

Environmental Monitoring Report

Semi-Annual Report (January-June 2016)
September 2016

CAM: Provincial Roads Improvement Project

Detailed Design and Implementation Supervision (DDIS) Consulting Services

Prepared by Korea Consultants International in association with Dainichi Consultant Inc., Sambo Engineering Co., Ltd. and Hankuk Engineering Consultants, and in Sub-consultancy with Moha Engineering & Consulting Co., Ltd., SBK, KACE and SAWAC for the Ministry of Public Works and Transport, the Kingdom of Cambodia, and the Asian Development Bank.

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KINGDOM OF CAMBODIA



MINISTRY OF PUBLIC WORKS AND TRANSPORT

PROVINCIAL ROADS IMPROVEMENT PROJECT
ADB LOAN 2839-CAM (SF)/8254-CAM (SCF)

**Consulting Services for
Detailed Design and Implementation Supervision (DDIS)**

SEMI-ANNUAL ENVIRONMENTAL MONITORING REPORT

Covering Period from January to June 2016

September 2016



Korea Consultants International

In association with

**Dainichi Consultant Inc., Sambo Engineering Co., Ltd.
and Hankuk Engineering Consultants**

In Sub-consultancy with

Moha Engineering & Consulting Co., Ltd., SBK, KACE and SAWAC

Contents

EXECUTIVE SUMMARY.....	i
1. Introduction	1
1.1 Project Description.....	1
1.2 Objective of Environmental Monitoring.....	5
2. Laws and Regulations.....	5
3. Environmental Monitoring Mechanism	6
3.1 Introduction.....	6
3.2 Environmental Management Plan (EMP) and CEMP	6
3.3 Environmental Management Program.....	7
3.4 The Scope of Work.....	7
3.5 Measurements.....	7
3.6 Time of Monitoring.....	8
3.7 Monitoring of CEMP by Checklists.....	9
3.8 Establishment of SEO.....	9
4. Result of Environmental Monitoring	10
4.1 Contract CW-A: Improvement of NR13 in Prey Veng and Svay Rieng	10
4.2 Contract CW-B1: Improvement of PR314D in Svay Rieng	14
4.3 Contract CW-C: Improvement of PR150B, NR53, and PR151B in Kampong Chhnang and Kampong Speu.....	16
4.4 Contract CW-D1: Climate Resilience, Reconstruction of Portanorn, Bakdao and Srok Dikes in Kampong Chhnang	21
5. Review of Environmental Parameters.....	21
6. Correct Action	24
7. Outstanding Issues	24
8. Conclusion.....	24

List of Tables

Table 1: List of construction work.....	3
Table 2: Civil works Progress by June 2016	4
Table 3: Environmental Parameters Contract Packages CW-A, B1, B2, C, and D	22

Appendices

Appendix A- Checklist of EMP Implementation for Contract CW-A.....	26
Appendix B- Checklist of EMP Implementation for Contract CW-B1	41
Appendix C- Checklist of EMP Implementation for Contract CW-C.....	54

ABBREVIATIONS

ADB	Asian Development Bank
AP	(Project) Affected Persons
BOD	biological oxygen demand
CBF	Cross Border Facility
CEMP	Contractor Environmental Management Plan
COI	Corridor of Impact
CW	Civil Work
DBST	Double Bituminous Surface Treatment
DDIS	Detailed Design and Implementation Supervision
EA	Executive Agency
EMP	Environmental Management Plan
EIA	Environmental Impact Assessment
GoC	Government of Cambodia
GGF	Good Governance Framework
GRM	Grievance Redress Mechanism
IEE	Initial Environmental Examination
KCI	Korea Consultants International
KEXIM	Korea Export and Import Bank
MCFA	Ministry of Culture and Fine Arts
MEF	Ministry of Economy and Finance
MOU	Memorandum of Understanding
MOE	Ministry of Environment
MRD	Ministry of Rural Development
MPWT	Ministry of Public Works and Transport
MT	motorized transport
NDF	Nordic Development Fund
NGO	Non-government Organization
NR	National Road
NTFP	non-timber forest products
PDOE	Provincial Department of Environment
PDRD	Provincial Department of Rural Development
PMU	Project Management Unit
PR	Provincial Road
PRIP	Provincial Road Improvement Project
PPE	Personal Protective Equipment
PPTA	Project Preparation Technical Assistance
RGC	Royal Government of Cambodia
ROW	Right of Way
RP	Resettlement Plan
SBST	Single Bituminous Surface Treatment
SDR	Special Drawing Right
SEO	Social and Environment Office
SPS	ADB's Safeguard Policy Statement
STD	Sexually Transmitted Disease
TOR	Terms of Reference
UNESCO	United Nations Educational Scientific and Cultural Organization
WB	World Bank
UXO	Unexploded Ordnance

EXECUTIVE SUMMARY

1. Asian Development Bank (ADB) approved Loan (ADB loan No. 2839-CAM (SF)/8254-CAM (SCF), approved on 16 December 2011) and Grant 0278-CAM for Improvement of Provincial Roads (PRIP) in southeastern and mid-west province in Cambodia as requested by the Government of Cambodia. This Project is a priority project in the Government's key infrastructure development agenda as it provides all-year access to provincial and rural agricultural communities of Prey Veng and Svay Rieng provinces of southeastern Cambodia, and Kampong Chhnang and Kampong Speu province in the mid-west of Cambodia.

2. The Project aims to rehabilitate of national/provincial roads in Kampong Chhnang, Kampong Speu, Prey Vang, and Svay Rieng provinces to climate resilient paved condition of provincial roads in the southeast and rural roads in the mid-west. The rehabilitation program will provide a safer, cost-effective provincial road network with all-year access from national road network to markets and other social services for provincial centers of southeastern and mid-western Cambodia. A new cross border facility (CBF) will be constructed at Prey Var, Svay Rieng to facilitate efficient cross border transport and trade between Cambodia and Vietnam. The Project will support a sustainable road maintenance regime in the Ministry of Public Works and Transport (MPWT), community-based road safety measures, HIV/AIDS and human trafficking prevention program (HHTPP), and climate resilient measures.

3. The Provincial Roads Improvement Project (PRIP) will be implemented for a Contract period of 36 months, from September 1st, 2014 and will be completed at the ends of August in 2017. There are five (5) Contract packages to be implemented under the project. These are: CW-A: Improvement of NR13 (62.4km); CW-B1: Improvement of PR314D (25.5km); CW-B2: Prey Var CBF; and CW-C: Improvement of NR53, PR150B and PR151B (70.63km), which are under Civil Works Output. Currently, CW-A, CW-B1, and CW-C had been already awarded at early 2014, and these contracts are progressing slowly (based on planned schedule with actual work). CW-B2 will be likely to award in the 4th Quarter 2016. The remaining contract, CW-D which is split into 5 contract packages and either in designing or in bidding process, will be awarded under Improved Climate Resilience Output.

4. The Subprojects (CW-A; CW-B1) at the southeast of Cambodia, in which located at Prey Veng and Svay Rieng provinces, the roads will be upgraded to DBST¹ road, 11m width with 10m carriage way & 0.5m shoulder in both sides. The Subprojects (CW-C), on the other hand, at the mid-west is location at Kampong Chhnang and Kampong Speu provinces, the roads will be upgraded to SBST² road, 8m width with 6m carriage way & 1m shoulder in both sides (Cross Section of NR-53, PR-150B & PR-151B). The project is also included reconstruction of bridges and installation of drainage structures such as box culverts and pipe culverts. Based on the results of IEE report which had been conducted as part of project preparation in accordance with ADB's Safeguard Policy Statement of 2009 (ADB SPS), the project is classified environmental **Category B**.

¹ DBST: Double Bituminous Surface Treatment

² SBST: Single Bituminous Surface Treatment

5. To monitor accurately documents in the semi-annual environmental monitoring report (SEMR), field monitoring and interviews were conducted on 23 to 25 August 2016 to monitor ongoing construction works which being carried out by the two (2) Contractors for CW-A, CW-B1 and the other for CW-C. During the monitoring, National Environmental Specialist has arranged meeting with RE, ARE of DDIS consultants in each subproject and also discussion meeting with the contractor's representatives. Furthermore, Local Authorities and Affected People were also interviewed. This Semi-annual report covers the period from January to June 2016, during construction stage of the subprojects of PRIP.

6. As a result of physical progress of the contracts by June 2016, progress indicated: 1) CW-A: Improvement of NR13 is progressing as a progress rate of 33.2%; 2) CW-B1 contract is progressing as a progress rate of 41.0%; and 3) CW-C contract is progressing as a progress rate of 32.8%.

7. Environmental mitigation measures were being implemented based on the environmental checklist, and contractors are trying to minimize the impact to nearby structures as much as they could. During that time, regular sprinkling of water on access roads was observed only one water truck was using for spraying water in each subproject. In addition, the regular monitoring for safeguards was carried out in actual field works i.e.: warning signs, traffic safety and use of personal protective equipment (PPE). Warning sign and traffic safety signs were installed at work activity area but insufficient at the dangerous areas such as deep excavations and arrow areas. PPE were provided to the workers, however; some workers still lack or are not using the appropriate PPE.

8. Previous major issue was the inappropriate location of a cement stabilized batching plant along NR 13 at PK 55+400 within a residential area without any approval and permission from DDIS and commune. The DDIS consultant has addressed non-compliance issues related EMP implementation to the Contractor to take immediate action for reducing of the adverse environmental impacts in compliance with IEE and EMP. Responding to the environmental issue, the Contractor has actively organized equipment and personnel to correct non-compliance issue. During the monitoring, it is observed that inappropriate location of a cement stabilized batching plant has been removed from the site by the contractor. Therefore, there is no major issue for the contract CW-A.

9. Based on the surveyed it was found that no complain exists regarding project impacts and donation to the project. The interview, however, shows that they are happy with the project that they prefer the new road with access road to facilitate in travelling and expressed their gratitude to all of the donors as well as Cambodia Government for improvement of their quality of life and reducing poverty.

1. Introduction

1.1 Project Description

10. ABD has approved the Loan No.2839-CAM (SF)/8254-CAM (SCF) on 16 December 2011 and Grant 0278-CAM for Improvement of Provincial Roads at the southeastern and mid-west provinces in Cambodia as requested by the Government of Cambodia. This project is the most important project of the Royal Government of Cambodia to improve quality of people's life through improvement of roads and other infrastructures as it provides all-year access to provincial and rural agricultural communities of Prey Veng and Svay Rieng provinces of southeastern Cambodia, and Kampong Chhnang and Kampong Speu province in the mid-west of Cambodia.

11. The Provincial Roads Improvement Project (PRIP) will be implemented for a Contract period of 36 months, which commencement works from September 1st, 2014 and will be completed at the end of August in 2017, in selected national/provincial roads in 4 provinces of Cambodia, namely: (i) Svay Rieng, (ii) Prey Veng, (iii) Kampong Chhnang, and (iv) Kampong Speu. There are five (5) Contract packages to be implemented under the project in selected national roads and provincial roads in Cambodia in 4 provinces. These are: CW-A: Improvement of NR13 (62.4km); CW-B1: Improvement of PR314D (25.5km); CW-B2: Prey Var CBF; and CW-C: Improvement of NR53, PR150B and PR151B (70.63km), which are under Civil Works Output. The remaining contract, on the other hand, CW-D will be awarded under Improved Climate Resilience Output.

12. The project is expected to get more around 640,900 beneficiaries (Commune Database Online, 2010) residing in the areas covered by the project with the Ministry of Public Works and Transport (MPWT) as the Executing Agency (EA). The Project Management Unit 3 (PMU3), as part of the General Department of Public Works of MPWT, is the implementing agency of the Project. MPWT will be responsible for engaging consulting services and awarding civil works contracts. The Project Director of PMU3 will have overall administrative oversight of the consulting services and civil work contracts, and the Project Manager will have responsibility for day-to-day operations.

13. The road will provide an all-year road access from national road to other national roads and provincial town areas, and will provide greater accessibility to basic facilities and services. It will also strengthen the capacity of the MPWT to plan, manage and monitor road maintenance operations and implement the loan covenants and other conditions in the loan package. A Social and Environmental Office (SEO) has been established in MPWT and this will be strengthened during the project. It is also intended to further involve the Provincial Department of Public Works and Transport (PDPWT) in project implementation and monitoring.

14. The road will upgrade target existing poor conditioned unpaved and paved roads of NR/PR in four provinces to a paved road standard with double bituminous surface treatment (DBST) and single bituminous surface treatment (SBST). The project will also improve bridges and other drainage structures such as box culverts, pipe culverts, and side drainage systems. For these subprojects no new roads will be built. The Project is classified as environment category B and an initial environmental examination (IEE) was conducted as part of project preparation in accordance with ADB Safeguard Policy Statement of 2009 (ADB SPS). The list

of the subproject roads is shown in Table 1 and Table 2.

Table 1: List of construction work activities

Contract	Road No.	Construction Works (road type)	Location			Work Scale
			Province	Starting Point	End Point	
CW-A	NR13	DBST road	-Prey Veng, -Svay Rieng	St.0+000 (Kamchay Mear district, Prey Veng province, Junction NR8)	St.62+400 (Prosot district, Svay Rieng province, Junction NR1)	Length: 62.4 km Width: 11 m
CW-B1	PR314D	DBST road	-Svay Rieng	St.0+000 (Prosot district, Junction NR1)	St.25+500 (Prey Vor, Cambodia-Vietnam Border)	Length: 25.5 km Width: 11 m
CW-B2		CBF	-Svay Rieng			Area: 5 Ha
CW-C	PR150B-E	SBST road	-Kampong Chhnang	St.0+000 (Thnal Thor Thoung, Junction NR5)	St.5+447.33 (Taches market, Boeung Tonle Sap)	Length: 5.447 km Width: 8 m
	PR150B-W	SBST road	-Kampong Chhnang	St.0+000 (Thnal Thor Thoung, Junction NR5)	St.25+550 (Tuek Phos)	Length: 25.55 km Width: 8 m
	NR53	SBST road	-Kampong Chhnang	St.0+000 (Chi Prang)	St.31+879.41 (Thnal Kaeng)	Length: 31.879 km Width: 8 m
	PR151B	SBST road	-Kampong Speu	St.0+000 (Thnal Kaeng, Kampong Chhnang province)	St.3+581.25 (Amleang, Kampong Speu province)	Length: 3.581 km Width: 8 m
CW-D1		Dike reconstruction	-Kampong Chhnang	Portanorn, Bakdao and Srok		3 dikes

Table 2: Civil works Progress by June 2016

Contract	Contract Amount (US\$)	Work Period	Progress (%)	Implementation of Work	Remarks
CW-A (NR13)	22,768,558.44	from Sep 2014 to Aug 2017	33.2	- July to December 2015: Site camp, De-Mining/UXO, Production of aggregate base course material, Production of RC pipe, Embankment, Bridge foundation, Installation of box and cross pipe culverts works. - January to June 2016: De-Mining/UXO, Production of aggregate base course materials, Production of RC pipe, Embankment, Construction of Bridge, Installation of box and cross pipe culverts works	Sinohydro
CW-B1 (PR314D)	10,728,905.58	from Sep 2014 to Aug 2017	41.0	- July to December 2015: Site camp, De-Mining/UXO, Production of aggregate base course material, Production of RC pipe, Embankment, Bridge, Installation of box and cross pipe culverts works. - January to June 2016: De-Mining/UXO, Production of aggregate base course materials, Production of RC pipe, Embankment, Structure, Construction of Bridge, Installation of box and cross pipe culverts works.	Sinohydro
CW-B2 (CBF)	Not yet due	-	-	-	-
CW-C (PR150B, NR53, PR151B)	18,671,259.25	from Sep 2014 to Aug 2017	32.8	- July to December 2015: Site camp, De-Mining/UXO, Production of RC pipe, Embankment, Installation of cross pipe culverts works. - January to June 2016: De-Mining/UXO, Production of RC pipe, Embankment, Sub-base, Production of RC pipe, Construction of Bridge, Installation of box and cross pipe culverts works.	Gumkang-Visvakam JV
CW-D1 (Climate resilience, 3 Dikes)	756,115.74	from May 2016 to May 2017	3.0	- May to June 2016: De-Mining/UXO, Joint survey works.	Royal Mekong

Source: Monthly Progress Reports No 42 in June 2016 (KCI).

1.2 Objective of Environmental Monitoring

15. The Environmental Management Plan (EMP) monitoring report for the Provincial Road Improvement Project is required for monitoring of EMP implementation during the construction stage. The consultant's national environmental specialist has responsibility for environmental monitoring during construction stage.

16. For the Provincial Road Improvement Project on the NR13 (62.4km), PR314D (25.5km) and NR53, PR150B and PR151B (70.63km), the Environmental Monitoring will be carried out throughout during implementing stage. The contractor shall be responsible for all environmental monitoring activities under the instruction of environmental monitoring team, with the collaboration of the MPWT's Social and Environmental Office (SEO). During road improvement project, the environmental monitoring program will provide information on:

- The potential environmental impacts along the project route and at worker camps, with respect to the environmental and social safeguard management, especially within the national and provincial road improvement section
- The results of an initial environmental examination or impact assessment
- The potential impacts from all the project's improvement or construction activities compared with the normal condition before the project implemented;
- Supervision and inspection of implementation of mitigation measure by the contractor during the construction period in accordance with the EMP.
- Assistance with the identification of alternative mitigation measures that may further reduce the negative impacts of the activities undertaken.
- Identifying issues or problems and complains from affected communities or parties,
- Providing comment and develop plans or measures for correcting operation actions for mitigating negative impacts.

2. Laws and Regulations

17. Overall environmental management is required to comply with the Cambodia National Environmental laws, overseen by the Ministry of Environment (MoE). Their main responsibility is for ensuring the implementation of the Law on Environmental Protection and Natural Resources Management. At provincial and city levels, corresponding provincial/city environment departments exist to oversee this role. These local departments have the responsibility for enforcing the environmental legislation, under the supervision of the MoE. However, the daily operation of these departments would normally be under the direct control of the provincial authorities. The EMP should be conducted by the contractor, overseen by the project owner (i.e. MPWT), in collaboration with the environmental agencies.

18. The Follow up, monitor and take appropriate measures to ensure a Project Owner will follow the Environmental Management Plan (EMP) in including Environmental Monitoring Plan (EMoP) while project construction is taking place and accede to their EIA report's approval. (Sub-Decree on EIA Process MoE, 1999)

19. The legislations and guidelines for managing of the environmental aspect of this project, under responsible of MoE and relevant laws and regulations are shown below:

- Law on Environmental Protection and Natural Resource Management. MoE, December, 1996.

- Sub-decree on Environmental Impact Assessment. MoE, August, 1999.
- Sub-decree on Water Pollution Control. MoE, April, 1999.
- Sub-decree on Solid Waste Management. MoE, 1999.
- Sub-decree on Air Pollution Control and Noise Disturbance. MoE, July, 2000.
- Law on Land Traffic. MPWT, December, 2006.
- Land Law. MLMUPC, August, 2001.
- General Environmental Guideline (draft) for road maintenance work. MPWT/PAMP, 2008.
- Environmental Assessment Guideline. ADB, 2003.

3. Environmental Monitoring Mechanism

3.1 Introduction

20. The Environmental monitoring describes the processes and activities that need to take place to characterize and monitor the quality of the environment. Environmental monitoring is used in the preparation of environmental impact assessments, as well as in many circumstances in which human activities carry a risk of harmful effects on the natural environment. All monitoring strategies and programs have reasons and justifications which are often designed to establish the current status of an environment or to establish trends in environmental parameters. In all cases the results of monitoring will be reviewed, analyzed statistically and published. The design of a monitoring program must therefore have regard to the final use of the data before monitoring starts. (ADB, 2009)

21. Environment Monitoring Mechanism were established for mitigation measures and taken action on adverse environmental impacts during project's implementation, as full implementation of the IEE, and EMP of the project. Therefore, the environmental specialist (National Environmental Specialist) was mobilized for preparation of the semi-annual environmental monitoring report of the civil works from January to June 2016. The report represented the activities of the contractors on the project sites in order to ensure compliance with ADB's Social Safeguard Policy Statement 2009. During site monitoring, the DDIS consultants and the contractor's representatives were arranged for discussion meeting, at that time Local authorities and affected people who are living along the road project were short interviewed as well.

3.2 Environmental Management Plan (EMP) and CEMP

22. An EMP (Environmental Management Plan) was included in the bidding documents of civil works during the procurement stage. The contractors were required to consider the requirements of the EMP when submitting their bids as the conditions in the EMP become contractually binding on the contractors.

23. The EMP included in the bidding documents is, of necessity, general in scope. This is because specific details such as location of contractors camps, borrow pit areas, batching plant, rock sources, crushing plants and the like are not known at the bidding stage. These details must be supplied by the contractor in his CEMP – Contractors Environmental Management Plan. All contractors had previously supplied a CEMP. This CEMP for the subprojects has been prepared to deal with mitigation and management measures to be taken during Project implementation to avoid, reduce, mitigate for adverse environmental impacts in compliance with the IEE and EMP in the Contract Documents.

3.3 Environmental Management Program

24. The Follow up, monitor and take appropriate measures to ensure a Project Owner will follow the Environmental Management Plan (EMP) in including Environmental Monitoring Plan (EMoP) while project construction is taking place and accede to their EIA report's approval (Sub-Decree on EIA Process, MoE, 1999). The Environmental Monitoring Program is included in the Environmental Management Plan and so the EMP can be considered as an Environmental Management and Monitoring Plan.

3.4 The Scope of Work

25. The Scope of Work or Major Tasks for the environmental monitoring in construction stage include:

- Reviewing the environmental report in previous month that prepared by contractors;
- Field monitoring on road construction activities and contractor's environmental mitigation measure performance in all road projects;
- Presenting and guidance to MPWT's staff/PMU environmental engineers on environmental monitoring aspect, in the field practice;
- Recommend to contractors to implement all EMP as stated in IEE report and other environmental safeguards in construction contract documents; and
- Instruct to take an remedy action to mitigate or rectify on other issues that find out in the construction stage.

26. The main purpose of environmental monitoring is to ensure that the environmental impacts of project activities are adequately addressed and mitigated. In addition, the project also needs to comply with ADB's SPS 2009 and Cambodia's environmental laws as indicated in the loan agreement. The contractors have a duty to comply with the relevant legislation. The DDIS consultant must check their activities and report to MPWT. In the event of non-compliance issues related EMP implementation, the DDIS Consultant can instruct the contractor to comply with the environmental safeguards guideline. Given the nature of the work activities most monitoring is based on visual observations.

3.5 Measurements

27. Measurements system is a very important component to measure the progressive works especially during the construction stage. It may be necessary to carry out measurements to establish if the regulations are being met. There will be a "hierarchy" of monitoring and measurements. This would be based on measurements being made by persons in the following order:

- Contractors
- Consultants inspectors
- SEO, environmental staff from MPWT
- Ministry of Environment (MOE would only be involved if an official complaint was made to them),
- Local authorities and Communities.

28. Initially, contractors are required to check daily that all operations are being conducted correctly. In general "good housekeeping" must be employed. If contractor's camps are

established, then overflowing of septic tanks must be checked by visual inspection. Dust must be controlled by covering of stockpiles and water sprays. Solid waste, engine oil and grease, must be taken away by waste removal contractors and records kept. For road construction operations, lack of dust suppression and noise control are usually the main sources of potential nuisance if activities take place near residential dwellings. Crusher plants and borrow areas can also be sources of noise and dust. Inspection of borrow areas should also include borrow roads used by contractors vehicles. After extraction from borrow areas is finished, reinstatement must be carried out. Warning signs must be erected to avoid drowning if deep ponds are left. Inspectors and SEO staff must make regular checks by visual inspection.

29. Checklists were established and controlled by Construction supervision inspectors, they are making daily spot checks and weekly formal checks on site operations. They check all of the above and view records for waste disposal. They must also investigate any pollution incidents and also taken action in all complaints from residents/Local Authorities if necessary. They are using checklists for record purposes and ensure that any complaints or incident are brought to the notice of the contractor immediately, verbally and with a follow up written notice.

30. During conducting environmental monitoring process for Provincial Road Improvement Project (CW-A, CW-B1 and CW-C), the monitoring team (environmental and social-gender specialists) conducted field investigation and monitoring along the roads was included consultation or discussion with contractors, assistant resident engineers, site engineers, site inspectors, site construction leaders and workers. Local communities are located along the road.

31. Initial monitoring is based on visual inspection and site assessment. Normally, implementation of "Good Housekeeping" and the contractor demonstrating a responsible attitude are sufficient to ensure an environmentally satisfactory operation.

32. The results must be submitted to SEO who will interpret them with respect to the relevant regulations. Discussions must then be held between SEO, the consultants' inspectors and the contractor to determine how to resolve any problems.

3.6 Time of Monitoring

33. The timing of the monitoring is very important for taken action on time. The following list is for guidance and is indicative only.

- Liquid emissions from sites must be checked at least weekly for the Contractors and monthly for the DDIS Consultant or after heavy rain if overflowing is reported.
- Dust emissions on site must be checked weekly by visual inspection and monthly by examining records of water spraying. Ambient air quality must be checked over a 24h continuous period at sensitive receptors in the event of complaints.
- Noise levels must be checked at site perimeters in the event of a complaint, at night as well as during the daytime.
- Correct removal and disposal of food waste and waste engine oil and grease must be checked weekly by visual inspection of the camps and checking of records from the waste disposal contractors.

- Noise and vibration must be checked at sensitive receptors if blasting occurs or in the event of complaint. Before blasting commences warning notices must be posted to local residents.
- Reinstatement of borrow pits and quarries must be checked after closure of the facility.
- Implementation of EMP will be checked weekly by the Contractors and at least once a month, and preparation of semi-annual environmental report by the DDIS Consultant, and semi-annual. Contractors and the DDIS Consultant, as well as SEO have to carry out the last EMP monitoring checklist approval.

34. In addition to regular monitoring, unannounced spot checks must be made by SEO on contractors operations. All of the above procedures should be carried out by the site inspectors, in conjunction with SEO, and where appropriate MOE/ DOE. The results should be formally recorded every week and compiled into a monthly report. This should be submitted to the Engineer, the Chief Resident Engineer and discussed with SEO and the contractors as necessary but at a minimum on a monthly basis. Monthly reports are being compiled into semi-annual reports for submission to ADB.

3.7 Monitoring of CEMP by Checklists

35. The CEMP is monitored and enforced by the Supervision Consultants inspectors who use Checklists included in the EMP. By using the checklists consistency is maintained between the various packages. The checklists are compiled every month and the checklists for all Contract Packages for **1) CW-A: Improvement of NR31; 2) CW-B1: Improvement of PR314D; 3) CW-C: Improvement of PR150B, NR53, and PR151B.** In general the semi-annual environmental monitoring is conducted every 6 months (two times per year) by compiling monthly reports. Site inspection of all Environment aspects were sighted and reviewed by the National Environmental Specialist.

36. The checklists had been filled in correctly and reporting was thorough. No significant environmental issues were identified. Dust from roads was commented upon during dry patches but was not a significant issue and was remedied by increased frequency of water sprays. During the rainy season it ceases to be an issue. However, much dust has been generated during monitoring. No noise complaints had been received. However, further remedial work for cement stabilized batching plant on NR13 and dust impact is required at the time of the inspections. No complaints from villagers were reported. It was observed that cement stabilized batching plant has been removed from the site by the contractor with the reason of repairing. Where possible contractors rent local houses for their workers rather than establishing camps. This is easier for them and avoids issues over sanitation and water supply. This approach is actively encouraged and appears to be working well during construction stage.

3.8 Establishment of SEO

37. Social & Environmental Office (SEO) is a division which has been established in the Department of Planning, MPWT. There is now 5 staff within Social and Environmental Office (SEO): 1 Chief, 1 Vice chief, 1 Resettlement, 2 Environment & Social Safeguards. It is

considered that this now makes them effective. SEO can act together with the DDIS consultant or independently to check contractor's activities. In the event of non-compliance issues related EMP implementation, SEO as part of MPWT can instruct the contractor to comply with the environmental safeguards guideline. During site inspection on Environmental Monitoring, the SEO should have cooperated with National Environmental Specialist if time availability.

4. Result of Environmental Monitoring

38. The Semi-Annual Environmental Monitoring Report focused on potential environmental and social resources, adverse environmental issues, and proposed mitigation measure were described in following paragraph, and the field record is included environmental monitoring checklist data from January to June 2016 attached in **Appendices**.

39. To verify the environmental assessments done by checklist, site visits were conducted to several selected roads by the National Environmental and Social Specialists and cooperation with Resident Engineers, Assistant Resident Engineers of the subprojects and contractors and also including to discussion with site workers and local communities. The results of site observation are given in below.

4.1 Contract CW-A: Improvement of NR13 in Prey Veng and Svay Rieng

40. **CW-A** is the subproject for improvement of NR13 and other structure works along the National Road No.13, the starting point of the project at the junction of NR8 (PK 0+000), in Prey Veng province, and end point at the junction of NR1 (PK62+430) in Svay Rieng province, referring to the Specification, this subproject will be upgraded to DBST road of 62.4km and reconstruction of other road structures. SINOHYDRO Corporation Limited Co., Ltd is the Contractor for the project. Construction works commenced on 1st September 2014 and the expected completion date in August 2017.

41. Site visit and inspection indicates that all the construction work activities are progressing slowly against planned. During raining season from May 2016, there were not many construction work activities in the project site, have a few construction works for structures (bridge and box culvert construction) and Pre-Stressed Concrete Deck for bridge at Casting Yards.

De-mining/UXO clearance work has been completed. The contractor continued clearing and grubbing works at completion of resettlement compensation agreement section. The mixing plant for cement stabilized sub-base has been demobilized from the site. Cement stabilized sub-base work is achieved up to 11,414 m³ out of total 182,813 m³. The embankment and sub-base work has been suspending during rainy season.

42. The substructure work is in progress for Br. #1, Br. #2 and Br. #4. PSC deck installation for Br. #3 has been completed and deck slab work is in progress. The box culverts #1, 2, 3, 4, and 5 have been fully completed out of total 5 numbers of culverts.

Pictures of Project Work Activities (CW-A)

	
Embankment work (PK 32+150 to PK 32+400)	Pipe culvert work (PC-29)
	
Concrete work for Pier (BR-01)	Installation of PSC Deck (BR-04)
	
Bridge construction (PK33+100)	Bridge construction (PK33+100)

43. Air and Noise Emission: the project area as well as NR13 is located in the rural area, so the air quality is still good because these areas are located in rural area and no industries are near the site, most of along the road areas are covered by rice field, agricultural farm, and rural resident. There was no major air and noise issue during the monitoring.

44. Soil erosion: In general, there was no sign of soil erosion during the site monitoring. Most of the embankment work along the road is far away from the water courses. There was no embankment work activity along the road due to raining and impossible to access borrow pits.

45. The Borrow pits/quarries: In this period the activities of quarry and borrow pits is limited due to raining.

	
<p>Casting Yard precast of PSC Deck & RC Pile</p>	<p>Housing keeping</p>
	
<p>Environmental condition at construction site</p>	<p>Construction materials at construction site</p>
	
<p>Water body is across the road (canal or stream)</p>	<p>Bridge construction</p>
	
<p>Road Surface Condition of NR13 during raining</p>	<p>Road Surface Condition of NR13 during raining</p>



46. Leaks and Spills Hazardous material and Non-Hazardous Waste: The spills or generating of hazardous waste material (fuel waste from construction machine) storage facilities in safety bins or containers at SINOHYDRO's site camp are well managed. Both fuel storage facilities had an in charged person for daily operation and maintained with security and safety.

47. Waste management: The workshops and storage areas in Site Camp of the Contractor have been improved and equipped with garbage bin. The platform space of Contractor site camp is well cleaned. Most of the construction sites are well managed of solid waste as well as spoil soil. The wastes are regularly collecting, keeping in rubbish bins, and disposed by local agency.

48. Water Quality: During field monitoring, there was no adverse sign of water quality (in canals, streams, rice field, and other water body located at along the road). The construction works is reduced due to raining, and structure work such as bridge and pipe culvert has small activities.

49. Dust generation: During monitoring, dust generation was observed from the dried surface of road even in raining season. The Contractor's regular sprinkling of water is being done at least two times per day at that time. However, water truck is not arranged sufficiently to effectively mitigate the dust generation along the project road. Dust generation is currently no major issue. But during consultation with local people, peoples are worried or considered of slip road by raining.

50. Economic Activities: A few local markets are along the roadside. During discussion with local communities, they are concerned to construction time on market section.

51. Safety: All the workshops and stockpile places have been equipped with extinguisher capacity of 4kg (at least 4 bottles). During the monitoring, an inappropriate location of batching plant along NR13 within a residential area has been removed. Therefore, there is not a non-compliance issue related to the cement stabilized batching plant regarding EMP implementation.

4.2 Contract CW-B1: Improvement of PR314D in Svay Rieng

52. **CW-B1** is the subproject for improvement of PR314D and other structures work along the provincial road, the starting point of the project at the junction of NR1 in Svay Teap and the end point at the Cambodia-Vietnam border, Prey Var CBF (25.20 km) and the road will be upgraded to DBST road. SINOHYDRO Corporation Limited Co., Ltd is the Contractor for the project. Construction works commenced on 1st September 2014 and the expected completion date in August 2017.

53. Embankment work shows progress delay due to contractor's lack of work team arrangement and unsolved selection of suitable sub-grade material. There was no activity for the embankment work during monitoring. Abutment 1 and 2 substructure work for Br. #1 has been completed and PSC Deck has been installed. Box culvert #1 and #2 has been fully completed.

Pictures of Project Work Activities (CW-B1)

54. Related to the EMP implementation, Environmental monitoring of this subproject (CW-B1) were inspected on 24-25 August, 2016. The status of this Sub-project is under construction, but the progress of work is very slowly against the scheduled. During this rainy season, there will not proceed Earthwork activities, and will be a few activities for pipe culvert, and bridges.



Discussion with assistant resident engineer and site engineers



Culvert construction activities



Bridge construction Thmei commune, Kampong Po, Svay Rieng

55. Water quality: there was no adverse sign of water quality (in canals, streams, rice field, and other water body located at along the road). The construction works is reduced due to raining, and structure work such as bridge and pipe culvert has small activities.

56. Dust management: The embankment work for CW-B1 has been stopped during rainy season. Therefore, the heavy dust generation was not observed. Dust impact is not major issue during rainy season, but communities are worried about slip road.



Culvert construction and road condition

Precast of culverts site (Casting yard)



57. **Waste Management:** The waste is managed by contractor or sub-contractors. The waste water generation from the project is wastewater from the bathing and flushing toilet. Generally, the workers camp is equipped with bathing room and toilet. The bathing water is drained into the storage tanks. The toilet is built separated between men and women. The solid wastes are regularly collecting, keeping in rubbish bins, and disposed by local agency. There are no significant negative environmental issues of project activities at construction site.

4.3 **Contract CW-C: Improvement of PR150B, NR53, and PR151B in Kampong Chhnang and Kampong Speu**

58. **CW-C** is the subproject for improvement of PR150B, NR53, and PR151B and other structures work along the provincial roads, the subproject is located in Kampong Chhnang and Kampong Speu province (70.6 km) and the road will be upgraded to SBST road. The Gumkang-Visvakam JV is the contractor for the project. Construction works commenced on 1st September 2014 and the expected completion date in August 2017.

59. Embankment and Sub-base work is ongoing, and some section has been reached to the final elevation of embankment. 534,166 m³ out of total 678,498 m³ for embankment has been completed. Mixing plant for aggregate mixed laterite sub-base has been installed and under operation. The Embankment and Sub-base work have a little activity due to raining. Abutment and Pier column work is in suspending, due to high water level during rainy season. The Box Culvert work for BC-01, BC-02 and BC-03 at PR150B is in progress for column, top slab and wing wall work.

Pictures of Project Work Activities (CW-C)

	
Construction activities at site for embankment (CW-C)	
	
Road construction activities at site for sub-base (CW-C)	
	
Culverts construction activities at site for pipe culvert (CW-C)	

60. Waste management: During site monitoring in August 2016, most of the Contractor's camp sites are well managed solid waste. The garbage bins/recycle bins at work sites and the contractor's office were equipped. The solid waste management at the Consultant's site camp was improved since the comments in previous report, and also equipped with garbage bins/recycle bins at the place. The contract will collaborate with the Local Authorities/Company to collect and dispose this solid waste generated from all activities.

61. Leaks and spills of hazardous material and oil waste: Improper oil/fuel container storage or change engine oil was carried out inappropriately by sub-contractor. The contractor should have provided a suitable tank, including built concrete platform, wall, and security equipment and fence around the fuel storage. At the workshops and storage area of sub-contractor, it was observed that (i) improper oil/fuel drum storage, (ii) insufficient housekeeping.

	
<p>Oil/fuel tank storage at construction site</p>	<p>Casting yard for precast culverts</p>
	
<p>Good condition of Fuel storage at main site camp</p>	<p>Solid waste at construction camp</p>
	
<p>Water body at bridge and culverts construction site</p>	

62. Water quality: During field monitoring, there was no sign of water laden into the rice field or water body, due to the earthwork activities was carried out by place. No soil erosion was observed. In general, the embankment work was not proceeding smoothly due to inaccessibility to borrow pits.



63. **Dust generation:** Project is a provincial road improvement where not much air pollution to be caused serious adverse impact to community except dust impact. Dust generation was observed along the project road during site monitoring, while water spray trucks are standby at sub-base work activity section. Water sources for dust control in this area are being insufficient because those water sources are kept for local people uses during the dry season only. So, the Local Authorities did not allow pumping from those water sources. Therefore, the Contractor should be taken action to solve this issue by finding other water sources for water sprinkling at least 2 times per day. Water spraying should be focused on populated areas and sensitive locations such as school zones, residential areas and health care centers. In this monitoring, the air pollution for smoke and dust emission is very low or not issue because construction works are temporary stopped during rainy season.



	
Current road condition of NR53	
	
Discussion with communities (PR150B)	
	
Discussion with communities and site manager (NR53)	
	
Discussion with resident engineer and assistant resident engineer (CW-C)	

64. There are no any sensitive resources such as forests, wildlife, and vegetation located at road side. No major adverse environmental issue was observed on the site. However, the contractor is neglected to take the correct action for the non-compliance of EMP implementation

even though DDIS consultant continuously reminded contractor to take correct action.

65. Traffic Safety: During the field monitoring, any traffic congestion as well as accident that caused by the project activities was not observed. Most of the construction activity areas equipped with warning signed. However, it is observed that warning signs and safety devices are absolutely insufficient for the road safety. Also, signs to reduce traffic speed should be in place at the dangerous areas such as deep excavations and narrow areas. Sub-base work is ongoing along the NR53, however, warning signs and installed traffic safety barriers are not sufficient. During discussion with local communities, they are worried of slipped road during rainy season.

4.4 Contract CW-D1: Climate Resilience, Reconstruction of Portanorn, Bakdao and Srok Dikes in Kampong Chhnang

66. **CW-D1** is the subproject for Climate Resilience output located at Kampong Leaeng District Kampong Chhnang Province and 3 dikes will be reconstructed. Royal Mekong Construction & Development Pte., Ltd is the Contractor for the project. Construction works commenced on 9 May 2016 and the expected completion is by May 2017.

67. There is no any activity for construction because 3 dikes are under flooding during rainy season.

5. Review of Environmental Parameters

68. Environment parameters were checked and reviewed for three contract packages. All civil works have been evaluated satisfactory and no major environmental issues were found. The reviewing of results on environmental parameters of each contract package is shown in **Table 3**.

Table 3: Environmental Parameters Contract Packages CW-A, CW-B1, CW- B2, CW-C, and CW-D

Regulation	Environmental Issue	Parameter	Standard	Contract Package CW-A	Contract Package CW-B1	Contract Package CW-B2	Contract Package CW-C	Contract Package CW-D1
ADB requirement	Notification of EMP to contractors	General requirements	ADB Social Safeguards Policy Statement 2009	Completed. EMP included in Tender Documents issued to contractors.	Completed. EMP included in Tender Documents issued to contractors.	N/A	Completed. EMP included in Tender Documents issued to contractors.	Completed. EMP included in Tender Documents issued to contractors.
ADB requirement	Submission of CEMP from contractor to MPWT	Specific details must be supplied by contractor on construction camps, borrow areas and roads, quarries, crushing and screening plants	ADB Social Safeguards Policy Statement 2009	Submitted by contractor. NR13 completed.	Submitted by contractor. PR314D completed.	N/A.	Submitted by contractor. PR150B, NR53, PR151B Completed	Submitted by contractor. 3 Dikes completed.
EMP requirement	Monthly Checklists	All environmental parameters	As per individual checklists given in EMP	Checklists completed by Engineer with contractor for January to June 2016. Checklists reviewed and confirmed to be in order. No environmental issues identified.	Checklists completed by Engineer with contractor for January to June 2016. Checklists reviewed and confirmed to be in order. No environmental issues identified.	N/A	Checklists completed by Engineer with contractor for January to June 2016. Checklists reviewed and confirmed to be in order. No environmental issues identified.	Not yet commenced
Sub-decree on Water Pollution Control	Water Quality	BOD	< 50mg/L	No visual evidence was sighted of impacts on water quality. No spills were observed. There are no major water courses near project roads. No remedial action is required. No sampling or measurements of water is required.	No visual evidence was sighted of impacts on water quality. No spills were observed. There are no major water courses near project roads. No remedial action is required. No sampling or measurements of water is required.	N/A	No visual evidence was sighted of impacts on water quality. No spills were observed. There are no major water courses near project roads. No remedial action is required. No sampling or measurements of water is required.	N/A
		SS	< 50mg/L					
		Temperature	<45°C					
		pH	6-9					
		Oil & Grease	< 5mg/L					
		Dissolved Oxygen	> 4mg/L					

Regulation	Environmental Issue	Parameter	Standard	Contract Packages CW-A	Contract Packages CW-B1	Contract Packages CW-B2	Contract Packages CW-C	Contract Packages CW-D
Sub-decree on Air and Noise Pollution Control	Air Quality	TSP	< 0.33 mg/m ³	No major air quality issues identified. Dust suppression on roads improved by more water spraying. Minor noise issues cured by controlling speed of vehicles.	No major air quality issues identified. Dust suppression on roads improved by more water spraying. Minor noise issues cured by controlling speed of vehicles.	N/A	No major air quality issues identified. Dust suppression on roads improved by more water spraying.	N/A
	Noise Quality	Leq	75dB(A)					
		Leq	65dB(A)					
No Regulation	Vibration	PPV	< 1mm/sec	No blasting taking place. Blasting will be carried out by commercial quarry owner with permission of local commune	No blasting taking place. Blasting will be carried out by commercial quarry owner with permission of local commune	N/A	No blasting taking place. Blasting will be carried out by commercial quarry owner with permission of local commune	N/A
Sub-decree on Solid Waste Management	Solid Waste	Food Waste	Properly Removed	Site camps acceptable. Attention to be given to oil storage and handling.	Site camps acceptable. Attention to be given to oil storage and handling.	N/A	Site camps acceptable. Attention to be given to oil storage and handling.	N/A
	Liquid Waste	Waste Oil, Grease	Properly Controlled After Removed by Subcontractor					
No Regulation	Septic Tank	Smell, Sewage	No Smell, No Overflowing	Workers camps acceptable. Where possible houses are being rented rather than setting up camps.	Workers camps acceptable. Where possible houses are being rented rather than setting up camps.	N/A	Workers camps acceptable. Where possible installed on the residential land are being rented for setting up camps.	N/A
No Regulation	Borrow Pits	Condition of Borrow Pits	Filled after Project Completion, Topsoil resurfaced	No issues identified. But shall be fenced after Project Completion	No issues identified. But shall be fenced after Project Completion	N/A	No issues identified. But shall be fenced after Project Completion	N/A
No Regulation	Borrow Pits	Depth of Borrow pits	No Drowning Hazard	No issues identified	No issues identified	N/A	No issues identified.	N/A
No Regulation	Borrow Road	Location for Borrow Road	No complaints from residents	No issues identified	No issues identified	N/A	No issues identified.	N/A
No Regulation	Quarries	Condition of Quarries	Quarries reinstated	N/A	N/A	N/A	N/A	N/A
No Regulation	Trees if Cut	Number of Trees	Tree Replanted	N/A	N/A	N/A	N/A	N/A

6. Correct Action

69. Most of the Corrective Actions are complying with the CEMP, and also implemented by the Contractors or Sub-contractors, while the other minor non-compliance issues or negative impacts will be corrected from August 2016.

7. Outstanding Issues

70. There is outstanding issue involved in environmental management in CW-A, CW-B1 and CW-C contract package.

71. **CW-A:** There is no major outstanding issue to the cement stabilized batching plant to avoid noise and dust negative impact to the resident because plant has been removed from the site. However, the contractor should have taken correct action during construction stage to the non-compliance of EMP implementation which has been addressed by DDIS consultant and ADB Loan Review Mission as well regarding dust control and safety.

72. **CW-B1:** The contractor should have taken correct action during construction stage to the non-compliance of EMP implementation which has been addressed by DDIS consultant and ADB Loan Review Mission as well regarding dust control and safety.

73. **CW-C:** The contractor should have taken correct action during construction stage to the non-compliance of EMP implementation which has been addressed by DDIS consultant and ADB Loan Review Mission as well regarding dust control and safety.

8. Conclusion

74. All above results of the semi-annual environmental monitoring to the ongoing civil works of the Project observed no significant impact. However, outstanding issues have been found to the CW-A, CW-B1 and CW-C contract package. The Contractor shall implement the environmental management and mitigation measures in compliance with the EMP/CEMP properly.

75. Strictly implement approved dust control plan such as Construction equipment and vehicles shall be used new equipment/machines and well maintained, emit small smoke/air, and shall meet MPWT and MoE's emission standards.

76. Separate solid waste into hazardous, non-hazardous, and reusable waste streams and store temporary on site. Provide sufficient and safety waste tanks/bins in the camp. Undertake regular collection and disposal of waste to site approved by authority. The solid wastes disposal shall be collaborated or delivered to local licensed waste sub-contractor. Provide education of understanding for proper waste management (collection and sanitation).

77. Implementing the construction safety policy: Construction personnel shall be provided with safety gears such as protective hard cap and other safety uses, Traffic management, to secure traffic safety, shall be planned and implemented, The safety single poles shall be provided around the construction sites, and Accident response plan shall be prepared in working sites such as:

materials, medicines, skill staffs, and other public safeties are presented in EMP report.

78. Related to the EMP implementation, air pollution mitigation has been carried out continually to reduce dust generation and gaseous emissions from road construction work activities and machineries by the Contractor at the construction sites. Among of monitoring items, worker camps and quarry & borrow pit sites operation are the most important to determine the effects of the project activities. As the results of the monitoring on site camp of the Contractors are in good condition, moreover, there are no any environmental issues or influences caused by those sub-projects during construction stage. However, Sub-contractor's site camp shall be improved for the issue of leaks and spills of hazardous material and oil waste. Therefore, the construction activity has been continually carried out strictly follow the environmental monitoring in the EMP and CEMP and other relevant environmental contracts. DDIS consultants' field monitoring to ensure compliance with the requirements in the EMP and CEMP shall be implemented frequently and closely whether the contractor's field activities are compliance with the requirements in the EMP and CEMP.

Appendix A: Checklist of EMP Implementation for Contract **CW-A**

ENVIRONMENTAL MONITORING CHECK LIST

January - June 2016

Provincial Road Improvement Project
ADB Loan No.2839-CAM (SF)/8254-CAM
Contract Package CW-A: **Improvement of NR13**

EMP Requirement (Mitigating Measures)	Compliance Status																		Remarks/ Reasons for Partial or Non- Compliance
	Jan 2016			Feb 2016			Mar 2016			Apr 2016			May 2016			Jun 2016			
	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	
1. Community Facilities (power lines, irrigation canals, etc.)																			
Interruption of utility services are minimized by laying out new lines prior to transfer	√			√			√			√			√			√			
Replacement structure are constructed prior to demolition of existing structure	√			√			√			√			√			√			
Temporary facilities to maintain adequate services are in place	√			√			√			√			√			√			
Coordination with local company or local offices	√			√			√			√			√			√			
Affected parties are informed in advance	√			√			√			√			√			√			
2. Air Quality (Dust and Gaseous Emissions)																			
Vehicles and equipment are well maintained and in good condition.	√			√			√			√			√			√			
Borrow areas, casting yard and other project facilities are duly licensed and have all the necessary environmental approvals	√			√			√			√			√			√			
All construction vehicles and equipment are tested for compliance with relevant emission standard and properly licensed	√			√			√			√			√			√			
Parked vehicles on the site works have their engines turned off. Unnecessary engine idling of vehicles and equipment is prohibited.	√			√			√			√			√			√			
Water spraying of roadways, working areas and other construction-related facilities near sensitive receptors and handling of all raw sand and aggregates, and other similar materials	√			√			√			√			√			√			
Dust barriers are installed as necessary	√			√			√			√			√			√			
Storage areas of construction materials such as sand, gravel, cement, etc., have provisions that prevent them from being blown away towards sensitive receptors			√			√			√			√			√			√	
Trucks transporting construction materials (i.e. sand, soil, cement, gravel, etc.) are tightly covered			√			√			√			√			√			√	
Roadways are regularly cleaned of tracked in mud, cement, etc. from construction works			√			√			√			√			√			√	

EMP Requirement (Mitigating Measures)	Compliance Status																		Remarks/ Reasons for Partial or Non- Compliance
	Jan 2016			Feb 2016			Mar 2016			Apr 2016			May 2016			Jun 2016			
	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	
Stockpiling of spoils near sensitive receptors is prohibited	√			√			√			√			√			√			
Construction vehicles have speed limits (typically 25 km/hour or less) along areas where sensitive receptors are located	√			√			√			√			√			√			
Areas where there is a regular movement of vehicles have an acceptable hard surface and are clear of loose surface material			√			√			√			√			√			√	
Cement and other fine-grained materials delivered in bulk are stored in closed containers			√			√			√			√			√			√	
Conveyor belts are fitted with wind-boards, and conveyor transfer points and hopper discharge areas are enclosed	√			√			√			√			√			√			
Weigh hoppers are vented with a suitable filter	√			√			√			√			√			√			
Wheel washers are used to clean delivery/ haul trucks of mud and dirt as they exit the work area		√			√			√			√			√			√		
Smoke belching vehicles and equipment are not used for the project	√			√			√			√			√			√			
Construction vehicle trips and travel distances for material deliveries are minimized (e.g., by using local materials and labor sources).	√			√			√			√			√			√			
Construction access roads are temporarily paved or sealed		√			√			√			√			√			√		
3. Noise Levels																			
Prior notification to the community on construction schedule	√			√			√			√			√			√			
Vehicle and equipment are fitted with emission control and silencers to meet national noise standard	√			√			√			√			√			√			
Vehicles and equipment are well-maintained and checked by the contractor every 6 months		√			√			√			√			√			√		
Only vehicles and equipment that are registered and have necessary permits are used	√			√			√			√			√			√			
Noisy equipment is completely enclosed whenever possible	√			√			√			√			√			√			
Stationary equipment that produce high noise level are positioned as far as is practical from sensitive receptors.	√			√			√			√			√			√			
Noisy construction activities within 200m of a settlement are only during daytime	√			√			√			√			√			√			
Suitable noise control barriers are used in the vicinity of	√			√			√			√			√			√			

EMP Requirement (Mitigating Measures)	Compliance Status																		Remarks/ Reasons for Partial or Non- Compliance
	Jan 2016			Feb 2016			Mar 2016			Apr 2016			May 2016			Jun 2016			
	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	
house, school, temples, medical facilities and other sensitive receptors																			
Noisy construction activities are avoided near school during examination period and coordinated with school administration	√			√			√			√			√			√			
Noisy construction activities are avoided in the vicinity of sensitive receivers	√			√			√			√			√			√			
Suitable noise level reduction measures are installed by the contractor if construction activities are disruptive	√			√			√			√			√			√			
Speed limits on construction vehicles are imposed		√			√			√			√			√			√		
Construction traffic routes are defined in cooperation with local communities and traffic police	√			√			√			√			√			√			
Asphalt concrete batching plants and crushing plant are located at least 500 m away from inhabited areas and other sensitive receptors		√		√			√			√			√			√			
4. Vibration Levels																			
Fully loaded trucks are rerouted away from roadways that go through heavily built areas	√			√			√			√			√			√			
Heavy equipment is operated away from vibration-sensitive areas	√			√			√			√			√			√			
Simultaneous activities like demolition, ground impacting and earthmoving are avoided	√			√			√			√			√			√			
Alternative equipment is used	√			√			√			√			√			√			
Use of vibrating rollers near vibration- sensitive structures are avoided	√			√			√			√			√			√			
5. Erosion and Sedimentation																			
Suitable soil erosion control measures are implemented prior to excavation of the bridge pier foundation and construction activities at waterways	√			√			√			√			√			√			
Silted water carried with the spoils during excavation and construction of bridge foundation are properly treated	√			√			√			√			√			√			
Spoils (excavated soil, rocks, removed asphalt, etc.) stockpiles are located at least 50 m from watercourses	√			√			√			√			√			√			
A bund is placed around the spoils stockpile area	√			√			√			√			√			√			
Spoil disposal does not cause sedimentation and	√			√			√			√			√			√			

EMP Requirement (Mitigating Measures)	Compliance Status																		Remarks/ Reasons for Partial or Non- Compliance
	Jan 2016			Feb 2016			Mar 2016			Apr 2016			May 2016			Jun 2016			
	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	
obstruction of water flow, damage to agricultural land and densely vegetated areas																			
Grading is avoided or minimized during the rainy season particularly in areas of steep topography and/or adjacent to water courses	√			√			√			√			√			√			
Phased grading schedule is implemented to limit the area subject to erosion at any given time	√			√			√			√			√			√			
Appropriate erosion control and stabilizing measures (such as geotextiles, mats, fiber rolls, soil binders that are not toxic to the environment, or vegetation measures/temporary landscaping) are used in disturbed areas and on graded slopes	√			√			√			√			√			√			
Construction works (for bridges, culverts, drainage, etc.) on or near watercourses do not cause obstruction of channel flow	√			√			√			√			√			√			
Slopes along water channels are stabilized	√			√			√			√			√			√			
Dumping of soil, rocks, construction materials and debris onto watercourses is prohibited	√			√			√			√			√			√			
When construction works cause obstruction of watercourses, the obstruction is immediately cleared to restore channel flow	√			√			√			√			√			√			
6. Spoils Disposal																			
Spoils (excavated soil and rocks, cut vegetation, removed pavement such as asphalt, etc.) are immediately transported to disposal sites approved by local authorities		√			√			√			√			√			√		
Temporary spoils stockpiles near paddy fields have bund or silt fence around them		√			√			√			√			√			√		
Temporary spoils stockpile that are planned to be used longer than six months are sodded.		√			√			√			√			√			√		
Height of spoils stockpile are limited to minimize windblown dust		√			√			√			√			√			√		
7. Soil and Groundwater Contamination																			
Maintenance shops, fuel and oil depot have impermeable flooring with sump	√			√			√			√			√			√			
Refueling and servicing of equipment are carried out only	√			√			√			√			√			√			

EMP Requirement (Mitigating Measures)	Compliance Status																		Remarks/ Reasons for Partial or Non- Compliance
	Jan 2016			Feb 2016			Mar 2016			Apr 2016			May 2016			Jun 2016			
	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	
in adequately equipped areas																			
Only minimal chemicals, hazardous substances and fuel are stored on site works, within an enclosed and covered secure area that has an impervious floor and impervious bund around it	√			√			√			√			√			√			
Storage area for chemicals, hazardous substances and fuel are located away from watercourses, flood-prone areas, work camps, and danger areas	√			√			√			√			√			√			
Oil-stained refuse such as oily rags, spent oil filters and used oil are collected and disposed of through recyclers/authorized waste handlers and disposed in authorized waste facilities	√			√			√			√			√			√			
Availability of spill clean-up materials specifically designed for petroleum products and other hazardous substances	√			√			√			√			√			√			
Immediate cleanup of spills or leaks of petroleum products and/or hazardous substances	√			√			√			√			√			√			
Training of relevant construction personnel in handling of fuels/hazardous substances and spill control procedures	√			√			√			√			√			√			
At least weekly check for leakage in containers and immediate repair or replacement when necessary	√			√			√			√			√			√			
Equipment maintenance and fuel storage areas are provided with drainage to an oil-water separator that is regularly skimmed of oil and maintained	√			√			√			√			√			√			
Discharge of oil-contaminated water into the environment is prohibited	√			√			√			√			√			√			
Waste oil, used lubricant and other hazardous wastes are stored in tightly sealed containers with proper labeling	√			√			√			√			√			√			
Removal and treatment or proper disposal of oil contaminated soils is included in work sites restoration	√			√			√			√			√			√			
8. Water Availability																			
Temporary canals/irrigation channels to prevent disruption of water supply to farmlands.	√			√			√			√			√			√			
9. Water Quality																			

EMP Requirement (Mitigating Measures)	Compliance Status																		Remarks/ Reasons for Partial or Non- Compliance
	Jan 2016			Feb 2016			Mar 2016			Apr 2016			May 2016			Jun 2016			
	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	
Suitable settling/retention ponds are constructed prior to operation of asphaltic concrete batching plants and casting yards	√			√			√			√			√			√			
Settling/retention ponds are properly operated and maintained to ensure effluent quality meets applicable effluent standards	√			√			√			√			√			√			
Bentonite slurry and sludge, mud and other materials and wastes from drilling are collected and processed to avoid pollution of surface water	√			√			√			√			√			√			
Bentonite slurry and sludge, mud and other materials and wastes from drilling are not discharged into watercourses	√			√			√			√			√			√			
Drilling solutions (e.g., bentonite slurry) for bridge construction, abutment construction, piling, etc. are processed in a closed system	√			√			√			√			√			√			
Proper disposal of bentonite-containing spoils as fill material in appropriate sites	√			√			√			√			√			√			
Spilled bentonite mud in agricultural land is cleaned immediately before it cakes and hardens	√			√			√			√			√			√			
Water from bridge foundation dewatering is not discharged directly into a water body	√			√			√			√			√			√			
Total suspended solids content of discharges into water bodies comply with applicable standards	√			√			√			√			√			√			
Sanitation facilities with sufficient capacity are provided to handle and treat sewage generated by workers	√			√			√			√			√			√			
Equipment service and maintenance yards are provided with impermeable flooring and collection sump	√			√			√			√			√			√			
All equipment maintenance shops are provided with water-tight receptacles for waste oil, oily rags, spent oil filters, solvents and oily containers	√			√			√			√			√			√			
Disposal of all waste oil, oily rags, spent oil filters, solvents and oily containers are through authorized waste handlers and recyclers	√			√			√			√			√			√			
Paving operations are restricted during wet weather	√			√			√			√			√			√			
Use of sediment control devices downstream of paving activities	√			√			√			√			√			√			
Use of mobile fueling/maintenance units for construction equipment whenever feasible	√			√			√			√			√			√			

EMP Requirement (Mitigating Measures)	Compliance Status																		Remarks/ Reasons for Partial or Non- Compliance
	Jan 2016			Feb 2016			Mar 2016			Apr 2016			May 2016			Jun 2016			
	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	
Accurate and up-to-date written inventories and labels for all stored hazardous materials	√			√			√			√			√			√			
Use of berms, ditches, and/or impervious liners, etc. in material storage, vehicle/equipment maintenance and fueling areas	√			√			√			√			√			√			
Material storage, maintenance and fueling areas and septic systems are at least 30 m from storm drains and surface waters	√			√			√			√			√			√			
Facilities for solid and domestic liquid waste management are used and maintained	√			√			√			√			√			√			
10. Solid Waste																			
Garbage bins and temporary storage facilities for construction wastes, domestic solid wastes and segregated wastes are provided within the project site	√			√			√			√			√			√			
Waste segregation (hazardous, non-hazardous, reusable) is practiced	√			√			√			√			√			√			
Regular collection and disposal of wastes (by contractor or authorized third party) to sites approved by local authorities	√			√			√			√			√			√			
Wastes are not dumped into watercourses, agricultural land and surrounding areas	√			√			√			√			√			√			
11. Borrow Pits																			
Borrow areas are not located in productive land, forested areas and near water courses such as rivers, streams, etc.	√			√			√			√			√			√			
Topsoil are properly removed, stockpiled and preserved for later use during site restoration and provision of vegetation cover to minimize erosion	√			√			√			√			√			√			
Stable side slopes are provided during excavation of the borrow pits	√			√			√			√			√			√			
Quarry sites lying on small rivers and streams are avoided	√			√			√			√			√			√			
Quarry sections located on the river bed are avoided or reduced if unavoidable	√			√			√			√			√			√			
Borrow pits are left in a tidy state with stable side slopes	√			√			√			√			√			√			

EMP Requirement (Mitigating Measures)	Compliance Status																		Remarks/ Reasons for Partial or Non- Compliance
	Jan 2016			Feb 2016			Mar 2016			Apr 2016			May 2016			Jun 2016			
	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	
and proper drainage																			
Quarry sites and borrow pits are restored and rehabilitated after use	√			√			√			√			√			√			
12. Traffic Management and Local Access																			
Signs advising that construction is in progress are provided, particularly where the alignment crosses existing roads and where construction related-facilities are located	√			√			√			√			√			√			
Flag persons are employed to regulate traffic especially in potentially hazardous areas	√			√					√			√			√			√	
Traffic advisory signs (to minimize traffic build-up) are posted in coordination with local authorities		√			√			√			√			√			√		
Sufficient lighting at night within and in the vicinity of construction sites are provided		√			√			√			√			√			√		
Regular monitoring of traffic conditions along access roads to ensure that project vehicles are not causing congestion	√			√			√			√			√			√			
Schedules are observed for different types of construction traffic trips (e.g., transport of pre-cast sections, haulage of spoils, delivery of construction materials, etc.)	√			√			√			√			√			√			
Delivery of construction materials and equipment and transport of spoils are during non-peak hours	√			√			√			√			√			√			
Interactions between construction works, traffic flows and pedestrians are minimized by the following safety measures: <ul style="list-style-type: none">• Temporary signals or flag controls• Adequate lighting• Fencing• Signage• Road diversion• Traffic cones• Barricades	√			√			√			√			√			√			
Use of escort vehicles and warning signs/lights to increase public awareness of potential hazards		√			√			√			√			√			√		
Construction activities and schedules are coordinated in	√			√			√			√			√			√			

EMP Requirement (Mitigating Measures)	Compliance Status																		Remarks/ Reasons for Partial or Non- Compliance
	Jan 2016			Feb 2016			Mar 2016			Apr 2016			May 2016			Jun 2016			
	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	
advance with local agencies, community representatives, businesses, schools																			
Existing access routes are maintained (whenever feasible)	√			√			√			√			√			√			
Provision of alternative access and/or parking when impacts to principal access routes and parking areas cannot be avoided		√			√			√			√			√			√		
Adequate informational and directional signage to improve alternative access function	√			√			√			√			√			√			
Construction operations are scheduled to avoid or minimize conflicts with local uses/activities	√			√			√			√			√			√			
At least one safe through lane is maintained at all times in construction areas	√			√			√			√			√			√			
13. Damage to Properties and Community Facilities																			
Local roads used by the project are upgraded prior to use	√			√			√			√			√			√			
Local and access roads used by the project are repaired and maintained regularly and fully restored at the end of the project	√			√			√			√			√			√			
Contractor immediately repairs and/or compensates for any damage to properties	√			√			√			√			√			√			
14. Accidental Discovery of Artifacts																			
Immediate stoppage of operations on road section where artifacts/ archaeological finds are unearthed; contractor informs the DDIS and CIPM	√			√			√			√			√			√			
CIPM notifies Ministry of Culture and Information (MCI) to obtain advice regarding the next steps	√			√			√			√			√			√			
Work is resumed only after MCI has provided official notification	√			√			√			√			√			√			
15. Occupational Health and Safety																			
Orientation for construction workers regarding health and safety measures, emergency response and prevention of HIV/AIDS and other diseases	√			√			√			√			√			√			
Workers at the bridge site are provided with life vests/buoyancy devices at all times	√			√			√			√			√			√			
Stable footpaths/access with sturdy guardrails to the	√			√			√			√			√			√			

EMP Requirement (Mitigating Measures)	Compliance Status																		Remarks/ Reasons for Partial or Non- Compliance
	Jan 2016			Feb 2016			Mar 2016			Apr 2016			May 2016			Jun 2016			
	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	
bridge work sites shall be provided																			
Preparation and implementation of a waterway safety plan, approved by the agencies in charge	√			√			√			√			√			√			
Contractor complies with the waterway traffic safety during construction	√			√			√			√			√			√			
First aid facilities that are readily accessible to workers	√			√			√			√			√			√			
Fire-fighting equipment at construction camps and work areas, as appropriate	√			√			√			√			√			√			
Adequate drainage in workers' camps	√			√			√			√			√			√			
Adequate and clean housing and sanitation facilities for all workers at the workers'/ construction camps	√			√			√			√			√			√			
Separate sleeping quarters for male and female workers	√			√			√			√			√			√			
Reliable supply of water for drinking, cooking and washing purposes at the workers' camps	√			√			√			√			√			√			
Separate hygienic sanitation facilities/toilets and bathing areas with sufficient water supply for male and female workers	√			√			√			√			√			√			
All wastewater from workers' and construction camps and project-related activities/ facilities are treated consistent with national regulations	√			√			√			√			√			√			
Proper collection and disposal of solid wastes within the workers'/construction camps	√			√			√			√			√			√			
Sturdy fencing on all excavation areas greater than 2 m deep	√			√			√			√			√			√			
Workers are provided and use appropriate and complete safety equipment such as safety boots, protective clothes, breathing mask, ear protection, helmets, gloves, etc.	√			√			√			√			√			√			
Reversing signals are installed on all construction vehicles	√			√			√			√			√			√			
Fall prevention and protection measures whenever a worker is exposed to the hazard of falling more than two meters, falling into operating machinery or through an opening	√			√			√			√			√			√			
16. Public Safety																			

EMP Requirement (Mitigating Measures)	Compliance Status																		Remarks/ Reasons for Partial or Non- Compliance
	Jan 2016			Feb 2016			Mar 2016			Apr 2016			May 2016			Jun 2016			
	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	
Signage are installed at the periphery of the construction site to warn and direct traffic and pedestrians	√			√			√			√			√			√			
Security personnel are deployed in hazardous areas to restrict public access	√			√			√			√			√			√			
Speed limits are imposed on construction vehicles along residential and other sensitive areas (typically 25 km per hour)	√			√			√			√			√			√			
Drivers are taught safe driving practices to minimize accidents and prevent spill of hazardous and other construction materials during transport	√			√			√			√			√			√			
Safe access to properties and establishments affected by construction works	√			√			√			√			√			√			
Safe passageways for pedestrians crossing the construction site	√			√			√			√			√			√			
Excavated areas are immediately backfilled, covered (e.g., with metal plates) and/or repaved		√			√			√			√			√			√		Half of road excavated for pipe culvert work
All construction vehicles and equipment are secured during non-working periods to prevent unauthorized access or use	√			√			√			√			√			√			
Appropriate safety barriers and warning signs are installed in areas that pose safety risks such as open excavations, cut slopes, erosion-prone slopes, manufactured slopes, drainages, etc.	√			√			√			√			√			√			
17. Flora and Fauna																			
Vegetation removal is coordinated with forest authority	√			√			√			√			√			√			
Tree-cutting permit is secured, as necessary	√			√			√			√			√			√			
Tree planting and landscaping plan that includes: <ul style="list-style-type: none">Inventory of the number of species of trees proposed for removalIdentifying and documenting quantity, variety, and location of replacement treesReplanting at the outer portions of the ROW and in other locations agreed with local authoritiesMonitoring and maintenance program to ensure effectiveness of the plan		N/A			N/A			N/A			N/A			N/A			N/A		

EMP Requirement (Mitigating Measures)	Compliance Status																		Remarks/ Reasons for Partial or Non- Compliance
	Jan 2016			Feb 2016			Mar 2016			Apr 2016			May 2016			Jun 2016			
	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	
<ul style="list-style-type: none">Adopting remedial measures where appropriate (e.g., replacing dead or damaged replanted trees)																			
Clearing of trees is limited to areas that are only necessary based on the project design and as approved by the forestry department			√			√			√			√			√			√	
Cutting of trees for firewood and for use in project is prohibited	√			√			√			√			√			√			
New alien plant species are not used for replanting/revegetation without an existing regulatory framework	√			√			√			√			√			√			
Invasive species are not introduced into new environments	√			√			√			√			√			√			
Workers are prohibited from hunting wild animals and collecting forest products	√			√			√			√			√			√			
Bridge works are scheduled in dry season to minimize adverse impacts to aquatic resources	√			√			√			√			√			√			
Contractors do not buy or use wood from illegal sources (illegal logging)	√			√			√			√			√			√			
No construction camps, asphalt mixing plants, material storage sites and other construction facilities are located in protected areas	√			√			√			√			√			√			
Construction camps, asphalt mixing plants, material storage sites and other construction facilities are located at least 1 km from the boundaries of national parks and class 1A and 1B watershed designated areas	√			√			√			√			√			√			
Precautions are adopted to ensure that damage to vegetation is avoided should fires resulting from execution of the works occur	√			√			√			√			√			√			
Road improvement works are restricted to the existing ROW boundaries	√			√			√			√			√			√			
Grading methods and facilities i.e., rounding, benching, terracing and retaining walls are used to reduce earthwork and related topographic alteration/vegetation removal	√			√			√			√			√			√			
Suitable wildlife crossing structures are installed at locations agreed with the park management boards and	√			√			√			√			√			√			

EMP Requirement (Mitigating Measures)	Compliance Status																		Remarks/ Reasons for Partial or Non- Compliance
	Jan 2016			Feb 2016			Mar 2016			Apr 2016			May 2016			Jun 2016			
	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	
National Environmental Board																			

Inspector's name and signature:

Bao po:

Project Manager

THANAWCIH Nithis:

Resident Engineer

Appendix B: Checklist of EMP Implementation for Contract CW-B1

ENVIRONMENTAL MONITORING CHECK LIST

January - June 2016

Provincial Road Improvement Project
ADB Loan No.2839-CAM (SF)/8254-CAM
Contract Package CW-B1: **Improvement of PR314D**

EMP Requirement (Mitigating Measures)	Compliance Status																		Remarks/ Reasons for Partial or Non- Compliance
	Jan 2016			Feb 2016			Mar 2016			Apr 2016			May 2016			Jun 2016			
	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	
1. Community Facilities (power lines, irrigation canals, etc.)																			
Interruption of utility services are minimized by laying out new lines prior to transfer	√			√			√			√			√			√			
Replacement structure are constructed prior to demolition of existing structure	√			√			√			√			√			√			
Temporary facilities to maintain adequate services are in place	√			√			√			√			√			√			
Coordination with local company or local offices	√			√			√			√			√			√			
Affected parties are informed in advance	√			√			√			√			√			√			
2. Air Quality (Dust and Gaseous Emissions)																			
Vehicles and equipment are well maintained and in good condition.	√			√			√			√			√			√			
Borrow areas, casting yard and other project facilities are duly licensed and have all the necessary environmental approvals	√			√			√			√			√			√			
All construction vehicles and equipment are tested for compliance with relevant emission standard and properly licensed	√			√			√			√			√			√			
Parked vehicles on the site works have their engines turned off. Unnecessary engine idling of vehicles and equipment is prohibited.	√			√			√			√			√			√			
Water spraying of roadways, working areas and other construction-related facilities near sensitive receptors and handling of all raw sand and aggregates, and other similar materials	√			√			√			√			√			√			
Dust barriers are installed as necessary	√			√			√			√			√			√			
Storage areas of construction materials such as sand, gravel, cement, etc., have provisions that prevent them from being blown away towards sensitive receptors			√			√			√			√			√			√	
Trucks transporting construction materials (i.e. sand, soil, cement, gravel, etc.) are tightly covered			√			√			√			√			√			√	
Roadways are regularly cleaned of tracked in mud, cement, etc. from construction works			√			√			√			√			√			√	
Stockpiling of spoils near sensitive receptors is prohibited	√			√			√			√			√			√			

EMP Requirement (Mitigating Measures)	Compliance Status																		Remarks/ Reasons for Partial or Non- Compliance
	Jan 2016			Feb 2016			Mar 2016			Apr 2016			May 2016			Jun 2016			
	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	
Construction vehicles have speed limits (typically 25 km/hour or less) along areas where sensitive receptors are located	√			√			√			√			√			√			
Areas where there is a regular movement of vehicles have an acceptable hard surface and are clear of loose surface material			√			√			√			√			√			√	
Cement and other fine-grained materials delivered in bulk are stored in closed containers			√			√			√			√			√			√	
Conveyor belts are fitted with wind-boards, and conveyor transfer points and hopper discharge areas are enclosed	√			√			√			√			√			√			
Weigh hoppers are vented with a suitable filter	√			√			√			√			√			√			
Wheel washers are used to clean delivery/ haul trucks of mud and dirt as they exit the work area		√			√			√			√			√			√		
Smoke belching vehicles and equipment are not used for the project	√			√			√			√			√			√			
Construction vehicle trips and travel distances for material deliveries are minimized (e.g., by using local materials and labor sources).	√			√			√			√			√			√			
Construction access roads are temporarily paved or sealed		√			√			√			√			√			√		
3. Noise Levels																			
Prior notification to the community on construction schedule	√			√			√			√			√			√			
Vehicle and equipment are fitted with emission control and silencers to meet national noise standard	√			√			√			√			√			√			
Vehicles and equipment are well-maintained and checked by the contractor every 6 months		√			√			√			√			√			√		
Only vehicles and equipment that are registered and have necessary permits are used	√			√			√			√			√			√			
Noisy equipment is completely enclosed whenever possible	√			√			√			√			√			√			
Stationary equipment that produce high noise level are positioned as far as is practical from sensitive receptors.	√			√			√			√			√			√			
Noisy construction activities within 200m of a settlement are only during daytime	√			√			√			√			√			√			
Suitable noise control barriers are used in the vicinity of house, school, temples, medical facilities and other	√			√			√			√			√			√			

EMP Requirement (Mitigating Measures)	Compliance Status																		Remarks/ Reasons for Partial or Non- Compliance
	Jan 2016			Feb 2016			Mar 2016			Apr 2016			May 2016			Jun 2016			
	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	
sensitive receptors																			
Noisy construction activities are avoided near school during examination period and coordinated with school administration	√			√			√			√			√			√			
Noisy construction activities are avoided in the vicinity of sensitive receivers	√			√			√			√			√			√			
Suitable noise level reduction measures are installed by the contractor if construction activities are disruptive	√			√			√			√			√			√			
Speed limits on construction vehicles are imposed		√			√			√			√			√			√		
Construction traffic routes are defined in cooperation with local communities and traffic police	√			√			√			√			√			√			
Asphalt concrete batching plants and crushing plant are located at least 500 m away from inhabited areas and other sensitive receptors		√		√			√			√			√			√			
4. Vibration Levels																			
Fully loaded trucks are rerouted away from roadways that go through heavily built areas	√			√			√			√			√			√			
Heavy equipment is operated away from vibration-sensitive areas	√			√			√			√			√			√			
Simultaneous activities like demolition, ground impacting and earthmoving are avoided	√			√			√			√			√			√			
Alternative equipment is used	√			√			√			√			√			√			
Use of vibrating rollers near vibration- sensitive structures are avoided	√			√			√			√			√			√			
5. Erosion and Sedimentation																			
Suitable soil erosion control measures are implemented prior to excavation of the bridge pier foundation and construction activities at waterways	√			√			√			√			√			√			
Silted water carried with the spoils during excavation and construction of bridge foundation are properly treated	√			√			√			√			√			√			
Spoils (excavated soil, rocks, removed asphalt, etc.) stockpiles are located at least 50 m from watercourses	√			√			√			√			√			√			
A bund is placed around the spoils stockpile area	√			√			√			√			√			√			
Spoil disposal does not cause sedimentation and obstruction of water flow, damage to agricultural land and	√			√			√			√			√			√			

EMP Requirement (Mitigating Measures)	Compliance Status																		Remarks/ Reasons for Partial or Non- Compliance
	Jan 2016			Feb 2016			Mar 2016			Apr 2016			May 2016			Jun 2016			
	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	
densely vegetated areas																			
Grading is avoided or minimized during the rainy season particularly in areas of steep topography and/or adjacent to water courses	√			√			√			√			√			√			
Phased grading schedule is implemented to limit the area subject to erosion at any given time	√			√			√			√			√			√			
Appropriate erosion control and stabilizing measures (such as geotextiles, mats, fiber rolls, soil binders that are not toxic to the environment, or vegetation measures/temporary landscaping) are used in disturbed areas and on graded slopes	√			√			√			√			√			√			
Construction works (for bridges, culverts, drainage, etc.) on or near watercourses do not cause obstruction of channel flow	√			√			√			√			√			√			
Slopes along water channels are stabilized	√			√			√			√			√			√			
Dumping of soil, rocks, construction materials and debris onto watercourses is prohibited	√			√			√			√			√			√			
When construction works cause obstruction of watercourses, the obstruction is immediately cleared to restore channel flow	√			√			√			√			√			√			
6. Spoils Disposal																			
Spoils (excavated soil and rocks, cut vegetation, removed pavement such as asphalt, etc.) are immediately transported to disposal sites approved by local authorities		√			√			√			√			√			√		
Temporary spoils stockpiles near paddy fields have bund or silt fence around them		√			√			√			√			√			√		
Temporary spoils stockpile that are planned to be used longer than six months are sodded.		√			√			√			√			√			√		
Height of spoils stockpile are limited to minimize windblown dust		√			√			√			√			√			√		
7. Soil and Groundwater Contamination																			
Maintenance shops, fuel and oil depot have impermeable flooring with sump	√			√			√			√			√			√			
Refueling and servicing of equipment are carried out only in adequately equipped areas	√			√			√			√			√			√			

EMP Requirement (Mitigating Measures)	Compliance Status																		Remarks/ Reasons for Partial or Non- Compliance
	Jan 2016			Feb 2016			Mar 2016			Apr 2016			May 2016			Jun 2016			
	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	
Only minimal chemicals, hazardous substances and fuel are stored on site works, within an enclosed and covered secure area that has an impervious floor and impervious bund around it	√			√			√			√			√			√			
Storage area for chemicals, hazardous substances and fuel are located away from watercourses, flood-prone areas, work camps, and danger areas	√			√			√			√			√			√			
Oil-stained refuse such as oily rags, spent oil filters and used oil are collected and disposed of through recyclers/authorized waste handlers and disposed in authorized waste facilities	√			√			√			√			√			√			
Availability of spill clean-up materials specifically designed for petroleum products and other hazardous substances	√			√			√			√			√			√			
Immediate cleanup of spills or leaks of petroleum products and/or hazardous substances	√			√			√			√			√			√			
Training of relevant construction personnel in handling of fuels/hazardous substances and spill control procedures	√			√			√			√			√			√			
At least weekly check for leakage in containers and immediate repair or replacement when necessary	√			√			√			√			√			√			
Equipment maintenance and fuel storage areas are provided with drainage to an oil-water separator that is regularly skimmed of oil and maintained	√			√			√			√			√			√			
Discharge of oil-contaminated water into the environment is prohibited	√			√			√			√			√			√			
Waste oil, used lubricant and other hazardous wastes are stored in tightly sealed containers with proper labeling	√			√			√			√			√			√			
Removal and treatment or proper disposal of oil contaminated soils is included in work sites restoration	√			√			√			√			√			√			
8. Water Availability																			
Temporary canals/irrigation channels to prevent disruption of water supply to farmlands.	√			√			√			√			√			√			
9. Water Quality																			
Suitable settling/retention ponds are constructed prior to	√			√			√			√			√			√			

EMP Requirement (Mitigating Measures)	Compliance Status																		Remarks/ Reasons for Partial or Non- Compliance
	Jan 2016			Feb 2016			Mar 2016			Apr 2016			May 2016			Jun 2016			
	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	
operation of asphaltic concrete batching plants and casting yards																			
Settling/retention ponds are properly operated and maintained to ensure effluent quality meets applicable effluent standards	√			√			√			√			√			√			
Bentonite slurry and sludge, mud and other materials and wastes from drilling are collected and processed to avoid pollution of surface water	√			√			√			√			√			√			
Bentonite slurry and sludge, mud and other materials and wastes from drilling are not discharged into watercourses	√			√			√			√			√			√			
Drilling solutions (e.g., bentonite slurry) for bridge construction, abutment construction, piling, etc. are processed in a closed system	√			√			√			√			√			√			
Proper disposal of bentonite-containing spoils as fill material in appropriate sites	√			√			√			√			√			√			
Spilled bentonite mud in agricultural land is cleaned immediately before it cakes and hardens	√			√			√			√			√			√			
Water from bridge foundation dewatering is not discharged directly into a water body	√			√			√			√			√			√			
Total suspended solids content of discharges into water bodies comply with applicable standards	√			√			√			√			√			√			
Sanitation facilities with sufficient capacity are provided to handle and treat sewage generated by workers	√			√			√			√			√			√			
Equipment service and maintenance yards are provided with impermeable flooring and collection sump	√			√			√			√			√			√			
All equipment maintenance shops are provided with water-tight receptacles for waste oil, oily rags, spent oil filters, solvents and oily containers	√			√			√			√			√			√			
Disposal of all waste oil, oily rags, spent oil filters, solvents and oily containers are through authorized waste handlers and recyclers	√			√			√			√			√			√			
Paving operations are restricted during wet weather	√			√			√			√			√			√			
Use of sediment control devices downstream of paving activities	√			√			√			√			√			√			
Use of mobile fueling/maintenance units for construction equipment whenever feasible	√			√			√			√			√			√			
Accurate and up-to-date written inventories and labels for	√			√			√			√			√			√			

EMP Requirement (Mitigating Measures)	Compliance Status																		Remarks/ Reasons for Partial or Non- Compliance
	Jan 2016			Feb 2016			Mar 2016			Apr 2016			May 2016			Jun 2016			
	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	
all stored hazardous materials																			
Use of berms, ditches, and/or impervious liners, etc. in material storage, vehicle/equipment maintenance and fueling areas	√			√			√			√			√			√			
Material storage, maintenance and fueling areas and septic systems are at least 30 m from storm drains and surface waters	√			√			√			√			√			√			
Facilities for solid and domestic liquid waste management are used and maintained	√			√			√			√			√			√			
10. Solid Waste																			
Garbage bins and temporary storage facilities for construction wastes, domestic solid wastes and segregated wastes are provided within the project site	√			√			√			√			√			√			
Waste segregation (hazardous, non-hazardous, reusable) is practiced	√			√			√			√			√			√			
Regular collection and disposal of wastes (by contractor or authorized third party) to sites approved by local authorities	√			√			√			√			√			√			
Wastes are not dumped into watercourses, agricultural land and surrounding areas	√			√			√			√			√			√			
11. Borrow Pits																			
Borrow areas are not located in productive land, forested areas and near water courses such as rivers, streams, etc.	√			√			√			√			√			√			
Topsoil are properly removed, stockpiled and preserved for later use during site restoration and provision of vegetation cover to minimize erosion	√			√			√			√			√			√			
Stable side slopes are provided during excavation of the borrow pits	√			√			√			√			√			√			
Quarry sites lying on small rivers and streams are avoided	√			√			√			√			√			√			
Quarry sections located on the river bed are avoided or reduced if unavoidable	√			√			√			√			√			√			
Borrow pits are left in a tidy state with stable side slopes and proper drainage	√			√			√			√			√			√			

EMP Requirement (Mitigating Measures)	Compliance Status																		Remarks/ Reasons for Partial or Non- Compliance
	Jan 2016			Feb 2016			Mar 2016			Apr 2016			May 2016			Jun 2016			
	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	
Quarry sites and borrow pits are restored and rehabilitated after use	√			√			√			√			√			√			
12. Traffic Management and Local Access																			
Signs advising that construction is in progress are provided, particularly where the alignment crosses existing roads and where construction related-facilities are located	√			√			√			√			√			√			
Flag persons are employed to regulate traffic especially in potentially hazardous areas	√			√					√			√			√			√	
Traffic advisory signs (to minimize traffic build-up) are posted in coordination with local authorities		√			√			√			√			√			√		
Sufficient lighting at night within and in the vicinity of construction sites are provided		√			√			√			√			√			√		
Regular monitoring of traffic conditions along access roads to ensure that project vehicles are not causing congestion	√			√			√			√			√			√			
Schedules are observed for different types of construction traffic trips (e.g., transport of pre-cast sections, haulage of spoils, delivery of construction materials, etc.)	√			√			√			√			√			√			
Delivery of construction materials and equipment and transport of spoils are during non-peak hours	√			√			√			√			√			√			
Interactions between construction works, traffic flows and pedestrians are minimized by the following safety measures: <ul style="list-style-type: none">• Temporary signals or flag controls• Adequate lighting• Fencing• Signage• Road diversion• Traffic cones• Barricades	√			√			√			√			√			√			
Use of escort vehicles and warning signs/lights to increase public awareness of potential hazards		√			√			√			√			√			√		
Construction activities and schedules are coordinated in advance with local agencies, community representatives,	√			√			√			√			√			√			

EMP Requirement (Mitigating Measures)	Compliance Status																		Remarks/ Reasons for Partial or Non- Compliance
	Jan 2016			Feb 2016			Mar 2016			Apr 2016			May 2016			Jun 2016			
	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	
businesses, schools																			
Existing access routes are maintained (whenever feasible)	√			√			√			√			√			√			
Provision of alternative access and/or parking when impacts to principal access routes and parking areas cannot be avoided		√			√			√			√			√			√		
Adequate informational and directional signage to improve alternative access function	√			√			√			√			√			√			
Construction operations are scheduled to avoid or minimize conflicts with local uses/activities	√			√			√			√			√			√			
At least one safe through lane is maintained at all times in construction areas	√			√			√			√			√			√			
13. Damage to Properties and Community Facilities																			
Local roads used by the project are upgraded prior to use	√			√			√			√			√			√			
Local and access roads used by the project are repaired and maintained regularly and fully restored at the end of the project	√			√			√			√			√			√			
Contractor immediately repairs and/or compensates for any damage to properties	√			√			√			√			√			√			
14. Accidental Discovery of Artifacts																			
Immediate stoppage of operations on road section where artifacts/ archaeological finds are unearthed; contractor informs the DDIS and CIPM	√			√			√			√			√			√			
CIPM notifies Ministry of Culture and Information (MCI) to obtain advice regarding the next steps	√			√			√			√			√			√			
Work is resumed only after MCI has provided official notification	√			√			√			√			√			√			
15. Occupational Health and Safety																			
Orientation for construction workers regarding health and safety measures, emergency response and prevention of HIV/AIDS and other diseases	√			√			√			√			√			√			
Workers at the bridge site are provided with life vests/buoyancy devices at all times	√			√			√			√			√			√			
Stable footpaths/access with sturdy guardrails to the bridge work sites shall be provided	√			√			√			√			√			√			

EMP Requirement (Mitigating Measures)	Compliance Status																		Remarks/ Reasons for Partial or Non- Compliance
	Jan 2016			Feb 2016			Mar 2016			Apr 2016			May 2016			Jun 2016			
	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	
Preparation and implementation of a waterway safety plan, approved by the agencies in charge	√			√			√			√			√			√			
Contractor complies with the waterway traffic safety during construction	√			√			√			√			√			√			
First aid facilities that are readily accessible to workers	√			√			√			√			√			√			
Fire-fighting equipment at construction camps and work areas, as appropriate	√			√			√			√			√			√			
Adequate drainage in workers' camps	√			√			√			√			√			√			
Adequate and clean housing and sanitation facilities for all workers at the workers'/ construction camps	√			√			√			√			√			√			
Separate sleeping quarters for male and female workers	√			√			√			√			√			√			
Reliable supply of water for drinking, cooking and washing purposes at the workers' camps	√			√			√			√			√			√			
Separate hygienic sanitation facilities/toilets and bathing areas with sufficient water supply for male and female workers	√			√			√			√			√			√			
All wastewater from workers' and construction camps and project-related activities/ facilities are treated consistent with national regulations	√			√			√			√			√			√			
Proper collection and disposal of solid wastes within the workers'/construction camps	√			√			√			√			√			√			
Sturdy fencing on all excavation areas greater than 2 m deep	√			√			√			√			√			√			
Workers are provided and use appropriate and complete safety equipment such as safety boots, protective clothes, breathing mask, ear protection, helmets, gloves, etc.	√			√			√			√			√			√			
Reversing signals are installed on all construction vehicles	√			√			√			√			√			√			
Fall prevention and protection measures whenever a worker is exposed to the hazard of falling more than two meters, falling into operating machinery or through an opening	√			√			√			√			√			√			
16. Public Safety																			
Signage are installed at the periphery of the construction	√			√			√			√			√			√			

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	Jan 2016			Feb 2016			Mar 2016			Apr 2016			May 2016			Jun 2016			
	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	
site to warn and direct traffic and pedestrians																			
Security personnel are deployed in hazardous areas to restrict public access	√			√			√			√			√			√			
Speed limits are imposed on construction vehicles along residential and other sensitive areas (typically 25 km per hour)	√			√			√			√			√			√			
Drivers are taught safe driving practices to minimize accidents and prevent spill of hazardous and other construction materials during transport	√			√			√			√			√			√			
Safe access to properties and establishments affected by construction works	√			√			√			√			√			√			
Safe passageways for pedestrians crossing the construction site	√			√			√			√			√			√			
Excavated areas are immediately backfilled, covered (e.g., with metal plates) and/or repaved		√			√			√			√			√			√		Half of road excavated for pipe culvert work
All construction vehicles and equipment are secured during non-working periods to prevent unauthorized access or use	√			√			√			√			√			√			
Appropriate safety barriers and warning signs are installed in areas that pose safety risks such as open excavations, cut slopes, erosion-prone slopes, manufactured slopes, drainages, etc.	√			√			√			√			√			√			
17. Flora and Fauna																			
Vegetation removal is coordinated with forest authority	√			√			√			√			√			√			
Tree-cutting permit is secured, as necessary	√			√			√			√			√			√			
Tree planting and landscaping plan that includes: <ul style="list-style-type: none">Inventory of the number of species of trees proposed for removalIdentifying and documenting quantity, variety, and location of replacement treesReplanting at the outer portions of the ROW and in other locations agreed with local authoritiesMonitoring and maintenance program to ensure effectiveness of the plan		NA			NA			NA			NA			NA			NA		

EMP Requirement (Mitigating Measures)	Compliance Status																		Remarks/ Reasons for Partial or Non- Compliance
	Jan 2016			Feb 2016			Mar 2016			Apr 2016			May 2016			Jun 2016			
	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	
<ul style="list-style-type: none">Adopting remedial measures where appropriate (e.g., replacing dead or damaged replanted trees)																			
Clearing of trees is limited to areas that are only necessary based on the project design and as approved by the forestry department			√			√			√			√			√			√	
Cutting of trees for firewood and for use in project is prohibited	√			√			√			√			√			√			
New alien plant species are not used for replanting/revegetation without an existing regulatory framework	√			√			√			√			√			√			
Invasive species are not introduced into new environments	√			√			√			√			√			√			
Workers are prohibited from hunting wild animals and collecting forest products	√			√			√			√			√			√			
Bridge works are scheduled in dry season to minimize adverse impacts to aquatic resources	√			√			√			√			√			√			
Contractors do not buy or use wood from illegal sources (illegal logging)	√			√			√			√			√			√			
No construction camps, asphalt mixing plants, material storage sites and other construction facilities are located in protected areas	√			√			√			√			√			√			
Construction camps, asphalt mixing plants, material storage sites and other construction facilities are located at least 1 km from the boundaries of national parks and class 1A and 1B watershed designated areas	√			√			√			√			√			√			
Precautions are adopted to ensure that damage to vegetation is avoided should fires resulting from execution of the works occur	√			√			√			√			√			√			
Road improvement works are restricted to the existing ROW boundaries	√			√			√			√			√			√			
Grading methods and facilities i.e., rounding, benching, terracing and retaining walls are used to reduce earthwork and related topographic alteration/vegetation removal	√			√			√			√			√			√			
Suitable wildlife crossing structures are installed at locations agreed with the park management boards and	√			√			√			√			√			√			

EMP Requirement (Mitigating Measures)	Compliance Status																		Remarks/ Reasons for Partial or Non- Compliance
	Jan 2016			Feb 2016			Mar 2016			Apr 2016			May 2016			Jun 2016			
	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	
National Environmental Board																			

Inspector's name and signature:

Bao po:

Project Manager

THANAWCIH Nithis:

Resident Engineer

Appendix C: Checklist of EMP Implementation for Contract **CW-C**

ENVIRONMENTAL MONITORING CHECK LIST

January - June 2016

Provincial Road Improvement Project
ADB Loan No.2839-CAM (SF)/8254-CAM
Contract Package CW-B1: **Improvement of PR150B, NR53, and PR151B**

EMP Requirement (Mitigating Measures)	Compliance Status																		Remarks/ Reasons for Partial or Non- Compliance
	Jan 2016			Feb 2016			Mar 2016			Apr 2016			May 2016			Jun 2016			
	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	
1. Community Facilities (power lines, irrigation canals, etc.)																			
Interruption of utility services are minimized by laying out new lines prior to transfer	√			√			√			√			√			√			
Replacement structure are constructed prior to demolition of existing structure	√			√			√			√			√			√			
Temporary facilities to maintain adequate services are in place	√			√			√			√			√			√			
Coordination with local company or local offices	√			√			√			√			√			√			
Affected parties are informed in advance	√			√			√			√			√			√			
2. Air Quality (Dust and Gaseous Emissions)																			
Vehicles and equipment are well maintained and in good condition.	√			√			√			√			√			√			
Borrow areas, casting yard and other project facilities are duly licensed and have all the necessary environmental approvals	√			√			√			√			√			√			
All construction vehicles and equipment are tested for compliance with relevant emission standard and properly licensed	√			√			√			√			√			√			
Parked vehicles on the site works have their engines turned off. Unnecessary engine idling of vehicles and equipment is prohibited.	√			√			√			√			√			√			
Water spraying of roadways, working areas and other construction-related facilities near sensitive receptors and handling of all raw sand and aggregates, and other similar materials	√			√			√			√			√			√			
Dust barriers are installed as necessary		√			√			√			√			√			√		Barrier is not necessary
Storage areas of construction materials such as sand, gravel, cement, etc., have provisions that prevent them from being blown away towards sensitive receptors	√			√			√			√			√			√			
Trucks transporting construction materials (i.e. sand, soil, cement, gravel, etc.) are tightly covered	√				√			√			√			√			√		No covered properly
Roadways are regularly cleaned of tracked in mud, cement, etc. from construction works	√			√			√			√			√			√			

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	Jan 2016			Feb 2016			Mar 2016			Apr 2016			May 2016			Jun 2016			
	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	
Stockpiling of spoils near sensitive receptors is prohibited	√			√			√			√			√			√			
Construction vehicles have speed limits (typically 25 km/hour or less) along areas where sensitive receptors are located	√			√			√			√			√			√			
Areas where there is a regular movement of vehicles have an acceptable hard surface and are clear of loose surface material	√					√			√			√			√			√	
Cement and other fine-grained materials delivered in bulk are stored in closed containers	√					√			√			√			√			√	
Conveyor belts are fitted with wind-boards, and conveyor transfer points and hopper discharge areas are enclosed		√			√			√			√			√			√		
Weigh hoppers are vented with a suitable filter		√			√			√			√			√			√		
Wheel washers are used to clean delivery/ haul trucks of mud and dirt as they exit the work area		√			√			√			√			√			√		
Smoke belching vehicles and equipment are not used for the project	√			√			√			√			√			√			
Construction vehicle trips and travel distances for material deliveries are minimized (e.g., by using local materials and labor sources).	√			√			√			√			√			√			
Construction access roads are temporarily paved or sealed		√			√			√			√			√			√		
3. Noise Levels																			
Prior notification to the community on construction schedule	√			√			√			√			√			√			
Vehicle and equipment are fitted with emission control and silencers to meet national noise standard	√			√			√			√			√			√			
Vehicles and equipment are well-maintained and checked by the contractor every 6 months	√				√			√			√			√			√		
Only vehicles and equipment that are registered and have necessary permits are used	√			√			√			√			√			√			
Noisy equipment is completely enclosed whenever possible	√			√			√			√			√			√			
Stationary equipment that produce high noise level are positioned as far as is practical from sensitive receptors.	√			√			√			√			√			√			
Noisy construction activities within 200m of a settlement are only during daytime	√			√			√			√			√			√			
Suitable noise control barriers are used in the vicinity of		√			√			√			√			√			√		There is no major

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house, school, temples, medical facilities and other sensitive receptors																			negative impact
Noisy construction activities are avoided near school during examination period and coordinated with school administration	√			√			√			√			√			√			
Noisy construction activities are avoided in the vicinity of sensitive receivers	√			√			√			√			√			√			
Suitable noise level reduction measures are installed by the contractor if construction activities are disruptive	√			√			√			√			√			√			
Speed limits on construction vehicles are imposed	√			√			√			√			√			√			
Construction traffic routes are defined in cooperation with local communities and traffic police	√			√			√			√			√			√			
Asphalt concrete batching plants and crushing plant are located at least 500 m away from inhabited areas and other sensitive receptors		√			√			√			√			√			√		Using commercial quarry
4. Vibration Levels																			
Fully loaded trucks are rerouted away from roadways that go through heavily built areas	√			√			√			√			√			√			
Heavy equipment is operated away from vibration-sensitive areas	√			√			√			√			√			√			
Simultaneous activities like demolition, ground impacting and earthmoving are avoided	√			√			√			√			√			√			
Alternative equipment is used	√			√			√			√			√			√			
Use of vibrating rollers near vibration- sensitive structures are avoided	√			√			√			√			√			√			
5. Erosion and Sedimentation																			
Suitable soil erosion control measures are implemented prior to excavation of the bridge pier foundation and construction activities at waterways	√			√			√			√			√			√			
Silted water carried with the spoils during excavation and construction of bridge foundation are properly treated	√			√			√			√			√			√			
Spoils (excavated soil, rocks, removed asphalt, etc.) stockpiles are located at least 50 m from watercourses	√			√			√			√			√			√			
A bund is placed around the spoils stockpile area	√			√			√			√			√			√			
Spoil disposal does not cause sedimentation and	√			√			√			√			√			√			

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	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	
obstruction of water flow, damage to agricultural land and densely vegetated areas																			
Grading is avoided or minimized during the rainy season particularly in areas of steep topography and/or adjacent to water courses	√			√			√			√			√			√			
Phased grading schedule is implemented to limit the area subject to erosion at any given time	√			√			√			√			√			√			
Appropriate erosion control and stabilizing measures (such as geotextiles, mats, fiber rolls, soil binders that are not toxic to the environment, or vegetation measures/temporary landscaping) are used in disturbed areas and on graded slopes	√			√			√			√			√			√			
Construction works (for bridges, culverts, drainage, etc.) on or near watercourses do not cause obstruction of channel flow	√			√			√			√			√			√			
Slopes along water channels are stabilized	√			√			√			√			√			√			
Dumping of soil, rocks, construction materials and debris onto watercourses is prohibited	√			√			√			√			√			√			
When construction works cause obstruction of watercourses, the obstruction is immediately cleared to restore channel flow	√			√			√			√			√			√			
6. Spoils Disposal																			
Spoils (excavated soil and rocks, cut vegetation, removed pavement such as asphalt, etc.) are immediately transported to disposal sites approved by local authorities			√			√			√			√			√			√	
Temporary spoils stockpiles near paddy fields have bund or silt fence around them		√			√			√			√			√			√		There is no spoils stockpile
Temporary spoils stockpile that are planned to be used longer than six months are sodded.		√			√			√			√			√			√		“
Height of spoils stockpile are limited to minimize windblown dust		√			√			√			√			√			√		“
7. Soil and Groundwater Contamination																			
Maintenance shops, fuel and oil depot have impermeable flooring with sump	√			√			√			√			√			√			
Refueling and servicing of equipment are carried out only	√			√			√			√			√			√			

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in adequately equipped areas																			
Only minimal chemicals, hazardous substances and fuel are stored on site works, within an enclosed and covered secure area that has an impervious floor and impervious bund around it	√			√			√			√			√			√			
Storage area for chemicals, hazardous substances and fuel are located away from watercourses, flood-prone areas, work camps, and danger areas	√			√			√			√			√			√			
Oil-stained refuse such as oily rags, spent oil filters and used oil are collected and disposed of through recyclers/authorized waste handlers and disposed in authorized waste facilities	√			√			√			√			√			√			
Availability of spill clean-up materials specifically designed for petroleum products and other hazardous substances	√			√			√			√			√			√			
Immediate cleanup of spills or leaks of petroleum products and/or hazardous substances	√			√			√			√			√			√			
Training of relevant construction personnel in handling of fuels/hazardous substances and spill control procedures	√			√			√			√			√			√			
At least weekly check for leakage in containers and immediate repair or replacement when necessary	√			√			√			√			√			√			
Equipment maintenance and fuel storage areas are provided with drainage to an oil-water separator that is regularly skimmed of oil and maintained	√			√			√			√			√			√			Maintain at commercial garage
Discharge of oil-contaminated water into the environment is prohibited	√			√			√			√			√			√			“
Waste oil, used lubricant and other hazardous wastes are stored in tightly sealed containers with proper labeling	√			√			√			√			√			√			“
Removal and treatment or proper disposal of oil contaminated soils is included in work sites restoration	√			√			√			√			√			√			“
8. Water Availability																			
Temporary canals/irrigation channels to prevent disruption of water supply to farmlands.	√			√			√			√			√			√			
9. Water Quality																			

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Suitable settling/retention ponds are constructed prior to operation of asphaltic concrete batching plants and casting yards		√			√			√			√			√			√		
Settling/retention ponds are properly operated and maintained to ensure effluent quality meets applicable effluent standards	√			√			√			√			√			√			
Bentonite slurry and sludge, mud and other materials and wastes from drilling are collected and processed to avoid pollution of surface water	√			√			√			√			√			√			Bentonite is not used
Bentonite slurry and sludge, mud and other materials and wastes from drilling are not discharged into watercourses	√			√			√			√			√			√			“
Drilling solutions (e.g., bentonite slurry) for bridge construction, abutment construction, piling, etc. are processed in a closed system	√			√			√			√			√			√			“
Proper disposal of bentonite-containing spoils as fill material in appropriate sites	√			√			√			√			√			√			“
Spilled bentonite mud in agricultural land is cleaned immediately before it cakes and hardens	√			√			√			√			√			√			“
Water from bridge foundation dewatering is not discharged directly into a water body	√			√			√			√			√			√			
Total suspended solids content of discharges into water bodies comply with applicable standards	√			√			√			√			√			√			
Sanitation facilities with sufficient capacity are provided to handle and treat sewage generated by workers	√			√			√			√			√			√			
Equipment service and maintenance yards are provided with impermeable flooring and collection sump	√			√			√			√			√			√			Maintain at commercial garage
All equipment maintenance shops are provided with water-tight receptacles for waste oil, oily rags, spent oil filters, solvents and oily containers	√			√			√			√			√			√			
Disposal of all waste oil, oily rags, spent oil filters, solvents and oily containers are through authorized waste handlers and recyclers	√			√			√			√			√			√			
Paving operations are restricted during wet weather	√			√			√			√			√			√			
Use of sediment control devices downstream of paving activities	√			√			√			√			√			√			
Use of mobile fueling/maintenance units for construction	√			√			√			√			√			√			

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equipment whenever feasible																			
Accurate and up-to-date written inventories and labels for all stored hazardous materials	√			√			√			√			√			√			
Use of berms, ditches, and/or impervious liners, etc. in material storage, vehicle/equipment maintenance and fueling areas	√			√			√			√			√			√			
Material storage, maintenance and fueling areas and septic systems are at least 30 m from storm drains and surface waters	√			√			√			√			√			√			
Facilities for solid and domestic liquid waste management are used and maintained	√			√			√			√			√			√			
10. Solid Waste																			
Garbage bins and temporary storage facilities for construction wastes, domestic solid wastes and segregated wastes are provided within the project site	√			√			√			√			√			√			
Waste segregation (hazardous, non-hazardous, reusable) is practiced	√			√			√			√			√			√			
Regular collection and disposal of wastes (by contractor or authorized third party) to sites approved by local authorities	√			√			√			√			√			√			
Wastes are not dumped into watercourses, agricultural land and surrounding areas	√			√			√			√			√			√			
11. Borrow Pits																			
Borrow areas are not located in productive land, forested areas and near water courses such as rivers, streams, etc.	√			√			√			√			√			√			
Topsoil are properly removed, stockpiled and preserved for later use during site restoration and provision of vegetation cover to minimize erosion		√			√			√			√			√			√		
Stable side slopes are provided during excavation of the borrow pits			√			√			√			√			√			√	
Quarry sites lying on small rivers and streams are avoided	√			√			√			√			√			√			
Quarry sections located on the river bed are avoided or reduced if unavoidable	√			√			√			√			√			√			

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Borrow pits are left in a tidy state with stable side slopes and proper drainage			√			√			√			√			√			√	
Quarry sites and borrow pits are restored and rehabilitated after use	√			√			√			√			√			√			
12. Traffic Management and Local Access																			
Signs advising that construction is in progress are provided, particularly where the alignment crosses existing roads and where construction related-facilities are located	√			√			√			√			√			√			
Flag persons are employed to regulate traffic especially in potentially hazardous areas		√			√			√			√			√			√		No arrangement
Traffic advisory signs (to minimize traffic build-up) are posted in coordination with local authorities			√			√			√			√			√			√	Insufficiency
Sufficient lighting at night within and in the vicinity of construction sites are provided		√			√			√			√			√			√		No provision of lighting
Regular monitoring of traffic conditions along access roads to ensure that project vehicles are not causing congestion	√			√			√			√			√			√			
Schedules are observed for different types of construction traffic trips (e.g., transport of pre-cast sections, haulage of spoils, delivery of construction materials, etc.)	√			√			√			√			√			√			
Delivery of construction materials and equipment and transport of spoils are during non-peak hours	√			√			√			√			√			√			
Interactions between construction works, traffic flows and pedestrians are minimized by the following safety measures: <ul style="list-style-type: none">• Temporary signals or flag controls• Adequate lighting• Fencing• Signage• Road diversion• Traffic cones• Barricades			√			√			√			√			√			√	Insufficiency of safety measures
Use of escort vehicles and warning signs/lights to increase public awareness of potential hazards			√			√			√			√			√			√	

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Construction activities and schedules are coordinated in advance with local agencies, community representatives, businesses, schools	√			√			√			√			√			√			
Existing access routes are maintained (whenever feasible)	√			√			√			√			√			√			
Provision of alternative access and/or parking when impacts to principal access routes and parking areas cannot be avoided	√			√			√			√			√			√			
Adequate informational and directional signage to improve alternative access function	√			√			√			√			√			√			
Construction operations are scheduled to avoid or minimize conflicts with local uses/activities	√			√			√			√			√			√			
At least one safe through lane is maintained at all times in construction areas	√			√			√			√			√			√			
13. Damage to Properties and Community Facilities																			
Local roads used by the project are upgraded prior to use		√			√			√			√			√			√		No activity
Local and access roads used by the project are repaired and maintained regularly and fully restored at the end of the project		√			√			√			√			√			√		“
Contractor immediately repairs and/or compensates for any damage to properties	√			√			√			√			√			√			
14. Accidental Discovery of Artifacts																			
Immediate stoppage of operations on road section where artifacts/ archaeological finds are unearthed; contractor informs the DDIS and CIPM		√			√			√			√			√			√		No artifacts found
CIPM notifies Ministry of Culture and Information (MCI) to obtain advice regarding the next steps		√			√			√			√			√			√		“
Work is resumed only after MCI has provided official notification		√			√			√			√			√			√		“
15. Occupational Health and Safety																			
Orientation for construction workers regarding health and safety measures, emergency response and prevention of HIV/AIDS and other diseases	√			√			√			√			√			√			
Workers at the bridge site are provided with life vests/buoyancy devices at all times	√			√			√			√			√			√			

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Stable footpaths/access with sturdy guardrails to the bridge work sites shall be provided	√			√			√			√			√			√			
Preparation and implementation of a waterway safety plan, approved by the agencies in charge		√			√			√			√			√			√		No waterway
Contractor complies with the waterway traffic safety during construction		√			√			√			√			√			√		“
First aid facilities that are readily accessible to workers		√			√			√			√			√			√		Keeping at office
Fire-fighting equipment at construction camps and work areas, as appropriate	√			√			√			√			√			√			
Adequate drainage in workers' camps	√			√			√			√			√			√			
Adequate and clean housing and sanitation facilities for all workers at the workers'/ construction camps	√			√			√			√			√			√			
Separate sleeping quarters for male and female workers	√			√			√			√			√			√			
Reliable supply of water for drinking, cooking and washing purposes at the workers' camps	√			√			√			√			√			√			
Separate hygienic sanitation facilities/toilets and bathing areas with sufficient water supply for male and female workers	√			√			√			√			√			√			
All wastewater from workers' and construction camps and project-related activities/ facilities are treated consistent with national regulations	√			√			√			√			√			√			
Proper collection and disposal of solid wastes within the workers'/construction camps	√			√			√			√			√			√			
Sturdy fencing on all excavation areas greater than 2 m deep			√			√			√			√			√			√	Insufficiency of fence
Workers are provided and use appropriate and complete safety equipment such as safety boots, protective clothes, breathing mask, ear protection, helmets, gloves, etc.			√			√			√			√			√			√	Insufficiency of PPE
Reversing signals are installed on all construction vehicles	√			√			√			√			√			√			
Fall prevention and protection measures whenever a worker is exposed to the hazard of falling more than two meters, falling into operating machinery or through an opening			√			√			√			√			√			√	Insufficiency of protection measures

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16. Public Safety																			
Signage are installed at the periphery of the construction site to warn and direct traffic and pedestrians			√			√			√			√			√			√	Insufficiency
Security personnel are deployed in hazardous areas to restrict public access		√			√			√			√			√			√		No arrangement
Speed limits are imposed on construction vehicles along residential and other sensitive areas (typically 25 km per hour)	√			√			√			√			√			√			
Drivers are taught safe driving practices to minimize accidents and prevent spill of hazardous and other construction materials during transport	√			√			√			√			√			√			
Safe access to properties and establishments affected by construction works	√			√			√			√			√			√			
Safe passageways for pedestrians crossing the construction site	√			√			√			√			√			√			
Excavated areas are immediately backfilled, covered (e.g., with metal plates) and/or repaved			√			√			√			√			√			√	Half of road excavated for pipe culvert work
All construction vehicles and equipment are secured during non-working periods to prevent unauthorized access or use	√			√			√			√			√			√			
Appropriate safety barriers and warning signs are installed in areas that pose safety risks such as open excavations, cut slopes, erosion-prone slopes, manufactured slopes, drainages, etc.			√			√			√			√			√			√	Insufficiency
17. Flora and Fauna																			
Vegetation removal is coordinated with forest authority	√			√			√			√			√			√			
Tree-cutting permit is secured, as necessary	√			√			√			√			√			√			
Tree planting and landscaping plan that includes: <ul style="list-style-type: none">Inventory of the number of species of trees proposed for removalIdentifying and documenting quantity, variety, and location of replacement treesReplanting at the outer portions of the ROW and in other locations agreed with local authorities		NA			NA			NA			NA			NA			NA		

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	Jan 2016			Feb 2016			Mar 2016			Apr 2016			May 2016			Jun 2016			
	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	Yes	No	Partially	
<ul style="list-style-type: none">Monitoring and maintenance program to ensure effectiveness of the planAdopting remedial measures where appropriate (e.g., replacing dead or damaged replanted trees)																			
Clearing of trees is limited to areas that are only necessary based on the project design and as approved by the forestry department	√			√			√			√			√			√			
Cutting of trees for firewood and for use in project is prohibited	√			√			√			√			√			√			
New alien plant species are not used for replanting/revegetation without an existing regulatory framework	√			√			√			√			√			√			
Invasive species are not introduced into new environments	√			√			√			√			√			√			
Workers are prohibited from hunting wild animals and collecting forest products	√			√			√			√			√			√			
Bridge works are scheduled in dry season to minimize adverse impacts to aquatic resources	√			√			√			√			√			√			
Contractors do not buy or use wood from illegal sources (illegal logging)	√			√			√			√			√			√			
No construction camps, asphalt mixing plants, material storage sites and other construction facilities are located in protected areas	√			√			√			√			√			√			
Construction camps, asphalt mixing plants, material storage sites and other construction facilities are located at least 1 km from the boundaries of national parks and class 1A and 1B watershed designated areas	√			√			√			√			√			√			
Precautions are adopted to ensure that damage to vegetation is avoided should fires resulting from execution of the works occur	√			√			√			√			√			√			
Road improvement works are restricted to the existing ROW boundaries	√			√			√			√			√			√			
Grading methods and facilities i.e., rounding, benching, terracing and retaining walls are used to reduce earthwork and related topographic alteration/vegetation removal	√			√			√			√			√			√			

EMP Requirement (Mitigating Measures)	Compliance Status																		Remarks/ Reasons for Partial or Non- Compliance
	Jan 2016			Feb 2016			Mar 2016			Apr 2016			May 2016			Jun 2016			
	Yes	No	Partial	Yes	No	Partial	Yes	No	Partial	Yes	No	Partial	Yes	No	Partial	Yes	No	Partial	
Suitable wildlife crossing structures are installed at locations agreed with the park management boards and National Environmental Board		√			√			√			√			√			√		There is no park

Checked by

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