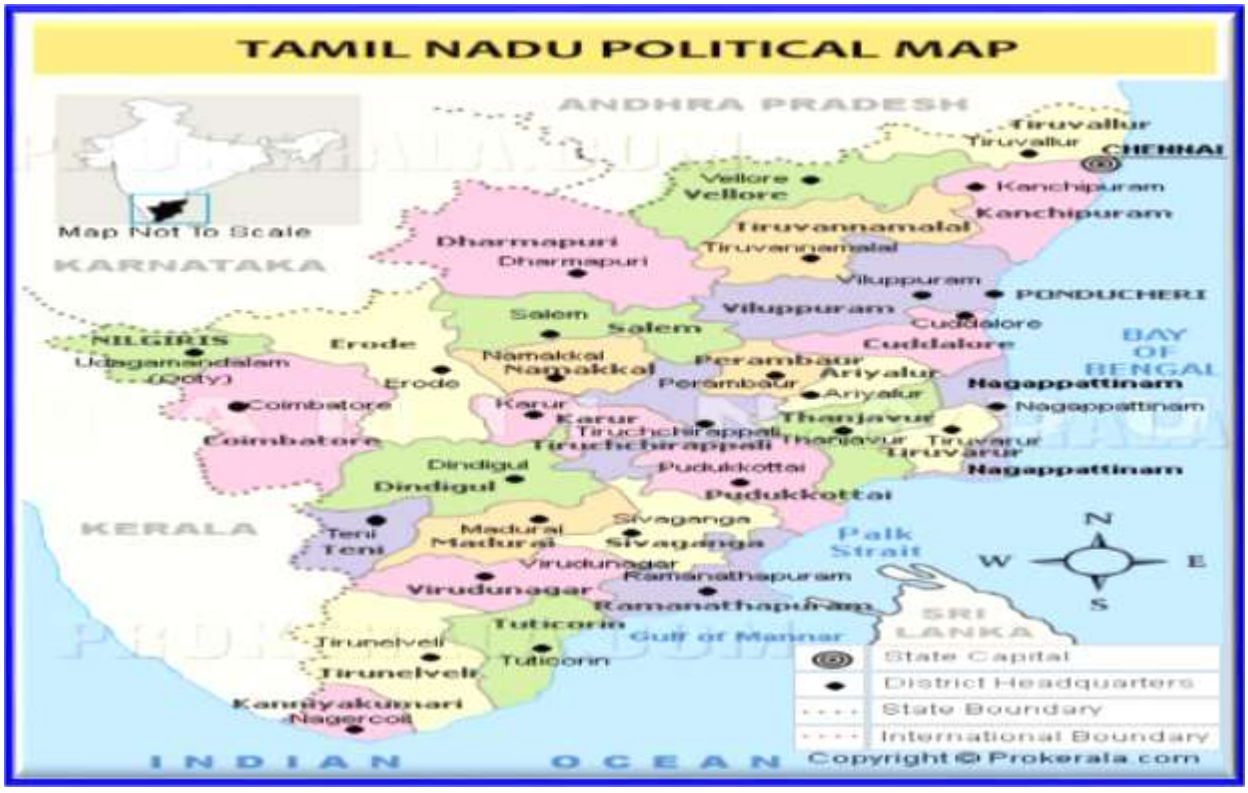
Environmental Monitoring Report (EMoP) Safeguard Policies for Environment

With

Environmental Checklist, Management and Monitoring Plan

"Environment Compliance" (EC) and MoEF & CC Policy Guidelines' for NHAI – Viluppuram – Puducherry Section of NH – 45A (New NH – 332), in the State of Tamil Nadu UT on HAM



NHAI: National Highway Authority of India,

May and June 2023

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ABBREVIATIONS AND ACRONYMS

AADT	Annual Average Daily Traffic	**MOEF**	Ministry of Environment and Forests
AC	Asphaltic Concrete	**MORT & H**	Ministry of Road Transport & Highways
ADT	Average Daily Traffic	**BRO**	Border Road Organisation
BBD	Benkelman Beam Deflection	**MSA**	Million Standard Axles
BC	Bituminous Concrete	**MSL**	Mean Sea Level
BM	Bituminous Macadam	**NH**	National Highway
BOQ	Bill of Quantities	**NMT**	Non – Motorized Traffic
BOT	Build Operate Transfer	**NPV**	Net Present Value
BSNL	Bharat Sanchar Nigam Limited	**NSDP**	Net State Domestic Product
BT	Bituminous Track	**NTPC**	National Thermal Power Corporation
CBR	California Bearing Ratio	**O&M**	Operation & Maintenance
CD	Cross Drainage	**O – D**	Origin Destination
CGWB	Central Ground Water Board	**OFC**	Optical Fiber Cable
CMSA	Cumulative Million Standard Axles	**OMC**	Optimum Moisture Content
COI	Corridor of Impact	**PCC**	Plain Cement Concrete
CRRI	Central Road Research Institute (India)	**PCU**	Passenger Car Unit
CVPD	Commercial Vehicle Per Day	**PIU**	Project Implementation Unit
DBFOT	Design, Build, Finance, Operate & Transfer	**PPM**	Parts Per Million
DBM	Dense Bituminous Macadam	**PPP**	Public Private Partnership
DLC	Dry Lean Concrete	**PPR**	Preliminary Project Report
DTM	Digital Terrain Model	**PQ**	Pre – Qualification
EA	Environmental Assessment	**PQC**	Pavement Quality Control
EASL	Equivalent Standard Axle Load	**PWD**	Public Works Department
EIA	Environment Impact Assessment	**QAP**	Quality Assurance Plan
EIRR	Economic Internal Rate of Return	**QC**	Quality Control
FFR	Final Feasibility Report	**R&R**	Resettlement and Rehabilitation
FIRR	Financial Internal Rate of Return	**RAP**	Resettlement Action Plans
GAD	General Arrangement Drawing	**RCC**	Reinforced Cement Concrete
GDP	Gross Domestic Product	**RHS**	Right Hand Side
GOI	Government of India	**RL**	Reduced Level
GPS	Global Positioning System	**ROB/ RUB**	Road Over Bridge/ Road Under Bridge
GSB	Granular Sub – Base	**ROW**	Right of Way
GTS	Geodetic Triangulation Survey	**Rs.**	Rupees
Ha	Hectare	**SH**	State Highway
HDM – 4	Highway Design & Maintenance Model (Series – 4)	**SIA**	Social Impact Assessment
HDMQ	Highway Design and Maintenance Model with Congestion Analysis	**Sq. Km.**	Square Kilometers
HFL	High Flood Level	**TBM**	Temporary Bench Mark
IRC	Indian Road Congress	**Temp**	Temperature
IRR	Internal Rate of Return	**TOR**	Terms of Reference
Km	Kilometre	**TRL**	Transportation Research Laboratory
KMPH	Kilometre Per Hour	**UG**	Under Ground
LA	Land Acquisition	**VDF**	Vehicles Damage Factor
LT/ HT	Low Tension/ High Tension Electric Lines	**Veh.**	Vehicles
m	Meters	**VGF**	Viability Gap Funding
MDR	Major District Road	**WB**	World Bank
mm	Millimetre	**WBM**	Water Bound Macadam
Dia.	Diameters	**WMM**	Wet Mix Macadam
EPC	Engineering, Procurement, and Construction	**PPE**	Personal Protective Equipment
PPR	Peste – des Petits Ruminants	**GAD**	General Administration Department
LMI	Labour Market Information	**MSE**	Mean Squared Error
SARA	Saturates, Aromatics, Resins and Asphaltenes	**ACZ**	Agro – Climatic Zone
PET	Poly – Ethylene Tere – phthalate	**SEDP**	Sustainable Environmental Development
FRC	Fibre Reinforced Concrete	**PCM**	Public Consultation Method
PCM	Public Consultation Meeting	**FGD**	Focus Group Discussion
UTC	Universal Time Coordinated	**GPS**	Global Positioning System
DEM	Digital Elevation Model	**DTM**	Digital Terrain Model
FCW	Flush Cause Way	**CRRI**	Central Road Research Institute
CVPD	Commercial Vehicles Per Day	**ATTC**	Advanced Technical Training Centre
CCCT	Centre for Computers and Communication	**CRPF**	Central Reserve Police Force
NWL	Normal Water Level	**TAR**	Tibet Autonomous Region
CCP	CIVIL CONSTRUCTION PRACTICES	**NSSDA**	National Standard for Spatial Data Accuracy
GSD	Ground Sample Distance	**DGPS**	Differential Global Positioning System
NRSC	National Remote Sensing Centre	**GIS**	Geographical Information System
DEM	Digital Elevation Model	**RL**	Reduced Level
NHAI	National Highway Authority of India	**CPWD**	Central Public Works Department

This is a Draft Report on **"Louis Berger Pattern"** for **Environmental and Social Management Framework (ESMF)** for the proposed **Enhancing Land, Air, Water, Noise and Road Construction Resource Efficiency (ELAWNRCRE)** Project with financial assistance from the **BRO/ NHAI/ ITBP/ CPWD/ PWD/ MPRDC/ MSRDC/ ADB/ NDB OR World Bank** etc. This is hereby disclosed with a view to soliciting comments/ suggestions on or before **December 2019**. In this regard, please send your comments/ suggestions by email to hg234276@gmail.com; h.g@rediffmail.com or by WhatsApp Number 09329213257 to ***Dr. Harish Kumar Gupta, Environment Expert, L. N. M. Infra Projects Pvt. Ltd., Bhopal (M.P.).***

"I am not interested in building a bridge just because someone says one is needed. I want to know if it is needed, and why, and where is the best place to put it. I want to know how the building of that bridge will change the lives of the people who use it."

Dr. Louis Berger | Founder

CHAPTER – 2: "Environment Compliance" (EC) and MoEF & CC Policy Guidelines' for NHAI – Vilupuram – Puducherry Section of NH – 45A (New NH – 332), in the State of Tamil Nadu UT on HAM.

1. "Environment Compliance" (EC) and MoEF & CC Policy Guidelines' Files Must be Containing Six Monthly Compliance Reports.

The following Environment Compliance files must have any six monthly self – compliance reports to the terms and conditions specified in the **"Environment Compliance" (EC),** which are required to be furnished to Regional Office, MOEF & CC, Chennai Regularly:

(I) **"Coastal Regulation Zone" (CRZ)** Clearance for four laning of Villupuram (00.000 Km) to Poondiyankuppam (67.000 Km) @ Villupuram and Cuddalore Districts of Tamilnadu and Puducherry District of Puducherry UT of NH – 45A in the States of Tamilnadu and UT Puducherry. Some of the important conditions of the CRZ Clearance are as follows:

1. *As per specific conditions, for every tree felled, ten trees shall be replanted and it was to be ensured that the survival rate was 85%.*
2. *As per special conditions, the Flow of natural tidal water to the mangroves, if any should remain unaffected, and thus adequate measures to be provided to maintain uninterrupted tidal water to mangroves,*
3. *As per general conditions,* ***"Consent To Establish" (CTE)*** *and* ***"Consent To Operate" (CTO)*** *shall be obtained from the* ***"State Pollution Control Board" (SPCB)****.*
4. *As per general conditions, newspaper advertisement should be released in two newspapers, that the project has been accorded Environment/ CRZ/ Non – CRZ Clearances.*
5. *Placement of hot – mix plants, quarrying and crushers, batch mixing plants, and discharge of sewage from construction camps requires* ***"No Objection Certificate" (Consent to Establish and Consent to Operate)*** *from* ***"State Pollution Control Board" (SPCB)*** *prior to establishment.*
6. ***"Consent To Operate" (CTO)*** *and* ***"Consent To Establish" (CTE)*** *the crusher unit should be obtained from the* ***"State Pollution Control Board" (SPCB)*** *under the* ***Air (Prevention and Control of Pollution) Act, 1981*** *before starting the operation.*

Table 1: Package Roads' Status of Check List for Environment, Health & Safety Management Measures of Highway Projects' Submitted to NHAI (PIU) as per Assignment Impression.

Check List for Environment, Health & Safety Management Measures A. Checklist for Environmental issues at Construction Establishments			
1. Checklist for Labour Camp Site Selection and Management			
Sr. No.	**Description**	**Status (YES/ NO)**	**Remarks** **Adequate at the Time of Inspection** **Needs Improvement** **Needs Immediate Attention**
(a)	***Arrangements with the land owner including the restoration aspects.***	***YES***	*Arrangements are done with the land owner including the restoration aspects.*
(b)	***Site layout plan of the labour camp.***	***YES***	*It is already being incorporated as per the requirement.*
(c)	***Establishment and maintenance of demarcated and levelled different areas within the camp as per the approved layout plan.***	***YES***	*Approved layout plan with establishment and maintenance of demarcation and also leveled different areas within the campsite.*
(d)	***Number of trees (to be) removed, if any, along with compensation measures.***	***YES***	*Trees are Not Removed.*
(e)	***Proposed top soil management.***	***YES***	*Distributed to formers for their Agricultural land purpose.*
(f)	***Site drainage provisions.***	***YES***	*Provided for all site locations.*
(g)	***Copy of the consents to establish and operate and conditions laid down there in the consent/ clearance/ licenses and plans.***	***YES***	*Consents to establish and operate conditions are laid down in the consent/ clearance/ licenses and plans etc.*
(h)	***Access road condition and proposed maintenance.***	***YES***	*Road conditions are accessible and well – sustained intendance and civil work.*
(i)	***Safety provision such as fire protection equipment and other labour camp facilities onsite.***	***YES***	*Installed all types of fire protection equipment along with other labour camp facilities are available onsite.*

(j)	***Sanitation and health facilities.***	***YES***	*Well – maintained both sanitation and health facilities on the projected site camp.*
(k)	***Staff strength and details such as Concessionaire staff v/s sub – contractors, women labour, migrant v/s local labour and skilled & unskilled labour.***	***YES***	*Very good staff strength such as Concessionaire staff v/s sub – contractors women labours, migrants along with skilled and unskilled labour.*
(l)	***Closure/ completion plan.***	***YES***	*Detailed completion/ closure plan is also incorporated for projects' work.*
2. Checklist for Borrow Area Management			
(a)	***Environmental Clearance from MoEF & CC/ SEIAA/ DEIAA for opening of new borrow area.***	***NO***	*No Environmental Clearance (EC) is required from MoEF & CC/ SEIAA/ SEAC/ DEIAA for opening of new borrow area. According to Dalmia, the ministry in 2013 had constituted an expert committee under the chairmanship of Director, NEERI, which had recommended that activities for excavation/ borrowing of* ***"Ordinary Earth"*** *of more than 5 hectare should be treated as* ***"Category – B1"*** *projects which entail a detailed EIA study, public hearing, etc. and those less than 5 ha to be treated as* ***"Category – B2"*** *projects subject to 11 safeguards including no blasting, maximum depth of 2 m, restoration the of area, after mining, compliance with dust emission norms, etc.* ***Annexure – IV:*** *https://www.financialexpress.com/industry/development-will-come-to-standstill-environment-clearance-not-needed-for-mining-of-ordinary-earth-says-supreme-court/2037973/*
(b)	***Consent of concerned Gram Sabha to be obtained.***	***NO***	*Gram Sabha consent of concerned is mostly not required as compulsory document.* ***Borrow Areas near Settlements:*** *Borrow pit location shall be located at least 0.8 Km from Villages and Settlements. If unavoidable, they should not be dug for more than 30 cm and should be drained. As far as possible borrow area selected for enhancement shall be on government/ community land in the vicinity of settlement.*
(c)	***Name of the land owner, arrangement with the owner including restoration aspect.***	***YES***	*Submitted in format as per Schedule – W.*
(d)	***Area (length and width in meters) involved, proposed depth of excavation in meters, quantity to be excavated in Cum and type of material proposed to be taken.***	***YES***	*Submitted in format as per Schedule – W.*
(e)	***Land use (before opening) of borrow area and area surrounding the proposed borrow area.***	***YES***	*Submitted in format as per Schedule – W.*
(f)	***A map/ drawing showing the dimension of the borrow areas, access roads and features of surrounding area.***	***YES***	*Submitted in format as per Schedule – W.*
(g)	***Number of trees to be removed, if any along with the compensation measure.***	***YES***	*Trees are Not Removed.*
(h)	***Soil management if required.***	***YES***	*For civil construction work soil management is most significant and valuable part like soil porosity, reliability testing etc.*
(i)	***Access road condition and proposed maintenance.***	***YES***	*Initial access road condition: was not good: and final access road condition is now good and well maintained.*
(j)	***Details of top soil quantity excavated in Cum & Where it was used L – 11.***	***YES***	*Distributed to formers for their Agricultural land purpose.*
(k)	***Closure/ Completion Plan:*** ***Initial access road condition and final access road condition.***	***YES***	*Initial access road condition: was not good: and final access road condition are now good and well maintained.*
3. Checklist for Disposal Site Management			
(a)	***Concessionaire's debris disposal plan with design drawings approved by the Environmental Engineer for each identified area.***	***NO***	*To be identified. Bituminous waste produced is used for diversions and access road.*
(b)	***Name of the land owner, arrangement with the owner including restoration aspects.***	***NO***	-------
(c)	***Location of the disposal site, existing land use and area covered (Sq. M.).***	***NO***	-------
(d)	***Whether the community is agreeable to siting of dumping site (Y/N).***	***NO***	-------
(e)	***Written permission from Village Panchayath/ Local community.***	***NO***	-------
(f)	***Proposed future use of the site.***	***NO***	-------
(g)	***Whether existing canal and drains within and adjacent to the site are safe and free from any debris.***	***NO***	-------

(h)	***Effective water sprays during the delivery and handling of materials when dust is likely to be created and dampen stored materials during dry and windy weather.***	***NO***	-------
(i)	***For materials having the potential to produce dust shall not be loaded to a level higher than the side and tail boards and shall be covered with a tarpaulin during transportation.***	***NO***	-------
(j)	***Obstruction to natural watercourses, destruction to agricultural land and crops and soil erosion if any.***	***NO***	-------
4. Checklist for Quarry Site Management			
(a)	***Prior consent of the IE to establish a new quarry exclusively for the project (If lead from existing quarries is uneconomical and alternative material sources are not available).***	***YES***	***"Independent Engineer" (IE)*** *has established a new quarry exclusively/ entirely for all projects e.g., such as roads 1A; 1B, and 1 00C etc.*
(b)	***The construction schedule and operation plans containing a detailed work plan for procuring materials, transportation and storage of quarry materials.***	***YES***	*Construction schedule and operation plans are completed for procuring materials, transportation and storage of quarry/ target materials.*
(c)	***Environmental clearances/ consents and other permits (CFE & CFO) for the existing/ new quarries being used for the project.***	***YES***	*All types of clearance permits are being used for the project e.g., like roads 1A; 1B and 1C etc.*
(d)	***Adequate steps to control and check natural drainage flow, soil erosion, debris flow etc. at quarry site.***	***YES***	*Satisfactory/ accessible steps are taken to fulfill control and check natural drainage flow, soil erosion, debris flow etc. at quarry site.*
(e)	***Safety measures during quarry operation.***	***YES***	*Agreeable safety measures have been done during quarry operation.*
(f)	***Mining operations with respect to provisions of various Acts and Rules in force.***	***YES***	*Acts and Rules are applied for mining as well as other kind of operations in civil construction work.*
(g)	***Design for redevelopment of exhaust quarry site.***	***YES***	*Renovation/ Redevelopment of exhaust designing is being finished at quarry site.*
5. Checklist for Crusher Establishments			
(a)	***Location of crusher units with respect to the "Safe Zones" as per the recent direction by Supreme Court.***	***YES***	
(b)	***Registration certificates from the Department of Mines and Geology and Department of Industries.***	***YES***	*Received and attached registered certificates from Mines, Geology Department including Environment and Forest Departments.*
(c)	***Environmental clearances/ consents and other permits (CFE & CFO) for the existing/ new quarries being used for the project.***	***YES***	*All categories of clearance licenses/ documents/ procedures are being compiled and completed for the projects e.g., like roads 1A; 1B and 1C etc.*
(d)	***Pollution abatement measures to control emission of suspended particulate matters into the air.***	***YES***	*Pollution abatement measures as well as techniques, methods and, approaches, are followed to control the emission of* ***"Suspended Particulate Matters" (SPM), PM_{10},, CO_2, CO, SO_2, NO_X, VOC, HC, Pb, Hg (Mercury), Zinc, Fluorides*** *etc. into the air.*
(e)	***Provision of Personnel Protective Equipment's (PPE) for the Workers.***	***YES***	***"Provision of Personnel Protective" (PPP)*** *Equipment's for all workers including COVID – 19 Test arrangement setup has been amended on the* ***"Site or Camp's Clinic"****.*
6. Checklist for Hot Mix Plant Management			
(a)	***Distance of hot mix plants from human settlements (shall be at least 500 m) and whether located on leeward side of most dominant wind direction with respect to human establishments.***	***YES***	*Applied and followed the distance of hot mix plants from human settlements and it shall be at least 500 m constantly for all locations or sites.*
(b)	***Consent/ permits to establish and operate obtained from State Pollution Control Board and implementation/ compliance of all permit conditions L – 12.***	***YES***	*Compliance Or implementation of all permits has been obtained from* ***"State Pollution Control Board" (SPCB)*** *as consent to establish and operate.*
(c)	***The hot mix plants shall be set up on barren/ waste lands and conversion of agricultural/ cultivable lands for this purpose shall not be allowed under any circumstances.***	***YES***	*Hot mix plants set up shall be installed on barren/ waste lands is fully applicable and followed for all projects e.g., like roads 1A; 1B and 1C etc.*
(d)	***Provision of paved surfaces at all operational areas like storage, handling, loading, unloading areas and provisions for separate storm water collection system with facility for separation of oil/ lubricants prior to discharge.***	***YES***	*There is a provision for separate prior to discharge system at all operational areas as storm water collection system with facility for separation of oil/ lubricants (oil, grease and toxic/ poisonous/ contaminated slippery chemicals).*
(e)	***Provision of adequate water supply to hot mix pants.***	***YES***	*There are batter and sufficient arrangements for water supply to hot mix pants.*
(f)	***Provisions made for control of dust and air pollutants.***	***YES***	*There are good engagements/ preparations for control of dust and air pollutants as well.*

(g)	***Hot mix plant restoration plan after completion of construction works, to restore to its previous state by undertaking cleanup operations.***	***YES***	*Restoration plan is also applied for hot mix plant by undertaking cleanup operations after completion of construction work.*
(h)	***Provisions for mitigation of noise pollution conforming to regulatory limits of State Pollution Control Board.***	***YES***	*Definitely there are mitigation measures for noise pollution compatible to regulatory limits of* ***"State Pollution Control Board" (SPCB).***
7. Checklist for Equipments/ Vehicles Deployed for Construction Works			
(a)	***Regular maintenance of all diesel run equipments/ vehicles deployed for construction activities for smooth operation and contribution to reduction in air quality and noise.***	***YES***	*Regularly maintaining diesel run equipments/ vehicles deployed for smooth operation and contribution to reduction in air, water, and soil and noise quality for construction activities of all projects (1A; 1B and 1C).*
(b)	***Valid periodical Pollution Under Control certificates for vehicles/ equipments being used in the construction activities.***	***YES***	*Equipments/ vehicles positioned or being used in the construction activities having Valid* ***"Pollution Under Control" (PUC)*** *certificates.*
(c)	***Spill proofing of all vehicles deployed for material movement.***	***YES***	*There is also well maintained spill proofing for all vehicles deployed for material movement at projected site and camp (1A; 1B and 1C).*

Table 2: Checklist for Safety Aspects during Project Implementation Safety during Civil Construction Work (Highway Roads).

Sr. No.	Description	Status (YES/ NO)	Remarks Adequate at the Time of Inspection Needs Improvement Needs Immediate Attention
(a)	***Appointment of qualified safety officers/ in – charge as per qualification criteria.***	***NO***	*To be Deployed. (IE instructed to deploy a qualified Safety Officer immediately).*
(b)	***Compliance with IRC Specifications, and procedures.***	***NO***	-------
(c)	***Preparation of Traffic Control Plans:*** ***(i) Provision of Temporary Traffic Barriers/ Barricades;*** ***(ii) Provision of suitable signboards;*** ***(iii) Provision for flags and warning lights;*** ***(iv) Demarcations (fencing, guarding, and watching) at construction sites;*** ***(v) Provision for sufficient lighting especially for nighttime work L – 13.***	***YES***	***(i)*** *Assimilated and Adapted Well Planned Approaches for Traffic Barriers and Barricades;* ***(ii)*** *Sign boards are mounted at the campsite;* ***(iii)*** *Flags and warning lights' systems, and reflectors as used indoors are well linked or connected;* ***(iv)*** *Fencing, guarding, and watching are also more secure or sheltered at construction sites;* ***(v)*** *Appropriate lighting exclusively for nighttime civil construction work at the site location.*
(d)	***Planning and implementation of approved Traffic Control Plans.***	***YES***	***"Approved Traffic Control Plans" (ATCP)*** *are executed with a strategical and tactic approach system on the site.*
(e)	***Arrangements for controlled access and entry to Construction Zones.***	***YES***	*Controlled access and entry preparations are accomplished to Construction Zones/ Regions/ Locations.*
(f)	***Safety arrangements for Road users/ Pedestrians.***	***YES***	*Road users' and Pedestrians' measures have been integrated for safety purposes on construction sites/ locations.*
(g)	***Arrangements for detouring traffic to alternate facilities.***	***YES***	*Detouring traffic to alternate facilities is arranged cooperatively the on construction site.*
(h)	***Regular Inspection of Work Zone Traffic Control Devices by Authorized Concessionaire Personnel:*** ***(i) Construction Workers Safety – Provision of personnel protective gears;*** ***(ii) Helmets;*** ***(iii) Safety Shoe;*** ***(iv) Ear Plugs;*** ***(v) Nose Masks;*** ***(vi) Hand Gloves;*** ***(vii) Protective Goggles;*** ***(viii) Safety Belts;*** ***(ix) Reflective Jackets;***	***YES***	*(i) Provided to all workers at a construction site;* *(ii) Provided to all workers at construction site;* *(iii) Delivered to all workers at construction site;* *(iv) Supplied to all workers at construction site;* *(v) Provided to all workers at construction site;* *(vi) Delivered to all workers at construction site;* *(vii) Intended to all workers at construction site;* *(viii) Prearranged to all workers at site;* *(ix) Systematized to all workers at construction site;*

	(x) Gum Boots.		*(x) Arranged to all workers at construction site.*
(i)	***Training/ Certification programs for workers and personnel in charge of Safety.***	***YES***	*Organized Training and Certification programs for workers and Safety personnel in charge at construction site/ zone;*
(j)	***Training on safe use of safety and construction equipment.***	***YES***	*Conducted the Training Program platform on safe use of safety and construction equipment.*
(k)	***Regular Road Safety Auditing.***	***YES***	*Accompanied Regular Road Safety Auditing policy to all workers at construction site/ location.*
(l)	***Compliance with existing Safety standards and guidelines.***	***YES***	*Safety standards and guidelines are applied or well followed with existing compliance.*
(m)	***Compliance to all Labour laws applicable to Concessionaire's personnel.***	***YES***	*Concessionaire's personnel compliance laws pertinent to all Labour and Workers on camp site too.*
(n)	***Routine preventive/ healthcare measures for Concessionaire's personnel.***	***YES***	*Concessionaire's personnel routine preventive and healthcare measures applicable to all Labour and Workers on Projected Camp Site.*
(o)	***Facilities for any emergency situation like fire, explosion, etc.***	***YES***	*For any emergency situation like fire, explosion, blasting, eruption and detonation etc. facilities are provided in advance for all construction sites e.g., like roads 1A; 1B and 1C etc.*
(p)	***Occupational safety procedures/ practices at Quarries, Crushing Units, Batching Plants and Construction Camps.***	***YES***	*Certainly occupational safety procedures and practices at Quarries, Crushing Units, Batching Plants and Construction Camps are maintained frequently and appropriately.*
(q)	***Traffic Safety Management.***	***YES***	*Rules and regulations are applied for the **"Traffic Safety Management" (TSM)** system as per the **Slandered Government Norms and ADB/ DBL/ CPCB/ KSPCB, Guidelines** etc.*
(r)	***Regular inspection of safety arrangements.***	***YES***	*Inspection of safety arrangements work has been accumulated on regular basis for construction zones.*
(s)	***Provision for insurance coverage to the Concessionaire's personnel.***	***YES***	*Concessionaire's personnel endowment policy plan for insurance coverage applicable/ effective to all Labour and Workers on anticipated campground.*

Table 3: Statutory Clearances required for the Project Road before Construction Work Clearances required to be Obtained by the Contractor Officially and Lawfully.

Sr. No.	Clearance Type		Detailed Description	Authority Name		Detailed Description	Required Statute		Detailed Description
(a)	**Type of Clearance;**	**:**	*Project Types Falls under Categories "A" and "B" (B1 & B2).*	**Name of the Authority;**	**:**	*SEAC/ DEIAA/ SEIAA/ MoEF CC (as applicable).*	**When Required;**	**:**	*During Construction of Road Network on Site.*
(b)	**Tree Felling Permission;**	**:**	*YES: Consent of Tree Cutting is Required.*	**Department of Forest, GoT;**	**:**	*Ministry of Environment, Forest and Climate Change.*	**Before Construction;**	**:**	*YES: Agreement/ Approval Required.*
(c)	**Construction Activity and Type of Clearance Required;**	**:**	*Roads/ Highways Construction and Environmental Clearance (EC).*	**Statutory Authority;**	**:**	*SEAC/ DEIAA SEIAA/ MoEF CC under Ministry of Environment and Forest.*	**Statute Under Which Clearance is Required;**	**:**	*Prior Official Order of Environmental Clearance Procedure under NABL/ NABET Lab Accreditation.*

Table 4: Pollution Prevention and Control Acts required for the Project Road before Construction Work Clearances required to be Obtained by the Contractor Officially and Lawfully.

Sr. No.	Activity and Type	Name of the Authority	Pollution Prevention and Control Acts
(1)	***Consent for Establishment of Hot Mix Plant, Wet Mix Macadam (WMM) Plant, Stone Crushers and Batching Plant.***	Tamil Nadu Pollution Control Board (TPCB) தமிழ்நாடு மாசு கட்டுப்பாடு வாரியம்.	*Air (Prevention and Control of Pollution) Act, 1981.* *Water (Prevention and Control of Pollution) Act, 1974.* *The Noise Pollution (Regulation and Control) Rules, 2000.*
(2)	***Consent for Operation of Hot Mix Plant, WMM Plant, Stone Crushers and Batching Plant.***		
(3)	***Permission for withdrawal of groundwater for construction.***	Central Ground Water Authority (CGWA); State Ground Water Board (SGWB).	*Environment (Protection) Act, 1986 Ground Water Rules, 2002.*
(4)	***Permission for extraction of sand from river bed.***	Department of Mines and Geology; Government of Tamil Nadu UT (GoT UT).	*Environment (Protection) Act, 1986.*
(5)	***Permission for extraction of sand from river bed.***	District Level Environment Impact Assessment Authority (DEIAA).	*Environment (Protection) Act, 1986.*

(6)	***New Quarry and its operation.***	Department of Mines and Geology, Government of Tamilnadu UT, Tamil Nadu Pollution Control Board (TPCB) தமிழ்நாடு மாசு கட்டுப்பாடு வாரியம்.	*Environment (Protection) Act, 1986.* *Karnataka Minor Mineral Concession Rules, 1994.* *The Mines Act, 1952.* *Mines and Minerals (Development And Regulation) Amendment Act, 2015.* *The Explosive Act, 1984.* *Air (Prevention and Control of Pollution) Act, 1981.* *Water (Prevention and Control of Pollution) Act, 1974.*
(7)	***Opening of New Borrow Areas/ Quarry.***	MoEF & CC/ SEIAA/ DEIAA Tamil Nadu Pollution Control Board (TPCB), District Collector.	*Environment (Protection) Act, 1986.* *Air (Prevention and Control of Pollution) Act, 1981.* *Minor Mineral and Concession Rules, 2015.*
(8)	***Location and layout of workers' camp, and equipment and storage yards.***	Tamil Nadu Pollution Control Board (TPCB) தமிழ்நாடு மாசு கட்டுப்பாடு வாரியம்.	*Environment (Protection) Act, 1986.* *Manufacturing, Storage and Import of Hazardous Chemicals Rules, 1989.*
(9)	***Discharges from labour camp.***	Tamil Nadu Pollution Control Board (TPCB).	*Water (Prevention and Control of Pollution) Act, 1974.*
(10)	***Storage, handling and transport of hazardous materials.***	Tamil Nadu Pollution Control Board (TPCB) தமிழ்நாடு மாசு கட்டுப்பாடு வாரியம்.	*Hazardous and Other Waste (Management and Transboundary Movement) Rules, 2016.* *Manufacturing, Storage and Import of Hazardous Chemicals Rules, 1989.*
(11)	***Disposal of Bituminous Wastes.***	Intimate local civic body to use Local Solid Waste Disposal (LSWD) site.	*Hazardous and Other Waste (Management and Transboundary Movement) Rules, 2016.*
(12)	***PUC Certificate for all construction vehicles and all machineries.***	Tamil Nadu Pollution Control Board (TPCB) தமிழ்நாடு மாசு கட்டுப்பாடு வாரியம்.	*The Motor Vehicle Act, 1988.* *The Motor Vehicles (Amendment) Bill, 2015.* *The Central Motor Vehicles Rules, 1989.*
(13)	***Installation of DG Set (Consent to Establish).***	Tamil Nadu Pollution Control Board (TPCB) தமிழ்நாடு மாசு கட்டுப்பாடு வாரியம்.	*Air (Prevention and Control of Pollution) Act, 1981.* *The Noise Pollution (Regulation and Control) Rules, 2000.*
(14)	***Operation of DG Set (Consent to Operate).***		
(15)	***Engagement of Labour – Labour License.***	Labour Commissioner (Ministry of Labour and Employment).	*The Building and Other Construction workers (Regulation of Employment and Conditions of Service) Act, 1996.* *Contract Labour (Regulation and Abolition) Act, 1970 along with Rules, 1971.*
(16)	***Engagement of Labour:*** ***– Social Security;*** ***– Labour Welfare;*** ***– Wages.***	Labour Commissioner (Ministry of Labour and Employment).	*The Employees' Provident Fund and Miscellaneous Provisions (Amendment) Act, 1996.* *The Personal Injuries (Compensation Insurance) Act, 1963.* *The Inter – State Migrant Workmen (Regulation of Employment and Conditions of Service) Act, 1979.* *Equal Remuneration Act, 1976.* *The Payment of Wages (Amendment) Act, 2005.* *The Minimum Wages Act, 1948.* *The Minimum Wages (Central) Rules, 1950.*

(II) Environment Clearance to 1,660 MW Ennore Supercritical Thermal Power Project (Expansion), Village Ernavur, District Ennore, Tamilnadu by M/s. Tamilnadu Generation and Distribution Corporation Ltd. (TANGEDCO). Some of the important conditions of **"Environment Compliance" (EC)** are:

1. *As per general conditions, The **"Electrostatic Precipitator" (ESP), "High Volume Sampler" (HVS), "Flue Gas Desulphurization" (FGD) System,** and NO_X control systems shall be established to meet the new emission norms of PM: 100 µg/ m³, SO_2: 100 µg/ m³ and Mercury (Hg): 0.03 µg/ Nm³. The progress of implementation of FGD and De – NO_X system shall be submitted to MoEF & CC.*

General Guidelines and Procedure for Conducting/ Accompanying Air, Water, Noise, Soil Testing, Ground Water, and Surface Water Testing/ Monitoring including Tree Cutting have to be followed by the contractor/ subcontractor/ concessionaire as depicted below:

Table 5: Environmental Management and Monitoring Plan (EMP/ EMoP).

Sr. No.	Parameters	Frequency	Remarks (if any)
1.	**Ambient Air Quality Monitoring;**	*Once in Three Months*	**-------**
2.	**Surface Water Quality Monitoring;**	*Once in Three Months*	**-------**
3.	**Ground Water Quality Monitoring;**	*Once in Six Months*	**If any sites change then the EPC has to carry out on a monthly or quarterly basis, depending on site or location specification.**
4.	**Batching Plant Effluent Treatment Plant (BPETP) Monitoring;**	*Once in Three Months*	**-------**

5.	**Sewage Treatment Plant (STP) Monitoring;**	*Once in Three Months*	-------
6.	**Soil Quality Monitoring;**	*Once in Six Months*	**If any sites change then the EPC has to carry out on a monthly or quarterly basis, depending on site or location specification.**
7.	**Ambient Noise Monitoring;**	*Once in Three Months*	-------
8.	**Solid & Construction and Demolition Waste;**	*Once in Three Months*	-------
9.	**Trees and Plantations Amenities for Highways Road Construction Network**	*Throughout of the Year Till Project Ending on Contractual Basis*	**If any sites change then the EPC has to carry out on monthly or quarterly basis, depending on site or location specification.**

After Testing as well as Monitoring Procedures' Certificates must be obtained from NABL – Accredited Laboratory as per CPCB/ SPCB/ NAAQM and as per IRC/ MOEF: Guidelines and Norms.

Table 6: Management of Solid and Construction and Demolition Waste Details by EPC (Once in Three Months).

Sr. No.	SOLID WASTE		CONSTRUCTION AND DEMOLITION WASTE	
1.	**Quantity of Waste Generated**	*13,100 Kg 0.17 to 5.7 Kg per Person/ Day (Approximately)*	**Quantity of Waste Generated**	*N/ A*
2.	**Location of Disposal**	*Km 320 + 000 within Base Camp Location but at the Edge of Boundary Wall Which is Far Away from Dwelling Units*	**Location of Disposal**	*N/ A*
3.	**Characteristics of Waste (% Degradable, % Non – Degradable)**	*100% Degradable*	**Characteristics of Waste**	*N/ A*
4.	**Technology Used for Disposal**	*Composting*	**Technology Used for Disposal**	*N/ A*

2. *The capital cost towards **"Corporate Environment Responsibility" (CER)** an amount of ₹ 13.6 Crores (0.25% of the total project cost of ₹ 5,421.38 Crores) shall be embarked on separately and implement various developmental activities in the surrounding villages. The six monthly progress reports on various welfare activities shall be submitted to the Regional Office, MoEF & CC.*
3. *The Standard EC conditions for Thermal Power Projects are to be complied with and uploaded on the MoEF & CC Website.*

(III) Environment clearance was given to the proposed expansion of the Steel Melting Plant from 19,200 TPA to 85,200 TPA of MS Billets of M/s. Arun Smelters Private Limited at SIPCOT Industrial Complex, Pappankuppam Village, Gummudipoondi Taluk, Tiruvallur District, and Tamilnadu. Some of the important conditions of **"Environment Compliance" (EC)** are:

1. *As per specific conditions, **"Consent To Operate" (CTO)** is required from TNPCB.*
2. *As per specific conditions, proper utilization of fly ash shall be ensured as per Fly Ash Notification, 1999, and subsequent amendments in 2003 and 2009. All the fly ash shall be provided to cement and brick manufacturers for further utilization and a **"Memorandum of Understanding" (MOU)** shall be submitted to the Regional Office of MoEF & CC.*
3. *As per specific conditions, a 10 m – 15 m wide green belt should be developed all along the boundary of the plant and in all 33% of the area should be developed green by planting native and broad leaf species in consultation with the **"Divisional Forest Officer" (DFO)** and Local Communities as per the CPCB guidelines. The complete plantation should be completed in 3 years.*
4. *As per specific conditions, an amount equal to 2.5% of the project cost shall be embarked towards the **"Enterprise Social Commitment" (ESC)** based on **"Public Hearing Issues" (PHI),** local needs, item – wise details along with time – a bound action plan as indicated by the project proponent shall be implemented. Action taken report in this regard shall be submitted to the Ministries of Regional Office.*

5. *As per specific conditions, at least four ambient air quality monitoring stations should be established in the plant area and air quality and stack emissions shall be regularly submitted once in six months to the Regional Office of MoEF & CC.*
6. *As per specific conditions, an advertisement in two newspapers should be given stating that **"Environment Compliance" (EC)** has been granted for the expansion of the smelter plant.*

(IV) **"Environment Compliance and Clearance" (ECC)** for Expansion of Steel Plant located at Sirupuzhalpet & New Gummidipondi Village by M/s. Suryadev Alloy and Powder Private Limited. The following are some of the important conditions of **"Environment Compliance" (EC)**:

1. *As per specific conditions, an amount of ₹ 52.50 Crores proposed towards **"Enterprise Social Commitment" (ESC)** shall be utilized as **"Capital Expenditure" (CE)** in the projected mode.*
2. *As per requirement Green Belt shall be developed in 21.90 hectares equal to 33% of the plant area with native species in accordance with CPCB guidelines. The 15 m wide green belts shall be interalia to cover the entire periphery of the plant.*
3. *The Capital cost of ₹ 40.00 Crores and annual recurring cost of ₹ 02.50 Crores towards the environment protection measures shall be provided separately. The funds provided should not be diverted for any other purpose.*
4. *As per general conditions, a 24 × 7 days continuous emission monitoring system at all stacks should be installed to monitor stack emission parameters applicable to the **"Thermal Power Plant" (TPP)**.*
5. *As per general conditions, the information about the grant of **"Environment Compliance" (EC)** for the Expansion of the Steel Plant should be advertised in two newspapers.*

(V) Coastal Regulation Zone Clearance for "Two/ Four/ Six/ Eight Laning of Mamallapuram to Mugaiyur Section of NH – 332A from 00.000 Km to 31.000 Km under Bharatmala Pariyojana, Phase – I, (Package – 1 DBL) in Kanchipuram District, Tamilnadu. Some of the important conditions of **"Coastal Regulation Zones" (CRZ)** Clearances are:

1. *As per specific conditions, a total of 637 mangroves tree will be destroyed by the proposed activity. Five times the number of mangroves destroyed or cut down during the construction process shall be replanted as compensatory mangrove afforestation in consultation with the Forest Department.*
2. *A minimum of ten times the number of trees felled (non – mangrove trees) shall be replanted.*
3. *Flow of natural tidal water to mangroves should remain unaffected and thus adequate measures to be provided/ carried out to maintain uninterrupted tidal water to mangroves.*
4. *An amount of ₹ 05.78 Crores i.e., 1% of the project cost shall be embarked under the **"Corporate Environment Responsibility" (CER)** and a Six Monthly Compliance report needs to be submitted to the Regional Office, MoEF & CC.*
5. *The project **"Environment Compliance" (EC)** for expansion should be advertised in two newspapers.*

Materials and methods required to control damage must be clearly described in the construction documents. Include an enforcement or penalty clause in the specifications. Complicated details should be illustrated on the working drawings. Prescriptions are part of the construction documents that are forwarded to the conservation commissions, construction departments, and subcontractors who will bid on part of the project. During this stage, hold a meeting with the owner, foremen, subcontractors, and others who will work on the site. Make it clear that preservation is important on this job, requiring everyone to work together.

Typical Protective Measures

(a) *Erect protective fencing around root zone prior to clearing;*
(b) *Do not change the grade around trees;*
(c) *Use pavement materials that allow air and water to pass;*
(d) *Run utilities in a single raceway or trench;*
(e) *Place irrigation on the surface (don't bury) and cover with mulch;*
(f) *Eliminate or minimize traffic in the protected areas and build boardwalks;*

(g) *Prohibit the storage of construction materials and soil in protected areas;*
(h) *Keep heavy equipment out of the protected zones;*
(i) *Control competition among plants in sensitive areas;*
(j) *Control storm water runoff.*

And a professional should be hired to perform some important **"Tree – Care Duties and Work"** before construction begins.

"Tree – Care Duties and Work":

(a) *Remove unwanted trees;*
(b) *Prune/ trim/ crop and improve saved trees;*
(c) *Reduce crown to minimize the impact on root zone reduction;*
(d) *Fertilize, water, and aerate where needed;*
(e) *Root prune/ trim/ crop outside of protected root zone;*
(f) *Mulch where and whenever needed.*

Solutions

Effective tree preservation must be integrated with the project design and land development process. Hire a certified arborist that works with residential construction projects and knows what builders are up against. A construction project is no place for an idealistic theorist. The arborist must be familiar with the roles played by members of the project team and become a central member of the team. They must understand the design concept and walk the site before any plans are drawn. The arborist will help lay out the site and communicate appropriate information at critical times during the project.

A Professional Arborist Knows:

(a) *Which trees are healthy, need pruning, or need removal;*
(b) *Which trees will survive proposed changes in the landscape;*
(c) *How to accomplish development goals, minimizing injury;*
(d) *Which trees pose a hazard due to weak root systems;*
(e) *Which trees have invasive roots that threaten pipes, utilities, and foundations;*
(f) *Which trees are pest and disease resistant;*
(g) *Which trees will provide the most aesthetic benefit;*
(h) *How to protect the trees that are valued;*
(i) *Where to plant new trees, and how and where to transplant existing trees;*
(j) *Which trees can be sold for lumber or firewood...?*

2. Strategies and Recommendations.

The State of Tamil Nadu in South India has a vast road network with 34 National Highways (NH) with a total length of 2,484 Km, 11 Expressways (including 3 National Expressways), State Highways (SH) with a total length of 1,801 Km, **"Major District Roads" (MDR)** with a length of 1,395 Km and other district roads with a length of 26,022 Km (2016). Here it is found more or less green area and less/ moderate traffic pollution, **"Air Quality Index" (AQI)** as compared to Metros and other cities. But roads currently which are under construction phase may contribute some chances of Land, Air, Water contamination in some sensitive zones like residential sites, schools, colleges, hospitals, **"ASHRAMS" (Old Age Homes)** occurred/ falls on roadside network...!!! There may be a variety of environmental applicability and necessities/ provisions during road construction network. The city has inadequate pedestrian infrastructure and there is no foot over bridges, sub – ways, pedestrian – only traffic signals at few places. In fact the city lacks in provisions for dedicated **"New Measurement Tracks" (NMT)** lanes and dedicated parking facilities for cycle rickshaws. The creation of new planning tools should aim to increase public involvement in the development of transportation and land use policies OR issues.

Develop policies that encourage concentrated mixed land use development along the public transport corridors. These share policies, principles and strategies intended to preserve and even enhance valued natural and cultural resources and facilitate **"Healthy",** sustainable communities and neighborhoods. These approaches also tend to foster a balance of mixed uses (including housing, educational, employment, recreational, retail, and service opportunities) which recognize the importance

of spatial or geographic proximity, layout, and design of those uses. In addition, the consideration of long term and broader (even global) impacts of land use decisions on our natural and human – made environment, including transportation systems and facilities, is critical to these concepts, as well. As per observation Environmental Experts/ Specialists recommends that cities should have **"New Measurement Tracks" (NMT)** on all major roads within a year. In view of above said this indicator reflects the availability of dedicated cycle track along all the arterial, sub arterial roads and public transport corridors, its encroachment and parking facilities OR amenities.

Climate change is already happening and even if we take immediate and drastic steps to reduce emissions, significant change is going to occur throughout the world. This will be a major change, but moving to a low carbon economy and transport system also presents huge opportunities; not just for climate change but for our prosperity, health, and the wider environment. Characterized by a heavy reliance on cars and trucks for both passenger and freight movement, transportation is a major consumer of fossil fuels and a big contributor to climate change. Solar Technology can also be used extensively as an alternative to regular energy production as it enables energy security through reliance on an indigenous, inexhaustible and mostly import – independent resource, enhance sustainability, reduce pollution, lower the costs of mitigating **"Stroking/ Potential/ Prospective Climate Change"** and keep **"Fossil Fuel"** prices lower in **"Vilupuram – Puducherry Section of NH – 45A (New NH – 332) Road: National Highway – 45A/ Regions"**, Tamil Nadu States. Solar lights and signals can be installed within the city to minimize the energy consumption. Working out the mobility plan, which is economically, socially, environmentally and technologically sustainable as climate resilient to achieve the goal of low carbon and inclusive transport incorporating development plans/ master plans. Choice of street furniture and other installations should consider the performance in humid climates in terms of maintenance, durability and human comfort. This will be a major change, but moving to a low carbon economy and transport system also presents huge opportunities; not just for **"Prospective Climate Change",** but for our prosperity, health and the wider environment.

Recently...!!! There are no potential threats identified, but in **"Vilupuram – Puducherry Section of NH – 45A (New NH – 332) Road: National Highway – 45A/ Regions"** higher levels of air pollution at few places due to vehicular activities. **"Vilupuram – Puducherry Section of NH – 45A (New NH – 332) Road: National Highway – 45A/ Regions"** can become economically vital/ essential and could be a hub for various services like industrial and educational institutional etc.

3. "ENVIRONMENTAL MANAGEMENT PLAN/ PROCEDURE" (EMP/ P).

The **"Environmental Management Plan/ Procedure" (EMP/ P)** establishes the criteria to identify the level of **"Environmental Impact Assessment" (EIA)** and the processes involved, their sequence to conduct the EA studies for various components/ phases of the rural as well as urban road improvements, rural road maintenance, rural waterways, growth center markets including their legal requirements and implications **{Figure 1}**. Comprehending the level of EA will help the **Vilupuram – Puducherry Section of NH – 45A (New NH – 332) Road: National Highway – 45A** (Additional Financing) in assessing the requirement of external agency in the form of consultancy services and also the stage of such requirement, like Design Consultant at planning and design stages and **"Construction Supervision Consultant" (CSC)** at construction stage etc. Once the need/ justification of a project is finalized based on the engineering parameters (like traffic, economic and financial analysis), the process of **"Environmental Management Plan/ Procedure" (EMP/ P)** starts. First step is screening of the project components to ascertain the category of **"Environmental Impact Assessment" (EIA)** required.

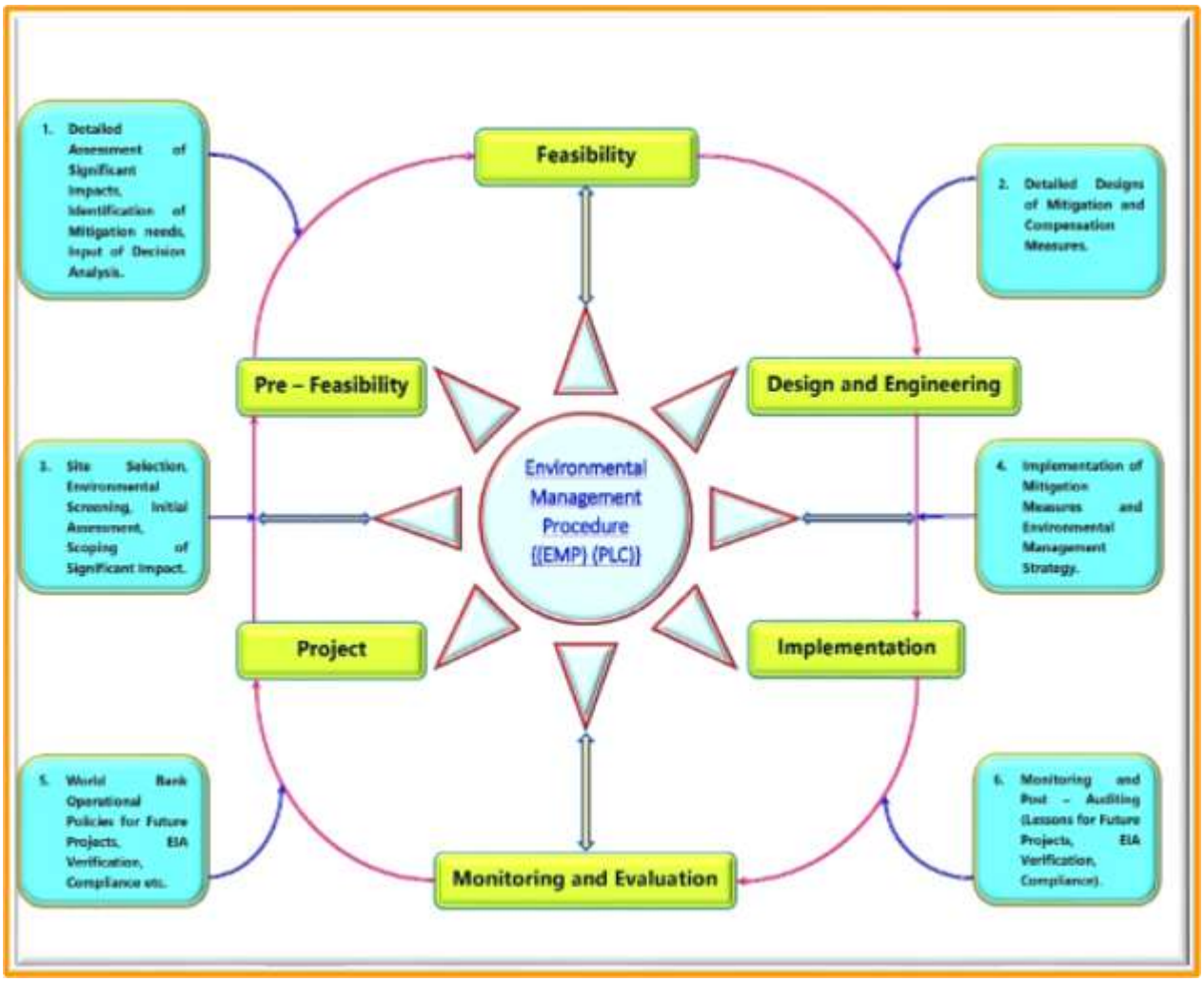


Figure 1: "Environmental Management Plan/ Procedure" (EMP/ P) Accumulated, Assembled, Designed and Implemented for "Project Life Cycle" (PLC) Assessment As Well As Evaluation Alongwith Reminiscent Instructive Methods OR Practices OR Rehearsals.

4. The Approach in Developing "Environmental Management Plan" (EMP).

The foremost documents the **"Environmental Management Plan" (EMP)** developed during the **"Environmental Impact Assessment" (EIA)** studies conducted for road construction and upgrading in the **"Vilupuram – Puducherry Section of NH – 45A (New NH – 332) Road"**. The **"Environmental Management Plan" (EMP)** plan was developed based on the baseline studies, impact assessment, and impact evaluation and complying with **"H/ PEPA" (Tamil Nadu/ Karnataka Environmental Public Authority)** guidelines and standards. This gives a framework for developing EMP and the components that should be included in the plan. ***The main components of EMP are: (i) Mitigation Program (ii) Monitoring Program (iii) Recommendations and (iv) EMP Implementation Program. The EMP should consist of cost estimates for monitoring program, equipment procurement, manpower, transportation, office cost, studies, reporting, stationeries, etc. EMP Implementation Program consists of "Environmental Supervision Plan" (ESP) which is an important instrument to ensure effective implementation of "Environmental Management Plan" (EMP). In this study the recommendations that are suggested are specific to the project and geographical conditions in the State of Rajasthan. The vital active part of EMP is EMP implementation and execution program*.**

The developed EMP addresses the environmental impacts during the design, construction and operational phases of the project. EMP outlines the key environmental management and safeguards that will be initiated by the project proponent to manage the project's key environmental concerns. **"Environmental Management Plan" (EMP)** is the mechanism to ensure that environmental considerations are integrated into the project survey and design, contract documents and project supervision and monitoring. These are tools for mitigating or offsetting the potential adverse environmental impacts resulting from various activities of the project. The EMP prepared consists mainly of mitigation measure, monitoring plan and recommendations. The recommendations that are suggested are specific to the project and geographical conditions in the State of Rajasthan. The vital section of EMP is the EMP implementation and execution program. The EMP should consist of cost estimates for monitoring program, equipment procurement, manpower, transportation, office cost, studies, reporting, stationeries, etc.

Keywords: Environmental Impact Assessment (EIA), Emergency Response Plan (ERP), Environment, Health and Safety (EHS) Programs etc.

Introduction

"The Environmental Management Plan" (EMP) is the key to ensure a safe and clean environment. The desired results from the environmental mitigation measures proposed in the project may not be obtained without a management plan to assure its proper implementation and function. The EMP envisages the plans for the proper implementation of management measures to reduce the adverse impacts arising out of the project activities.

Stage and Step Wise "Environmental Management Measures/ Plan" (EMM/ P)

The **"Environmental Management Measures/ Plan" (EMM/ P)** includes a list of all project – related activities at different stages of project (design and pre – construction stage, construction stage and operation and maintenance stage), remedial measures, reference to laws/ guidelines, monitoring indicators and performance target and a clear reporting schedule. The **"Environmental Management Measures/ Plan" (EMM/ P)** sets a time frame to all proposed mitigation and monitoring actions with specific responsibility assigned to the proponents, the contractors and the regulatory agencies to implement the project and follow – up actions defined. Stage wise management measures are tabulated below in the **Table 30**:

Table 7: Segment OR Stage and Step Wise "Environmental Management Measures/ Plan" (EMM/ P).

Project Activities	Potential Issues	Mitigation Measures	Location	Tools		Responsibility[1*]	
				MI and PT[2*]	DS and RM[3*]	Implementation	Supervision
A. Detailed Design and Pre – Construction							
A01: Finalization of ROW: **"Non – Forest Areas" (NFA)**;	Widening or geometric improvements leading to loss of agricultural land and or destruction of trees;	Limiting the ROW to construction width to avoid acquisition of excess land; Avoiding concentric widening in green tunnels so as to save trees of one side;	Entire Stretch;	**MI:** TCS and cross section schedule; **PT:** Fixing width as per site needs;	**DS:** Review of design in light of site conditions;	Design Consultant;	NHAI;
A02: Inadequate Drainage Provisions;	▪ Raised embankment and inadequate drainage facilities causes' water logging, which damage pavement and obstructs movement of people and vehicles; ▪ Natural hazards such as flooding;	▪ Provision of adequate no. of cross drainage structures; ▪ Increase (vent and height) in waterway of existing structures; ▪ Provisions of roadside drains with suitable outfalls; ▪ Drainage system including surface and subsurface drains shall be provided as per IRC Codes; ▪ All culverts have been designed for 50 years HFL return period and bridges designed for 100 year HFL return period; ▪ Embankment height to be raised along low lying/ potential water logged areas;	Entire Stretch;	**MI:** Design and number of cross and side drains, slab/ box culverts, and Hume pipes; **PT:** Design and numbers are in accordance with site needs;	**DS:** IRC: SP: 73 – 2015; (2 – Lane Manual); IRC: 37 – 2012; IRC: 58 – 2015; IRC: SP: 13 – 2004; **RM:** Design Review in light of site conditions;	Design Consultant;	NHAI;
A03: Safety Arrangement Prior to Start of Construction;	Inadequate safety arrangements in pre – construction stage results increased risk in both preconstruction and construction phase;	▪ Safety barriers shall be provided where high embankment (> 3.0 m) and deep trenches (> 1.5 m) are to be constructed; ▪ Provision of retro – reflective warning sign boards near school, hospital and religious places; ▪ Signs and marking viz., cat's eyes, delineators, object markers, hazard markers, safety barriers at hazardous locations; ▪ Horizontal and vertical geometry as per IRC – Specification;	Entire Stretch;	**MI:** Number and location of Semi – rigid type/ rigid type/ flexible type safety barriers, warning sign boards; **PT:** Numbers and location are in accordance with site needs;	**DS:** IRC - SP: 73 – 2015; IRC: SP :84 – 2014; IRC: SP: 87 – 2013; IRC: 37 – 2012; **RM:** Review of design;	Design Consultant;	NHAI;
A04: Tree Felling;	▪ Loss of trees; ▪ Loss of habitat of avifauna;	▪ Tree clearing to be restricted to construction width only; ▪ Trees to be felled shall be clearly marked;	Entire Stretch;	**MI:** Number of trees felled, expenditure of budgeted compensatory	Review final design. Check budget provision for compensatory afforestation and additional plantation;	Design Consultant (EMP Budget);	NHAI and Forest Department;

[1*] ***MI:*** *Monitoring Indicators;* ***PT:*** *Performance Target;*
[2*] ***DS:*** *Design Standards/ Reference Guidelines;* ***RM:*** *Review Mechanism;*
[3*] ***IR:*** *Institutional Responsibility;*

		▪ Obtain prior tree felling permission from **"State Forest Department" (SFD)** as per applicable rules; ▪ Stacking, transport and storage of the wood will be done as per the relevant norms. Systematic corridor level documentation for the trees to be felled and those saved will be maintained by the NHAI;	Number of affected **"Trees = 977"**;	afforestation fund and additional plantation; **PT:** Unnecessary tree felling; Utilization of fund for plantations;		Contractor (Tree felling clearance);	
A05: *(i)* Sitting of Project Infrastructure: Construction Camps;	Inappropriate location such (near settlements or eco – sensitive zones, biodiversity hotspots and human settlements) can lead to conflicts with community or potential impacts on natural habitats;	Camps to be established with prior permission from SPCB. Camps to maintain minimum distance from following: # 500 m from habitation, water bodies and traffic route; # 1,000 m from Eco – sensitive zones; # 500 m from community reserves/ conservation areas;	All Camps;	**MI:** Location of camp sites and distance from habitation, water bodies and through traffic;	**RM:** On site Observation;	Contractor;	IE and NHAI;
A05: *(ii)* Sitting of Project Infrastructure: Plant and Machinery;	Potential impact from air pollution on natural habitats and resources located in sensitive areas legally and otherwise;	▪ Batching, WMM, HMP and crushers at downwind (1 Km) direction from nearest town and 500 m from villages; ▪ Location of the plants should be based on State Pollution Control Board (SPCB) guidelines; ▪ **"Consent To Establish" (CTE)** must be obtained from **"State Pollution Control Board" (SPCB)** before setting up of plant;	All Plant Sites;	**MI:** Compliance to the conditions of CTE; **PT:** Timely obtaining of CTE;	**DS:** Provision under Air Act, 1981 and Water Act, 1974 Guideline Note 7 of EMF for RSHDP – VII; **RM:** On site observation and review of compliance to CTE;	Contractor;	IE and NHAI;
A06: Procurement of Machinery;	Potential sources of impacts on air and noise environment;	▪ Procure/ Hire machinery which complies with the Emission Standards suggested by CPCB; ▪ All diesel generators procured or hired for the project to comply with the standards prescribed by CPCB;	All Machineries;	**MI:** Emission Standards suggested by CPCB;	**DS:** Guideline Note 7 of EMF for RSHDP – VII; **RM:** Inspection of manufactures specification;	Contractor;	IE and NHAI;
A07: *(i)* Location of Quarry Sites;	Potential impacts on natural habitats and resources located in sensitive areas legally and otherwise;	▪ Only existing or new approved sites (having necessary statutory clearances) to be considered for procurement of quarry material; ▪ Crushers to obtain Consent to establish from RSPCB; ▪ Only waste land to be used for dumping of debris, no agricultural land shall be used even for temporary dumping;	All Quarries;	**MI:** Existence of licenses for all quarry areas from authorities; **PT:** Valid Quarry license; Number case of non – compliance to establish/ permit;	**DS:** IRC Guidelines on Borrow Areas; EP Act,1986; Water Act, 1974; Air Act, 1981; **RM:** Site Inspection;	Contractor;	IE and NHAI;
A07: *(ii)* Location of Borrow Areas;	Potential impacts on unstable areas or on agricultural land;	▪ Location in area with stable soil and preferably away from agricultural land; ▪ Non – productive, barren lands, upland shall be used for borrowing earth with	All Borrow Areas;	**MI:** Location in inappropriate locations; Complaints from local people;	**DS:** IRC: SP: 108: 2015 Guideline Note 2 of EMF for RSHDP – VII;	Contractor;	IE and NHAI;

		the necessary permissions/ consents; ▪ Follow IRC recommended practice for borrow area (IRC: SP: 108: 2015) for identification of location; ▪ Should be sited away from habituated areas;		**PT:** Zero complaints;	**RM:** Site Inspection;		
B. Construction							
B01: *(i)* **Site Clearance:** Clearing and Grubbing;	▪ Impact on Roadside Vegetation; ▪ Dumping of debris can affect the quality of the soil if dumped on agricultural land;	▪ No tree shall be felled without the permission of the forest department; ▪ Debris should not be placed on agricultural land even temporarily. Debris to be placed on designated disposal sites only; ▪ Debris should be used for backfilling; ▪ The root stump shall not be place on the edge of the carriageway as it would pose hazard for both the local community and the traffic;	All Stretches;	**MI:** No dumping of waste and dust control measures; **PT:** Zero violation of guidelines;	**DS:** Guidance Note 4 and 11 of EMF for RSHDP – VII; **RM:** Site Inspection;	Contractor;	IE and NHAI;
B01: *(ii)* **Site Clearance:** Dismantling of existing culverts and structures, if any;	▪ Dumping of debris on existing drainage will result flooding; ▪ Diversions of drainage channel can affect normal flow; ▪ Quality of the soil would degrade if debris dumped on agricultural land;	▪ None of the debris should be placed inside any drainage channel; ▪ Provision of diversion channels and/ or scheduling construction of culverts preferably in dry months; ▪ Debris shall be dumped only at specified dumping area;	All Culvert Locations;	**MI:** No dumping of waste in agri land and scheduling of construction; **PT:** Zero violation of guidelines;	**DS:** Guidance Note 5 and 11 of EMF for RSHDP – VII; **RM:** Site Inspection;	Contractor;	IE and NHAI;
B01: *(iii)* **Site Clearance:** Traffic Diversion;	Loss of vegetation; Loss of topsoil;	▪ No trees would be cut down for the creation of diversions without appropriate permissions; ▪ The topsoil shall be removed and stored separately for reclamation of the diversion road;	Places Requiring Traffic Diversion;	**MI:** Storage of top soil;	**DS:** Guidance Note 3 EMF for RSHDP – VII; **RM:** Site Inspection;	Contractor;	IE and NHAI;
B02: *(i)* **Worker's Camp:** Operation of Construction Camp	▪ Wastewater and runoff from camp will cause contamination of receiving water bodies; ▪ Runoff from camp contaminating surface water body; ▪ Contamination of soil and ground water from oil; ▪ Indiscriminate dumping of Solid waste from construction map will lead to contamination of nearby agricultural fields;	▪ **Water Pollution Control Measures to be Provided:** *e.g.,* ***i.)*** Adequate number of toilets and bathrooms to be provided; ***ii.)*** Soak pits and septic tank to be provided; ***iii.)*** no wastewater to flow out of the camp; ▪ Runoff from camp routed through ***i.)*** Peripheral drain ***ii.)*** Sedimentation tank; ▪ **All Oil and Bitumen to be Stored:** *e.g.,* ***i.)*** On impervious platform; ***ii.)*** Storage areas to be bonded and; ***iii.)*** Runoff from the areas to be routed through oil – water separator; ▪ The ***i.)*** Camp shall be fenced; ***ii.)*** Access to Camp to be restricted;	All Construction Camps, Laydown Areas, Material Storage Yards etc.;	**MI:** No dumping of waste and no disposal of waste water; **PT:** Zero violation;	**DS:** Guidance Note (GN) 9 of EMF for RSHDP – VII; **RM:** Regular Site Inspection;	Contractor;	IE and NHAI;

		▪ Composing facilities to be provided for biodegradable waste; non – biodegradable waste to be recycled to maximum possible extent and remaining waste should either be disposed at approved disposal ground or through licensed waste operators;					
B02: *(ii)* Worker's Camp: Camp Facilities;	Inappropriate facilities for workers lead to unsafe working conditions, which may affect health of workers;	▪ The location, layout and basic facility provision of each labor camp will be submitted to IE for approval; ▪ The contractor will maintain necessary living accommodation and ancillary facilities in functional and hygienic manner; ▪ Adequate water and sanitary latrines with septic tanks with soak pits shall be provided; ▪ Contractor to provide first aid facility for workers and emergency response system; ▪ Contractor to conduct workshop on HIV/ AIDS for all laborers at camps at least twice a year; ▪ Contractor shall conduct biannual health check – ups of all laborers through registered medical practitioner; ▪ Waste disposal facilities such as dust bins must be provided and regular disposal of waste must be carried out; ▪ Contractor shall take all precautions to protect the workers from insect and pest bites to reduce health risk. However, use of insecticides should comply with local regulations, if any; ▪ LPG should be used as fuel source in construction camps instead of wood;	All Camps;	**MI:** Camp health records; Existence of proper first aid kit in camp site; Complaints from workers; **PT:** No record of illness due to unhygienic conditions or vectors; Zero cases of STD. Clean and tidy camp site conditions;	**DS:** The Building and Other Construction Workers Act, 1996; The Contract Labour Act, 1970; The Water Act,1974; **RM:** Camp records Site Inspection; Consultation with workers and local people;	Contractor;	IE and NHAI;
B03: *(i)* Materials: Borrow Areas Operation;	▪ Illegal Procurement of Soil; ▪ Loss of topsoil; ▪ Formation of stagnant water pools due to borrowing/ quarrying; ▪ Particulate emission from excavation; ▪ Safety of the adjoining private or Public Property;	▪ The Borrow Areas to obtain requite licenses and permission and **"Environmental Clearance" (EC)**; ▪ The topsoil shall be removed and stored separately for reclamation of the diversion road; ▪ The borrow area to be adequately drained; ▪ **Excavation Operations to Adopt Measures:** *e.g.,* ***i.)*** Consider the wind direction during operation; ***ii.)*** Reducing drop height during loading;	All Borrow Areas in the Project;	**MI:** Existence of borrow areas in inappropriate unauthorized locations; Poor borrow area management practices; Number of accidents; Complaints from local people; **PT:** No case of non – compliance to conditions;	**DS:** Guidance Note 8 of EMF for RSHDP – VII IRC: SP: 108: 2015; **RM:** Review of design documents and site observations;	Contractor;	IE and NHAI;

		iii.) Water sprinkling depending on water availability; ▪ Adequate Safety distance and slope to be maintained to prevent the damage to the adjoining property; ▪ The extent of borrow areas should be sited away from settlements; ▪ Depths of borrow pits to be regulated and sides not steeper than 25%; ▪ Topsoil to be stockpiled and protected for use at the rehabilitation stage; ▪ At least 10% of the acquired area shall be kept for stockpiling of fertile topsoil. The piles shall be covered with gunny bags/ tarpaulin; ▪ Slope of stockpile shall not exceed 1: 2 (V: H) and edge of pile shall be protected by silt fencing; ▪ Borrow areas shall be leveled with salvaged material or other filling materials which do not pose contamination of soil. Else, it shall be converted into fish pond;					
B03: *(ii)* Materials: Quarry Operation (Stone and Sand) Including Stone Crusher;	▪ Illegal Procurement of Stones; ▪ Noise and Vibrations from Blasting resulting in damages; ▪ Air pollution from Stone crushers; ▪ Erosion of sediments from the Stacked material;	▪ The Quarry to obtain requisite licenses and permission and **"Environmental Clearance" (EC)**; ▪ **"Consent To Operate" (CTO)** must be obtained from **"State Pollution Control Board" (SPCB)** for crusher units; ▪ The conditions of CTO must be complied and regular reported to SPCB as per the stipulations; ▪ In case of exiting quarry, the same must be obtained from the owners; ▪ The charge of the blasting to be decided in conformity with DGMS circular; ▪ Air quality and noise levels should be within the stipulated standards; ▪ Dry and Wet method of dust suppression should be placed; ▪ Erosion control measures to prevent sediment being washed to nearby properties;	All New and Existing Quarry;	**MI:** Valid licenses for all quarry areas from which materials are being sourced; Existence of a Quarry; Redevelopment Plan; **PT:** No case of non – compliance; Pollution level within prescribed limit;	**DS:** Guidance Notes 9 of EMF for RSHDP – VII; EP Act, 1986 Air Act, 1981 and Water Act, 1974; **RM:** Site Inspection; Compliance to EC conditions in case of opening new quarries;	Contractor;	IE and NHAI;
B03: *(iii)* Materials: Material Transport	**Deterioration of Air Quality Due To: *i.)*** Dust emission from Haul roads; ***ii.)*** Fugitive emission from trucks;	▪ **Water Sprinkling on Haul Roads** (in case of water scarcity dust suppressant may be used); ▪ Speed of the truck on haul roads not to exceed 15 Kmph;	All Materials;	**PT:** No case of non – compliance;	**DS:** Guidance Notes 8 of EMF for RSHDP – VII; **RM:** Site Inspection;	Contractor;	IE and NHAI;

		▪ **All Truck Carrying:** *e.g., **a)*** Excavated soil; ***b)*** Sand, ***c)*** Cement shall be covered with tarpaulin sheets;					
B03: *(iv)* Materials: Material Handling (Soil, Aggregates Bitumen, Oils);	▪ Fugitive emission from loose material deteriorating air quality; ▪ Erosion from stockpiling causing sedimentation; ▪ Contamination of surface and ground water from oil and bitumen; ▪ Health and Safety concerns of workers; ▪ Risk of injury from vehicle and equipment;	▪ Storage against wind break and windrow in the direction of the wind; ▪ Wetting/ covering of surface; ▪ Cement to be stored in closed area; ▪ All stockpile to have garland drains along with sedimentation tank; ▪ **All Oil and Bitumen to be Stored:** *e.g., **i.)*** On impervious platform ***ii.)*** Storage areas to be bonded and; ***iii.)*** Runoff; ▪ from the areas to be routed through oil – water separator; ▪ Workers involved in material transport should be provided with PPE's;	All Borrow Areas and During Procurement of Material;	**PT:** No case of non – compliance;	**DS:** Guidance Notes 11 of EMF for RSHDP – VII; **RM:** Site Inspection;	Contractor;	IE and NHAI;
B04: *(i)* Earthwork: Operation of Equipment and Machinery;	▪ Compaction of the agricultural land; ▪ Emission resulting in air quality deteriorations; ▪ High noise levels; ▪ Accidental spillage of fuel and machine oils; ▪ Risk of Injury to workers; ▪ Safety of the public;	▪ Restrict the equipment and machinery within the designated work site; ▪ All vehicle to have **"Pollution Under Control" (PUC)** Certificates; ▪ Regular Maintenance of Equipment and Vehicle; ▪ **Safety Measures for Workers:** *e.g., **i.)*** Posting of flagman; ***ii.)*** Reverse alarm on vehicles; ***iii.)*** reflective jackets and high reflective material to be work by workmen; ▪ Contractor to prepare traffic management and dust suppression plan duly approved by AE and NHAI; ▪ Water Sprinklings for dust suppression as necessary; ▪ Safety Measures *e.g., **i.)*** Traffic Marshals (Flagman) to control traffic; ▪ Batching, WMM, HMP and crushers at predominant downwind (1 Km) direction from the nearest settlement; ▪ All plants shall be used after obtaining **"Consent To Operate" (CTO)** from SPCB and compliance to stipulated conditions must be adhered to; ▪ Hot mix plant should be fitted with dust extraction unit and must have at – least **6 m Stack Height** for the discharge of its scrubbed flue gases; ▪ Crusher Plant should have a combination of dry and wet type control system to minimize deterioration air quality;	`	**MI:** Emission to conform with stipulated standards; Compliance to the statutory conditions and safe work practices; **PT:** Zero violation of mitigation measures; No sighting of spilled oil in construction site or camp site;	**DS:** Guidance Note 7 of EMF for RSHDP – VII; Air Act, 1981, Water Act, 1974; Noise Pollution (Regulation and Control) Rules, 2003 and amended in 2010, CPCB methods of environmental monitoring and data compilation; Air and Noise Standards; **RM:** Site Inspection and review of related documents;	Contractor;	IE and NHAI;

		▪ Construction equipment and machinery to be fitted with silencers and maintained properly; ▪ Near School, noisy construction activities shall be carried out after closing of school and in the weekends/ holidays only; ▪ Carry out noisy operations intermittently to reduce the total noise generated; ▪ Manage smooth traffic flow to avoid traffic jams and honking; ▪ Restrict construction activities near built up areas during day time; ▪ Noise limits for construction equipment such as compactors, rollers, front loaders, concrete mixers, cranes (moveable) etc. shall not exceed 75 dB (A) at a distance of 11 m from its source; ▪ To avoid soil contamination Oil – Interceptors shall be provided at wash down and refueling areas; ▪ Waste oil and oil soaked cotton/ cloth shall be stored in containers labelled **"Waste Oil"** and **"Hazardous"** sold off to MOEF/ SPCB authorized vendors; ▪ Workers involved should be provided with PPE's; ▪ Environmental monitoring is to be conducted as per the monitoring plan;					
B04: *(ii)* Earthwork: Excavation;	▪ Discharge of water from excavation increasing sediment; ▪ Load in receiving water body; ▪ Erosion of Cut Slopes; ▪ Public safety issues;	▪ Water to be routed through sedimentation tank before discharge; ▪ Feasibility of reusing the water for construction; ▪ Slope stabilization measures as seeding, mulching and bio – engineering techniques; ▪ **Safety Measures:** *e.g.,* ***i.)*** Barricading of worksites; ***ii.)*** Dedicated walkways and crossover points; ***ii.)*** Illumination of work area in settlement; ▪ Un – used Non – bituminous wastes to be dumped in borrow pits with the concurrence of landowner and covered with a layer of topsoil conserved from opening the pit; ▪ Bituminous wastes (if any) will be disposed – off in an identified dumping	All Stretches Involving Excavation;	**MI:** Emission to conform with stipulated standards; Compliance to the statutory; Conditions and safe work practices; **PT:** Zero violation of mitigation measures; No sighting of spilled oil or bitumen in construction site or camp site;	**DS:** Guidance Notes 2 of EMF for RSHDP – VII; **RM:** Site Inspection and review of related documents;	Contractor;	IE and NHAI;

		site approved by the State Pollution Control Board; ▪ Other applicable emission control mechanisms mentioned in EMP Matrix (refer Point **B04** ***(i)*** above);					
B04: ***(iii)*** **Earthwork:** Embankment Construction;	▪ Erosion causing impact on embankment/ slope stability; ▪ Contamination of water bodies/ water courses;	▪ Encroachment into any water body is discouraged; ▪ Slope stabilization measures as seeding, mulching and bio – engineering techniques; ▪ Construction of temporary erosion control structures as per requirements; ▪ Control measures as silt fencing, vegetative barriers; ▪ Avoiding disposal of liquid wastes into natural water courses; ▪ Side slopes of all cut and fill areas will be graded and covered with stone pitching, turfing. Care should be taken that the slope gradient shall not be greater than 2: 1; ▪ The earth stock piles to be provided with gentle slopes to soil erosion; ▪ Other applicable emission control mechanisms mentioned in EMP Matrix;	All Embankment Locations;	**MI:** Occurrence of slope failure or erosion issues; **PT:** No slope failures. Minimal erosion issues;	**DS:** Guidance Notes 2 and 5 of EMF for RSHDP – VII; IRC: 56 – 1974 recommended practice for treatment of embankment slopes for erosion control; **RM:** Site Inspection and review of related documents;	Contractor;	IE and NHAI;
B04: ***(iv)*** **Earthwork:** Culvert and Minor Bridge Works;	▪ Interruption of flows; ▪ Pollution of water channel during construction; ▪ Debris contaminating the soil and water; ▪ Occupational Health and safety of workers; ▪ Community Health and safety;	▪ Diversion channels to prevent stoppage of the flow of water; ▪ Construction wastewater or water in excavation to be disposed through sedimentation tank; ▪ **Batching Plant and Transit Mixer Wash Waste:** *e.g.,* ***i.)*** Not to be disposed on agricultural land; ***ii.)*** To be reused in paving of roads; ▪ PPE to be provided to workers involved in bar bending and casting operations; ▪ Traffic Marshall to guide traffic during the movement of transit mixers in and out of the casting site; ▪ Other applicable emission control mechanisms mentioned in EMP Matrix;	All Culverts and Bridge Location;	**MI:** Occurrence of spillage in water body; **PT:** Implementation of mitigation measures;	**DS:** Guidance Note 5, 11, 12 and 13 of EMF for RSHDP – VII; **RM:** Site Inspection and review of related documents;	Contractor;	IE and NHAI;
B05: ***(i)*** **Surfacing:** Bituminous Surfacing;	▪ Deterioration of air quality; ▪ Contamination of Soil from Bituminous Waste; ▪ Worker's safety; ▪ Community Safety;	▪ **Air Pollution Control Measures:** *e.g.,* ***i.)*** No open burning of wood/ burned for bitumen works; ***ii.)*** Hot – mix plants to have air pollution control; ▪ Bitumen waste and off – spec material not to be thrown on agricultural land; ▪ PPE's to be provided to workers;	Entire Stretch Having Flexible Pavement;	**MI:** Adoption of air emission control measures and safe work procedures; **PT:** Zero violation of mitigation measures;	**DS:** Guidance Notes 7 and 12 of EMF for RSHDP – VII; **RM:** Site Inspection and review of related documents;	Contractor;	IE and NHAI;

		▪ Traffic Marshall to guide traffic during the movement of vehicle carrying hot – mix to and from the surfacing site; ▪ Other applicable emission control mechanisms mentioned in EMP Matrix;					
B05: *(i)* Surfacing: Concrete Surfacing;	▪ Contamination of soil and water from concrete; ▪ Stress on water resources in water scarce areas;	▪ **Batching plant and Transit Mixer Wash Waste:** *e.g.,* ***i.)*** Not to be disposed on agricultural land; ***ii.)*** To be reused in paving of roads; ▪ Construction wastewater to be used for curing; ▪ Admixture to be used for reducing water requirement in curing;	Entire Stretch Having Rigid Pavement;	**MI:** No water contamination and wastage of water; **PT:** Zero violation of mitigation measures;	**DS:** Guidance Notes 10 and 11 of EMF for RSHDP – VII; **RM:** Site Inspection;	Contractor;	IE and NHAI;
B06: *(i)* Shoulder: Shoulder Protection;	Erosion of adjoining areas leading sedimentation of water bodies;	Erosion control measures of shoulders especially in areas with higher slopes;	Entire Stretch;	**MI:** Installation of sediment traps; **PT:** Zero violation;	**DS:** Guidance Notes 2 of EMF for RSHDP – VII; **RM:** Site Inspection;	Contractor;	IE and NHAI;
B06: *(ii)* Shoulder: Plantation;	▪ Shifting sand dunes affecting infrastructure; ▪ Impact on Species Diversity;	▪ Stabilization of Sand Dunes using vegetative cover (Grasses and Trees); ▪ Selection of local species drought resistant species; ▪ Green belt development in surplus land of existing right of way;	Rural Stretches;	**MI:** Adoption of effective and eco – friendly stabilization measures; **PT:** Zero violation;	**DS:** Guidance Notes 2 and 10 of EMF for RSHDP – VII; **RM:** Site Inspection;	Contractor;	IE and NHAI
B06: *(iii)* Shoulder: Signage;	▪ Safety of local population and traffic; ▪ Collision with Wildlife;	▪ Safety Features to be included as per Traffic Study findings; ▪ Road Signage to be provided as per IRC Code; ▪ Safety features to be included considering the outcomes of the Wildlife Surveys;	All Traffic Junctions and Wildlife Crossings;	**MI:** Safety signs, diversion warning boards, flag men etc. Complaints from road users; Number of traffic accidents; **PT:** Zero violation and Accidents;	**DS:** Guidance Notes 4 and 13 of EMF for RSHDP – VII; **RM:** Site Inspection;	Contractor;	IE and NHAI
C. Post Construction Decommissioning							
C01: Clearing of Construction Camps;	▪ Debris Contaminating the Soil and Water; ▪ Loss of productive land;	▪ All Debris to be removed and disposed at designated sites; ▪ All construction zones including river – beds, culverts, road – side areas, camps, hot mix plant sites, crushers, batching plant sites and any other area used/ affected by the project will be left clean and tidy; ▪ Reutilization of debris for strengthening of the shoulder of approach roads; ▪ Restoration of conserved Topsoil;	Entire Stretch, and Lands Used by Camps, Plant Sites Borrow and Quarry Areas etc.;		**DS:** Guidance Notes 6 and 11 of EMF for RSHDP – VII; **RM:** Site Inspection;		

IE: Independent Engineer, **NHAI:** National Highway Authority of India, **PWD:** Public Works Department, **EO:** Environmental Officer, **IRC:** Indian Road Congress, **SPCB:** State Pollution Control Board;

5. Construction Materials' Applications.

India's road infrastructure has seen consistent improvement in the last few years. Connectivity has improved and road transportation has become a focus of rapid development. Roads are providing better access to services, ease of transportation and freedom of movement to people. Recognizing the significance of a reliable and swift road network in the country and the role it plays in influencing its economic development, the **"Ministry of Road Transport and Highways" (MORTH)** has taken up the responsibility of building quality roads and highways across the country.

The seven phased **"National Highway Development Project" (NHDP)** is being implemented initiated by the **"National Highway Authority of India" (NHAI)** with a total estimated expenditure of USD – 92 Billion. As the largest highway development project in the country since 2000, more than 49,260 Km of the roads are being upgraded to match international standards.

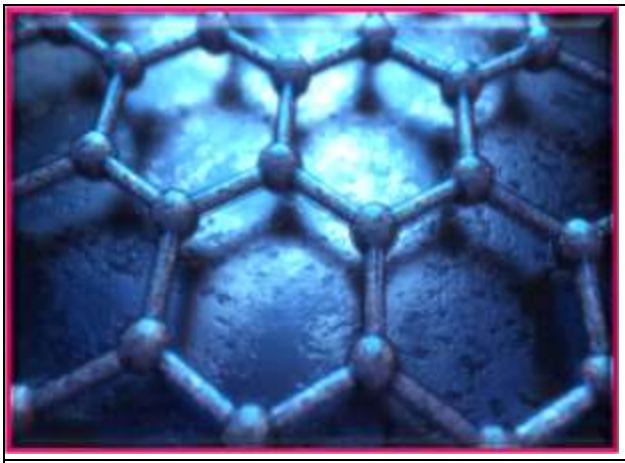
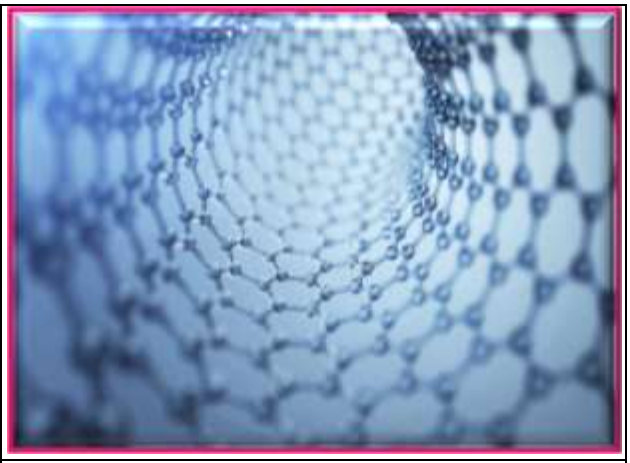
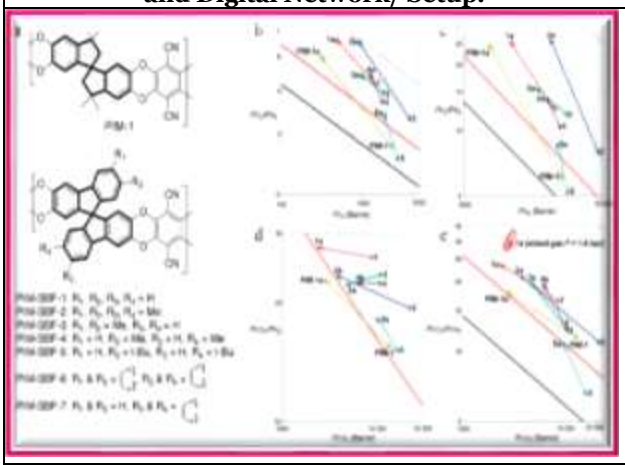
Key Projects' Applications under NHDP include the following under its various phases and development of National Highways to 4/ 6 lane standards on the following routes:

- *Golden Quadrilateral connecting 4 major metropolitan cities viz. Delhi – Mumbai – Chennai – Kolkata. North South and East West Corridors (NS – EW) connecting Srinagar to Kanyakumari and Silchar to Porbandar with a spur from Salem to Cochin;*
- *Road connectivity of major ports of the country to National Highways;*
- *As the 4 – laning of 4,000 Km of National Highways Upgradation of about 20,000 Km of National Highways to 2 – lane paved shoulder;*
- *Six laning of 6,500 Km of existing 4 – lane National Highways;*
- *Development of 1,000 Km of fully access controlled expressways under **"Public Private Partnership" (PPP)**; model following **"Design – Build – Finance – Operate" (DBFO)** approach. Nine such expressways have been identified along High – Density Corridors. These corridors will seek to ensure quicker connectivity;*
- *Construction of standalone Ring Roads, Bypasses, Grade Separators, Flyovers, Elevated Roads, Tunnels, Road Over Bridges, Underpasses, Service Roads, etc. on **"BOT" (Toll)**;*

Many innovative methods and applications are emerging in India and throughout the globe for improving the life of the pavements like emulsified bituminous mix, foam bituminous mix, fiber reinforced bituminous mix, composite pavements, perpetual pavements etc. There are several materials which can be characterized as **"Smart"** and are used for pavement construction. **"Self – Healing Material" (SHM),** for instance, has the ability to heal damages automatically and autonomously, that is, without any external intervention. Incorporation of self – healing properties in man – made materials very often cannot perform self – healing action without an external trigger. Nano – technology is focused on materials in the Nano – scale, while civil engineering infrastructure, especially road pavements, is focused on the macro scale. Different types of procedures, methods and materials are used to attain a very good, sustainable and economic concrete construction. The process of self – healing of cracks or self – filling up of cracks due to bacterial reaction in the concrete after hardening is known as **"Self – Healing Concrete" (SHC)**. ***"It can be observed that small cracks that occur in a structure of width in the range of 0.05 to 0.1 mm get completely sealed in repetitive dry and wet cycles. The mechanism of this autogenously healing is the width of 0.05 to 0.1 mm that act as capillary and the water particles seep through the cracks. These water particles hydrate none or partial reacted cement and the cement expands, which in turn fills the crack. The bacteria used for self – healing of cracks are acid producing bacteria. These types of bacteria can be in dormant cell and be viable for over 200 years under dry conditions; they acts as a catalyst in the healing process of cracks"***.

Super – Strength Roads to Contain Miracle Material Graphene: "Graphene Engineering Innovation Centre" (GEIC) to see how the wonder material can improve the road network and Graphene is up to 200 times stronger than steel and just one atom thick. Highways engineering believes adding graphene into maintenance and renewals operations has the potential to extend asset life and make the network perform at an **"Industry Changing Level" (ICL)**. Highways engineers will now work with the GEIC to explore the operational and road user benefit of incorporating graphene into assets such as road surfacing and road markings as well as help to drive the development of a low carbon and digital road network. ***"GEIC is at the forefront, having made the***

discovery in Manchester, UK and by building collaboration with operations teams who understand the challenges is looking to deliver improved safety and performance of the roads".

	
Highways Graphene Mulls use in Roads' Construction Network System.	**Highways Explore using Graphene in Roads' Construction Network Grid System.**
	
Highways – GEIC – Main to Create Low Carbon and Digital Network/ Setup.	**Graphene Roads' Highways and Flyovers Construction Complex.**
	
Membranes with Intrinsic Macro – Porosity Structure in Construction Network.	**Exemplified Representation/ Model of Roads' Highways Construction Linkage.**

Highways England, a government responsible for motorways and major roads, has partnered with the **"Graphene Engineering Innovation Center" (GEIC),** in order to use graphene to address challenges experienced by the road network in England, such as the deterioration of surfaces.

Similarly Highways India, the government is answerable for motorways and foremost roads, has collaborative effort amalgamated with the **"Graphene Engineering Innovation Center" (GEIC),** in order to use graphene to address challenges experienced by the road network, such as the worsening of surfaces. Highways Engineer believes adding graphene into maintenance and Graphene CA recently introduced a new product line called **"Original Graphene" (OG)**. OG Concrete Admix, aimed at the retail concrete industry, reportedly imbues cement with graphene's superior properties to make it stronger, lighter, and more resistant. Graphene CA's focus on a price – sensitive application is said to lead to taller, faster, lighter, and more durable constructions overall, with the added benefit of being eco – friendly. The launch of **"Original Graphene Cement" (OGC)** admix targets multiple improvements in cement from a single additive reducing cracking, improving strength and weather resistance to build structures that last. The Cur bridge works, which were delivered by subcontractor **"Aggregate Industries" (AI),** involved removal and reinstatement of the existing carriageway to a depth of 150 mm over a 750 m – long section. One lane was replaced using conventional materials, while the opposite **"Trial"** lane was resurfaced using the asphalt enhanced by the innovative asphalt modifier.

Global infrastructure services firm Aecom is reportedly developing one of the UK's first 3D – printed commercial products made from **"Graphene – Reinforced Polymer" (GRP)**. Aecom has produced a graphene arch using additive manufacturing techniques. It believes the method could reduce the time and cost of installing digital signaling systems and transform the digitization of transport networks. The 4.5 – meter high, lightweight arch is being tested on outdoor track at Network Rail's workforce development center in Bristol. Graphene CA, graphene producer and developer of grapheme – based technology for industries and consumers, has announced that it has signed a memorandum of understanding with Apis Cor to develop 3D – printing system capable of printing graphene materials. Graphene CA and its partner Apis Cor, a developer of specialized concrete 3D – printing equipment, are discussing a future co – operation in which Graphene CA will design an extruder and mixing system that can be embedded into Apis Cor's 3D – printer. ***"Together, supplementary innovative companies are expecting to develop 3D – printing system capable of printing graphene material in forthcoming days; time all over Indian regional/ state wise road network programme".***

6. Foremost Approach To Vilupuram – Puducherry Section of NH – 45A (New NH – 332) Road Project with HAM.

- ***Project:*** *Four to Four Laning of Vilupuram – Puducherry Section of NH – 45A (New NH – 332) on HAM Basis;*
- ***Client:*** *National Highways Authority of India (NHAI);*
- ***Concessionaire:*** *Chautala Tollway Private Limited;*
- ***EPC Contractor:*** *M/s. Dilip Buildcon Limited;*
- ***Total Project Cost:*** *₹ 1,013.00 Crores;*
- ***Length of Stretch:*** *Approximately 29.000 Km;*
- ***Date of Commencement/ Start:*** *17/ 05/ 2021;*
- ***Expected Completion Date:*** *23 – 08 – 2025;*

Figure 2: BOTHER... SAFEGUARD; PROTECT; CONSERVE AND PRESERVE OUR PLANET EARTH'S NATURAL – MOTHER... (ECO – NATURAL – GREEN – ENVIRONMENT)...!!!

7. Package – I DBL 45A (Total Length 29.000 Kms) Roads: "Guidelines for Siting, Operation and Redevelopment of Borrow Areas" Yielded to Pondicherry.

(A) Siting

Specific locations of borrow areas to be used will be identified by the contractor based on the recommendations/ endorsements/ approvals of the EIA report. In case the contractor or the concessionaire wants to open any new borrow areas other than those mentioned in this report, then the selection and recommendations for borrow areas will be based on environmental as well as civil engineering exertion considerations/ contemplations. Location of source of supply of material for embankment or sub – grade and the procedure for excavation or transport of material shall be in compliance/ acquiescence with the environmental requirements of the MoEF & CC/ SEIAA/ SEAC/ DEIAA, APRDC and as specified in IRC: 10 – 1961.

Certain precautions have to be taken to restrict un – authorized borrowing by the Contractor and the Concessionaire/ Sub – Contractor. No borrow area shall be opened without permission of the Engineer/ Civil Engineering Expert for construction activities. The borrowing shall not be carried out in cultivable lands, unless and until, it shall be agreed upon by the Engineer that there is no suitable uncultivable land in the vicinity for borrowing or private landowners are willing to allow borrowing on their fields.

(B) Operation

To avoid any embankment or ridge slippage, the borrow areas will not be dug continuously, and the size and shape of borrow pits will be decided by the Engineer/ Civil Engineering Expert for construction activities. Redevelopment of the borrow areas to mitigate the impacts will be the responsibility of the contractor. The contractor shall evolve site – specific redevelopment plans for each borrow area location, which shall be implemented after the approval of the **"Supervision Consultant" (SC)**.

According to Dalmia, the ministry in 2013 had constituted an expert committee under the chairmanship of Director, NEERI, which had recommended that activities for excavation/ borrowing of **"Ordinary Earth"** more than 5 hectare should be treated as **Category B1** projects which entail a detailed EIA study, public hearing, etc. and those less than 5 ha to be treated as **Category B2** projects subject to 11 safeguards including no blasting, maximum depth of 2 m, restoration of area, after mining, compliance with dust emission norms etc. Precautionary measures as the covering of vehicles will be taken to avoid spillage during transport of borrow materials. To ensure that the spills, which might result from the transport of borrow and quarry materials do not impact the settlements, it will be ensured that the excavation or digging and carrying of earth will be done during day – time only. The unpaved surfaces used for the haulage of borrow materials will be maintained properly and borrowing of earth shall be carried out at locations recommended and suggested as follows:

Non – Cultivable Lands: Borrowing of earth will be carried out up to a depth of 2.0 m from the existing ground level. Borrowing of earth shall not be done continuously. Ridges of not less than 8 m width shall be left at intervals not exceeding 300 m. Small drains shall be cut through the ridges, if necessary, to facilitate drainage and borrow pits shall have slopes not steeper than 1 vertical in 4 horizontal.

Productive Lands: Borrowing of earth shall be avoided on productive lands. However, in the event of borrowing from productive lands, under circumstances as described above, topsoil shall be preserved in stockpiles. The conservation of topsoil shall be carried out as described in section of this chapter. At such locations, the depth of borrow pits shall not exceed 45 cm and it may be dug out to a depth of not more than 30 cm after stripping the 15 cm top soil aside.

Elevated Lands: At locations where private owners desire their fields to be leveled, the borrowing shall be done to a depth of not more than 2 m or up to the level of surrounding fields.

Borrow Pits along Roadside: Borrow pits shall be located 5 m away from the toe of the embankment. Depth of the pit should be such that the bottom of the pit shall not fall within an imaginary line of slope 1 vertical to 4 horizontal projected from the edge of the final section of the bank. Borrow pits

should not be dug continuously. Ridges of not less than 8 m width should be left at intervals not exceeding 300 m. Small drains should be cut through the ridges to facilitate drainage.

Borrow Pits on the Riverside: The borrow pit should be located not less than 15 m from the toe of the bank, distance depending on the magnitude and duration of flood to be withstood.

Community/ Private Ponds: Borrowing can be carried out at locations, where the private owners (or in some cases, the community) desire to develop lands (mostly low – lying areas) for pisciculture purposes and for use as fishponds.

Borrow Areas near Settlements: Borrow pit location shall be located at least 0.8 Km from Villages and Settlements. If unavoidable, they should not be dug for more than 30 cm and should be drained.

Table 8: Apparent/ Credible Borrow Area along the Projected Corridor for Package – I DBL 45A Roads.

Sr. No.	Sample Number	Name of Village	Material Type	Site Identification			Approximate Quantity (Cum)				Available Land/ Terrain	Surrounding Land/ Terrain
				Nearest Chainage (Km)	Left/ Right	Offset from Nearest Chainage (m)	Length (m)	Breadth (m)	Depth (m)	Total (Cum)		
1.												
2.												

(C) Criteria for Evaluation of Borrow Areas

- *Existing land use (Agricultural Field/ Barren/ Scrub/ Grazing/ Any Other Type);*
- *Vegetation/ Trees to be removed;*
- *Erosion/ Degradation potential;*
- *Distance and name of the nearest settlement;*
- *Distance from the nearest surface water body;*
- *Drainage pattern of the area;*
- *Distance of the nearest Reserve Forest (if any);*
- *Distance of the nearest Sacred Tree (if any);*
- *Distance from the nearest school/ hospital/ primary health center etc.;*
- *Daily/ Occasional use of borrow area by the community;*
- *Any schemes or avenues for generation of income for adjoining community.*

(D) Documentation of Borrow Pit

Following checklist provides guidelines in order to ensure that redevelopment of borrow areas must comply with MORTH and Highways Projects, **Clause 305.2.2.2 and EMP Requirement**. The contractor must ensure that following data based must be documented for each identified borrow areas that provide the basis of the redevelopment/ revitalization plan.

- *Chainage along with offset distance;*
- *Area (in Sq. M.);*
- *Type of Access/ Width/ Kutcha/ Pucca etc. from Carriageway;*
- *Soil Type;*
- *Slope/ Drainage Characteristics;*
- *Water Table of the area or identify from nearest well etc./ ask people;*
- *Existing Land – use such as barren/ agricultural field/ grazing land etc.;*
- *Location/ Name/ Population/ Caste of Nearest Settlement/ Community and distance from Borrow Area/ Type and characteristics of settlement;*
- *Daily/ Occasional use of the Borrow Area by the community, if any;*
- *Identification of any other community facility in the vicinity of the borrow pit.*

(E) Guidelines for Stripping, Stocking, Stockpiles, Preservation of Top Soil

During the excavation/ digging quarry of the borrowing material contractor must ensure that the topsoil from all areas or locations or regions of cutting and all areas to be permanently covered shall be stripped to a specified depth of 150 mm and stored in stockpiles. At least 10% of the temporarily acquired area shall be earmarked for storing topsoil. The stockpile shall be designed such that the slope does not exceed 1: 2 (vertical to horizontal) and the height of the pile is restricted to 2 m. Stockpiled will not be surcharged or otherwise loaded and multiple handing will be kept to a minimum to ensure that no compaction will occur. The stockpiles shall be covered with gunny bags or tarpaulin.

It shall be ensured by the contractor that the topsoil will not be unnecessarily trafficked either before stripping or when in stockpiles. Stockpiled topsoil will be returned to cover the disturbed area and cut slopes. Residual topsoil will be distributed on adjoining/ proximate barren/ rocky areas as identified by the Engineer in a layer of thickness of 75 mm – 150 mm. Top soil shall also be utilized for redevelopment of borrow areas. Landscaping along slopes, medians and incidental spaces etc.

(F) Guidelines for Enhancement/ Development/ Improvement

As far as possible borrow area selected for enhancement shall be on government/ community land in the vicinity of settlement. The contractor must ensure that any enhancement design proposed should be workable, maintenance free and preferably worked out in consultation with the community and proposed enhancement materials should be locally available. The borrow area can be developed either of the following:

Vegetative Cover:

- *Vegetative cover must be established on all affected land;*
- *Topsoil must be placed, seeded and mulched within 30 days of final grading if it is within a current growing season or within 30 days of the start of the next growing season;*
- *Vegetative material used in reclamation must consist of grasses, legumes, herbaceous or woody plants or a mixture thereof;*
- *Plant material must be planted during the first growing season following the reclamation phase;*
- *Selection and use of vegetative cover must take into account soil and site characteristics such as drainage, pH, nutrient availability and climate to ensure permanent growth;*
- *The vegetative cover is acceptable if within one growing season of seeding;*
- *The planting of trees and shrubs results in a permanent stand or regeneration and succession rate, sufficient to assure a 75% survival rate;*
- *The planting results in 90% ground coverage;*
- *The site shall be inspected when the planting is completed and again at one year to ensure compliance with the reclamation or renovation plan.*

Certificate of Completion of Reclamation or Renovation

- *Contractors have to obtain certificate of satisfaction/ gratification/ contentment from the landowner and submit it to the Engineer before final payment is to done.*

(G) Working Plan/ Strategy/ Design/ Proposal

The contractor must prepare a working plan before enhancing the identified borrow areas. Following are the inputs that provide the guidelines to the contractor to formulate the working plan:

- ✓ *Access of property/ width of access/ material;*
- ✓ *Orientation of property with respect to the road;*
- ✓ *Site slope selection;*
- ✓ *Local drainage/ water logging etc. if any;*
- ✓ *Location of nearest culvert etc. if any to drain water if required;*
- ✓ *Any other community resources such as tube well/ well etc. in the vicinity;*
- ✓ *Location of trees including Species/ Girth/ Foliage spread and afternoon shaded area on ground;*
- ✓ *Surrounding land use; nearby settlements (name of structure/ pattern of settlement);*
- ✓ *Mark on plan part of the borrow area, most suitable for storing and staking topsoil.*

(H) Drawings to be Prepared

The contractor have to prepared the drawings showing both cross – section as well as plan of the identified borrow areas incorporating following inputs:

- *Contours if any, depth if any;*
- *Location of trees, height and foliage spread and afternoon shaded area on ground;*
- *Any other existing details at the road/ property interface such as signage/ railing/ etc.;*
- *Details of immediate surrounding for at least 5 m on either sides.*

(I) Photographs to be Included

The contractor must ensure that photographs are to be taken before and after the excavation/ digging/ ploughing/ tunneling of borrow materials and also after the implementation of redevelopment plan, incorporating the following:

- *Overall view from access side;*
- *Any other community resource in the vicinity;*
- *All spots to be detailed such as access to borrow pit/ cluster of existing trees etc.*

(J) OUTPUTS

The Contractor/ Concessionaire must ensure based on the above – mentioned guidelines following outcomes must be evolved and progressed:

- *Working Plan Status on Site/ Camp/ Location;*
- *Cross Section Status on Site/ Camp/ Location;*
- *Longitudinal Section/ Elevation of Site/ Location;*
- *Details of all proposed enhancements including signage etc.*
- *To standardize the tendering process and to provide a fair and accurate method to price the project* ***"Bill Of Quantities" (BOQ)****.*

8. TEAM COMPOSITION AND TASK ASSIGNMENT.

The Consultant have formulated their team and manning schedule as per the **"Term of Reference" (TOR)** and is being presented as an attachment of the inception report, which also includes the activities to be carried out along with the details of personal responsible for carrying out/ preparing and checking/ verifying the concealed activities **(Table 9)**. To ensure the execution of project in time and within the budget, it is important to adopt an effective and efficient management system. The management philosophy adopted by the Consultant is based on the following basics tenets:

- *Matching of professionals to specific tasks and activities;*
- *A quality assurance plan for the Consultants Team put in place and monitored by the head office staff of the Consultants; and Periodic meetings, which will be property documented between the Consultants and the* ***NHAI/ M/s. Dilip Buildcon Limited****.*

KEY PERSONNEL

Table 9: Miscellaneous Organization Chart of IE TEAM... COMPOSITION AND TASK ASSIGNMENT/ MISSION/ OPERATION/ ACTION FOR KEY PERSONNEL.

Sr. No.	Name	Position OR Designation	Remarks
1.	**Er. Mahesh Kumar Uppala**	*Team Leader cum Senior Highway Engineer*	**Input of 30 Months (2.5 Years)**
2.	**Er. Samuel Devendranath**	*Resident cum Highway Engineer*	**Input of 48 Months (4 Years)**
3.	**Er. N. Sivakumar**	*Bridge/ Structural Engineer*	**Input of 30 Months (2.5 Years)**
4.	**Er. Devesh Tripathi**	*Senior Pavement Specialist*	**Input of 24 Months (2 Years)**
5.	**Er. Apparao Pogiri**	*Sr. Quality cum Materials Expert*	**Input of 24 Months (2 Years)**
6.	**Er. Sanjay Sharma**	*Road Safety Expert*	**Input of 14 Months (1 Years)**
7.	**Er. N. Rishivadhan Raj**	*Survey Engineer*	**Input of 32 Months (2.5 Years)**
8.	**Er. K. Kalaivanan**	*Assistant Highway Engineer – I*	**Input of 30 Months (2.5 Years)**
9.	**Er. R. Natarajan**	*Assistant Highway Engineer – II*	**Input of 48 Months (4 Years)**
10.	**Er. A. Anandaraj**	*Assistant Bridge Engineer*	**Input of 30 Months (2.5 Years)**
11.	**Er. Zubair Siddiqui**	*CAD Expert*	**Input of 16 Months (1.25 Years)**
12.	**Er. D. Muthukrishnan**	*Quantity Surveyor*	**Input of 15 Months (1.25Years)**
13.	**Dr. Harish Kumar Gupta**	*Environmental Engineer*	**Intermittent 06 Months Input Out of 48 Months (4 Years)**
14.	**Er. R. Mohandoss**	*Asst. Quality cum Material Engineer – I*	**Input of 24 Months (2 Years)**
15.	**Er. R. Vijayaprasanth**	*Asst. Quality cum Material Engineer – II*	**Input of 24 Months (2 Years)**
16.	**Er. Chetan Malviya**	*Electrical Engineer*	**Input of 07 Months**
17.	**Er. Shivam Purohit**	*HTMS/ Toll Expert*	**Input of 02 Months**
18.	**Er. G. Murugan**	*Horticulture cum Landscaping Expert*	**Input of 18 Months (1.5 Years)**
19.	**Mr. Kamaraj Hrithik**	*Office Manger*	**Input of 48 Months (4 Years)**
20.	**Mr. T. Harinee**	*Accountant cum Cashier*	**Input of 48 Months (4 Years)**
21.	**Mr. S. Sumathi**	*Steno cum Computer Operator*	**Input of 48 Months (4 Years)**
22.	**Mr. M. Vasanthi**	*Office Boy*	**Input of 48 Months (4 Years)**

Support Staff

Note: To be Assessed by Consultant as per Requirement of Assignment.

TECHNICAL STAFF AND RESPONSIBILITY

The traffic survey team will include one senior traffic engineer, traffic supervisors and local enumerators' will have sufficient – educational background and will be given proper training regarding vehicle type, class time interval and direction of flow, before the commencement of surveys. Pilot surveys will be carried out for two to three hours at each location to familiarize traffic supervisors/ enumerators with the work. At every location one supervisor will be placed with the enumerators. Manpower will be allocated separately for each direction of traffic movement. For every two – three locations one traffic engineer will be made responsible for overall supervision of work. The methodology of collection and analysis of data, number and location of traffic survey stations shall be finalized in consultation with NHAI and VRC DC.

ENVIRONMENTAL AND SOCIAL SURVEYS, PLANS AND MITIGATIONS MEASURES

- *Primary and Secondary data collection for Social and Environment Parameters for preparation of **"Initial Environment Examination" (IEE)** and **"Social Impact Assessment" (SIA)**;*
- *Assessment of utility shifting requirements and costs including O & M requirements and estimates, along with actions required for statutory clearances and other clearances like Electricity board, Forest, National Highways, or from any other departments etc.;*
- *Preparing document and needful actions required for statutory clearances and other clearances like Electricity Board, Forest, National Highways or from any other departments etc. including **"Environment and Social Management Plan" (ESMP), "Resettlement Plan" (RP)** with **"Due Diligence Report" (DDR), "Resettlement and Rehabilitation Budget" (RRB),** and **"Mitigation Measures" (MM)**;*
- *Assessment of each project site, environmental and social aspects for detailed design of the project components, preparing initial environmental, social, checklist and report as required;*
- *Preparation of environmental and social safeguard actions including impact assessments, if any;*
- *Preparation of **"Environment and Social Management Plan" (ESMP)** and mitigation measures;*
- *Identifying, assisting and coordinating stakeholder's consultations for each project insofar environmental and social issues are concerned.*

ESTIMATION OF QUANTITIES

Based on the surveys and designs evolved by the consultants, within the framework and the requirements of the project, the consultants have to prepare rate analysis/ data bank with the latest schedule of rates and prepare items, quantity schedules and subsequently work out the detailed cost estimates. The consultant shall conduct his own studies and prepare estimates based on the recent schedule of rates specified by the **NHAI** and **M/s. Dilip Buildcon Limited**. In case for items for which the schedules of rates are not available, prevailing market rates shall be procured and appended in the DPR. The consultant shall be responsible for the validity of the project details, designs/ analysis, drawings, estimates and bid/ tender documents given/ made by them.

9. Annexure – I: Compliance Parameters' Laboratory "Analysis/ Investigation of Air, Water, Noise and Soil Quality Sample Checking/ Testing for Pondicherry – Package – I DBL": Roads' Network @ Tamilnadu (January to June, 2023).

Sr. No.	Package	Parameters	Analytical Laboratory	Parameters Compliance	Analysis of Compliance Parameters	Yes/ No	Remarks/ Comments	Sampling/ Testing/ Analysis Date with Month and Year
1.	Package – I DBL	1. Air; 2. Water; 3. Noise; and 4. Soil; 5. DG Stack, 6. DG Noise, 7. Soil, 8. Drinking Water, 9. Ground Water, 10. Surface Water	M/s. Sishodiya Research Laboratories Pvt Ltd., Lucknow, U. P. 226 021.	1. Jankipuram Junction @ Chainage Number: 000 + 000; {Ambient Air and Noise Monitoring}	Air Quality and Noise Parameter are in compliance with CPCB standards. Fluoride limits in Water Sample is Alarming.	No	Water not suitable for human use, can only be used in construction activities on site or location.	04–05–2023; 05–05–2023; 06–05–2023; 07–05–2023; 08–05–2023;
2.				2. Jankipuram @ Chainage Number: 000 + 485; {Ambient Air and Noise Monitoring}	Air Quality and Noise Parameter are in Compliance with CPCB Standards. Noticeable TDS in Bore Well Water.	No	RO Treatment and proper supervision should be done for drinking water.	04–05–2023; 05–05–2023; 06–05–2023; 07–05–2023; 08–05–2023;
3.				3. Main Camp @ Chainage Number: 018 + 500; {Ambient Air and Noise Monitoring}	All Parameters of attributes observed to be in Compliance with CPCB Standards.	Yes	-------	04–05–2023; 05–05–2023; 06–05–2023; 07–05–2023; 08–05–2023;
4.				4. Crusher Plant @ Chainage Number: 018 + 500; {Ambient Air and Noise Monitoring}	All Parameters of attributes observed to be in Compliance with CPCB Standards.	Yes	-------	04–05–2023; 05–05–2023; 06–05–2023; 07–05–2023; 08–05–2023;
5.				5. Kandamanglam Rural Area @ Chainage Number: 000 + 025; {Ambient Air and Noise Monitoring}	All Parameters of attributes observed to be in Compliance with CPCB Standards.	Yes	-------	04–05–2023; 05–05–2023; 06–05–2023; 07–05–2023; 08–05–2023;
1.				1. Jankipuram Junction @ Chainage Number: 000 + 000; Jankipuram @ Chainage Number: 000 + 485; Main Camp @ Chainage Number:	Noticeable TDS is found in Drinking Water.	Yes	RO Treatment and proper handling has to be done for Drinking Water.	04–05–2023; 05–05–2023; 06–05–2023; 07–05–2023; 08–05–2023;
2.				2.	PM_{10}: 156 µg/ m^3.	No	Dust Emissions from HMP should be controlled; sprinkling in camp suggested and recommended.	

				3. 018 + 500; Crusher Plant @ Chainage Number: 4. 018 + 500; Kandamanglam Rural Area @ Chainage Number: 000 + 025; @ 014 + 080; @ 007 + 320; @ 003 + 100; @ 001 + 796; {DG Stack, DG Noise, Soil, Drinking Water, Ground Water, Surface Water and Other Quality Sample}	**Alarming TDS Content in Water.**	*Yes*	**RO water for drinking should be provided to workers and staff.**	
3.					**PM_{10}: 217 µg/ m^3.**	*No*	**Water sprinkling trips should be increased or reviewed.**	
4.					**All Parameters of attributes observed to be in Compliance with CPCB Standards.**	*Yes*	-------	
5.					**All Parameters of attributes observed to be in Compliance with CPCB Standards.**	*Yes*	-------	
1.					-------		-------	-------
2.					-------		-------	-------
3.					-------		-------	-------
4.					-------		-------	-------
5.					-------		-------	-------

10. Annexure – II: Compliance Constraints' Test: Modern Cutting – Edge Status of Source Approval for Emulsion (RS – 1) and Bitumen (VG – 40). Submission of Environmental Monitoring Test Report's Results of May, 2023; "Exploration of Parameters Like: Air, Water, Noise, DG Stack, DG Noise, Soil, Drinking Water, Ground Water, Surface Water and Other Quality Sample Monitoring Certification Process and Procedures for – Package I DBL" for Four Laning of Viluppuram – Puducherry Section of NH – 45A (New NH – 332) Road (Design Length Approximately 29.000 Km) in the States of Pondicherry, Tamil Nadu (UT).

DBL VILUPPURAM HIGHWAYS LIMITED

(vilupuram@dilipbuildcon.co.in)

DBL-RO/NHAI/Villupuram-Puducherry/2023-24/ 349 — 05th June 2023

The Team Leader,
L.N Malviya Infra Projects Limited,
NH 332 -Villupuram Puducherry NH Road,
Pangur, Puducherry.

Sub: - UPC - **N/08019/01002/TN**-Four-Laning of Villupuram – Puducherry section of NH 45A (New NH 332) from Km 0.000 to Km 29.000 (Design Chainage) under Bharatmala Pariyojana Phase I (Residual NHDP IV works) on HAM in the State of Tamil Nadu and Union Territory of Puducherry- **Submission of Environmental Monitoring Test Results –Reg**

Ref: - 1. Concession Agreement dated 17th May 2021.

Dear Sir,

We are herewith submitting the Environmental Monitoring Test Results of our site which was conducted by M/S Sishodia Research Laboratories in Presence of your representative and the Test results are found as per specification requirement.

We hereby request your formal approval at the earliest.

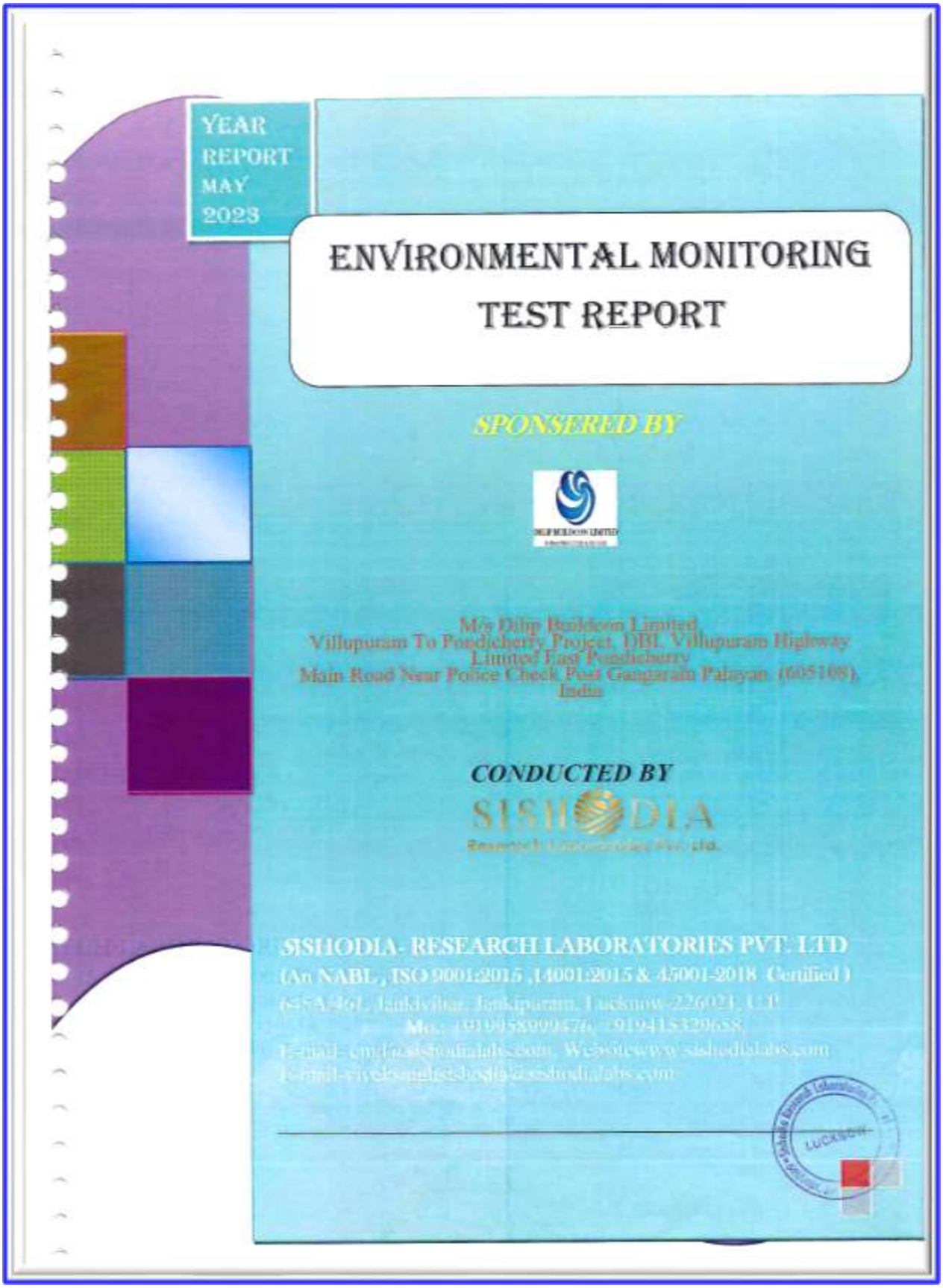
Thanking you and assuring our best service all the time.

For M/s. DBL Villupuram Highways Limited,

Kumar Sengottaiyan
Project Manager

Encl: As mentioned above.
Copy to: The Project Director, NHAI-PIU, Puducherry, for information

(CIN: U45201MP2021PTC055629) | **Regd. Office :** Plot No. 5, Inside Govind Narayan Singh Gate,Chuna Bhatti, Kolar Road, Bhopal - 462 016 (M.P.), Ph.: 0755-4029999, Fax : 0755-4029998


YEAR
REPORT
MAY
2023
ENVIRONMENTAL MONITORING
TEST REPORT
SPONSERED BY
M/s Dilip Buildcon Limited
Villupuram To Poedicherry Project, DBL Villupuram Highway
Limited East Pondicherry
Main Road Near Police Check Post Gangaram Palayam. (605108),
India
CONDUCTED BY
SISHODIA
SISHODIA- RESEARCH LABORATORIES PVT. LTD
(An NABL, ISO 9001:2015 ,14001:2015 & 45001-2018 Certified)

SISHODIA Research Laboratories Pvt. Ltd.

M/s Sishodia Research Laboratories Pvt. Ltd., Lucknow, U.P.226021

CONTENT

Sr. No.	Description
A.	**Ambient Air Quality**
1	CH NO: 00+00 JANKIPURAM JN
2	CH NO: 0+485 JANKIPURAM
3	CH NO: 18+500 MAIN CAMP
4	CRUSHER PLANT
5	CH NO: 25 KANDAMANGLAM RURAL AREA
B.	**Ambient Noise Monitoring**
1	CH NO: 00+00 JANKIPURAM JN
2	CH NO: 0+485 JANKIPURAM
3	CH NO: 18+500 MAIN CAMP
4	CRUSHER PLANT
5	CH NO: 25 KANDAMANGLAM RURAL AREA
C.	**DG STACK**
1	CH NO: 0+485 JANKIPURAM
2	CH NO: 18+500 MAIN CAMP
D.	**DG NOISE**
1	CH NO: 0+485 JANKIPURAM
2	CH NO: 18+500 MAIN CAMP
E.	**SOIL**
1	CH NO: 14+080
2	CH NO: 7+320
3	CH NO: 3+100
F.	**DRINKING WATER**
1	CH NO: 18+500 MAIN CAMP
2	CH NO: 0+485 JANKIPURAM

SISHODIA Research Laboratories Pvt. Ltd.

M/s Sishodia Research Laboratories Pvt. Ltd., Lucknow, U.P.226021

G.	**GROUND WATER**
1	CH NO: 18+500 MAIN CAMP
2	CH NO: 0+485 JANKIPURAM
3	CRUSHER PLANT
H.	**SURFACE WATER**
1	CH NO: 1+796

LUCKNOW

EST 2009

IAS-IAF

SISHODIA Research Laboratories Pvt. Ltd.

CIN No :- U73100UP2009PTC037857

Accredited by NABL as per ISO/IEC 17025: 2017

Recognized by MoEFCC (Govt. of India) Under EPA 1986 | (Vide F. No. LS/99/7/2021-Sahlab-HO-CPCB-HO/Pvt-322/3

TEST REPORT

Format No-7.8F-01

Report No	Sample code	Report issue date
TC-639423000000273F	SMPL/AAQ/273/2023	16/05/2023

SAMPLING DETAILS

1.	Name and Address of Customer:	M/s Dilip Buildcon Limited, Villupuram To Pondicherry Project, DBL Villupuram Highway Limited East Pondicherry Main Road Near Police Check Post Gangaram Palayan. (605108)	
2.	Sampling Location:	Ch No: 00 + 00 Jankipuram JN.	
3.	Type of Sample :	Ambient Air	
4.	Date of sampling : 04/05/2023– 05/05/2023	Sampling Period:	24 hr
5.	Sample collected by:	SRLPL TEAM	
6.	Method of Sampling :	SRL/QR/SP/01	
7.	Packing condition:	Sealed	
8.	Laboratory Sample Receiving date:	11/05/2023	
9.	Period of Sample analysis:	11/05/2023– 16/05/2023	
10	Sampling Machine Placed:	3.0 m above the ground level	

CLIMATICALLY CONDITION

Wind direction	E-W
Avg. Humidity (%)	68
Avg. Ambient Temperature(°C)	34
Environmental condition	Ambient Condition
Wind speed (km/hr)	3.0

AMBIENT AIR ANALYSIS RESULTS

S. No.	Parameter	Test Method	Result	Unit	Standards limits (24 hours) *
1	Respirable Particulate Matter (PM_{10})	IS 5182 PART 23 2006	86.5	$\mu g/m^3$	100
2	Respirable Particulate Matter ($PM_{2.5}$)	CPCB, Volume-I	50.0	$\mu g/m^3$	60
3	Sulphur Dioxide (SO_2)	IS 5182 (Part 2)	15.8	$\mu g/m^3$	80
4	Nitrogen Oxides (as NO_2)	IS 5182 (Part 6)	28.0	$\mu g/m^3$	80

BDL-Below detection limit, NR-No Relaxation, NT-No Transfer

Page-1/3

(Reviewed By)

(Authorized Signatory)

Note :- 1. The result listed refer only to tested Sample and applicable Parameter.
2. This Certified is not to be reproduced wholly or parts promotional publicity or legal purpose without permission of Authority of SRLPL.
3. The Sample will be destroyed after 21 days from date of issue of test Report unless otherwise specified.
4. Any Discrepancy found in the test Report may be communicated within Seven days.

EST 2009

SISHODIA
Research Laboratories Pvt. Ltd.

CIN NO :- U73100UP2009PTC037857

IAS-IAF

TEST REPORT

Format No-7.8F-01

Report No	Sample code	Report issue date
RPT/2300170	SMPL/AAQ/273/2023	16/05/2023

SAMPLING DETAILS

1.	Name and Address of Customer:	M/s Dilip Buildcon Limited, Villupuram To Pondicherry Project, DBL Villupuram Highway Limited East Poodicherry Main Road Near Police Check Post Gangaram Palayan. (605108)	
2.	Sampling Location:	Ch No: 00 + 00 Jankipuram JN.	
3.	Type of Sample :	Ambient Air	
4.	Date of sampling : 04/05/2023– 05/05/2023	Sampling Period:	24 hr
5.	Sample collected by:	SRLPL TEAM	
6.	Method of Sampling :	SRL/QR/SP/01	
7.	Packing condition:	Sealed	
8.	Laboratory Sample Receiving date:	11/05/2023	
9.	Period of Sample analysis:	11/05/2023– 16/05/2023	
10	Sampling Machine Placed:	3.0 m above the ground level	

CLIMATICALLY CONDITION

Wind direction	E-W
Avg. Humidity (%)	68
Avg. Ambient Temperature(°C)	34
Environmental condition	Ambient Condition
Wind speed (km/hr)	3.0

AMBIENT AIR ANALYSIS RESULTS

S. No.	Parameter	Test Method	Result	Unit	Standards limits (24 hours) *
1.	Carbon Monoxide (as CO)	IS 5182 (Part 1)	0.35	mg/m³	02

BDL*Below detection limit, NR*- No Relaxation, NT*=No Traceable

Page 2/2

END OF REPORT

(Reviewed By)

LUCKNOW

(Authorized Signatory)

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SISHODIA Research Laboratories Pvt. Ltd.

CIN NO :- U73100UP2009PTC037857

IAS-IAF

TEST REPORT

Format No-7.8F-01

Report No	Sample code	Report issue date
RPT/2300171	SMPL/AAQ/274/2023	16/05/2023

SAMPLING DETAILS

1.	Name and Address of Customer:	M/s Dilip Buildcon Limited, Viluppuram To Pondicherry Project, DBL Viluppuram Highway Limited East Pondicherry Main Road Near Police Check Post Gangaram Palayan.(605108)	
2.	Sampling Location:	Ch No: 00 + 485 Jankipuram.	
3.	Type of Sample :	Ambient Air	
4.	Date of sampling : 05/05/2023– 06/05/2023	Sampling Period:	24 hr
5.	Sample collected by:	SRLPL TEAM	
6.	Method of Sampling :	SRL/QR/SP/01	
7.	Packing condition:	Sealed	
8.	Laboratory Sample Receiving date:	11/05/2023	
9.	Period of Sample analysis:	11/05/2023– 16/05/2023	
10	Sampling Machine Placed:	3.0 m above the ground level	

CLIMATICALLY CONDITION

Wind direction	N -W
Avg. Humidity (%)	70
Avg. Ambient Temperature(°C)	35
Environmental condition	Ambient Condition
Wind speed (km/hr)	3.0

AMBIENT AIR ANALYSIS RESULTS

S. No.	Parameter	Test Method	Result	Unit	Standards limits (24 hours) *
1.	Carbon Monoxide (as CO)	IS 5182 (Part 1)	0.30	mg/m³	02

BDL*Below detection limit, NR**No Relaxation, NT**Not Traceable

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END OF REPORT

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TEST REPORT

Format No-7.8F-01

Report No	Sample code	Report issue date
TC-639423000000277F	SMPL/AAQ/277/2023	16/05/2023

SAMPLING DETAILS

1.	Name and Address of Customer:	M/s Dilip Buildcon Limited, Viluppuram To Pondicherry Project, DBL Villupuram Highway Limited East Pondicherry Main Road Near Police Check Post Gangaram Palayan. (605108)
2.	Sampling Location:	Ch No: 25 Kandamangalam Rural Area
3.	Type of Sample :	Ambient Air
4.	Date of sampling : 08/05/2023– 09/05/2023	Sampling Period: 24 hr
5.	Sample collected by:	SRLPL TEAM
6.	Method of Sampling :	SRL/QR/SP/01
7.	Packing condition:	Sealed
8.	Laboratory Sample Receiving date:	11/05/2023
9.	Period of Sample analysis:	11/05/2023– 16/05/2023
10	Sampling Machine Placed:	3.0 m above the ground level

CLIMATICALLY CONDITION

Wind direction	N-W
Avg. Humidity (%)	68
Avg. Ambient Temperature(°C)	34
Environmental condition	Ambient Condition
Wind speed (km/hr)	3.0

AMBIENT AIR ANALYSIS RESULTS

S. No.	Parameter	Test Method	Result	Unit	Standards limits (24 hours) *
1	Respirable Particulate Matter (PM_{10})	IS 5182 PART 23 2006	92.0	µg/m³	100
2	Respirable Particulate Matter ($PM_{2.5}$)	CPCB, Volume-I	50.5	µg/m³	60
3	Sulphur Dioxide (SO_2)	IS 5182 (Part 2)	16.0	µg/m³	80
4	Nitrogen Oxides (as NO_2)	IS 5182 (Part 6)	25.9	µg/m³	80

BDL*Below detection limit, NR*=No Relaxation, NT*=Not Traceable

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CIN NO :- U73100UP2009PTC037857

TEST REPORT

Format No-7.8F-01

Report No	Sample code	Report issue date
RPT/2300174	SMPL/AAQ/277/2023	16/05/2023

SAMPLING DETAILS

1.	Name and Address of Customer:	M/s Dilip Buildcon Limited, Viluppuram To Pondicherry Project, DBL Viluppuram Highway Limited East Pondicherry Main Road Near Police Check Post Gangaram Palayan.(605108)	
2.	Sampling Location:	Ch No: 25 Kandarangalam Rural Area	
3.	Type of Sample :	Ambient Air	
4.	Date of sampling : 08/05/2023– 09/05/2023	Sampling Period:	24 hr
5.	Sample collected by:	SRLPL TEAM	
6.	Method of Sampling :	SRL/QR/SP/01	
7.	Packing condition:	Sealed	
8.	Laboratory Sample Receiving date:	11/05/2023	
9.	Period of Sample analysis:	11/05/2023– 16/05/2023	
10	Sampling Machine Placed:	3.0 m above the ground level	

CLIMATICALLY CONDITION

Wind direction	N -W
Avg. Humidity (%)	68
Avg. Ambient Temperature(°C)	34
Environmental condition	Ambient Condition
Wind speed (km/hr)	3.0

AMBIENT AIR ANALYSIS RESULTS

S. No.	Parameter	Test Method	Result	Unit	Standards limits (24 hours) *
1.	Carbon Monoxide (as CO)	IS 5182 (Part I)	0.32	mg/m³	02

BDL*Below detection limit, NR*=No Relaxation, NT*=No Traceable

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TEST REPORT

Format No-7.8F-01

Report No	Sample code	Report issue date
TC-6394230000002 75F	SMPL/AAQ/275/2023	16/05/2023

SAMPLING DETAILS

1.	Name and Address of Customer:	M/s Dilip Buildcon Limited, Villupuram To Pondicherry Project, DBL Villupuram Highway Limited East Pondicherry Main Road Near Police Check Post Gangaram Palayan. (605108)	
2.	Sampling Location:	Ch No: 18 + 500 Main Camp.	
3.	Type of Sample :	Ambient Air	
4.	Date of sampling : 06/05/2023– 07/05/2023	Sampling Period:	24 hr
5.	Sample collected by:	SRLPL TEAM	
6.	Method of Sampling :	SRL/QR/SP/01	
7.	Packing condition:	Sealed	
8.	Laboratory Sample Receiving date:	11/05/2023	
9.	Period of Sample analysis:	11/05/2023– 16/05/2023	
10	Sampling Machine Placed:	3.0 m above the ground level	

CLIMATICALLY CONDITION

Wind direction	N-W
Avg. Humidity (%)	71
Avg. Ambient Temperature(°C)	35
Environmental condition	Ambient Condition
Wind speed (km/hr)	3.0

AMBIENT AIR ANALYSIS RESULTS

S. No.	Parameter	Test Method	Result	Unit	Standards limits (24 hours) *
1	Respirable Particulate Matter (PM_{10})	IS 5182 PART 23 2006	85.0	$\mu g/m^3$	100
2	Respirable Particulate Matter ($PM_{2.5}$)	CPCB, Volume-I	50.5	$\mu g/m^3$	60
3	Sulphur Dioxide (SO_2)	IS 5182 (Part 2)	16.0	$\mu g/m^3$	80
4	Nitrogen Oxides (as NO_2)	IS 5182 (Part 6)	26.5	$\mu g/m^3$	80

BDL-Below detection limit, NR*-No Relaxation, NP*-No Transfer

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TEST REPORT

Format No-7.8F-01

Report No	Sample code	Report issue date
RPT/2300172	SMPL/AAQ/275/2023	16/05/2023

SAMPLING DETAILS

1.	Name and Address of Customer:	M/s Dilip Buildcon Limited, Viluppuram To Pondicherry Project, DBL Viluppuram Highway Limited East Pondicherry Main Road Near Police Check Post Gangaram Palayan.(605108)	
2.	Sampling Location:	Ch No: 18 + 500 Main Camp.	
3.	Type of Sample :	Ambient Air	
4.	Date of sampling : 06/05/2023– 07/05/2023	Sampling Period:	24 hr
5.	Sample collected by:	SRLPL TEAM	
6.	Method of Sampling :	SRL/QR/SP/01	
7.	Packing condition:	Sealed	
8.	Laboratory Sample Receiving date:	11/05/2023	
9.	Period of Sample analysis:	11/05/2023– 16/05/2023	
10	Sampling Machine Placed:	3.0 m above the ground level	

CLIMATICALLY CONDITION

Wind direction	N -W
Avg. Humidity (%)	71
Avg. Ambient Temperature(°C)	35
Environmental condition	Ambient Condition
Wind speed (km/hr)	3.0

AMBIENT AIR ANALYSIS RESULTS

S. No.	Parameter	Test Method	Result	Unit	Standards limits (24 hours) *
1.	Carbon Monoxide (as CO)	IS 5182 (Part I)	0.29	mg/m³	02

BDL *below detection limit, NR*- No Relaxation, NT*-Not Traceable

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TEST REPORT

Format No-7.8F-01

Report No	Sample code	Report issue date
TC-639423000000276F	SMPL/AAQ/276/2023	16/05/2023

SAMPLING DETAILS

1.	**Name and Address of Customer:**	M/s Dilip Buildcon Limited, Viluppuram To Pondicherry Project, DBL Viluppuram Highway Limited East Pondicherry Main Road Near Police Check Post Gangaram Palayan. (605108)	
2.	**Sampling Location:**	Crusher Plant.	
3.	**Type of Sample :**	Ambient Air	
4.	**Date of sampling : 07/05/2023– 08/05/2023**	Sampling Period:	24 hr
5.	**Sample collected by:**	SRLPL TEAM	
6.	**Method of Sampling :**	SRL/QR/SP/01	
7.	**Packing condition:**	Sealed	
8.	**Laboratory Sample Receiving date:**	11/05/2023	
9.	**Period of Sample analysis:**	11/05/2023– 16/05/2023	
10	**Sampling Machine Placed:**	3.0 m above the ground level	

CLIMATICALLY CONDITION

Wind direction	N -W
Avg. Humidity (%)	70
Avg. Ambient Temperature(°C)	35
Environmental condition	Ambient Condition
Wind speed (km/hr)	3.0

AMBIENT AIR ANALYSIS RESULTS

S. No.	Parameter	Test Method	Result	Unit	Standards limits (24 hours) *
1	Respirable Particulate Matter (PM_{10})	IS 5182 PART 23 2006	90.0	$\mu g/m^3$	100
2	Respirable Particulate Matter ($PM_{2.5}$)	CPCB, Volume-1	52.0	$\mu g/m^3$	60
3	Sulphur Dioxide (SO_2)	IS 5182 (Part 2)	18.0	$\mu g/m^3$	80
4	Nitrogen Oxides (as NO_2)	IS 5182 (Part 6)	30.8	$\mu g/m^3$	80

BDL*Below detection limit, NR*=No Relaxation, NT*=No Threshold

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Research Laboratories Pvt. Ltd.
CIN NO :- U73100UP2009PTC037857

IAS-IAF

TEST REPORT

Format No-7.8F-01

Report No	Sample code	Report issue date
RPT/2300173	SMPL/AAQ/276/2023	16/05/2023

SAMPLING DETAILS

1.	Name and Address of Customer:	M/s Dilip Buildcon Limited, Viluppuram To Pondicherry Project, DBL Viluppuram Highway Limited East Pondicherry Main Road Near Police Check Post Gangaram Palayan (605108)	
2.	Sampling Location:	Crusher Plant.	
3.	Type of Sample :	Ambient Air	
4.	Date of sampling : 07/05/2023– 08/05/2023	Sampling Period:	24 hr
5.	Sample collected by:	SRLPL TEAM	
6.	Method of Sampling :	SRL/QR/SP/01	
7.	Packing condition:	Sealed	
8.	Laboratory Sample Receiving date:	11/05/2023	
9.	Period of Sample analysis:	11/05/2023– 16/05/2023	
10	Sampling Machine Placed:	3.0 m above the ground level	

CLIMATICALLY CONDITION

Wind direction	N -W
Avg. Humidity (%)	70
Avg. Ambient Temperature(°C)	35
Environmental condition	Ambient Condition
Wind speed (km/hr)	3.0

AMBIENT AIR ANALYSIS RESULTS

S. No.	Parameter	Test Method	Result	Unit	Standards limits (24 hours) *
1.	Carbon Monoxide (as CO)	IS 5182 (Part I)	0.28	mg/m³	02

BDL *Below detection limit NR*=No Relaxation NT*=No Threshold

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TEST REPORT

Format No-7.8F-01

Report No	Sample code	Report issue date
TC-639423000000277F	SMPL/AAQ/277/2023	16/05/2023

SAMPLING DETAILS

1.	Name and Address of Customer:	M/s Dilip Buildcon Limited, Viluppuram To Pondicherry Project, DBL Viluppuram Highway Limited East Pondicherry Main Road Near Police Check Post Gangaram Palayan. (605108)	
2.	Sampling Location:	Ch No: 25 Kandamangalam Rural Area	
3.	Type of Sample :	Ambient Air	
4.	Date of sampling : 08/05/2023– 09/05/2023	Sampling Period:	24 hr
5.	Sample collected by:	SRLPL TEAM	
6.	Method of Sampling :	SRL/QR/SP/01	
7.	Packing condition:	Sealed	
8.	Laboratory Sample Receiving date:	11/05/2023	
9.	Period of Sample analysis:	11/05/2023– 16/05/2023	
10	Sampling Machine Placed:	3.0 m above the ground level	

CLIMATICALLY CONDITION

Wind direction	N-W
Avg. Humidity (%)	68
Avg. Ambient Temperature(°C)	34
Environmental condition	Ambient Condition
Wind speed (km/hr)	3.0

AMBIENT AIR ANALYSIS RESULTS

S. No.	Parameter	Test Method	Result	Unit	Standards limits (24 hours) *
1	Respirable Particulate Matter (PM_{10})	IS 5182 PART 23 2006	92.0	$\mu g/m^3$	100
2	Respirable Particulate Matter ($PM_{2.5}$)	CPCB, Volume-I	50.5	$\mu g/m^3$	60
3	Sulphur Dioxide (SO_2)	IS 5182 (Part 2)	16.0	$\mu g/m^3$	80
4	Nitrogen Oxides (as NO_2)	IS 5182 (Part 6)	25.9	$\mu g/m^3$	80

BDL*Below detection level, NR*=No Relaxation, NT*=No Traceable

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Research Laboratories Pvt. Ltd.

CIN NO :- U73100UP2009PTC037857

IAS-IAF

TEST REPORT

Format No-7.8F-01

Report No	Sample code	Report issue date
RPT/2300174	SMPL/AAQ/277/2023	16/05/2023

SAMPLING DETAILS

1.	Name and Address of Customer:	M/s Dilip Buildcon Limited, Viluppuram To Pondicherry Project, DBL Viluppuram Highway Limited East Pondicherry Main Road Near Police Check Post Gangaram Palayan.(605108)	
2.	Sampling Location:	Ch No: 25 Kandamangalam Rural Area	
3.	Type of Sample :	Ambient Air	
4.	Date of sampling : 08/05/2023– 09/05/2023	Sampling Period:	24 hr
5.	Sample collected by:	SRLPL TEAM	
6.	Method of Sampling :	SRL/QR/SP/01	
7.	Packing condition:	Sealed	
8.	Laboratory Sample Receiving date:	11/05/2023	
9.	Period of Sample analysis:	11/05/2023– 16/05/2023	
10	Sampling Machine Placed:	3.0 m above the ground level	

CLIMATICALLY CONDITION

Wind direction	N -W
Avg. Humidity (%)	68
Avg. Ambient Temperature(°C)	34
Environmental condition	Ambient Condition
Wind speed (km/hr)	3.0

AMBIENT AIR ANALYSIS RESULTS

S. No.	Parameter	Test Method	Result	Unit	Standards limits (24 hours) *
1.	Carbon Monoxide (as CO)	IS 5182 (Part I)	0.32	mg/m^3	02

BDL*below detection limit, NR*=No Relaxation, NT*=No Traceable

Page 2/2

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SISODIA

AMBIENT AIR MONITORING

(Reviewed By)	(Authorized Signatory)

DILIP BUILDCON LIMITED	M/s Dilip Buildcon Limited,Villupuram To Pondicherry Project, DBL Villupuram Highway Limited East Pondicherry Main Road Near Police Check Post Gangaram Palayam. (605108)

SISODIA

AMBIENT AIR MONITORING

(Reviewed By)	(Authorized Signatory)

DILIP BUILDCON LIMITED	M/s Dilip Buildcon Limited, Villupuram To Pondicherry Project, DBL Villupuram Highway Limited East Pondicherry Main Road Near Police Check Post Gangaram Pulayan. (605108)

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TEST REPORT

Format No-7.8F-01

Report No	Sample code	Report issue date
TC-639423000000278F	SMPL/ANQ/278/2023	16/05/2023

SAMPLING DETAILS

1.	Name and Address of Customer:	M/s Dilip Buildcon Limited, Viluppuram To Pondicherry Project, DBL Viluppuram Highway Limited East Pondicherry Main Road Near Police Check Post Gangaram Palayan. (605108)
2	Type of Sample :	Ambient Noise
3	Date of sampling :	04/05/2023- 05/05/2023
4	Sample collected by:	SRLPL Team
5	Method of Sampling :	SRL/QR/SP/01
6	Laboratory Data Receiving date:	11/05/2023
7	Period of Data analysis:	11/05/2023– 16/05/2023

AMBIENT NOISE RESULT

Noise Location	Day			Night		
	L_{Max}	L_{Min}	L_{eq}	L_{Max}	L_{Min}	L_{eq}
Ch No: 00 + 00 Jankipuram JN.	75.80	65.70	71.15	64.90	50.30	60.52

Noise (Ambient Standard)

Area Code	Category of Area	Limit in dB (A) Leq	
		Day Time	Night Time
A	Industrial Area	75	70
B	Commercial Area	65	55
C	Residental Area	55	45
D	Silence Zone	50	40

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

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****END OF REPORT****

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TEST REPORT

Format No- 7.8F-01

Report No	Sample code	Report issue date
TC-6394230000000279F	SMPL/ANQ/279/2023	16/05/2023

SAMPLING DETAILS

1.	Name and Address of Customer:	M/s Dilip Buildcon Limited, Villupuram To Pondicherry Project, DBL Villupuram Highway Limited East Pondicherry Main Road Near Police Check Post Gangaram Palayan. (605108)
2	Type of Sample :	Ambient Noise
3	Date of sampling :	05/05/2023– 06/05/2023
4	Sample collected by:	SRLPL Team
5	Method of Sampling :	SRL/QR/SP/01
6	Laboratory Data Receiving date:	11/05/2023
7	Period of Data analysis:	11/05/2023– 16/05/2023

AMBIENT NOISE RESULT

Noise Location	Day			Night		
	L_{Max}	L_{Min}	L_{eq}	L_{Max}	L_{Min}	L_{eq}
Ch No: 00 + 485 Jankipuram	76.90	64.30	72.42	62.90	45.60	60.03

Noise (Ambient Standard)

Area Code	Category of Area	Limit in dB (A) Leq	
		Day Time	Night Time
A	Industrial Area	75	70
B	Commercial Area	65	55
C	Residential Area	55	45
D	Silence Zone	50	40

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

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(Authorized Signatory)

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TEST REPORT

Format No-7.8F-01

Report No	Sample code	Report issue date
TC-6394230000000280F	SMPL/ANQ/280/2023	16/05/2023

SAMPLING DETAILS

1.	Name and Address of Customer:	M/s Dilip Buildcon Limited, Viluppuram To Pondicherry Project, DBL Viluppuram Highway Limited East Pondicherry Main Road Near Police Check Post Gangaram Pakyan. (605108)
2	Type of Sample :	Ambient Noise
3	Date of sampling :	06/05/2023– 07/05/2023
4	Sample collected by:	SRLPL Team
5	Method of Sampling :	SRL/QR/SP/01
6	Laboratory Data Receiving date:	11/05/2023
7	Period of Data analysis:	11/05/2023– 16/05/2023

AMBIENT NOISE RESULT

Noise Location	Day			Night		
	L_{Max}	L_{Min}	L_{eq}	L_{Max}	L_{Min}	L_{eq}
Ch No: 18 + 500 Main Camp.	76.5	63.6	70.9	60.1	50.1	53.5

Noise (Ambient Standard)

Area Code	Category of Area	Limit in dB (A) Leq	
		Day Time	Night Time
A	Industrial Area	75	70
B	Commercial Area	65	55
C	Residential Area	55	45
D	Silence Zone	50	40

Note: 1. Day time shall mean from 6.00 a.m. to 10.00 p.m.
2. Night time shall mean 5 a.m. to 10.00 p.m. to 6.00 a.m.
3. Silence zone is an area comprising not less than 100 metres around hospitals, educational institutions, courts, religious places or any other area which is declared as such by the competent authority.
4. Mixed categories of areas may be declared as one of the four above mentioned categories by the competent authority.

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TEST REPORT

Format No-7.HF-01

Report No	Sample code	Report issue date
TC-6394230000000281F	SMPL/ANQ/281/2023	16/05/2023

SAMPLING DETAILS

1.	Name and Address of Customer:	M/s Dilip Buildcon Limited, Viluppuram To Pondicherry Project, DBL Viluppuram Highway Limited East Pondicherry Main Road Near Police Check Post Gangaram Palayan. (605108)
2	Type of Sample :	Ambient Noise
3	Date of sampling :	07/05/2023– 08/05/2023
4	Sample collected by:	SRLPL Team
5	Method of Sampling :	SRL/QR/SP/01
6	Laboratory Data Receiving date:	11/05/2023
7	Period of Data analysis:	11/05/2023– 16/05/2023

AMBIENT NOISE RESULT

Noise Location	Day			Night		
	L_{Max}	L_{Min}	L_{eq}	L_{Max}	L_{Min}	L_{eq}
Crusher Plant	74.5	68.0	72.6	57.80	52.50	53.6

Noise (Ambient Standard)

Area Code	Category of Area	Limit in dB (A) Leq	
		Day Time	Night Time
A	Industrial Area	75	70
B	Commercial Area	65	55
C	Residential Area	55	45
D	Silence Zone	50	40

Note:

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TEST REPORT

Format No-7.8F-01

Report No	Sample code	Report issue date
TC-6394230000000282F	SMPL/ANQ/282/2023	16/05/2023

SAMPLING DETAILS

1.	Name and Address of Customer:	M/s Dilip Buildcon Limited, Villupuram To Pondicherry Project, DBL Villupuram Highway Limited East Pondicherry Main Road Near Police Check Post Gangaram Palayan. (605108)
2	Type of Sample :	Ambient Noise
3	Date of sampling :	08/05/2023– 09/05/2023
4	Sample collected by:	SRLPL Team
5	Method of Sampling :	SRL/QR/SP/01
6	Laboratory Data Receiving date:	11/05/2023
7	Period of Data analysis:	11/05/2023– 16/05/2023

AMBIENT NOISE RESULT

Noise Location	Day			Night		
	L_{Max}	L_{Min}	L_{eq}	L_{Max}	L_{Min}	L_{eq}
Ch No: 25 Kandamangalam Rural Area	82.10	60.20	73.30	69.20	50.00	60.4

Noise (Ambient Standard)

Area Code	Category of Area	Limit in dB (A) Leq	
		Day Time	Night Time
A	Industrial Area	75	70
B	Commercial Area	65	55
C	Residential Area	55	45
D	Silence Zone	50	40

Note: 1. Day time shall mean from 6.00 a.m. to 10.00 p.m.
2. Night time shall mean from 10.00 p.m. to 6.00 a.m.
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SISUDIA

AMBIENT NOISE MONITORING

(Reviewed By)	(Authorized Signatory)

DILIP BUILDCON LIMITED	M/s Dilip Buildcon Limited,Villupuram To Pondicherry Project, DBL Villupuram Highway Limited East Pondicherry Main Road Near Police Check Post Gangaram Palayan. (605108)

SISU DLA

AMBIENT NOISE MONITORING

(Reviewed By)	(Authorised Signatory)

DILIP BUILDCON LIMITED	M/s Dilip Buildcon Limited,Villupuram To Pondicherry Project, DBL Villupuram Highway Limited East Pondicherry Main Road Near Police Check Post Gangaram Palayan. (605108)

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TEST REPORT

Format No- 7.8F-01

Report No	Sample code	Report issue date
TC-639423000000283F	SMPL/DGQ/283/2023	16/05/2023

SAMPLING DETAILS

1.	Name and Address of Customer:	M/s Dilip Buildcon Limited, Villupuram To Pondicherry Project, DBL Villupuram Highway Limited East PondicherryMain Road Near Police Check Post Gangaram Palayan. (605108)
2.	Sampling Location:	Jankipuram Ch No: 0 + 485
3.	Type of Sample :	D.G. Stack- 400 KVA
4.	Date of Sampling	06/05/2023
5.	Sample Collection :	SRLPL Team
6.	Laboratory Sample Receiving date:	11/05/2023

TEST RESULTS

S. No.	Particulars			Value
1.	Capacity of D.G Set			400 (KVA)
2.	Stack Attached to			D.G Set Exhaust
3.	Type of Stack			Circular
4.	Height of the duct from the ground (m)			9.0
5.	Diameter of the duct (m)			9.0
6.	Material of Construction of duct			M.S.
7.	Type of fuel used			HSD oil
8.	Quantity of fuel used Lit. per Hr			21
9.	Sampling Duration(min)			35
10.	Atmospheric Pressure (mmHg)			756
11.	Atmospheric temperature (°K)			305
12.	Flue Gas temperature (°K)			422
13.	Flue Gas Exist Velocity (m/s)			15.8
14.	Concentration of Pollutant in flue Gas	Pollutant	Result	Standard*
		PM (g/kw-hr)	0.15	0.2
		CO (g/kw-hr)	1.45	3.5

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Research Laboratories Pvt. Ltd.

CIN NO :- U73100UP2009PTC037857

IAS-IAF

Format No- 7.8F-01

TEST REPORT

Report No.	Sample code	Report issue date
RPT/2300175	SMPL/DGQ/283/2023	16/05/2023

SAMPLING DETAILS

1.	Name and Address of Customer:	M/s Dilip Buildcon Limited, Villupuram Pondicherry Project, DBL Villupuram Highway Limited East PondicherryMain Road Near Police Check Post Gangaram Palayan. (605108)
2.	Sampling Location:	Jankipuram Ch No: 0 + 485
3.	Type of Sample :	D.G. Stack- 400 KVA
4.	Date of Sampling	06/05/2023
5.	Sample Collection :	SRLPL Team
6.	Laboratory Sample Receiving date:	11/05/2023

TEST RESULTS

S. No.	Particulars			Value
1.	Capacity of D.G Set			400(KVA)
2.	Stack Attached to			D.G.Set Exhaust
3.	Type of Stack			Circular
4.	Height of the duct from the ground (m)			9.0
5.	Diameter of the duct (m)			9.0
6.	Material of Construction of duct			M.S.
7.	Type of fuel used			HSD oil
8.	Quantity of fuel used Lit. per Hr			21
9.	Sampling Duration(min)			35
10.	Atmospheric Pressure (mmHg)			756
11.	Atmospheric temperature (°K)			305
12.	Flue Gas temperature (°K)			422
13.	Flue Gas Exist Velocity (m/s)			15.8
14.	Concentration of Pollutant in flue Gas	Pollutant	Result	Standard*
		Nox+HC (g/kw-hr)	1.38	4.0

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(Reviewed By)

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TEST REPORT

Format No- 7.8F-01

Report No	Sample code	Report Issue date
TC-6394230000000078F	SMPL/DGQ/284/2023	16/05/2023

SAMPLING DETAILS

1.	Name and Address of Customer:	M/s Dilip Buildcon Limited, Villupuram To Pondicherry Project, DBL Villupuram Highway Limited East PondicherryMain Road Near Police Check Post Gangaram Palayan. (605108)
2.	Sampling Location:	Ch No: 18 + 500 Main Camp.
3.	Type of Sample :	D.G. Stack- 430 KVA
4.	Date of Sampling	08/05/2023
5.	Sample Collection :	SRLPL Team
6.	Laboratory Sample Receiving date:	11/05/2023

TEST RESULTS

S. No.	Particulars			Value
1.	Capacity of D.G Set			430 (KVA)
2.	Stack Attached to			D.G.Set Exhaust
3.	Type of Stack			Circular
4.	Height of the duct from the ground (m)			10.0
5.	Diameter of the duct (m)			9.0
6.	Material of Construction of duct			M.S.
7.	Type of fuel used			HSD oil
8.	Quantity of fuel used Lit. per Hr			23-25
9.	Sampling Duration(min)			45
10.	Atmospheric Pressure (mmHg)			756
11.	Atmospheric temperature (°K)			303
12.	Flue Gas temperature (°K)			400
13.	Flue Gas Exist Velocity (m/s)			16.5
14.	Concentration of Pollutant in flue Gas	Pollutant	Result	Standard*
		PM (g/kw-hr)	0.09	0.2
		CO (g/kw-hr)	1.6	3.5

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CIN NO :- U73100UP2009PTC037857

IAS-IAF

Format No- 7.8F-01

TEST REPORT

Report No.	Sample code	Report issue date
RPT/2300176	SMPL/DGQ/284/2023	16/05/2023

SAMPLING DETAILS

1.	Name and Address of Customer:	M/s Dilip Buildcon Limited, Villupuram To Pondicherry Project, DBL Villupuram Highway Limited East PondicherryMain Road Near Police Check Post Gangaram Palayan. (605108)
2.	Sampling Location:	Ch No: 18 + 500 Main Camp.
3.	Type of Sample :	D.G. Stack- 430 KVA
4.	Date of Sampling	08/05/2023
5.	Sample Collection :	SRLPL Team
6.	Laboratory Sample Receiving date:	11/05/2023

TEST RESULTS

S. No.	Particulars	Value		
1.	Capacity of D.G Set	430 (KVA)		
2.	Stack Attached to	D.G.Set Exhaust		
3.	Type of Stack	Circular		
4.	Height of the duct from the ground (m)	10.0		
5.	Diameter of the duct (m)	9.0		
6.	Material of Construction of duct	M.S.		
7.	Type of fuel used	HSD oil		
8.	Quantity of fuel used Lit. per Hr	23-25		
9.	Sampling Duration(min)	45		
10.	Atmospheric Pressure (mmHg)	756		
11.	Atmospheric temperature (°K)	303		
12.	Flue Gas temperature (°K)	400		
13.	Flue Gas Exist Velocity (m/s)	16.5		
14.	Concentration of Pollutant in flue Gas	Pollutant	Result	Standard*
		Nox+HC (g/kw-hr)	1.15	4.0

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SISODIA

DG STACK MONITORING

(Reviewed By)	(Authorized Signatory)

DILIP BUILDCON LIMITED	M/s Dilip Buildcon Limited,Villupuram To Pondicherry Project, DBL Villupuram Highway Limited East Pondicherry Main Road Near Police Check Post Gangaram Palayan. (605108)

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TEST REPORT

Format No-7.8F-01

Report No	Sample code	Report issue date
TC-639423000000285F	SMPL/WZNQ/285/2023	16/05/2023

SAMPLING DETAILS

1.	Name and Address of Customer:	M/s Dilip Buildcon Limited, Villupuram To Pondicherry Project, DBL Villupuram Highway Limited East PondicherryMain Road Near Police Check Post Gangaram Palayan. (605108)
2	Type of Sample :	D.G. Noise
3	Date of sampling :	06/05/2023
4	Sample collected by:	SRLPL Team
5	Method of Sampling :	SRL/QR/SP/01
6	Laboratory Data Receiving date:	11/05/2023
7	Period of Data analysis:	11/05/2023-16/05/2023

WORKZONE NOISE RESULT

Noise Location	Limit in db (A) L eq		
	L_{Max}	L_{Min}	L_{eq}
Jankipuram Ch No: 0 + 485	83.90	73.80	78.89

Noise (Workzone Standard as per factories Act.)

Sr. No	Category of Area	Limit in dB (A) Leq
A	Work Place Area	90

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TEST REPORT

Format No-7.8F-01

Report No	Sample code	Report issue date
TC-6394230000000286F	SMPL/WZNQ/286/2023	16/05/2023

SAMPLING DETAILS

1.	Name and Address of Customer:	M/s Dilip Buildcon Limited, Villupuram To Pondicherry Project, DBL Villupuram Highway Limited East PondicherryMain Road Near Police Check Post Gangaram Palayan. (605108)
2	Type of Sample :	D.G. Noise
3	Date of sampling :	08/05/2023
4	Sample collected by:	SRLPL Team
5	Method of Sampling :	SRL/QR/SP/01
6	Laboratory Data Receiving date:	11/05/2023
7	Period of Data analysis:	11/05/2023-16/05/2023

WORKZONE NOISE RESULT

Noise Location	Limit in Db (A) L eq		
	L_{Max}	L_{Min}	L_{eq}
Ch No: 18 + 500 Main Camp.	84.9	74.00	79.45

Noise (Workzone Standard as per factories Act.)

Sr. No	Category of Area	Limit in dB (A) L eq
A	Work Place Area	90

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DG NOISE MONITORING

(Reviewed By)	(Authorized Signatory)

DILIP BUILDCON LIMITED	M/s Dilip Buildcon Limited, Villupuram To Pondicherry Project, DBL Villupuram Highway Limited East Pondicherry Main Road Near Police Check Post Gangaram Pulayan. (605108)

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TEST REPORT

Format No- 7.8F-01

Report No	Sample code	Report issue date
TC-6394230000000287F	SMPL/SQ/287/2023	16/05/2023

SAMPLING DETAIL

1	Name and Address of Customer:	M/s Dilip Buildcon Limited, Vilhupuram To Poodicherry Project, DBL Vilhupuram Highway Limited East PondicherryMain Road Near Police Check Post Gangaram Palayan. (605108)		
2	Sampling Location:	CH N. : 14+080		
3	Type of Sample :	Soil		
4	Date of sampling: 05/05/2023	Sampling Timing:	NA	
5	Sample collected by:	SRLPL Team		
6	Method of Sampling :	SRL/QR/SP/01		
7	Packing condition: Sealed	Container:	2 kg/PP Bag	
8	Laboratory Sample Receiving date:	11/05/2023		
9	Period of Sample analysis:	11/05/2023-16/05/2023		
10	Humidity (%) 70	Ambient Temperature(°C)	30	

SOIL TESTING RESULT

Sl. No.	Parameters	Unit	Test Method	Result
1.	pH	-	IS:2720(PART-26):2011	9.30
2.	Conductivity	µmhos/cm	IS:14767 2000: 2016	1150
3.	Moisture content	%	IS:2720(PART 2):2015	8.9
4.	Organic Matter	%	IS:2720(PART 22):2015	0.57
5.	Water Holding Capacity	%	USDA Method	65

BDL*below detection Limit NR*–No Relaxation, NT*–No Traceable

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Research Laboratories Pvt. Ltd.

CIN NO :- U73100UP2009PTC037857

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TEST REPORT

Report No	Sample code	Report issue date
RPT/2300177	SMPL/SQ/287/2023	16/05/2023

SAMPLING DETAIL

1	Name and Address of Customer:	M/s Dilip Buildcon Limited, Villupuram To Pondicherry Project, DBL Villupuram Highway Limited East PondicherryMain Road Near Police Check Post Gangaram Palayan. (605108)		
2	Sampling Location:	CH N. : 14+080		
3	Type of Sample :	Soil		
4	Date of sampling: 05/05/2023	Sampling Timing:	NA	
5	Sample collected by:	SRLPL Team		
6	Method of Sampling :	SRL/QR/SP/01		
7	Packing condition: Sealed	Container:	2 kg/PP Bag	
8	Laboratory Sample Receiving date:	11/05/2023		
9	Period of Sample analysis:	11/05/2023-16/05/2023		
10	Humidity (%) 70	Ambient Temperature(°C)	30	

SOIL TESTING RESULT

Sl. No.	Parameters	Unit	Result
1.	Magnesium	mg/kg	4.5
2.	Sodium	mg/kg	18
3.	Potassium	mg/kg	156.7
4.	Total Organic Carbon	mg/kg	15.8
5.	Bulk Density	g/cm^3	1.48
6.	Residual Chlorine	%	0.2
7.	Iron	mg/kg	15.7
8.	Oil & Grease	ppm	125.0
9.	Chloride	mg/kg	23.55
10.	Copper	mg/kg	0.20
11.	Cobalt	mg/kg	BDL
12.	Lead	mg/kg	1.18
13.	Mercury	mg/kg	BDL
14.	Zinc	mg/kg	2.4
15.	Manganese	mg/kg	14.06
16.	Chromium	mg/kg	1.2
17.	Sodium Absorption Ratio	%	7.6
18.	Cadmium	mg/kg	0.87
19.	Sulphate	mg/kg	15.7

BDL*-below detection Limit NR*-No Relaxation, NT**-No Traceable

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END OF REPORT

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CIN No :- U73100UP2009PTC037857

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TEST REPORT

Format No- 7.8F-4(

Report No	Sample code	Report issue date
TC-6394230000002888	SMPL/SQ/288/2023	16/05/2023

SAMPLING DETAIL

1	Name and Address of Customer:	M/s Dilip Buildcon Limited, Villupuram To Pondicherry Project, DBL Villupuram Highway Limited East PondicherryMain Road Near Police Check Post Gangaram Palayan. (605108)		
2	Sampling Location:	CH N. : 7+320		
3	Type of Sample :	Soil		
4	Date of sampling: 05/05/2023	Sampling Timing:	NA	
5	Sample collected by:	SRLPL Team		
6	Method of Sampling :	SRL/QR/SP/01		
7	Packing condition: Sealed	Container:	2 kg/PP Bag	
8	Laboratory Sample Receiving date:	11/05/2023		
9	Period of Sample analysis:	11/05/2023-16/05/2023		
10	Humidity (%) 69	Ambient Temperature(°C)	31	

SOIL TESTING RESULT

Sl. No.	Parameters	Unit	Test Method	Result
1.	pH	-	IS:2720(PART-26):2011	8.8
2.	Conductivity	µmhos/cm	IS:14767 2000: 2016	1302
3.	Moisture content	%	IS:2720(PART 2):2015	10.5
4.	Organic Matter	%	IS:2720(PART 22):2015	0.75
5.	Water Holding Capacity	%	USDA Method	67

BDL=below detection Limit NR*=No Relaxation, NT*=No Traceable.

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TEST REPORT

Report No	Sample code	Report issue date
RPT/2300178	SMPL/SQ/288/2023	16/05/2023

SAMPLING DETAIL

1	Name and Address of Customer:	M/s Dilip Buildcon Limited, Villupuram To Pondicherry Project, DBL Villupuram Highway Limited East PondicherryMain Road Near Police Check Post Gangaram Palayan. (605108)		
2	Sampling Location:	CH N. :7+320		
3	Type of Sample :	Soil		
4	Date of sampling: 05/05/2023	Sampling Timing:	NA	
5	Sample collected by:	SRLPL Team		
6	Method of Sampling :	SRL/QR/SP/01		
7	Packing condition: Sealed	Container:	2 kg/PP Bag	
8	Laboratory Sample Receiving date:	11/05/2023		
9	Period of Sample analysis:	11/05/2023-16/05/2023		
10	Humidity (%) 69	Ambient Temperature (°C)	31	

SOIL TESTING RESULT

Sl. No.	Parameters	Unit	Result
1.	Magnesium	mg/kg	4.7
2.	Sodium	mg/kg	21.5
3.	Potassium	mg/kg	156
4.	Total Organic Carbon	mg/kg	15.7
5.	Bulk Density	g/cm³	1.38
6.	Residual Chlorine	%	0.2
7.	Iron	mg/kg	16.6
8.	Oil & Grease	ppm	142.0
9.	Chloride	mg/kg	23.99
10.	Copper	mg/kg	0.16
11.	Cobalt	mg/kg	BDL
12.	Lead	mg/kg	1.2
13.	Mercury	mg/kg	BDL
14.	Zinc	mg/kg	2.8
15.	Manganese	mg/kg	14.8
16.	Chromium	mg/kg	1.0
17.	Sodium Absorption Ratio	%	8.0
18.	Cadmium	mg/kg	0.88
19.	Sulphate	mg/kg	18.5

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BDL*-below detection Limit NR*-No Relaxation, NT*-No Traceable.

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TEST REPORT

Format No- 7.8F-01

Report No	Sample code	Report issue date
TC-6394230000000289F	SMPL/SQ/289/2023	16/05/2023

SAMPLING DETAIL

1	Name and Address of Customer:	M/s Dilip Buildcon Limited, Villupuram To Pondicherry Project, DBL Villupuram Highway Limited East PondicherryMain Road Near Police Check Post Gangaram Palayan. (605108)		
2	Sampling Location:	CH N. :3+100		
3	Type of Sample :	Soil		
4	Date of sampling: 05/05/2023	Sampling Timing:	NA	
5	Sample collected by:	SRLPL Team		
6	Method of Sampling :	SRL/QR/SP/01		
7	Packing condition: Sealed	Container:	2 kg/PP Bag	
8	Laboratory Sample Receiving date:	11/05/2023		
9	Period of Sample analysis:	11/05/2023-16/05/2023		
10	Humidity (%) 72	Ambient Temperature(°C)	33	

SOIL TESTING RESULT

Sl. No.	Parameters	Unit	Test Method	Result
1.	pH	-	IS:2720(PART-26):2011	8.9
2.	Conductivity	µmhos/cm	IS:14767 2000: 2016	1215
3.	Moisture content	%	IS:2720(PART 2):2015	9.55
4.	Organic Matter	%	IS:2720(PART 22):2015	0.76
5.	Water Holding Capacity	%	USDA Method	68

BDL*-below detection Limit NR**-No Relaxation, NT**-No Traceable

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TEST REPORT

Report No	Sample code	Report issue date
RPT/2300179	SMPL/SQ/289/2023	16/05/2023

SAMPLING DETAIL

1	Name and Address of Customer:	M/s Dilip Buildcon Limited, Villupuram To Pondicherry Project, DBL Villupuram Highway Limited East PondicherryMain Road Near Police Check Post Gangaram Palayan. (605108)		
2	Sampling Location:	CH N. :3+100		
3	Type of Sample :	Soil		
4	Date of sampling: 05/05/2023	Sampling Timing:	NA	
5	Sample collected by:	SRLPL Team		
6	Method of Sampling :	SRL/QR/SP/01		
7	Packing condition: Sealed	Container:	2 kg/PP Bag	
8	Laboratory Sample Receiving date:	11/05/2023		
9	Period of Sample analysis:	11/05/2023-16/05/2023		
10	Humidity (%) 72	Ambient Temperature(°C)	33	

SOIL TESTING RESULT

Sl. No.	Parameters	Unit	Result
1.	Magnesium	mg/kg	3.95
2.	Sodium	mg/kg	21.2
3.	Potassium	mg/kg	146.2
4.	Total Organic Carbon	mg/kg	15.07
5.	Bulk Density	g/cm^3	1.82
6.	Residual Chlorine	%	0.2
7.	Iron	mg/kg	14.6
8.	Oil & Grease	ppm	142.0
9.	Chloride	mg/kg	23.00
10.	Copper	mg/kg	0.16
11.	Cobalt	mg/kg	BDL
12.	Lead	mg/kg	1.18
13.	Mercury	mg/kg	BDL
14.	Zinc	mg/kg	2.7
15.	Manganese	mg/kg	14.48
16.	Chromium	mg/kg	1.1
17.	Sodium Absorption Ratio	%	7.5
18.	Cadmium	mg/kg	0.95
19.	Sulphate	mg/kg	17.6

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BDL*below detection Limit NR**-No Relaxation, NT***-No Traceable

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SOIL MONITORING

(Reviewed By)	(Authorized Signatory)

DILIP BUILDCON LIMITED	M/s Dilip Buildcon Limited, Villupuram To Pondicherry Project, DBL Villupuram Highway Limited East Pondicherry Main Road Near Police Check Post Gangaram Palayan. (605108)

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TEST REPORT

Format No-7.8F-01

URL/ Report No	Sample code	Report issue date
TC-639423000000290F	SMPL/DWQ/290/2023	16/05/2023

SAMPLING DETAIL

1.	Name and Address of Customer:	M/s Dilip Buildcon Limited,Villupuram To Pondicherry Project, DBL Villupuram Highway Limited East Pondicherry Main Road Near Police Check Post Gangaram Palayan. (605108)		
2.	Sampling Location:	Ch No: 18 + 500 Main Camp.		
3.	Type of Sample :	DRINKING WATER		
4.	Date of sampling : 08/05/2023	Sampling Timing:	9:30 AM	
5.	Sample Given by:	Customer		
6.	Method of Sampling :	SRL/QR/SP/01		
7.	Packing condition: Sealed	Quantity Of Sample:	2 Liter, HDPE	
8.	Laboratory Sample Receiving date:	11/05/2023		
9.	Period of Sample analysis:	11/05/2023– 16/05/2023		

DRINKING WATER TESTING RESULT

Sr. No.	Parameters	Reference Method	Unit	Result	BIS Standard IS 10500: 2012 Requirement (Acceptable limit)	BIS Standard IS 10500: 2012 Permissible limit in the absence of alternate source
1.	pH	IS 3025 P,11	-	7.40	6.5 - 8.5	NR*
2.	Turbidity	IS 3025 P,10	NTU	NIL	1	5
3.	Taste	APHA 2160-B	–	Agreeable	Agreeable	Agreeable
4.	Total Dissolve Solids	IS 3025 P,16	mg/l	92	500	2000
5.	Total Hardness as CaCo3	IS 3025 P,21	mg/l	116.0	200	600
6.	Calcium as Ca	IS 3025 P,40	mg/l	38.0	75	200
7.	Magnesium as Mg	IS 3025 P,46	mg/l	5.10	30	100
8.	Total Alkalinity as CaCo3	IS 3025 P,23	mg/l	120.0	200	600
9.	Chloride as Cl	IS 3025 P,32	mg/l	11.99	250	1000
10.	Sulphate as So4	IS 3025 P,24	mg/l	12.0	200	400
11.	Nitrate as No3	IS 3025 P,34	mg/l	6.0	45	NR*
12.	Fluoride as F	IS 3025 P,60	mg/l	NT	1	1.5
13.	Residual Free Chlorine	IS 3025 P,26	mg/l	NT	0.2	1
14.	Iron as Fe	IS 3025 P,53	mg/l	BDL	0.3	NR*
15.	Electrical Conductivity	IS 3025 P,14	µmhos/cm	214	-	-
16.	Odour	APHA 2150-B	-	Agreeable	Agreeable	Agreeable
17.	Colour	APHA 2120 B	Hazen	<1.0	5.0	15.0
18.	Zinc as Zn	IS: 3025 (Part-49)	mg/l	N.T	5	15
19.	Copper as Cu	IS: 3025 (Part-42)	mg/l	N.T	0.05	1.5
20.	Manganese as Mn	IS: 3025 (Part-59)	mg/l	N.T	0.1	0.3
21.	Lead as Pb	IS: 3025 (Part-47)	mg/l	N.T	0.01	No Relaxation
22.	Aluminium as Al	IS: 3025 (Part-55)	mg/l	N.T	0.03	0.2
23.	Cadmium as Cd	IS: 3025 (Part-41)	mg/l	N.T	0.003	No Relaxation
24.	Nickel as Ni	IS: 3025 (Part-54)	mg/l	N.T	0.02	No Relaxation
25.	Mercury as Hg	IS: 3025 (Part-48)	mg/l	N.T	0.001	No Relaxation
26.	Sulphide as H2S	IS: 3025 (Part-29)	mg/l	N.T	0.05	No Relaxation
27.	Total Chromium as Cr	IS: 3025 (Part52)	mg/l	N.T	0.05	0.05

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BDL=Below detection Limit NR*=No Relaxation, NT**=Not Traceable

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CIN NO :- U73100UP2009PTC037857

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TEST REPORT

Format No-7.8F-01

Report No	Sample code	Report issue date
RPT/2300180	SMPL/DWQ/290/2023	16/05/2023

SAMPLING DETAIL

1.	Name and Address of Customer:	M/s Dilip Buildcon Limited,Villupuram To Pondicherry Project, DBL Villupuram Highway Limited East Pondicherry Main Road Near Police Check Post Gangaram Palayan. (605108)		
2.	Sampling Location:	Ch No: 18 + 500 Main Camp.		
3.	Type of Sample :	DRINKING WATER		
4.	Date of sampling : 08/05/2023	Sampling Timing:	9:30 AM	
5.	Sample Given by:	Customer		
6.	Method of Sampling :	SRL/QR/SP/01		
7.	Packing condition: Sealed	Quantity Of Sample:	2 Liter, HDPE	
8.	Laboratory Sample Receiving date:	11/05/2023		
9.	Period of Sample analysis:	11/05/2023– 16/05/2023		

DRINKING WATER TESTING RESULT

Sr. No.	Parameters	Reference Method	Unit	Result	BIS Standard IS 10500: 2012	
					Requirement (Acceptable limit)	Permissible limit in the absence of alternate source
28.	Total Coliform	APHA-9221- E	MPN/100ml	Absent	Shall not be detected in 100 ml sample	
29.	E-Coli, per 100 ml	IS 5887-(P-1)	MPN/100ml	Absent		

BDL*below detection Limit NR*=No Relaxation, NT*=No Traceable

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TEST REPORT

Format No-7.8F-01

URL/Report No	Sample code	Report issue date
TC-6394230000000291F	SMPL/DWQ/291/2023	16/05/2023

SAMPLING DETAIL

1.	Name and Address of Customer:	M/s Dilip Buildcon Limited,Villupuram To Pondicherry Project, DBL Villupuram Highway Limited East Pondicherry Main Road Near Police Check Post Gangaram Palayan. (605108)		
2.	Sampling Location:	Ch No: 00 + 485 Jankipuram.		
3.	Type of Sample :	DRINKING WATER		
4.	Date of sampling : 08/05/2023	Sampling Timing:	9:45 AM	
5.	Sample Given by:	Customer		
6.	Method of Sampling :	SRL/QR/SP:01		
7.	Packing condition: Sealed	Quantity Of Sample:	2 Liter, HDPE	
8.	Laboratory Sample Receiving date:	11/05/2023		
9.	Period of Sample analysis:	11/05/2023– 16/05/2023		

DRINKING WATER TESTING RESULT

Sr. No.	Parameters	Reference Method	Unit	Result	BIS Standard IS 10500: 2012 Requirement (Acceptable limit)	BIS Standard IS 10500: 2012 Permissible limit in the absence of alternate source
1.	pH	IS 3025 P,11	-	7.3	6.5 - 8.5	NR*
2.	Turbidity	IS 3025 P,10	NTU	1.0	1	5
3.	Taste	APHA 2160-B	--	Agreeable	Agreeable	Agreeable
4.	Total Dissolve Solids	IS 3025 P,16	mg/l	124.0	500	2000
5.	Total Hardness as CaCo3	IS 3025 P,21	mg/l	150.0	200	600
6.	Calcium as Ca	IS 3025 P,40	mg/l	44.9	75	200
7.	Magnesium as Mg	IS 3025 P,46	mg/l	9.17	30	100
8.	Total Alkalinity as CaCo3	IS 3025 P,23	mg/l	170.0	200	600
9.	Chloride as Cl	IS 3025 P,32	mg/l	13.99	250	1000
10.	Sulphate as So4	IS 3025 P,24	mg/l	24.0	200	400
11.	Nitrate as No3	IS 3025 P,34	mg/l	8.0	45	NR*
12.	Fluoride as F	IS 3025 P,60	mg/l	NT	1	1.5
13.	Residual Free Chlorine	IS 3025 P,26	mg/l	NT	0.2	1
14.	Iron as Fe	IS 3025 P,53	mg/l	BDL	0.3	NR*
15.	Electrical Conductivity	IS 3025 P,14	µmhos/cm	268	-	-
16.	Odour	APHA 2150-B	-	Agreeable	Agreeable	Agreeable
17.	Colour	APHA 2120 B	Hazen	<1.0	5.0	15.0
18.	Zinc as Zn	IS: 3025 (Part-49)	mg/l	N.T	5	15
19.	Copper as Cu	IS: 3025 (Part-42)	mg/l	N.T	0.05	1.5
20.	Manganese as Mn	IS: 3025 (Part-59)	mg/l	N.T	0.1	0.3
21.	Lead as Pb	IS: 3025 (Part-47)	mg/l	N.T	0.01	No Relaxation
22.	Aluminium as Al	IS: 3025 (Part-55)	mg/l	N.T	0.03	0.2
23.	Cadmium as Cd	IS: 3025 (Part-41)	mg/l	N.T	0.003	No Relaxation
24.	Nickel as Ni	IS: 3025 (Part-54)	mg/l	N.T	0.02	No Relaxation
25.	Mercury as Hg	IS: 3025 (Part-48)	mg/l	N.T	0.001	No Relaxation
26.	Sulphide as H2S	IS: 3025 (Part-29)	mg/l	N.T	0.05	No Relaxation
27.	Total Chromium as Cr	IS: 3025 (Part52)	mg/l	N.T	0.01	0.05

BDL*-below detection Limit NR*-No Relaxation, NT*-No Traceable

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Research Laboratories Pvt. Ltd.

CIN NO :- U73100UP2009PTC037857

IAS-IAF

TEST REPORT

Format No-7.8F-01

Report No	Sample code	Report Issue date
RPT/2300181	SMPL/DWQ/291/2023	16/05/2023

SAMPLING DETAIL

1.	Name and Address of Customer:	M/s Dilip Buildcon Limited,Villupuram To Pondicherry Project, DBL Villupuram Highway Limited East Pondicherry Main Road Near Police Check Post Gangaram Palayan. (605108)		
2.	Sampling Location:	Ch No: 00 + 485 Jankipuram.		
3.	Type of Sample :	DRINKING WATER		
4.	Date of sampling : 08/05/2023	Sampling Timing:	9:45 AM	
5.	Sample Given by:	Customer		
6.	Method of Sampling :	SRL/QR/SP/01		
7.	Packing condition: Sealed	Quantity Of Sample:	2 Liter, HDPE	
8.	Laboratory Sample Receiving date:	11/05/2023		
9.	Period of Sample analysis:	11/05/2023– 16/05/2023		

DRINKING WATER TESTING RESULT

Sr. No.	Parameters	Reference Method	Unit	Result	BIS Standard IS 10500: 2012 Requirement (Acceptable limit)	Permissible limit in the absence of alternate source
28.	Total Coliform	APHA-9221- E	MPN/100ml	Absent	Shall not be detected in 100 ml sample	
29.	E-Coli, per 100 ml	IS 5887-(P-1)	MPN/100ml	Absent		

BDL*-below detection Limit NR*-No Relaxation, NT**-No Traceable

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END OF REPORT

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TEST REPORT

Format No- 7.8F-01

ULR/Report No	Sample code	Report issue date
TC-639423000000292F	SMPL/DWQ/292/2023	16/05/2023

SAMPLING DETAILS

1.	Name and Address of Customer:	M/s Dilip Buildcon Limited,Villupuram To Pondicherry Project, DBL Villupuram Highway Limited East Pondicherry Main Road Near Police Check Post Gangaram Palayan. (605108)		
2.	Sampling Location:	Ch No: 18 + 500 Main Camp.		
3.	Type of Sample :	Ground Water		
4.	Date of sampling : 08/05/2023	Sampling Timing:	10:00 AM	
5.	Sample collected by:	SRLPL Team		
6.	Method of Sampling :	SRL/QR/SP/01		
7.	Packing condition: Sealed	Container:	2 Liter, HDPE	
8.	Laboratory Sample Receiving date:	11/05/2023		
9.	Period of Sample analysis:	11/05/2023– 16/05/2023		

GROUND WATER TESTING RESULT

Sr. No.	Parameters	Reference Method	Unit	Result	BIS Standard IS 10500: 2012	
					Requirement (Acceptable limit)	Permissible limit in the absence of alternate source
1	pH	IS 3025 P,11	-	7.2	6.5 - 8.5	NR*
2	Turbidity	IS 3025 P,10	NTU	1.0	1	5
3	Electrical Conductivity	IS 3025 P,14	µmhos/cm	720	-	-
4	Total Suspended Solids	IS 3025 P,17	mg/l	3.0	-	-
5	Total Dissolve Solids	IS 3025 P,16	mg/l	368	500	2000
6	Total Solids	IS 3025 P,15	mg/l	371	-	-
7	Total Hardness as $CaCO_3$	IS 3025 P,21	mg/l	200.8	200	600
8	Calcium as Ca	IS 3025 P,40	mg/l	74.2	75	200
9	Magnesium as Mg	IS 3025 P,46	mg/l	12.70	30	100
10	Total Alkalinity as $CaCO_3$	IS 3025 P,23	mg/l	198	200	600
11	Chloride as Cl^-	IS 3025 P,32	mg/l	19.9	250	1000
12	Sulphate as SO_4	IS 3025 P,24	mg/l	12.4	200	400
13	Nitrate as NO_3	IS 3025 P,34	mg/l	11.4	45	NR*
14	Fluoride as F	IS 3025 P,60	mg/l	0.5	1	1.5
15	Residual Free Chlorine	IS 3025 P,26	mg/l	NT	0.2	1
16	Iron as Fe	IS 3025 P,53	mg/l	0.1	0.3	NR*
17	Sodium as Na	APHA 3500-Na,B	mg/l	18.0	-	-
18	Potassium as K	APHA 3500-K,B	mg/l	12.0	-	-

BDL*below detection Limit NR*=No Relaxation, NT*=No Traceable.

Page 1/1

END OF REPORT

(Reviewed By)

(Authorized Signatory)

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SISHODIA Research Laboratories Pvt. Ltd.

CIN No :- U73100UP2009PTC037857

Accredited by NABL as per ISO/IEC 17025: 2017

Recognized by MoEFCC (Govt. of India) Under EPA 1986 | (Vide F. No. LB/98/7/2021-Sublab-HO-CPCB-HO/Pvt-322/92

TEST REPORT

Format No- 7.8F-01

ULR/Report No	Sample code	Report issue date
TC-639423000000293F	SMPL/DWQ/293/2023	16/05/2023

SAMPLING DETAIL

1.	Name and Address of Customer:	M/s Dilip Buildcon Limited,Villupuram To Pondicherry Project, DBL Villupuram Highway Limited East Pondicherry Main Road Near Police Check Post Gangaram Palayan. (605108)		
2.	Sampling Location:	CH NO: 0+485 JANKIPURAM		
3.	Type of Sample :	Ground Water		
4.	Date of sampling : 08/05/2023	Sampling Timing:	10:30 AM	
5.	Sample collected by:	SRLPL Team		
6.	Method of Sampling :	SRL/QR/SP/01		
7.	Packing condition: Sealed	Container:	2 Liter, HDPE	
8.	Laboratory Sample Receiving date:	11/05/2023		
9.	Period of Sample analysis:	11/05/2023– 16/05/2023		

GROUND WATER TESTING RESULT

Sr. No.	Parameters	Reference Method	Unit	Result	BIS Standard IS 10500: 2012	
					Requirement (Acceptable limit)	Permissible limit in the absence of alternate source
1	pH	IS 3025 P,11	-	7.4	6.5 - 8.5	NR*
2	Turbidity	IS 3025 P,10	NTU	1.0	1	5
3	Electrical Conductivity	IS 3025 P,14	µmhos/cm	664	-	-
4	Total Suspended Solids	IS 3025 P,17	mg/l	3.8	-	-
5	Total Dissolve Solids	IS 3025 P,16	mg/l	426	500	2000
6	Total Solids	IS 3025 P,15	mg/l	429.8	-	-
7	Total Hardness as $CaCO_3$	IS 3025 P,21	mg/l	188	200	600
8	Calcium as Ca	IS 3025 P,40	mg/l	60	75	200
9	Magnesium as Mg	IS 3025 P,46	mg/l	9.23	30	100
10	Total Alkalinity as $CaCO_3$	IS 3025 P,23	mg/l	192	200	600
11	Chloride as Cl^-	IS 3025 P,32	mg/l	54.9	250	1000
12	Sulphate as SO_4	IS 3025 P,24	mg/l	36.5	200	400
13	Nitrate as NO_3	IS 3025 P,34	mg/l	21.4	45	NR*
14	Fluoride as F	IS 3025 P,60	mg/l	0.27	1	1.5
15	Residual Free Chlorine	IS 3025 P,26	mg/l	NT	0.2	1
16	Iron as Fe	IS 3025 P,53	mg/l	0.1	0.3	NR*
17	Sodium as Na	APHA 3500-Na,B	mg/l	15.5	-	-
18	Potassium as K	APHA 3500-K,B	mg/l	11.3	-	-

BDL*below detection Limit NR*=No Relaxation, NT*=No Traceable.

Page 1/1

END OF REPORT

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SISHODIA Research Laboratories Pvt. Ltd.
CIN No :- U73100UP2009PTC037857
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TEST REPORT

Format No- 7.8F-01

ULR/Report No	Sample code	Report issue date
TC-63942300000294F	SMPL/DWQ/294/2023	16/05/2023

SAMPLING DETAIL

1.	Name and Address of Customer:	M/s Dilip Buildcon Limited,Villupuram To Pondicherry Project, DBL Villupuram Highway Limited East Pondicherry Main Road Near Police Check Post Gangaram Palayan. (605108)	
2.	Sampling Location:	CRUSHER PLANT	
3.	Type of Sample :	Ground Water	
4.	Date of sampling : 08/05/2023	Sampling Timing:	10:50 AM
5.	Sample collected by:	SRLPL Team	
6.	Method of Sampling :	SRL/QR/SP/01	
7.	Packing condition: Sealed	Container:	2 Liter, HDPE
8.	Laboratory Sample Receiving date:	11/05/2023	
9.	Period of Sample analysis:	11/05/2023– 16/05/2023	

GROUND WATER TESTING RESULT

Sr. No.	Parameters	Reference Method	Unit	Result	BIS Standard IS 10500: 2012	
					Requirement (Acceptable limit)	Permissible limit in the absence of alternate source
1	pH	IS 3025 P,11	-	7.43	6.5 - 8.5	NR*
2	Turbidity	IS 3025 P,10	NTU	1.0	1	5
3	Electrical Conductivity	IS 3025 P,14	µmhos/cm	932	-	-
4	Total Suspended Solids	IS 3025 P,17	mg/l	8	-	-
5	Total Dissolve Solids	IS 3025 P,16	mg/l	396	500	2000
6	Total Solids	IS 3025 P,15	mg/l	404	-	-
7	Total Hardness as $CaCO_3$	IS 3025 P,21	mg/l	170	200	600
8	Calcium as Ca	IS 3025 P,40	mg/l	64	75	200
9	Magnesium as Mg	IS 3025 P,46	mg/l	2.43	30	100
10	Total Alkalinity as $CaCO_3$	IS 3025 P,23	mg/l	186	200	600
11	Chloride as Cl	IS 3025 P,32	mg/l	32.9	250	1000
12	Sulphate as SO_4	IS 3025 P,24	mg/l	34.8	200	400
13	Nitrate as NO_3	IS 3025 P,34	mg/l	28.4	45	NR*
14	Fluoride as F	IS 3025 P,60	mg/l	0.55	1	1.5
15	Residual Free Chlorine	IS 3025 P,26	mg/l	NT	0.2	1
16	Iron as Fe	IS 3025 P,53	mg/l	0.1	0.3	NR*
17	Sodium as Na	APHA 3500-Na,B	mg/l	16.9	-	-
18	Potassium as K	APHA 3500-K,B	mg/l	11.4	-	-

Page 1/1

BDL*-below detection Limit NR*=No Relaxation, NT**=No Traceable.

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SISODIA

GROUND WATER MONITORING

(Reviewed By)	(Authorized Signatory)

DILIP BUILDCON LIMITED	M/s Dilip Buildcon Limited, Villupuram To Pondicherry Project, DBL Villupuram Highway Limited East Pondicherry Main Road Near Police Check Post Gangaram Palayan. (605108)

SISHODIA Research Laboratories Pvt. Ltd.

CIN No : U73100UP2007PTC037857

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TEST REPORT

Format No- 7.8F-01

ULR/Report No	Sample code	Report issue date
TC-639423000000295F	SMPL/SWQ/295/2023	16/05/2023

SAMPLING DETAIL

1.	Name and Address of Customer:	M/s Dilip Buildcon Limited,Villupuram To Pondicherry Project, DBL Villupuram Highway Limited East Pondicherry Main Road Near Police Check Post Gangaram Palayan. (605108)	
2.	Sampling Location:	CH NO: 1+796	
3.	Type of Sample :	Surface Water	
4.	Date of sampling : 08/05/2023	Sampling Timing:	11:00 AM
5.	Sample collected by:	SRLPL Team	
6.	Method of Sampling :	SRL/QR/SP/01	
7.	Packing condition: Sealed	Container:	2 Liter, HDPE
8.	Laboratory Sample Receiving date:	11/05/2023	
9.	Period of Sample analysis:	11/05/2023– 16/05/2023	

SURFACE WATER TESTING RESULT

Sr. No.	Parameters	Reference Method	Unit	Result	Standard As per IS I-IS: 2296-1982				
					A	B	C	D	E
1	pH	IS 3025 P,11	-	7.1	8.5	8.5	8.5	8.5	8.5
2	Turbidity	IS 3025 P,10	NTU	1.0	-	-	-	-	-
3	Electrical Conductivity	IS 3025 P,14	µmhos/cm	562	-	-	-	1000	2250
4	Total Suspended Solids	IS 3025 P,17	mg/l	24	-	-	-	-	-
5	Total Dissolve Solids	IS 3025 P,16	mg/l	268	500		1500		2100
6	Total Solids	IS 3025 P,15	mg/l	292	-	-	-	-	-
7	Total Hardness as $CaCO_3$	IS 3025 P,21	mg/l	184.0	300	-	-	-	-
8	Calcium as Ca	IS 3025 P,40	mg/l	61.40	80.1	-	-	-	-
9	Magnesium as Mg	IS 3025 P,46	mg/l	7.41	24.28	-	-	-	-
10	Total Alkalinity as $CaCO_3$	IS 3025 P,23	mg/l	194.0	-	-	-	-	-
11	Chloride as Cl	IS 3025 P,32	mg/l	15.88	250	-	600	-	600
12	Sulphate as SO_4	IS 3025 P,24	mg/l	24.0	400	-	400	-	1000
13	Nitrate as NO_3	IS 3025 P,34	mg/l	18.0	20	-	50	-	-
14	Fluoride as F	IS 3025 P,60	mg/l	0.5	1.5	1.5	1.5	-	-
15	Iron as Fe	IS 3025 P,53	mg/l	0.1	0.3		50	-	-
16	Biochemical Oxygen Demand	IS 3025 P,44	mg/l	BDL	2	3	3	-	-
17	Chemical Oxygen Demand	IS 3025 P,58	mg/l	60	-	-	-	-	-
18	Dissolve Oxygen	IS 3025 P,44	mg/l	5.0	6	5	4	4	-
19	Oil & Grease	IS 3025 P,39	mg/l	BDL	-	-	0.1	0.1	-

BDL*below detection Limit NR*=No Relaxation, NT***=No Traceable.

Page-1/1

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SURFACE WATER MONITORING

(Reviewed By)	(Authorized Signatory)

DILIP BUILDCON LIMITED	M/s Dilip Buildcon Limited, Villupuram To Pondicherry Project, DBL Villupuram Highway Limited East Pondicherry Main Road Near Police Check Post Gangaram Palayan. (605108)

DBL VILUPPURAM HIGHWAYS LIMITED

(villupuram@dilipbuildcon.co.in)

DBL-RO/NHAI/ Villupuram Puducherry /2023-24/ 798 — 05th June 2023

The Team Leader,
LN Malviya Infra Projects Limited,
NH 332 -Villupuram Puducherry NH Road,
Pangur, Puducherry.

Sub: - UPC - N/08019/01002/TN Four-Laning of Villupuram – Puducherry section of NH 45A (New NH 332) from Km 0.000 to Km 29.000 (Design Chainage) under Bharatmala Pariyojana Phase I (Residual NHDP IV works) on HAM in the State of Tamil Nadu and Union Territory of Puducherry – **Source Approval for Bitumen (VG- 40)- Reg**

Ref: - 1. Concession Agreement dated 17th May 2021.

Dear Sir,

Adverting to the above subject matter, the concessionaire is herewith submitting the profile of Bitumen VG-40 M/s. Indian Oil Corporation Limited (IOCL).

The above manufacturers used for Bituminous works in our project.

This is being submitted for your kind review and provide your consent for further action at the earliest.

Thanking you and assuring our best service all the time.

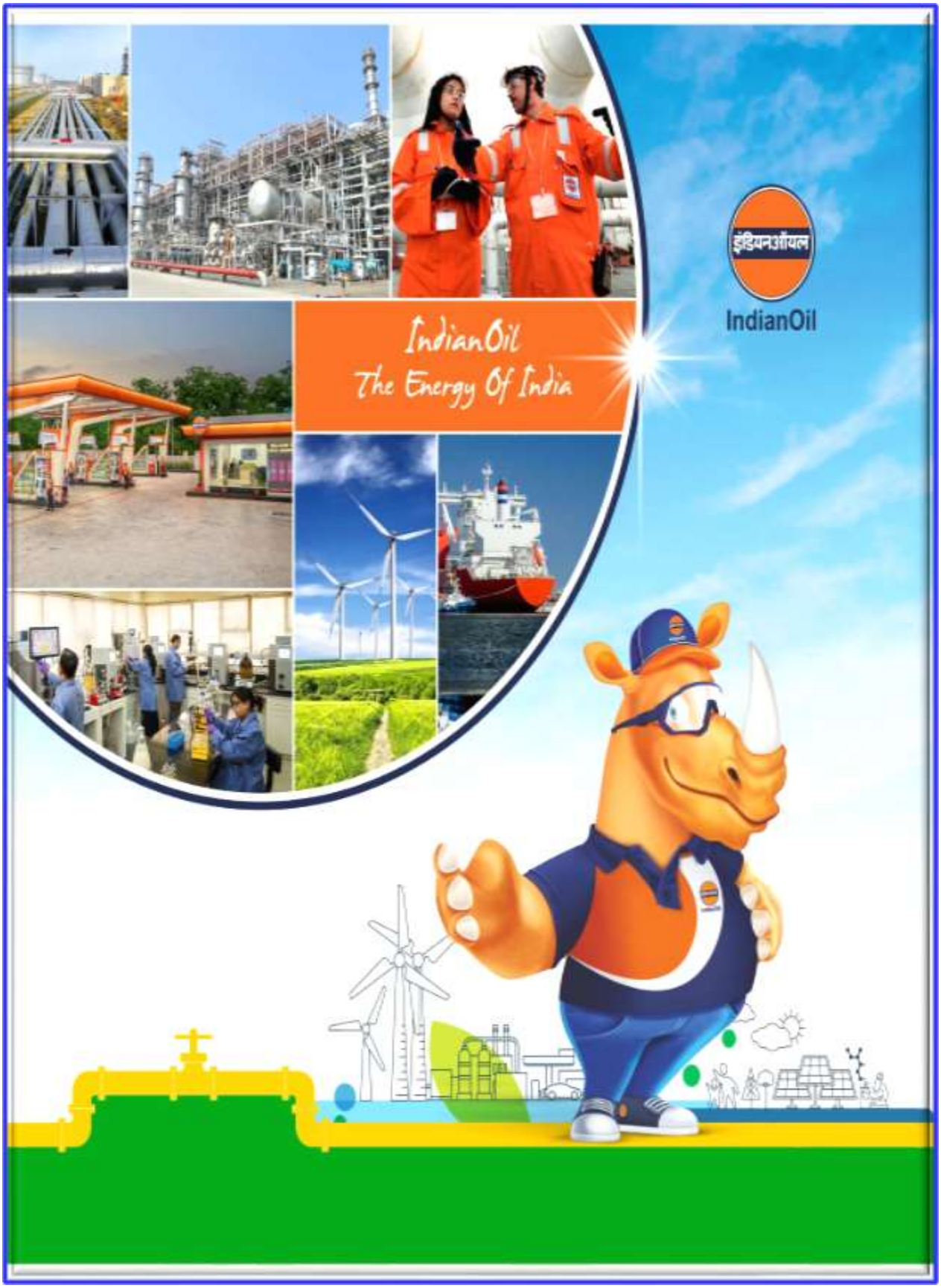
Yours faithfully

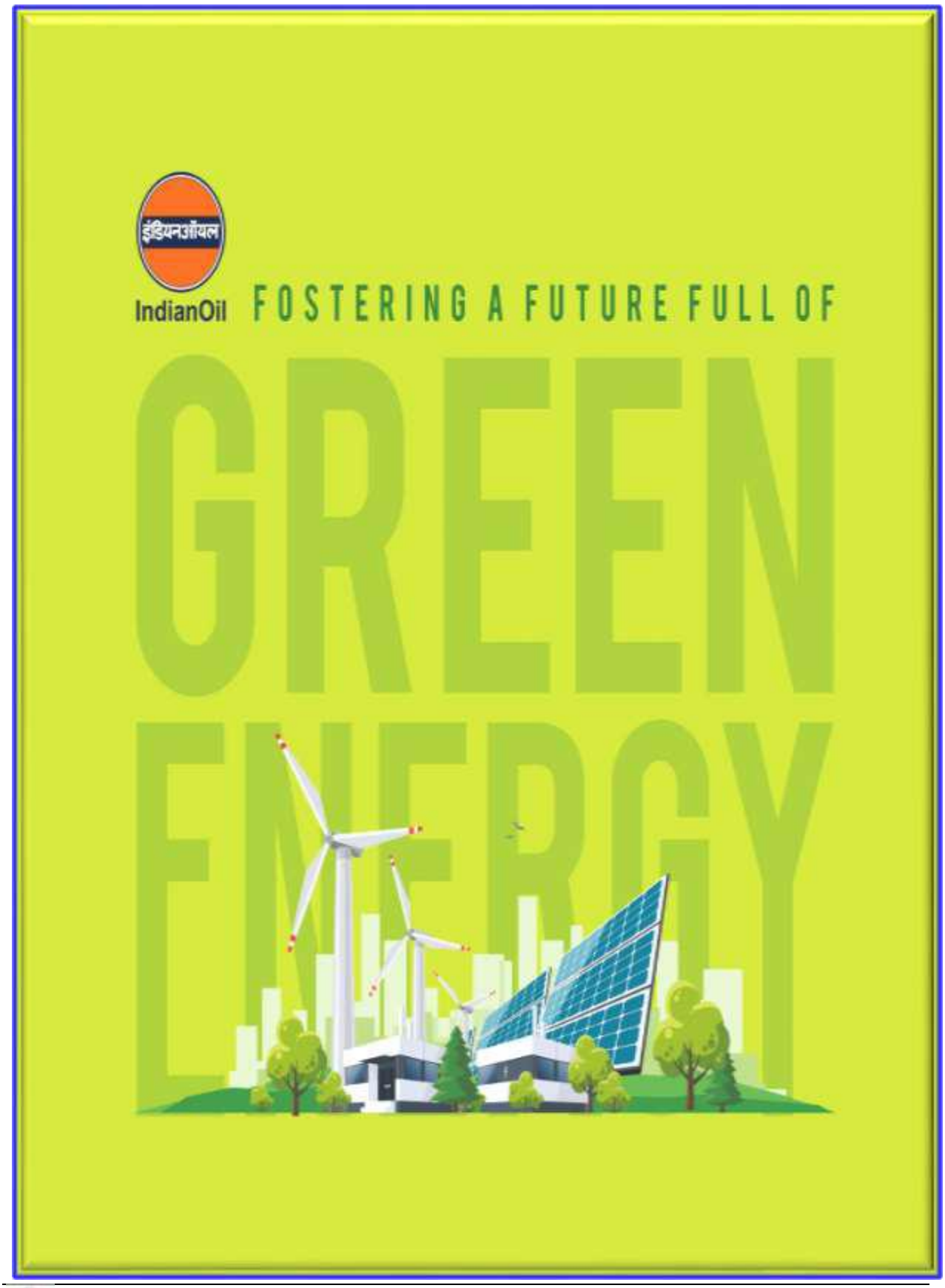
For M/s. DBL Villupuram Highways Limited,

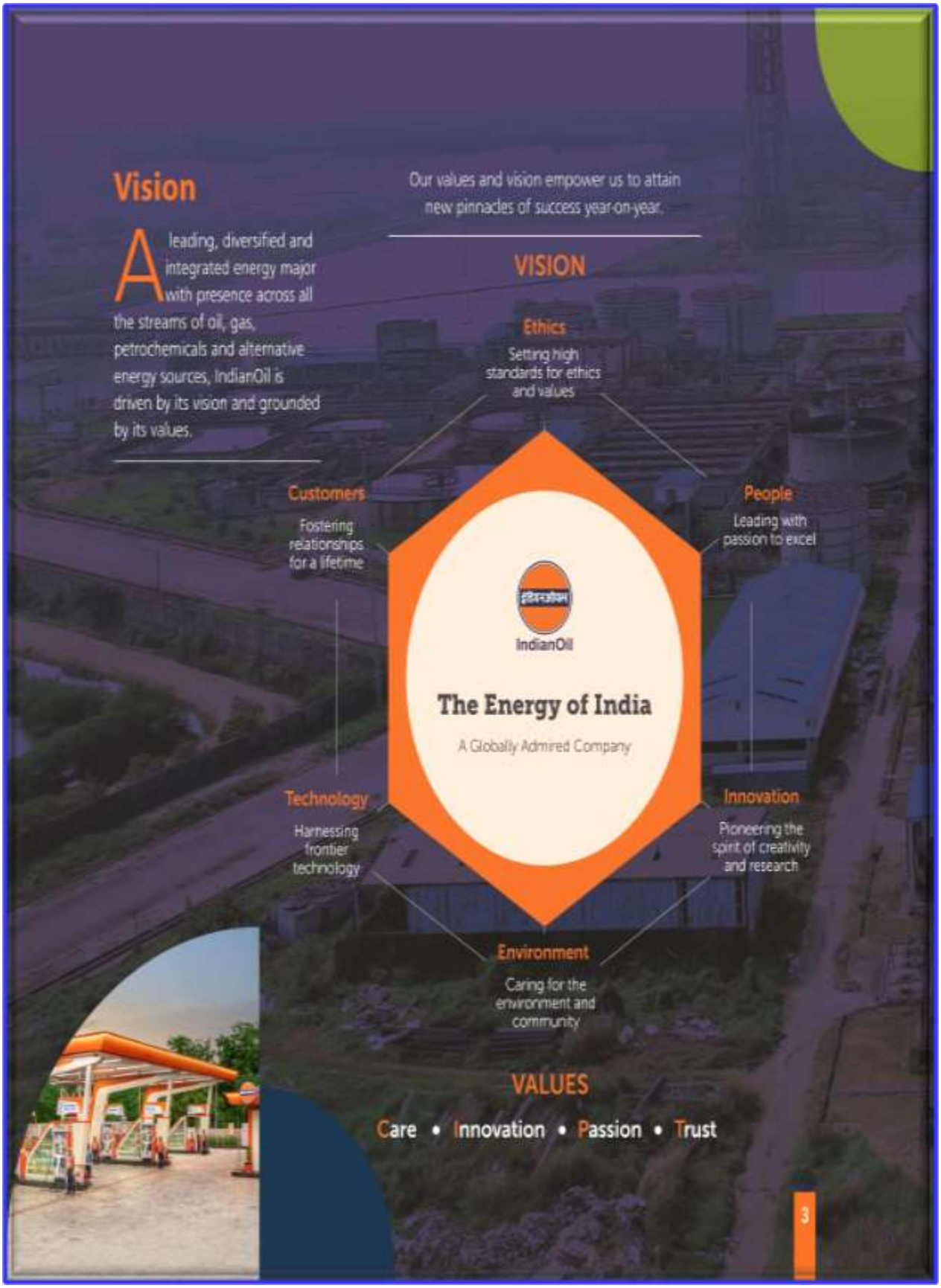
Kumar Sengottaiyan
Project Manager

Encl: As mentioned above.
Copy to: The Project Director, NHAI-PIU, Puducherry, for information

(CIN: U45201MP2021PTC055629) | **Regd. Office :** Plot No. 5, Inside Govind Narayan Singh Gate,Chuna Bhatti, Kolar Road, Bhopal - 462 016 (M.P.), Ph.: 0755-4029999, Fax : 0755-4029998


इंडियनऑयल
IndianOil
IndianOil
The Energy Of India


इंडियनऑयल
IndianOil
FOSTERING A FUTURE FULL OF
GREEN
ENERGY


Vision
Our values and vision empower us to attain new pinnacles of success year-on-year.
A leading, diversified and integrated energy major with presence across all the streams of oil, gas, petrochemicals and alternative energy sources, IndianOil is driven by its vision and grounded by its values.
VISION
Ethics
Setting high standards for ethics and values
Customers
Fostering relationships for a lifetime
People
Leading with passion to excel
IndianOil
The Energy of India
A Globally Admired Company
Technology
Harnessing frontier technology
Innovation
Pioneering the spirit of creativity and research
Environment
Caring for the environment and community
VALUES
Care • Innovation • Passion • Trust
3


Through our operations, we not only create value for ourselves and our stakeholders, but also contribute towards uplifting the communities in which we operate
We address these changing dynamics through our sound strategies and robust business model across our business clusters, which include:
Refining, Pipelines and Marketing
IndianOil has the largest share in the market among downstream companies in India, alongside of maintaining the largest petroleum pipeline network in the world. To reach out to maximum number of customers, IndianOil continue to strengthen petroleum marketing and distribution network which is one of the largest in Asia.
Petrochemicals
With the endeavour to be the largest petrochemicals player in India, we are making significant strides towards integrating our downstream operations and establishing a strong international presence.
Exploration & Production
IndianOil is cementing it's position in the E&P segment by investing towards acquiring E&P assets in domestic and international market.
Natural Gas
Being the second largest player in the space, we have been making consistent progress in up-scaling our operations to ensure the steady supply of clean and safe gas across the country.
Other Energy Segments and Businesses
IndianOil continue to expand it's presence in the bio-energy space to accelerate India's journey towards carbon-neutrality. The company also has strong presence in explosive, cryogenics and fertiliser business.
4

The Energy Pillar of India

IndianOil's business interests encompass the entire hydrocarbon value chain- from refining, pipeline transportation & marketing to exploration & production of crude oil & gas, petrochemicals, gas marketing, alternative energy sources and globalisation of downstream operations. The brand's global aspirations are fulfilled through IndianOil's business forays in Sri Lanka, Mauritius, the UAE, and other countries.

IndianOil, the 'Energy of India', is a diversified, integrated energy major with a presence in almost all the streams of oil, gas, petrochemicals and alternative energy sources. The Brand IndianOil leverages high-calibre people and state-of-the-art technologies to tap all forms of energy most responsibly and delivering them to the consumers most affordably. India's highest rank Energy PSU in Fortune500 list (Rank 142), IndianOil recorded Revenue of ₹7,28,460 crores and a net profit of ₹24,184 crores for the financial year 2021-22.

socially responsible technology solutions. Cutting-edge research is carried out in core areas like fuels & lubricants, refining technologies & catalysts, petrochemical & polymers. The R&D efforts in sunrise areas like Nano, Solar, Bioenergy, Hydrogen and Fuel Cell provide the much-needed future direction.

One of India's most socially responsive brands, IndianOil, has successfully combined its corporate social responsibility agenda with its business offerings. The Corporation has been partnering with communities in which it operates by supporting numerous initiatives connected with health, family welfare, education, environment protection, potable water, sanitation, and empowerment of women and other marginalised groups. IndianOil spent Rs. 194.72 crore (which is 65% of total CSR expenditure) on thematic area, i.e., Health and Nutrition, with special focus on Covid related measures including setting up makeshift hospitals and temporary Covid Care facilities during 2021-22, in compliance with the Department of Public Enterprises (DPE) guidelines for CSR Expenditure by Central Public Sector Enterprises (CPSE). As against the 18 Aspirational Districts allotted by DPE, the Company spent Rs. 18.43 crore

As a Brand with one of the largest customer interface in India, IndianOil reaches precious petroleum fuels to every nook and corner of the country through its network of over 58,000 plus customer touch-points, surmounting the challenges of tough terrain, climate and accessibility. The marketing network is bolstered by 70.05 MMTPA of Refining Capacity and more than 15,000 KM of cross country pipelines. Moreover, IndianOil's R&D Centre at Faridabad, one of Asia's finest in downstream petroleum R&D, offers a competitive advantage to the Corporation through world-class technology and process solutions and innovative products. R&D Centre plays a key role in the efforts towards 'Atmanirbhar Bharat' by developing cost effective, environment friendly &

Milestones

IndianOil rose to a position of leadership with its ubiquitous presence and its diligence to make a mark in the lives of the citizens of India. For over six decades now, the company contributed to the growth of the nation, relying on our inherent strengths and innovations to reset industry benchmarks time and again.

Every milestone of our existence heralded new opportunities as we continued to broaden the scope of our operations. Our strong desire to establish a visionary brand, allowed us to adapt and change with time, consistently creating value for our stakeholders.

1958 Indian Refineries Limited established

1959 Indian Oil Company Limited formed. First office at Bakhtawar Chambers, Bombay

1960 First parcel of diesel received from Russia

1962 Guwahati Refinery, first public sector refinery inaugurated. Refinery, first public sector refinery inaugurated

First fuel station at Angar

First export cargo to Bhutan

1998 IndianOil enters LNG business through Petronet LNG

Panipat Refinery commissioned

2000 IndianOil Foundation set up

IndianOil enters Exploration and Production

2001 IndianOil (Mauritius) Ltd. registered

CPCL & BRPL become subsidiary Companies

2002 IndianOil Autogas launched

Controlling stake acquired in IBP Co. Ltd.

2003 Lanka IOC incorporated

Launch of premium fuel XTRAPREMIUM

IBP/MLF unit commissioned at Guwahati Refinery

2004 IndianOil, first Indian corporate to touch ₹ 1,50,000 Crore turnover

Entry into petrochemicals with LAB plant at Gujarat Refinery

2005 10000th fuel station at Tirupati

2007 IBP Co. Ltd. merged with IndianOil


1964
Indian Refineries Ltd. merged with Indian Oil Co. Ltd. and renamed as Indian Oil Corporation Limited
IndianOil enters aviation business; first supply to IAF
First product pipeline commissioned
1965
Barauni Refinery commissioned
IndianOil Aviation enters civil aviation
Indane Cooking Gas launched in Calcutta (Kolkata)
1966
Gujarat Refinery dedicated to the nation
1969
Madras Refineries Ltd. (JV) commissioned
1972
IndianOil R&D Centre established
SERVO, the first indigenous lubricant brand launched
Over the years, IndianOil has reached out to customers in every corner of the country. With rapid advances in our operational methods, we have strengthened our pipeline network, diversified into sustainable products, supported social endeavours and have ensured stellar business performance year after year bearing testimony to the immense potential of a truly global organisation.
1975
Worlds highest altitude fuel station comes up at Leh
Haldia Refinery commissioned
1981
Assam Oil Company Limited merged with IndianOil
1982
Mathura Refinery commissioned
1993
India's first Hydrocracker commissioned at Gujarat (Koyali) Refinery
1995
IndianOil shares listed on BSE
IndianOil Institute of Petroleum Management (IIPM) inaugurated at Gurgaon
2009
Amalgamation of Bongaigaon Refinery with IndianOil
India's first solar energy station at Puri
2010
IndianOil gets Maharatna status
Panipat Naphtha Cracker goes on-stream
strengthening IndianOil's petrochemical presence
Petrochemical brand PROPEL launched
2012
20000th fuel station commissioned
2016
Paradip Refinery commissioned
100th AFS at Roundla
2020
IndianOil leads pan-India rollout of BS-VI fuels
CNG retailing begins under IndiaGreen brand
India's first 100 Octane petrol XP100 and value added Indoline XtraTec launched
30000th fuel station commissioned
H-CNG
2021
INDMAX unit at Bongaigaon Refinery dedicated to the nation
Ramanathapuram – Thoothukudi Natural Gas Pipeline commissioned
First batch of 10% Ethanol Blended Motor Sport transported from Bongaigaon Refinery
One – horned Rhino adopted as Brand Mascot
IndianOil become the first Public Sector Enterprise to induct 9 women hockey players onto its rolls
2022
Guwahati Refinery completes 60 years
IndianOil R&D Centre and Bongaigaon Refinery complete 50 years
SERVO brand completes 50 years
Dahej-Koyali Natural Gas Pipeline commissioned
IndianOil inks MoU with NTCA for transcontinental relocation of 'Cheetah'
IndianOil committed to achieve Net Zero emissions by the year 2046

High-Octane Performance Achieved through our Capitals

At IndianOil, our capitals range from our mega infrastructure and assets, growing talent pool, advanced technology backbone, to best-of-breed R&D and governance practices. Our high-octane performance is underpinned by these capitals and their interplay enables us to unlock stakeholder value responsibly and sustainable.

Financial Capital

Highest ever
Revenue from operations (₹ 7,28,460 crore) and PAT (₹ 24,184 crore)

US$ 11.25 per barrel
GRM as compared to US$ 5.64 per barrel in 2020-21

₹ 47,568 crore
EBITDA

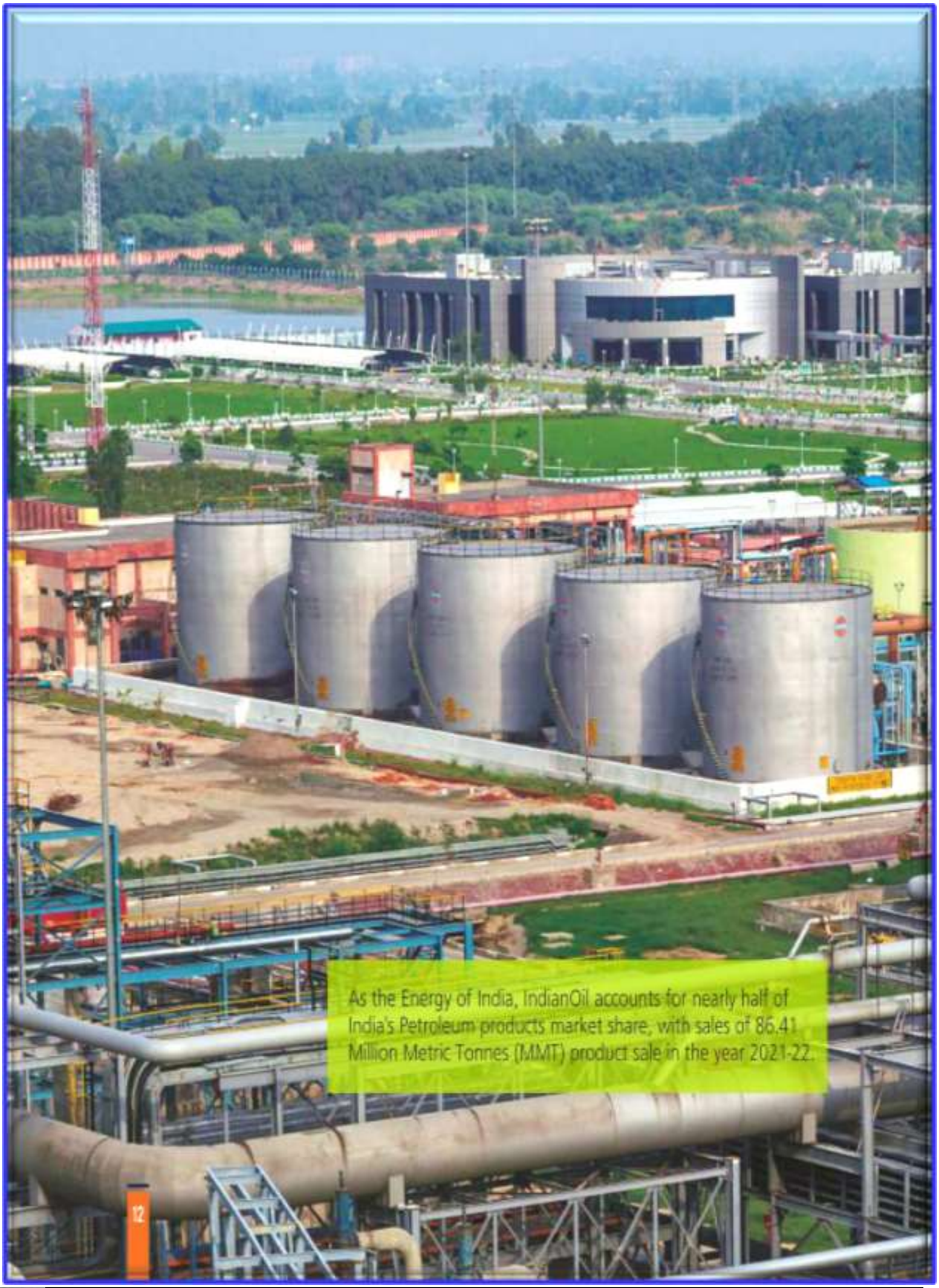
₹ 21,177 crore
Operating cash flow

Manufactured Capital

67.67 MMT
Crude throughput

₹ 30,391 crore
Capital expenditure

83.25 MMT
Throughput of our countrywide network of pipelines


As the Energy of India, IndianOil accounts for nearly half of India's Petroleum products market share, with sales of 86.41 Million Metric Tonnes (MMT) product sale in the year 2021-22.

Our Business Model

Refining, Pipelines and Marketing

With a distinguished legacy of more than 100 years (since the inception of our Digboi refinery in 1901), IndianOil enjoys the largest market share among downstream companies in India. IndianOil manages one of the largest oil pipeline networks in the world. We have an extensive petroleum marketing and distribution network, one of Asia's largest, enabling the company to reach customers in the farthest corners of the country.

96.6%
capacity utilization

70.05
refining capacity (MMTPA)

15,000+
pipeline network (km)

58,000+
marketing and distribution touchpoints

7,28,460
PETROLEUM REVENUE
(₹ in Crore)

Petrochemicals

Built with an investment of ₹ 24,000 Crore, in the last 16 years we have been integrating our downstream operations and positioning ourselves as the second largest petrochemicals player in India with an international presence.

Some of our mega plants include:

- The country's largest Linear Alkyl Benzene (LAB) plant at Gujarat Refinery;
- Paraxylene/Purified Terephthalic Acid (PX/PTA) at Panipat
- World scale Naphtha Cracker plant at Panipat
- World class 700 KTA Polypropylene Plant at Paradip

35,000

proposed investment in petrochemicals over next 5 years (₹ in Crore)

2.92

PETROCHEMICAL SALES (MMT)

Natural Gas

Leveraging decades of experience, we have fast-tracked growth in the natural gas segment, establishing ourselves as the second largest player in the field. We have been investing across the natural gas value chain, scaling up LNG sourcing, import terminals, pipelines, city gas distribution networks and improving the 'LNG at the Doorstep' service continuously.

5.68

Natural Gas Sale (MMT)

105.71

LNG Sales through Road tankers (TMT)

1100+

gas pipeline network (km)

1,488

CNG stations in India

14

Combating climate change

IndianOil acknowledges the climate-related challenges to its operations and is actively implementing initiatives to reduce its footprint. The first step in its climate strategy is to quantify and report GHG emissions due to operations. The Company regularly monitors and discloses its GHG footprint from all locations in its disclosures.

Green rating of operating units

IndianOil's operating locations undergo continuous upgradations to make them more reliable, efficient and lower in emissions.

Renewable energy

IndianOil has a total renewable energy portfolio of 232.95 MW capacity, comprising of both wind power and grid connected / off-grid solar projects. In 2020-21, IndianOil generated 329 GWh of renewable power for own consumption as well as to supply to the grid.

Hydrogen based fuels

Hydrogen as a significant role in our future. Hydrogen can be converted into electricity. It can also be blended with natural gas to decarbonise existing gas grids. IndianOil is spearheading the development of hydrogen in the country. The refineries use Hydrogen as feedstock for petrochemical units.

Hydrogen enriched-Compressed Natural Gas or H-CNG, is predicted to be the first step to a hydrogen economy.

Electric mobility

EV charging facilities and battery swapping stations have been installed at 268 retail outlets in collaboration with varied partners. The Company aims to install 3,000 EV charging stations by 2030.

Biodiesel from Used Cooking Oil (UCO)

IndianOil also received the first-ever supply of bio-diesel produced from used cooking Oil at Tikrikalan Terminal, Delhi. The Company has tied up with 22 plants through EOIs for supplying biodiesel produced from UCO with an annual capacity of 229 TKL. O

Compressed Biogas

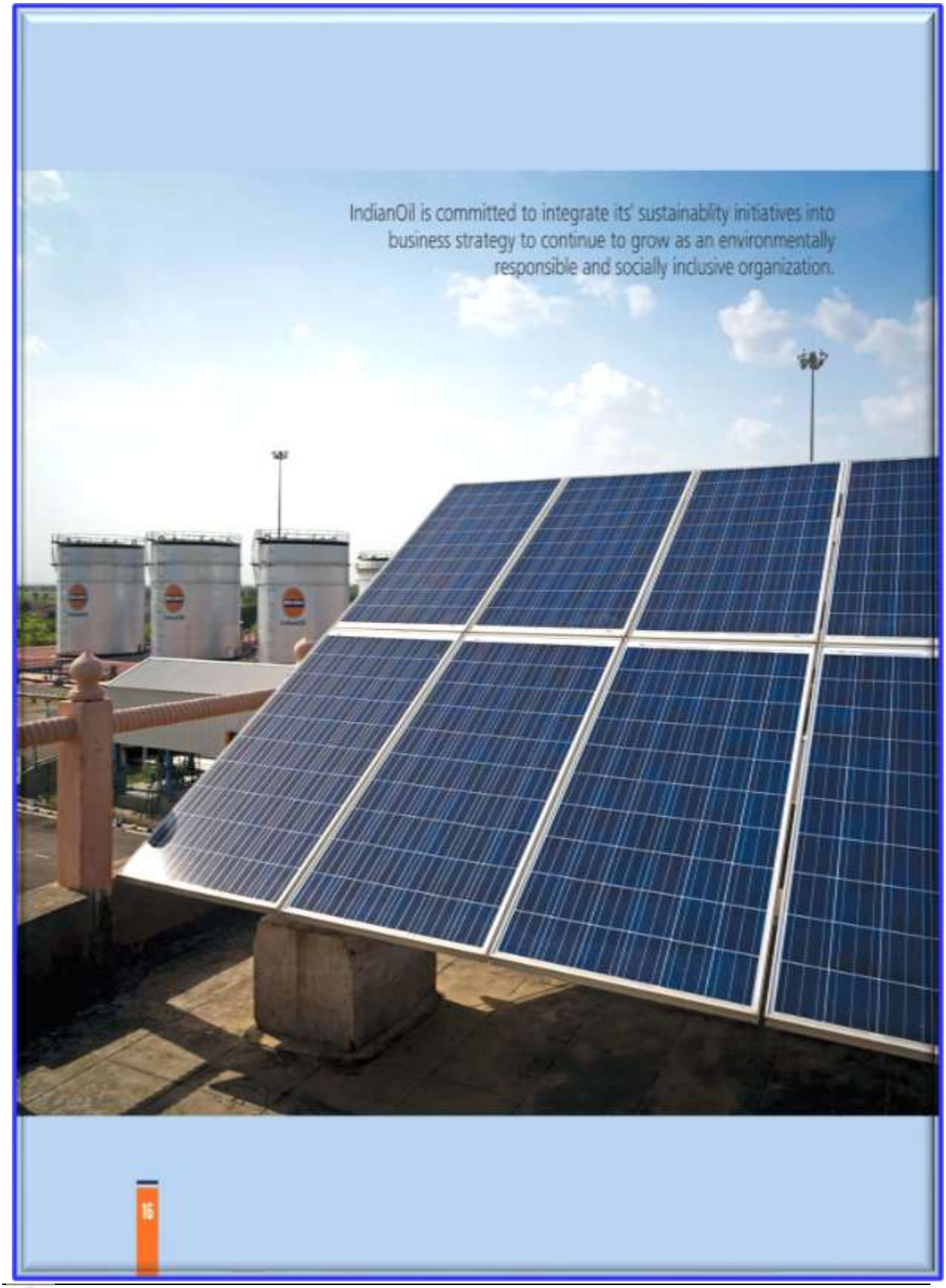
IndianOil is spearheading the Government of India's initiative on compressed biogas named SATAT (Sustainable Alternative Towards Affordable Transportation) that aims to boost availability of a green automotive fuel produced from organic waste as well as to contribute as an additional source of income for the farmers. The year was marked by the emergence of IndianOil as the first oil and gas company to market CBG as an industrial fuel.

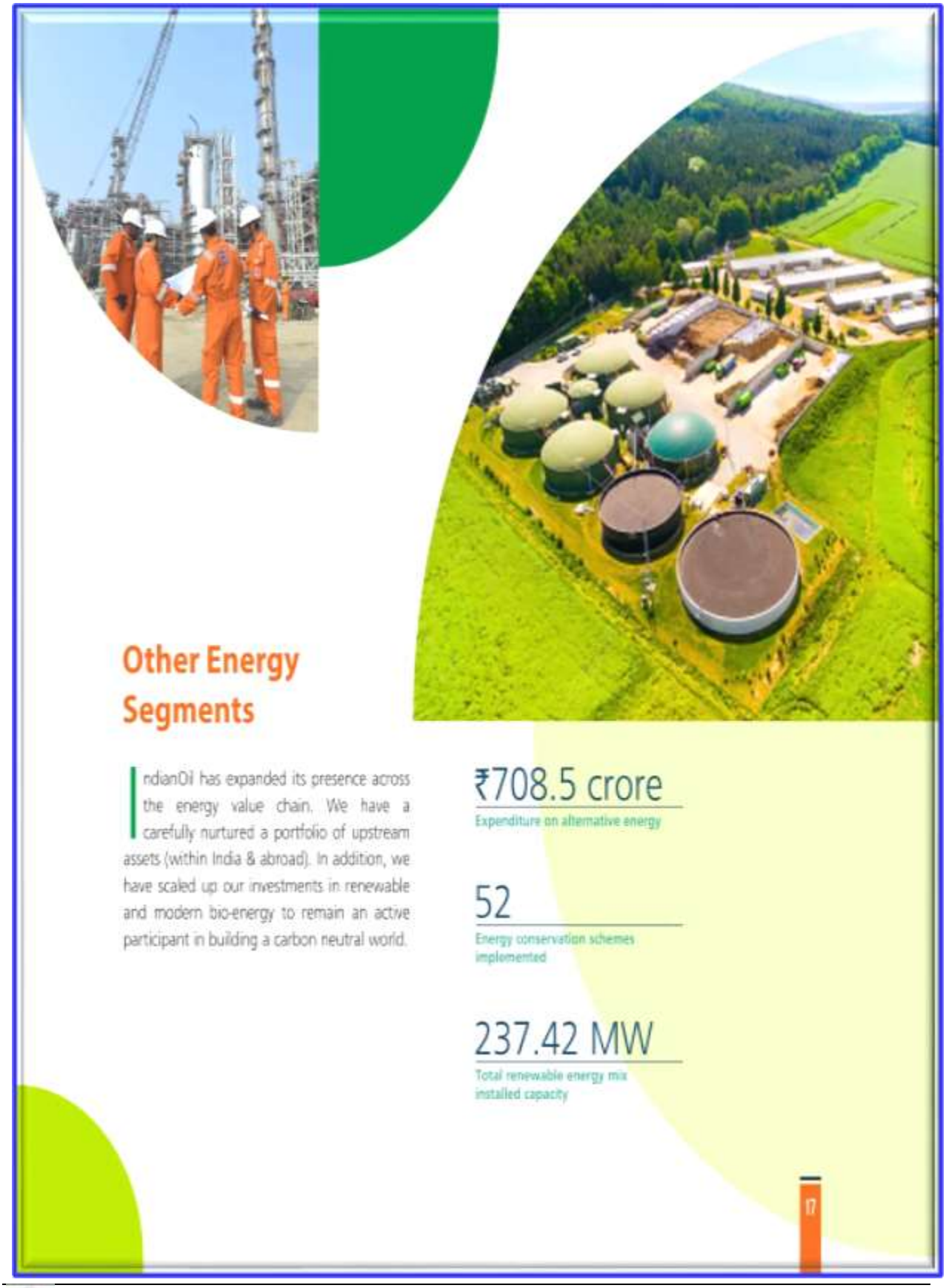
IndianOil is the first and only Oil and Gas Company selling CBG through 23 retail outlets across eight states under the 'IndiGreen' brand.

Going Plastic Neutral

IndianOil has been making efforts to become plastic neutral and #BeatPlasticPollution.

15


IndianOil is committed to integrate its' sustainability initiatives into
business strategy to continue to grow as an environmentally
responsible and socially inclusive organization.



Other Energy Segments

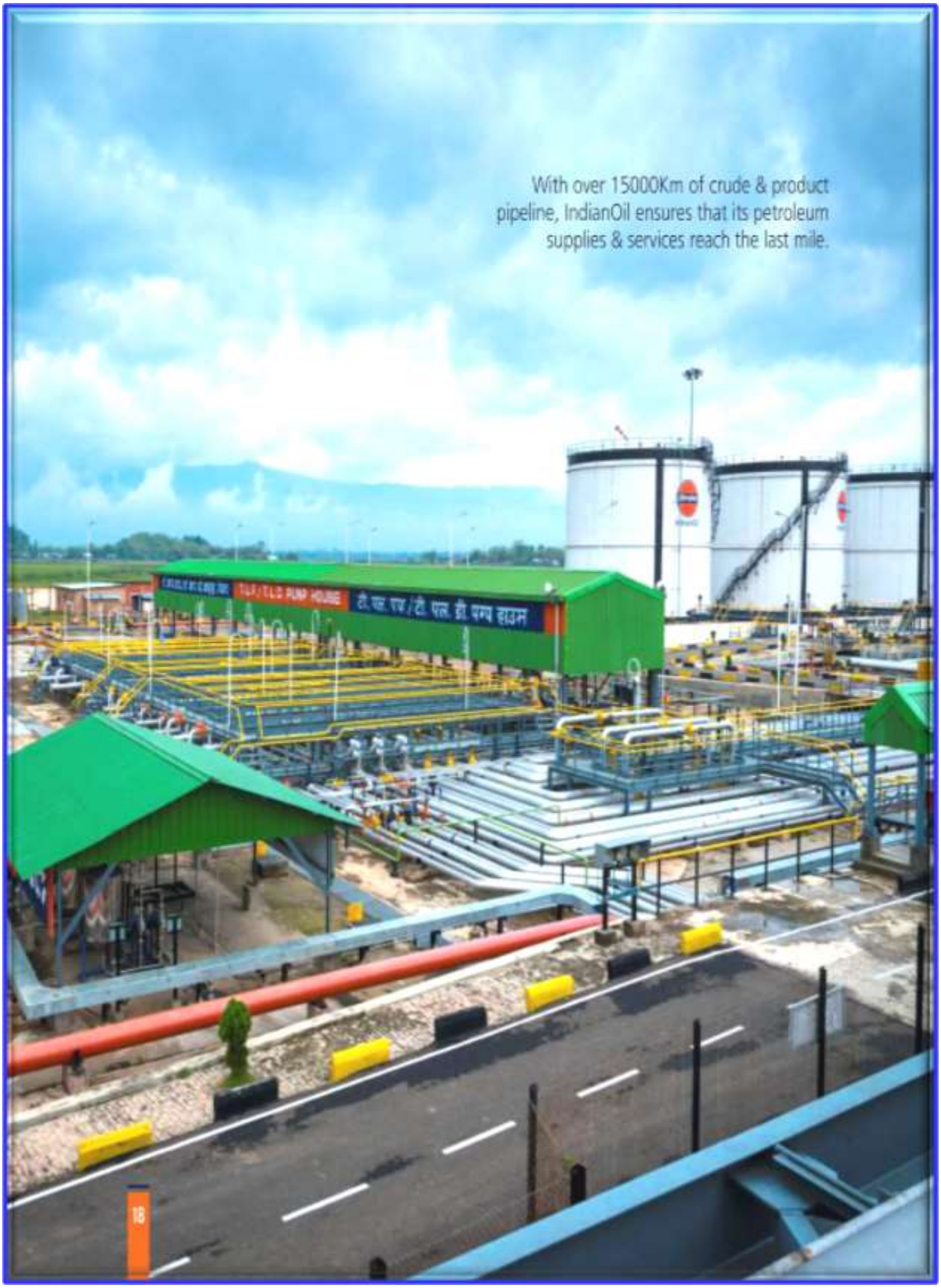
IndianOil has expanded its presence across the energy value chain. We have a carefully nurtured a portfolio of upstream assets (within India & abroad). In addition, we have scaled up our investments in renewable and modern bio-energy to remain an active participant in building a carbon neutral world.

₹708.5 crore
Expenditure on alternative energy

52
Energy conservation schemes implemented

237.42 MW
Total renewable energy mix installed capacity

17


With over 15000Km of crude & product
pipeline, IndianOil ensures that its petroleum
supplies & services reach the last mile.

Other Businesses

IndianOil has presence in explosives, cryogenics and has invested in fertiliser business.

287

all time high production and sales of bulk explosives (TMT)

31,000

annual capacity to produce cryocans (number)

51

annual capacity to produce cryogenic vessels (number)

Caring Beyond Business

A strong social conscience has always driven us at IndianOil, which is reflected in our social stewardship initiatives. IndianOil's key Corporate Social Responsibility thrust areas include Safe drinking water and protection of water resources, Healthcare and sanitation, Education and employment-enhancing vocational skills, Empowerment of women and socially/economically backward groups, etc.

Moreover, the IndianOil Foundation (IOF), exclusively funded by IndianOil, aims to protect, preserve and promote India's glorious past.

493
CSR projects undertaken

2.72
patients treated through Aarogyan initiative (Lakh)

6000+
Non-employee patients treated at Assam Oil Division Hospital, Digboi (Assam)

284
Youth skilled through Skill Development Institute


BAL HEALTHY WORKPLACE AWARD
RECOGNITION CEREMONY
India Oil
rate Office
Shrikant Madhav Vaidya

Supporting the SDGs

IndianOil is working towards identifying solutions to the social and environmental challenges and create an inclusive, peaceful, and prosperous world for all. We are proud to make steady progress towards the SDG goals, touching all seventeen goals directly or indirectly, through our day-to-day operations, community development, and initiatives to protect the enviroment. However we focus on 10 SGDs where we can create maxmum impact.

SDG 3

Ensure **safety of workforce** with a well-defined safety management system and defined roles and responsibilities

SDG 6

Strive to **optimise water consumption** across locations with several water conservation initiatives

SDG 7

Apart from spearheading the Pradhan Mantri Ujjawala Yojana (PMUY) and Sustainable Alternative Towards Affordable Transportation (SATAT) scheme, we are diversifying our product portfolio with **introduction of clean energy products**

SDG 8

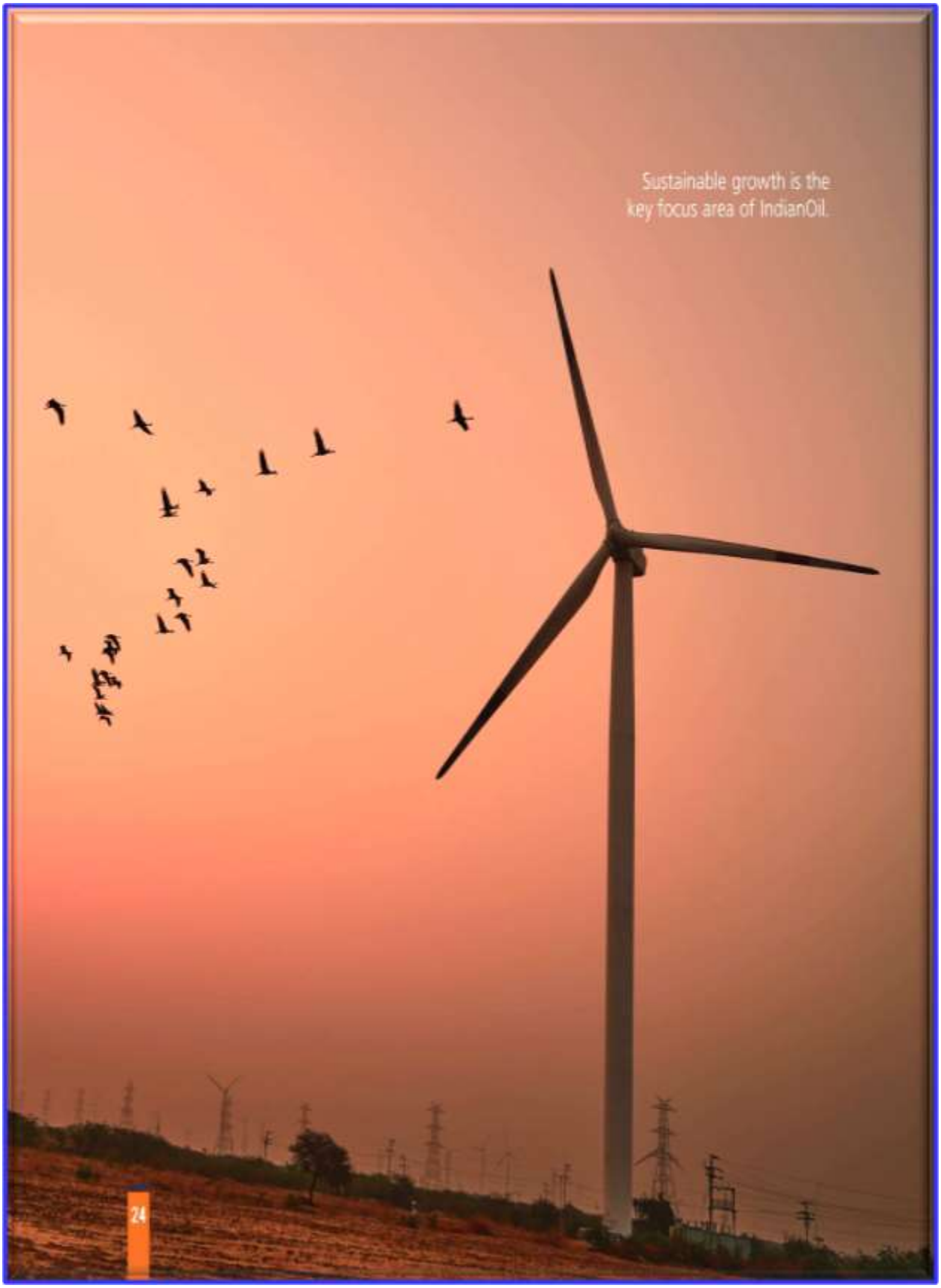
As a Maharatna PSU, we have contributed over last six decades towards the economic growth of India, **generating several employment opportunities and promoting multiple businesses**

SDG 9

Continuous **investments in technological upgradation** of our refineries and pipelines backed by our robust R&D team for development of fuels and petroleum products

22


SDG 12
Complying with various regulatory norms and promoting sustainability initiatives across our supply chain. We are moving towards a circular economy through our efforts in developing bio-energy from waste, plastic recycling and promoting indigenous purchases
SDG 13
Reducing emissions from our operations through energy efficiency measures and through use of greener fuels like natural gas and renewable energy. We are reducing emissions from our products through innovative products and green offerings like CBG and Natural Gas.
SDG 16
Committed to highest standards of accountability and integrity within our operations
SDG 15
Continue to develop greenbelt / eco-parks across our operating locations for conservation of flora and fauna, while also planting trees to restore ecosystems
SDG 17
Partnering with NGOs, academic institutions, industry bodies and several business partners in our endeavour to create a positive impact on lives we touch.
23


Sustainable growth is the
key focus area of IndianOil.

Our environmental performance

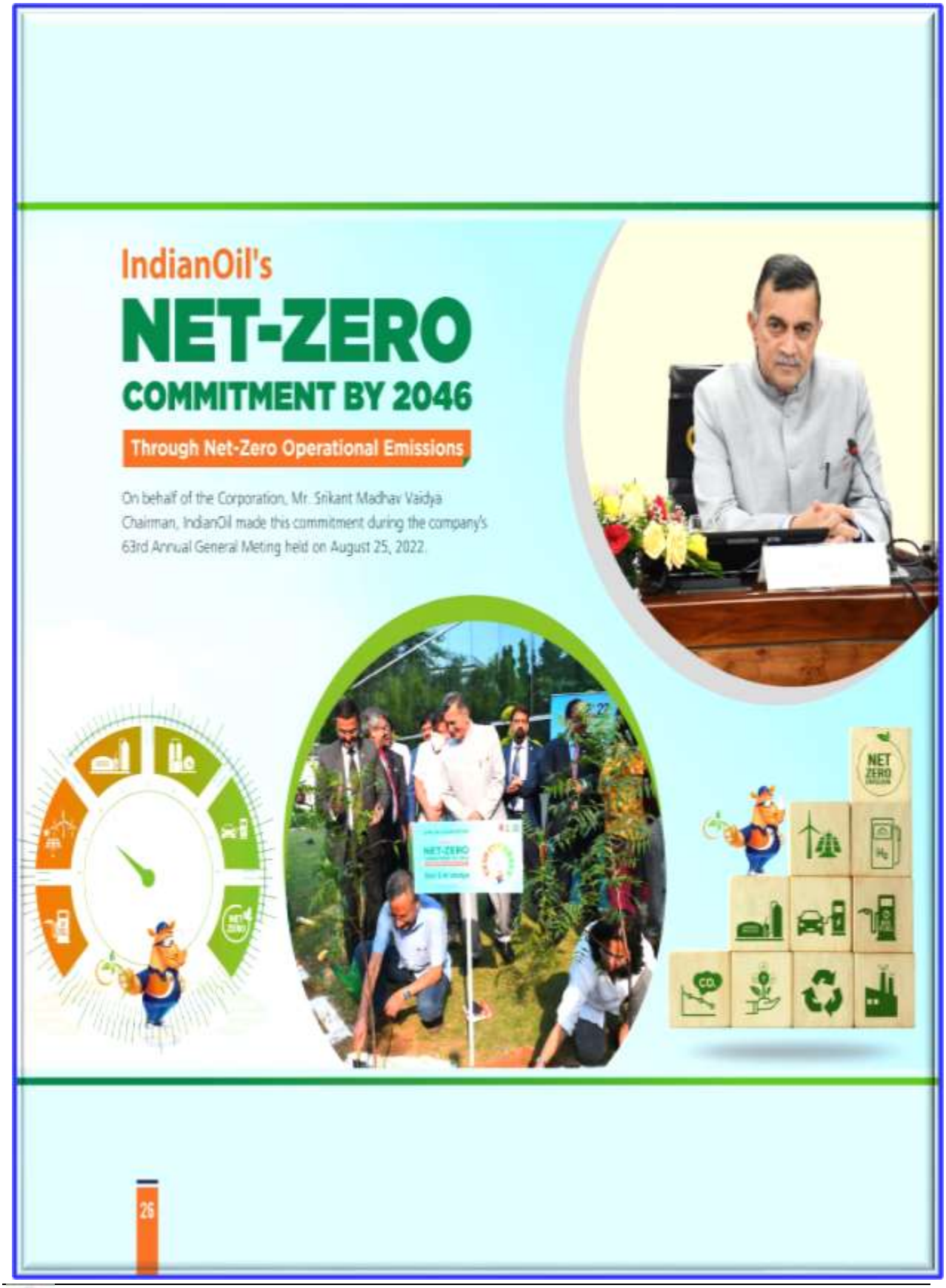
We strive to conserve and protect our natural environment by reducing emissions/effluents from our units. We monitor the emission levels regularly and proactively aspire to pursue the transition towards greener fuel, such as natural gas, biofuel, renewable energy, hydrogen fuel, etc., to minimise the impact of our products on the environment.

All our operating units comply with stipulated environmental regulations mandated by the Central/ State Pollution Control Boards and the Ministry of Environment, Forests and Climate Change authorities and orders of the NGT and Courts.

Addressing Climate change

Use of oil and gas is considered to be a major contributor to climate change. Greenhouse gas (GHG) emissions from the sector are probably the most significant. As a result, we actively try to limit our impact on the environment. IndianOil, therefore, aims to achieve excellence through sustainable operations and enhance the green cover. In addition, our assets are located in various states that are prone to natural disasters, such as flooding, cyclones and earthquakes. We have drawn up a strategy to internalise these risks and safeguard ourselves from similar incidents.

25


IndianOil's
NET-ZERO
COMMITMENT BY 2046
Through Net-Zero Operational Emissions
On behalf of the Corporation, Mr. Srikant Madhav Vaidya
Chairman, IndianOil made this commitment during the company's
63rd Annual General Meting held on August 25, 2022.
NET ZERO
26

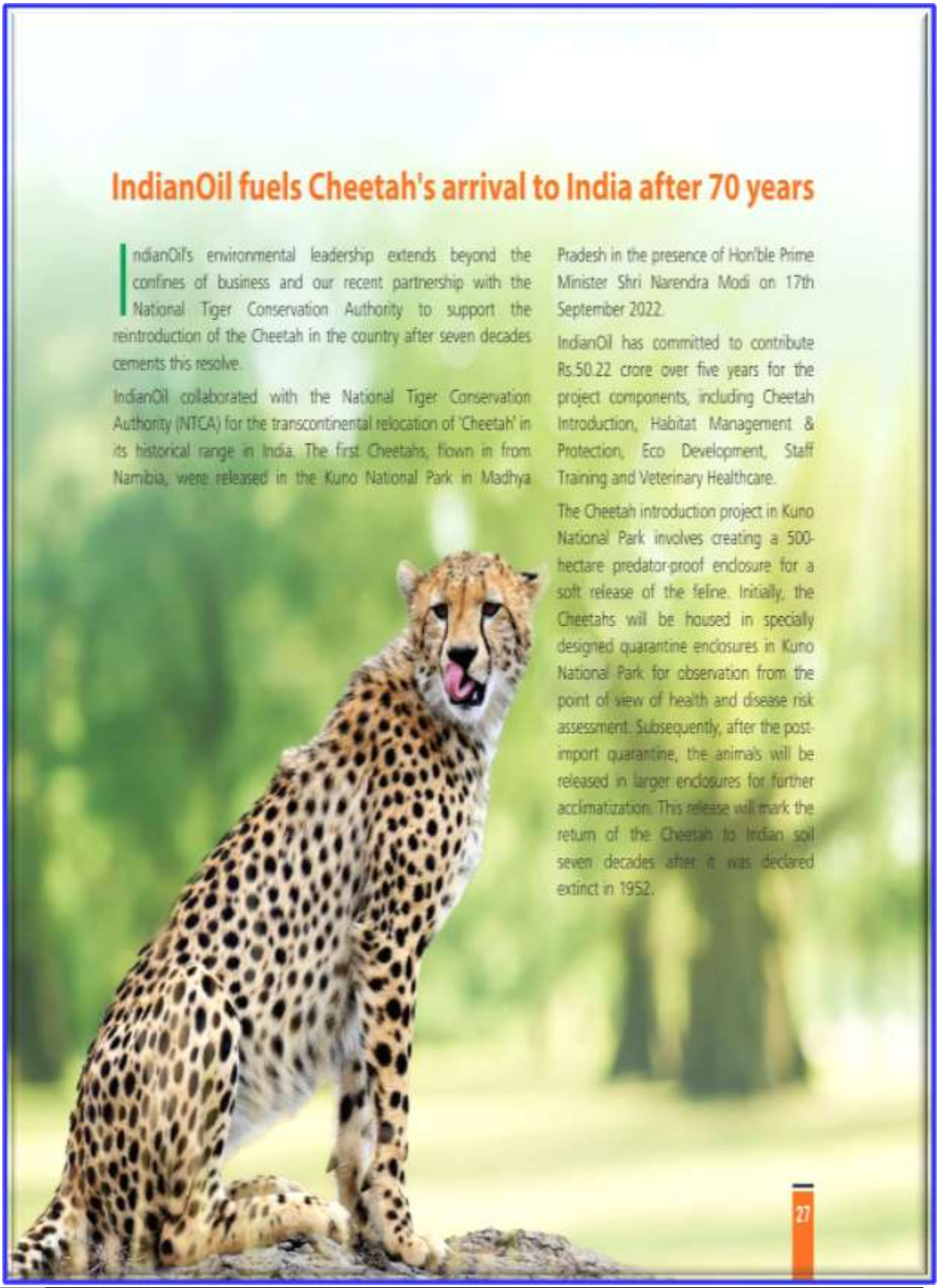
IndianOil fuels Cheetah's arrival to India after 70 years

IndianOil's environmental leadership extends beyond the confines of business and our recent partnership with the National Tiger Conservation Authority to support the reintroduction of the Cheetah in the country after seven decades cements this resolve.

IndianOil collaborated with the National Tiger Conservation Authority (NTCA) for the transcontinental relocation of 'Cheetah' in its historical range in India. The first Cheetahs, flown in from Namibia, were released in the Kuno National Park in Madhya Pradesh in the presence of Hon'ble Prime Minister Shri Narendra Modi on 17th September 2022.

IndianOil has committed to contribute Rs.50.22 crore over five years for the project components, including Cheetah Introduction, Habitat Management & Protection, Eco Development, Staff Training and Veterinary Healthcare.

The Cheetah introduction project in Kuno National Park involves creating a 500-hectare predator-proof enclosure for a soft release of the feline. Initially, the Cheetahs will be housed in specially designed quarantine enclosures in Kuno National Park for observation from the point of view of health and disease risk assessment. Subsequently, after the post-import quarantine, the animals will be released in larger enclosures for further acclimatization. This release will mark the return of the Cheetah to Indian soil seven decades after it was declared extinct in 1952.



27

IndianOil's Brand Mascot

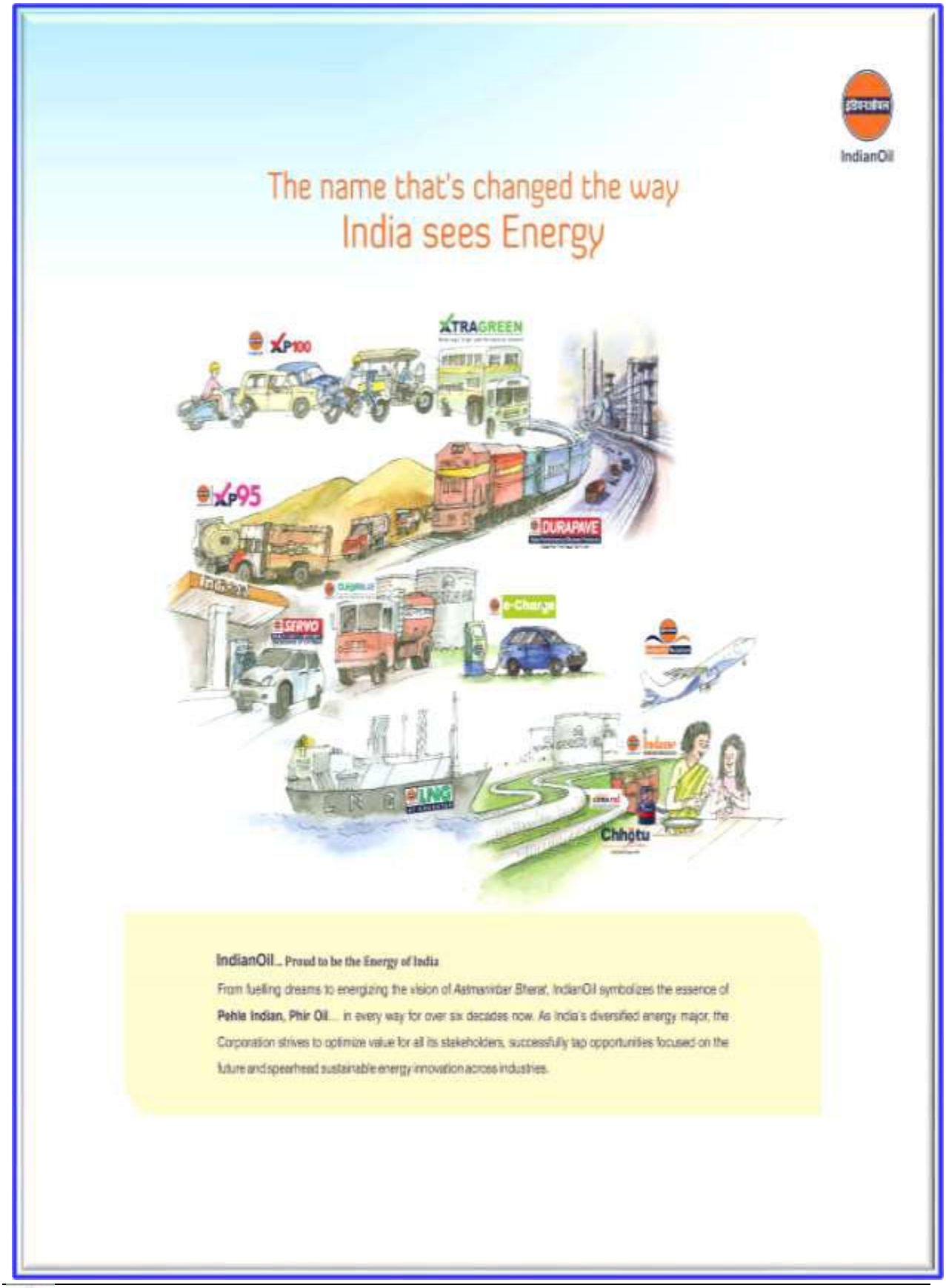
IndianOil launched its official brand mascot 'IndianOil Rhino' on IndianOil Day, i.e., 1st September 2021.

IndianOil has been prioritizing the core value of 'Care' in every action, and through the choice mascot, the Corporation has committed itself to espouse the cause of the Great Indian Rhino and create awareness about this majestic dweller of Indian forests.

The Indian Single Horned Rhino is an exquisite combination of strength, power and agility. More importantly, its identity is rooted in its Indianness, making it the perfect storyteller for brand IndianOil. This Rhino is also a critical cog in the ecology to which it belongs, and its continued well-being is crucial for the sustenance of the ecological chain.


IndianOil
Marketing Locations
(as on March 31, 2022)
LEGEND
LPG Bottling Plants
Aviation Fuel Stations
Lube Plants
Terminals
LPG Terminals
Oil Depot
Map not to scale
29


Refineries, Pipelines, R&D
(as on March 31, 2022)
IndianOil
LEGEND
Crude Oil Pipeline (Existing)
Crude Oil Pipeline (Ongoing)
Product Pipeline (Existing)
Product Pipeline (Ongoing)
Gas Pipeline (Existing)
Gas Pipeline (Ongoing)
LPG Pipeline (Existing)
LPG Pipeline (Ongoing)
Single Point Mooring
IndianOil Refineries
Gas Terminal
Research and Development Centre
Details of Group Refineries
Digboi
Guwahati
Barauni
Gujarat (Koyali)
Haldia
Bongaigaon
Mathura
Panipat
Paradip
CPCL (Subsidiary) Refinery
Manali, Chennai
Total
38


IndianOil
The name that's changed the way
India sees Energy
XTRAGREEN
XP100
XP95
DURAPAVE
SERVO
e-Charge
LNG
Chhotu
IndianOil... Proud to be the Energy of India
From fuelling dreams to energizing the vision of Aatmanirbar Bharat, IndianOil symbolizes the essence of Pehle Indian, Phir Oil... in every way for over six decades now. As India's diversified energy major, the Corporation strives to optimize value for all its stakeholders, successfully tap opportunities focused on the future and spearhead sustainable energy innovation across industries.


IndianOil
The Energy of India
ENERGY BRANDS
That make a difference
XTRAPREMIUM
XTRAMILE
XTRAPOWER
XP100
XTRATEJ
XTRAGREEN
Indane
PROPEL
RHINOWAX
PREMIUM PARAFFIN WAX
SERVO
NANOCUT
SWAGAT
Fuel@Call
Chhotu
CNG
autogas
CLEAN BLUE
LNG
HCNG
XTRA GUARD
XP95
IndiGreen
Corporate Office, 3079/3, Josip Broz Tito Marg, Sadiq Nagar, New Delhi - 110049 www.iocl.com
/IndianOilCorpLimited
/IndianOilcl
/indianoilcorporationlimited
/indianoilcorp
Figures as on March 2022

INDIAN OIL CORPORATION LIMITED

Gujarat Refinery Laboratory,
P.O. Jawaharnagar
Koyali 391320

TEST REPORT

Material: 132000 -Bitumen VG-30 Bulk
Reason for test: Paving Bitumen VG-30 Full Spec (2013)
Industry standard description: IS: 73 -2013

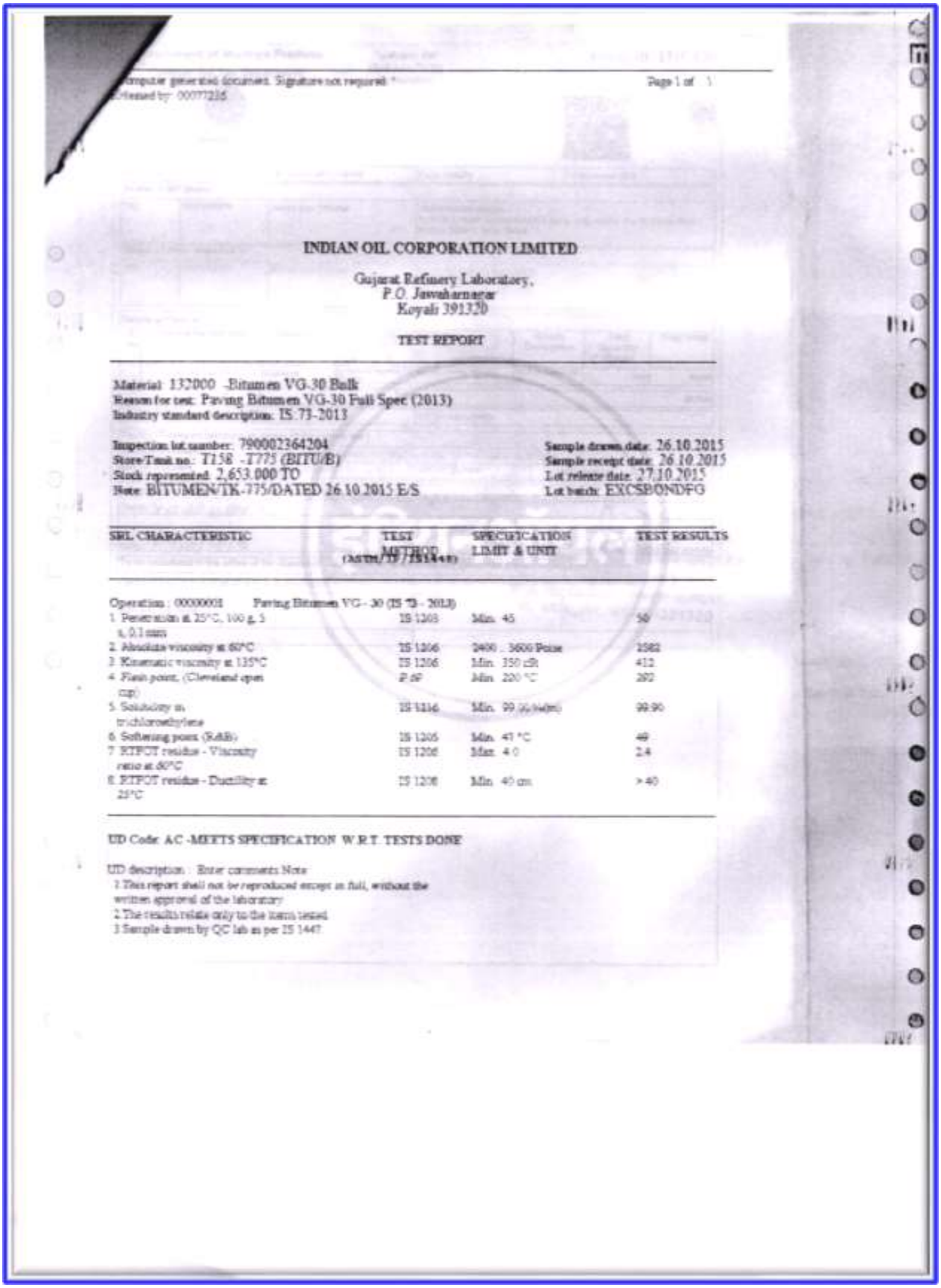
Inspection lot number: 7900023 72041
Store/Tank no.: T158 -T775 (BITU/B)
Stock represented: 3,500.000 TO
Note: BITUMEN/TK-775/DATED 07.11.2015 M/S

Sample drawn date: 07.11.2015
Sample receipt date: 07.11.2015
Lot release date: 07.11.2015
Lot batch: EXCSBONDFG

IOL CHARACTERISTIC	TEST METHOD	TEST RESULTS
Operation : 00000001 Paving Bitumen VG - 30 (IS 73 - 2013)		
1. Penetration at 25°C, 100 g, 5 s, 0.1 mm	IS 1203	48
2. Absolute viscosity at 60°C	IS 1206	2656
3. Kinematic viscosity at 135°C	IS 1206	404
4. Flash point, (Cleveland open cup)	PMS	294
5. Solubility in trichloroethylene	IS 1216	99.90
6. Softening point (R&B)	IS 1205	52
7. RTFOT residue - Viscosity ratio at 60°C	IS 1206	2.3
8. RTFOT residue - Ductility at 25°C	IS 1208	>40

UD Code: AC -MEETS SPECIFICATION W.R.T. TESTS DONE

UD description : Enter comments Note
1.This report shall not be reproduced except in full, without the written approval of the laboratory
2.The results relate only to the items tested.
3.Sample drawn by QC lab as per IS 1447



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Released by: 00077216

INDIAN OIL CORPORATION LIMITED

Gujarat Refinery Laboratory,
P.O. Jawaharnagar
Koyali 391320

TEST REPORT

Material: 132000 -Bitumen VG-30 Bulk
Reason for test: Paving Bitumen VG-30 Full Spec (2013)
Industry standard description: IS 73-2013

Inspection lot number: 790002364204
Store/Tank no.: T158 -T775 (BITU/B)
Stock represented: 2,653.000 TO
Note: BITUMEN/TK-775/DATED 26.10.2015 E/S

Sample drawn date: 26.10.2015
Sample receipt date: 26.10.2015
Lot release date: 27.10.2015
Lot batch: EXCSBONDFG

SRL	CHARACTERISTIC	TEST METHOD (ASTM/IP/IS/IS)	SPECIFICATION LIMIT & UNIT	TEST RESULTS
Operation : 00000001 Paving Bitumen VG - 30 (IS 73 - 2013)				
1	Penetration at 25°C, 100 g, 5 s, 0.1 mm	IS 1203	Min. 45	59
2	Absolute viscosity at 60°C	IS 1206	2400 - 3600 Poise	2582
3	Kinematic viscosity at 135°C	IS 1206	Min. 350 cSt	412
4	Flash point, (Cleveland open cup)	IS 1209	Min. 220 °C	282
5	Solubility in trichloroethylene	IS 1216	Min. 99 %(m/m)	99.90
6	Softening point (R&B)	IS 1205	Min. 47 °C	49
7	RTFOT residue - Viscosity ratio at 60°C	IS 1206	Max. 4.0	2.4
8	RTFOT residue - Ductility at 25°C	IS 1208	Min. 40 cm	> 40

UD Code: AC -MEETS SPECIFICATION W.R.T. TESTS DONE

UD description : Enter comments Note
1 This report shall not be reproduced except in full, without the written approval of the laboratory
2 The results relate only to the items tested
3 Sample drawn by QC lab as per IS 1447

INDIAN OIL CORPORATION LIMITED

Haldia Refinery Laboratory,
P.O. Haldia Oil Refinery
Haldia 721606

TEST REPORT

Material: 134000 -Bitumen VG-40 - Bulk
Reason for test: Detail Analysis of Bitumen VG-40
Industry standard description:

Inspection lot number: 190002404232
Store/Tank no.: T964 -TK-964(BITUMEN2)
Stock represented: 1,800.000 TO
Note: BATCH NO-964-12, REPORT NO-183-15

Sample drawn date: 24.12.2015
Sample receipt date: 28.12.2015
Lot release date: 23.12.2015
Lot batch: EXCBONDFG

SRL	CHARACTERISTIC	TEST METHOD (ASTM/IP/IS1448)	SPECIFICATION LIMIT & UNIT	TEST RESULTS
	Operation : 00000001Detail Analysis of Bitumen VG-40			
1.	Penetration at 25 deg C,100g,5s,0.1mm	IS 1203	Min. 35	34
2.	Absolute Viscosity at 60 deg.C	IS 1206	3200 .. 4800 Poise	3918
3.	Kinematic Viscosity at 135 deg C	IS 1206	Min. 400.0 cSt	588.0
4.	Flash Point (Cleveland Open Cup)	IS 1209	Min. 220.0 CEL	332.0
5.	Solubility in Trichloroethelene	IS 1216	Min. 99.0 %m	99.9
6.	Softening Point (Ring & Ball)	IS 1205	Min. 50.0 CEL	51.4
7.	Viscosity Ratio at 60 deg C from RTFOT	IS 1206	Max. 4.0	3.8
8.	Ductility at 25 deg C	IS 1208	Min. 25.0 cm	> 25.0

UD Code: AC -MEETS SPECIFICATION W.R.T. TESTS DONE

"Computer generated document. Signature not required." Page 1 of 1
Released by: 00071149

INDIAN OIL CORPORATION LIMITED

Haldia Refinery Laboratory,
P.O. Haldia Oil Refinery
Haldia 721606

TEST REPORT

Material: 134000 -Bitumen VG-40 - Bulk
Reason for test: Detail Analysis of Bitumen VG-40
Industry standard description:

Inspection lot number: 790002382343
Store/Tank no.: T964 -TK-964(BITU/B/2)
Stock represented: 180.000 TO
Note: BATCH NO-964-10, REPORT NO-153-15

Sample drawn date: 23.11.2015
Sample receipt date: 23.11.2015
Lot release date: 24.11.2015
Lot batch: EXCSBONDFG

SRL CHARACTERISTIC	TEST METHOD (ASTM/IP/IS1448)	SPECIFICATION LIMIT & UNIT		TEST RESULTS
Operation : 00000001Detail Analysis of Bitumen VG-40				
1. Absolute Viscosity at 60 deg C	IS 1206	Min.	3200.0 Poise	3374.0
2 Kinematic Viscosity at 135 deg C	IS 1206	Min.	400.0 cSt	573.0
3. Flash Point (Clevelend Open Cup)	IS 1209	Min.	220.0 CEL	350.0
4. Solubility in Trichloroethelene	IS 1216	Min.	99.0 %(m)	99.0
5. Penetration at 25 deg C,100g,5s,0.1mm	IS 1203	Min.	35	42
6. Softening Point (Ring & Ball)	IS 1205	Min.	50.0 CEL	50.8
7. Viscosity Ratio at 60 deg C free STEP	IS 1206	Max.	4.0	3.8
8. Ductility at 25 deg C	IS 1208	Min.	25.0 cm	> 25.0

UD Code: AC -MEETS SPECIFICATION W.R.T. TESTS DONE

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Released by: 00071149

INDIAN OIL CORPORATION LIMITED

Haldia Refinery Laboratory,
P.O. Haldia Oil Refinery
Haldia 721606

TEST REPORT

Material: 134000 -Bitumen VG-40 - Bulk
Reason for test: Detail Analysis of Bitumen VG-40
Industry standard description:

Inspection lot number: 7900023527796
Store/Tank no.: T962 -TK-962(BITU/B/2)
Stock represented: 170.000 TO
Note: BATCH NO-962-08, REPORT NO-126-15

Sample drawn date: 08.10.2015
Sample receipt date: 08.10.2015
Lot release date: 09.10.2015
Lot batch: EXCSBONDFG

SRL	CHARACTERISTIC	TEST METHOD (ASTM/IP/IS1448)	SPECIFICATION LIMIT & UNIT		TEST RESULTS
Operation : 00000001Detail Analysis of Bitumen VG-40					
1.	Absolute Viscosity at 60 deg C	IS 1206	Min.	3200.0 Poise	3693.0
2.	Kinematic Viscosity at 135 deg C	IS 1206	Min.	400.0 cSt	554.0
3.	Flash Point (Clevelend Open Cup)	IS 1209	Min.	220.0 CEL	348.0
4.	Solubility in Trichloroethelene	IS 1216	Min.	99.0 %(m)	99.0
5.	Penetration at 25 deg C,100g,5s,0.1mm	IS 1203	Min.	35	39
6.	Softening Point (Ring & Ball)	IS 1205	Min.	50.0 CEL	51.2
7.	Viscosity Ratio at 60 deg C from RTFOT	IS 1206	Max.	4.0	3.2
8.	Ductility at 25 deg C	IS 1208	Min.	25.0 cm	> 25.0

UD Code: AC -MEETS SPECIFICATION W.R.T. TESTS DONE

RTCPL

Radhey Testing & Consultants Pvt. Ltd.

(Material Testing, Calibration, Survey, Environmental Test, Soil & Rock Investigation, Engineers & Consultants)

8-363, Kalindi Vihar, Opp. R.B. Degree College, 100 Feet Road, Agra-282 006. E-mail: rtcplagra@gmail.com
Mob. 9837003861, 9219591810,11-12-13,14 [illegible]

Issue Date : 25.04.2023

Issued To : M/S Dilip Buildcon Ltd. Villupuram-Puducherry NH-45A (New NH 332) Bharatmala Pariyojana Phase-I Tamil Nadu.
Sample of Bitumen VG-40 Submitted to Lab by the Client. Source: IOCL.

Sample Identification : ULR- TC747522000001273F

TEST REPORT No. 016-22-46142

Ref. No. & Date : DBL-SO/VUPM PON/Lab/2022-23/95 07.25.04.2023

Date of Sample Receipt by Lab : 40.04.2023

Job Order No. : 4620

Duration of Testing : 01.05.2023 to 04.05.2023

TEST REPORT

Subject :- Four-laning of Villupuram – Puducheery Section of NH-45A (New NH 332) from km 0+000 to km 29+000 (Design Chainage) Under Bharatmala Pariyojana Phase-I (Residual NHDP IV works) on HAM in the state of Tamil Nadu and Union Territory of Puducherry.

Test Method: IS: 73-2013

Sl. No.	Test Parameters	Test Method	Results	Limits As per 73-2013 Table-1
1.	Bitumen Penetration (25 °C /100gm/5 sec. , 0.1 mm)	IS-1203	39	35 Min.
2.	Absolute viscosity at 60°C, Poises	IS-1206 P02	3620	3200-4800
3.	Kinematic viscosity at 135°C, cSt	IS-1206 P03	590	400 Min.
4.	Flash Point, °C (Cleveland open cup)	IS-1448 P69	310	220 Min.
5.	Solubility in Trichloroethylene, %	IS-1216	99.1	99.0 Min.
6.	Softening Point, °C (R & B)	IS-1205	57.2	50.0 Min.
7.	Tests on residue from rolling Thin film oven test.			
	(a) Viscosity ratio at 60°C	IS-1206 P02	2.7	4.0 Max
	(b) Ductility at 25°C, cm	IS-1208	63.4	25 Min.

TC-7475

Checked By

Approved by
Er. D. N. Tiwary
Technical Manager
Authorised Signatory
AUTHORISED SIGNATORY

Note : 1. Sample will be retained only for Three month.
2. The results listed refer only to the tested sample and applicable Parameters. Endorsement of product is neither inferred nor implied.
3. Total liability of our works is limited to invoiced amount.
4. This report can not used as an evidence in a court of law without the written approval of the lab.
5. Certificate shall not be reproduced except in full, with out the written approval of the laboratory.
6. Any Complaint about the report should be intimated within 7 days.
7. Mobile No. 9837003861, 9457434087 for sample collection in all Over India.

Format No. : F01 (7.8)

DBL VILUPPURAM HIGHWAYS LIMITED

(villupuram@dilipbuildcon.co.in)

DBL-RO/NHAI/Viluppuram-Puducherry/2023-24/797

31st May 2023

The Team Leader,
L.N Malviya Infra Projects Limited,
NH 332 -Viluppuram Puducherry NH Road,
Pangur, Puducherry

Sub: - UPC - N/08019/01002/TN Four-Laning of Viluppuram – Puducherry section of NH 45A (New NH 332) from Km 0.000 to Km 29.000 (Design Chainage) under Bharatmala Pariyojana Phase I (Residual NHDP IV works) on HAM in the State of Tamil Nadu and Union Territory of Puducherry – **Source Approval for Emulsion (RS-1) Reg**.

Ref: - 1. Concession Agreement dated 17th May 2021.

Dear Sir,

Adverting to the above subject matter, the concessionaire is herewith submitting the profile and credentials of Emulsion (RS1) M/s. Hindustan Colas Limited (HINCOL).

The above manufacturers used for Bituminous works in our project.

This is being submitted for your kind review and provide your consent for further action at the earliest.

Thanking you and assuring our best service all the time.

Yours faithfully

For M/s. DBL Viluppuram Highways Limited,

Kumar Sengottaiyan
Project Manager

Encl: As mentioned above.
Copy to: The Project Director, NHAI-PIU, Puducherry, for information

(CIN: U45201MP2021PTC055629) | **Regd. Office :** Plot No. 5, Inside Govind Narayan Singh Gate,Chuna Bhatti, Kolar Road, Bhopal - 462 016 (M.P.), Ph.: 0755-4029999, Fax : 0755-402999 www.dilipbuildcon.com

HINCOL

WE SPEAK THE WAY

COMPANY PROFILE

Hindustan Colas Private Limited is a Joint Venture Company of **Hindustan Petroleum Corporation Ltd.,** (A Govt. of India Enterprise) the second largest oil PSU, with **Colas S.A., France** (World leader in Road construction Industry) Engaged in the business of Manufacturing and Marketing of **Cationic Bitumen Emulsion, Cutback and all type of Modified bitumen.** We always remained in the forefront with regard to the development of environment friendly and energy efficient products. HPCL believes in constant growth through all round excellence in its operations, innovations and also alliances with internationally reputed organizations.

You may be aware of the impetus being given by the Govt. of India and also the Various State Governments in developing good infrastructure, consequent to which the road construction activity is presently witnessing significant growth. These new major road projects require high volumes of straight grade bitumen and also various other value added bitumen products like bitumen emulsions, modified bitumen, cutback bitumen, etc.

While the straight grade bitumen is being produced & marketed directly by HPCL from its refineries, HPCL is utilizing the services of M/s Hindustan Colas Private Limited (*A 50:50 Joint Venture Company of HPCL with COLAS, SA of France*) to produce the value added bitumen products like bitumen emulsions, modified bitumen, cutback bitumen, etc.

M/s Hindustan Colas Private Limited was incorporated in 1995 and has successfully set up eight manufacturing facilities till date near **Mumbai, Delhi, Chennai, Vadodara, Visakhapatnam, Jhansi, Mangalore, Haldia & Ulberia.** The products manufactured by our JVC use the technical know-how received from M/s COLAS SA, and the production is carried out in highly sophisticated and automated imported plants. The superior quality products have enabled the JVC of HPCL to become the leader in bitumen emulsion market, within a short span of time.

We manufacture and supply all grades of **Bitumen Emulsions** as per the latest specifications – **IS: 8887:2004** or **as per ASTM D 2397** specifications or **as per BS 434 Pt-I** specifications. We also manufacture various grades of **Polymer modified Bitumen** as per latest specifications of **IS 15462: 2004** and **IRC: SP: 53: 2002** at all plants in India.

Contd.../-

HINCOL

HINCOL products have been very popular across the country and are being used in almost all the states in various departments for varying applications viz., tack coat, prime coat, surface dressing, maintenance works etc.

In the ongoing "Golden Quadralateral" and " North-South-East-West" corridor projects, besides the World Bank Aided Projects in various states, HINCOL products particularly bitumen emulsions and modified bitumen are being extensively used.

Hindustan Colas Private Ltd. is also a permanent Member of BIS Committee for finalization of Specifications for various Bitumen, Tar and their Products.

We are also engaged in following prestigious R&D activities

1. Finalization of Specifications for Roads Building Sector through PCD 6 and PCD 6:1, PCD 6:2 (Bitumen, Tar and their Sectional and Sub Committee)
2. Field Track Trials of polymer Modified Bitumen Vs Conventional Bitumen 60/70 with CRRI, Delhi
3. Field Track trials of Multi grade bitumen in pavement Construction with IIT, Madras
4. Working with BRO for the study of Cold mix Technologies in top layers of highways works and field trials are in progress.

Contd.../-

HINCOL

WE OPEN THE WAY

Our Vision

- To use innovative technology in making available, superior quality products and appropriate solutions to customers.
- To render specialized technical support to Road Builders.

Our Resources

- State-of-art manufacturing plants, all imported from COLAS SA, France (World leaders in the construction of roads and other related activities including transport infrastructure and activities linked to the transformation and use of bitumen) at the following locations
  1. Vashi, Navi Mumbai
  2. Bahadurgarh, near Delhi
  3. Irungattukottai, near Chennai
  4. Baroda, Gujarat
  5. Visakhapatnam, A.P.
  6. Mangalore, Karnataka
  7. Jhansi, UP
  8. Haldia, WB
- Technology support from COLAS SA and marketing support from Hindustan Petroleum Corporation Limited provides for high quality products, backed up by efficient customer service.
- Well equipped laboratories at all HINCOL plants supported by Central Research Laboratory of COLAS SA at Paris, facilitates ensuring strict quality control and to continuously carrying out improvements to quality, in line with latest international developments.

Our Services

- HINCOL ensures supply of our products confirming to the highest quality standards.
- Plants in all regions and the strong marketing network of Hindustan Petroleum Corporation Limited ensure easy availability of HINCOL products across India.
- Efficient technical support for use of HINCOL products.

Contd.../-

HINCOL

WE OPEN THE WAY

QUALITY AT HINCOL

The Quality System provides the tools by which we measure our performance, acting as a catalyst in promoting continuous improvement. It plays an integral part in all our day to day activities. **HINCOL** is committed to the provision of products and services that consistently meet the agreed requirements of its customers. We operate our business to meet or exceed the requirements of our customers. Through a structured programme of quality improvement projects, specific initiatives, measurement of performance and encouragement of ideas, we aim to meet our target of continuous improvement in the quality of everything we do.

The key features to our approach to quality are:

- culture of creativity and innovation
- collective responsibility
- people and processes enable and deliver the service
- active participation of supply chain partners
- flexibility in developing and producing performance indicators
- structured approach to sustainable and continuous improvement

HINCOL Plants are **ISO 9001-2008/ ISO 14001:2004/ISO 18001:2007** certified.

Contd.../-

HINCOL

CLIENT LIST

For over 17 years Hindustan Colas Private Ltd. has forged strong relationships with clients with wide variety of Quality Products. Below is a listing of our rapidly growing customer-base.

Gujarat State (NHAI/State Highways Projects)

1. M/s. Ircon International Ltd.	- Godhra – Shamlaji Rd (GSHP 7)
2. M/s. Bridge & Roof India (P) Ltd.	- Bagodara – Dhilka Rd (GSHP 6)
3. M/s. V.K.Patel & Co.	– Atkot-Chavand Rd (GSHP –RMC-19)
4. M/s. KMC Construction	- Ladvel – Godhra Rd (GSHP 8)
5. M/s. Backbone Enterprise Ltd	- Bharuch - Dahej (SH 06)
6. M/s. MSK Projects Ltd	-Kim-Mandvi BOT (SH)
7. M/s. Saraswati Construction Co.	-Deesa-Pathwada-Gondri Road BOT (SH 7)
8. M/s. Kunal Structure (I) Pvt Ltd	-Dhrol-Jodia-Amran (SH)
9. M/s. DIC-NCC JV	- Bamanbore – Garamore Rd (NH 8A, Pack. III)
10. M/s. DIC-NCC JV	- Garamore – Gagodhar Rd (NH 15, Pack. IV)
11. M/s. DIC-NCC JV	- Radhanpur – Deesa Rd (NH 14, Pack. VI)
12. M/s. Jilin-Sadbhav JV	- Gagodhar – Radhanpur Rd (NH 15, Pack. V)
13. M/s. Limak-Soma JV	- Porbander – Bhiladi Rd (NH 8B, Pack. I)
14. M/s. Dinesh Chandra R Agrawal	- Radhanpur – Deesa Rd (NH 14, Pack. VI)
15. M/s. Longjian Road & Bridge	- Jetpur – Bhiladi (NH 8B, Pack. II)
16. M/s. Backbone Enterprise Ltd	- Rajkot -Gondal–Jetpur (NH8B, Pack.VII)
17. M/s. Backbone Enterprise Ltd	- Ribda - Gondal (NH8B, EW-10/GJ)
18. M/s. Soma Enterprise	- Jetpur – Bhiladi (NH 8B, Pack. II)
19. M/s. L&T, ECC	- Palanpur-Swaroopganj BOT (NH-15)
20. M/s. L&T, ECC	- Baroda- Bharuch BOT (NH-8)
21. M/s. Modern Road Makers P Ltd.	- Bharuch-Surat BOT (NH- 8)
22. M/s. Modern Road Makers P Ltd.	- Surat-Dahisar BOT (NH- 8)
23. M/s. Soma Enterprise Ltd	-GJ/MH Border-Surat-Hazira Port (NH-6)
24. M/s. Isolux Corsan India Ltd	-GJ/MH Border-Surat-Hazira Port (NH-6)
25. M/s. L&T, ECC	- Rajkot-Jamnagar-Vadinar BOT (SH 25)
26. M/s. L&T, ECC	- Ahmedabad-Veeramgaon-Malya BOT (SH 17)
27. M/s. L&T, ECC	- Halol-Godhra-Samlaji BOT (SH 5)
28. M/s. Welspun Projects Ltd	- Bharuch-Dahej Six Lane (SH 6)
29. M/s. Ashish Infracon P Ltd	- Gandhinagar-Gojaria (SH)
30. M/s. Tacon Infrastructure P Ltd	- Gojaria-Visnagar (SH)
31. M/s. Ketan Construction Ltd	- Bagodhra-Tarapur (SH)
32. M/s. L&T, ECC	- Samakhiali-Gandhidham BOT (NH 8A)
33. M/s. L&T, ECC	- Kandla-Mundra BOT (NH 8A)
34. M/s. Backbone Enterprise Ltd	- Jetpur - Somnath (NH8D)
35. M/s. Patel Infrastructure P Ltd	- Palanpur-Radhanpur-Samakhiali (NH14/NH15)
36. M/s. Patel Infrastructure P Ltd	- Vadodara-Ahmedabad (NE1) (Resurfacing)
37. M/s. Modern Road Makers P Ltd	- Vadodara-Ahmedabad (NE8)

HINCOL

Other Important Project

1. M/s. Patel-Sadbhav JV - Sardar Patel Ring Road Project in Ahmedabad
2. M/s. Essar Projects (I) Ltd. - Essar Refinery project in Jamnagar
3. M/s. Mundra Port & SEZ Ltd. – Mundra Port & SEZ in Mundra
4. M/s. Ideal Road Bulider - Bus Rapid Transit System in Ahmedabad
5. M/s. Backbone Enterprises Ltd - Bus Rapid Transit System in Rajkot
6. M/s. Reliance Industries Ltd - Refinery internal road project in Jamnagar
7. M/s. Reliance Petroleum Ltd - RPL –SEZ in Jamnagar
8. M/s. R.K.Construction - Baroda Ring Road Project
9. M/s. R.K.Construction - Various GIDC internal road project (Savli/Waghodia/Halol/ Makarpura/Dahod)
10. M/s. Royal Infra Engi P Ltd - Bus Rapid Transit System in Surat

Maharashtra State (NHAI Projects)

1. M/s Sadbhav Engineering Ltd. - Igatpuri-Thane on NH3
2. M/s IRCON SOMA TOLLWAYS PVT LTD. – Dhule-Pimpelgaon on NH3
3. M/s Ideal Road Builder P Ltd – Nagpur-Hyderabad section on NH 7
4. M/s IDAA Infrastructure Ltd - Dahisar-Surat on NH 8
5. M/s IL&FS Transportation Network Ltd - Pune-Satara on NH4 Extn
6. M/s. Montecarlo Ltd. - Khed - Sinnar on NH 50

Other Important Project

1. M/s L&T-ECC - Mumbai International Air Port Project

Chhattisgarh State

(NHAI Projects)

1. M/s DSC Ltd - Raipur –Drug BOT Project on NH7
2. M/s DSC Ltd - Durg –Aurang BOT Project on NH7

Other Important Project

1. M/s BSCPL Infra Ltd – NRDA project at Naya RAIPUR
2. M/s. L &T – NRDA project 2 at Naya RAIPUR

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PWD Chhattisgarh/PWD MP/R&B Gujarat for Maintenance work

M.P. State (NHAI/State Highways Projects)

1. M/s. CSCHK-SOMA JV	- Raj-MP Border (NH 76 to NH 25, EW-II, MP-1)
2. M/s. Unitech Ltd	- Betul - Paratwara (MPRDC/Phase I/Package1)
3. M/s. Unitech Ltd	- Seoni-Chindwara (MPRDC/Phase II/Package2)
4. M/s. Ramky-ERA-Shriram JV	- Gwalior Bypass (NH-75 & NH 3)
5. M/s. IJM Corporation	- Lalitpur-Sagar, KM 132-187 (NH 26, C-4)
6. M/s. Ssangyong Engi.	- Sagar by Pass KM 187-211 (NH 26, C-5)
7. M/s. Ssangyong Engi.	Sagar –Rajmarg Chouraha KM 187-211 (NH 26, C-6)
8. M/s. BSCPL	- Sagar-Rajmarg, KM 225-297 (NH 26, C-7)
9. M/s. Meenakshi Infra. P. Ltd.	- Lakhnadaon-Seoni, KM 547-597 (NH 7, MP-2)
10. M/s. Sadbhav Engineering	- Seoni- Khapasa Border KM 597-652 (NH 7)
11. M/s. Somdatt Builder	- Tikamgarh-Orcha/Malhera/Shahpur Road (MPRDC/PhaseII/ Pack IV)
12. M/s. Ketan Construction	- Vidisha-Korwai Road (MPRDC/PhaseII/ Pack V)
13. M/s. Monte Carlo Construction	-Jabalpur-Amarkantak (MPRDC/PhaseII/ PackVII)
14. M/s. JMC Projects (I) Ltd.	– Badnawar- Thandla Road (SH1/18) (MPRDC/PhaseII/ Pack VIII)
15. M/s. Valecha Engineering	– Katni-Pawai-Amanganj-Panna-Ajaygarh (MPRDC Regular Contract/PhaseII)
16. M/s. Valecha Engineering	– Lukwasa-Isagarh-Chanderi (MPRDC Regular Contract/PhaseII)
17. M/s. ERA Infra Engineering	– Manasa-Rampura-Bhanpura (SH31A) (MPRDC Regular Contract/PhaseII)
18. M/s. Monte Carlo Construction	– Narsinghpur- Chindwara (MPRDC Regular Contract/PhaseII)
19. M/s. Dilip Buildcon	– Pichhore-Astha-Kannod (MPRDC Regular Contract/PhaseII)
20. M/s. TCIL	– Pichhore-Dinara-Datia (MPRDC Regular Contract/PhaseII)
21. M/s. Sadbhav Engineering	-Shivpuri-Sheopur-Rajasthan Border (SH06) (MPRDC/MPSRSP II/ PackI)
22. M/s. SCC Projects Ltd	-Gairatganj-Silwani-Bareli-Piparia Road (SH44/15/19) (MPRDC/MPSRSP II/ Pack II)
23. M/s. JMC Projects (I) Ltd.	– Mandleshwar-Kasrawad-Khargon Road (SH1/31) (MPRDC/MPSRSP II/ Pack III)
24. M/s. PATH Ltd.	– Badwah-Dhamnod Road-Khalghat (SH38) (MPRDC/ MPSRSP II / Pack IV)
25. M/s. IDEB Projects (P) Ltd.	– Indore-Depalpur/Birgodha-Ingoria Road (MPRDC/ MPSRSP II / Pack V)
26. M/s. MSK Projects (I) Ltd.	– Khandwa-Khargone (SH26) (MPRDC/MPSRSP II/ Pack VII)
27. M/s. NKG Infrasture Ltd.	– Hoshangabad-Nasrullaganj-Khategaon (SH22)

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28. M/s. Sadbhav Engineering	(MPRDC/ MPSRSP II / Pack VIII) – Seoni-Chiraidongri (SH06)
29. M/s. ARCONS Infrastructure	(MPRDC/ MPSRSP II / Pack XI) – Balaghat- Nainpur (SH12)
30. M/s. Sadbhav Engineering	(MPRDC/ MPSRSP II / Pack XII) – Seoni-Chiraidongri (SH06)
31. M/s. Vijai Infrastructure Ltd	(MPRDC/ MPSRSP II / Pack XIII)
32. M/s. Monte Carlo Construction Ltd	(MPRDC/ MPSRSP II / Pack XIV)
33. M/s. Ramky Infrastructure Ltd	(MPRDC/ MPSRSP II / Pack XV)
34. M/s. Tirupati Buildcon P Ltd. / M/s. Sherman India Road Maker's	– Betul- Khandwa (MPRDC Regular Contract/PhaseII)
35. M/s. Dilip Buildcon P Ltd.	– Mandsaur-Sitamau (MPRDC /BOT)
36. M/s. Backbone Enterprises	– Lebad-Nagda (SH31) (Package I) (MPRDC /BOT)
37. M/s. Dilip Buildcon P Ltd.	– Lebad-Jaora (SH31) (Package IV) (MPRDC /BOT)
39. M/s. Varaha Infra Engi Ltd	– Jaora-Nayagaon (SH31) (MPRDC /BOT)
40. M/s. Ketan Const Ltd	Bargwan – Baidhan (SH6) (MPRDC/ MPSRSP II / Pack XVI)
41. M/s. Dilip Buildcon P Ltd	Nasrullaganj-Sehore Road (SH53) (MPRDC/ MPSRSP II / Pack XVII)
42. M/s. DSC Ltd	- Gwalior-Jhansi (NH3)
43. M/s. SEW Infrastructure Ltd	- Kalghat-MP/MH Border (NH3)
44. M/s. Varaha Infra Engi Ltd	- Indore –Ujjain BOT (Package II)
45. M/s. Galfar Engi & Contracting (I) P Ltd	- Indore –Ujjain BOT (Package I)
46. M/s. Dilip Buildcon P Ltd	- Bhind-Gopalpur BOT (MPRDC)
47. M/s. Backbone Enterprise Ltd	- Sagar-Damoh BOT (MPRDC)
48. M/s. Dilip Buildcon P Ltd	- Lebad-Manpur BOT (MPRDC)
49. M/s. IVRCL Infra Project Ltd	- Indore-Jhabua-GJ/MP Border BOT (NH59)

HINCOL

As the marketing of HINCOL products is being done thru' the parent company, you can get in touch with any of the regional offices of HPCL or its field personnel for any enquiry. Alternately, you may also get in touch with us directly at all our plants.

G.P.Singh
Manager-Business Development (WZ)
Cell: +91 9925024641
E-mail: gpsingh@hincol.com

LEA Associates South Asia Pvt. Ltd.

A LEA Group Company

Consulting Engineers & Planners

MPRDC PROJECT
Sagar-Damoh, Damoh-Jabalpur, Bina-Khimlasa-Malthon & Bhind-Mihona-Gopalpur Road Projects
E-8/392, Trilanga Colony, Bhopal-462 039
Tele- 0755 - 4295527
E-mail : leabhopal@leaindia.com
09630099571(TL), 09893555361(OM)

No. LASA/73328/MPRDC-SAGAR/MATE./2010/76 Dated: 27th March 2010

To,
M/s. Essel Sagar-Damoh Toll Roads Ltd.
3, Paville House,
Off. Veer Savarkar Marg,
Twin Tower Lane, Prabhadevi,
Mumbai-400 025

Proj: **Strengthening, Up-gradation - Sagar-Damoh, Damoh-Jabalpur, Bhind-Mihona-Gopalpur & Bina-Khimalasa-Malthon Road Projects.**

Sub: **Approval of Source for Procurement of Bitumen Emulsion (Sagar-Damoh Road).**

Ref: **Backbone letter No. BEL/SD/2010/046 dated 23rd March 2010.**

Dear Sir,

Based on the credentials and other related documents submitted for the approval of source for procurement of Bitumen Emulsion, the sources of M/s. Hindustan Colas Limited, Vashi is found in order, subject to following conditions:-

- The material shall be as per IS-8887 and other specification prescribed in the Concession Agreement.
- Before incorporating in the works, satisfactory third party tests are mandatory as per MOSRTH Specification.

Thanking you,

Yours faithfully,

(Y.P. Singh Deo)
Team Leader

Copy to:
1) Chief Engineer, MPRDC, Bhopal.
2) Divisional Manager, MPRDC, Sagar.
3) Resident Engineer, M/s. Lea Associates South Asia Pvt. Ltd., Sagar.
4) Material Engineer, LASA, Bhopal / Office copy.

Project Offices:
*Agartala * Allahabad *Bangalore *Bhopal *Bhubaneswar* Chennai
* Delhi-an-exte * Gandhinagar *Guwahati * Jammu *Lucknow
* Mumbai * Salem * Surat *Thiruvananthapuram*Varanasi
*Visakhapatnam * Wardha

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aarvee associates
architects engineers & consultants pvt. ltd.
Independent Engineer services for 6-Laning of Ahmedabad-Vadodara section of NH 8 & improvement of Ahmedabad-Vadodara Expressway in the state of Gujarat under NHDP Phase V on DBFO (Toll) basis

Letter Ref.: AA/AMBD-VDDR/Q&M/018

Date: 27.08.2012

To:

The Chief Project Co-ordinator,
IRB Ahmedabad Vadodara Super Express Tollway Pvt. Ltd.
B-301, Universal Business Park,
Kamani Oil Mill Road,
Chandivli Estate, Andheri (E),
Mumbai – 400 072.

Dear Sir,

Sub: Independent Engineer Services for Six Laning of Ahmedabad - Vadodara Section of NH – 8 from km 6.400 to km 108.700 (length 102.300 km) in the state of Gujarat and improvement of Ahmedabad - Vadodara Expressway from km 0.000 to km 93.302 in the state of Gujarat (length 93.302 km) under NHDP Phase V on Design, Build, Finance, Operate and Transfer (Toll) Basis – **Quality & Materials - Source approvals – Reg.**

Ref: Concessionaire's Letter No. IRB/AVSETPL/152/2012 dated 22.08.2012
Concessionaire's Letter No. IRB/AVSETPL/153/2012 dated 22.08.2012
Concessionaire's Letter No. IRB/AVSETPL/154/2012 dated 22.08.2012
Concessionaire's Letter No. IRB/AVSETPL/159/2012 dated 22.08.2012

With reference to the above letters on the above subject, we have reviewed the company profile. The report found satisfactory. The approval is accorded for the following sources.

1. Bharat Petroleum Corporation limited, Mumbai.
2. Hindustan Petroleum Corporation Limited, Mumbai
3. Indian Oil, New Delhi.
4. Hindustan Coals Limited, New Mumbai.

With best Regards,

for **Aarvee Associates Architects Engineers & Consultants Pvt. Ltd.,**

For **Muneer Abdul**
Team Leader cum Senior Highway Engineer

CC: 1. The Project Director, NHAI, PIU-Ahmedabad – for information and records.
2. The Managing Director, Aarvee Associates Architects Engineers & Consultants Pvt. Ltd., Hyderabad

AHMEDABAD - VADODARA SUPER EXPRESS TOLLWAY PVT. LTD.
Inward No.
Date 29/08/2012
Sign.

HINDUSTAN COLAS PRIVATE LIMITED

A joint venture of Hindustan Petroleum Corp. Ltd. with Colas SA, France.

ilac-MRA

TC-10612

Branch Office:Adjacent HPCL POL Terminal, Village Bala, Via Katipalla, 575030, Mangalore, Karnataka, INDIA.
Phone: 0824-6558484 / 2271745 | Fax 0824- 2271745 | Email: corporate@hincol.com | Web: www.hincol.com | CIN: U23200MH1995PTC090671

TEST REPORT (I)

Product & Type : HINCOL Emulsion RS1 (Bulk)
Batch No. : MLRM337758
ULR : TC1061223000001320F
SAP Invoice No : 4103119000
Sample Received Date : 23.05.2023

Date : 25.05.2023
Discipline : Mechanical
Group : Buildings Materials
SAP Certificate No : IRS0201264
Date Of Testing : 25.05.2023

Description	Units	Test Methods	Specifications	Results
Residue on 600 micron IS Sieve, Max	%	IS 8887-2018 ANNEX-B	0.05	0.002
Viscosity by Say bolt Furol Viscometer at 50°C	Sec	IS 3117-2019	20 - 100	28
Miscibility with water		IS 8887-2018 ANNEX-H	NO COAGULATION	NO COAGULATION
Tests on Residue				
a)Residue by evaporation, Min	%	IS 8887-2018 ANNEX-J	60	61.92

Note:

1. The test results relates only to the sample tested.
2. Test certificate shall not be reproduced unless written permission is obtained from lab.
3. The samples will be destroyed after 90 days from the date of issue of test certificate unless otherwise specified.
4. Any correction invalidates this report.

------------------- END OF TEST REPORT -------------------

For Hindustan Colas Pvt. Ltd.

Authorized Signatory
Name: Prarthana
Designation: Bco

Registered & Corporate Office: HINCOL House, B-601, 6th Floor, Marathon Futurex, N.M. Joshi Marg, Lower Parel, Mumbai- 400013, India.
Phone: +91-22-2302 3250 | Fax: +91-22-2302 3299 | Email: corporate@hincol.com | Web: www.hincol.com | CIN: U23200MH1995PTC090671

Page# 1 / 1

11. Annexure – III: Proposed Existing and New/ Expansion Highway Projects' Road Safety Management System Audit Frame Work in India and Pit Method of Land Filing Solid Wastes for Large Landfills at Projected Sites.

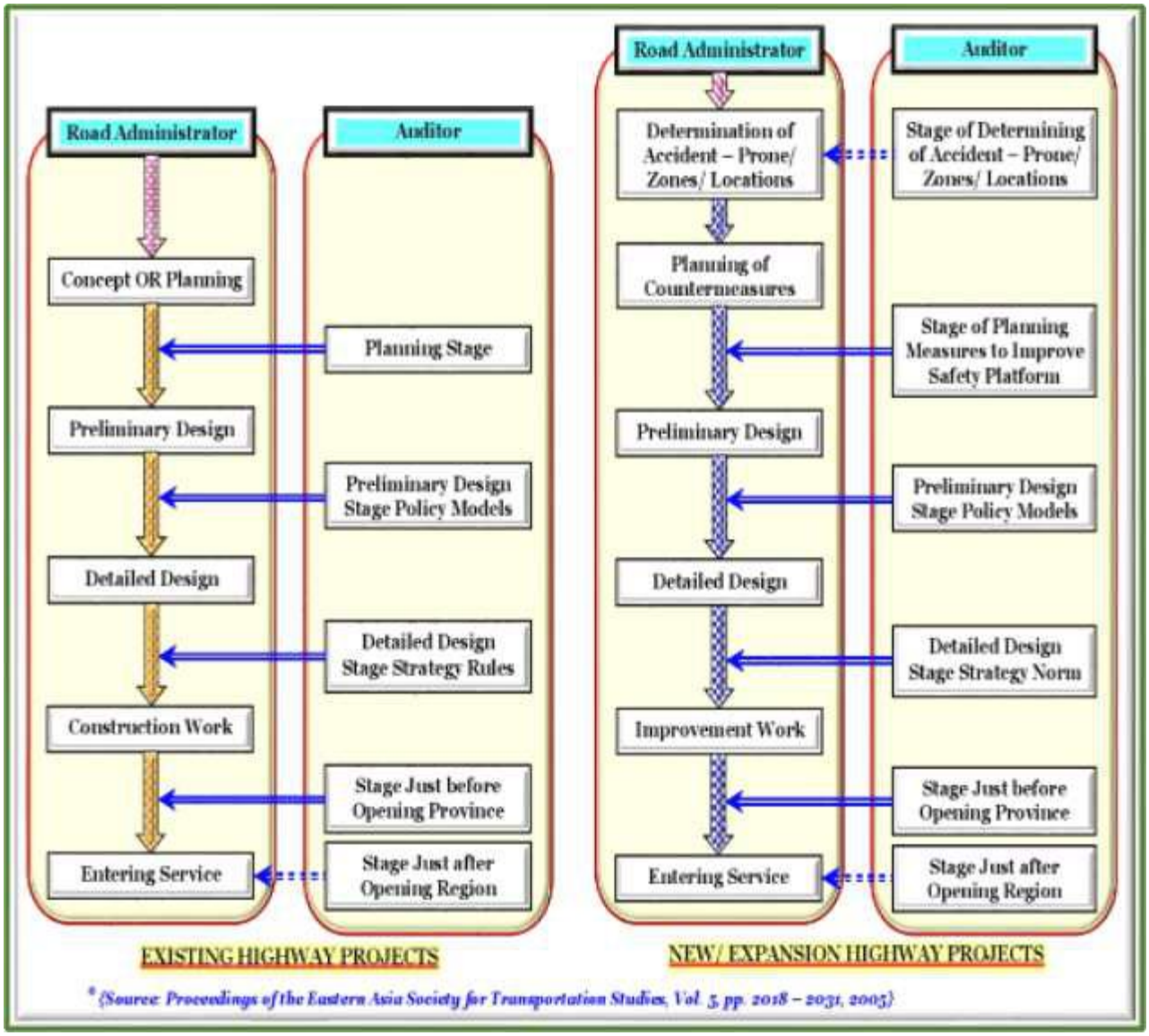


Figure 3: Existing and New/ Expansion Highway Projects are an Integral Part during Planning, Construction and Operational Stage for Road Safety Management System Audit Frame Work in India*.

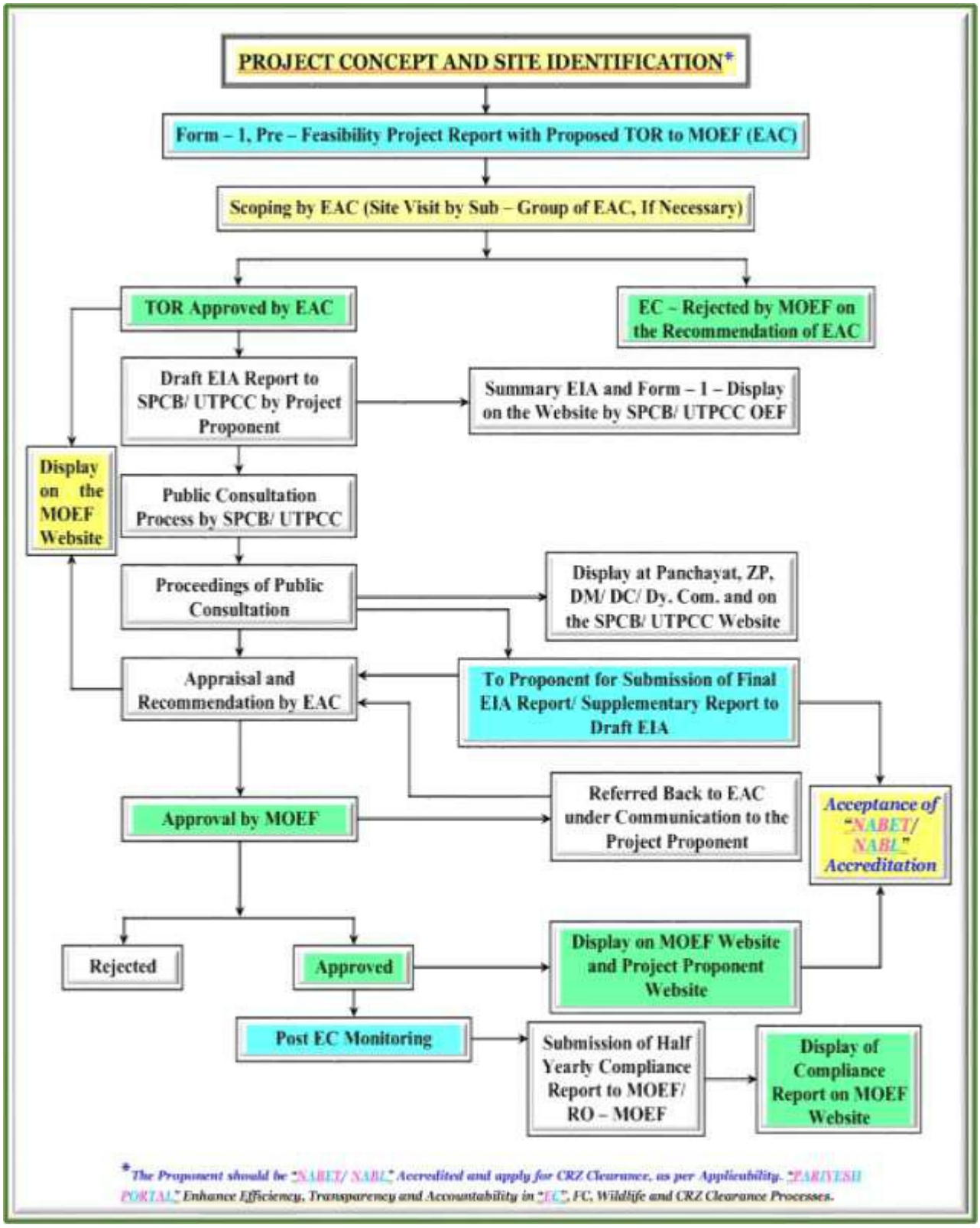


Figure 4: Stream Illustration of Prior Environmental Clearance Process for Category "A" Projects.

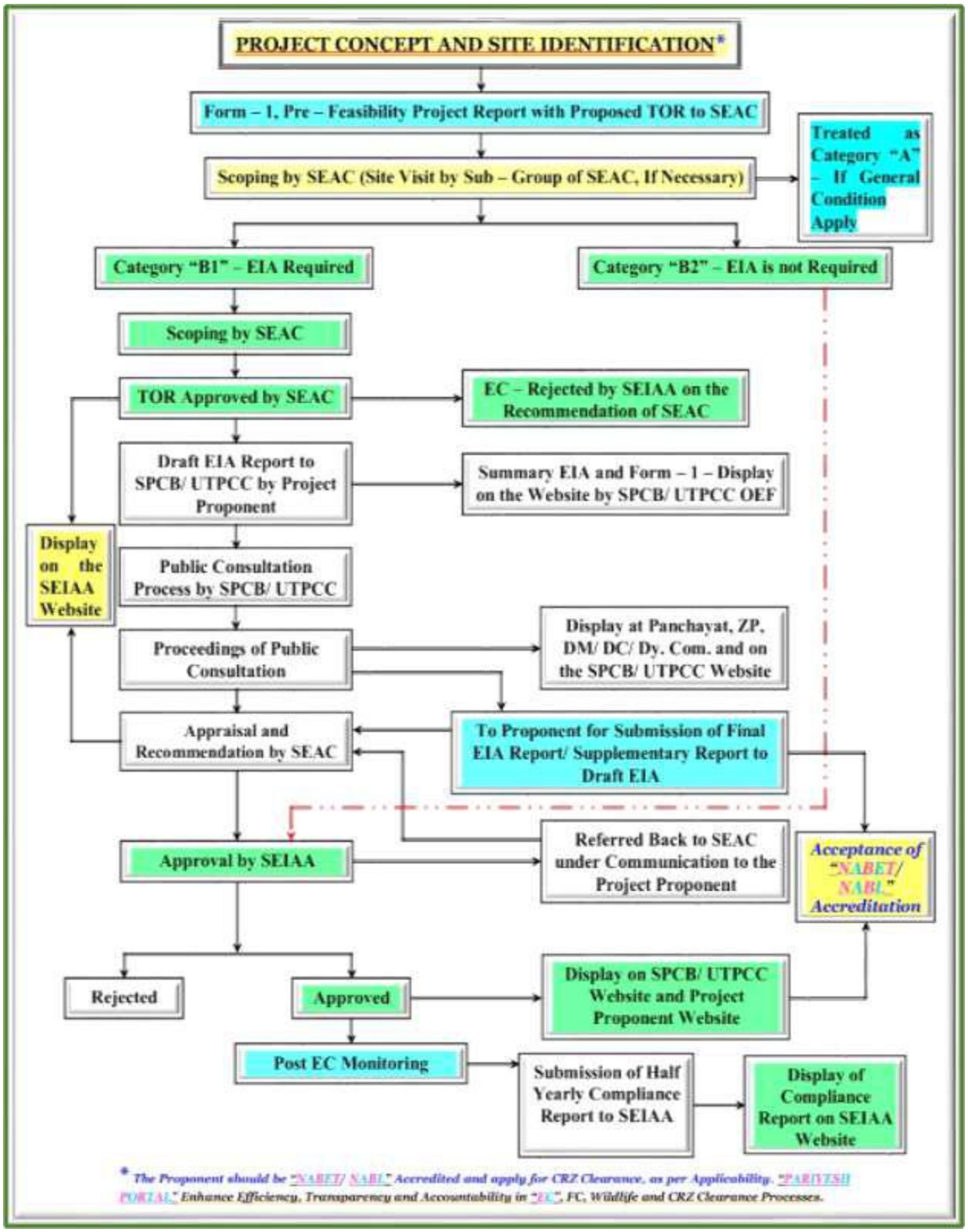


Figure 5: Stream Illustration of Prior Environmental Clearance Process for Category "B" Projects.

Waste Management System/ Structure Coordination" (WMS/ SC)

- *The Contractor should provide separate garbage bins in the camps for bio – degradable, non – biodegradable **"Waste Management System/ Structure Coordination" (WMS/ SC)** and ensure that these are regularly emptied and disposed – off in safe and scientific manner;*
- *The disposal of kitchen waste and other bio – degradable matter will be disposed in approved **"Landfills Sites" (LS)** through arrangement with local civic bodies;*
- *Non – biodegradable waste like discarded plastic bags, paper and paper products, bottles, packaging material, gunny bags, metal containers, strips and scraps of metal etc. and other such materials will be sold/ given out for recycling or disposed in approved **"Landfills Sites" (LS)** through arrangement with local civic bodies;*
- *No incineration or burning of wastes should be carried out on **"Landfills Sites" (LS)**;*
- ***"Effluent Treatment System" (ETS)** like septic tank with **"Soak Pits" (SP)** provided for toilets should be sited, designed, built and operated in such a way that no health hazard occurs and no pollution to the air, soil properties or characteristics, land area, ground or adjacent watercourses takes place and **"Area Method" (AM)** of **"Land Filing Solid Wastes" (LFSW)** along with **"Trench Method" (TM)** of **"Land Filing Solid Wastes" (LFSW)** for Small Landfills must be applied for **"Waste Management System/ Structure Coordination" (WMS/ SC)** at Projected Site **{Figures 6 and 7}**;*
- *Soak pits must be provided to collect waste water from bathrooms and kitchen sideways through **"Pit Method" (PM)** of **"Land Filing Solid Wastes" (LFSW)** for Large Landfills at Projected Site **{Figure 8}**;*
- *"Septic tank must be provided for toilets and the sludge should/ must be cleaned by municipal exhausters".*

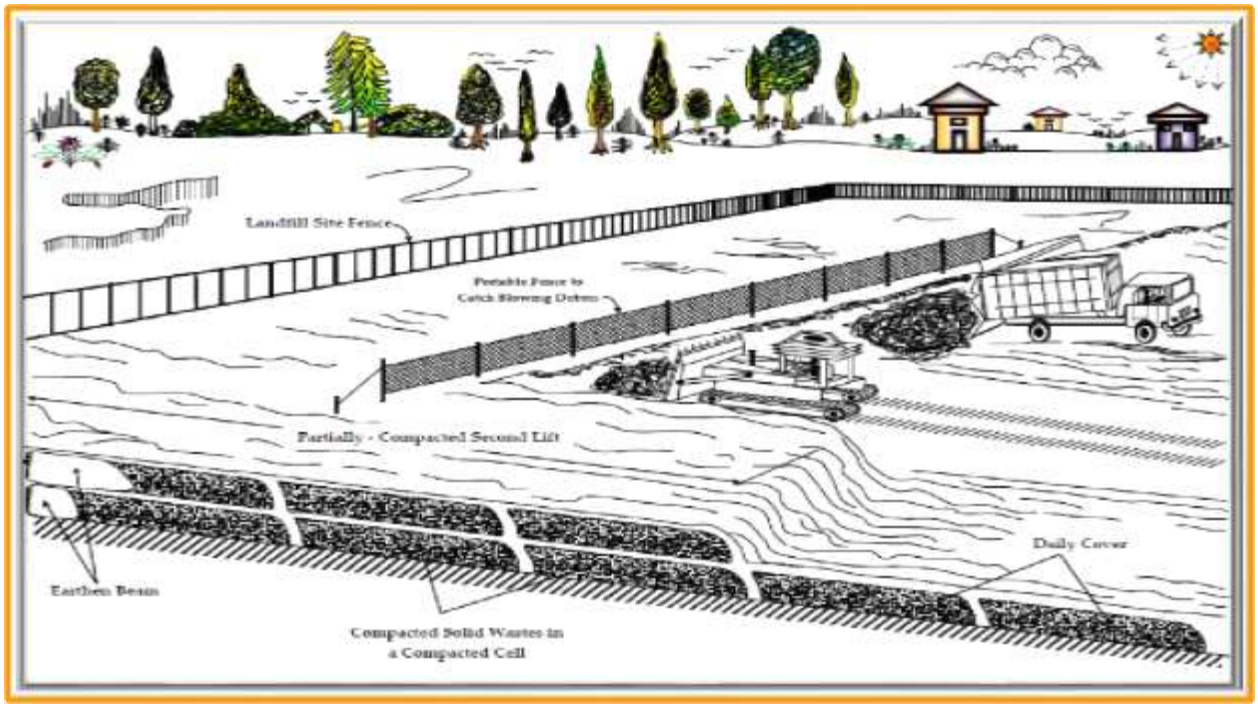


Figure 6: Proposed/ Recommended/ Optional/ Suggested Area Method of Land Filing Solid Wastes at Projected Site.

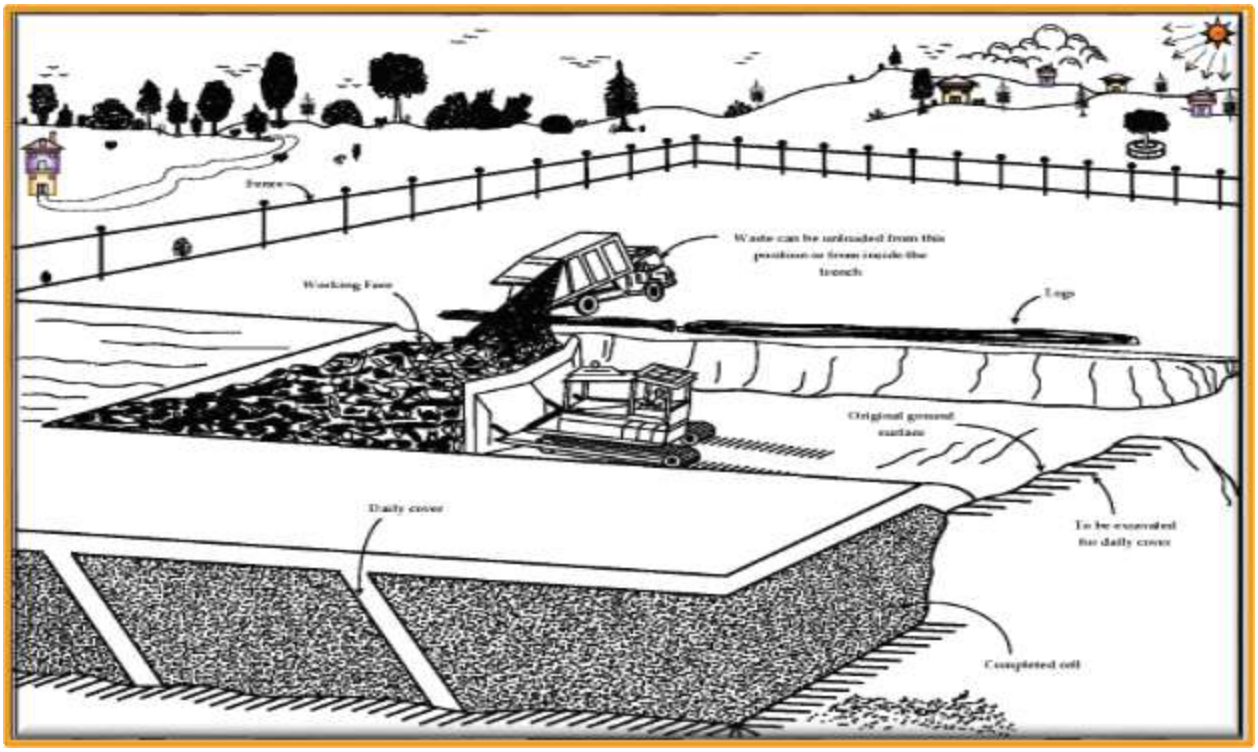


Figure 7: Proposed/ Recommended/ Optional/ Suggested Trench Method of Land Filing Solid Wastes at Projected Site.

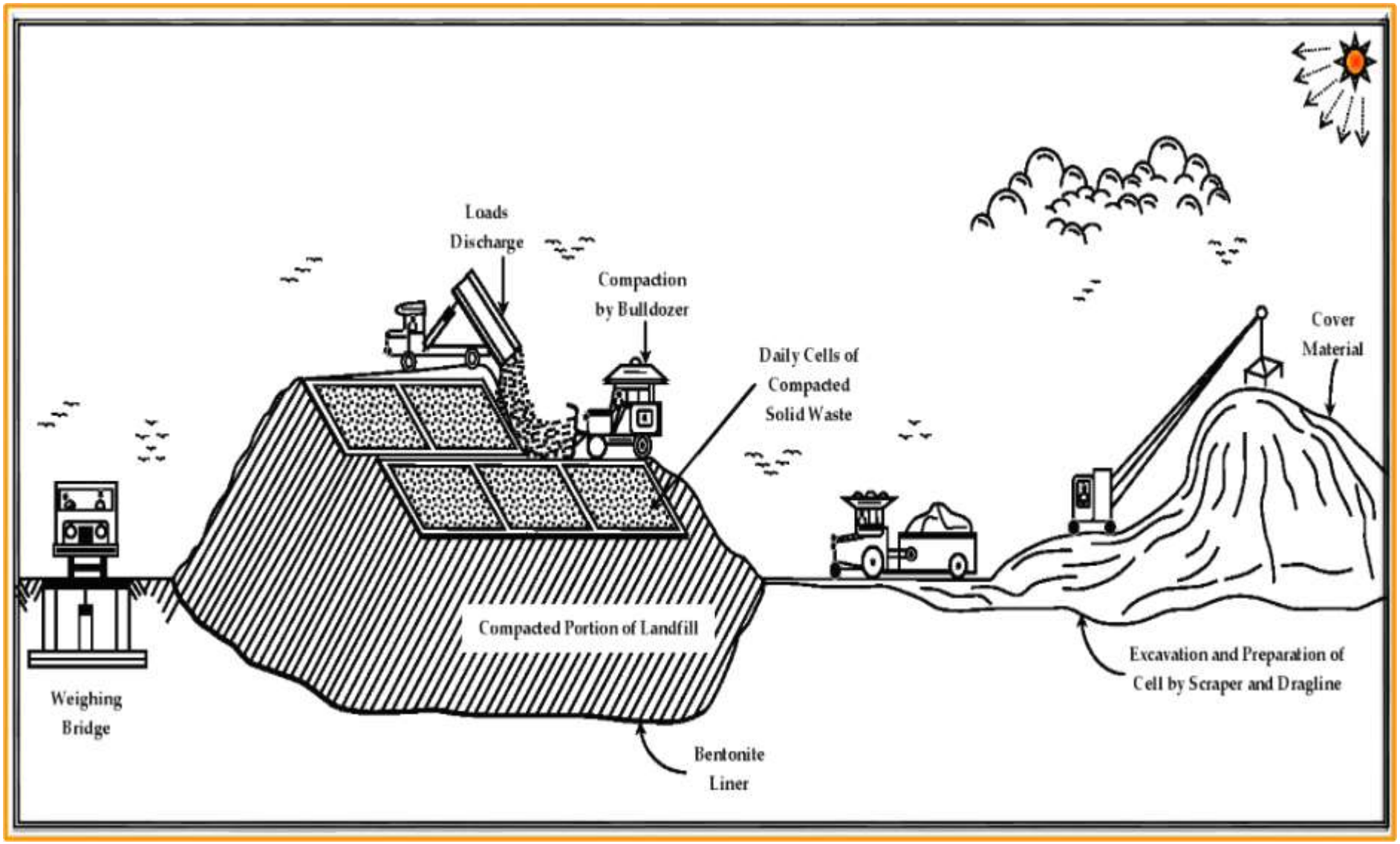


Figure 8: Pit Method of Land Filing Solid Wastes for Large Landfills at Projected Sites.

12. Annexure – IV: To be Monitored Policies/ Strategies/ Guidelines/ Procedures/ Rules (Figure 9).

(a) Mandatory scheduling and planning of inclusive programme for the prevention, control or abatement of pollution of streams, ponds (i.e., State of Tamil Nadu/ Karnataka) and wells in the state and to secure the execution there of;

(b) *To recommend* the *State Government on any matter concerning the prevention, control or abatement of air, land, soil, ground water table and water pollution etc.;*

(c) *To assemble and disseminate information relating to water pollution and the prevention, control or abatement of air, land, soil, ground water table and water pollution etc. there of;*

(d) *To inspire, conduct and participate in investigations and research relating to problems of water pollution and prevention, control or abatement of air, land, soil, ground water table and water pollution etc.;*

(e) *To cooperate with the* ***"Central Pollution Control Board" (CPCB)*** *in organizing the training of persons engaged or to be engaged in programmes relating to prevention, control or abatement of air, land, soil, ground water table and water pollution etc. and to organize mass education/ training programmes relating thereto;*

(f) *To examine sewage or trade effluents, works and plants for the treatment of sewage and trade effluents and to review plans, specifications or other data relating to plants set up for the treatment of water, works for the purification thereof and the system for the disposal of sewage or trade, industry effluents or in connection with the grant of any consent as mandatory by this Act;*

(g) *Lay down and carry out, modify or annul effluent standards plans for the sewage and trade, industry effluents and for the quality of receiving waters (not being water in an inter – state stream, pond, water bodies and river) resulting from the discharge of effluents and to classify waters of the state;*

(h) *To progress economical, beneficial and reliable methods of treatment of sewage and trade, industry effluents, with regard to the peculiar conditions of soils, weather, climate and water resources of different regions and more especially the prevailing flow characteristic of water in streams, channels and wells, which render it impossible to attain even the minimum degree of dilution of pollution proceedings;*

(i) *To develop methods and approaches of utilization/ consumption/ application of sewage and suitable trade or industry effluents in agricultural and green field areas located in the region or state;*

(j) *To grow resourceful methods/ techniques/ procedures/ actions of disposal of sewage and trade or industry effluents on land areas, as are necessary on account of the predominant conditions of scant stream flows that do not provide for major part of the year the minimum degree of dilution or reduction in pollution level along with* ***"Positive and Negative Impacts"*** *at contemporary demonstrating alarming circumstances/ incidents/ surrounding provinces' extensive magnitude situations like i.e.,* ***ENVIRONMENTAL POLLUTION Verses CORONA VIRUS Verses GLOBAL WARMING and CLIMATE CHANGE*** ***a Global Calamity and Tragedy in Terms of CATASTROPHIC CORONA SHATTERING – EARTHS' NATURAL ECO – SYSTEM along with NATURALISTIC CATASTROPE (NATURALISTIC: प्राकृतिक; CATASTROPE: तबाही; OR PRALAYA: प्रलय)* LOSS, RUIN AND DISASTER (Figure 9).;***

(k) *To lay down standards of treatment of sewage and trade/ industry effluents to be discharged into any particular stream taking into account the minimum fair weather dilution available in that stream and the tolerance limits of pollution permissible in the water of the stream, pond, channel after the discharge/ expulsion of such effluents;*

(l) *To assistance the State Government with respect to the location of any industry or trade or locality about to carrying on of which is likely to pollute a stream or well or pond or waterway or treasurable water bodies.*

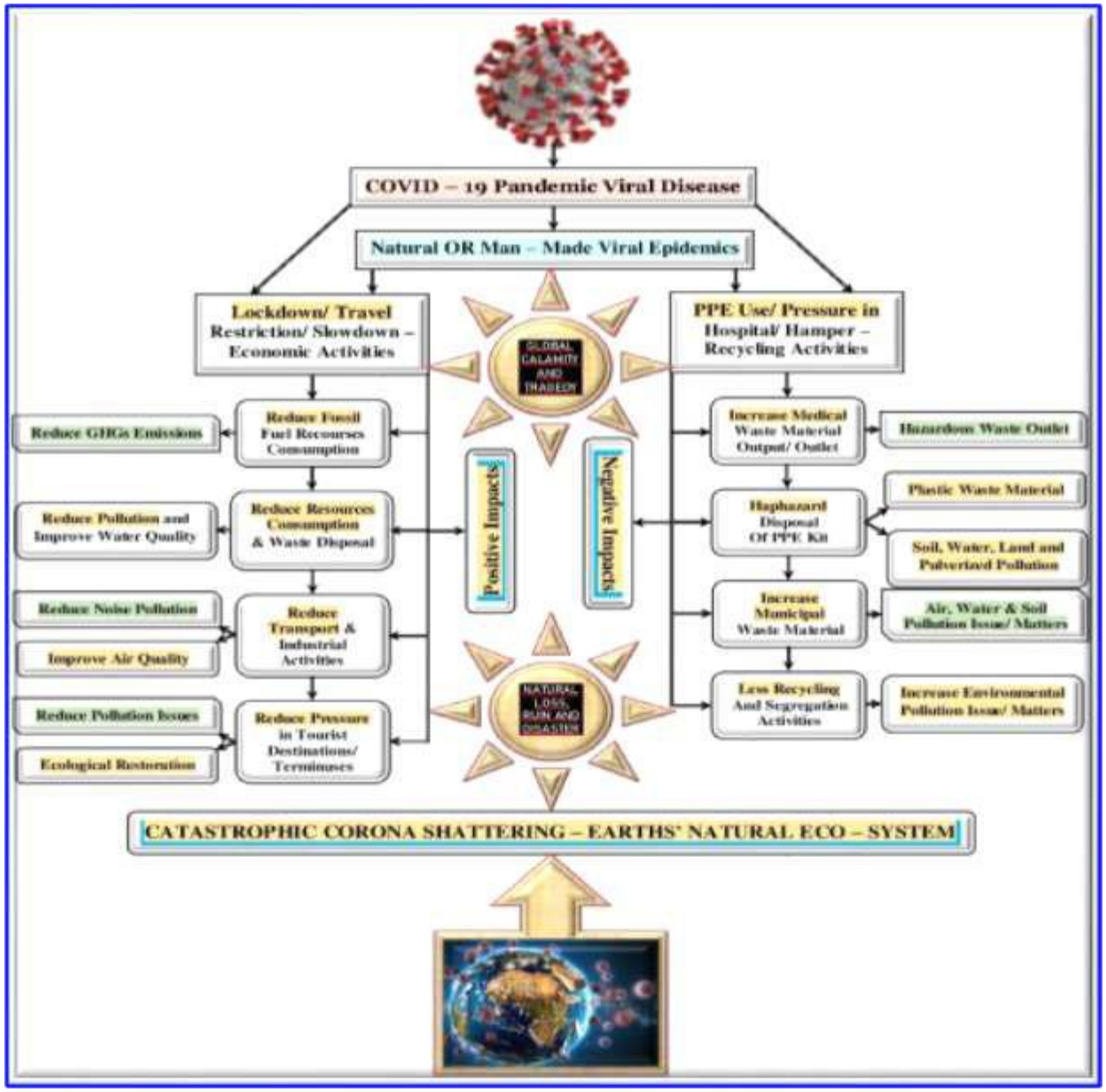


Figure 9: ENVIRONMENTAL POLLUTION Verses CORONA VIRUS Verses GLOBAL WARMING and CLIMATE CHANGE a Global Calamity and Tragedy in Terms of CATASTROPHIC CORONA SHATTERING – EARTHS' NATURAL ECO – SYSTEM along with NATURALISTIC CATASTROPHE (NATURALISTIC: प्राकृतिक; CATASTROPHE: तबाही; OR PRALAYA: प्रलय)* LOSS, RUIN AND DISASTER.

NATURALISTIC CATASTROPHE (NATURALISTIC: प्राकृतिक; CATASTROPHE: तबाही; OR PRALAYA: प्रलय))*: In Hindu Cosmology, is an azonic term for **"Dissolution"**. A **"PRALAYA (Sanskrit: प्रलय, Destruction)"** specifies different periods of time during which a non – activity situation persists, as per different formats or contexts or environments' at present circumstances facing whole around the **"WORLD OR GLOBE"**. The word **"MAHA… MAHAPRALAYA"** stands for **"Great… Great Dissolution"**…!!!

13. Annexure – V: Package Roads Proposed D. G. Sets Installation and Minimum Chimney Height Providing Above Ground Level for Highway Projects' as Road Safety Management System Audit Frame Work in India @ Projected Sites.

Sr. No.	Chimney Number	Chimney Attached to	KVA Rating/ Capacity	Minimum Chimney Height to be Provided Above Ground Level (in Meter)	Constituents to be Controlled in the Emission	Tolerance Limits mg/ NM^3	Air Pollution Control Equipment to be Installed in Addition to Chimney Height as per Col. (4)	Date on Which Air Pollution Control Equipment shall be Provided to Achieve the Stipulated Tolerance Limits and Chimney Heights Conforming to Stipulated Heights
(a)	1.	Any Other…….	Exhaust for Hot Tar	03	PM (mg/ NM^3), SO_2 (PPM), NO_X (PPM)	Nil	N. A.	-------
(b)	2.	D. G. Sets	25 KVA	06	PM (mg/ NM^3), SO_2 (PPM), NO_X (PPM)	N.A., N.A., N.A.	AEC	-------
(c)	3.	D. G. Sets	40 KVA	06	PM (mg/ NM^3), SO_2 (PPM), NO_X (PPM)	N.A., N.A., N.A.	AEC	-------
(d)	4.	D. G. Sets	125 KVA	09	PM (mg/ NM^3), SO_2 (PPM), NO_X (PPM)	N.A., N.A., N.A.	AEC	-------
(e)	5.	D. G. Sets	125 KVA	09	PM (mg/ NM^3), SO_2 (PPM), NO_X (PPM)	N.A., N.A., N.A.	AEC	-------
(f)	6.	D. G. Sets	125 KVA	09	PM (mg/ NM^3), SO_2 (PPM), NO_X (PPM)	N.A., N.A., N.A.	AEC	-------
(g)	7.	D. G. Sets	380 KVA	15	PM (mg/ NM^3), SO_2 (PPM), NO_X (PPM)	N.A., N.A., N.A.	AEC	-------
(h)	8.	Cement Silo	Silos – 2 No's. in RCM Plant	01	PM (mg/ NM^3), SO_2 (PPM), NO_X (PPM)	Closed System with Dust Collector	DUST	-------
(i)	9.	Any Other…….	No Air Pollution Source	09	PM (mg/ NM^3), SO_2 (PPM), NO_X (PPM)	PM < 150 mg/ NM^3	PRT, SCR	-------

Note: N. A.; AEC: Acoustic Enclosures; DUS: Dust Collector; PRT, SCR: Port Hole;

14. Annexure – VI: Proposed Daily Inspection Report during Construction Period for Highway Projects' as Road Management System Audit Frame Work @ Projected Sites.

Sr. No.	Component	Item Description	Description of Inspection Work Carried Out	Results of Lab Tests Conducted (Test Conducted, Pass/ Fail)	Name of Key Personnel Inspecting the Work
(1)	Road Works Including Culverts, and Minor Bridges etc.	Embankment/ Sub Grade/ GSB/ WMM/ DBM/ BC etc.	-------	-------	-------
(2)	Major Bridge Works, Flyovers, ROB, RUB, VUP, PUP etc.	Foundation/ Sub Structure/ Super Structure etc.	-------	-------	-------
(3)	Approach to ROB/ RUB/ Major Bridges/ Viaduct/ RE Wall etc.	Foundation/ Sub Structure/ Super Structure etc.	-------	-------	-------
(4)	Other Works etc.	-------	-------	-------	-------

All figures and graphs in templates are illustrative. Please add actual details.

15. Annexure – VII: Package Roads' Salient Features of Highway Projects' as Project Overview. Client OR Authority Project Details with Construction Period and Security Performance {Tables 10 and 11}.

Table 10: Client OR Authority Project Details with Construction Period and Security Performance.

Sr. No.	Client OR Authority Project Details with Construction Period and Security Performance (CAPDCPSP)
1.	**Client/ Authority: The Chief Project Officer, Project Implementation Unit (PIU), "National Highway Authority of India (NHAI).**
2.	***Project Name: Independent Engineer Services for Four – Laning of Vilupuram – Puducherry Section of NH – 45A (New NH – 332) from Chainage @ 00.000 Km to Chainage @ 29.000 Km (Design Chainage) under Bharatmala Pariyojana Phase – I (Residual NHDP – IV Works) on Hybrid Annuity Mode (HAM) in the State of Tamil Nadu and Union Territory of Puducherry. Package – I DBL (Total Length 29.000 Kms).***
3.	**Length of Project:** 29.000 Kms.
4.	**Contract/ Phase/ Package:** NHDP: Hybrid Annuity Mode (HAM).
5.	**Project Bid Cost:** INR: ₹ 1,013.00 Crores.
6.	**Independent Engineer:** M/s. L. N. Malviya Infra Projects Pvt. Ltd.
7.	**Consulting Engineer:** M/s. L. N. Malviya Infra Projects Pvt. Ltd.
8.	**Authorized Representative of Consultant:** Team Leader (TL/ RE/ OM), Er. Mahesh Kumar Uppala/ Er. Samuel Devendranath/ Mr. Kamaraj Hrithik.
9.	**Date of Signing of Consultant Agreement:** 24 – 08 – 2021.
10.	**Concessionaire:** M/s. Villupuram Puducherry Highways Pvt. Ltd.
11.	**Authorized Representative of SPV:** M/s. Villupuram Puducherry Highways Pvt. Ltd.
12.	**Date of Signing of CA:** 17/ 05/ 2021.
13.	**EPC Contractor:** M/s. Dilip Buildcon Limited.
14.	**Sub – Contractor: National Highway Authority of India (NHAI).**
15.	**Appointed Date:** 24 – 08 – 2021.
16.	**Concession Period:** Almost 6,205 Days OR 17 Years.
17.	**Construction Period:** Nearby 1,460 Days OR 48 Months OR 4.0 Years.
18.	**Schedule Date of Completion:** 23 – 08 – 2025.
19.	**Performance Security (Concessionaire):** Not Applicable.
20.	**Agreement Number:** VDCHPL/ HD/ NHAI/ HAM/ NH – 54/ M – DS/ 001 on Dated: 03 / 03/ 2021.
21.	**Work Order Issue: LOA Vide Letter No.: NHAI/ 11012/ NH – 54/ M – DS/ HAM/ 2018/ HR/ 77 – M on Dated: 22/ 01/ 2021, of Letter Bearing Reference No.: VDCHPL/ HD/ NHAI/ HAM/ NH – 54/ M – DS/ 001 on Dated: 03 / 03/ 2021.**
22.	**Provisional Work Order Issued Vide Letter No.: 08/ 03/ 2021.**
23.	**Letter No.: NHAI/ 11012/ NH – 54/ M – DS/ HAM/ 2018/ HR/ 77 – M on Dated: 22/ 01/ 2021.**
24.	**-------**

Table 11: Package Roads under Four Laning of "Vilupuram – Puducherry Section" NH – 45A (New NH – 332) from Chainage @ 00.000 Km to Chainage @ 29.000 Km in the "State of Tamil Nadu and Union Territory" under NHAI (PIU): Salient Features of Highway Project' as Project Overview.

Sr. No.	Key Project Report Details		Item Description
(1)	**Project Name**	:	***Independent Engineer Services for Four – Laning of Vilupuram – Puducherry Section of NH – 45A (New NH – 332) from Chainage @ 00.000 Km to Chainage @ 29.000 Km (Design Chainage) under Bharatmala Pariyojana Phase – I (Residual NHDP – IV Works) on Hybrid Annuity Mode (HAM) in the State of Tamil Nadu and Union Territory of Puducherry. Package – I DBL (Total Length 29.000 Kms).***
(2)	**NH No. (New/ Old)**	:	*NH – 45A (New NH – 332).*
(3)	**Scheme/ Phase**	:	*Hybrid Annuity Mode (HAM) Pattern.*
(4)	**Mode of the Execution (BOT Toll/ BOT Annuity/ EPC/ HAM/ Item Rate/ Others)**	:	*Mode of Execution on Hybrid Annuity Mode (HAM) Pattern Basis.*
(5)	**No. of Lanes/ Configuration**	:	*04 – Laning.*
(6)	**Length of the Project (in Km)**	:	*Designed Total Road Length is Approximately 29.000 Km.*

(7)	**Total Project Cost (in Crores)**	**:**	*INR: ₹ 1,013.00 Crores.*
(8)	**Grant (in Crores)**	**:**	*INR: ₹ 1,013.00 Crores.*
(9)	**No. of Bypasses (Name of Town, Length)/ Major Realignment**	**:**	***Total 01 Number (s): 01)*** *Kottakkal, @ Length 4.42 Km on RHS of Existing Road;*
(10)	**No. of Minor Bridges (Number and Location)**	**:**	***Total 07 Number (s):*** *07 Nos.*
(11)	**No. of Major Bridges**	**:**	***Total 01 Number (s):*** *1 No. (Design Chainage: Located @ 277 + 524 Kms LHS).*
(12)	**No. of Toll Plazas (Number and Location)**	**:**	***Total 01 Number (s):*** *1 No. (Design Chainage: Located @ 297 + 850 Kms).*
(13)	**Number of Realignments**	**:**	***Total 29 Number (s):*** *29 Nos. Realignment @ Chainage: 11.080 Kms.*
(14)	**Number of VUP/ LVUP**	**:**	***Total 10 Number (s):*** *10 Nos.*
(15)	**Number of VOPs**	**:**	***Total 12 Number (s):*** *12 Nos.*
(16)	**Number of Viaducts**	**:**	***Total 03 Number (s):*** *03 Nos.*
(17)	**Number of RUB/ ROB**	**:**	*NIL.*
(18)	**Number of Culverts**	**:**	***Total 29 Number (s):*** *Hume Pipe Culverts (HPCs): 29 Nos.* ***Total 54 Number (s):*** *Box Culverts (BCs): 54 Nos.*
(19)	**No. of Grade Separators**	**:**	*NIL.*
(20)	**No. of Fly Overs (Number and Location)**	**:**	***Total 02 Number (s):*** *02 Nos.*
(21)	**DPR Consultant Name**	**:**	*Rail India Technical and Economic Service (RITES) Limited.*
(22)	**Lead & Consortium Members of Banks**	**:**	*NA.*
(23)	**Concessionaire/ Contractor Name (SPV & Parent Company)**	**:**	*SPV: M/s. Dilip Buildcon Limited.*
(24)	**Date of Award (LOA Date)**	**:**	*21/ 06/ 2021.*
(25)	**Date of Signing Concession Agreement**	**:**	*17/ 05/ 2021.*
(26)	**Appointed Date**	**:**	*24 – 08 – 2021.*
(27)	**Concession Period**	**:**	*Almost 15 Years.*
(28)	**Construction Period (in Days)**	**:**	*Nearby 730 Days OR 24 Months OR 2.0 Years.*
(29)	**Commercial Operation Date (COD)**	**:**	*24 – 08 – 2021.*
(30)	**Operation & Maintenance Period (in Days)**	**:**	*15 Years.*
(31)	**EOT (if Any)**		*Not Applicable.*
(32)	**IE Contract Period/ Scheduled Date of Completion**	**:**	*23 – 08 – 2025 OR 1,460 Days OR 4 Years.*
(33)	**Independent Engineer/ Authority Engineer**	**:**	*M/s. L. N. Malviya Infra Projects Pvt. Ltd.*
(34)	**IE Contract Value**	**:**	*₹ 5, 82, 89,600/- Crores.*
(35)	**IE Bidding Date**	**:**	*10 – 08 – 2020.*
(36)	**IE LOA Date**		*21/ 06/ 2021.*
(37)	**IE/ AE Agreement Date**	**:**	*08/ 07/ 2021.*
(38)	**IE Appointed Date**	**:**	*24/ 08/ 2021.*
(39)	**IE/ AE Mobilization Date**	**:**	*24 – 08 – 2021.*
(40)	**IE Scheduled Completion Date**	**:**	*23 – 08 – 2025.*
(41)	**IE EOT (Extension Of Time)**	**:**	*Not Applicable.*
(42)	**Operation and Maintenance Period**	**:**	*5,475 Days (15 Years).*
(43)	**Concessionaire Bidding Date**	**:**	*20 – 12 – 2019.*
(44)	**Concessionaire LOA Date**	**:**	*17 – 03 – 2021.*
(45)	**Concessionaire Agreement Date**	**:**	*17 – 05 – 2021.*
(46)	**Concessionaire Appointed Date**	**:**	*25 – 11 – 2021.*
(47)	**Concessionaire Schedule Date of Completion**	**:**	*24 – 11 – 2023.*
(48)	**Bid Project Cost**	**:**	*INR: ₹ 1,013.00 Crores.*

(49)	**Revised Scheduled Date of Completion**	**:**	*Not Applicable.*
(50)	**Others... etc.**	**:**	-------

Address of the Independent Engineer:

Sr. No.	Name of the Independent Engineer		Address
1.	**M/s. L. N. Malviya Infra Projects Pvt. Ltd., Bhopal**	**:**	*C/O Manivannam, Advocate No. 2, Vilupuram Pondicherry Main Road, Pangur, Pondicherry – 605 102, Mail ID: lnmalviya@lninfra.com;*

Details of Design and Safety Consultant:

Sr. No.	Name of the Consultant		Address
1.	**Design Consultant**	**:**	***M/s. H. B. S. Infra Engineers India Pvt. Ltd.*** *16 – 31, 4th Floor, 6th Phase, KPHB Colony, Kukatpally, Hyderabad – 500 085 (Telangana);*
2.	**Safety Consultant**	**:**	***M/s. Sri Infotech Pvt. Ltd.;***

16. Annexure – VIII: Proposed Package Roads' Detailed Visual Inspection Report of Highway Projects' as Project Overview.

Table 12: Assets to be covered – Pavement, Shoulder, Drainage, Median, Bridges, Road Furniture, Buildings, Horticulture, and Service Road etc.

Sr. No.	NCP/ Sr. No.	Date of Issue	Description of Defect	Chainage	Side	IE Remarks
(1)	311	*15.08.2016*	**Potholes**	*311+200*	**LHS**	*To be repaired*
(2)	312	*15.08.2016*	**Cracking**	*311+500*	**RHS**	*To be filled immediately*
(3)	-------	-------	-------	-------	-------	-------
(4)	-------	-------	-------	-------	-------	-------
(5)	-------	-------	-------	-------	-------	-------
(6)	-------	-------	-------	-------	-------	-------

All figures and graphs in templates are illustrative. Please add actual details.

17. Annexure – IX: Package Roads' Status of Quarterly Environmental Monitoring Report (QEMR) of Highway Projects' Submitted to NHAI (PIU) as per Assignment Impression.

Sr. No.	Roads' Package Number	Description of Quarterly Environmental Monitoring Report	Date of Submission	DBL Authority Remarks
(1)	**Package – 1: 1A, 1B and 1C**	*DBL – QEMR of April 2020 – June 2020*	**15th July, 2020**	*Approved*
(2)	**Package – 1: 1A, 1B and 1C**	*DBL – QEMR of August 2020 – September 2020*	**15th October, 2020**	*Approved*
(3)	**Package – 1: 1A, 1B and 1C**	*DBL – QEMR of October 2020 – December 2020*	**15th January, 2021**	-------
(4)	**Package – 1: 1A, 1B and 1C**	*DBL – QEMR of January 2021 – March 2021*	**15th April, 2021**	-------
(5)	**Package – 1: 1A, 1B and 1C**	*DBL – QEMR of April 2021 – June 2021*	**15th May, 2021**	-------
(6)	-------	-------	-------	-------

All figures and graphs in templates are illustrative. Please add actual details.

(VI) The six monthly self – compliance reports for compliance to the EC/ CRZ/ Non – CRZ conditions may be obtained from project proponents and intimated to the audit section.

18. Annexure – X: ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES.

A. Introduction

This chapter presents key environmental issues associated with various aspects of the proposed subprojects. The environmental impacts caused due to the development of the subproject road sections can be categorized as **"Primary" (Direct)** and **"Secondary" (Indirect)** impacts. **"Primary" (Direct)** impacts are those which are induced directly by the project whereas the secondary impacts are those, which are indirectly induced and typically include the associated investment and changing patterns of social and economic activities due to the proposed action. Interaction of the project activities with environmental attributes is presented as **"Activity – Impact Identification Matrix"** in the **Table 13**.

Table 13: "Activity – Impact Identification Matrix".

Sr. No.	Activities	Type of Impact							
		Air	Water	Noise	Flora	Fauna	Drainage	Soil	Topography
1.	Labour Camp Activities	-------	-ve/t	-------	-------	-------	-------	-------	-------
2.	Quarrying	*-ve/t*	-------	*-ve/t*	-ve/t		-ve/t		-ve/p
3.	Material Transport and Storage	*-ve/t*	-------	*-ve/t*	-------	-------	-------	-------	-------
4.	Drilling, Blasting and Hill Cutting	*-ve/t*	-------	*-ve/t*	-ve/t	*-ve/t*	-------	-------	-------
5.	Earthwork	-------	-------	-------	-------	-------	-ve/p	*-ve/t*	-ve/t
6.	Payment Works	*-ve/t*	-ve/t	*-ve/t*	-ve/t	-------	-------	*-ve/t*	-ve/p
7.	Use of Construction Equipment's	*-ve/t*	-ve/t	*-ve/t*	-------	*-ve/t*	-------	-------	-------
8.	Plantation	*-ve/p*	-------	*-ve/p*	-ve/p	-------	-------	-------	-------
9.	Drainage Work	-------	-------	-------	-------	-------	-ve/p	-------	-------
10.	Culvert and Bridge Construction	-------	-ve/t	*-ve/t*	-------	-------	-ve/p	-------	-------
11.	Stripping of Top Soil	-------	-------	-------	-------	-------	-------	*-ve/p*	-------
12.	Debris Generation	-------	-------	-------	-------	-------	-ve/t	*-ve/t*	-------
13.	Oil and Grease	-------	-------	-------	-------	-------	-------	*-ve/t*	-------
14.	Construction in Forest and Sensitive Areas	*-ve/t*	-ve/t	*-ve/t*	-ve/t	*-ve/t*	-ve/p	*-ve/p*	-ve/p

Notes: *t – temporary, p – permanent. Impact indicated in bold letters indicates significant impacts.*

Identification and assessment of the potential environmental impacts are based on **"Secondary" (Indirect)** information supplemented by field visits. Impacts on various environmental components may be assessed at four different stages, namely:

i. *The Project Location;*
ii. *Design And Pre – Construction;*
iii. *Construction; And*
iv. *Operation Stages.*

A few permanent as well as short – term and long – term adverse effects, mainly @ the construction and operation stages, are, nonetheless, anticipated. Temporary short – term impacts can be kept in check through proper planning and adopting environmental friendly road construction applicable methods/ applications and the appropriate regulatory measures.

Impacts Related to Project Location, Preliminary Planning and Design Improvement of Subproject Road Section.

Positive Environmental Impacts due to Improvement of Subproject Road Sections

The positive impacts expected from the improvement of the subproject road section include:

a) **Improved Quality of Life for the Rural Population in the Projects Influence Area:** This as a result of better access to markets, health, education and other facilities; and the derived stimulus for local economic activity;
b) **A More Efficient and Safe Road Transport System:** Through reduced travel times, reduced road accidents, reduced vehicle operating and maintenance costs and reduced transportation costs for goods;
c) The facilitation of tourism;
d) Interstate connectivity to **"Environment Compliance" (EC) and MoEF & CC Policy Guidelines' for NHAI – Vilupuram – Puducherry Section of NH – 45A (New NH – 332), in the State of Tamil Nadu UT on HAM**; and
e) Better connectivity to the state highway and national highway network.

Adverse Environmental Impacts due to Improvement of Subproject Road Sections

The adverse environmental impacts anticipated from the improvement of the project road section are:

a) Loss of productive soil and agriculture land, cutting of road side trees that falls within formation width *i.e.,* 10 m (for intermediate lane and 11 m for 2 – Lane Roads) may reduce the ecological balance of the area and also increase soil erosion problem. Noise, air and water pollution and disposal of construction waste, during construction, will adversely impact both local residents and natural ecological balance of environmental area. These latter effects should, however, only be temporary as well as reversible in nature;
b) A number of quarries and other sources will be established which will change the landscape. However, the operation of quarries is an independent and already regulated activity. Adverse impacts on water quality of rivers crossing or running parallel to the proposed alignments in the form of silt deposition and runoff during construction are expected. However, this is short term and will be taken care of by controlled construction activities;
c) Improvement on existing road and construction of new road and bridges, although limited, may enhance soil erosion, landslips and reduce the micro – level ecological balance of the area. Construction may also disturb the habitation of fauna living in this area. These should, however, be only temporarily reversible in nature. The improvement will also require the cutting of trees;
d) Minor impacts of noise and air quality for those now living and workings close to the subproject roads (mainly @ urban centers) will deteriorate during the construction period and afterwards during operation.

B. Forest Clearing and Tree Felling

Most of the subproject roads are passing through plain terrain with land use being agriculture. Although diversion of forest land is not envisaged adverse impacts are anticipated due to land clearing which will involve cutting of trees. Problem of soil erosion is expected in some locations. To minimize loss of trees, the following mitigation measures have been adopted. During the detailed design and these will be implemented during construction stage of the subproject roads:

a) Widening proposal considered option with minimal tree cutting (Total 506 – Numbers);
b) Widening is restricted to minimum width in the length passing through forest areas;
c) Adequate measures are included in the design to minimize any unforeseen impacts on flora and fauna in the forest areas;
d) Land stabilization measures were included in identified areas prone to erosion;

e) Strictly enforce the environmental conditions put as part of the forest clearance and no objection certificates issued by the Forest Department and SPCB;

f) Adopting **"Environmental Friendly Road Construction" (EFRC)** Methods.

Based on the tree inventory carried out during the field surveys in first quarter the number of trees to be cleared along subproject road sections. The main species of trees to be cut are local species namely Coconut (Cocos *nucifera*) Mahua (Madhuca *longifalia*), Pipal (Ficus *religiosa*), Sarai (Sharea *robusta*), Babool (Acacia *arabica*, Wi/ ld.), Aam (Mangifera *indica*), Sagon (Tectana *grandis* Linn), Chirol (Ho/ apte/ ea *integrifalia*), and Neem (Azadirachta *indica*). **Table 14** present details of the trees to be cut due to proposed road improvement work. As per compensatory afforestation requirement, the tree plantation will be done ten times of tree cutting (1: 10 of tree cutting). At sensitive locations such as schools and temples along the project roads suitable noise barrier shall need to be provided. The compensatory plan will be developed in consultation with local forest department. As per compensatory afforestation, the tree plantation will be done ten times of tree cutting (Ratio 1: 10 Tree Cutting).

Construction Camps, Borrow Pits and Quarries

There is a need to establish construction camps and related facilities, such as borrow pits and quarries. These must be located in environmentally sound and socially safe areas. It is expected that construction materials for the road works will be mined mostly from approved quarries. The following criteria are applied for locating the borrow areas:

a) Borrow areas are not established in ecologically sensitive areas;

b) Villagers are consulted in regard to the design and location of all borrow areas these should ensure the safety of local communities and, if possible, should incorporate beneficial post construction features for the villages;

c) Located away from the road and hill slopes as well as settlements facing the road, so as to minimize visual impacts;

d) In case of protected areas/ reserve forest areas, construction facilities such as temporary workers camp, hot mix plants, and concrete batching plant and stone crushers should not be established in stretches that passes through reserve/ protected forests. Local forest department/ village forest management committees should be consulted before locating these temporary subproject facilities;

e) Construction camps for laborer's should be located @ West 500 m away from settlements and 1.0 Km away from forest/ protected areas;

f) Living accommodation and ancillary facilities should be erected and maintained to standards and scales approved by – in – Charge; and

g) Toilets and urinals should be provided in accessible places away from the asphalt plant and mixing yard.

Cultural Heritage

There are no adverse impacts anticipated on historical places/ monuments. However, there are few temples and small shrines along the roads. Care must be taken to avoid any damage to these structures. Earthworks, as associated with the road construction/ improvement works, or deriving from secondary sites such as quarries or borrow pits, may reveal sites or artifacts of cultural/ archaeological significance. In the event of such discovery, the concerned authorities should be informed and the requirement to take such action should be incorporated in contract documents.

Other Impacts Deriving from the Project Planning and Design Process

During preliminary planning and design of the subproject roads, the *Consultant* has taken into account the need for:

- *Optimum sitting and control of borrow areas;*
- *Reduced incidence of slope failures due to inadequate drainage;*
- *Providing adequate culverts/ drains;*
- *Providing side – drainage structures;*

- *Mechanized construction methods and thereby, for example, reduced use of firewood for heating bitumen;*
- *Maximizing safety and thereby reducing traffic accidents;*
- *Reducing travel times and, thereby, fuel consumption and emissions;*
- *Adequate signage's for wildlife protections;*
- *Increased accessibility for residents to education and health facilities, markets etc., and for others who might come for tourist or other purposes; and*
- *Improving the socio – economic conditions of residents in the project areas of influence.*

As Part of this Work, the Following Guiding Principles have been used in determining the Alignments:

Table 14: Guiding Principles Have Been Used in Determining the Alignments.

Environmental Issue	Measures Taken
Alignment;	*Final alignment has been determined so as to minimize land take, tree removal, air pollution and the impact on people and animals and to avoid unfavourable geological condition and cultural relics.*
Balancing Cut and Fill;	*The design attempted to equalize cut and fill. The centerline has been aligned so that on all slopes below 60 degrees, half cut and half fill is achieved.*
Soil Erosion;	*Temporary and permanent drainage system has been designed to minimize the soil erosion.*
Dust and Air Pollution;	*Borrow sites, waste disposal sites and asphalt mixing sites have been identified – keeping in mind environmental issues such as dust.*
Wildlife Habitat;	*Care has been taken in preservation of wildlife and construction workers should be educated on wildlife protection.*

C. Environmental Impacts during Construction Stage

1. Permits and Clearances

As a requirement of **"Environmental Impact Assessment" (EIA)** Notification, 2006, by Government of India, any development activities should not be taken in any part of the Country unless it has granted environmental clearance by the **"Ministry of Environment, Forest and Climate Change" (MOEF & CC),** Government of India.

Highways are classified as one of the projects, listed in said notification, which require prior clearance. However, an amendment to this notification clarifies, that the highway improvement projects are excluded from purview of this notification. Also, major district roads are not required to comply with the Environmental Protection Act and Rules 1986 and the EIA Notification (2006, 2009, and 2011) and relevant amendments. Hence, the roads under this sector project are not required to obtain environmental clearances and prepare environmental assessment reports under national laws. Some of the relevant applicable sections are:

i. Since the proposed subproject interventions are primarily limited to the improvement of existing major district roads and the alignments of the subproject roads does not pass through any environmentally sensitive areas, therefore it does not fall in the purview of Notification No.: S. O. 195 (E): Dated 19th January, 2009 by the Ministry of Environment, Forests and Climate Change on amendment to the EIA, Notification. Also, major district roads are not required to comply with the Environmental Protection Act and Rules 1986 and the EIA Notification (2006, 2009, and 2011) and relevant amendments. Hence, the roads under subprojects are not required to obtain environmental clearances and prepare environmental assessment reports under national laws;

ii. As per the Forest Conservation Rules (1981, Amended 2003) a forestry clearance from Department of Forests is required for diversion of forest land for non – forest purpose. Processing of the forestry clearance entails **"Two Stages": Stage – I** and **Stage – II**. Amongst other requirements **Stage – I** clearance requires the applicant to make payments for compensation of forestry land that will be acquired and trees that will be cut under the project. Accordingly timely allocation of budget for this

purpose by the applicant is necessary to expedite the clearance process. Since the improvement of the proposed subprojects is restricted to the available ROW, diversion of forest land is not required. Therefore, forest clearance is not required for subproject road;

iii. Cutting of trees in non – forestland require a tree cutting permit from the local forestry department. All trees cut under a project must be compensated by compensatory afforestation as required by the Forest Department;

iv. As per **"Office Memorandum" (OM)** issued by Ministry of Environment, Forests and Climate Change on 19th March, 2013 the grant of environmental clearance for linear projects including roads has been delinked from the forestry clearance procedure. Hence, after receipt of environmental clearance construction works may commence on sections/ parts of a linear project that do not require forestry clearance. Construction works may commence on sections requiring forestry clearance only after receipt of the respective clearance;

v. Placement of hot – mix plants, quarrying and crushers, batch mixing plants, discharge of sewage from construction camps requires **"No Objection Certificate" (Consent to Establish and Consent to Operate)** from **"State Pollution Control Board" (SPCB)** prior to establishment.

vi. Permission from **"Central Ground Water Authority" (CGWA)** is required for extracting ground water for construction purposes, from areas declared as critical or semi critical from ground water potential prospective by them.

Before the start of civil works for any section of subproject the **"Project Proponent" (APRBRP)** must obtain necessary clearances/ permits from the forest department and Andhra Pradesh State Pollution Control Board. Table outlines the applicable clearances and permits and the authorized bodies that issue them along with the procedures involved. The status of the permits/ clearances has also been presented in this **Table 15**.

Table 15: Clearances and Permits Required for the Subprojects from "Forest Clearance Divisional Department" (FCDD).

Sr. No.	Permissions/ Clearances	Concerned Agency	Responsibility/ Time Required
A.	***Pre – Construction Stage***		
1.	**Permission for Cutting of Trees;**	*District Forest Office/ State Forest Department for trees felling in forest areas and District Authorities in non – forests Areas (Compensatory tree plantation to be made 1: 10 as per the permission granted);*	**APRBRP/ 3 – 6 Months**
B.	***Implementation Stage***		
2.	**Consent To Operate (COT) Hot Mix Plant, Crushers, Batching Plant;**	*A. P. State Pollution Control Board (To be obtained before installation);*	**Contractor/ 3 – 6 Months**
3.	**Authorization for Disposal of Hazardous Waste;**	*A. P. State Pollution Control Board (To be obtained before generation);*	**Contractor/ 3 – 6 Months**
4.	**Consent for Disposal of Sewage from Labour Camps;**	*A. P. State Pollution Control Board (Before setting up the camp);*	**Contractor/ 3 – 6 Months**
5.	**Pollution Under Control Certificate;**	*Department of Transport, Government of A. P. authorized testing centers;*	**Contractor/ 1 – 2 Months**
6.	**Employing Labour/ Workers' Status;**	*District Labour Commissioner;*	**Contractor/ 1 – 2 Months**

*Any falling or cutting of trees requires forestry clearance and appropriate permits from **"Forest Clearance Divisional Department" (FCDD)**. The procedures are necessary to obtain such permits will require liaison with local territorial forestry offices and their head office in the district headquarters. Joint verification and making of trees to be cut is being carried out jointly with divisional forest departments of districts involved. It is imperative that all necessary clearances and permits be obtained before commencement of any type civil construction work @ site location/ area/ region.*

D. Physical Environment

a) Topography, Geology and Soil

The terrain and geological conditions of areas are such that, even with reasonable care exercised during final design, during construction the interaction between proposed road features and existing land features may reveal/ result in some land instabilities.

During the Construction Phase following Restrictions should be imposed:

- *Existing vegetation including shrubs and grasses along the roads (except within the strip directly under embankments or cuttings) should be properly maintained;*
- *Sites for quarrying, borrowing and disposal of spoils are to be confirmed according to the applicable laws and regulations in the state and the practices followed in recent ongoing internationally funded road projects should be continued;*
- *Controlled and environmental – friendly quarrying techniques should be applied to minimize erosions; and*
- *Cut material should be disposed of in suitable depressions.*

It is also important to:

- *Maintain adequate vegetative cover above and below the roads;*
- *Maintain the natural course of water bodies (that is as far as possible) and avoid throwing debris into stream courses;*
- *Construct proper drainage structures to avoid erosion; and*
- *Minimize the construction of hair – pin bends that are close to each other: as this often adds to instability in civil work structure designs etc.*

b) Erosion and Silt Run – Off

All activities will occur within the available **"Right Of Ways" (ROW),** no adverse environmental impact is anticipated on the productive soil. Lands taken on lease for access road and for construction camp will be restored in its original land use.

Land clearing and grubbing activities will remove vegetation and soil cover, which may cause some soil erosion during monsoon. Excavations in borrow pits may lead to loss of top soil and soil erosion. The risks of stream and river bank erosion near bridges and cross drainage works are significant. To avoid or minimize erosion, land clearing and grubbing will be conducted during dry season, productive top soils from borrow pits will be stored and reused in road embankment slope protection. Erosion control measures like site screens will be installed along rivers and nallahs (small local streams etc.).

There is the risk of contamination of soil from construction material and oil spills. *Contractors* are required to ensure proper handling materials and able to implement spills containment. Oil contaminated waste will be properly collected, stored disposed through 3rd party service providers. All fuel and lubricant storage and handling areas will be located @ least 500 meters from the nearest water body and provided with perimeter interceptor drains. All construction debris will dispose by the *Contractor* on pre designated area as identified by the **"Superintending Engineer" (SE)**.

c) Climate

The proposed improvement/ construction works will be localized activities and the subproject will not have significant impact on climatic conditions, such as rainfall, temperature and humidity in the projected area. A climate change impact and risk analysis has been carried out using **"TEEMP Model" (Chapter 6: Climate Change Impact and Risks)** and appropriate adaptation measures are incorporated in the subproject design.

d) Surface and Ground Water, Drainage and Hydrology

Given the presence of rivers and streams in the subproject areas and some of them crossing and or running parallel to subproject roads; improvement of road may result in disruptions to the natural hydrology and water mismanagement and lead to further problems of soil erosion. The natural courses of river streams will be maintained. Appropriate temporary diversions of streams will be made and brought back to their natural course as soon works are completed in that section. No disposal of construction debris in streams and rivers is allowed.

Minor impacts on water resources are expected during the construction phase. The rehabilitation of existing bridges may also cause soil erosion and turbidity in downstream water bodies. To mitigate this, river – bank' slope stabilities will be monitored and, if necessary, appropriate remedial measures applied throughout the construction period. Construction work @ bridges during rainy season will be minimized to avoid erosion and sedimentation.

The likely impacts of surface water movements are changes in the natural drainage systems, downstream scour, and erosion due to constriction in flows. If suspended solid concentrations in the water are affected, this could also affect natural aquatic river ecology of earth system in the environment and its surrounding areas/ places/ regions.

To Mitigate these Impacts the Following Measures should be Implemented:

- *Chemicals and oils are stored in secure, impermeable containers, and disposed of well away from surface waters;*
- *No vehicle cleaning activity is allowed within 300 m of water bodies/ drains;*
- *Construction camps are equipped with sanitary latrines that do not pollute surface water;*
- *The work on bridges and culverts is limited to dry seasons, when many of the smaller streams will have low water – water diversion works can be minimized and the original course restored immediately after the work has been completed;*
- *Drivers are made aware of diversions and other works @ bridge construction site to avoid accidents;*
- *Drainage structures are properly designed to accommodate forecast discharges;*
- *Side drain waters must be discharged @ every available stream crossing to minimize volume and prevent erosion @ discharge point;*
- *Provide lined drainage structures;*
- *Where an increased discharge of surface water endangers the stability of the water outlet, erosion protection measures such as bioengineering measures, ripraps, and check dams are incorporated;*
- *In areas with high water tables, seepage may occur and side drains and up – slope catch drains must always been lined to avoid percolation;*
- *All debris and vegetation, clogging culverts are regularly cleared; and*
- *Ground water pollution is not envisaged in these subprojects.*

e) Air Quality

During construction air quality may be degraded for short periods due to ***(i)*** the exhaust emissions from the operation of construction machinery; ***(ii)*** fugitive emissions from concrete and asphalt plants; ***(iii)*** the dust generated from the haulage of materials, exposed soils and material stockpiles; ***(iv)*** cleaning of the road; ***(v)*** material loading; ***(vi)*** unloading; and ***(vii)*** blasting activities (if any). The impact is expected to be localized, temporary and confined to construction areas.

Adverse air quality impacts during construction are likely to result from three main sources; ***(i)*** emissions from construction equipment, including delivery trucks; ***(ii)*** fugitive dust from earth – moving operations and demolition; and ***(iii)*** localized increased traffic congestion in construction areas or site locations.

The adverse impacts on air quality during construction stage were classified and presented in the **Table 16** below. There are two types of pollution *i.e.,* dust pollution and pollution from harmful toxic gases.

Table 16: Impact on Air Quality during Construction Stage.

Sr. No.	Impact	Source
1.	**Generation of Dust (Suspended Particulate Matter);**	• *Transportation and tipping of cut material – while the former will occur over the entire stretch between the cutting location and disposal site the latter is more location specific and more intense;* • *Blasting Operations;* • *Transportation of raw materials from quarries and borrow sites;* • *Stone crushing, handling and storage of aggregates in asphalt plants;* • *Site levelling, clearing of trees, laying of asphalt, construction of bridges;* • *Concrete batching plants;* • *Asphalt mix plants – due to the mixing of aggregates with bitumen; and* • *Construction of structures and allied activities.*

2.	**Generation of Polluting Gases Including SO_2, NO_X and HC;**	• *Hot mix plants;* • *Large construction equipment, trucks and asphalt producing and paving equipment;* • *The movement of heavy machinery, oil tankers etc. on steep slopes will cause much higher emissions of gases;* • *Toxic gases released through the heating process during bitumen production; and* • *Inadequate vehicle maintenance and the use of adulterated fuel in vehicles.*

On the proposed subprojects road sections, it is expected that air quality will be affected to some minor extent by dust and particulate matters generated by construction, vehicular movements, site clearance, earth filling and material loading and unloading. The impacts are expected to be localized, temporary and confined to construction areas. Care should, however, be taken @ sensitive urban locations so that harmful impacts can be minimized.

f) Noise Quality (Levels)

The noise level along all the subproject road sections is within standards and limits. During the construction period, noise will be generated from the operation of heavy machinery, blasting works, the haulage of construction materials to the construction yard and the general activities @ the yard itself. Concrete mixing and material movements will be the primary noise generating activities and will be uniformly distributed over the entire construction period. These construction activities are expected to produce noise levels in the range of 80 dB (A) – 95 dB (A) @ a distance of about 5 m from the source.

Construction noise is not normally regulated though still may cause concern among local villagers. The range of typical noise levels in relation to distance from a construction site is shown in the **Table 17**.

Table 17: Construction Noise Site and Distance Relationship.

Sr. No.	Distance from Construction Site (m)	Range of Typical Noise Level dB (A)
1.	**08**	*82 – 102*
2.	**15**	*75 – 95*
3.	**30**	*69 – 89*
4.	**61**	*63 – 83*
5.	**91**	*59 – 79*
6.	**122**	*57 – 77*
7.	**152**	*55 – 75*
8.	**305**	*49 – 69*

Piling, if necessary, will also cause vibration. Noise and vibration from this 'source will be unavoidable but the impact will only be temporary and affect people living or working near piling locations. In construction sites within 500 meter of a settlement, noisy operations should cease between 22: 00 Hrs and 06: 00 Hrs. Regular maintenance of construction vehicles and machinery must also be undertaken to reduce noise. The impact and sources of noise and vibration are summarized in the **Table 18**.

Table 18: Likely Impact on Noise Quality in the Vicinity of Projected Area.

Sr. No.	Impact	Source
1.	**Increased Noise Levels Causing Discomfort to Local Residents, Workers, Flora and Fauna;**	• *Mobilization of heavy construction machinery;* • *Accelerations/ decelerations/ gear changes – though the extent of impact will depend on the level of congestion and smoothness of the road surface;* • *Excavation work for foundations and grading;* • *Construction of structures and other facilities;* • *Crushing plants, asphalt production plants; and loading, transportation and unloading of construction materials.*

Typical noise levels (Noise Level in db (A) @ 50 Feet) associated with various construction activities and equipment's are presented in the **Table 19**.

Table 19: Typical Noise Levels of Principal Construction Equipment's.

Sr. No.	Clearing		Structure Construction	
1.	**Bulldozer**	*00 – 80*	**Crane Operation**	*75 – 77*
2.	**Front End Loader**	*72 – 84*	**Welding Generator**	*71 – 82*
3.	**Jack Hammer**	*81 – 98*	**Concrete Mixer**	*74 – 88*

4.	**Crane With Ball**	*75 – 87*	**Concrete Pump**	*81 – 84*
5.	**Excavation and Earth Moving**		**Concrete Vibrator**	*00 – 76*
6.			**Air Compressor**	*74 – 87*
7.	**Bulldozer**	*00 – 80*	**Pneumatic Tools**	*81 – 98*
8.	**Backhoe**	*72 – 93*	**Bulldozer**	*00 – 80*
9.	**Front End Loader**	*72 – 84*	**Cement and Dump Trucks**	*83 – 94*
10.	**Dump Truck**	*83 – 94*	**Front End Loader**	*72 – 84*
11.	**Jack Hammer**	*81 – 98*	**Dump Truck**	*83 – 94*
12.	**Scraper**	*80 – 93*	**Paver**	*86 – 88*
13.	**Grading and Compaction**		**Landscaping and Clean – Up**	
14.	**Grader**	*80 – 93*	**Bulldozer**	*00 – 80*
15.	**Roller**	*73 – 75*	**Backhoe**	*72 – 93*
16.			**Truck**	*83 – 94*
17.		**Paving**	**Front and End Loader**	*72 – 84*
18.	**Paver**	*86 – 88*	**Dump Truck**	*83 – 94*
19.	**Truck**	*83 – 94*	**Paver**	*86 – 88*
20.	**Tamper**	*74 – 77*	**Dump Truck**	*83 – 94*

Source: *Federal Transit Administration 2006;*

The noise levels indicated for various construction activities/ equipment, while far exceeding permissible standards of CPCB for residential areas, it will occur only intermittently. Still, these extremely high sound levels present real risk to the health of workers on – site. Timely scheduling of construction activities, proper maintenance of construction machineries, use of personnel protective equipment's etc. will minimize these impacts.

Residences, schools, temples, and other noise sensitive areas within 100 m the roadways will be affected temporarily during construction. The number of persons potentially affected and the duration of these effects cannot be estimated based on available information.

During construction, varying degree of noise impacts is likely to be felt by the communities of main settlements along the subproject roads. Although temporary in nature, the construction noise will affect the most communities living close to the construction zone/ site/ camp location.

Noise impacts are an unavoidable consequence of construction that should be mitigated by limiting the timing of construction to daylight hours (8: 00 AM – 5: 00 PM) in the vicinity of sensitive receptors. Further to minimize noise impacts near sensitive receptors (particularly schools), operation of excavator and other heavy machineries will be carried out mostly during off – hours (7:00 AM to 9: 00 AM and 3.30 PM to 7: 00 PM) and on holidays (Saturday and Sundays). Baseline noise will be established for all sensitive areas prior to construction and follow up noise monitoring will be carried out during the construction.

Although the measures noise levels over the project duration is well within standards; implementation of suitable mitigation measures will reduce the construction noise to acceptable limits. Mitigation measures should include:

- *Installations of noise barriers;*
- *Construction machinery should be located away from settlements;*
- *Careful planning of machinery operation and the scheduling of such operations;*
- *Controlled blasting should only be carried out with prior approval from in charge;*
- *Contractors should be required to fit noise shields on construction machinery and to provide earplugs to the operators of heavy machines; and*
- *Only controlled blasting should be conducted.*

Trees will be planted along the roads to act as natural barrier to noise. Further, physical noise barriers have been provided in the subproject design @ sensitive locations. These physical noise barriers can be constructed from earth, concrete, masonry, wood, metal, and other materials. To effectively reduce sound transmission through the barrier, the material chosen must be rigid and sufficiently dense (@ Lowest 20 Kilograms/ Square Meter). To effectively reduce the noise coming around its ends, a barrier should be @ lowest eight times as long as the distance from the home or receiver to the barrier.

g) Topography and Appearance

Construction activities of the project road will bring permanent changes in the local – level topography and appearance of the project sites. There will be loss in aesthetic beauty of the project areas mainly due to the earthwork. In the **Table 20** elaborates potential effects on the topography and appearance and appropriate mitigation measures.

Table 20: Potential Effects on Topography by the Proposed Upgrading Road Sections.

Sr. No.	Construction Activity	Potential Effect on Topography and Appearance	Mitigation Measures Stages
1.	**Clearing of Vegetation for Widening of the Road;**	*Scarring of landscape from cutting and potential erosion (short term and long term) may be caused. There may be minor permanent changes in the landscape;*	**Cut material should be used to widen the road or disposed of at proper disposal sites. Cut slopes should be re – vegetated immediately after widening activities;**
2.	**Stone Quarrying;**	*Scarring of landscape and potential landslides (rock slides/ falls). There may be permanent changes in the landscape;*	**Stone quarrying should only be undertaken in legally approved areas. Controlled and environmental friendly quarrying should be carried out to minimize landslides and erosion;**
3.	**Earthwork from Borrow Areas;**	*Scarring of landscape due to unearthing activities. Minor but permanent changes in landscape;*	**Borrow areas should be in legally approved locations. As soon as construction activities are complete, they should be re – vegetated and brought back as far as possible to their previous appearance;**
4.	**Waste Disposal;**	*Disposal of cut soils and debris @ improper locations which will make the area look untidy and unattractive;*	**Cut off material should be used to widen the road or disposed of @ proper disposal sites;**
5.	**Establishment of Labor Camps;**	*Disposal of waste and litter @ improper locations and deforestation for fire – wood will make the area look dirty and unattractive.*	**Provision and allocation of proper waste disposal bins and sites are required. A supply of cooking gas should be provided by the contractor to eliminate the use of fire wood.**

E. Biological Environment/ Ecological Resources

a) Wildlife

The proposed road alignment is not located inside or within a 10 – Kilometer distance from a legally protected or key biodiversity area which was identified as the corridor of impact.

To Avoid Impacts to Wildlife the Following Measures will be Implemented:

Bridge design including approaches will take into account wildlife movements along riparian corridors, where smaller animals are known to disperse, road design will consider the construction of faunal culvert or pipe crossing, where endangered and critically endangered bird species are known take territories along the **road, strict noise control will be implemented particularly during construction period to avoid** disturbance information and cautionary roadside signages will be installed to warn drivers of impending sensitive areas.

b) Vegetation

Part of the subproject roads does not pass through any forest area. The density of vegetation in forest is 0.2 to 0.3 Hectare. Removal of the existing vegetative cover and the uprooting of trees is an unfortunate activity, which will reduce the ecological balance in the areas. This will also enhance soil erosion. Scrub forests and vegetation will also be removed for improvement of subproject road sections. The loss of vegetative cover will mostly be permanent and only some might be revived through mitigation efforts. Another impact from road construction activities and deriving from the quarrying, preparation and transfer of stone chips and other earthwork; is the accumulation of dust on the surrounding vegetation. This leads to deterioration of the vegetative health, which in turn will affect the ecology as well as the aesthetic beauty of the area. Induced impacts may result from the following:

- *Increased forest harvesting for fire – wood, construction timber, forage, medicinal plants and other products;*

- *Increased earth and rock extraction;*
- *Construction crew demands for wood as a fuel and for building materials;*
- *Construction crew demands for food and recreational hunting and fishing.*

To Minimize Negative Impacts on the Vegetative Cover the Contract Documents Should Specify That:

- *All wood building material for workers' housing should be brought from outside the project area;*
- *Workers should be supplied with non – wood fuels such as kerosene or liquefied petroleum gas for the duration of the contract;*
- *All contract equipment and plants should be cleaned to the satisfaction of the project engineer in charge prior to their relocation to project sites;*
- *During site clearance, care should be taken to ensure that the minimum area of vegetation area is affected; and*
- *Water sprinkling of trucks used as construction vehicles should be properly and regularly undertaken, so that dust deposition problem on vegetation is minimized.*

c) Human Use Values

Field reconnaissance surveys of the subproject roads were conducted to assess the environmental and social conditions. It was noted that since the proposed improvements will be carried out within available road width, relocation of structures will not be required. The widening options have been devised to avoid impacts of structures. At certain locations on the roads, particularly @ bridge/ culvert sites, traffic will be temporarily diverted from the existing carriageway while construction is in progress and temporary traffic diversions will be managed within the ROW. In other instances, traffic may have to be diverted across adjacent private land, in which case compensation will be paid for any loss of crops or the replacement of damaged structures. In other situations, most frequently not @ bridge sites, for example when bitumen surfacing is in progress, it may be required to close the road temporarily. In these circumstances, adequate radio and press releases should be made beforehand and a date/ time given for the re – opening.

Most construction will be undertaken during the dry season when few crops are planted. Losses should be minimized during construction.

d) Sensitive Location Such as School, College and Hospital along the Projected Road

The sensitive location such as school, college and hospital along subproject road within 100 meters from the edge of the existing road has been identified. These sensitive structures are kept unaffected by the proposed improvement proposals. Short term impacts during the construction stage are expected. Measures such as timely scheduling of construction activities in these areas, provision of sign boards, appropriate noise barriers such as planting trees and/ or raised boundary walls are adopted to minimize impacts.

e) Health, Safety and Hygiene for Construction Workers

Construction of the subproject road sections will result in the generation of waste. In isolated places, the amount of waste generated may be greater than normal because of substandard subsoil materials, which will need to be replaced. The *Contractor* will be required to control the construction sites, keep it clean and provide facilities such as dust bins and collectors for the temporary storage of all waste. This waste should be adequately stored to avoid pollution of water supplies and water sources and to avoid dust formation. The *Contractor* will be responsible for the safe removal and/ or storage of all waste in order to prevent environmental pollution of any type that may be harmful to people or animals.

All necessary safeguards should be taken to ensure the safety, welfare and good health of all persons entitled to be on the sites and to ensure that works are carried out in a safe and efficient manner. All personnel working @ vulnerable site locations will wear safety helmets and strong footwear, it should be ensured that all workmen and staff employed on site use proper safety equipment – for example, eye protectors, ear plugs, safety helmets, the designated safety equipment when working over water and that proper rescue equipment is available. Fire extinguishers and first – aid equipment will be kept @ all sites. The construction camps are anticipated to house up to 200 people for about two years. With this concentration of people, the potential

for the transmission of diseases and illnesses will increase. The main health and safety risks during construction will arise from:

- *Inadequate sanitation facilities in worker camps;*
- *Introduction of sexually transmitted, and other diseases, by immigrant workers;*
- *Outbreaks of malaria, typhoid, cholera etc. amongst the labour force;*
- *The following actions will be undertaken @ construction camps and stipulated in construction contracts;*
- *Submit and obtain approval for a health and safety plan prior to the commencement of work;*
- *Provision of adequate health care facilities; and*
- *Workers will be required to undergo pre – employment medical screening and treatment (if required) and periodic health checks thereafter.*

The subprojects will support a public health education programme for workers and villagers covering road safety, malaria, hygiene, and sexually transmitted diseases. The district health departments will also be invited to participate in monitoring and educating communities and workers affected by the project.

F. Social Environment/ Material Resources

a) Nuisance to Nearby Properties

Nuisance to Nearby Properties is Likely to Result From:

- *Noise and vibration from mechanical devices and construction plant;*
- *Dust during quarrying, construction and the trafficking of new surfaces prior to sealing;*
- *Gaseous emissions from heavy equipment; and*
- *Fumes from asphalt boiling sites.*

Much of the subproject road sections are existing roads in plain terrains and presently air/ dust pollution is not a major issue. Nonetheless, there will be regular watering of the road surfaces or the application of emulsion coats near villages, where dust is a nuisance. Noise generating equipment such as power generators and concrete mixers will be kept away from populated/ commercial areas. Provisions will be incorporated into the *Contractor's* contract to require the use of dust suppression measures.

b) Interference with Utilities and Traffic

On the subproject roads, utilities interfere with the ROW @ few locations that will have to be shifted/ removed prior to construction. This should not be a major problem. Traffic may experience minor delays when diverted around active construction areas, but will be more severely hampered @ the locations where temporary road closures are necessary. Such hazard points will have proper signs indicating the nature of the problem envisaged.

Contractor will ensure that information on the timing of construction works and notifications of road closure (if any) is provided via the local media (Radio, TV Channel, and Newspaper etc.) or through the local community heads.

c) Community Impacts

Construction camps may put stress on local resources and the infrastructure in nearby communities resulting to people raising grievances. This sometimes leads to aggression between residents and migrant workers. To prevent such problems, the *Contractor* should provide the construction camps with facilities such as health care clinics, places of worship, and occasional entertainment. The use of local laborer's during the construction will be promoted to minimize these problems.

d) Quality of Life

The impact of the improvements of subproject roads on the socio – economic environment will be significantly beneficial. Improved access and reduced travel time and cost will be major stimuli to economic growth, particularly in rural areas. Better access of agricultural goods to market will be important and a major contributor to poverty reduction.

Increased labour mobility will occur. This has both positive and negative impacts. Increased access is a two – way phenomenon, and the corollary to increased access to the project areas is increased access for the residents of these areas to more urban life – styles. Outmigration may result. There is also the likelihood of the relocation of homes and businesses to new road – side locations.

During construction, benefits to local people can be maximized if the *Contractor* recruit's construction workers locally regardless of gender. Where possible, he/ she should also not discriminate in the employment of women.

e) Construction Materials

Adequate earth material is available from barren land in the vicinity. Estimated quantity for each road section is about aggregates will be mostly sourced from licensed quarries available locally. Sand will be taken from river beds after prior permission from competent authority.

Quarrying to be Under Lease or Permit: No person shall undertake quarrying of any minor mineral in any area, except under and in accordance with the terms and conditions of a quarry lease or a permit granted under these rules 1996: Provided that the Government shall have power to grant exemption from obtaining a lease or permit for quarrying any minor mineral in any area in the case of any category of persons, subject to such conditions as may be specified in the order granting such exemption.

"Sustainable Sand Mining Management Guidelines" (SSMMG) 2016 and past experience suggest that the sources of sand in India are complete as described below:

a) River (Riverbed and Flood Plain), ***b)*** Lakes and Reservoirs, ***c)*** Agricultural Fields, ***d)*** Coastal/ Marine Sand, ***e)*** Palaeo – Channels and ***f)*** Manufactured Sand (M – Sand).

The SSMMG – 2016 highlights the identification of the sand mining sources, replenishment of the River Bed Material (Sand, Boulder, Gravel, and Cobble etc.), preparation of Districts Survey Report, and Standard Environmental Conditions Suitable for Sand Mining Projects.

Construction water requirement will be met through local rivers and other local streams. Domestic water requirement for workers will also be met mainly through local streams. If needed, groundwater may also be abstracted. Road maintenance, repair and new construction will continue to cause large demands for construction materials. There is a clear need for a better materials supply policy in each district to minimize environmental impacts of small – scale, poorly managed operations and improve the quality and reliability of supply. In some districts, it may be appropriate to develop centralized quarries, if an operator can be attracted. In any case, pre – designation of sources would give contractors a level playing field for bidding and minimize incentives for environmentally damaging cost cutting.

As a prior requirement of subproject, every new quarry and borrow area should also be subjected to a site – specific environmental investigation work according to an approved plan; and should be left in a safe condition or restored to a productive land use. Subject to these conditions, obtaining construction materials for subprojects will not cause unacceptable impacts.

f) Mitigation for Quarries and Borrow Areas

Quarry and borrow pits may be filled with rejected construction waste and afterwards should be given a vegetative cover. If this is not possible, then the excavated slopes will be filled in such a way that they resemble an original ground surface.

- *Aggregates will be first sourced from licensed quarry sites (which are in operation) that comply with environmental and other applicable regulations;*
- *Occupational health safety procedures/ practices for the work force will be adhered to in all quarries;*
- *Quarry and crushing units will be provided with adequate dust suppression measures;*
- *Regular monitoring of the quarries by concerned authorities to ensure compliance with environmental management and monitoring measures;*
- *Prior approval will be obtained from concerned authorities and all local environmental regulations be complied with;*

- *Within all identified borrow areas, the actual extent of area to be excavated will be demarcated with signs and access to the operational area controlled;*
- *Borrow pit plant and machinery will conform to CPCB – EHS noise emission regulations;*
- *Protective gear will be provided to the work force exposed to noise levels beyond threshold limits and there should be proper rotation of such personnel; and*
- *All operation areas will be water sprinkled to control dust levels to national ambient air quality standards.*

The subprojects will require large amounts of bitumen or bitumen emulsion usually stored in drums. These empty bitumen drums are generally recycled as steel sheeting, or used in road construction as parapets or for river bank stabilization. When supplied and used in this manner, bitumen is not regarded as a significant environmental hazard.

The subprojects will require the import, transport and use of fuel and oils. Minor diesel spills are common in region, especially around fuel stations. To mitigate these impacts following measures will be applied.

- *Secondary containment around fuel tanks and @ fueling stations will be built;*
- *Oil and fuel spills, and other runoff from contaminated areas will be controlled; and*
- *Equipment and fuel depots will be placed in safe zones away from drinking water sources and along river banks.*

The subprojects provide an opportunity to assist the PIU and contractors in improving fuel handling practices so as to minimize future fuel spillage.

G. Environmental Impacts during Operation Phase

1. Noise Vibration, Air Pollution, Runoff, Spoils of Hazardous Materials

The current low traffic flows along the subproject roads are expected to increase, because of improved economic activities associated with better access. The larger numbers of vehicles will be an additional source of noise and gaseous emissions.

An incremental increase of about 3 dB (A) to 5 dB (A) noise level is expected due to increased traffic over the designed life of the project *i.e.,* 20 years. Most of these increase in noise level will be attenuated by natural means *i.e.,* distance form source, obstacles from nearby and surrounding building and structures, difference in levels of vehicle and receptor as well as installation of recommended mitigation measures such as installation of noise barriers @ sensitive location, planning of trees etc. Repairs to culverts and new drainage work will eliminate reduce the soil erosion problems presently caused by poor cross drainage. Also, the situation will remain good because these roads pass through area that are largely vegetated and plants have the capacity to absorb gaseous as well as noise pollutants. Bioengineering techniques may also help to absorb pollution.

Since the subproject roads are mostly passing through plain terrain and work will not include blasting of rocks (which is mainly requires in hilly terrains) therefore possibilities of **"Acid Rock Drainage" (ARD)** cause mainly due to leaching of Sulphur containing materials from rock that become exposed to atmospheric oxygen by blasting work.

2. Land Use and Settlements

The likely impacts on land use and settlement patterns are limited. Improved access will lead to increased migration, but this will occur gradually and over a prolonged period. There will be time for new residential areas to be established. There will be a need to control ribbon development.

3. Social Impacts

Specific Benefits to Local People Will Include:

- *Easier communication;*
- *Easier access to markets (both internally and regionally) with savings in travel times and costs;*

- *Enhanced market efficiency through better distribution and accelerated deliveries etc.;*
- *Improved access to health, education and other social services;*
- *Employment generation;*
- *Improved technical skills; and*
- *Enhanced economic activity.*

Likely Adverse Social Impacts Will Include:

- *Increased chances of exposure to communicable diseases, particularly during construction;*
- *Influxes of new settlers leading to increased pressure on natural resources causing hardship to local communities relying on local/ forest resources; and*
- *Rural – to – urban migration causing labour shortages in the depleted rural areas and other negative impacts in the urban areas.*

H. Cumulative and Induced Environmental Impacts

According to the MORTH Environment Sourcebook" Cumulative Impacts is Described As: *"The combination of multiple impacts from existing projects, the proposed subprojects, and anticipated future projects that may result in significant adverse and/ or beneficial impacts that cannot be expected in the case of a stand – alone project".*

The Sourcebook also Describes Induced Impacts As: *"Adverse and/ or beneficial impacts on areas and communities from unintended, but predictable developments caused by a project, which may occur at later or @ a different location".*

Economic activities supporting transport like fuel stations, automotive repair shops, lodging, and restaurants are expected to increase with increase of traffic and induce development in the project areas. The improved roads will provide better connectivity and result in ***(i)*** Reduction in travel time ***(ii)*** Better mode and frequency of transport ***(iii)*** Access to quality health care facilities, educational and other infrastructural facilities ***(iv)*** Enhanced tourism activities in the areas, districts and state, which in many terms will boost the local economy ***(v)*** Better investment climate for industries creating more employment opportunities to local people. In terms of environment safeguard issues the improved road surface is expected to result in less dust and noise due to traffic plying on the damaged roads. However, the increased traffic due to the improved road will generate more air pollution due to vehicle exhaust and noise. The smoother road conditions will also result in increase of traffic speeds, hence creating more risks for accidents amongst traffic users as well as the local communities in the subproject areas of one district in Andhra Pradesh. For addressing the impacts of air pollution and noise, regular maintenance of the road surface, maintenance and monitoring of newly planted trees and installation of noise barriers where necessary have been included in the **"Environmental Management Plan" (EMP)** for implementation during operation stage. For addressing safety related impacts, regular maintenance of the road furniture includes safety related furniture, enforcing rules against encroachment of structures and sensitive structures (schools, temples etc.) inside the ROW and implementation of the emergency response system has been included in the **"Environmental Management Plan" (EMP)** for implementation during operation stage. Information on future development projects along the projected roads was not available. Hence, it is difficult to assess cumulative impacts from other projects, which may get implemented in the project areas.

I. Potential Environmental Enhancement Protection Measures

"Initial Environmental Examination" (IEE) Report presents good environmental management practices and guide documents in the following aspects of road construction:

- *Tree Plantation and Management – Annexure;*
- *Borrow Area Management – Annexure;*
- *Emergency Management System – Annexure;*
- *Debris Disposal Management – Annexure.*

19. Annexure – XI: Anthropogenic Catastrophic Disaster due to Increase in Pollution, Heat, Temperature, Global Warming, Communicable Diseases, Health Effect and Climate Change.

Why @ Present Climate Change and Temperature Rise (Heat Waves) Day by Day... is Still the Greatest Threat to Human Health...???

Polluted air, impact of vector – borne diseases and steadily rising temperatures are linked to health effects ranging from increased heart attacks and strokes to the spread of infectious diseases and psychological trauma **(Figure 10)**.

Figure 10: Workers fumigate for mosquitoes on a city street in New Delhi, India, as a preventive measure against the spread of dengue, malaria, and chikungunya. The impact of vector – borne diseases will increase as global temperatures rise here an urgent action must be taken to reduce emissions.

People around the world are witnessing firsthand how climate change can wreak havoc on the natural earth planet. Steadily rising average temperatures fuel increasingly intense wildfires, hurricanes, and other disasters that are now impossible to ignore. And while the world has been plunged into a deadly **"Pandemics" (Like COVID – 19 and Monkey Pox Additionally),** scientists are sounding the alarm once more that climate change is still the greatest threat to human health in recorded history till date. As recently as August — when wildfires raged in the United States, Europe, and Siberia — **"World Health Organization" (WHO) Director – General Tedros Adhanom Ghebreyesus** said in a statement that "the risks posed by climate change could dwarf those of any single disease."

On September 5th, more than 200 medical journals released an unprecedented joint editorial that urged world leaders to act. ***"The science is unequivocal and a global increase of 1.5°C above the pre – industrial average and the continued loss of biodiversity risk catastrophic harm to health that will be impossible to reverse."*** Despite the acute dangers posed by COVID – 19, the authors of the joint operation has written that world governments "cannot wait for the pandemic to pass to rapidly reduce emissions." Instead, they argue, everyone must treat climate change with the same urgency as they have COVID – 19. Here's a look at the ways that climate change can affect your health — including some less obvious, but still insidious effects — and why scientists say it's not too late to avert/ prevent catastrophe.

Air Pollution

Climate change is caused by an increase of carbon dioxide and other greenhouse gases in Earth's atmosphere, mostly from fossil fuel emissions. But burning fossil fuels can also have direct consequences for human health. That's because the polluted air contains small particles that can induce stroke and heart attacks by penetrating the lungs and heart and even traveling into the bloodstream. Those particles might

harm the organs directly or provoke an inflammatory response from the immune system as it tries to fight them off. Estimates suggest that air pollution and unpredictable flood prone areas **(Figure 11)** causes anywhere between 3.6 million and nine million premature deaths a year.

Figure 11: A family has dinner in their flooded home in Central Java, Indonesia. For over 40 years, they witnessed their productive agricultural land slowly disappear under the sea. They have physically raised everything in their home to cope.

People over the age of 65 years are most susceptible to the harmful effects of **"Air Pollution" (AP),** but many others are at risk too, says Kari Nadeau, Director of the Sean N. Parker Center for Allergy and Asthma Research @ Stanford University. People who smoke or vape are at increased risk, as are children with asthma. Air pollution also has consequences for those with allergies. **"Carbon Dioxide" (CO_2)** increases the acidity of the air, which then pulls more pollen out from plants. For some people, this might just mean that they face annoyingly long bouts of seasonal allergies. But for others, it could be life – threatening. ***"For people who already have respiratory disease, certainly that is a problem".*** When pollen gets into the respiratory pathway, the body creates mucus to get rid of it, which can then fill up and suffocate the lungs. Even healthy people can have similar outcomes if pollen levels are especially intense. In the year 2016, in the Australian State of Victoria, a severe thunderstorm combined with high levels of pollen to induce and has been described as ***"The World's Largest and Most Calamitous and Catastrophic Epidemic of Thunderstorm Asthma."*** So many residents suffered asthma attacks that emergency rooms were overwhelmed — and at least 10 people died as a result.

"Climate Change and Increasing Temperature Heat Waves" (CCITHW) is also causing wildfires to get worse, and wildfire smoke is especially toxic. As one recent study showed, fires can account

for 25% of dangerous air pollution in the U. S. Nadeau explains that the smoke contains particles of everything that the fire has consumed along its path — from rubber tires to harmful chemicals. These particles are tiny and can penetrate even deeper into a person's lungs and organs. (Here's how breathing wildfire smoke affects the body).

Extreme Heat Waves OR Temperatures

Heat waves are deadly, but researchers at first didn't see direct links between climate change and the harmful impacts of heat waves and other extreme weather events **(Figure 12)**. *The evidence base has been growing as "We have now got a number of studies which has shown that we can with high confidence attribute health outcomes to* ***"Calamitous and Catastrophic Climate Change and Global Warming"*** *on Global/ Regional/ State/ Local Scale".*

Figure 12: Workers pick tomatoes in a field in Los Baños, California, under a scorching sun. Not only are rising heat waves impacting people's health and ability to work, agriculture in California is threatened by drought.

Most recently, Haines points to a study published earlier this year in Nature Climate Change that attributes more than a third of heat – related deaths to climate change. As National Geographic reported at the time, the study found that the human toll was even higher in some countries with less access to air conditioning or other factors that render people more vulnerable to heat. (How climate change is making heat waves even deadlier and tormenting). That's because the human body was not designed to cope with temperatures above 98.6°F. Heat can break down muscles. The body does have some ways to deal with the heat — such as sweating. ***"But when it's hot outside all the time, you cannot cope with that, and your heart muscles and cells start to literally die and degrade".*** If you're exposed to extreme heat for too long and are unable to adequately release that heat, the stress can cause a cascade of problems throughout the body. The heart has to work harder to pump blood to the rest of the organs, while sweat leeches the body of necessary minerals such as sodium and potassium. The combination can result in heart attacks and strokes.

Dehydration from heat exposure can also cause serious damage to the kidneys, which rely on water to function properly. For people whose kidneys are already beginning to fail — particularly older adults — Nadeau says that extreme heat waves can be a death sentence. ***"This is happening more and more, studies have also drawn links between higher temperatures and preterm birth and other pregnancy complications".*** It's unclear why, extreme heat waves reduces blood flow to the fetus...?

Food Insecurity

One of the less direct — but no less harmful — ways that climate change can affect health is by disrupting the world's supply of food. Climate change both reduces the amount of food that's

available and makes it less nutritious. According to an **"Intergovernmental Panel on Climate Change" (IPCC)** special report, crop yields have already begun to decline as a result of rising temperatures, changing precipitation patterns, and extreme weather events. Meanwhile, studies have shown that increased carbon dioxide in the atmosphere can leech plants of zinc, iron, and protein — nutrients that humans need to survive.

Malnutrition is linked to a variety of illnesses, including heart disease, cancer, and diabetes. It can also increase the risk of stunting, or impaired growth, in children, which can harm cognitive function. Climate change also imperils what we eat from the sea. Rising ocean temperatures have led many fish species to migrate toward Earth's poles in search of cooler waters. Haines says that the resulting decline of fish stocks in subtropics regions "has big implications for nutrition," because many of those coastal communities depend on fish for a substantial amount of the protein in their diets.

This effect is likely to be particularly harmful for Indigenous communities, says Tiff – Annie Kenny, a professor in the faculty of medicine @ Laval University in Quebec, who studies climate change and food security in the Canadian Arctic. It's much more difficult for these communities to find alternative sources of protein, either because it's not there or because it's too expensive. "So what are people going to eat instead"?

Infectious Diseases

As the planet gets hotter, the geographic region where ticks and mosquitoes like to live is getting wider. These animals are well – known vectors of diseases such as the Zika virus, dengue fever, and malaria. As they cross the tropics of Cancer and Capricorn, mosquitoes and ticks bring more opportunities for these diseases to infect greater swaths of the world. ***"It used to be that they stayed in those little sectors near the Equator, but now unfortunately because of the warming of Northern Europe and Canada, you can find Zika in places you wouldn't have expected"***.

In addition, climate conditions such as temperature and humidity can impact the life cycle of mosquitoes. There's particularly good evidence showing that, in some regions, climate change has altered these conditions in ways that increase the risk of mosquitos transmitting dengue. There are also several ways in which climate change is increasing the risk of diseases that can be transmitted through water, such as cholera, typhoid fever, and parasites. Sometimes that's fairly direct, such as when people interact with dirty floodwaters. But drought can have indirect impacts when people, say, can't wash their hands or are forced to drink from dodgier sources of freshwater.

Mental Health

A common result of any climate – linked disaster is the toll on mental health. The distress caused by drastic environmental change is so significant that it has been given its own name — Solastalgia.

Figure 13: Solar and wind farms West of Mojave, California, provide a glimpse of the future. The Biden administration announced a plan to scale up production and installation of solar panels from 3% of the nation's electricity to 45% over the next three decades to reduce the carbon emissions contributing to "GLOBAL WARMING".

The effects on mental health have been apparent in studies of emergency room visits arising from wildfires in the Western U. S. People lose their homes, their jobs, and sometimes their loved ones, and that takes an immediate toll. ***"What's the fastest acute issue that develops? It's psychological," Extreme weather events such as wildfires and hurricanes cause so much stress and anxiety that they can lead to post – traumatic stress disorder and even suicide in the long run.***

Another common most prominent factor is that the very high level of **"Carbon Dioxide" (CO_2)** emissions contributing to **"Climate Change and Global Warming"** causes disproportionate harm to the world's most vulnerable people **(Figure 13)**. On September 2nd, the **"Environmental Protection Agency" (EPA)** released an analysis showing that racial and ethnic minority communities are particularly at risk. According to the report, if temperatures rise by 2°C (3.6°F), Black people are 40% more likely to live in areas with the highest projected increases in related deaths. Another 34% are more likely to live in areas with a rise in childhood asthma.

Further, the effects of **"Climate Change and Global Warming"** don't occur in isolation. At any given time, a community might face air pollution, food insecurity, disease a lethal **"Pandemics" (Like COVID – 19 and Monkey Pox Additionally),** and extreme heat waves OR temperature increase all at once. Particularly devastating in communities where the prevalence of food insecurity and poverty are already tremendously very high. This situation hasn't been adequately studied, because "it's difficult to capture these shocks that **"Climate Change and Global Warming"** can bring."

Table 21: Suggested Most Burning Topics on Climate Change in Terms of "Environmental Mechanism Techniques" (EMT) and Urban "Heat Mitigation Measures" (HMM).

Sr. No.	Description		Remarks
1.	Theoretically As Already Everyone Knows About Our Eminent Scientist Albert Einstein's Formula...!!! *e.g.,* **$E = M \times C^2$** *Indeed, Seriously in Forthcoming Days... A Day will Come... When All Together... We will have to Follow Diversified and Initiated the Newly Constructed Approachable/ Certainly Applicable Modified Formula...!!!* Which would Mostly be Concerned and Related to Our Preciously – Heavenly – Sustainable Environment **"The Living Paradise The Planet Earth"** and its Surrounding Natural Eco – Friendly Environmental Kingdom is depicted below as:		**Suggested Most Burning Topic on "Environmental Mechanism Techniques" (EMT) and Urban "Heat Mitigation Measures" (HMM)**

	Environment = Materials *{In Terms of Non – Recycled Hazardous/ Polluted Wastes (Solid, Liquide and Gaseous State Substances)}* × **Climate Change** *{In Terms of Green House Effect, Global Warming Causing Generation of More Deadly Bacteria's as well as Dangerous Viruses Such as COVID – 19 VS Monkey Pox, Ebola etc. And Increasing Abruptly Unlamented/ Unprecedented Temperature Rise Day by Day… @ Present Condition/ Situation…Whole in and Around the WORLD…!!!}.*		

Why there's Reason for Hope to Conserve and Preserve Resources Like "WATER… ITS NATURAL ECOSYSTEM, ENVIRONMENT AND LIFE"

In recent years, scientists and environmental activists have begun to push for more research into the myriad health effects of climate change. "One of the striking things is there's been a real dearth of funding for climate change and health". "For that reason, some of the evidence we have is still fragmentary." Still, hope is not lost. In the Paris Agreement, countries around the world have pledged to limit global warming to below 2°C (3.6°F) — and preferably to 1.5°C (2.7°F) — by cutting their emissions. "*When you reduce those emissions, you benefit health as well as the* ***Precious Erath Planet to Conserve and Preserve Resources Like "WATER ITS NATURAL ECOSYSTEM, ENVIRONMENT AND LIFE"***.

Meanwhile, scientists and environmental activists have put forward solutions that can help people adapt to the health effects of climate change. These include early heat warnings and dedicated cooling centers, more resilient supply chains, and freeing healthcare facilities from dependence on the electric grid.

SOCIO – ECONOMIC CHARACTERISTICS

On the basis of socio – economic data collected from the **"District – Handbooks"** and other departmental publications and brochures relevant to the project roads, as stated earlier, a **"Project Road Influence Area Profile" (PRIA)** has been prepared. The profile consists of demographic features, land utilization, occupation structure, agriculture production, acreage intensity irrigation facilities, and concentration of infrastructure facilities, such as, availability of banks, hospital beds, primary schools, electrified villages, drinking water facilities, status of accessibility (paved/ unpaved road), number of hat/ bazaar, primary health centers, government public distribution shops, post offices and family planning center etc. The compiled data have been used in the present project for several analyses during the study. A summary with salient features are presented in and **Flow Diagrams 14, 15, 16 and 17 respectively** as given below.

Since the time series data are not available for the above socio – economic parameters, it is difficult to establish any trend analysis report work. However, the data available reveal the salient features of the **"Project Road Influence Area Profile" (PRIA)** as well as the concentration of different activities occurs in the projected area/ region. The status of a **"Project Road Influence Area" (PRIA),** thus identified, in a specific activity would be useful to appreciate the relative importance of that particular projected road. The information collected and compiled for all the projected roads has been utilized for establishing, launching, ascertaining the relative potential, possible, probable, prospective for future development and growth and in turn an increase in traffic of the state or region.

Figure 14: Overview of the Environment and Social Framework.

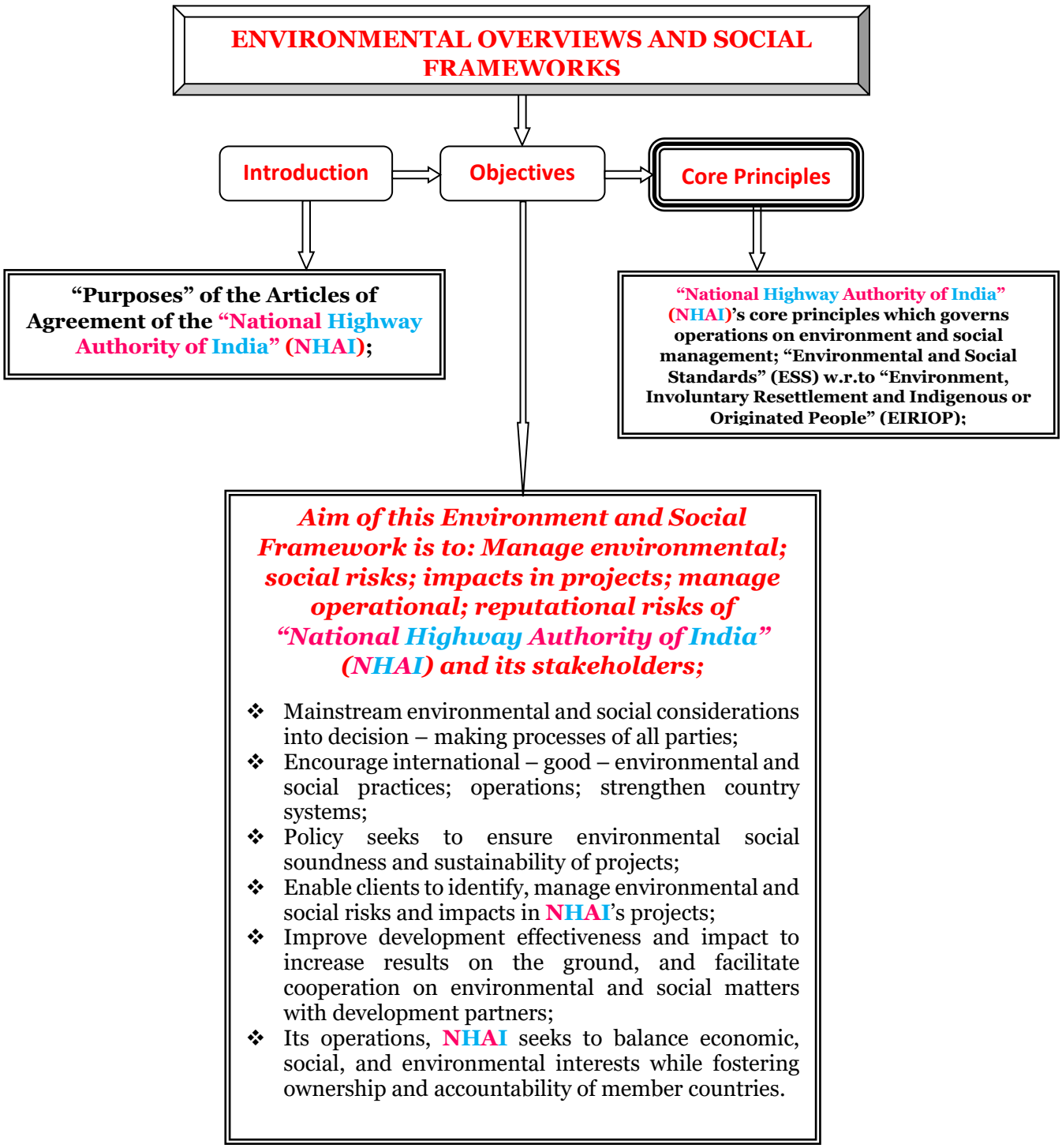


Figure 15: Core Principles of the Environmental and Social Framework.

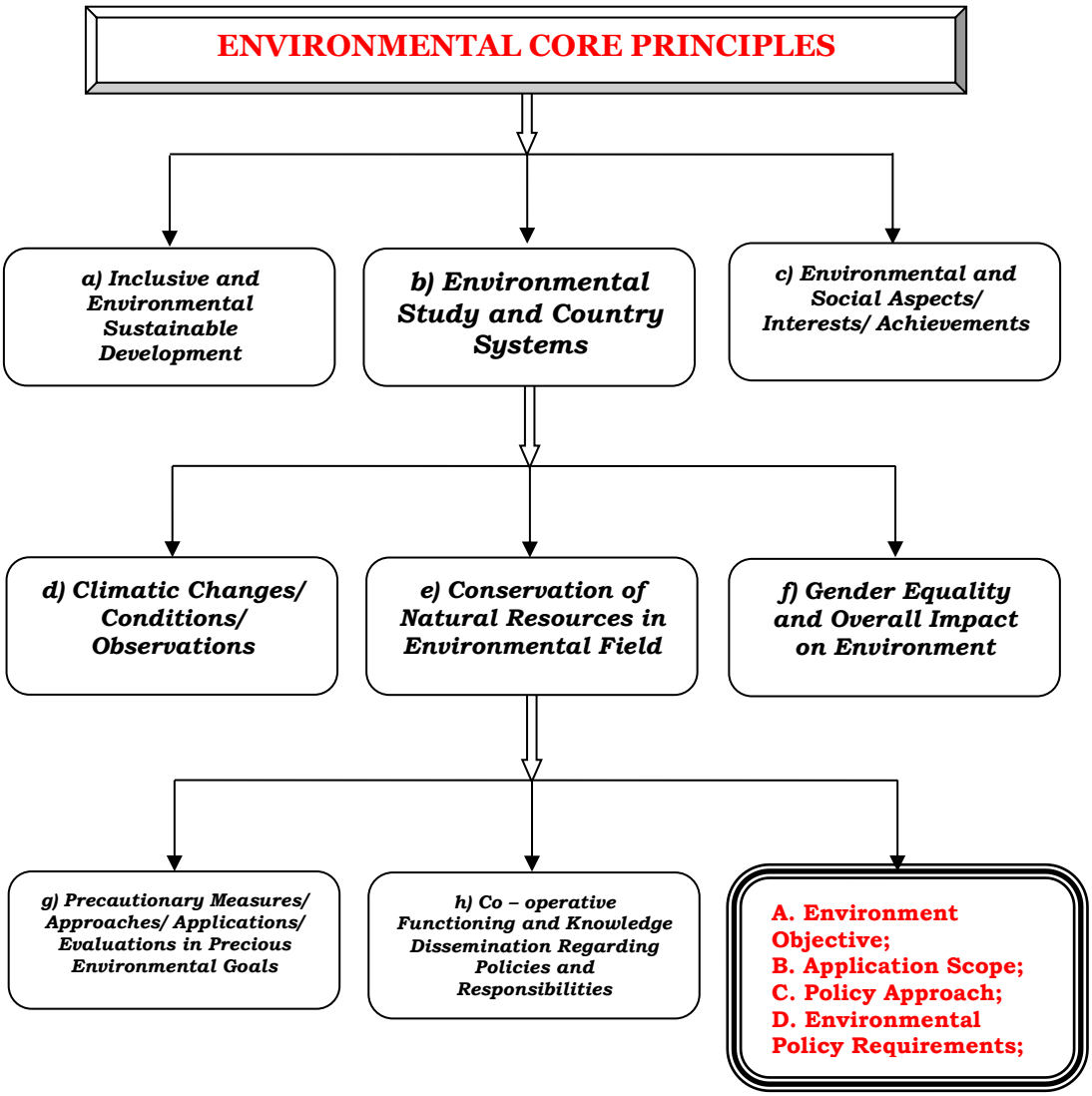


Figure 16: The Environmental Objectives; Application Scope; Policy Approach of the Environmental and Social Framework.

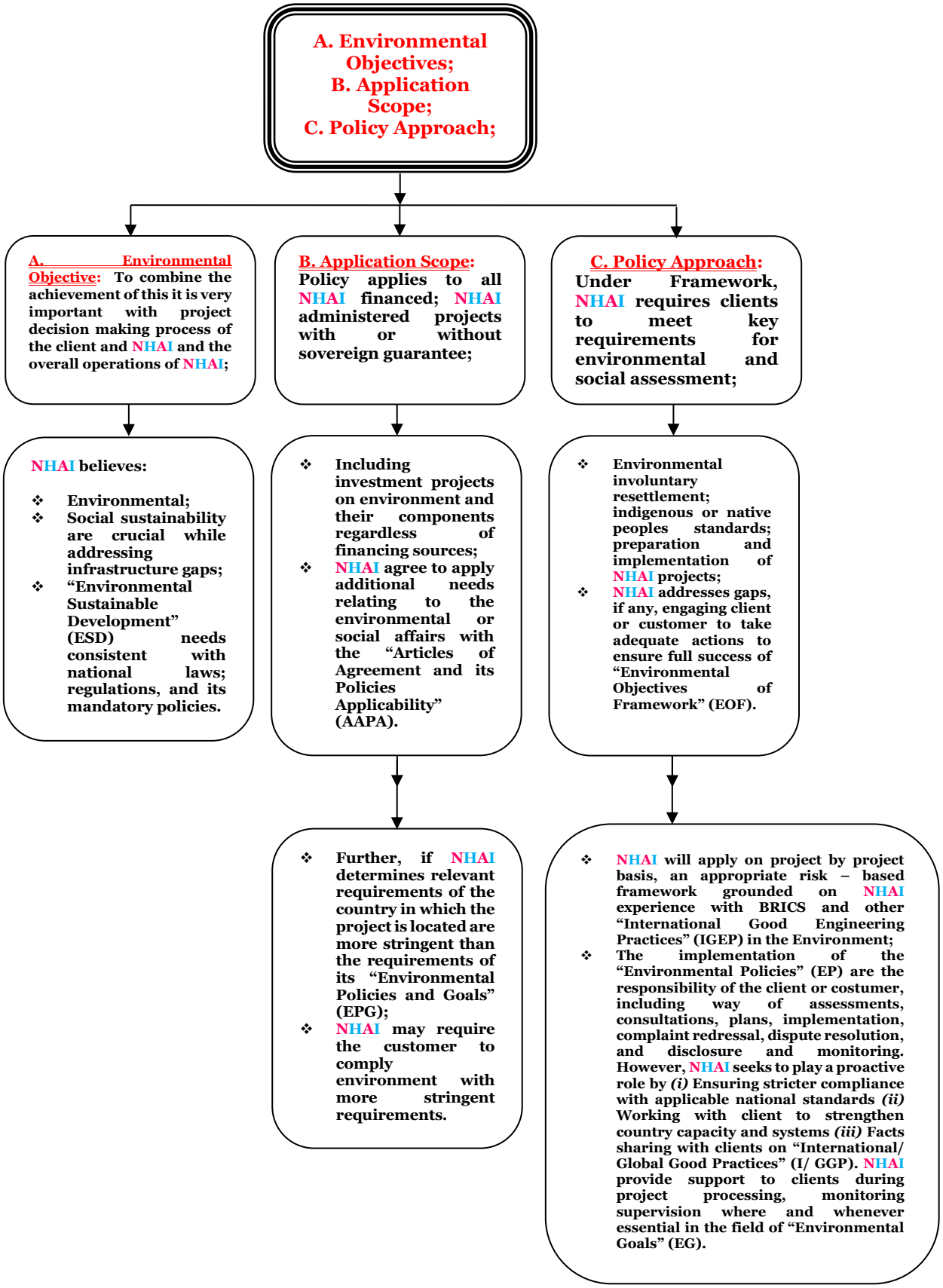
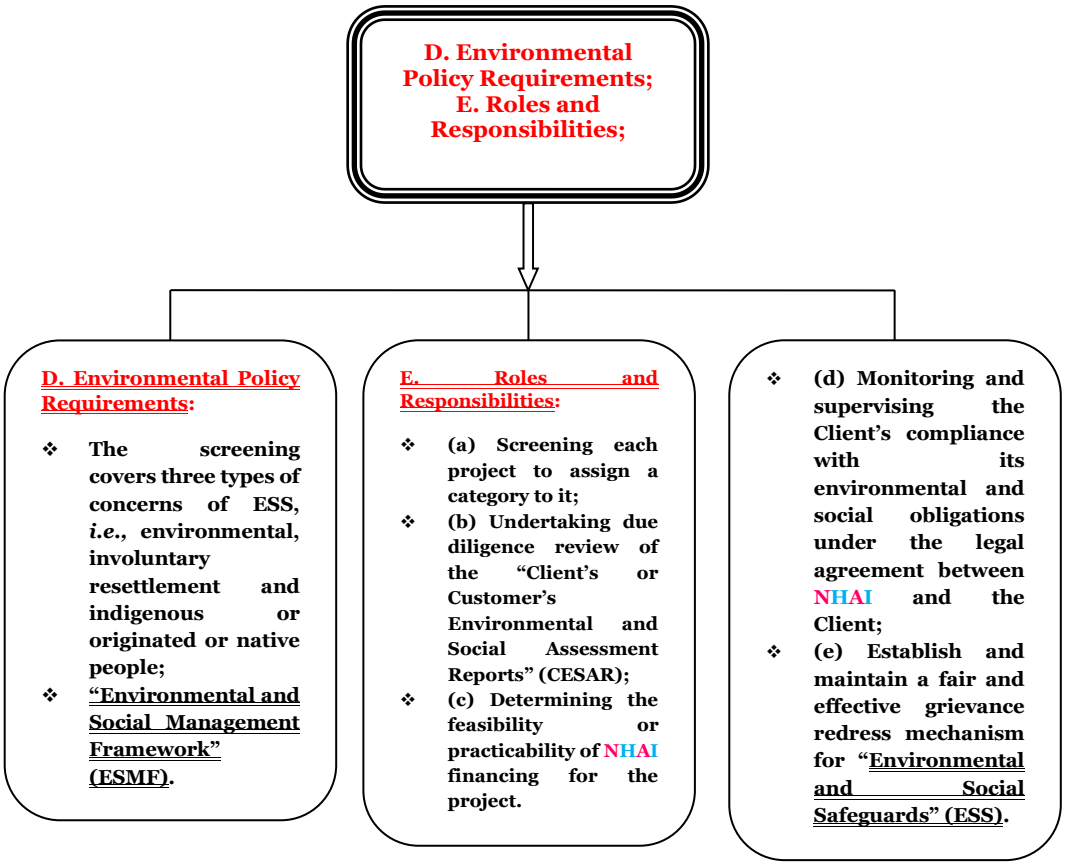


Figure 17: The Policy Requirements; Roles and Responsibilities of the Environment and Social Framework.



The COVID – 19 pandemic also presents an opportunity for world leaders to think bigger and more strategically. For example, the pandemic has laid bare problems with efficiency and equity that have many countries restructuring their healthcare facilities. In the process, they can look for new ways to reduce waste and emissions, such as getting more hospitals using renewable energy. ***"This is in our hands to do" "If we don't do anything, which would be Cataclysmic OR Catastrophic (Figures 18 to 20)."***

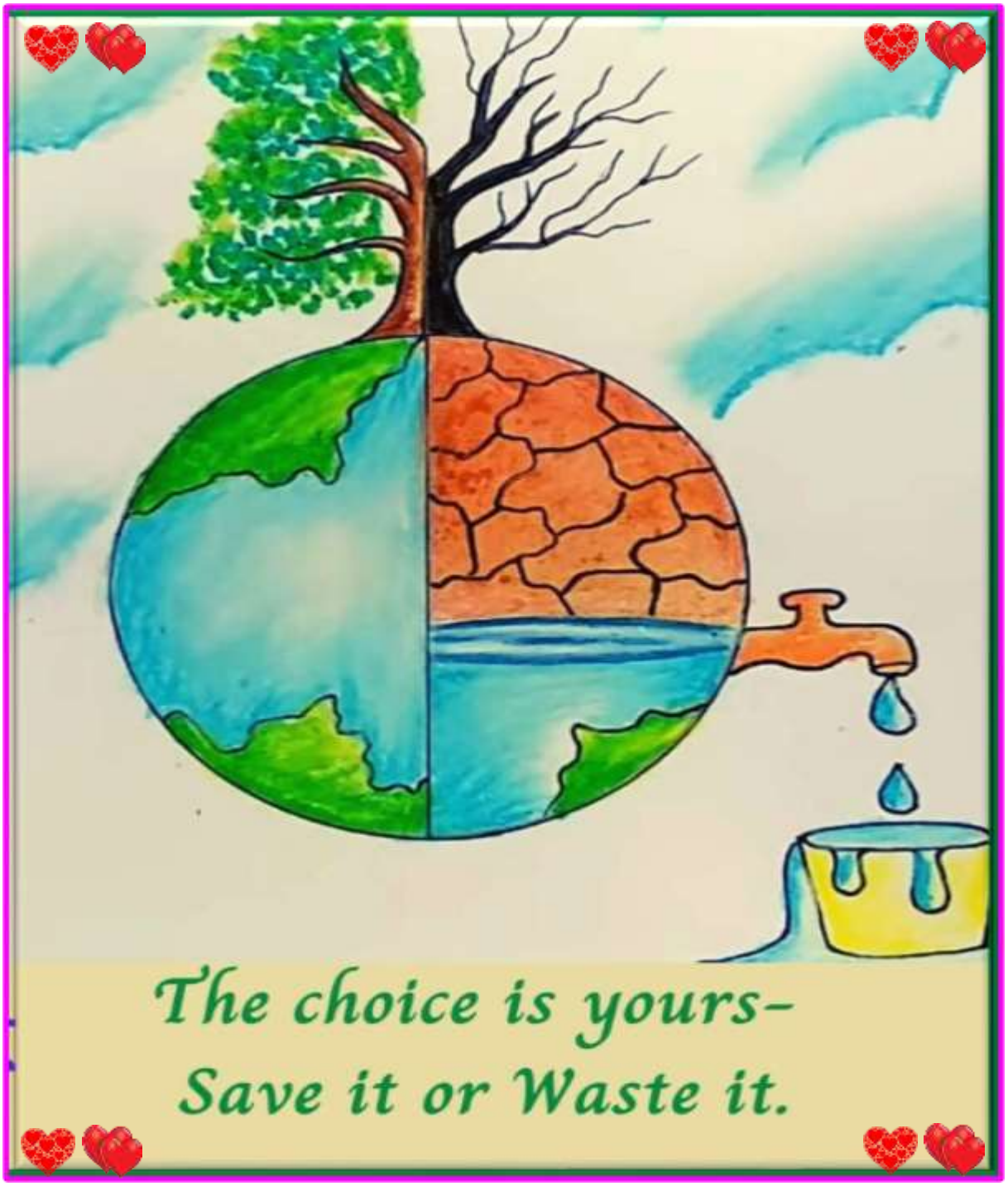


Figure 18: Save it OR Waste it... Choice is Yours...!!!

Figure 19: Save Water... Save Life, Trees, Erath and Environmental Eco – System...!!!

Figure 20: Save Water... Save Precious Nature on "PERADISE EARTH"...!!!
How You Can Save/ Conserve Water...???

Read and try to implement the following **"Save Water Tips" (SWT)**. Don't forget to share with your friends and family and do your bit to help in saving the water! Even if your home has an abundant supply of water, saving water and reducing wastage becomes a common responsibility towards our future generations. Reducing your water usage will also reduce electricity used directly or indirectly. Water is an essential natural resource for humans, Slogans on save water to promote water conservation with posters on save water slogans **(Figures 21 and 22)**.

So, Spread the Message of "Save Water, Save Life" with a Poster Picture...!!!

Figure 21: "Save Water, Save Life" Poster.

Spread some awareness about water conservation with this attention – grabbing poster idea...!!! Featuring a fun, clip art design and lots of bright poster accessories. When it comes to conserving water, small adjustments can have a big impact and it may surprise you on how easy it is to save water. The idea behind the poster 'save water, save lives' was using the metaphor of comparing the body of a tree to the human body.

- ***"Conserve water, conserve life."***
- *"Don't flush our planet's most valuable resource."*
- ***"Don't let the water run when you brush your teeth."***
- *"A drop of water is worth more than a sack of gold to a thirsty man."*
- ***"Thousands Lived without Love, but not without water. So SAVE WATER."***
- *"If you don't want mental hydration then think about water conservation."*
- ***"Don't let the water run in the sink, our life's on the brink."***

- *"Water is the most critical resource issue of our lifetime and our children's lifetime. The health of our waters is the principal measure of how we live on the land."*
- ***"No matter, how much rich you are, you can't live without water."***
- *"Four million people die each year due to water – borne disease."*
- ***"Life depends on water, the reservoir depends on you."***
- *"Water is the one substance from which the earth can conceal nothing, it sucks out its innermost secrets and brings them to our very lips."*
- ***SAVE WATER – Don't waste the world's blood.***
- *Walk in the desert, you will realize the cost of Water.*
- ***Waste water today – Live in desert tomorrow.***
- *A river is more than an amenity, it is a treasure.*
- ***It takes a lot of blue to stay green.***
- *Thousands have lived without love, not one without water.*
- ***Conserve Water, Conserve Life***
- *Thousands Lived without Love, but not without water.*
- ***Water Covers 2/ 3 of the surface of the Earth but Only 0.002% is Drinkable… Save Water…!!!***
- *Whatever may be the occupation Water preservation is our obligation.*
- ***Do your children a favors and save tomorrow's life saver. Water!***
- *If you don't want mental hydration then think about water conservation.*
- ***Water is the most critical resource issue of our lifetime and our children's lifetime.***
- *The health of our waters is the principal measure of how we live on the land.*
- ***Save Water To Secure Your Future.***
- *Don't make nature cry, keep your water clean.*
- ***We forget the water cycle and it will ignore our life cycle.***
- *Don't be a leak in the pipeline; Prevent water loss.*
- ***A river is more than an amenity; it is a treasure.***

Simple Ways to Save Water Tips

Turn off the tap when you brush your teeth…!!!

- *This can save 6 liters of water per minute.*
- *Place a cistern displacement device in your toilet cistern to reduce the volume of water used in each flush. You can get one of these from your water provider.*

Take a shorter shower…!!!

- *Showers can use anything between 6 and 45 liters per minute. Consider getting an aerated shower head, which combines water and air, or inserting a regulator in your shower, which puts an upper limit on flow rates.*

Always use full loads in your washing machine and dishwasher…!!!

- *This cut out unnecessary washes in between.*

Fix a dripping tap…!!!

- *A dripping tap can waste 15 liters of water a day, or 5,500 liters of water a year.*
- *Install a water butt to your drainpipe and use it to water your plants, clean your car and wash your windows. A water butt can collect around 5,000 liters a year.*

Water your garden with a watering can rather than a hosepipe…!!!

- *A hosepipe can use as much as 1,000 liters of water an hour. Mulching your plants (with bark chippings, heavy compost or straw) and watering in the early morning and late afternoon will reduce evaporation and also save water.*
- *Fill a jug with tap water and place this in your fridge. This will mean you do not have to leave the cold tap running for the water to run cold before you fill your glass.*

Install a water meter…!!!

- *When you're paying your utility provider for exactly how much water you use, laid out in an itemized bill, there's an incentive to waste less of the stuff.*

Invest in water – efficient goods…!!!

- *When you are need to replace household products. You can now get water – efficient showerheads, taps, toilets, washing machines, dishwashers and many other water-saving products. For more information visit the Water wise website.*

Why does saving water important…?

- *Even though water doesn't appear in short supply in the UK, using less water actually means you are:*

Reducing energy use…!!!

- *Cleaning **"Waste Water"** (or **"Grey Water",** as it's called) is an energy – intensive process; so is heating the hot water that comes out of your taps.*

Saving money…!!!

- *If you're on a water meter, these tips above could save you a bob or two.*

Figure 22: "WATER" Conservation… Overall "LIFE'S PRESERVATION"…!!!

20. Annexure – XII: DRAINAGE MEASURES FOR HIGHWAYS/ EXPRESSWAYS UNDER CONSTRUCTION (Anticipated MITIGATION MEASURES).

Table 22: Necessary Action to Conduct Pre – Monsoon and Post – Monsoon Inspection as per Memorandum Issued on 8th June, 2022 by "National Highway Authority of India" (NHAI), Regional Office, Chandigarh, Union Territory (UT).

Sr. No.	Details	Remarks
1.	*Necessary action to conduct pre – monsoon and post – monsoon inspection as per memorandum issued on 8th June, 2022 by "National Highway Authority of India" (NHAI), Regional Office, Chandigarh – Bays No. 35 – 38, Sector – 4, Panchkula, Telephone: 0172 – 2583030, 2586818; Fax: 0172 – 2573030; E – Mail: ronhaichd@gmail.com.* ***{NHAI/ PIU/ BTI/ 25286/ DAB – CHT/ VRC/ 5479 (RO Chandigarh Letter No.: 9454 – 1201 dated 08.06.2022)}.***	**Actions has to be Followed and Initiated**
2.	We have taken up large programme for development of highway network under Bharatmala Pariyojna. The programme includes development of 22 Greenfield Corridors, most of which are under construction. IRC: Codes laid down detail process and design guidelines for drainage measures including protection of embankment for highways and expressways. PDs should ensure that design guidelines are followed in provision of cross – drainage works and slope protection. Further, rain harvesting has also been proposed as an additional drainage and ground re – charge measures.	**Development for Bharatmala Pariyojna**
3.	The issue of Cross – Drainage is of greater significance for New Greenfield Highways and Expressways. Usually, 3 monsoon seasons are observed during construction of Greenfield projects. It is desirable that drainage pattern, **"High Flood Level" (HFL)** zone and other hydrology aspects are captured during construction period and to provide additional mitigation measures, if required.	**Greater Significance for New Greenfield Highways and Expressways**
4.	As we are close to on – set of monsoon for the current year, suitable instructions need to be issued to all project units for strict compliance of the above. It may also be ensured that pre – monsoon and post – monsoon are also carried out, as prescribed.	
5.	**"Regional Offices" (ROs)** are requested to review the same on monthly basis at their level.	
6.	Actions taken report is required to be submitted to this office on monthly basis.	
7.	The issues with the approval of **"Regional Office" (RO)** Chandigarh.	

A. Anticipated Environmental Impacts and Mitigation Measures

Design and Construction Phase:

Impact on Physiographic and Topography: Since proposed project is only widening of existing road within available ROW without any land acquisition, impact on the physiographic of the area is not significant. The design will consider the improvement of roadside drainage conditions through the improvement of cross – drainage structures. Design of the cross – drainage structures will follow IRC: Codes' Standard Guidelines.

Potential Environmental Impacts on Soil: Since all activities will occur within the available ROW, so temporary environmental impacts are anticipated on the productive soil (Ref. Annexure – 3: Soil Analysis Reports). Lands taken on lease for access road and for construction camp will be restored its original land use.

Land clearing and grubbing will remove vegetation and soil cover, which may cause some soil erosion during monsoon. Excavations in borrow pits may lead to loss of top soil and soil erosion. The risks of stream and river bank erosion near bridges and cross drainage works are significant. To avoid or minimize erosion, land clearing and grubbing will be conducted during dry season, productive top soils from borrow pits will be stored and reused in road embankment slope protection. Erosion control measures like silt screens will be installed along rivers and nallahs.

There is the risk of contamination of soil from construction material and oil spills. Contractors are required to ensure proper handling materials and able to implement spills containment. Oil contaminated waste will be properly collected, stored disposed through 3rd party service providers. All fuel and lubricant

storage and handling areas will be located @ West 500 meters from the nearest water body and provided with perimeter interceptor drains. All construction debris will dispose by the ***"Contractor"*** on pre – designated area as identified by the ***"Superintend Engineer" (SE)***.

Impact on Water Resources and Drainage: Deterioration of water quality may occur near the construction camp and active construction camps. This will be minimized by timing land clearing and earthmoving during the dry season; proper handling of materials including oil, and lubricants; prohibiting the disposal of untreated sewage; and proper erosion control near rivers and nallahs. Impact on Ambient Air Quality Significant amount of dust will be generated during project construction. The following mitigation measures will also be undertaken:

i) Asphalt and hot – mix plants will be located at West 1.0 Km away from any inhabited urban and rural stretches along the road with the clearance from **"Tamil Nadu Pollution Control Board" (TPCB)**;
ii) Sprinkling of water on the active construction fronts and construction yard;
iii) Regular maintenance of machinery and equipment installed @ projected site/ location/ region.

Substantial noise will be generated from the use of heavy equipment and processing of rocks and asphalt. Adequate distance separating the rock crusher and hot mix plants will be required and the sourcing of **"Ready – Made" (RM)** gravel and asphalt will be promoted to avoid the establishment of these plants. Along the road particularly near sensitive sites like schools and hospitals, the use of less noisy equipment, scheduling of noisy activities, and provision of noise barriers will be implemented by the contractor to minimize disturbance.

Impact on Flora, Fauna and Ecosystem: *The River Godavari is a boon to the people of* ***Pondicherry Vilupuram – Puducherry Section of NH – 45A (New NH – 332) District****. This area abounds in irrigation and particularly coconut trees are found in almost all the towns and villages on the ridges of the fields. The vegetation of* ***Vilupuram – Puducherry Section of NH – 45A (New NH – 332)*** *and District can be Divided into 4 – Categories viz.* ***a) Coastal Vegetation:*** *The mangrove forests of Koringa Reserve Forests are found in coastal vegetation* ***b) Vegetation of the Plains:*** *This type of forest is found in the forest blocks such as Denancheruvu. The average height of the trees is 5 meters.* ***c) Vegetation of the Low – Lying Hills:*** *Shrub jungles of poor type with an average height of 3 meters are found in the Kodiga and Murari forest blocks.* ***d) Vegetation of Hills:*** *Good miscellaneous dry deciduous and semi evergreen forest is found in Rampachodavaram reserve forest. In some forests, it is found that the trees rise up to 10 Meters to 25 Meters height also. All cut trees will be compensated @ the rate of 1: 10 ratio with preference to fast growing local species that are more efficient in absorbing carbon emissions.*

Construction Workers' Camp: As the *Contractor* is required to source labor from the local communities along the subproject road; the size of the construction camps will be relatively small. It is the contractual responsibility of the *Contractors* to maintain a hygienic camp with adequate water and electric supply; toilet facilities located away from the water bodies and wells; proper disposal of domestic refuse; temporary medical facilities; pest control; clean and adequate food; and security.

Impacts on Social Environment: Construction and operation phases of project road will have some beneficial impact on social environment. Some increase in income of local people is expected as local unskilled, semiskilled and skilled persons may gain direct or indirect employment during construction phase. Since the immigration of work force during construction phase is likely to be very small phase. Since the immigration of work force during construction phase is likely to be very small, the social impacts on literacy, health care, transport facilities and cultural aspects are expected to be insignificant.

Operation Phase:

Increase in vehicular emissions, noise level, road crashes due to higher speed vehicular speed, and oil contaminated road surface runoff will occur during project operation phase. The impact on air quality is not expected to be significant given the low projected traffic. Community safety is enhanced through the crash barriers, speed brakes, traffic signs, and pavement markers. Oil contamination will occur, but expected to be in trace amounts based on the low – level vehicular traffic. To control the anticipated increase in noise level the following measures will be implemented; good road surface will reduce the road – tire noise, prohibition of horns along sensitive areas, road widening will increase capacity and decrease congestion of vehicles, and compensatory tree plantation will be located near sensitive areas will be implemented.

Climate Change Impacts: Sector specific climate risks screening has been done for overall transport sector of Andhra Pradesh to analyze impact on road components due to likely change in climatic variables, mainly temperature and precipitation. Projections have been made for the year 2080s. Given the projected variations of temperature and precipitation on the projected roads were screened for different types of climate risks and impact on road components. Key engineering measures taken to address flood risks in the design are: ***i)*** increase in embankment height, ***ii)*** construction of new side and lead away drains, ***iii)*** construction of new culverts and widening of existing ones and ***iv)*** widening of bridges.

B. Public Consultation and Information Disclosures

C. Environmental Management Plan (EMP)

A fully budgeted environmental management plan has been prepared for mitigation management avoidance of the potential adverse impacts and enhancement of various environmental Components along the project road sections. For each mitigation measures to be carried out its location, timeframe, implementation and overseeing's supervising responsibilities have been identified. Monitoring plan for construction and operation phase has been framed to ensure effective implementation of **"Environmental Management Plan" (EMP)**.

The monitoring program included performance indicators for water, air, and noise level monitoring, frequency of monitoring, and institutional arrangements of the project in the construction and operation stages, along with the estimated cost. The reporting system included roles and responsibilities of each party involved in the project implementation *i.e.,* NHAI (PIU), *Supervision Consultant* and *Contractors* and reporting mechanisms during implementation and operation phases.

An environmental management budget has been estimated INR: ₹ 61, 20,000/- for implementation of the "Environmental Management Plan" (EMP). This budget also includes cost of environmental monitoring and associated training programs.

D. Conclusions and Recommendations

The findings of the IEE show that overall, the project has temporary environmental impacts. Effective EMP implementation will ensure elimination and minimization of identified adverse impacts. APRBRP shall ensure that EMP and EMoP is included in **"Bill Of Quantity" (BOQ)** and forms part of bid document and civil works contract. If there is any change in the project design the EMP and EMoP will accordingly. APRBRP needs capacity building and practical exposure. Adequate training shall be imparted as proposed under **"Environmental Management Plan" (EMP)** to enhance the capability of concerned EA and IA officials.

21. Annexure – XIII: Photographs of Environmental Compliance Survey/ Observations/ Remarks with Entirely Testing Certificates (Land, Air, Water, Soil and Waste Management etc.) for Four Laning of Vilupuram – Puducherry Section of NH – 45A (New NH – 332) Road (Design Length Approximately 29.000 Km) in the States of Pondicherry, Tamil Nadu (UT).

WRD AE, SDO & EE Site Visit... With NHAI Representative, IE and Concessionaire... with Construction Experts @ Chainage 08 + 500 Km, Vilupuram – Puducherry Section of NH – 45A (New NH – 332), Four Laning Road (Design Length Approximately 29.000 Km) in the States of Pondicherry Tamil Nadu Union Territory (UT).

Successfully Vallalar Temple Dismantled @ Chainage 23 + 460 Km with Construction Experts @ Vilupuram – Puducherry Section of NH – 45A (New NH – 332), Four Laning Road (Design Length Approximately 29.000 Km) in the States of Pondicherry Tamil Nadu Union Territory.

Started to do Girder Erection with Ritual Worship of GOD @ Chainage 16 + 200 Km with Construction Experts @ Vilupuram – Puducherry Section of NH – 45A (New NH – 332), Four Laning Road (Design Length Approximately 29.000 Km) in the States of Pondicherry Tamil Nadu Union Territory (UT).

Girder Erection Launching in Progress @ Chainage 23 + 300 Km with Construction Experts @ Vilupuram – Puducherry Section of NH – 45A (New NH – 332), Four Laning Road (Design Length Approximately 29.000 Km) in the States of Pondicherry Tamil Nadu Union Territory (UT).

Site Visit with NHAI, IE and Concessionaire @ Chainage 25 + 476 Km of ROB as Additional Land Requirement for Staircase Purpose… with Construction Experts @ Vilupuram – Puducherry Section of NH – 45A (New NH – 332), Four Laning Road (Design Length Approximately 29.000 Km) in the States of Pondicherry Tamil Nadu Union Territory (UT).

Hotspot Locations Joint Inspection by Team Leader @ Valavanur… with Construction Experts @ Vilupuram – Puducherry Section of NH – 45A (New NH – 332), Four Laning Road (Design Length Approximately 29.000 Km) in the States of Pondicherry Tamil Nadu Union Territory (UT).

Kolathur Temple @ Chainage 1 + 700 Km Dismantling is in Progress @ Valavanur... with Construction Experts @ Vilupuram – Puducherry Section of NH – 45A (New NH – 332), Four Laning Road (Design Length Approximately 29.000 Km) in the States of Pondicherry Tamil Nadu Union Territory (UT).

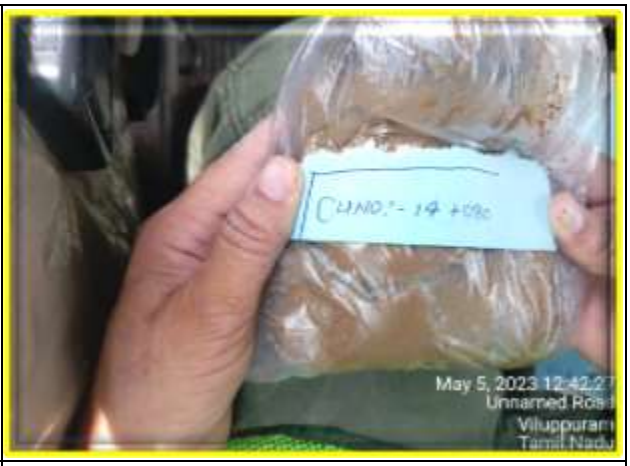
Project Site Office Staff as Manager Mr. Kamaraj Hrithik and Others Working @ Vilupuram – Puducherry Section of NH – 45A (New NH – 332), Four Laning Road (Design Length Approximately 29.000 Km) in the States of Pondicherry Tamil Nadu Union Territory (UT).

22. Annexure – XIII: Photographs of Environmental Compliance Survey/ Observations/ Remarks with Monitoring (Air, Water, Noise and Surface Water Parameters) for Four Laning of Vilupuram – Puducherry Section of NH – 45A (New NH – 332) Road (Design Length Approximately 29.000 Km) in the States of Pondicherry, Tamil Nadu (UT).

Team Leader Inspection @ Environmental Monitoring Process Started @ Projected Locations and Chainages @ 00 + 000 Km up to 29 + 000 Km.

Project Site Office Staff as Team Leader Er. Mahesh Uppala and Dilip Buildcon Team Working @ Vilupuram – Puducherry Section of NH – 45A (New NH – 332), Four Laning Road (Design Length Approximately 29.000 Km) in the States of Pondicherry Tamil Nadu Union Territory (UT).

	
Ambient Air Quality Monitoring and Ambient Noise Monitoring Process Started @ Chainage Number 00 + 000 Km under Team Leader Supervision.	**Day 2 Ambient Air Quality and Ambient Noise Monitoring Going on @ Chainage Number 00 + 500 Km Camp Site.**
	
Day 2 Monitoring Going on @ Chainage Number 00 + 500 Km Camp Site.	**DG Stack Emission Sample Collected @ Chainage Number 00 + 500 Km Camp Site.**
	
Soil Samples with IE Representative Going on Kulathur @ Chainage Number 00 + 500 Km Camp Site.	**Soil Samples with IE Representative Going on Kulathur @ Chainage Number 03 + 100 Km Camp Site.**

	
Soil Samples with IE Representative Going on Kulathur @ Chainage Number 03 + 100 Km Camp Site.	**Day 2 Ambient Air Quality and Ambient Noise Monitoring Going on @ Chainage Number 14 + 080 Km Camp Site.**
	
Day 2 Soil Samples Going on Unnamed Road Viluppuram @ Chainage Number 07 + 320 Km Camp Site.	**Ambient Air Quality and Ambient Noise Monitoring Process Start @ Crusher... Camp Site.**
	
Ambient Air Quality and Ambient Noise Monitoring Process Near @ Crusher... Camp Location Site.	**Ambient Air Quality and Ambient Noise Monitoring Process Going On @ Chainage Number 18 + 500 Km Camp Site.**

	
Ambient Air Quality and Ambient Noise Monitoring Process Going On @ Chainage Number 18 + 500 Km Camp Site.	**DG Stack Emission and DG Noise Sample Collected @ Chainage Number 18 + 500 Km Camp Site.**
	
DG Stack Emission and DG Noise Sample Collected @ Chainage Number 18 + 500 Km Camp Site.	**Ambient Air Quality and Ambient Noise Monitoring Process Going On @ Chainage Number 25 + 470 Km (ROB) Camp Site.**
	
Ambient Air Quality and Ambient Noise Monitoring Process Going On @ Chainage Number 25 + 470 Km (ROB) Camp Site.	**Ground Water, Tap Drinking Water Sample Collected @ Crusher and Chainage Number 00 + 480 Km Camp Site.**

Ground Water, Tap Drinking Water Sample Collected @ Crusher and Chainage Number 00 + 480 Km Camp Site.

Pond Water Sample Collected @ Chainage Number 01 + 796 Km LHS Camp Site.

Tap Drinking Water Sample Collected @ Chainage Number 01 + 796 Km LHS Camp Site.

Tap Drinking Water Sample Collected @ Chainage Number 01 + 796 Km LHS Camp Site.

23. Annexure – XIV: Mitigation Measures.

Annexure – IVD Mitigation Measures					
Sr. No.	**Areas**	**No. of Bridges Cleaned**	**No. of Culverts Cleaned**	**No. of Pipe Culverts Converted to Box Culverts**	**No. of Bridges where Additional Vents were Provided**
1.	**Areas of Very High Vulnerability;**	-------	-------	-------	-------
2.	**Areas of High Vulnerability;**	-------	-------	-------	-------
3.	**Areas of Moderate Vulnerability;**	-------	-------	-------	-------
4.	**Areas of Low Vulnerability;**	-------	-------	-------	-------
5.	**Other Areas;**	*01*	**45**	*Nil*	**Nil**
	Total Numbers =	*01*	**45**	*00*	**00**

24. Annexure – XV: Systematically/ Scientifically/ Precisely Designed Air, Water and Soil Quality Monitoring Network.

1. Air Quality

Ambient air quality in the state is quite pure in the state. Except for a few urban centers, the ambient air quality along the subproject roads is good. There are no major industrial activities along the projected roads. Dust arising from unpaved surfaces, forest fires, smoke charcoal production, domestic heating, and vehicular pollution are sources of pollution in the region. Firewood burning is the major contributor to the ambient pollution load. Industrial and vehicular pollution is mainly concentrated in the major commercial areas.

Vehicular pollution is a secondary source of pollution in the region as the traffic density is low. Pollution from vehicles is mainly due to the use of low – grade fuel, and poor maintenance of vehicles. The level of pollution in rural areas is much lower than that of urban areas due to the lower volume of traffic. There is a sudden increase in the number of vehicles in the town area during another cause of air pollution.

Secondary information is not available on the ambient air quality of the project road area. The major transport on the project road sections is the traffic flowing on unpaved or damaged roads. This Air Quality Monitoring Station Set up might also add to the air pollution load along the project road of the projected sections.

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

- *Meteorological conditions, climatic conditions, and weather records/ interpretations;*
- *The assumed regional influences on background air quality data;*
- *The areas where the impact would most likely be greatest;*
- *Present land use pattern along the proposed alignment; and*
- *Traffic congestion points etc.*

To establish the baseline ambient air quality, **"Ambient Air Quality Monitoring" (AAQM)** stations were set up @ locations as indicated in **Table 1**.

At each of the 1 locations, monitoring was undertaken as per a new notification issued by **"The Ministry of Environment, Forest and Climate Change" (MOEF & CC)** on 16th, November 2021, in the second quarter of 2022; Data for the following parameters was collected.

- *Particulate Matter PM_{10};*
- *Particulate Matter $PM_{2.5}$;*
- *Sulphur Dioxide (So_2);*
- *Oxides of Nitrogen (NO_x);*
- *Carbon Monoxide (CO).*

The sampling of PM_{10}, $PM_{2.5}$, SO_2, and NO_x was undertaken on a 24 – Hourly basis while bi – hourly samples were collected for CO, PM, SO_2, and NO_x were monitored using **M/s. Reliance Infrastructure Limited/ Roadway Solutions India Infra Limited;** make Repairable Dust Sampler **(APM – 460)** along with gaseous attachment **(Model APM – 415 and 411)**. **What Man GFIA Filter Papers** were used for PM, Carbon Monoxide (CO) samples were monitored by using make **Gas Detector Model Number: C – 096** and **GP – 200 P** respectively.

The methodology adopted for sampling and analysis and the instrument used for analysis in the laboratory are presented in **Table 23**.

Table 23: Techniques Used for Ambient Air Quality Monitoring.

Techniques Used for Ambient Air Quality Monitoring			
Sr. No.	**Parameter (µg/ m³)**	**Technique**	**Minimum Detectable Limit (µg/ m³)**
1.	**Particulate Matter ($PM_{2.5}$)**	*Gravimetric Method*	**01**
2.	**Particulate Matter (PM_{10})**	*Gravimetric Method*	**01**
3.	**Sulphur Dioxide (SO_2)**	*Modified West and Gaeke*	**05**
4.	**Nitrogen Oxide (NO_X)**	*Modified Jacob and Hochheiser*	**05**
5.	**Carbon Monoxide (CO)**	*Non – Dispersive Infrared Spectroscopy (NDIRS)*	**01**

A summary of results for each location is presented in **Tables 24 and 25** the existing air quality along the project roads @ monitored locations. These results are compared with the National Ambient Air Quality Standards prescribed by the **"Ministry of Environment Forests and Climate Change" (MOEF & CC)** for respective Zones.

It can be seen from **Tables 24 and 25** that @ all the monitored locations the ambient air quality parameters are well within the NAAQS standards prescribed by the Ministry of Environment, Forest and Climate Change for residential areas. The maximum concentration of PM_{10} and $PM_{2.5}$ is 85.10 µg/ m³ and 42.96 µg/ m³ recorded on Road. These are well within the standards of 100 µg/ m³ and 60 µg/ m³ respectively for PM_{10} and $PM_{2.5}$. The **"National Ambient Air Quality Standards" (NAAQS)** prescribed by **"The Ministry of Environment, Forests and Climate Change" (MEOF & CC)**.

Table 24: Ambient Air Quality Status along the Projected Road Part – I.

Ambient Air Quality Status along the Projected Road										
Sr. No.	**Experimental Parameter (µg/ m³)**	**Test Method**	**Units**	**Limits as per Environment (Protection) Act**	**AAQM – 1**	**AAQM – 2**	**AAQM – 3**	**AAQM – 4**	**AAQM – 5**	**AAQM – 6**
1.	**PM_{10} Particulate Matter**	*IS: 5182 (P – 23): 2006*	**µg/ m³**	*100*	**62.88**	*70.29*	**69.31**	*83.02*	**62.89**	*65.44*
2.	**$PM_{2.5}$ Particulate Matter**	*As per CPCB Guidelines*	**µg/ m³**	*60*	**29.70**	*38.46*	**36.16**	*42.64*	**32.10**	*37.68*
3.	**Sulphur Dioxide (SO_2)**	*IS: 5182 (P – 02): 2001*	**µg/ m³**	*80*	**6.32**	*11.03*	**9.83**	*10.15*	**7.12**	*8.12*
4.	**Oxides of Nitrogen (NO_X)**	*IS: 5182 (P – 06): 2006*	**µg/ m³**	*80*	**11.81**	*20.87*	**17.08**	*21.04*	**15.71**	*17.10*
5.	**Carbon Monoxide (CO)**	*IS: 5182 (P – 10): 1999*	**µg/ m³**	*2.00*	**0.290**	*0.400*	**0.330**	*0.390*	**0.380**	*0.370*

Table 25: Ambient Air Quality Status along the Projected Road Part – II.

Sr. No.	**Experimental Parameter (µg/ m³)**	**Test Method**	**Units**	**Limits as per Environment (Protection) Act**	**AAQM – 7**	**AAQM – 8**	**AAQM – 9**	**AAQM – 10**	**AAQM – 11**
1.	**PM_{10} Particulate Matter**	*IS: 5182 (P – 23): 2006*	**µg/ m³**	*100*	**84.20**	*85.10*	**78.31**	*71.20*	**64.22**
2.	**$PM_{2.5}$ Particulate Matter**	*As per CPCB Guidelines*	**µg/ m³**	*60*	**41.53**	*42.96*	**40.17**	*39.64*	**31.17**
3.	**Sulphur Dioxide (SO_2)**	*IS: 5182 (P – 02): 2001*	**µg/ m³**	*80*	**11.19**	*12.17*	**09.86**	*08.45*	**06.90**
4.	**Oxides of Nitrogen (NO_X)**	*IS: 5182 (P – 06): 2006*	**µg/ m³**	*80*	**23.21**	*23.89*	**19.75**	*15.33*	**11.78**
5.	**Carbon Monoxide (CO)**	*IS: 5182 (P – 10): 1999*	**µg/ m³**	*2.00*	**0.420**	*0.430*	**0.410**	*0.390*	**0.350**

2. Collection and Analysis of Data

Data was collected on various environmental components such as soil, meteorology, geology, hydrology, water quality, flora and fauna, habitat, demography, land use, cultural properties etc., to establish the baseline environmental setup. Secondary data on environment for the subproject corridors were collected both from published and other relevant sources *e.g.,* the Departments of Forest, **"Maharashtra State Pollution Control Board" (MSPCB),** the State Statistical Department, etc. The data collection from the field was completed with the help of enumerators/ investigators. The interviewers were trained for filling up the questionnaire at the site. To ensure the accuracy of the data it was collected under the supervision of the consultant. The type and source of information compiled in this **Environmental Monitoring Plan for MSRDC Report** are shown in **Table 26**.

Table 26: Primary and Secondary Information Sources.

Information	Sources
Technical information on existing road features and proposed Rehabilitation Work. Investigation of road features; viz. Water bodies community structures, environmentally sensitive location areas, congested locations, etc.;	***MSRDC** Design Consultant Ground physical surveys and graphics consultants;*
Climatic Condition;	*Indian Meteorological Department (IMD), ENVIS Website, NIC, primary data collection;*
Geology, Seismicity, Soil and Topography;	*Geological Survey of India (SoI) Topo sheets, Primary data collection;*
Land Use/ Land Cover;	*Survey of India (SoI) Topo – Sheet, Observation during survey;*
Drainage Pattern;	*Survey of India Topo – Sheet and field observation;*
Status of Forest Areas, Compensatory Afforestation Norms etc.;	*Divisional Forest Office (DFO);*
Status of Fishing Activity;	*District Fisheries Offices;*
Air Quality, Noise, Soil and Water Quality;	*Onsite monitoring and Analysis of Field samples during field visit the monitoring report is given in **Annexure – 1**;*
Borrow Areas, Quarries and Other Construction Material Source;	*These sources are provided in **Annexure – 1**;*
River Geo – Morphology, Hydrology, Drainage, and Flood Patterns;	*Feasibility report, field observations;*
Socio – Economic Environment;	*Census 2021. Official websites maintained by State Govt., and Public Consultation during the Field Survey;*

3. Environmental Monitoring and Analysis

In order to assess the situation in particular sections of the subproject roads during the screening and site visit of the area, different locations were identified for monitoring and analysis the noise level, ambient air and water quality. The monitoring and analysis of water quality, air quality and noise level has been done by **M/s. Reliance Infrastructure Limited/ Roadway Solutions India Infra Limited**, NABL accredited leading environmental research laboratory. Air quality monitoring has been carried out as per **"Ministry of Environment, Forest and Climate Change" (MOEF & CC)** notification of November, 2009 the revised Air Quality standards and the on – site monitoring results are incorporated in the **Environmental Monitoring Report**.

- *Physical environmental components such as meteorology, geology, topography, soil characteristics, air quality, surface and sub – surface water quality;*

- *Biological environmental components such as aquatic, biotic, flora, fauna, mammals, and*
- *Land environment in terms of land use, soil composition etc.*

4. Water Quality

In order to establish baseline conditions, surface and groundwater samples were collected. The sampling locations were selected after the field reconnaissance and a review of all the water bodies/ resources in the project influence area. Samples were collected as per IS: 2488 (Part I – V).

Ground water (drinking water) samples were analyzed as per IS: 10500 – 1991. Grab sample were collected from water source and were analyzed for various Physio – chemical parameters as per the procedures laid down in the MPHA and BIS. Atomic Absorption Spectrophotometer and UVNIS – Spectrophotometer were used for analysis of water samples according to the necessity. The water samples were collected from following locations along the subproject roads.

The results of the analyzed of these samples are presented in the **Table 27**. The results were compared with standards for drinking water quality.

It can be seen from table that the pH of the sampled water in the region is well within permissible limits (6.6 – 7.6). The water is also hard in nature with total hardness level ranging from 116 – 593 mg/ l against the permissible limit of 200 mg/ l. Other water quality parameters analyzed like chloride, sulphate, fluorides are **"Ground Water Sample" (GWS)** collection are found well within the permissible limits the project road for drinking waters as specified by CPCB on all sample subproject roads. Overall, the ground water quality in the projected areas is good **(Table 27)**.

Table 27: Water Quality Characteristics along the Projected Road Part – I.

Part – I

Ground/ Water Quality along the Project Road (Physical and Chemical Parameters)											
Sr. No.	**Parameter**	**Test Method**	**Unit**	**Desirable Limits**	**Permissible Limits**	**SWQ 1**	**SWQ 2**	**SWQ 3**	**SWQ 4**	**SWQ 5**	**SWQ 6**
1.	**pH Value**	*IS: 3025 (P – 11): 1983*	-------	*6.5 to 8.5*	**N. R.**	*7.60*	**7.24**	*7.12*	**7.01**	*7.07*	**6.59**
2.	**Color Gratified**	*IS: 3025 (P – 09): 1984*	°C	-------	-------	*B. D. L.*	**B. D. L.**	*B. D. L.*	**B. D. L.**	*B. D. L.*	**B. D. L.**
3.	**Odour Category**	*IS: 3025 (P – 16): 1984*	mg/l	*Agreeable*	**Agreeable**	*Agreeable*	**Agreeable**	*Agreeable*	**Agreeable**	*Agreeable*	**Agreeable**
4.	**Taste Category**	*IS: 3025 (P – 17): 1984*	mg/l	*Agreeable*	**Agreeable**	*Agreeable*	**Agreeable**	*Agreeable*	**Agreeable**	*Agreeable*	**Agreeable**
5.	**Turbidity Type**	*IS: 3025 (P – 21): 2009*	NTU	*01*	**600**	*<01*	**<01**	*<01*	**<01**	*<01*	**<01**
6.	**Total Dissolved Solids**	*IS: 3025 (P – 23): 1986*	mg/l	*500*	**2000**	*1077.03*	**1055.38**	*1012.60*	**381.34**	*1216.82*	**331.90**
7.	**Total Hardness**	*IS: 3025 (P – 40): 1991*	mg/l	*200*	**600**	*116.72*	**291.80**	*359.89*	**145.90**	*593.33*	**136.17**
8.	**Total Alkalinity**	*IS: 3025 (P – 32): 1988*	mg/l	*200*	**600**	*567.32*	**268.19**	*195.98*	**113.46**	*371.34*	**113.46**
9.	**Calcium (as Ca)**	*IS: 3025 (P – 60): 2008*	mg/l	*75*	**200**	*27.26*	**50.64**	*62.32*	**35.05**	*124.65*	**35.05**
10.	**Chloride (as Cl)**	*IS: 3025 (P – 53): 2003*	mg/l	*250*	**1000**	*160.42*	**391.63**	*330.28*	**84.93**	*212.33*	**56.62**
11.	**Fluoride (as F)**	*IS: 3025 (P – 46): 1994*	mg/l	*1.0*	**1.5**	*0.20*	**0.21**	*0.21*	**0.06**	*0.23*	**0.05**
12.	**Iron (as Fe)**	*IS: 3025 (P – 53): 2003, RA: 2019*	mg/l	*0.3*	**N.R.**	*0.10*	**0.11**	*0.11*	**0.03**	*0.14*	**0.03**
13.	**Magnesium (as Mg)**	*IS: 3025 (P – 34): 1988*	mg/l	*30*	**100**	*12.15*	**41.31**	*51.03*	**14.58**	*70.47*	**12.15**
14.	**Nitrate (as NO_3)**	*IS: 3025 (P – 24): 1986*	mg/l	*45*	**N. R.**	*41.62*	**24.48**	*18.83*	**10.84**	*31.14*	**10.92**
15.	**Sulphate (as SO_4)**	*IS: 3025 (P – 45): 1993*	mg/l	*200*	**400**	*64.17*	**117.48**	*132.11*	**33.97**	*84.93*	**22.64**
16.	**Sodium (as Na)**	*IS: 3025 (P – 45): 1993*	mg/l	-------	-------	*170.14*	**80.40**	*58.50*	**33.90**	*92.47*	**33.90**

Part – II

Sr. No.	**Parameter**	**Test Method**	**Unit**	**Requirement (Acceptable Limit)**	**Permissible Limit in Absence of Alternate Source**	**SWQ 7**	**SWQ 8**	**SWQ 9**	**SWQ 10**	**SWQ 11**
1.	**pH Value**	*IS: 3025 (P – 11): 1983*	-------	*6.5 to 8.5*	**N. R.**	*7.58*	**7.13**	*7.25*	**6.64**	*7.13*
2.	**Color Gratified**	*IS: 3025 (P – 09): 1984*	°C	-------	-------	*B. D. L.*	**B. D. L.**	*B. D. L.*	**B. D. L.**	*B. D. L.*
3.	**Odour Category**	*IS: 3025 (P – 16): 1984*	mg/l	*Agreeable*	**Agreeable**	*Agreeable*	**Agreeable**	*Agreeable*	**Agreeable**	*Agreeable*
4.	**Taste Category**	*IS: 3025 (P – 17): 1984*	mg/l	*Agreeable*	**Agreeable**	*Agreeable*	**Agreeable**	*Agreeable*	**Agreeable**	*Agreeable*
5.	**Turbidity Type**	*IS: 3025 (P – 21): 2009*	mg/l	*01*	**600**	*<01*	**<01**	*<01*	**<01**	*<01*
6.	**Total Dissolved Solids**	*IS: 3025 (P – 23): 1986*	mg/l	*500*	**2000**	*970.04*	**1131.50**	*1105.38*	**994.29**	*1018.02*

7.	**Total Hardness**	*IS: 3025 (P – 40): 1991*	**mg/l**	*200*	**600**	*437.70*	**311.25**	*340.43*	**340.43**	*330.71*
8.	**Total Alkalinity**	*IS: 3025 (P – 32): 1988*	**mg/l**	*200*	**600**	*330.08*	**546.69**	*464.17*	**175.35**	*587.95*
9.	**Calcium (as Ca)**	*IS: 3025 (P – 60): 2008*	**mg/l**	*75*	**200**	*97.38*	**74.01**	*81.80*	**77.90**	*85.69*
10.	**Chloride (as Cl)**	*IS: 3025 (P – 53): 2003*	**mg/l**	*250*	**1000**	*160.42*	**212.33**	*217.04*	**344.44**	*84.93*
11.	**Fluoride (as F)**	*IS: 3025 (P – 46): 1994*	**mg/l**	*1.0*	**1.5**	*0.20*	**0.22**	*0.20*	**0.21**	*0.20*
12.	**Iron (as Fe)**	*IS: 3025 (P – 53): 2003, RA: 2019*	**mg/l**	*0.3*	**N. R.**	*0.11*	**0.14**	*0.12*	**0.11**	*0.12*
13.	**Magnesium (as Mg)**	*IS: 3025 (P – 34): 1988*	**mg/l**	*30*	**100**	*48.60*	**31.59**	*34.02*	**36.45**	*18.16*
14.	**Nitrate (as NO_3)**	*IS: 3025 (P – 24): 1986*	**mg/l**	*45*	**N. R.**	*31.22*	**36.18**	*34.11*	**16.48**	*45.30*
15.	**Sulphate (as SO_4)**	*IS: 3025 (P – 45): 1993*	**mg/l**	*200*	**400**	*64.05*	**63.68**	*86.81*	**137.77**	*33.97*
16.	**Sodium (as Na)**	*IS: 3025 (P – 45): 1993*	**mg/l**	-------	-------	*95.47*	102.71	*118.14*	**52.50**	*148.52*

5. Soil Quality

The result of the analysis of these samples is presented in the **Table 28**.

Table 28: Soil Quality along the Projected Road Part – I.

Sr. No.	Parameter	Test Standards	Unit	SQ1	SQ2	SQ3	SQ4	SQ5	SQ6
1.	**pH Value**	*IS: 2720 (P – 26): 1987*	-------	*7.27*	**7.20**	*7.35*	**6.85**	*7.87*	**6.57**
2.	**Electrical Conductivity**	*IS: 14767: 2000*	**µS/ cm**	*210.25*	**240.32**	*215.89*	**101.26**	*522.29*	**560.46**
3.	**Sodium Adsorption Ration**	*As per USEPA Guidelines*	-------	*0.61*	**0.62**	*0.70*	**0.69**	*0.75*	**0.76**
4.	**Organic Carbon**	*IS: 2720 (P – 22): 1972*	**%age**	*1.04*	**0.98**	*1.13*	**1.47**	*0.39*	**1.49**
5.	**Organic Matter**	*As per USEPA Guidelines*	**mg/ Kg**	*1.56*	**1.40**	*1.62*	**1.80**	*0.81*	**1.84**
6.	**Nitrogen (as N)**	*IS: 14684: 1999*	**mg/ 1000 Kg**	*262.72*	**252.74**	*258.25*	**309.66**	*321.64*	**190.47**
7.	**Phosphorous (as P)**	*IS: 9497: 1980*	**mg/ Kg**	*25.46*	**30.11**	*28.41*	**25.89**	*55.43*	**120.26**
8.	**Potassium (as K)**	*IS: 5305: 1969*	**mg/ 1000 Kg**	*110.21*	**112.49**	*108.74*	**256.19**	*443.20*	**351.51**
9.	**Iron (as Fe)**	*As per USEPA Guidelines*	**mg/ 1000 Kg**	*5.38*	**5.82**	*5.67*	**7.12**	*7.85*	**8.10**
10.	**Copper (as Cu)**	*As per USEPA Guidelines*	**mg/ 1000 Kg**	*4.17*	**6.30**	*3.81*	**1.73**	*1.54*	**1.19**
11.	**Zinc (as Zn)**	*As per USEPA Guidelines*	**Kg/ Ha**	*1.90*	**2.25**	*2.10*	**1.18**	*1.40*	**1.97**

g) Mitigation for Quarries and Borrow Areas:

Quarry and borrow pits may be filled with rejected construction waste and afterward should be given a vegetative cover. If this is not possible, then the excavated slopes will be filled in such a way that they resemble an original ground surface.

- *Aggregates will be first sourced from licensed quarry sites (which are in operation) that comply with environmental and other applicable regulations;*
- *Occupational health safety procedures/ practices for the workforce will be adhered to in all quarries;*
- *Quarry and crushing units will be provided with adequate dust suppression measures;*
- *Regular monitoring of the quarries by concerned authorities to ensure compliance with environmental management and monitoring measures;*
- *Prior approval will be obtained from concerned authorities and all local environmental regulations are complied with;*

- *Within all identified borrow areas, the actual extent of the area to be excavated will be demarcated with signs and access to the operational area controlled;*
- *Borrow pit plant and machinery will conform to CPCB – EHS noise emission regulations;*
- *Protective gear will be provided to the workforce exposed to noise levels beyond threshold limits and there should be a proper rotation of such personnel; and*
- *All operation areas will be water sprinkled to control dust levels to* ***"National Ambient Air Quality Monitoring" (NAAQM)*** *Standards.*

h) Conclusions and Recommendations:

After Studying the Features of the Project Area and Screening Exercises the following Conclusions and Recommendations are made:

a) The detailing of trees and forest areas along the project stretch will be the part of detailed **"Environmental Impact Assessment" (EIA)** study;

b) A further study on the project section having these feature would be required during detail **"Environmental Impact Assessment" (EIA)** study at subsequent stage;

c) Careful study of alternate analysis is recommended to avoid critical environmental interference/ intrusion;

d) One side widening options should be explored to avoid impact on large trees as well as to mitigate the impacts on forest areas/ particular land sites;

e) Other clearances required for the project are Forest Clearance for diversion of Reserved/ Protected Forests, NOC from State Pollution Control Board, Permission for Tree Felling etc.

25. Annexure – XVI: An Optional, Mandatory...!!! All Over India Suggested and Proposed Small Sewage Treatment Plant @ Tamil Nadu (Karnataka):

"Installation of Small Sewage Treatment Plan under Environment Mitigation Measures" Measures for Nagpur/ Amravati/ Washim/ Aurangabad/ Nashik/ Mumbai under MSRDC/ NMSCEL (Nodal) Director. Mandatory Reference Official Order Issued on Dated: 20/ 10/ 2022 for other/ Regions/ Places/ States too Like Urban Heat Mitigation Strategies, Technologies in Terms of Cooling Cities Strategies...!!! To Mitigate Urban Heat as an Example Portrayed in the Letter as Depicted Below:

नागपुर मुंबई सुपर कम्युनिकेशन
एक्सप्रेसवे लिमिटेड
(विशेष उद्देश वाहन)

हिंदुहृदयसम्राट म.रा.र.वि.म.

No. MSRDC/NMSCEW/2022/ ३१७५
Date: 20 OCT 2022

To,
The Project Director,
Nagpur/Amravati/Washim/Aurangabad/Nashik/
NMSCEL

Subject: Construction of Access Controlled Nagpur Mumbai Super Communication Expressway "**Hindu Hrudaysamrat Balasaheb Thackeray Maharashtra Samruddhi Mahamarg**" on EPC mode in Construction Package no. CP-01 to CP-16 in the State of Maharashtra

Regarding: - Installation of small sewage treatment plant under environment mitigation measures.

Reference:-

1. Office note dated 21.09.2022

The Construction of Access Controlled Nagpur-Mumbai Super Communication Expressway (Maharashtra Samruddhi Mahamarg) is in progress through EPC contractors in packages 1 to 16.

As per clause 3.9.3 of CA. & IRC-SP-99, Clause No. 1.15 & 14.2 the Contractor is required to take necessary preventive measures to avoid environmental damage.

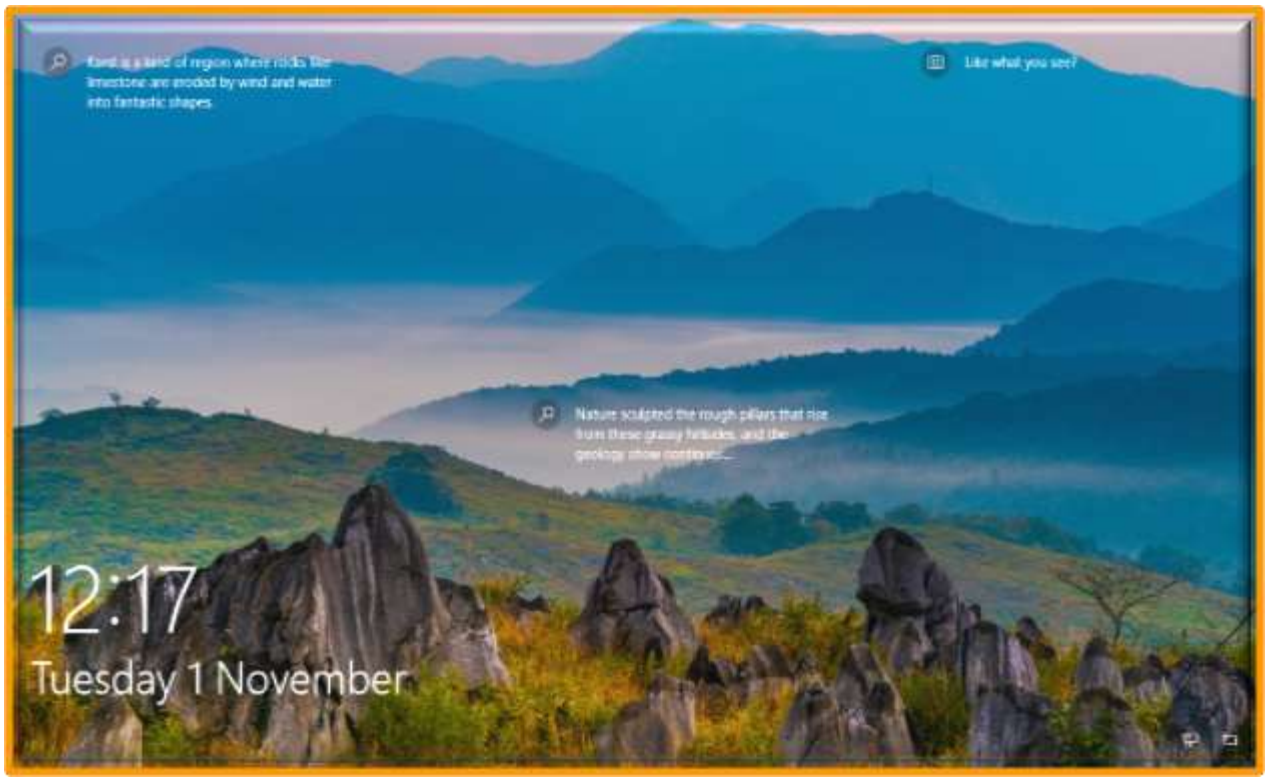
The toll plaza complex & all building works are the part of the development of the Samruddhi Mahamarg and the sewage of these buildings is likely to cause pollution to the ground water.

It is the obligation of the EPC contractor to carry out various parameter for mitigation of adverse environment impact. (Clause No. - 3.9.3, Vo-II of CA & IRC-SP-99, Clause 1.15& 14.2).

Accordingly, all Project Director are instructed to give directives to EPC Contractor to install small sewage treatment plant as per requirement of the toll plaza complex, police station buildings and all other building works in the Samruddhi Mahamarg as per the Contract agreement.

(A.S. Gaikwad)
Director, (Nodal)
NMSCEL

www.msrdc.org


Like what you see?
12:17
Tuesday 1 November


Like what you see?
12:42
Wednesday 2 November


12:51
Thursday 3 November


12:59
Friday 4 November


12:49
Tuesday 8 November


12:36
Tuesday 6 December

SAVE/ PRESERVE/ CONSERVE FANTASTIC AND ECCENTRIC SHAPES' OF "Heavenly Paradise Precious Planet Earths' NATURAL ECOSYSTEM AND ATMOSPHERIC ENVIRONMENT"...!!!

26. Annexure – XVII: Approaches to the Structures/ Blackspot Locations.

1. CH 39 + 300

2. CH 45 + 200

3. CH 48 + 380


Six Laning of Sriperumbudur Km 37+000 to Karaipettai Km 71+015 of NH-4
UPC code: N/02003/08002/TN
48.387 km
Drone Height: 40-60 Meters
LAT: +12.93624
LONG: +79.89465
Time & Date
9:36:04 AM
Friday, July 29th 2022
Vehicle Underpass@ Km 48+380
Black Spot Thirumangalam East Bypass @ km 48+380

4. CH 63 + 430


Six Laning of Sriperumbudur Km 37+000 to Karaipettai Km 71+015 of NH-4
UPC code: N/02003/08002/TN
63.428 km
Drone Height: 40-60 Meters
LONG: +79.77131
Time & Date
18:14:16 AM
Friday, July 29th 2022
Light Vehicle Underpass@ Km 63+436
Black Spot Rajakulam Junction @ Km 63+430 LVUP

5. CH 68 + 530


Six Laning of Sriperumbudur Km 37+000 to Karaipettai Km 71+015 of NH-4
68.513 km
Drone Height: 40-60 Meters
LONG: +79.72478
Black Spot Meenakshi Hospital @ Km 68+530 VUP

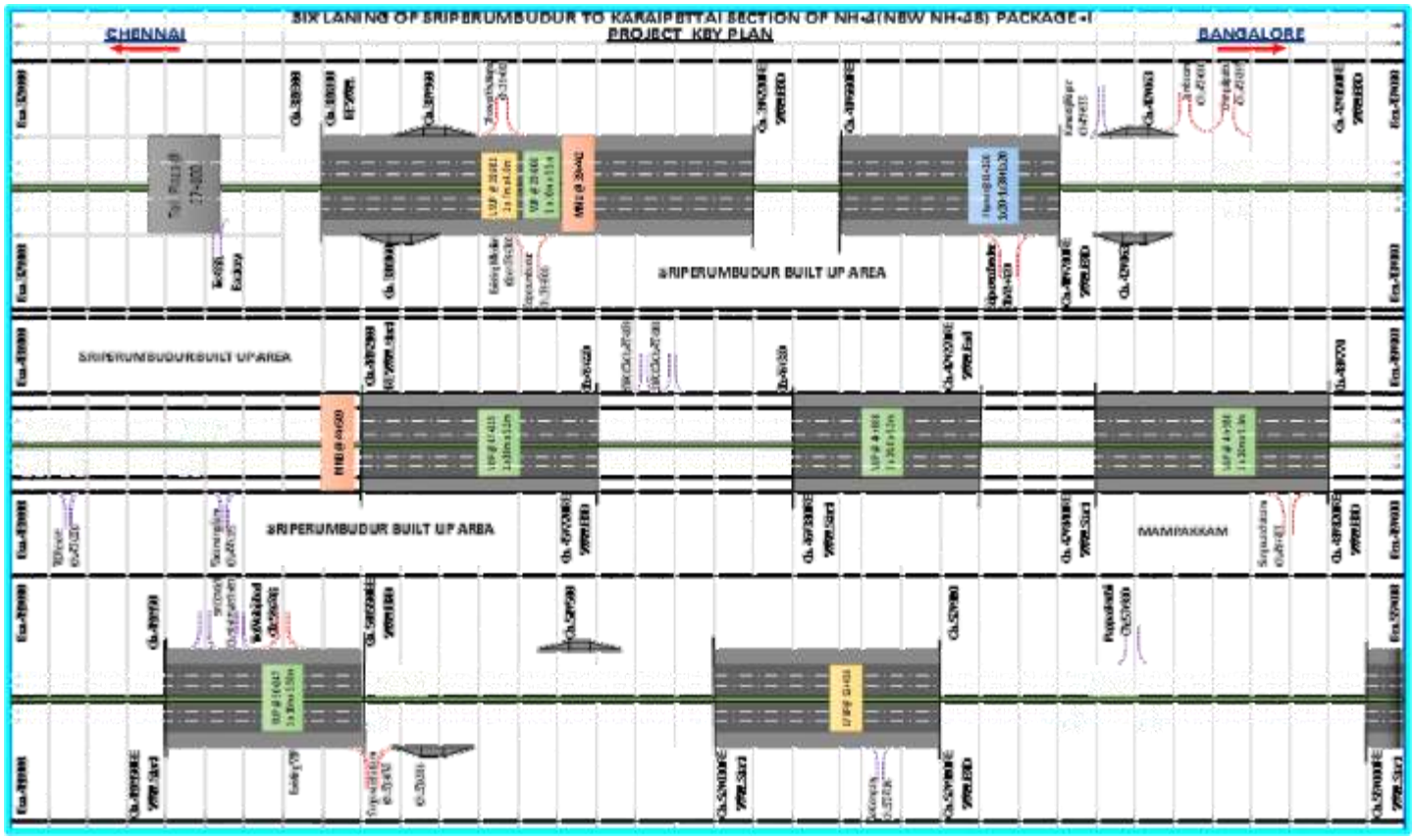
6. CH 69 + 350

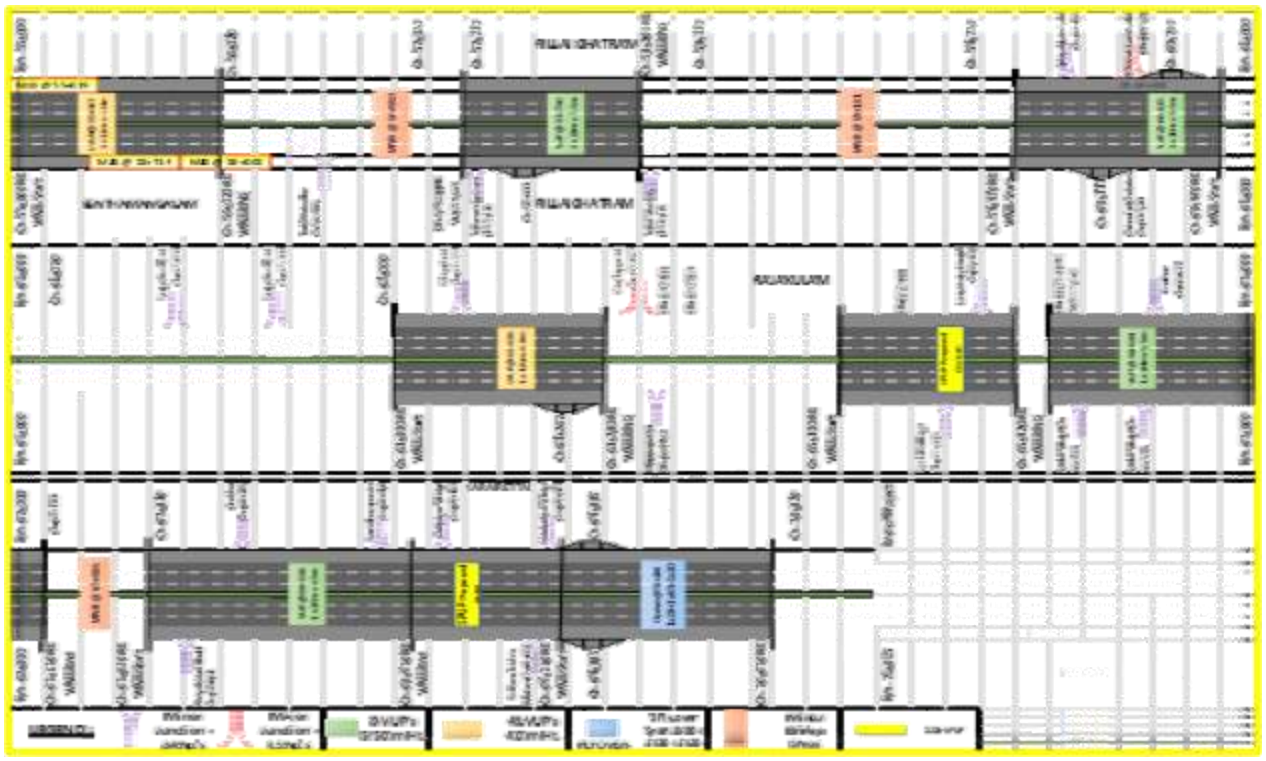

Six Laning of Sriperumbudur Km 37+000 to Karaipettai Km 71+015 of NH-4
UPC code: N/02003/08002/TN
69.342 km
Drone Height: 40-60 Meters
LONG: +79.71721
Time & Date
10:38:28 AM
Black Spot Karaipettai RTO Junction @ Km 69+350

7. CH 70 + 200


Six Laning of Sriperumbudur Km 37+000 to Karaipettai Km 71+015 of NH-4
UPC code: N/02003/08002/TN
70.207 km
Drone Height: 40-60 Meters
LONG: +79.70924
Time & Date
10:41:38 AM
Friday, July 29th 2022
Fly Over@ Km 70+200
Black Spot Ponnerikarai Junction @ Km 70+200

27. Annexure – XVIII: Strip Chart showing Structure – Approach Road Portion along the Project Highway.





28. Annexure – XIX: Environmental Engineering as well as Audit Aspects and Prospects with Brief Summary as per Few Quoted Suggestions/ Opinions/ Thoughts and More... Please Just Have a Look Once...!!!.

Office Letter Ref. No.: ***Dated: 22 – 02 – 2023***

To

The Resident Engineer/ Team Leader/ Project Director NHAI (PIU) Office, Four – Laning of Villupuram – Puducherry Section of NH – 45A (New NH – 332), in the State of Tamil Nadu and Union Territory of Puducherry.

Subject: Initial Preliminary Basis Observations and Environmental Engineering as well as Audit Aspects and Prospects with Brief Summary (Dated: 05 – 02 – 2023 to 22 – 02 – 2023) – reg.

Respected Sir,

With due respect, I would like to highlight some significant points and overviews regarding technical parts of observation and environmental – related work performed during visits to many places and chainages located @ 00.000 Km to Chainage @ 29.000 Km (Design Chainage) under Bharatmala Pariyojana Phase – I (Residual NHDP – IV Works) on **"Hybrid Annuity Mode" (HAM)** in the State of Tamil Nadu and Union Territory of Puducherry. Package – I DBL (Total Length 29.000 Kms):

Sr. No.	Description		Remarks
1.	Initially, a Trees Plantation was carried out at camp locations with the collaborative efforts of the Project Director, Team Leader along with significant source/ chainages as well as points of **Villupuram – Puducherry Section Road**.	**:**	**Satisfactory and Need to be Improved;**
2.	Collaborative task is performed by Team Leader's Team as well as Resident Engineer Champs throughout is marvelous outcome task performance in the month of February 2023 duration and time period of the project road construction management activities are going on very fast in progress without any delay @ all projected sites and locations.	**:**	**Good Updates;**
3.	Most of the construction activities along the projected are road found to be in good condition and contractors, workers, are taking care of all kinds of Health and Safety measures are following COVID – 19 Norms/ Conditions, while working @ construction sites/ places.	**:**	**Safety Measures are Considered;**
4.	Construction of Road Side Drains, RE Walls' Panels/ Structure are maintained satisfactory along the projected site in the highway construction road.	**:**	**Satisfactory and Need to be Improved;**
5.	**"Initial Environmental Examination" (IEE), "Environmental Management Plan" (EMP), "Environmental Impact Assessment" (EIA)** Guidelines has been followed by the contractor and concessionaire consistently.	**:**	**Guidelines Followed;**
6.	The monitoring certificates **"Consent To Operate" (CTO)/ "Consent To Establishment" (CTE)** for Air, Noise, Water, Ground Water, and Surface Quality Testing is being done by Certified and Accredited Laboratory and **Further IE has Instructed to Measuring the Environmental Parameters for the Project Area...!!! {Latter Reference is IE Ltr. No. 239 Dt: 07th February – 2023}** by MOEF, NABL, NABET, An ISO: 9001 – 2025 and OHSAS 18001: 2007 **Certified Company (Centre for Envotech and Management Consultancy Pvt. Ltd.)...** Regarding Projected Road... Network...!!!	**:**	**Applied and Followed Standard Norms of CPCB/ NAAQM/ TSPCB etc.** **Latter Reference is IE Ltr. No. 239 Dt: 07th February – 2023**

	(a) Near @ Villupuram Camp and Laboratory Site Visit the compliance has been carried out for **"Air Quality Index" (AQI),** Water Quality (pH Value, Turbidity, COD, BOD, Electrical Conductivity, TDS, TSS, Parameters etc.), Noise, Ground Water, Surface Water Quality, Soil Testing and Monitoring for **"ENVIRONMENTAL AUDIT" (EA)** Report Work @ Villupuram – Pondicherry under NHAI (PIU), TAMILNADU...!!! ***(b)*** At many places and chainage it's found to be the air quality is very poor nearby surrounding locality of inhabited/ densely populated areas and residential areas..!!! Mandatory steps to be taken to improve the **"Air Quality Index" (AQI)** along with all monitoring and measuring parameters as per CPCB/ SPCB/ NAAQM/ IRC: Code Practices/ Guidelines and Standard Norms; ***(c)*** During the laboratory an camp site visit on dated 20 – 02 – 2023 found ongoing process and progress of the work satisfactory following all mandatory as well as satisfactory MOEF/ MORT&H Standard Guidelines; ***(d)*** Laboratory and camp site are fully equipped with highly sophisticated instruments' installation for the purpose of concrete road highway construction network and fulfils the needs and requirements of ongoing project work; ***(e)*** Regarding all kinds of audits (including environmental audit) the contractor is having full – fledged installation on their camp as well as laboratory site along with compulsory requirements all kinds of testing certificates to present in the concerned authority like NHAI (PIU)/ RO Office Chennai etc. ***(i)*** *At all chainages RHS/ LHS respectively for Air Pollutants/ Quality Monitoring Parameters' Measurement Techniques are being followed...!!!* ***(ii)*** *At all chainages RHS/ LHS respectively for Noise Monitoring Parameters' Measurement Techniques are being followed...!!!* ***(iii)*** *At all chainages RHS/ LHS respectively for Water Sampling Monitoring Parameters' Measurement Techniques are being followed...!!!* **(iv)** *At all chainages RHS/ LHS respectively for Soil Sampling Locations/ Monitoring Parameters' Measurement Techniques are being followed... As per Standard Norms of CPCB/ NAAQM/ TSPCB Guidelines...!!!*		
7.	Moreover @ All Camp sites' labs were found to be well furnished to check various types of testing materials related to construction road network @ projected camp number – 1 and camp number – 2 nearby site road locations.	**:**	**Found Satisfactory;**
8.	Most of the Borrow Areas, Dumping Sites, Batching Plants, Hot Mixing Plants, and Asphalt Mixing Plants are well established and are in working condition/ operation under **"Consent To Operate" (CTO)/ "Consent To Establishment" (CTE) System**.	**:**	**Satisfactory Working Condition and Need to Improve Further;**
9.	The monitoring and testing results at all location of the project roads were found to be under the permissible limits as per CPCB/ NAAQM/ MSPCB Standard Guidelines and Norms.	**:**	**Initial Results Found Satisfactory;**
10.	Technically according to my suggestions and point of views of contractors are fully aware with the Guidelines of IRC: Standard Codes would make great advantage for getting rewards as well as most precious achievement through **"Construction Industry Development Council" (CIDC)** and **"Engineering Council of India" (ECI)** New Delhi has already been awarded to Solapur and Bijapur Road under my supervision of Four Laning **"Solapur to Vijayapura" (SEAR)** of NH – 13 (New NH – No. 52) from 00.000 Km to 110.542 Km (@ Design Length 109.08 Km) in the "State of Maharashtra and Karnataka" under NHAI. Best Construction Awarded by **{"CONSTRUCTION INDUSTRY DEVELOPMENT COUNCIL" (CIDC)}** VISHWAKARMA AWARD ON 8th, APRIL 2022 @ NEW DELHI) And completed with EIA/ EAR/ EMP/ EMoP/ Environmental Audit Report Work and had Submitted to NHAI (PIU) Solapur.	**:**	**Technically Aware with Guidelines of IRC: Standard Codes;**

11.	The Approach in Developing **"Environmental Management Plan" (EMP)** Active Part of EMP is EMP implementation and execution program as per IRC: Guidance Notes for Site Inspection. The foremost documents the **"Environmental Management Plan" (EMP)** developed during the **"Environmental Impact Assessment" (EIA)** studies conducted for road construction and upgrading in the *"Consultancy Services for Project Development of Independent Engineer Services for Four – Laning of Villupuram – Puducherry Section of NH – 45A (New NH – 332) from Chainage @ 00.000 Km to Chainage @ 29.000 Km (Design Chainage) under Bharatmala Pariyojana Phase – I (Residual NHDP – IV Works) on **"Hybrid Annuity Mode" (HAM)** in the State of Tamil Nadu and Union Territory of Puducherry. Package – I DBL (Total Length 29.000 Kms)"*. The **"Environmental Management Plan" (EMP)** plan is developed based on the baseline studies, impact assessment, and impact evaluation and complying with **"TSEPA" (Tamilnadu State Environmental Public Authority)** Guidelines and Standards. This gives a framework for developing EMP and the components that should be included in the plan. The main components of EMP are: *(i) Mitigation Program (ii) Monitoring Program (iii) Recommendations and (iv) EMP Implementation Program. The EMP should consist of cost estimates for monitoring program, equipment procurement, manpower, transportation, office cost, studies, reporting, stationeries, etc.* EMP Implementation Program consists of **"Environmental Supervision Plan" (ESP)** which is an important instrument to ensure effective implementation of **"Environmental Management Plan" (EMP)**. In this study the recommendations that are suggested are specific to the project and geographical conditions in the State of Tamilnadu. The vital the developed EMP addresses the environmental impacts during the design, construction and operational phases of the project. EMP outlines the key environmental management and safeguards that will be initiated by the project proponent to manage the project's key environmental concerns. **"Environmental Management Plan" (EMP)** is the mechanism to ensure that environmental considerations are integrated into the project survey and design, contract documents and project supervision and monitoring. These are tools for mitigating or offsetting the potential adverse environmental impacts resulting from various activities of the project. The EMP prepared consists mainly of mitigation measure, monitoring plan and recommendations. The recommendations that are suggested are specific to the project and geographical conditions in the State of Tamilnadu. The vital section of EMP is the **"Environmental Management Plan" (EMP)** as well as **"Environmental Audit Report" (EAR)** implementation and execution program. The EMP should consist of cost estimates for monitoring program, equipment procurement, manpower, transportation, office cost, studies, reporting etc. *Keywords: Environmental Impact Assessment (EIA), Emergency Response Plan (ERP), Environment, Health and Safety (EHS) Programs etc.*		"Environmental Management Plan" (EMP) Mechanism
12.	Theoretically As Already Everyone Knows About Our Eminent Scientist Albert Einstein's Formula...!!! *e.g.,* **$E = M \times C^2$** Indeed, Seriously in Forthcoming Days... A Day will Come... When All Together... We will have to Follow and Initiate the Newly Constructed Approachable/ Certainly Applicable Modified Formula...!!! Which would Mostly be Concerned and Related to Our Preciously – Heavenly – Sustainable Environment "The Living Paradise The Planet Earth" and its Surrounding Natural Eco – Friendly Environmental Kingdom is depicted below as: **Environment = Materials** *(In Terms of Non – Recycled Hazardous/ Polluted Wastes)* × **Climate Change** *(In Terms of Green House Effect, Global Warming Causing Generation of More Deadly Bacteria's as well as Dangerous Viruses Such as COVID – 19 VS Monkey Pox, Ebola etc. And Increasing Abruptly Unlamented/ Unprecedented Temperature Rise Day by Day).*		**Suggested Most Burning Topic on "Environmental Mechanism"**

Thanks a lot for all team champions for their endless cooperation and efforts with regards once again.

Sincerely Yours,

(Dr. Harish Kumar Gupta),
Environmental Expert/ Specialist/ Engineer,
Highway Engineering Consultant,
Mobile Contact and WhatsApp Number: 9329213257;

29. Annexure – XXX: Photographs of Preliminary Basis Interpretations about Environmental Compliance Survey/ Observations/ Remarks with Entirely Testing Certificates (Land, Air, Water, Soil and Waste Management etc.) for Four Laning of Vilupuram – Puducherry Section of NH – 45A (New NH – 332) Road (Design Length Approximately 29.000 Km) in the States of Pondicherry, Tamil Nadu (UT).

Plantation Work on Camp Site and Testing Laboratory.

Pollution Near Inhabited Site Area Spreading and Degrading "Air Quality Index" (AQI) Trough Soil Dust Emissions.

Construction Work in Extravagant Progress Going on Near Projected Camp Site Locations.

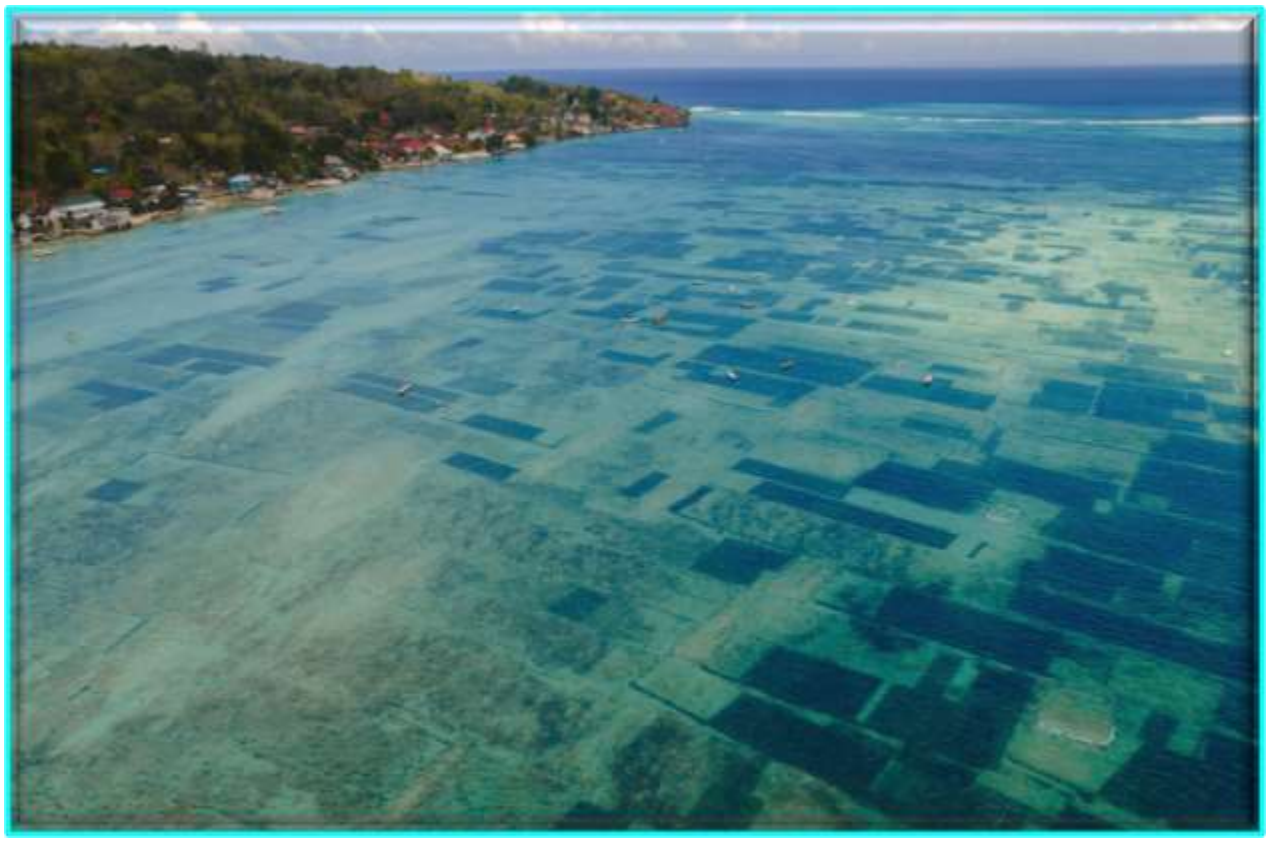
Dlip Buildcon Ltd. Administrative Office @ Viluppuram Highways Private Limited – Puducherry Section of NH – 45A (New NH – 332), Four Laning Road (Design Length Approximately 29.000 Km) in the States of Pondicherry Tamil Nadu Union Territory.

Borrow Area Borrow Sampling Collection @ Kandamanadi Village Location @ Chainage 00 + 000 RHS Inside 2 Km Distance on the Projected Site Overburdened Removed and Stacked.

Office and Laboratory Setup.

Office and Laboratory Setup.

Crusher and Mixing Plant.

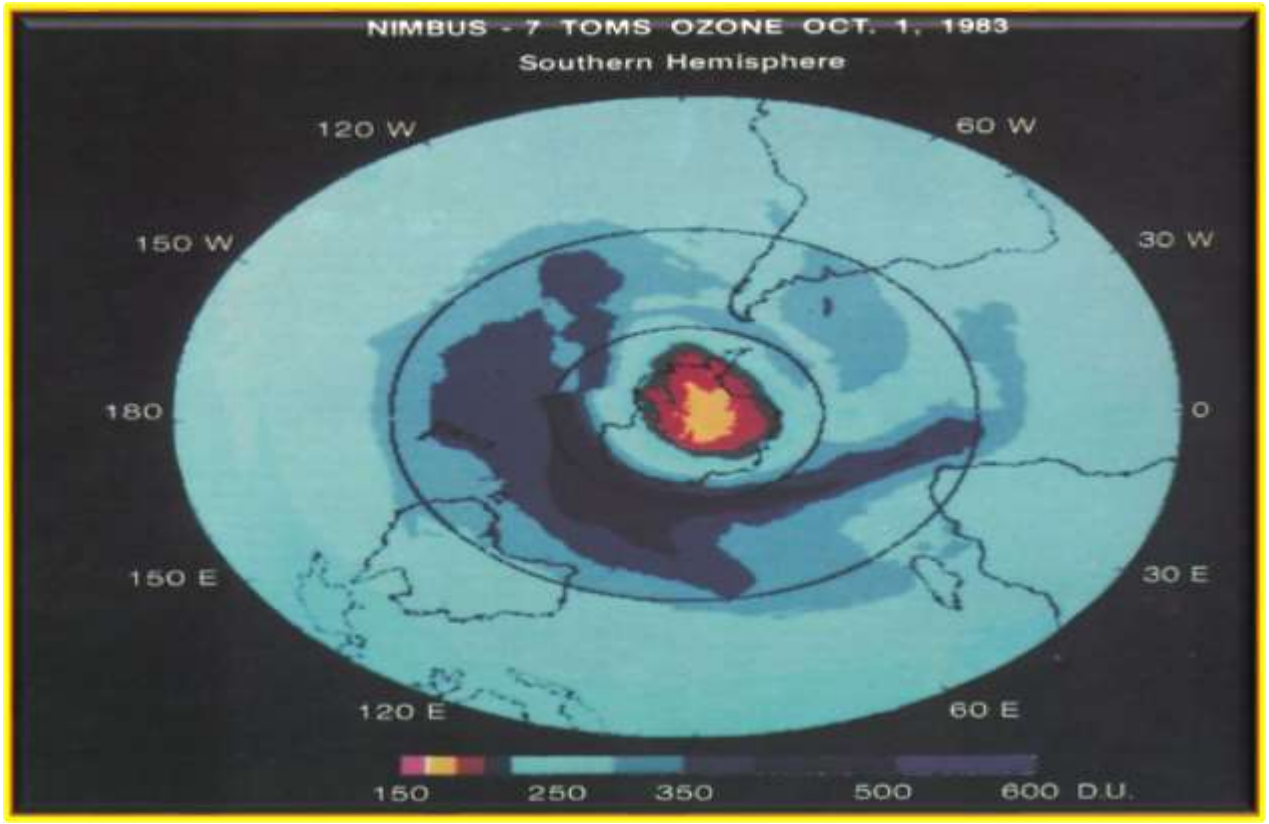


SAVE/ PRESERVE/ CONSERVE... OUR FANTASTIC AND ECCENTRIC SHAPES' OF "NATURAL ECOSYSTEM AND ATMOSPHERIC ENVIRONMENT" EXISTING ON THIS HEAVENLY CREATED PARADISE ON THIS PLANET "THE EARTH"...!!!

Biodiversity of a coral reef. Corals adapt and modify their environment by forming calcium carbonate skeletons. This provides growing conditions for future generations and forms a habitat for many other species.

Environmental science examines the effects of humans on nature, such as the **"Glen Canyon Dam"** in the United States.

The **"Earth's Atmosphere"** Existing Environment.



A Team of British Researchers found a hole in the **"Ozone Layer"** forming over Antarctica, the discovery of which would later influence the **"Montreal Protocol in 1987"**.

The **"Open – Pit Coal Mining @ Garzweiler",** Germany.

The Tagebau Garzweiler (German pronunciation: [ˈtaːgəbaʊ̯ ˈgaʁtsˌvaɪ̯lɐ]) is a surface mine (German: Tagebau) in the German State of North Rhine – Westphalia. It is operated by RWE and used for mining lignite. The mine currently has a size of 48 Km² (19 Sq Mi) and got its name from the village of Garzweiler which previously existed at this location. The community was moved to a section of Jüchen with the same name.

The Open – Pit Mine

Bucket Wheel Excavators in Garzweiler Surface Mine

The mine is located west of Grevenbroich and exploitation is progressing towards Erkelenz. Mining was originally limited to the 66 Km² (25 Sq Mi) Garzweiler – I area located East of the A – 44 Motorway. Mining in the 48 Km² (19 Sq Mi) Garzweiler – II area started in 2006 and it will take until around 2045 to fully exploit both sectors. The lignite is used for power generation at nearby power plants such as Neurath and Niederaußem. It is not yet known what effect the plan to phase out all coal – fired power plants in Germany by 2038 will have on the Garzweiler lignite mine system.

The Panoramic View of **"Tagebau Garzweiler"** Location.

30. Annexure – XXXI: Flood Preparedness as per the Instructions of Regional Office (RO) Chennai – IE Report and Compliance Requested – Reg. for Four Laning of Vilupuram – Puducherry Section of NH – 45A (New NH – 332) Road (Design Length Approximately 29.000 Km) in the States of Pondicherry, Tamil Nadu (UT).

MOST URGENT

Sir,

The Hon'ble Home Minister would Review Flood Preparedness Next Week.

1. Please consolidate and send reports on major issues faced in last monsoon; especially breaches on highways/ landslides/ duration/ remedial measures.
2. *Vulnerable road stretches/ bridges and our preparedness*.
3. Flooding observed on Greenfield alignments and remedial measures.

Further, the Concessionaire is requested to ensure the Following:

1. Cleaning Vent Way, Upstream/ Downstream of all CD Works.
2. *Cleaning of all RCC drain and earthen drain and also ensuring the proper inlet and outlet of rain water*.
3. Attending Rain Cuts ***in Shoulder***/ Embankment ***during Rainy*** Season.
4. *Preparedness for attending potholes and patches*.
5. Keeping required men and machinery 24 × 7 for emergency works during monsoon for remaining grid, fallen trees, attending drainage issues etc.

Note:

01. *The Concessionaire has to convey their target date for Sr. No.: 1 and 2 instructions mentioned above. Subsequently, the report on the above has to be submitted during the monsoon period for the above instructions. Accordingly, IE has to monitor the project stretches for necessary compliance.*

02. *The Concessionaire and IE are requested to furnish the contact details of the personnel for the respective stretches in case of emergency.*

In this regard, the IE is hereby requested to inspect the site along with concessionaire and furnish a report/ compliance to this office before 19.05.2023 Regards, NHAI, PIU, Puducherry.

भारतीय राष्ट्रीय राजमार्ग प्राधिकरण
सड़क परिवहन एवं राजमार्ग मंत्रालय, भारत सरकार
National Highways Authority of India
Ministry of Road Transport and Highways, Government of India
परियोजना कार्यान्वयन इकाई - ठाणे, एम.टी.एन.एल. बिल्डींग, बाबूभाई पेट्रोल पंप के सामने,
एल.बी.एस. मार्ग, कैसल मिल सर्कल के पास, ठाणे (प) - ४००६०१
Project Implementation Unit - Thane MTNL Building, Opp. Babubhai Petrol Pump
LBS Marg, Near Castle Mill Circle, Thane(w) - 400601
ईमेल : piuthane@nhai.org / piuthane@gmail.com वेबसाइट / Website : nhai.gov.in

NHAI/PIU -Thane/ VME & VT/2023-24/350 Date: 18.05.2023.

To,

Concessionaire's/IE's Vadodara Mumbai Expressway (Package-XI to XVII	Contractor/ Authority Engineer Construction of New 4-Lane Bridge across Varsova Creek
Concessionaire/IE Vadape Thane NH-848	Contractor/AE Surat-Dahisar Section of NH-48

Sub: Flood preparedness / pre-monsoon works to avoid flooding -Reg.

Ref: 1. Review of flood preparedness by Hon'ble Union Home Minister.
2. This office letter no.NHAI/PIU-Thane/VME/2023-24/284 dated 08.05.2023

Sir,

With reference to above Hon'ble Union Home Minister, Government of India is taking review of flood preparedness, in next week, It is requested to complete the following actions in your jurisdiction and take immediate necessary action and submit report at the earliest.

1. Please consolidate and send report on major issues faced in last monsoon; especially breaches on highways/ land slides/ duration/ remedial measures.
2. Vulnerable road stretches/ bridges & our preparedness.
3. Flooding observed on greenfield alignments & remedial measures.

Also it is requested to do pre-monsoon works as communicated to you vide this office letter referred above.

Please treat this as **"Most Urgent".**

धन्यवाद,

आपका भवदीय,
18.05.2023
(सुहास दे. चिटणीस)
महाप्रबंधक (तकनिकी) तथा परियोजना निर्देशक
प.का.ई.ठाणे

प्रत: 1. CGM (T) & RO, Mumbai: for kind information, please.

G/2023/May 23/ (122) 18.05.2023 All Concessionaire's & IE's Flood preparedness

31. Annexure – XXXII: Client OR Authority Project Details with Construction Period and Security Performance {Tables 31 (a) and 31 (b)}.

Table 31 (a): Client OR Authority Project Details with Construction Period and Security Performance.

Sr. No.	Client OR Authority Project Details with Construction Period and Security Performance (CAPDCPSP)
1.	**Client/ Authority: The Chief Project Officer, Project Implementation Unit (PIU), "National Highway Authority of India (NHAI).**
2.	***Project Name: Independent Engineer Services for Four – Laning of Viluppuram – Puducherry Section of NH – 45A (New NH – 332) from Chainage @ 00.000 Km to Chainage @ 29.000 Km (Design Chainage) under Bharatmala Pariyojana Phase – I (Residual NHDP – IV Works) on Hybrid Annuity Mode (HAM) in the State of Tamil Nadu and Union Territory of Puducherry. Package – I DBL (Total Length 29.000 Kms).***
3.	**Length of Project:** 29.000 Kms.
4.	**Contract/ Phase/ Package:** NHDP: Hybrid Annuity Mode (HAM).
5.	**Project Bid Cost:** INR: ₹ 1,013.00 Crores.
6.	**Independent Engineer:** M/s. L. N. Malviya Infra Projects Pvt. Ltd.
7.	**Consulting Engineer:** M/s. L. N. Malviya Infra Projects Pvt. Ltd.
8.	**Authorized Representative of Consultant:** Team Leader (TL/ RE/ OM), Er. Mahesh Kumar Uppala/ Er. Samuel Devendranath/ Mr. Kamaraj Hrithik.
9.	**Date of Signing of Consultant Agreement:** 24 – 08 – 2021.
10.	**Concessionaire:** M/s. Villupuram Puducherry Highways Pvt. Ltd.
11.	**Authorized Representative of SPV:** M/s. Villupuram Puducherry Highways Pvt. Ltd.
12.	**Date of Signing of CA:** 17/ 05/ 2021.
13.	**EPC Contractor:** M/s. Dilip Buildcon Limited.
14.	**Sub – Contractor: National Highway Authority of India (NHAI).**
15.	**Appointed Date:** 24 – 08 – 2021.
16.	**Concession Period:** Almost 6,205 Days OR 17 Years.
17.	**Construction Period:** Nearby 1,460 Days OR 48 Months OR 4.0 Years.
18.	**Schedule Date of Completion:** 23 – 08 – 2025.
19.	**Performance Security (Concessionaire):** Not Applicable.
20.	**Agreement Number on Dated:** 17 / 05/ 2021.
21.	**Work Order Issue: LOA Vide Letter No.: NHAI/** NHDP/ IV/ 11013.NH-45/ HAM/ 2019/ 23930 24 on Dated: 17/ 03/ 2021.
22.	**Provisional Work Order Issued Vide Letter Number on Dated:** 25/ 11/ 2021.
23.	**Letter Number: NHAI/** 11015/ 280/ 2021/ RO/ Chennai/ 4070 on Dated: 04/ 12/ 2021.
24.	-------

Table 31 (b): Package Roads under Four Laning of "Viluppuram – Puducherry Section" NH – 45A (New NH – 332) from Chainage @ 00.000 Km to Chainage @ 29.000 Km in the "State of Tamil Nadu and Union Territory" under NHAI (PIU): Salient Features of Highway Project' as Project Overview.

Sr. No.	Key Project Report Details		Item Description
(1)	**Project Name**	:	***Independent Engineer Services for Four – Laning of Viluppuram – Puducherry Section of NH – 45A (New NH – 332) from Chainage @ 00.000 Km to Chainage @ 29.000 Km (Design Chainage) under Bharatmala Pariyojana Phase – I (Residual NHDP – IV Works) on Hybrid Annuity Mode (HAM) in the State of Tamil Nadu and Union Territory of Puducherry. Package – I DBL (Total Length 29.000 Kms).***
(2)	**NH No. (New/ Old)**	:	*NH – 45A (New NH – 332).*
(3)	**Scheme/ Phase**	:	*Hybrid Annuity Mode (HAM) Pattern.*
(4)	**Mode of the Execution (BOT Toll/ BOT Annuity/**	:	*Mode of Execution on Hybrid Annuity Mode (HAM) Pattern Basis.*

	EPC/ HAM/ Item Rate/ Others)		
(5)	**No. of Lanes/ Configuration**	**:**	*04 – Laning.*
(6)	**Length of the Project (in Km)**	**:**	*Designed Total Road Length is Approximately 29.000 Km.*
(7)	**Total Project Cost (in Crores)**	**:**	*INR: ₹ 1,013.00 Crores.*
(8)	**Grant (in Crores)**	**:**	*INR: ₹ 1,013.00 Crores.*
(9)	**No. of Bypasses (Name of Town, Length)/ Major Realignment**	**:**	***Total 01 Number (s): 01)*** *Janakipuram to Valavanur Bypass.*
(10)	**No. of Minor Bridges (Number and Location)**	**:**	***Total 02 Number (s):*** *02 Nos.*
(11)	**No. of Major Bridges**	**:**	*Nil.*
(12)	**No. of Toll Plazas (Number and Location)**	**:**	***Total 01 Number (s):*** *1 No. (Design Chainage: Located @ 18 + 500 Kms).*
(13)	**Number of Realignments**	**:**	*Nil.*
(14)	**Number of VUP/ LVUP**	**:**	***Total 07 Number (s):*** *07 Nos.*
(15)	**Number of VOPs**	**:**	*Nil.*
(16)	**Number of Viaducts**	**:**	*Nil.*
(17)	**Number of RUB/ ROB**	**:**	***Total 04 Number (s):*** *04 Nos.*
(18)	**Number of Culverts**	**:**	***Total 101 Number (s):*** *Box Culverts (BCs): 101 Nos.*
(19)	**No. of Grade Separators**	**:**	***Total 01 Number (s):*** *01 No.*
(20)	**No. of Fly Overs (Number and Location)**	**:**	***Total 05 Number (s):*** *05 Nos.*
(21)	**DPR Consultant Name**	**:**	*Feedback infra Pvt. Ltd.*
(22)	**Lead & Consortium Members of Banks**	**:**	*Indian Bank.*
(23)	**Concessionaire/ Contractor Name (SPV & Parent Company)**	**:**	*SPV: M/s. DBL VILLUPURAM HIGHWAYS PRIVATE LTD.*
(24)	**Date of Award (LOA Date)**	**:**	*21/ 06/ 2021.*
(25)	**Date of Signing Concession Agreement**	**:**	*17/ 05/ 2021.*
(26)	**Appointed Date**	**:**	*25 – 11 – 2021.*
(27)	**Concession Period**	**:**	*Almost 17 Years.*
(28)	**Construction Period (in Days)**	**:**	*Nearby 730 Days OR 24 Months OR 2.0 Years.*
(29)	**Commercial Operation Date (COD)**	**:**	*24 – 11 – 2023.*
(30)	**Operation & Maintenance Period (in Days)**	**:**	*15 Years.*
(31)	**EOT (if Any)**		*Not Applicable.*
(32)	**IE Contract Period/ Scheduled Date of Completion**	**:**	*24 – 08 – 2025 OR 1,460 Days OR 4 Years.*
(33)	**Independent Engineer/ Authority Engineer**	**:**	*M/s. L. N. Malviya Infra Projects Pvt. Ltd.*
(34)	**IE Contract Value**	**:**	*₹ 5, 82, 89,600/- Crores.*
(35)	**IE Bidding Date**	**:**	*10 – 08 – 2020.*
(36)	**IE LOA Date**		*21/ 06/ 2021.*
(37)	**IE/ AE Agreement Date**	**:**	*08/ 07/ 2021.*
(38)	**IE Appointed Date**	**:**	*24/ 08/ 2021.*
(39)	**IE/ AE Mobilization Date**	**:**	*24 – 08 – 2021.*
(40)	**IE Scheduled Completion Date**	**:**	*23 – 08 – 2025.*
(41)	**IE EOT (Extension Of Time)**	**:**	*Not Applicable.*

(42)	**Operation and Maintenance Period**	**:**	*Total Approximately 5,475 Days (15 Years).*
(43)	**Concessionaire Bidding Date**	**:**	*20 – 12 – 2019.*
(44)	**Concessionaire LOA Date**	**:**	*17 – 03 – 2021.*
(45)	**Concessionaire Agreement Date**	**:**	*17 – 05 – 2021.*
(46)	**Concessionaire Appointed Date**	**:**	*25 – 11 – 2021.*
(47)	**Concessionaire Schedule Date of Completion**	**:**	*24 – 11 – 2023.*
(48)	**Bid Project Cost**	**:**	*INR: ₹ 1,013.00 Crores.*
(49)	**Revised Scheduled Date of Completion**	**:**	*Not Applicable.*
(50)	**Others... etc.**	**:**	-------

Address of the Independent Engineer:

Sr. No.	Name of the Independent Engineer		Address
1.	**M/s. L. N. Malviya Infra Projects Pvt. Ltd., Bhopal**	**:**	*C/O Manivannam, Advocate No. 2, Viluppuram Pondicherry Main Road, Pangur, Pondicherry – 605 102, Mail ID: lnmalviya@lninfra.com;*

Details of Design and Safety Consultant:

Sr. No.	Name of the Consultant		Address
1.	**Design Consultant**	**:**	***M/s. Infinite Civil Solutions Pvt. Ltd.*** *Infinite House – F. P. 25, NR. Aditya Elegance & Railway Track, CIMS Hospital Road, Sola, Ahmedabad – 380 060;*
2.	**Safety Consultant**	**:**	***M/s. Infinite Civil Solutions Pvt. Ltd.*** *Infinite House – F. P. 25, NR. Aditya Elegance & Railway Track, CIMS Hospital Road, Sola, Ahmedabad – 380 060;*

32. Annexure – XXXIII: Instructions in respect of Preparatory Arrangements / Emergency Operations on NHs during ensuing Monsoon 2023 – 2024 by All Implementing Agencies of MoRT&H, viz. Roads Wing/ NHAI/ NHIDCL/ BRO – Communicated.

भारतीय राष्ट्रीय राजमार्ग प्राधिकरण
(सड़क परिवहन और राजमार्ग मंत्रालय)
National Highways Authority of India
(Ministry of Road Transport & Highways, Government of India)
क्षेत्रीय कार्यालय, चेन्नई / Regional Office, Chennai
"श्री टवर, 3rd मंजिल, DP-34 (SP) इंडस्ट्रियल एस्टेट,गिण्डी, चेन्नई - 600 032.
'SRI TOWER', 3rd Floor, DP-34 (SP), Industrial Estate, Guindy, Chennai-600 032.
दूरभाष / Tele : 91- 44 - 2225 2635 वेब/website: www.nhai.gov.in ई.मेल/E - mail : rochennai@nhai.org

NHAI/14013/32/2022/RO Chennai/ 1617 10th June, 2023

To

All Project Directors
Under RO-Chennai and RO-Madurai

Sub: Instructions in respect of preparatory arrangements / emergency operations on NHs during ensuing monsoon 2023-24 by all implementing agencies of MoRT&H, viz. Roads Wing / NHAI / NHIDCL / BRO - Communicated - Reg.

Ref: MoRT&H, New Delhi letter No.NH-15017/16/2022-P&M dated 08.06.2023

Please find enclosed a copy of the MoRT&H, New Delhi letter cited, directing to take necessary advance action to maintain the road infrastructure without any blockage in a trafficable condition all through the year, including the monsoon season.

2. All Project Directors are requested to take necessary advance action as per the guidelines issued by MoRT&H and submit the Action Taken Report to the Regional Office.

3. In this regard, it is also to inform that Chief Secretary to Government of Tamil Nadu held a meeting at Chennai on 09.06.2023 during which it has been directed to take necessary advance action / preventive measures to avoid any damage to the road infrastructure due to the rains. Further, all stakeholders, viz. Contractors / Concessionaires / O&M Agencies need to be sensitized to be fully prepared with adequate machinery and manpower to meet any emergency situation due to heavy rains / winds during the ensuing monsoon period.

Encl: As above

10/06/2023
(S.P. Somashekar)
Regional Officer-Chennai

Copy to:
(1) RO-Madurai.
(2) All Contractors / Concessionaires / O&M Agencies / IE / AE / SC working under RO-Chennai and RO-Madurai for information and necessary action.

कॉर्पोरेट कार्यालय: जी-5 एवं -6, सेक्टर-10 द्वारका, नई दिल्ली - 110075 वेबसाइट : http://www.nhai.gov.in
Corporate Office : G-5 & 6, Sector - 10, Dwarka, New Delhi - 110 075 Website : http: //www.nhai.gov.in

NH-15017/16/2022-P&M
Government of India
Ministry of Road Transport & Highways
(Planning Zone)
Transport Bhawan, 1, Parliament Street, New Delhi - 11000

Dated the: 08th June, 2023

To,

1. The Principal Secretaries/ Secretaries of all States/ UTs Public Works Departments dealing with National Highways, Other Centrally Sponsored Schemes & State Schemes
2. The Engineers-in-Chief and Chief Engineers of all States/ UTs Public works Departments dealing with National Highways, Other Centrally Sponsored Schemes
3. The Chairman, National Highways Authority of India (NHAI), G-5&6, Sector-10, Dwarka, New Delhi- 110075
4. The Managing Director, NHIDCL, 3rd Floor, PTI Building, 4- Parliament Street, New Delhi - 110001
5. Director General (Border Roads), Seema Sadak Bhawan, New Delhi
6. All CE-ROs / SE-ROs of the Ministry

Subject: - Instructions in respect of preparatory arrangements/emergency operations on NHs during ensuing monsoon 2023-24 by all the implementing agencies of MORTH, viz., Roads Wing/NHAI/NHIDCL/BRO-reg.

Sir/Madam,

National Highways (NHs) form the lifeline of goods and passenger movement and are to be maintained without any blockages in a trafficable condition all through the year including during the Monsoon period. In this connection, preventive and preparatory arrangements along with systems and arrangements in place by All ROs duly coordinated by the local/Central control centres play vital role in ensuring this objective.

2. To facilitate and guide all the implementing agencies and field offices, indicative checklist of actions to be taken, has been worked out and placed at Annexure-IA & Annexure-IB.

3. To facilitate sharing of resources as per the emergency requirements between the agencies, a suggestive editable Shared Google work sheet format is prepared and attached at Annexure-II, which may be monitored by Monitoring Zone of the Ministry.

4. Adequate financial resources are the bottom line for timely implementation of the emergency operations. After formulation of Performance Based Maintenance Contract (PBMC) system, all ROs shall ensure that all sections of NHs are either covered under ongoing works / Defect Liability Period (DLP) or under contract maintenance. However, till operationalization of PBMC, all the implementing agencies should either park adequate financial resources with the concerned regional offices for immediate action or specify a method of raising need-based fund requisition and obtain sanction on emergency basis within a week's period. For NHs stretches entrusted with State PWDs, concerned ROs of the Ministry should seek immediate fund requirement from Ministry.

NH-15017/16/2022-P&M
Government of India
Ministry of Road Transport & Highways
(Planning Zone)
Transport Bhawan, 1, Parliament Street, New Delhi - 11000

5. All ROs of implementing agencies should prepare and submit Action Taken Report (ATR) in respect of preparatory arrangements /emergency operations during ensuing monsoon 2023-24, in accordance with Annexure-III, which may be compiled/monitored by the Monitoring Zone of the concerned implementing agency.

6. State/UT Governments are also requested to ensure similar preparedness and actions on State Highways and other State Roads.

7. Compliance of the above guidelines are to be strictly ensured.

8. This issues with the approval of Competent Authority.

Encl.: As above

Yours faithfully

(Saurav Shivhare)
Asst. Executive Engineer (Planning)
Email Id: -planningmorth@gmail.com

Copy for information to:

1. PS to Hon'ble Minister, RT&H.
2. PS to Hon'ble MoS, RT&H
3. Sr. PPS to Secretary (RT&H)
4. PSO to DG(RD) & SS
5. Sr. PPS to AS (Highways) / AS (NHIDCL)
6. PPS to all ADGs
7. All Project Zone Chief Engineers

Annexure-IA

Preparatory actions and advance arrangements for emergency Road clearing /repairs during Monsoons to keep NHs open and trafficable

i. Identifying vulnerable locations likely to be severely affected by floods and heavy rainfall by each of the Regional Officer (For examples Submissible bridges, weak /distressed bridges, over topping stretches, causeways etc.).

ii. Identifying landslide prone areas, rock fall prone areas, sinking zones etc.

iii. Inspection of the vulnerable spots before monsoon for preventive action and installation of warning signs.

iv. Cleaning of drains/culverts.

v. Keeping in stock/on-offer excavators/backhoe loaders/dozers, saw cutters for tree cutting, sand bags, traffic cones & Signages, etc., in required quantities at required locations.

vi. Keeping rate-running contracts in place for emergency works like breach closing, tree removal, landslide clearance, etc., where the stretches are neither under construction nor in DLP.

vii. Keeping on-offer/in-stock Bailey bridges including their quantities and locations (for hilly areas).

viii. Keeping on-offer/in-stock Hume pipes (NP-3, 1 m diameter) in required quantities

ix. Alerting and instructing the concerned contractors for the above actions in respect of ongoing work stretches and those under DLP/maintenance period and ensuring the actions.

***

Annexure-IB

Effective Strategies/Actions for Information Management and Disaster Preparedness for emergency road clearing/repairs during monsoons to keep NHs open and trafficable

i. All Regional Offices and field officers should download Meghdoot app and keep a tab on weather forecasting and disaster warnings. All regional officers shall Keep liaison with CWC/State Disaster Management Department.

ii. Local WhatsApp groups to be formed by regional officers covering executing agencies of MoRT&H (Roads wings/NHAI/NHIDCL/BRO), local administration, CWC, etc.

iii. All regional officers should keep contact details of emergency service providers ready (For example ambulance, hospitals, police authorities, trauma centres, etc.)

iv. Every regional office should maintain the inventory of equipments and material for emergency operation along with their quantities and location, details of rate-running contract arrangements in place and share the same with all other regional offices/project directors of Roads Wing/NHAI/NHIDCL/BRO, so that a compiled list of all available resources and arrangements is available to all ROs and other field officers.

v. 24×7 central control room with one officer, each from Roads Wing/NHAI/NHIDCL/BRO shall be maintained with requisite facilities like telephone/resting arrangements/computer and printer with internet/food and snacks/MTS support, etc.

vi. Regional offices shall maintain their local control rooms with similar arrangements as above

***

33. Annexure – XXXIV: Instructions Format of Shared Google Work Sheet of Inventory/ Stock of Resources {to be shared among All ROs/ PDs of RW/ NHAI/ NHIDCL/ BRO}.

Equipments					Material					Rate running Contracts				
Sr. No.	Type of Equipment	Nos.	Location	Implementing Organisation (RW/ NHAI/ NHIDCU/ BRO): - & Contact Details of concerned RO (Name and Mobile No.)	Sr. No.	Type of Material	Nos. / Quantity	Location	Implementing Organisation (RW/ NHAI/ NHIDCU/ BRO): - & Contact Details of concerned RO (Name and Mobile No.)	Sr. No.	Detail of Rate running Contract	Nos.	Location	Implementing Organisation (RW/ NHAI/ NHIDCU/ BRO): - & Contact Details of concerned RO (Name and Mobile No.)
1.														
2.														
3.														
4.														
5.														

Note: The above should be dynamically updated wherever the resources are expanded or added.

34. Annexure – XXXV: Name of the Implementing Organization (RW/ NHAI/ NHIDCL/ BRO) and Name and Location of Regional Office (RO).

Name of the Implementing Organization (RW/ NHAI/ NHIDCL/ BRO) and Name and Location of Regional Office (RO):		***Contact Mobile:***	***Status Date:***
Action taken report by ROs in respect of preparatory arrangements/ emergency operations during ensuing monsoon period of the year 2023 – 2024 by all the implementing agencies of MORTH viz., NHAI, NHIDCL, RW and BRO from the previously reported status date (if any/ to the present status date);			-------
Sr. No.	**Description of the Action**	**Number of Locations**	**Details of Locations**
1.	Vulnerable Locations Identified by ROs;	**Number of Locations**	**Details of Locations**
2.	Landslide Prone Areas, Rock Fall Prone Areas, Sinking Zones etc., Identified by ROs;	**Details of Locations Inspected**	**Details of Locations Inspected**
3.	Inspection of the vulnerable spots before monsoon carried out by ROs/ PDs/ EENH of PWDs or equivalent along with installation of warning signs;	-------	-------
4.	Whether Cleaning of Drains/ Culverts is Ensured **(Yes/ No)**;	-------	-------
5.	Whether keeping in stock/ on – offer excavators/ backhoe loaders/ dozers, saw cutters for tree cutting, sand bags, traffic cones a Signages, etc., in required quantities at required locations is ensured and the details there of entered in the Google Worksheet **(Yes/ No)**;	-------	-------
6.	Whether rate – running contracts in place for emergency works like breach closing, tree removal, landslide clearance, etc., where the stretches are neither under construction nor in OLP is ensured and the details there of entered in the Google Worksheet **(Yes/ No)**;	-------	-------
7.	Whether Bailey bridges including their quantities and locations (for hilly areas) are kept ready and the details there of entered in the Google Worksheet **(Yes/ No)**;	-------	-------
8.	Whether Hume Pipes (NP – 3, 1 m Diameter) in required quantities are kept ready and the details there of entered in the Google Worksheet **(Yes/ No)**;	-------	-------
9.	Whether the Contractors for the above actions in respect of ongoing work stretches and those under; OLP/ maintenance period in respect of above actions have been instructed and alerted **(Yes/ No)**;	-------	-------
10.	Whether the Mehgdoot app has been downloaded by ROs/ all field officers under the concerned ROs **(Yes/ No)**;	-------	-------
11.	Whether Local WhatsApp groups are formed by Regional officers covering executing agencies of MoRT & H (Roads Wings/ NHAI/ NHIDCL/ BRO), Local Administration, EWE, etc. **(Yes/ No)**;	-------	-------
12.	Whether the contact details of emergency service providers are kept ready (For example ambulance, hospitals, police authorities, trauma centres, etc. **(Yes/ No)**;	-------	-------
13.	Whether list of all available resources and arrangements with the concerned ROs and nearby ROs in the region is compiled and kept ready **(Yes/ No)**;	-------	-------
14.	Whether 24 × 7 central control room is created and maintained at selected location by concerned ROs of all the agencies but together **(Yes/ No)**;	**Length under the ongoing contracts of Development works + O & : M Works or under**	**Length not covered in any ongoing contracts of Development Works + O & : M**

		DLP in Km;	Works/ DLP in Km;
15.	*Status of NH Network in the jurisdiction of the concerned RO: Total NH Length in Km in the; Jurisdiction of the* ***RO: .....!!!***	-------	-------

35. Annexure – XXXIV: NHAI/ Policy Guidelines/ Environment/ 2023 Policy Circular No. 7.4.11/ 2023 dated 03rd July, 2023 for Implementing Organization (RW/ NHAI/ NHIDCL/ BRO) and Name and Location of Regional Office (RO).

भारतीय राष्ट्रीय राजमार्ग प्राधिकरण
(सड़क परिवहन और राजमार्ग मंत्रालय, भारत सरकार)
National Highways Authority of India
(Ministry of Road Transport and Highways, Government of India)
जी-5 एवं 6, सेक्टर-10, द्वारका, नई दिल्ली - 110 075 • G-5 & 6, Sector-10, Dwarka, New Delhi-110075
दूरभाष/Phone : 91-11-25074100 / 25074200

NHAI/Policy Guidelines/ Environment/ 2023
Policy Circular No.7.4.11/ 2023 dated 03rd July, 2023
[Decision taken on E-Office File No. NHAI/GHD/02/04/24/2016/197 (Comp. No. 196097)]

Sub: Regarding Densification of Plantations including Planting of Bamboo, Initiating the Plantations in ROW from the Appointed date, Conservation of Existing Trees in ROW at the time of Initiating the Construction of Highway-reg.

1. Densification of Plantations including Planting of Bamboo

The plantation activities are being carried out on National Highways as per the SOP of NHAI and technical specifications of Indian Road Congress (IRC) guidelines. Presently, the specifications of spacing between plant to plant and row to row in the road side avenue plantations prescribed in IRC:SP:21:2009 are being followed. The spacing between row to row is 3 m and plant to plant in various rows are as follows:

i. 1st Row: 3 m
ii. 2nd Row: 6 m
iii. 3rd Row: 8 to 12 m

These avenue plantation spacing were reviewed and discussed in VC meeting on 17.03.2023 and after thorough discussion, it was decided that spacing between plant to plant in all the rows should be reduced to 3 m for densification of the plantations which will help in faster greening of Highways. The spacing between row to row will remain to be 3 m but the spacing between plant to plant in various rows will be kept as follows:

i. 1st row: 3 m
ii. 2nd row: 3 m
iii. 3rd row and subsequent rows: 3 m

The post planting operations like watering, weeding, casualty replacement and protection of plants etc. as prescribed in the IRC: SP: 21-2009 guidelines shall be followed without fail. The densification of plantations will be applicable to existing as well as future plantations.

It has also been decided that the bamboo plantations should be taken up during 2023-24 and subsequent years, wherever possible at the edge of the ROW of National Highways particularly in the Controlled-Access Highways at a spacing of 3 to 4 m between plant to plant where more than 2 rows of avenue plantations are possible in the ROW. Post planting operations like watering, weeding, casualty replacement and protection of plants etc. for the bamboo plants shall also be followed as prescribed in the IRC:SP:21-2009.

Contd...2/-

2. **Initiating the Plantations in ROW from the Appointed date**

Normally, the plantation activity particularly in the avenue plantation starts after completion of a stretch of the National Highway which sometimes takes 3 to 4 years. It is felt that we may advance the process of plantations with little care and meticulous planning so that by the time the construction of the Highway is completed, some tree growth will get established in the avenue plantations on both the sides of National Highways as per the availability of ROW lands. After the Appointed Date is given to Concessionaire/Contractor, he starts moving the men, machinery and material required for the construction of the Highway. During this time, there is lot of movement of vehicles and other machinery in the ROW land. It is advised that after about six months to one year from the Appointed Date, we may plan for taking up the plantations at least in the last row during the monsoon season in the avenue wherever possible as per the availability of ROW lands on both the sides of proposed Highway. For this purpose, the carriageways must be demarcated on the ROW and from the middle of the last carriageway towards the outer edge of ROW lands, the required space as per the prescribed norms should be marked from where the first row of plantation will start in future. In such land i.e. from the location of the first row of future plantations to the outer edge of ROW if the land is available, at least one row of avenue plantation can be taken up on the Highway wherever possible on the onset of monsoon with the trees which have bigger crown as per the suitability of soil and agro-climatic conditions as prescribed in IRC: SP: 21-2009. At certain places, certain structures would come up in future or the ROW land may be required at some places for some other purpose, so at such places we need not take up the plantation in the beginning as mentioned above. Such areas shall be planted in due course of time as per the availability of ROW after the completion of the particular stretch of the National Highway.

There are many traditional and indigenous tree species which were available in plenty in the past but slowly they are disappearing like Mahua (*Madhuca longifolia*), Bael (*Aegle marmelos*), Wood Apple (*Feronia elephentum*), Gular (*Ficus racemosa*) and many other such species in various agro-climatic zones. Some plants of such tree species should also be planted in ROW lands to conserve them for future as well as for a better bio-diversity.

3. **Conservation of Existing Trees in ROW at the time of Initiating the Construction of Highway**

IRC: SP: 21-2009 "Guidelines of Landscaping and Tree Plantation" emphasizes on conservation of existing features including landscapes and trees. It also emphasizes that while constructing the roads in forest areas, felling of trees should be kept to minimum. Of late many instances have come to the notice that while constructing new Highway or expanding the existing National Highway, the trees available in the ROW lands are mechanically felled without giving any due consideration to protect as many trees as possible from felling. It has been found that in some Regions, the Regional Officers have realised it, took proactive action and protected many trees in ROW lands from felling. Keeping in view the above, the following guidelines are issued in this regard:

Contd...3/-

i. DPR must contain clear design and measurements of ROW and Carriageways as per the prescribed norms.
ii. The ROW space should be clearly demarcated on the ground.
iii. All the trees in the ROW should be enumerated in a book.
iv. The permission for felling of the trees available in the project area as per the enumeration should be obtained from the Competent Authority as per the existing rules and procedure in force.
v. From the middle of the proposed last carriageway, the required space as per the prescribed norms should be marked towards the outer edge of ROW from where the first row of plantation will start in due course of time. So in the space between the proposed first row of plantation to the outer edge of ROW on both sides whatever the number of trees are available, their inventory shall be prepared and they will be marked with the paint for their easy identification for retaining them without felling. However, due to some reasons, if any tree or trees are required to be felled in future for construction of the highway, such tree or trees may be felled as per the need according to the felling permission already obtained from the Competent Authority. This way, we would be able to save at least some trees in ROWs.
vi. If such plants/trees require any maintenance in future, it may be included in the Concession Agreement.

4. This issues with the approval of Competent Authority.

03/07/23

(Sanjay Kumar Patel)
General Manager (Coord.)

To:

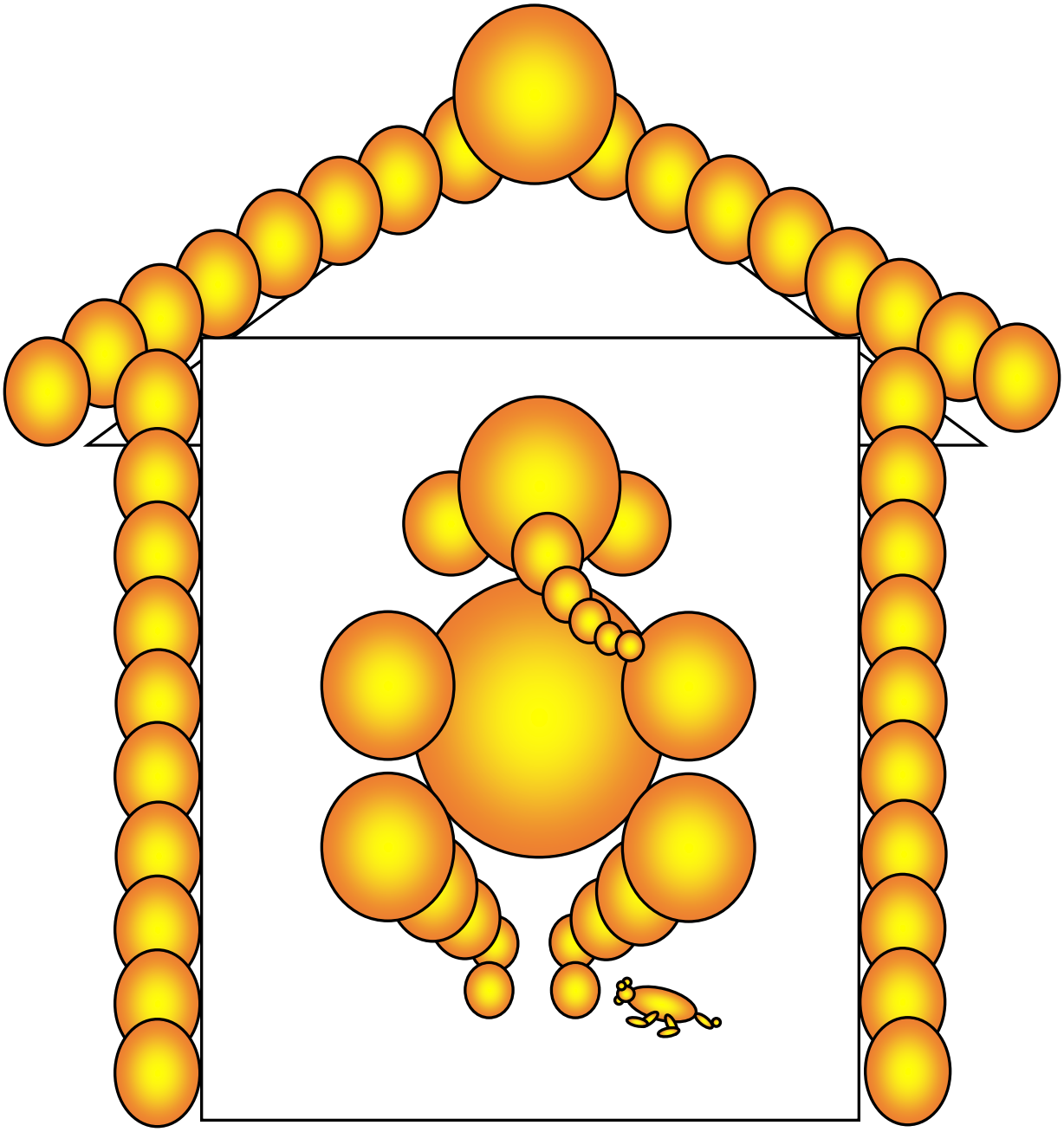
All Officers of NHAI HQ/ ROs/ PIUs/ CMUs/ Site Offices

Copy to:

1. Hindi Division for translation in Hindi.
2. Library for hosting the circular on library site.
3. Web Admin for circulation.

क्या यह दोगलापन नहीं है कि इंसान पहले पेड़ काटता है और उसका पेपर बनाता है फिर उसी पेपर पर लिखता है कि "Save Trees...!!! Reduce Carbon Dioxide (CO_2) Emission, Global Warming, Climate Change and Temperature Rise (UVR)...!!!"?

**☞☞☞ इनसान जो करता है, उसे करने दो। उसकी बुराई मत करो। ☞☞☞ इनसान सब कुछ सुन सकता है। लेकिन अपनी बुराई नहीं सुन सकता। चाहे दोगलेपन वाली हो या अकेलेपन वाली। ☞☞☞ वैसे इस दिशा में अभी तक तुम्हारा क्या योगदान रहा है? ☞☞☞ तुमने कितने पेड़ लगाए हैं अभी तक...??? ☞☞☞ शायद एक भी नहीं न...??? चलिए अब लगा दो एक। Image...!!!*

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L.N.M. Bhopal (M.P.)


Thank You!
To Study Report