

# Environmental Monitoring Report

---

Semi-Annual Report (January to June 2013)  
July 2013

## VIE: Ho Chi Minh City-LongThanh-Dau Giay Expressway

Prepared by the Consortium of Nippon Koei Co., Ltd. and TEDI South for Vietnam Expressway Corporation, the Ministry of Transport of Vietnam, and the Asian Development Bank.

## **CURRENCY EQUIVALENTS**

(as of 1 July 2013)

Currency unit	–	dong (D)
D1.00	=	\$0.000047
\$1.00	=	D21,170

## **NOTE**

In this report, "\$" refers to US dollars unless otherwise stated.

This environmental monitoring report is a document of the borrower. The views expressed herein do not necessarily represent those of ADB's Board of Directors, Management, or staff, and may be preliminary in nature.



THE SOCIALIST REPUBLIC OF VIET NAM  
MINISTRY OF TRANSPORT  
VIETNAM EXPRESSWAY CORPORATION

HOCHIMINH – LONG THANH – DAU GIAY EXPRESSWAY  
PROJECT MANAGEMENT UNIT (HLD EPMU)



NORTH-SOUTH EXPRESSWAY CONSTRUCTION PROJECT  
HO CHI MINH CITY – DAU GIAY SECTION (CS)

LOAN NO. VNXV-1



SEMI-ANNUAL ENVIRONMENTAL SUPERVISION REPORT  
(January 2013 – June 2013)

July 2013

Consortium of  
Nippon Koei Co., Ltd  
TEDI South

## TABLE OF CONTENTS

1. INTRODUCTION.....	1
1.1. Report purpose.....	1
1.2. Project Implementation Progress and Change in Project Scope .....	2
1.2.1. Implementation Progress .....	2
1.2.2. Scope of project.....	4
2. INCORPORATION OF ENVIRONMENTAL REQUIREMENTS INTO PROJECT CONTRACTUAL ARRANGEMENTS.....	5
3. SUMMARY OF ENVIRONMENTAL MITIGATIONS AND COMPLIANCE WITH EMP .....	6
4. SUMMARY OF ENVIRONMENTAL MONITORING.....	18
4.1. Environmental Monitoring by CSC .....	18
4.1.1. Monitoring program .....	18
4.1.2. Monitoring Result .....	21
4.2. Environmental Monitoring by Contractors .....	26
4.2.1. Monitoring Program .....	26
4.2.2. Monitoring Result .....	27
4.3. Assessment of Monitoring Results.....	34
5. ENVIRONMENTAL AND TRAINING AND ORIENTATION .....	35
6. KEY ENVIRONMENTAL ISSUES.....	36
6.1. Key Issues Identified .....	36
6.2. Action Taken.....	37
6.3. Additional Action Required.....	37
7. CONCLUSION AND RECOMMENDATION .....	37
Appendix 1. MAP OF SAMPLING LOCATIONS.....	39
Appendix 2. PHOTOS OF ENVIRONMENTAL MONITORING AND SUPERVISION .....	40

## 1. INTRODUCTION

### 1.1. *Report purpose*

In the surrounding area of Ho Chi Minh City (HCMC), the traffic volume has long been over the capacity of road. It is foreseen that the demand of traffic in HCMC and Dong Nai area where industrial development has been recently significant with the planned development of industrial zones and the international airport will increase significantly. The Government of Vietnam (GOV) has decided to construct the HCMC – Long Thanh – Dau Giay Expressway (HLD Expressway) with the assistance from Asian Development Bank (ADB) and Japan Bank for International Cooperation (JBIC), which was currently named as Japan International Cooperation Agency (JICA) by integrating with previous JICA. The express way was divided into two portions such as HCMC – Long Thanh funded by JICA and Long Thanh – Dau Giay funded by ADB.

Ho Chi Minh –Long Thanh –Dau Giay Expressway crosses thinly population density areas such as agricultural land and some high population density areas. EIA has been implemented for environmental and social consideration according to the Vietnamese environmental law and regulations and JBIC and ADB guidelines for Environmental and Social Considerations and Regulations.

Implementation of Environmental Management Plan (EMP) during construction and post-construction stages is necessary for sustainable development as well as to ensure the environmental protection in the road construction project.

The main purpose of the environmental supervision report (January 2013 – June 2013) is to summarize the environmental supervision activities by Contractors and Construction Supervision Consultants (CS Consultants) during the period of January 2013 – June 2013 to support VEC to prepare environmental supervision reports to JICA (previous JBIC), ADB as well as to prepare them to other agencies.

The main objectives of this environmental supervision report are follows;

- Grasp the general environmental condition
- Identify the environmental impacts during the construction period and propose mitigation measures
- Summarize the result of environment inspection during construction period.

- Implementation of environmental monitoring in pre-construction and during construction stages.

## **1.2. Project Implementation Progress and Change in Project Scope**

### **1.2.1. Implementation Progress**

The construction progress of each package as of June 2013 is described as follows:

#### **a. Package 1a:**

Completed and it is in the period of warranty.

#### **b. Package 1b:**

##### **▪ Temporary Works**

- **Temporary road and temporary berth, temporary bridges and Truong Luu road**
  - + Service road and bridge: Maintenance for service road and bridges.
  - + Truong Luu road: Maintenance for Truong Luu road.
- **Batching plant:** Batching plant was operated for supplement of concrete for project.
- **Site laboratory:**

Site laboratory was operated with approved equipment. The following tests have been doing at site laboratory:

- + Concrete aggregate and sample compression
- + Earth work and compaction
- + Steel reinforcement
- + Asphalt concrete work
- **Site Clearance:** The works of site clearing on handed over land have been completed 100%.
- **Earth Work and Soft Soil Improvement:** In this month, The Contractor continues to carry out for slope protection
- **Bridge Substructure:** Carrying out cleaning & finishing work for final acceptance
- **Bridge Superstructure:** In this month, Installation work for median precast slab was completed.
- **Lighting and electrical Works:** Preparation works for new built medium voltage power line.
- **Water proofing layer construction work:** The Contractor has carried out for 88 s.pans in June
- **Asphalt concrete work:** Contractor has carried out mass construction for ACS layer and completed 108 s,spans in this month.
- **Drainage system installation:** Catch pit & grating installation work was completed in this month, installation for drainage pipes was started also. Up to now, 06 s.spans of drainage pipe were installed.

**c. Package 2:**

- **Works at site**
  - Construct cantilever segments for P21, 22,23,24, 25
  - Construct parapet at approach bridge HCMC side
  - Construct approach bridge at Dong nai side
  - Construction SCSM at approach road at Dong Nai side
  - Conduct soft soil treatment for widening area of Long Phuoc toll plaza
- **Earth Works and Soft Soil Improvement:** Soft soil treatment for widening area of Long Phuoc toll plaza
- **Bridge Substructure:** Girder erection from P32-P28, Constructing abutment A2.
- **Bridge Superstructure:** Finish concreting for deck slab S1 to S20 at HCM side, Constructing deck slab S32 to S45 for approach bridge at Dong nai side
- **Lighting and Electronics Works:** No activity done yet

**d. Package 3:**

- **Temporary Works:** Carry out maintenance of service road on site
- **Survey works :** For Topography survey work : have been finished
- **Site clearance:** Site clearing on site all most finished
- **Earth Work and Soft Soil Improvement**
  - Carry out installation of PVD material on site is 100.00% completed (alternative DMM section and original VCM section)
  - Surcharge works was completed
  - Termination of vacuum pump for original VCM section (include alternative DMM section) was completed
  - Construction of surcharge removal was completed
  - Construction of embankment layer on site is complete
  - Construction of capping layer on site was completed
  - Production of aggregate material for sub-base and base course
  - Production of material for asphalt treated base course
  - Production of material for asphalt concrete binder course
  - Construction of sub-base layer on site is ongoing
  - Construction of base course layer on site is ongoing
  - Construction of asphalt treated base course is ongoing
  - Construction of asphalt concrete binder course is ongoing
  - Construction of cohesive slope and slope protection is ongoing
  - Construction of concrete curb is ongoing
  - Construction of drainage system is completed
  - Construction of concrete curb is ongoing
  - Sand cement stabilized mat construction was completed
  - DMM work was completed (including soil cement column transition)



- **Bridge Substructure**
  - Ruot Ngua bridge: Substructure works were completed
  - Rach Vuon bridge: Substructure works were complete
  - Nuoc Trong bridge: Substructure works were completed
  - Ngon Cung bridge: Substructure works were completed
  - Hang Dieu Bridge: Substructure works were completed
  - Dong Mon bridge: Substructure works are completed
  - IPR 25A bridge: Construction of bored pile is completed, Casting concrete for pile cap and pier column of pier P-2 and head stock P-3 have been completed.
  - Long Thanh flyover: Substructure works was completed
- **Bridge Superstructure**
  - Ruot Ngua bridge: Installation parapet is ongoing
  - Nuoc Trong bridge: Super-structure works was completed
  - Ngon Cung bridge: Super-structure works was completed
  - Hang Dieu bridge: Super-structure works was completed
  - Dong Mon bridge: Super-structure works was completed
  - IPR 25A bridge: Casting concrete works for deck slab of span P5, P6 and P7 are completed
  - Long Thanh fly-over: Installation parapet is ongoing
- **Lighting and electrical Works:** Installation electric poles works are on going
- **Road furniture:** Production of guardrail is complete
- **Miscellaneous Works:** Casting concrete for precast beam, moveable barrier, concrete brick and concrete curb on site are ongoing

### 1.2.2. Scope of project

HLD Expressway construction project with total length of about 55km, is divided into 2 parts;

- Part 1: From An Phu Intersection (beginning point) to Ring Road 2 intersection (Km4+000) will be constructed as urban road. This section is funded by HoChiMinh City People Committee;
- Part 2: From Ring Road 2 intersection (Km4+000) to Dau Giay Intersection (ending point). The Project scope is summarized in following table.

**Table 1.** Project Scope

Section	Distance (Km)
---------	---------------



Ring Road 2 intersection to NH-51 interchange (JICA portion); KM.4+000 to KM.23+900	19.900 km
NH-51 interchange to Dau Giay interchange (ADB portion); KM.23+900 to KM.54+982	31.082 km
Total	50.982 km

## 2. INCORPORATION OF ENVIRONMENTAL REQUIREMENTS INTO PROJECT CONTRACTUAL ARRANGEMENTS

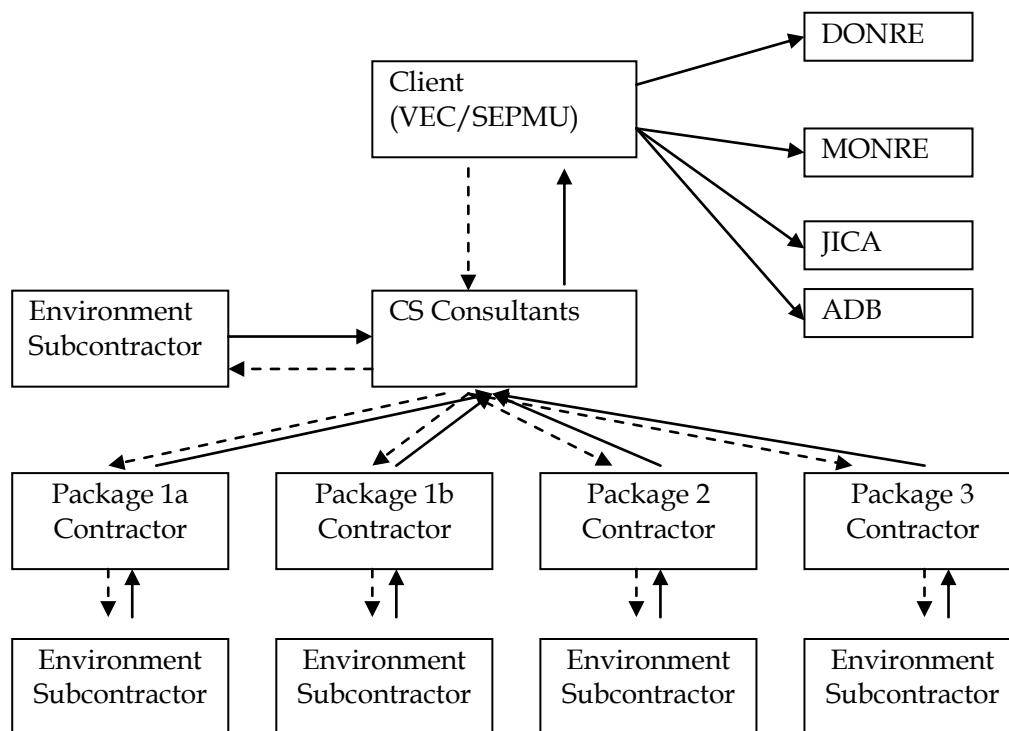
Environmental requirements were incorporated into Volume 3. General Specification of contract document. Which requires the construction contractors comply with environmental regulations and protection as summarized below:

- The Contractor shall submit an Environmental Management Plan detailing how he intends to comply with applicable local laws and regulations concerning protection of the environment and the attached specification for environmental monitoring.
- The contractor shall implement environmental monitoring program which shall be implemented in two phases: prior to the start of construction and during construction. The first phase is required to provide baseline data on environmental quality in the Project area, in particular for houses adjacent to areas of the works. Monitoring programs in the construction phase are required to collect data and evaluate the impact of the Project and the effectiveness of the Contractor's mitigation measures.
- The Contractor shall strictly comply with Vietnamese Laws and Standards regarding the environment on all works associated with the Contract.
- The Contractor shall be responsible for implementing and managing mitigation measures during the construction of the Works. The recommended mitigation measures including measure for air quality, noise and vibration, water environment, waste management, impacts on traffic.

### Implementation arrangement of EMP

The EMP including the explanation of baseline condition at pre-construction and potential impacts and mitigation measures at construction stage and operation stage

EMP has been prepared to monitor the environmental impacts and implement the appropriate mitigation measures during construction and operation stages as required in the EIA. The frameworks of management are described in the following figure.



**Figure 1. Framework of organizations regarding environmental management**

### 3. SUMMARY OF ENVIRONMENTAL MITIGATIONS AND COMPLIANCE WITH EMP

No.	Mitigation Measures	Compliance Attained	Comment on Reasons for Non-Compliance	Corrective actions taken
<b>I.</b>	<b>Over-all</b>	Good		
	Prepare and implement a site-specific EMP			
<b>II.</b>	<b>Air quality</b>			
2.1	Construction activities			
	<ul style="list-style-type: none"> <li>No burning of debris or other materials will occur on the site.</li> <li>Dust suppression measures will also be used, including covering and wetting loads, limiting the speed for vehicles transporting construction materials, and watering roads and other open areas regularly. In residential areas, 3m high fences of iron sheets of fiberboards are used around construction sites to minimize dust. Dust suppression measures including but not limited to the following will be implemented:</li> <li>Stockpiles of sand and aggregate greater than 20 cubic meters for use in concrete manufacture</li> </ul>	Fair	Construction site of Package 3 especially at IPR 25 overpass construction area, the	The contractor improved dust control by mobilize

No.	Mitigation Measures	Compliance Attained	Comment on Reasons for Non-Compliance	Corrective actions taken
	<p>shall be enclosed on three sides, with walls extending above the pile and two (2) meters beyond the front of the piles. Locations should be indicated by the accompanying site plan(s).</p> <ul style="list-style-type: none"> <li>- Effective water sprays shall be used during the delivery and handling of all raw sand and aggregate, and other similar materials, when dust is likely to be created and to dampen all stored materials during dry and windy weather.</li> <li>- Conveyor belts shall be fitted with wind-boards, and conveyor transfer points and hopper discharge areas shall be enclosed to minimize dust emission.</li> <li>- All conveyors carrying materials that have the potential to create dust shall be totally enclosed and fitted with belt cleaners. Locations should be indicated by the accompanying site plan(s).</li> <li>- Areas of reclamation shall be completed, including final compaction, as quickly as possible consistent with good practice to limit the creation of blown wind dust.</li> <li>- Construction walls will be provided in all locations where strong winds could blow dust and debris. In residential areas, such as An Phu and Long Than towns, build 3m high fences with fiberboards and iron sheets to minimize dust.</li> </ul>		<p>circulation of vehicles was generating much dust in March due to the dry road surface,</p> <p>Concentration of dust measured of Package 3 was slightly higher than the standard.</p>	<p>one watering truck at IPR 25 overpass construction area and carry out watering the access road frequently to control the dust</p>
2.2	Vehicle operation			
	<ul style="list-style-type: none"> <li>- All roads within the construction areas of the site shall be watered at least twice each day, and more if necessary to control dust to the satisfaction of the ESO.</li> <li>- Areas within the site where there is a regular movement of vehicles shall have an acceptable hard surface and be kept clear of loose surface material. Locations should be indicated by the accompanying site plan(s).</li> <li>- Ensure that vehicles and machinery are used and maintained properly to meet applicable emission standards. Fuel-efficient vehicles shall be preferred.</li> <li>- All vehicles, while parked on the site, will be required to have their engines turned off.</li> <li>- Any vehicles with an open load carrying area used for moving potentially dust-producing materials shall have properly fitting side and tailboards.</li> <li>- Ensure that employees are trained on the proper use and maintenance of machinery and vehicles. Use dust suppression measures: cover and wet loads, limit the speed for vehicles transporting</li> </ul>	Fair		

No.	Mitigation Measures	Compliance Attained	Comment on Reasons for Non-Compliance	Corrective actions taken
	<p>construction materials, select suitable transport routes and vehicles, and water roads and other open areas regularly. Limit traffic congestion through planning of transportations in coordination with local officials.</p> <ul style="list-style-type: none"> <li>- Conduct regular site inspections to ensure the use of best practices and report any complaints from local people.</li> </ul>			
2.3	Crushing, concrete and asphalt plant operation			
	<ul style="list-style-type: none"> <li>- Dust nuisance as a result of its activities will be avoided. An air pollution control system shall be installed and shall be operated whenever the plant is in operation.</li> <li>- Install a three-sided roofed enclosure with a flexible curtain across the entry where dusty materials are being discharged to vehicles from a conveying system at a fixed transfer point. Install exhaust fans for this enclosure and vented to a suitable fabric filter system.</li> <li>- Materials having the potential to create dust shall not be loaded to a level higher than the side and tail boards, and shall be covered by a clean tarpaulin in good condition.</li> <li>- The concrete batching plant and crushing plant sites and ancillary areas will be frequently cleaned and watered to minimize any dust emissions. The plants shall not be located within 1000 m of settlements, schools, health facilities and other sensitive sites. Provide VEC and PSC a map on the location of plants prior to the beginning of construction works for approval. Dust suppression and other air pollution control measures shall be used in the plants to minimize emission levels</li> <li>- Dry mix batching shall be carried out in a totally enclosed area with exhaust to suitable fabric filters.</li> <li>- All equipment and machinery on the site will be checked at least weekly and all necessary corrections and or repairs made to ensure compliance with safety and air pollution requirements.</li> </ul>	Good		
III.	<b>Water quality</b>			
	<ul style="list-style-type: none"> <li>- Wastewater from mixing materials will be drained to a separate collecting system, and processed by sediment traps before release to the public drainage system.</li> <li>- Mud from drilling will be collected and processed to avoid pollution of surface water.</li> <li>- Drilling solutions for performing the abutment will be processed in a closed system, especially</li> </ul>	Good		

No.	Mitigation Measures	Compliance Attained	Comment on Reasons for Non-Compliance	Corrective actions taken
	<p>for abutments at the riverbed.</p> <ul style="list-style-type: none"> <li>- Inner-lined drill holes will be used during piling.</li> <li>- Proper drainage systems will be provided at all construction, material exploitation, and storage sites. All existing stream courses and drains within, and adjacent to, the site will be kept safe and free from any debris and any excavated materials arising from the works. Chemicals, sanitary wastewater, spoil, waste oil and concrete agitator washings will not be deposited in the watercourses</li> <li>- All water and waste products arising on the site will be collected, removed from the site via a suitable and properly designed temporary drainage system and disposed of at a location and in a manner that will cause neither pollution nor nuisance. The Contractor will ensure that construction camps and other potential sources of secondary impacts are properly sited and provided with drainage and wastewater facilities.</li> <li>- Hygiene bathrooms will be set up at all construction camp sites and septic tanks will be used to treat wastewater. Proper drainage will be provided to avoid creation of stagnant water bodies.</li> <li>- Extraction of sand and gravel in river beds will be prohibited except (i) where there is no technically and economically feasible alternative, and (ii) provided specific mitigation measures are implemented to minimize impacts on river morphology, water quality (e.g. turbidity), and ecosystems (e.g. reduced extraction during fish spawning period).</li> <li>- Equipment and vehicle maintenance area will be provided with adequate drainage facility as well as oil and grease separator to avoid discharge of oil-laden water into the surrounding soil and water courses.</li> <li>- Drainage works will be constructed, maintained, removed and reinstated as necessary and all other precautions taken, as necessary, for the avoidance of damage by flooding and silt washed down from the works. Adequate precautions will be taken to ensure that no spoil or debris of any kind is allowed to be pushed, washed down, fallen or be deposited on land adjacent to the site. Stockpiles will not be located near rivers and streams. Dumping of spoils and obstruction of flows along rivers and streams</li> </ul>			

No.	Mitigation Measures	Compliance Attained	Comment on Reasons for Non-Compliance	Corrective actions taken
	<p>will be avoided.</p> <ul style="list-style-type: none"> <li>- Downstream slopes will be stabilized, where warranted, with concrete, rock gabions or walls to avoid erosion.</li> <li>- Prepare emergency response plan in case of fuel and chemical spills</li> </ul>			
<b>IV.</b>	<b>Loss of water resources</b>			
	<ul style="list-style-type: none"> <li>- Any source of water (potable or otherwise) for the community, such as wells, ponds or tube wells, accidentally lost will be replaced immediately.</li> <li>- The location and sitting of the replaced source of water will be as per design or as directed by the engineer. In general, there should be only lateral displacement (of the new site from the old); the replacement will be ready prior to demolition/dismantling of the existing source.</li> </ul>	Very good		
<b>V.</b>	<b>Noise and vibration</b>			
	<ul style="list-style-type: none"> <li>- Vehicles and machinery must be used, maintained and equipped so as to avoid unnecessary noise and vibration.</li> <li>- Plants must be located away from sensitive areas and noisy construction work, such as crushing, concrete mixing and batching must be done during daylight hours.</li> <li>- Use of machines causing loud noise and vibration (drill, excavator etc.) is prohibited between 23 pm and 5 am. If night-time construction is necessary, the contractor will apply for a permit from local authorities and inform residents about coming works beforehand.</li> <li>- At residential areas, temporary noise walls or boards will be used to minimize noise impacts from construction activities near schools, temples, clinics etc. The contractor will specify the locations and type of temporary noise walls before beginning of construction.</li> <li>- Ensure that local authorities and residents are notified in advance about disturbing activities, such as blasting operations. The effectiveness of mitigation activities will be monitored regularly through noise level measuring.</li> <li>- Be responsible for repairing any damage caused as the result of vibrations generated from or by the use of his equipment, plant, and machinery.</li> <li>- Erect temporary noise barriers where schools and other potentially sensitive receptors (as identified during consultation with local residents) are within 50 meters of construction activities. Temporary barriers of sufficient</li> </ul>	Good		



No.	Mitigation Measures	Compliance Attained	Comment on Reasons for Non-Compliance	Corrective actions taken
	<p>height with skid footings and a cantilevered upper portion will be erected within a short distance from stationary plants, and at practicable distances from mobile plants.</p> <ul style="list-style-type: none"> <li>- The minimum effective height of the noise barriers should be as such that no part of the noise sources associated with the operation of construction machinery should be visible from the target receptors to be protected. The locations of the temporary noise barriers shall be adjusted where and when necessary taking into consideration the locations and type of receptor involved and the machinery intended to be protected. Use of the proposed noise barriers, as other construction site equipment, should take into account the following standard requirements:</li> <li>- A minimum of 4.5 meter wide thoroughfare with not less than 4.5 meter vertical clearance to be maintained at all times for the free passage of fire appliances;</li> <li>- The barrier shall not be located where it prevents access to community facilities, residential areas, and places of work or access routes.</li> <li>- Ensure that the use of noise sources (i.e., aggregate crushers, operators, etc.) will be avoided as much as possible near sensitive receptors. Non-vibratory rollers (for compaction) will be used near sensitive receptors such as schools and cultural resources.</li> <li>- Ensure that all exhaust systems will be maintained in good working order; properly designed engine enclosures and intake silencers will be employed; and regular equipment maintenance will be undertaken.</li> <li>- Ensure that stationary equipment will be placed as far from sensitive land uses as practical; selected to minimize objectionable noise impacts; and provided with shielding mechanisms where possible.</li> </ul>			
<b>VI.</b>	<b>Waste</b>			
	<ul style="list-style-type: none"> <li>- Waste from construction activities, including the demolishing of structures before the construction itself begins, must be collected and recycled when possible.</li> <li>- The contractor will establish hygienic groups to collect waste from construction camp sites and to ensure the cleanliness of the whole construction area. The contractor will also co-</li> </ul>	Good		



No.	Mitigation Measures	Compliance Attained	Comment on Reasons for Non-Compliance	Corrective actions taken
	<p>operate with local authorities or companies to organize the waste collection and specify the measures in the site-specific EMP.</p> <ul style="list-style-type: none"> <li>- The EMP will be updated during detailed design and will require that contractors be responsible for spoil disposal in a manner consistent with a site-specific EMP that they will be required to prepare prior to any construction work. Spoils from the works will only be disposed of in selected locations to avoid any adverse impacts to water or soil quality. The locations will be specified by the contractor in the site-specific EMP before the beginning of construction activities. The contractor shall also obtain permission from the authorities to dispose any surplus material or other spoils from the works.</li> </ul>			
<b>VII.</b>	<b>Handling of hazardous and toxic materials</b>			
	<ul style="list-style-type: none"> <li>- During the construction, fuels, oil, and other dangerous chemical substances will be transported, stored and handled at the site. If adequate mitigation measures are not used, there is a risk of spills into the surrounding area. The contractor will apply for appropriate permits for the transport and handling of hazardous materials and prepare an emergency and contingency plan for fuel and oil spillage. Fuel storage sites will be located away from water bodies on a cement pavement with a surrounding canal leading to an oil and grease separator to facilitate the capture and removal of spilled oil. The contractor also ensures that employees are trained on handling hazardous materials.</li> <li>- Fuel storage sites will be located away from water bodies on a cement pavement with embankment. A canal leading to an oil and grease separator will be installed to facilitate the capture and removal of spilled oil.</li> <li>- Use and maintain vehicles and machinery properly to avoid accidental spills.</li> </ul>	Good		
<b>VIII.</b>	<b>Contamination of soil</b>			
	<ul style="list-style-type: none"> <li>- Use good housekeeping practices to avoid any contamination of soil from solid wastes, wastewater and hazardous materials. All wastes shall be disposed in designated disposal sites approved by local authorities.</li> <li>- Ensure all workers are aware of the importance of careful handling of hazardous and dangerous materials. Prepare emergency plans for</li> </ul>	Good		

No.	Mitigation Measures	Compliance Attained	Comment on Reasons for Non-Compliance	Corrective actions taken
	accidents.			
<b>IX.</b>	<b>Spoils disposal</b>			
	<ul style="list-style-type: none"> <li>- Waste from construction activities, including the demolishing of structures before the construction itself begins, must be collected and recycled when possible.</li> <li>- Establish hygienic groups to collect waste from construction camp sites and to ensure the cleanliness of the whole construction area.</li> <li>- Spoils from the works will only be disposed of in selected locations approved by local authorities.</li> <li>- Disposal shall not cause adverse impacts to water and soil quality as well as land use.</li> <li>- The locations of spoils disposal sites will be specified by the contractor in the site-specific EMP before the beginning of construction activities.</li> </ul>	Good		Package 1b Contractor has completed the removal of all concrete pile head out of the project area and clearing of river at Tac river
<b>X.</b>	<b>Erosion</b>			
	<ul style="list-style-type: none"> <li>- Provide temporary or permanent drainage to protect sites susceptible to erosion.</li> <li>- Stabilize downstream slopes on rivers and streams prone to erosion problems.</li> <li>- Protect sensitive surface/erosion prone sites with vegetation and replace removed trees to ensure interception of rainwater and deceleration of surface runoff as soon as possible after construction works.</li> <li>- On streams, downstream slopes can be stabilized with concrete, rock gabions or walls as seen necessary.</li> <li>- Careful stockpiling of topsoil in suitable locations to prevent these from being washed away.</li> <li>- Specify the erosion protection measures to be used in the site-specific EMP.</li> </ul>	Good		
<b>XI.</b>	<b>Loss of vegetation cover</b>			
	<ul style="list-style-type: none"> <li>- Minimize the clearing of vegetation for construction activities and borrow areas.</li> <li>- Re-vegetate embankment slopes and road cuts.</li> <li>- Landscape road verges and plant vegetation to contribute to aesthetic value.</li> <li>- Where roadside trees are lost as a result of construction activities, the Contractor shall replant trees as a ratio of one-to-one.</li> <li>- Where trees cannot be replaced at the roadside due to a lack of roadside space, the Contractor shall consult with affected residents to determine an appropriate alternative planting location and schedule.</li> <li>- The Contractor will be responsible for all works</li> </ul>	Good		

No.	Mitigation Measures	Compliance Attained	Comment on Reasons for Non-Compliance	Corrective actions taken
	associated with tree planting including maintenance of the trees for a one-year period after planting.			
<b>XII.</b>	<b>Changes in Hydrological Situation and Irrigation systems</b>			
	<ul style="list-style-type: none"> <li>- Temporary drainage will be established along the expressway to avoid inundation during construction. The contractor shall ensure that activities shall not cause disruption of irrigation into surrounding croplands and that damaged irrigation facilities shall be repaired immediately.</li> <li>- The Contractor shall ensure irrigation channels diverted during the construction phase will be returned to their original status. Where this is not possible, or where channels are irrevocably altered, consultation will be held with landowners to ensure that an adequate redesign is undertaken to ensure that irrigation channels are returned as closely as possible to their former layout. The Contractor will undertake all necessary works to achieve this status, including provision of labor.</li> </ul>	Good		
<b>XIII.</b>	<b>Traffic conditions and use of waterways</b>			
	<ul style="list-style-type: none"> <li>- Contractor to formulate and implement a traffic management plan minimizing the disturbance caused by construction activities. The plan shall explain the means and methods to be taken for proper and adequate control of traffic during the course of the Works. This plan shall include but not be limited to the traffic control equipment the Contractor proposes to use for the Works; traffic control signage including location and sign descriptions; how and when the Contractor proposes to use traffic control flag men; traffic control means during no-working periods; and traffic control means and devices for night and off-hour periods.</li> <li>- The contractor shall also ensure implementation of the following measures: that the traffic management plan shall comply with the traffic control provisions with regard to: <ul style="list-style-type: none"> <li>a. General traffic management requirements</li> <li>b. Temporary road works</li> <li>c. Traffic control</li> <li>d. Number of lanes for traffic control</li> <li>e. Half-width construction</li> <li>f. Extraordinary traffic</li> <li>g. Vertical clearance</li> <li>h. Materials for traffic control devices</li> </ul> </li> <li>- In order to facilitate traffic through or around</li> </ul>	Good		

No.	Mitigation Measures	Compliance Attained	Comment on Reasons for Non-Compliance	Corrective actions taken
	<p>the Works, or wherever ordered by the ESC, the Contractor shall erect and maintain at prescribed points on the Works and at the approaches to the Works, traffic signs, lights, flares, barricades, rubber cones with traffic lamps, temporary signaling stations on river and other facilities as necessary or required by the ESC for the proper direction and control of traffic.</p> <ul style="list-style-type: none"> <li>- As necessary for proper control of traffic or when/ where directed by the ESC, the Contractor shall furnish and station competent flagmen whose sole duties shall consist of directing the movement of traffic through or around the Works.</li> <li>- Furnish and erect, within or in the vicinity of the project area, such warning and guide signs as may be necessary or ordered by the ESC.</li> <li>- In order to minimize disruption to traffic flows the Contractor shall enclose the site with temporary fence to provide a visual barrier between his work and adjacent traffic. The temporary fence shall be two meters high and the movement of men, materials and plant into and out of the barrier area shall be controlled by flagmen</li> <li>- Organize temporary means of access to avoid such short-term negative impacts. Maintain local roads and bridges used by construction vehicles.</li> </ul>			
<b>XIV.</b>	<b>Historic and Cultural Resources</b>			
	<ul style="list-style-type: none"> <li>- Protect sites of known antiquities, historic and cultural resources by the placement of suitable fencing and barriers.</li> <li>- Not locate construction camps within 500 meters from cultural resources.</li> <li>- Adhere to accepted international practice and all applicable historic and cultural preservation requirements of the Government of Vietnam.</li> <li>- In the event of unanticipated discoveries of cultural or historic artifacts (movable or immovable) in the course of the work, the Contractor shall take all necessary measures to protect the findings and shall notify the ESC / ESO and concerned provincial-level and central government level representatives. If continuation of the work would endanger the discovery, work shall be suspended until a solution for preservation of the artifacts is agreed upon.</li> </ul>	Good		
<b>XV.</b>	<b>Utilities</b>			
	<ul style="list-style-type: none"> <li>- Ascertain and take into account, in the method</li> </ul>			

No.	Mitigation Measures	Compliance Attained	Comment on Reasons for Non-Compliance	Corrective actions taken
	<p>of working, the presence of utility services on and in the vicinity of the site.</p> <ul style="list-style-type: none"> <li>- Take into account the periods required to locate, access, protect, support and divert all utility services, including any periods of notice required to affect such work in consultation with authorities operating such services.</li> <li>- Assume all responsibility to locate or to confirm the details and location of all utility services on or in the vicinity of the project site.</li> <li>- Exercise the greatest care at all times to avoid damage to or interference with services.</li> <li>- The contractor shall assume responsibility for any damage and/or interference caused by them, their agents, directly or indirectly, arising from actions taken or a failure to take action, and for full restoration of the damage.</li> <li>- Wherever existing ground surfaces are to be disturbed for construction of the works, carry out full and adequate preliminary investigations to locate all services in the area by means of hand-dug trial holes and trenches in combination with electronic and electro-mechanical devices, where appropriate. Each service thus exposed shall be identified. Every service at risk shall be fully exposed and adequately protected and supported in situ or diverted to the satisfaction of the appropriate authority prior to the commencement of such construction.</li> <li>- When working in the vicinity of overhead power cable, ascertain and satisfy safety requirements about the safe clearances to be maintained from the power cables in consultation with the authority operating the power line. Where existing overhead power lines, communications cables or other major utilities require relocation, the Contractor will use the services of specialist enterprises with the necessary skills and technology to carry out the work.</li> <li>- The Contractor will consult with Provincial Departments of Transportation (PDOTs) to determine the proposed schedule for future utilities works on the Project Road. If such works, i.e. cable laying, is proposed in the near future the Contractor should propose an appropriate works schedule to synchronize such activities and reduce potential disruption.</li> </ul>			
XVI.	Safety			

No.	Mitigation Measures	Compliance Attained	Comment on Reasons for Non-Compliance	Corrective actions taken
	<ul style="list-style-type: none"> <li>- Ensure that safety, rescue and industrial health matters are given a high degree of publicity to all persons who are regularly or occasionally on the site. Posters, in both Vietnamese and English, drawing attention to site safety, rescue and industrial health regulation shall be made or obtained from the appropriate sources and shall be displayed prominently in relevant areas of the site.</li> <li>- Basic medical care shall be provided at camp sites. A fully equipped first aid base shall be set up. Arrangements for emergency medical services shall be made to the satisfaction of the ESC and ESO..Workers shall be provided with potable water supply and appropriate protective equipment. Work camps shall be provided with facilities to ensure the safety of workers, e.g., fire-fighting equipment, adequate storage for hazardous materials, and contingency measures in case of accidents.</li> <li>- Borrow pits shall be constructed with proper drainage to prevent the creation of mosquito-breeding sites. Upon completion of extraction activities, the contractor will restore borrow pits through dewatering and installation of fences, as appropriate, to minimize health and safety risks. Borrow pits will be left in a tidy state with stable side slopes and proper drainage in order to avoid creation of stagnant water bodies.</li> <li>- Contractors shall ensure that blasting activities shall not cause damage to lives and properties by making sure that the area is clear, adequately warning people using sirens and other appropriate means, and stopping at a safe distance in case blasting is near the road.</li> <li>- Implement a Safety Training Program consisting of:               <ul style="list-style-type: none"> <li>a. Initial Safety Induction Course</li> <li>b. Periodic Safety Training Courses</li> <li>c. Safety Meetings</li> <li>d. Safety Inspections</li> <li>e. (e) Safety Equipment and Clothing</li> </ul> </li> </ul>	Good		
<b>XVII.</b>	<b>Social impacts Consultation and Complaints Procedures</b>			
	<ul style="list-style-type: none"> <li>- Provide local community information on upcoming construction related activities and issues related to traffic safety.</li> <li>- Record any complaints received and respond to them promptly.</li> <li>- Co-operate with local authorities to prevent and solve problems related to environmental issues.</li> </ul>	Good		



**Note:**

1. Very good: mitigations are fully effective
2. Good: mitigations are generally effective
3. Fair: mitigations are partially affective
4. Poor: mitigations are generally ineffective
5. Very poor: mitigations are completely ineffective

## 4. SUMMARY OF ENVIRONMENTAL MONITORING

### 4.1. Environmental Monitoring by CSC

#### 4.1.1. Monitoring program

a. *Monitoring Items:*

Monitoring items include air quality, noise, vibration, surface water quality, groundwater quality, soil and wastewater.

b. *Environmental reference standards:*

The environmental standards to be referred were updated in line with recent Vietnamese standards from the EMP as follows.

**Table 2.** Environmental standards

No	Environmental component	Environmental standard
1	Air quality	QCVN 05:2009/BTNMT “ National Technical Regulation on ambient air quality” QCVN 06:2009/BTNMT “ National Technical Regulation on hazardous substances in ambient air”
2	Noise	QCVN 26:2010/BTNMT – National technical regulation on noise
3	Vibration	QCVN 27:2010/BTNMT – National technical regulation on vibration
4	Surface water	QCVN 08:2008/BTNMT “ National Technical Regulation on surface water quality”
5	Ground water	QCVN 09:2008/BTNMT “ National Technical Regulation on groundwater quality”



No	Environmental component	Environmental standard
6	Soil	QCVN 03:2008/BTNMT “ National Technical Regulation on soil quality”
7	Industrial Wastewater	QCVN 40:2011/BTNMT “National Technical Regulation on industrial waste water”
8	Domestic wastewater	QCVN 14:2008/BTNMT “National Technical Regulation on domestic waste water”

*c. Monitoring Locations*

Monitoring locations of air, noise, vibration, surface water, groundwater and soil are selected for most affected areas during construction and operation stages. The monitoring of wastewater will be carried out during only construction stages for affected area. The monitoring locations are summarized as following table. Map of sampling location is presented in the Appendix 1.

**Table 3.** Monitoring locations

No.	Location	Sample No	Pk1a	Pk1b	Pk2	Pk3
<b>I.</b>	<b>Air, Noise, Vibration</b>					
1	Intersection Nguyen Duy Trinh Street with HLD Expressway	A1	6+150			
2	Truong Khanh Shrine (Near Residential Area)	A2			11+300	
3	Long Thanh town near NH51	A3				23+300
<b>II.</b>	<b>Surface Water</b>					
1	Ong Nhieu river (Ong Nhieu bridge)	SW1-1, SW1-2	7+100			
2	Tac river (Song Tac bridge)	SW2-1, SW2-2		10+400		
3	Dong Nai river (Long Thanh bridge)	SW3-1, SW3-2			12+600	

No.	Location	Sample No	Pk1a	Pk1b	Pk2	Pk3
4	Dong Mon bridge (Dong Mon river)	SW4-1, SW4-2				21+350
<b>III.</b>	<b>Groundwater</b>					
1	Tan Dien A Hamlet – Phu Huu (District 9)	GW1-1, GW1-2, GW1-3	5+250			
2	Long Phuoc Ward, near Dong Nai river	GW2-1, GW2-2, GW2-3		10+400		
3	Long Thanh Town	GW3-1, GW3-2, GW3-3				23+300
<b>IV.</b>	<b>Soil</b>					
1	Phu Huu Ward, District 9, HCMC (Land bank)	S1-1, S-2, S1-3	4+200			
2	Truong Khanh ward, district 9	S2-1, S2-2, S2-3			11+300	
3	Long Thanh Town	S3-1, S3-2, S3-3				23+300
<b>V.</b>	<b>Wastewater</b>					
		WW1-1, WW1-2, WW1-3	4+350, 4+980 5+480	-	-	-
		WW2-1, WW2-2, WW2-3	-	7+900 10+300 10+500	-	-
		WW3-1, WW3-2, WW3-3	-	-	11+500 12+300 12+900	-
		WW4-1, WW4-2, WW4-3	-	-	-	18+300 19+100 21+350

*d. Monitoring Schedule*

The environmental monitoring is quarterly carried out during the construction stage and semiannually during the defect liability period of operation stage. The environmental monitoring schedule described in the EMP is summarized as follows.

**Table 4. Monitoring schedule**

Year	Month	Package 1a	Package 1b	Package 2	Package 3
2009	12	X/1 (Initial Survey)			
2010	3	X/2	X /1 (Initial Survey)	X /1 (Initial Survey)	X /1 (Initial Survey)
	6	X/3	X/2	X/2	X/2
	9	X/4	X/3	X/3	X/3
	12	X/5	X/4	X/4	X/4
2011	3	X/6	X/5	X/5	X/5
	6	X/7	X/6	X/6	X/6
	9	X/8	X/7	X/7	X/7
	12	X/9	X/8	X/8	X/8
2012	3	X/10	X/9	X/9	X/9
	6	X/11	X/10	X/10	X/10
	9	X/12	X/11	X/11	X/11
	12			X/12	X/12
2013	3	X/13	X/12	X/13	X/13
	9	X/14	X/13	X/14	X/14
2014	3	X/15	X/14	X/15	X/15
	9		X/15	X/16	X/16
2015	3			x/17	x/17



: Construction period (PK-1a & 1b=32 months, PK-2 & 3= 36 months)



: Operation period (Defect liability Period=24 months)

X/No : The month when the environmental monitoring will be conducted.

#### 4.1.2. Monitoring Result

According to the original schedule, all the packages shall be operation stage in March 2013. However, due to the construction delay so just only package 1a is completed but it has not come into operation, it is in the defect liability period (02 years). Packages 1b, 2 and 3 are still in construction stage. Therefore, the environmental monitoring results from January to June as follows:

##### a. Package 1a in March 2013

➤ **Air quality**

The net result of analyses shows that: the value of CO, SO<sub>2</sub> and HC: from 06am to 10pm, in average per 1 hour, are under the allowable values in QCVN05:2009/BTNMT and QCVN 06:2009/BTNMT.

The Dust content in 18-22h was 0,41mg/m<sup>3</sup>, higher than allowable value according to QCVN05:2009/BTNMT is 2.05 times.

➤ **Noise**

- 6h to 21h: Noise level was 69,93 dBA lower than allowable value 70dBA;
- 21h to 22h: Noise level was 71,1 dBA higher than allowable value (55dBA) is 1,29 times;

➤ **Vibration**

From 6h to 21h and 21h to 22h: Vibration level is lower than allowable value following QCVN27:2010/BTNMT.

➤ **Surface water**

- SS content in sample SW1-2 was higher than allowable value according to QCVN08:2008/BTNMT about 1,08 times. In this position, the SS contents often are higher than allowable value;
- Coliform value in two both samples (SW1-2 and SW1-3) together higher than allowable value according to QCVN08:2008/BTNMT for 2,8 times and 32 times respectively;
- All other parameters are meeting the allowable level.

➤ **Underground water quality**

- pH level at three samples of underground water (GW1-1, GW1-2 and GW1-3) did not meet QCVN09:2008/BTNMT that were from 4,83, 4,42 and 4,97 lower than allowable value QCVN09:2008/BTNMT (5,5 – 8,5);
- Coliform value at GW1-1 and GW1-3 are higher than allowable value according to QCVN09:2008/BTNMT for 153 and 31 times respectively;
- Three samples of underground water were contaminated Fecal Coliform;
- Other parameters meet the allowable levels according to QCVN09:2008/BTNMT.

➤ **Soil quality**

- As content in sample S1-1 is 14mk/kg higher than allowable about 1,17times;
- All of other parameters are meeting the QCVN03:2008/BTNMT.

➤ **Waste water**

- Coliform value in 3 samples: W1-1, W1-2, W1-3 are  $9,3 \times 10^4$  MPN/100ml,  $4,6 \times 10^5$  MPN/100ml,  $2,1 \times 10^4$  MPN/100ml respectively. They are higher than allowable of QCVN40:2011/BTNMT column B are 18,6 times, 92 times and 4,2 times respectively;
- All remaining measured parameters meet the QCVN40:2011/BTNMT.

**b. Package 1b in March 2013**

➤ **Surface water quality**

- SS value in sample SW2-2 was 58mg/l. It is higher than allowable value about 1,16 times;
- Coliform value in two samples SW2-1 and SW2-4 were  $1,5 \times 10^4$  MPN/100ml and  $1,1 \times 10^4$  MPN/100ml respectively. They are higher than allowable in QCVN08:2008/BTNMT for 2 times and 1,47 times respectively;
- All remaining measured parameters meet the QCVN08:2008/BTNMT.

➤ **Underground water**

- Cl<sup>-</sup> content in 3 samples (GW2-1; GW2-2; GW2-3) are higher than allowable value from 2,5 times, 4,2 and 4,4 respectively. The high Cl<sup>-</sup> concentration may be cause by natural impacts (salt intrusion, soil acidity and high electrical conductivity in water);
- Mn content in samples GW2-2 and GW2-3 are higher allowable value which is 1,74 times, 3,36 times respectively.

➤ **Waste water**

- Coliform value in three samples (W2-1, W2-2 and W2-3) was  $1,5 \times 10^5$  MPN/100ml,  $7,5 \times 10^5$  MPN/100ml,  $4,6 \times 10^4$  MPN/100ml respectively. They are higher than allowable limit of 30 times, 150 times and 9,2 times respectively;
- All remaining measured parameters meet the QCVN40:2011/BTNMT.

**c. Package 2 in March 2013**

➤ **Air quality**

- Dust value at 6-21h was 0,72 mg/m<sup>3</sup>. It is higher than allowable limit of QCVN05:2009/BTNMT (0,3) is 3,65 times;
- NO<sub>2</sub> value at 6-21h was 0,86mg/m<sup>3</sup>. It is higher than allowable limit of QCVN05:2009/BTNMT (0,2) is 4,3 times.
- SO<sub>2</sub> and CO content: The analyzed values from 6am to 22pm, in average per 1 hour, is under the allowable values in QCVN05:2009/BTNMT.

➤ **Noise**

- 6h to 21h and 21h to 22h: Noise level is lower than allowable value.

➤ **Vibration**

- 6h to 21h: Vibration level is lower than allowable value.
- 21h to 22h: Vibration level is higher than allowable value and higher than initial level measured on March 2010 (due to the initial level measured on March 2010 was very low).

➤ **Surface water**

- SS value in sample SW3-3 is 71,2 mg/l. It is higher than allowable limit 1,42 times.
- Coliform value in samples SW3-1 and SW3-4 was 1,5x10<sup>5</sup>MPN/100ml, 9,3x10<sup>5</sup>MPN/100ml. They are higher than allowable limit 20 times and 124 times respectively.
- All remaining measured parameters are under regulation of QCVN08:2008/BTNMT.

➤ **Soil quality**

- The analyzed results of environmental parameters meet the QCVN03:2008/BTNMT - For land of people's livelihood.

➤ **Waste water**

- Coliform content at 3 samples (W3-1, W3-2 and W3-4) was 7,5x10<sup>4</sup>MPN/100ml, 1,1x10<sup>5</sup>MPN/100ml, 9,3x10<sup>4</sup> MPN/100ml respectively. These value are higher than allowable limit about 15 times, 22 and 18,6 times respectively.
- The most of other parameters meet the QCVN40:2011/BTNMT.

**d. Package 3 in March 2013**

➤ **Air quality**

- Dust content from 6-21h was 0,68 mg/m<sup>3</sup>, this value is higher than allowable value about 2,27 times. This dust content is lower than the dust content in initial environment result.
- Dust content from 21-22h was 0,60 mg/m<sup>3</sup>, this value is higher than allowable value about 2,0 times. It is lower than the dust content in initial environment.
- The high dust content may be cause the monitoring location is near National Highway No.51 where there are many vehicles transporting goods from Vung Tau to industrial parks and on the contrary, in addition, the hot sun and low humidity conditions make more dust in the air environment.
- The contents of NO<sub>2</sub>, SO<sub>2</sub>, CO: The analyzed values of samples from 6am to 10pm, in average per 1 hour, are under the allowable values in QCVN05:2009/BTNMT.

➤ **Noise**

- 6h to 21h: Noise level is lower allowable value.
- 21 to 22h: Noise level was 67,7 (dBA) higher than allowable value (55 dBA), about 1,23 times. But, initial level measured (74,67 dBA) is lower than this time.

➤ **Vibration**

- 6h to 21h: Vibration level was 57,3dB lower than allowable value (75dB).
- 21h to 22h: Vibration level was 61,6 dB higher than allowable (28,6dB) value about 2,15 times but higher than initial level measured.

➤ **Surface water quality**

- SS value at SW4-2 was 74 mg/l higher than allowable limit 1,48 times.
- Coliform value at SW4-2 was 1,5x10<sup>4</sup>MPN/100ml higher than allowable limit 2 times.
- All of others parameters is under according to QCVN08:2008/BTNMT.

➤ **Underground water**

- pH value at GW3-1 was 5,14 not meeting in QCVN09:2008/BTNMT.
- Cl<sup>-</sup> value at GW3-1 and GW3-2 was 446,7 and 751,6mg/l higher than allowable value to 1,79 and 3,01 times respectively.
- The Coliform value in all of three underground samples were 7,5x10<sup>2</sup> MNP/100ml, 1,5x10<sup>2</sup> MNP/100ml, 9,3x10<sup>2</sup> MNP/100ml respectively, these value are higher than allowable value.
- The Fecal Coilorm value in these three underground samples is rather high. The results of Coliform at points (GW3-1, GW3-2 and GW3-3) was 2,3x10<sup>1</sup> MNP/100ml, 4,8x10<sup>1</sup> MNP/100ml, 2,4x10<sup>2</sup> MNP/100ml respectively. They meet the allowable value of QCVN09:2008/BTNMT is 0MNP/100ml.



### ➤ Soil quality

- Cu content at point S3-1 was 76,3mg/kg, higher than allowable value about 1,1 times.
- The remaining analyzed results of environmental parameters are meeting the QCVN03:2008/BTNMT - For land of people's livelihood.

## 4.2. Environmental Monitoring by Contractors

### 4.2.1. Monitoring Program

According to the Clause 2 - Environmental Monitoring - Section 01300 – Volume 3 of Tender Document, the contractor shall implement environmental monitoring work in two phases: prior to the start of construction and during construction.

**Table 5.** Environmental monitoring plan of contractors

TT	Item	Pk1a	Pk1b	Pk2	Pk3
1	Air (3 samples/point)	3 points: Km 4+400 Km 6+150 Km 7+400	2 points: Km 8+000 Km 10+600	2 points: Km 12+000 Km 14+600	3 points: Km 23+300 Km 22+850 Km 16+100
2	Noise (3 samples/point)	3 points: Km 4+400 Km 6+150 Km 7+400	2 points: Km 8+000 Km 10+600	2 points: Km 12+000 Km 14+600	3 points: Km 23+300 Km 22+850 Km 16+100
3	Vibration (3 samples/point)	3 points: Km 4+400 Km 6+150 Km 7+400	2 points: Km 8+000 Km 10+600	2 points: Km 12+000 Km 14+600	3 points: Km 23+300 Km 22+850 Km 16+100
4	Surface water quality (2 samples/point)	3 points: Km 4+440 Km 5+480 Km 7+100	3 points: Km 8+350 Km 9+300 Km 10+450	1 point: Km 12+600	5 points: Km 14+600 Km 16+100 Km 18+300 Km 19+200 Km 21+250
5	Ground water quality	1 point: Km 6+200	1 point: Km 7+800	1 point: Km 11+800	1 point: Km 23+150

TT	Item	Pk1a	Pk1b	Pk2	Pk3
	(1 sample/point)				
6	Soil quality (1 sample/point)	1 point: Km 4+450	1 point: Km 8+000	1 point: Km 11+800	1 point: Km 23+150
7	Excavated soil (1 sample/point)	1 point	1 point	1 point	1 point

The monitoring of construction contractors is carried out every three months as shown in table 6.

**Table 6.** Environmental monitoring schedule of contractors

Monitoring	Pk1a	Pk1b	Pk2	Pk3
1 <sup>st</sup> monitoring (Baseline monitoring)	03/2010	<b>06/2010</b>	<b>07/2010</b>	<b>07/2010</b>
2 <sup>nd</sup> monitoring	06/2010	09/2010	10/2010	10/2010
3 <sup>rd</sup> monitoring	09/2010	12/2010	01/2011	01/2011
4 <sup>th</sup> monitoring	12/2010	03/2011	04/2011	04/2011
5 <sup>th</sup> monitoring	03/2011	06/2011	07/2011	07/2011
6 <sup>th</sup> monitoring	06/2011	09/2011	10/2011	10/2011
7 <sup>th</sup> monitoring	09/2011	12/2011	01/2012	01/2012
8 <sup>th</sup> monitoring	12/2011	03/2012	04/2012	04/2012
9 <sup>th</sup> monitoring	03/2012	06/2012	07/2012	07/2012
10 <sup>th</sup> monitoring	06/2012	09/2012	10/2012	10/2012
11 <sup>th</sup> monitoring	09/2012	12/2012	01/2013	01/2013
12 <sup>th</sup> monitoring	-	01/2013	04/2013	04/2013

## 4.2.2. Monitoring Result

**a. Monitoring results of package 1b in March 2013 is summarized as follows:**

### ➤ Air quality

In general, air environment quality in project area was rather good. The concentrations of pollution parameters such as TSP, SO<sub>2</sub>, NO<sub>2</sub>, CO monitored at two sampling positions in three times in March 2013 still fully satisfy the limited values of National Technical Regulation on ambient air quality QCVN 05:2009/BTNMT.

➤ **Noise**

All noise results measured in two monitoring positions A4 and A5 at two times: 15:00-16:00 and 17:30-18:30 in construction phase in March 2013 are higher than baseline value but satisfactory the limited value of the National technical regulation QCVN26:2010/BTNMT. Noise level in 22:00-23:00 showed that these results are lower than the baseline value (64.4 dBA) and lower than the limited level (55dBA).

➤ **Vibration**

The vibration results measured in two monitoring positions A4 and A5 in construction phase in March 2013 showed that these results are higher than the baseline value measured in pre-construction phase. However, these values are lower than the limited value (75 dB) of the National technical regulation QCVN 27:2010/BTNMT. The detail of results as follows:

- 15:00-16:00: The vibration results vary from 46.4 to 51.4 dB.
- 17:30-18:30: The vibration results vary from 47.1 to 52.3 dB.
- 22:00-23:00: The vibration results vary from 40.8 to 44.8 dB.

➤ **Surface water**

Surface water quality at project area in March 2013 was relatively good. Some of these measurements as CO, DO, SS, BOD, lubricant, Coliform satisfy the limited values of QCVN 08:2008/BTNMT-Column B1. Comparison with the values in pre-construction phase showed that water quality in March 2013 was still relatively good. Result of DO, BOD, COD, SS are lower than results baseline.

➤ **Underground water**

Groundwater quality at project area measured in construction phase in March 2013 is rather good. Most of parameters meet the limited value of National

Technical Regulation on ground water quality QCVN 09:2008/BTNMT, except for Cl-(718.6 mg/L) and Mn (0.537 mg/L).

➤ **Soil quality**

Heavy metal concentration of soil was low. All these results are within the limited values of the Regulation QCVN 03:2008/BTNMT. Comparison with the survey results in the pre-construction phase showed that most of the results in March 2013 changed insignificantly.

**b. Monitoring results of package 2**

▪ **The monitoring result in January 2013 is summarized as follows:**

➤ **Air quality**

Air environment quality in project area was rather good. The concentrations of indicatorspollution parameters such as TSP, SO<sub>2</sub>, NO<sub>2</sub>, CO monitored at two sampling locations in three times in construction phase still fully satisfy the limited values of National Technical Regulation on ambient air quality QCVN 05:2009/BTNMT.

➤ **Noise**

The noise results measured at two monitoring locations A-6 and A-7 in construction phase in January 2013 in three times (15:00-16:00; 17:30-18:30 and 22:00-23:00) showed that:

- 15:00-16:00 and 17:30-18:30 showed that the noise level is higher than the baseline value. But this value still below the limited value (70 dBA) of the Vietnamese Regulation QCVN 26:2010/BTNMT.
- 22:00-23:00 showed that the noise level is lower than the baseline value and it is also lower than the limited level (55 dBA) of the Vietnamese Regulation QCVN 26:2010/BTNMT.

➤ **Vibration**

The vibration results measured at two monitoring locations A-6 and A-7 in construction phase in January 2013 showed that these values are although higher than the baseline value measured in pre-construction stage. However, all values in

this month are below the limited value (75dB) of the Vietnamese Regulation QCVN 27:2010/BTNMT such as:

- 15:00-16:00: The vibration level varies from 48.2 to 54.5dB.
- 17:30-18:30: The vibration level varies 47.4 dB to 52.1 dB.
- 22:00-23:00: The vibration level varies from 42.6 dB to 46.8dB.

➤ **Surface water**

Monitoring results show that surface water quality of Dong Nai River at project area does not meet a part of domestic water supplying purpose. Some monitoring results of BOD, COD, NO<sub>2</sub>- are over the limited values of QCVN 08:2008/BTNMT-Column A2. The cause of such mutations on the results was due the weather condition, the rains should lead to many organic substances, and at the same time of monitoring at point W8, the site was under construction and the tide was making. This showed that the environmental were not impacted by construction activities of the project.

➤ **Underground water**

Groundwater quality at project area was quite good. All of parameters meet the limited value of National Technical Regulation on ground water quality QCVN 09:2008/BTNMT.

➤ **Soil quality**

All these results of soil monitoring in construction phase are lower than the limited values in the Regulation QCVN 03:2008/BTNMT.

▪ **The monitoring result in April 2013 is summarized as follows:**

➤ **Air quality**

Air environment quality in project area was rather good. The concentration of pollution parameters such as TSP, SO<sub>2</sub>, NO<sub>x</sub>, CO monitored at two locations in three times in construction are phase still fully satisfy the limited values of National Technical Regulation on ambient air quality QCVN 05:2009/BTNMT.

➤ **Noise**

The noise results measured at two monitoring locations A-6 and A-7 in three times showed that most these values are higher than the baseline value measured in pre-

construction phase. However all values in this month are below the limited value of the Vietnamese Regulation QCVN 26:2010/BTNMT.

➤ **Vibration**

The vibration results measured at two monitored locations A-6 and A-7 in construction phase in April 2013 showed that these values are although higher than the baseline value measured in pre-construction phase. However all values in this month are below the limited value (75dB) of the Vietnamese Regulation QCVN 27:2010/BTNMT. The detail of results as follows:

- 15:00-16:00: The vibration results were varied from 48.6 to 55.8 dB.
- 17:30-18:30: The vibration results were 47.2 dB and 52.0 dB.
- 22:00-23:00: The vibration results were varied from 40.5 dB to 44.3 dB.

➤ **Surface water**

Monitoring results showed that surface water quality of Dong Nai River at project area did not meet a part of domestic water supplying purpose. Some monitored results of BOD, COD, NO<sub>2</sub>- are over the limited values of QCVN 08:2008/BTNMT-Column A2. The cause of such mutations on the results was due the weather condition, the rains should lead to many organic substances, and at the same time of monitoring at point W8, the site was under construction and the tide was making. This showed that the environmental were not impacted by construction activities of the project.

➤ **Underground water**

Groundwater quality at project area was quite good. All of parameters meet the limited value of National Technical Regulation on ground water quality QCVN 09:2008/BTNMT.

➤ **Soil quality**

All these results of soil monitoring in construction phase are lower than the limited values of the Regulation QCVN 03:2008/BTNMT.

**c. Monitoring result of package 3**

▪ **The monitoring result in January 2013 is summarized as follows:**

➤ **Air quality**

The concentration of some pollution parameters such as TSP, SO<sub>2</sub>, NO<sub>2</sub>, ...etc monitored at three sampling locations in six times in January 2013 were higher

than results in pre – construction phase and they were higher than the results monitored in October 2012. It showed that the ambient air was affected by construction activities of the project. However, all of values meet with the limited values of the Vietnamese Regulation QCVN 05:2009/BTNMT applied for ambient air environment quality and QCVN 06:2009/BTNMT applied for hazardous gases.

➤ **Noise**

LEQ values recorded at three monitoring locations in construction phase in January 2013, all these values are lower than the limitation value (70 dBA) of the National Technical Regulation on noise QCVN 26:2010/BTNMT. Detail of results as follows:

- Time 1: range within 53.1 – 65.4 dBA.
- Time 2: range within 50.2 – 64.2 dBA.
- Time 3: range within 56.1 – 67.9 dBA.
- Time 4: range within 57.1 – 67.5 dBA.
- Time 5: range within 57.9 – 68.4dBA.
- Time 6: range within 52.7 – 65.1dBA.

➤ **Vibration**

The results of vibration level at 3 monitored locations (NVA-1, NVA-2, NVA-3) in 6 times in January 2013 were in range from 39.1 – 55.2 dB. They fully meet the limited value 75dB of the National Technical Regulation on vibration QCVN 27:2010/BTNMT.

➤ **Surface water**

Surface water quality at project area in January 2013 is better monitoring results in October 2012. Some of parameters (such as DO, COD, BOD, SS and Coliform) not meet the limited values of QCVN 08:2008/BTNMT-level B1. These values have changed when compared with the baseline values in October 2012 (Surface water quality at project area is better).

➤ **Underground water**

All of parameters are meet the limited value of National Technical Regulation on ground water quality QCVN 09:2008/BTNMT.

➤ **Soil quality**



Results of soil monitoring in January 2013 were quite good. All of these results meet the limited values of the Regulation QCVN 03:2008/BTNMT. Most of the results in this period were change insignificantly when compared with the survey results in the pre-construction phase. This proved that the soil quality did not affected by the activities of the project.

▪ **The monitoring result in April 2013 is summarized as follows:**

➤ **Air quality**

The concentration of some parameters such as TSP, SO<sub>2</sub>, NO<sub>2</sub>, CO, Pb... monitored at three locations in six times in April 2013 were higher than results in pre – construction phase and they were also equivalent to the results in January 2013. It showed that the operation of the project was affect to the surrounding air environment. However, all of values meet with the limited values of the Vietnamese Regulation QCVN 05:2009/BTNMT applied for ambient air environment quality and QCVN 06:2009/BTNMT applied for hazardous gases.

➤ **Noise**

LEQ values recorded at three monitoring locations in construction phase in April 2013 all values are lower than the limited value (70 dBA) of the National Technical Regulation on noise QCVN 26:2010/BTNMT. The following detail results:

- Time 1: range 56.1 – 65.7dBA.
- Time 2: range 56.5 – 64.3dBA.
- Time 3: range 55.0 – 68.1dBA.
- Time 4: range 57.5 – 68.7 dBA.
- Time 5: range 57.9 – 68.9dBA.
- Time 6: range 52.5 – 67.1dBA.

➤ **Vibration**

The results of vibration level at 3 monitoring locations (NVA-1, NVA-2, NVA-3) in 6 times in April 2013 were within range 39.4 – 57.5dB. They fully meet the limited value 75dB of the National Technical Regulation on vibration QCVN 27:2010/BTNMT.

➤ **Surface water**

Surface water quality at project area in April 2013 is better monitoring results in January 2013. Some of parameters (such as DO, COD, BOD, SS and Coliform) are

lower than the limited values of QCVN 08:2008/BTNMT-level B1. These values have changed when compared with the baseline (Surface water quality at project area is better).

➤ **Underground water**

All of parameters meet the limited value in National Technical Regulation on ground water quality QCVN 09:2008/BTNMT.

➤ **Soil quality**

Results of soil monitoring in April 2013 was quite good. All of these results meet the limited values in the Regulation QCVN 03:2008/BTNMT. This results were compared with the survey results in the pre-construction phase, most of the results in this period change insignificantly. This proved that the soil quality in the project area is not affected by the activities of the project.

#### **4.3. Assessment of Monitoring Results**

Through the monitoring of CS Consultant and contractors, there are finding as follows:

- **Air, noise and vibration:**

Package 1a: it is in the warranty. It has not come into operation. However, the noise level and dust content were monitored in March 2013 show that they exceed allowable regulation because the monitoring location near Nguyen Duy Trinh street so the results were impacted by transport from this street. The vibration level meets the allowable limit of regulation.

Packages 1b, 2 and 3: the results measured in March 2013 show that the dust content at Package 2 and 3 exceed allowable regulation because the monitoring point of Package 2 is near construction area of toll gate so dust effected from this area. The monitoring point of Package 3 is near NH51 so they were effected by the transport in this road. Air quality at Package 1b was quite good. All analyzed results meet the allowable limit of regulation.

Environmental monitoring was carried out in January 2013 and April 2013 by Contractor. The results are compared with the results of previous monitoring show that the results of this monitoring is higher than the results of previous monitoring but they meet the allowable limit of regulation this prove that there is no considerable impact to the environmental by activities of project.

Most vibration monitoring results meets the allowable limit of regulation.

- Surface water: Coliform and SS always exceed the allowable limit of regulation during series monitoring including initial monitoring. This proved that they were not impacted by activity of project.
- Groundwater: Most of underground water samples in package 1a, 1b, 2 and 3 were contaminated by Cl-, Mn and Coliform during series of monitoring. This proved that this is natural characteristics of groundwater in this area. It is not because of activating of project.
- Soil: The analysis results of soil in all packages of monitoring always meet the allowable limit of regulation.
- Waste water: Most Coliform content at sampling locations do not meet the requirement of Vietnam regulation.
- Other monitoring parameters in general satisfied environmental regulation.

## 5. ENVIRONMENTAL AND TRAINING AND ORIENTATION

An Environmental Training Program is required and shall consist of:

- ***Initial Induction Course:*** All workmen shall be required to attend a induction course within their first week on site.
- ***Periodic Training Courses:*** Periodic safety course shall be conducted not less than once every six months. All employees will be required to participate in relevant training courses appropriate to the nature, scale and duration of the Works. Training courses shall be organized for all workmen on the site and at all levels of supervision and management. Regular environmental and safety meetings will be conducted on a monthly basis and shall require attendance by the ESO and safety representatives of Subcontractors.

Training program, schedule, participants and documents as follows:

- ***Scope of training program:***
  - + Requirements of environmental protection during construction
  - + Measures to collect, dispose and treat wastes including fuel, oil, grout, concrete, living waste and spoils from equipment repair,...
  - + Handling procedures in case of chemicals, hazardous substance spills,...
  - + Occupational safety and health act matters

- + How to work in compliance with standard of safety
  - + Other safety and health management.
- **Training schedule:** every month
  - **Participants:** All staff and workers of contractors and subcontractors
  - **Resources trainers/persons:** Environmental Specialist and Safety officers of the main Contractor.
  - **Training document:** site environmental management plans and health and safety plans of contractors, environmental management plan updated June 2010.

**Table 7:** Number of workers participating in environmental and safety trainings

Time	Package 1b	Package 2	Package 3
	Regular training	Regular training	Regular training
01/2013	60	106	330
02/2013	68	75	404
03/2013	56	196	380
04/2013	42	85	275
05/2013	0	74	290
06/2013	54	126	213

## 6. KEY ENVIRONMENTAL ISSUES

### 6.1. Key Issues Identified

The noise level and dust content increased at intersection with public roads and were higher than allowable values.

Surface water in the monitoring contained high amount of SS and Coliform due to polluted from upper rivers.

Ground water in the monitoring contained high amount of Cl<sup>-</sup>, Mn and Coliform due to natural characteristic of area groundwater.

Wastewater in the monitoring contained high amount of coliform. This is mainly due to improper hygiene of drainage system.

During March 2013, the whole service road surface especially IPR 25 area of package 3 was arising a lot of dust.

### **6.2. Action Taken**

Implementation of necessary measures to avoid environmental issues cited in previous report: spraying water to reduce dust, regular clean of batching plant, supply of garbage bins, training of workers on environment and safety, etc.

### **6.3. Additional Action Required**

Although contractors have implemented mitigations, continuous and further actions shall be conducted as follows:

- Regular spraying water and this practice shall be enhanced in dry day and strong wind
- Although safety onsite have well done in the last 6 months. However, the Contractors shall strongly implement safety measures and the consultant shall more closely supervise the site to immediately stop violation of safety.

## **7. CONCLUSION AND RECOMMENDATION**

The result of environmental monitoring results shows that most of the parameters for air, noise, vibration and surface water, groundwater are under the current Vietnamese standards, except TSP, noise level and some surface water parameters SS and Coliform.

Mitigation measures such as spraying water for reducing TSP especially at package 3 shall be effectively implemented as specified in updated site environmental management plans of contractors when the weather is sunny and hot with windy.

The wastewater drainage system shall be regularly checked and cleaned to avoid contamination of waste and run-off water.





## Appendix 1. MAP OF SAMPLING LOCATIONS





## Appendix 2. PHOTOS OF ENVIRONMENTAL MONITORING AND SUPERVISION

### Environmental monitoring by CS Consultant



Soil sampling, Pk 1a



Ground water sampling, Pk1b



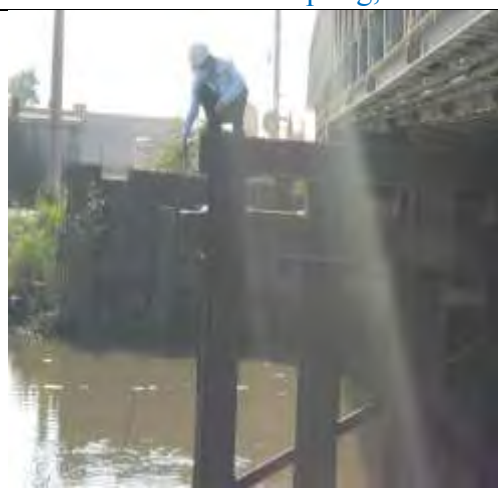
Monitoring noise, air, vibration, Pk 1a



Surface water sampling, Pk2



Monitoring noise, air, vibration, Pk 3



Surface water sampling, Pk 3

### Environmental monitoring by contractors



Air, noise and vibration sampling, Pk 1b in March 2013



Surface water sampling on Tac river, pk 1b in March 2013



Air, noise and vibration sampling, Pk2 in February 2013



Surface water sampling on Dong Nai river, Pk2 in April 2013



Air, noise and vibration sampling, Pk3 in April 2013



Surface water sampling on Hang Dieu cannal, Pk3 in April 2013





### Supervision activities

	
<p>Đường cao tốc của gói 1a</p>	<p>Expressway is being proved asphalt, Pk1b</p>
	
<p>Using lifejacket when sailing on the river, Pk2</p>	<p>Removed the part of pile head out of Dong Nai river, Pk2</p>
	
<p>Dust at IPR 25 overpass construction area in March 2013, Pk3</p>	<p>Construction site, Pk3</p>

