Environmental Due Diligence Report

July 2017

IND: SASEC Road Connectivity Investment Program – Tranche 1

Prepared by Ministry of Road Transport and Highways, Government of India for the Asian Development Bank.

CURRENCY EQUIVALENTS

(as of May 2017)

Currency unit	–	Indian Rupee (Rs)
INR1.00	=	$ 0.01555
$1.00	=	INR 64.32

ABBREVIATIONS

ADB	:	Asian Development Bank
BOQ	:	Bill of Quantity
DFO	:	Divisional Forest Officer
DPR	:	Detailed Project Report
EARF	:	Environmental Assessment and Review Framework
EIA	:	Environmental Impact Assessment
EMP	:	Environmental Management Plan
FFA	:	Framework Financing Agreement
GOI	:	Government of India
IEE	:	Initial Environmental Examination
LVRs	:	Light Vehicle Roads
MFF	:	Multitranche Financing Facility
NGO	:	Non-Governmental Organization
NHs	:	National Highways
NOC	:	No Objection Certificate
PFR	:	Periodic Finance Request
PIU	:	Project Implementation Unit
PMC	:	Project Management Consultant
ROW	:	Right-of-Way
SASEC	:	South Asia Subregional Economic Cooperation
SRCIP	:	SASEC Road Connectivity Investment Program
SHs	:	State Highways
SPCB	:	State Pollution Control Board
SPS	:	Safeguard Policy Statement

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I. INTRODUCTION

A. Context and Purpose of the Report

1. The Government of India (GOI) has renewed its recognition that one of the major constraints for regional connectivity is the last-mile connectivity, especially in North Bengal and Northeastern Region (NB-NER) of India, between the in-country trunk road network and neighboring countries, which has been often left out development due to tedious coordination with multiple agencies and countries. The road network capacity in NB-NER is limited due to geographic constraints and limited availability of land, and increased traffic level. Security concerns also lower the network utilization. However, the connectivity in NB-NER is the key to integration of South and South East Asia. Increase in trade and resultant traffic, and improved road capacity and conditions, will improve the security situation and network utilization.

2. Transport infrastructure development is high priority for the government, making ADB's strategy of reducing poverty through infrastructure-led growth especially relevant. ADB's continued support for regional connectivity is in line with the country partnership strategy (2013-2017) for India, in terms of supporting regional connectivity and inclusive growth. The South Asia Sub-regional Economic Cooperation (SASEC) Road Connectivity Investment Program investment program has been designed in coordination with development partners to avoid overlaps, and continues ADB support for implementation efficiency of road agencies in parallel with improvement to the last-mile connectivity for regional cooperation and integration.

3. The SASEC Road Connectivity Investment Program (SRCIP) aimed to improve road connectivity and efficiency of the international trade corridor, by expanding about 500km of roads in NB-NER of India. The project area under SRCIP is a key strategic thoroughfare integrating South and South East Asia, bordering Bangladesh, Bhutan, Myanmar and Nepal. It will enable efficient and safe transport within India and regionally with other SASEC member countries. Ultimately, SRCIP will pave the way from India and other South Asian countries to Myanmar, and further afield to other member countries of the Association of South East Asian Nations (ASEAN).

4. The GOI sought financial assistance from Asian Development Bank (ADB) to implement SRCIP which is an integral part of part of India's investment program for regional connectivity ("Regional Road Connectivity Program"), which is in line with the SASEC framework. The ADB Loan was provided through Multitranche Financing Facility (MFF) modality for US$ 500 million to be implemented in tranches from 2015 to 2022. The GOI entered into a Framework Financing Agreement (FFA) with ADB on 26 February 2014. The first loan for Tranche 1 (Loan Number 3118-IND) amounting to US$ 300 million was approved by ADB Board on 01 April 2014. Subsequently a loan agreement was signed on 26 March 2015 and this loan became effective on 24 June 2015.

5. Project 1 or Tranche 1 of the MFF was designed to improve two national highway subprojects totaling about 135km in West Bengal State and a state road subprojects totaling about 130km in Manipur State. The civil works under Tranche 1 are grouped in 3 packages. The two civil work contracts in West Bengal State have been awarded in the second quarter of the year 2015 whereas civil works contract in Manipur State was awarded in March 2016. Subsequently contractors have been mobilized. Table 1 shows details of each contract package.

Table 1: Start of Construction and Physical Accomplishment by Contract Packages, as of 31 March 2017

Contract Package	Subprojects / Road Section	State	Contract Award/ Appointed Date	Physical Accomplishment to date (%)	Name of the Firm(s)
SRCIP-MO RTH/WB-AH-02	Asian Highway No 2: Panitanki-Shiva mandir Mor-Medical Mor-Fulbari (Nepal-India-Bangladesh)	West Bengal	29 Jan 2015/ 28 May 2015	58.45 % (Physical- as of 31 March 2017) 47.49% (Financial - as of 31 March 2017)	M/s. Dinesh Chandra R. Agrawal Infracon Pvt. Ltd.
SRCIP-MO RTH/WB-AH48	Asian Highway No 48: Jaigaon-Hasima ra-Dhupguri and Mainaguri-Chan grabandha (Bhuthan-India- Bangladesh)	West Bengal	12 Nov 2014/ 28 May 2015	54.20 % (Physical- as of 31 March 2017) 47.11% (Financial - as of 31 March 2017)	M/s. Punjj Lloyd India Ltd.,
MN/PWD/ EAP/04	Imphal-Kanchup-Tamenglong Road	Manipur	21 March 2016 / 12 August 2016	0.40% (Physical as on 31 march 2017). Contractor is in fast track regarding mobilization equipments and manpower and construction Plant sites at two locations.) 4.47 % excluding mobilization advance (Financial – as on 31 march 2017)	M/s. Hindustan Construction Company Limited (HCC) in joint venture with M/s. Vensar Constructions Company Limited (VCCL)

6. The GOI has submitted the second Periodic Finance Request (PFR) for SRCIP. This environmental due diligence (EDD) is a requirement of the Asian Development Bank (ADB) on individual tranches of MFF as provided in Para 5, Section C, Multi-tranche Financing Facility, OM Section D14/BP issued on February 2015. EDD is the process of identifying environmental risk to allow the Bank avoid or manage risks that may increase the project's cost of compliance to environmental regulations and third-party damages. EDD helps ADB "determine whether the investments are ready for financing (par. 6, OM Section D14/OP, 18 May 2010)" by allowing the early identification of potential sources of environmental risks and liabilities.

7. This EDD report assesses the compliance of Tranche 1 to MoEFCC/GOI's environmental policies, laws, and regulations particularly relating to forest and wildlife areas and the ADB's Safeguard Policy Statement (SPS), 2009 as translated into provisions of the Environmental Assessment and Review Framework (EARF), Environmental Management Plan (EMP), and Environmental Monitoring Plan (EMoP). This EDD was prepared by an ADB staff consultant as an independent expert. Appendix-I present the location maps of Tranche 1 subproject roads.

B. Methodology and Approach Used for Due Diligence

8. This report is prepared through literature review, field monitoring work, and interview of relevant parties such as staff from PIUs, construction supervision consultant, contractors, local forest authorities, local communities and villagers. The literature review covered the technical specifications of bidding document, the bill of quantity (BoQ) submitted by the contractors, semi-annual environmental monitoring reports, and other relevant project documents like project EIA reports including EMPs, EARF, and the monthly progress reports submitted by supervision consultants. An environmental verification checklist[1] guided the field monitoring work. The purpose of the field monitoring work is to gather information on to compliance status with the EARF, EMP, and EMoP.

II. STATUS OF TRANCHE 1 WORKS UNDER SCRIP

9. All the subprojects included in Tranche 1 were prepared by the Executing Agency (EA) supported by an ADB financed technical assistance. Key information on the contract packages under Tranche 1 of SCRIP is summarized in Table 2.

Table 2: Contract Packages Under Tranche 1 of SCRIP

Sl. No.	Civil Works Package	Road Name / Subproject	Length (Kms)	Contract Amount (INR Crores)
1.	SRCIP-MO RTH/WB-AH-02	AH-02, Panitanki – Banglabandha	37.271	427.25
2.	SRCIP-MO RTH/WB-AH48	AH-48, Phuentsholing (Bhutan) ends at Bangladesh border at Changrabandha	90.586	666.00
3.	MN/PWD/EAP/04	Imphal-Kangchup-Tamenglong Road	107.97	1114.18

10. For AH-02 and AH-48 packages, contractors were appointed in May 2015 and mobilization took place in second half of of 2015 (sample subprojects). Whereas for Manipur (Imphal-Tamenglong road), the contractor was appointed in August 2016 and civil works started in the last quarter of 2016. the The physical work progress of ADB assisted Tranche 1 works under SCRIP as of March 2017 is presented in Table 1.

III. FINDINGS OF THE DUE DILIGENCE

11. The subprojects being implemented under Tranche 1 pose significant adverse environmental impacts, as about 2.6 km of AH-48 subproject in West Bengal passes through Jaldhapara National Park which also has some elephant crossings. Wildlife clearance from National Board for Wildlife (NBWL) is required. The EA applied for wildlife clearance in August 2015 and it has been under process at State Chief Wildlife Warden's Office in West Bengal since then. The Imphal-Tamenglong road subproject in Manipur involves greenfield construction in hilly terrain, environmental clearance from State Level EIA Authority is required as some sections of the road are located in elevations above 1000m. The "No Objection" for construction of road sections below 1000m was issued by the Directorate of Environment, Manipur on 24 September 2016 (see appendix 2). MPWD has submitted application to SEIAA for the environmental clearance for sections above 1000m and it is being processed[2]. Forest clearance for AH-48 and Imphal-Tamenglong road subprojects is also under

[1] Environmental Verification Checklist is adapted from the approved environmental management plan (EMP) by filtering applicable environmental mitigation tasks/activities to be implemented by the contractors given the current stage of project development.

[2] Approval for the formation of Board of Members of State Environmental Impact Assessment Authority (SEIAA) of Manipur (who is responsible to issue environmental clearance) is still pending from Ministry of

process. All the contractors have obtained tree cutting permits for their respective work package. Overall the impacts are mostly related to those associated with construction work. The significant findings are as follows.

A. Implementation of Environmental Safeguard During Project Preparation

12. ***Environmental Categorization and Public Disclosure***: During project preparation in 2013-2014, PPTA and DPR consultants were deputed to conduct feasibility study, surveys, and preparation of the detailed project reports (DPRs) for Tranche 1 sample subprojects (AH-02 and AH-48) including environmental impact assessment (EIA) report. The Tranche 1 was categorized as Environment Category "A" in accordance with ADB's SPS 2009 guidelines. Accordingly, EIA were conducted for sample subprojects. The draft EIA report for sample subprojects covering two sample subprojects was prepared in accordance to ADB's SPS 2009 requirements and disclosed on ADB's website in July 2013. The final EIA report was disclosed in December 2013. The final EARF was disclosed in February 2014. Subsequently non-sample subproject in Manipur (Imphal-Tamenglong road) was prepared. This subproject was also categorized as Environment Category 'A' project due to over 90km of the 108km road requiring greenfield construction in hilly terrain. Accordingly an EIA including EMP has been prepared in compliance with SPS 2009 and EARF requirements. The final EIA report for Imphal-Tamenglong subproject was disclosed on ADB website in June 2015.

13. ***Preparation of Bid Documents***: The EMP, which provides needed mitigation measures for each stage of road development has been provided in the bidding documents for each civil works contract package. In addition, an appendix of the bidding document emphasized the following key measures to be implemented by the contractor:

i. Precaution to be adopted during disposal of debris/solid waste including disposal of organic debris generated during road construction.
ii. Precaution to be adopted for sanitation and housekeeping at the labor and construction camps like toilets, hygiene, water supply, waste disposal, first aid and maintenance etc.
iii. To measure and maintain the air quality standard.
iv. To measure and maintain the noise quality standard.
v. To check the primary water quality standards including physical and chemical properties of drinking water.

14. The contractors' response on the instruction to include works for environmental impacts associated with the construction activities was satisfactory. It was noted from Contractor's BOQ documents that environmental items are included, environment focal person was designated, and necessary budget allocated to handle anticipated environmental issues. Resources were provided by the contractor to implement the Environmental Monitoring Plan (EMoP). Table 3 presents the subproject-wise environmental management budget and its comparison with overall civil works cost.

Table 3: Subproject wise EMP Budget and Its comparison with civil works cost

Contract Package	Subprojects / Road Section	State	EMP Budget Provision (INR in Crores)	% of Civil Works Cost
SRCIP-MO RTH/WB-AH-02	AH-02, Panitanki – Banglabandha	West Bengal	6	1.4%

Environment, Forest and Climate Change (MoEF&CC) side. This is the reason for delay in processing the environmental clearance for the subproject in Manipur.

Contract Package	Subprojects / Road Section	State	EMP Budget Provision (INR in Crores)	% of Civil Works Cost
SRCIP-MO RTH/WB-AH48	AH-48, Phuentsholing (Bhutan) ends at Bangladesh border at Changrabandha	West Bengal	24.05	3.61%
MN/PWD/EAP/04	Imphal-Kangchup-Tamenglong Road	Manipur	0.3653	0.03%

15. The bidding document highlighted health and safety measures, more particularly compliance to labour regulations, health and safety during construction, and issues relating to equipment, storage of hazardous materials, and labour camp hygiene.

16. ***Environmental Statutory Clearances***: As stated in the loan document, prior to commencing civil works at any particular section of road, all required statutory clearances have to be obtained for those sections. In line with the above requirement, all statutory clearances that are required for the project at various stages of implementation have been assessed. Both the sub-project roads in West Bengal i.e. AH-02 and AH-48 do not require Environmental Clearance from MoEFCC. However since Imphal-Tamenglong road subproject in Manipur involves greenfield construction in hilly terrain above and elevation of 1000m, an environmental clearance from State Level EIA Authority is required. A "No Objection" for construction of road sections below 1000m was issued by the Directorate of Environment, Manipur on 24 September 2016 (appendix 2). The clearance for construction of road sections above 1000m is yet to be issued.

17. Since AH-48 subproject passes through Jaldhapara National Park for about 2.6 km length, wildlife clearance from National Board for Wildlife (NBWL) is required. The EA has applied for wildlife clearance and it is under process with State Chief Wildlife Warden, West Bengal to be further forwarded to the National Board for Wildlife.

18. Forest clearance is required for AH-48 and Imphal-Tamenglong road subprojects. The EA has submitted forest clearecne proposals to respective forest departments and is applications are under processed. Tree cutting permits have been obtained by all the contractors.

19. Both the Contractors of AH-02 and AH-48 subprojects in West Bengal have obtained labour license and Workmen Compensation Insurance. The Contractors for both roads have obtained the Consent to Establish (CTE) and Consent to Operate (CTO) for operating crushing plant, batching plant and asphalt plant. Table 4 present the details of clearances /permits required for Project 1 subprojects and its status as on December 2016.

Table 4: Summary of Environmental Statutory Clearances/Permits for Tranche 1 of SRCIP as on December 2016

Sl. No.	Clearances / Permits Required	Package / Road Section		
		SRCIP-MO RTH/WB-AH-02	SRCIP-MO RTH/WB-AH48	MN/PWD/EAP/04
		AH-02	AH-48	Imphal-Tamenglong
Clearance / Permits by PIUs / Executing Agencies				
1.	Environmental Clearance from SEIAA/MOEF	Not required	Not required	No objection for construction in sections below 1000m issued in September 2016. Clearance for construction above

Sl. No.	Clearances / Permits Required	Package / Road Section		
		SRCIP-MO RTH/WB-AH-02	SRCIP-MO RTH/WB-AH48	MN/PWD/EAP/04
		AH-02	AH-48	Imphal-Tamenglong
				1000m under processing. Joint site visit with SEIAA completed.
2.	Forest Clearance from Forest Department / MoEF	Not required	Applied and under process	In Principle or stage 1 approval obtained.
3.	Wildlife Clearance from NBWL	Not required	Applied and under process	Not required
5.	Tree cutting permit from Division Forest Department	Obtained	Obtained	In Principle approval obtained.
6.	Certificate of Registration of Principal Employer	Obtained	Obtained	Not required
Clearance / Permits by Contractors				
7.	Consent to Establish (CTE) from State PCB for crushing plant, batching plant and asphalt plant	Obtained	Obtained	CTE obtained,
8.	Consent to Operate (CTO) from State PCB	Obtained	Obtained	Yet to obtain (Plants have not started operating yet)
9.	Labour License	Obtained	Obtained	Obtained
10.	Licence for Storage of Petroleum products	Obtained	Obtained	Yet to obtain
11.	Quarry Permissions	Obtained	Not required*	Under process
12.	Borrow area clearance	Not required	Not required	Under process

*Materials are being sourced from a third party supplier

20. File review and site inspection confirmed that work is under progress as per conditions laid in permits and NOCs obtained till date. PIUs are advised to follow up closely and expedite the process to get pending approvals/clearances.

B. Compliance with EARF Requirements

21. The requirements stipulated in the EARF have been or are being complied with. Table 5 shows the compliance of various conditions of the EARF.

Table 5: Status of EARF Compliance for Tranche 1 of SRCIP

EARF Reference	Requirements	Compliance Status
Section IV (9), Para 18	(i) The subprojects selected will be part of priority roads that will enhance regional connectivity within SASEC and/or BIMSTEC countries.	**Complied**. All Tranche 1 subprojects aimed to enhance regional connectivity within SASEC and BIMSTEC countries.
	(ii) As much as possible all efforts will be made to avoid subprojects passing through or near eco sensitive areas such as designated wild-life sanctuaries, national parks, notified ecological sensitive areas or area of internationally significance (e.g., protected wetland designated by the Wetland	**Complied.** None of the Tranche 1 subprojects located in any ecological sensitive areas except AH-48 section which is passing through Jaldapara National Park.

EARF	Requirements	Compliance Status
	Convention). If absolutely unavoidable, project passing through critical habitat areas can be selected only (i) if no alternatives are available, (ii) there are no measurable adverse impacts on the critical habitat that could impair its ability to function (iii) there is no reduction in the population of any recognized endangered or critically endangered species (iii) any lesser impacts can be mitigated (iv) the overall benefits from the project substantially outweigh the environmental costs (v) Any conversion or degradation can be appropriately mitigated and (vi) the respective wildlife agency supports the subproject.	Alternatives were considered but it was absolutely unavoidable because any other alternative would have required new construction through the national park. Critical Habitat tests were also conducted for these options and it will be continued during construction as well as operational phases.
	(iii) As much as possible subprojects or sections passing through reserved forests where enough ROW is not available must be avoided. If absolutely unavoidable, project passing through reserved forests can be selected only (i) if no alternatives are available, (ii) any lesser impacts can be mitigated (iii) the overall benefits from the project substantially outweigh the environmental costs (iv) Any conversion or degradation can be appropriately mitigated.	**Complied.** Reserve Forest areas were avoided to the extent possible. However in AH-48 and Imphal-Tamenglong subprojects, acquisition of forest land is required for proposed improvements. Necessary forest/wildlife clearances are being obtained for these sections as per national regulatory framework.
	(iv) As much as possible subprojects passing through or near cultural heritage designated by UNESCO or declared as archeologically protected by GOI must be avoided. If absolutely unavoidable, project passing through or near such sites be selected only (i) if no alternatives are available, (ii) any lesser impacts can be mitigated (iii) the overall benefits from the project substantially outweigh the environmental costs.	**Complied.** None of the Tranche 1 subprojects pass through or are located near any UNESCO designated sites.
Section IV, Para 21	The EIA or IEE study will be conducted in accordance with the requirements of ADB's SPS 2009 as well as MOEF, where required.	**Complied**. EIAs for Tranche 1 subprojects were prepared in compliance with SPS as well as MoEFCC requirements.
	For category A subprojects, the EIA report must be prepared in a manner that the draft EIA can be disclosed on the ADB website atleast 120 days before approval of the respective subproject by ADB.	**Complied.** EIAs for category A subprojects were disclosed on ADB website 120 days before board approval.
Section VII, Para 40	The IA through the EA will submit semi-annual monitoring reports for category A and annual monitoring reports for category B projects to ADB.	**Complied.** Semi-annual environmental monitoring reports (for both West Bengal and Manipur) have been submitted by EA and disclosed on ADB link (https://www.adb.org/projects/47341-002/main#project-documents.)

22. Other EARF requirements such as compliance with Government policies and regulations, implementation of environmental mitigation measures and monitoring activities, making adequate resources (manpower and budget) available for environmental management,

strengthening institutional capacity, compliance with ADB's Environment Policy, and information disclosure are being followed with the progress of Tranche 1 civil works implementation.

C. Compliance with Loan Conditions

23. As per the loan agreement, Schedule 5, the Borrower shall undertake the subprojects in accordance with ADB's Safeguard Policy Statement (SPS) 2009, and all applicable laws and regulations of the Borrower and the relevant State, as set out in the EARF. These conditions are being complied by all three subprojects under Tranche 1. Table 6 shows the compliance of various loan conditions with respect to each subproject.

Table 6: Compliance Status with Loan Conditions on Environment Safeguard: Tranche 1 under SRCIP

Reference to Loan Agreement	Loan Conditions	Compliance Status
Schedule 5, Para 1	India will ensure, cause the Ministry of Road Transport and Highways (MoRTH), the Manipur Public Works Department (MPWD) and the West Bengal Public Works Department (WBPWD) to ensure, that all the requirements prescribed in this Schedule, and the following social and safeguard frameworks and plans that have been prepared with respect to the Facility and the first tranche and of which ADB has been provided full copies, and which are deemed incorporated herein by reference, are complied with during the processing and implementation of the components/projects under the Facility. (i) Environmental Assessment and Review Framework (ii) Resettlement Framework (iii) Indigenous Peoples Planning Framework (iv) Two Combined Resettlement Plan and Indigenous Peoples Plan for AH-2 and AH-48 and (v) Environmental Impact Assessment for AH-2 and AH-48.	**Complied.** Safeguards documents are prepared in compliance with EARF requirements. EIAs for all Tranche 1 subprojects were prepared and approved by ADB before award of civil works contract.
Schedule 5, Para 2	The frameworks cover the Facility-specific information and requirements in accordance with ADB's safeguard policies: (i) the general anticipated impacts of the components or projects likely to be financed under the MFF on the environment, involuntary resettlement, and indigenous peoples; (ii) the safeguard criteria that are to be used in selecting components, projects; (iii) the requirements and procedure that will be followed for screening and categorization, impact assessments, development of management plans, public consultation and information disclosure (including the 120-day disclosure rule, if required), and monitoring and reporting; and (iv) the institutional arrangements (including budget and capacity building requirements), grievance redress mechanisms and the client's and ADB's responsibilities and authorities for the preparation, review and clearance of safeguard documents.	**Complied.**
Schedule 5, Para 3	Prior to the preparation of each PFR, the applicability and relevance of each safeguard framework for environmental assessment, involuntary resettlement, and indigenous people will be reviewed by India, MoRTH, MPWD and WBPWD and updated to ensure relevance and consistency with applicable country legal frameworks and	**Complied.** The EARF has been updated.

Reference to Loan Agreement	Loan Conditions	Compliance Status
	ADB's Safeguard Policy Statement (2009), as amended from time to time.	
Schedule 5, Para 4	In all cases, for each new PFR preparation, India will cause MoRTH, MPWD and WBPWD to review on-going projects to check on the status of compliance with the social and environment safeguard plans and frameworks, and submit due diligence reports of the earlier PFR to ADB, together with other required safeguard documents and semi-annual monitoring reports relevant to the components/projects included in the tranche being processed. In any case if significant involuntary resettlement and environment issues are identified in the course of the implementation and review of ongoing projects, a corrective action plan will be prepared to address such issues and submitted to ADB.	**On-going:** Implementation is in progress, no significant environmental issues that are not addressed in the EMP are encountered till date. This clause is hence deemed to be Complied.
Schedule 5, Para 5	Semi-annual monitoring reports that describe the progress of the implementation of resettlement and environmental activities and any compliance issues and corrective actions (if any) will be submitted to ADB.	**On-going:** Semi-annual monitoring reports are being submitted. As of June 2016, 2 monitoring reports were submitted for West Bengal subprojects and 1 environmental monitoring report have been submitted for Manipur subproject. These reports have been disclosed on ADB link (https://www.adb.org/projects/47341-002/main#project-documents.)

D. Implementation of Environmental Safeguards

1. Pre-construction phase

24. The approved EMPs require the project to address three environmental issues during the pre-construction stage, these are: getting requisite permits/clearances, tree cutting, removal of utilities, and shifting of religious places. In AH-02 and AH-48 tree cutting has been completed in non-forest areas whereas in forest areas, joint verification with forest department (as part of forest clearance process) has been completed. For Imphal-Tamenglong joint verification with forest department and In Principle Approval has been obtained.

25. The PIUs together with Contractor's are coordinating with respective state authorities for shifting of the roadside utilities. In AH-02 and AH-48 subprojects EPC contractors in coordination with PIUs are carrying out utility shifting i.e. electric lines. PHED has been executing shifting of pipelines with the fund placed by PIU.

26. Relocation of cultural properties in the RoW is being handled by the PIUs in coordination with the contractors and in agreement with local communities. Affected properties are about 47

Nos. (in AH-02) and 13 Nos. (in AH-48) have been compensated to the claimants. Affected small shrines have been shifted adjacent to the present location by the contractor with the construction equipment. Appendix-3 presents the status of implementation of EMP (pre-construction activities) for AH-02 and AH-48.

2. Implementation of Environmental Safeguards during construction

27. The civil works contracts for sample subprojects in West Bengal (AH-02 and AH-48) were awarded in May 2015 whereas contract award for non-sample subproject in Manipur (Imphal-Tamenglong) was awarded in March 2016. Subsequently, contractors' were mobilized for these subprojects and implementation is in progress. Sample subprojects in West Bengal (AH-02 and AH-48) completed mobilization, camp settings, site clearing and earthwork. Structures and road work in under progress. Overall these two sample subprojects achieved nearly 40% physical progress as on November 2016. For Imphal-Tamenglong subproject in Manipur, the contractor is in the process of mobilizing the machineries, resources, and setting up the site offices, and land clearing for the embankments and back filling. Physical progress in this subproject is almost nil.

28. The EMP enumerated key environmental issues that are likely to confront the project to include pollution (air, water, groundwater, and land), loss of topsoil, soil compaction, and occupational health and safety. Specific mitigation measures were provided to guide the Contractors in addressing these issues. As mentioned, the contractor in Manipur (Imphal-Tamenglong) is still at the initial stage and many activities have not started. Some physical progress has been achieved on AH-02 and AH-48 subprojects hence status of EMP implementation by the Contractor in these two subprojects is presented in Appendix-3. Highlights of EMP implementation are discussed in the following sections.

29. ***Setting up Site Offices and Construction Camps:*** Site offices and construction camps for AH-02 and AH-48 and for Imphal-Tamenglong subproject have been established by the contractor. In AH-02 the contractor establishment one camp site at km 8+600 and plant site at km 9+777. Whereas for AH-48 there are two Camp sites one each at Chainage km 19+800 in Mainagudi and km 75+200 at Rangali Bazna. Approximately 200 contractors' staff (engineers, supervisors, operators, drivers, technicians, and semi/unskilled workers) will be deputed for the implementation of civil works in AH-02 and AH-48 (West Bengal) contract packages. The field visit confirmed the contractors' site offices, storage facilities and construction camps are not located nearby any water bodies, residential areas or other sensitive locations. The PIU and supervision consultant were consulted in the selection of construction camp sites. All construction camp sites are located in private land and contractor has obtained necessary lease agreements with the property owners.

30. Each subproject has separate workers and construction camps. Workers camps are equipped with adequate water supply with overhead storage tanks and sanitation facilities. However contractors have been advised to maintain hygienic conditions at all time in the workers and construction camps with provision of adequate water supply and sanitation facilities.

31. In Manipur, the contractor has considered 3-4 sites and after consultations with relevant authorities (including forest department) site office and residential camp site is selected at chainage Km 5+500 and plant site (to set up construction camps with hot mix and crusher plant) is selected at chainage Km 15+580. These sites are atleast 1 km away from the residential areas. Contractor obtained NOCs for establishment of site office and plants from Manipur

Pollution Control Board and has established the site office and hot mix, crushing, batching and WMM plants.

32. ***Mobilization of Resources:*** In terms of human resources, preference was given by contractors to hire local staff at project site as described in special conditions of contract. However, various technical skills and experiences are not available within the project area and are sourced outside. **Appendix 3** gives the contract wise details of manpower mobilized by each contractor. Mobilization of heavy equipment and machineries are being undertaken by most the Contractors. Heavy equipment for land clearing are being transported through existing road. To date, there are no reports (as confirmed by PIUs) of damage on existing road. Nonetheless, continuous monitoring is being carried out by the authority engineers to ensure damages are avoided and in case of damages are incurred immediate repairs will be made by the concerned Contractor.

33. ***Site Clearing:*** Site clearing work has been completed for AH-48 and most of the road length in AH-02. For Imphal-Tamenglong section, as most of the contractor is at initial stage of mobilization, site clearing work is mostly commenced at location of cross drainage and embankment sites. It was observed that site clearing for all roads involved shrubs and limited amount of soil removal. For AH-02 and AH-48 roads, site clearing is limited to bushes. However, for Imphal-Tamenglong road being 90 km green field alignment and hilly terrain, back cutting is involved. Contractor has started works at sections, which are located below 1000m and are free from any encumbrances. During site visits, it was noted that inadequate safety signage and safety measures (such as lack of signages at work areas, workers without PPEs, less first aid boxes etc.) particularly during earthwork and back cutting/blasting were provided by the Contractor to the workers. This situation was confirmed by the authority engineer and reflected in their monthly progress report for further actions by contractors. Contractors' have been instructed to provide requisite safety measures at all work places. For clearing of trees, joint verification and marking of the trees is being carried with the Forest Department officials. For AH-02 and AH-48, the compensation against tree felling, removal of log, and litter from the subproject roads and plantation of suitable species is already paid to the concerned department. Whereas for Imphal-Tamenglong, compensation will be paid once Forest Department submits their estimate.

34. Top productive soil is being preserved for further uses in AH-02 and AH048 sections.

35. ***Cut and Fill for Preparation of Embankment:*** The scope of work under Tranche 1 mostly involves strengthening of existing roads. Therefore, in AH-02 and AH-48, the volume of cut and fill is limited. However, Imphal-Tamenglong subproject is located in hilly terrain which require cutting of hills to accommodate proposed improvements.

36. In hilly terrain of Imphal-Tamenglong road, cut materials and rocks will be disposed off at selected locations and disposal sites are being selected in consultation with forest department officials. A site at chainage km 15+900 has been selected at present and others sites are being considered. At this stage, there are no significant adverse effects on environment as cut and fill are balanced since work is at initial stage and no major hill cutting has started in Imphal-Tamenglong road. The mitigation measures proposed in EMP are being followed by contractor to manage cut and fill material where required.

37. **Monitoring of Dust / Particulate Emissions.** It is noted from the progress report that environmental quality monitoring has not been done in Manipur based on the opinion that works are at very initial stage contrary to the EMP requirement that these be carried out prior to commencement of construction and during construction activities on subproject roads. The PIU in Manipur is coordinating with Manipur State Pollution Control Board (MSPCB) to start the

monitoring and necessary agreements has been done by contractor to get the baseline environmental monitoring done with the help of MSPCB. Meanwhile the authority engineer has advised the contractor to refer to EMP to control dust emissions by regular sprinkling of water on hauling roads and material handling sites as well as monitor the particulate concentration at camp sites. For AH-02 and AH-48 monitoring is being done by the contractors. The results of the monitoring (Appendix 5) conducted for AH-02 indicated slight higher concentration of PM_{10} at camp site (119ug/m^3 compared to a CPCB prescribed permissible limit of 100ug/m^3. At other places all monitored parameters are well within the permissible limits. In sections where earth work is in progress (particularly at camp sites where PM level is high) the Contractor has been advised to mobilized adequate water tankers to control dust. This was confirmed during the field visit.

38. **Wildlife Management Activities:** A 2.6 km section of AH-48 subproject passes through Jaldapara National Park and various wildlife management activities are proposed in the environmental management plan including obtaining wildlife clearance from the National Board for Wildlife (NBWL). PIU had submitted proposal in April 2015 seeking prior Central Government (GoI) approval for undertaking work in national park area. The Project Director and External Wildlife Monitor Consultant had several meetings with the Forest and Wildlife officials of West Bengal and various efforts were made to process the proposal and have it forwarded to higher authorities at State Level for further submission to the NBWL at central level.

39. As part of the mitigation measures 3 wildlife underpasses were proposed in the project design in the 2.6 km section. This proposal was based on discussions with local Forestry officials during preparation of the EIA in 2012[3]. During follow up consultations with the Forestry officials in 2016 the State forest department asked the project authority to consider constructing an elevated road for the entire length of 2.6 km instead of the 3 underpasses. Their key concerns were: i) constructing underpass will require additional land from the national park to divert traffic during construction; ii) elephants may not be able to cross the area due to disturbance from the underpass construction; iii) this may result in elephants moving their crossing route which may result in the underpass not being utilized; and iv) change of the crossing route of the elephants may cause more human-elephant conflict.

40. Considering the concerns raised over several rounds of discussions between the PIU and Divisional/state Forestry Officials, the lack of progress in the application for wildlife clearance and an elevated road being beyond the technical and financial capacity of the project it was decided that only road surface improvement within the existing carriageway width will be carried out in that section. The underpasses will not be constructed. However, speed control measures and informatory sign boards will be placed within the PWD Right of Way in that section to prevent vehicle – wildlife collision.

41. Meanwhile as required in the EMP, a Draft Wildlife Management Plan (WLMP) has been prepared by the External Wildlife Monitor Consultant and has been submitted to the State Wildlife Authorities for their comments. The WLMP plan includes various wildlife and biodiversity conservation activities and is meant to serve as an environmental enhancement plan to ensure the project road results in no-net loss of biodiversity or a net-gain in biodiversity. The WLMP will be finalized in consultation with the State Wildlife Authorities. Once it is final it will be implemented in coordination with Jaldapara National Park authorities and local Forestry Officials. The budget for the underpasses will be added to WLMP.

[3] Appendix 7.2 of the EIA on details of consultations held in April and May 2012 reflects that a number of mitigation measures including underpasses were recommended by the local Forestry officials.

42. Based on the final WLMP and further consultation with the local Forestry Officials an addendum to the EIA report of December 2013 is proposed to be prepared. The addendum will elaborate on the updated scope of wildlife mitigation under AH-48 which will include the WLMP and exclusion of the 3 underpasses.

43. **Occupational Health and Safety.** The contractors have submitted the site specific EHS management plan for each package. Specific attention is being paid to safety aspects of works as well as local communities. Workers have been provided with personal protective equipment (PPEs). Regular training is also provided to workers on environmental, health and safety aspects. Health checkup camps and HIV/AIDs camps are also being organized. However some areas such as work zone safety, management and workers camp facilities and usage of PPEs by the workers needs further improvement. The CSC together with contractor has been advised to organize training sessions for workers on use of PPEs as well as work place management. The same will be reported in the next semi-annual monitoring report.

44. At this stage, no unanticipated environmental impacts were observed by supervision and external monitoring consultants in AH-02 and AH-48 and the same is confirmed during the field visit. There are no deviations from the proposed mitigation measures for handling the environmental impacts associated with construction activities. The contract-wise status of activities under Tranche 1 subprojects is presented in table 1. The status of EMP and EMoP implementation in AH-02 and AH-48 and the Imphal – Tamenglong road is shown in **Appendix 4**.

45. Photographic record of EMP implementation is presented below.

Photograph 1: Discussion Session at site during Joint inspection with Forest Officials at Tamenglong district (Imphal-Tamenglong Subproject)

Photograph 2: Project Director Addressing Community in Imphal-Tamenglong Road Section

Photograph 3: PIU, ISCD Team and Forest Official during Joint inspection and consultation with local community at village Nagache

Photograph 4: Topsoil is preserved at campsite of km 9+777 (AH-02)

Photograph 5: Topsoil is preserved for reuse at campsite of Rangali Bazna (AH-48)

Photograph 6: Sprinkling of Water on AH-02 Subproject

Photograph 7: Sprinkling of Water on AH-48 Subproject

Photograph 8: Turfing work on the slope of the Embankment (AH-48)

Photograph 9: Trucks are being covered with Tarpaulin while transporting the material (AH-02)

Photograph 10: PPEs and Safety Measures are Provided to the workers (AH-02)

Photograph 11: Training to Contractor, Authority Engineer and PIU staff on environmental management (AH-02 and AH-48)

Photograph 12: Training to Contractor, Authority Engineer and PIU staff on Wildlife Management (AH-02 and AH-48)

Photograph 13: Fire Safety Mock Drill at Package AH-02, Naxalbari Camp

Photograph 14: HIV / AIDS Awareness campaign on AH-02

Photograph 15 : Training to Drivers on Safe driving at construction sites (AH-48, Mainagudi camp)

Photograph 16: Public Consultation at Km 16+840 on AH-48 Subproject

Photograph 17: Public Consultation at Km 11+840 on AH-02 Subproject

Photograph 18: Public Consultation at Km 10+500 on AH-02 Subproject

3. Public Consultations and Complaints

46. Local public have been involved in the subprojects right from the project design stage. In the present stage of construction also local public, including women groups and vulnerable persons are being consulted on a continuous basis. The EPC contractors are holding consultative meetings to know their overall perception of the project and any grievances they are having. The consultations held in both the packages of West Bengal i.e. AH-02 and AH-48 are listed in along with the brief outcome of the consultations in the semi-annual monitoring reports.

47. The subprojects are being implemented for over 1 year and there are no major public environment safeguards related complaints received during this period. This was based on inspection of the grievance/complaint register during the field visit. This was also reconfirmed by Project Directors of the respective subprojects. Complaint registers are being maintained at all site offices. Also, there is no history of any major accidents neither at work site nor at construction camps. However, there have been cases of minor injuries or near miss which the contractor is able to address with medical staff and first aid facilities on site. In addition, regular training and awareness programs are being held for workers and operators to avoid even small accidents.

4. Institutional Capacity and Arrangement

48. The PMC at MDONER has provision for an environmental safeguard officer within its organizational structure responsible to coordinate environment safeguards implementation, ensure timely reporting, and submit monitoring reports to the ADB. At present, PMC does not have an environmental safeguard officer and PMC has been advised to appoint environmental officer on priority. There is a socio-economic impact monitoring and evaluation specialist within

PMC with a dual role of performing environmental safeguard tasks. In the absence of the environmental safeguard officer at the PMC, there could be coordination issues in addressing grievances and delays in timely submission of environmental monitoring report. At state level, each PIU has designated a focal environmental person within its structure and assisted by the environmental expert of the supervision consultant.

49. **West Bengal Subprojects (AH-02 and AH-48)**: The implementation support consultants (ISC) are supported by an experienced environmental expert with the responsibilities to supervise and monitor the contractors in implementing environmental mitigation measures. There is also an external monitor for wildlife conservation activities for AH-02 and AH-48 subprojects in West Bengal to conduct third party monitoring of implementation of environment safeguard activities and monitoring and implementation of wildlife related mitigation and enhancement measures.

50. **Manipur Subproject (Imphal-Tamenglong)**: There is an environmental institutional support and capacity development consultant (ISCD) and also construction supervision consultant (CSC). These consultants have one qualified environmental specialist within its team. The environmental experts have the responsibilities to supervise and monitor the contractors in implementing environmental mitigation measures. ISDC will also conduct third party monitoring of implementation of environment safeguard activities and monitoring and implementation of mitigation and enhancement measures. The CSC's environmental expert has the responsibilities to supervise and monitor the contractors in implementing environmental mitigation measures.

51. Each contractor has an experienced and qualified Environment, Health, and Safety (EHS) officer who is also designated to implement the environmental mitigation measures. He is responsible for day-to-day implementation of EMP. As this officer will have several responsibilities, a special training-workshop should be provided to ensure the implementation of mitigation measures and to ensure standard monitoring and reporting is carried out across all sub-projects.

52. During the desk review and site visits, it was observed that there was no proper communication between the environment officer of the PIU, ISC, contractor and the External Monitor for Wildlife Conservation Activities (EMWCA). Hence there is a need to enhance communication links and coordination between responsible environmental officers of these agencies to ensure smooth implementation of environmental mitigation measure. Figure 1 and Figure 2 shows the organization charts for the environmental management of SRCIP Tranche 1 subprojects in West Bengal and Manipur respectively.

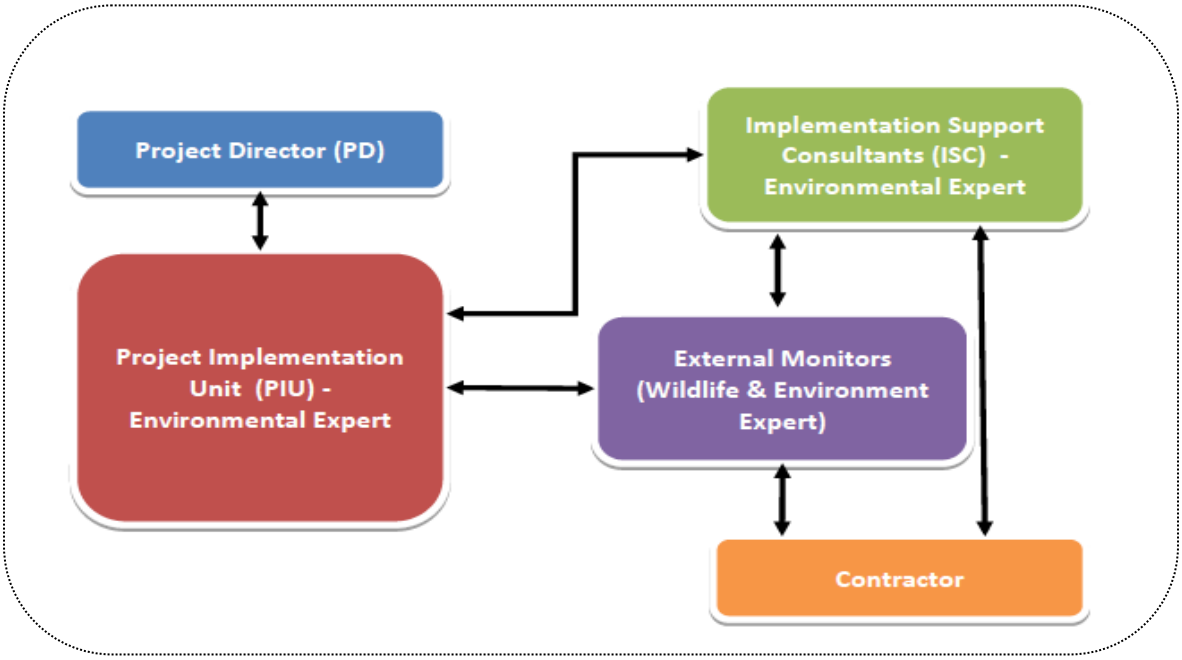


Figure 1: Organization Chart for Environmental Management in West Bengal (AH-02 and AH-48)

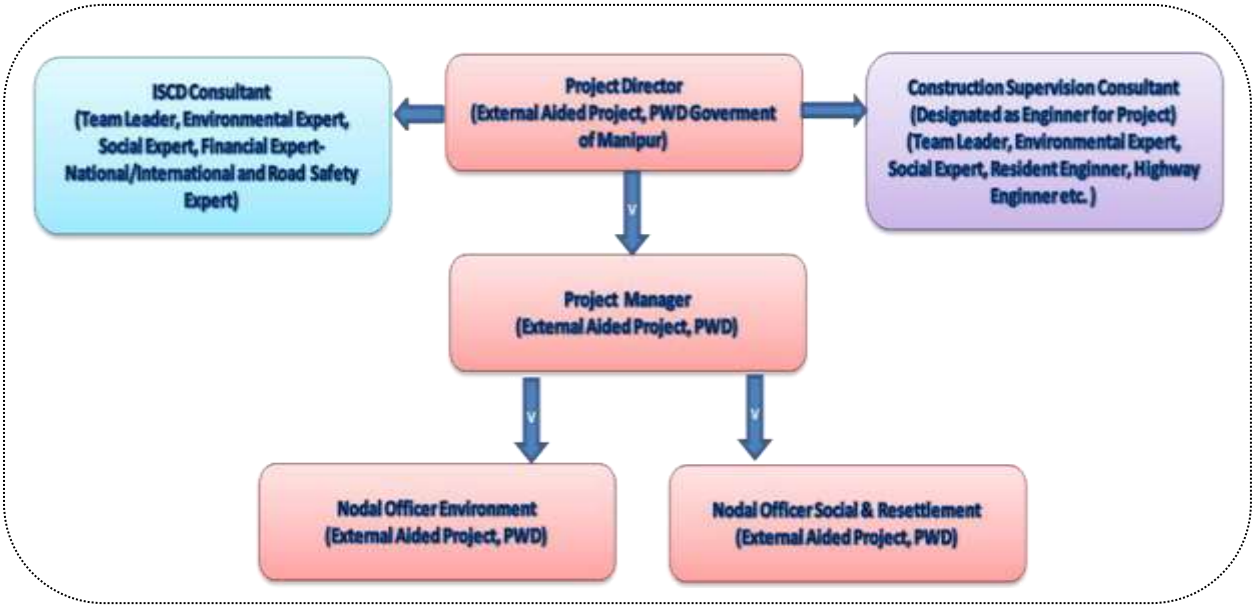


Figure 2: Organization Chart for Environmental Management in Manipur (Imphal – Tamenglong)

IV. CONCLUSION AND RECOMMENDATIONS

53. At the project preparation stage, the prescribed environmental assessment studies were successfully carried out for all subprojects included in Tranche 1 and the EMP and EMoP were integrated in all bidding documents. The contracts for civil works have included the

environmental requirement as special instruction to contractors. It is concluded that to date, the EA has largely complied with the general environmental conditions set in the EARF and Loan Conditions.

54. At the project level, satisfactory compliance to the EMP was established however corrective actions are required in some of the identified area (as discussed in previous sections). The required statutory clearances (environmental clearances and forest clearance) for the subproject roads are being obtained. The contractors' have also obtained NOCs from pollution control boards to establish and operate the hot mix and crushing plants and additional clearance from the Forest Department is being obtained for the sections of the roads located within forestland. In this context, it is noted that Tranche 1 has been implemented in accordance with the Government's environmental requirement.

55. There were no serious environmental problems associated with the early construction works. The establishment of site offices, construction camps, mobilization of resources, and land clearing were undertaken in cognizant of the mitigation measures for pre-construction stage as stated in the EMP.

56. No unanticipated impacts were experienced during project implementation so far. However, a change in the scope and strategy for wildlife mitigation has been warranted due to concerns raised by the local Forestry officials. The originally proposed 3 elephant underpasses will not be constructed. However, the WLMP as planned will be implemented based on feedback and guidance from the local Forestry officials. Budget savings from the exclusion of 3 elephant underpasses will be added to the WLMP.

57. The adequacy of the institutional arrangement to implement environmental safeguard requirement throughout project cycle is generally found satisfactory. However proper communication links between environmental specialists of key agencies i.e. ISC, CSC, External Monitor and Contractors is required for successful implementation of environmental safeguards throughout project cycle.

58. On the basis of these findings the following recommendations (Tabulated below) made to further enhance the success strengthen the environmental performance of the Project.

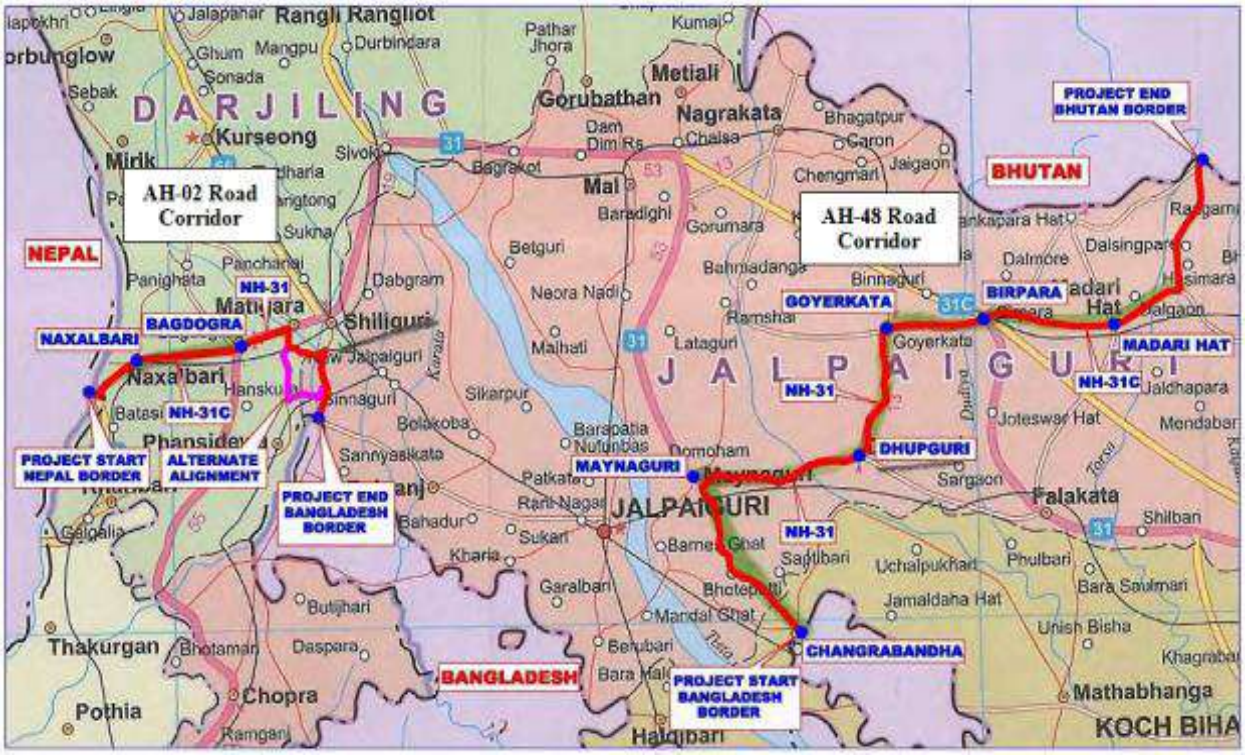
Table 7: Recommendations for Improvement

Issue	Responsibility	Timeframe
1. Expedite the process to get necessary regulatory clearances as listed below.		
a. Environmental clearance from SEIAA for Imphal-Tamenglong subproject	PIU, Manipur	Immediate. Civil work should not start in sections above 1000m without the environment clearance)
b. Finalization of Wildlife Management Plan	PIU (AH-48) and External Monitor for Wildlife	Immediate
c. Forest Clearance for AH-48	West Bengal PIUs	Immediate. Civil work should not start on forest land without forest

Issue	Responsibility	Timeframe
		clearance)
d. NOCs from the State Pollution Control Boards to establish construction camps/hot mix plants in Imphal-Tamenglong subproject	Contractor (IKT Road, Manipur)	Prior to establish and operate camps and plants.
2. Enhance communication links and coordination between responsible environmental officer of ISC, External Monitor, Environmental Focal Person within PIUs, Supervision Consultants and Contractors.	PIUs (Manipur and West Bengal)	Immediate
3. Monitoring of baseline environmental data for Imphal-Tamenglong Road	PIU Manipur and Contractor	Immediate.
4. Enforcement of use of PPEs by workers and monitoring of dust etc.	Contractors	Immediate
5. Provide adequate sanitation facilities at workers' camps (particularly in camp 3, at km 9+780 of AH-02 road septic tank is required).	Contractor	Immediate

59. No significant environmental risk and liabilities for Tranche 2 were identified in this environmental due diligence. Minor non-conformances such as inadequate occupational safety measures and lack of environmental quality monitoring are being addressed with additional capacity building and strict enforcement of mitigation and safety measures. The existing ADB environmental safeguard is found adequate in addressing environmental issues that is confronting Tranche 1. No unanticipated impacts were encountered demonstrating the robustness of the approved environmental assessment reports that formed part of the civil work contracts.

APPENDIX 1: LOCATION MAP OF SUBPROJECT ROADS



Map 1: Location map of AH-02 and AH-48 Project roads in West Bengal State

Map 2: Location map of Imphal-Tamenglong Subproject Road in Manipur State

APPENDIX 2: NO OBJECTION LETTER FROM THE DIRECTORATE OF ENVIRONMENT, IMPHAL, MANIPUR

GOVERNMENT OF MANIPUR
DIRECTORATE OF ENVIRONMENT
POROMPAT, IMPHAL – 05

No.1/48/2015(EIA)DoE Imphal, the 24th September, 2016

To,
The Project Director
EAP, PWD, Manipur

Sub:- Environmental Clearance for construction of Imphal Kangchup Tamenglong Road under ADB assisted SRCIP Project Loan No. 3118-IND : Request for issue on "No Objection" for commencement of work in the stretches of elevation below 1000 m MSL.

Sir,

I am directed to refer your letter No. 9/PD/NESRIP/Forest & Env/2013/1002, dtd. 22nd Sep., 2016 on the above subject, Government has conveyed approval under vide letter No. 57/82/2002-For. & Envt. (pt), dtd. the 23rd Sept., 2016 (copy enclosed) to issue "**NO OBJECTION**" from environment angle. However, it is to state that Department should ensure to follow the codal formalities of environmental clearance for construction of Imphal-Kangchup-Tamenglong Road for commencement of work to the Agency and subject to-in-principal approval by the competent authority under Forests (Conservation) Act, 1980.

Details / specific stretches of the road below 1000 m MSL and non-ecological sensitive zone under the above mentioned project are under given below.

Sl. No.	Road	Length (km)	Terrain	Land Use	Average Elevation above MSL (m)
1	Kangchup Makhong to Kangchup Chiru (12.944-16.350 km)	3.406	Plain / Hilly	Residential / Agricultural / Forest	785.440 - 998.182
2	Waphong village (30.525-37.175 km)	6.650	Hilly	Forest / Agriculture	998.350 - 999.048
3	Waphong to Bhalok Part III (41.850-92.825 km)	50.975	Hilly	Forest / Agriculture	999.227 - 999.810
	Total	**61.031**			

Encl. : As above

Yours sincerely
24/9/16
(Dr. M. Homeshwor Singh)
DIRECTOR

Copy to :
The Addl. Chief Secretary (Forests and Environment), Govt. of Manipur

APPENDIX 3: STATUS OF STAFF MOBILIZATION AND CONTRACTOR ACTIVITIES AT SITES UNDER TRANCHE 1 SUBPROJECTS

Sl. No.	Package	Road Sections		Mitigation measures										
		From	To	Site Clearance	Location of site for disposal	Site Offices		Construction Camps		Staff under Contract		Local Staff (Yes/ No)	Budget for Env. Mitigation	Remark
						No.	Places	No.	Places	No.*	Position			
1.	SRCIP-MO RTH/WB-AH-02	Panitanki	Fulbari	Completed	Within 1Km distance from the construction camps	1	At Km 8+600	1	Naxalbari Camp (at Km 9+777)	200	Engineer , Jun. Eng., Supervisor, Operators, Lab. Tech., Drivers, Accountant, Workers etc.	Yes only unskilled staff	No separate budget for Env. Mitigation is provided in BOQ.	Budget for Env. Mitigation is already included in contract cost as per special condition of contract.
2.	SRCIP-MO RTH/WB-AH48	Jaigaon	Chan Grabandha	Completed	Being identified.	2	At Mainpuri and Rangalo Bazna	2	Camp-1: Mainguri (km 19+800) Camp-2: Rangalo Bazna (km 75+160)	200	Do	Yes only unskilled staff	Do	Do
3.	MN/PWD /EAP/04	Imphal	Tamenglong	Ongoing	At Km 15+900	1	At Km 5+500	1	At Kanchup Chiru (Km 15+580)	150	Do	Yes only unskilled staff	Do	Do
	Total	**3 Road sections**				**4**		**4**		**550**				

(* Tentative staff numbers)

APPENDIX 4: STATUS OF EMP IMPLEMENTATION FOR CONTRACTS AH-02 (PANITANKI-FULBARI) AND AH-48 (JAIGAON-CHAN GRABANDHA)

Sl. No.	Environmental issues / impacts	Mitigation / Management Actions Proposed in the EMPs	Status of Management Actions	
			AH-02	AH-48
1	**Pre-Construction Stage**			
1.1	Tree clearance	**Enhancement/Mitigation Measures:** • Compensatory plantation & additional plantation in available clear space **Management Action:** • Only marked trees to be felled. • Compensatory plantation @ 5 saplings for each tree felled. No. of tree felled will be as per the list approved by DFO for the project site. • Removal of trees only within CoI after joint verification with forest department.	• Joint verification of trees to be cut has been completed and tree marking is completed for all stretches in the corridor • Tree clearance has been completed except for two (2 nos.) of isolated trees in the RoW.	• Joint verification of trees to be cut has been completed • Trees in non-forest lands have been removed
1.2	Grubbing & levelling at along Project road	**Enhancement/Mitigation Measures:** • Removal of remains of trees to facilitate construction and carting away of remains **Management Action:** • Contractor will carry out the clearing of stumps and levelling. • Carting away will be done by the Public Works (Road Directorate) after the stumps are removed from the ground.	• Most of the stump removal is completed there are isolated locations where roots were located.	• Stump removal is completed
1.3	Siting of construction Camp	**Enhancement/Mitigation Measures:** • Sitting will be finalized after approval of Authority Engineer who will look into the site and planning of the Contractor **Management Action:** • Contractor will prepare a site plan. • The Contractor will avoid camp site near water courses (Major perennial rivers) • Machinery and equipment area will be protected • Vehicle refuelling sites will be avoided near water sources	• Camp site establishment is completed at km 8+750. • Camp site and plant site at and km 9+780 for HMP and RE Panel Casting. Topsoil is preserved. • Pre-casting yard is established at km. 3+775 • Land Acquisition for the Batching Plant and casting yard at km 22 has been completed and CTE obtained from competent authority. • Approval of Authority Engineer for camp / plant site is yet to be issued. • Topsoil is preserved at campsite of km	• Camp sites are established at chainage km 19+800 in Mainagudi, km 75+200 at Rangali Bazna • Top soilis preserved for reuse at the campsite of Rangali Bazna

Sl. No.	Environmental issues / impacts	Mitigation / Management Actions Proposed in the EMPs	Status of Management Actions	
			AH-02	AH-48
			9+777	
2	**Construction Phase**			
2.1	Borrow pit exploitation causing loss of productive land (Borrow area development)	**Enhancement / Mitigation Measures:** • Indemnity by contractors to Chief Engineer P-3, MORTH, New Delhi against third party claims. **Management Action:** • Contractor will verify that enough quantity of borrow materials is available at identified borrow pits.	• No borrow areas are required only RBM is being used. The RBM is procured from licensed third party sources. Their licenses are being checked periodically.	• No borrow areas are required only RBM is being used. • Request to respective irrigation divisions applied for extraction of RBM but it is yet to be obtained. In the meantime, the RBM is procured from licensed third party sources. • Their licenses are being checked periodically.
2.2	Erosion/ damage to embankments	**Enhancement / Mitigation Measures:** • AH-48: Embankment portion at bridges, High embankment locations and ROB location (0.674 of Hasimara bypass), and locations of raised portions **Management Action:** • Appropriate items in specification for retaining wall/ Toe wall of slope stabilization measures, monitoring of complianceduring construction of retaining/ Toe wall and appropriate administration of contracts will be ensured.	• Shoulder protection measures for protecting from erosion during November 2015 after monsoon have been undertaken	• Shoulder protection measures for protecting from erosion during monsoon have been undertaken
2.3	Road side landscape development	**Enhancement / Mitigation Measures:** • The positive impact will be on bio-aesthetes and beauty • Landscaping and beautification of ponds and access roads will improve aesthetic considerations. **Management Action:** • Turfing of the slopes to check soil erosion with grasses etc., • Suitable drainage measures will be taken	• Turfing and landscaping will be carried out immediately after construction works are completed in the section. Test section have been carried out at km 19+000	• Turfing work on the slope of the Embankment between Ch. 8+300, 11+00, & 14+500 - 16+00. This activity planned just before Monsoon is good initiative by the EPC Contractor as it can restrict the erosion of shoulder and

Sl. No.	Environmental issues / impacts	Mitigation / Management Actions Proposed in the EMPs	Status of Management Actions	
			AH-02	AH-48
		to avoid water logging in adjoining area.		embankment slope soil during rainy season and also environmental friendly in regards of sedimentation control in storm water. • For rest of the sections, Turfing and landscaping will be carried out immediately after construction works are completed.
2.4	Safe site for construction worker's camp	**Enhancement / Mitigation Measures:** • AH:48: Site will be located at least at 500 m downwind from habitations and major water course and at least 4 km away from Jaldapara National Park **Management Action:** • Authority Engineer and PIU will approve the site chosen by the contractors condition will be put in contract document for location of site above specified distances.	• Camp site layout has in- principal approval from Authority Engineer but needs to be documented as an approval letter. But the location of all equipment and machinery in the campsite are approved by WBSPCB.	• Camp site layout has been approved by the Authority Engineer. Location of all equipment and machinery in the campsite are also approved by WBSPCB • Camp site of RangaliBazna at km 75+200 is more than 4 km away from Jaldapara National Park and there are no settlements in the 500 m radius of the camp site.
2.5	Sanitation and disposal facilities at construction worker's site	**Enhancement / Mitigation Measures:** • Proper availability of drinking water and sanitation facilities at worker's camp **Management Action:** • Contractors will install temporary toilets with septic tank/ soak pits. • Contractor will provide suitable collection and disposal system for collection of domestic refuse dustbins will be provided. The collected domestic kitchen / food waste shall be	• Septic tank is installed for treatment of toilet wastes in Camp 1. But in camp 3, at km 9+780 toilet water is being let out directly into village drains • Dust bins are installed for collection of solid wastes which is transported to the municipal land fill sites. • No compost pits have been provided as Food waste generated at the rate of 30 kg / day is being given to local people daily for use in their piggeries and other	• Septic tank is installed for treatment of toilet wastes. • Dust bins are installed for collection of solid wastes • No compost pits have been provided as Food waste is being given to local people daily for use in their piggeries and other farms.

Sl. No.	Environmental issues / impacts	Mitigation / Management Actions Proposed in the EMPs	Status of Management Actions	
			AH-02	AH-48
		recycled as compost and disposed in pits dug in the camp areas	farms.	
2.6	Cooking fuel at worker's camp	**Enhancement / Mitigation Measures:** • Workers' should not depend for cooking on fuel wood. **Management Action:** • Contractors will ensure availability of kerosene oil/ LPG.	• LPG commercial cylinders are being used for cooking in the campsites for all the staff and workers.	• LPG commercial cylinders are being used for cooking in the campsites for all the staff and workers.
2.7	Health facilities at worker's camp	**Enhancement / Mitigation Measures:** • Availability of first aid and Health facilities **Management Action:** • The Contractors will ensure presence of first aid boxes in two numbers and make shift dispensary at respective camps.	• Ten (10) no's of first aid boxes are placed at the campsites and plant locations at various place to enable fast treatment at the place of work immediately. • A dedicated room and vehicle is provided at the campsite at km 8+600 along with a Male nurse at the camp • The male nurse would provide timely medical help where needed including along the project road.	• Three (3) no's of first aid boxes are placed at the campsites i.e., one in each location. • Efforts are underway for appointing a doctor to attend to in case of injuries. A first aider is however, available at present
2.8	HIV/ AIDS Awareness campaign at workers' camp	**Enhancement / Mitigation Measures:** • Workers to be made aware of HIV/AIDS and protection measures. **Management Action:** • To organize awareness programme every month	• HIV/AIDS awareness camp organized in April 2016 onwards. • Various NGOs are being explored for engaging them for the purpose of conducting the camps. •	• HIV / AIDS awareness camp is organised in February 2016. A local NGO working in this sector has been engaged for the purpose.
2.8.1	Provision of Clean drinking water	**Enhancement / Mitigation Measures:** • The previous of unhygienic conditions at work place of construction workers. • The non-availability of good drinking water **Management Action:** • At every work place, the good and sufficient water supply shall be maintained to avoid waterborne diseases and securing the health of worker. • Adequate drainage, sanitation and waste disposal to be provided at workplace. • Medical care to be provided to workers if	• Clean drinking water is being supplied to the workers at the camp site by installing the RO filter. • All workers carry the water from camp to their respective work sites. All necessary bottles etc., are being provided to the workers for the purpose • Drainage and sanitation is provided at the camp site to maintain hygienic conditions • Medical care is being provided through a male nurse.	• Clean drinking water is being supplied to the workers at the camp site by installing the RO filter. • All workers carry the water from camp to their respective work sites. All necessary bottles etc., are being provided to the workers for the purpose • Drainage and sanitation is provided at the camp site to maintain hygienic

Sl. No.	Environmental issues / impacts	Mitigation / Management Actions Proposed in the EMPs	Status of Management Actions	
			AH-02	AH-48
		falling ill.		conditions • Photo of RO system provided at both the campsites in the project corridor.
2.9	Damage to services running parallel of across the alignment of project road corridor during construction leading to interruption in supply	**Enhancement / Mitigation Measures:** • Relocation of any potentially affected services prior to commencement of any construction works • Contractor will be responsible for identifying and safeguarding services adjacent to works and for compensating statutory undertakers for any accidental damage to such services **Management Action:** • Potential areas shall be identified and shared with AE.	• Utility shifting being carried out by EPC. Electric lines, PHED lines being shifted by PIU. Utility shifting has been completed in about 12.5 km length and rest is in progress / substantial completion. • No accidental damage has been reported so far	• Utility shifting being carried out by EPC. Electric lines, PHED lines being shifted by PIU • No accidental damage has been reported so far
2.10	Damage to Archaeological and cultural sites & properties	**Enhancement / Mitigation Measures:** • No existence of archaeological sites are reported • No monument exists in the corridor **Management Action:** • Relocation of cultural properties • Religious structures which are falling in the alignment will be suitably relocated in consultation with local people and authorities.	• Relocation of cultural properties in the RoW is being handled by the PIU in coordination with the contractor. Affected properties about 47 Nos. have been compensated to the claimants. • Affected small shrines have been shifted adjacent to the present location by the contractor with the construction equipment. • No archaeological finds have been encountered till date	• Relocation of cultural properties in the RoW is being handled by the PIU in coordination with the contractor. Affected properties about 13 Nos. have been compensated to the claimants. • Affected small shrines have been shifted adjacent to the present location by the contractor with the construction equipment. • No archaeological finds have been encountered till date.

Sl. No.	Environmental issues / impacts	Mitigation / Management Actions Proposed in the EMPs	Status of Management Actions	
			AH-02	AH-48
2.11	Fire Prevention	**Enhancement / Mitigation Measures:** • Adopt safe work practices and have adequate fire fighting facilities. **Management Action:** • Provision of adequate fire fighting equipment will be made.	• Necessary fire fighting arrangements including fire extinguishers are installed at the plant sites and camp sites. • Fire drills are being conducted to ensure safe handling of the equipment and undertaking fire fighting appropriately in case of any fire incidence.	• Necessary fire fighting arrangements including fire extinguishers are installed at the plant sites and camp sites. • Fire drills are being conducted to ensure safe handling of the equipment and undertaking fire fighting appropriately in case of any fire incidence.
2.12	Presences of contractor‘s work force increasing pressure on already strained local facilities including health & medical facilities	**Enhancement / Mitigation Measures:** • Contractor will provide own suitable equipped and staffed site emergency medical facilities **Management Action:** • Monitoring of compliances during construction and proper administration of contracts will be ensured.	• First aid box available and being replenished regularly. Total 10 boxes have been placed at campsite and plant sites. Hence, no strain on local facilities is being anticipated	• First aid box available and being replenished regularly. Total 3 boxes i.e. One each at the campsite and plant sites. Hence, no strain on local facilities is being anticipated
2.13	Incomplete post use clearance and reinstatement of construction camps leading to loss of land productivity or additional costs for land owners to reinstate land	**Enhancement / Mitigation Measures:** • Contractor will prepare site restoration plans for approval of authority Engineer and PIU to implement these plans fully prior to demobilization. All temporary work sites to be notified by the contractor prior to use. **Management Action:** • Monitoring of compliances during construction and proper administration of contracts will be ensured. • All sites will be photographed to record pre-use state. • BOQ’s will include nominated lump sum for reinstatement of temporary sites to pre-use status.	• Site restoration plans are yet to be prepared • Pre-use state photographs are taken for all the sites.	• Site restoration plans are yet to be prepared • Pre-use state photographs are taken for all the sites.
2.14	Pollution of land, ground water and	**Enhancement / Mitigation Measures:** • During construction it will be ensured that	• Material is being stored close to water body at km 19 and hence sand bags	• No work near surface water bodies is

Sl. No.	Environmental issues / impacts	Mitigation / Management Actions Proposed in the EMPs	Status of Management Actions	
			AH-02	AH-48
	surface water arising from sanitary and other wastes and spillage.	contractor does not dispose off debris in water bodies (River and streams being crossed by the project roads) **Management Action:** • Monitoring of compliances during construction and strict administration of contracts will be ensured.	are being used for restraining flow of material into the water body. No work near surface water bodies is underway at present • Measures for protection of groundwater from contamination due to sanitary wastes are being taken by providing sceptic tanks and soak pits at Camp 1. But in camp 3, at km 9+780 septic tank need to be installed.	underway at present • Measures for protection of groundwater from contamination due to sanitary wastes are being taken by providing sceptic tanks and soak pits
2.15	Contamination of soil from fuel and lubricants	**Enhancement / Mitigation Measures:** • The impact will be negligible since the chemical nature of the soil will not change much • Negligible impact on the growth of vegetation **Management Action:** • Vehicles and machines are maintained and refilled in such a fashion that old diesel spillage does not contaminate the soil. Impervious surface will be provided at the refuelling sites, bitumen, lubricant, fuel storage sites. • Fuel storage and refilling sites shall be kept away from cross drainage structure and important water bodies. • Spoils shall be disposed off as desired and the site shall be fully cleaned before handing over.	• Waste oil is being collected at the rate of 120 lit /month (Up to date) • Impervious surface for collection of waste oil is planned for construction • Waste oil is being collected for reuse and recycling through authorised recyclers. • Till date about 4000 lit has been collected and stored in the premises for sale to the recyclers. The storage place has impervious surface and it is away from water bodies.	• Waste oil is being collected for reuse and recycling through authorised recyclers. The waste oil collected is stored in the premises for sale to the recyclers • Impervious surface for collection of waste oil provided • Vehicle wash area is planned for construction
2.16	Contamination of soil from construction wastes	**Enhancement / Mitigation Measures:** • The impact will be marginal of the soil quality • The growth of vegetation will be partially disturbed • Vehicle maintenance and refuelling will be confined to areas under construction yard to trap discarded lubricant and fuel spills.	• All construction wastes are being disposed in the RoW. Planned to reuse bituminous waste.	• Vehicle washing platform is yet to be provided • Waste disposal sites are being identified

Sl. No.	Environmental issues / impacts	Mitigation / Management Actions Proposed in the EMPs	Status of Management Actions	
			AH-02	AH-48
		Management Action: • The construction wastes shall be dumped in selected pits, developed in infertile land • Follow the norms of SPCB • Borrow pits to be filled by such wastes • Ensure vehicles are cleaned, serviced and refuelled in the service area only.		
2.17	Contractor's water abstraction resulting in depletion of scarce water resources with local uses and pollution of surface water bodies from construction activities.	**Enhancement / Mitigation Measures:** • Contractor will make suitable arrangement for own supply and protection of water bodies from pollution • Silt fencing will be provided all around the base of the stockpile of materials wherever material is stockpiled near water bodies **Management Action:** • Monitoring of compliances during construction and strict administration of contracts will be ensured.	• Silt fencing shall be provided for about 300 m along the water bodies that are close to the road.	• Silt fencing shall be provided along the water bodies that are close to the road.
2.18	Construction traffic causing pavement and structure damage to roads due to overloading increasing congestion and increased road safety hazards	**Enhancement / Mitigation Measures:** • Contractor will use appropriate vehicles and to comply with legal gross vehicle and axle load limits. • Contractor will repair damage at own expense **Management Action:** • Monitoring of compliances during construction and strict administration of contracts will be ensured.	• No impacts till date have been identified	• No impacts till date have been identified
2.19	Road safety hazards associated with temporary traffic diversions	**Enhancement / Mitigation Measures:** • Contractor will take all reasonable measures to minimize interference with traffic flew and to provide safe transit at diversions. The contractor will maintain two-way traffic at diversions and will inform to local traffic police about the traffic diversion.	• Traffic management plans are prepared for diversions • Road safety measures as per IRC: SP-55 are being followed.	• Traffic management plans are prepared for diversions and accordingly, diversions are being carried out on site

Sl. No.	Environmental issues / impacts	Mitigation / Management Actions Proposed in the EMPs	Status of Management Actions	
			AH-02	AH-48
		Management Action: • Monitoring of compliances during construction and strict administration of contracts will be ensured.		
2.20	Pollution from Hot Mix Plant, Concrete batching Plant, Construction yard and due to movement and operation of construction vehicles and machinery.	**Enhancement / Mitigation Measures:** • Construction camps will be located in open areas and away from residential complexes. **Management Action:** • Monitoring of air pollution and timely action to decrease the pollutant concentration by appropriate measure will be taken up.	• Construction camps are more than 500 m away from settlements • AAQM is initiated from April 2016	• Construction camps are more than 500 m away from settlements • AAQM has been initiated in April 2016
2.21	Emission from construction vehicle and machinery	**Enhancement / Mitigation Measures:** • Effect on human health • Dust settled on leaves may reduce growth rate of the plants • Crowded market places and construction sites will have higher degree of emission **Management Action:** • All vehicles, equipment's and machinery used for construction shall be regularly maintained to ensure that the pollution emissions levels are as per norms of SPCB • Monitoring of suspended particles test will be conducted as per the norms of SPCB • The human settlements shall be at least 500 m downward wind direction of asphalt mixing plant.	• Construction camps are more than 500 m away from settlements • AAQM is initiated from March 2016 onwards • Pollution under control certificates are being monitored and regularly updated	• Construction camps are more than 500 m away from settlements • AAQM is initiated in April 2016 • Pollution under control certificates are being monitored and regularly updated.
2.21	Dust and its treatment	**Enhancement / Mitigation Measures:** • The impact of dust at construction sites is rather adverse, but localised in nature • No serious health problem is likely to be caused **Management Action:**	• Sprinkling of water is being done with 4 water tankers for thrice a day.	• Sprinkling of water is being done with 8 water tankers for 3 to 4 times a day.

Sl. No.	Environmental issues / impacts	Mitigation / Management Actions Proposed in the EMPs	Status of Management Actions	
			AH-02	AH-48
		• Precautions to reduce the level of dust emissions from the hot mix plants shall be taken • The Hot Mix Plants be sited at least 500 m from nearest habitation. The plant will be including the dust extraction unit. Water sprinklers will be provided at the HMP dust collection pits to avoid dust rising. • Water should be sprayed in the earth mixing sites, asphalt mixing site and service roads. In filling sub grade, water sprayed is needed to solidity the material. After the impacting, water should be sprayed regularly to prevent dust. • Vehicles delivering material should be covered.	• Trucks are being covered with tarpaulin while material is transferred	
2.22	Noise Levels	**Enhancement / Mitigation Measures:** • Construction camps will be located in open areas as far as possible from residential areas. • All equipment will be maintained in good working order, properly designed engine enclosures and inbuilt silencers. • Construction work will be prohibited between 10.00 PM to 6.00 AM near residential areas. **Management Action:** • Contractor to set up the camp site as per the EMP conditions and seek approval of Authority Engineer • Ensure the equipment is maintained in good working condition • In construction sites within 150m radius where, there are human settlements, construction will be stopped between	• Construction working times are 8 Am to 5 pm and no working in the night time is being carried out	• Construction times are maintained from 7 am to 7 pm and no working in the night time is being carried out

Sl. No.	Environmental issues / impacts	Mitigation / Management Actions Proposed in the EMPs	Status of Management Actions	
			AH-02	AH-48
		10.00 pm and 6.00 am.		
2.23	Noise from blasting operation	**Enhancement / Mitigation Measures:** • The sudden and loud noise of blasting is disturbing and irritating • The intense noise may cause partial deafness **Management Action:** • People living near such sites will be given prior information of operational hours. • Blasting will be undertaken only in day time.	• No blasting is being carried out by the contractor as material is being procured from third party sources who are already licensed.	• No blasting is being carried out by the contractor as material is being procured from third party sources who are already licensed.
2.24	Relocation of common property resources (CPRs)	**Enhancement / Mitigation Measures:** • AH-48: 19 Hand Pump, 12 tube well, 21 passenger sheds and 09 water taps within ROW. These need to be relocated in case of public assets of the owners need to be compensated in case of private asset **Management Action:** • All common property resources shall be identified and relocated during the course of execution of the civil works but prior to dismantling of the asset.	• The CPRs affected by the road works have been compensated. About 60 Nos of CPRs have been affected and the impacts are adequately compensated.	• The CPRs affected by the road works have been compensated by the EA.
2.25	Relocation Utility lines / Community Utility	**Enhancement / Mitigation Measures:** • Short term negative impact during transitory phase of shifting of utility lines. • No impact on shifting wells, hand pumps etc. **Management Action:** • All utilities to be relocated with prior approval of the concerned agencies • All communities' utilities such as sources of water to be relocated to suitable places.	• Relocation of utilities is being undertaken by the EA.	• Relocation of utilities is being undertaken by the EA.
2.26	Relocation of religious structures	**Enhancement / Mitigation Measures:** • 53 small religious strictures are falling in proposed ROW. These needs to be relocated in consultation with locals.	• Assistance for loss of religious structures is being undertaken by the EA. Compensation has been paid for 47 religious structures so far.	• Assistance for loss of religious structures is being undertaken by the EA. Compensation has

<table>
<tr><th rowspan="2">Sl. No.</th><th rowspan="2">Environmental issues / impacts</th><th rowspan="2">Mitigation / Management Actions Proposed in the EMPs</th><th colspan="2">Status of Management Actions</th></tr>
<tr><th>AH-02</th><th>AH-48</th></tr>
<tr><td></td><td></td><td>Management Action:
Local people and authorities will be consulted
Land for relocation will be identified in consultation with them
Process for relocation will be initiated and relocated.</td><td>Wherever possible shrines have been relocated to their adjacent locations that do not interfere with road works</td><td>been paid for 13 religious structures so far.
Wherever possible shrines have been relocated to their adjacent locations that do not interfere with road works</td></tr>
<tr><td>2.27</td><td>Accidental hazards and Safety</td><td>Enhancement / Mitigation Measures:
The contractor will prepare a safety manual for all activities at construction as well as activities at construction camps. This manual will have safety measures to be adopted. The safety procedure for transpiration of construction materials will also detailed.
The type of accidental risks may be due to ill-maintained machines and vehicles due to poor light conditions at the work place, or due to carelessness and poor management of the work involved
Management Action:
Safety Manual prepared and submitted to AE details out the management plans
To ensure safe construction in the temporary accesses during construction, lighting devices and safety signal devices shall be installed. Traffic rules and regulation to be strictly followed.
At blasting sites- the blasting time, signal and guarding will be regulated. Prior to blasting the site should be thoroughly inspected. Blasting will not be carried out during peak hours.
Safety of workers undertaking various operations during construction should be ensured by providing helmets, masks, safety goggles etc.</td><td>No fatalities have happened during construction till date
DRA provides treatment for common ailments as well as work related injuries. The month wise number of cases reported are as below:
<table><tr><td rowspan="2">Month</td><td colspan="3">No. of cases</td></tr><tr><td>Diseases</td><td>Injuries</td><td>Fatalities</td></tr><tr><td>Jan-16</td><td>3</td><td>1</td><td>0</td></tr><tr><td>Feb-16</td><td>4</td><td>2</td><td>0</td></tr><tr><td>Mar-16</td><td>2</td><td>Nil</td><td>0</td></tr><tr><td>Apr-16</td><td>6</td><td>1</td><td>0</td></tr><tr><td>May-16</td><td>4</td><td>Nil</td><td>0</td></tr><tr><td>Jun-16</td><td>6</td><td>2</td><td>0</td></tr><tr><td>Total</td><td>25</td><td>6</td><td>0</td></tr></table>Note: So far all injuries are minor such as small cuts, and scrapes.</td><td>No fatalities have happened during construction till date
All injuries are treated for first aid only and no referrals were needed</td></tr>
</table>

Sl. No.	Environmental issues / impacts	Mitigation / Management Actions Proposed in the EMPs	Status of Management Actions	
			AH-02	AH-48
		• The electrical equipments should be checked regularly to avoid risks to workers. • At every work place, a ready available first aid unit including an adequate supply of dressing materials, a mode of transport.		
2.28	Negative impact on Flora due to Cutting of Trees and removal of vegetation	**Enhancement / Mitigation Measures:** • To compensate for 15997 numbers of trees to be cut 79,985 numbers of trees will planted **Management Action:** • The number of trees felled will be confirmed by PD. To compensate the felled trees adequate number of trees as finalised by the PD will be planted.	• The compensatory afforestation will be taken up after completion of the road construction. • Locations for afforestation and landscaping scheme are yet to be identified • About 250 trees have been planted in June 2016 but were drowned during the monsoon due to heavy rains • To avoid such situations, a Tree Plantation scheme will be prepared at finalised locations and accordingly planted.	• The compensatory afforestation will be taken up after completion of the road construction. Locations for afforestation and landscaping scheme are yet to be identified
2.29	Road plantation side	**Enhancement / Mitigation Measures:** • Heavy loss of roadside trees leading to increase in air and noise pollution. **Management Action:** • Trees will be removed as per the design with prior approval of DFO • Five trees will be planted in case of one removed.		
2.30	Negative impact on Fauna.	**Enhancement / Mitigation Measures:** • The compensatory plantation will provide nesting ground to avifauna as this will be done in available space on either side of road. **For AH-48 only** • Construction of three underpasses for the elephant crossing in Jaldapara Wild Life Sanctuary at KM 718, KM 86.173 AND	• Location of compensatory plantation is yet to be identified. Rest of the items are not applicable for this package	• Location of compensatory plantation is yet to be identified. • Construction works in the premises near the sanctuary and in forest areas are not initiated yet as the Wild life clearance and forest clearance are

Sl. No.	Environmental issues / impacts	Mitigation / Management Actions Proposed in the EMPs	Status of Management Actions	
			AH-02	AH-48
		KM 86.913. • The elephant underpass construction works will be taken up in December to May period when elephant movement is low. • Necessary signage on either side of project road will be provided at Jaldapara Wild Life Sanctuary and at locations of elephant underpasses to warn the road users. • Construction workers shall be trained about safe handling of animals if found by chance. Cost of training built into training component cost. • Construction workers will be trained not to go for fishing in water bodies. • Noise barrier will be provided in the form of fibre sheet in the entire length of project road portion falling Jaldapara Wild Life Sanctuary (km 85.022 to 87.900) **Management Action:** • Necessary training to workers not hunt the animals and birds in Jaldapara Wild Life area. • Ensure Elephant underpasses are constructed as per specifications. • Noise barrier wall about 3 m height in the form of fibre sheet in entire length of project road falling in Jaldapara Wild Life Sanctuary.		yet to be received • Measures as required in the EMP will be undertaken prior to initiation of the construction works in the area • Due to concerns raised by the State/Divisionalforestry officials on non-use of the underpasses and increase in elephant – wildlife conflicts due to potential change in elephant movement route during construction of the underpasses, it was decided that the underpasses will not be constructed. Now there will only be an improvement in road surface within the PWD ROW. Speed control measures and informatory sign boards will be provided to prevent vehicle – wildlife collisions.
2.31	Occupational Safety and Health	**Enhancement / Mitigation Measures:** • Construction worker will be provided with personal protective equipment (PPE) such as ear plugs, helmets, safety shoes, gloves etc. **Management Action:** • The contractor will ensure adequacy and	• All construction workers are provided training for use of PPE and tool box meetings are regularly conducted. Few photographs indicating use of PPE are as below.	• PPE are being issued on a regular basis to all workers.

Sl. No.	Environmental issues / impacts	Mitigation / Management Actions Proposed in the EMPs	Status of Management Actions	
			AH-02	AH-48
		availability of PPEs		
2.32	Siltation in to water Bodies	**Enhancement / Mitigation Measures:** • The siltation will be avoided by not storing the construction waste, excavated earth etc. near the banks of surface water bodies. **Management Action:** • Silt fencing using geo textiles will be provided. The details of silt fencing provided in 3900 m.in AH-48 and 300 m in AH-02.	• Silt fencing shall be provided for about 300 m along the water bodies that are close to the road.	• Silt fencing shall be provided along the water bodies (cumulatively for about 3900 m) in stretches that are close to the road. As of now no silt fencing has been provided.
2.33	Water Bodies and water sources	**Enhancement / Mitigation Measures:** • The part filling of a ponds will have only negative impact **Management Action:** • Any source of water for community such as ponds, wells, tube-wells etc. lost incidentally shall be replaced immediately. • All desired measures will be taken to prevent temporary or permanent flooding.	• Presently source of water is borewell. No surface water sources are being used and no water body is getting affected due to construction works	• Presently source of water is borewell. No surface water sources are being used and no water body is getting affected due to construction works
2.34	Drainage and run-off water	**Enhancement / Mitigation Measures:** • The flow of runoff water will not be affected largely, excepting certain stretches where the drainage problem already exists. **Management Action:** • At cross drainage channels, etc the earth stone or any other construction material shall be properly disposed of so as not to block the flow of water • All necessary precaution shall be taken to construct temporary or permanent device to prevent water pollution.	• These measures will be undertaken while working close to water bodies	• These measures will be undertaken while working close to water bodies
2.35	Contamination of water from construction wastes	**Enhancement / Mitigation Measures:** • All measures will be taken to prevent the waste water produced in construction site from entering directly in to water body as	• These measures will be undertaken while working close to water bodies	• These measures will be undertaken while working close to water bodies

Sl. No.	Environmental issues / impacts	Mitigation / Management Actions Proposed in the EMPs	Status of Management Actions	
			AH-02	AH-48
		directed by Authority Engineer. Construction works near surface water sources shall be avoided during monsoon • The discharge standards promulgated under the Environmental Protection Act, shall be strictly adhered to. **Management Action:** • Condition will be included in contract document		
2.36	Contamination of water from fuel and lubricants	**Enhancement / Mitigation Measures:** • The construction wastes may increase the suspended matter and clay in stagnant water bodies • There will be very little increase in toxicity • The community dependent on such water used for purpose other than drinking may be affected • The fuel and lubricants may affect the both component of water bodies **Management Action:** • Construction work close to the streams or other water bodies shall be avoided especially during monsoon • All waste arising from the project is to be disposed of as per the norms of SPCB • Waste products must be collected stored and transferred to disposal location. • The slopes of embankment landing to water bodies should be modified and re-canalized so that contaminant may not enter the water body. • To avoid contamination from fuel and lubricants the vehicles and equipment shall be properly maintained and refilled.	• These measures will be undertaken while working close to water bodies • Measures for provision of drainage are undertaken as part of the camp site layout for camp site.	• These measures will be undertaken while working close to water bodies • Measures for provision of drainage are undertaken as part of the camp site layout for camp site. • Stream passing close to plant site is isolated through barricades to avoid runoff entering the water body
2.37	Use of water for construction	**Enhancement / Mitigation Measures:** • The use of water from sources, already in use by local community may cause	• Water source for Construction water is borewell at the camp and plant sites. The details of sources of water are as	• Water source for Construction water is borewell at the camp and

<table>
<tr><th>Sl. No.</th><th>Environmental issues / impacts</th><th>Mitigation / Management Actions Proposed in the EMPs</th><th colspan="2">Status of Management Actions</th></tr>
<tr><th></th><th></th><th></th><th>AH-02</th><th>AH-48</th></tr>
<tr>
<td></td><td></td><td>scarcity of water for community
• The easy availability of underground water will not affect the water tube
Management Action:
• Arrangement of supply and storage of water will be made by the contractor in such a way so that the water availability and supply to nearby communities remain unaffected. If a new tube-well is to be bored, proper sanction and approval by Ground water department shall be obtained.
• The waste of water during the construction shall be minimised.</td>
<td>below. These pumps are located at the campsites
<table>
<tr><th>S.No.</th><th>Location</th><th>Depth (ft)</th><th>Pump cap. (hp)</th></tr>
<tr><td>1</td><td>8+750</td><td>260</td><td>7.5</td></tr>
<tr><td>2</td><td>9+050</td><td>240</td><td>5</td></tr>
<tr><td>3</td><td>9+777</td><td>260</td><td>5</td></tr>
<tr><td>4</td><td>3+750</td><td>240</td><td>5</td></tr>
</table>
The bore wells have been improved by the CSC and No Objection letters have been issued by the SPCB for the bore wells.</td>
<td>plant sites. The details of sources of water are as below. These pumps are located at the campsites
<table>
<tr><th>S.No.</th><th>Bore dia (in)</th><th>Depth BGL (ft)</th><th>Dsch. Lit/ min</th></tr>
<tr><td>1</td><td>6</td><td>155</td><td>30</td></tr>
<tr><td>2</td><td>4</td><td>65</td><td>15</td></tr>
<tr><td>3</td><td>4</td><td>55</td><td>15</td></tr>
<tr><td>4</td><td>4</td><td>60</td><td>20</td></tr>
<tr><td>5</td><td>4</td><td>60</td><td>20</td></tr>
<tr><td>6</td><td>4</td><td>60</td><td>20</td></tr>
<tr><td>7</td><td>4</td><td>60</td><td>20</td></tr>
<tr><td>8</td><td>4</td><td>60</td><td>20</td></tr>
<tr><td>9</td><td>4</td><td>60</td><td>20</td></tr>
<tr><td>10</td><td>6</td><td>60</td><td>35</td></tr>
</table>
</td>
</tr>
<tr>
<td>2.38</td><td>Environmental monitoring during construction phase</td>
<td>Enhancement / Mitigation Measures:
• Ambient air quality, water quality, noise and soil quality as per EMOP to be Monitored
• Monitoring of construction sites arrangements made for protection measures at storage areas, drainage arrangement and sanitation at construction camp.
• Inspection of construction camps for sanitation.
Management Action:
• Environment monitoring for pollution control shall be as per Environment Monitoring Plan.
• Record will be maintained for reporting and for future reference.</td>
<td>• Monitoring agency having NABL accreditation is engaged in the project. Environmental Monitoring has been initiated from March 2016 onwards.</td>
<td>• Monitoring agency having NABL accreditation has been engaged in the project. Environmental Monitoring has been initiated from April 2016 onwards.</td>
</tr>
<tr>
<td>2.39</td><td>Biodiversity Assessment in Jaldapara Wild Life Sanctuary at</td>
<td>Enhancement / Mitigation Measures:
• Biodiversity Assessment through an external expert at the midterm of</td>
<td>• Not Applicable</td>
<td>• Bio-diversity assessment will be conducted at the required stage of the</td>
</tr>
</table>

Sl. No.	Environmental issues / impacts	Mitigation / Management Actions Proposed in the EMPs	Status of Management Actions	
			AH-02	AH-48
	Midterm of construction phase	construction to assess any damage or changes in the biodiversity in 3 km distance on either side in area due to construction **Management Action:** • The assessment will help to adopt more strict supervision and monitoring if any damage major changes are observed in comparison to baseline scenario.		construction works as per the EMP

Status of EMP Implementation for the Imphal – Tamenglong Road

Sr. No.	Environmental components related to project activities	Compliance			Explanation(in case of done or not done justification necessary)
		YES	NO	N/A	
PRECONSTRUCTION STAGE					
1	Site preparation work completed by PIU including necessary clearance	YES			Major Initiative Taken by PIU. Few are in Progress such as shifting of electrical post, pipe line etc. EC & FC is in final stage for approval.
CONSTRUCTIONSTAGE					
2	Establishment of temporary camps with sanitary and solid waste management arrangement	NO			Camp is under development
3	Removal of overburden and excavated material from working site and use/preservation of the same–as per mitigation measures	YES			Partially progress
4	Water sprinkling at construction site for arresting dust	NO			Not Done
5	Materials carrying vehicle are covered	NO			Not Done
6	All vehicles and equipments mobilized to construction site and producing emission, have Pollution Control Board certification	Not Given Document to CSC by Contractor			Review under progress
7	At sensitive locations enclosures provided around generator set and concrete mixture or other noise producing machinery	-			No DG sets are placed at site.
8	Regular maintenance of noise producing equipment done	Yes			Done. Contractor has advice to purchase hand Noise monitoring DB meter to monitor site noise due to machine operation.

Sr. No.	Environmental components related to project activities	Compliance			Explanation(in case of done or not done justification necessary)
		YES	NO	N/A	
9	Arrangement of drainage of waste water and arresting solid waste from waste water generated at construction site	Not Applicable			No Camp so no such waste water at site. Base and Construction camp is under construction.
10	Felling of trees done (if necessary) with mitigation measures i.e. planting of three trees for each tree fell.	No			Stage-II Final approval is waiting from Forest Department. Civil work is in progress without forest section.
11	Local flooding from watering of excavation, flushing pipes etc.	No			Not yet observed
12	Ensure use of Personal Protective Equipment like helmet, gumboot, gloves, safety tape, nose musk and earplugs at workplace	Yes			Partially equipped during this period.
13	Provide Health and Safety training to all personnel and implement H&S plan	No			No such staff training done by Contractor or CSC during this quarter.
14	Plan truck routes to avoid Town, narrow or congested roads, important or fragile buildings, religious and tourist sites narrow or congested roads, important or fragile buildings, religious and tourist sites	Not Applicable			Scope will be operated when situation demand.
15	Plan transport of waste to avoid peak traffic and tourist season	Not Applicable			Scope will be operated when situation demand.
16	Suitable short term traffic diversion and implementation of traffic management plan at construction site	Not Applicable			Scope will be operated when situation demand.
17	Consideration of public safety as per prescribed mitigation measures	Yes			Done.
18	Consideration of protection of religious and heritage places/ structures	- -			Not Identified during this period. Scope will be operated when situation demand. None of these issue still arise but special attention always advice to preserved such cases.
19	Employ at least 50% of work force from communities near sites	Yes			Partially done.
20	Continuous monitoring on implementation of mitigation measures	Yes			Partially done.

APPENDIX 5: ENVIRONMENTAL QUALITY MONITORING RESULTS (AH-02 AND AH-48 SUBPROJECTS)

Mitra S. K. Private Limited

Shruchi Centre (5th Floor)
74B, Acharya Jagadish Chandra Bose Road
Kolkata – 700 016, West Bengal, India
CIN: U51909WB1956PTC023037

T : 91 33 22172249 / 40143000 / 22650006 / 22650007
F : 91 33 22650006
E : mkp@mitrask.com
W : www.mitrask.com

TEST REPORT

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DINESHCHANDRA R. AGRAWAL INFRACON PVT. LTD.

Bolbom Shankar Service Station, Satbhaiya Dari Basti,
P.O + P.S : Naxalbari, Dist. Darjeeling, West Bengal - 734429
Ref. No. & Date : DRA/AH-02/WO/15-16/36 , DTD- 31.01.2016

Report No. : EC/048
Date : 11.04.2016
Sample Description :
Ambient Air

ANALYSIS RESULT

Sl. No.	Date of Monitoring	Location	Co-ordinates	Concentration of Pollutants					
				PM_{10} in $\mu g/m^3$	$PM_{2.5}$ in $\mu g/m^3$	Sulphur Dioxide (SO_2) in $\mu g/m^3$	Nitrogen Dioxide(NO_2) in $\mu g/m^3$	Carbon monoxide (CO) in mg/m^3	Lead (Pb) in $\mu g/m^3$
1	03.03.2016 to 04.03.2016 (12.30 pm to 12.30 pm)	km 08+750 (WMM &Batching plant in Camp 1)	26°41'10.2"N 88°13'17.4"E	119	58	5.9	26.2	0.68	0.02
2	04.03.2016 to 05.03.2016 (3.40 pm to 3.40 pm)	km 09+777 (HMP in Camp 3)	26°41'13.2"N 88°13'54.6"E	97	52	5.4	23.8	0.59	<0.02
3	06.03.2016 to 07.03.2016 (1.30 pm to 1.30 pm)	km 24+950 (Shivmandir area)	26°42'30.1"N 88°21'42.1"E	120	71	5.9	21.5	0.42	0.03
4	07.03.2016 to 08.03.2016 (2.30 pm to 2.30 pm)	km 27+590 (Near Medical College)	26°41'16.0"N 88°23'05.2"E	97	50	6.7	29.6	0.39	0.02
Limit as per CPCB notification, New Delhi, 18th Nov, 2009. No.B-29016/20/90/PCI-I.				**100**	**60**	**80**	**80**	**2**	**1**
Sampling and Analysis done according to				**IS: 5182(Part-23)-2006**	**USEPA CFR-40, Part-50, Appendix-L**	**IS: 5182 (Part-2)-2001**	**IS: 5182 (Part- 6)-2006**	**IS 5182 :(Part-10):1999**	**EPA-IO 3.2**

For Mitra S.K Pvt Ltd

Report Prepared by

Authorised Signatory

Mitra S. K. Private Limited

Shrachi Centre (5th Floor)
74B, Acharya Jagadish Chandra Bose Road
Kolkata – 700 016, West Bengal, India
CIN: U51909WB1956PTC023037

T 91 33 22172249 / 40143000 / 22650006 / 22650007
F 91 33 22650008
E info@mitrask.com
W : www.mitrask.com

TEST REPORT

Name & Address of the Customer :
DINESHCHANDRA R. AGRAWAL INFRACON PVT. LTD.
Bolbom Shankar Service Station, Satbhaiya Dari Basti,
P.O + P.S : Naxalbari, Dist. Darjeeling, West Bengal - 734429
Ref. No. & Date : DRA/AH-02/WO/15-16/36 , DTD- 31.01.2016

Report No. : EC/047
Date : 11.04.2016
Sample Description : Noise

ANALYSIS RESULT

Sampling Station	km 09+777 (HMP In Camp 3)	km 22+093 Near University Area	km 19+601 Bagogra Airport More	km 27+590 Near Medical College
Co-Ordinates	N 26°41'14.0" E 88°13'54.2"	N 26°42'20.9" E 88°21'12.7"	N 26°42'03.5" E 88°19'44.6"	N 26°41'16.0" E 88°23'05.2"
Distance Form PCL (m)	25 m	20 m	20 m	10 m
Direction Form Reference Point	RHS	RHS	RHS	RHS
Monitoring Date	3/3/2016 to 4/3/2016	4/3/2016 to 5/3/2016	6/3/2016 to 7/3/2016	7/3/2016 to 8/3/2016
Monitoring Time	6.04 pm to 6.04 pm	4.45 pm to 4.45 pm	6.14 pm to 6.14 pm	12.45 pm to 12.45 pm
Day time Leq dB(A)	60.2	58.0	71.9	62.7
Night time Leq dB(A)	53.0	50.4	66.1	52.8
L10 in dB(A)	51.2	47.1	64.8	50.8
L50 in dB(A)	57.3	54.4	71.6	55.0
L90 in dB(A)	62.3	59.6	72.8	64.6

Noise Limit as per CPCB

Code/ Category	Leq dB(A) Day Time	Leq dB(A) Night Time	NOTE :
A/ Industrial	75	70	Day Time : 06.00 Hr.-22.00 Hr.
B/ Commercial	65	55	Night Time:22.00 Hr.-06.00 Hr.
C/ Residential	55	45	
D/ Silence	50	40	

Report Prepared By

for Mitra S. K. Private Limited

Authorised Signatory

Mitra S. K. Private Limited

Shrachi Centre (5th Floor)
74B, Acharya Jagadish Chandra Bose Road
Kolkata – 700 016, West Bengal, India
CIN: U51909WB1956PTC023037

T 91 33 22172249 / 40143000 / 22650006 / 22650007
F 91 33 22650008
E info@mitrask.com
W www.mitrask.com

TEST REPORT

Name & Address of the Customer :
DINESHCHANDRA R. AGRAWAL INFRACON PVT. LTD.
Bolbom Shankar Service Station, Satbhaiya Dari Basti,
P.O + P.S : Naxalbari, Dist. Darjeeling.West Bengal - 734429
Ref. No. & Date : DRA/AH-02/WO/15-16/36 , DTD- 31.01.2016

Report No. : EC/045
Date : 11.04.2016
Sample Description : Ground Water
Date of sampling : 08.03.2016

BACTERIOLOGICAL ANALYSIS RESULT

Sampling Location			KM 08+ 750 (WMM and Batching Plant in Camp 1)	KM 09+ 777 (HMP in camp 3)
Latitude			26° 41'09.0"N	26° 41'12.6"N
Longitude			88° 13'20.4"E	88° 13'55.0"E
SL. No.	Test Parameters	Unit	Result	
1.	E.coli	/100ml	Absent	Absent
2.	Total coliform organism	/100ml	Absent	Absent

CHEMICAL ANALYSIS RESULT

Sampling Location			KM 08+ 750 (WMM and Batching Plant in Camp 1)	KM 09+ 777 (HMP in camp 3)
Latitude			26° 41'09.0"N	26° 41'12.6"N
Longitude			88° 13'20.4"E	88° 13'55.0"E
Sl No.	Test Parameters	Unit	Result	
1.	Colour	Hazen	<1.0	<1.0
2.	Odour	---	Unobjectionable	Unobjectionable
3.	pH	---	6.89	7.3
4.	Turbidity	NTU	4	<1.0
5.	Total Dissolved Solids	mg/l	98	90
6.	Aluminium (as Al)	mg/l	<0.01	<0.01
7.	Ammonia (as total ammonia- N)	mg/l	<0.1	<0.1
8.	Anionic Detergents (as MBAS)	mg/l	<0.02	<0.02
9.	Barium (as Ba)	mg/l	<0.5	<0.5
10.	Boron (as B)	mg/l	<0.5	<0.5
11.	Calcium (as Ca)	mg/l	11.5	13.2
12.	Chloramines (as Cl_2)	mg/l	<0.1	<0.1
13.	Chloride (as Cl)	mg/l	6.1	6.2
14.	Copper (as Cu)	mg/l	<0.02	<0.02
15.	Fluoride (as F)	mg/l	<0.1	<0.1
16.	Free Residual Chlorine	mg/l	<0.1	<0.1
17.	Iron (as Fe)	mg/l	0.88	<0.05
18.	Magnesium (as Mg)	mg/l	7.9	7.9
19.	Manganese	mg/l	<0.02	<0.02
20.	Mineral Oil	mg/l	<0.01	<0.01
21.	Nitrate (as NO_3)	mg/l	<0.4	<0.4
22.	Phenolic Compounds (as C_6H_5OH)	mg/l	<0.001	<0.001
23.	Selenium (as Se)	mg/l	<0.005	<0.005
24.	Silver (as Ag)	mg/l	<0.005	<0.005
25.	Sulphate (as SO_4)	mg/l	<1.0	<1.0
26.	Sulphide (as H_2S)	mg/l	<0.01	<0.01

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Mitra S. K. Private Limited

Shrachi Centre (5th Floor)
748, Acharya Jagadish Chandra Bose Road
Kolkata - 700 016, West Bengal, India
CIN: U51909WB1956PTC023037

T : 91 33 22172249 / 40143000 / 22650005 / 22651007
F : 91 33 22650006
E : info@mitrask.com
W : www.mitrask.com

EC/ 045

Date- 11.04.2016

Sl No.	Test Parameters	Unit	Result	
27.	Total Alkalinity (as $CaCO_3$)	mg/l	77.5	53
28.	Total Hardness (as $CaCO_3$)	mg/l	61.8	66
29.	Zinc(as Zn)	mg/l	<0.02	0.08
30.	Cadmium (as Cd)	mg/l	<0.002	<0.002
31.	Cyanide (as CN)	mg/l	<0.01	<0.01
32.	Lead (as Pb)	mg/l	0.005	0.01
33.	Mercury (as Hg)	mg/l	<0.001	<0.001
34.	Molybdenum (as Mo) in mg/l	mg/l	<0.05	<0.05
35.	Nickel (as Ni)in mg/l	mg/l	<0.01	<0.01
36.	Polychlorinated biphenyls (as PCB)	mg/l	<0.0005	<0.0005
37.	Polynuclear Aromatic Hydrocarbons (as PAH)	mg/l	<0.0001	<0.0001
38.	Total Arsenic(as As)	mg/l	<0.01	<0.01
39.	Total Chromium (as Cr)	mg/l	<0.01	<0.01
40.	Bromoform	mg/l	<0.05	<0.05
41.	Dibromochloromethane	mg/l	<0.05	<0.05
42.	Bromodichloromethane	mg/l	<0.05	<0.05
43.	Chloroform	mg/l	<0.05	<0.05
44.	Alachlor	µg/l	<0.02	<0.02
45.	Atrazine	µg/l	<0.02	<0.02
46.	Aldrin	µg/l	<0.01	<0.01
47.	Dieldrin	µg/l	<0.01	<0.01
48.	Alpha-HCH	µg/l	<0.01	<0.01
49.	Beta-HCH	µg/l	<0.01	<0.01
50.	Butachlor	µg/l	<0.02	<0.02
51.	Chlorpyrifos	µg/l	<0.02	<0.02
52.	Delta-HCH	µg/l	<0.01	<0.01
53.	2,4-Dichlorophenoxyacetic acid	µg/l	<0.01	<0.01
54.	o,p-DDT	µg/l	<0.01	<0.01
55.	p,p-DDT	µg/l	<0.01	<0.01
56.	o,p-DDE	µg/l	<0.01	<0.01
57.	p,p-DDE	µg/l	<0.01	<0.01
58.	o,p-DDD	µg/l	<0.01	<0.01
59.	p ,p-DDD	µg/l	<0.01	<0.01
60.	Endosulfan alpha	µg/l	<0.01	<0.01

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Shrachi Centre (5th Floor)
74B, Acharya Jagadish Chandra Bose Road
Kolkata – 700 016, West Bengal, India
CIN: U51909WB1956PTC023037

T : 91 33 22172249 / 40143000 / 22650006 / 22650007
F : 91 33 22650008
E : info@mitrask.com
W : www.mitrask.com

EC/ 045

Date- 11.04.2016

Sl No.	Test Parameters	Unit	Result	
61.	Endosulfan beta	µg/l	<0.01	<0.01
62.	Endosulfan sulfate	µg/l	<0.01	<0.01
63.	Ethion	µg/l	<0.02	<0.02
64.	Gama-HCH(Lindane)	µg/l	<0.01	<0.01
65.	Isoproturon	µg/l	<0.02	<0.02
66.	Malathion	µg/l	<0.02	<0.02
67.	Methyl parathion	µg/l	<0.02	<0.02
68.	Monocrotophos	µg/l	<0.02	<0.02
69.	Phorate	µg/l	<0.02	<0.02

Report Prepared By

for Mitra S. K. Private Limited

Authorised Signatory

Mitra S. K. Private Limited

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Kolkata – 700 016, West Bengal, India
CIN: U51909WB1956PTC023037

T : 91 33 22172249 / 40143000 / 22650006 / 22650007
F : 91 33 22650008
E : info@mitrask.com
W : www.mitrask.com

TEST REPORT

Name & Address of the Customer :
DINESHCHANDRA R. AGRAWAL INFRACON PVT. LTD.
Bolbom Shankar Service Station, Satbhaiya Dari Basti,
P.O + P.S : Naxalbari, Dist. Darjeeling,West Bengal - 734429
Ref. No. & Date : DRA/AH-02/WO/15-16/36 , DTD- 31.01.2016

Report No. : EC/ 046
Date : 11.04.2016
Sample Description : Surface Water
Date of sampling : 08.03.2016

BACTERIOLOGICAL ANALYSIS RESULT

Sampling Location			Halia River at Km 19+ 727	Mahananda River at Km 30+ 000
Latitude			26° 42'03.9"N	26° 41'12.9"N
Longitude			88° 19'49.7"E	88° 24'23.4"E
SL. No.	Test Parameters	Unit	Result	
1.	E.coli	/100ml	Present	Present
2.	Total coliform organism	MPN/100ml	920	1600

CHEMICAL ANALYSIS RESULT

Sampling Location			Halia River at Km 19+ 727	Mahananda River at Km 30+ 000
Latitude			26° 42'03.9"N	26° 41'12.9"N
Longitude			88° 19'49.7"E	88° 24'23.4"E
Sl No.	Test Parameters	Unit	Result	
1.	Colour	Hazen	<1.0	<1.0
2.	Odour	---	Unobjectionable	Unobjectionable
3.	pH value at 26°C	---	6.35	7.00
4.	Total Dissolved Solids	mg/l	54	48
5.	Copper (as Cu)	mg/l	<0.02	<0.02
6.	Fluoride (as F)	mg/l	0.17	0.16
7.	Iron (as Fe)	mg/l	0.32	1.39
8.	Manganese (as Mn)	mg/l	<0.02	<0.02
9.	Nitrate (as NO_3)	mg/l	4.6	2.0
10.	Phenolic Compounds (as C_6H_5OH)	mg/l	<0.001	<0.001
11.	Selenium (as Se)	mg/l	<0.005	<0.005
12.	Cadmium (as Cd)	mg/l	<0.001	<0.001
13.	Cyanide (as CN)	mg/l	<0.01	<0.01
14.	Lead (as Pb)	mg/l	<0.005	<0.005
15.	Mercury (as Hg)	mg/l	<0.001	<0.001
16.	Nickel (as Ni)	mg/l	<0.02	<0.02
17.	Arsenic(as As)	mg/l	<0.01	<0.01
18.	Total Chromium (as Cr)	mg/l	<0.01	<0.01
19.	Zinc (as Zn)	mg/l	<0.02	<0.02
20.	Hexavalent Chromium (as Cr^{+6})	mg/l	<0.01	<0.01

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Shrachi Centre (5th Floor)
74B, Acharya Jagadish Chandra Bose Road
Kolkata – 700 016, West Bengal, India
CIN: U51909WB1956PTC023037

T : 91 33 22172249 / 40143000 / 22650006 / 22650007
F : 91 33 22650008
E : info@mitrask.com
W : www.mitrask.com

EC/ 046

Date- 11.04.2016

Sl No.	Test Parameters	Unit	Result	
21.	Vanadium (as V)	mg/l	<0.2	<0.2
22.	Total Suspended Solid	mg/l	3.3	21.2
23.	Temperature	^{0} C	28	28
24.	Dissolved Oxygen	mg/l	6.9	5.2
25.	Biochemical Oxygen Demand (For 3 days at 27^{0}C)	mg/l	<2.0	<2.0
26.	Chemical Oxygen Demand	mg/l	<4.0	<4.0
27.	Oil and Grease	mg/l	<1.4	<1.4
28.	Ammoniacal Nitrogen (as N)	mg/l	<0.1	<0.1
29.	Sulphide (as S)	mg/l	<0.1	<0.1
30.	TKN	mg/l	<0.3	<0.3
31.	Free Ammonia	mg/l	<0.1	<0.1
32.	Total residual chlorine	mg/l	<0.1	<0.1
33.	Bio-assay	---	All fishes survive after 96 hrs in 100% effluent	All fishes survive after 96 hrs in 100% effluent
34.	Dissolved Phosphate (as P)	mg/l	0.07	<0.05
35.	Particle Size Distribution	---	Passes thruogh 850 um IS sieve	Passes thruogh 850 um IS sieve

Report Prepared By

for Mitra S. K. Private Limited

Authorised Signatory

Mitra S. K. Private Limited

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74B, Acharya Jagadish Chandra Bose Road
Kolkata – 700 016, West Bengal, India
CIN: U51909WB1956PTC023037

T : 91 33 22172249 / 40143000 / 22650006 / 22651007
F : 91 33 22650008
E : info@mitrask.com
W : www.mitrask.com

TEST REPORT

Name & Address of the Customer :
DINESHCHANDRA R. AGRAWAL INFRACON PVT. LTD.
Bolbom Shankar Service Station, Satbhaiya Dari Basti,
P.O + P.S : Naxalbari, Dist. Darjeeling, West Bengal - 734429

Report No. : EC/ 049
Date : 11.04.2016
Sample Description : Soil

Ref. No. & Date : DRA/AH-02/WO/15-16/36 , DTD- 31.01.2016

CHEMICAL ANALYSIS RESULT

Sampling Location			Tea Garden at Shiv Mandir	Agricultural Field at Fulbari	Agricultural Field at Hatighisa
Latitude			26° 42'50.5"N	26° 28'32.1"N	26° 41'16.0"N
Longitude			88° 22'13.1"E	88° 25'02.3"E	88° 13'55.8"E
Date of Sampling			07.03.2016	07.03.2016	08.03.2016
Sl No.	Test Parameters	Unit	Result		
1.	pH (1:2.5) at 25°C	---	4.89	4.15	4.32
2.	Calcium (as Ca)	mg/kg	300	200	400
3.	Chloride (as Cl)	mg/kg	49.5	49.5	39.6
4.	Iron (as Fe)	mg/kg	52.7	9.5	69
5.	Magnesium (as Mg)	mg/kg	60	60	120
6.	Bulk Density	gm/cc	1.25	1.33	1.11
7.	Lead (as Pb)	mg/kg	10.4	7.8	9.4
8.	Sodium (as Na)	mg/kg	10	10	40
9.	Sand	%	63.4	71.7	42.7
10.	Silt	%	25.4	22.1	23.7
11.	Clay	%	11.2	6.2	33.6
12.	Texture	---	Sandy Loam	Sandy Loam	Clay Loam
13.	Electrical conductivity at 25 °C	µs/cm	36.5	37.7	94
14.	Potassium (as K)	mg/kg	50	10	70
15.	Organic Matter	%	2.4	1.53	2.03
16.	Water Holding capacity	%	48.4	33.4	35.6
17.	Phosphorus	mg/kg	62.6	60.6	4.6
18.	Porosity	%	50.8	47.2	54.3
19.	Moisture	%	16.6	4.7	23.8
20.	Nitrogen	mg/kg	361	335	431
21	Organic Carbon	%	1.4	0.89	1.18
22	Infiltration rate	mm/Hr	18.3	24.6	6.2
23.	Cation Exchange Capacity	meq/100gm	9.5	6.6	13.3

Report Prepared By

for Mitra S. K. Private Limited

Authorised Signatory

Mitra S. K. Private Limited

Shruchi Centre (5th Floor)
74B, Acharya Jagadish Chandra Bose Road
Kolkata – 700 016, West Bengal, India
CIN: U51909WB1956PTC023037

T : 91 33 22172249 / 40143000 / 22550006 / 22550007
F : 91 33 22550008
E : info@mitrask.com
W : www.mitrask.com

TEST REPORT

Name & Address of the Customer :
PUNJ LLOID LTD.
Bangladesh Bhutan Road (AH-48) Project Camp-2,Beside NRL Petrol Pump, Paschim Cheka Mari,P.O- Rangalibazna,Vill-Madarihat,Dist.- Alipurduar, West Bengal- 735220

Report No. : EC/245
Date : 29.04.2016
Sample Description : Ground Water

Ref. No. & Date : PLL/BB1/2016/WO/0020 , DTD- 21.03.2016

BACTERIOLOGICAL ANALYSIS RESULT

Sampling Location			Camp -1 at km 19+800	Camp-2 at km 75+160	At km 74+660
Date of Sampling			10.04.2016	09.04.2016	09.04.2016
Latitude			26°32'50.2" N	26°41'06.7" N	26°40'56.5" N
Longitude			88°49'39.2" E	89°14'03.8" E	88°13'22.1" E
Sl. No.	Test Parameters	Unit	Result		
1.	E.coli	/100ml	Not Detected	Not Detected	Not Detected
2.	Total coliform organism	/100ml	Detected	Detected	Detected

CHEMICAL ANALYSIS RESULT

Sampling Location			Camp -1 at km 19+800	Camp-2 at km 75+160	At km 74+660
Date of Sampling			10.04.2016	09.04.2016	09.04.2016
Latitude			26°32'50.2" N	26°41'06.7" N	26°40'56.5" N
Longitude			88°49'39.2" E	89°14'03.8" E	88°13'22.1" E
Sl No.	Test Parameters	Unit	Result		
1.	Colour	Hazen	<1.0	<1.0	<1.0
2.	Odour	—	Odourless	Odourless	Odourless
3.	pH	—	7.2	6.97	6.52
4.	Turbidity	NTU	<1.0	<1.0	<1.0
5.	Total Dissolved Solids	mg/l	25	220	193
6.	Aluminium (as Al)	mg/l	<0.01	<0.01	<0.01
7.	Ammonia (as total ammonia-N)	mg/l	<0.1	<0.1	<0.1
8.	Anionic Detergents (as MBAS)	mg/l	<0.02	<0.02	<0.02
9.	Barium (as Ba)	mg/l	<0.5	<0.5	<0.5
10.	Boron (as B)	mg/l	<0.5	<0.5	<0.5
11.	Calcium (as Ca)	mg/l	3.2	41.2	34.8
12.	Chloramines (as Cl_2)	mg/l	<0.1	<0.1	<0.1
13.	Chloride (as Cl)	mg/l	7.36	11.0	11.0
14.	Copper (as Cu)	mg/l	<0.02	<0.02	<0.02
15.	Fluoride (as F)	mg/l	<0.1	<0.1	0.17
16.	Free Residual Chlorine	mg/l	<0.1	<0.1	<0.1
17.	Iron (as Fe)	mg/l	<0.05	<0.05	2.16
18.	Magnesium (as Mg)	mg/l	2.83	19.9	13.3
19.	Manganese	mg/l	<0.02	<0.02	<0.02
20.	Mineral Oil	mg/l	<0.01	<0.01	<0.01
21.	Nitrate (as NO_3)	mg/l	<0.5	2.2	2.3
22.	Phenolic Compounds (as C_6H_5OH)	mg/l	<0.001	<0.001	<0.001

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Shrachi Centre (5th Floor)
74B, Acharya Jagadish Chandra Bose Road
Kolkata – 700 016, West Bengal, India
CIN: U51909WB1956PTC023037

T : 91 33 22172240 / 40143000 / 22650006 / 22650007
F : 91 33 22650008
E : info@mitrask.com
W : www.mitrask.com

EC/245

Date- 29.04.2016

Sl No.	Test Parameters	Unit	Result		
23.	Selenium (as Se)	mg/l	<0.005	<0.005	<0.005
24.	Silver (as Ag)	mg/l	<0.005	<0.005	<0.005
25.	Sulphate (as SO_4)	mg/l	<1.0	12.84	13.08
26.	Sulphide (as H_2S)	mg/l	<0.01	<0.01	<0.01
27.	Total Alkalinity (as $CaCO_3$)	mg/l	15	195.0	155
28.	Total Hardness (as $CaCO_3$)	mg/l	19.8	186.1	142.6
29.	Zinc(as Zn)	mg/l	<0.02	<0.02	<0.02
30.	Cadmium (as Cd)	mg/l	<0.002	<0.002	<0.002
31.	Cyanide (as CN)	mg/l	<0.01	<0.01	<0.01
32.	Lead (as Pb)	mg/l	<0.005	<0.005	<0.005
33.	Mercury (as Hg)	mg/l	<0.001	<0.001	<0.001
34.	Molybdenum (as Mo) in mg/l	mg/l	<0.05	<0.05	<0.05
35.	Nickel (as Ni)in mg/l	mg/l	<0.01	<0.01	<0.01
36.	Polychlorinated biphenyls (as PCB)	mg/l	<0.0005	<0.0005	<0.0005
37.	Polynuclear Aromatic Hydrocarbons (as PAH)	mg/l	<0.0001	<0.0001	<0.0001
38.	Total Arsenic(as As)	mg/l	<0.01	<0.01	<0.01
39.	Total Chromium (as Cr)	mg/l	<0.01	<0.01	<0.01
40.	Bromoform	mg/l	<0.05	<0.05	<0.05
41.	Dibromochloromethane	mg/l	<0.05	<0.05	<0.05
42.	Bromodichloromethane	mg/l	<0.05	<0.05	<0.05
43.	Chloroform	mg/l	<0.05	<0.05	<0.05
44.	Alachlor	µg /l	<0.02	<0.02	<0.02
45.	Atrazine	µg /l	<0.02	<0.02	<0.02
46.	Aldrin	µg /l	<0.01	<0.01	<0.01
47.	Dieldrin	µg /l	<0.01	<0.01	<0.01
48.	Alpha-HCH	µg /l	<0.01	<0.01	<0.01
49.	Beta-HCH	µg /l	<0.01	<0.01	<0.01
50.	Butachlor	µg /l	<0.02	<0.02	<0.02
51.	Chlorpyrifos	µg /l	<0.02	<0.02	<0.02
52.	Delta-HCH	µg /l	<0.01	<0.01	<0.01
53.	2,4-Dichlorophenoxyacetic acid	µg /l	<0.01	<0.01	<0.01
54.	o,p-DDT	µg /l	<0.01	<0.01	<0.01
55.	p,p-DDT	µg /l	<0.01	<0.01	<0.01
56.	o,p-DDE	µg /l	<0.01	<0.01	<0.01
57.	p,p-DDE	µg /l	<0.01	<0.01	<0.01
58.	o,p-DDD	µg /l	<0.01	<0.01	<0.01
59.	p ,p-DDD	µg /l	<0.01	<0.01	<0.01
60.	Endosulfan alpha	µg /l	<0.01	<0.01	<0.01

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Mitra S. K. Private Limited

Shastri Centre (5th Floor)
74B, Acharya Jagadish Chandra Bose Road
Kolkata – 700 016, West Bengal, India
CIN: U51909WB1956PTC023037

T : 91 33 22172249 / 40143000 / 22550006 / 22650007
F : 91 33 22850008
E : info@mitrask.com
W : www.mitrask.com

EC/245

Date- 29.04.2016

Sl No.	Test Parameters	Unit	Result		
51.	Endosulfan beta	µg/l	<0.01	<0.01	<0.01
52.	Endosulfan sulfate	µg/l	<0.01	<0.01	<0.01
53.	Ethion	µg/l	<0.02	<0.02	<0.02
54.	Gama-HCH(Lindane)	µg/l	<0.01	<0.01	<0.01
55.	Isoproturon	µg/l	<0.02	<0.02	<0.02
56.	Malathion	µg/l	<0.02	<0.02	<0.02
57.	Methyl parathion	µg/l	<0.02	<0.02	<0.02
58.	Monocrotophos	µg/l	<0.02	<0.02	<0.02
59.	Phorate	µg/l	<0.02	<0.02	<0.02

Report Prepared By

for Mitra S.K. Private Limited

Authorised Signatory

Mitra S. K. Private Limited

Shrachi Centre (5th Floor)
74B, Acharya Jagadish Chandra Bose Road
Kolkata – 700 016, West Bengal, India
CIN: U51909WB1956PTC023037

T : 91 33 22172249 / 40143000 / 22650006 / 22650007
F : 91 33 22650008
E : info@mitrask.com
W : www.mitrask.com

TEST REPORT

Name & Address of the Customer :
PUNJ LLOID LTD.
Bangladesh Bhutan Road (AH-48) Project Camp-2,Beside NRL Petrol Pump, Paschim Cheka Mari,P.O- Rangalibazna,Vill-Madarihat,Dist.- Alipurduar, West Bengal- 735220

Report No. : EC/246
Date : 29.04.2016
Sample Description : Surface Water

Ref. No. & Date : PLL/BB1/2016/WO/0020 , DTD- 21.03.2016

CHEMICAL ANALYSIS RESULT

Sampling Location			River at km 48+300	Torsa River at km 87+847	River at km 42+200
Date of Sampling			09.04.2016	09.04.2016	09.04.2016
Latitude			26°39'30.7" N	26°43'43.6" N	26°37'02.3" N
Longitude			89°01'43.6" E	89°19'26.6" E	89°00'38.4" E
Sl No.	Test Parameters	Unit	Result		
1.	Colour	Hazen	<1.0	<1.0	<1.0
2.	Odour	---	Unobjectionable	Unobjectionable	Unobjectionable
3.	pH value at 26°C	---	7.25	7.68	8.31
4.	Total Dissolved Solids	mg/l	130	76	218
5.	Copper (as Cu)	mg/l	<0.02	<0.02	<0.02
6.	Fluoride (as F)	mg/l	2.01	1.97	1.94
7.	Iron (as Fe)	mg/l	1.86	1.17	1.21
8.	Manganese (as Mn)	mg/l	<0.02	<0.02	<0.02
9.	Nitrate (as NO_3)	mg/l	3.44	2.15	0.70
10.	Phenolic Compounds (as C_6H_5OH)	mg/l	<0.001	<0.001	<0.001
11.	Selenium (as Se)	mg/l	<0.005	<0.005	<0.005
12.	Cadmium (as Cd)	mg/l	<0.001	<0.001	<0.001
13.	Cyanide (as CN)	mg/l	<0.01	<0.01	<0.01
14.	Lead (as Pb)	mg/l	<0.005	<0.005	<0.005
15.	Mercury (as Hg)	mg/l	<0.001	<0.001	<0.001
16.	Nickel (as Ni)	mg/l	<0.02	<0.02	<0.02
17.	Arsenic(as As)	mg/l	<0.01	<0.01	<0.01
18.	Total Chromium (as Cr)	mg/l	<0.01	<0.01	<0.01
19.	Zinc (as Zn)	mg/l	<0.02	<0.02	<0.02
20.	Hexavalent Chromium (as Cr^{+6})	mg/l	<0.01	<0.01	<0.01

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Mitra S. K. Private Limited

Shrachi Centre (5th Floor)
74B, Acharya Jagadish Chandra Bose Road
Kolkata – 700 016, West Bengal, India
CIN: U51909WB1956PTC023037

T : 91 33 22172249 / 40143000 / 22650006 / 22650007
F : 91 33 22650006
E : info@mitrask.com
W : www.mitrask.com

EC/ 246

Date- 29.04.2016

Sl No.	Test Parameters	Unit	Result		
21.	Vanadium (as V)	mg/l	<0.2	<0.2	<0.2
22.	Total Suspended Solid	mg/l	9.2	8.0	4.4
23.	Temperature	^{0}C	23	24.4	26.4
24.	Dissolved Oxygen	mg/l	7.0	8.0	6.6
25.	Biochemical Oxygen Demand (For 3 days at 27^{0}C)	mg/l	<2.0	<2.0	<2.0
26.	Chemical Oxygen Demand	mg/l	<4.0	<4.0	<4.0
27.	Oil and Grease	mg/l	<1.4	<1.4	<1.4
28.	Ammoniacal Nitrogen (as N)	mg/l	<0.1	<0.1	<0.1
29.	Sulphide (as S)	mg/l	<0.1	<0.1	<0.1
30.	TKN	mg/l	<0.3	<0.3	<0.3
31.	Free Ammonia	mg/l	<0.1	<0.1	<0.1
32.	Total residual chlorine	mg/l	<0.1	<0.1	<0.1
33.	Bio-assay	---	All fishes survive after 96 hrs in 100% effluent	All fishes survive after 96 hrs in 100% effluent	All fishes survive after 96 hrs in 100% effluent
34.	Dissolved Phosphate (as P)	mg/l	<0.05	<0.05	<0.05
35.	Particle Size Distribution	---	Passes thruogh 850 um IS sieve	Passes thruogh 850 um IS sieve	Passes thruogh 850 um IS sieve

Report Prepared By

for Mitra S.K. Private Limited

Authorised Signatory

Mitra S. K. Private Limited

Shrachi Centre (5th Floor)
74B, Acharya Jagadish Chandra Bose Road
Kolkata – 700 016, West Bengal, India
CIN: U51909WB1956PTC023037

T : 91 33 22172249 / 40143000 / 22650006 / 22650007
F : 91 33 22650008
E : info@mitrask.com
W : www.mitrask.com

TEST REPORT

Name & Address of the Customer :
PUNJ LLOID LTD.
Bangladesh Bhutan Road (AH-48) Project Camp-2,Beside NRL Petrol Pump, Paschim Cheka Mari,P.O- Rangalibazna,Vill-Madarihat,Dist.- Alipurduar, West Bengal- 735220

Report No. : EC/247
Date : 29.04.2016
Sample Description : Soil

Ref. No. & Date : PLL/BB1/2016/WO/0020 , DTD- 21.03.2016

CHEMICAL ANALYSIS RESULT

Sampling Location			Dhupguri Town at km 45+000	Gankata Town at km 55+760	Birpara Town at km 66+300
Date of Sampling			09.04.2016	09.04.2016	09.04.2016
Latitude			26°37'51.1" N	26°42'11.3" N	26°42'13.1" N
Longitude			89°01'32.3" E	89°02'37.6" E	89°09'14.8" E
Sl No.	Test Parameters	Unit	Result		
1.	pH (1:2.5) at 26°C	---	4.5	5.59	4.19
2.	Calcium (as Ca)	mg/kg	396	990	396
3.	Chloride (as Cl)	mg/kg	49	49	58.8
4.	Iron (as Fe)	mg/kg	44.6	25.6	20.2
5.	Magnesium (as Mg)	mg/kg	118.8	178.2	118.8
6.	Bulk Density	gm/cc.	1.23	1.14	1.11
7.	Lead (as Pb)	mg/kg	10.2	12.6	9.3
8.	Sand	%	58.7	28.9	28.3
9.	Silt	%	27.0	37.5	23.6
10.	Clay	%	14.3	33.6	48.1
11.	Texture	---	Sandy Loam	Clay Loam	Clay
12.	Electrical conductivity at 25°C	µs/cm	64.3	61.4	78.6
13.	Potassium (as K)	mg/kg	60	20	100
14.	Organic Matter	%	1.41	2.2	1.36
15.	Water Holding capacity	%	46.5	48.5	59.6
16.	Phosphorus	mg/kg	75.7	<3.0	8.9
17.	Porosity	%	50.2	53.1	58.3
18.	Moisture	%	26.7	42.8	28.9
19.	Nitrogen	mg/kg	323	346	225
20	Organic Carbon	%	0.82	1.27	0.79
21	Infiltration rate	mm/Hr	18.6	7.2	4.2

Report Prepared By

for Mitra S. K. Private Limited

Authorised Signatory

Mitra S. K. Private Limited

Shrachi Centre (5th Floor)
748, Acharya Jagadish Chandra Bose Road
Kolkata – 700 016, West Bengal, India
CIN: U51909WB1956PTC023037

T : 91 33 22172249 / 40143000 / 22650006 / 22650007
F : 91 33 22650006
E : info@mitrask.com
W : www.mitrask.com

TEST REPORT

Name & Address of the Customer :
PUNJ LLOID LTD.
Bangladesh Bhutan Road (AH-48) Project Camp-2,Beside NRL Petrol Pump, Paschim Cheka Mari,P.O- Rangalibazna,Vill-Madarihat,Dist.- Alipurduar, West Bengal- 735220

Report No. : EC/ 248
Date : 29.04.2016
Sample Description : Soil

Ref. No. & Date : PLL/BB1/2016/WO/0020 , DTD- 21.03.2016

CHEMICAL ANALYSIS RESULT

Sampling Location			Dalsinghpara at km 88+000	Madhya Madarihat at km 80+000	Bhotpaatti village at km 13+500
Date of Sampling			09.04.2016	09.04.2016	10.04.2016
Latitude			26°46'13.8" N	26°41'26.0" N	26°29'41.5" N
Longitude			89°21'43.3" E	89°16'51.0" E	88°50'35.7" E
Sl No.	Test Parameters	Unit	Result		
1.	pH (1:2.5) at 25°C	---	4.2	6.69	4.49
2.	Calcium (as Ca)	mg/kg	297	1188	297
3.	Chloride (as Cl)	mg/kg	117.6	58.8	39.2
4.	Iron (as Fe)	mg/kg	16.9	<5.0	18.8
5.	Magnesium (as Mg)	mg/kg	118.8	356.4	59.4
6.	Bulk Density	gm/cc	1.09	1.05	1.25
7.	Lead (as Pb)	mg/kg	<5.0	<5.0	<5.0
8.	Sand	%	21.5	46.2	55.2
9.	Silt	%	25.1	19.7	26.4
10.	Clay	%	53.4	34.1	18.4
11.	Texture	---	Clay	Sandy Clay Loam	Sandy Loam
12.	Electrical conductivity at 25° C	µs/cm	44.1	125.6	32.6
13.	Potassium (as K)	mg/kg	50	320	50
14.	Organic Matter	%	2.0	2.2	1.71
15.	Water Holding capacity	%	58.1	49.1	45.6
16.	Phosphorus	mg/kg	12.7	4.2	46.3
17.	Porosity	%	57.4	55.8	51.0
18.	Moisture	%	37.5	28.5	13.8
19.	Nitrogen	mg/kg	358	352	340
20.	Organic Carbon	%	1.17	1.25	0.99
21	Infiltration rate	mm/Hr	4.4	14.6	17.2

Report Prepared By

for Mitra S. K. Private Limited

Authorised Signatory

Mitra S. K. Private Limited

Shraddha Centre (5th Floor)
74B, Acharya Jagadish Chandra Bose Road
Kolkata – 700 016, West Bengal, India
CIN: U51909WB1956PTC023037

T : 91 33 22172249 / 40143000 / 22650006 / 22650007
F : 91 33 22650006
E : info@mitrask.com
W : www.mitrask.com

TEST REPORT

Name & Address of the Customer :
PUNJ LLOID LTD.
Bangladesh Bhutan Road (AH-48) Project Camp-2,Beside NRL Petrol Pump, Paschim Cheka Mari,P O- Rangalibazna,Vill-Madarihat,Dist.- Alipurduar, West Bengal- 735220

Report No. : EC/249
Date : 29.04.2016
Sample Description : Noise

Ref. No. & Date : PLL/BB1/2016/WO/0020 , DTD- 21.03.2016

ANALYSIS RESULT

Sampling Station	Camp at Mainaguri Km 19+800	Rajarhaat Bhotpatti Village Area km 13+200	Camp 2 Rangali Bazna Km 75+160	Jaldapara NP Area Km 85+000	Mount Carmel School Km 42+000	Near Proposed EUP
Co-Ordinates	N 26°32'51.8" E 88°49'37.9"	N 26°29'41.7" E 88°50'34.0"	N 26°41'06.7" E 89°13'59.2"	N 26°42'21.1" E 89°17'05.2"	N 26°36'40.2" E 89°00'31.0"	N 26°43'05.6" E 89°19'36.6"
Distance Form Reference Point (m)	125 m	50 m	50 m	120 m	30 m	105 m
Direction Form Reference Point	RHS	LHS	LHS	RHS	RHS	LHS
Monitoring Date	8/4/2016 to 9/4/2016	10/4/2016 to 11/4/2016	12/4/2016 to 13/4/2016	13/4/2016 to 14/4/2016	11/4/2016 to 12/4/2016	14/4/2016 to 15/4/2016
Day time Leq dB(A)	63.3	61.6	66.0	63.7	65.3	63.6
Night time Leq dB(A)	58.5	49.1	56.1	49.3	52.5	53.3
L10 in dB(A)	53.7	48.8	55.7	47.1	50.6	49.5
L50 in dB(A)	61.7	56.0	57.9	50.1	57.9	52.1
L90 in dB(A)	65.4	64.5	70.2	65.1	68.5	66.8

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

NOTE :
Day Time : 06.00 Hr.-22.00 Hr.
Night Time:22.00 Hr.-06.00 Hr.

Report Prepared By

for Mitra S.K. Private Limited

Authorised Signatory

Mitra S. K. Private Limited

Bhakti Centre (5th Floor)
748, Acharya Jagadish Chandra Bose Road
Kolkata – 700 016, West Bengal, India
CIN: U51909WB1958PTC023037

T : 91 33 22172249 / 40143000 / 22650006 / 22650007
F : 91 33 22650006
E : info@mitrask.com
W : www.mitrask.com

TEST REPORT

Name & Address of the Customer :
PUNJ LLOID LTD.
Bangladesh Bhutan Road (AH-48) Project Camp-2,Beside NRL Petrol Pump,
Paschim Cheka Mari,P O- Rangalibazna,Vill-Madarihat,Dist.- Alipurduar, West Bengal- 735220
Ref. No. & Date : PLL/BB1/2016/WO/0029 , DTD- 21.03.2016

Report No. : EC/244
Date : 29.04.2016
Sample Description : Ambient Air

ANALYSIS RESULT

Sl. No.	Date of Monitoring	Location	Co-ordinates	Concentration of Pollutants					
				PM_{10} in µg/m³	$PM_{2.5}$ in µg/m³	Sulphur Dioxide (SO_2) in µg/m³	Nitrogen Dioxide(NO_2) in µg/m³	Carbon monoxide (CO) in mg/m³	Lead (Pb) in µg/m³
1	08.04.2016 to 09.04.2016	Camp-1 Mayaguri km 19+800	26°32'52.1" N 88°49'38.9" E	127	66	7.5	42.5	0.42	0.09
2	10.04.2016 to 11.04.2016	Rajarhat Bhotpatti km 13+200	26°29'41.7"N 88°50'34.0" E	93	48	5.8	35.7	0.34	<0.02
3	11.04.2016 to 12.04.2016	Dhupguri Town km 40 +000	26°35'19.2" N 89°00'27.2" E	156	84	6.9	39.7	0.48	0.07
4	12.04.2016 to 13.04.2016	Birpara Town km 66+ 000	26°42'12.5" N 89°08'37.0" E	198	93	8.8	47.6	0.54	0.09
5	13.04.2016 to 14.04.2016	Hasimara at Km 89+ 000	26°42'21.1" N 89°17'05.2" E	98	46	6.5	28.7	0.34	0.02
6	14.04.2016 to 15.04.2016	Camp 2 Rangali Bazza At Km 75+ 160	26°43'03.6" N 89°19'36.6" E	125	52	6.0	26.3	0.29	0.02
7	**Limit as per CPCB notification, New Delhi, 18th Nov, 2009, No.B-29016/20/09/PCI-L**			100	60	80	80	2	1
	Sampling and Analysis done according to			IS: 5182(Part-23)-2006	USEPA CFR-40, Part-50, Appendix-L	IS: 5182 (Part-2)-2001	IS: 5182 (Part- 6)-2006	IS 5182 :(Part-10):1999	APHA-IO 3.2

Report Prepared by:

For Mitra S.K.Private Limited
Authorised Signatory