	78
5	Chemical Oxygen Demand	mg/L	-	-	-	-	-	152	320	134.4	236.8
6	Electrical Conductivity	µs/cm	-	-	-	1000	2250	1699	1491	1721	2080
7	Total Suspended Solids	mg/L	-	-	-	-	-	48	64	76	62
8	Total Dissolved Solids	mg/L	500	-	1500	-	2100	1157	1009	1174	1434
9	Total Hardness as $CaCO_3$	mg/L	-	-	-	-	-	308	292	412	452
10	Oil & Grease	mg/L	-	-	-	-	-	ND	ND	ND	ND
11	Alkalinity as $CaCO_3$	mg/L	-	-	-	-	-	500	460	328	540
12	Nitrate as NO_3	mg/L	20	-	50	-	-	13.29	23.5	38.1	25.87
13	Chloride as Cl	mg/L	250	-	600	-	600	206.95	161.62	283.82	289.73
14	Sulphate as SO_4	mg/L	400	-	400	-	1000	51.76	41.06	75.62	104.5
15	Potassium as K	mg/L	-	-	-	-	-	25.41	21.82	25.33	29.64
16	Calcium as Ca	mg/L	-	-	-	-	-	62.4	60.8	104	113.6
17	Magnesium as Mg	mg/L	-	-	-	-	-	36.93	34.02	36.93	40.82
18	Fluoride as F	mg/L	1.5	1.5	1.5	-	-	0.32	0.24	0.56	0.3
19	Phenolic Compounds	mg/L	-	-	-	-	-	ND	ND	ND	ND
20	Lead as Pb	mg/L	0.1	-	0.1	-	-	0.006	0.008	ND	0.008
21	Residual Sodium Carbonate	meq/L	-	-	-	-	-	ND	ND	ND	ND
22	Arsenic as As	mg/L	0.05	0.2	0.2	-	-	0.005	0.014	0.023	0.009
23	Silica as SiO_2	mg/L	-	-	-	-	-	13.99	13.18	6.28	16.61
24	Cadmium as Cd	mg/L	-	-	-	-	-	0.004	ND	0.013	0.004

Sl. No.	Parameters	Unit	Water Quality Criteria					Results			
			A	B	C	D	E	Lake near Koralur Village (12° 59' 06.5"N, 77° 46' 36.7"E)	Varthur Lake (12° 56' 43.4"N, 77° 44' 47.1"E)	Rayasandra Lake (12° 52' 02.4"N, 77° 40' 34.0"E)	Chikkatogur Lake (12° 51' 29.9"N, 77° 39' 34.4"E)
25	Hexavalent Chromium as Cr^{+6}	mg/L	-	-	-	-	-	ND	ND	ND	ND
26	Total Chromium	mg/L	-	-	-	-	-	0.017	ND	0.007	ND
27	Copper as Cu	mg/L	1.5	-	1.5	-	-	0.007	0.012	0.009	0.008
28	Zinc as Zn	mg/L	15	-	15	-	-	0.011	0.023	0.013	0.015
29	Iron as Fe	mg/L	0.3	-	50	-	-	0.648	0.68	0.149	0.223
30	Mercury as Hg	mg/L	-	-	-	-	-	ND	ND	ND	ND
31	Nitrite as NO_2	mg/L	-	-	-	-	-	0.16	ND	2.5	ND
32	Carbonate as CO3	mg/L	-	-	-	-	-	ND	ND	ND	ND
33	Bicarbonate as HCO3	mg/L	-	-	-	-	-	500	460	328	540
34	Sodium as Na	mg/L	-	-	-	-	-	122	108.8	129.1	151.7
35	Total Phosphate as PO4	mg/L	-	-	-	-	-	11.08	11.83	3.44	12.83
36	*Total coliform*	MPN/100 ml	50	500	5000	-	-	3300	540×10^4	3800	240×10^4
							Class	**E**	**E**	**E**	**E**

Note: ND- Not Detected

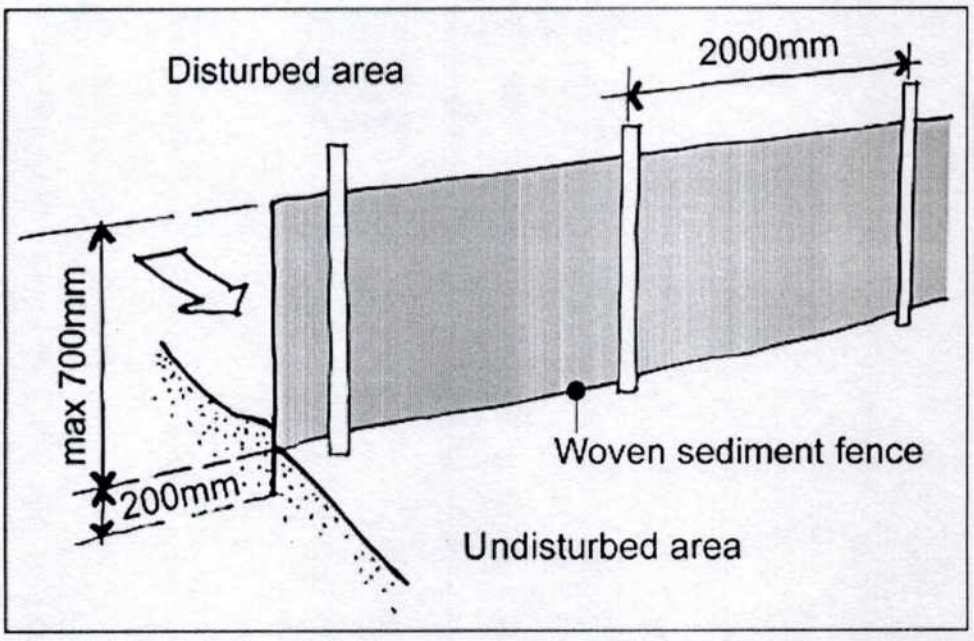


Fig – 1 Silt/Sediment Fencing Arrangements at the disturbed areas

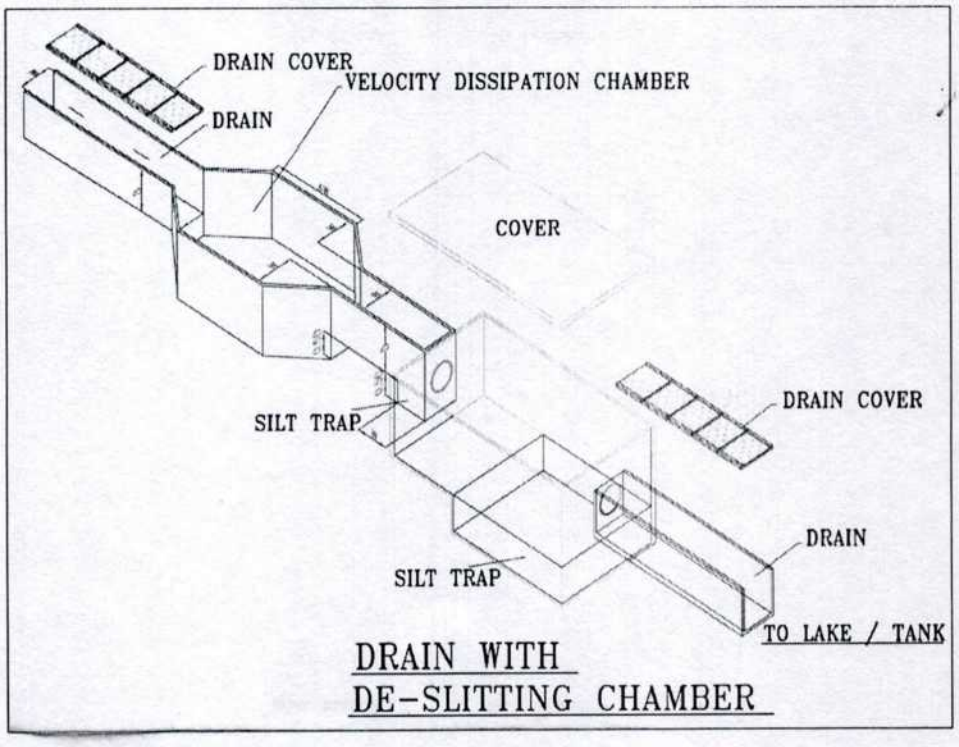


Fig -2 Silt/Sediment Trap Arrangements (before letting into lake)

ANNEXURE-19

Sl. No.	Parameters	Unit	Standards IS 10500:2012 (Second Revision)		Results				
			AL	PL	Kadugodi (12° 59' 50.7" N 77° 46' 07.8"E)	Varthur (12° 56' 22.6" N 77° 44' 58.6"E)	Sulikunte village (12° 52' 54.3" N 77° 44' 10.7"E)	Huskur village (12° 51' 41.0" N 77° 42' 14.5"E)	Jigani Bommasandra Industrial Area (12° 48' 46.9" N 77° 40' 48.8"E)
1	pH	-	6.5-8.5		7.67	7	7.26	6.89	6.86
2	Temperature	0°C	Not specified		27.2	26.6	27.2	25.5	28
3	Electrical Conductivity	µS/cm	Not specified		2810	2390	1222	1149	2900
4	Total Dissolved Solids	mg/L	500	2000	1851	1578	1086	787	1918
5	Total Hardness as $CaCO_3$	mg/L	200	600	668	660	420	380	888
6	Alkalinity as $CaCO_3$	mg/L	200	600	420	384	340	300	384
7	Phenolic Compounds	mg/L	0.001	0.002	ND	ND	ND	ND	ND
8	Oil & Grease	mg/L	10		ND	ND	ND	ND	ND
9	Phosphate Total as PO_4	mg/L	Not specified		ND	0.43	0.22	0.21	0.14
10	Chloride as Cl	mg/L	250	1000	445.45	337.04	151.76	148.89	431.65
11	Sulphate as SO_4	mg/L	200	400	90.86	89.51	180	42.66	155.66
12	Sodium as Na	mg/L	Not specified		157.4	108.6	88	60	109.4
13	Potassium as K	mg/L	Not specified		3.46	7.51	5.15	2.08	3.05
14	Calcium as Ca	mg/L	75	200	184	160	108.8	96	192
15	Magnesium as Mg	mg/L	30	100	50.54	63.18	35.96	34.02	99.14
16	Silica as SiO_2	mg/L	Not specified		12.5	16.1	12.6	13.62	15.22
17	Nitrate as NO_3	mg/L	45		10.51	31.11	33.41	41.7	43.35
18	Fluoride as F	mg/L	1	1.5	0.59	0.5	0.18	0.43	0.27
19	Residual Sodium Carbonate	meq/L	Not specified		ND	ND	ND	ND	ND

Sl. No.	Parameters	Unit	Standards IS 10500:2012 (Second Revision)		Results				
			AL	PL	Kadugodi (12° 59' 50.7" N 77° 46' 07.8"E)	Varthur (12° 56' 22.6" N 77° 44' 58.6"E)	Sulikunte village (12° 52' 54.3" N 77° 44' 10.7"E)	Huskur village (12° 51' 41.0" N 77° 42' 14.5"E)	Jigani Bommasandra Industrial Area (12° 48' 46.9" N 77° 40' 48.8"E)
20	Lead as Pb	mg/L	0.01		0.007	0.006	0.006	0.008	0.008
21	Arsenic as As	mg/L	0.01	0.05	0.008	ND	ND	0.018	0.014
22	Cadmium as Cd	mg/L	0.003		ND	ND	ND	ND	ND
23	Total Chromium	mg/L	0.05		0.006	ND	ND	ND	0.127
24	Chromium Hexavalent as Cr^{+6}	mg/L	Not specified		ND	ND	ND	ND	ND
25	Copper as Cu	mg/L	0.05	1.5	0.022	ND	ND	0.005	0.017
26	Zinc as Zn	mg/L	5	15	0.152	ND	0.007	0.007	0.016
27	Iron as Fe	mg/L	0.3		0.09	0.16	0.009	0.019	0.575
28	Mercury as Hg	mg/L	0.001		ND	ND	ND	ND	ND
29	Nitrite as NO_2	mg/L	Not specified		ND	ND	ND	ND	ND
30	Carbonate as CO_3	mg/L	Not specified		ND	ND	ND	ND	ND
31	Bicarbonate as HCO_3	mg/L	Not specified		420	384	340	300	384
32	*Total coliform*	MPN/100 ml	Not specified		11	350	6	4	<1.8

Note: ND- Not Detected

ANNEXURE-20

DETAILS OF SOIL QUALITY ANALYSIS LOCATIONS, RESULTS & SOIL NUTRIENT MAPS

Table 1: Details of soil sampling locations

Sl.No.	Location	Latitude	Longitude	Criteria
1	Anchepalya Village	13° 03' 24.1"N	77° 29' 01.9"E	Vacant land (Residential land use)
2	Near Kasghattapura	13° 06' 21.0"N	77° 30' 31.2"E	Mango orchard (Agricultural land use)
3	Near Jarakabande RF	13° 07' 49.2"N	77° 32' 29.1"E	Vacant land (Forest land use)
4	Near Maruti Nagar	13° 06' 26.57"N	77° 36' 46.10"E	Vacant land (Residential land use)
5	Near Thirumenahalli	13° 05' 14.0"N	77° 38' 08.0"E	College playground (Commercial land use)
6	Near Rampura	13° 03' 07.2"N	77° 41' 35.9"E	Vegetable cropped area (Agricultural land use)
7	Near Virgonagar	13° 01' 34.4"N	77° 44' 11.8"E	Vegetable cropped area (Agricultural land use)
8	Near Seeghihalli	13° 00' 38.5"N	77° 46' 02.1"E	Vegetable cropped area (Agricultural land use)
9	Near Channasandra	12° 59' 11.0"N	77° 46' 18.1"E	Vegetable cropped area (Agricultural land use)
10	Near Nagondanahalli	12° 58' 08.01"N	77° 46' 00.5"E	College premises (mixed residential and commercial land use)
11	Near Valepura	12° 57' 23.0"N	77° 45' 56.07"E	Coconut plantation (Agricultural land use)
12	Near Varthur	12° 56' 19.2"N	77° 45' 13.8"E	Flower garden (Agricultural land use)
13	Near Kachamaranahalli	12° 54' 32.5"N	77° 44' 46.2"E	Sapota orchard (Agricultural land use)
14	Near Sulikunte	12° 52' 53.2"N	77° 44' 10.7"E	Residential plot (residential land use)
15	Near Doddanagamangala	12° 52' 09.0"N,	77° 40' 58.10"E	Vacant land (Agricultural land use)

Table 2: Soil quality analysis results

Sl.No	Parameters	Unit	Anchepalya Village (13° 03' 24.1"N, 77° 29' 01.9"E)	Near Kasghattapura (13° 06' 21.0"N, 77° 30' 31.2"E)	Near Jarakabande RF (13° 07' 49.2"N, 77° 32' 29.1"E)	Near Maruti Nagar (13° 06' 26.57"N, 77° 36' 46.10"E)	Near Thirumenahalli (13° 05' 14.0"N, 77° 38' 08.0"E)	Near Rampura (13° 03' 07.2"N, 77° 41' 35.9"E)
1.	pH	-	7.58	7.1	7.5	7.2	7.53	7.5
2.	Texture	-	Sandy Loam	Sandy Loam	Sandy Loam	Loam	Loam	Sandy Loam
3.	Permeability	cm/hr	0.45	0.46	0.55	0.31	0.42	0.38
4.	Bulk Density	g/cc	1.77	1.37	1.43	1.54	1.45	1.95
5.	Moisture Content	Percent	1.69	4.55	4.46	6.23	5.99	3.43
6.	Electrical Conductivity	µs/cm	96.7	110.1	80.15	70.26	202	260
7.	Magnesium as Mg	meq/L	2	2.5	1.7	1.4	10.4	1.6
8.	Calcium as Ca	meq/L	8.1	10.1	3.2	4.1	62	5.4
9.	Sodium Absorption Ratio	-	0.77	0.62	0.38	1.3	6.01	2.46
10.	Chloride as Cl	meq/L	0.78	0.44	0.53	0.73	0.63	0.92
11.	Sodium	mg/100gm	3.99	3.59	1.39	4.98	8.98	14.96
12.	Organic Carbon	Percent	0.74	0.69	0.57	0.57	0.46	0.4
13.	Available Potassium as K	kg/ha	147.84	286.72	134.4	255.36	243.52	248
14.	Available Phosphorus as P_2O_5	kg/ha	16.83	25.9	14.24	28.49	23.21	28.49
15.	Cation exchange Capacity	meq/100g	3.47	3.12	4.33	6.94	6.94	5.9
16.	Water Holding Capacity	Percent	18.01	18.79	22.71	49.05	18.29	21.61
17.	Porosity	Percent	26.85	28.27	30.91	28.69	42	13.71
18.	Hexavalent Chromium	µg/g	ND	0.078	0.019	ND	0.13	ND
19.	Nitrate Nitrogen	µg/g	75.86	136.55	123.16	116.02	110.5	106.4
20.	Available Nitrogen as N	kg/ha	209.04	231.56	270.69	176.18	227.2	371.45
21.	Soil Salinity	µs/cm	81.3	93.4	70.3	50.96	158	236
22.	Total Alkalinity	meq/L	2.2	0.6	1.2	0.4	3.6	3.2

Sl.No	Parameters	Unit	Anchepalya Village (13° 03' 24.1"N, 77° 29' 01.9"E)	Near Kasghattapura (13° 06' 21.0"N, 77° 30' 31.2"E)	Near Jarakabande RF (13° 07' 49.2"N, 77° 32' 29.1"E)	Near Maruti Nagar (13° 06' 26.57"N, 77° 36' 46.10"E)	Near Thirumenahalli (13° 05' 14.0"N, 77° 38' 08.0"E)	Near Rampura (13° 03' 07.2"N, 77° 41' 35.9"E)
23.	Nitrite as NO_2	µg/g	0.36	ND	2.83	3.9	3.83	1.53
24.	Boron	mg/100gm	ND	0.17	ND	0.69	0.26	1.48
25.	Zinc as Zn	mg/kg	1.33	2.74	1.014	0.58	6.66	16.21
26.	Manganese as Mn	mg/kg	41.9	79.7	57.63	21.05	5.92	39.7
27.	Copper as Cu	mg/kg	4.22	7.15	1.05	0.95	70.6	11.5
28.	Barium	mg/kg	9.15	4.72	1.91	3.54	1.4	2.15
29.	Cadmium	mg/kg	0.024	0.028	ND	ND	0.01	0.1
30.	Lead	mg/kg	2.14	1.82	3.51	1.77	3.87	5.77
31.	Nickel	mg/kg	1.5	2	0.22	0.34	1.24	1.24
32.	Mercury	mg/kg	ND	ND	ND	ND	ND	ND
33.	Iron	ppm	7.88	9.33	6.02	3.07	1.077	4.47

Note: ND- Not Detected

Sl.No	Parameters	Unit	Near Virgonagar (13° 01' 34.4"N, 77° 44' 11.8"E)	Near Seeghihalli (13° 00' 38.5"N, 77° 46' 02.1"E)	Near Channasandra (12° 59' 11.0"N, 77° 46' 18.1"E)	Near Nagondanahalli (12° 58' 08.01"N, 77° 46' 00.5"E)	Near Valepura (12° 57' 23.0"N, 77° 45' 56.07"E)	Near Varthur (120 56' 19.2"N, 770 45' 13.8"E)
1.	pH	-	7.59	7.61	7.3	7.15	7.45	7.11
2.	Texture	-	Sandy Loam	Sandy Loam	Loam	Sandy Loam	Loam	Sandy Loam
3.	Permeability	cm/hr	0.51	1.05	0.39	0.43	0.48	0.6
4.	Bulk Density	g/cc	1.53	1.79	1.25	1.83	1.5	1.63
5.	Moisture Content	Percent	9.01	2.46	4.22	4.35	3.76	2.91
6.	Electrical Conductivity	µs/cm	213	569	310	122.8	123.2	133
7.	Magnesium as Mg	meq/L	1.2	3.4	0.5	1.2	2.6	1.3
8.	Calcium as Ca	meq/L	6.4	8.2	4.8	4.3	6.1	5.5
9.	Sodium Absorption Ratio	-	0.94	2.7	3.61	1.4	2.44	0.47
10.	Chloride as Cl	meq/L	0.63	0.44	0.53	1.12	0.69	0.78
11.	Sodium	mg/100gm	5.98	21.15	19.16	7.58	16.56	1.99
12.	Organic Carbon	Percent	0.74	0.57	0.8	0.74	0.69	0.57
13.	Available Potassium as K	kg/ha	203.2	262.88	245.12	171.68	282.24	255.36
14.	Available Phosphorus as P_2O_5	kg/ha	23.21	20.72	25.9	20.72	22.02	25.9
15.	Cation exchange Capacity	meq/100g	6.94	4.33	5.55	6.94	5.03	6.24
16.	Water Holding Capacity	Percent	21.97	22.8	17.08	16.48	15.73	24.97
17.	Porosity	Percent	19.89	17.88	51.55	25.6	43.18	26.57
18.	Hexavalent Chromium	µg/g	0.02	0.02	0.01	ND	ND	0.01
19.	Nitrate Nitrogen	µg/g	111.4	109.6	150.5	9.81	53.55	80.32
20.	Available Nitrogen as N	kg/ha	256.36	220.71	270.69	293.52	187.34	239.9
21.	Soil Salinity	µs/cm	196	460	296	120	105	120.8

Sl.No	Parameters	Unit	Near Virgonagar (13° 01' 34.4"N, 77° 44' 11.8"E)	Near Seeghihalli (13° 00' 38.5"N, 77° 46' 02.1"E)	Near Channasandra (12° 59' 11.0"N, 77° 46' 18.1"E)	Near Nagondanahalli (12° 58' 08.01"N, 77° 46' 00.5"E)	Near Valepura (12° 57' 23.0"N, 77° 45' 56.07"E)	Near Varthur (120 56' 19.2"N, 770 45' 13.8"E)
22.	Total Alkalinity	meq/L	1.6	0.8	1.8	1.6	0.6	0.8
23.	Nitrite as NO_2	µg/g	0.12	17.88	0.62	0.93	0.31	0.76
24.	Boron	mg/100gm	4.53	0.69	2.48	0.43	0.91	2.52
25.	Zinc as Zn	mg/kg	3.98	6.48	2.73	4.14	2.63	1.59
26.	Manganese as Mn	mg/kg	19.69	22.7	42.15	14. 8	36	45.3
27.	Copper as Cu	mg/kg	2.19	2.39	2.33	1.94	3.25	2.1
28.	Barium	mg/kg	2.75	0.9	1.29	4.42	4.16	5.02
29.	Cadmium	mg/kg	0.048	0.06	0.028	0.04	0.036	0.024
30.	Lead	mg/kg	1.03	0.66	0.78	0.7	1.49	1.28
31.	Nickel	mg/kg	0.36	0.52	0.58	0.25	0.86	0.62
32.	Mercury	mg/kg	ND	ND	ND	ND	ND	ND
33.	Iron	ppm	1.51	2.22	2.13	1.09	2.72	4.57

Note: ND-Not Detected

Sl.No	Parameters	Unit	Near Kachamaranahalli (12° 54' 32.5"N, 77° 44' 46.2"E)	Near Sulikunte (12° 52' 53.2"N, 77° 44' 10.7"E)	Near Doddanagamangala (12° 52' 09.0"N, 77° 40' 58.10"E)
1.	pH	-	7.17	7.23	7.1
2.	Texture	-	Sandy Loam	Silt Loam	Loam
3.	Permeability	cm/hr	0.43	1.16	0.73
4.	Bulk Density	g/cc	1.42	1.38	1.25
5.	Moisture Content	Percent	1.9	10.5	2.61
6.	Electrical Conductivity	µs/cm	117.45	541	390
7.	Magnesium as Mg	meq/L	1	0.9	1.8
8.	Calcium as Ca	meq/L	9.6	7	7.6
9.	Sodium Absorption Ratio	-	0.49	0.96	1
10.	Chloride as Cl	meq/L	0.39	1.02	0.93
11.	Sodium	mg/100gm	2.59	4.39	4.98
12.	Organic Carbon	Percent	0.74	0.46	0.51
13.	Available Potassium as K	kg/ha	161.28	129.92	264.64
14.	Available Phosphorus as P_2O_5	kg/ha	16.83	29.79	24.64
15.	Cation exchange Capacity	meq/100g	7.11	5.03	9.54
16.	Water Holding Capacity	Percent	28.52	19.11	27.53
17.	Porosity	Percent	48.55	36.98	40.19
18.	Hexavalent Chromium	µg/g	0.02	0.01	ND
19.	Nitrate Nitrogen	µg/g	9.81	98.3	98.17
20.	Available Nitrogen as N	kg/ha	243.88	217.32	223.91
21.	Soil Salinity	µs/cm	95.6	436	210
22.	Total Alkalinity	meq/L	0.12	1.6	1
23.	Nitrite as NO_2	µg/g	2.97	0.24	0.36
24.	Boron	mg/100gm	1.56	0.61	1.52
25.	Zinc as Zn	mg/kg	0.78	0.63	0.96
26.	Manganese as Mn	mg/kg	19.2	58.4	9.21

Sl.No	Parameters	Unit	Near Kachamaranahalli (12° 54' 32.5"N, 77° 44' 46.2"E)	Near Sulikunte (12° 52' 53.2"N, 77° 44' 10.7"E)	Near Doddanagamangala (12° 52' 09.0"N, 77° 40' 58.10"E)
27.	Copper as Cu	mg/kg	1.22	1.15	1.55
28.	Barium	mg/kg	3.42	5.22	2.24
29.	Cadmium	mg/kg	ND	ND	ND
30.	Lead	mg/kg	0.55	0.98	0.82
31.	Nickel	mg/kg	0.54	0.44	0.36
32.	Mercury	mg/kg	ND	ND	ND
33.	Iron	ppm	2.31	2.05	1.43

Note: ND-Not Detected

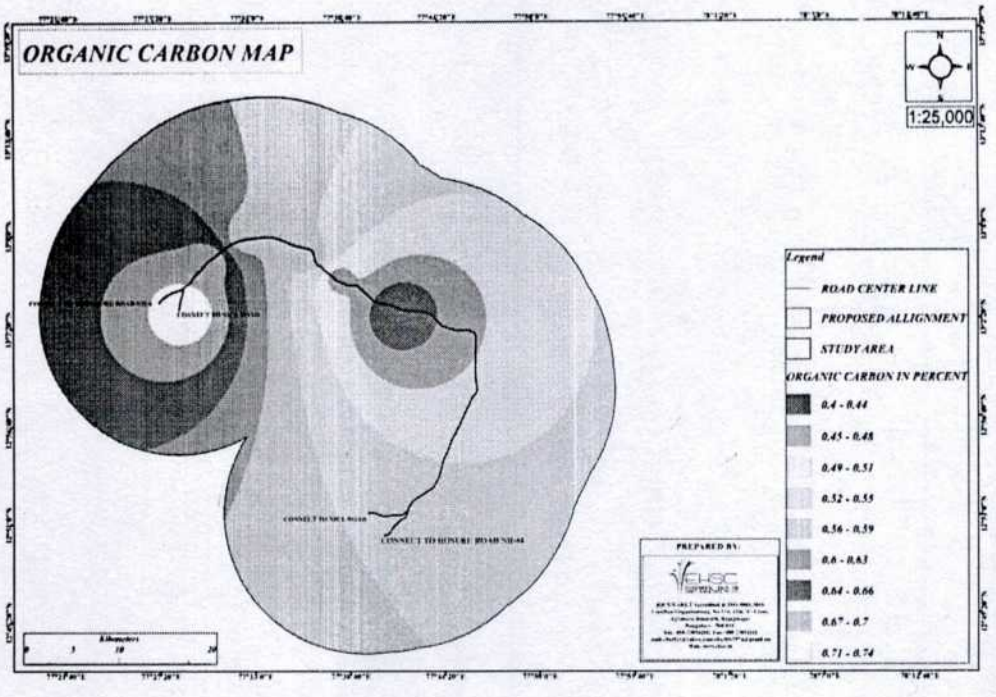


Fig 1: Map indicating trend of Available Organic Carbon in the study area

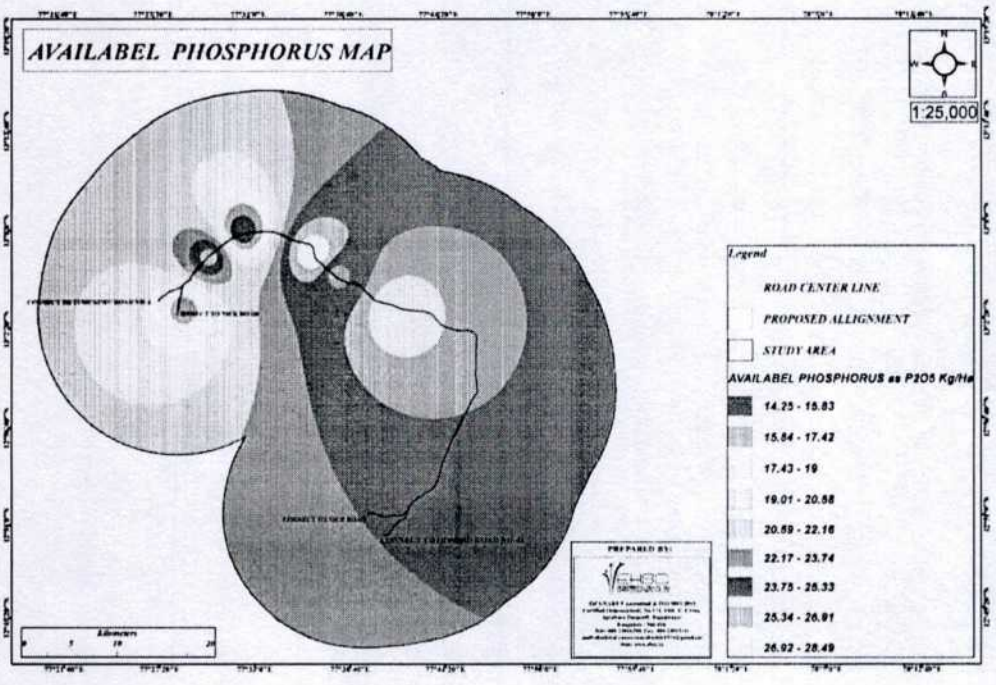


Fig 2: Map indicating trend of Available Phosphorous in the study area

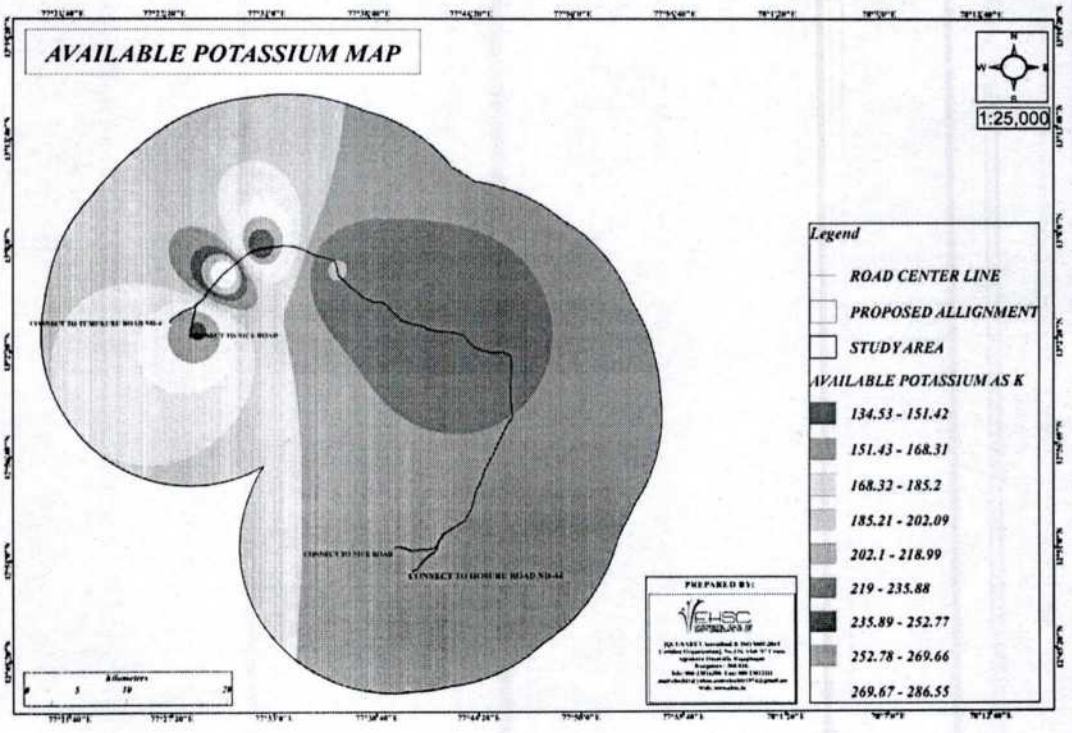


Fig 3: Map indicating trend of Available Potassium in the study area

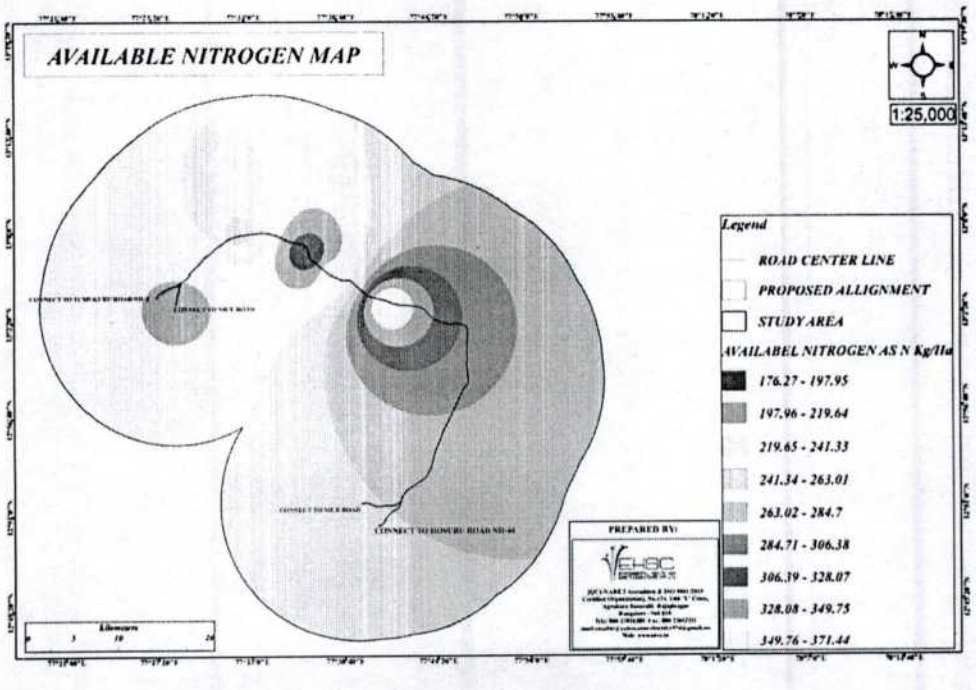


Fig 4: Map indicating trend of Available Nitrogen in the study area

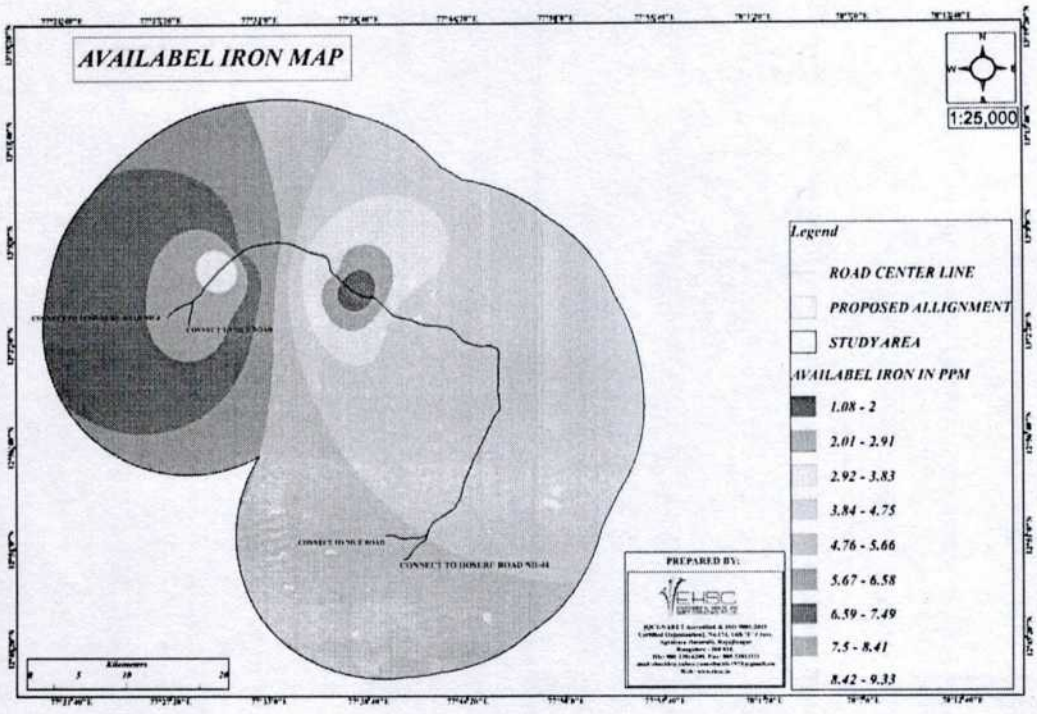


Fig 5: Map indicating trend of Available Iron in the study area

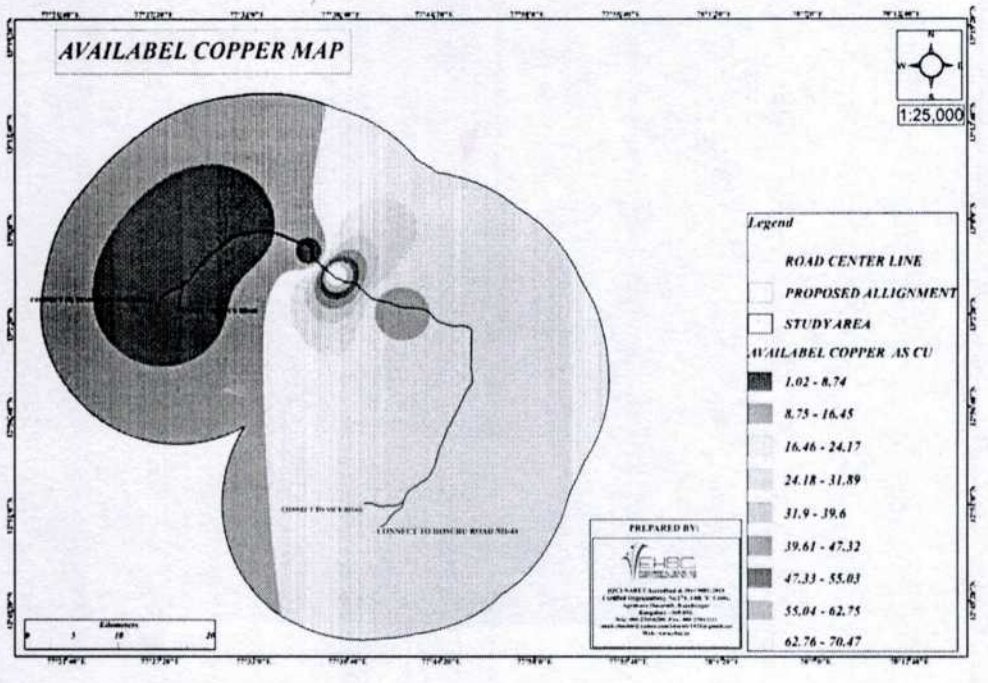
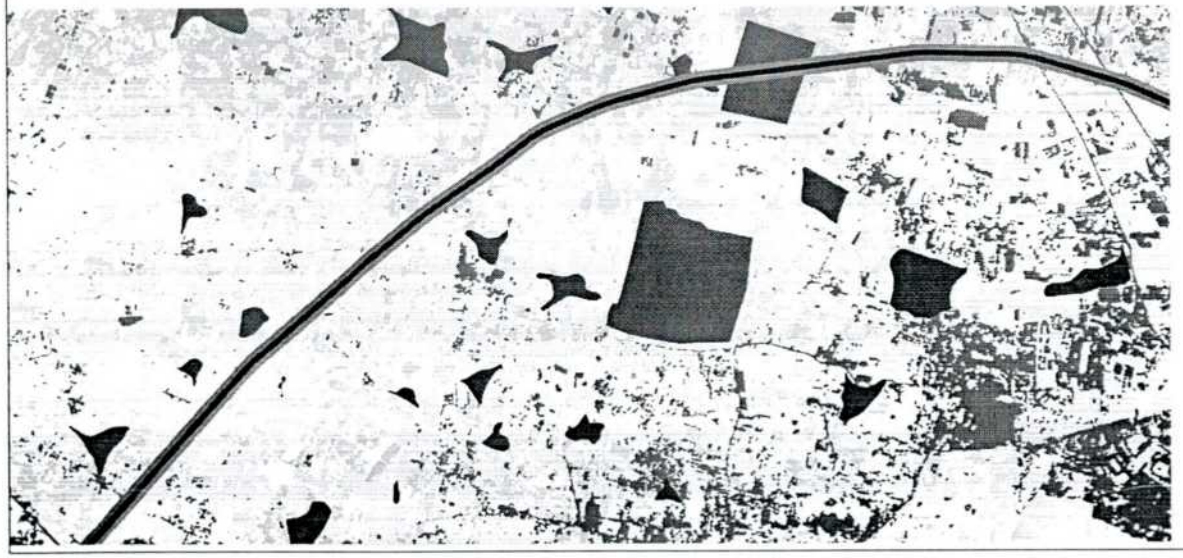


Fig 6: Map indicating trend of Available Copper in the study area

ANNEXURE-21



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Legend

- ROAD CENTER LINE
- PROPOSED ALLIGNMENT
- PROPOSED STUDY AREA

LULC CLASSES

- Built Up
- Plantation
- Agricultural Land
- Fallow Land
- Bareen Land
- Water body
- Forest Boundary

0 0.5 1 2 KM

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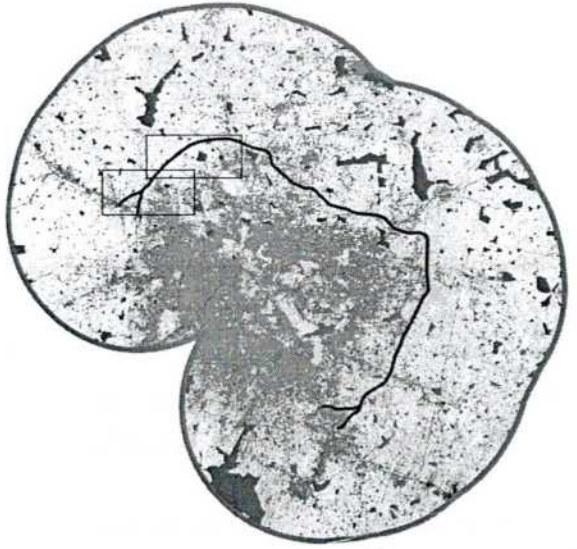

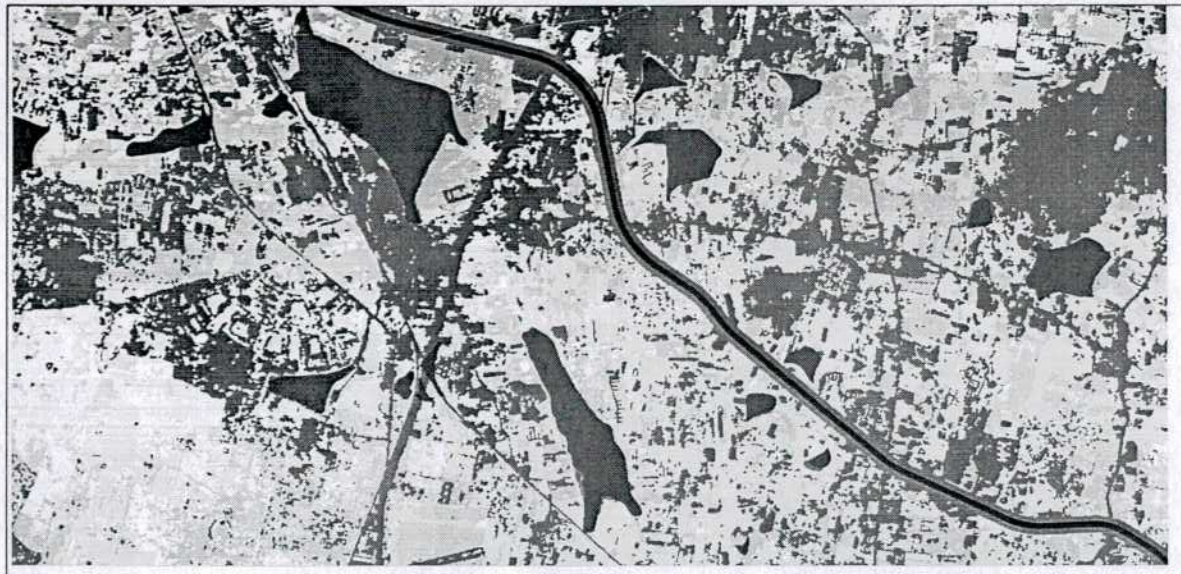

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Legend

- ROAD CENTER LINE
- PROPOSED ALLIGNMENT
- PROPOSED STUDY AREA

LULC CLASSES

- Built Up
- Plantation
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- Fallow Land
- Bareen Land
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0 0.5 1 2 KM

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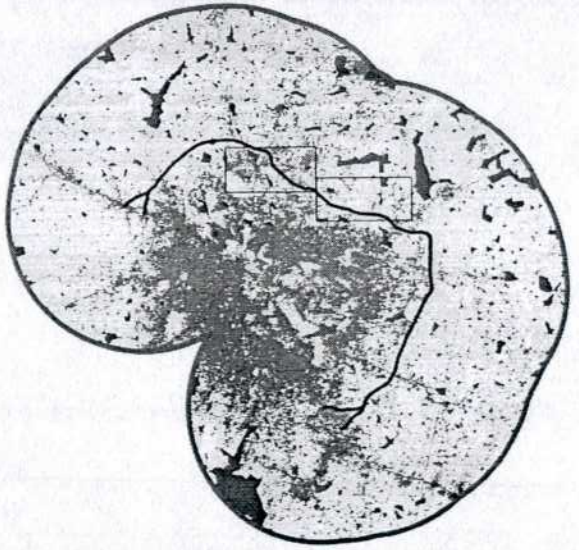

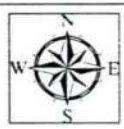

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Legend

- ROAD CENTER LINE
- PROPOSED ALLIGNMENT
- PROPOSED STUDY AREA

LULC CLASSES

- Built Up
- Plantation
- Agricultural Land
- Fallow Land
- Bareen Land
- Water body
- Forest Boundary

0 0.5 1 2 KM

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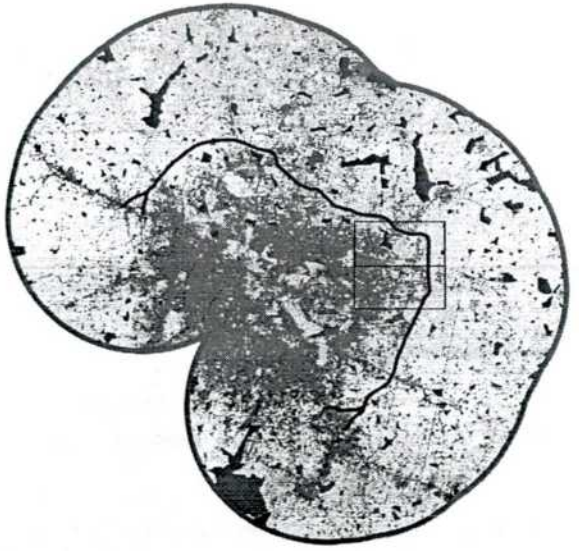

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Legend

- ROAD CENTER LINE
- PROPOSED ALLIGNMENT
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- LULC CLASSES
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0 0.5 1 2 KM

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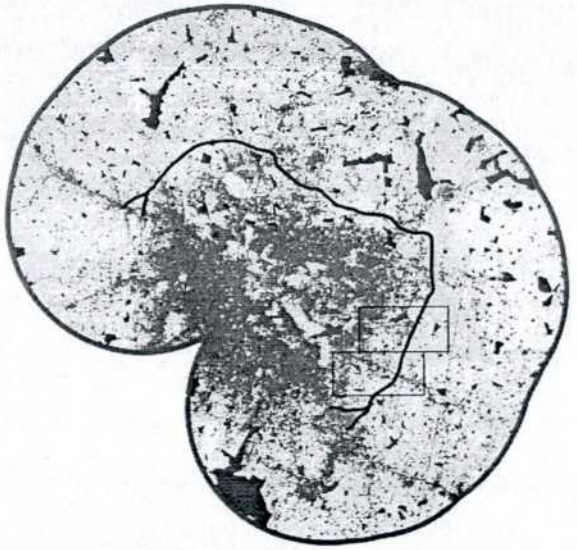

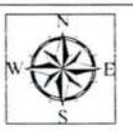

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Legend

- *ROAD CENTER LINE*
- *PROPOSED ALLIGNMENT*
- *PROPOSED STUDY AREA*

LULC CLASSES

- *Built Up*
- *Plantation*
- *Agricultural Land*
- *Fallow Land*
- *Bareen Land*
- *Water body*
- *Forest Boundary*

0 0.5 1 2 KM

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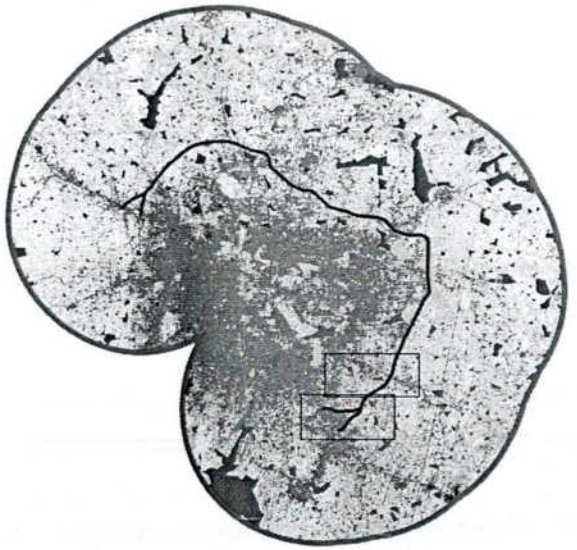


ANNEXURE-22

ECOLOGY AND BIODIVERSITY STUDIES

A. Details of sampling locations

Sl.No.	Location	Geographical coordinates	Chainage in Km	Criteria
1	Anchepalya lake	13°03'10.1"N 77°28'42.2"E	0+800	Water body
2	Chikkabanavara lake	13°05'9.6"N 77°30'21.2"E	4+700	Water body
3	Jarkabandekaval	13°07'39.7"N 77°32'51.2"E	12+000	Reserve Forest
4	Puttenahalli Lake	13°6'43.61"N 77°34'34.99"E	14+800	Water body
5	Near Bileshivale	13°03'25.9"N 77°41'27.8"E	29+800	Plantation
6	Rampura Lake	13°02'48.5"N 77°40'50.8"E	30+000	Water body
7	Near Aavalahalli	13°02'11.5"N 77°44'30.5"E	36+600	Agricultural land
8	Yellamma lake	13°01'17.2"N 77°43'24.9"E	37+400	Water body
9	Near Channasandra	12°58'50.7"N77°46'21.4"E	44+400	Plantation
10	Sheelavanthakere	12°57'50.29"N 77°44'36.10"E	46+600	Water body
11	Near Huskur	12°52'04.4"N 77°42'26.9"E	58+300	Agricultural land
12	Rayasandra Lake	12°52'9.83"N 77°40'49.59"E	61+600	Water body

B.Project Alignment.

B.1 Flora in Project Alignment.

Table 1: Checklist of Trees recorded within the Project Alignment.

Sl.No	Scientific Name	Local Name	Family	Nos.	IUCN Conservation Status-2021	RET Status	USES
Peripheral Ring Road (65.950 km)							
1	*Acacia auriculiformis* Benth.	Kadu seege	Fabaceae	73	Least Concern	Common	Pulp wood
2	*Acacia leucophloea* (Roxb.) Willd.	Beala	Fabaceae	267	Least Concern	Common	Medicinal Siddha, Folk
3	*Aegle marmelos* (L.) Correa	Bilwapatre	Rutaceae	3	Near Threatened	Common	Medicinal and Traditional
4	*Alangium salvifolium* (L.f.) Wangerin	Ankole mara	Alangiaceae	1	Not Assessed	Common	Edible and timber Siddha, Folk
5	*Albizia amara* (Roxb.)B.Boivin	Chigure	Fabaceae	32	Least Concern	Common	Fodder, fuel wood and timber
6	*Albizia lebbeck (L.)Benth.*	Baage	Fabaceae	116	Least Concern	Common	Timber
7	*Albizia odoratissima* (L.F.)BENTH.	Aenu baage	Fabaceae	16	Least Concern	Common	Edible and Medicinal
8	*Alstonia scholaris* (L.) R.Br.	aelele haale	Apocynaceae	6	Least Concern	Common	Ornamental Homeopathy and Medicinal
9	*Anacardium occidentale* L.	Gaerumara	Anacardiaceae	73	Not Assessed	Common	Medicinal
10	*Annona reticulate* L.	Rampala	Annonaceae	4	Least Concern	Common	Medicinal and edible
11	*Annona squamosa L.*	Sithapala	Annonaceae	2	Least Concern	Common	Medicinal and edible
12	*Araucaria columnaris* J.R Forst Hook.	Christmas tree	Araucariaceae	6	Least Concern	Common	Ornamental
13	*Araucaria heterophylla* (Salisb.) Franco	Christmas tree	Araucariaceae	8	Vulnerable	Common	Ornamental
14	*Areca catechu* L.	Adike	Arecaceae	433	Not Assessed	Common	Medicinal, edible and traditional
15	*Artocarpus heterophyllus* Lam.	Halasu	Moraceae	148	Not Assessed	Common	Edible and medicinal
16	*Azadirachta indica* A.Juss.	Bevu	Meliaceae	953	Least Concern	Common	Medicinal, edible and traditional
17	*Balanites aegyptiaca* (L.) Delile	Ingala	Zygophyllaceae	3	Least Concern	Common	Medicinal
18	*Bauhinia malabarica ROXB.*	basavanapaada	Fabaceae	4	Least Concerned	Common	Medicinal
19	*Bauhinia purpurea* L.	Basavanapadu	Fabaceae	5	Least Concerned	Common	Ornamental & medicinal
20	*Bauhinia racemosa* LAM.	Basavanapada	Caesalpiniaceae	21	Not Assessed	Common	Medicinal
21	*Bismarckia nobilis* Hildebr. &	Thale Gari	Arecaceae	2	Least Concern	Common	Ornamental

Sl.No	Scientific Name	Local Name	Family	Nos.	IUCN Conservation Status-2021	RET Status	USES
	H.Wendl						
22	*Bombax ceiba* L.	Kempu Buruga	Malvaceae	5	Least Concern	Common	Edible and Medicinal
23	*Boswellia serrata ROXB.*	Dhupa	Burseraceae	2	Not Assessed	Common	Medicinal
24	*Bougainvillea glabra* Choisy	Paper flower	Nyctaginaceae	1	Least Concerned	Common	Ornamental
25	*Butea monosperma var.lutea*	Muthugada mara	Fabaceae	30	Least Concern	Common	Ornamental
26	*Carica papaya* L.	Papaya	Caricaceae	15	Data Deficient	Common	Edible and Medicinal
27	*Caryota urens* L.	Bagane	Arecaceae	11	Least Concern	Common	Medicinal
28	*Cassia fistula* L.	Kakke mara	Fabaceae	3	Least Concern	Common	Ornamental and medicinal
29	*Casuarina equisetifolia* (Benth.) L.A.S. Johnson	Sarve mara	Casuriniaceae	9	Least Concern	Common	Fuel, erosion control, and as a windbreak
30	*Chloroxylon swietenia (*Roxb.)DC.	Hurugalu	Rutaceae	7	Vulnerable	Common	Timber, medicinal and fuel wood, Traditional
31	*Cinnamomum sulphuratum* NEES.	Chakke mara	Lauraceae	1	Vulnerable	Common	Folk
32	*Cinnamomum verum* J.Presl	Chakke mara	Lauraceae	1	Not Assessed	Common	Medicine and Edible
33	*Citrus maxima* (Burm.) Merr.	Bublimara	Rutaceae	3	Least Concern	Common	Medicinal & Edible
34	*Citrus medica L.*	Helikai	Rutaceae	8	Least Concern	Common	Medicinal & Edible
35	*Cocos nucifera* L.	Tengu	Arecaceae	5384	Not Assessed	Common	Edible and Medicinal
36	*Commiphora caudata (Wight & Arn.) Engl.*	Konda Mavu	Burseraceace	4	Not Assessed	Common	Medicinal
37	*Cordia dichotoma* FORST. F.	Alale	Cordiaceae	23	Least Concern	Common	Edible and Medicinal
38	*Dalbergia latifolia* Roxb.	Beete mara	Fabaceae	1	Vulnerable	Common	Medicinal
39	*Dalbergia sissoo* DC.	Agara	Fabaceae	11	Least Concern	Common	Timber
40	*Delonix regia* (Hook.) Raf.	May tree	Fabaceae	10	Least Concern	Common	Ornamental
41	*Eucalyptus globulus* Labill	Nilagiri	Myrtaceae	11002	Least Concern	-	Medicinal
42	*Eucalyptus grandis* W.Hill	Neelagiri mara	Myrtaceae	1	Near threatened	Common	Medicinal
43	*Eucalyptus tereticornis* L.	Neelagiri	Myrtaceae	2488	Least Concern	Common	Medicinal
44	*Ficus benghalensis* L.	Aladamara	Moraceae	25	Not Assessed	Common	Edible and Medicinal
45	*Ficus benjamina* L.	Peeladamara	Moraceae	2	Least Concern	Common	Medicinal and Ornamental
46	*Ficus carica* L.	Attimara	Moraceae	10	Least Concern	Common	Medicinal and Ornamental
47	*Ficus elastica* ROXB. EX. HORNEM.	Goni	Moraceae	3	Not Assessed	Common	Ornamental
48	*Ficus hispida* L.F.	Adavi atthi	Moraceae	4	Not Assessed	Common	Medicinal

Sl.No	Scientific Name	Local Name	Family	Nos.	IUCN Conservation Status-2021	RET Status	USES
49	*Ficus racemosa* L.	Attimara	Moraceae	57	least Concern	Common	Medicinal
50	*Ficus religiosa* L.	Arali mara	Moraceae	27	Not Assessed	Common	Medicinal and Traditional
51	*Ficus virens* Aiton	Basari mara	Moraceae	1	Least Concern	Common	Medicinal
52	*Gliricidia sepium* (Jacq.)Walp.	Gobbarada gida	Fabaceae	18	Least Concern	Common	Medicinal
53	*Gmelina arborea* L.	Shivane	Lamiaceae	15	least Concern	Common	Medicinal
54	*Grevillea robusta* A. Cunn. ex R. Br.	Silver oak	Proteaceae	1589	least Concern	Common	Folk
55	*Hardwickia binata* Roxb.	Kamara	Fabaceae	1	least Concern	Common	Medicinal and dyeing
56	*Holoptelea integrifolia* (Roxb.) Planch.	Tabsi mara	Ulmaceae	11	Not Assessed	Common	Medicinal
57	*Jacaranda mimosifolia* D. Don	Aalada mara	Bignoniaceae	1	Vulnerable	Common	Ornamental
58	*Kigelia africana (LAMK.) BENTH.*	Mara sowthekai	Bignoniaceae	1	Least Concern	Common	Medicinal
59	*Lagerstroemia speciosa* Deepu & Pandur.	Nandi mara	Lytharaceae	12	Not Assessed	Common	Medicinal, folk
60	*Leucaena leucocephala(Lam.)de Wit*	Chigurakku	Fabaceae	68	Not Assessed	Common	Fodder, fuel wood and medicinal
61	*Limonia acidissima* L.	Aranamullu	Rutaceae	7	Not Assessed	-	Medicinal, folk
62	*Madhuca longifolia* (KOEN.) MACLER	Hippe	Sapotaceae	5	Not assessed	-	Medicinal, folk
63	*Magnolia champaca* (L.) Baill. ex Pierre	Sampige mara	Magnoliaceae	1	Least Concern	Common	Ornamental
64	*Mallotus philippensis* (Lam.) Muell.Arg.	Kumkuma mara	Euphorbiaceae	1	Least Concern	Common	-
65	*Mangifera indica* L.	Mavina mara	Anacardiaceae	4139	Data Deficient	Common	Edible and Fuel wood
66	*Manilkara zapota* (L.) VAN ROYEN	Sapota	Sapotaceae	726	Not Assessed	Common	Edible and medicinal
67	*Melaleuca viminalis* (Sol. ex Gaertn.) Byrnes	Bottle brush	Myrtaceae	1	Least Concern	Common	Ornamental
68	*Melia azedarach* L.	Hebbevu	Meliaceae	29	Least Concern	Common	Medicinal, Pulp wood and plywood
69	*Melia dubia* Hiern, Non Cav.	Kadu Bevu	Meliaceae	4	Not Assessed	Common	Medicinal, folk
70	*Millingtonia hortensis* L. fil.	Akashamallige	Bignoniaceae	27	Not Assessed	Common	Ornamental
71	*Moringa oleifera* Lam.	Nugge	Moringaceae	48	Least Concern	Common	Edible, medicinal and cosmetics
72	*Morus alba* L.*	Hippunerale	Moraceae	4	Not Assessed	Common	Medicinal

Sl.No	Scientific Name	Local Name	Family	Nos.	IUCN Conservation Status-2021	RET Status	USES
73	*Muntingia calabura L.*	Gasagase Mara	Muntingiaceae	122	Not Assessed	Common	Edible
74	*Murraya koenigii* (L.) SPR	karibevu	Rutaceae	4	Least Concern	Common	Medicinal
75	*Neolamarckia cadamba* (Roxb.) Bosser	Kaduavalatige	Rubiaceae	21	Not assessed	Common	Ornamental and pollution control
76	*Peltophorum pterocarpum (DC.) K.Heyne*	Copperpod	Fabaceae	78	Least Concern	Common	Medicinal
77	*Persea americana* Mill.	Butterfruit	Lauraceae	2	Least Concern	Common	Medicinal
78	*Phoenix sylvestris* (L.) Roxb.	Echallu mara	Arecaceae	266	Not Assessed	Common	Medicinal, Edible, ornamental
79	*Phyllanthus emblica* L.	Betta Nalli	Phyllanthaceae	95	Least Concern	Common	Edible and Medicinal
80	*Pithecellobium dulce* (Roxb.)Benth.	Seeme hunase	Fabaceae	218	Least Concern	Common	Edible, medicinal and agroforestry
81	*Polyalthia longifolia(Sonn.) Thwaites*	Ashoka mara	Annonaceae	131	Not Assessed	Common	Ornamental and windbreak
82	*Pongamia pinnata* (L.)Pierre	Honge	Fabaceae	1370	Least Concern	Common	Medicinal
83	*Prosopis juliflora* (Sw.) DC.	Ballari jaali	Fabaceae	21	Not Assessed	-	Fuelwood
84	*Psidium guajava* L.	Guava	Myrtaceae	76	Least Concern	Common	Edible and Medicinal
85	*Pterocarpus marsupium* Roxb.	Honne mara	Fabaceae	16	Near Threatened	Common	Medicinal and Timber
86	*Roystonea regia*(Kunth) O.F.Cook	Gaali mara	Arecaceae	2	Least Concern	Common	Ornamental
87	*Samanea saman* (Jacq.) Merr.	Male mara	Fabaceae	36	Least Concern	Common	Folk
88	*Santalum album* Linn.	Srigandha mara	Santalinaceae	21	Vulnerable	Common	Medicinal and Timber
89	*Saraca asoca* (Roxb.) Willd.	Ashoka	Fabaceae	8	Vulnerable	Common	Ornamental
90	*Senegalia catechu* (L.f.) P.J.H.Hurter & Mabb.	Catechu	Fabaceae	35	Least Concern	Common	Medicinal and Timber
91	*Senegalia ferruginea* (DC.) Pedley	Banni	Fabaceae	4	Not assessed	Common	Timber
92	*Senna siamea* (Lam.) H.S.Irwin & Barneby	Simetangedi	Fabaceae	161	Least Concern	Common	Medicinal
93	*Sesbania grandiflora* (L.) Poiret	Agase mara	Fabaceae	3	Not assessed	Common	Medicinal
94	*Simarouba glauca* DC.	Simaruba	Simaroubaceae	71	Least Concern	Common	Medicinal
95	*Spathodea campanulata* P.Beauv.	Neerukayi mara	Bignoniaceae	26	Least Concern	Common	Ornamental and timber
96	*Swietenia mahagoni* (L.) JACQ	Mahogani	Meliaceae	26	Near Threatened	Common	Timber
97	*Symplocos racemosa* Roxb.	Bala Doddli	Symplocaceae	3	Not Assessed	Common	Timber
98	*Syzygium cumini* (L.) Skeels	Jambunerale	Myrtaceae	204	Least Concern	Common	Edible and Medicinal
99	*Syzygium jambos* (L.) ALSTON	Paneerale	Myrtaceae	1	Least Concern	Common	Edible and Medicinal

Sl.No	Scientific Name	Local Name	Family	Nos.	IUCN Conservation Status-2021	RET Status	USES
100	*Tabebuia argentea* (Bur. & Schum.) Britton.	-	Bignoniaceae	8	Not Assessed	Common	Ornamental
101	*Tabebuia aurea* (Silva Manso) Benth. & Hook.f. ex S.Moore	Silver trumpet tree	Bignoniaceae	1	Not Assessed	Common	Ornamental
102	*Tabebuia rosea* DC.	Pink poui	Bignoniaceae	150	Least Concern	-	Ornamental
103	*Tamarindus indica* L.	Hunase mara	Fabaceae	188	Least Concern	Common	Edible and medicinal
104	*Tectona grandis* L.f.	Tega	Verbenaceae	2336	Not Assessed	Common	Timber
105	*Terminalia arjuna* (Roxb.) Wight & Arn.	Arjuna mara	Combretaceae	5	Not Assessed	Common	Edible and medicinal
106	*Terminalia catappa* L.	Badami	Combertaceae	17	Least Concern	Common	Edible, medicinal and Agroforestry
107	*Terminalia elliptica* Willd.	Matthi mara	Combretaceae	3	Not Assessed	-	Timber
108	*Thespesia populnea* (L.) Sol. ex Corrêa	Gante mara	Malvaceae	11	Least Concern	Common	Ornamental and medicinal
109	*Toona ciliata* M. Roem.	Noga mara	Meliaceae	6	Least Concern	Common	Medicinal
110	*Vachellia nilotica* (L.) P.J.H.Hurter & Mabb	Kari jali	Fabaceae	404	Least Concern	Common	Timber
111	*Wrightia tinctoria* R.Br. ssp. laevis (Hook.f.) Pichon	Halle	Apocynaceae	4	Least Concern	Common	Medicinal
112	*Ziziphus jujuba* Lam	Bore Hannu	Rhamnaceae	11	Least Concern	Common	Edible and medicinal
113	*Ziziphus mauritiana* Lam.	Kare hannu	Rhamnaceae	12	Least Concern	Common	Edible and medicinal
114	*Ziziphus oenoplia* Mill.	Bore	Rhamnaceae	7	Not Assessed	Common	Edible and medicinal
			Total A	**34217**			
NICE Integration Tumkur Road (3.4 km)							
1	*Acacia auriculiformis* Benth.	Kadu seege	Fabaceae	1	Least Concern	Common	Pulp wood
2	*Acacia leucophloea* (Roxb.) Willd.	Beala	Fabaceae	31	Least Concern	Common	Medicinal Siddha, Folk
3	*Aegle marmelos* (L.) Correa	Bilwapatre	Rutaceae	1	Near Threatened	Common	Medicinal and Traditional
4	*Albizia lebbeck (L.)Benth.*	Baage	Fabaceae	1	Least Concern	Common	Timber
5	*Alstonia scholaris* (L.) R.Br.	aelele haale	Apocynaceae	1	Least Concern	Common	Ornamental Homeopathy and Medicinal
6	*Areca catechu* L.	Adike	Arecaceae	4	Not Assessed	Common	Medicinal, edible and traditional
7	*Artocarpus heterophyllus* Lam.	Halasu	Moraceae	11	Not Assessed	Common	Edible and medicinal

Sl.No	Scientific Name	Local Name	Family	Nos.	IUCN Conservation Status-2021	RET Status	USES
8	*Azadirachta indica* A.Juss.	Bevu	Meliaceae	85	Least Concern	Common	Medicinal, edible and traditional
9	*Butea monosperma* var. *lutea*	Muthugada mara	Fabaceae	1	Least Concern	Common	Ornamental
10	*Cocos nucifera* L.	Tengu	Arecaceae	395	Not Assessed	Common	Edible and Medicinal
11	*Dalbergia latifolia* Roxb.	Beete mara	Fabaceae	1	Vulnerable	Common	Medicinal
12	*Dalbergia sissoo* DC.	Agara	Fabaceae	1	Least Concern	Common	Timber
13	*Delonix regia* (Hook.) Raf.	May tree	Fabaceae	3	Least Concern	Common	Ornamental
14	*Eucalyptus globulus* Labill	Nilagiri	Myrtaceae	45	Least Concern	Common	Medicinal
15	*Ficus benghalensis* L.	Aladamara	Moraceae	9	Not Assessed	Common	Edible and Medicinal
16	*Ficus racemosa* L.	Attimara	Moraceae	13	least Concern	Common	Medicinal
17	*Glimea arborea*	Kashmiri mara	Lamiaceae	1	Not Assessed	Common	Pulp,Packing
18	*Gliricidia sepium* (Jacq.)Walp.	Gobbarada gida	Fabaceae	5	least Concern	Common	Manure plant
19	*Grevillea robusta* A. Cunn. ex R. Br.	Silver oak	Proteaceae	15	least Concern	Common	Folk
20	Leucaena leucocephala	Subbabull	Fabaceae	4	Least Concern	Common	Fodder and Timber
21	*Mangifera indica* L.	Mavina mara	Anacardiaceae	44	Data Deficient	Common	Edible and Fuel wood
22	*Manilkara zapota* (L.) VAN ROYEN	Sapota	Sapotaceae	5	Not Assessed	Common	Edible and medicinal
23	*Melia azedarach* L.	Hebbevu	Meliaceae	1	Least Concern	Common	Medicinal, Pulp wood and plywood
24	*Melinea arborea*	White Teak	Lamiales	1	Not Assessed	Common	Pulping and packing
25	*Michelia Champka*	Sampige	Magnoliaceae	1	Least Concern	Common	Medicinal
26	*Moringa oleifera* Lam.	Nugge	Moringaceae	2	Least Concern	Common	Edible, medicinal and cosmetics
27	*Muntingia calabura L.*	Gasagase Mara	Muntingiaceae	7	Not Assessed	Common	Edible
28	Peltophorum pterocarpum	Copper pod	Fabaceae	3	Not Assessed	Common	Medicinal and Decoration
29	*Phoenix sylvestris* (L.) Roxb.	Echallu mara	Arecaceae	10	Not Assessed	Common	Medicinal, Edible, ornamental
30	*Phyllanthus emblica* L.	Betta Nalli	Phyllanthaceae	2	Least Concern	Common	Edible and Medicinal
31	*Polyalthia longifolia* (Sonn.) Thwaites	Ashoka mara	Annonaceae	17	Not Assessed	Common	Ornamental and windbreak
32	*Pongamia pinnata* (L.)Pierre	Honge	Fabaceae	227	Least Concern	Common	Medicinal
33	*Samanea saman (Jacq.) Merr.*	male mara	Fabaceae	10	Least Concern	Common	Edible and Medicinal
34	*Santalum album* Linn.	Srigandha mara	Santalinaceae	3	Vulnerable	Common	Medicinal and Timber
35	*Senegalia chundra* (Roxb. ex Rottler) Maslin	Bili Jali Mara	Fabaceae	4	Not Assessed	Common	Timber

Sl.No	Scientific Name	Local Name	Family	Nos.	IUCN Conservation Status-2021	RET Status	USES
36	*Senna siamea* (Lam.) H.S.Irwin & Barneby	Seeme tangadi	Fabaceae	3	Least Concern	Common	Ornamental and Fuel wood
37	*Spathodea adiantum P.Beauv.*	Tulip tree	Bignoniaceae	1	Not Assessed	Common	Medicinal
38	*Spathodea campanulata* P.Beauv.	Neerukayi mara	Bignoniaceae	10	Least Concern	Common	Ornamental and timber
39	*Syzygium cumini* (L.) Skeels	Jambunerale	Myrtaceae	2	Least Concern	Common	Edible and Medicinal
40	Tabebuia rosea	Pink poui	Bignoniaceae	1	Least Concern	Common	Ornamental
41	*Tamarindus indica* L.	Hunase mara	Fabaceae	15	Least Concern	Common	Edible and medicinal
42	*Tectona grandis* L.f.	Tega	Verbenaceae	97	Not Assessed	Common	Timber
43	*Vachellia nilotica* (L.) P.J.H.Hurter & Mabb	Kari jali	Fabaceae	67	Least Concern	Common	Timber
44	*Ziziphus jujuba* Lam	Bore Hannu	Rhamnaceae	2	Least Concern	Common	Edible and medicinal
			Total B	**1163**			
NICE Integration Hosur Road (4.08 km)							
1	*Acacia leucophloea* (Roxb.) Willd.	Beala	Fabaceae	1	Least Concern	Common	Medicinal Siddha, Folk
2	*Annona squamosa* L.	Sithapala	Annonaceae	1	Least Concern	Common	Medicinal and edible
3	*Artocarpus heterophyllus* Lam.	Halasu	Moraceae	15	Not Assessed	Common	Edible and medicinal
4	*Azadirachta indica* A.Juss.	Bevu	Meliaceae	27	Least Concern	Common	Medicinal, edible and traditional
5	*Bauhinia malabarica ROXB.*	basavanapaada	Caesalpiniaceae	4	Least Concern	Common	Medicinal
6	*Cocos nucifera* L.	Tengu	Arecaceae	197	Not Assessed	Common	Edible and Medicinal
7	*Dalbergia sissoo* DC.	Agara	Fabaceae	6	Least Concern	Common	Timber
8	*Delonix regia* (Hook.) Raf.	May tree	Fabaceae	8	Least Concern	Common	Ornamental
9	*Eucalyptus globulus* Labill	Nilagiri	Myrtaceae	6	Least Concern	Common	Medicinal
10	*Ficus racemosa* L.	Attimara	Moraceae	8	least Concern	Common	Medicinal
11	*Grevillea robusta* A. Cunn. ex R. Br.	Silver oak	Proteaceae	108	least Concern	Common	Folk
12	*Leucaena leucocephala subsp. ixtahuacana*	Chigurakku	Fabaceae	13	Not Assessed	Common	Fodder, fuel wood and medicinal
13	*Mangifera indica* L.	Mavina mara	Anacardiaceae	71	Data Deficient	Common	Edible and Fuel wood
14	*Manilkara zapota* (L.) VAN ROYEN	Sapota	Sapotaceae	214	Not Assessed	Common	Edible and medicinal
15	*Melaleuca viminalis* (Sol. ex Gaertn.) Byrnes	Bottle brush	Myrtaceae	1	Least Concern	Common	Ornamental
16	*Muntingia calabura L.*	Gasagase Mara	Muntingiaceae	29	Not Assessed	Common	Edible
17	*Peltophorum pterocarpum (DC.) K.Heyne*	Copperpod	Fabaceae	31	Least Concern	Common	Medicinal

ANNEXURE-19

GROUND WATER QUALITY SAMPLING LOCATIONS & RESULTS

Table 1: Details of Ground water sampling locations

Sl. No.	Locations	Latitude	Longitude	Parameters analyzed
1	Soladevanahalli Village	13⁰ 05' 04.9"N	77⁰ 28' 42.6"E	pH, Temperature, Electrical Conductivity, Total Dissolved Solids, Total Hardness as $CaCO_3$,Oil & Grease, Alkalinity as $CaCO_3$, Nitrate as NO_3, Chloride as Cl, Sulphate as SO_4, Potassium as K, Calcium as Ca, Magnesium as Mg, Fluoride as F, Phenolic Compounds, Lead as Pb, Residual Sodium Carbonate, Arsenic as As, Silica as SiO_2, Cadmium as Cd, Hexavalent Chromium as Cr^{+6} , Total Chromium, Copper as Cu, Zinc as Zn, Iron as Fe, Mercury as Hg, Nitrite as NO_2 , Carbonate as CO_3, Bicarbonate as HCO_3, Sodium as Na, Total Phosphate as PO_4, Total coliform at 10 locations.
2	Doddabyalakere Village	13⁰ 06' 27.1"N	77⁰ 36' 49.9"E	
3	Yelahanka New Town	13⁰ 06' 02.3"N	77⁰ 35' 00.7"E	
4	Chikkagubbi Village	13⁰ 04' 49.9"N	77⁰ 39' 59.3"E	
5	Rampura Village	13⁰ 03' 09.3"N	77⁰ 41' 46.2"E	
6	Kadugudi	12⁰ 59' 50.7"N	77⁰ 46' 07.8"E	
7	Varthur	12⁰ 56' 22.6"N	77⁰ 44' 58.6"E	
8	Sulikunte Village	12⁰ 52' 54.3"N	77⁰ 44' 10.7"E	
9	Huskur Village	12⁰ 51' 41.0"N	77⁰ 42' 14.5"E	
10	Jigani Bommasandra Industrial Area	12⁰ 48' 46.9"N	77⁰ 40' 48.8"E	

Table 2: Ground water quality results

Sl. No.	Parameters	Unit	Standards IS 10500:2012 (Second Revision)		Results				
			AL	PL	Soladevanahalli Village (13° 05' 04.9" N 77° 28' 42.6"E)	Doddabyalakere village (13° 06' 27.1" N 77° 31' 27.6"E)	Yelhanka New Town (13° 06' 02.3" N 77° 35' 00.7"E)	Chikkagubbi village (13° 04' 49.9" N 77° 39' 59.3"E)	Rampura village (13° 03' 09.3" N 77° 41' 46.2"E)
1	pH	-	6.5-8.5		7.68	7.32	7.33	7.05	6.66
2	Temperature	0°C	Not specified		24.7	28.4	26.5	27.9	25.3
3	Electrical Conductivity	µS/cm	Not specified		810	1461	658	1827	1837
4	Total Dissolved Solids	mg/L	500	2000	592	1204	480	1224	1250
5	Total Hardness as $CaCO_3$	mg/L	200	600	236	580	156	500	380
6	Alkalinity as $CaCO_3$	mg/L	200	600	246	400	94	244	140
7	Phenolic Compounds	mg/L	0.001	0.002	ND	ND	ND	ND	ND
8	Oil & Grease	mg/L	10		ND	ND	ND	ND	ND
9	Phosphate Total as PO_4	mg/L	Not specified		ND	ND	ND	ND	ND
10	Chloride as Cl	mg/L	250	1000	119.11	198.52	121.21	323.24	323.24
11	Sulphate as SO_4	mg/L	200	400	7.37	84.96	130.33	68.36	75.49
12	Sodium as Na	mg/L	Not specified		54.8	53.55	52.39	117.06	168.1
13	Potassium as K	mg/L	Not specified		7.08	8.58	5	11.65	1.9
14	Calcium as Ca	mg/L	75	200	48.8	128	34.4	116.8	96
15	Magnesium as Mg	mg/L	30	100	27.7	63.18	17.01	50.54	34.02
16	Silica as SiO_2	mg/L	Not specified		23.58	31.49	30.64	55.82	16.99
17	Nitrate as NO_3	mg/L	45		12.07	32.7	26.84	34.15	42.21
18	Fluoride as F	mg/L	1	1.5	0.57	0.48	0.25	0.52	0.31
19	Residual Sodium Carbonate	meq/L	Not specified		ND	ND	ND	ND	ND

Sl.No	Scientific Name	Local Name	Family	Nos.	IUCN Conservation Status-2021	RET Status	USES
18	*Pithecellobium dulce* (Roxb.)Benth.	Seeme hunase	Fabaceae	1	Least Concern	Common	Edible, medicinal and agroforestry
19	*Polyalthia longifolia* (Sonn.) Thwaites	Ashoka mara	Annonaceae	7	Not Assessed	Common	Ornamental and windbreak
20	*Pongamia pinnata* (L.)Pierre	Honge	Fabaceae	18	Least Concern	Common	Medicinal
21	*Psidium guajava* L.	Balehannu	Myrtaceae	4	Least Concern	Common	Edible and Medicinal
22	*Samanea saman (Jacq.) Merr.*	male mara	Fabaceae	1	Least Concern	Common	Edible and Medicinal
23	*Saraca asoca(Roxb.) Willd.*	ashoka mara	Fabaceae	15	Vulnerable	Common	Medicinal
24	*Senna siamea* (Lam.) H.S.Irwin & Barneby	Seeme tangadi	Fabaceae	12	Least Concern	Common	Ornamental and Fuel wood
25	*Spathodea campanulata* P.Beauv.	Neerukayi mara	Bignoniaceae	2	Least Concern	Common	Ornamental and timber
26	*Syzygium cumini* (L.) Skeels	Jambunerale	Myrtaceae	3	Least Concern	Common	Edible and Medicinal
27	*Tamarindus indica* L.	Hunase mara	Fabaceae	7	Least Concern	Common	Edible and medicinal
28	*Tectona grandis* L.f.	Tega	Verbenaceae	605	Not Assessed	Common	Timber
29	*Terminalia arjuna* (Roxb.) Wight & Arn.	Arjuna mara	Combretaceae	7	Not Assessed	Common	Edible and medicinal
30	*Terminalia catappa* L.	Badami	Combertaceae	13	Least Concern	Common	Edible, medicinal and Agroforestry
31	*Thespesia populnea* (L.) Sol. ex Corrêa	Gante mara	Malvaceae	1	Least Concern	Common	Ornamental and medicinal
32	*Vachellia nilotica* (L.) P.J.H.Hurter & Mabb	Kari jali	Fabaceae	7	Least Concern	Common	Timber
33	*Ziziphus jujuba* Lam	Bore Hannu	Rhamnaceae	1	Least Concern	Common	Edible and medicinal
			Total C	**1444**			
			Grand Total (A+B+C)	**36824**			

Note: Species recorded by EHSCPL team, *-Species of varying in habit from a shrub to a tree.

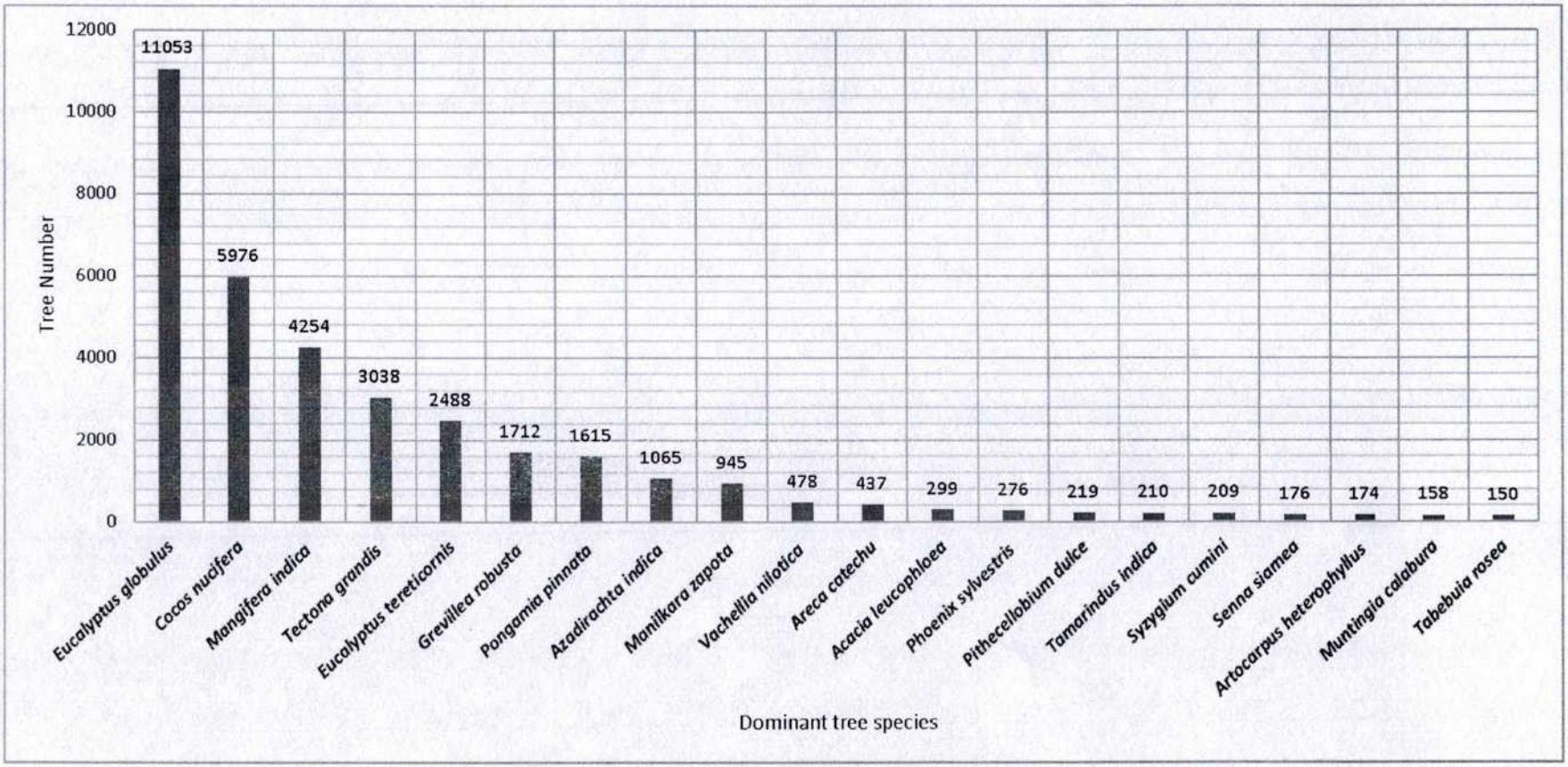


Fig 1: Dominant Tree Species in the Project Alignment.

Table 2: Girth Class Distribution of Trees in the Project Alignment.

Sl. No.	Girth Class	Number of trees	Percentage (%)
1	30-60	22341	60.67
2	60-90	9880	26.83
3	90-120	3772	10.24
4	120-150	528	1.43
5	150-180	143	0.39
6	180-210	63	0.17
7	210-240	28	0.08
8	240-270	28	0.08
9	270-300	13	0.04
10	>300	28	0.08
Total		**36824**	**100.00**

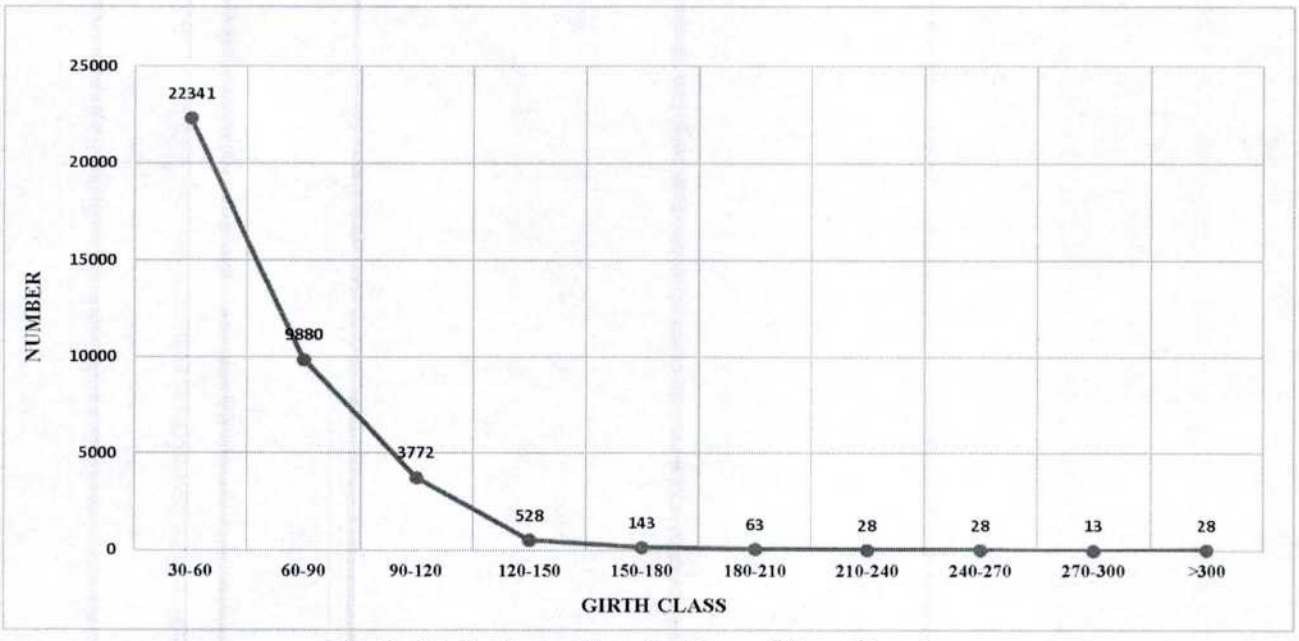


Fig 2: Girth Class Distribution of Tree Species

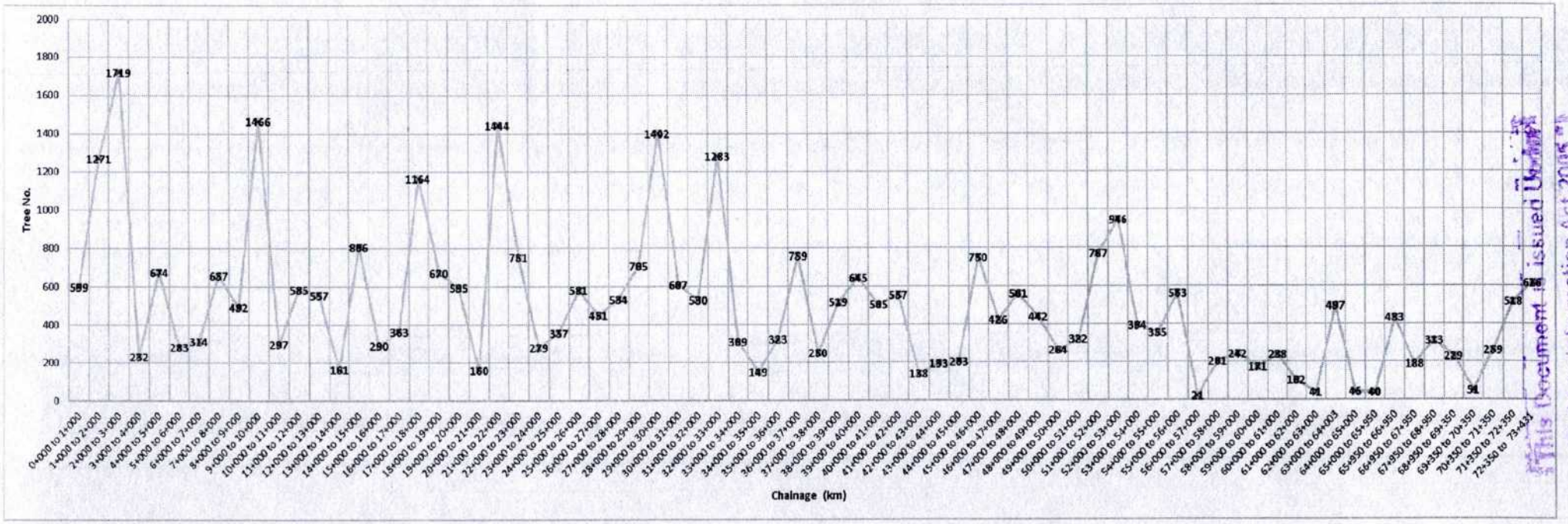


Fig 3: Chainage Wise Distribution of Number of Trees

Table 3: Basal area (m^2), Volume (m^3) and CO_2 (Tonnes) of Tree Species in the Project Alignment.

Sl. No.	Scientific Name	Basal Area (m^2)	Volume (m^3)	Carbon sequestration capacity (Tonnes)
1	*Acacia auriculiformis* Benth.	4.61	10.90	17.29
2	*Acacia leucophloea* (Roxb.) Willd.	9.04	23.41	76.34
3	*Aegle marmelos* (L.) Correa	0.36	0.89	1.13
4	*Alangium salvifolium* (L.f.) Wangerin	0.01	0.01	0.01
5	*Albizia amara* (Roxb.)B.Boivin	0.55	1.10	1.60
6	*Albizia lebbeck (L.)Benth.*	7.48	14.32	17.39
7	*Albizia odoratissima* (L.F.)BENTH.	0.92	2.32	3.96
8	*Alstonia scholaris* (L.) R.Br.	0.21	0.32	0.26
9	*Anacardium occidentale* L.	3.62	5.62	35.79
10	*Annona reticulate* L.	0.36	0.69	0.83
11	*Annona squamosa L.*	0.12	0.11	0.13
12	*Araucaria columnaris* J.R Forst Hook.	0.32	0.73	0.79
13	*Araucaria heterophylla* (Salisb.) Franco	0.49	0.49	0.59
14	*Areca catechu* L.	6.31	14.08	15.63
15	*Artocarpus heterophyllus* Lam.	16.82	33.88	40.75
16	*Azadirachta indica* A.Juss.	38.77	76.00	104.63
17	*Balanites aegyptiaca* (L.) Delile	0.09	0.21	0.31
18	*Bauhinia malabarica ROXB.*	0.23	0.37	0.58
19	*Bauhinia purpurea* L.	0.23	0.21	0.58
20	*Bauhinia racemosa* LAM.	0.69	1.26	1.85
21	*Bismarckia nobilis* Hildebr. & H.Wendl	0.18	0.23	0.28
22	*Bombax ceiba* L.	0.23	0.56	0.43
23	*Boswellia serrata ROXB.*	0.02	0.08	0.10
24	*Bougainvillea glabra* Choisy	0.01	0.02	0.02
25	*Butea monosperma var.lutea*	1.7	2.20	2.49
26	*Carica papaya* L.	0.33	0.45	0.54
27	*Caryota urens* L.	1.2	1.05	2.33
28	*Cassia fistula* L.	0.02	0.03	0.04
29	*Casuarina equisetifolia* (Benth.) L.A.S. Johnson	0.75	1.58	1.98
30	*Chloroxylon swietenia (*Roxb.)DC.	0.13	0.39	0.45
31	*Cinnamomum sulphuratum* NEES.	0.05	0.06	0.06
32	*Cinnamomum verum* J.Presl	0.02	0.01	0.01
33	*Citrus maxima* (Burm.) Merr.	0.07	0.75	0.91
34	*Citrus medica L.*	0.07	0.12	0.14
35	*Cocos nucifera* L.	360.07	926.99	1112.04
36	*Commiphora caudata (Wight & Arn.) Engl.*	0.28	0.73	0.84
37	*Cordia dichotoma* FORST. F.	0.48	0.84	0.78
38	*Dalbergia latifolia* Roxb.	0.18	0.50	0.87
39	*Dalbergia sissoo* DC.	0.66	1.27	2.02
40	*Delonix regia* (Hook.) Raf.	0.86	1.65	1.97

Sl. No.	Scientific Name	Basal Area (m^2)	Volume (m^3)	Carbon sequestration capacity (Tonnes)
41	*Eucalyptus globulus* Labill	261.68	666.21	798.13
42	*Eucalyptus grandis* W.Hill	0.01	0.05	0.06
43	*Eucalyptus tereticornis* L.	45.32	160.55	206.79
44	*Ficus benghalensis* L.	19.32	53.87	54.36
45	*Ficus benjamina* L.	0.03	0.05	0.06
46	*Ficus carica* L.	0.26	0.72	0.86
47	*Ficus elastica* ROXB. EX. HORNEM.	0.11	0.25	0.30
48	*Ficus hispida* L.F.	0.05	0.11	0.10
49	*Ficus racemosa* L.	23.63	49.81	46.44
50	*Ficus religiosa* L.	10.21	27.05	26.30
51	*Ficus virens* Aiton	0.03	0.05	0.41
52	*Gliricidia sepium* (Jacq.)Walp.	0.84	1.37	1.62
53	*Gmelina arborea* L.	0.33	0.63	0.57
54	*Grevillea robusta* A. Cunn. ex R. Br.	68.9	160.98	193.23
55	*Hardwickia binata* Roxb.	0.05	0.15	0.16
56	*Holoptelea integrifolia* (Roxb.) Planch.	0.48	1.16	1.01
57	*Jacaranda mimosifolia* D. Don	0.18	0.17	0.43
58	*Kigelia africana (LAMK.) BENTH.*	0.07	0.30	0.23
59	*Lagerstroemia speciosa* Deepu & Pandur.	0.16	0.21	0.36
60	*Leucaena leucocephala(Lam.)de Wit*	2.9	5.95	7.22
61	*Limonia acidissima* L.	0.23	0.36	0.58
62	*Madhuca longifolia* (KOEN.) MACLER	0.08	0.02	0.22
63	*Magnolia champaca* (L.) Baill. ex Pierre	0.05	2.33	0.06
64	*Mallotus philippensis* (Lam.) Muell.Arg.	0.01	149.35	0.03
65	*Mangifera indica* L.	102.22	18.24	179.32
66	*Manilkara zapota* (L.) VAN ROYEN	14.67	0.03	22.02
67	*Melaleuca viminalis* (Sol. ex Gaertn.) Byrnes	0.04	0.15	0.09
68	*Melia azedarach* L.	2.52	6.78	7.50
69	*Melia dubia* Hiern, Non Cav.	0.29	0.06	0.56
70	*Millingtonia hortensis* L. fil.	1.05	1.85	3.02
71	*Moringa oleifera* Lam.	1.01	0.04	2.19
72	*Morus alba* L.	0.15	5.37	0.40
73	*Muntingia calabura L.*	3.26	0.08	5.26
74	*Murraya koenigii* (L.) SPR	0.05	1.50	0.11
75	*Neolamarckia cadamba* (Roxb.) Bosser	1.18	0.10	1.90
76	*Peltophorum pterocarpum (DC.) K.Heyne*	6.25	12.69	15.54
77	*Persea americana* Mill.	0.03	0.34	0.09
78	*Phoenix sylvestris* (L.) Roxb.	12.39	19.86	22.34
79	*Phyllanthus emblica* L.	2	6.20	3.41
80	*Pithecellobium dulce* (Roxb.)Benth.	7.74	10.20	17.31
81	*Polyalthia longifolia(Sonn.) Thwaites*	6.18	13.03	13.87
82	*Pongamia pinnata* (L.)Pierre	43.98	78.41	100.65
83	*Prosopis juliflora* (Sw.) DC.	1.54	0.75	5.99

Sl. No.	Scientific Name	Basal Area (m^2)	Volume (m^3)	Carbon sequestration capacity (Tonnes)
84	*Psidium guajava* L.	0.95	1.21	1.38
85	*Pterocarpus marsupium* Roxb.	1.17	2.55	4.00
86	Roystonea regia(Kunth) O.F.Cook	0.09	0.12	0.14
87	Samanea saman (Jacq.) Merr.	3.98	9.45	11.49
88	*Santalum album* Linn.	0.33	0.47	0.62
89	*Saraca asoca* (Roxb.) Willd.	0.4	0.75	1.01
90	*Senegalia catechu* (L.f.) P.J.H.Hurter & Mabb.	0.7	1.31	2.35
91	*Senegalia ferruginea* (DC.) Pedley	0.09	0.15	0.20
92	*Senna siamea* (Lam.) H.S.Irwin & Barneby	5.32	9.18	13.07
93	*Sesbania grandiflora* (L.) Poiret	0.04	0.09	0.08
94	*Simarouba glauca* DC.	3.58	7.15	6.19
95	*Spathodea campanulata* P.Beauv.	6.8	19.44	14.26
96	*Swietenia mahagoni* (L.) JACQ	0.58	1.12	1.33
97	*Symplocos racemosa* Roxb.	0.07	0.19	0.23
98	*Syzygium cumini* (L.) Skeels	16.67	33.61	44.92
99	*Syzygium jambos* (L.) ALSTON	0.06	0.15	0.24
100	*Tabebuia argentea* (Bur. & Schum.) Britton.	0.1	0.13	0.18
101	*Tabebuia aurea* (Silva Manso) Benth. & Hook.f. ex S.Moore	0.01	0.02	0.03
102	*Tabebuia rosea* DC.	3.88	7.07	8.19
103	*Tamarindus indica* L.	24	50.03	75.46
104	*Tectona grandis* L.f.	111.54	231.51	288.63
105	*Terminalia arjuna* (Roxb.) Wight & Arn.	0.86	2.04	2.55
106	*Terminalia catappa* L.	1.92	2.85	3.89
107	*Terminalia elliptica* Willd.	0.2	0.60	0.72
108	*Thespesia populnea* (L.) Sol. ex Corrêa	0.87	3.04	4.52
109	*Toona ciliata* M. Roem.	0.13	0.26	0.32
110	*Vachellia nilotica* (L.) P.J.H.Hurter & Mabb	19.82	34.58	50.42
111	*Wrightia tinctoria* R.Br. ssp. laevis (Hook.f.) Pichon	0.05	0.08	0.13
112	*Ziziphus jujuba* Lam	0.39	0.66	1.16
113	*Ziziphus mauritiana* Lam.	0.22	0.53	0.73
114	*Ziziphus oenoplia* Mill.	0.14	0.18	0.43
	Total	**1304.99**	**3004.35**	**3728.69**

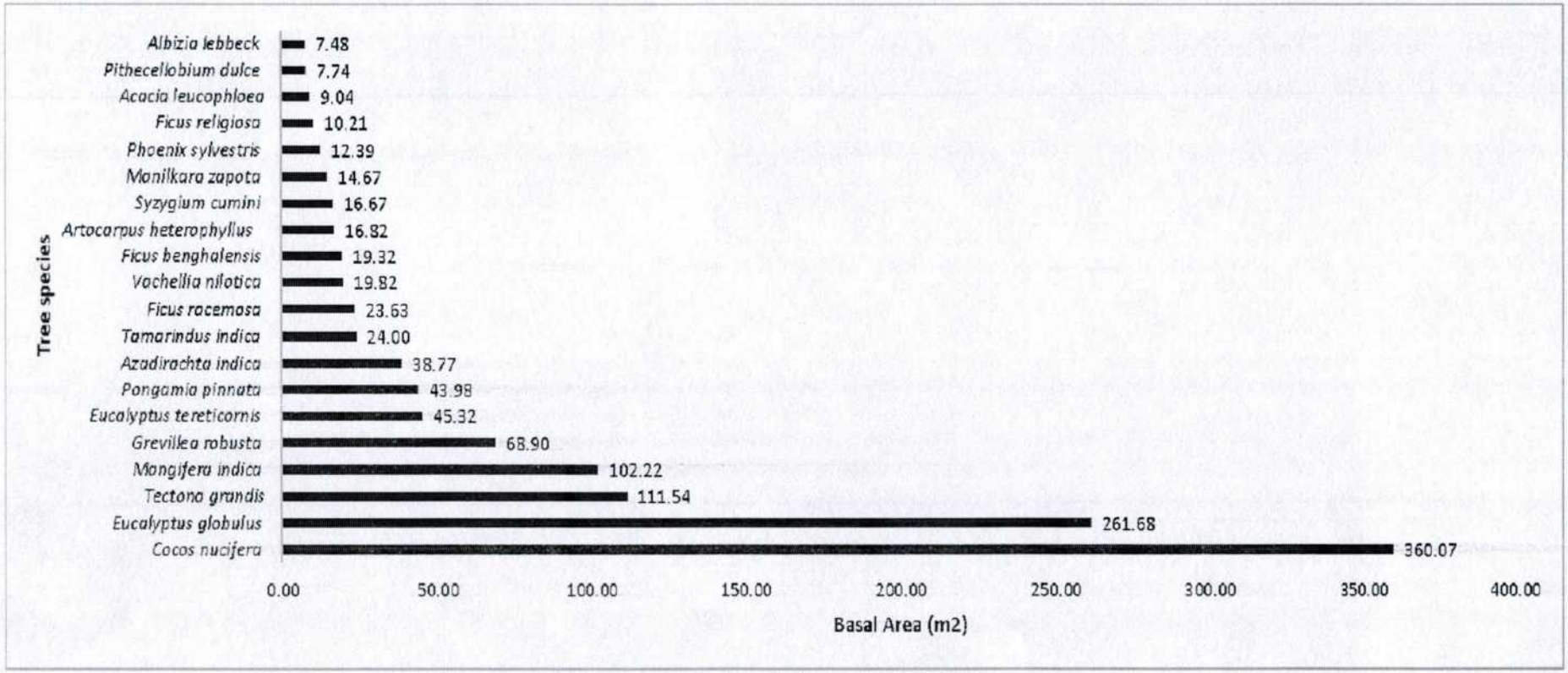


Fig 4: Basal area (m^2) of Tree Species

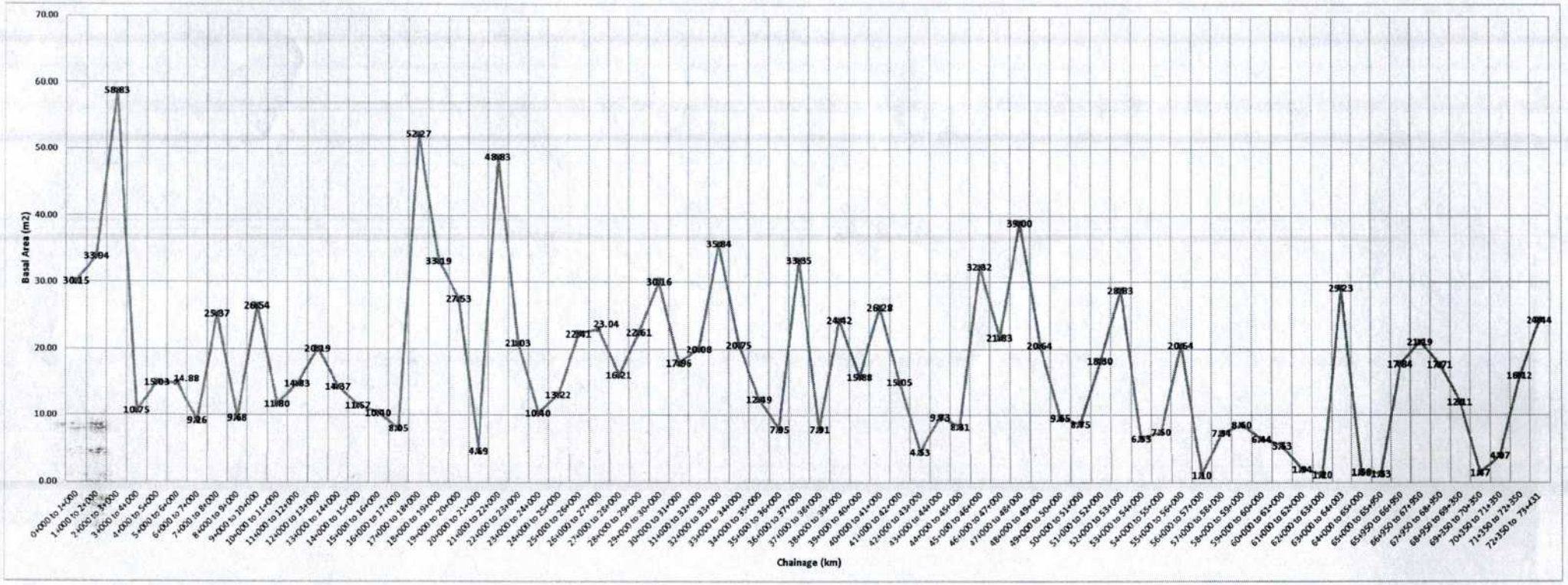


Fig 5: Chainage Wise Distribution of Basal area (m²)

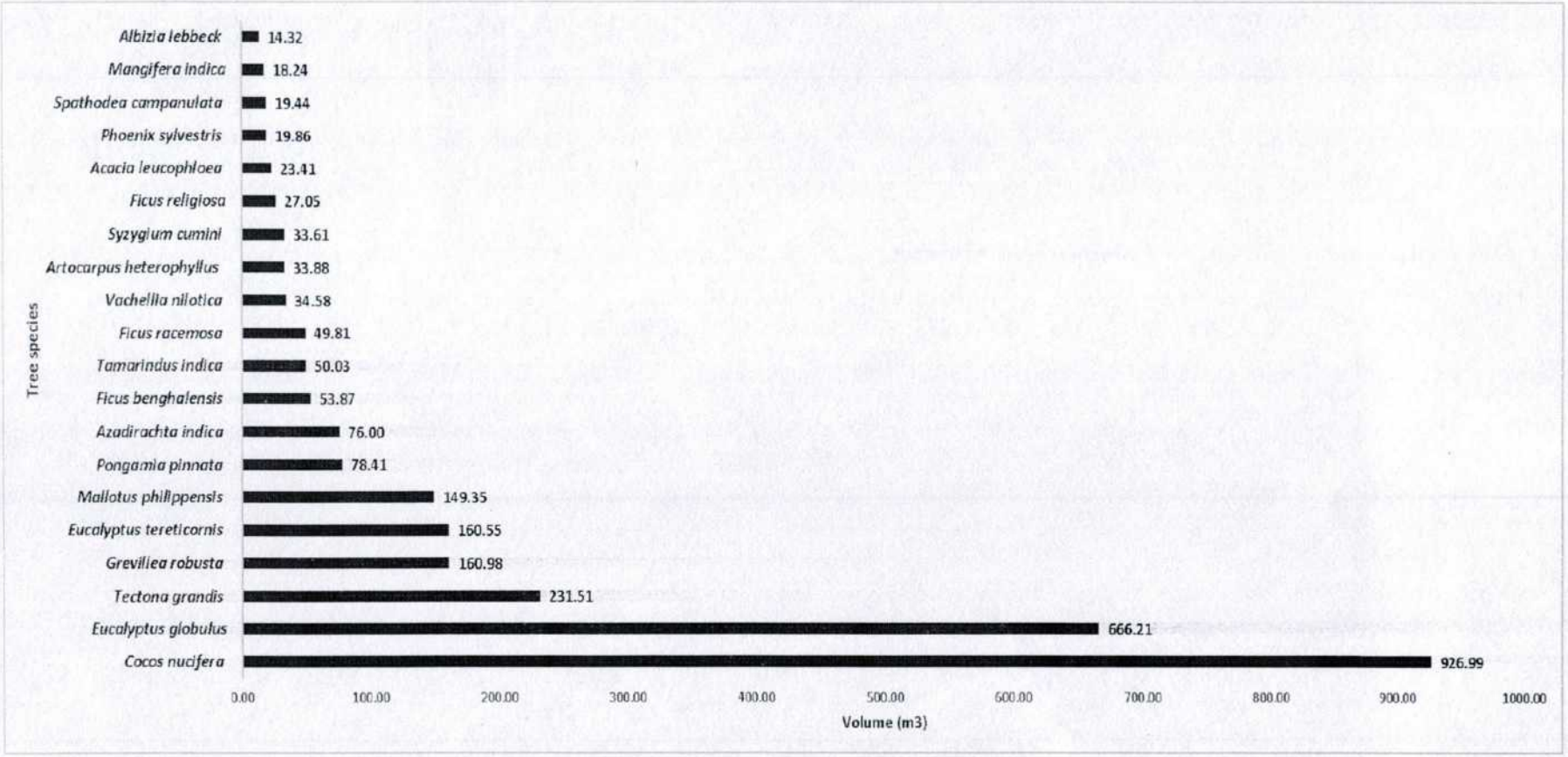


Fig 6: Volume (m^3) of Top 20 Species

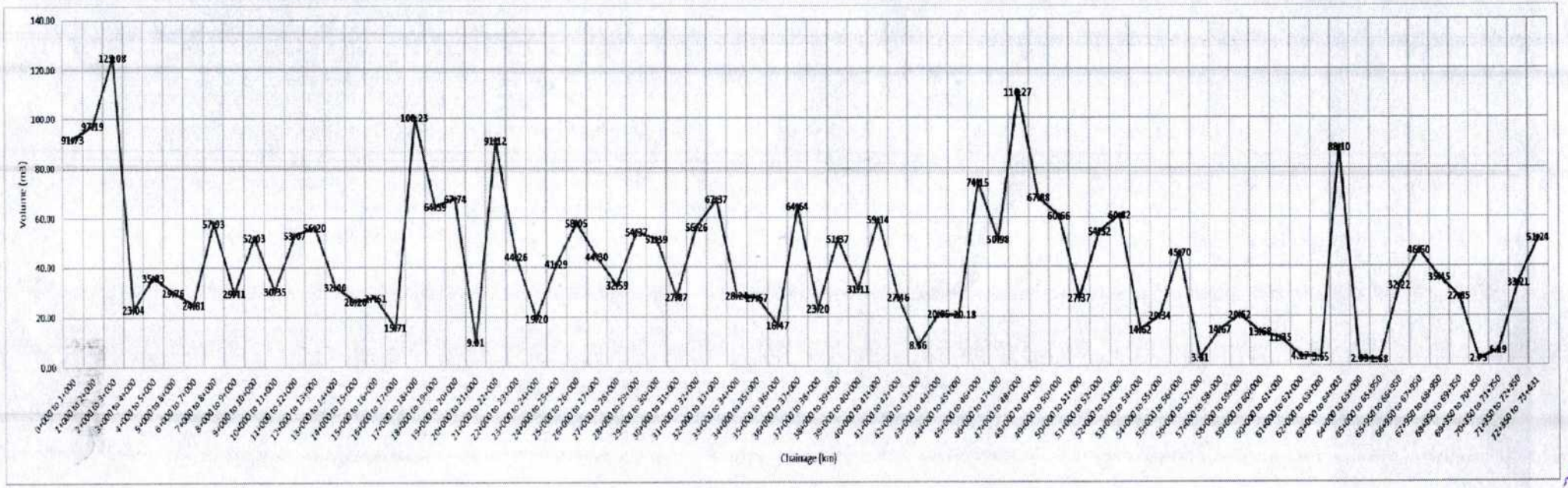


Fig 7: Chainage Wise Distribution of Volume (m^3)

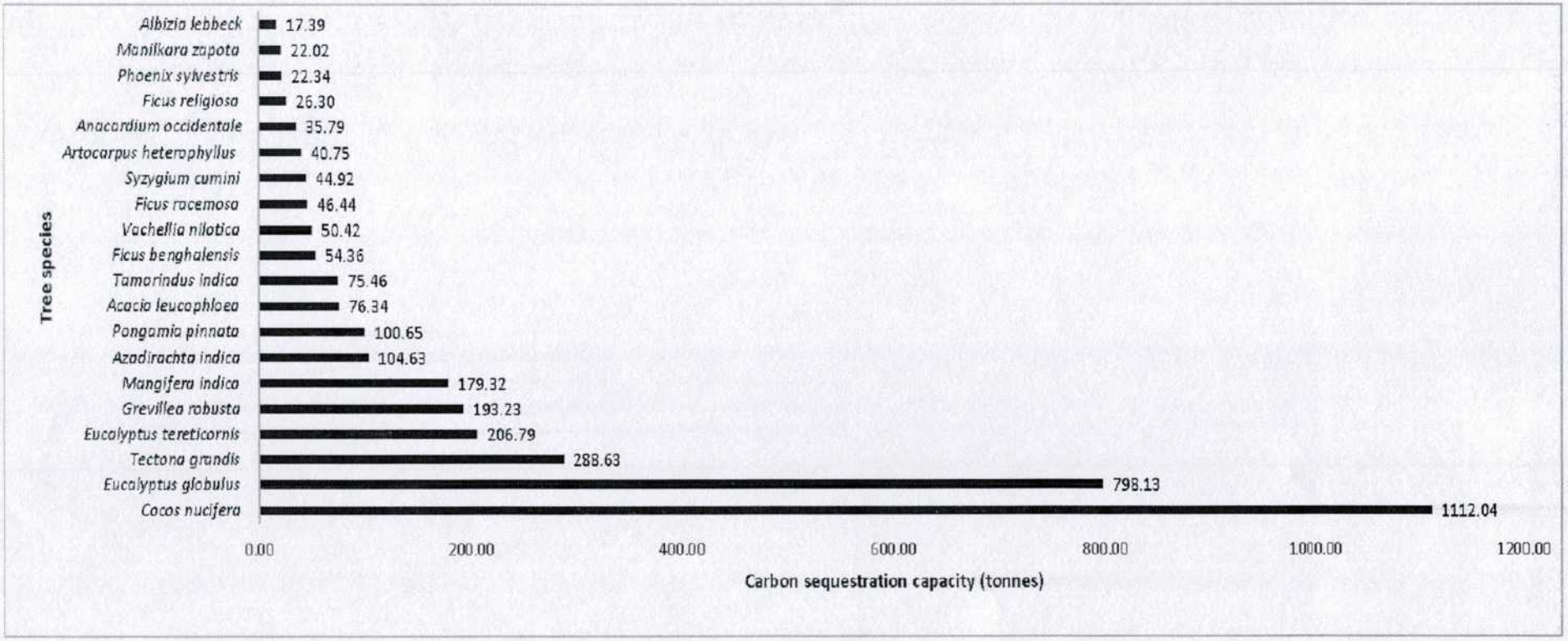


Fig 8: Carbon Sequestration (Tonnes) Potential of Top 20 Species

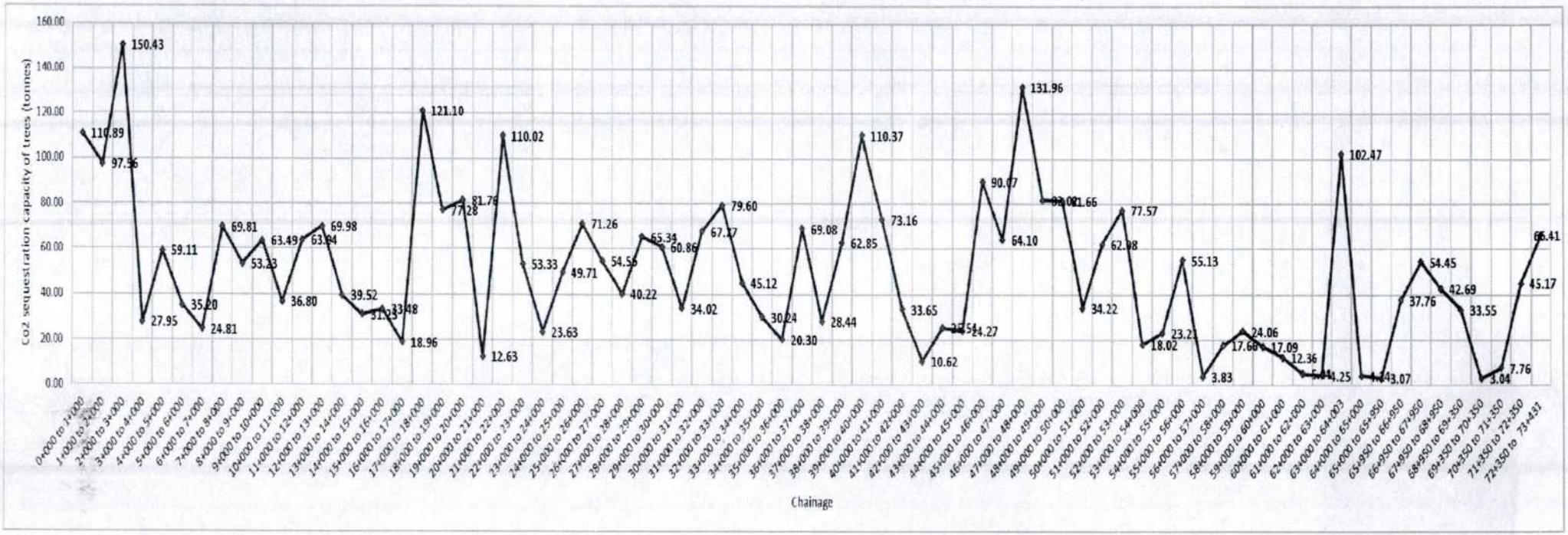


Fig 9: Chainage Wise Carbon Sequestration (Tonnes) Potential of Tree Species

Table 4: Checklist of Herbs, Shrubs and Climbers recorded within the Project Alignment.

Sl. No	Scientific Name	Local name	Family	IUCN Conservation Status, 2019	RET Status	Uses
Herbs						
1	*Abutilon hirtum* (Lam.) Sweet	Tutti	Malvaceae	Not Assessed	Common	Edible and Medicinal
2	*Achyranthes aspera* L.	Uttaranee	Amaranthacea	Not Assessed	Common	Medicinal
3	*Alternanthera philoxeroides* (MAR.) GRISEB.	Dodda honagone	Amaranthaceae	Not Assessed	Common	Medicinal
4	*Alternanthera sessilis* (L.) R.Br. ex DC.	Honganne	Amaranthaceae	Least Concerned	Common	Medicinal
5	*Amaranthus viridis* L.	Mulluharive	Amaranthacea	Not Assessed	Common	Medicinal
6	*Anisomeles indica* (L.) Kuntze	Kala bhangra	Lamiaceae	Not Assessed	Common	Medicinal
7	*Aristida purpurea* Nutt.	Porake hullu	Poaceae	Least Concerned	Common	Forage
8	*Artemisia pallens* Wall. ex DC.	Davana	Asteraceae	Not Assessed	Common	Medicinal
9	*Brachiaria ramosa* STAPF	Bennakki hullu	Poaceae	Least Concerned	Common	Fodder and agroforestry
10	*Cardamine hirsuta* L.	Kadu sasuve	Brassicasaceae	Not Assessed	Common	***
11	*Cassia occidentalis* L.	Aanesogate	Caesalpiniaceae	Not Assessed	Common	Edible and medicinal
12	*Cenchrus purpureus* (Schumach.) Morrone	Seeme hullu	Poaceae	Least Concerned	Common	Medicinal
13	*Chenopodium album* L.	Sakothina soppu	Amaranthaceae	Not Assessed	Common	Medicinal
14	*Chloris barbata* SW	Sevaragu	Poaceae	Not Assessed	Common	Medicinal
15	*Chromolaena odorata* (L.) R. King & H. Rob.	Kamyunist kale	Asteraceae	Not Assessed	Common	Medicinal
16	*Coix barbata* (J.Koenig) Veldkamp	Manjutti	Poaceae	Not Assessed	Common	Edible & Medicinal
17	*Commelina benghalensis* L.	Hittagani	Commelinaceae	Least Concerned	Common	Medicinal
18	*Conyza bonariensis* (L.)	-	Asteraceae	Not Assessed	Common	Edible and medicinal
19	*Crotalaria pallida* Aiton	Gulagitche	Fabaceae	Not Assessed	Common	Medicinal
20	*Croton bonplandianum* Baill.	Nelabedisoppu	Euphorbiaceae	Not Assessed	Common	Medicinal
21	*Cynodon dactylon* (L.) Pers.	Ambate	Poaceae	Not Assessed	Common	Fodder & Medicinal
22	*Cyperus rotundus* L.	Kornari gadde	Cyperaceae	Least Concerned	Common	Medicinal
23	*Digitaria sanguinalis* (L.) Scop.	Kadu dabbe hullu	Poaceae	Not Assessed	Common	Fodder & Medicinal
24	*Eragrostis tenella* (L.) P.Beauv. ex Roem. & Schult.	Sanna hullu	Poaceae	Not Assessed	Common	Medicinal
25	*Euphorbia heterophylla* L.	Kempuneneyakki	Euphorbiaceae	Not Assessed	Common	Medicinal
26	*Heteropogon contortus* (L.)	Kaarda hullu,	Poaceae	Not Assessed	Common	Medicinal
27	*Hygrophila auriculata* (Schumach.) Heine	Neeruppi gida	Acanthaceae	Least Concerned	Common	Medicinal
28	*Marsilea quadrifolia* L.	Neeru sabbasege	Marsileaceae	Least Concerned	Common	Ornamental

Sl. No	Scientific Name	Local name	Family	IUCN Conservation Status, 2019	RET Status	Uses
29	*Mimosa pudica* L.	Muttidare muni	Fabaceae	Least Concerned	Common	Medicinal & ornamental
30	*Ocimum sanctum* L.	Tulasi	Lamiaceae	Not Assessed	Common	Edible and medicinal
31	*Oxalis corniculata* L.	Changeri gida	Oxalidaceae	Not Assessed	Common	Medicinal
32	*Parthenium hysterophorus* L.	Congress gida	Asteraceae	Not Assessed	Common	Chemical industry
33	*Portulaca oleracea* L.	Beedi soppu	Portulacaceae	Least Concerned	Common	Medicinal
34	*Sida acuta* Burm. fil.	Bheemanakaddi	Malvaceae	Not Assessed	Common	Medicinal
35	*Sonchus asper* (L.)	Kalijibi	Asteraceae	Not Assessed	Common	Edible and medicinal
36	*Sonchus oleraceus* L.	Naayi hakkarike	Asteraceae	Not Assessed	Common	Edible and medicinal
37	*Sphaeranthus indicus* L.	Adikekasa	Asteraceae	Least Concerned	Common	Medicinal
38	*Stachytarpheta indica* (L.) Vahl	Kariyuttarani	Verbenaceae	Not Assessed	Common	Edible & Medicinal
39	*Synedrella nodiflora* Gaertn.	-	Asteraceae	Not Assessed	Common	Medicinal
40	*Themeda triandra* Forssk.	Bettanchi hullu	Poaceae	Not Assessed	Common	Edible
41	*Trichodesma indicum* (L.) R. Br.	Katte tume soppu	Boraginaceae	Not Assessed	Common	Medicinal
42	*Tridax procumbens* L.	Sanna gida	Asteraceae	Not Assessed	Common	Medicinal
43	*Triumfetta rhomboidea* Jacq.	Jattoate	Tiliaceae	Not Assessed	Common	Edible & Medicinal
44	*Typha angustata* Bory	Aane jondu	Typhaceae	Least Concerned	Common	Edible and medicinal
45	*Vitex altissima* L.f.	Bharanige	Lamiaceae	Not Assessed	Common	Medicinal
46	*Waltheria indica* L.	Kari Bende	Malvaceae	Not Assessed	Common	Medicinal
47	*Wedelia chinensis* (Osbeck.) Merr.	Gargari	Asteraceae	Least Concerned	Common	Medicinal
Shrubs						
1	*Breynia vitis-idaea* (Burm.f.) C.E.C.Fisch.	Kempuhulli	Phyllanthaceae	Least Concerned	Common	Medicinal
2	*Buddleja asiatica* Lour.	Holi lakki	Scrophulariaceae	Least Concerned	Common	Medicinal
3	*Calotropis gigantea* (L.)	Bili ekkada gida	Asclepiadaceae	Not Assessed	Common	Medicinal and ornamental
4	*Calotropis procera* R.BR.	Bili aekka	Asclepiadaceae	Not Assessed	Common	Medicinal
5	*Canthium parviflorum* L.	Achchumullu	Rubiaceae	Not Assessed	Common	Medicinal
6	*Dodonaea viscosa* (L. fil.) J.G.West	Bandarike	Sapindaceae	Not Assessed	Common	Medicinal
7	*Erythroxylum monogynum* Roxb	Jivadane	Erythroxylaceae	Not Assessed	Common	Medicinal
8	*Euphorbia caducifolia* Haines	Dubbakalli	Euphorbiaceae	Not Assessed	Common	Medicinal
9	*Gardenia gummifera* L.f.	Adavi bikke	Rubiaceae	Least Concerned	Common	Medicinal
10	*Lantana camara* L.	Beli gida	Verbenaceae	Not Assessed	Common	Medicinal & ornamental
11	*Maytenus emarginata* (Willd.) Ding	Haalu manike	Celastraceae	Not Assessed	Common	Medicinal

Sl. No	Scientific Name	Local name	Family	IUCN Conservation Status, 2019	RET Status	Uses
12	*Phyllanthus reticulatus* Poir.	Karihuli	Phyllanthaceae	Not Assessed	Common	Medicinal
13	*Plumbago zeylanica* L.	Chitramulike	Plumbaginaceae	Not Assessed	Common	Ornamental
14	*Prosopis juliflora* (SW.) DC.	Kabuli kikkar	Fabaceae	Not Assessed	Common	Edible and medicinal
15	*Pterolobium punctatum* Hemsl.	Bada bakka	Fabaceae	Not Assessed	Common	Medicinal
16	*Randia dumetorum* (Retz.) Poir.	Kare hannu	Rubiaceae	Not Assessed	Common	Medicinal
17	*Ricinus communis* L.	Aralu, arudalu	Euphorbiaceae	Not Assessed	Common	Medicinal and timber
18	*Rosa miniatures* L.	Gulaabi gida	Rosaceae	Not Assessed	Common	Ornamental
19	*Scutia myrtina* (N.Burm.) Kurz	Kurudi hannu	Rhamnaceae	Least Concerned	Common	Medicinal
20	*Solanum nigrum* L	Kaagehannina gida	Solanaceae	Not Assessed	Common	Medicinal
21	*Solanum viarum* Dun.	Cikkasonde	Solanaceae	Not Assessed	Common	Medicinal
22	*Vachellia horrida* (L.) Kyal. & Boatwr	Anegobli	Fabaceae	Not Assessed	Common	Medicinal
Climbers						
1	*Cardiospermum halicacabum* L.	Agnibali	Sapindaceae	Not Assessed	Common	Medicinal
2	*Cocculus hirsutus* (L.) Diels	Aadama balli	Menispermaceae	Not Assessed	Common	Medicinal
3	*Ipomoea cairica* (L.) SW.	Morning glory	Convolvulaceae	Least Concern	Common	Ornamental
4	*Ipomoea obscura* (L.) Ker Gawler	Bilichita bogari	Convolvulaceae	Not Assessed	Common	Edible & Medicinal
5	*Passiflora foetida* L.	Kukke balli	Passifloraceae	Not Assessed	Common	Medicinal
6	*Toddalia asiatica* (L.) Lam.	Dodda kadu menasu	Rutaceae	Not Assessed	Common	Medicinal

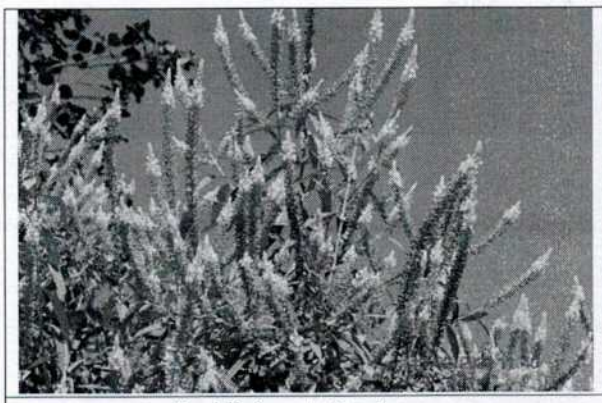
Note: Species recorded by EHSCPL team

Table 5: Family-wise Floristic Diversity within the Project Alignment.

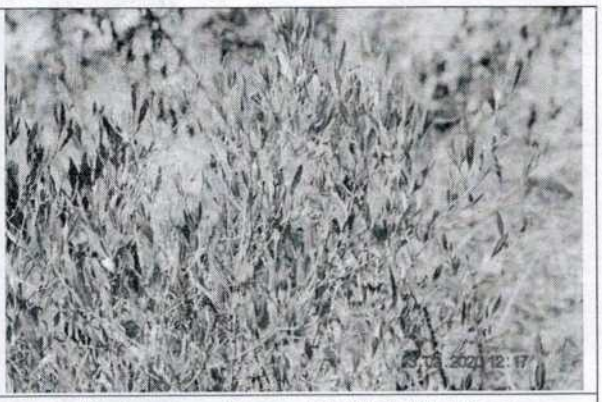
Sl. No.	Family	Trees	Shrubs	Herbs	Climbers
1	Acanthaceae	-	-	1	-
2	Alangiaceae	1			
3	Amaranthaceae	-	-	5	-
4	Anacardiaceae	4	-	-	-
5	Annonaceae	6	-	-	-
6	Apocynaceae	3	-	-	-
7	Araucariaceae	2	-	-	-
8	Arecaceae	10	-	-	-
9	Asclepiadaceae	-	2	-	-
10	Asteraceae	-	-	10	-
11	Bignoniaceae	11	-	-	-
12	Boraginaceae	-	-	1	-
13	Brassicasaceae	-	-	1	-
14	Burseraceae	2	-	-	-
15	Caesalpiniaceae	2	-	1	-
16	Caricaceae	1			
17	Casuriniaceae	1	-	-	-
18	Celastraceae	-	1	-	-
19	Combertaceae	5	-	-	-
20	Commelinaceae	-	-	1	-
21	Convolvulaceae	-	-	-	2
22	Cordiaceae	1	-	-	-
23	Cornaceae	-	-	-	-
24	Cyperaceae	-	-	1	-
25	Erythroxylaceae	-	1	-	-
26	Euphorbiaceae	1	2	2	-
27	Fabaceae	56	3	2	-
28	Lamiaceae	3	-	3	-
29	Lauraceae	3	-	-	-
30	Lytharaceae	1	-	-	-
31	Magnoliaceae	2	-	-	-
32	Malvaceae	3	-	3	-
33	Marsileaceae	-	-	1	-
34	Meliaceae	8	-	-	-
35	Menispermaceae	-	-	-	1
36	Mimosaceae	-	-	-	-
37	Moraceae	15	-	-	-
38	Moringaceae	2	-	-	-
39	Muntingiaceae	3	-	-	-
40	Myrtaceae	13	-	-	-
41	Nyctaginaceae	1	-	-	-
42	Oxalidaceae	-	-	1	-
43	Passifloraceae	-	-	-	1
44	Phyllanthaceae	2	2	-	-

Sl. No.	Family	Trees	Shrubs	Herbs	Climbers
45	Plumbaginaceae	-	1	-	-
46	Poaceae	-	-	10	-
47	Portulacaceae	-	-	1	-
48	Proteaceae	3	-	-	-
49	Rhamnaceae	5	1	-	-
50	Rosaceae	-	1	-	-
51	Rubiaceae	1	3	-	-
52	Rutaceae	7	-	-	1
53	Santalinaceae	2	-	-	-
54	Sapindaceae	-	1	-	1
55	Sapotaceae	4	-	-	-
56	Scrophulariaceae	-	1	-	-
57	Simaroubaceae	1	-	-	-
58	Solanaceae	-	2	-	-
59	Symplocaceae	1	-	-	-
60	Tiliaceae	-	-	1	-
61	Typhaceae	-	-	1	-
62	Ulmaceae	1	-	-	-
63	Verbenaceae	3	1	1	-
64	Zygophyllaceae	1	-	-	-
	Total	**191**	**22**	**47**	**6**

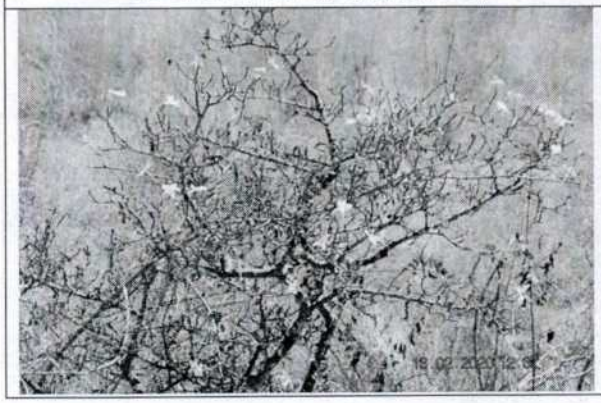
Flora within PRR Alignment



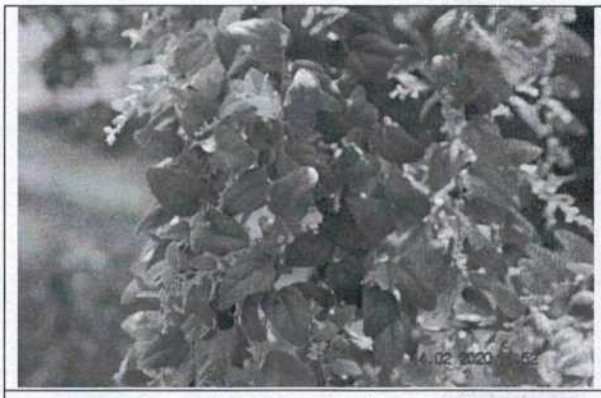
Buddleja asiatica Lour.
Jarakabandekaval
13° 7'39.42"N 77°32'50.79"E



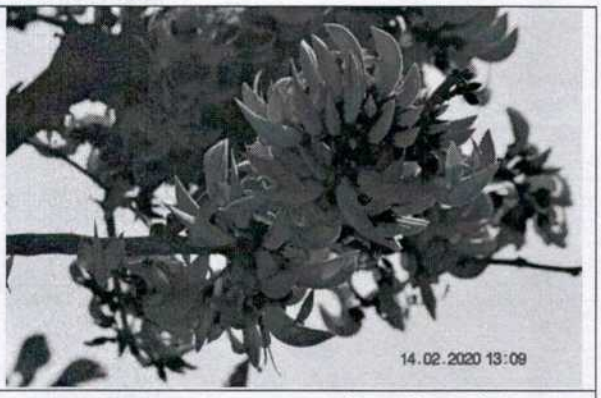
Dodonaea viscosa (L. fil.) J.G. West
Jarakabandekaval
13° 7'38.92"N 77°32'51.60"E



Gardenia gummifera L.f. Jarakabandekaval 13° 7'38.39"N 77°32'53.42"E	*Melia azedarach* L. SA Bileshivale 13° 3'25.49"N 77°41'28.34"E
	
Ipomoea cairica (L.) SW. Jarakabandekaval 13° 7'39.31"N 77°32'49.82"E	*Sesbania grandiflora* (L.) Poiret Bileshivale 13° 3'27.23"N 77°41'28.56"E
	
Rosa miniatures L. Bileshivale 13° 3'27.34"N 77°41'26.67"E	*Mangifera indica* L. Near Avalahalli 13° 2'11.73"N 77°44'28.92"E
	
Ficus racemosa L. Near Channasandra 12°58'51.23"N 77°46'21.27"E	*Portulaca oleracea* L. Near Channasandra 12°58'49.73"N 77°46'21.25"E



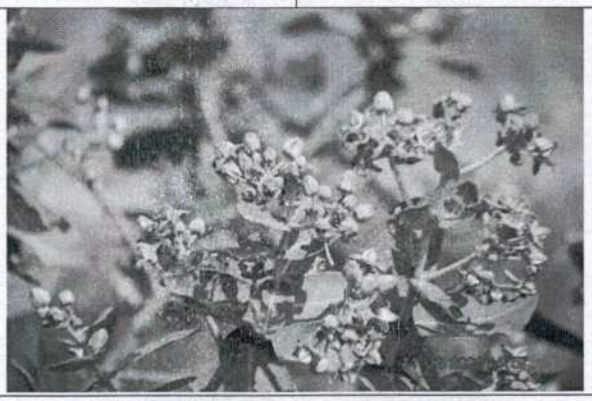
Cocculus hirsutus (L.) Diels
Near Channasandra
12°58'51.46"N 77°46'22.82"E



Butea monosperma (Lam.) Taub.
Bileshivale
13° 3'26.12"N 77°41'27.31"E

Calotropis gigantea (L.)
Near Bileshivale
13° 3'25.35"N 77°41'26.74"E

Lantana camara L.
Near Avalahalli
13° 2'11.53"N 77°44'32.02"E



Calotropis procera R.BR.
Near Bileshivale
13° 3'24.94"N 77°41'29.21"E

B.2. Avifauna and Butterfly species recorded witin the Project Alignment.

Table 8: Checklist of Birds recorded within the Project Alignment.

Sl. No.	Common Name	Scientific Name	Family	IUCN Conservation Status, 2019	WL(P)A, 1972 Schedule	Migratory Status	No. observed
1	Barn Swallow	*Hirundo rustica* (Linnaeus, 1758)	Hirundinidae	Least Concern	-	M	2
2	Black Drongo	*Dicrurus macrocercus* (Vieillot, 1817)	Dicruridae	Least Concern	IV	R	2
3	Black Kite	*Milvus migrans* (Boddaert, 1783)	Accipitridae	Least Concern	I	R	27
4	Black-headed ibis	*Threskiornis melanocephalus* (Latham, 1790)	Threskiornithidae	Near Threatened	IV	E	3
5	Brahminy Kite	*Haliastur indus* (Boddaert, 1783)	Accipitridae	Least Concern	I	R	1
6	Cattle Egret	*Bubulcus ibis* (Linnaeus, 1758)	Ardeidae	Least Concern	IV	R	2
7	Common Buzzard	*Buteo buteo* (Linnaeus, 1758)	Accipitridae	Least Concern	I	R	1
8	Common Myna	*Acridotheres tristis* (Linnaeus, 1766)	Sturnidae	Least Concern	IV	R	15
9	Greater Coucal	*Centropus sinensis* (Stephens, 1815)	Cuculidae	Least Concern	IV	-	2
10	Green Barbet	*Megalaima zeylanica* (Gmelin, 1788)	Megalaimidae	Least Concern	IV	-	1
11	House Crow	*Corvus splendens* (Vieillot, 1817)	Corvidae	Least Concern	V	R	3
12	Indian Pond heron	*Ardeola grayii* Sykes, 1832	Ardeidae	Least Concern	IV	R	5
13	Indian Roller	*Coracias benghalensis* Linnaeus, 1758	Coraciidae	Least Concern	IV	R	1
14	Indian Silverbill	*Euodice malabarica* (Linnaeus, 1758)	Estrildidae	Least Concern	IV	-	1
15	Jungle Babbler	*Turdoides striata* (Dumont, 1823)	Leiothrichidae	Least Concern	IV	R	1
16	Jungle Myna	*Acridotheres fuscus* (Wagler, 1827)	Sturnidae	Least Concern	IV	R	1
17	Jungle Prinia	*Prinia sylvatica* (Jerdon, 1840)	Cisticolidae	Least Concern	IV	R	1
18	Laughing Dove	*Spilopelia senegalensis* (Linnaeus, 1766)	Columbidae	Least Concern	IV	R	1
19	Little Bee-eater	*Merops pusillus* Müller, 1776	Meropidae	Least Concern	IV	R	1
20	Little Green Bee-eater	*Merops orientalis* (Latham, 1802)	Meropidae	Least Concern	IV	R	7
21	Loten's Sunbird	*Cinnyris lotenius* Linnaeus, 1766	Nectariniidae	Least Concern	IV	R	5
22	Median Egret	*Ardea intermedia* Wagler, 1827	Ardeidae	Least Concern	IV	R	8
23	Paddy-field Pipit	*Anthus rufulus* Vieillot, 1818	Motacillidae	Least Concern	IV	R	3
24	Pied Bushchat	*Saxicola caprata* (Linnaeus, 1766)	Muscicapidae	Least Concern	IV	-	11
25	Purple Sunbird	*Cinnyris asiaticus* (Latham, 1790)	Nectariniidae	Least Concern	IV	R	1
26	Red Vented BulBul	*Pycnonotus cafer* (Linnaeus, 1766)	Pycnonotidae	Least Concern	IV	R	2
27	Red Wattled Lapwing	*Vanellus indicus* Boddaert, 1783	Charadriidae	Least Concern	IV	R	11

Sl. No.	Common Name	Scientific Name	Family	IUCN Conservation Status, 2019	WL(P)A, 1972 Schedule	Migratory Status	No. observed
28	Rose Ringed Parakeet	*Psittacula krameri* Scopoli, 1769	Psittacidae	Least Concern	IV	R	2
29	Spotted Owlet	*Athene brama* (Temminck, 1821)	Strigidae	Least Concern	IV	R	1
30	White-breasted Kingfisher	*Halcyon smyrnensis* (Linnaeus, 1758)	Alcedinidae	Least Concern	IV	R	1
31	White-browed Wagtail	*Motacilla maderaspatensis* (Gmelin, 1789)	Motacillidae	Least Concern	IV	R	2
						Total	**125**

Note: Species recorded by EHSCPL team; WL (P) A- Wildlife (Protection) Act. R=Resident, LM=Local Migrant and M= Migrant.

Avifaunal Diversity within the Project Alignment.

	
Indian Roller *Coracias benghalensis* Linnaeus, 1758 Near Channasandra 12°58'50.58"N 77°46'21.77"E	White-browed wagtail *Motacilla maderaspatensis* (Gmelin, 1789) Near Bileshivale 13° 3'25.55"N 77°41'27.80"E
	
Little Bee-eater *Merops pusillus* Müller, 1776 Jarakabande kaval 13° 7'39.31"N 77°32'51.22"E	Pied Bushchat (Female) *Saxicola caprata* (Linnaeus, 1766) Jarakabande kaval 13° 7'39.49"N 77°32'50.82"E
	
Little Green Bee- eater *Merops orientalis* (Latham, 1802) Jarakabande kaval 13° 7'39.60"N 77°32'51.91"E	Pied Bushchat (male) *Saxicola caprata* (Linnaeus, 1766) Near Bileshivale 13° 3'25.69"N 77°41'27.77"E

C.Study Area.

C.1. Avifauna and Butterfly species recorded in Study area

Table 11: Checklist of Birds recorded at Study area

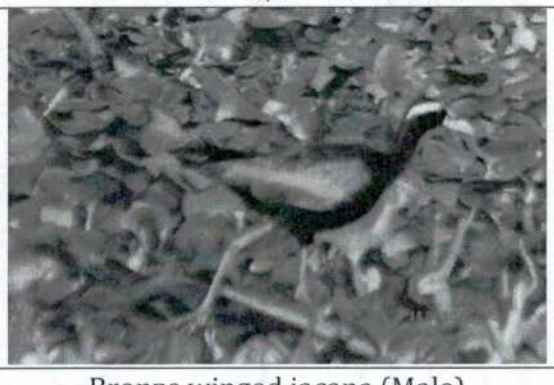
Sl. No.	Common Name	Scientific Name	Family	IUCN Conservation Status, 2019	WL(P)A, 1972 Schedule	Migratory Status	No. observed
1	Ashy Prinia	*Prinia socialis* (Sykes, 1832)	Cisticolidae	Least Concern	IV	R	2
2	Asian Koel	*Eudynamys scolopaceus* (Linnaeus, 1758)	Cuculidae	Least Concern	IV	R	1
3	Asian open billed stork	*Anastomus oscitans* (Boddaert, 1783)	Ciconiidae	Least Concern	IV	R	1
4	Barn Swallow	*Hirundo rustica* (Linnaeus, 1758)	Hirundinidae	Least Concern	-	RM	388
5	Black Drongo	*Dicrurus macrocercus* (Vieillot, 1817)	Dicruridae	Least Concern	IV	R	11
6	Black Kite	*Milvus migrans* (Boddaert, 1783)	Accipitridae	Least Concern	I	R	47
7	Black-headed Ibis	*Threskiornis melanocephalus* (Latham, 1790)	Threskiornithidae	Near Threatened	IV	R	139
8	Black-hooded Oriole	*Oriolus xanthornus* (Linnaeus, 1758)	Oriolidae	Least Concern	-	R	1
9	Black-Shouldered Kite	*Elanus caeruleus* (Desfontaines, 1789)	Accipitridae	Least Concern	I	R	1
10	Black-winged Stilt	*Himantopus himantopus* (Linnaeus, 1758)	Recurvirostridae	Least Concern	IV	R	20
11	Brahminy Kite	*Haliastur indus* (Boddaert, 1783)	Accipitridae	Least Concern	I	R	11
12	Bronze Winged Jacana	*Metopidius indicus* (Latham, 1790)	Jacanidae	Least Concern	IV	R	30
13	Cattle Egret	*Bubulcus ibis* (Linnaeus, 1758)	Ardeidae	Least Concern	IV	R	176
14	Common Coot	*Fulica atra* (Linnaeus, 1758)	Rallidae	Least Concern	IV	RM	18
15	Common Myna	*Acridotheres tristis* (Linnaeus, 1766)	Sturnidae	Least Concern	IV	R	30
16	Common sandpiper	*Actitis hypoleucos* (Linnaeus, 1758)	Scolopacidae	Least Concern	IV	R	1
17	Glossy Ibis	*Plegadis falcinellus* (Linnaeus, 1766)	Threskiornithidae	Least Concern	IV	RM	1
18	Great Cormorant	*Phalacrocorax carbo* (Linnaeus, 1758)	Phalacrocoracidae	Least Concern	IV	R	128
19	Great White Pelican	*Pelecanus onocrotalus* (Linnaeus, 1758)	Pelecanidae	Least Concern	IV	RM	35
20	Greater Coucal	*Centropus sinensis* (Stephens, 1815)	Cuculidae	Least Concern	IV	R	2
21	Green Barbet	*Megalaima zeylanica* (Gmelin, 1788)	Megalaimidae	Least Concern	IV	R	2
22	Grey Heron	*Ardea cinerea* (Linnaeus, 1758)	Ardeidae	Least Concern	IV	R	19
23	Hoopoe	*Upupa epops* (Linnaeus, 1758)	Upupidae	Least Concern	-	R	1
24	House Crow	*Corvus splendens* (Vieillot, 1817)	Corvidae	Least Concern	V	R	13

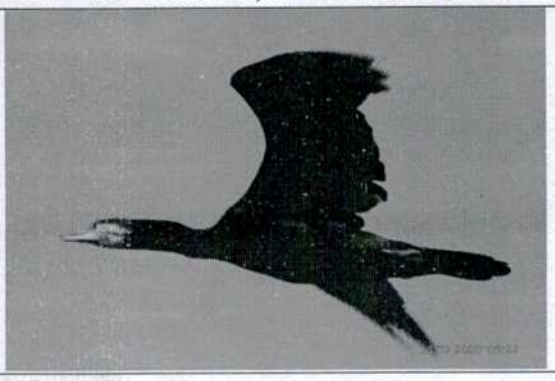
Sl. No.	Common Name	Scientific Name	Family	IUCN Conservation Status, 2019	WL(P)A, 1972 Schedule	Migratory Status	No. observed
25	Indian Peafowl	*Pavo cristatus* (Linnaeus, 1758)	Phasianidae	Least Concern	I	R	2
26	Indian Pond heron	*Ardeola grayii* (Sykes, 1832)	Ardeidae	Least Concern	IV	R	60
27	Laughing Dove	*Spilopelia senegalensis* (Linnaeus, 1766)	Columbidae	Least Concern	IV	R	1
28	Lesser Whistling-Duck	*Dendrocygna javanica* (Horsfield, 1821)	Anatidae	Least Concern	IV	R	102
29	Little Cormorant	*Microcarbo niger* (Vieillot, 1817)	Phalacrocoracidae	Least Concern	IV	R	119
30	Little Egret	*Egretta garzetta* (Linnaeus, 1766)	Ardeidae	Least Concern	IV	R	8
31	Little Grebe	*Tachybaptus ruficollis* (Pallas, 1764)	Podicipedidae	Least Concern	IV	R	17
32	Little Stint	*Calidris minuta* (Leisler, 1812)	Scolopacidae	Least Concern	IV	M	17
33	Median Egret	*Ardea intermedia* (Wagler, 1827)	Ardeidae	Least Concern	IV	R	71
34	Oriental Darter	*Anhinga melanogaster* (Pennant, 1769)	Anhingidae	Near Threatened	IV	RM	90
35	Painted Stork	*Mycteria leucocephala* (Pennant, 1769)	Ciconiidae	Near Threatened	IV	RM	33
36	Pied Bushchat	*Saxicola caprata* (Linnaeus, 1766)	Muscicapidae	Least Concern	IV	R	3
37	Purple Sunbird	*Cinnyris asiaticus* (Latham, 1790)	Nectariniidae	Least Concern	IV	R	11
38	Purple Swamphen	*Porphyrio porphyrio* (Linnaeus, 1758)	Rallidae	Least Concern	IV	R	453
39	Red Wattled Lapwing	*Vanellus indicus* (Boddaert, 1783)	Charadriidae	Least Concern	IV	R	27
40	Rock Dove	*Columba livia* (Gmelin, 1789)	Columbidae	Least Concern	IV	R	4
41	Rose Ringed Parakeet	*Psittacula krameri* (Scopoli, 1769)	Psittacidae	Least Concern	IV	R	4
42	Small Minivet	*Pericrocotus cinnamomeus* (Linnaeus, 1766)	Campephagidae	Least Concern	IV	R	4
43	Spot Billed Duck	*Anas poecilorhyncha* (Forster, 1781)	Anatidae	Least Concern	IV	R	206
44	Spot-Billed Pelican	*Pelecanus philippensis* (Gmelin, 1789)	Pelecanidae	Near Threatened	IV	RM	4
45	White Wagtail	*Motacilla alba* (Linnaeus, 1758)	Motacillidae	Least Concern	IV	RM	4
46	White-Breasted Kingfisher	*Halcyon smyrnensis* (Linnaeus, 1758)	Alcedinidae	Least Concern	IV	R	5
47	White-Browed Wagtail	*Motacilla maderaspatensis* (Gmelin, 1789)	Motacillidae	Least Concern	IV	R	4
						Total	**2327**

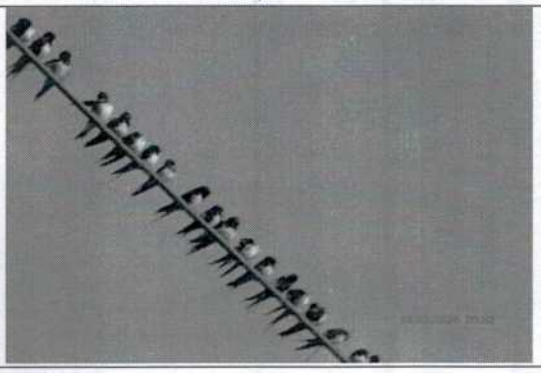
Note: Species recorded by EHSCPL team; WL(P)A- Wildlife (Protection) Act., R=Resident, LM=Local Migrant and M= Migrant.

Avifaunal Diversity in Study area

	
Little egret Near Anchepalya 13° 3'16.14"N, 77°28'40.76"E	Rock Dove Sheelavanthakere Lake 12°57'51.81"N, 77°44'37.10"E
	
Black-headed ibis Chikkabanavara lake 13° 4'51.99"N, 77°30'18.48"E	Painted Stork Near Anchepalya 13° 2'56.93"N, 77°28'49.31"E
	
Purple Sunbird Chikkabanavara lake 13° 5'4.50"N, 77°30'31.51"E	Grey heron Sheelavanthakere Lake 12°57'47.11"N, 77°44'30.17"E

	
Glossy ibis Yallamma Lake 13° 1'50.98"N, 77°43'29.74"E	Purple Swamphen Yallamma Lake 13° 1'18.25"N, 77°43'22.22"E
	
Spot billed duck Yallamma Lake 13° 1'14.56"N, 77°43'43.92"E	Indian Pond heron Puttenahalli lake 13° 6'41.07"N, 77°34'29.97"E
	
Little egret Near Anchepalya 13° 3'1.84"N, 77°28'41.21"E	Common sandpiper Near Anchepalya 13° 2'57.12"N, 77°28'45.40"E
	
Bronze winged jacana (Female)	Bronze winged jacana (Male)

Rampura Lake 13° 3'3.99"N, 77°40'57.87"E	Rampura Lake 13° 3'3.99"N, 77°40'57.87"E
	
Little cormorant Near Anchepalya 13° 3'17.18"N, 77°28'41.90"E	Great cormorant Near Anchepalya 13° 2'58.07"N, 77°28'44.10"E
	
White-breasted Kingfisher Yallamma lake 13° 1'39.61"N, 77°43'29.37"E	Median egret Yallamma lake 13° 1'26.74"N, 77°43'59.43"E
	
Ashy Prinia Puttenahalli lake 13° 6'36.84"N, 77°34'29.46"E	Oriental Darter Near Anchepalya 13° 2'59.58"N, 77°28'40.47"E

	
Black Kite Near Anchepalya 13° 2'59.49"N, 77°28'50.40"E	Brahminy kite Near Anchepalya 13° 2'57.52"N, 77°28'41.66"E
	
Greater coucal Puttenahalli lake 13° 6'41.06"N, 77°34'27.59"E	Brown headed Barbet Sheelavanthakere Lake 12°57'47.08"N, 77°44'30.40"E
	
Great white pelican Rampura lake 13° 2'58.17"N, 77°41'13.51"E	Common Coot Chikkabanavara lake 13° 4'52.06"N, 77°30'18.59"E
	
Black-headed ibis	Common swallow

Chikkabanavara lake 13° 4'51.99"N, 77°30'18.48"E	Near Anchepalya 13° 3'1.83"N, 77°28'39.76"E
	
Grey heron Near Anchepalya 13° 3'5.83"N, 77°28'39.12"E	Pied Bushchat Chikkabanavara lake 13° 4'51.39"N, 77°30'11.67"E
	
Common Myna Sheelavanthakere Lake 12°57'49.96"N, 77°44'36.11"E	Small Minivet Rampura lake 13° 2'45.23"N, 77°40'57.98"E
	
Black-winged Stilt Near Anchepalya 13° 2'59.55"N, 77°28'41.33"E	Red Wattled Lapwing Near Anchepalya 13° 2'56.10"N, 77°28'43.04"E

Table 12: Checklist of Butterfly Recorded at Study area

Sl. No.	Common Name	Scientific Name	Family	IUCN Conservation Status, 2019	WL(P)A, 1972 Schedule	No. observed
1	Bamboo Treebrown	*Lethe europa* (Fabricius, 1787)	Nymphalidae	Not Assessed	-	1
2	Blue Tiger	*Tirumala gautama* (Moore, 1877)	Nymphalidae	Not Assessed	-	3
3	Cabbage Butterfly	*Pieris rapae*(Linnaeus, 1758)	Pieridae	Not Assessed	-	15
4	Common Crow	*Euploea core* (Cramer, 1780)	Nymphalidae	Least Concern	IV	4
5	Common Grass Yellow	*Eurema hecabe* (Linnaeus, 1758)	Pieridae	Not Assessed	-	5
6	Common Jezebel	*Delias eucharis* (Drury, 1773)	Pieridae	Not Assessed	II	1
7	Common Leopard	*Phalanta phalantha* (Drury, 1773)	Nymphalidae	Not Assessed	-	1
8	Common Pierrot	*Castalius rosimon* (Fabricius, 1775)	Lycaenidae	Not Assessed	-	1
9	Common Wanderer	*Pareronia valeria* (Cramer, 1776)	Pieridae	Not Assessed	-	1
10	Crimson Rose	*Pachliopta hector* (Linnaeus, 1758)	Papilionidae	Least Concern	-	3
11	Danid Eggfly	*Hypolimnas misippus* (Linnaeus, 1764)	Nymphalidae	Not Assessed	-	3
12	Indian angled Castor	*Ariadne merione* (Cramer, 1779)	Nymphalidae	Not Assessed	-	1
13	Large Three Ring	*Ypthima inica* (Hewitson, 1864)	Nymphalidae	Not Assessed	-	1
14	Lemon Pansy	*Junonia lemonias* (Linnaeus, 1758)	Nymphalidae	Not Assessed	-	4
15	Plain Tiger	*Danaus chrysippus* (Linnaeus, 1758)	Nymphalidae	Not Assessed	-	1
16	Small Grass Yellow	*Eurema brigitta* (Stoll, 1780)	Pieridae	Least Concern	-	3
17	Striped Tiger	*Danaus genutia* (Cramer, 1779)	Nymphalidae	Not Assessed	-	1
18	Tailed Jay	*Graphium Agamemnon* (Linnaeus, 1758)	Papilionidae	Not Assessed	-	1
19	Yellow Orange Tip	*Ixias pyrene* (Linnaeus, 1764)	Pieridae	Not Assessed	-	3
					Total	**53**

Note: Species recorded by EHSCPL team, WL(P)A- Wildlife (Protection) Act.

Butterfly of Study area

	
Common Crow Sheelavanthakere Lake 12°57'56.16"N, 77°44'34.60"E	Danid Eggfly Sheelavanthakere Lake 12°57'56.16"N, 77°44'34.60"E
	
Large Three Ring Near Anchepalya 13° 2'57.37"N, 77°28'40.43"E	Striped Tiger Sheelavanthakere Lake 12°57'51.82"N, 77°44'37.43"E
	
Bamboo Treebrown Sheelavanthakere Lake 12°57'55.07"N, 77°44'35.18"E	Lemon Pancy Puttenahalli Lake 13° 6'37.76"N, 77°34'33.58"E

Table 13: Family wise Birds and Butterflies recorded at Study area

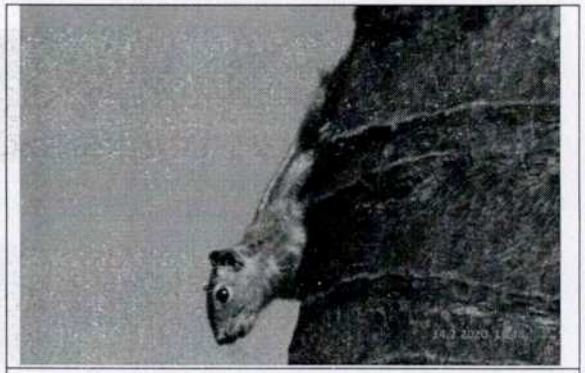
Sl. No.	Family	Birds	Butterfly
1	Accipitridae	3	-
2	Alcedinidae	1	-
3	Anatidae	2	-
4	Anhingidae	1	-
5	Ardeidae	5	-
6	Campephagidae	1	-
7	Charadriidae	1	-
8	Ciconiidae	2	-
9	Cisticolidae	1	-
10	Columbidae	2	-
11	Corvidae	1	-
12	Cuculidae	2	-
13	Dicruridae	1	-
14	Hirundinidae	1	-
15	Jacanidae	1	-
16	Lycaenidae	-	1
17	Megalaimidae	1	-
18	Motacillidae	2	-
19	Muscicapidae	1	-
20	Nectariniidae	1	-
21	Nymphalidae	-	10
22	Oriolidae	1	-
23	Papilionidae	-	2
24	Pelecanidae	2	-
25	Phalacrocoracidae	2	-
26	Phasianidae	1	-
27	Pieridae	-	6
28	Podicipedidae	1	-
29	Psittacidae	1	-
30	Rallidae	2	-
31	Recurvirostridae	1	-
32	Scolopacidae	2	-
33	Sturnidae	1	-
34	Threskiornithidae	1	-
35	Upupidae	2	-
	Total	**47**	**19**

Table 14: Checklist of Mammals recorded at Study Area

Sl. No.	Common Name	Scientific Name	Family	IUCN Conservation Status, 2019	WL(P)A, 1972 Schedule
1	Indian Hare	*Lepus nigricollis* (F. Cuvier, 1823)	Leporidae	Least Concern	-
2	Indian Palm Squirrel	*Funambulus palmarum* (Linnaeus, 1766)	Sciuridae	Least Concern	-

Note: Species recorded by EHSCPL team,

Mammals recorded at project Site



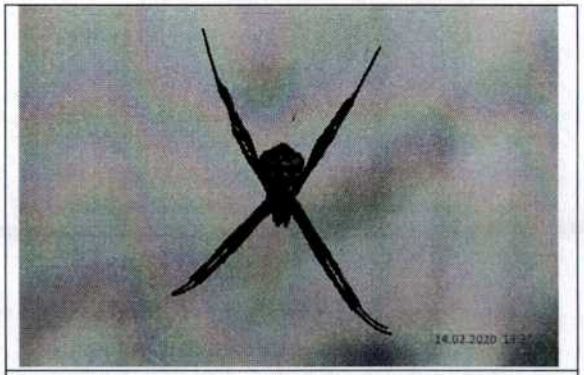
Indian Palm Squirrel
Funambulus palmarum (Linnaeus, 1766)
Puttenahalli Lake
13° 6'43.98"N, 77°34'37.09"E

Table 15: Checklist of Insect recorded at Study Area

Sl. No.	Common Name	Scientific Name	Family	IUCN Conservation status, 2019	WL(P)A, 1972 Schedule
1	Signature spider	*Argiope anasuja* (Thorell , 1887)	Araneidae	Not Assessed	-

Note: Species recorded by EHSCPL team

Insect recorded at study area



Signature spider
Argiope anasuja (Thorell, 1887)
Rampura lake
13° 2'46.96"N, 77°40'56.97"E

D. Green belt development plan

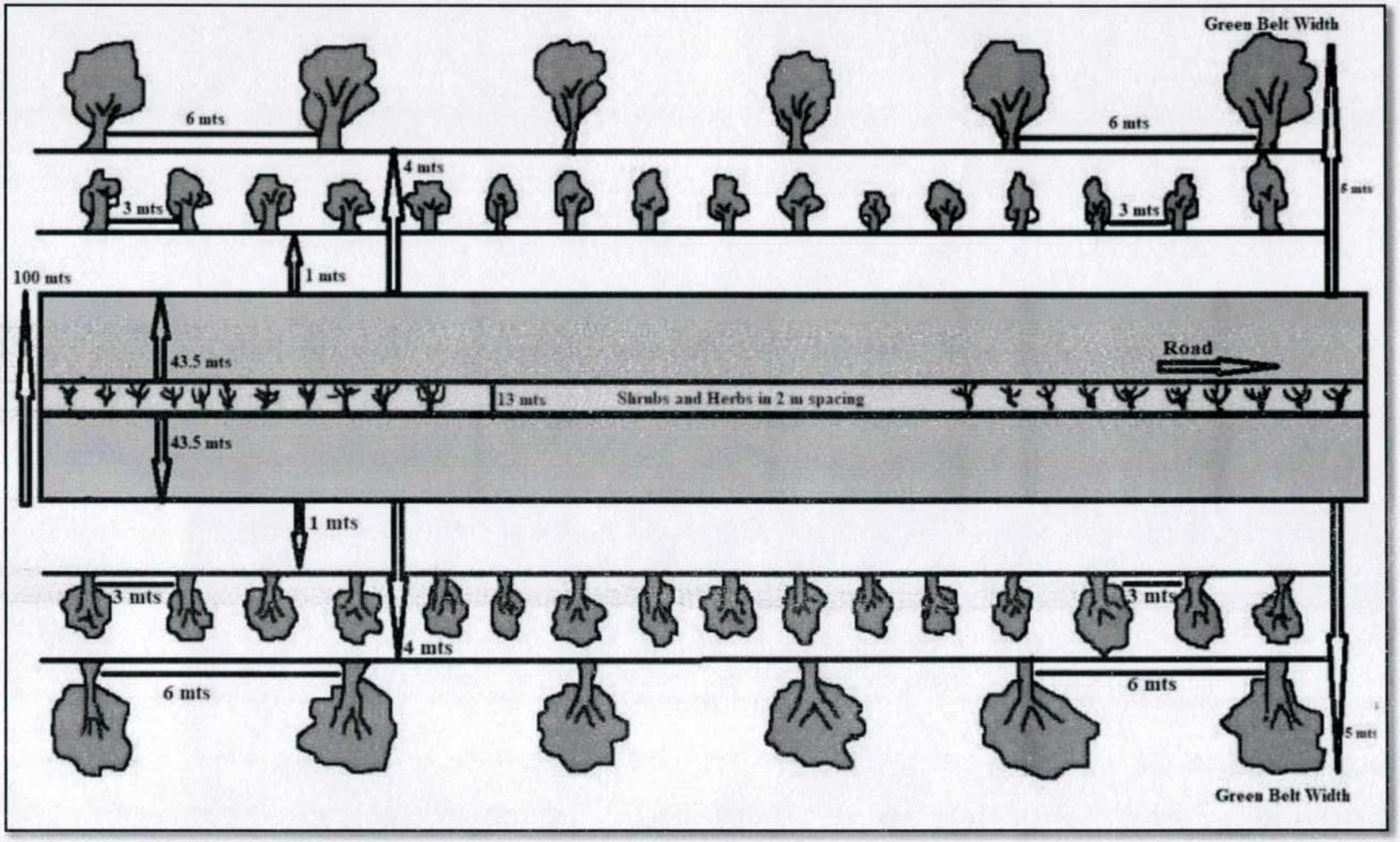


Fig 11: Schematic diagram showing Green Belt Development[1]

[1] Guidelines for the National Green Highways

Table 16: List of Tree, shrubs and herbs Species recommended for the development of Greenbelt2

Sl.No	Scientific Name	Local Name	Family	IUCN Conservation Status, 2020	RET Status	Uses
Trees						
1	*Acacia nilotica* (L.) Delile	Kari jail	Fabaceae	Least Concerned	Common	Timber
2	*Albizia saman* (Jacq.)Merr.	Male mara	Fabaceae	Not Assessed	Common	Edible and medicinal
3	*Alstonia scholaris* (L.) R.Br.	Bootha mara	Apocynaceae	Least Concern	Common	Ornamental
4	*Annona squamosa* L.	Seethaphal	Annonaceae	Least concerned	Common	Fruit
5	*Artocarpus heterophyllus* Lam.	Halasu	Moraceae	Not Assessed	Common	Edible and medicinal
6	*Azadirachta indica* A.Juss.	Bevina mara	Meliaceae	Least concerned	Common	Medicinal and Traditional
7	*Butea monosperma* (Lam.) Taub.	Muthugada mara	Fabaceae	Not Assessed	Common	Ornamental
8	*Cassia siamea* Lam K.	Simetangedi	Fabaceae	Least concerned	Common	Medicinal
9	*Cocos nucifera* L.	Tengu	Arecaceae	Not Assessed	Common	Medicinal
10	*Dalbergia sissoo* DC.	Agara	Fabaceae	Not Assessed	Common	Timber
11	*Ficus benghalensis* L.	Aladamara	Moraceae	Not Assessed	Common	Edible and Medicinal
12	*Ficus benjamina* L.	Peeladamara	Moraceae	Not assessed	Common	Ornamental and Fruit
13	*Ficus religiosa* L.	Arali mara	Moraceae	Not Assessed	Common	Edible and Traditional
14	*Kigelia africana* (lamk.) Benth.	Mara Sowthekai	Bignoniaceae	Least concerned	Common	Medicinal
15	*Madhuca longifolia* (KOEN.) MACLER	Hippe mara	Sapotaceae	Not Assessed	Common	Flower, oil, medicinal
16	*Magnolia champaca* (L.) Baill. ex Pierre	Sampige mara	Magnoliaceae	Least concerned	Common	Ornamental
17	*Melia azedarach* L.	Hebbevu	Meliaceae	Least Concern	Common	Pulp wood and plywood
18	*Melia dubia* Hiern, Non Cav.	Kadu Bevu	Meliaceae	Not Assessed	Common	Medicinal
19	*Millingtonia hortensis* L. fil.	Akashamallige	Bignoniaceae	Not Assessed	Common	Ornamental
20	*Neolamarckia cadamba* (Roxb.) Bosser	Kaduavalatige	Rubiaceae	Not assessed	Common	Ornamental and pollution control
21	*Peltophorum pterocarpum* (DC.) K.Heyne	Bettada hunise	Fabaceae	Not Assessed	Common	Edible and timber

[2] Guidelines for the National Green Highways Policy 2015

Sl.No	Scientific Name	Local Name	Family	IUCN Conservation Status, 2020	RET Status	Uses
22	*Pongamia pinnata* (L.)Pierre	Honge	Fabaceae	Not Assessed	Common	Medicinal
23	*Prosopis chilensis* (Molina) Stuntz	Bellary jali	Fabaceae	Least concerned	Common	Edible and timber
24	*Prosopis cineraria* (L.) DRUCE	Banni mara	Mimosaceae	Not Assessed	Common	Timber and Traditional
25	*Spathodea campanulata* P.Beauv.	Neerukayi mara	Bignoniaceae	Least concerned	Common	Ornamental and timber
26	*Tamarindus indica* L.	Hunase mara	Fabaceae	Least concerned	Common	Edible and medicinal
27	*Terminalia arjuna* (Roxb.) Wight & Arn.	Arjuna mara	Combretaceae	Not Assessed	Common	Edible and medicinal
28	*Terminalia catappa* L.	Badami	Combertaceae	Not Assessed	Common	Edible, medicinal and Agroforestry
29	*Thespesia populnea* (L.) Sol. ex Corrêa	Gante mara	Malvaceae	Least concerned	Common	Ornamental and medicinal
30	*Ziziphus mauritiana* Lam.	Kare hannu	Rhamnaceae	Least concerned	Common	Edible and medicinal
Herbs and Shrubs						
1	*Bambusa arundinacea WILLD.*	Andebidiru	Bambusaceae	Not Assessed	Common	Medicinal
2	*Bambusa vulgaris SCHRAD.*	Bamboo	Poaceae	Not Assessed	Common	Medicinal
3	*Caesalpinia pulcherrima (L.)Sw.*	Rathna Gentige	Fabaceae	Not Assessed	Common	Ornamental
4	*Calotropis procera R.BR.*	Bili aekka	Asclepiadaceae	Not Assessed	Common	Medicinal
5	*Duranta repens L.*	Huchhu aelasi	Verbenaceae	Not Assessed	Common	Medicinal
6	*Hibiscus rosa-sinensis L.*	Daasavaala,	Malvaceae	Not Assessed	Common	Medicinal
7	*Murraya paniculata (L.) JACK.*	Angaarakana gida	Rutaceae	Not Assessed	Common	Medicinal
8	*Ricinus communis L.*	Aralu	Euphorbiaceae	Not Assessed	Common	Medicinal and timber
9	*Sesbania sesban (L.)Merr.*	Tagache	Fabaceae	Not Assessed	Common	Medicinal
10	*Tabernaemontana divaricata (L.) R. Br.*	Tagari	Apocynaceae	Not Assessed	Common	Medicinal
11	*Tecoma stans (L.) Juss. ex Kunth*	Gante hoo	Bignoniaceae	Not Assessed	Common	Ornamental
12	*Nerium indicum* L.	Chandaatha	Apocynaceae	Not Assessed	Common	Ornamental

Table 17: Checklist of trees proposed for transplantation

Sl.No	Species	Number
1	*Aegle marmelos* (L.) Correa	1
2	*Albizia lebbeck* (L.)Benth.	116
3	*Anacardium occidentale* L.	62
4	*Annona reticulate* L.	1
5	*Annona squamosa L.*	1
6	*Artocarpus heterophyllus* Lam.	97
7	*Chloroxylon swietenia* DC.	7
8	*Cordia dichotoma*	28
9	*Dalbergia latifolia* Roxb.	1
10	*Dalbergia sissoo* DC.	9
11	*Ficus benghalensis* L.	15
12	*Ficus benjamina* L.	2
13	*Ficus carica* L.	10
14	*Ficus elastica* ROXB. EX. HORNEM.	3
15	*Ficus hispida* L.F.	4
16	*Ficus racemosa* L.	30
17	*Ficus religiosa* L.	20
18	*Ficus virens* Aiton	2
19	*Gmelina arborea* L.	15
20	*Holoptelea integrifolia* (Roxb.) Planch.	11
21	*Lagerstroemia speciosa* Deepu & Pandur.	12
22	*Magnolia champaca* (L.) Baill. ex Pierre	1
23	*Mallotus philippensis* (Lam.) Muell.Arg.	1
24	*Melia azedarach* L.	26
25	*Millingtonia hortensis* L. fil.	10
26	*Muntingia calabura* L.	130
27	*Neolamarckia cadamba* (Roxb.) Bosser	13
28	*Parkia biglobosa* (Jacq.) R.Br. ex G.Don	5
29	*Peltophorum pterocarpum* (DC.)	63
30	*Phyllanthus emblica* L.	4
31	*Pithecellobium dulce* (Roxb.)Benth.	208
32	*Pongamia pinnata* (L.)Pierre	1285
33	*Psidium guajava* L.	75
34	*Pterocarpus marsupium* Roxb.	12
35	*Santalum album* Linn.	21
36	*Senegalia ferruginea* (DC.) Pedley	4
37	*Simarouba glauca* DC.	57
38	*Swietenia mahagoni* (L.) JACQ	23
39	*Syzygium cumini* (L.) Skeels	136
40	*Syzygium jambos* L. (Alston)	4
41	*Terminalia arjuna* (Roxb.) Wight & Arn.	2

Sl.No	Species	Number
42	*Terminalia catappa* L.	67
43	*Terminalia elliptica* Willd.	3
Total		**2597**

ANNEXURE - 3

Guidelines for tree transplanting

Transplanting is the term used to describe the digging and replanting of trees from one location to a new location. Due to the wide extent and morphology of tree root system, transplanting of trees usually involves substantial removal of roots. The whole transplanting process in particular for large trees is an engineering feat and requires substantial involvement of resources and time.

A decision to transplant a tree should be based on a balancing consideration of its conditions, size, species, conservation status, amenity value, suitability for transplanting, environmental and cultural factors, functional and engineering considerations and cost effectiveness.

Species:

Trees having particular significance and high conservation value would be recommendable for transplanting in case they cannot be preserved on site. Identified trees should be healthy and structurally sound, and invasive exotic tree species should not be considered for transplanting.

Age, height and girth:

Conditions of the trees to be transplanted including health, form and structure will affect the success of the proposed transplanting.

The lifespan and health of the trees after transplanting have to be considered before transplanting to assess the cost effectiveness of the operation.

Trees with poor form/architecture, health or structure should not be considered for transplanting. If the tree has poor health, the rates of survival and recovery will be low. Trees suffer substantial stress and shock during construction and transplanting. A transplanted tree should be able to re-establish sufficient roots to sustain itself.

Root system:

Larger trees need bigger root ball to encompass more roots to ensure adequate re-growth, as well as anchorage and stability. Transplanting may not be recommendable for situation where a reasonable root ball size cannot be achieved. International practices generally recommend a range of 8:1 to 10:1 for root ball diameter: trunk diameter. A larger root ball is recommendable for more mature trees to enhance better recovery after transplanting.

Root pruning is sometimes required before transplanting a tree. Sufficient time should be allowed between preparation and final lifting for development of new roots capable of sustaining and continuing the growth of the transplanted tree.

Soil type:

Trees growing on slopes, retaining walls or areas where formation of a root ball of reasonable size is not practicable are considered not transplantable. Trees should not be transplanted to non-fertile soils like lateritic soil.

Distance to travel:

Access to existing and receptor locations, manoeuvering spaces and transportation to the receptor site (including availability of access to accommodate the tree, topography of proposed route, engineering limitation, etc.) and other site constraints should be considered.

Large transplanting machine may be needed. Accessibility of the site should be considered including the movement and set up of the transplanting equipment and the manoeuvrability of the operation machinery and vehicles.

Season of transplant:

Summer is not a common transplanting season as evapo-transpiration rate is high and the transplanted trees will be under stress when transplanting work is taken place during that time.

Pre and Post care:

a) **Pit size:** The height, breadth and depth of pits depends on tree girth size

Table.1: Pit size based on tree girth size

S.No	Pit size (m^3)	Girth class (m)	Size of the tree
1	2.0 X 2.0 X 2.0	0.1 to 0.5	Small
2.	2.5 X 2.5 X 2.5	0.5 to 1.0	Medium
3.	3.0 X 3.0 X 3.0	1.0 to 1.5	Large

b) **Digging:**

- **Stage 1:** Dig a trench on the outside of the marked circumference in only two opposing segments.
- **Stage 2:** After a period of not less than 1 month since the firstroot pruning, dig a trench on the outside of the marked circumference in the adjacent two opposing segments.
- **Stage 3:** After another period of not less than one month since the secondroot pruning, dig a trench on the outside of the marked circumference, in the remaining two opposing segments.
- **Stage 4:** After a further period of not less than 1 month since the third root pruning, prepare the root ball and cut the underside of the root ball, followed by uplifting and transplanting.

c) **Root trimming:** Cuts must be clean to avoid tearing or breaking the roots. All cut roots shall be trimmed cleanly back to the healthy tissues to reduce the split and torn roots. Sharp cut ends can promote a flush of new fibrous roots, helping the trees recover faster from injuries.

d) **Crown pruning and cleaning:** Pruning of tree crown during transplanting may not be necessarily beneficial to the trees as thinning the crown can reduce the tree's capability in making food and building up reserves. Excessive pruning can ruin the natural form of a tree and reduce photosynthesis.

Crown cleaning however can be carried out to remove unhealthy, damaged,

diseased, dead and crossed branches so as to minimise susceptibility to pests and diseases.

e) **Pre root treatment:** Tree roots should be treated with antitermite, antibacterial, antifungal and root hormones.

Table 2:Active ingredients of root treatment chemicals

S.No	Name	Chemical Name	Active ingredient	Quantity/tree (L)
1	Anti-termite	Chloropyriphos 20% EC	4 mL/3 L water	8
2	Anti - bacterial	Bactinash 200	17 g/3 L water	2
3	Anti - fungal	Corbondazim (Bavistin)	2 g/3 L water	15
4	Root hormone	IBA	2000 ppm	20

f) **Preparation of pit at receptor site:** Tree lifting operations shall be carefully timed so as to enable direct delivery to the receptor site. No transplanting operations should commence until either the receptor site or the holding nursery is fully prepared. Tree uplifted must be transplanted and watered the same day. Watering before lifting is recommended.

Before uplifting, the outer edge of the previously dug trenches at receptor site shall be loosened from the surrounding soil and add 15 -25 kg of vermicompost or well decomposed matured farmyard manure or any compost per pit and watered to maintain soil moisture for longer time and easy establishment of roots.

g) **Damp hessian (Gunny bag):** is placed on the sides and across the tip of the ball and pinned. The hessian should cover the full circumference of the root ball with bottom skirt hanging out. This skirt is pinned to the root ball later after the tree is taken out of the hole. The base of the root ball should also be properly wrapped. This hessian shall be kept moist throughout the time of uplifting until the uplifted tree is transplanted in its new location.

h) **Lifting and handling of trees:** Lifting should be done by direct lift, with padded protection for the tree, using a machine of appropriate capacity connected to the support around the root ball, not to any other part of the tree. Tree should not be lifted by the trunk as this can cause serious trunk injury but by its root ball which should be properly prepared and wrapped.

i) **Planting:** Tree should preferably be placed in the same orientation from which they originated. Any branches damaged in transit should be properly pruned back to the nearest branch bark ridge.

j) **After care/ post planting care:** Immediately following planting and where appropriate, a soil saucer can be formed on the soil surface around the edge of the root

ball circumference to permit rain or irrigation water to be retained and slowly infiltrate into the root ball perimeter to conserve soil moisture.

Mulch can be used to conserve soil moisture, to buffer soil temperature extremes, to control weeds and other competing vegetation, and to replenish organic matters and nutrients in the soil.

k) **Nutrient management:** Fertilisation may be unnecessary unless nutrient deficiency is confirmed. Moderate release of nutrients by decomposition of both mulch and organic matter added to backfill soil may be sufficient during the initial establishment period

Source: Greening, Landscape and Tree Management Section Development Bureau The Government of the Hong Kong Special Administrative Region, 2014)

ANNEXURE- 4

POST TREE TRANSPLANTATION ASSESSMENT
(As per the information provided during the inspection)

1. Tree No.

S. No.	Particulars		Remarks (Yes/No)
1	Species	:	
	Tree Number given by BBMP		
	a) Height (mt)	:	
	b) Girth (mt)	:	
3	Soil type	:	
	a) At native	:	
	b) At receptor site	:	
4	Distance from native to receptor site (km)	:	
5	Season of transplant (d/m/y)	:	
6	Pit size	:	
	a) Girth class 0.1 to 0.5 m: 2.0X2.0X2.0	:	
	b) Girth class 0.5 to 1.0 m: 2.5X2.5X2.5	:	
	c) Girth class 1.5 to 1.5 m: 3.0X3.0X3.0	:	
7	Whether digging is done scientifically?	:	
	a) **Stage 1:**Dig a trench on the outside of the marked circumference in only two opposing segments.	:	
	b) **Stage 2:** After a period of not less than 1 month since the first root pruning, dig a trench on the outside of the marked circumference in the adjacent two opposing segments.	:	
	c) **Stage 3:** After another period of not less than one month since the second root pruning, dig a trench on the outside of the marked circumference, in the remaining two opposing segments.	:	
	d) **Stage 4:** After a further period of not less than 1 month since the third root pruning, prepare the root ball and cut the underside of the root ball, followed by uplifting and transplanting.	:	
8	Whether roots are trimmed?	:	
9	Whether root treatment is done with chemicals like	:	
	a) Anti termite	:	
	b) Anti bacterial	:	
	c) Anti fungal	:	
	d) Root hormone	:	
10	Whether the root ball was covered by gunny bag?	:	
11	Whether, crown pruning was appropriate?	:	

12	Whether, the lifted tree is transplanted on the same day?	:	
	a) Date of uproot	:	
	b) Date of transplant	:	
13	Whether, the tree has been transported scientifically?	:	
14	After transplanting whether trees were irrigated regularly?	:	
15	What are the other post transplanting activities carried out?	:	

ANNEXURE-23

AQUATIC BIODIVERSITY

Table 1: Physico chemical features of water samples

Sl. No.	Parameters	Unit	Results								
			Anchepalya lake	Yelhanka lake	Agrahara lake	Cheemasandra lake	Chinnaganahalli lake	Chikkabanahalli lake	Koralur lake	Chikkatogur lake	Varthur lake
1	Colour	-	Greenish	Clear	Slightly green	Clear	Slightly greenish	Clear	Slightly turbid	Greenish	Greenish
2	Odour	-	Decaying material and sludge	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Decaying vegetation, dumped waste, etc	Nauseating of decaying vegetation
3	Ambient temperature	^{0}C	22.0	23.2	23.5	26.5	23.5	22.9	22.5	22.3	23.3
4	Water temperature	^{0}C	22.2	23.0	22.7	25.8	24.0	24.0	22.7	22.5	24.1
5	pH	-	7.75	8.18	7.96	7.9	7.99	7.86	7.66	7.64	7.41
6	Dissolved Oxygen	mg/L	4.6	4.8	4.6	4.8	4.7	4.7	4.6	4.9	4.9
7	Free Carbon di-oxide	mg/L	-	5.8	-	-	3.8	-	4.0	-	14.8
8	Free Ammonia	mg/L	-	0.03	-	-	-	-	-	-	0.6
9	Total Hardness	mg/L	96.0	128.00	292.60	192.00	276.00	320.00	312.00	440.0	260
10	Nitrate	mg/L	6.03	7.98	11.81	7.32	11.29	6.8	15.49	28.09	23.5
11	Iron	mg/L	0.42	0.05	0.16	0.067	0.06	BDL	0.58	0.18	0.49
12	Calcium	mg/L	20.8	28.8	56.0	48.0	64.00	65.6	59.2	96.00	60.8
13	Potassium	mg/L	10.30	20.69	25.16	43.91	26.83	20.15	22.9	25.46	19.70
14	Specific conductivity	micro-mhos/cm	481.00	1067.00	2250.00	1408.00	1517.00	1248.00	1586.0	1980.00	1365.00

Table 2: Qualitative, quantitative and percentage composition of plankton biomass of lakes

Species	Anchepalya lake		Yelhanka lake		Agrahara lake		Cheemasandra lake		Chinnaganahalli lake		Chikkabanahalli lake		Koralur lake		Chikkatogur lake		Varthur lake	
	Nos./1	%	Nos./1	%	Nos./1	%	Nos./1	%	Nos./1	%	Nos./1	%	Nos./1	%	Nos./1	%	Nos./1	%
PHYTOPLANKTON	**597**	**65.39**	**30**	**10.83**	**92**	**11.56**	**360**	**17.26**	**461**	**39.17**	**139**	**40.76**	**152**	**10.78**	**270**	**36.29**	**114**	**60.32**
Anacystis cyanea (Kutzing)Drought & Dally	283	31.00	21	7.58	92	11.56	88	4.22	27	2.29	77	22.58	64	4.54	126	16.94	62	32.80
Arthrodesmus octocornis (Ehrenberg)	98	10.73	-	-	-	-	72	3.45	62	5.27	28	8.21	-	-	44	5.91	-	-
Coelastrum cambricum Arch.	-	-	-	-	-	-	-	-	3	0.26	-	-	-	-	-	-	-	-
Coelastrum chodati Ducell	-	-	3	1.08	-	-	28	1.34	-	-	-	-	-	-	-	-	-	-
Denticula thermalis	-	-	-	-	-	-	-	-	7	0.59	-	-	-	-	-	-	-	-
Fragilaria capucina Desmazieres	-	-	-	-	-	-	8	0.38	-	-	-	-	-	-	14	1.88	12	6.35
Melosira ambigua (Grun.) Mull	-	-	-	-	-	-	12	0.57	-	-	-	-	-	-	-	-	-	-
Mougeotia lactivirens (A. Braun) Wittrock	-	-	3	1.08	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Navicula radiosa Kutz.	-	-	3	1.08	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oedogonium crenulocestatum Wittrock	-	-	-	-	-	-	4	0.19	-	-	3	0.88	-	-	-	-	-	-
Opophora martyi Herib.	-	-	-	-	-	-	-	-	7	0.59	-	-	-	-	-	-	-	-
Oscillatoria princeps (Vaucher)	-	-	-	-	-	-	84	4.03	43	3.65	-	-	-	-	22	2.96	-	-
Oscillatoria tenuis Agardh	17	1.86	-	-	-	-	-	-	-	-	-	-	32	2.27	-	-	24	12.70
Quadrigula clostridioides (Bohlin) Printz.	6	0.66	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenastrum gracile Reinsch.	-	-	-	-	-	-	-	-	28	2.38	-	-	-	-	-	-	-	-
Spirulina major Kützing	174	19.06	-	-	-	-	-	-	233	19.80	19	5.57	56	3.97	28	3.76	16	8.47
Synedra ulna	-	-	-	-	-	-	-	-	13	1.10	-	-	-	-	28	3.76	-	-

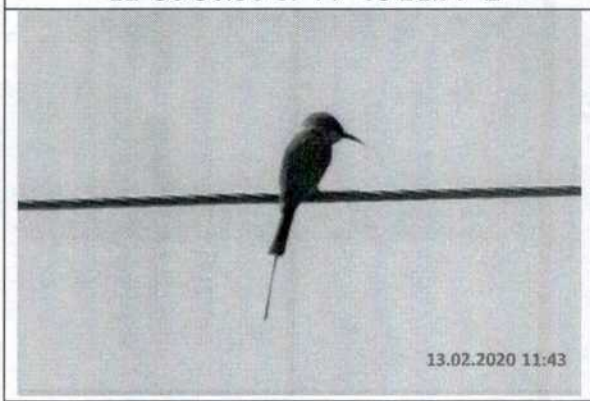
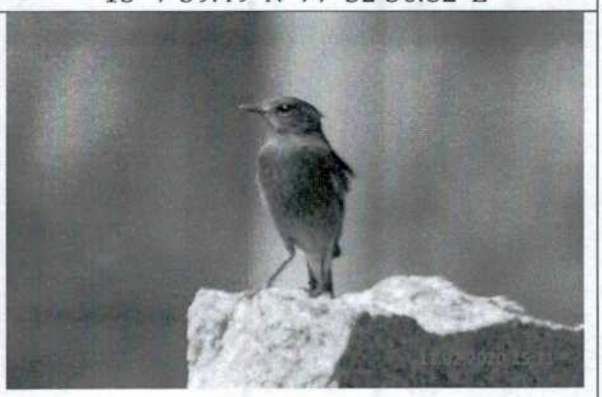
Species	Anchepalya lake		Yelhanka lake		Agrahara lake		Cheemasandra lake		Chinnaganahalli lake		Chikkabanahalli lake		Koralur lake		Chikkatogur lake		Varthur lake	
	Nos./1	%	Nos./1	%	Nos./1	%	Nos./1	%	Nos./1	%	Nos./1	%	Nos./1	%	Nos./1	%	Nos./1	%
(Nitzsch) Ehr.																		
Ulothrix zonata (Web et. Mohr.) Kutzing	19	2.00	-	-	-	-	64	3.07	38	3.23	12	3.52	-	-	8	1.08	-	-
ZOOPLANKTON	**316**	**54.61**	**247**	**89.17**	**697**	**87.56**	**1718**	**82.36**	**716**	**60.83**	**202**	**59.24**	**1258**	**89.22**	**474**	**63.71**	**68**	**35.98**
Arcella mitrata Leidy	-	-	3	1.08	-	-	9	0.43	-	-	-	-	-	-	-	-	-	-
Bosmina longirostris (O F Muller)	-	-	7	2.53	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Brachionus calyciflorus Pallas	191	20.92	86	30.05	353	44.34	652	31.26	465	39.51	167	48.97	1088	77.16	368	49.46	68	35.97
Ceriodaphnia reticulate (Jurine)	-	-	17	6.14	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cyclops	33	3.61	28	10.11	28	3.52	72	3.45	19	1.61	-	-	41	2.91	23	3.09	-	-
Cypris subglobosa Sowerby	22	2.41	21	7.58	53	6.66	72	3.45	28	2.38	-	-	11	0.78	6	0.81	-	-
Daphnia magna Straus	16	1.75	7	2.53	78	9.80	44	2.11	57	4.84	-	-	13	0.92	-	-	-	-
Diaphnosoma brachyurum (Lieven)	-	-	-	-	-	-	36	1.72	-	-	-	-	-	-	-	-	-	-
Filinia longiseta (Ehrenberg)	11	1.21	11	3.97	-	-	12	0.058	24	2.04	-	-	7	0.50	-	-	-	-
Filinia(Fadaewella) minuta Smirner	-	-	-	-	-	-	-	-	53	4.50	-	-	-	-	-	-	-	-
Keratella quadrata Ahlstrom	-	-	8	2.89	36	4.52	104	4.99	28	2.38	7	2.05	19	1.35	44	5.91	-	-
Keratella valga Ahlstrom	-	-	-	-	-	-	52	2.50	-	-	-	-	-	-	-	-	-	-
Nauplius	43	4.71	59	21.30	149	18.72	653	31.30	42	3.57	28	8.22	79	5.60	33	4.44	-	-
Simocephalus exspinosus (Loch.)	-	-	-	-	-	-	12	0.58	-	-	-	-	-	-	-	-	-	-
INSECT APPENDAGES	**-**	**-**	**-**	**-**	**7**	**0.88**	**8**	**0.38**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**7**	**3.70**
Insect appendages	-	-	-	-	7	0.88	8	0.38	-	-	-	-	-	-	-	-	7	3.70

Table 3: Checklist of littoral organisms recorded

Sl. No.	Species	Nos. recorded								
		Anchepalya lake	Yelhanka lake	Agrahara lake	Cheemasandra lake	Chinnaganahalli lake	Chikkabanahalli Lake	Koralur lake	Chikkatogur lake	Varthur lake
INSECTS										
1	*Anax* spp.	-	-	3	-	3	-	-	-	-
2	*Caenis* spp.	3	11	5	3	21	-	-	-	-
3	*Chironomous*	-	-	7	-	-	-	-	-	-
4	*Cloeon* spp.	5	7	2	-	3	2	-	-	-
5	*Culex* spp.	11	11	11	7	3	11	-	17	11
6	*Diplonychus rusticum* Fabricius	7	9	3	3	2	3	2	-	-
7	*Dytiscus limbatus* Fabricius	3	3	-	2	2	2	-	3	-
8	*Enallagma* spp.	-	-	1	2	2	-	-	-	-
9	*Hydrometra elongate* Fabricius	-	1	-	-	-	-	-	-	-
10	*Laccotrephes maculatus* Fabricius	1	-	2	-	-	-	-	-	-
11	*Laccotrephesruber* Linnaeus	-	1	-	-	2	-	-	-	-
12	*Limnometra fluviorum* Leth. & SEv.	13	21	3	-	7	5	-	-	7
13	*Micronecta merope* Dist.	11	21	7	11	-	15	-	-	-
14	*Notonecta glauca* Linnaeus	21	5	7	-	3	7	-	-	9
15	*Plea striola* Fieber	-	2	-	2	2	-	-	-	-
16	*Stratiomys* spp.	2	-	-	-	1	1	-	-	-
17	*Urothemis signata* (Rambur)	7	4	5	3	5	5	2	3	-
MOLLUSCS										
1	*Bellamya bengalensis* (Lamarck)	13	7	3	13	-	11	7	5	-
2	*Gyraulus convexiusculus*	39	7	5	-	-	-	-	9	-

Sl. No.	Species	Nos. recorded								
		Anchepalya lake	Yelhanka lake	Agrahara lake	Cheemasandra lake	Chinnaganahalli lake	Chikkabanahalli Lake	Koralur lake	Chikkatogur lake	Varthur lake
	(Button)									
3	*Lymnaea luteola* Lamarck	67	11	7	19	3	-	-	7	-
4	*Thiara* (Melanoides) *tuberculata* (Muller)	5	11	9	-	-	22	3	-	-
FISH										
1	*Gambusia affinis* (Baird & Girard)	21	21	13	15	5	77	7	15	11
2	*Oreochromis mossambica* (Peters)	11	21	11	9	11	11	-	13	5
ARTHROPODA										
1	*Macrobrachium* spp.	5	-	5	-	3	-	-	-	-

Avifaunal Diversity within the Project Alignment.

	
Indian Roller *Coracias benghalensis* Linnaeus, 1758 Near Channasandra 12°58'50.58"N 77°46'21.77"E	White-browed wagtail *Motacilla maderaspatensis* (Gmelin, 1789) Near Bileshivale 13° 3'25.55"N 77°41'27.80"E
	
Little Bee-eater *Merops pusillus* Müller, 1776 Jarakabande kaval 13° 7'39.31"N 77°32'51.22"E	Pied Bushchat (Female) *Saxicola caprata* (Linnaeus, 1766) Jarakabande kaval 13° 7'39.49"N 77°32'50.82"E
	
Little Green Bee- eater *Merops orientalis* (Latham, 1802) Jarakabande kaval 13° 7'39.60"N 77°32'51.91"E	Pied Bushchat (male) *Saxicola caprata* (Linnaeus, 1766) Near Bileshivale 13° 3'25.69"N 77°41'27.77"E

	
Jungle myna *Acridotheres fuscus* (Wagler, 1827) Near Channasandra 12°58'50.72"N 77°46'22.02"E	Spotted owlet *Athene brama* (Temminck, 1821) Near Channasandra 12°58'51.18"N 77°46'21.42"E
	
Jungle babbler *Turdoides striata (*Dumont, 1823) Near Channasandra 12°58'51.62"N 77°46'20.76"E	Indian silver bill *Euodice malabarica* (Linnaeus, 1758) Near Channasandra 12°58'49.69"N 77°46'21.34"E

Table 9: Checklist of Butterfly Recorded within the Project Alignment.

Sl. No.	Common Name	Scientific Name	Family	IUCN Conservation status, 2019	WL(P)A, 1972 Schedule	No. observed
1	Common Baronet	*Euthalia nais* (Forster, 1771)	Nymphalidae	Not Assessed	-	3
2	Blue Pansy	*Junonia orithya* (Linnaeus, 1764)	Nymphalidae	Not Assessed	-	4
3	Cabbage Butterfly	*Pieris rapae* Linnaeus, 1758	Pieridae	Not Assessed	-	1
4	Common Crow	*Euploea core* (Cramer, 1780)	Nymphalidae	Least Concern	IV	1
5	Common Emigrant	*Catopsilia pomona* Fabricius, 1775	Pieridae	Not Assessed	-	2
6	Common Grass Yellow	*Eurema hecabe* (Linnaeus, 1758)	Pieridae	Not Assessed	II	2
7	Common Jezebel	*Delias eucharis* (Drury, 1773)	Pieridae	Not Assessed	II	1
8	Crimson Rose	*Pachliopta hector* Linnaeus, 1758	Papilionidae	Least Concern	-	1
9	Grass Jewel	*Chilades trochylus* (Freyer, 1845)	Lycaenidae	Least Concern	-	1
10	Great Eggfly	*Hypolimnas bolina* (Linnaeus, 1758)	Nymphalidae	Not Assessed	-	1
11	Indian Cabbage White	*Pieris canidia* Sparrman, 1768	Pieridae	Not Assessed	-	4
12	Lemon Pansy	*Junonia lemonias* (Linnaeus, 1758)	Nymphalidae	Not Assessed	-	1
13	Plain Tiger	*Danaus chrysippus* (Linnaeus, 1758)	Nymphalidae	Not Assessed	-	2
14	Small Grass Yellow	*Eurema brigitta* Stoll, 1780	Pieridae	Least Concern	-	2
15	Tawny Coster	*Acraea terpsicore* (Linnaeus, 1758)	Nymphalidae	Not Assessed	-	2
16	White Orange Tip	*Ixias marianne* (Cramer, 1779)	Pieridae	Not Assessed	-	2
17	Yellow Orange Tip	*Ixias pyrene* (Linnaeus, 1764)	Pieridae	Not Assessed	-	1
					Total	**31**

Note: Species recorded by EHSCPL team, WL(P)A- Wildlife (Protection) Act.

Butterflie Diversity within the Project Alignment.

Common Emigrant
Catopsilia pomona Fabricius, 1775
Jarakabande kaval
13° 7'42.01"N 77°32'50.52"E

Great eggfly
Hypolimnas bolina (Linnaeus, 1758)
Jarakabande kaval
13° 7'40.67"N 77°32'50.87"E

Crimson rose
Pachliopta hector Linnaeus, 1758
Jarakabande kaval
13° 7'38.72"N 77°32'51.10"E

Common Grass yellow
Eurema hecabe (Linnaeus, 1758)
Near Channasandra
12°58'50.72"N 77°46'20.92"E

Common Baronet
Euthalia nais (Forster, 1771)
Jarakabande kaval
13° 7'38.56"N 77°32'52.31"E

Table 10: Distribution of Family Wise Birds and Butterflies within the Project Alignment

Sl. No.	Family	Birds	Butterflies
1	Accipitridae	3	-
2	Alcedinidae	1	-
3	Ardeidae	3	-
4	Charadriidae	1	-
5	Cisticolidae	1	-
6	Columbidae	1	-
7	Coraciidae	1	-
8	Corvidae	1	-
9	Cuculidae	1	-
10	Dicruridae	1	-
11	Estrildidae	1	-
12	Hirundinidae	1	-
13	Leiothrichidae	1	-
14	Lycaenidae	-	1
15	Megalaimidae	1	-
16	Meropidae	2	-
17	Motacillidae	2	-
18	Muscicapidae	1	-
19	Nectariniidae	2	-
20	Nymphalidae	-	7
21	Papilionidae	-	1
22	Pieridae	-	8
23	Psittacidae	1	-
24	Pycnonotidae	1	-
25	Strigidae	1	-
26	Sturnidae	2	-
27	Threskiornithidae	1	-
	Total	**31**	**17**

C.Study Area.

C.1. Avifauna and Butterfly species recorded in Study area

Table 11: Checklist of Birds recorded at Study area

Sl. No.	Common Name	Scientific Name	Family	IUCN Conservation Status, 2019	WL(P)A, 1972 Schedule	Migratory Status	No. observed
1	Ashy Prinia	*Prinia socialis* (Sykes, 1832)	Cisticolidae	Least Concern	IV	R	2
2	Asian Koel	*Eudynamys scolopaceus* (Linnaeus, 1758)	Cuculidae	Least Concern	IV	R	1
3	Asian open billed stork	*Anastomus oscitans* (Boddaert, 1783)	Ciconiidae	Least Concern	IV	R	1
4	Barn Swallow	*Hirundo rustica* (Linnaeus, 1758)	Hirundinidae	Least Concern	-	RM	388
5	Black Drongo	*Dicrurus macrocercus* (Vieillot, 1817)	Dicruridae	Least Concern	IV	R	11
6	Black Kite	*Milvus migrans* (Boddaert, 1783)	Accipitridae	Least Concern	I	R	47
7	Black-headed Ibis	*Threskiornis melanocephalus* (Latham, 1790)	Threskiornithidae	Near Threatened	IV	R	139
8	Black-hooded Oriole	*Oriolus xanthornus* (Linnaeus, 1758)	Oriolidae	Least Concern	-	R	1
9	Black-Shouldered Kite	*Elanus caeruleus* (Desfontaines, 1789)	Accipitridae	Least Concern	I	R	1
10	Black-winged Stilt	*Himantopus himantopus* (Linnaeus, 1758)	Recurvirostridae	Least Concern	IV	R	20
11	Brahminy Kite	*Haliastur indus* (Boddaert, 1783)	Accipitridae	Least Concern	I	R	11
12	Bronze Winged Jacana	*Metopidius indicus* (Latham, 1790)	Jacanidae	Least Concern	IV	R	30
13	Cattle Egret	*Bubulcus ibis* (Linnaeus, 1758)	Ardeidae	Least Concern	IV	R	176
14	Common Coot	*Fulica atra* (Linnaeus, 1758)	Rallidae	Least Concern	IV	RM	18
15	Common Myna	*Acridotheres tristis* (Linnaeus, 1766)	Sturnidae	Least Concern	IV	R	30
16	Common sandpiper	*Actitis hypoleucos* (Linnaeus, 1758)	Scolopacidae	Least Concern	IV	R	1
17	Glossy Ibis	*Plegadis falcinellus* (Linnaeus, 1766)	Threskiornithidae	Least Concern	IV	RM	1
18	Great Cormorant	*Phalacrocorax carbo* (Linnaeus, 1758)	Phalacrocoracidae	Least Concern	IV	R	128
19	Great White Pelican	*Pelecanus onocrotalus* (Linnaeus, 1758)	Pelecanidae	Least Concern	IV	RM	35
20	Greater Coucal	*Centropus sinensis* (Stephens, 1815)	Cuculidae	Least Concern	IV	R	2
21	Green Barbet	*Megalaima zeylanica* (Gmelin, 1788)	Megalaimidae	Least Concern	IV	R	2
22	Grey Heron	*Ardea cinerea* (Linnaeus, 1758)	Ardeidae	Least Concern	IV	R	19
23	Hoopoe	*Upupa epops* (Linnaeus, 1758)	Upupidae	Least Concern	-	R	1
24	House Crow	*Corvus splendens* (Vieillot, 1817)	Corvidae	Least Concern	V	R	13