



Environment Impact Monitoring Report

Project Number: L2546
January 2012

Sri Lanka: Eastern and North Central Provincial Road Development Project

Prepared by
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For Road Development Authority
Provincial Council and Local Government Authority

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Asian Development Bank

Environment Impact Monitoring Report

**L2546: Eastern and North Central Provincial Road
Development Project Sri Lanka**

July to December 2011

Cardno Acil Supervision Consultants

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Abbreviations

ADB:	Asian Development Bank
ARE:	Assistant Residence Engineer
BIQ:	Basic Information Questionnaires
CEA:	Central Environment Authority
CSC:	Construction Supervision Consultant
EMAP:	Environment Management Action Plan
EMP:	Environment Management Plan
EO:	Environment Officer
EP:	Eastern Province
ES:	Environment Specialist
GS&MB:	Geological Survey & Mines Bureau
LA:	Local Authority
LGA:	Local Government Authority
PM:	Project Manger
ROW:	Right Of Way
SO:	Safety Officer
TL:	Team Leader

Executive Summary

The Eastern Road Development Project includes rehabilitation and improvement to approximately 150 km of C and D class roads located in Trincomalee and Batticaloa districts of Sri Lanka. The Asian Development Bank (ADB) funded project consists of 13 contracts executed by local contractors.

The project will improve connectivity in the transport road network of two relatively poor and conflict affected provinces. The provision of improved roads will contribute to poverty reduction. The Project will improve connectivity to neglected areas supporting socially inclusive development. The result will include improved connection to national highway network, reduce vehicle operating costs, journey times, and improvement of reliability of access. The construction activities of the project started in year 2010 and environmental monitoring procedure for the project also established at the initial stage. This Report covers the Environmental Impact Monitoring activities for the period from July to December 2011

Field Environment Monitoring Program is carried out periodically on all ongoing project roads. Basic Information Questionnaires (BIQs) for the two new contracts EP01 (roads) & EPBP02 (bridges) were prepared and submitted to the Central Environment Authority (CEA) provincial office at Trincomalee to obtain environmental clearance on 9th October 2011. Work Shop was organized and conducted on 5th of September 2011 at AREs' office (EP BP 02) in Batticaloa regarding the preparation of Environment Management Action Plan (EMAS), implementation of Environment Management Plan (EMP), Environment Monitoring Plan (EMoP) and preparation of Environmental Assessment Checklists for new contracts.

Adverse long term environmental impacts were not identified due to project construction activities on sub project roads. However several short term environmental impacts were identified and instructions were given by the AREs & CSCs regarding emanation of dust, temporary floods, soil erosion and siltation, public & worker safety, borrowing and quarry operations etc.

Construction activities of the project are restricted to the existing ROW of the sub project roads. Environment impact and risk associated with construction related activities can easily be mitigated through the proposed mitigation measures through EMP & EMAP. Positive environment impacts including protection of ground cover vegetation, agricultural lands, water resources, natural flow path, sensitive floral and faunal habitats, etc are in highly satisfactory level for all contracts.

Common areas identified at various mitigated levels included siltation of the earth and side drains, ongoing turfing work, construction debris and spoil within the ROWs not managed, lack of watering for turfing areas, delayed restoration of the burrow sites, removal of excess materials from storage yards, transportation of construction materials without proper covering, emanation of dust due to insufficient watering of construction sites/haulage roads, high speed construction vehicles, work force without safety gears are the social and environment impact observed during the field survey of several ongoing construction packages.

The construction activities of the project are not causing significant environmental impacts and most of the potential environmental impacts are temporary and occur only during the construction period. Routine maintenance program has been included for a period of three years after the completion of each contract in order to maintain the long-term operation of the roads.

1. Reporting Period

The Eastern Road Development Project includes rehabilitation and improvement of approximately 150 km of C and D class roads located in Trincomalee and Batticaloa districts of Sri Lanka. The Asian Development Bank (ADB) funded project consists of 13 contracts (last two awarded in August 2011) executed by local contractors consisting of approximately 150 km made up of 14 roads and construction, replacement or repair of 46 bridges. The main objective of the project is to improve connectivity within the provincial road network and to national highway network; reduce costs and journey times; and improve reliability of access.

This Report covers the Environmental Impact Monitoring activities for the period from July to December 2011. The report is based on the information provided by the ARE's of each contract, field survey of the Environment Specialist and Monthly Environment Assessment Check lists submitted by the contractors through ARE's.

2. Construction Activities during the Reporting Period

The ongoing construction activities of the project involve widening of existing carriage ways, improvement of the road surface, pavements, construction of side drains, removal of roadside structures and trees, widening construction or replacement of culverts, bridges and cause ways, sub base and base course, other miscellaneous and maintenance work.

Awareness Program: Work Shop was organized and conducted on 5th of September 2011 at ARE's office of EPBP 02 in Batticaloa. Project Manager (PM), Environment Officer (EO) and Sociologist (SO) and the other staff members were instructed regarding the preparation of Environment Management Action Plan (EMAP), implementation of Environment Management and Monitoring Plans (EMP/EmoP) and preparation of Environmental Assessment Checklists for (EP 01 & EPBP 02) new packages.

Evaluation of EMAP: The commencement date of the two new contacts (EP01 & EPBP02) was 4th of August 2011. The EMAPs was submitted by Access construction limited for EPBP02 and VVK & Company for EP01 on 20th October 2011. Submitted EMAPs by above contractors are now in an acceptable level and approval was given to implementation of proposed EMAP during the construction and maintenance stage.

3. Environmental Impact Monitoring and Mitigation Measures

The environment issues of the project during the current construction phase were monitored according to the EMP provided through Bid documents and EMAP submitted by the contractors at the initial stage of the project. Environment assessment methodology was discussed with Assistant Residence Engineers (ARE) on all packages prior to hand over the Environment Assessment Check lists to the contractors during the initial stage of the project. A work shop was also organized and conducted to the PMSO and EO of all packages regarding Environment Monitoring, implementation of EMP and completion of the Environment Assessment Check lists.

Field Environment Monitoring Program was carried out all ongoing and completed package roads in Trincomalee and Batticaloa districts of Eastern Province (EP) during the period September and October 2011. Visual observations were made to understand the impact to the air, water, noise and ground vibrations. During the field surveys, instructions were given to the PM, EO and SO based on the visual observation regarding the ongoing construction to reduce environment and social impacts as well as enhance the environment quality around sub project roads.

Submitted Environment Assessment Check lists by the contractors were evaluated with the help of ARE's of all contract packages from June to December 2011.

4. Results of Environmental Monitoring

Current Situation: Adverse permanent environmental impacts were not present due to project activities of sub project roads. Several temporary environmental impacts were identified due to negligence of the contract obligations and instructions given by the ARE's & Construction Supervision Consultants (CSCs). In addition road congestions are common town and highly populated areas of both Trincomalee and Batticaloa districts. Linear ribbon type developments, illegal construction and temporally business premises are some of the reasons for the road congestion. The identified impact during the constriction stage and proposed mitigation

measures to enhance environment quality in the project affected areas are considered as follows:

Existing Environment Issue

- **Land use:** Poor land use pattern in several subproject areas has contributed to the problems such as temporally flood, road congestions, impacts to wet lands, coastal habitats and other environmental sensitive locations. These are existing environmental problems and not due to construction related activities. However these activities directly or indirectly impact to the existence of sub project roads.

Proposed mitigation action: Organize small group awareness program with the help of Local Government Authorities (LGA) in the particular areas to educate people regarding the above activities and should give the responsibility for them to prevent from existing problems with the help of relevant authorities.

- **Loss of access :** Several public and private access have been disrupted due to the ongoing construction activities

Proposed mitigation action: Adequate provisions should be made to ensure undisturbed moving of pedestrian, vehicles and livestock from main roads are maintained.

- **Emanation of dust:** The major existing environmental and social problem identified during the review has been emanation of dust from the gravel and sandy roads due to wind and transportation of vehicles. In addition transportation of construction materials and other construction related activities also increase dust level in the subproject affected areas. The dust causes adverse impacts such as respiratory problems, nuisance to the road users as well as road side communities. In general contractors are not sprinkling water adequately over the construction sites and roads at sufficiently regular intervals.

Proposed mitigation action: Sprinkling of water on construction sites and roads, which use for construction related activities in regular intervals, special attention should be taken to minimize dust near the public sensitive locations, transportation of construction materials with proper covering, load and unloading of construction materials without strong wind etc.

- **Temporally floods:** Drainage systems in town areas are not functioning properly due to some illegal construction, solid waste disposal and due to poor maintenance. Construction of culverts, bridges and other irrigation structures, storage of construction materials beside the road and alternation of natural flow paths create temporally impact to the existing drainage facilities. This situation will adversely impact to the aquatic biology, increase soil erosion and sedimentation as well as changes of hydrological characters.

Proposed mitigation action: Maintenance of culverts, bridges and all existing drainage paths clear of blockage at all times, removal of bypass, limitation of the work during the rainy season, removal of construction materials and the construction debris around flood prone locations, maintenance of natural flow paths

- **Soil erosion and siltation:** Based on the current situation of the completed contracts, soil erosion can impact to carriage ways, embankment slops, line and earth drains, access roads both public and private during the rainy season.

Proposed mitigation action: All eroded soil should removal from the existing drainage structures, cleaning of cross drainages, treatment of clearing and filling areas against flow acceleration, re turfing of the damaged embankments, stabilize of disturbed lands by grass, regular inspection by EO to monitor the progress of the actions.

- **Public & worker safety:** At the initial stage of the project personal safety equipments especially footwear, safety jackets, helmets and other equipments supplied to the workers depending on their activity. However currently contractors are not properly engaging this activity.

Proposed mitigation action: Establishment of the warning signs, speed limits and signals, provisions of safety gears to the workers depending on their duty, continuous checking of safety arrangements by the safety officers, safety training for the new employees prior to start work by the safety offices.

- **Road side landscape and aesthetic value:** All construction work should be completed based on the detailed design, typical designs/guide lines given as a part of the bid documents.

Proposed mitigation action: All debris and spoil should be removed from the road side or other work place, road landscape plantation or re vegetation, removal of temporally structures,

septic tanks and provision of road furniture including foot paths, sign boards and other road side protections.

- **Borrowing and quarry operations:** In general rehabilitation of the material extraction sites has not been done by the contractors as mentioned in the EMAP once after extraction..

Proposed mitigation action: Follow the environment requirements and guidelines issued by the Central Environment Authority (CEA), Geological and Survey Mines Bureau (GS&MB) and respective Local Authorities (LA) and re-establishment of material extraction sites and access road once after extraction must be completed prior to taking over..

Evaluation of Environmental and Social Background: Environment specialist visited the project for two months (September and October) from June to December 2011. This evaluation on the environment and social background were done for two months (September and October) based on the field observation and data collected by him. Proposed mitigation measures against the project activities were evaluated during the field survey under various project activities using following 3 criteria: highly satisfaction, satisfaction and not satisfaction. Table: 1 & 3 indicates that the situation of the ongoing packages on September and October 2011, Table: 2 indicates that the situation of the completed packages on September 2011, Table: 4 indicates that comparison of the ongoing packages on September & October 2011, respectively on project affected environment due to project activities and influence of the mitigation actions.

Mitigation Implemented during visit: Based on the instructions given, some improvements have been observed in removal of debris and spoil, turfing work, transportation of construction materials with tarpaulin cover, clearing of culvert outlets and controlling of the vehicle speed between September and October 2011. The main social impact to the road side community and road users is emanation of dust due to transportation of construction vehicles over the unpaved road and windy situation throughout the year.

5. Status of Environmental Permits and Licensee

Preparation of Basic Information Questionnaires (BIQs): Environmental clearance from the CEA for the proposed project roads of EP01 & EPBP02 was valid for one year from 15th

October 2008. Based on the field observations, information collected from relevant authorities and road side communities as well as considering engineering designs, BIQ for ongoing packages of EP01 & EPBP02 roads were prepared and submitted to the provincial office of CEA at Trincomalee to obtain environmental clearance on 9th October 2011.

6. Public Complaints

In general project affected communities in all most all the project roads have given their public support to the project. Any complaints that have been received have been resolved to the satisfaction of all parties.

7. Social Impact

Social impacts will be considered in a separate report.

8. Conclusions and Recommendations

The construction activities of the project are limited to the existing ROW of the sub project roads. Also land acquisition from the private or government properties is not involved. Environment impact and risk associated with construction related activities can easily be mitigated through environment mitigation measures given by the contractors through the EMAP and EMP.

Project roads are not located within highly environmentally sensitive areas and considerable amount of the proposed road sections runs through predominantly man made habitats belongs to semi urban and rural areas of the EP. Therefore the effect on flora, fauna and different ecological habitats due to improvement of project is insignificant.

Positive environment impacts including protection of ground cover vegetation, agricultural lands, water resources, natural flow paths, and sensitive floral and faunal habitats, clearance obtained

from the relevant Government Authorities for the material extraction sites, processing plants as well as other construction related activities are in highly satisfactory level for all contract packages.

In general lack of strict adherence to the environment mitigation requirements by the contractors are the main concern during the field observation. Items include poor control of siltation of the earth and side drains, turving work, construction debris and spoil within the ROWs, delayed restoration of the burrow sites, removal excess materials from storage yards transportation of construction materials without proper covering, emanation of dust due to insufficient watering of construction sites/haulage roads, high speed construction vehicles, work force without safety equipment are the social and environment impact observed during the field survey of several ongoing construction packages.

Environment impacts regarding the construction activities were minimized in accordance with the EMP and EMAP. The construction activities of the project are not causing significant environmental impacts and most of the potential environmental impacts are temporary and occurred only during the construction period.

Table 1: Evaluation of Environment Impact and Mitigation Measures of ongoing packages September 2011

Abbreviations

HS: Highly Satisfaction S: Satisfaction NS: Not Satisfaction X= Evaluate

Package Names and Numbers	EP 03			EP 04			EP 05			EP 06			EP 08B		
Road Numbers	EPTC0025			EPBTC069 EPBTC072 EPBTC091 EPBTC095			EPTCC028			EPTCC017 EPTCC028B			EPBTC045 EPBTD49		
Level of Satisfaction	HS	S	NS	HS	S	NS	HS	S	NS	HS	S	NS	HS	S	NS
1. Earthworks and soil conservation															
1.1 Disposal of debris and spoil			X			X			X			X			X
1.2 Protection of agricultural areas		X			X		X				X		X		
1.3 Protection of ground cover vegetation		X			X		X				X		X		
1.4 Burrowing of earth			X			X		X			X			X	
1.5 Erosion control			X			X			X			X			X
1.6 Quarry operations		X		No Quarry operations							X		No Quarry operations		
2. Water Pollution															
2.1 Protection of water sources		X			X		X				X		X		
2.2 Prevention of water quality		X			X		X				X		X		
2.3 No siltation of water bodies			X			X		X			X		X		
2.4 No alteration of drainage paths		X			X			X			X			X	
2.5 Precautions for contamination of water from construction materials		X			X			X		X				X	
2.6 Locating, sanitation & waste disposal in construction camps		X			X		X				X		X		
2.7 Adequate facilities for disposal of sewerage & solid wastes		X			X			X		X				X	
2.8 No impact to the public or community water supply		X			X		X			X			X		
3. Air pollution															
3.1 Effectively management of dust			X			X			X		X				X
3.2 Delivering materials effectively covered while transport			X			X		X			X		X		X
3.3 Vehicle speed limit which control the dust emission			X			X			X			X			X
3.4 Watering of construction & transportation sites			X			X			X			X			X
3.5 Immediate cleaning of debris, dust & other materials from the road			X			X			X			X		X	
3.6 Level of emissions from construction vehicles, equipment & machinery		X			X			X			X			X	
3.7 Regularly serviced machinery, equipments & vehicles		X			X				X		X			X	
3.8 Level of air emission from material extraction sites		X			X				X		X			X	
4. Noise pollution & vibration															
4.1 Level of noise from vehicles, plants & equipments		X			X			X			X		X		
4.2 Level of Vibration from machineries & equipments	X			X				X		X			X		
5. Impact on flora and fauna															
5.1 Minimize loss or damage to trees & vegetation	X				X		X			X			X		
5.2 No destruction of other flora	X			X			X			X			X		

5.3 No removal of trees in protected areas	X			X			X			X			X		
5.4 No impact to wild fauna and their habitats	X			X			X				X		X		
6. Accidents & risks															
6.1 Public & Worker safety			X			X		X			X				X
6.2 Provide proper safety appliances to workers e.g. Helmets, goggles, masks, foot wears			X			X			X				X		X
6.3 Adequate warning signals & signs available			X			X			X				X		X
7. Health & safety															
7.1 Prevention & control of vector based diseases	X			X			X			X			X		
7.2 No vector breeding sites at the vicinity of labor camps	X			X			X			X			X		
7.3 Adequate actions for workers health & safety			X			X		X					X		X
7.4 First Aid Facility		X				X		X				X			X
7.5 Adequate bathing, latrine facilities for labor camps		X				X	X			X			X		
7.6 No affect to adjacent watercourses by sewerage system	X				X		X			X			X		
7.7 Garbage disposed		X			X		X			X			X		
8. Environmental enhancement															
8.1 Road side landscape		X			X				X			X			
8.2 Re-planting of trees, re-vegetation of other plants	This will involve with the rainy season														
8.3 Reconstruction of removed utilities such as water, electricity & telephone		X			X			X			X			X	

**Table 2: Evaluation of Environment Impact and Mitigation Measures September 2011
(Roads of completed packages)**

Abbreviations

HS: Highly Satisfaction **S:** Satisfaction **NS:** Not Satisfaction **X=** Evaluate

NA= Not

Applicable

Package Names and Numbers	EP 03			EPBP 03			EP8A			EP 10A			EP 10B			EP 10C			EP 10D					
Road Numbers	TCC006 TCC019			TCC006 TCC017 TCC019 TCC025 TCC028			BTC044			BTC054			BTC054			BTC054			BTC057					
Level of Satisfaction	H	S	N	H	S	N	H	S	N	H	S	N	H	S	N	H	S	N	H	S	N	H	S	N
Disposal of debris and spoil			X		X			X			X			X			X			X			X	
Protection of ground cover vegetation & agricultural lands	X				X			X			X			X			X			X			X	
Protection of water resources & natural flow path		X			X			X			X			X			X			X			X	
Erosion control measures		X			X			X			X			X			X			X			X	
Turfing work		X			NA			X			X			X			X			X			X	
Watering for turfing areas			X		NA			X			X			X			X			X			X	
No Siltation of the earth and side drains			X		NA			X			X			X			X			X			X	
Public safety		X			X			X			X			X			X			X			X	
Clearing of storage yards			X		X			X			X			X			X			X			X	
Road side landscape		X			X			X			X			X			X			X			X	
Restoration of the burrow pits			X					X			X			X			X			X			X	

Table 3: Evaluation of Environment Impact and Mitigation Measures of ongoing packages October 2011

Abbreviations

HS: Highly Satisfaction

S: Satisfaction

NS: Not Satisfaction

0= Evaluate

Package Names and Numbers	EP 03			EP 04			EP 05			EP 06			EP 08B		
Road Numbers	EPTC0025			EPBTC069 EPBTC072 EPBTC091 EPBTC095			EPTCC028			EPTCC017 EPTCC028B			EPBTC045 EPBTD49		
Level of Satisfaction	HS	S	NS	HS	S	NS	HS	S	NS	HS	S	NS	HS	S	NS
1. Earthworks and soil conservation															
1.1 Disposal of debris and spoil		●				●		●			●				●
1.2 Protection of agricultural areas		●			●		●			●			●		
1.3 Protection of ground cover vegetation		●			●		●			●			●		
1.4 Burrowing of earth		●				●		●			●			●	
1.5 Erosion control			●			●			●			●			●
1.6 Quarry operations		●		No Quarry operations							●		No Quarry operations		
2. Water Pollution															
2.1 Protection of water sources		●			●		●			●			●		
2.2 Prevention of water quality		●			●		●			●			●		
2.3 No siltation of water bodies			●			●		●		●			●		
2.4 No alteration of drainage paths		●			●		●			●			●		
2.5 Precautions for contamination of water from construction materials		●			●		●			●			●		
2.6 Locating, sanitation & waste disposal in construction camps		●			●		●			●			●		
2.7 Adequate facilities for disposal of sewerage & solid wastes		●			●		●			●			●		
2.8 No impact to the public or community water supply		●			●		●			●			●		
3. Air pollution															
3.1 Effectively management of dust			●			●			●			●			●
3.2 Delivering materials effectively covered while transport		●			●			●			●				●
3.3 Vehicle speed limit which control the dust emission		●			●		●			●			●		
3.4 Watering of construction & transportation sites															
3.5 Immediate cleaning of debris, dust & other materials from the road			●			●			●			●			●
3.6 Level of emissions from construction vehicles, equipment & machinery		●			●			●			●			●	
3.7 Regularly serviced machinery, equipments & vehicles		●			●			●			●			●	
3.8 Level of air emission from material extraction sites		●			●				●		●			●	
4. Noise pollution & vibration															
4.1 Level of noise from vehicles, plants & equipments		●			●			●			●			●	
4.2 Level of Vibration from machineries & equipments	●			●				●		●			●		

5. Impact on flora and fauna													
5.1 Minimize loss or damage to trees & vegetation	•				•		•			•			•
5.2 No destruction of other flora	•			•		•			•			•	
5.3 No removal of trees in protected areas	•			•		•			•			•	
5.4 No impact to wild fauna and their habitats	•			•		•					•	•	
6. Accidents & risks													
6.1 Public & Worker safety			•			•		•			•		•
6.2 Provide proper safety appliances to workers e.g. Helmets, goggles, masks, foot wears			•			•			•			•	•
6.3 Adequate warning signals & signs available			•			•			•			•	•
7. Health & safety													
7.1 Prevention & control of vector based diseases	•			•			•			•			•
7.2 No vector breeding sites at the vicinity of labor camps	•			•			•			•			•
7.3 Adequate actions for workers health & safety			•			•		•				•	•
7.4 First Aid Facility		•			•			•			•		•
7.5 Adequate bathing, latrine facilities for labor camps		•			•			•				•	
7.6 No affect to adjacent watercourses by sewerage system	•				•			•				•	
7.7 Garbage disposed		•			•			•				•	
8. Environmental enhancement													
8.1 Road side landscape		•			•			•			•		•
8.2 Re-planting of trees, re-vegetation of other plants	This will involve with the rainy season												
8.3 Reconstruction of removed utilities such as water, electricity & telephone		•			•			•			•		•

Table 4: Evaluation of Environment Impact and Mitigation Measures of ongoing packages: Comparison September & October 2011

Abbreviations

HS: Highly Satisfaction

S: Satisfaction

NS: Not Satisfaction

X= Evaluate (Previous month: September 2011)

0 = Evaluate (Current situation: October 2011)

Package Names and Numbers	EP 03			EP 04			EP 05			EP 06			EP 08B		
	HS	S	NS	HS	S	NS	HS	S	NS	HS	S	NS	HS	S	NS
Road Numbers	EPTC0025			EPBTC069 EPBTC072 EPBTC091 EPBTC095			EPTCC028			EPTCC017 EPTCC028B			EPBTC045 EPBTD49		
Level of Satisfaction	HS	S	NS	HS	S	NS	HS	S	NS	HS	S	NS	HS	S	NS
1. Earthworks and soil conservation															
1.1 Disposal of debris and spoil		●	X			X●		●	X		●	X			X●
1.2 Protection of agricultural areas		X●			X●		X●				X●		X●		
1.3 Protection of ground cover vegetation		X●			X●		X●				X●		X●		
1.4 Burrowing of earth		●	X			X●		X●			X●			X●	
1.5 Erosion control			X●			X●			X●			X●			X●
1.6 Quarry operations		X●		No Quarry operations							●		No Quarry operations		
2. Water Pollution															
2.1 Protection of water sources		X●			X●		X●			X●			X●		
2.2 Prevention of water quality		X●			X●		X●			X●			X●		
2.3 No siltation of water bodies			X●			X●		X●		X●			X●		
2.4 No alteration of drainage paths		X●			X	●		X●		X	●			X●	
2.5 Precautions for contamination of water from construction materials		X●			X●			X●	X	●				X●	
2.6 Locating, sanitation & waste disposal in construction camps		X●			X●		X●				X●		X	●	
2.7 Adequate facilities for disposal of sewerage & solid wastes		X●			X●			X●		X●				X●	
2.8 No impact to the public or community water supply		X●			X●		X●			X●			X●		
3. Air pollution															
3.1 Effectively management of dust			X●			X●			X●		X	●			X●
3.2 Delivering materials effectively covered while transport		●	X		●	X		X●			●	X		X	●
3.3 Vehicle speed limit which control the dust emission		●	X			X●		●	X		●	X		●	X
3.4 Watering of construction & transportation sites			X			X			X			X			X
3.5 Immediate cleaning of debris, dust & other materials from the road			X●			X●			X●			X●		X	●
3.6 Level of emissions from construction vehicles, equipment & machinery		X●			X●			X●			X●			X●	

3.7 Regularly serviced machinery, equipments & vehicles		X●			X●			●	X		X●			X●	
3.8 Level of air emission from material extraction sites		X●			X●				X●		X●			X●	
4. Noise pollution & vibration															
4.1 Level of noise from vehicles, plants & equipments		X●			X●			X●			X●		X●		
4.2 Level of Vibration from machineries & equipments	X●			X●				X●		X●			X●		
5. Impact on flora and fauna															
5.1 Minimize loss or damage to trees & vegetation	X●				X●		X●			X●			X●		
5.2 No destruction of other flora	X●			X●			X●			X●			X●		
5.3 No removal of trees in protected areas	X●			X●			X●			X●			X●		
5.4 No impact to wild fauna and their habitats	X●			X●			X●			X	●		X●		
6. Accidents & risks															
6.1 Public & Worker safety				X●			X●		X●			X●		●	X
6.2 Provide proper safety appliances to workers e.g. Helmets, goggles, masks, foot wears				X●			X●		X●			X●			X●
6.3 Adequate warning signals & signs available				X●			X●		X●			X●			X●
7. Health & safety															
7.1 Prevention & control of vector based diseases	X●			X●			X●			X●			X●		
7.2 No vector breeding sites at the vicinity of labor camps	X●			X●			X●			X●			X●		
7.3 Adequate actions for workers health & safety				X●			X●		X●			X●		X●	
7.4 First Aid Facility		X●			●	X		X●			X●			X●	
7.5 Adequate bathing, latrine facilities for labor camps		X●			●	X	X●			X●			X●		
7.6 No affect to adjacent watercourses by sewerage system	X●				X●		X●			X●			X●		
7.7 Garbage disposed		X●			X●		X●			X●			X●		
8. Environmental enhancement															
8.1 Road side landscape		X●			X●				X●		X●			●	
8.2 Re-planting of trees, re-vegetation of other plants	This will involve with the rainy season														
8.3 Reconstruction of removed utilities such as water, electricity & telephone		X●			X●			X●			X●			X●	