

Environmental Monitoring Report

Quarterly Report (Environmental Quality)
July 2014

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

Packages 7, 8 and 9

Prepared by Scientific Technological Center For Environmental Protection in Transportation (CEPT)
for the Vietnam Expressway Corporation, the Ministry of Transport of Vietnam, and the Asian
Development Bank.

CURRENCY EQUIVALENTS

(as of 30 June 2014)

Currency unit	–	dong (D)
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NOTE

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

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THE SOCIALIST REPUBLIC OF VIET NAM
MINISTRY OF TRANSPORT
VIET NAM EXPRESSWAY CORPORATION (VEC)
HO CHI MINH - LONG THANH - DAU GIAY EXPRESSWAY PROJECTS
MANAGEMENT UNIT (EPMU HLD)

North-South Expressway Construction Project
(Ho Chi Minh City - Dau Giay Section)

JICA Loan Agreement No.VNXV-1

ENVIRONMENTAL MONITORING REPORT
CONSTRUCTION STAGE

PACKAGE 7, 8 AND 9

QUARTER II, 2014
(NO.6 - JUNE 2014)

HA NOI, JULY 2014
Scientific Technological Center
For Environmental Protection in Transportation (CEPT)

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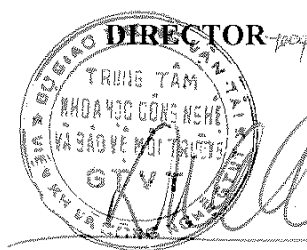
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HA NOI, JULY 2014

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PREFACE

Highway 1A length of Ho Chi Minh City - Dong Nai Province and Highway 51 is one of the most important centre lines in region. From 1997 to 2000, highway 1A from Ho Chi Minh City to Bien Hoa Province was recovered, improved and widened with scale of 4 to 6 traffic lanes. Highway 51 was upgraded into four traffic lanes. However, according to statistic, traffic survey to 2015, highway 1 will be overload, no-responses inter-regional traffic demand, effects to regional development. To build new express highways to serve future traffic demand in compass of priority economic region is very necessary.

The express highway of Ho Chi Minh city - Long Thanh - Dau Giay was approved Pre-feasibility Research Report in June 2002 by The Government, Prime Minister approved project's contents by document No 56/TTg-CN issued in 10, January 2007 and Ministry of Communications made a decision No 334/QĐ - BGTVT in 13, February 2007 for ratifying project investment. This express highway will recover only way position and share transport flow of highway 1A and 51. The route has important meaning in promoting development and stability of Southern priority economic region, especially three-cornered economic region of Ho Chi Minh city-Dong Nai- Ba Ria Vung Tau.

The way run through regions having sparse population density, essential floristic composition along roadside are fruit-trees planted in garden and some industrial crops such as coffee tree, rubber and flood rice in depression areas. Some dense residential quarter concentrates in the townships, towns and big interchanges such as An Phu, Long Thanh, Dau Giay, line research almost run through spacious area, sparse population density area and non-important project area. The most geologic of the way lies on weak area. Some rivers and canals break the flat terrain.

Vietnam Expressway Corporation (VEC) has been established as state enterprise belonging to Ministry of Transport. In this HLD expressway project, VEC is responsible for conducting the project and official connection with related Ministries and local authorities as well as ADB and JICA. VEC will authorize the rights of project's management to the Ho Chi Minh City - Long Thanh - Dau Giay Expressway Project Management Unit (EPMU-HLD).

Scientific technological center for environmental protection in transportation (CEPT) conducted the environmental monitoring for Packages 7, 8 and 9 (No.6), Quarter II/2014 from 17th to 19th June, 2014. These works is carried out to evaluate the environmental quality which may cause on surroundings during construction stage of project.

MỤC LỤC

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CHAPTER 1. INTRODUCTION

1.1. Introduction

In the surrounding areas of Ho Chi Minh City, the traffic density has been increased more than circulation capacity of roads. There is a prediction that the circulation demand in Ho Chi Minh City and Dong Nai province, where the industrial development recently becomes very important in accordance with the development planning of industrial parks and international airports will be noticeably increased.

Vietnam government has decided to conduct an expressway construction project Ho Chi Minh City - Long Thanh - Dau Giay (HLD Expressway) with the financial supports from Asia Development Bank (ADB) and Japanese International Corporation Agency (JICA).

VEC is responsible for conducting the project HLD. VEC will authorize the rights of project's management to the Ho Chi Minh City - Long Thanh - Dau Giay Expressway Project Management Unit (EPMU-HLD).

Total length of the project is 54.98 km including 4 lanes (phase 1) with starting point at An Phu Interchange at District 2 under Ho Chi Minh City (Km0+000) and ending point at Interchange with National Highway 1A at Dau Giay under Dong Nai Province (km54+984), which belongs the center line of North – South expressway.

The Project section is divided into 9 civil works packages (1a, 1b, 2, 3, 5, 6, 7, 8 and 9) and one ITS work Package (4) by which Package 7 with total length 2Km, Package 8 with total length 2Km and Package 9 is interchange with Ring road No.2 under Ho Chi Minh City. Specifically as follows:

- Package 7 has beginning point at Km0+000 and ending point at Km2+000, with total length 2Km, and 02 bridges. Design speed 80Km/h
- The Package 8 has starting point at Km2+00, district 2 and ending point at Km4+00 district 9, Ho Chi Minh City, with 2Km length. Designed speed is 80 km/h according to Vietnamese Standard TCXDVN 104-2007, HL93 design loading.
- Package 9 includes Ring Road 2 Interchange Km 4+514 (excluding main road Interchange expressway). 8 Ramps with design speed 40 Km/h (except Ramp A1; D1 with design speed 60 Km/h).

1.2. Scope of work

- To conduct environmental monitoring: Air quality, noise, vibration, surface water quality, underground water quality and soil.
- Scope of work: Environmental monitoring locations of Packages 7, 8 and 9.

1.3. Work plan

* *Execution agent:* Scientific Technological Center for Environmental Protection in Transportation (CEPT)

* *Plan for implementation:*

Table 1.1. Plan for implementation

Works \ date	17//06/2014 - 19/06/2014	20/06/2014 10/07/2014	11/07/2014	15/07/2014
Monitoring and sampling at the site	X			
Analyzing		X		
Draft report			X	
Completion report				X

CHAPTER 2. BACKGROUND CONDITIONS

2.1. Location of the project

- Location of the project: the beginning of Package - 7 (Km 0+000) to the end of Package - 9 (Km 4 +000, the National Highway intersection) in which the construction cost is financed by JICA.
- Distance: 4Km.

Table 2.1. Detailed plan for sampling

No.	Detailed contents	Point	Packages	Location (Km)	Sign of samples
17th June 2014					
1	Air quality	Intersection An Phu with HLD expressway	7	00+200	A7
2	Noise	Intersection An Phu with HLD expressway	7	00+200	N7
3	Vibration	Intersection An Phu with HLD expressway	7	00+200	V7
4	Surface water	Ba Dai Canal	7	0+346 (up stream)	SW7-1; SW7-2
		Ba Dai canal	7	0+346 (down stream)	SW7-3; SW7-4
		Kenh Muong canal	7	1+150 (up stream)	SW7-5; SW7-6
		Kenh Muong canal	7	1+150 (down stream)	SW7-7; SW7-8
5	Underground water	An Phu ward (District 2)	7	00+200	GW7-1; GW7-2; GW7-3
6	Soil quality	Kenh Muong canal, District 2 (Land bank)	7	1+150	S7-1; S7-2; S7-3
18th June 2014					
1	Air quality	Phu Huu ward	8	3+200	A8

No.	Detailed contents	Point	Packages	Location (Km)	Sign of samples
2	Noise	Phu Huu ward	8	3+200	N8
3	Vibration	Phu Huu ward	8	3+200	V8
4	Surface water	Ong Cai River	8	3+380 (up stream)	SW8-1; SW8-2
		Ong Cai River	8	3+380 (down stream)	SW8-3; SW8-4
5	Underground water	Phu Huu ward	8	3+200	GW8-1; GW8-2; GW8-3
6	Soil quality	Phu Huu ward	8	3+880	S8-1; S8-2; S8-3
19th June 2014					
1	Air quality	Ring road No.2 with HLD expressway	9	4+500	A9
2	Noise	Ring road No.2 with HLD expressway	9	4+500	N9
3	Vibration	Ring road No.2 with HLD expressway	9	4+500	V9
4	Underground water	Residential area near Ring road No.2 with HLD expressway	9	4+500	GW9-1; GW9-2; GW9-3
5	Soil quality	Residential area near Ring road No.2 with HLD expressway	9	4+500	S9-1; S9-2; S9-3

2.2. Progress of implementing the Project

Construction progress of packages 7, 8 and 9 in June 2014 as follows:

▪ PACKAGE 7:

- *Preparation of MS and SD:* Submission of MS and SD is satisfied with construction progress.
- *Equipment mobilization:* Mobilization of personnel and equipment is satisfied with construction progress.
- *Site clearing and grubbing:* Contractor has completed the site clearing and grubbing

- **Construction of temporary service road:** Completed 85.56% of work quantity
- **Excavation and disposal of topsoil; off site:** Completed
- **Prefabricated Vertical Drains (PVD):** Completed
- **VCM:** Completed
- **Bored pile:** Completed;
- **Construction of pile cap, pier column and headstock:** Completed
- **Manufacturing of Super-T girder for MuongKenh Bridge and girder I for Ba Dai Bridge:** Completed;
- **Launching of Super-T girder for MuongKenh Bridge:** Completed 20 nos Super-T in June 2014;
- **Precast concrete pile (30x30 cm):** Driving 1,720 m of the Ba Dai Bridge in June 2014.
- **Construction deck slab of Muong Kenh Bridge:** Construction 8 single spans for span S1; S3; S10; S11; S12 of Muong Kenh Bridge.

▪ **PACKAGE 8:**

⚡ **Temporary works**

- + **Temporary road:** The Contractor do not carry out the construction of temporary road in this month
- + **Batching plant:** Batching plant is completed and in operation.
- + **Site laboratory:** Site laboratory is in the stage of operation.
- + **Site office:** Site office is in operation.

⚡ **Site clearance and top soil removal**

- Thruway: completed
- Ramp way:
 - ✓ Ramp X1, Y1, X2: construction completed
 - ✓ Painting island at Y1 ramp: Carrying out surcharge work
 - ✓ DXH ramp: The Contractor carried out the removal of top soil at P9 side however the work is temporary stop due to changing of soft soil treatment method
 - ✓ Ramp Y2, Y3: The Contractor's plan to construct in the next month

⚡ **Backfilling and Working Platform Filling:**

- ✓ Thruway: completed.
- ✓ Ramp way:
 - Completed X1, X2 and Y1 ramp way
 - Painting island: Completed soil replacement work.

- Ramp Y2, Y3, DXH: The Contractor's plan to construct in the next month.

✚ ***PVD installation:***

- ✓ Completed.

✚ ***VCM Application:***

- ✓ Operating 100% on thruway and ramp way.

✚ ***Surcharge work:***

- ✓ Thruway and Ramp way: Completion 100%.

✚ ***Removal of surcharge:***

- ✓ Carrying out removal of surcharge at Block 8 (Km3+636 to Km3+815). Accomplishment quantity in this month is 12,738m3.

✚ ***Construction of capping layer:***

- ✓ Carrying out construction of capping layer at Block 8 (Km3+636 to Km3+815). Accomplishment quantity in this month is 1,113m3.
- ✓ Construction of capping layer at Block 9 (Km3+939 to Km4+11). Accomplishment quantity in this month is 1,128m3.

✚ ***Fabrication of precast components:***

- ✓ The Contractor completed fabrication for 5360(piece) precast block, 1885 precast beam, 451(piece) concrete curb and 72(piece) ditch.

✚ ***Sub-structure:***

- ✓ Bored pile: Completed 100%.
- ✓ Sub-structure Work:
 - Do Xuan Hop Flyover:
 - Completed 05 pile caps for pier P1R, P2L, P2R, P16L, P16R.
 - Completed 04 pier columns: P1L, P2L, P2R and P16L.
 - Number of headstock completion: 06 headstocks including P1L, P3L, P3R, P14R, P15BL and P15BR.
 - Ba Hien's Bridge:
 - Completed 01 pile cap for A2R.
 - Completion of 02 abutment's wing wall A1R, A2L.

✚ ***Superstructure:***

- ✓ Do Xuan Hop Flyover:
 - In this month the Contractor produced 32 hollow slab girders 24m length. Accumulated quantity is 352, equivalent to 81% completion.
 - In this month the Contractor erection 48 hollow slab. Accumulated quantity is 144, equivalent to 33% completion.
- ✓ Ba Hien Bridge:
 - Completed girder fabrication

- Fabricated 120 precast planks for bottom formwork of deck slab

✚ **Approach Slab:**

- ✓ RC pile fabrication: 100% completion
- ✓ RC pile driving:
 - Driving for RC slab at A1, A2 – BH bridge: 3,559md.
 - Total completion up to now is 17,723md, equivalent to 67% completion.

▪ **PACKAGE 9:**

✚ **Temporary works**

a) **Batching plant**

- Operated cement concrete batching plant

b) **Site laboratory**

Site laboratory is operating with all approved equipment. Site laboratory is carrying out these following tests:

- Concrete mix design and sample compressing
- Soil tests and compaction
- Reinforcement.

✚ **Site Clearance**

Contractor carrying out the site clearing for area which already hand over to the Contractor.

✚ **Earth work and Soft Soil Improvement.**

The contractor is carrying out the construction of ramp A1; D1; B2, A2, C1, B1-A2, backfill: 0 m3 (up to now: 218704m3; K98: 1433m3 (up to now 20062m3), Sub-Base: 4260m3 (Up to now: 18684 m), Base: 4408 m3 (up to now: 14517m3), ATB : 4381m2, up to now 28890 m2 (Ramp A1,A2,B2,D1,D2,C1), ACB: 3361 m2, up to now 15466m2 (Ramp A2,B2,C1)

✚ **Bridge substructure**

The final

✚ **Bridge superstructure**

In this month, Contractor construction Launching girder 0 nos, up to now 324 girder. Hollow slab girder 03 segment (up to now: 09 Segment); Box girder 02 Segment, up to now: 13nos, Deck Slab 01 nos (Up to now 67 nos); Parapet: 1516m up to now 4589m; Slope Project : 3560m2 up to now 3560m2

✚ **Lighting and Electrical work**

Construction of Ramp A1, D1 was completed and the two Ramps were put into operation

2.3. Previous environmental conditions and environmental tendency

▪ Environmental conditions:

The results of the 05th environmental monitoring (March 2014) of Packages 7, 8 and 9 as follows:

▪ **PACKAGE 7**

- **Air quality**

All parameters monitored in March 2014 meet the allowable limits of regulations of QCVN 05:2013/BTNMT, QCVN 06:2009/BTNMT. Most monitored results are lower than baseline data (March 2013), except HC content is higher than baseline data. This proves that activities of project do not impact on environmental.

- **Noise and vibration**

+ Noise level:

Noise level monitored during two periods of time from 06:00 to 21:00 and from 21:00 to 22:00 in March 2014 meets the allowable limit of regulations of QCVN 26:2010/BTNMT. Analysis results are the following:

- ✓ From 06:00 to 21:00: noise level was 61,5dBA. This value is 1,05 times higher than baseline data (monitored in March 2013) but it is 1,38 times lower than regulations. This shows that construction activity during this time was a slight impact on the environment.
- ✓ From 21:00 to 22:00: noise level was 52,5dBA. This value is 1,2 times lower than baseline data and it is also lower than the allowable limits of regulations.

+ Vibration level:

Vibration level was 50,6dB and 47,0dB during the periods from 06:00 to 21:00 and from 21:00 to 22:00 respectively in March 2014. These values are lower than baseline data monitored in March 2013 and they are also lower than permitted values of regulations of QCVN 27:2010/BTNMT many times.

- **Surface water quality**

+ Ba Dai canal

All parameters were analyzed in surface water samples which taken at Ba Dai canal in March 2014 meet the permitted values of regulations of QCVN 08:2008/BTNMT column B1, except BOD and COD concentration of the sample SW7-3 slightly exceed the permitted values of regulation but not significantly.

+ Muong Kenh cannal

All parameters were analyzed in surface water samples which taken at Muong Kenh cannal in March 2014 meet the permitted values of regulations of QCVN 08:2008/BTNMT column B1, except BOD and COD concentration of the sample SW7-2 slightly exceed the permitted values of regulation but not significantly.

- **Ground water quality**

All parameters were analyzed in underground water samples at project area in March 2014 meet the permitted values of regulations of QCVN 09:2008/BTNMT.

- **Soil quality**

All parameters were analyzed in soil samples at project area in March 2014 meet the permitted values of regulations of QCVN 03:2008/BTNMT.

▪ **PACKAGE 8**

- **Air quality**

All parameters monitored during the period of time from 06:00 to 22:00 at project area in March 2014 are shown that they are lower than baseline data (monitored in March 2014). This shows that construction activities of project during this period impact on environment at project area but not significantly due to all parameters still meet the permitted values of regulations of QCVN 05:2013/BTNMT, QCVN 06:2009/BTNMT.

- **Noise and vibration**

+ Noise level:

All noise level were monitored during two periods of time from 06:00 to 21:00 and from 21:00 to 22:00 are higher than baseline data (monitored in March 2013), but during period of time from 06:00 to 21:00, noise level meet the allowable limits of regulations of QCVN 26:2010/BTNMT and during period of time from 21:00 to 22:00, noise level is 1,07 times higher than permitted values of regulations. This proves that construction activities during period from 21:00 to 22:00 has affected on regional environment of project.

+ Vibration level:

Vibration level monitored during two periods of times from 06:00 to 21:00 and from 21:00 to 22:00 in March 2014 are shown that they are higher than baseline data (monitored in March 2013), but when these values compared with regulations of QCVN 26:2010/BTNMT as follows:

- ✓ From 06:00 to 21:00: vibration level was 48,9dB. This value is 1,05 times higher than baseline data (monitored in March 2013) but it is 1,5 times lower than regulations.
- ✓ From 21:00 to 22:00: vibration level was 34,6dB. This value is 1,3 times higher than the allowable limits of regulations.

The above results are shown that construction activities during this periods has impact on environment, however the period of time from 06:00 to 21:00, the noise level is still acceptable because it has not exceed permitted regulations but the period of time from 21:00 to 22:00, noise level need to be controlled to avoid affecting the local environment.

- **Surface water quality**

Analysis results of four surface water samples of Ong Cai river (Ong Cai bridge) in March 2014 are lower than permitted values of regulations of QCVN 08:2008/BTNMT.

- **Ground water quality**

These parameters were analyzed in 03 samples of groundwater at the project area in March 2014 meet the allowable limits of regulations of QCVN 09:2008/BTNMT.

- **Soil quality**

These parameters were analyzed in 03 samples of soil at the project area in March 2014 is the same groundwater samples, these results meet the allowable limits of regulations of QCVN 03:2008/BTNMT.

▪ **PACKAGE 9**

- **Air quality**

All parameters were monitored in the ambient air of the project area in March 2014 are lower than permitted values of QCVN 05:2013 /BTNMT and QCVN06:2009 /BTNMT although concentration of HC and CO are higher baseline data monitored in March 2013. This proves that construction activities during this period still have an impact on environment however they are still in control.

- **Noise and vibration**

+ Noise level:

Noise level monitored during two periods of times from 06:00 to 21:00 and from 21:00 to 22:00 in March 2014 is higher than baseline data monitored in March 2013. However, when compared with QCVN 26:2010/BTNMT are shown as follows:

- ✓ From 06:00 to 21:00: noise level was 56,3dBA. This value is 1,24 times lower than permitted values of regulations.

- ✓ From 21:00 to 22:00: noise level was 61dBA. This value is 1,1 times higher than the allowable limits of regulations.

The above results are shown that construction activities had affected on regional environment. However, the noise level in the period of time from 06:00 to 21:00 is still under control but noise level in the period of time from 21:00 to 22:00 should be control to avoid affecting the surrounding area.

+ Vibration level:

Vibration level were monitored during two periods of time from 06:00 to 21:00 and from 21:00 to 22:00 are higher than baseline data (monitored in March 2013), when vibration level compared with QCVN 26:2010/BTNMT are shown that during period of time from 06:00 to 21:00, vibration level is lower than the allowable limits of regulations many times and during period of time from 21:00 to 22:00, vibration level is higher than permitted values of regulations but not significantly.

- **Ground water quality**

All parameters were analyzed in 03 samples of groundwater at the project area in March 2014 meet the allowable limits of regulations of QCVN 09:2008/BTNMT.

- **Soil quality**

All parameters were analyzed in 03 samples of soil at the project area in March 2014 meet the allowable limits of regulations of QCVN 03:2008/BTNMT.

▪ **Environmental tendency:**

In order to assessing environmental tendency due to activities of project, we based on the environmental monitoring results of the Quarter II/2014 (No.6 – June 2014) and comparision with environmental monitoring results of the Quarter I/2014 (No.5 – March 2014). The results for assessing and comparing on environmental status through the results of the Quarter II/2014 and Quarter I/2014 will be showed in the chart in Section 4.4 of Chapter 4.

CHAPTER 3. METHODOLOGY OF ENVIRONMENTAL MONITORING

3.1. Air quality

▪ **Methodology:**

- According to the requirements of the control equipments and standard methods of MONRE for air sampling, sample analyzing and writing report under the adjustment of National Environmental Monitoring System (NEMS), application of ambient air quality standards (QCVN05:2013/BTNMT).
- Sampling location marked by using GPS.

▪ **Parameters for monitoring:** TSP, HC, CO, SO₂, NO₂ and microclimate conditions (temp., air pressure, wind velocity, wind direction, humidity).

▪ **Frequency:** The monitoring will be conducted in one day, making 8 measurements in one position within 16 hours (from 6 am to 10 pm).

▪ **Equipment for monitoring:** **Equipment:** DustScan Scout Aerosol Monitor, USA.

▪ **Methods for analyzing:**

Table 3.1: Methods for analyzing

No.	Parameters	Methodology
1	Air temp.	Microclimate machine (3733 /2002/QĐ-BYT)
2	Humidity	
3	Air pressure	
4	Wind direction	
5	Wind velocity	
6	SO ₂	TCVN 5971-1995 (ISO 6767:1990)
7	NO ₂	TCVN 6137-96 (ISO 6768:1985)
8	HC	Ref. TCVN 7558-1:2005
9	Dust	MicroDust_Pro-880nm, (Casella)
10	CO	Ref. TCVN 7242:2003

3.2. Noise level

▪ **Methodology:**

- The sampling and analyzing sample shall be carried out based on the standard method for sampling and lab analyzing according to the requirements of (MONRE) with calibrated

equipments. Standards for reference: QCVN26:2010/BTNMT (National Technical Regulation on Noise).

- Sampling position will be marked by using GPS.
- **Parameters for monitoring:** Leq, Lmax, L50
- **Frequency:** The monitoring will be conducted in one day, making 3 measurements per hour within 16 hours (from 6 am to 10 pm) for one position.
- **Equipment for monitoring:** Noise meter Rion NL-21, Japan.

3.3. Vibration level

- **Methodology:**
 - The sampling and analyzing sample shall be carried out based on the standard method for sampling according to the requirements of (MONRE) with calibrated equipments. Standards for reference: QCVN27:2010/BTNMT (National Technical regulation on Vibration)
 - Sampling position will be marked by using GPS.
- **Parameters for monitoring:** Lveq and Leq
- **Frequency:** The monitoring will be conducted in one day, making 3 measurements per hour within 16 hours (from 6 am to 10 pm) for one position.
- **Equipment for monitoring:** Japanese Rionvibro model VM53 RION. The product is calibrated before using.

3.4. Surface water quality

- **Methodology:**
 - The sampling and analyzing sample shall be carried out based on the standard method for sampling and lab analyzing according to the requirements of (MONRE) with calibrated equipments. Standard for reference: QCVN 08:2008/BTNMT- B1 Colum: (National technical regulation on surface water quality)
 - Sampling position will be marked by using GPS.
- **Parameters for monitoring:** pH, temperature, BOD, COD, conductivity, DO, SS, As, Cd, Pb, Cr6+, Cu, Zn, Hg, NH4+, NO2-, NO3-, PO43-, oils and greases, coliform.
- **Frequency:** The monitoring will be conducted in a day, taking 4 samples a day (in the morning and in the afternoon) for each position.
- **Equipment for monitoring:**

- All of parameters such as pH, temp., conductivity, DO will be measured at sites by the equipment of YSI, USA.
- Other parameters such as SS, BOD₅, Coli form, grease, Cu, Fe... will be sampled, stored and analyzed in lab. All of these equipments are also calibrated before measuring.

▪ **Methods for analyzing:** (Table 3.2)

Table 3.2. Analysis methods for surface water

No.	Parameters	Methodology
1	pH	TCVN 6492-2011
2	Temperature	machine HI2211
3	Conductivity (EC)	machine HI2211
4	DO	Máy HD3409.2
5	SS	TCVN 6625-2000
6	BOD ₅	TCVN 6001-2008
7	COD	TCVN 6491-1999
8	NH ₄ ⁺ (N)	TCVN 5988-1995
9	NO ₂ ⁻	TCVN 6178-1996
10	NO ₃ ⁻	TCVN 6180-1996
11	PO ₄ ³⁻	TCVN 6202-2008
12	Cu	SMEWW3111B-2005
13	Zn	SMEWW3111B-2005
14	As	SMEWW-3500-2005
15	Cd	SMEWW-3500-2005
16	Cr ⁶⁺	SMEWW-3500-2005
17	Hg	SMEWW-3500-2005
18	Pb	SMEWW-3500-2005
19	Oils and grease	SMEWW 5520B-2005
20	Coliform	TCVN 6187-1-2009

3.5. Surface water quality

▪ **Methodology:**

- The sampling and analyzing sample shall be carried out based on the standard method for sampling and lab analyzing according to the requirements of (MONRE) with calibrated equipments. Standard for reference: QCVN 09:2008/BTNMT (National technical regulation on ground water quality)
- Sampling position will be marked by using GPS.

- **Parameters for monitoring:** pH, colour, temperature, odour, TS, hardness, conductivity, turbidity, CN^- , NO_3^- , Cl^- , SO_4^{2-} , Mn, Fe, Cd, Pb, As, E.Coli, Coliform.
- **Frequency:** The monitoring will be conducted in a day, taking 3 samples a day for each position.
- **Equipment for monitoring:**
 - All of parameters such as pH, temp., conductivity, DO will be measured at sites by the equipment of YSI, USA.
 - Other parameters such as SS, Coli form, grease, Cu, Fe... will be sampled, stored and analyzed in lab. All of these equipments are also calibrated before measuring.
- **Methods for analyzing:** (Table 3.3)

Table 3.3. Analysis methods for ground water

No.	Parameters	Methodology
1	pH	TCVN 6492-2011
2	Temperature	TCVN 4557-1988
3	Odour	Cảm quan
4	Turbidity	TCVN 6184-1996
5	Colour	TCVN 6185-2008
6	Total solid (TS)	SMEWW 2540C-2005
7	Conductivity (EC)	SMEWW 2540C-2005
8	Hardness	SMEWW 2340-2005
9	Clorua (Cl^-)	TCVN 6194-1996
10	Sulfat (SO_4^{2-})	SMEWW-4500- SO_4^{2-}
11	NO_3^- (N)	TCVN 6180-1996
12	Xianua (CN^-)	TCVN 6181-1996
13	Fe	SMEWW3111B-2005
14	Mn	SMEWW3111B-2005
15	As	SMEWW-3500-2005
16	Cd	SMEWW-3500-2005
17	Pb	SMEWW-3500-2005
18	E.Coli	TCVN 6187-1-2009
19	Coliform	TCVN 6187-1-2009

3.6. Soil quality

▪ **Methodology:**

- The sampling will be carried out at site and analyzed in lab with the calibrated equipments. The sampling and analyzing sample shall be carried out based on the standard method for sampling and lab analyzing according to the requirements of (MONRE). The thickness of sampling will be from 20 to 30 cm from the ground. Standard for reference: QCVN03:2008/BTNMT (National technical regulation on the allowable limits of heavy metals in the soils)
- Sampling position will be marked by using GPS.

▪ **Parameters for monitoring:** - pH, organic compounds, Total N, Total P, Cl^- , SO_4^{2-} , Cu, Zn, Cd, Pb, Hg, As.

▪ **Frequency:** The monitoring will be conducted in a day, taking 3 samples a day for one position.

▪ **Analysis methods:** (Table 3.4)

Table 3.4. Analysis methods for ground water

No.	Parameters	Methodology
1	pH	TCVN 5979-2007
2	Organic	TCVN 4450-85
3	Total N	TCVN 6498-1999
4	Sulfat (SO_4^{2-})	TK.TCVN 6200-1996
5	Total P	TK.TCVN 6202-2008
6	Clorua (Cl^-)	TK.TCVN 6194-1996
7	Copper (Cu)	TCVN 9496-2009
8	Zinc (Zn)	TCVN 9496-2009
9	Asen (As)	TCVN 9496-2009
10	Cadimi (Cd)	TCVN 9496-2009
11	Lead (Pb)	TCVN 9496-2009
12	Mercury (Hg)	TCVN 9496-2009

CHAPTER IV. THE RESULTS OF ENVIRONMENTAL MONITORING

4.1. PACKAGE 7

4.1.1. Air quality

- Monitoring location: An Phu intersection – Package 7 (Km00+200)
- Monitoring time: From 06:00 to 22:00 dated 17th June 2014
- Co-ordinate: N 10°47'42,5"; E 106°45'01,4"
- Weather conditions: sunny, light wind.
- Exterior conditions: Environmental monitoring location near Mai Chi Tho Street. There are a lot of vehicles.

Note: () : Detailed monitoring results and analysis are attached in the Appendix*

Table 4.1. Monitoring result of microclimate (*)

Time	Temp. (°C)	Moisture (%)	Wind (m/s)	Pressure (mB)	Wind direction
<i>Average result</i> (6h-22h) (06/2014)	29,47	68,88	0,35 – 0,87	1005,9	SE
Baseline data (03/2013) (6h-22h)	32,3	50,5	0,1-3,2	1005,8	SE

Table 4.2. Analysis results of ambient air quality (*)

Standard	Time	SO ₂	NO ₂	HC	Dust	CO
		(mg/m ³)	(mg/m ³)	(mg/m ³)	(mg/m ³)	(mg/m ³)
<i>Average result</i> (6h-22h) (06/2014)	6h - 22h	0,057	0,046	0,77	0,13	3,53
Baseline data (03/2013)	6h - 22h	0,065	0,1	0,85	0,39	7,08
QCVN05:2009/BTNMT	TB 1h	0,35	0,2	-	0,3	30
QCVN06:2009/BTNMT	TB 1h	-	-	5	-	-

Note:

- *NTD: Not detected*
- *Details of the analytical results in Appendix*
- *QCVN 05:2013/BTNMT – National technical regulation on ambient air quality*
- *QCVN 06:2009/BTNMT – National technical regulation on hazardous substances in ambient air.*

Remarks:

Ambient air regulations of QCVN 05:2013/BTNMT, QCVN 06:2009/BTNMT and baseline data (monitored in March 2013) are used for assessing the ambient air quality at project area.

All monitoring data of SO₂, NO₂, HC, TSP and CO monitored in June 2014 are lower than baseline data (March 2013) and they meet permitted values of regulations of QCVN 05:2013/BTNMT, QCVN 06:2009/BTNMT. This proved that construction activities during this period do not impact on surroundings.

4.1.2. Noise and vibration

Monitoring location, time and co-ordinate are the same of air monitoring.

▪ **Noise level:**

Table 4.3. Monitoring results of noise level (*)

Time		Results (dBA)			Baseline data (03/2013)	QCVN 26:2010/BTNMT (dBA)
		L _{eq}	L _{max}	L ₅₀		
Average result (06/2014)	6h - 21h	63,6	72,45	62,15	58,3	70
	21h - 22h	59,8	64,2	58,2	63,5	55

Note: QCVN 26:2010/BTNMT – National technical regulation on noise.

Remarks:

Noise regulations of QCVN 26:2010/BTNMT and baseline data (monitored in March 2013) are used for assessing the noise level at project area. The monitored data shows that:

- From 06:00 – 21:00: noise level was 63,6dBA. This value is 1,09 times higher than baseline data but it is 1,1 times lower than permitted values of QCVN 26:2010/BTNMT. This proved that the construction activities during this month were a slight impact on surroundings.
- From 21:00 – 22:00: noise level was 59,8dBA. This value is a litter higher than the allowable limits of regulations of QCVN 26:2010/BTNMT but it is 1,06 times lower than baseline data.

▪ **Vibration level:**

Table 4.4. Monitoring results of vibration (*)

Time		Results (dB)		Baseline data (03/2013)	QCVN 27:2010/BTNMT (dB)
		L _{eq}	L _{veq}		
Average result (06/2014)	6h - 21h	52,6	45,10	54,1	75
	21h - 22h	45,0	40,2	58,5	58,5 (baseline data)

Note: QCVN 27:2010/BTNMT – National technical regulation on vibration.

Remarks:

Vibration regulations of QCVN 27:2010/BTNMT and baseline data (monitored 03/2013) are used for assessing the vibration level at project area.

Vibration level of June 2014 was 52,6dB during the period of time from 6:00 – 21:00 and it was 45,0dB during the period of time from 21:00 – 22:00. These values are lower than baseline data (monitored in March 2013) and they are also lower than permitted values of regulations of QCVN 27:2010/BTNMT several times.

4.1.3. Surface water quality

a) Ba Dai Canal

- The sampling time: 17th June 2014.
- Monitoring locations and sampling: Table 4.5.
- Monitoring and analysis results: Table 4.6

Table 4.5. Description of monitoring locations and sampling

No.	Location	Description of locations	Co-ordinate
1	SW7-1	Km 0+346, up stream, high tide	N 10°47'42,6"; E 106°45'07,5"
2	SW7-2	Km 0+346, up stream, low tide	N 10°47'42,1"; E 106°45'06,8"
3	SW7-3	Km 0+346, down stream, high tide	N 10°47'25,3"; E 106°45'09,4"
4	SW7-4	Km 0+346, down stream, low tide	N 10°47'25,8"; E 106°45'10,1"

Table 4.6. The analysis results of surface water at Ba Dai Canal

No.	Parameters	Unit	Analysis results				QCVN 08:2008/ BTNMT Column B1
			SW7-1	SW7-2	SW7-3	SW7-4	
1	pH	-	6,77	7,06	7,04	7,11	5,5 ÷ 9
2	Temperature	°C	30,5	30,8	30,5	30,6	-

No.	Parameters	Unit	Analysis results				QCVN 08:2008/ BTNMT Column B1
			SW7-1	SW7-2	SW7-3	SW7-4	
3	Conductivity (EC)	μS/cm	2707	1106	1102	1058	-
4	DO	mg/L	4,28	4,39	4,35	4,31	≥ 4
5	BOD ₅	mg/L	10	12	14	13	15
6	COD	mg/L	22	23	27	24	30
7	SS	mg/L	28	35	44	39	50
8	PO ₄ ³⁻ (P)	mg/L	0,056	0,072	0,086	0,107	0,3
9	NO ₂ ⁻ (N)	mg/L	NTD	NTD	NTD	NTD	0,04
10	NO ₃ ⁻ (N)	mg/L	0,374	0,235	0,228	0,327	10
11	NH ₄ ⁺ (N)	mg/L	0,31	0,26	0,29	0,24	0,5
12	As	mg/L	NTD	NTD	NTD	NTD	0,05
13	Cd	mg/L	NTD	NTD	NTD	NTD	0,01
14	Cr ⁶⁺	mg/L	NTD	NTD	NTD	NTD	0,04
15	Cu	mg/L	0,042	0,031	0,043	0,045	0,5
16	Hg	mg/L	NTD	NTD	NTD	NTD	0,001
17	Pb	mg/L	NTD	NTD	NTD	NTD	0,05
18	Zn	mg/L	0,046	0,053	0,076	0,062	1,5
19	Oils and grease	mg/L	NTD	NTD	NTD	NTD	0,1
20	Coliform	MPN/ 100mL	490	230	1700	210	7500

Note:

- NTD: Not detected
- QCVN 08:2008/BTNMT (Column B1) – National technical regulation on surface water quality.
- Column B1 – Using for irrigation or other purposes which required the similar water quality or the same type B2 (B2 –river traffic and other purposes with requirements for low quality water).

Remarks:

In this report, the surface water regulations of QCVN 08:2008/BTNMT Column B1 are used for assessing the water quality of Ba Dai Canal.

All parameters of surface water quality at Ba Dai Canal were analyzed in June 2014 meet Column B1 - QCVN 08:2008/BTNMT.

b) Muong Kenh Canal

- The sampling time: 17th June 2014.
- Monitoring locations and sampling: Table 4.7.
- Monitoring and analysis results: Table 4.8

Table 4.7. Description of monitoring locations and sampling

No.	Location	Description of locations	Co-ordinate
1	SW7-5	Km 1+150, up stream, high tide	N 10°47'47,1"; E 106°45'46,1"
2	SW7-6	Km 1+150, up stream, low tide	N 10°47'47,8"; E 106°45'46,6"
3	SW7-7	Km 1+150, down stream, high tide	N 10°47'47,4"; E 106°45'45,2"
4	SW7-8	Km 1+150, down stream, low tide	N 10°47'47,5"; E 106°45'45,7"

Table 4.8. The analysis results of surface water at Muong Kenh Canal

No.	Parameters	Units	Analysis results				QCVN 08:2008/ BTNMT Column B1
			SW7-5	SW7-6	SW7-7	SW7-8	
1	pH	-	7,02	7,05	7,16	7,11	5,5 ÷ 9
2	Temperature	°C	31,1	30,9	31,1	30,8	-
3	Conductivity(EC)	μS/cm	1031	910	953	1016	-
4	DO	mg/L	4,26	4,33	4,57	4,62	≥ 4
5	BOD ₅	mg/L	12	13	11	10	15
6	COD	mg/L	25	26	21	19	30
7	SS	mg/L	37	31	32	35	50
8	PO ₄ ³⁻ (P)	mg/L	0,112	0,098	0,106	0,118	0,3
9	NO ₂ ⁻ (N)	mg/L	NTD	NTD	NTD	NTD	0,04
10	NO ₃ ⁻ (N)	mg/L	0,216	0,338	0,307	0,286	10
11	NH ₄ ⁺ (N)	mg/L	0,17	0,24	0,23	0,21	0,5
12	As	mg/L	NTD	NTD	NTD	NTD	0,05
13	Cd	mg/L	NTD	NTD	NTD	NTD	0,01
14	Cr ⁶⁺	mg/L	NTD	NTD	NTD	NTD	0,04
15	Cu	mg/L	0,023	0,035	0,038	0,041	0,5
16	Hg	mg/L	NTD	NTD	NTD	NTD	0,001
17	Pb	mg/L	NTD	NTD	NTD	NTD	0,05

No.	Parameters	Units	Analysis results				QCVN 08:2008/ BTNMT Column B1
			SW7-5	SW7-6	SW7-7	SW7-8	
18	Zn	mg/L	0,047	0,053	0,061	0,073	1,5
19	Oils and grease	mg/L	NTD	NTD	NTD	NTD	0,1
20	Coliform	MPN/ 100mL	1100	930	750	260	7500

Note:

- NTD: Not detected
- QCVN 08:2008/BTNMT (Column B1) – National technical regulation on surface water quality.
- Column B1 – Using for irrigation or other purposes which required the similar water quality or the same type B2 (B2 –river traffic and other purposes with requirements for low quality water).

Remarks:

The surface water regulations of QCVN 08:2008/BTNMT Column B1 is used for assessing the water quality of Muong Kenh Canal.

All parameters of surface water quality of Muong Kenh canal in June 2014 meet permitted values of Column B1 - QCVN 08:2008/BTNMT.

4.1.4. Ground water quality

- The sample time: 17th June 2014.
- Monitoring locations and sampling: Table 4.9.
- Monitoring and analysis results: Table 4.10

Table 4.9. Description of monitoring locations and sampling

No.	Location	Location descriptions	Co-ordinate
1	GW7-1	Number 110 Nguyen Thi Dinh Street, An Phu Ward, District 2	N 10°47'42,5"; E 106°45'05,8"
2	GW7-2	Number 133 Nguyen Thi Dinh Street, An Phu Ward, District 2	N 10°47'42,1"; E 106°45'07,2"
3	GW7-3	Number 108 Nguyen Thi Dinh Street, An Phu Ward, District 2	N 10°47'42,6"; E 106°45'06,5"

Table 4.10. Analysis results of ground water

No.	Parameters	Units	Analysis results			QCVN 09:2008/ BTNMT
			GW7-1	GW7-2	GW7-3	
1	pH	-	6,06	5,92	6,14	5,5 ÷ 8,5
2	Temperature	°C	29,5	29,3	29,9	-
3	Turbidity	NTU	0,54	1,28	0,72	-
4	Conductivity (EC)	μS/cm	718	736	719	-
5	Colour	Co-Pt	3,1	2,9	2,4	-
6	Odour	-	Odorless	Odorless	Odorless	-
7	Hardness	mgCaCO ₃ /L	34,6	31,1	23,5	500
8	Clorua (Cl ⁻)	mg/L	164,3	172,1	158,6	250
9	Sulfat (SO ₄ ²⁻)	mg/L	104,7	98,5	115,4	400
10	NO ₃ ⁻ (N)	mg/L	0,429	0,372	0,516	15
11	TS	mg/L	381	392	375	1500
12	As	mg/L	NTD	NTD	NTD	0,05
13	Cd	mg/L	NTD	NTD	NTD	0,005
14	Xianua (CN ⁻)	mg/L	NTD	NTD	NTD	0,01
15	Fe	mg/L	2,23	2,16	2,27	5
16	Mn	mg/L	0,248	0,216	0,251	0,5
17	Pb	mg/L	NTD	NTD	NTD	0,01
18	E.Coli	MPN/100mL	NTD	NTD	NTD	NTD
19	Coliform	MPN/100mL	3	NTD	4	3

Note:

- NTD: Not detected
- QCVN 09:2008/BTNMT – National technical regulation on underground water quality.

Remarks:

The ground water regulations of QCVN 09:2008/BTNMT are used for assessing the ground water quality of the project area.

Most parameters of ground water quality at three samplings at project area in June 2014 are shown that they meet permitted values of QCVN 09:2008/BTNMT. Except Coliform content of GW7-3 is 1,33 times higher than the allowable limits of regulations.

4.1.5. Soil quality

- The sample time: 17th June 2014.
- Monitoring locations and sampling: Table 4.11.

- Monitoring and analysis results: Table 4.12

Table 4.11. Description of monitoring locations and sampling

No.	Location	Location descriptions	Co-ordinate
1	S7-1	Near Muong Kenh Canal, An Phu Ward, District 2	N 10°47'45,2"; E 106°45'44,1"
2	S7-2	Near Muong Kenh Canal, An Phu Ward, District 2	N 10°47'48,4"; E 106°45'32,5"
3	S7-3	Near Muong Kenh Canal, An Phu Ward, District 2	N 10°47'46,3"; E 106°45'31,4"

Table 4.12. Analysis results of soil quality

No.	Parameters	Units	Analysis results			QCVN 03:2008 /BTNMT
			S7-1	S7-2	S7-3	
1	pH	-	6,03	5,91	5,87	-
2	Organic	%	2,15	2,24	2,11	-
3	Total N	%	0,086	0,081	0,072	-
4	Clorua (Cl ⁻)	mg/kg	1539	1478	1265	-
5	Sulfat (SO ₄ ²⁻)	%	0,012	0,016	0,014	-
6	Asen (As)	mg/kg	2,38	1,45	1,27	12
7	Cadimi (Cd)	mg/kg	NTD	NTD	NTD	5
8	Copper (Cu)	mg/kg	4,53	3,91	5,12	70
9	Mercury (Hg)	mg/kg	NTD	NTD	NTD	-
10	Total P	mg/kg	105	96	118	-
11	Lead (Pb)	mg/kg	15,63	13,51	16,27	120
12	Zinc (Zn)	mg/kg	58,49	51,26	55,42	200

Note:

- NTD: Not detected
- QCVN 03:2008/BTNMT – National technical regulation on the allowable limits of heavy metals in the soils.

Remarks:

The soil quality regulations of QCVN 03:2008/BTNMT is used for assessing the soil quality of the project area.

All parameters were analyzed in soil samples at project area in June 2014 meet the permitted values of regulations of QCVN 03:2008/BTNMT.

4.2. PACKAGE 8

4.2.1. Air quality

- Monitoring location: Phu Huu Ward, near Do Xuan Hop Street – Package 8 (Km3+200)
- Monitoring time: From 06:00 to 22:00 dated 18th June 2014
- Co-ordinate: N 10°47'51,1"; E 106°46'44,5"
- Weather conditions: sunny, light wind.
- Exterior conditions: Environmental monitoring location near Do Xuan Hop Street. There are a lot of vehicles.

Note: () Detailed monitoring results and analysis are attached in the Appendix*

Table 4.13. Monitoring result of microclimate (*)

Time	Temperature	Humidity	Wind	Pressure	Wind direction
	(°C)	(%)	(m/s)	(mB)	
Average results (6h-22h) (06/2014)	30,8	68,8	0,4 – 1,37	1006,14	ES
Baseline data (03/2013) (6h-22h)	32,2	58,9	0,1-2,3	1005,4	SE

Table 4.14. Analysis results of air quality parameters (*)

Standard	Thời gian	SO ₂	NO ₂	HC	TSP	CO
		(mg/m ³)	(mg/m ³)	(mg/m ³)	(mg/m ³)	(mg/m ³)
Average results (Tháng 06/2014)	6h - 22h	0,092	0,079	1,205	0,22	6,66
Baseline data (03/2013)	6h - 22h	0,01	0,05	0	0,13	3,10
QCVN05:2009/BTNMT	Average 1 hour	0,35	0,2	-	0,3	30
QCVN06:2009/BTNMT	Average 1 hour	-	-	5	-	-

Note:

- NTD: Not detected
- Details of the analytical results in Appendix
- QCVN 05:2013/BTNMT – National technical regulation on ambient air quality
- QCVN 06:2009/BTNMT – National technical regulation on hazardous substances in ambient air.

Remarks:

Ambient air regulations of QCVN 05:2013/BTNMT, QCVN 06:2009/BTNMT and baseline data (monitored 03/2013) are used for assessing the ambient air quality at project area.

All parameters monitored during the period of time from 06:00 to 22:00 at project area in June 2014 are shown that they are higher than baseline data (monitored in March 2014). This shows that construction activities of project during this period impact on environment at project area but not significantly due to all parameters still meet the permitted values of regulations of QCVN 05:2013/BTNMT, QCVN 06:2009/BTNMT.

4.2.2. Noise and vibration level

Monitoring locations, time and co-ordinate are the same of air monitoring.

▪ Noise level:

Table 4.15. Monitoring results of noise level(*)

Time		Results (dBA)			Baseline data (03/2013)	QCVN 26:2010/BTNMT (dBA)
		L _{eq}	L _{max}	L ₅₀		
Average result (06/2014)	6h - 21h	62,3	75,8	60,5	54,6	70
	21h - 22h	59,2	67,3	56,8	51,6	55

Note:

- Details of the analytical results in Appendix
- QCVN 26:2010/BTNMT – National technical regulation on noise.

Remarks:

Noise regulations of QCVN 26:2010/BTNMT and baseline data (monitored in March 2013) are used for assessing the noise level at project area. According to the monitored data, they are shown that:

All noise level were monitored during two periods of time from 06:00 to 21:00 and from 21:00 to 22:00 in June 2014 are higher than baseline data (monitored in March 2013), but during period of time from 06:00 to 21:00, noise level meet the allowable limits of regulations of QCVN 26:2010/BTNMT but during period of time from 21:00 to 22:00, noise level is 1,076 times higher than permitted values of regulations. This proves that the construction activities in this period effects on the environment of this area, but the impact in the period from 6:00 to 21:00 still within the permissible limits except the noise level in period from 21:00 to 22:00 needs to take measures to reduce the noise level.

▪ Vibration level:

Table 4.16. Monitoring results of vibration(*)

Time		Results (dB)		Baseline data (03/2013)	QCVN 27:2010/BTNMT (dB)
		L _{eq}	L _{veq}		
Average result (06/2014)	6h - 21h	48,5	42,0	39,1	75
	21h - 22h	36,5	30,8	26,5	26,5 (baseline data)

Note:

- Details of the analytical results in Appendix.
- QCVN 27:2010/BTNMT – National technical regulation on vibration.

Remarks:

Vibration regulations of QCVN 27:2010/BTNMT and baseline data (monitored in March 2013) are used for assessing the vibration level at project area. According to the monitored data, they can be seen that:

Vibration level monitored during two periods of times from 06:00 to 21:00 and from 21:00 to 22:00 in June 2014 are shown that they are higher than baseline data (monitored in March 2013), but when these values compared with regulations of QCVN 26:2010/BTNMT as follows:

- From 06:00 to 21:00: vibration level was 48,5dB. This value is 1,5 times lower than regulations.
- From 21:00 to 22:00: vibration level was 36,5dB. This value is 1,37 times higher than the allowable limits of regulations.

The above results are shown that construction activities during this periods has impact on environment, however the period of time from 06:00 to 21:00, the noise level is still acceptable because it has not exceed permitted regulations but the period of time from 21:00 to 22:00, noise level need to be controlled to avoid affecting the local environment.

4.2.3. Surface water quality

- The sample time: 18th June 2014.
- Monitoring locations and sampling: Ong Cai River (Ong Cai bridge) Table 4.17.
- Monitoring and analysis results: Table 4.18

Table 4.17. Description of monitoring locations and sampling

TT	Vị trí	Mô tả vị trí	Tọa độ
1	SW8-1	Km 3+380 up stream, high tide	N 10°47'54,8"; E 106°46'47,7"
2	SW8-2	Km 3+380 up stream, low tide	N 10°47'54,8"; E 106°46'47,7"
3	SW8-3	Km 3+380 down stream, high tide	N 10°47'51,0"; E 106°46'47,6"
4	SW8-4	Km 3+380 down stream, low tide	N 10°47'51,0"; E 106°46'47,6"

Table 4.18. Analysis results of surface water samples at Ong Cai River (Ong Cai Bridge)

No.	Parameters	Units	Analysis results				QCVN 08:2008/ BTNMT Column B1
			SW8-1	SW8-2	SW8-3	SW8-4	
1	pH	-	7,18	7,09	7,14	7,22	5,5 ÷ 9
2	Temperature	°C	30,6	30,8	30,1	30,5	-
3	Conductivity(E C)	μS/cm	741	756	763	755	-
4	DO	mg/L	4,53	4,39	4,42	4,37	≥ 4
5	BOD ₅	mg/L	12	9	13	15	15
6	COD	mg/L	21	17	25	29	30
7	SS	mg/L	35	33	41	44	50
8	PO ₄ ³⁻ (P)	mg/L	0,062	0,054	0,087	0,101	0,3
9	NO ₂ ⁻ (N)	mg/L	NTD	NTD	NTD	NTD	0,04
10	NO ₃ ⁻ (N)	mg/L	0,217	0,253	0,362	0,416	10
11	NH ₄ ⁺ (N)	mg/L	0,13	0,18	0,36	0,29	0,5
12	As	mg/L	NTD	NTD	NTD	NTD	0,05
13	Cd	mg/L	NTD	NTD	NTD	NTD	0,01
14	Cr ⁶⁺	mg/L	NTD	NTD	NTD	NTD	0,04

No.	Parameters	Units	Analysis results				QCVN 08:2008/ BTNMT Column B1
			SW8-1	SW8-2	SW8-3	SW8-4	
15	Cu	mg/L	0,039	0,044	0,038	0,046	0,5
16	Hg	mg/L	NTD	NTD	NTD	NTD	0,001
17	Pb	mg/L	NTD	NTD	NTD	NTD	0,05
18	Zn	mg/L	0,056	0,067	0,061	0,043	1,5
19	Oils and grease	mg/L	NTD	NTD	NTD	NTD	0,1
20	Coliform	MPN/ 100mL	270	460	930	1500	7500

Note:

- NTD: Not detected
- QCVN 08:2008/BTNMT (Column B1) – National technical regulation on surface water quality.
- Column B1 – Using for irrigation or other purposes which required the similar water quality or the same type B2 ((B2 –river traffic and other purposes with requirements for low quality water).

Remarks:

The surface water regulations of QCVN 08:2008/BTNMT Column B1 is used for assessing the water quality of Ong Cai River (Ong Cai Bridge). According to the monitored data at Ong Cai River, they are shown that:

Analysis results of four surface water samples of Ong Cai river (Ong Cai bridge) in June 2014 are lower than permitted values of regulations of QCVN 08:2008/BTNMT.

4.2.4. Ground water quality

- The sample time: 18th June 2014.
- Monitoring locations and sampling: Table 4.19.
- Monitoring and analysis results: Table 4.20

Table 4.19. Description of monitoring locations and sampling

No.	Location	Location discription	Co-ordinate
1	GW8-1	Residential area belong Phu Huu Ward, Km 3+200 (No. 21, Phu Duc residential area, Do Xuan Hop Street, District 9)	N 10°47'56,5"; E 106°46'42,7"

No.	Location	Location discription	Co-ordinate
2	GW8-2	Residential area belong Phu Huu Ward, Km 3+200 (No. 01, Phu Duc residential area, Do Xuan Hop Street, District 9)	N 10 ⁰ 47'58,4"; E 106 ⁰ 46'42,5"
3	GW8-3	Residential area belong Phu Huu Ward, Km 3+200 (steering committee of Package 8, Phu Duc residential area, Do Xuan Hop Street, District 9)	N 10 ⁰ 47'54,1"; E 106 ⁰ 46'46,2"

Table 4.20. Analysis results of ground water samples

No.	Parameters	Unit	Analysis results			QCVN 09:2008/ BTNMT
			GW8-1	GW8-2	GW8-3	
1	pH	-	6,91	6,89	6,88	5,5 ÷ 8,5
2	Temperature	°C	30,2	30,1	29,8	-
3	Turbidity	NTU	0,52	0,83	0,66	-
4	Conductivity (EC)	µS/cm	592	581	588	-
5	Colour	Co-Pt	2,6	1,7	3,1	-
6	Odour	-	Odorless	Odorless	Odorless	-
7	Hardness	mgCaCO ₃ /L	25,6	23,8	26,5	500
8	Clorua (Cl ⁻)	mg/L	112,6	134,5	107,2	250
9	Sulfat (SO ₄ ²⁻)	mg/L	57,1	62,5	64,8	400
10	NO ₃ ⁻ (N)	mg/L	0,463	0,365	0,317	15
11	TS	mg/L	314	298	306	1500
12	As	mg/L	NTD	NTD	NTD	0,05
13	Cd	mg/L	NTD	NTD	NTD	0,005
14	Xianua (CN ⁻)	mg/L	NTD	NTD	NTD	0,01
15	Fe	mg/L	0,181	0,156	0,173	5
16	Mn	mg/L	0,104	0,092	0,087	0,5
17	Pb	mg/L	NTD	NTD	NTD	0,01
18	E.Coli	MPN/100mL	NTD	NTD	NTD	NTD
19	Coliform	MPN/100mL	NTD	2	NTD	3

Note:

- NTD: Not detected
- QCVN 09:2008/BTNMT – National technical regulation on underground water quality.

Remarks:

Underground water regulations of QCVN 09:2008/BTNMT is used for assessing the water quality of project area. The analyzed data of ground water samples shows that:

These parameters were analyzed in 03 samples of groundwater at the project area in June 2014 meet the allowable limits of regulations of QCVN 09:2008/BTNMT. The concentration of As, Cd, Xianua, Pb and Ecoli are not detected in all samplings.

4.2.5. Soil quality

- The sample time: 18th June 2014.
- Monitoring locations and sampling: Table 4.21.
- Monitoring and analysis results: Table 4.22

Table 4.21. Description of monitoring locations and sampling

No.	Location	Location discriptions	Co-ordinate
1	S8-1	Near Ong Cai River, Phu Huu Ward, District 9	N 10 ⁰ 47'54,5"; E 106 ⁰ 46'48,8"
2	S8-2	Near Ong Cai River, Phu Huu Ward, District 9	N 10 ⁰ 47'55,6"; E 106 ⁰ 46'48,7"
3	S8-3	Near Ong Cai River, Phu Huu Ward, District 9	N 10 ⁰ 47'50,4"; E 106 ⁰ 46'44,2"

Table 4.22. Analysis results of soil sample

No.	Parameters	Unit	Analysis results			QCVN 03:2008 /BTNMT
			S8-1	S8-2	S8-3	
1	pH	-	5,35	5,44	5,28	-
2	Organic	%	1,45	1,54	1,78	-
3	Total N	%	0,069	0,062	0,091	-
4	Clorua (Cl)	mg/kg	684	657	763	-
5	Sulfat (SO ₄ ²⁻)	%	0,018	0,015	0,014	-
6	Asen (As)	mg/kg	0,738	0,557	0,623	12
7	Cadimi (Cd)	mg/kg	NTD	NTD	NTD	5

8	Copper (Cu)	mg/kg	5,84	6,15	7,28	70
9	Mercury (Hg)	mg/kg	NTD	NTD	NTD	-
10	Total P	mg/kg	193	186	154	-
11	Lead (Pb)	mg/kg	14,67	15,58	12,34	120
12	Zinc (Zn)	mg/kg	51,95	44,32	41,07	200

Note:

- *NTD: Not detected*
- *QCVN 03:2008/BTNMT – National technical regulation on the allowable limits of heavy metals in the soils.*

Remarks:

The soil quality regulations of QCVN 03:2008/BTNMT is used for assessing the soil quality of the project area. According to the analyzed data, they are shown that:

These parameters were analyzed in 03 samples of soil at the project area in June 2014 is the same groundwater samples, these results meet the allowable limits of regulations of QCVN 03:2008/BTNMT.

4.3. PACKAGE 9

4.3.1. Air quality

- Monitoring location: Project area near Ring Road 2 (Km4+500)
- Monitoring time: From 06:00 to 22:00 dated 19th June 2014
- Co-ordinate: N 10⁰47'53,5"; E 106⁰47'26,3"
- Weather conditions: sunny, light wind.
- Exterior conditions: Environmental monitoring location near Ring Road 2. There are a lot of vehicles.

Note: () : Detailed monitoring results and analysis are attached in the Appendix*

Table 4.23. Monitoring results of microclimate (*)

Time	Temperature	Humidity	Wind	Pressure	Wind direction
	(⁰ C)	(%)	(m/s)	(mB)	
Average results (6h-22h) (06/2014)	30,3	75,7	0,2 – 1,2	1005,8	ES
Baseline data (03/2013) (6h-22h)	32,2	58,4	0,2-2,3	1005,5	SE

Table 4.24. Analysis results of ambient air quality(*)

Regulations	Time	SO ₂	NO ₂	HC	TSP	CO
		(mg/m ³)	(mg/m ³)	(mg/m ³)	(mg/m ³)	(mg/m ³)
Average results (06/2014)	6h - 22h	0,05	0,043	0,97	0,16	3,09
Baseline data (03/2013)	6h - 22h	0,09	0,06	0	0,28	2,90
QCVN05:2013/BTNMT	Average an hour	0,35	0,2	-	0,3	30
QCVN06:2009/BTNMT	Average an hour	-	-	5	-	-

Note:

- NTD: Not detected
- Details of the analytical results in Appendix
- QCVN 05:2013/BTNMT – National technical regulation on ambient air quality
- QCVN 06:2009/BTNMT – National technical regulation on hazardous substances in ambient air.

Remarks:

Ambient air regulations of QCVN 05:2013/BTNMT, QCVN 06:2009/BTNMT and baseline data (monitored in March 2013) are used for assessing the ambient air quality at project area.

Most parameters of air quality in the project area in June 2014 are lower than baseline data and all of them are also lower than permitted values of QCVN 05:2013 /BTNMT and QCVN06:2009 /BTNMT several times.

4.3.2. Noise and vibration

Monitoring locations, time and co-ordinate are the same of air monitoring.

▪ **Noise level:**

Table 4.25. Monitoring results of noise level (*)

Time		Results (dBA)			Baseline data (03/2013)	QCVN 26:2010/BTNMT (dBA)
		L _{eq}	L _{max}	L ₅₀		
Average result (06/2014)	6h - 21h	58,0	73,9	54,9	51,3	70
	21h - 22h	52,4	66,2	50,7	53,4	55

Note: QCVN 26:2010/BTNMT – National technical regulation on noise.

Remarks:

Noise regulations of QCVN 26:2010/BTNMT and baseline data (monitored 03/2013) are used for assessing the noise level at project area. According to the monitored data in December 2013, they can be seen that:

Noise level monitored during two periods of times from 06:00 to 21:00 and from 21:00 to 22:00 in June 2014 are lower than permitted values of regulations QCVN 26:2010/BTNMT but when they compared with baseline data are shown that:

- From 06:00 to 21:00: noise level was 58,0dBA. This value is 1,13 times higher than baseline data but it is 1,2 times lower than permitted values of regulations. This value proved that during this time construction activities of project impacted on surroundings but they are also under control.
- From 21:00 to 22:00: noise level was 52,4dBA. This value is lower than baseline data and it is also lower than the allowable limits of regulations.

▪ **Vibration level:**

Table 4.26. Monitoring results of vibration(*)

Time		Results (dB)		Baseline data (03/2013)	QCVN 27:2010/BTNMT (dB)
		L _{eq}	L _{veq}		
Average result (06/2014)	6h - 21h	45,4	41,6	47,2	75
	21h - 22h	40,2	37,6	47,1	47,1 (baseline data)

Note: QCVN 27:2010/BTNMT – National technical regulation on vibration.

Nhận xét:

Vibration regulations of QCVN 27:2010/BTNMT and baseline data (monitored 03/2013) are used for assessing the vibration level at project area.

Vibration level were monitored during two periods of time from 06:00 to 21:00 and from 21:00 to 22:00 in June 2014 are lower than baseline data (monitored in March 2013) and they are also lower than permitted values of regulations several times.

4.3.3. Ground water quality

- The sample time: 19th June 2014.
- Monitoring locations and sampling: Table 4.27.
- Monitoring and analysis results: Table 4.28

Table 4.27. Description of monitoring locations and sampling

No.	Location	Location descriptions	Co-ordinate
1	GW9-1	Number 26B, 827th street, Phu Huu Ward, District 9 –(Phu Huu Ward near intersection with Ring Road 2 street)	N 10 ⁰ 47'45,1"; E 106 ⁰ 47'29,5"
2	GW9-2	Nguyen Van Hoang is host, 827th street, Phu Huu Ward, District 9 (Phu Huu Ward near intersection with Ring Road 2 street)	N 10 ⁰ 47'44,2"; E 106 ⁰ 47'27,6"
3	GW9-3	Hoang Thanh Phong is host, 827th street, Phu Huu Ward, District 9 (Phu Huu Ward near intersection with Ring Road 2 street)	N 10 ⁰ 47'43,8"; E 106 ⁰ 47'27,5"

Table 4.28. Analysis results of ground water samples

No.	Parameters	Units	Analysis results			QCVN 09:2008/ BTNMT
			GW9-1	GW9-2	GW9-3	
1	pH	-	6,44	6,38	6,23	5,5 ÷ 8,5
2	Temperature	°C	30,2	29,7	29,6	-
3	Turbidity	NTU	0,34	1,12	0,54	-
4	Conductivity (EC)	µS/cm	682	754	731	-
5	Colour	Co-Pt	3,6	3,8	2,1	-
6	Odour	-	Odorless	Odorless	Odorless	-
7	Hardness	mgCaCO ₃ /L	76,5	94,4	87,2	500
8	Clorua (Cl ⁻)	mg/L	143,8	186,7	198,2	250
9	Sulfat (SO ₄ ²⁻)	mg/L	61,7	89,5	106,7	400
10	NO ₃ ⁻ (N)	mg/L	0,136	0,459	0,513	15
11	TS	mg/L	362	385	378	1500
12	As	mg/L	NTD	NTD	NTD	0,05
13	Cd	mg/L	NTD	NTD	NTD	0,005
14	Xianua (CN ⁻)	mg/L	NTD	NTD	NTD	0,01
15	Fe	mg/L	1,35	2,57	2,39	5
16	Mn	mg/L	0,076	0,124	0,143	0,5
17	Pb	mg/L	NTD	NTD	NTD	0,01

No.	Parameters	Units	Analysis results			QCVN 09:2008/ BTNMT
			GW9-1	GW9-2	GW9-3	
18	E.Coli	MPN/100mL	NTD	NTD	NTD	NTD
19	Coliform	MPN/100mL	NTD	NTD	3	3

Note:

- NTD: Not detected
- QCVN 09:2008/BTNMT – National technical regulation on underground water quality.

Remarks:

Underground water regulations of QCVN 09:2008/BTNMT is used for assessing the water quality of project area.

All parameters were analyzed in 03 samples of groundwater at the project area in June 2014 are lower than the allowable limits of regulations of QCVN 09:2008/BTNMT. Coliform of GW9-3 was 3MPN/100ml, it meet permitted values of regulations.

4.3.4. Soil quality

- The sample time: 19th June 2014
- Monitoring locations and sampling: Table 4.29.
- Monitoring and analysis results: Table 4.30

Table 4.29. Description of monitoring locations and sampling

No.	Locaiton	Location descriptions	Co-ordinate
1	S9-1	Intersection of Ring road 2 with HLD expressway (Km4+500)	N 10 ⁰ 47'53,1"; E 106 ⁰ 47'25,2"
2	S9-2	Intersection of Ring road 2 with HLD expressway (Km4+500)	N 10 ⁰ 47'51,6"; E 106 ⁰ 47'26,3"
3	S9-3	Intersection of Ring road 2 with HLD expressway (Km4+500)	N 10 ⁰ 47'48,1"; E 106 ⁰ 47'25,7"

Table 4.30. Analysis results of soil samples

No.	Parameters	Unit	Analysis results			QCVN 03:2008 /BTNMT
			S9-1	S9-2	S9-3	

1	pH	-	5,36	5,68	6,03	-
2	Organic	%	1,27	2,34	1,65	-
3	Total N	%	0,092	0,089	0,077	-
4	Clorua (Cl ⁻)	mg/kg	628	824	931	-
5	Sulfat (SO ₄ ²⁻)	%	0,025	0,026	0,029	-
6	Asen (As)	mg/kg	0,418	0,376	0,215	12
7	Cadimi (Cd)	mg/kg	NTD	NTD	NTD	5
8	Copper (Cu)	mg/kg	6,27	5,48	6,32	70
9	Mercury (Hg)	mg/kg	NTD	NTD	NTD	-
10	Total P	mg/kg	295	314	326	-
11	Lead (Pb)	mg/kg	10,43	17,68	16,51	120
12	Zinc (Zn)	mg/kg	55,04	52,22	45,46	200

Note:

- NTD: Not detected
- QCVN 03:2008/BTNMT – National technical regulation on the allowable limits of heavy metals in the soils.

Remarks:

The soil quality regulations of QCVN 03:2008/BTNMT is used for assessing the soil quality of the project area.

All parameters were analyzed in 03 samples of soil at the project area in June 2014 meet the allowable limits of regulations of QCVN 03:2008/BTNMT.

4.4. Assessment of environmental changing tendency between two monitoring periods in June 2014 (No.6) and March 2014 (No.5)

4.4.1. Assessment of environmental changing tendency of air quality

Ambient air quality during two series of monitoring is shown in the following table:

Table 4.31. Comparison of air results between two series of monitoring

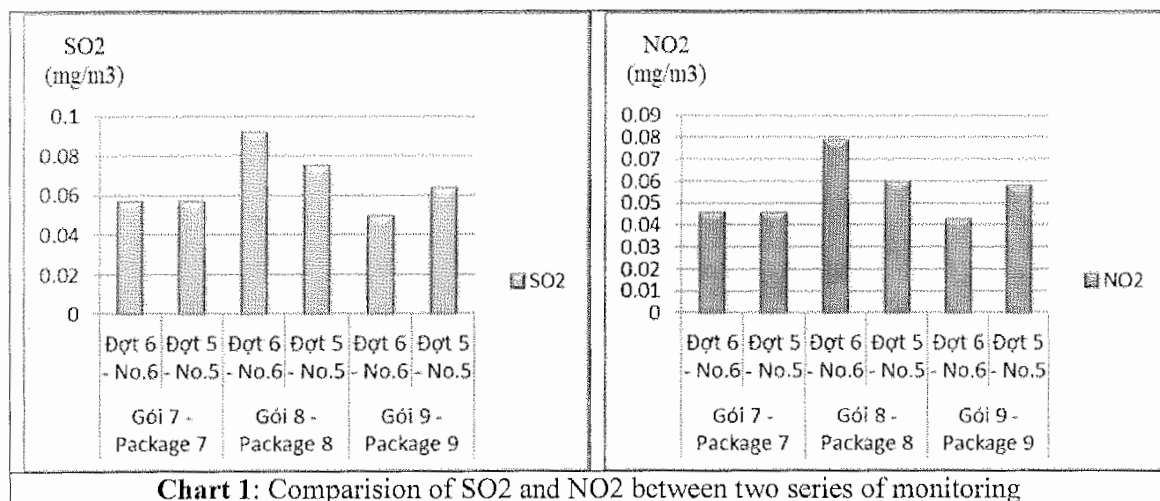
Packages	Series	SO ₂	NO ₂	HC	TSP	CO
		mg/m ³	mg/m ³	mg/m ³	mg/m ³	mg/m ³
Package 7	No.6	0,057	0,046	0,77	0,13	3,53
	No.5	0,057	0,046	1,04	0,15	3,39

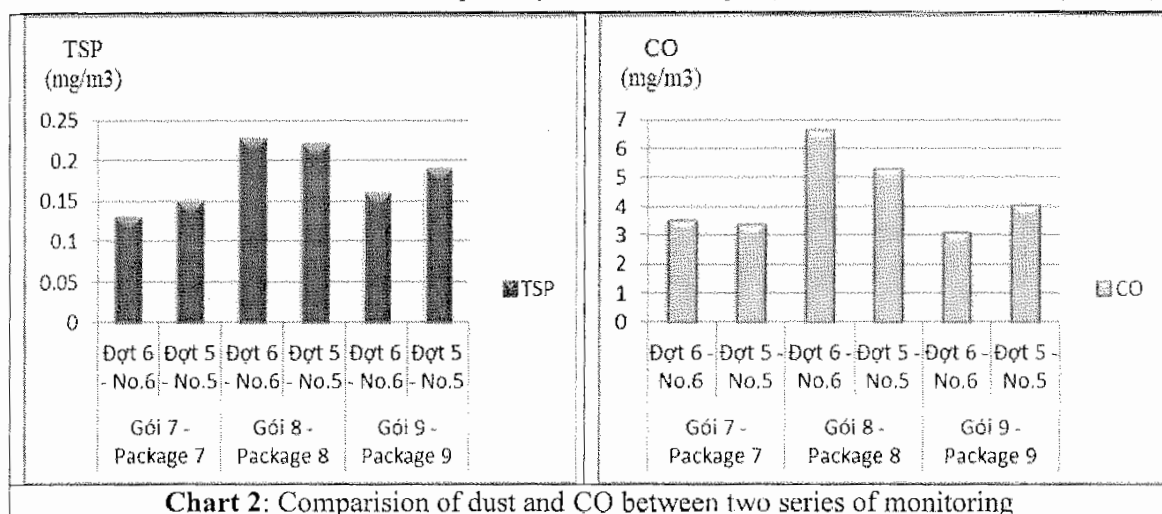
Package 8	No.6	0,092	0,079	1,205	0,228	6,66
	No.5	0,075	0,06	1,04	0,22	5,3
Package 9	No.6	0,05	0,043	0,97	0,16	3,09
	No.5	0,064	0,058	0,84	0,19	4,04
QCVN 05:2013/BTNMT		0,35	0,2	-	0,3	30
QCVN 06:2009/BTNMT		-	-	5	-	-

Remarks:

According to the monitored data showed that all parameters in ambient air quality during two series of monitoring are lower than permitted regulations of QCVN 05:2013/BTNMT and QCVN 06:2009/BTNMT.

- Packages 7 and 9: most parameters of series No.6 are lower or equal parameters of series No.5, except CO content of series No.6 of package 7 and HC content of series No.6 of Package 9 are a little higher than No.5.
- Package 8: most parameters monitored in series No.6 are higher than series No.5 but not much.





4.4.2. Assessment of environmental changing tendency of noise and vibration level

Noise and vibration level are compared as the following table:

Table 4.32. Comparison of noise and vibration level between two series of monitoring

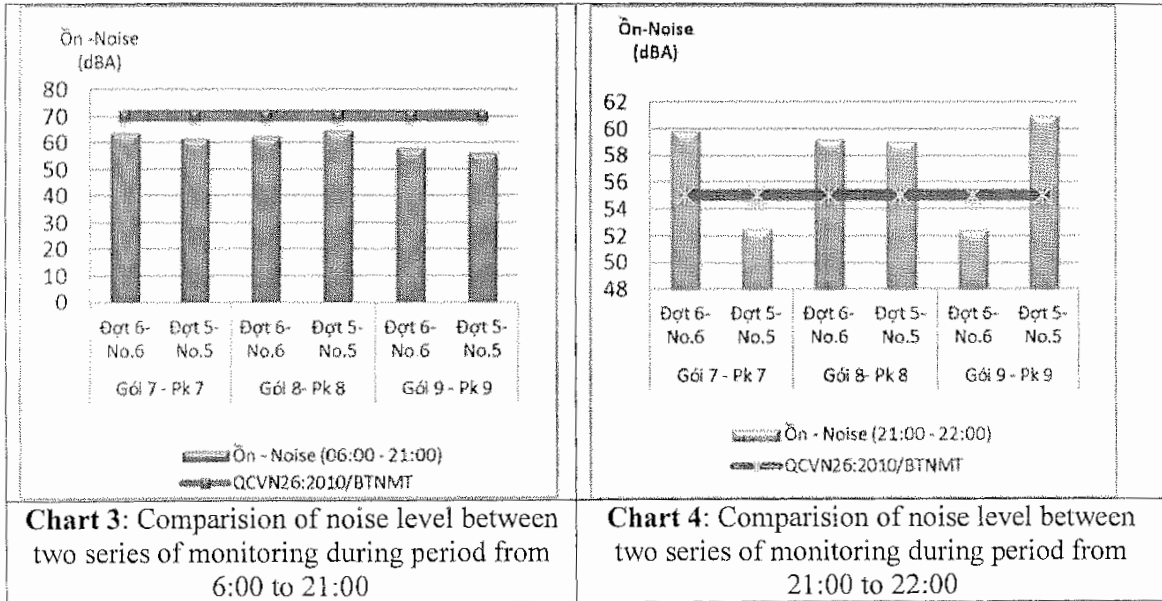
Packages	Series	Noise (dBA)		Vibration (dB)	
		6-21h	21-22h	6-21h	21-22h
Package 7	No.6	63,61	59,8	52,6	45,0
	No.5	61,5	52,5	50,6	47,0
QCVN 27:2010/BTNMT		-	-	75	58,5(baseline data)
Package 8	No.6	62,3	59,2	48,5	36,5
	No.5	64,8	59	48,9	34,6
QCVN 27:2010/BTNMT		-	-	75	26,5(baseline data)
Package 9	No.6	58,0	52,4	45,4	40,2
	No.5	56,3	61	51,9	48,4
QCVN 27:2010/BTNMT		-	-	75	47,1(baseline data)
QCVN 26:2010/BTNMT		70	55	-	-

Note: baseline data (Monitored in March 2013)

Remarks:

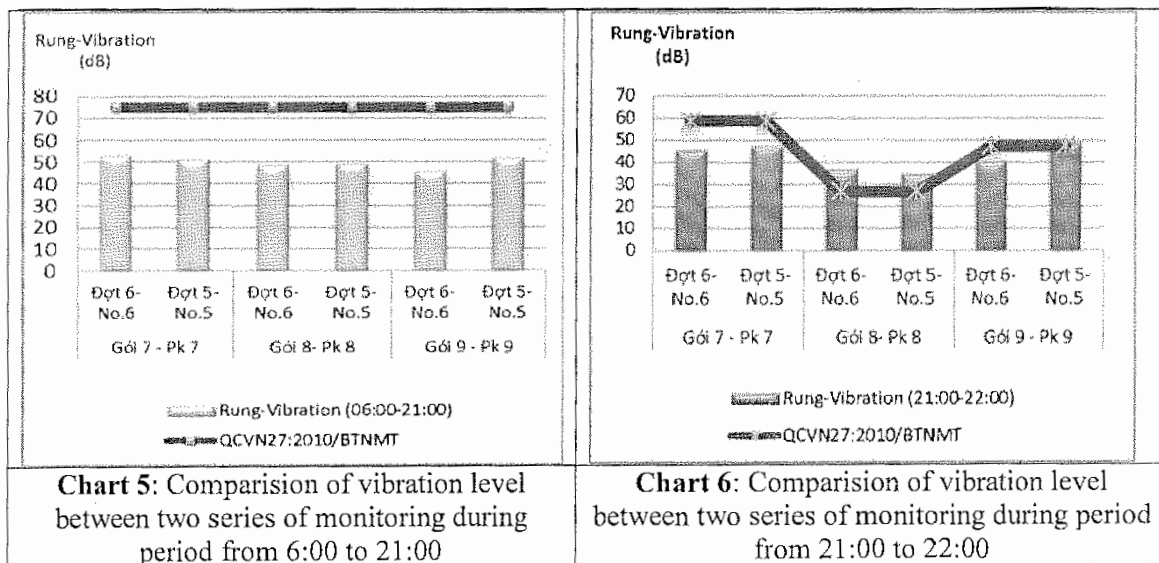
- Noise level:

- From 06:00 – 21:00: noise level of all packages are lower than permitted values of regulations many times, although noise level of series No.6 of Package 7 and 9 tend to be higher than series No.5.
- From 21:00 – 22:00: noise level during this time of series No.5 and No.6 are 4 -6dBA higher than permitted values of regulations. Noise level of series No.6 of Package 7 and 8 is higher than series No.5 but they are lower than series No.5 of Package 9.



▪ **Vibration level:**

During two period of time from 6:00 to 21:00 and from 21:00 to 22:00, vibration level of all packages in series No.6 are lower than series No.5 and they meet the allowable limits of regulations of QCVN 27:2010/BTNMT, except vibration level of Package 7 in series No.6 from 6:00 – 21:00 is higher than vibration level of series No.5 and vibration level of Package 8 in series No.6 from 21:00 – 22:00 is higher than vibration level of series No.5.



4.4.3. Assessment of environmental changing tendency of surface water quality

We just compare some of the key parameters which is a large variation observed during two series of monitoring. They are shown in the following table:

Table 4.33. Comparison of surface water quality between two series of monitoring

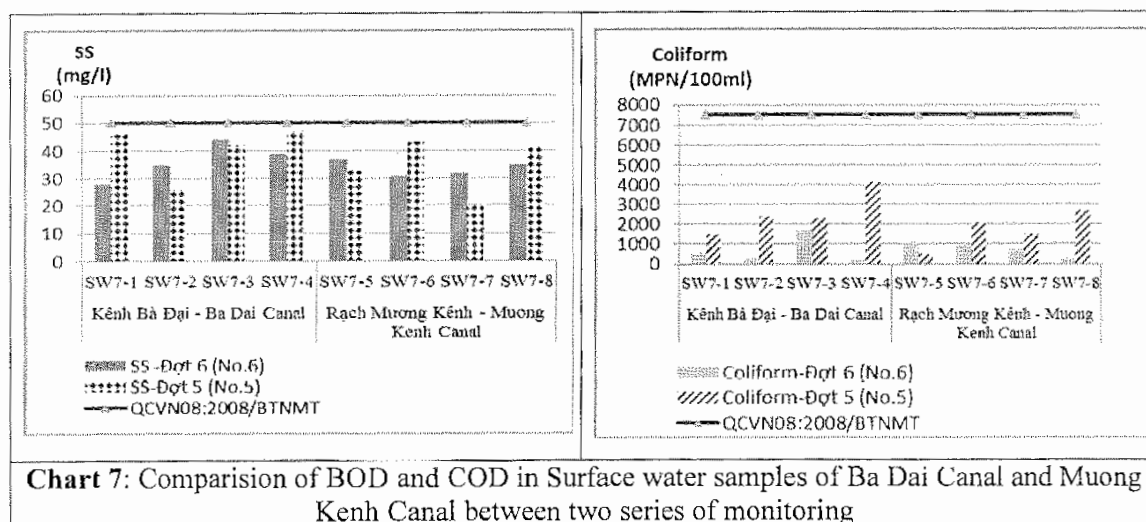
Location	Parameters									
	No.6 (June 2014)					No.5 (March 2014)				
	pH	SS (mg/l)	BOD ₅ (mg/l)	COD (mg/l)	Coliform MPN/ 100ml	pH	SS (mg/l)	BOD ₅ (mg/l)	COD (mg/l)	Coliform MPN/ 100ml
Package 7: Ba Dai Canal										
SW7-1	6,77	28	10	22	490	6,71	46	13	25	1500
SW7-2	7,06	35	12	23	230	6,79	26	15	28	2400
SW7-3	7,04	44	14	27	1700	6,91	42	16	31	2300
SW7-4	7,11	39	13	24	210	6,93	47	15	28	4100
Package 7: Muong Kenh Canal										
SW7-5	7,02	37	12	25	1100	6,96	33	13	26	490
SW7-6	7,05	31	13	26	930	7,06	43	16	33	2100
SW7-7	7,16	32	11	21	750	7,14	20	12	23	1500
SW7-8	7,11	35	10	19	260	7,17	41	15	29	2700
Package 8: Ong Cai river										
SW8-1	7,18	35	12	21	270	6,54	38	13	25	630
SW8-2	7,09	33	9	17	460	6,76	28	12	22	1500
SW8-3	7,14	41	13	25	930	6,48	47	14	28	110

Location	Parameters									
	No.6 (June 2014)					No.5 (March 2014)				
	pH	SS (mg/l)	BOD ₅ (mg/l)	COD (mg/l)	Coliform MPN/ 100ml	pH	SS (mg/l)	BOD ₅ (mg/l)	COD (mg/l)	Coliform MPN/ 100ml
SW8-4	7,22	44	15	29	1500	6,43	36	12	21	490
QCVN 08:2008/ BTNMT	5,5 - 9	50	15	30	7500	5,5 - 9	50	15	30	7500

Remarks:

Comparison of surface water of series No.6 (June 2014) with series No.5 (March 2014) are shown that all analysis results meet permitted values of regulations of Colum B1 - QCVN 08:2008/BTNMT.

- pH of most analysis samples of surface water of package 7 and 8 in series No.6 are a little higher than series No.5. in addition, SS content of 50% of analysis samples in series No.6 is higher than series No.5
- Concentration of BOD and COD: most analysis results of surface water samples of Packages 7 and 8 in series No.6 are lower than series No.5.
- Most Coliform content of samples at Ba Dai canal in series No.6 are lower than series No.5 and analysis results are also shown that most Coliform content of sampling of Muong Kenh Canal and Ong Cai river in series No.6 are lower than series No.5, except Coliform content of SW7-5 of Muong Kenh cannal and SW8-3 and SW8-4 of Ong Cai river in series No.6 are from 2,2 – 8,4 times higher than series No.5



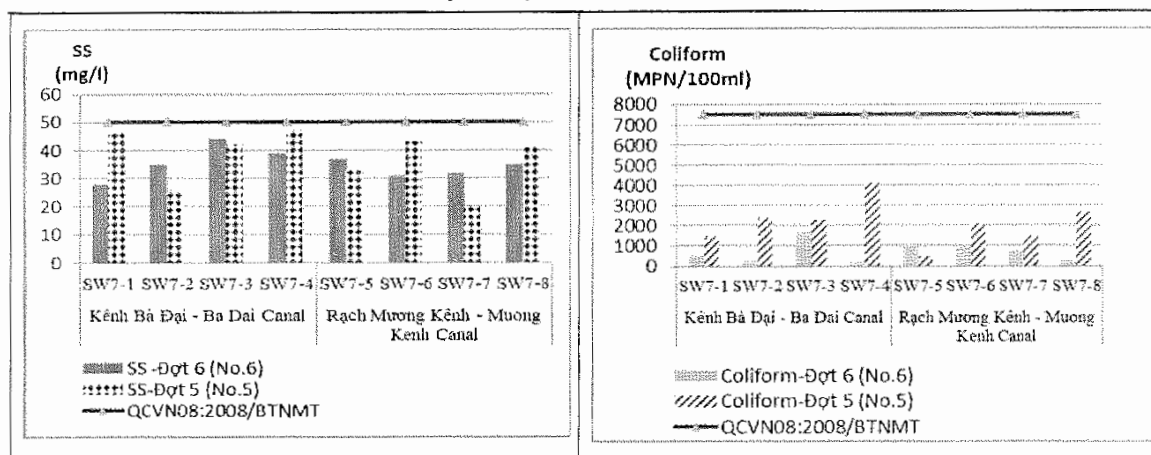


Chart 8: Comparison of SS and Coliform in Surface water samples of Ba Dai Canal and Muong Kanh Canal between two series of monitoring

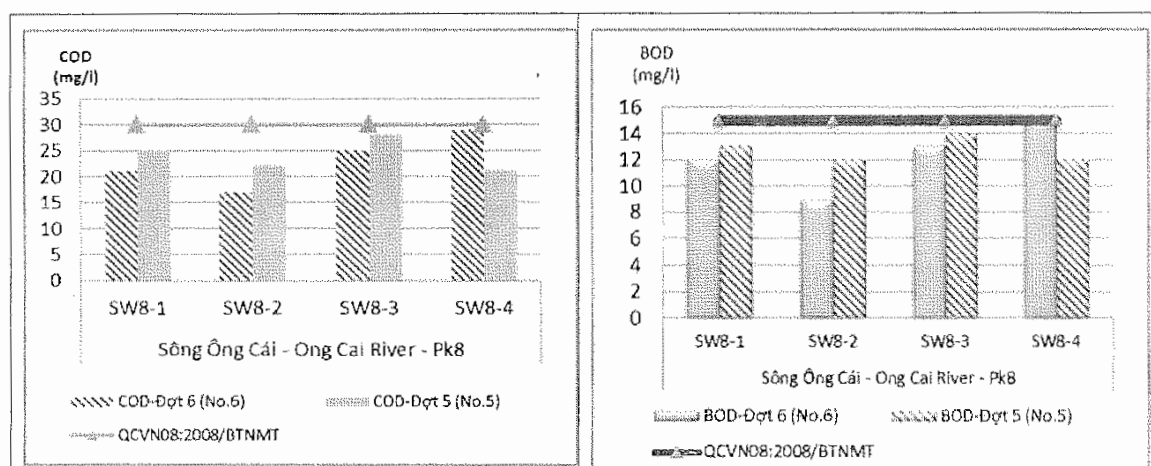


Chart 9: Comparison of BOD and COD in Surface water samples of Ong Cai River between two series of monitoring

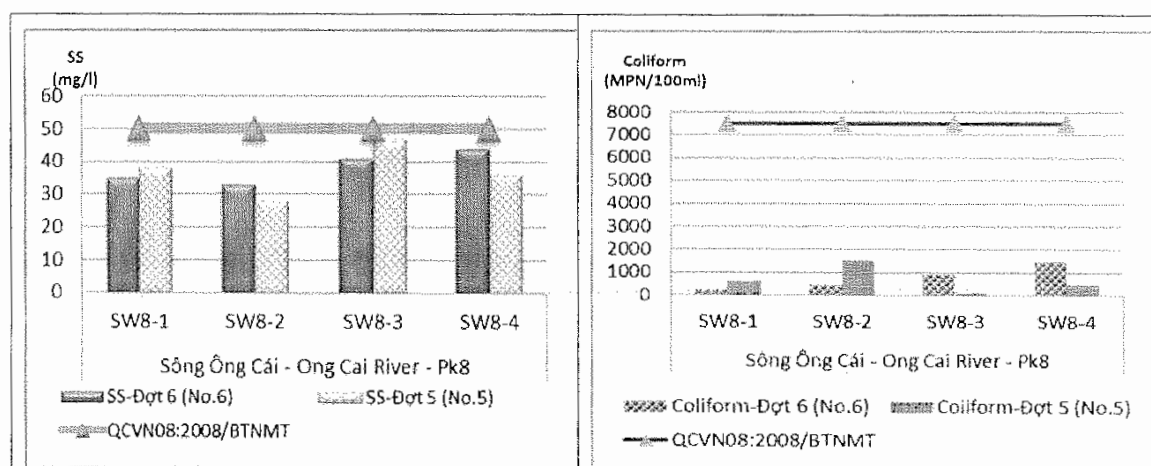


Chart 10: Comparison of SS and Coliform in Surface water samples of Ong Cai River between two series of monitoring

4.4.4. Assessment of environmental changing tendency of ground water quality

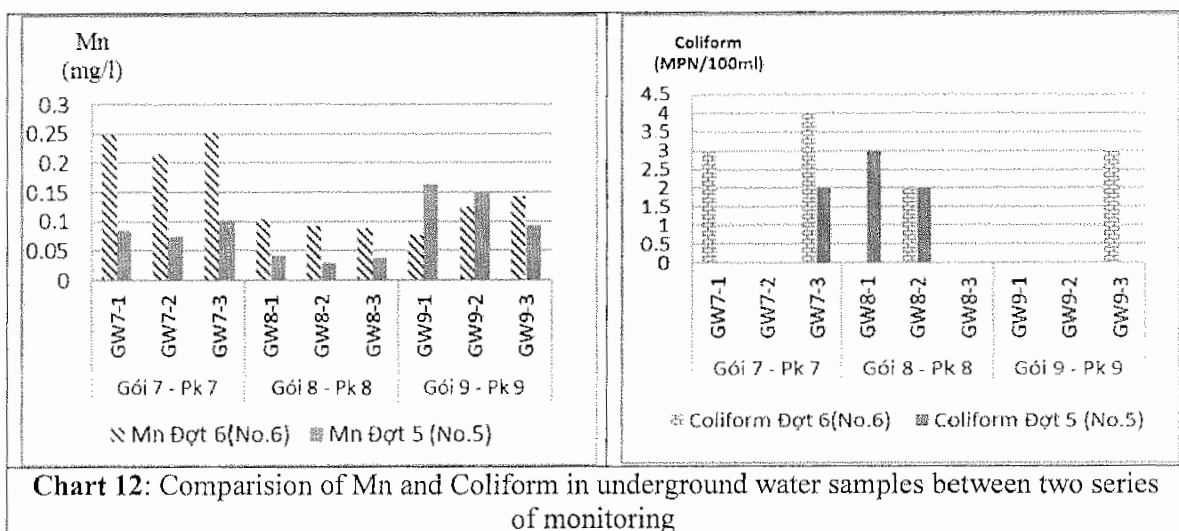
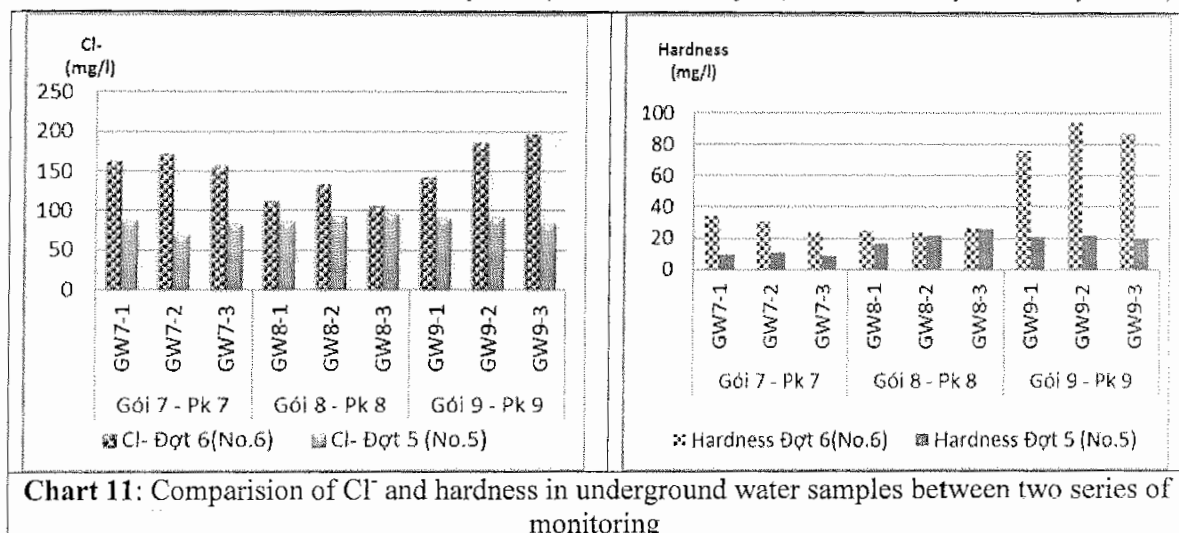
We just compare some of the key parameters which is a large variation observed during two series of monitoring. They are shown in the following table:

Table 4.34. Comparison of ground water quality between two series of monitoring

Location	Parameters									
	No.6 (June 2014)					No.5 (March 2014)				
	pH	Cl ⁻	Hardness	Mn	Coliform	pH	Cl ⁻	Hardness	Mn	Coliform
		(mg/l)	(mg/l)	(mg/l)	MPN/100ml		(mg/l)	(mg/l)	(mg/l)	MPN/100ml
Package 7										
GW7-1	6,06	164,3	34,6	0,248	3	5,87	87,1	9,2	0,084	NTD
GW7-2	5,92	172,1	31,1	0,216	NTD	5,85	68,4	10,5	0,075	NTD
GW7-3	6,14	158,6	23,5	0,251	4	5,88	83,2	8,6	0,103	2
Package 8										
GW8-1	6,91	112,6	25,6	0,104	NTD	6,61	86,2	16,8	0,042	3
GW8-2	6,89	134,5	23,8	0,092	2	6,32	93,1	21,3	0,029	2
GW8-3	6,88	107,2	26,5	0,087	NTD	6,24	95,5	25,4	0,038	NTD
Package 9										
GW9-1	6,44	143,8	76,5	0,076	NTD	5,64	89,9	20,4	0,164	NTD
GW9-2	6,38	186,7	94,4	0,124	NTD	6,18	92,1	21,2	0,152	NTD
GW9-3	6,23	198,2	87,2	0,143	3	6,13	83,4	19,3	0,092	NTD
QCVN 09:2008/ BTNMT	5,5 - 8,5	250	500	0,5	3	5,5 - 8,5	250	500	0,5	3

Remarks:

Most analysis results of pH, Cl⁻, hardness, Mn and Coliform of ground water quality at project area of packages 7 8 and 9 in series No.6 are higher than results of series No.5. however, they are under permitted values of regulations of QCVN 09:2008/ BTNMT.



4.4.5. Assessment of environmental changing tendency of soil quality

We just compare some of the key parameters which is a large variation observed during two series of monitoring. They are shown in the following table:

Table 4.35. Comparison of soil quality between two series of monitoring

Vị trí	Parameters									
	No.6 (June 2014)					No.5 (March 2014)				
	pH	As	Cd	Cu	Pb	pH	As	Cd	Cu	Pb
		mg/kg	mg/kg	mg/kg	mg/kg		mg/kg	mg/kg	mg/kg	mg/kg
Package 7										
S7-1	6,03	2,38	NTD	4,53	15,63	5,72	1,12	NTD	2,59	89
S7-2	5,91	1,45	NTD	3,91	13,51	6,15	0,658	NTD	5,76	84

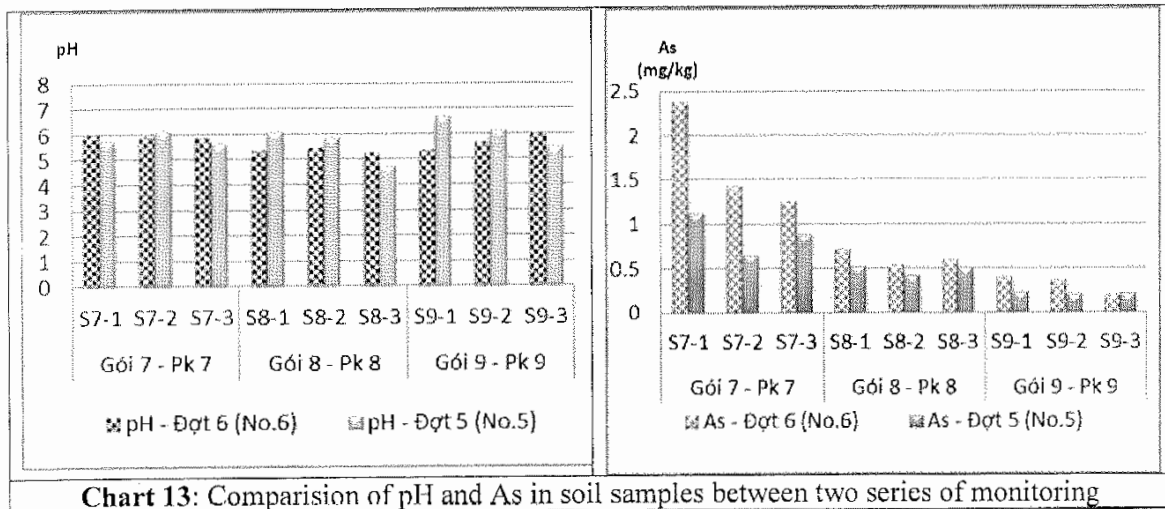
S7-3	5,87	1,27	NTD	5,12	16,27	5,64	0,884	NTD	5,48	71
Package 8										
S8-1	5,35	0,738	NTD	5,84	14,67	6,12	0,531	NTD	7,45	12,35
S8-2	5,44	0,557	NTD	6,15	15,58	5,86	0,427	NTD	5,63	13,26
S8-3	5,28	0,623	NTD	7,28	12,34	4,74	0,516	NTD	8,82	10,54
Package 9										
S9-1	5,36	0,418	NTD	6,27	10,43	6,68	0,236	NTD	8,65	15,38
S9-2	5,68	0,376	NTD	5,48	17,68	6,14	0,205	NTD	4,23	14,26
S9-3	6,03	0,215	NTD	6,32	16,51	5,52	0,227	NTD	5,11	14,75
QCVN 03:2008/ BTNMT	-	12	5	70	120	-	12	5	70	120

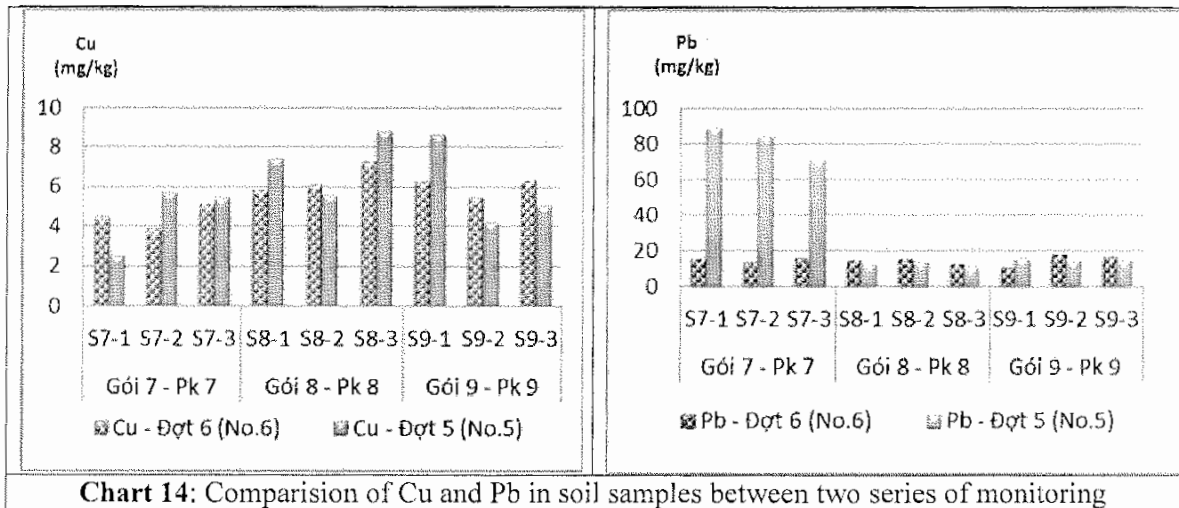
Remarks:

Cd content is not detected in all samples which analyzed at two series of samplings of all packages.

Pb content in series No.6 of three packages is lower than series No.5. while As content in series No.6 of three Packages is higher than series No.5.

- pH and Cu content change up and down between analyzed samples of Packages but they do not change much





CHAPTER V. CONCLUSION AND RECOMMENDATION

5.1. Conclusion

▪ PACKAGE 7

➤ Air quality

All monitoring data of SO₂, NO₂, HC, TSP and CO monitored in June 2014 are lower than baseline data (March 2013) and they meet permitted values of regulations of QCVN 05:2013/BTNMT, QCVN 06:2009/BTNMT. This proved that construction activities during this period do not impact on surroundings.

➤ Noise level:

- From 06:00 – 21:00: noise level was 63,6dBA. This value is 1,09 times higher than baseline data but it is 1,1 times lower than permitted values of QCVN 26:2010/BTNMT. This proved that the construction activities during this month were a slight impact on surroundings.
- From 21:00 – 22:00: noise level was 59,8dBA. This value is a litter higher than the allowable limits of regulations of QCVN 26:2010/BTNMT but it is 1,06 times lower than baseline data.

➤ Vibration level:

Vibration level of June 2014 was 52,6dB during the period of time from 6:00 – 21:00 and it was 45,0dB during the period of time from 21:00 – 22:00. These values are lower than baseline data (monitored in March 2013) and they are also lower than permitted values of regulations of QCVN 27:2010/BTNMT several times.

➤ Surface water quality

- Ba Dai Canal: All parameters of surface water quality at Ba Dai Canal were analyzed in June 2014 meet Column B1 - QCVN 08:2008/BTNMT.
- Muong Kenh Canal: All parameters of surface water quality of Muong Kenh canal in June 2014 meet permitted values of Column B1 - QCVN 08:2008/BTNMT

➤ Ground water quality

Most parameters of ground water quality at three samplings at project area in June 2014 are shown that they meet permitted values of QCVN 09:2008/BTNMT. Except Coliform content of GW7-3 is 1,33 times higher than the allowable limits of regulations.

➤ Soil quality

All parameters were analyzed in soil samples at project area in June 2014 meet the permitted values of regulations of QCVN 03:2008/BTNMT.

▪ **PACKAGE 8**

➤ Air quality

All parameters monitored during the period of time from 06:00 to 22:00 at project area in June 2014 are shown that they are higher than baseline data (monitored in March 2014). This shows that construction activities of project during this period impact on environment at project area but not significantly due to all parameters still meet the permitted values of regulations of QCVN 05:2013/BTNMT, QCVN 06:2009/BTNMT.

➤ Noise level:

All noise level were monitored during two periods of time from 06:00 to 21:00 and from 21:00 to 22:00 in June 2014 are higher than baseline data (monitored in March 2013), but during period of time from 06:00 to 21:00, noise level meet the allowable limits of regulations of QCVN 26:2010/BTNMT but during period of time from 21:00 to 22:00, noise level is 1,076 times higher than permitted values of regulations. This proves that the construction activities in this period effects on the environment of this area, but the impact in the period from 6:00 to 21:00 still within the permissible limits except the noise level in period from 21:00 to 22:00 needs to take measures to reduce the noise level.

➤ Vibration level:

Vibration level monitored during two periods of times from 06:00 to 21:00 and from 21:00 to 22:00 in June 2014 are shown that they are higher than baseline data (monitored in March 2013), but when these values compared with regulations of QCVN 26:2010/BTNMT as follows:

- From 06:00 to 21:00: vibration level was 48,5dB. This value is 1,5 times lower than regulations.
- From 21:00 to 22:00: vibration level was 36,5dB. This value is 1,37 times higher than the allowable limits of regulations.

➤ Surface water quality

Analysis results of four surface water samples of Ong Cai river (Ong Cai Bridge) in June 2014 are lower than permitted values of regulations of QCVN 08:2008/BTNMT.

➤ Ground water quality

These parameters were analyzed in 03 samples of groundwater at the project area in June 2014 meet the allowable limits of regulations of QCVN 09:2008/BTNMT. The concentration of As, Cd, Xianua, Pb and Ecoli are not detected in all samplings.

➤ Soil quality

These parameters were analyzed in 03 samples of soil at the project area in June 2014 is the same groundwater samples, these results meet the allowable limits of regulations of QCVN 03:2008/BTNMT.

▪ **PACKAGE 9**

➤ Air quality

Most parameters of air quality in the project area in June 2014 are lower than baseline data and all of them are also lower than permitted values of QCVN 05:2013 /BTNMT and QCVN06:2009 /BTNMT several times.

➤ Noise level:

- From 06:00 to 21:00: noise level was 58,0dBA. This value is 1,13 times higher than baseline data but it is 1,2 times lower than permitted values of regulations. This value proved that during this time construction activities of project impacted on surroundings but they are also under control.
- From 21:00 to 22:00: noise level was 52,4dBA. This value is lower than baseline data and it is also lower than the allowable limits of regulations.

➤ Vibration level:

Vibration level were monitored during two periods of time from 06:00 to 21:00 and from 21:00 to 22:00 in June 2014 are lower than baseline data (monitored in March 2013) and they are also lower than permitted values of regulations several times.

➤ Ground water quality

All parameters were analyzed in 03 samples of groundwater at the project area in June 2014 are lower than the allowable limits of regulations of QCVN 09:2008/BTNMT. Coliform of GW9-3 was 3MPN/100ml, it meet permitted values of regulations.

➤ Soil quality

All parameters were analyzed in 03 samples of soil at the project area in June 2014 meet the allowable limits of regulations of QCVN 03:2008/BTNMT.

5.2. Recommendation

Through the environmental monitoring in June 2014 we found that the environmental status at project area Package 7 , 8 and 9 are shown as follows:

- Air quality: construction activities of Packages 7 and 8 during this period did not impact on surroundings, all monitored parameters are under control that mean they meet permitted values of regulations. Except, construction activities of Package 8 was impact on surroundings but not significantly but the Package 8 Contractor shall have corrective measures for dust control in order to avoid affecting to workers as well as people who lives around this area.
- Vibration and noise level:
 - + From 06:00 – 21:00: construction activities of all Packages have less impact on surroundings at Packages 7 8 and 9 area. However, noise level is under control of regulations. During this time, vibration level is lower than baseline data, except vibration level due to the construction activities of Package 8 is higher than baseline data. Therefore, the contractors shall be has corrective measures to control these noise level and Package 8 Contractor need to control not only noise level but also vibration.
 - + From 21:00 – 22:00: only construction activities of Package 8 in this time impact surroundings by noise and vibration. Construction activities of Packages 7 and 9 are under control that means it not impact on surroundings by noise and vibration. The Package 8 Contractor is requested to control all construction activities in order to noise and vibration control during this period.
- Surface water quality, ground water quality and soil quality: there is not change much compared with the previous monitoring. All analysis results meet permitted values of regulations.

APPENDIX

APPENDIX 1: THE LIST PERSONNEL MOBILIZED FOR SURVEY AND MONITORING

APPENDIX 2: SOME MONITORING PICTURES

APPENDIX 3: THE MINUTES FOR SITE INSPECTION

APPENDIX 4: MONITORING RESULT AND ANALYSIS

PHỤ LỤC 5: MAP OF MONITORING LOCATIONS

APPENDIX 1:

THE LIST PERSONNEL MOBILIZED FOR SURVEY AND MONITORING

No.	Fullname	Position	Company
1	Nguyen Huu Nhat	Management	CEPT
2	Nguyen Van Chien	Air monitoring	CEPT
3	Pham Thi Minh Hoa	Noise and vibration monitoring	CEPT
4	Pham Thi Tra	Water and soil monitoring	CEPT
5	Nguyen Thien Tu	Water and soil monitoring	CEPT
6	Ha Sinh Vuong	Air monitoring	CEPT
7	Tran Dai Nghia	Air monitoring	CEPT
8	Nguyen Thanh Minh	Noise and vibration monitoring	CEPT
9	Bui Ngoc Chau	Noise and vibration monitoring	CEPT
10	Nguyen Hoang Duy Tuan	Water and soil monitoring	CEPT
11	Vu Truong Xuan	Water and soil monitoring	CEPT
12	Tran Quang Tran	Water and soil monitoring	CEPT
13	Nguyen Thi My Duyen	Analysis	CEPT
14	Dang Minh Tri	Analysis	CEPT
15	Huynh Thi Dieu Thao	Analysis	CEPT

APPENDIX 2. SOME MONITORING PICTURES

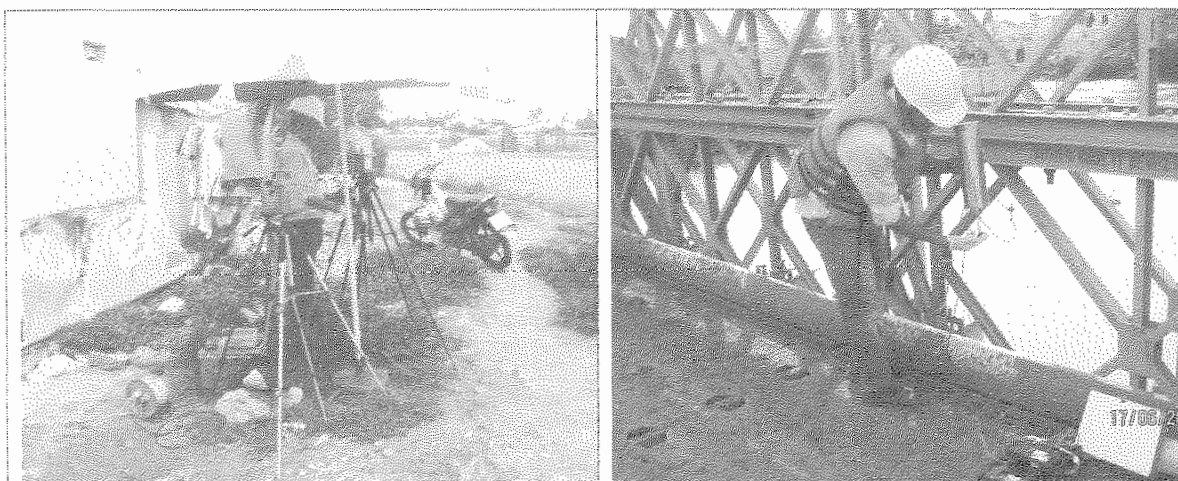


Figure 1: Air, noise, vibration monitoring and sampling of surface water of Muong Kenh canal– Pk 7

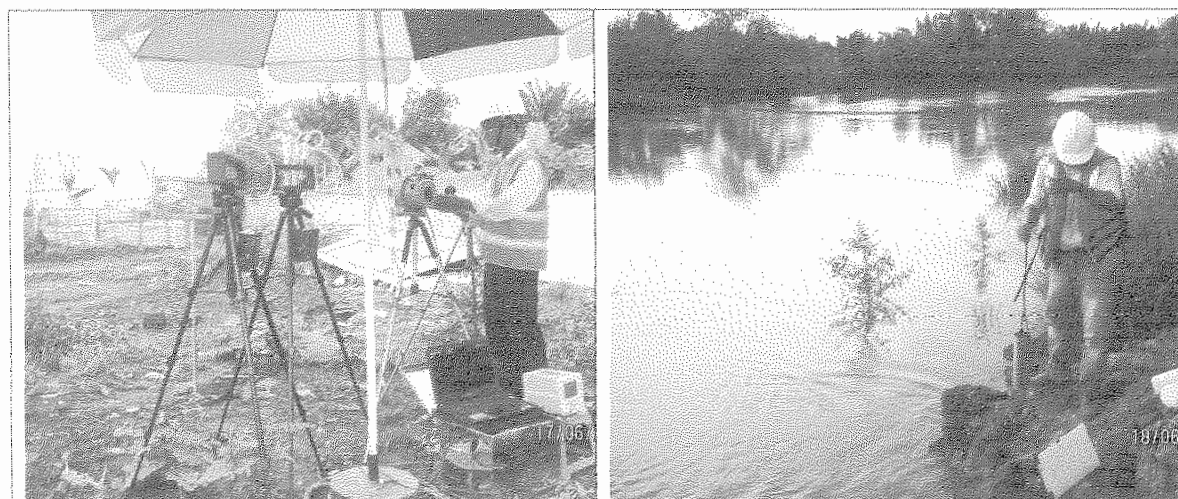


Figure 2: Air, noise, vibration monitoring and sampling of surface water of Ong Cai River– Pk 8



Figure 3: Air, noise, vibration monitoring and sampling of ground water– Pk 9

APPENDIX 3:

THE MINUTES FOR SITE INSPECTION

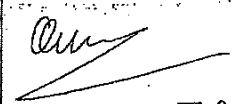
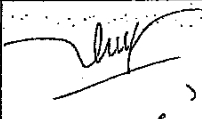
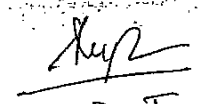
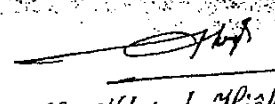
Project/(Tên dự án): North-Southe Expressway Construction Project (Ho Chi Minh City- Dau Giay section); DA-XD đường cao tốc Bắc Nam (Đoan TP HCM- Dầu Giây)
 Package/ (Gói thầu):.....
 Consultant/ (Tư vấn chính): NIPPON KIEO- TEDI SOUTHE Sub- Consultant/(Tư vấn phụ): CEPT

CHECKING EQUIPMENT AND PERSONAL AT SITE
 (Biên bản kiểm tra máy móc thiết bị và nhân lực tại hiện trường)

Ref/ (Số văn bản) Date / (Ngày) 03/06/2014 Mẫu số: EMW01
 Work item/ (Hạng mục): Environment monitoring (Quan trắc môi trường) Base on (Căn cứ vào):

Equipment/ (Máy móc)

No	Equipment type/ (Chủng loại máy)	Capacity (Công suất)	Quantity (Số lượng)	Correct type and Capacity/ (Đúng chủng loại và công suất)	Quantity (Số lượng)	Conddition/ (Tình trạng)	Trial Operation/ (Chạy thử)	Certificate/ (Chứng chỉ)
Methods stastements/ (Theo biện pháp thi công)				Acctually Mobilized (Thực tế huy động)				
1	RION - NL21 (MÁY ÒN)		1	OK	1	OK	OK	OK
2	RION - VM83 (MÁY RUNG)		1	OK	1	OK	OK	OK
3	RADECO (MÁY ĐO BỤI)		1	OK	1	OK	OK	OK
4	MÁY ĐO VI KHÍ HẬU		1	OK	1	OK	OK	OK
5	AIRCHEK SAMPLER		2	OK	2	OK	OK	OK
6	DELTA OHM		1	OK	1	OK	OK	OK

Comment/ (Nhận xét)	Sub-contractor/ (Tư vấn phụ)	Inspector Consultant/ (Tư vấn GS)	Observer EPMU HLD/ (Quan sát viên)	Site engineer/ (Kỹ sư hiện trường)
Acceptantce/(Nghiem thu) Accepted	 Trần Quang Tru	 Đoàn Thị Thuý	 Lê Duy Trung	 Lê Khánh Hiệp


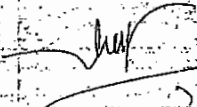
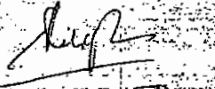
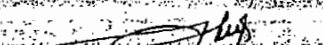
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Package/ (Gói thầu):.....7.....

Consultant/ (Tư vấn chính): NIPPON KIEO- TEDI SOUTHE

Sub- Consultant/(Tư vấn phụ): CEPT

Work contents: (Nội dung công việc)	
Air sampling and microclimate (Mẫu không khí và vi khí hậu)	8 Samples/day, Km 00 + 200 (8 mẫu / ngày, Km 00 + 200)
Noise monitoring (Quan trắc tiếng ồn)	48 Samples/day, Km 00 + 200 (48 mẫu / ngày, Km 00 + 200)
Variation monitoring (Quan trắc rung)	48 Samples/day, Km 00 + 200 (48 mẫu / ngày, Km 00 + 200)
Surface water quality sampling (Chất lượng nước mặt)	8 Samples
Ground water quality sampling (Chất lượng nước ngầm)	3 Samples
Waste water sampling - Soil monitoring (Mẫu nước thải) (Quan trắc mẫu đất)	3 Samples

Comment/ (Nhận xét)	Sub- contractor/ (Tư vấn phụ)	Inspector Consultant/ (Tư vấn GS)	Observer EPMU HLD/ (Quan sát viên)	Site engineer/ (Kỹ sư hiện trường)
Acceptance/(Nghiệm thu)	 Tran Quang Hanh	 Doan Thi Thuy	 Le Duy Trung	 Le Khanh Thiep
Accepted				

Project/(Tên dự án): North-Southe Expressway Construction Project (Ho Chi Minh City- Dau Giay section); DA-XD đường cao tốc Bắc Nam (Đoan TP HCM- Dầu Giây)

Package/ (Gói thầu):.....6.....

Consultant/ (Tư vấn chính): NIPPON KIEO- TEDI SOUTHE

Sub- Consultant/(Tư vấn phụ): CEPT

CHECKING EQUIPMENT AND PERSONAL AT SITE

(Biên bản kiểm tra máy móc thiết bị và nhân lực tại hiện trường)

Ref/ (Số văn bản)

Date / (Ngày) 08/06/2014

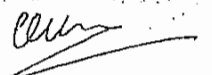
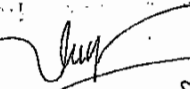
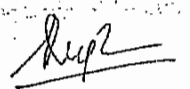
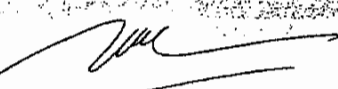
Mẫu số: EMW01

Work item/ (Hạng mục): Environment monitoring (Quan trắc môi trường)

Base on (Căn cứ vào):

Equipment/ (Máy móc)

No	Equipment type/ (Chủng loại máy)	Capacity (Công suất)	Quantity (Số lượng)	Correct type and Capacity/ (Đúng chủng loại và công suất)	Quantity (Số lượng)	Conddition/ (Tình trạng)	Trial Operation/ (Chạy thử)	Certificate/ (Chứng chỉ)
Methods statements/ (Theo biện pháp thi công)				Acctually Mobilized (Thực tế huy động)				
1	RION - NL21 (MÁY ÒN)		1	OK	1	OK	OK	OK
2	RION - VM83 (MÁY RUNG)		1	OK	1	OK	OK	OK
3	RADECO (MÁY ĐO BỤI)		1	OK	1	OK	OK	OK
4	MÁY ĐO VI KHÍ HẬU		1	OK	1	OK	OK	OK
5	AIRCHEK SAMPLER		2	OK	2	OK	OK	OK
6	DELTA OHM		1	OK	1	OK	OK	OK

Comment/ (Nhận xét)	Sub-contractor/ (Tư vấn phụ)	Inspector/ Consultant/ (Tư vấn GS)	Observer EPMU HLD/ (Quan sát viên)	Site engineer/ (Kỹ sư hiện trường)
Acceptance/(Nghiệm thu) Accepted	 Trần Quang Trạch	 Đoàn Thị Thủy	 Lê Duy Trung	 Hà Minh Long

Sub- Consultant/(Tư vấn phụ): CEPT

Mẫu số: EMW01

Base on (Căn cứ vào):

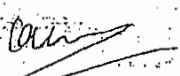

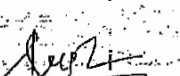

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Project/ (Tên dự án): North-Southe Expressway Construction Project (Ho Chi Minh City - Dau Giay section); DA-XD đường cao tốc Bắc Nam (Đoạn TP HCM- Dầu Giây)

Package/ (Gói thầu):.....

Consultant/ (Tư vấn chính): NIPPON KIEO- TEDI SOUTHE

Sub- Consultant/(Tư vấn phụ): CEPT


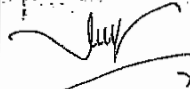
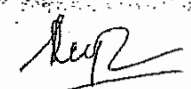
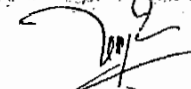
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Noise monitoring (Quan trắc tiếng ồn)	48 samples /day				
Variation monitoring (Quan trắc rung)	48 Samples /day				
Surface water quality sampling (Chất lượng nước mặt)	4 Samples /day				
Ground water quality sampling (Chất lượng nước ngầm)	3 samples /day				
Waste water sampling - soil monitoring (Mẫu nước thải) (quan trắc đất)	3 samples /day				
Comment/ (Nhận xét)	Sub- contractor/ (Tư vấn phụ)	Inspector Consultant/ (Tư vấn GS)	Observer EPMU HLD/ (Quan sát viên)	Site engineer/ (Kỹ sư hiện trường)	
Acceptance/(Nghiệm thu)	 Tran Quang Tran	 Doan Thi Thuy	 Le Duy Trung	 Ha Nhat Dung	
Accepted/					

Project/(Tên dự án): North-Southe Expressway Construction Project (Ho Chi Minh City- Dau Giay section); DA-XD đường cao tốc Bắc Nam (Đoạn TP HCM- Dầu Giây)
 Package/ (Gói thầu): 4.....
 Consultant/ (Tư vấn chính): NIPPON KIEO- TEDI SOUTHE Sub- Consultant/(Tư vấn phụ): CEPT

CHECKING EQUIPMENT AND PERSONAL AT SITE
 (Biên bản kiểm tra máy móc thiết bị và nhân lực tại hiện trường)

Ref/ (Số văn bản) Date / (Ngày) 19/06/2014 Mẫu số: EMW01
 Work item/ (Hạng mục): Environment monitoring (Quan trắc môi trường) Base on (Căn cứ vào):

Equipment/ (Máy móc)								
No	Equipment type/ (Chủng loại máy)	Capacity (Công suất)	Quantity (Số lượng)	Correct type and Capacity/ (Đúng chủng loại và công suất)	Quantity (Số lượng)	Conddition/ (Tình trạng)	Trial Operation/ (Chạy thử)	Certificate/ (Chứng chỉ)
Methods stastements/ (Theo biện pháp thi công)				Acctually Mobilized (Thực tế huy động)				
1	RION - NL21 (MÁY ÒN)		1	OK	1	OK	OK	OK
2	RION - VM83 (MÁY RUNG)		1	OK	1	OK	OK	OK
3	RADECO (MÁY ĐO BỤI)		1	OK	1	OK	OK	OK
4	MÁY ĐO VI KHÍ HẬU		1	OK	1	OK	OK	OK
5	AIRCHEK SAMPLER		2	OK	2	OK	OK	OK
6	DELTA OHM		1	OK	1	OK	OK	OK

Comment/ (Nhận xét)	Sub- contractor/ (Tư vấn phụ)	Inspector Consultant/ (Tư vấn GS)	Observer EPMU HLD/ (Quan sát viên)	Site engineer/ (Kỹ sư hiện trường)
Acceptantce/(Nghiệm thu) Accepted	 Trần Quang Trần	 Đoàn Thị Thủy	 Lê Duy Tru	 Nguyễn Khánh Toàn

Project/ (Tên dự án): North-Southe Expressway Construction Project (Ho Chi Minh City - Dau Giay section); DA-XD đường cao tốc Bắc Nam (Đoan TP HCM- Dầu Giây)

Package/ (Gói thầu): 2.....

Consultant/ (Tư vấn chính): NIPPON KIEO- TEDI SOUTHE

Sub- Consultant/(Tư vấn phụ): CEPT

Work contents: (Nội dung công việc)					
Air sampling and microclimate (Mẫu không khí và vi khí hậu)	8 samples/day				
Noise monitoring (Quan trắc tiếng ồn)	48 samples/day				
Variation monitoring (Quan trắc rung)	48 samples/day				
Surface water quality sampling (Chất lượng nước mặt)	No,				
Ground water quality sampling (Chất lượng nước ngầm)	3 samples/day				
Waste water sampling - Soil monitoring (Mẫu nước thải) (quan trắc đất)	3 samples/day				
Comment/ (Nhận xét)	Sub- contractor/ (Tư vấn phụ)	Inspector Consultant/ (Tư vấn GS)	Observer EPMU HLD/ (Quan sát viên)	Site engineer/ (Kỹ sư hiện trường)	
Acceptance/(Nghiệm thu)	Trần Quang Tiến	Đoàn Thị Thủy	Lê Duy Trung	Nguyễn Khánh Toàn	
Acceptance/					

APPENDIX 4:

MONITORING RESULT AND ANALYSIS



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Tel: (84-4)38346314 Fax (84-4)37663841

RESULT OF NOISE MONITORING

Name of project: HO CHI MINH – LONG THANH – DAU GIAY EXPRESSWAY
Monitoring site: PACKAGE 7 - INTERSECTION AN PHU (Km 00+200)
Co-ordinate: N 10°47'42,5"; E 106°45'01,4"
Time of monitoring: 17/06/2014 (06h - 22h)
Surrounding conditions: Mostly cloudy, slight wind, rainy disrupted
Nearby the site, going on construction activities
Staff: Bui Ngoc Chau – Nguyen Thanh Minh

No	Code	Sign	Result (dBA)		
			Leq	Lmax	L50
01	MM14060412	N7.1 (06h-07h)	61.0	68.5	59.9
02	MM14060413	N7.2 (07h-08h)	61.7	70.1	60.2
03	MM14060414	N7.3 (08h-09h)	62.0	70.6	61.0
04	MM14060415	N7.4 (09h-10h)	62.1	71.6	61.8
05	MM14060416	N7.5 (10h-11h)	61.6	63.8	61.5
06	MM14060417	N7.6 (11h-12h)	60.8	65.0	58.8
07	MM14060418	N7.7 (12h-13h)	68.1	80.8	64.6
08	MM14060419	N7.8 (13h-14h)	67.4	74.2	62.5
09	MM14060420	N7.9 (14h-15h)	65.1	76.5	64.0
10	MM14060421	N7.10 (15h-16h)	68.5	78.4	67.1
11	MM14060422	N7.11 (16h-17h)	64.4	74.9	62.3
12	MM14060423	N7.12 (17h-18h)	62.6	68.3	61.0
13	MM14060424	N7.13 (18h-19h)	62.2	70.1	62.4
14	MM14060425	N7.14 (19h-20h)	63.0	75.0	62.2
15	MM14060426	N7.15 (20h-21h)	63.7	79.0	62.9
16	MM14060427	N7.16 (21h-22h)	59.8	64.2	58.2

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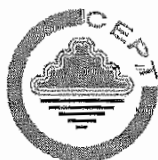
Nguyen Thanh Minh

Phan Chi Minh Hoa



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Dương Thị Phương Nga



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RESULT OF VIBRATION MONITORING

Name of project: HO CHI MINH – LONG THANH – DAU GIAY EXPRESSWAY

Monitoring site: PACKAGE 7 - INTERSECTION AN PHU (Km 00+200)

Co-ordinate: N 10°47'42,5"; E 106°45'01,4"

Time of monitoring: 17/06/2014 (06h - 22h)

Surrounding conditions: Mostly cloudy, slight wind, rainy disrupted
Nearby the site, going on construction activities

Staff: Bui Ngoc Chau – Nguyen Thanh Minh

No	Code	Sign	Result (dB)	
			Leq	Lveq
1.	MM14060428	V7.1 (06h-07h)	50.1	42.2
2.	MM14060429	V7.2 (07h-08h)	50.2	42.6
3.	MM14060430	V7.3 (08h-09h)	50.8	43.0
4.	MM14060431	V7.4 (09h-10h)	50.4	42.9
5.	MM14060432	V7.5 (10h-11h)	54.5	46.8
6.	MM14060433	V7.6 (11h-12h)	55.0	47.4
7.	MM14060434	V7.7 (12h-13h)	56.6	48.4
8.	MM14060435	V7.8 (13h-14h)	54.1	45.2
9.	MM14060436	V7.9 (14h-15h)	58.4	50.1
10.	MM14060437	V7.10 (15h-16h)	58.0	49.2
11.	MM14060438	V7.11 (16h-17h)	52.6	44.0
12.	MM14060439	V7.12 (17h-18h)	58.8	50.8
13.	MM14060440	V7.13 (18h-19h)	46.2	40.4
14.	MM14060441	V7.14 (19h-20h)	46.5	41.6
15.	MM14060442	V7.15 (20h-21h)	46.8	42.0
16.	MM14060443	V7.16 (21h-22h)	45.0	40.2

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RESULT OF AIR QUALITY MONITORING

Name of project: HO CHI MINH – LONG THANH – DAU GIAY EXPRESSWAY
Monitoring site: PACKAGE 7 - INTERSECTION AN PHU (Km 00+200)
Co-ordinate: N 10°47'42,5"; E 106°45'01,4"
Time of monitoring: 17/06/2014 (06h - 22h)
Surrounding conditions: Mostly cloudy, slight wind, rainy disrupted
Nearby the site, going on construction activities
Staff: H. T. Dieu Thao – Tran Dai Nghia

1. Results of microclimate parameters:

No	Code	Sign	Temp °C	Humidity %	Wind velocity m/s	Pressure mB	Wind direction
1.	MM14060444	A7.1 (06h-08h)	28.2	76.6	0.1-0.3	1005.4	WS
2.	MM14060445	A7.2 (08h-10h)	30.7	62.6	0.2-0.7	1006.8	WS
3.	MM14060446	A7.3 (10h-12h)	32.1	56.5	0.2-0.5	1006.5	WS
4.	MM14060447	A7.4 (12h-14h)	33.4	54.6	0.6-1.2	1007.1	WS
5.	MM14060448	A7.5 (14h-16h)	32.8	58.1	0.8-1.5	1005.2	WS
6.	MM14060449	A7.6 (16h-18h)	27.1	67.3	0.4-1.2	1006.7	WS
7.	MM14060450	A7.7 (18h-20h)	26.4	77.5	0.3-0.9	1004.4	WS
8.	MM14060451	A7.8 (20h-22h)	25.1	89.9	0.2-0.7	1004.9	WS



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2. Results of air quality measurement:

No	Code	Sign	SO ₂ mg/m ³	NO ₂ mg/m ³	HC mg/m ³	TSP mg/m ³	CO mg/m ³
1.	MM14060452	A7.1 (06h-08h)	0.049	0.044	NDT	0.122	3.16
2.	MM14060453	A7.2 (08h-10h)	0.055	0.047	NDT	0.147	3.85
3.	MM14060454	A7.3 (10h-12h)	0.063	0.051	0.51	0.158	4.17
4.	MM14060455	A7.4 (12h-14h)	0.069	0.052	0.74	0.153	4.84
5.	MM14060456	A7.5 (14h-16h)	0.078	0.059	1.18	0.157	4.89
6.	MM14060457	A7.6 (16h-18h)	0.062	0.050	0.65	0.107	3.97
7.	MM14060458	A7.7 (18h-20h)	0.042	0.034	NDT	0.101	1.97
8.	MM14060459	A7.8 (20h-22h)	0.040	0.034	NDT	0.092	1.42

Note: NDT – Not detected

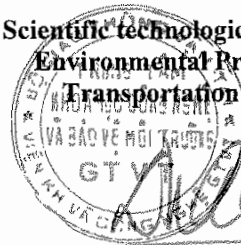
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RESULT OF SURFACE WATER MONITORING

Name of project: HO CHI MINH – LONG THANH – DAU GIAI EXPRESSWAY
Monitoring site: **Package 7 - BA DAI CANAL**
Co-ordinate: **SW7-1: N 10°47'42,6"; E 106°45'07,5"**
SW7-2: N 10°47'42,1"; E 106°45'06,8"
SW7-3: N 10°47'25,3"; E 106°45'09,4"
SW7-4: N 10°47'25,8"; E 106°45'10,1"
Time of monitoring: **17/06/2014**
Surrounding conditions: Mostly cloudy, slight wind
Nothing household nearby canal, having many water coconut along canal
Staff: **Tran Quang Tran – Tran Thanh Phuong**

1. Results on measuring, monitoring the surface water at upstream (morning and afternoon):

No	Analysis critetia	Unit	Result analysis		QCVN 08:2008/BTNMT	
			SW7-1 MM14060460	SW7-2 MM14060461	Column A2	Column B1
1.	pH	-	6.77	7.06	6 ÷ 8.5	5.5 ÷ 9
2.	Temp.	°C	30.5	30.8	-	-
3.	Conductivity	μS/cm (25°C)	2707	1106	-	-
4.	DO	mg/l	4.28	4.39	≥ 5	≥ 4
5.	BOD ₅	mg/l	10	12	6	15
6.	COD	mg/l	22	23	15	30
7.	SS	mg/l	28	35	30	50
8.	PO ₄ ³⁻	mg/l	0.056	0.072	0.2 (as P)	0.3 (as P)
9.	NO ₂ ⁻	mg/l	NDT	NDT	0.02 (as N)	0.02 (as N)
10.	NO ₃ ⁻	mg/l	0.374	0.235	5 (as N)	10 (as N)



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No	Analysis criteria	Unit	Result analysis		QCVN 08:2008/BTNMT	
			SW7-1 MM14060460	SW7-2 MM14060461	Column A2	Column B1
11.	NH ₄ ⁺	mg/l	0.31	0.26	0.2 (as N)	0.5 (as N)
12.	As	mg/l	NDT	NDT	0.02	0.05
13.	Cd	mg/l	NDT	NDT	0.005	0.01
14.	Cr ⁶⁺	mg/l	NDT	NDT	0.02	0.04
15.	Cu	mg/l	0.042	0.031	0.2	0.5
16.	Hg	mg/l	NDT	NDT	0.001	0.001
17.	Pb	mg/l	NDT	NDT	0.02	0.05
18.	Zn	mg/l	0.046	0.053	1.0	1.5
19.	Oil and grease	mg/l	NDT	NDT	0.02	0.1
20.	Coliforms	MPN/100ml	490	230	5000	7500

2. Result on measuring, monitoring the surface water at downstream (morning and afternoon):

No	Analysis criteria	Unit	Result analysis		QCVN 08:2008/BTNMT	
			SW7-3 MM14060462	SW7-4 MM14060463	Column A2	Column B1
1.	pH	-	7.04	7.11	6 ÷ 8.5	5.5 ÷ 9
2.	Temp.	°C	30.5	30.6	-	-
3.	Conductivity	μS/cm(25°C)	1102	1058	-	-
4.	DO	mg/l	4.35	4.31	≥ 5	≥ 4
5.	BOD ₅	mg/l	14	13	6	15



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No	Analysis critetia	Unit	Result analysis		QCVN 08:2008/BTNMT	
			SW7-3 MM14060462	SW7-4 MM14060463	Column A2	Column B1
6.	COD	mg/l	27	24	15	30
7.	SS	mg/l	44	39	30	50
8.	PO ₄ ³⁻	mg/l	0.086	0.107	0.2 (as P)	0.3 (as P)
9.	NO ₂ ⁻	mg/l	NDT	NDT	0.02 (as N)	0.02 (as N)
10.	NO ₃ ⁻	mg/l	0.228	0.327	5 (as N)	10 (as N)
11.	NH ₄ ⁺	mg/l	0.29	0.24	0.2 (as N)	0.5 (as N)
12.	As	mg/l	NDT	NDT	0.02	0.05
13.	Cd	mg/l	NDT	NDT	0.005	0.01
14.	Cr ⁶⁺	mg/l	NDT	NDT	0.02	0.04
15.	Cu	mg/l	0.043	0.045	0.2	0.5
16.	Hg	mg/l	NDT	NDT	0.001	0.001
17.	Pb	mg/l	NDT	NDT	0.02	0.05
18.	Zn	mg/l	0.076	0.062	1.0	1.5
19.	Oil and grease	mg/l	NDT	NDT	0.02	0.1
20.	Coliforms	MPN/100ml	1700	210	5000	7500

Note: NDT – Not detected

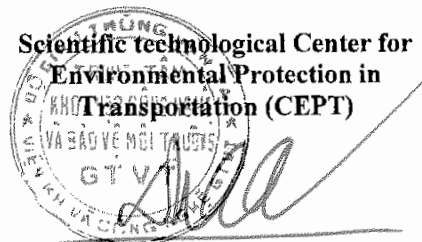
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RESULT OF SURFACE WATER MONITORING

Name of project: HO CHI MINH – LONG THANH – DAU GIAY EXPRESSWAY

Monitoring site: Package 7 - MUONG KENH CANAL

Co-ordinate: SW7-5: N 10°47'47,1"; E 106°45'46,1"

SW7-6: N 10°47'47,8"; E 106°45'46,6"

SW7-7: N 10°47'47,4"; E 106°45'45,2"

SW7-8: N 10°47'47,5"; E 106°45'45,7"

Time of monitoring: 17/06/2014

Surrounding conditions: Mostly cloudy, slight wind

Nothing household nearby canal, having many water coconut along canal

Staff: Tran Quang Tran – Tran Thanh Phuong

1. Results on measuring, monitoring the surface water at upstream (morning and afternoon):

No	Analysis criteria	Unit	Result analysis		QCVN 08:2008/BTNMT	
			SW7-5 MM14060464	SW7-6 MM14060465	Column A2	Column B1
1.	pH	-	7.02	7.05	6 ÷ 8.5	5.5 ÷ 9
2.	Temp.	°C	31.1	30.9	-	-
3.	Conductivity	µS/cm (25°C)	1031	910	-	-
4.	DO	mg/l	4.26	4.33	≥ 5	≥ 4
5.	BOD ₅	mg/l	12	13	6	15
6.	COD	mg/l	25	26	15	30
7.	SS	mg/l	37	31	30	50
8.	PO ₄ ³⁻	mg/l	0.112	0.098	0.2 (as P)	0.3 (as P)
9.	NO ₂ ⁻	mg/l	NDT	NDT	0.02 (as N)	0.02 (as N)
10.	NO ₃ ⁻	mg/l	0.216	0.338	5 (as N)	10 (as N)
11.	NH ₄ ⁺	mg/l	0.17	0.24	0.2 (as N)	0.5 (as N)
12.	As	mg/l	NDT	NDT	0.02	0.05



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No	Analysis critetia	Unit	Result analysis		QCVN 08:2008/BTNMT	
			SW7-5 MM14060464	SW7-6 MM14060465	Column A2	Column B1
13.	Cd	mg/l	NDT	NDT	0.005	0.01
14.	Cr ⁶⁺	mg/l	NDT	NDT	0.02	0.04
15.	Cu	mg/l	0.023	0.035	0.2	0.5
16.	Hg	mg/l	NDT	NDT	0.001	0.001
17.	Pb	mg/l	NDT	NDT	0.02	0.05
18.	Zn	mg/l	0.047	0.053	1.0	1.5
19.	Oil and grease	mg/l	NDT	NDT	0.02	0.1
20.	Coliforms	MPN/100ml	1100	930	5000	7500

2. Result on measuring, monitoring the surface water at downstream (morning and afternoon):

No	Analysis critetia	Unit	Result analysis		QCVN 08:2008/BTNMT	
			SW7-7 MM14060466	SW7-8 MM14060467	Column A2	Column B1
1.	pH	-	7.16	7.11	6 ÷ 8.5	5.5 ÷ 9
2.	Temp.	°C	31.1	30.8	-	-
3.	Conductivity	μS/cm(25 ⁰ C)	953	1016	-	-
4.	DO	mg/l	4.57	4.62	≥ 5	≥ 4
5.	BOD ₅	mg/l	11	10	6	15
6.	COD	mg/l	21	19	15	30
7.	SS	mg/l	32	35	30	50



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No	Analysis critetia	Unit	Result analysis		QCVN 08:2008/BTNMT	
			SW7-7 MM14060466	SW7-8 MM14060467	Column A2	Column B1
8.	PO_4^{3-}	mg/l	0.106	0.118	0.2 (as P)	0.3 (as P)
9.	NO_2^-	mg/l	NDT	NDT	0.02 (as N)	0.02 (as N)
10.	NO_3^-	mg/l	0.307	0.286	5 (as N)	10 (as N)
11.	NH_4^+	mg/l	0.23	0.21	0.2 (as N)	0.5 (as N)
12.	As	mg/l	NDT	NDT	0.02	0.05
13.	Cd	mg/l	NDT	NDT	0.005	0.01
14.	Cr^{6+}	mg/l	NDT	NDT	0.02	0.04
15.	Cu	mg/l	0.038	0.041	0.2	0.5
16.	Hg	mg/l	NDT	NDT	0.001	0.001
17.	Pb	mg/l	NDT	NDT	0.02	0.05
18.	Zn	mg/l	0.061	0.073	1.0	1.5
19.	Oil and grease	mg/l	NDT	NDT	0.02	0.1
20.	Coliforms	MPN/100ml	750	260	5000	7500

Note: NDT – Not detected

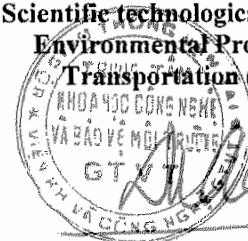
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Phạm Thị Trào

Scientific technological Center for
Environmental Protection in
Transportation (CEPT)



GIÁM ĐỐC

Đặng Thị Phương Nga



**INSTITUTE OF TRANSPORTATION SCIENCE AND TECHNOLOGY
SCIENTIFIC TECHNOLOGICAL CENTER FOR ENVIRONMENTAL
PROTECTION IN TRANSPORTATION (CEPT)**

1252 Lang street. Dong Da district. Hanoi city. Viet Nam

Tel: (84-4)38346314 Fax (84-4)37663841

RESULT OF GROUNDWATER MONITORING

Name of project: **HO CHI MINH – LONG THANH – DAU GIAY EXPRESSWAY**

Monitoring site: **Package 7 - AN PHU WARD. DISTRICT 2**

Co-ordinate: **GW7-1: N 10°47'42,5"; E 106°45'05,8" (110 Nguyen Thi Dinh, An Phu, District 2)**
GW7-2: N 10°47'42,1"; E 106°45'07,2" (133 Nguyen Thi Dinh, An Phu, District 2)
GW7-3: N 10°47'42,6"; E 106°45'06,5" (108 Nguyen Thi Dinh, An Phu, District 2)

Time of monitoring: **17/06/2014**

Weather condition: **Mostly cloudy, slight wind**

Staff: **Tran Quang Tran –Tran Thanh Phuong**

No	Analysis criteria	Unit	Result analysis			QCVN 09:2008/ BTNMT
			GW7-1 MM14060468	GW7-2 MM14060469	GW7-3 MM14060470	
1	pH	-	6.06	5.92	6.14	5.5 ÷ 8.5
2	Temp.	°C	29.5	29.3	29.9	-
3	Turbidity	NTU	0.54	1.28	0.72	-
4	Conductivity	μS/cm (25°C)	718	736	719	-
5	Color	Pt/Co	3.1	2.9	2.4	-
6	Smell	-	Not Smell	Not Smell	Not Smell	-
7	Hardness level	mgCaCO ₃ /l	34.6	31.1	23.5	500
8	Cl ⁻	mg/l	164.3	172.1	158.6	250
9	SO ₄ ²⁻	mg/l	104.7	98.5	115.4	400
10	NO ₃ ⁻	mg/l	0.429	0.372	0.516	15 (as N)
11	TDS	mg/l	381	392	375	1500



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No	Analysis criteria	Unit	Result analysis			QCVN 09:2008/ BTNMT
			GW7-1 MM14060468	GW7-2 MM14060469	GW7-3 MM14060470	
12	As	mg/l	NDT	NDT	NDT	0.05
13	Cd	mg/l	NDT	NDT	NDT	0.005
14	CN ⁻	mg/l	NDT	NDT	NDT	0.01
15	Fe	mg/l	2.23	2.16	2.27	5
16	Mn	mg/l	0.248	0.216	0.251	0.5
17	Pb	mg/l	NDT	NDT	NDT	0.01
18	E. Coli	MPN/ 100ml	NDT	NDT	NDT	Not detected
19	Coliforms	MPN/ 100ml	3	NDT	4	3

Note: NDT – Not detected

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RESULT OF SOIL MONITORING

Name of project: HO CHI MINH – LONG THANH – DAU GIAY EXPRESSWAY
Monitoring site: **Package 7 - NEAR KENH MUONG CANAL. AN PHU WARD. DISTRICT 2**
Co-ordinate: S7-1: N 10°47'45,2"; E 106°45'44,1"
S7-2: N 10°47'48,4"; E 106°45'32,5"
S7-3: N 10°47'46,3"; E 106°45'31,4"
Time of monitoring: 17/06/2014
Weather condition: Mostly cloudy, slight wind
Staff: Tran Quang Tran – Tran Thanh Phuong

No	Analysis critetia	Unit	Result analysis			QCVN 03:2008/ BTNMT
			S7-1 MM14060471	S7-2 MM14060472	S7-3 MM14060473	
1.	pH	-	6.03	5.91	5.87	-
2.	Organic matters	%	2.15	2.24	2.11	-
3.	Total N	%	0.086	0.081	0.072	-
4.	Cl ⁻	mg/kg	1539	1478	1265	-
5.	SO ₄ ²⁻	%	0.012	0.016	0.014	-
6.	As	mg/kg	2.38	1.45	1.27	12
7.	Cd	mg/kg	NDT	NDT	NDT	5
8.	Cu	mg/kg	4.53	3.91	5.12	70
9.	Hg	mg/kg	NDT	NDT	NDT	-
10.	P	mg/kg	105	96	118	-
11.	Pb	mg/kg	15.63	13.51	16.27	120
12.	Zn	mg/kg	58.49	51.26	55.42	200

Note: NDT – Not detected

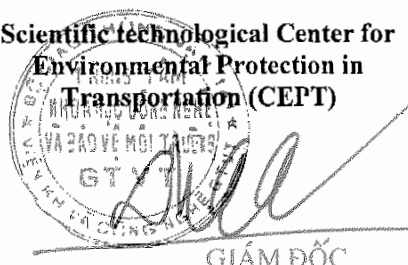
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RESULT OF NOISE MONITORING

Name of project: HO CHI MINH – LONG THANH – DAU GIAY EXPRESSWAY
Monitoring site: PACKAGE 8 - PHU HUU WARD, DISTRICT 9
Co-ordinate: N 10°47'51,1"; E 106°46'44,5"
Time of monitoring: 18/06/2014 (06h - 22h)
Surrounding conditions: Mostly cloudy, slight wind, rainy disrupted
Nearby the site - 500m from away, going on construction activities
Staff: Bui Ngoc Chau – Nguyen Thanh Minh

No	Code	Sign	Result (dBA)		
			Leg	Lmax	L50
01	MM14060474	N8.1 (06h-07h)	62.9	74.1	62.1
02	MM14060475	N8.2 (07h-08h)	63.1	78.4	62.3
03	MM14060476	N8.3 (08h-09h)	62.1	75.2	61.0
04	MM14060477	N8.4 (09h-10h)	64.2	80.6	62.8
05	MM14060478	N8.5 (10h-11h)	63.2	77.1	60.4
06	MM14060479	N8.6 (11h-12h)	62.9	75.0	60.6
07	MM14060480	N8.7 (12h-13h)	62.0	79.7	59.7
08	MM14060481	N8.8 (13h-14h)	64.3	82.4	63.2
09	MM14060482	N8.9 (14h-15h)	62.8	76.3	60.0
10	MM14060483	N8.10 (15h-16h)	63.4	78.6	61.9
11	MM14060484	N8.11 (16h-17h)	60.5	71.3	56.8
12	MM14060485	N8.12 (17h-18h)	59.8	69.3	58.1
13	MM14060486	N8.13 (18h-19h)	60.3	70.4	58.6
14	MM14060487	N8.14 (19h-20h)	62.1	76.5	60.4
15	MM14060488	N8.15 (20h-21h)	61.3	72.1	60.3
16	MM14060489	N8.16 (21h-22h)	59.2	67.3	56.8

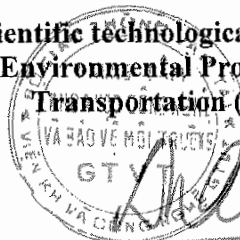
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Nguyen Thanh Minh

Phan Chu Phung Hoa



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Dang Chi Phuong Ngo



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RESULT OF VIBRATION MONITORING

Name of project: HO CHI MINH – LONG THANH – DAU GIAY EXPRESSWAY

Monitoring site: PACKAGE 8 - PHU HUU WARD, DISTRICT 9

Co-ordinate: N 10°47'51,1"; E 106°46'44,5"

Time of monitoring: 18/06/2014 (06h - 22h)

Surrounding conditions: Mostly cloudy, slight wind, rainy disrupted
Nearby the site - 500m from away, going on construction activities

Staff: Bui Ngoc Chau – Nguyen Thanh Minh

No	Code	Sign	Result (dB)	
			Leq	Lveq
01	MM14060490	V8.1 (06h-07h)	48.5	40.2
02	MM14060491	V8.2 (07h-08h)	48.2	39.8
03	MM14060492	V8.3 (08h-09h)	50.3	42.6
04	MM14060493	V8.4 (09h-10h)	52.8	46.6
05	MM14060494	V8.5 (10h-11h)	54.2	48.4
06	MM14060495	V8.6 (11h-12h)	54.8	48.9
07	MM14060496	V8.7 (12h-13h)	42.7	36.4
08	MM14060497	V8.8 (13h-14h)	40.3	36.0
09	MM14060498	V8.9 (14h-15h)	54.2	48.5
10	MM14060499	V8.10 (15h-16h)	54.6	47.6
11	MM14060500	V8.11 (16h-17h)	52.8	46.8
12	MM14060501	V8.12 (17h-18h)	52.0	46.3
13	MM14060502	V8.13 (18h-19h)	46.2	38.6
14	MM14060503	V8.14 (19h-20h)	38.6	32.4
15	MM14060504	V8.15 (20h-21h)	38.2	31.6
16	MM14060505	V8.16 (21h-22h)	36.5	30.8

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RESULT OF AIR QUALITY MONITORING

Name of project: HO CHI MINH – LONG THANH – DAU GIAY EXPRESSWAY
Monitoring site: PACKAGE 8 - PHU HUU WARD, DISTRICT 9
Co-ordinate: N 10°47'51,1"; E 106°46'44,5"
Time of monitoring: 18/06/2014 (06h - 22h)
Surrounding conditions: Mostly cloudy, slight wind, rainy disrupted
Nearby the site - 500m from away, going on construction activities
Staff: H. T. Dieu Thao – Tran Dai Nghia

1. Results of microclimate parameters:

No	Code	Sign	Temp °C	Humidity %	Wind velocity m/s	Pressure mB	Wind direction
1	MM14060506	A8.1 (06h-08h)	29.9	71.1	0.4-0.8	1005.7	WS
2	MM14060507	A8.2 (08h-10h)	31.2	68.7	0.4-0.7	1007.1	WS
3	MM14060508	A8.3 (10h-12h)	31.7	67.9	0.2-1.1	1006.8	WS
4	MM14060509	A8.4 (12h-14h)	34.5	54.2	0.2-1.6	1005.9	WS
5	MM14060510	A8.5 (14h-16h)	33.1	53.2	0.8-2.1	1007.2	WS
6	MM14060511	A8.6 (16h-18h)	29.2	78.5	0.2-2.4	1005.5	WS
7	MM14060512	A8.7 (18h-20h)	28.7	76.6	0.2-0.9	1004.6	WS
8	MM14060513	A8.8 (20h-22h)	28.1	80.2	0.8-1.4	1006.3	WS



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2. Results of air quality measurement:

No	Code	Sign	SO ₂ mg/m ³	NO ₂ mg/m ³	HC mg/m ³	TSP mg/m ³	CO mg/m ³
1	MM14060514	A8.1 (06h-08h)	0.072	0.060	NDT	0.279	5.82
2	MM14060515	A8.2 (08h-10h)	0.127	0.112	1.24	0.294	7.74
3	MM14060516	A8.3 (10h-12h)	0.142	0.128	1.63	0.287	8.07
4	MM14060517	A8.4 (12h-14h)	0.102	0.097	1.37	0.248	9.69
5	MM14060518	A8.5 (14h-16h)	0.085	0.072	1.18	0.237	6.58
6	MM14060519	A8.6 (16h-18h)	0.070	0.058	1.46	0.162	5.96
7	MM14060520	A8.7 (18h-20h)	0.078	0.062	NDT	0.169	5.17
8	MM14060521	A8.8 (20h-22h)	0.064	0.049	0.35	0.152	4.28

Note: NDT – Not detected

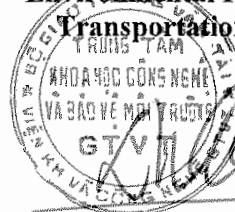
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RESULT OF SURFACE WATER MONITORING

Name of project: HO CHI MINH – LONG THANH – DAU GIAY EXPRESSWAY
Monitoring site: Package 8 – ONG CAI RIVER
Co-ordinate: SW8-1: N 10°47'54,8"; E 106°46'47,7"
SW8-2: N 10°47'54,8"; E 106°46'47,7"
SW8-3: N 10°47'51,0"; E 106°46'47,6"
SW8-4: N 10°47'51,0"; E 106°46'47,6"
Time of monitoring: 18/06/2014
Weather condition: Sunny and light winds
Sampling location is nearly the site, having many water coconut along canal
Staff: Tran Quang Tran – Tran Thanh Phuong

1. Results on measuring, monitoring the surface water at upstream (morning and afternoon):

No	Analysis critetia	Unit	Result analysis		QCVN 08:2008/BTNMT	
			SW8-1 MM14060523	SW8-2 MM14060524	Column A2	Column B1
1.	pH	-	7.18	7.09	6 ÷ 8.5	5.5 ÷ 9
2.	Temp.	°C	30.6	30.8	-	-
3.	Conductivity	μS/cm(25°C)	741	756	-	-
4.	DO	mg/l	4.53	4.39	≥ 5	≥ 4
5.	BOD ₅	mg/l	12	9	6	15
6.	COD	mg/l	21	17	15	30
7.	SS	mg/l	35	33	30	50
8.	PO ₄ ³⁻	mg/l	0.062	0.054	0.2 (as P)	0.3 (as P)
9.	NO ₂ ⁻	mg/l	NDT	NDT	0.02 (as N)	0.02 (as N)
10.	NO ₃ ⁻	mg/l	0.217	0.253	5 (as N)	10 (as N)
11.	NH ₄ ⁺	mg/l	0.13	0.18	0.2 (as N)	0.5 (as N)
12.	As	mg/l	NDT	NDT	0.02	0.05



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No	Analysis criteria	Unit	Result analysis		QCVN 08:2008/BTNMT	
			SW8-1 MM14060523	SW8-2 MM14060524	Column A2	Column B1
13.	Cd	mg/l	NDT	NDT	0.005	0.01
14.	Cr ⁶⁺	mg/l	NDT	NDT	0.02	0.04
15.	Cu	mg/l	0.039	0.044	0.2	0.5
16.	Hg	mg/l	NDT	NDT	0.001	0.001
17.	Pb	mg/l	NDT	NDT	0.02	0.05
18.	Zn	mg/l	0.056	0.067	1.0	1.5
19.	Oil and grease	mg/l	NDT	NDT	0.02	0.1
20.	Coliforms	MPN/100ml	270	460	5000	7500

2. Result on measuring, monitoring the surface water at downstream (morning and afternoon):

No	Analysis criteria	Unit	Result analysis		QCVN 08:2008/BTNMT	
			SW8-3 MM14060525	SW8-4 MM14060526	Column A2	Column B1
1.	pH	-	7.14	7.22	6 ÷ 8.5	5.5 ÷ 9
2.	Temp.	°C	30.1	30.5	-	-
3.	Conductivity	μS/cm(25°C)	763	755	-	-
4.	DO	mg/l	4.42	4.37	≥ 5	≥ 4
5.	BOD ₅	mg/l	13	15	6	15
6.	COD	mg/l	25	29	15	30
7.	SS	mg/l	41	44	30	50



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No	Analysis criteria	Unit	Result analysis		QCVN 08:2008/BTNMT	
			SW8-3 MM14060525	SW8-4 MM14060526	Column A2	Column B1
8.	PO ₄ ³⁻	mg/l	0.087	0.101	0.2 (as P)	0.3 (as P)
9.	NO ₂ ⁻	mg/l	NDT	NDT	0.02 (as N)	0.02 (as N)
10.	NO ₃ ⁻	mg/l	0.362	0.416	5 (as N)	10 (as N)
11.	NH ₄ ⁺	mg/l	0.36	0.29	0.2 (as N)	0.5 (as N)
12.	As	mg/l	NDT	NDT	0.02	0.05
13.	Cd	mg/l	NDT	NDT	0.005	0.01
14.	Cr ⁶⁺	mg/l	NDT	NDT	0.02	0.04
15.	Cu	mg/l	0.038	0.046	0.2	0.5
16.	Hg	mg/l	NDT	NDT	0.001	0.001
17.	Pb	mg/l	NDT	NDT	0.02	0.05
18.	Zn	mg/l	0.061	0.043	1.0	1.5
19.	Oil and grease	mg/l	NDT	NDT	0.02	0.1
21	Coliforms	MPN/100ml	930	1500	5000	7500

Note: NDT – Not detected

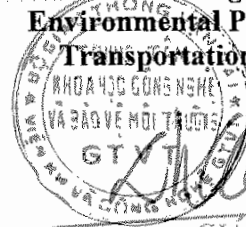
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RESULT OF GROUNDWATER MONITORING

Name of project: **HO CHI MINH – LONG THANH – DAU GIAY EXPRESSWAY**

Monitoring site: **Package 8 - PHU HUU WARD, DISTRICT 9**
GW8-1: N 10°47'56,5"; E 106°46'42,7"
 (Lot No. 21, Phu Duc Residential Area, Do Xuan Hop street, District 9)
GW8-2: N 10°47'58,4"; E 106°46'42,5"
 Co-ordinate: (Lot No. 01, Phu Duc Residential Area, Do Xuan Hop street, District 9)
GW8-3: N 10°47'54,1"; E 106°46'46,2"
 (Package 8 Headquarter, Phu Duc Residential Area, Do Xuan Hop street, District 9)

Time of monitoring: **18/06/2014**

Weather condition: **Sunny and light winds**

Staff: **Tran Quang Tran –Tran Thanh Phuong**

No	Analysis critetia	Unit	Result analysis			QCVN 09:2008/ BTNMT
			GW8-1 MM14060527	GW8-2 MM14060528	GW8-3 MM14060529	
1	pH	-	6.91	6.89	6.88	5.5 ÷ 8.5
2	Temp.	°C	30.2	30.1	29.8	-
3	Turbidity	NTU	0.52	0.83	0.66	-
4	Conductivity	μS/cm (25°C)	592	581	588	-
5	Color	Pt/Co	2.6	1.7	3.1	-
6	Smell	-	Not Smell	Not Smell	Not Smell	-
7	Hardness level	mgCaCO ₃ /l	25.6	23.8	26.5	500
8	Cl ⁻	mg/l	112.6	134.5	107.2	250
9	SO ₄ ²⁻	mg/l	57.1	62.5	64.8	400
10	NO ₃ ⁻	mg/l	0.463	0.365	0.317	15 (as N)
11	TDS	mg/l	314	298	306	1500



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No	Analysis critetia	Unit	Result analysis			QCVN 09:2008/ BTNMT
			GW8-1 MM14060527	GW8-2 MM14060528	GW8-3 MM14060529	
12	As	mg/l	NDT	NDT	NDT	0.05
13	Cd	mg/l	NDT	NDT	NDT	0.005
14	CN ⁻	mg/l	NDT	NDT	NDT	0.01
15	Fe	mg/l	0.181	0.156	0.173	5
16	Mn	mg/l	0.104	0.092	0.087	0.5
17	Pb	mg/l	NDT	NDT	NDT	0.01
18	E. Coli	MPN/ 100ml	NDT	NDT	NDT	Not detected
19	Coliforms	MPN/ 100ml	NDT	2	NDT	3

Note: NDT – Not detected

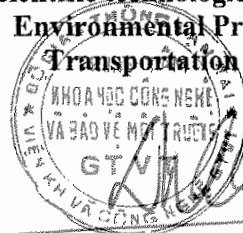
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RESULT OF SOIL MONITORING

Name of project: HO CHI MINH – LONG THANH – DAU GIAY EXPRESSWAY

Monitoring site: **Package 8 – NEAR ONG CAI RIVER**

Co-ordinate: **S8-1: N 10°47'54,5"; E 106°46'48,8"**

S8-2: N 10°47'55,6"; E 106°46'48,7"

S8-3: N 10°47'50,4"; E 106°46'44,2"

Time of monitoring: **18/06/2014**

Weather condition: Sunny and light winds

Staff: **Tran Quang Tran – Tran Thanh Phuong**

No	Analysis criteria	Unit	Result analysis			QCVN 03:2008/ BTNMT
			S8-1 MM14060530	S8-2 MM14060531	S8-3 MM14060532	
1.	pH	-	5.35	5.44	5.28	-
2.	Organic matters	%	1.45	1.54	1.78	-
3.	Total N	%	0.069	0.062	0.091	-
4.	Cl ⁻	mg/kg	684	657	763	-
5.	SO ₄ ²⁻	%	0.018	0.015	0.014	-
6.	As	mg/kg	0.738	0.557	0.623	12
7.	Cd	mg/kg	NDT	NDT	NDT	5
8.	Cu	mg/kg	5.84	6.15	7.28	70
9.	Hg	mg/kg	NDT	NDT	NDT	-
10.	P	mg/kg	193	186	154	-
11.	Pb	mg/kg	14.67	15.58	12.34	120
12.	Zn	mg/kg	51.95	44.32	41.07	200

Note: NDT – Not detected

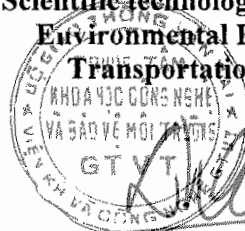
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Pham Thi Tra

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Dương Thị Phương Nga



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SCIENTIFIC TECHNOLOGICAL CENTER FOR ENVIRONMENTAL
PROTECTION IN TRANSPORTATION (CEPT)

1252 Lang street, Dong Da district, Hanoi city, Viet Nam

Tel: (84-4)38346314 Fax (84-4)37663841

RESULT OF NOISE MONITORING

Name of project: HO CHI MINH – LONG THANH – DAU GIAY EXPRESSWAY
Monitoring site: PACKAGE 9 - INTERSECTION (Km 4+500)
Co-ordinate: N 10°47'53,5"; E 106°47'26,3"
Time of monitoring: 19/06/2014 (06h - 22h)
Surrounding conditions: Mostly cloudy, slight wind, rainy disrupted
The site is going on 500 m from away sampling location
Staff: Bui Ngoc Chau – Nguyen Thanh Minh

No	Code	Sign	Result (dBA)		
			Leq	Lmax	L ₅₀
01	MM14060533	N9.1 (06h-07h)	65.3	76.2	58.2
02	MM14060534	N9.2 (07h-08h)	60.4	70.4	54.7
03	MM14060535	N9.3 (08h-09h)	58.2	74.3	51.3
04	MM14060536	N9.4 (09h-10h)	55.7	72.6	52.1
05	MM14060537	N9.5 (10h-11h)	55.1	75.9	52.7
06	MM14060538	N9.6 (11h-12h)	56.9	76.5	55.3
07	MM14060539	N9.7 (12h-13h)	56.4	70.3	51.9
08	MM14060540	N9.8 (13h-14h)	57.5	71.8	55.6
09	MM14060541	N9.9 (14h-15h)	58.1	73.0	55.2
10	MM14060542	N9.10 (15h-16h)	59.0	70.9	57.6
11	MM14060543	N9.11 (16h-17h)	58.5	75.3	54.8
12	MM14060544	N9.12 (17h-18h)	57.3	76.8	56.2
13	MM14060545	N9.13 (18h-19h)	56.0	72.1	55.3
14	MM14060546	N9.14 (19h-20h)	58.1	74.6	56.8
15	MM14060547	N9.15 (20h-21h)	58.5	79.2	57.1
16	MM14060548	N9.16 (21h-22h)	52.4	66.2	50.7

Monitored by

Nguyen Thanh Minh

Checked by

Phan Chu Phat Hoa

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Dang Chi Phuong Nga



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RESULT OF VIBRATION MONITORING

Name of project: HO CHI MINH – LONG THANH – DAU GIAY EXPRESSWAY
Monitoring site: PACKAGE 9 - INTERSECTION (Km 4+500)
Co-ordinate: N 10°47'53,5"; E 106°47'26,3"
Time of monitoring: 19/06/2014 (06h - 22h)
Surrounding conditions: Sunny and light winds on day. It's cool and light winds at night
The site is going on 500 m from away sampling location
Staff: Bui Ngoc Chau – Nguyen Thanh Minh

No	Code	Sign	Result (dB)	
			Leq	Lveq
01	MM14060549	V9.1 (06h-07h)	44.2	40.6
02	MM14060550	V9.2 (07h-08h)	44.6	40.9
03	MM14060551	V9.3 (08h-09h)	46.4	41.8
04	MM14060552	V9.4 (09h-10h)	45.2	41.2
05	MM14060553	V9.5 (10h-11h)	47.6	42.9
06	MM14060554	V9.6 (11h-12h)	42.4	38.6
07	MM14060555	V9.7 (12h-13h)	42.0	38.2
08	MM14060556	V9.8 (13h-14h)	44.2	40.1
09	MM14060557	V9.9 (14h-15h)	44.8	41.0
10	MM14060558	V9.10 (15h-16h)	43.6	40.4
11	MM14060559	V9.11 (16h-17h)	50.2	49.6
12	MM14060560	V9.12 (17h-18h)	48.4	43.5
13	MM14060561	V9.13 (18h-19h)	48.8	44.6
14	MM14060562	V9.14 (19h-20h)	44.2	40.9
15	MM14060563	V9.15 (20h-21h)	44.6	40.2
16	MM14060564	V9.16 (21h-22h)	40.2	37.6

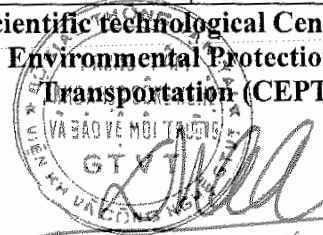
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RESULT OF AIR QUALITY MONITORING

Name of project: HO CHI MINH – LONG THANH – DAU GIAY EXPRESSWAY
Monitoring site: PACKAGE 9 - INTERSECTION (Km 4+500)
Co-ordinate: N 10°47'53,5"; E 106°47'26,3"
Time of monitoring: 19/06/2014 (06h - 22h)
Surrounding conditions: Sunny and light winds on day. It's cool and light winds at night
The site is going on 500 m from away sampling location
Staff: H.T. Dieu Thao – Tran Dai Nghia

1. Results of microclimate parameters:

No	Code	Sign	Temp °C	Humidity %	Wind velocity m/s	Pressure mB	Wind direction
1	MM14060565	A9.1 (06h-08h)	28.4	81.3	0.2-0.8	1004.1	WS
2	MM14060566	A9.2 (08h-10h)	29.7	78.2	0.2-0.7	1005.6	WS
3	MM14060567	A9.3 (10h-12h)	31.4	71.9	0.2-0.9	1005.2	WS
4	MM14060568	A9.4 (12h-14h)	33.1	67.2	0.3-1.4	1007.4	WS
5	MM14060569	A9.5 (14h-16h)	31.8	70.3	0.2-0.9	1006.5	WS
6	MM14060570	A9.6 (16h- 18h)	30.1	78.0	0.2-1.4	1005.9	WS
7	MM14060571	A9.7 (18h-20h)	29.1	78.6	0.2-2.8	1004.8	WS
8	MM14060572	A9.8 (20h-22h)	28.6	80.4	0.2-0.7	1006.7	WS



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2. Results of air quality measurement:

No	Code	Sign	SO ₂ mg/m ³	NO ₂ mg/m ³	HC mg/m ³	TSP mg/m ³	CO mg/m ³
1	MM14060573	A9.1 (06h-08h)	0.046	0.042	NDT	0.145	2.85
2	MM14060574	A9.2 (08h-10h)	0.052	0.046	0.48	0.197	3.27
3	MM14060575	A9.3 (10h-12h)	0.057	0.049	1.16	0.209	3.86
4	MM14060576	A9.4 (12h-14h)	0.048	0.041	0.92	0.154	2.94
5	MM14060577	A9.5 (14h-16h)	0.053	0.047	1.31	0.168	4.16
6	MM14060578	A9.6 (16h-18h)	0.059	0.051	NDT	0.175	4.27
7	MM14060579	A9.7 (18h-20h)	0.041	0.034	NDT	0.117	2.14
8	MM14060580	A9.8 (20h-22h)	0.038	0.031	NDT	0.103	1.26

Note: NDT – Not detected

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Tran Dai Nghia

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Nguyễn Văn Châu

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RESULT OF GROUNDWATER MONITORING

Name of project: **HO CHI MINH – LONG THANH – DAU GIAY EXPRESSWAY**

Monitoring site: **Package 9 – PHU HUU WARD. DISTRICT 9**
GW9-1: N 10°47'45,1"; E 106°47'29,5"
 (26B, 827street, Phu Huu, District 9)

Co-ordinate: **GW9-2: N 10°47'44,2"; E 106°47'27,6"**
 (Nguyen Van Hoang's house, 827 street, Phu Huu, District 9)

GW9-3: N 10°47'43,8"; E 106°47'27,5"
 (Hoang Thanh Phong's house, 827 street, Phu Huu, District 9)

Time of monitoring: **19/06/2014**

Weather condition: **Sunny and light winds**

Staff: **Tran Quang Tran –Tran Thanh Phuong**

No	Analysis critetia	Unit	Result analysis			QCVN 09:2008/ BTNMT
			GW9-1 MM14060581	GW9-2 MM14060582	GW9-3 MM14060583	
1	pH	-	6.44	6.38	6.23	5.5 ÷ 8.5
2	Temp.	°C	30.2	29.7	29.6	-
3	Turbidity	NTU	0.34	1.12	0.54	-
4	Conductivity	μS/cm (25°C)	682	754	731	-
5	Color	Pt/Co	3.6	3.8	2.1	-
6	Smell	-	Not Smell	Not Smell	Not Smell	-
7	Hardness level	mgCaCO ₃ /l	76.5	94.4	87.2	500
8	Cl ⁻	mg/l	143.8	186.7	198.2	250
9	SO ₄ ²⁻	mg/l	61.7	89.5	106.7	400
10	NO ₃ ⁻	mg/l	0.136	0.459	0.513	15 (as N)
11	TDS	mg/l	362	385	378	1500



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No	Analysis critetia	Unit	Result analysis			QCVN 09:2008/ BTNMT
			GW9-1 MM14060581	GW9-2 MM14060582	GW9-3 MM14060583	
12	As	mg/l	NDT	NDT	NDT	0.05
13	Cd	mg/l	NDT	NDT	NDT	0.005
14	CN ⁻	mg/l	NDT	NDT	NDT	0.01
15	Fe	mg/l	1.35	2.57	2.39	5
16	Mn	mg/l	0.076	0.124	0.143	0.5
17	Pb	mg/l	NDT	NDT	NDT	0.01
18	E. Coli	MPN/ 100ml	NDT	NDT	NDT	Not detected
19	Coliforms	MPN/ 100ml	NDT	NDT	3	3

Note: NDT – Not detected

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RESULT OF SOIL MONITORING

Name of project: HO CHI MINH – LONG THANH – DAU GIAY EXPRESSWAY

Monitoring site: Package 9 – NEAR THE INTERSECTION

S9-1: N 10°47'53,1"; E 106°47'25,2"

Co-ordinate: S9-2: N 10°47'51,6"; E 106°47'26,3"

S9-3: N 10°47'48,1"; E 106°47'25,7"

Time of monitoring: 19/06/2014

Weather condition: Sunny and light winds

Staff: Tran Quang Tran – Tran Thanh Phuong

No	Analysis criteria	Unit	Result analysis			QCVN 03:2008/ BTNMT
			S9-1 MM14060584	S9-2 MM14060585	S9-3 MM14060586	
1.	pH	-	5.36	5.68	6.03	-
2.	Organic matters	%	1.27	2.34	1.65	-
3.	Total N	%	0.092	0.089	0.077	-
4.	Cl ⁻	mg/kg	628	824	931	-
5.	SO ₄ ²⁻	%	0.025	0.026	0.029	-
6.	As	mg/kg	0.418	0.376	0.215	12
7.	Cd	mg/kg	NDT	NDT	NDT	5
8.	Cu	mg/kg	6.27	5.48	6.32	70
9.	Hg	mg/kg	NDT	NDT	NDT	-
10.	P	mg/kg	295	314	326	-
11.	Pb	mg/kg	10.43	17.68	16.51	120
12.	Zn	mg/kg	55.04	52.22	45.46	200

Note: NDT – Not detected

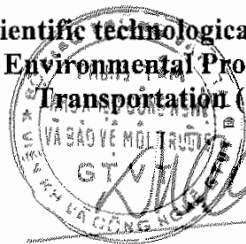
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APPENDIX 5:

MAP OF MONITORING LOCATIONS

Environmental Monitoring Report

Quarterly Report (Environmental Quality)
April 2014

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

Packages 7, 8 and 9

Prepared by Scientific Technological Center For Environmental Protection in Transportation (CEPT)
for the Vietnam Expressway Corporation, the Ministry of Transport of Vietnam, and the Asian
Development Bank.

CURRENCY EQUIVALENTS

(as of 31 March 2014)

Currency unit	–	dong (D)
D1.00	=	\$0.0000474
\$1.00	=	D21,091

NOTE

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

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THE SOCIALIST REPUBLIC OF VIET NAM
MINISTRY OF TRANSPORT
VIET NAM EXPRESSWAY CORPORATION (VEC)
HO CHI MINH - LONG THANH - DAU GIAY EXPRESSWAY PROJECTS
MANAGEMENT UNIT (EPMU HLD)

North-South Expressway Construction Project
(Ho Chi Minh City - Dau Giay Section)

JICA Loan Agreement No.VNXV-1

ENVIRONMENTAL MONITORING REPORT

PACKAGE 7, 8 AND 9

QUARTER I, 2014
(NO.5 - MARCH 2014)

HA NOI, APRIL 2014

Scientific Technological Center
For Environmental Protection in Transportation (CEPT)

THE SOCIALIST REPUBLIC OF VIET NAM
MINISTRY OF TRANSPORT
VIET NAM EXPRESSWAY CORPORATION (VEC)
HO CHI MINH - LONG THANH - DAU GIAY EXPRESSWAY PROJECTS
MANAGEMENT UNIT (EPMU HLD)

North-South Expressway Construction Project
(Ho Chi Minh City - Dau Giay Section)

JICA Loan Agreement No.VNXV-1

ENVIRONMENTAL MONITORING REPORT

PACKAGE 7, 8 AND 9

QUARTER I, 2014
(NO.5 - MARCH 2014)

DIRECTOR

DANG THI PHUONG NGA

HA NOI, APRIL 2014

Scientific Technological Center
For Environmental Protection in Transportation (CEPT)

PREFACE

Highway 1A length of Ho Chi Minh City - Dong Nai Province and Highway 51 is one of the most important centre lines in region. From 1997 to 2000, highway 1A from Ho Chi Minh City to Bien Hoa Province was recovered, improved and widened with scale of 4 to 6 traffic lanes. Highway 51 was upgraded into four traffic lanes. However, according to statistic, traffic survey to 2015, highway 1 will be overload, no-responses inter-regional traffic demand, effects to regional development. To build new express highways to serve future traffic demand in compass of priority economic region is very necessary.

The express highway of Ho Chi Minh city - Long Thanh - Dau Giay was approved Pre-feasibility Research Report in June 2002 by The Government, Prime Minister approved project's contents by document No 56/TTg-CN issued in 10, January 2007 and Ministry of Communications made a decision No 334/QD - BGTVT in 13, February 2007 for ratifying project investment. This express highway will recover only way position and share transport flow of highway 1A and 51. The route has important meaning in promoting development and stability of Southern priority economic region, especially three-cornered economic region of Ho Chi Minh city-Dong Nai- Ba Ria Vung Tau.

The way run through regions having sparse population density, essential floristic composition along roadside are fruit-trees planted in garden and some industrial crops such as coffee tree, rubber and flood rice in depression areas. Some dense residential quarter concentrates in the townships, towns and big interchanges such as An Phu, Long Thanh, Dau Giay, line research almost run through spacious area, sparse population density area and non-important project area. The most geologic of the way lies on weak area. Some rivers and canals break the flat terrain.

Vietnam Expressway Corporation (VEC) has been established as state enterprise belonging to Ministry of Transport. In this HLD expressway project, VEC is responsible for conducting the project and official connection with related Ministries and local authorities as well as ADB and JICA. VEC will authorize the rights of project's management to the Ho Chi Minh City - Long Thanh - Dau Giay Expressway Project Management Unit (EPMU-HLD).

Scientific technological center for environmental protection in transportation (CEPT) conducted the environmental monitoring for Packages 7, 8 and 9 (No.5), Quarter I/2014 on 26th March, 2014. These works is carried out to evaluate the environmental quality which may cause on surroundings during construction stage of project.

MỤC LỤC

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CHAPTER 1. INTRODUCTION

1.1. Introduction

In the surrounding areas of Ho Chi Minh City, the traffic density has been increased more than circulation capacity of roads. There is a prediction that the circulation demand in Ho Chi Minh City and Dong Nai province, where the industrial development recently becomes very important in accordance with the development planning of industrial parks and international airports will be noticeably increased.

Vietnam government has decided to conduct an expressway construction project Ho Chi Minh City - Long Thanh - Dau Giay (HLD Expressway) with the financial supports from Asia Development Bank (ADB) and Japanese International Corporation Agency (JICA).

VEC is responsible for conducting the project HLD. VEC will authorize the rights of project's management to the Ho Chi Minh City - Long Thanh - Dau Giay Expressway Project Management Unit (EPMU-HLD).

Total length of the project is 54.98 km including 4 lanes (phase 1) with starting point at An Phu Interchange at District 2 under Ho Chi Minh City (Km0+000) and ending point at Interchange with National Highway 1A at Dau Giay under Dong Nai Province (km54+984), which belongs the center line of North – South expressway.

The Project section is divided into 9 civil works packages (1a, 1b, 2, 3, 5, 6, 7, 8 and 9) and one ITS work Package (4) by which Package 7 with total length 2Km, Package 8 with total length 2Km and Package 9 is interchange with Ring road No.2 under Ho Chi Minh City. Specifically as follows:

- Package 7 has beginning point at Km0+000 and ending point at Km2+000, with total length 2Km, and 02 bridges. Design speed 80Km/h
- The Package 8 has starting point at Km2+00, district 2 and ending point at Km4+00 district 9, Ho Chi Minh City, with 2Km length. Designed speed is 80 km/h according to Vietnamese Standard TCXDVN 104-2007, HL93 design loading.
- Package 9 includes Ring Road 2 Interchange Km 4+514 (excluding main road Interchange expressway). 8 Ramps with design speed 40 Km/h (except Ramp A1; D1 with design speed 60 Km/h).

1.2. Scope of work

- To conduct environmental monitoring: Air quality, noise, vibration, surface water quality, underground water quality and soil.
- Scope of work: The specified sites of packages 7, 8 and 9 belonging the project.

1.3. Work plan

* *Execution agent:* Scientific Technological Center for Environmental Protection in Transportation (CEPT)

* *Plan for implementation:*

Table 1.1. Plan for implementation

date Works	26/03/2014	14/04/2014	18/04/2014	24/04/2014
Monitoring and sampling at the site	X			
Analyzing		X		
Draft report			X	
Completion report				X

CHAPTER 2. BACKGROUND CONDITIONS

2.1. Location of the project

- Location of the project: the beginning of Package - 7 (Km 0+000) to the end of Package - 9 (Km 4 +000, the National Highway intersection) in which the construction cost is financed by JICA.
- Distance: 4Km.

Table 2.1. Detailed plan for sampling

No.	Detailed contents	Point	Packages	Location (Km)	Sign of samples
26th March 2014					
1	Air quality	Intersection An Phu with HLD expressway	7	00+200	A7
2	Noise	Intersection An Phu with HLD expressway	7	00+200	N7
3	Vibration	Intersection An Phu with HLD expressway	7	00+200	V7
4	Surface water	Ba Dai Canal	7	0+346 (up stream)	SW7-1; SW7-2
		Ba Dai canal	7	0+346 (down stream)	SW7-3; SW7-4
		Kenh Muong canal	7	1+150 (up stream)	SW7-5; SW7-6
		Kenh Muong canal	7	1+150 (down stream)	SW7-7; SW7-8
5	Underground water	An Phu ward (District 2)	7	00+200	GW7-1; GW7-2; GW7-3
6	Soil quality	Kenh Muong canal, District 2 (Land bank)	7	1+150	S7-1; S7-2; S7-3
26th March 2014					
1	Air quality	Phu Huu ward	8	3+200	A8

No.	Detailed contents	Point	Packages	Location (Km)	Sign of samples
2	Noise	Phu Huu ward	8	3+200	N8
3	Vibration	Phu Huu ward	8	3+200	V8
4	Surface water	Ong Cai River	8	3+380 (up stream)	SW8-1; SW8-2
		Ong Cai River	8	3+380 (down stream)	SW8-3; SW8-4
5	Underground water	Phu Huu ward	8	3+200	GW8-1; GW8-2; GW8-3
6	Soil quality	Phu Huu ward	8	3+880	S8-1; S8-2; S8-3
26th March 2014					
1	Air quality	Ring road No.2 with HLD expressway	9	4+500	A9
2	Noise	Ring road No.2 with HLD expressway	9	4+500	N9
3	Vibration	Ring road No.2 with HLD expressway	9	4+500	V9
4	Underground water	Residential area near Ring road No.2 with HLD expressway	9	4+500	GW9-1; GW9-2; GW9-3
5	Soil quality	Residential area near Ring road No.2 with HLD expressway	9	4+500	S9-1; S9-2; S9-3

2.2. Progress of implementing the Project

Construction progress of packages 7, 8 and 9 in March 2014 as follows:

■ PACKAGE 7:

- *Preparation of MS and SD*: Submission of MS and SD is satisfied with construction progress.
- *Equipment mobilization*: Mobilization of personnel and equipment is satisfied with construction progress.
- *Site clearing and grubbing*: Contractor has completed the site clearing and grubbing

- *Construction of temporary service road*: Completed 85.56% of work quantity
- *Excavation and disposal of topsoil; off site*: Completed
- *Prefabricated Vertical Drains (PVD)*: Completed
- *VCM*: Completed
- *Bored pile*: Completed;
- *Construction of pile cap, pier column and headstock*
 - + Construction of 01 pier column and pile cap of P2L; headstock P1L (Ba Dai).
 - + Construction of headstock P6L; P6R; pile cap and pier column P8L, P8R (MK).
- *Manufacturing of Super-T girder*: Completed 34nos in Mar 2014;
- *Precast concrete pile (30x30 cm)*:
 - + Manufacturing 1,391lm of the Ba Dai Bridge in Mar 2014;
 - + Driving 4,250 lm of the Ba Dai Bridge in Mar 2014;

■ **PACKAGE 8:**

- *Temporary works*
 - + Temporary road: The Contractor do not carry out the construction of temporary road in this month
 - + Batching plant: Batching plant is completed and in operation.
 - + Site laboratory: Site laboratory is in the stage of operation.
 - + Site office: Site office is in operation.
- *Site clearance and top soil removal*
 - + Thruway: completed
 - + Ramp way:
 - Ramp X1, Y1: construction completed
 - Ramp X2 and Painting island at X1 ramp: completed
 - Painting island at Y1 ramp: completed in this month
 - Remaining ramps include Y2, Y3 and DXH ramp: the Contractor's plan to construct in the next month
- *Backfilling and Working Platform Filling*:
 - + Thruway: completed.
 - + Ramp way:

- Completed X1 and Y1 ramp way
- Painting island: Completed soil replacement work.
- *PVD installation:* Completed.
- *VCM Application:* Operating 100% on thruway and ramp way.
- *Surcharge work:* Sand filling for surcharge work carried out for following sections:
 - + Km2+495 to Km2+740: achieved 3,613 m³
 - + Ramp X1 : achieved 3,618 m³
 - + Ramp Y1: achieved 8,000 m³
 - + Monthly achievement is 15,231m³ and accumulated quantity up to now is 211,962 m³ equivalent to 97% completion.
- *Sub-structure:*
 - + Bored pile: Completed 100%.
 - + Sub-structure Work:
 - Do Xuan Hop Flyover:
 - Completed 05 pile caps for pier P4R, P6R, P6L, P15AR, P15AL and 01 pile cap for abutment A2R
 - Completed 05 pier column P4R, P6R, P8R, P15AR and P15AL
 - Number of headstock completion: 02 numbers including P7L and P9L
 - Ba Hien Bridge:
 - Driving sheet pile cofferdam and excavation pit for A2L
 - Completion of 01 pile cap for A1L and 01 headstock for P1R
- *Superstructure:*
 - + Do Xuan Hop Flyover: In this month the Contractor produced 70 hollow slab girders in which 32 girders with 12m length and 38 girders with 24m length. Accumulated quantity is 236, equivalent to 55% completion
 - + Ba Hien Bridge: completed 02 I-girders in this month, accumulated quantity is 50 girders, equivalent to 100% quantity of project
- *Approach Slab:*
 - + RC pile fabrication: fabricated 921 linear meter in this month, accumulated quantity reached 26,002 linear meter, equivalent to 98% completion
 - + RC pile driving:
 - Driving for RC slab at A1 – DXH bridge: 1,033m
 - Driving for RC slab at A2 – DXH bridge: 1,322m
 - Total completion up to now is 12,961m, equivalent to 49% completion.

▪ **PACKAGE 9:**

- *Temporary works*

- + Batching plant: Operated cement concrete batching plant
- + Site laboratory: Site laboratory is operating with all approved equipment. Site laboratory is carrying out these following tests:
 - Concrete mix design and sample compressing
 - Soil tests and compaction
 - Reinforcement.

- *Site Clearance*

Contractor carrying out the site clearing for area which already hand over to the Contractor.

- *Earth work and Soft Soil Improvement.*

The contractor is carrying out the construction of ramp A1; D1; B2, A2, C1, B1-A2, Excavation 66240 m³ (Up to now: 188833m³), backfill: 61804 m³ (up to now: 1167117m³; K98: 4490m³ (up to now 8972m³), Sub-Base: 2803m³ (Up to now: 8388m), Base 525m³ (up to now: 5446m³).

- *Bridge substructure*

- + In this month, Contractor mobilized 2 construction team for bored pile construction
Quantity up to now: 629 piles.
- + Contractor mobilized 7 construction team for pier construction and completed pile cap (up now: 106 nos), pier column (up now: 103 nos) ; headstock (up now: 67 nos)

- *Bridge superstructure*

In this month, Contractor fabricated 34 Super T girders (up now: 297 nos). Launching Super T: up now: 256 nos, hollow slab girder (up now: 3 nos); Box girder up now: 06 nos

- *Lighting and Electrical work*

Construction of Ramp A1, D1 was completed and the two Ramps were put into operation

2.3. Previous environmental conditons and environmental tendency

▪ **Environmental conditons:**

The results of the 04th environmental monitoring (December 2013) of Packages7, 8 and 9 as follows:

▪ **PACKAGE 7**

- *Air quality:* The monitored data in December 2013 shows that dust content and pollutions content in ambient air of project area are lower than baseline data (monitored in March 2013) and they are lower than the allowable limits of QCVN 05:2009/BTNMT and QCVN 06:2009/BTNMT.
- *Noise level:*
 - + From 6:00 to 21:00: noise level is lower than baseline data (monitored in March 2013) and it is also lower than the allowable limits of QCVN 26:2010/BTNMT several times.
 - + From 21:00 to 22:00: noise level is lower than baseline data but it is 1,09 times higher than permitted regulations of QCVN 26:2010/BTNMT.
- *Vibration level:*
 - + Vibration regulations of QCVN 27:2010/BTNMT and baseline data (monitored 03/2013) are used for assessing the vibration level at project area.
 - + The monitored data shows that vibration level monitored in December 2013 at project area during two periods from 6:00 to 21:00 and from 21:00 to 22:00 are from 1,1 to 1,2 times lower than baseline data and they are from 1,2 to 1,5 times lower than permitted regulations of QCVN 27:2010/BTNMT.
- *Surface water quality*
 - + Ba Dai Canal: The analyzed data at Ba Dai Canal in December 2013 shows that most of analyzed parameters meet the allowable limits of QCVN 08:2008/BTNMT Column B1. Other parameters such as: NO_2^- , As, Cd, Cr^{6+} , Hg, Pb and oils and grease were not detected in all analyzed samples.
 - + Muong Kenh Canal: The analyzed data of surface water quality of Muong Kenh Canal in December 2013 shows that all analyzed parameters meet the allowable limits of QCVN 08:2008/BTNMT Column B1. Other parameters of NO_2^- , As, Cd, Cr^{6+} , Hg, Pb and oils and grease were not detected in all analyzed samples.
- *Ground water quality:* Analyzed results shows that the ground water quality at Project area of Package 7 in December 2013 meets the allowable limit of regulations of QCVN 09:2008/BTNMT, except Coliform content at GW7-1 sample is slightly higher than the allowable limits.
- *Soil quality:* The analyzed results shows that soil quality at Project area of Package 7 in December 2013 is still no sign of pollution by activities of Project. All analyzed parameters at three samples meet permitted regulations of QCVN 03:2008/BTNMT. All analyzed samples, Cd and Hg content is not detected.

▪ **PACKAGE 8**

- *Air quality:* The monitored data shows that dust and pollution parameters content at project area in December 2013 are slightly exceed baseline data (monitored in March 2013) but these values are lower than permitted regulations of QCVN 05:2009/BTNMT, QCVN 06:2009/BTNMT several times.
- *Noise level:*
 - + During the period from 6:00 to 21:00: noise level was 56,2dBA, this value is slightly higher than baseline data (monitored in March 2013 was 54,6dBA) but it is lower than the allowable limits of QCVN 26:2010/BTNMT (70dBA) several times.
 - + During the period from 21:00 to 22:00: noise level was 58,7dBA. This noise level is higher than baseline data (monitored in March 2013) and permitted regulations of QCVN 26:2010/BTNMT (55dBA).
- *Vibration level:*
 - + From 6:00 to 21:00: Vibration level was 50,2dB, this value is 1,28 times slightly higher than baseline data (monitored in March 2013 was 39,1dB) but this vibration level is lower than permitted regulation of QCVN 27:2010/BTNMT several times.
 - + From 21:00 to 22:00: Vibration level was 44,6dB. This vibration level is higher than baseline data (monitored in March 2013) and it is 1,68 times higher than the allowable limits of regulations of QCVN 27:2010/BTNMT (26,5dB)
- *Surface water quality:* Analysis results in all samples of Ong Cai River are lower than permitted regulations of QCVN 08:2008/BTNMT Column B1, except BOD5 and Coliform at SW8-2 sample are slightly exceed the allowable limits.
- *Ground water quality:* Most analyzed parameters in ground samples at project area in December 2013 meet permitted regulations of QCVN 09:2008/BTNMT, except Coliform of sample of GW8-2 was 4 MPN/100mL, it is slightly higher than the allowable limits of QCVN 09:2008/BTNMT (3 MPN/100mL).
- *Soil quality:* All analyzed parameters of soil quality at project area in December 2013 are lower than permitted regulations of 03:2008/BTNMT several times. Cd and Hg contents are not detected in all analyzed samples.

▪ **PACKAGE 9**

- *Air quality:* According to the monitored data at project area in December 2013, dust and pollutions content in the ambient air of Package 9 area are lower than baseline data (monitored in March 2013) and they are also lower than the allowable limits of regulations of QCVN 05:2009/BTNMT and QCVN 06:2009/BTNMT.
- *Noise level:*

- + From 6:00 to 21:00: noise level was 55,2dBA, this value is 3,9dBA slightly higher than baseline data (it was 51,3dBA in March 2013) but this noise level is 1,26 times lower than permitted limit of QCVN 26:2010/BTNMT (70dBA)
- + From 21:00 to 22:00: noise level was 50,5dBA. This noise level is 1,05 times lower than baseline data (monitored in March 2013) and it is 1,08 times lower than permitted regulations of QCVN 26:2010/BTNMT (55dBA).
- *Vibration level:* The monitored data shows that vibration level at project area in December 2013 at two periods from 6:00 to 21:00 and from 21:00 to 22:00 are lower than baseline data (monitored in March 2013) and permitted regulations of QCVN 27:2010/BTNMT.
- *Ground water quality:* The analyzed results of ground water samples at project area in December 2013 shows that they are lower than the allowable limits of QCVN 09:2008/BTNMT several times. Parameters of As, Cd, CN^- , Pb and Ecoli are no detected in three samples.
- *Soil quality:* According to the analyzed results of pollutions in soil of project area in December 2013, all parameters meet permitted regulations of QCVN 03:2008/BTNMT. Cd and Hg are not detected in all samples.

▪ **Environmental tendency:**

In order to assessing environmental tendency due to activities of project, we based on the environmental monitoring results of the Quarter I/2014 (No.5 – March 2014) and comparision with environmental monitoring results of the Quarter IV/2013 (No.4 – December 2013). The results for assessing and comparing on environmental status through the results of the Quarter I/2014 and Quarter IV/2013 will be showed in the chart in Section 4.4 of Chapter 4.

CHAPTER 3. METHODOLOGY OF ENVIRONMENTAL MONITORING

3.1. Air quality

- **Methodology:**
 - According to the requirements of the control equipments and standard methods of MONRE for air sampling, sample analyzing and writing report under the adjustment of National Environmental Monitoring System (NEMS), application of ambient air quality standards (QCVN05:2013/BTNMT).
 - Sampling location marked by using GPS.
- **Parameters for monitoring:** TSP, HC, CO, SO₂, NO₂ and microclimate conditions (temp., air pressure, wind velocity, wind direction, humidity).
- **Frequency:** The monitoring will be conducted in one day, making 8 measurements in one position within 16 hours (from 6 am to 10 pm).
- **Equipment for monitoring:** **Equipment:** DustScan Scout Aerosol Monitor, USA.
- **Methods for analyzing:**

Table 3.1: Methods for analyzing

No.	Parameters	Methodology
1	Air temp.	Microclimate machine (3733 /2002/QĐ-BYT)
2	Humidity	
3	Air pressure	
4	Wind direction	
5	Wind velocity	
6	SO ₂	TCVN 5971-1995 (ISO 6767:1990)
7	NO ₂	TCVN 6137-96 (ISO 6768:1985)
8	HC	Ref. TCVN 7558-1:2005
9	Dust	MicroDust_Pro-880nm, (Casella)
10	CO	Ref. TCVN 7242:2003

3.2. Noise level

- **Methodology:**
 - The sampling and analyzing sample shall be carried out based on the standard method for sampling and lab analyzing according to the requirements of (MONRE) with calibrated

equipments. Standards for reference: QCVN26:2010/BTNMT (National Technical Regulation on Noise).

- Sampling position will be marked by using GPS.
- **Parameters for monitoring:** Leq, Lmax, L50
- **Frequency:** The monitoring will be conducted in one day, making 3 measurements per hour within 16 hours (from 6 am to 10 pm) for one position.
- **Equipment for monitoring:** Noise meter Rion NL-21, Japan.

3.3. Vibration level

- **Methodology:**
 - The sampling and analyzing sample shall be carried out based on the standard method for sampling according to the requirements of (MONRE) with calibrated equipments. Standards for reference: QCVN27:2010/BTNMT (National Technical regulation on Vibration)
 - Sampling position will be marked by using GPS.
- **Parameters for monitoring:** Lveq and Leq
- **Frequency:** The monitoring will be conducted in one day, making 3 measurements per hour within 16 hours (from 6 am to 10 pm) for one position.
- **Equipment for monitoring:** Japanese Rionvibro model VM53 RION. The product is calibrated before using.

3.4. Surface water quality

- **Methodology:**
 - The sampling and analyzing sample shall be carried out based on the standard method for sampling and lab analyzing according to the requirements of (MONRE) with calibrated equipments. Standard for reference: QCVN 08:2008/BTNMT- B1 Colum: (National technical regulation on surface water quality)
 - Sampling position will be marked by using GPS.
- **Parameters for monitoring:** pH, temperature, BOD, COD, conductivity, DO, SS, As, Cd, Pb, Cr6+, Cu, Zn, Hg, NH4+, NO2-, NO3-, PO43-, oils and greases, coliform.
- **Frequency:** The monitoring will be conducted in a day, taking 4 samples a day (in the morning and in the afternoon) for each position.
- **Equipment for monitoring:**

- All of parameters such as pH, temp., conductivity, DO will be measured at sites by the equipment of YSI, USA.
- Other parameters such as SS, BOD₅, Coli form, grease, Cu, Fe... will be sampled, stored and analyzed in lab. All of these equipments are also calibrated before measuring.

▪ **Methods for analyzing:** (Table 3.2)

Table 3.2. Analysis methods for surface water

No.	Parameters	Methodology
1	pH	TCVN 6492-2011
2	Temperature	machine HI2211
3	Conductivity (EC)	machine HI2211
4	DO	Máy HD3409.2
5	SS	TCVN 6625-2000
6	BOD ₅	TCVN 6001-2008
7	COD	TCVN 6491-1999
8	NH ₄ ⁺ (N)	TCVN 5988-1995
9	NO ₂ ⁻	TCVN 6178-1996
10	NO ₃ ⁻	TCVN 6180-1996
11	PO ₄ ³⁻	TCVN 6202-2008
12	Cu	SMEWW3111B-2005
13	Zn	SMEWW3111B-2005
14	As	SMEWW-3500-2005
15	Cd	SMEWW-3500-2005
16	Cr ⁶⁺	SMEWW-3500-2005
17	Hg	SMEWW-3500-2005
18	Pb	SMEWW-3500-2005
19	Oils and grease	SMEWW 5520B-2005
20	Coliform	TCVN 6187-1-2009

3.5. Surface water quality

▪ **Methodology:**

- The sampling and analyzing sample shall be carried out based on the standard method for sampling and lab analyzing according to the requirements of (MONRE) with calibrated equipments. Standard for reference: QCVN 09:2008/BTNMT (National technical regulation on ground water quality)
- Sampling position will be marked by using GPS.

- **Parameters for monitoring:** pH, colour, temperature, odour, TS, hardness, conductivity, turbidity, CN^- , NO_3^- , Cl^- , SO_4^{2-} , Mn, Fe, Cd, Pb, As, E.Coli, Coliform.
- **Frequency:** The monitoring will be conducted in a day, taking 3 samples a day for each position.
- **Equipment for monitoring:**
 - All of parameters such as pH, temp., conductivity, DO will be measured at sites by the equipment of YSI, USA.
 - Other parameters such as SS, Coli form, grease, Cu, Fe... will be sampled, stored and analyzed in lab. All of these equipments are also calibrated before measuring.
- **Methods for analyzing:** (Table 3.3)

Table 3.3. Analysis methods for ground water

No.	Parameters	Methodology
1	pH	TCVN 6492-2011
2	Temperature	TCVN 4557-1988
3	Odour	Cảm quan
4	Turbidity	TCVN 6184-1996
5	Colour	TCVN 6185-2008
6	Total solid (TS)	SMEWW 2540C-2005
7	Conductivity (EC)	SMEWW 2540C-2005
8	Hardness	SMEWW 2340-2005
9	Clorua (Cl^-)	TCVN 6194-1996
10	Sulfat (SO_4^{2-})	SMEWW-4500- SO_4^{2-}
11	NO_3^- (N)	TCVN 6180-1996
12	Xianua (CN^-)	TCVN 6181-1996
13	Fe	SMEWW3111B-2005
14	Mn	SMEWW3111B-2005
15	As	SMEWW-3500-2005
16	Cd	SMEWW-3500-2005
17	Pb	SMEWW-3500-2005
18	E.Coli	TCVN 6187-1-2009
19	Coliform	TCVN 6187-1-2009

3.6. Soil quality

- **Methodology:**
 - The sampling will be carried out at site and analyzed in lab with the calibrated equipments. The sampling and analyzing sample shall be carried out based on the standard method for sampling and lab analyzing according to the requirements of (MONRE). The thickness of sampling will be from 20 to 30 cm from the ground. Standard for reference: QCVN03:2008/BTNMT (National technical regulation on the allowable limits of heavy metals in the soils)
 - Sampling position will be marked by using GPS.
- **Parameters for monitoring:** - pH, organic compounds, Total N, Total P, Cl^- , SO_4^{2-} , Cu, Zn, Cd, Pb, Hg, As.
- **Frequency:** The monitoring will be conducted in a day, taking 3 samples a day for one position.
- **Analysis methods:** (Table 3.4)

Table 3.4. Analysis methods for ground water

No.	Parameters	Methodology
1	pH	TCVN 5979-2007
2	Organic	TCVN 4450-85
3	Total N	TCVN 6498-1999
4	Sulfat (SO_4^{2-})	TK.TCVN 6200-1996
5	Total P	TK.TCVN 6202-2008
6	Clorua (Cl^-)	TK.TCVN 6194-1996
7	Copper (Cu)	TCVN 9496-2009
8	Zinc (Zn)	TCVN 9496-2009
9	Asen (As)	TCVN 9496-2009
10	Cadimi (Cd)	TCVN 9496-2009
11	Lead (Pb)	TCVN 9496-2009
12	Mercury (Hg)	TCVN 9496-2009

CHAPTER IV. THE RESULTS OF ENVIRONMENTAL MONITORING

4.1. PACKAGE 7

4.1.1. Air quality

- Monitoring location: An Phu intersection – Package 7 (Km00+200)
- Monitoring time: From 06:00 to 22:00 dated 26th March 2014
- Co-ordinate: N 10°47'42,5"; E 106°45'01,4"
- Weather conditions: sunny, light wind.
- Exterior conditions: Environmental monitoring location near Mai Chi Tho Street. There are a lot of vehicles.

Note: () Detailed monitoring results and analysis are attached in the Appendix*

Table 4.1. Monitoring result of microclimate (*)

Time	Temp. (^o C)	Moisture (%)	Wind (m/s)	Pressure (mB)	Wind direction
<i>Average result</i> (6h-22h) (03/2014)	31,4	63,1	0,2 – 1,3	1006,1	ES
Baseline data (03/2013) (6h-22h)	32,3	50,5	0,1-3,2	1005,8	SE

Table 4.2. Analysis results of ambient air quality (*)

Standard	Time	SO ₂ (mg/m ³)	NO ₂ (mg/m ³)	HC (mg/m ³)	Dust (mg/m ³)	CO (mg/m ³)
<i>Average result</i> (6h-22h) (03/2014)	6h - 22h	0,057	0,046	1,04	0,15	3,39
Baseline data (03/2013)	6h - 22h	0,065	0,1	0,85	0,39	7,08
QCVN05:2009/BTNMT	TB 1h	0,35	0,2	-	0,3	30
QCVN06:2009/BTNMT	TB 1h	-	-	5	-	-

Note:

- *NTD: Not detected*
- *Details of the analytical results in Appendix*
- *QCVN 05:2013/BTNMT – National technical regulation on ambient air quality*
- *QCVN 06:2009/BTNMT – National technical regulation on hazardous substances in ambient air.*

Remarks:

Ambient air regulations of QCVN 05:2013/BTNMT, QCVN 06:2009/BTNMT and baseline data (monitored in March 2013) are used for assessing the ambient air quality at project area.

All parameters monitored in March 2014 meet the allowable limits of regulations of QCVN 05:2013/BTNMT, QCVN 06:2009/BTNMT. Most monitored results are lower than baseline data (March 2013), except HC content is higher than baseline data. This proves that activities of project do not impact on environmental.

4.1.2. Noise and vibration

Monitoring location, time and co-ordinate are the same of air monitoring.

▪ **Noise level:**

Table 4.3. Monitoring results of noise level (*)

Time		Results (dBA)			Baseline data (03/2013)	QCVN 26:2010/BTNMT (dBA)
		L _{eq}	L _{max}	L ₅₀		
Average result (03/2014)	6h - 21h	61,5	70,9	58,0	58,3	70
	21h - 22h	52,5	65,4	50,2	63,5	55

Note: QCVN 26:2010/BTNMT – National technical regulation on noise.

Remarks:

Noise regulations of QCVN 26:2010/BTNMT and baseline data (monitored in March 2013) are used for assessing the noise level at project area. The monitored data shows that:

Noise level monitored during two periods of time from 06:00 to 21:00 and from 21:00 to 22:00 in March 2014 meets the allowable limit of regulations of QCVN 26:2010/BTNMT. Analysis results are the following:

- From 06:00 to 21:00: noise level was 61,5dBA. This value is 1,05 times higher than baseline data (monitored in March 2013) but it is 1,38 times lower than regulations. This shows that construction activity during this time was a slight impact on the environment.
- From 21:00 to 22:00: noise level was 52,5dBA. This value is 1,2 times lower than baseline data and it is also lower than the allowable limits of regulations.

▪ **Vibration level:**

Table 4.4. Monitoring results of vibration (*)

Time		Results (dB)		Baseline data (03/2013)	QCVN 27:2010/BTNMT (dB)
		L _{eq}	L _{veq}		
Average result (03/2014)	6h - 21h	50,6	43,6	54,1	75
	21h - 22h	47,0	40,1	58,5	58,5 (baseline data)

Note: QCVN 27:2010/BTNMT – National technical regulation on vibration.

Remarks:

Vibration regulations of QCVN 27:2010/BTNMT and baseline data (monitored 03/2013) are used for assessing the vibration level at project area.

Vibration level was 50,6dB and 47,0dB during the periods from 06:00 to 21:00 and from 21:00 to 22:00 respectively in March 2014. These values are lower than baseline data monitored in March 2013 and they are also lower than permitted values of regulations of QCVN 27:2010/BTNMT many times.

4.1.3. Surface water quality

a) Ba Dai Canal

- The sample time: 26th March 2014.
- Monitoring locations and sampling: Table 4.5.
- Monitoring and analysis results: Table 4.6

Table 4.5. Description of monitoring locations and sampling

No.	Location	Description of locations	Co-ordinate
1	SW7-1	Km 0+346, up stream, high tide	N 10°47'42,6"; E 106°45'07,5"
2	SW7-2	Km 0+346, up stream, low tide	N 10°47'42,1"; E 106°45'06,8"
3	SW7-3	Km 0+346, down stream, high tide	N 10°47'25,3"; E 106°45'09,4"
4	SW7-4	Km 0+346, down stream, low tide	N 10°47'25,8"; E 106°45'10,1"

Table 4.6. The analysis results of surface water at Ba Dai Canal

No.	Parameters	Unit	Analysis results				QCVN 08:2008/ BTNMT Column B1
			SW7-1	SW7-2	SW7-3	SW7-4	
1	pH	-	6,71	6,79	6,91	6,93	5,5 ÷ 9
2	Temperature	°C	30,3	30,6	30,1	30,2	-
3	Conductivity (EC)	µS/cm	3612	3345	3581	3579	-
4	DO	mg/L	4,58	4,36	4,42	4,48	≥ 4
5	BOD ₅	mg/L	13	15	16	15	15
6	COD	mg/L	25	28	31	28	30
7	SS	mg/L	46	26	42	47	50
8	PO ₄ ³⁻ (P)	mg/L	0,084	0,137	0,134	0,154	0,3
9	NO ₂ ⁻ (N)	mg/L	NTD	NTD	NTD	NTD	0,04
10	NO ₃ ⁻ (N)	mg/L	0,562	0,507	0,417	0,473	10
11	NH ₄ ⁺ (N)	mg/L	0,18	0,24	0,21	0,26	0,5
12	As	mg/L	NTD	NTD	NTD	NTD	0,05
13	Cd	mg/L	NTD	NTD	NTD	NTD	0,01
14	Cr ⁶⁺	mg/L	NTD	NTD	NTD	NTD	0,04
15	Cu	mg/L	0,031	0,037	0,035	0,041	0,5
16	Hg	mg/L	NTD	NTD	NTD	NTD	0,001
17	Pb	mg/L	NTD	NTD	NTD	NTD	0,05
18	Zn	mg/L	0,051	0,065	0,039	0,068	1,5
19	Oils and grease	mg/L	NTD	NTD	NTD	NTD	0,1
20	Coliform	MPN/ 100mL	1500	2400	2300	4100	7500

Note:

- *NTD: Not detected*
- *QCVN 08:2008/BTNMT (Column B1) – National technical regulation on surface water quality.*
- *Column B1 – Using for irrigation or other purposes which required the similar water quality or the same type B2 (B2 –river traffic and other purposes with requirements for low quality water).*

Remarks:

In this report, the surface water regulations of QCVN 08:2008/BTNMT Column B1 are used for assessing the water quality of Ba Dai Canal.

All parameters were analyzed in surface water samples which taken at Ba Dai cannal in March 2014 meet the permitted values of regulations of QCVN 08:2008/BTNMT column B1, except BOD and COD concentration of the sample SW7-3 slightly exceed the permitted values of regulation but not significantly.

b) Muong Kenh Canal

- The sample time: 26th March 2014.
- Monitoring locations and sampling: Table 4.7.
- Monitoring and analysis results: Table 4.8

Table 4.7. Description of monitoring locations and sampling

No.	Location	Description of locations	Co-ordinate
1	SW7-5	Km 1+150, up stream, high tide	N 10 ⁰ 47'47,1"; E 106 ⁰ 45'46,1"
2	SW7-6	Km 1+150, up stream, low tide	N 10 ⁰ 47'47,8"; E 106 ⁰ 45'46,6"
3	SW7-7	Km 1+150, down stream, high tide	N 10 ⁰ 47'47,4"; E 106 ⁰ 45'45,2"
4	SW7-8	Km 1+150, down stream, low tide	N 10 ⁰ 47'47,5"; E 106 ⁰ 45'45,7"

Table 4.8. The analysis results of surface water at Muong Kenh Canal

No.	Parameters	Units	Analysis results				QCVN 08:2008/ BTNMT Column B1
			SW7-5	SW7-6	SW7-7	SW7-8	
1	pH	-	6,96	7,06	7,14	7,17	5,5 ÷ 9
2	Temperature	°C	30,4	30,2	30,3	30,1	-
3	Conductivity(EC)	μS/cm	3382	3602	3419	3664	-
4	DO	mg/L	4,81	4,59	5,60	5,53	≥ 4
5	BOD ₅	mg/L	13	16	12	15	15
6	COD	mg/L	26	33	23	29	30
7	SS	mg/L	33	43	20	41	50
8	PO ₄ ³⁻ (P)	mg/L	0,145	0,172	0,092	0,124	0,3
9	NO ₂ ⁻ (N)	mg/L	NTD	NTD	NTD	NTD	0,04
10	NO ₃ ⁻ (N)	mg/L	0,479	0,451	0,581	0,675	10

No.	Parameters	Units	Analysis results				QCVN 08:2008/ BTNMT Column B1
			SW7-5	SW7-6	SW7-7	SW7-8	
11	NH ₄ ⁺ (N)	mg/L	0,22	0,24	0,31	0,34	0,5
12	As	mg/L	NTD	NTD	NTD	NTD	0,05
13	Cd	mg/L	NTD	NTD	NTD	NTD	0,01
14	Cr ⁶⁺	mg/L	NTD	NTD	NTD	NTD	0,04
15	Cu	mg/L	0,036	0,030	0,033	0,036	0,5
16	Hg	mg/L	NTD	NTD	NTD	NTD	0,001
17	Pb	mg/L	NTD	NTD	NTD	NTD	0,05
18	Zn	mg/L	0,028	0,036	0,024	0,056	1,5
19	Oils and grease	mg/L	NTD	NTD	NTD	NTD	0,1
20	Coliform	MPN/ 100mL	490	2100	1500	2700	7500

Note:

- *NTD: Not detected*
- *QCVN 08:2008/BTNMT (Column B1) – National technical regulation on surface water quality.*
- *Column B1 – Using for irrigation or other purposes which required the similar water quality or the same type B2 (B2 –river traffic and other purposes with requirements for low quality water).*

Remarks:

The surface water regulations of QCVN 08:2008/BTNMT Column B1 is used for assessing the water quality of Muong Kenh Canal.

All parameters were analyzed in surface water samples which taken at Muong Kenh cannal in March 2014 meet the permitted values of regulations of QCVN 08:2008/BTNMT column B1, except BOD and COD concentration of the sample SW7-2 slightly exceed the permitted values of regulation but not significantly.

4.1.4. Ground water quality

- The sample time: 26th March 2014.
- Monitoring locations and sampling: Table 4.9.
- Monitoring and analysis results: Table 4.10

Table 4.9. Description of monitoring locations and sampling

No.	Location	Location descriptions	Co-ordinate
1	GW7-1	Number 110 Nguyen Thi Dinh Street, An Phu Ward, District 2	N 10 ⁰ 47'42,5"; E 106 ⁰ 45'05,8"
2	GW7-2	Number 133 Nguyen Thi Dinh Street, An Phu Ward, District 2	N 10 ⁰ 47'42,1"; E 106 ⁰ 45'07,2"
3	GW7-3	Number 108 Nguyen Thi Dinh Street, An Phu Ward, District 2	N 10 ⁰ 47'42,6"; E 106 ⁰ 45'06,5"

Table 4.10. Analysis results of ground water

No.	Parameters	Units	Analysis results			QCVN 09:2008/ BTNMT
			GW7-1	GW7-2	GW7-3	
1	pH	-	5,87	5,85	5,88	5,5 ÷ 8,5
2	Temperature	°C	29,8	30,1	30,2	-
3	Turbidity	NTU	1,19	1,11	0,89	-
4	Conductivity (EC)	μS/cm	356	371	364	-
5	Colour	Co-Pt	2,3	3,7	3,5	-
6	Odour	-	Odorless	Odorless	Odorless	-
7	Hardness	mgCaCO ₃ /L	9,2	10,5	8,6	500
8	Clorua (Cl ⁻)	mg/L	87,1	68,4	83,2	250
9	Sulfat (SO ₄ ²⁻)	mg/L	75,2	74,1	82,6	400
10	NO ₃ ⁻ (N)	mg/L	0,316	0,284	0,357	15
11	TS	mg/L	205	241	213	1500
12	As	mg/L	NTD	NTD	NTD	0,05
13	Cd	mg/L	NTD	NTD	NTD	0,005
14	Xianua (CN ⁻)	mg/L	NTD	NTD	NTD	0,01
15	Fe	mg/L	0,218	0,256	0,287	5
16	Mn	mg/L	0,084	0,075	0,103	0,5
17	Pb	mg/L	NTD	NTD	NTD	0,01
18	E.Coli	MPN/100mL	NTD	NTD	NTD	NTD
19	Coliform	MPN/100mL	NTD	NTD	2	3

Note:

- *NTD: Not detected*
- *QCVN 09:2008/BTNMT – National technical regulation on underground water quality.*

Remarks:

The ground water regulations of QCVN 09:2008/BTNMT are used for assessing the ground water quality of the project area.

All parameters were analyzed in underground water samples at project area in March 2014 meet the permitted values of regulations of QCVN 09:2008/BTNMT.

4.1.5. Soil quality

- The sample time: 26th March 2014.
- Monitoring locations and sampling: Table 4.11.
- Monitoring and analysis results: Table 4.12

Table 4.11. Description of monitoring locations and sampling

No.	Location	Location descriptions	Co-ordinate
1	S7-1	Near Muong Kenh Canal, An Phu Ward, District 2	N 10 ⁰ 47'45,2"; E 106 ⁰ 45'44,1"
2	S7-2	Near Muong Kenh Canal, An Phu Ward, District 2	N 10 ⁰ 47'48,4"; E 106 ⁰ 45'32,5"
3	S7-3	Near Muong Kenh Canal, An Phu Ward, District 2	N 10 ⁰ 47'46,3"; E 106 ⁰ 45'31,4"

Table 4.12. Analysis results of soil quality

No.	Parameters	Units	Analysis results			QCVN 03:2008 /BTNMT
			S7-1	S7-2	S7-3	
1	pH	-	5,72	6,15	5,64	-
2	Organic	%	1,76	2,51	2,43	-
3	Total N	%	0,092	0,078	0,064	-
4	Clorua (Cl ⁻)	mg/kg	942	1053	836	-
5	Sulfat (SO ₄ ²⁻)	%	0,017	0,025	0,022	-
6	Asen (As)	mg/kg	1,12	0,658	0,884	12
7	Cadimi (Cd)	mg/kg	NTD	NTD	NTD	5
8	Copper (Cu)	mg/kg	2,59	5,76	5,48	70
9	Mercury (Hg)	mg/kg	NTD	NTD	NTD	-
10	Total P	mg/kg	89	84	71	-
11	Lead (Pb)	mg/kg	12,12	14,26	14,51	120
12	Zinc (Zn)	mg/kg	63,25	45,37	42,78	200

Note:

- *NTD: Not detected*
- *QCVN 03:2008/BTNMT – National technical regulation on the allowable limits of heavy metals in the soils.*

Remarks:

The soil quality regulations of QCVN 03:2008/BTNMT is used for assessing the soil quality of the project area.

All parameters were analyzed in soil samples at project area in March 2014 meet the permitted values of regulations of QCVN 03:2008/BTNMT.

4.2. PACKAGE 8

4.2.1. Air quality

- Monitoring location: Phu Huu Ward, near Do Xuan Hop Street – Package 8 (Km3+200)
- Monitoring time: From 06:00 to 22:00 dated 26th March 2014
- Co-ordinate: N 10°47'51,1" ; E 106°46'44,5"
- Weather conditions: sunny, light wind.
- Exterior conditions: Environmental monitoring location near Do Xuan Hop Street. There are a lot of vehicles.

Note: (): Detailed monitoring results and analysis are attached in the Appendix*

Table 4.13. Monitoring result of microclimate (*)

Time	Temperature	Humidity	Wind	Pressure	Wind direction
	(^o C)	(%)	(m/s)	(mB)	
Average results (6h-22h) (03/2014)	31,2	65,2	0,4 – 1,4	1006,3	ES
Baseline data (03/2013) (6h-22h)	32,2	58,9	0,1-2,3	1005,4	SE

Table 4.14. Analysis results of air quality parameters (*)

Standard	Thời gian	SO ₂	NO ₂	HC	TSP	CO
		(mg/m ³)	(mg/m ³)	(mg/m ³)	(mg/m ³)	(mg/m ³)
Average results (Tháng 03/2014)	6h - 22h	0,075	0,06	1,04	0,22	5,3
Baseline data (03/2013)	6h - 22h	0,01	0,05	0	0,13	3,10

QCVN05:2009/BTNMT	Average 1 hour	0,35	0,2	-	0,3	30
QCVN06:2009/BTNMT	Average 1 hour	-	-	5	-	-

Note:

- *NTD: Not detected*
- *Details of the analytical results in Appendix*
- *QCVN 05:2013/BTNMT – National technical regulation on ambient air quality*
- *QCVN 06:2009/BTNMT – National technical regulation on hazardous substances in ambient air.*

Remarks:

Ambient air regulations of QCVN 05:2013/BTNMT, QCVN 06:2009/BTNMT and baseline data (monitored 03/2013) are used for assessing the ambient air quality at project area.

All parameters monitored during the period of time from 06:00 to 22:00 at project area in March 2014 are shown that they are lower than baseline data (monitored in March 2014). This shows that construction activities of project during this period impact on environment at project area but not significantly due to all parameters still meet the permitted values of regulations of QCVN 05:2013/BTNMT, QCVN 06:2009/BTNMT.

4.2.2. Noise and vibration level

Monitoring locations, time and co-ordinate are the same of air monitoring.

▪ **Noise level:**

Table 4.15. Monitoring results of noise level(*)

Time		Results (dBA)			Baseline data (03/2013)	QCVN 26:2010/BTNMT (dBA)
		L_{eq}	L_{max}	L₅₀		
<i>Average result (03/2014)</i>	6h - 21h	64,8	68,0	64,3	54,6	70
	21h - 22h	59	61,6	56,5	51,6	55

Note:

- *Details of the analytical results in Appendix*
- *QCVN 26:2010/BTNMT – National technical regulation on noise.*

Remarks:

Noise regulations of QCVN 26:2010/BTNMT and baseline data (monitored in March 2013) are used for assessing the noise level at project area. According to the monitored data, they are shown that:

All noise level were monitored during two periods of time from 06:00 to 21:00 and from 21:00 to 22:00 are higher than baseline data (monitored in March 2013), but during period of time from 06:00 to 21:00, noise level meet the allowable limits of regulations of QCVN 26:2010/BTNMT and during period of time from 21:00 to 22:00, noise level is 1,07 times higher than permitted values of regulations. This proves that construction activities during period from 21:00 to 22:00 has affected on regional environment of project.

▪ **Vibration level:**

Table 4.16. Monitoring results of vibration(*)

Time		Results (dB)		Baseline data (03/2013)	QCVN 27:2010/BTNMT (dB)
		L _{eq}	L _{veq}		
<i>Average result (03/2014)</i>	6h - 21h	48,9	42,2	39,1	75
	21h - 22h	34,6	30,2	26,5	26,5 (baseline data)

Note:

- *Details of the analytical results in Appendix.*
- *QCVN 27:2010/BTNMT – National technical regulation on vibration.*

Remarks:

Vibration regulations of QCVN 27:2010/BTNMT and baseline data (monitored in March 2013) are used for assessing the vibration level at project area. According to the monitored data, they can be seen that:

Vibration level monitored during two periods of times from 06:00 to 21:00 and from 21:00 to 22:00 in March 2014 are shown that they are higher than baseline data (monitored in March 2013), but when these values compared with regulations of QCVN 26:2010/BTNMT as follows:

- From 06:00 to 21:00: vibration level was 48,9dB. This value is 1,05 times higher than baseline data (monitored in March 2013) but it is 1,5 times lower than regulations.
- From 21:00 to 22:00: vibration level was 34,6dB. This value is 1,3 times higher than the allowable limits of regulations.

The above results are shown that construction activities during this periods has impact on environment, however the period of time from 06:00 to 21:00, the noise level is still acceptable because it has not exceed permitted regulations but the period of time from 21:00 to 22:00, noise level need to be controlled to avoid affecting the local environment.

4.2.3. Surface water quality

- The sample time: 26th March 2014.
- Monitoring locations and sampling: Ong Cai River (Ong Cai bridge) Table 4.17.
- Monitoring and analysis results: Table 4.18

Table 4.17. Description of monitoring locations and sampling

TT	Vị trí	Mô tả vị trí	Tọa độ
1	SW8-1	Km 3+380 up stream, high tide	N 10°47'54,8"; E 106°46'47,7"
2	SW8-2	Km 3+380 up stream, low tide	N 10°47'54,8"; E 106°46'47,7"
3	SW8-3	Km 3+380 down stream, high tide	N 10°47'51,0"; E 106°46'47,6"
4	SW8-4	Km 3+380 down stream, low tide	N 10°47'51,0"; E 106°46'47,6"

Table 4.18. Analysis results of surface water samples at Ong Cai River (Ong Cai Bridge)

No.	Parameters	Units	Analysis results				QCVN 08:2008/ BTNMT Column B1
			SW8-1	SW8-2	SW8-3	SW8-4	
1	pH	-	6,54	6,76	6,48	6,43	5,5 ÷ 9
2	Temperature	°C	30,4	30,2	30,3	29,9	-
3	Conductivity(E C)	µS/cm	1240	1199	1075	1159	-
4	DO	mg/L	4,79	4,82	5,19	4,88	≥ 4
5	BOD ₅	mg/L	13	12	14	12	15
6	COD	mg/L	25	22	28	21	30
7	SS	mg/L	38	28	47	36	50
8	PO ₄ ³⁻ (P)	mg/L	0,081	0,076	0,056	0,093	0,3
9	NO ₂ ⁻ (N)	mg/L	NTD	NTD	NTD	NTD	0,04
10	NO ₃ ⁻ (N)	mg/L	0,468	0,384	0,591	0,423	10
11	NH ₄ ⁺ (N)	mg/L	0,19	0,22	0,25	0,27	0,5
12	As	mg/L	NTD	NTD	NTD	NTD	0,05
13	Cd	mg/L	NTD	NTD	NTD	NTD	0,01
14	Cr ⁶⁺	mg/L	NTD	NTD	NTD	NTD	0,04

No.	Parameters	Units	Analysis results				QCVN 08:2008/ BTNMT Column B1
			SW8-1	SW8-2	SW8-3	SW8-4	
15	Cu	mg/L	0,032	0,041	0,028	0,033	0,5
16	Hg	mg/L	NTD	NTD	NTD	NTD	0,001
17	Pb	mg/L	NTD	NTD	NTD	NTD	0,05
18	Zn	mg/L	0,048	0,075	0,053	0,057	1,5
19	Oils and grease	mg/L	NTD	NTD	NTD	NTD	0,1
20	Coliform	MPN/ 100mL	630	1500	110	490	7500

Note:

- NTD: Not detected
- QCVN 08:2008/BTNMT (Column B1) – National technical regulation on surface water quality.
- Column B1 – Using for irrigation or other purposes which required the similar water quality or the same type B2 ((B2 –river traffic and other purposes with requirements for low quality water).

Remarks:

The surface water regulations of QCVN 08:2008/BTNMT Column B1 is used for assessing the water quality of Ong Cai River (Ong Cai Bridge). According to the monitored data at Ong Cai River, they are shown that:

Analysis results of four surface water samples of Ong Cai river (Ong Cai bridge) in March 2014 are lower than permitted values of regulations of QCVN 08:2008/BTNMT.

4.2.4. Ground water quality

- The sample time: 26th March 2014.
- Monitoring locations and sampling: Table 4.19.
- Monitoring and analysis results: Table 4.20

Table 4.19. Description of monitoring locations and sampling

No.	Location	Location discription	Co-ordinate
1	GW8-1	Residential area belong Phu Huu Ward, Km 3+200 (No. 21, Phu Duc residential area, Do Xuan Hop Street, District 9)	N 10°47'56,5"; E 106°46'42,7"

No.	Location	Location discription	Co-ordinate
2	GW8-2	Residential area belong Phu Huu Ward, Km 3+200 (No. 01, Phu Duc residential area, Do Xuan Hop Street, District 9)	N 10 ⁰ 47'58,4"; E 106 ⁰ 46'42,5"
3	GW8-3	Residential area belong Phu Huu Ward, Km 3+200 (steering committee of Package 8, Phu Duc residential area, Do Xuan Hop Street, District 9)	N 10 ⁰ 47'54,1"; E 106 ⁰ 46'46,2"

Table 4.20. Analysis results of ground water samples

No.	Parameters	Unit	Analysis results			QCVN 09:2008/ BTNMT
			GW8-1	GW8-2	GW8-3	
1	pH	-	6,61	6,32	6,24	5,5 ÷ 8,5
2	Temperature	°C	29,9	29,8	30,1	-
3	Turbidity	NTU	1,31	0,46	0,59	-
4	Conductivity (EC)	µS/cm	376	353	364	-
5	Colour	Co-Pt	4,3	3,2	3,8	-
6	Odour	-	Odorless	Odorless	Odorless	-
7	Hardness	mgCaCO ₃ /L	16,8	21,3	25,4	500
8	Clorua (Cl ⁻)	mg/L	86,2	93,1	95,5	250
9	Sulfat (SO ₄ ²⁻)	mg/L	26,4	41,2	53,4	400
10	NO ₃ ⁻ (N)	mg/L	0,326	0,272	0,384	15
11	TS	mg/L	195	181	187	1500
12	As	mg/L	NTD	NTD	NTD	0,05
13	Cd	mg/L	NTD	NTD	NTD	0,005
14	Xianua (CN ⁻)	mg/L	NTD	NTD	NTD	0,01
15	Fe	mg/L	0,624	0,337	0,346	5
16	Mn	mg/L	0,042	0,029	0,038	0,5
17	Pb	mg/L	NTD	NTD	NTD	0,01
18	E.Coli	MPN/100mL	NTD	NTD	NTD	NTD
19	Coliform	MPN/100mL	3	2	NTD	3

Note:

- NTD: Not detected
- QCVN 09:2008/BTNMT – National technical regulation on underground water quality.

Remarks:

Underground water regulations of QCVN 09:2008/BTNMT is used for assessing the water quality of project area. The analyzed data of ground water samples shows that:

These parameters were analyzed in 03 samples of groundwater at the project area in March 2014 meet the allowable limits of regulations of QCVN 09:2008/BTNMT.

4.2.5. Soil quality

- The sample time: 26th March 2014.
- Monitoring locations and sampling: Table 4.21.
- Monitoring and analysis results: Table 4.22

Table 4.21. Description of monitoring locations and sampling

No.	Location	Location discriptions	Co-ordinate
1	S8-1	Near Ong Cai River, Phu Huu Ward, District 9	N 10 ⁰ 47'54,5"; E 106 ⁰ 46'48,8"
2	S8-2	Near Ong Cai River, Phu Huu Ward, District 9	N 10 ⁰ 47'55,6"; E 106 ⁰ 46'48,7"
3	S8-3	Near Ong Cai River, Phu Huu Ward, District 9	N 10 ⁰ 47'50,4"; E 106 ⁰ 46'44,2"

Table 4.22. Analysis results of soil sample

No.	Parameters	Unit	Analysis results			QCVN 03:2008 /BTNMT
			S8-1	S8-2	S8-3	
1	pH	-	6,12	5,86	4,74	-
2	Organic	%	2,18	1,93	1,67	-
3	Total N	%	0,053	0,081	0,075	-
4	Clorua (Cl ⁻)	mg/kg	539	625	842	-
5	Sulfat (SO ₄ ²⁻)	%	0,023	0,024	0,019	-
6	Asen (As)	mg/kg	0,531	0,427	0,516	12
7	Cadimi (Cd)	mg/kg	NTD	NTD	NTD	5

8	Copper (Cu)	mg/kg	7,45	5,63	8,82	70
9	Mercury (Hg)	mg/kg	NTD	NTD	NTD	-
10	Total P	mg/kg	267	214	196	-
11	Lead (Pb)	mg/kg	12,35	13,26	10,54	120
12	Zinc (Zn)	mg/kg	53,12	38,47	35,95	200

Note:

- *NTD: Not detected*
- *QCVN 03:2008/BTNMT – National technical regulation on the allowable limits of heavy metals in the soils.*

Remarks:

The soil quality regulations of QCVN 03:2008/BTNMT is used for assessing the soil quality of the project area. According to the analyzed data, they are shown that:

These parameters were analyzed in 03 samples of soil at the project area in March 2014 is the same groundwater samples, these results meet the allowable limits of regulations of QCVN 03:2008/BTNMT.

4.3. PACKAGE 9

4.3.1. Air quality

- Monitoring location: Project area near Ring Road 2 (Km4+500)
- Monitoring time: From 06:00 to 22:00 dated 26th March 2014
- Co-ordinate: N 10⁰47'53,5"; E 106⁰47'26,3"
- Weather conditions: sunny, light wind.
- Exterior conditions: Environmental monitoring location near Ring Road 2. There are a lot of vehicles.

Note: (): Detailed monitoring results and analysis are attached in the Appendix*

Table 4.23. Monitoring results of microclimate (*)

Time	Temperature	Humidity	Wind	Pressure	Wind direction
	(⁰ C)	(%)	(m/s)	(mB)	
Average results (6h-22h) (03/2014)	32,0	62,5	0,4 – 1,6	1006,6	ES
Baseline data (03/2013) (6h-22h)	32,2	58,4	0,2-2,3	1005,5	SE

Table 4.24. Analysis results of ambient air quality(*)

Regulations	Time	SO ₂	NO ₂	HC	TSP	CO
		(mg/m ³)	(mg/m ³)	(mg/m ³)	(mg/m ³)	(mg/m ³)
Average results (03/2014)	6h - 22h	0,064	0,058	0,84	0,19	4,04
Baseline data (03/2013)	6h - 22h	0,09	0,06	0	0,28	2,90
QCVN05:2013/BTNMT	Average an hour	0,35	0,2	-	0,3	30
QCVN06:2009/BTNMT	Average an hour	-	-	5	-	-

Note:

- NTD: Not detected
- Details of the analytical results in Appendix
- QCVN 05:2013/BTNMT – National technical regulation on ambient air quality
- QCVN 06:2009/BTNMT – National technical regulation on hazardous substances in ambient air.

Remarks:

Ambient air regulations of QCVN 05:2013/BTNMT, QCVN 06:2009/BTNMT and baseline data (monitored in March 2013) are used for assessing the ambient air quality at project area.

All parameters were monitored in the ambient air of the project area in March 2014 are lower than permitted values of QCVN 05:2014 /BTNMT and QCVN06:2009 /BTNMT although concentration of HC and CO are higher baseline data monitored in March 2013. This proves that construction activities during this period still have an impact on environment however they are still in control.

4.3.2. Noise and vibration

Monitoring locations, time and co-ordinate are the same of air monitoring.

▪ **Noise level:**

Table 4.25. Monitoring results of noise level (*)

Time		Results (dBA)			Baseline data (03/2013)	QCVN 26:2010/BTNMT (dBA)
		L _{eq}	L _{max}	L ₅₀		
Average result (03/2014)	6h - 21h	56,3	78,8	54,8	51,3	70
	21h - 22h	61	79,1	60,1	53,4	55

Note: QCVN 26:2010/BTNMT – National technical regulation on noise.

Remarks:

Noise regulations of QCVN 26:2010/BTNMT and baseline data (monitored 03/2013) are used for assessing the noise level at project area. According to the monitored data in December 2013, they can be seen that:

Noise level monitored during two periods of times from 06:00 to 21:00 and from 21:00 to 22:00 in March 2014 is higher than baseline data monitored in March 2013. However, when compared with QCVN 26:2010/BTNMT are shown as follows:

- From 06:00 to 21:00: noise level was 56,3dBA. This value is 1,24 times lower than permitted values of regulations.
- From 21:00 to 22:00: noise level was 61dBA. This value is 1,1 times higher than the allowable limits of regulations.

The above results are shown that construction activities had affected on regional environment. However, the noise level in the period of time from 06:00 to 21:00 is still under control but noise level in the period of time from 21:00 to 22:00 should be control to avoid affecting the surrounding area.

▪ **Vibration level:**

Table 4.26. Monitoring results of vibration(*)

Time		Results (dB)		Baseline data (03/2013)	QCVN 27:2010/BTNMT (dB)
		L _{eq}	L _{veq}		
<i>Average result (03/2014)</i>	6h - 21h	51,9	45,7	47,2	75
	21h - 22h	48,4	42	47,1	47,1 (baseline data)

Note: QCVN 27:2010/BTNMT – National technical regulation on vibration.

Nhận xét:

Vibration regulations of QCVN 27:2010/BTNMT and baseline data (monitored 03/2013) are used for assessing the vibration level at project area.

Vibration level were monitored during two periods of time from 06:00 to 21:00 and from 21:00 to 22:00 are higher than baseline data (monitored in March 2013), when vibration level compared with QCVN 26:2010/BTNMT are shown that during period of time from 06:00 to 21:00, vibration level is lower than the allowable limits of regulations many times and during period of time from 21:00 to 22:00, vibration level is higher than permitted values of regulations but not significantly.

4.3.3. Ground water quality

- The sample time: 26th March 2014.
- Monitoring locations and sampling: Table 4.27.
- Monitoring and analysis results: Table 4.28

Table 4.27. Description of monitoring locations and sampling

No.	Location	Location discriptions	Co-ordinate
1	GW9-1	Number 26B, 827th street, Phu Huu Ward, District 9 –(Phu Huu Ward near intersection with Ring Road 2 street)	N 10°47'45,1"; E 106°47'29,5"
2	GW9-2	Nguyen Van Hoang is host, 827th street, Phu Huu Ward, District 9 (Phu Huu Ward near intersection with Ring Road 2 street)	N 10°47'44,2"; E 106°47'27,6"
3	GW9-3	Hoang Thanh Phong is host, 827th street, Phu Huu Ward, District 9 (Phu Huu Ward near intersection with Ring Road 2 street)	N 10°47'43,8"; E 106°47'27,5"

Table 4.28. Analysis results of ground water samples

No.	Parameters	Units	Analysis results			QCVN 09:2008/ BTNMT
			GW9-1	GW9-2	GW9-3	
1	pH	-	5,64	6,18	6,13	5,5 ÷ 8,5
2	Temperature	°C	29,7	30,1	29,5	-
3	Turbidity	NTU	1,56	1,37	0,68	-
4	Conductivity (EC)	µS/cm	346	264	257	-
5	Colour	Co-Pt	5,1	2,3	2,6	-
6	Odour	-	Không có mùi lạ	Không có mùi lạ	Không có mùi lạ	-
7	Hardness	mgCaCO ₃ /L	20,4	21,2	19,3	500
8	Clorua (Cl ⁻)	mg/L	89,9	92,1	83,4	250
9	Sulfat (SO ₄ ²⁻)	mg/L	38,2	33,1	40,4	400
10	NO ₃ ⁻ (N)	mg/L	0,261	0,317	0,363	15

No.	Parameters	Units	Analysis results			QCVN 09:2008/ BTNMT
			GW9-1	GW9-2	GW9-3	
11	TS	mg/L	176	203	194	1500
12	As	mg/L	NTD	NTD	NTD	0,05
13	Cd	mg/L	NTD	NTD	NTD	0,005
14	Xianua (CN)	mg/L	NTD	NTD	NTD	0,01
15	Fe	mg/L	3,25	3,16	2,92	5
16	Mn	mg/L	0,164	0,152	0,092	0,5
17	Pb	mg/L	NTD	NTD	NTD	0,01
18	E.Coli	MPN/100mL	NTD	NTD	NTD	NTD
19	Coliform	MPN/100mL	NTD	NTD	NTD	3

Note:

- NTD: Not detected
- QCVN 09:2008/ BTNMT – National technical regulation on underground water quality.

Remarks:

Underground water regulations of QCVN 09:2008/ BTNMT is used for assessing the water quality of project area.

All parameters were analyzed in 03 samples of groundwater at the project area in March 2014 meet the allowable limits of regulations of QCVN 09:2008/ BTNMT.

4.3.4. Soil quality

- The sample time: 26th March 2014
- Monitoring locations and sampling: Table 4.29.
- Monitoring and analysis results: Table 4.30

Table 4.29. Description of monitoring locations and sampling

No.	Locaiton	Location descriptions	Co-ordinate
1	S9-1	Intersection of Ring road 2 with HLD expressway (Km4+500)	N 10 ⁰ 47'53,1"; E 106 ⁰ 47'25,2"
2	S9-2	Intersection of Ring road 2 with HLD expressway (Km4+500)	N 10 ⁰ 47'51,6"; E 106 ⁰ 47'26,3"

No.	Locaiton	Location descriptions	Co-ordinate
3	S9-3	Intersection of Ring road 2 with HLD expressway (Km4+500)	N 10 ⁰ 47'48,1"; E 106 ⁰ 47'25,7"

Table 4.30. Analysis results of soil samples

No.	Parameters	Unit	Analysis results			QCVN 03:2008 /BTNMT
			S9-1	S9-2	S9-3	
1	pH	-	6,68	6,14	5,52	-
2	Organic	%	2,63	2,81	2,94	-
3	Total N	%	0,076	0,104	0,095	-
4	Clorua (Cl ⁻)	mg/kg	826	751	806	-
5	Sulfat (SO ₄ ²⁻)	%	0,015	0,020	0,018	-
6	Asen (As)	mg/kg	0,236	0,205	0,227	12
7	Cadimi (Cd)	mg/kg	NTD	NTD	NTD	5
8	Copper (Cu)	mg/kg	8,65	4,23	5,11	70
9	Mercury (Hg)	mg/kg	NTD	NTD	NTD	-
10	Total P	mg/kg	324	385	352	-
11	Lead (Pb)	mg/kg	15,38	14,26	14,75	120
12	Zinc (Zn)	mg/kg	51,67	49,59	48,63	200

Note:

- *NTD: Not detected*
- *QCVN 03:2008/BTNMT – National technical regulation on the allowable limits of heavy metals in the soils.*

Remarks:

The soil quality regulations of QCVN 03:2008/BTNMT is used for assessing the soil quality of the project area.

All parameters were analyzed in 03 samples of soil at the project area in March 2014 meet the allowable limits of regulations of QCVN 03:2008/BTNMT.

4.4. Assessment of environmental changing tendency between two monitoring periods in March 2014 (No.5) and December 2013 (No.4)

4.4.1. Assessment of environmental changing tendency of air quality

Ambient air quality during two series of monitoring is shown in the following table:

Table 4.31. Comparison of air results between No. 5 and No.4

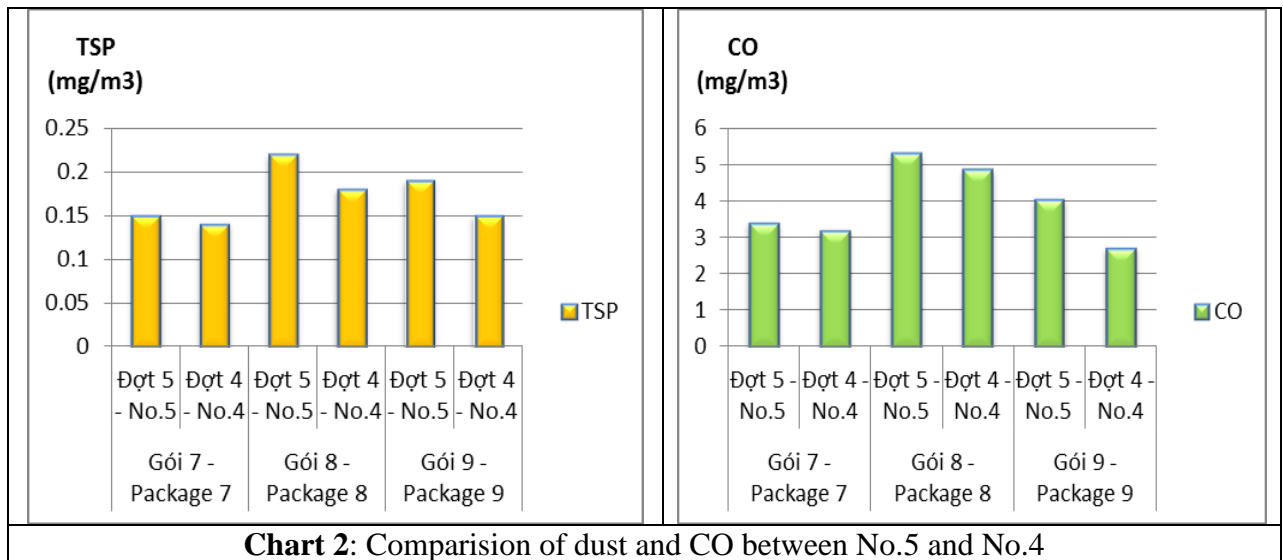
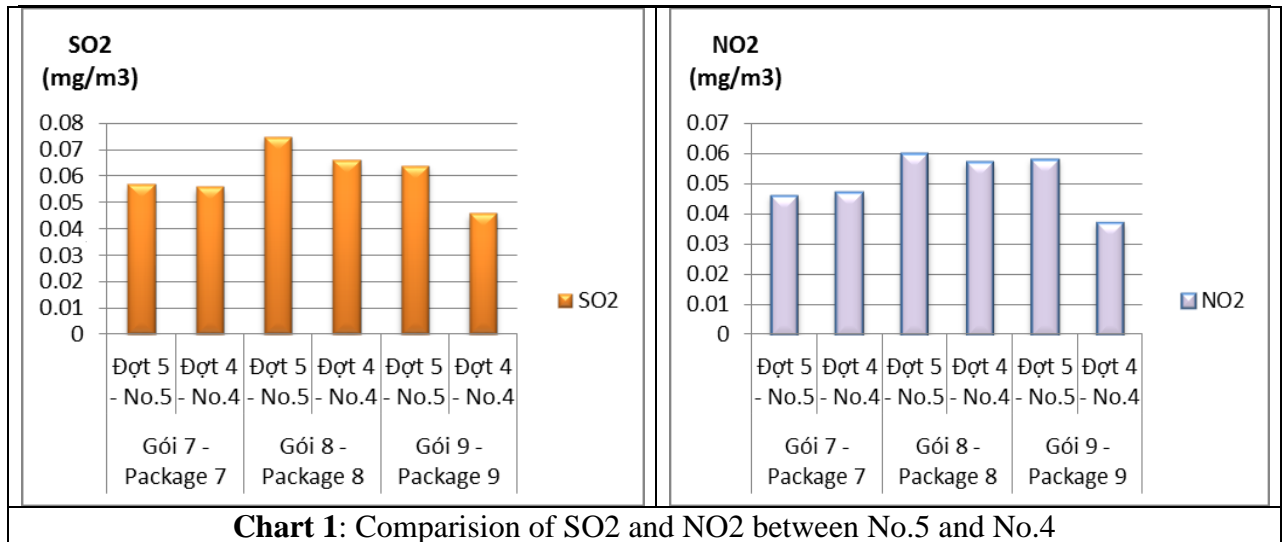
Packages	Series	SO ₂	NO ₂	HC	TSP	CO
		mg/m ³	mg/m ³	mg/m ³	mg/m ³	mg/m ³
Package 7	No.5	0,057	0,046	1,04	0,15	3,39
	No.4	0,056	0,047	1,04	0,14	3,2
Package 8	No.5	0,075	0,06	1,04	0,22	5,3
	No.4	0,066	0,057	0,71	0,18	4,85
Package 9	No.5	0,064	0,058	0,84	0,19	4,04
	No.4	0,046	0,037	0,71	0,15	2,7
QCVN 05:2013/BTNMT		0,35	0,2	-	0,3	30
QCVN 06:2009/BTNMT				5		

Remarks:

According to the monitored data showed that all parameters in ambient air quality during two series of monitoring are lower than permitted regulations of QCVN 05:2013/BTNMT và QCVN 06:2009/BTNMT.

The concentration of SO₂, TSP and CO during series of No.5 of Packages 7, 8 and 9 are higher than the series of No.4.

- NO₂ content: NO₂ content of series No.5 is higher than series of No.4 in Packages 8 and 9, but this NO₂ content of series No.5 is slightly lower than series of No.4 in Package 7.
- HC content does not change between Series No.5 and No.4 at Package 7, but HC content of series No.5 is higher than series of No.4 in Packages 8 and 9.



4.4.2. Assessment of environmental changing tendency of noise and vibration level

Noise and vibration level are compared as the following table:

Table 4.32. Comparison of noise and vibration level between No.5(March 2014) and No.4(December 2013)

Packages	Series	Noise (dBA)		Vibration (dB)	
		6-21h	21-22h	6-21h	21-22h
Package 7	No.5	61,5	52,5	50,6	47,0
	No.4	58,2	60,2	50,5	47,5
QCVN 27:2010/BTNMT		-	-	75	58,5(baseline data)
Package 8	No.5	64,8	59	48,9	34,6

Packages	Series	Noise (dBA)		Vibration (dB)	
		6-21h	21-22h	6-21h	21-22h
	No.4	56,2	58,7	50,2	44,6
QCVN 27:2010/BTNMT		-	-	75	26,5(baseline data)
Package 9	No.5	56,3	61	51,9	48,4
	No.4	55,2	50,5	45,7	38,9
QCVN 27:2010/BTNMT		-	-	75	47,1(baseline data)
QCVN 26:2010/BTNMT		70	55	-	-

Note: baseline data (Monitored in March 2013)

Remarks:

▪ **Noise level:**

- From 06:00 to 21:00: Noise level of series No.5 and No.4 of Packages 7, 8 and 9 meet permitted values of regulation of QCVN 26:2010/BTNMT. Noise level of series No.5 of Packages 7, 8 and 9 are higher than noise level of series No.4.
- From 21:00 to 22:00: most of noise level of series No.5 and No.4 of Packages 7, 8 and 9 are higher than allowable limits of regulations of QCVN 26:2010/BTNMT, except noise level of series No.5 of Package 7 and series No.4 of Package 8 meet the allowable limits of regulations. For Packages 8 and 9, noise level of series No.5 were 0,3dBA and 10,5dBA higher than noise level of series No.4 respectively. For Package 7, noise level of series No.5 is lower than noise level of series No.4

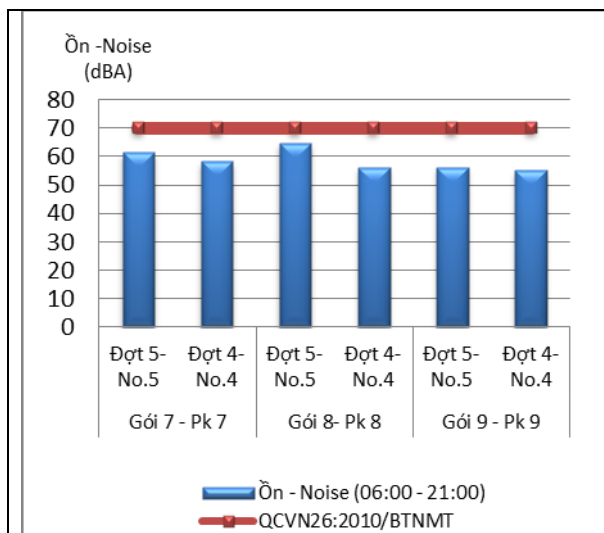


Chart 3: Comparison of noise level between No.5 and No.4 during period from 6:00 to 21:00

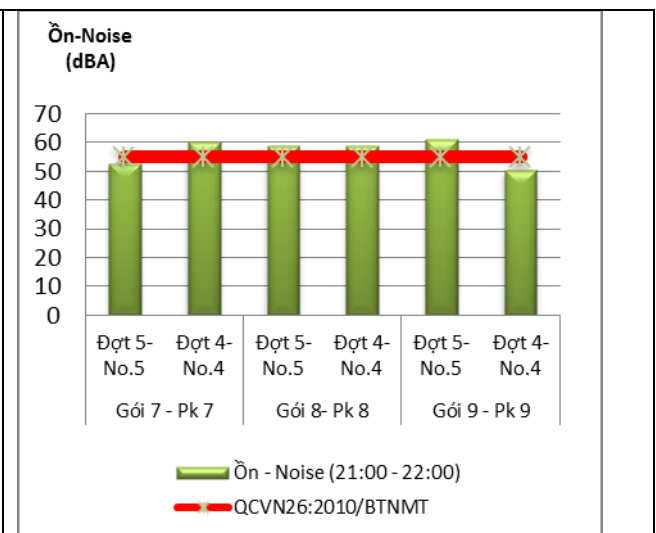
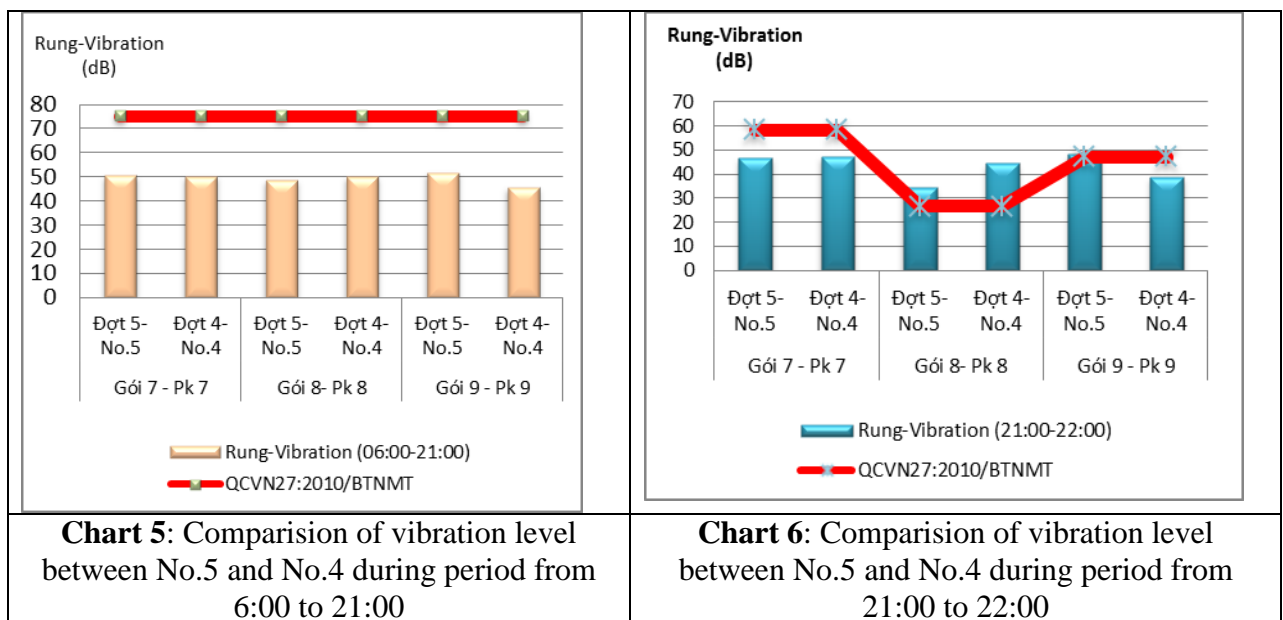


Chart 4: Comparison of noise level between No.5 and No.4 during period from 21:00 to 22:00

▪ **Vibration level:**

- Package 7: during two periods of times from 06:00 to 21:00 and from 21:00 to 22:00, there is no significant change between the vibration of series 5 and series 4. These results meet the allowable limits of regulations of QCVN 27:2010/BTNMT.
- Package 8: during two periods of times from 06:00 to 21:00 and from 21:00 to 22:00, noise level of series No.5 is lower than series No.4.
- Package 9: during two periods of times from 06:00 to 21:00 and from 21:00 to 22:00, noise level of series No.5 is higher than series No.4. Most these results meet the allowable limits of regulation, except, vibration level of series No.5 during the periods of time from 21:00 to 22:00 exceed permitted values of regulation but not significantly.



4.4.3. Assessment of environmental changing tendency of surface water quality

We just compare some of the key parameters which is a large variation observed during two series of monitoring. They are shown in the following table:

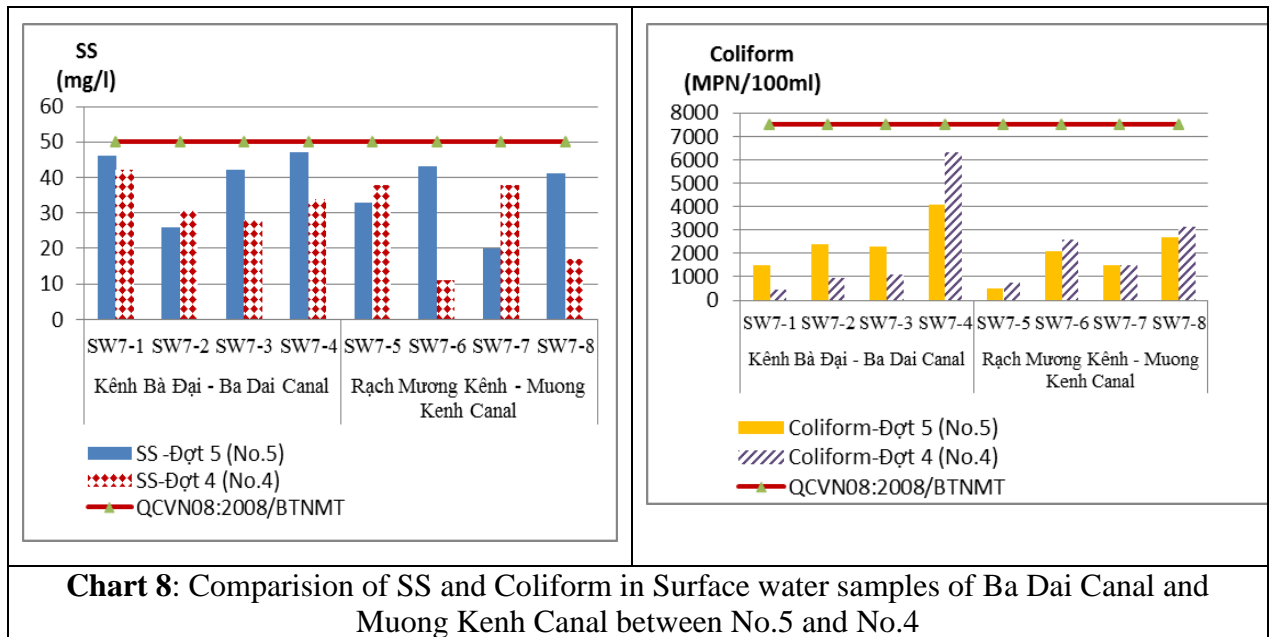
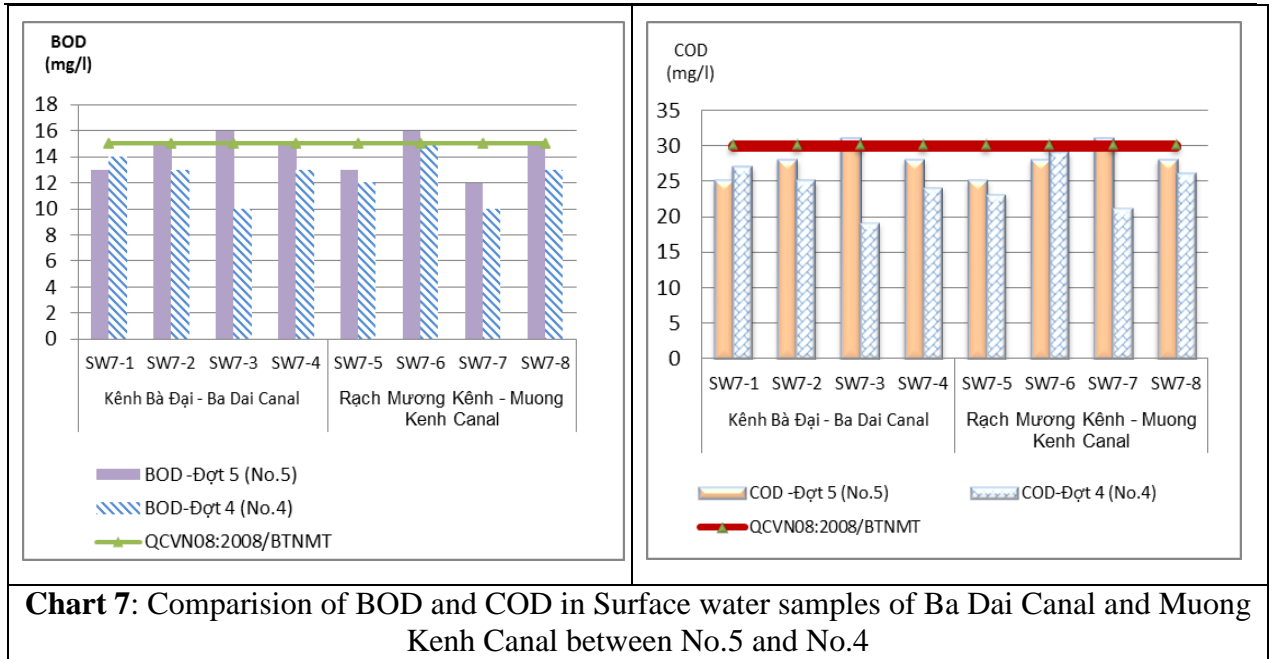
Table 4.33. Comparison of surface water quality between No.5 and No.4

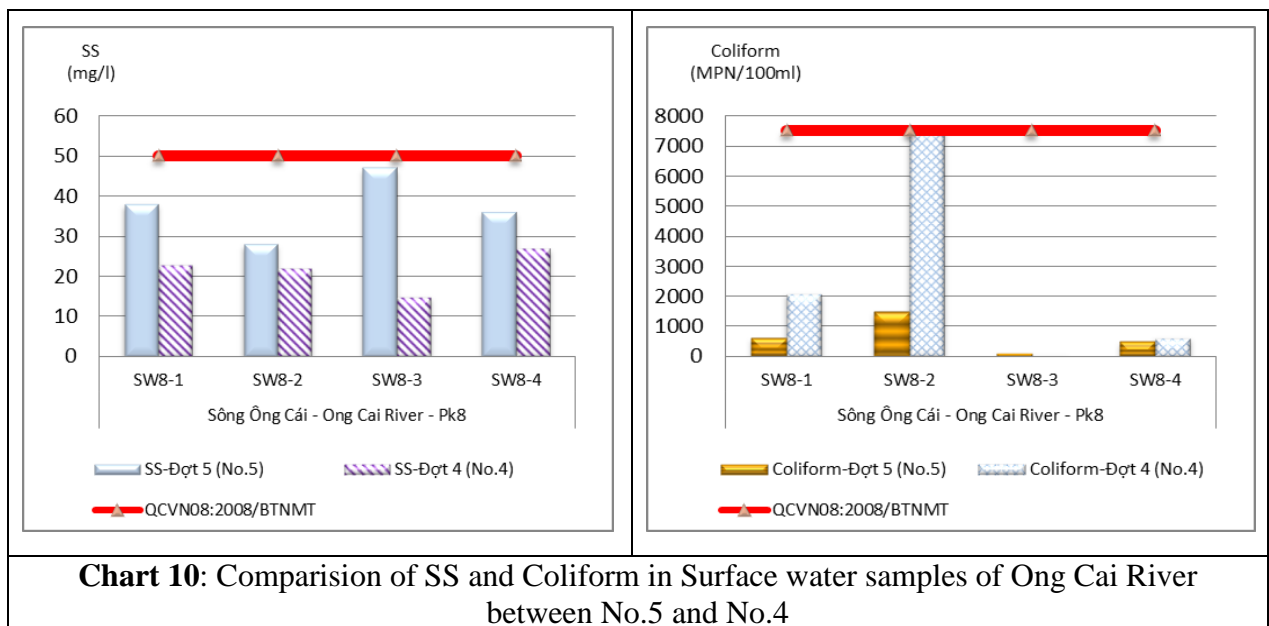
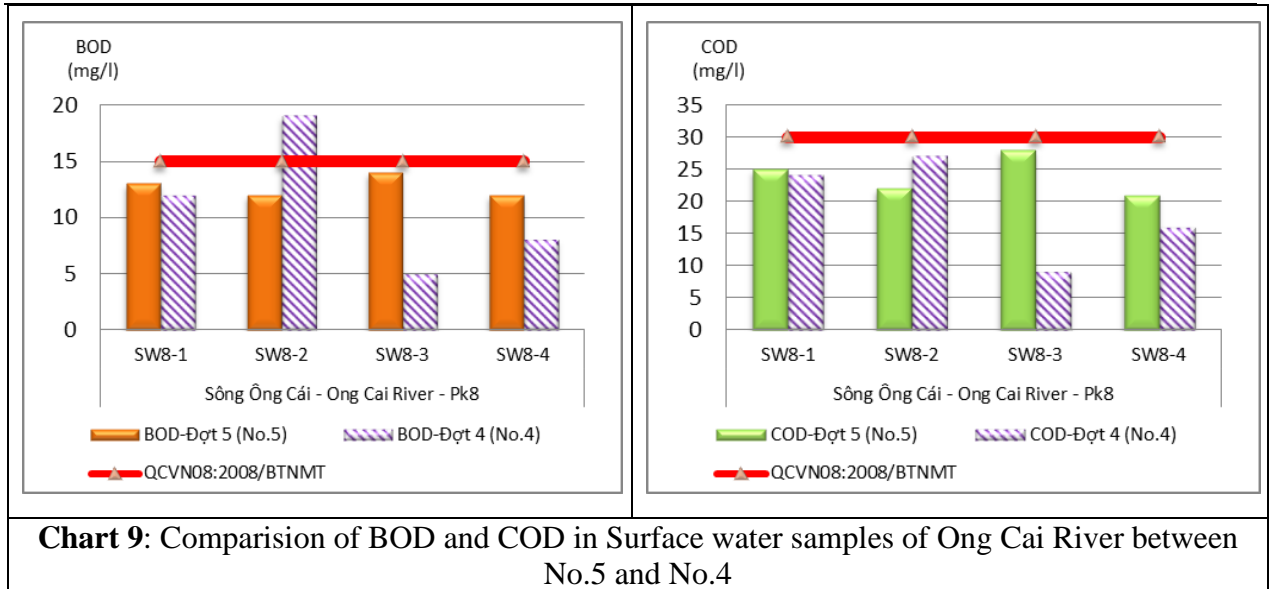
Location	Parameters									
	No.5 (March 2014)					No.4 (December 2013)				
	pH	SS (mg/l)	BOD ₅ (mg/l)	COD (mg/l)	Coliform MPN/ 100ml	pH	SS (mg/l)	BOD ₅ (mg/l)	COD (mg/l)	Coliform MPN/ 100ml
Package 7: Ba Dai Canal										
SW7-1	6,71	46	13	25	1500	6,41	42	14	27	460
SW7-2	6,79	26	15	28	2400	6,89	31	13	25	930

Location	Parameters									
	No.5 (March 2014)					No.4 (December 2013)				
	pH	SS	BOD ₅	COD	Coliform	pH	SS	BOD ₅	COD	Coliform
		(mg/l)	(mg/l)	(mg/l)	MPN/ 100ml		(mg/l)	(mg/l)	(mg/l)	MPN/ 100ml
SW7-3	6,91	42	16	31	2300	6,97	28	10	19	1100
SW7-4	6,93	47	15	28	4100	7,02	34	13	24	6300
Package 7: Muong Kenh Canal										
SW7-5	6,96	33	13	26	490	7,06	38	12	23	760
SW7-6	7,06	43	16	33	2100	7,03	11	15	29	2600
SW7-7	7,14	20	12	23	1500	7,05	38	10	21	1500
SW7-8	7,17	41	15	29	2700	7,09	17	13	26	3100
Package 8: Ong Cai river										
SW8-1	6,54	38	13	25	630	6,44	23	12	24	2100
SW8-2	6,76	28	12	22	1500	6,46	22	19	27	7600
SW8-3	6,48	47	14	28	110	6,55	15	5	9	40
SW8-4	6,43	36	12	21	490	6,67	27	8	16	630
QCVN 08:2008/ BTNMT	5,5 - 9	50	15	30	7500	5,5 - 9	50	15	30	7500

Remarks:

- Concentration of SS, BOD and COD: the concentration of these parameters of series No.5 are slightly exceed the previous (series No.4) but not much, most of them meet the permitted values of regulations of QCVN 08:2008/BNTMT column B1.
- pH: Muong Kenh cannal: pH measured at almost samples of series No.5 is higher than series No.4; Ong Cai river and Ba Dai cannal: there are no change much between two series No.5 and No.4.
- Coliform content of series No.5 are lower than series No.4 at most samples were taken from Muong Kenh cannal and Ong Cai river. Coliform content of series No.5 are 2,09 to 3,2 times higher than series No.4 for samples from Ba Dai cannal.





4.4.4. Assessment of environmental changing tendency of ground water quality

We just compare some of the key parameters which is a large variation observed during two series of monitoring. They are shown in the following table:

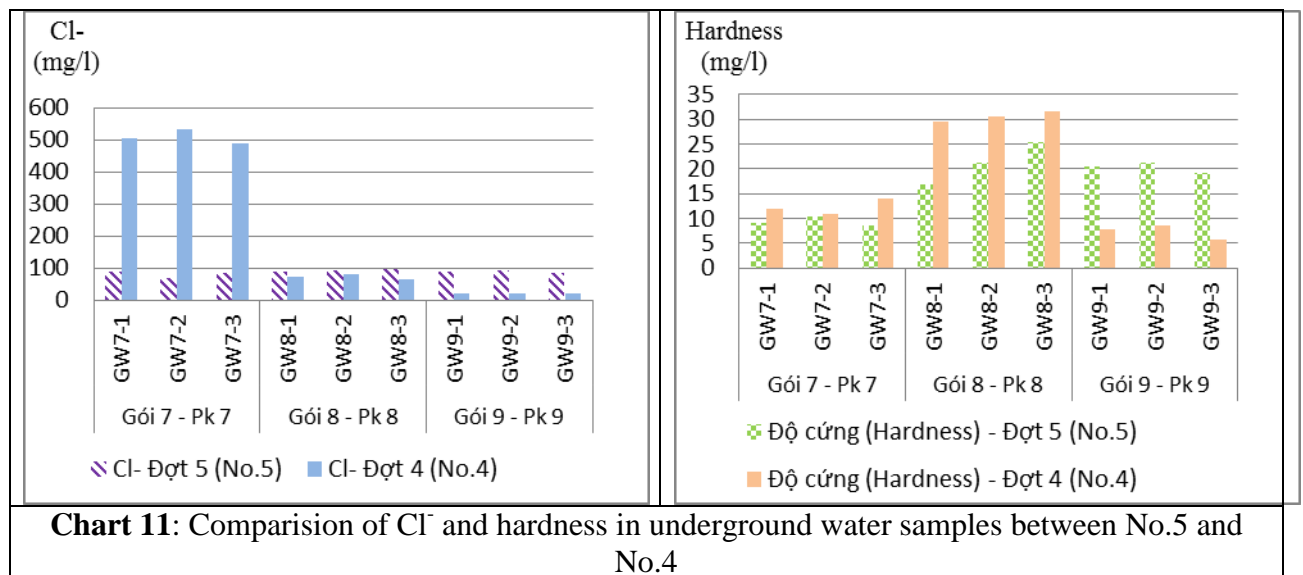
Table 4.34. Comparison of ground water quality between No.5 and No.4

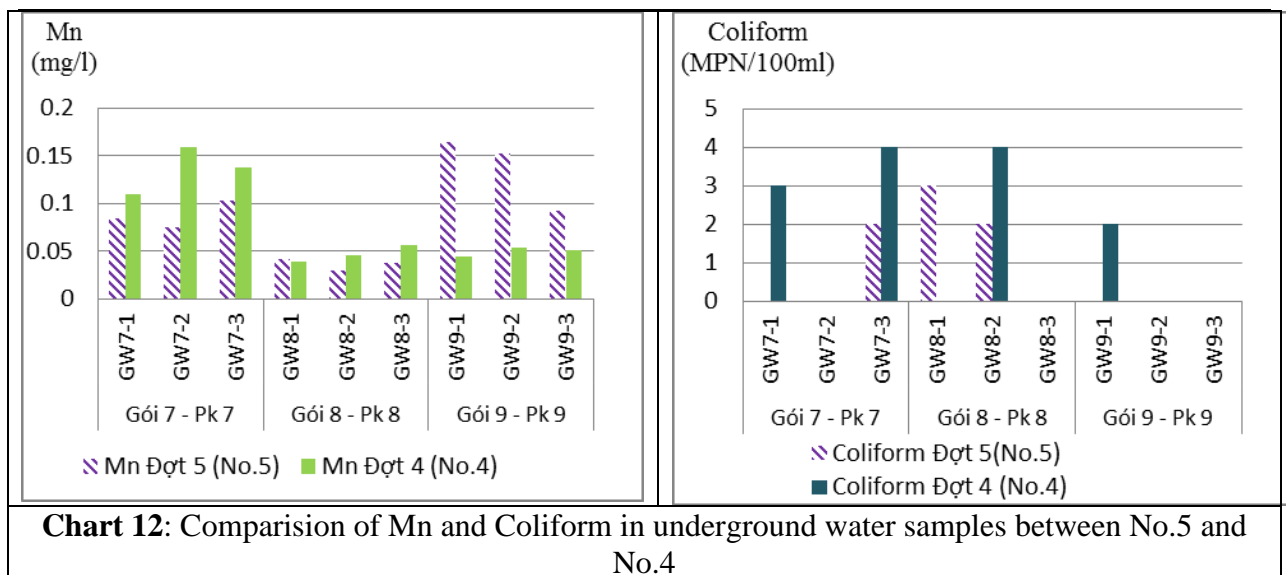
Location	Parameters									
	No.5 (March 2014)					No.4 (December 2013)				
	pH	Cl ⁻	Hardness	Mn	Coliform	pH	Cl ⁻	Hardness	Mn	Coliform
		(mg/l)	(mg/l)	(mg/l)	MPN/		(mg/l)	(mg/l)	(mg/l)	MPN/

					100ml					100ml
Package 7										
GW7-1	5,87	87,1	9,2	0,084	KPH	6,26	50,4	12	0,109	3
GW7-2	5,85	68,4	10,5	0,075	KPH	6,34	53,4	11	0,159	NTD
GW7-3	5,88	83,2	8,6	0,103	2	6,37	48,9	14	0,138	4
Package 8										
GW8-1	6,61	86,2	16,8	0,042	3	5,65	73,4	29,4	0,039	NTD
GW8-2	6,32	93,1	21,3	0,029	2	5,61	78,9	30,5	0,045	4
GW8-3	6,24	95,5	25,4	0,038	KPH	5,79	64,6	31,7	0,056	NTD
Package 9										
GW9-1	5,64	89,9	20,4	0,164	KPH	5,98	19,7	7,8	0,044	2
GW9-2	6,18	92,1	21,2	0,152	KPH	6,01	21,4	8,6	0,053	NTD
GW9-3	6,13	83,4	19,3	0,092	KPH	5,94	20,5	5,7	0,051	NTD
QCVN 09:2008/ BTNMT	5,5 - 8,5	250	500	0,5	3	5,5 - 8,5	250	500	0,5	3

Remarks:

- All parameters were analyzed during two series meet the permitted values of regulations.
- Cl- content of series No.5 is higher than series No.4 at all Packages.
 - Concentration of hardness and Coliform of series No.5 are lower than series No.4 at all Packages.
 - pH and Mn content of all samples of Package 7 at series 5 are lower than series 4, but they are higher than series No.4 at most samples of Packages 8 and 9.





4.4.5. Assessment of environmental changing tendency of soil quality

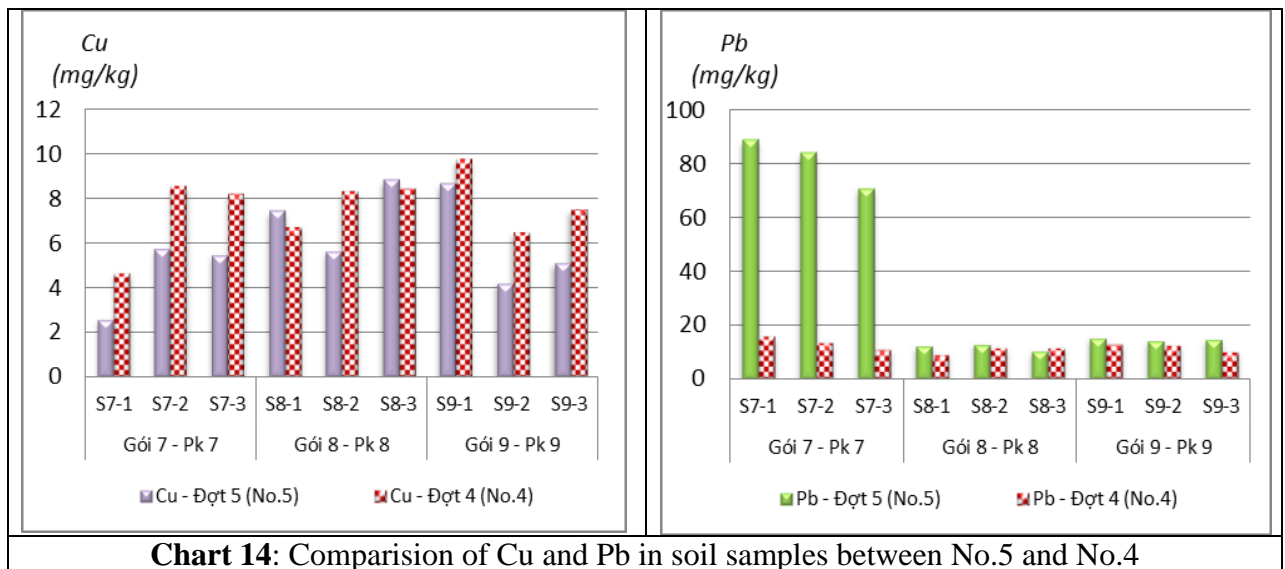
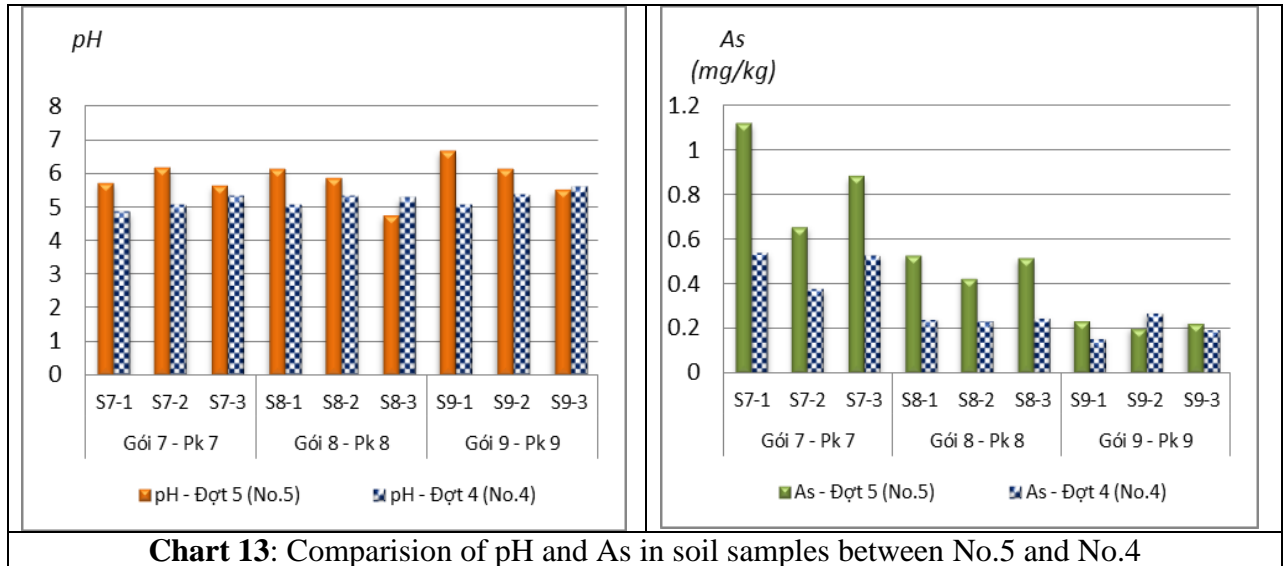
We just compare some of the key parameters which is a large variation observed during two series of monitoring. They are shown in the following table:

Table 4.35. Comparison of soil quality between No.5 and No.4

Vị trí	Parameters									
	No.5 (March 2014)					No.4 (December 2013)				
	pH	As	Cd	Cu	Pb	pH	As	Cd	Cu	Pb
		mg/kg	mg/kg	mg/kg	mg/kg		mg/kg	mg/kg	mg/kg	mg/kg
Package 7										
S7-1	5,72	1,12	KPH	2,59	89	4,85	0,542	NTD	4,67	15,72
S7-2	6,15	0,658	KPH	5,76	84	5,06	0,378	NTD	8,54	13,58
S7-3	5,64	0,884	KPH	5,48	71	5,31	0,529	NTD	8,23	11,29
Package 8										
S8-1	6,12	0,531	KPH	7,45	12,35	5,07	0,245	NTD	6,72	9,47
S8-2	5,86	0,427	KPH	5,63	13,26	5,32	0,237	NTD	8,34	11,53
S8-3	4,74	0,516	KPH	8,82	10,54	5,28	0,251	NTD	8,46	11,62
Package 9										
S9-1	6,68	0,236	KPH	8,65	15,38	5,04	0,158	NTD	9,77	12,85
S9-2	6,14	0,205	KPH	4,23	14,26	5,37	0,274	NTD	6,48	12,67
S9-3	5,52	0,227	KPH	5,11	14,75	5,58	0,196	NTD	7,52	10,41
QCVN 03:2008/ BTNMT	-	12	5	70	120	-	12	5	70	120

Remarks:

- All parameters were analyzed during two series meet the permitted values of regulations.
- Cd not detected in all samples of soil at project area of Packages 7, 8 and 9 during two series of monitoring No.5 and No.4.
 - pH, As and Pb content of most samples of series No.5 are higher than series No.4. Cu content of series No.5 has tended to decrease from the series No.4 at most samples of all Packages.



CHAPTER V. CONCLUSION AND RECOMMENDATION

5.1. Conclusion

▪ PACKAGE 7

- Air quality

All parameters monitored in March 2014 meet the allowable limits of regulations of QCVN 05:2013/BTNMT, QCVN 06:2009/BTNMT. Most monitored results are lower than baseline data (March 2013), except HC content is higher than baseline data. This proves that activities of project do not impact on environmental.

- Noise and vibration

+ Noise level:

Noise level monitored during two periods of time from 06:00 to 21:00 and from 21:00 to 22:00 in March 2014 meets the allowable limit of regulations of QCVN 26:2010/BTNMT. Analysis results are the following:

- ✓ From 06:00 to 21:00: noise level was 61,5dBA. This value is 1,05 times higher than baseline data (monitored in March 2013) but it is 1,38 times lower than regulations. This shows that construction activity during this time was a slight impact on the environment.
- ✓ From 21:00 to 22:00: noise level was 52,5dBA. This value is 1,2 times lower than baseline data and it is also lower than the allowable limits of regulations.

+ Vibration level:

Vibration level was 50,6dB and 47,0dB during the periods from 06:00 to 21:00 and from 21:00 to 22:00 respectively in March 2014. These values are lower than baseline data monitored in March 2013 and they are also lower than permitted values of regulations of QCVN 27:2010/BTNMT many times.

- Surface water quality

+ Ba Dai cannal

All parameters were analyzed in surface water samples which taken at Ba Dai cannal in March 2014 meet the permitted values of regulations of QCVN 08:2008/BTNMT column B1, except BOD and COD concentration of the sample SW7-3 slightly exceed the permitted values of regulation but not significantly.

+ Muong Kenh cannal

All parameters were analyzed in surface water samples which taken at Muong Kenh cannal in March 2014 meet the permitted values of regulations of QCVN

08:2008/BTNMT column B1, except BOD and COD concentration of the sample SW7-2 slightly exceed the permitted values of regulation but not significantly.

- **Ground water quality**

All parameters were analyzed in underground water samples at project area in March 2014 meet the permitted values of regulations of QCVN 09:2008/BTNMT.

- **Soil quality**

All parameters were analyzed in soil samples at project area in March 2014 meet the permitted values of regulations of QCVN 03:2008/BTNMT.

▪ **PACKAGE 8**

- **Air quality**

All parameters monitored during the period of time from 06:00 to 22:00 at project area in March 2014 are shown that they are lower than baseline data (monitored in March 2014). This shows that construction activities of project during this period impact on environment at project area but not significantly due to all parameters still meet the permitted values of regulations of QCVN 05:2013/BTNMT, QCVN 06:2009/BTNMT.

- **Noise and vibration**

+ Noise level:

All noise level were monitored during two periods of time from 06:00 to 21:00 and from 21:00 to 22:00 are higher than baseline data (monitored in March 2013), but during period of time from 06:00 to 21:00, noise level meet the allowable limits of regulations of QCVN 26:2010/BTNMT and during period of time from 21:00 to 22:00, noise level is 1,07 times higher than permitted values of regulations. This proves that construction activities during period from 21:00 to 22:00 has affected on regional environment of project.

+ Vibration level:

Vibration level monitored during two periods of times from 06:00 to 21:00 and from 21:00 to 22:00 in March 2014 are shown that they are higher than baseline data (monitored in March 2013), but when these values compared with regulations of QCVN 26:2010/BTNMT as follows:

- ✓ From 06:00 to 21:00: vibration level was 48,9dB. This value is 1,05 times higher than baseline data (monitored in March 2013) but it is 1,5 times lower than regulations.

- ✓ From 21:00 to 22:00: vibration level was 34,6dB. This value is 1,3 times higher than the allowable limits of regulations.

The above results are shown that construction activities during this periods has impact on environment, however the period of time from 06:00 to 21:00, the noise level is still acceptable because it has not exceed permitted regulations but the period of time from 21:00 to 22:00, noise level need to be controlled to avoid affecting the local environment.

- **Surface water quality**

Analysis results of four surface water samples of Ong Cai river (Ong Cai bridge) in March 2014 are lower than permitted values of regulations of QCVN 08:2008/BTNMT.

- **Ground water quality**

These parameters were analyzed in 03 samples of groundwater at the project area in March 2014 meet the allowable limits of regulations of QCVN 09:2008/BTNMT.

- **Soil quality**

These parameters were analyzed in 03 samples of soil at the project area in March 2014 is the same groundwater samples, these results meet the allowable limits of regulations of QCVN 03:2008/BTNMT.

- **PACKAGE 9**

- **Air quality**

All parameters were monitored in the ambient air of the project area in March 2014 are lower than permitted values of QCVN 05:2014 /BTNMT and QCVN06:2009 /BTNMT although concentration of HC and CO are higher baseline data monitored in March 2013. This proves that construction activities during this period still have an impact on environment however they are still in control.

- **Noise and vibration**

+ Noise level:

Noise level monitored during two periods of times from 06:00 to 21:00 and from 21:00 to 22:00 in March 2014 is higher than baseline data monitored in March 2013. However, when compared with QCVN 26:2010/BTNMT are shown as follows:

- ✓ From 06:00 to 21:00: noise level was 56,3dBA. This value is 1,24 times lower than permitted values of regulations.
- ✓ From 21:00 to 22:00: noise level was 61dBA. This value is 1,1 times higher than the allowable limits of regulations.

The above results are shown that construction activities had affected on regional environment. However, the noise level in the period of time from 06:00 to 21:00 is still

under control but noise level in the period of time from 21:00 to 22:00 should be control to avoid affecting the surrounding area.

+ Vibration level:

Vibration level were monitored during two periods of time from 06:00 to 21:00 and from 21:00 to 22:00 are higher than baseline data (monitored in March 2013), when vibration level compared with QCVN 26:2010/BTNMT are shown that during period of time from 06:00 to 21:00, vibration level is lower than the allowable limits of regulations many times and during period of time from 21:00 to 22:00, vibration level is higher than permitted values of regulations but not significantly.

- **Ground water quality**

All parameters were analyzed in 03 samples of groundwater at the project area in March 2014 meet the allowable limits of regulations of QCVN 09:2008/BTNMT.

- **Soil quality**

All parameters were analyzed in 03 samples of soil at the project area in March 2014 meet the allowable limits of regulations of QCVN 03:2008/BTNMT.

5.2. Recommendation

Through the environmental monitoring in March 2014 we found that the environmental status at project area Package 7 , 8 and 9 are shown as follows:

- Air quality: there is no impact on environment due to construction activities of Packages 7 and 9 during this period and they are under control by contractors. Construction activities of Package 8 had slightly impacted on environmental of project area but not significantly.
- Noise and vibration level: during period of time from 21:00 to 22:00, noise and vibration level slightly exceed the permitted values therefore, the Contractor need to take countermeasure to minimize these noise and vibration level to avoid impacting on surrounding.
- Surface water quality, ground water quality and soil quality: there is not change much compared with the previous monitoring.

There is no serious impact on environmental now due to construction activities of Packages 7, 8 and 9 but the Contractor shall be clean and watering in order to dust control at some special area such as: An Phu intersection – Package 7, Do Xuan Hop street – Package 8 and Ring road No.2 – Package 9 and as well as implementing necessary measures to minimize noise during construction, especially at night.

APPENDIX

APPENDIX 1: THE LIST PERSONNEL MOBILIZED FOR SURVEY AND MONITORING

APPENDIX 2: SOME MONITORING PICTURES

APPENDIX 3: THE MINUTES FOR SITE INSPECTION

APPENDIX 4: MONITORING RESULT AND ANALYSIS

PHỤ LỤC 5: MAP OF MONITORING LOCATIONS

APPENDIX 1:

THE LIST PERSONNEL MOBILIZED FOR SURVEY AND MONITORING

No.	Fullname	Position	Company
1	Nguyen Huu Nhat	Management	CEPT
2	Pham Thi Thu Tham	Secretery	CEPT
3	Nguyen Van Chien	Air monitoring	CEPT
4	Pham Thi Minh Hoa	Noise and vibration monitoring	CEPT
5	Nguyen Thien Tu	Water and soil monitoring	CEPT
6	Ha Sinh Vuong	Air monitoring	CEPT
7	Tran Dai Nghia	Air monitoring	CEPT
8	Nguyen Thanh Minh	Noise and vibration monitoring	CEPT
9	Bui Ngoc Chau	Noise and vibration monitoring	CEPT
10	Nguyen Hoang Duy Tuan	Water and soil monitoring	CEPT
11	Vu Truong Xuan	Water and soil monitoring	CEPT
12	Tran Quang Tran	Water and soil monitoring	CEPT
13	Nguyen Thi My Duyen	Analysis	CEPT
14	Dang Minh Tri	Analysis	CEPT
15	Huynh Thi Dieu Thao	Analysis	CEPT

APPENDIX 2. SOME MONITORING PICTURES



Figure 1: Air, noise, vibration monitoring and sampling of surface water of Muong Kenh canal– Pk 7



Figure 2: Air, noise, vibration monitoring and sampling of surface water of Ong Cai River– Pk 8



Figure 3: Air, noise, vibration monitoring and sampling of ground water– Pk 9

APPENDIX 3:

THE MINUTES FOR SITE INSPECTION

Project/(Tên dự án): North-Southe Expressway Construction Project (Ho Chi Minh City- Dau Giay section); DA-XD đường cao tốc Bắc Nam (Đoan TP HCM- Dầu Giây)

Package/ (Gói thầu):.....7.....

Consultant/ (Tư vấn chính): NIPPON KIEO- TEDI SOUTHE

Sub- Consultant/(Tư vấn phụ): CEPT

CHECKING EQUIPMENT AND PERSONAL AT SITE

(Biên bản kiểm tra máy móc thiết bị và nhân lực tại hiện trường)

Ref/ (Số văn bản)

Date / (Ngày) 26 / 3 / 2014




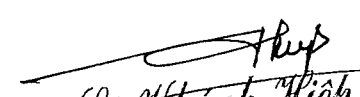
Mẫu số: EMW01

Work item/ (Hạng mục): Environment monitoring (Quan trắc môi trường)

Base on (Căn cứ vào):

Equipment/ (Máy móc)

No	Equipment type/ (Chủng loại máy)	Capacity (Công suất)	Quantity (Số lượng)	Correct type and Capacity/ (Đúng chủng loại và công suất)	Quantity (Số lượng)	Conddition/ (Tình trạng)	Trial Operation/ (Chạy thử)	Certificate/ (Chứng chỉ)
Methods stastements/ (Theo biện pháp thi công)				Acctually Mobilized (Thực tế huy động)				
1	RION - NL21 (MÁY ÒN)		1	OK	1	OK	OK	OK
2	RION - VM83 (MÁY RUNG)		1	OK	1	OK	OK	OK
3	RADECO (MÁY ĐO BỤI)		1	OK	1	OK	OK	OK
4	MÁY ĐO VI KHÍ HẬU		1	OK	1	OK	OK	OK
5	AIRCHEK SAMPLER		2	OK	2	OK	OK	OK
6	DELTA OHM		1	OK	1	OK	OK	OK

Comment/ (Nhận xét)	Sub- contractor/ (Tư vấn phụ)	Inspector Consultant/ (Tư vấn GS)	Observer EPMU HLD/ (Quan sát viên)	Site engineer/ (Kỹ sư hiện trường)
Acceptantce/(Nghiệm thu)	 Trần Quang Trần	 Đoàn Thị Chinh	 Lê Duy Trung	 Lê Khánh Thiệp
Accepted/				

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Project/ (Tên dự án): North-Southe Expressway Construction Project (Ho Chi Minh City - Dau Giay section); DA-XD đường cao tốc Bắc Nam (Đoạn TP HCM- Dầu Giây)

Package/ (Gói thầu):.....*X*.....

Consultant/ (Tư vấn chính): NIPPON KIEO- TEDI SOUTHE

Sub- Consultant/(Tư vấn phụ): CEPT

Work contents: (Nội dung công việc)	
Air sampling and microclimate (Mẫu không khí và vi khí hậu)	8 samples /day , Km 00 + 200 (8 mẫu /ngày , Km 00 + 200)
Noise monitoring (Quan trắc tiếng ồn)	48 samples /day , Km 00 + 200 (48 mẫu /ngày , Km 00 + 200)
Variation monitoring (Quan trắc rung)	48 samples /day , Km 00 + 200 (48 mẫu /ngày , Km 00 + 200)
Surface water quality sampling (Chất lượng nước mặt)	4 samples /day , Km 0 + 348 4 samples /day , Km 1 + 150
Ground water quality sampling (Chất lượng nước ngầm)	3 samples /day , Km 00 + 200
Soil sampling (Chất lượng đất)	3 samples /day , Km 1 + 150
Waste water sampling (Mẫu nước thải)	

Comment/ (Nhận xét)	Sub- contractor/ (Tư vấn phụ)	Inspector Consultant/ (Tư vấn GS)	Observer EPMU HLD/ (Quan sát viên)	Site engineer/ (Kỹ sư hiện trường)
Acceptance/ (Nghị quyết)				
Accepted	<i>Chen</i> Trần Quang Tiến	<i>Đoàn Thị Thùy</i> Đoàn Thị Thùy	<i>Lê Duy Trung</i> Lê Duy Trung	<i>Lê Khánh Hiệp</i> Lê Khánh Hiệp



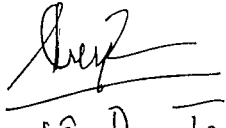
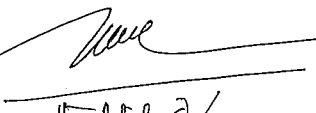
Project/(Tên dự án): North-Southe Expressway Construction Project (Ho Chi Minh City- Dau Giay section); DA-XD đường cao tốc Bắc Nam (Đoan TP HCM- Dầu Giây)
Package/ (Gói thầu):.....
Consultant/ (Tư vấn chính): NIPPON KIEO- TEDI SOUTHE **Sub- Consultant/**(Tư vấn phụ): CEPT

CHECKING EQUIPMENT AND PERSONAL AT SITE
(Biên bản kiểm tra máy móc thiết bị và nhân lực tại hiện trường)

Ref/ (Số văn bản) _____ **Date /** (Ngày) 26/3/2014 **Mẫu số:** EMW01
Work item/ (Hạng mục): Environment monitoring (Quan trắc môi trường) **Base on** (Căn cứ vào):

Equipment/ (Máy móc)

No	Equipment type/ (Chủng loại máy)	Capacity (Công suất)	Quantity (Số lượng)	Correct type and Capacity/ (Đúng chủng loại và công suất)	Quantity (Số lượng)	Conddition/ (Tình trạng)	Trial Operation/ (Chạy thử)	Certificate/ (Chứng chỉ)
Methods stastements/ (Theo biện pháp thi công)				Acctually Mobilized (Thực tế huy động)				
1	RION - NL21 (MÁY ÒN)		1	OK	1	OK	OK	OK
2	RION - VM83 (MÁY RUNG)		1	OK	1	OK	OK	OK
3	RADECO (MÁY ĐO BỤI)		1	OK	1	OK	OK	OK
4	MÁY ĐO VI KHÍ HẬU		1	OK	1	OK	OK	OK
5	AIRCHEK SAMPLER		2	OK	2	OK	OK	OK
6	DELTA OHM		1	OK	1	OK	OK	OK

Comment/ (Nhận xét)	Sub- contractor/ (Tư vấn phụ)	Inspector Consultant/ (Tư vấn GS)	Observer EPMU HLD/ (Quan sát viên)	Site engineer/ (Kỹ sư hiện trường)
Acceptantce/(Nghiem thu) Accepted	 Trần Quang Trần	 Đoàn Chi Thủy	 Lê Duy Trung	 Trần Minh Quỳnh

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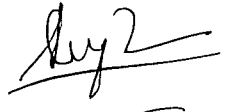
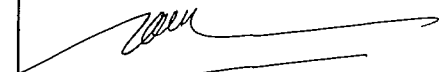
Project/ (Tên dự án): North-Southe Expressway Construction Project (Ho Chi Minh City - Dau Giay section); DA-XD đường cao tốc Bắc Nam (Đoạn TP HCM- Dầu Giây)

Package/ (Gói thầu):.....§.....

Consultant/ (Tư vấn chính): NIPPON KIEO- TEDI SOUTHE

Sub- Consultant/(Tư vấn phụ): CEPT

Work contents: (Nội dung công việc)	
Air sampling and microclimate (Mẫu không khí và vi khí hậu)	8 samples /day , km 3 + 200 (8 mẫu /ngày , km 3 + 200)
Noise monitoring (Quan trắc tiếng ồn)	48 samples /day , km 3 + 200 (48 mẫu /ngày , km 3 + 200)
Variation monitoring (Quan trắc rung)	48 samples /day , km 3 + 200 .
Surface water quality sampling (Chất lượng nước mặt)	4 samples /day , km 3 + 880
Ground water quality sampling (Chất lượng nước ngầm)	3 samples /day , km 3 + 200
Soil sampling (Chất lượng đất)	3 samples /day , km 3 + 880
Waste water sampling (Mẫu nước thải)	

Comment/ (Nhận xét)	Sub- contractor/ (Tư vấn phụ)	Inspector Consultant/ (Tư vấn GS)	Observer EPMU HLD/ (Quan sát viên)	Site engineer/ (Kỹ sư hiện trường)
Acceptantce/ (Nghịệm thu)				
Accepted	 Trần Quang Trần	 Đoàn Thị Chinh	 Lê Duy Trung	 Hà Minh Quynh

Project/(Tên dự án): North-Southe Expressway Construction Project (Ho Chi Minh City- Dau Giay section); DA-XD đường cao tốc Bắc Nam (Đoan TP HCM- Dầu Giây)

Package/ (Gói thầu):.....9.....

Consultant/ (Tư vấn chính): NIPPON KIEO- TEDI SOUTHE

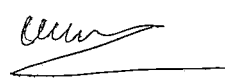
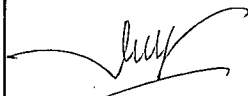

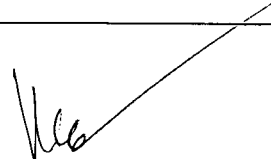
Sub- Consultant/(Tư vấn phụ): CEPT

CHECKING EQUIPMENT AND PERSONAL AT SITE
(Biên bản kiểm tra máy móc thiết bị và nhân lực tại hiện trường)

Ref/ (Số văn bản) _____ Date / (Ngày) 28/3/2014 _____ Mẫu số: EMW01
Work item/ (Hạng mục): Environment monitoring (Quan trắc môi trường) _____ Base on (Căn cứ vào): _____

Equipment/ (Máy móc)

No	Equipment type/ (Chủng loại máy)	Capacity (Công suất)	Quantity (Số lượng)	Correct type and Capacity/ (Đúng chủng loại và công suất)	Quantity (Số lượng)	Conddition/ (Tình trạng)	Trial Operation/ (Chạy thử)	Certificate/ (Chứng chỉ)
Methods stastements/ (Theo biện pháp thi công)				Acctually Mobilized (Thực tế huy động)				
1	RION - NL21 (MÁY ÒN)		1	OK	1	OK	OK	OK
2	RION - VM83 (MÁY RUNG)		1	OK	1	OK	OK	OK
3	RADECO (MÁY ĐO BỤI)		1	OK	1	OK	OK	OK
4	MÁY ĐO VI KHÍ HẬU		1	OK	1	OK	OK	OK
5	AIRCHEK SAMPLER		2	OK	2	OK	OK	OK
6	DELTA OHM		1	OK	1	OK	OK	OK

Comment/ (Nhận xét)	Sub- contractor/ (Tư vấn phụ)	Inspector Consultant/ (Tư vấn GS)	Observer EPMU HLD/ (Quan sát viên)	Site engineer/ (Kỹ sư hiện trường)
Acceptantce/(Nghiệm thu) <u>Accepted</u>	 Trần Quang Thiên	 Đoàn Thị Thuy	 Lê Duy Trung	

[illegible]

Project/ (Tên dự án): North-Southe Expressway Construction Project (Ho Chi Minh City - Dau Giay section); DA-XD đường cao tốc Bắc Nam (Đoạn TP HCM- Dầu Giây)

Package/ (Gói thầu):.....*9*.....

Consultant/ (Tư vấn chính): NIPPON KIEO- TEDI SOUTHE

Sub- Consultant/(Tư vấn phụ): CEPT

Work contents: (Nội dung công việc)	
Air sampling and microclimate (Mẫu không khí và vi khí hậu)	8 samples /day , km 4 + 500 (8 mẫu /ngày , km 4 + 500)
Noise monitoring (Quan trắc tiếng ồn)	48 samples /day , km 4 + 500 (48 mẫu /ngày , km 4 + 500)
Variation monitoring (Quan trắc rung)	48 samples /day , km 4 + 500
Surface water quality sampling (Chất lượng nước mặt)	No (không lấy)
Ground water quality sampling (Chất lượng nước ngầm)	3 samples /day , km 4 + 500 (3 mẫu /ngày , km 4 + 500)
Soil sampling (Chất lượng đất)	3 samples /day , km 4 + 500 (3 mẫu /ngày , km 4 + 500)
Waste water sampling (Mẫu nước thải)	No.

Comment/ (Nhận xét)	Sub- contractor/ (Tư vấn phụ)	Inspector Consultant/ (Tư vấn GS)	Observer EPMU HLD/ (Quan sát viên)	Site engineer/ (Kỹ sư hiện trường)
Acceptantce/ (Nghiem thu)				
<i>Accepted</i>	<i>Trần Quang Trăn</i>	<i>Đoàn Thị Chinh</i>	<i>Lê Duy Tru.</i>	

APPENDIX 4:

MONITORING RESULT AND ANALYSIS



INSTITUTE OF TRANSPORTATION SCIENCE AND TECHNOLOGY
SCIENTIFIC TECHNOLOGICAL CENTER FOR ENVIRONMENTAL
PROTECTION IN TRANSPORTATION (CEPT)

1252 Lang street, Dong Da district, Hanoi city, Viet Nam

Tel: (84-4)38346314 Fax (84-4)37663841

RESULT OF NOISE MONITORING

Name of project: HO CHI MINH – LONG THANH – DAU GIAY EXPRESSWAY
Monitoring site: PACKAGE 8 - PHU HUU WARD, DISTRICT 9
Co-ordinate: N 10°47'51,1"; E 106°46'44,5"
Time of monitoring: 27/03/2014 (06h - 22h)
Surrounding conditions: Sunny and light winds on day. It's cool and light winds at night
The site is going on 500 m from away sampling location
Staff: Bui Ngoc Chau – Nguyen Thanh Minh

No	Code	Sign	Result (dBA)		
			Leq	Lmax	L50
01	MM14032367	N8.1 (06h-07h)	62.5	76.6	67
02	MM14032368	N8.2 (07h-08h)	66.1	67.2	65.2
03	MM14032369	N8.3 (08h-09h)	66.2	67.1	65.6
04	MM14032370	N8.4 (09h-10h)	65.7	70.7	65.7
05	MM14032371	N8.5 (10h-11h)	70.4	73.6	65.8
06	MM14032372	N8.6 (11h-12h)	60.9	66.9	65
07	MM14032373	N8.7 (12h-13h)	66.8	68.2	65.4
08	MM14032374	N8.8 (13h-14h)	57.8	60.4	53.5
09	MM14032375	N8.9 (14h-15h)	62.8	69.1	67.4
10	MM14032376	N8.10 (15h-16h)	70.6	71.1	70
11	MM14032377	N8.11 (16h-17h)	68.7	69.7	67.8
12	MM14032378	N8.12 (17h-18h)	64.5	66.5	62.5
13	MM14032379	N8.13 (18h-19h)	64.3	65.9	62.7
14	MM14032380	N8.14 (19h-20h)	65.5	66.5	63.8
15	MM14032381	N8.15 (20h-21h)	59.1	61	56.4
16	MM14032382	N8.16 (21h-22h)	59	61.6	56.5

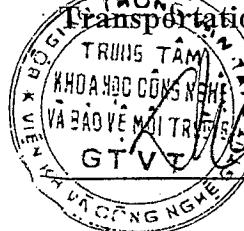
Monitored by

Nguyen Thanh Minh

Checked by

Phan Thi Nhat Hoa

Scientific technological Center for
Environmental Protection in
Transportation (CEPT)



GIÁM ĐỐC

Dang Thi Phuong Nga



INSTITUTE OF TRANSPORTATION SCIENCE AND TECHNOLOGY
SCIENTIFIC TECHNOLOGICAL CENTER FOR ENVIRONMENTAL
PROTECTION IN TRANSPORTATION (CEPT)

1252 Lang street, Dong Da district, Hanoi city, Viet Nam

Tel: (84-4)38346314 Fax (84-4)37663841

RESULT OF VIBRATION MONITORING

Name of project: HO CHI MINH – LONG THANH – DAU GIAY EXPRESSWAY
Monitoring site: PACKAGE 8 - PHU HUU WARD, DISTRICT 9
Co-ordinate: N 10°47'51,1"; E 106°46'44,5"
Time of monitoring: 27/03/2014 (06h - 22h)
Surrounding conditions: Sunny and light winds on day. It's cool and light winds at night
The site is going on 300 m from away sampling location
Staff: Bui Ngoc Chau – Nguyen Thanh Minh

No	Code	Sign	Result (dB)	
			Leq	Lveq
01	MM14032383	V8.1 (06h-07h)	42.5	38
02	MM14032384	V8.2 (07h-08h)	44.2	38.6
03	MM14032385	V8.3 (08h-09h)	50.4	44.8
04	MM14032386	V8.4 (09h-10h)	52.6	46.2
05	MM14032387	V8.5 (10h-11h)	52.4	45.3
06	MM14032388	V8.6 (11h-12h)	50.8	44.6
07	MM14032389	V8.7 (12h-13h)	49.2	40.5
08	MM14032390	V8.8 (13h-14h)	50.3	42.2
09	MM14032391	V8.9 (14h-15h)	54.5	47.4
10	MM14032392	V8.10 (15h-16h)	54.8	47.8
11	MM14032393	V8.11 (16h-17h)	54.6	47.5
12	MM14032394	V8.12 (17h-18h)	52.6	46.7
13	MM14032395	V8.13 (18h-19h)	48.2	40
14	MM14032396	V8.14 (19h-20h)	38.5	32.6
15	MM14032397	V8.15 (20h-21h)	38.9	31.5
16	MM14032398	V8.16 (21h-22h)	34.6	30.2

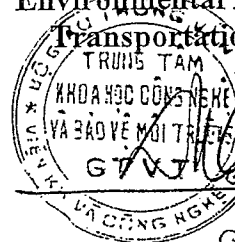
Monitored by

Checked by

Nguyen Thanh Minh

Phan Thị Linh Hoa

Scientific technological Center for
Environmental Protection in
Transportation (CEPT)



GIÁM ĐỐC

Dặng Thị Phương Nga



INSTITUTE OF TRANSPORTATION SCIENCE AND TECHNOLOGY
SCIENTIFIC TECHNOLOGICAL CENTER FOR ENVIRONMENTAL
PROTECTION IN TRANSPORTATION (CEPT)

1252 Lang street, Dong Da district, Hanoi city, Viet Nam

Tel: (84-4)38346314 Fax (84-4)37663841

RESULT OF AIR QUALITY MONITORING

Name of project: HO CHI MINH – LONG THANH – DAU GLAY EXPRESSWAY
Monitoring site: PACKAGE 8 - PHU HUU WARD, DISTRICT 9
Co-ordinate: N 10°47'51,1"; E 106°46'44,5"
Time of monitoring: 27/03/2014 (06h - 22h)
Surrounding conditions: Sunny and light winds on day. It's cool and light winds at night
The site is going on 300 m from away sampling location
Staff: Tran Dai Nghia – Nguyen Van Chien

1. Results of microclimate parameters:

No	Code	Sign	Temp. °C	Humidity %	Wind velocity m/s	Pressure mB	Wind direction
1	MM14032399	A8.1 (06h-08h)	29.4	72.4	0.2-0.5	1004.8	ES
2	MM14032400	A8.2 (08h-10h)	30.7	66.5	0.4-1.1	1005.2	ES
3	MM14032401	A8.3 (10h-12h)	35.2	51.7	0.3-0.7	1007.6	ES
4	MM14032402	A8.4 (12h-14h)	36	49.7	0.4-2.4	1005.6	ES
5	MM14032403	A8.5 (14h-16h)	32.4	64.2	1.2-3.2	1006.5	ES
6	MM14032404	A8.6 (16h-18h)	30.1	68.5	0.4-1.4	1007.4	ES
7	MM14032405	A8.7 (18h-20h)	28.3	72.6	0.3-0.9	1007.1	ES
8	MM14032406	A8.8 (20h-22h)	27.5	75.8	0.2-0.7	1006.2	ES



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2. Results of air quality measurement:

No	Code	Sign	SO ₂ mg/m ³	NO ₂ mg/m ³	HC mg/m ³	TSP mg/m ³	CO mg/m ³
1	MM14032407	A8.1 (06h-08h)	0.064	0.051	0.31	0.179	4.28
2	MM14032408	A8.2 (08h-10h)	0.08	0.062	1.15	0.214	5.84
3	MM14032409	A8.3 (10h-12h)	0.085	0.078	1.72	0.236	6.02
4	MM14032410	A8.4 (12h-14h)	0.093	0.067	1.56	0.267	5.27
5	MM14032411	A8.5 (14h-16h)	0.077	0.054	1.39	0.253	6.74
6	MM14032412	A8.6 (16h-18h)	0.081	0.078	1.02	0.241	5.92
7	MM14032413	A8.7 (18h-20h)	0.062	0.055	0.76	0.219	4.87
8	MM14032414	A8.8 (20h-22h)	0.065	0.047	0.43	0.172	3.46

Monitored by

Tran Dai Nghia

Checked by

Nguyễn Văn Chuan

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RESULT OF SURFACE WATER MONITORING

Name of project: HO CHI MINH – LONG THANH – DAU GIAY EXPRESSWAY

Monitoring site: Package 8 – ONG CAI RIVER

Co-ordinate: SW8-1: N 10°47'54,8"; E 106°46'47,7"
SW8-2: N 10°47'54,8"; E 106°46'47,7"
SW8-3: N 10°47'51,0"; E 106°46'47,6"
SW8-4: N 10°47'51,0"; E 106°46'47,6"

Time of monitoring: 27/03/2014

Weather condition: Sunny and light winds

Staff: Nguyen Thien Tu - Le Minh Hien

1. Results on measuring. Monitoring the surface water at upstream (morning and afternoon):

No	Analysis criteria	Unit	Result analysis		QCVN 08:2008/BTNMT	
			SW8-1 MM14032415	SW8-2 MM14032416	Column A2	Column B1
1.	pH	-	6.54	6.76	6 ÷ 8.5	5.5 ÷ 9
2.	Temp.	°C	30.4	30.2	-	-
3.	Conductivity	μS/cm(25°C)	1240	1199	-	-
4.	DO	mg/l	4.79	4.82	≥ 5	≥ 4
5.	BOD ₅	mg/l	13	12	6	15
6.	COD	mg/l	25	22	15	30
7.	SS	mg/l	38	28	30	50
8.	PO ₄ ³⁻	mg/l	0.081	0.076	0.2 (as P)	0.3 (as P)
9.	NO ₂ ⁻	mg/l	NDT	NDT	0.02 (as N)	0.02 (as N)
10.	NO ₃ ⁻	mg/l	0.468	0.384	5 (as N)	10 (as N)
11.	NH ₄ ⁺	mg/l	0.19	0.22	0.2 (as N)	0.5 (as N)
12.	As	mg/l	NDT	NDT	0.02	0.05



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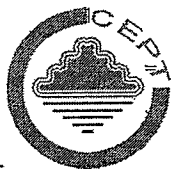
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No	Analysis criteria	Unit	Result analysis		QCVN 08:2008/BTNMT	
			SW8-1 MM14032415	SW8-2 MM14032416	Column A2	Column B1
13.	Cd	mg/l	NDT	NDT	0.005	0.01
14.	Cr ⁶⁺	mg/l	NDT	NDT	0.02	0.04
15.	Cu	mg/l	0,032	0,041	0.2	0.5
16.	Hg	mg/l	NDT	NDT	0.001	0.001
17.	Pb	mg/l	NDT	NDT	0.02	0.05
18.	Zn	mg/l	0,048	0,075	1.0	1.5
19.	Oil and grease	mg/l	NDT	NDT	0.02	0.1
20.	Coliforms	MPN/100ml	630	1500	5000	7500

2. Result on measuring. Monitoring the surface water at downstream (morning and afternoon):

No	Analysis criteria	Unit	Result analysis		QCVN 08:2008/BTNMT	
			SW8-3 MM14032417	SW8-4 MM14032418	Column A2	Column B1
1.	pH	-	6.48	6.43	6 ÷ 8.5	5.5 ÷ 9
2.	Temp.	°C	30.3	29.9	-	-
3.	Conductivity	μS/cm(25 ⁰ C)	1075	1159	-	-
4.	DO	mg/l	5.19	4.88	≥ 5	≥ 4
5.	BOD ₅	mg/l	14	12	6	15
6.	COD	mg/l	28	21	15	30
7.	SS	mg/l	47	36	30	50



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No	Analysis criteria	Unit	Result analysis		QCVN 08:2008/BTNMT	
			SW8-3 MM14032417	SW8-4 MM14032418	Column A2	Column B1
8.	PO ₄ ³⁻	mg/l	0.056	0.093	0.2 (as P)	0.3 (as P)
9.	NO ₂ ⁻	mg/l	NDT	NDT	0.02 (as N)	0.02 (as N)
10.	NO ₃ ⁻	mg/l	0.591	0.423	5 (as N)	10 (as N)
11.	NH ₄ ⁺	mg/l	0.25	0.27	0.2 (as N)	0.5 (as N)
12.	As	mg/l	NDT	NDT	0.02	0.05
13.	Cd	mg/l	NDT	NDT	0.005	0.01
14.	Cr ⁶⁺	mg/l	NDT	NDT	0.02	0.04
15.	Cu	mg/l	0.028	0.033	0.2	0.5
16.	Hg	mg/l	NDT	NDT	0.001	0.001
17.	Pb	mg/l	NDT	NDT	0.02	0.05
18.	Zn	mg/l	0.053	0.057	1.0	1.5
19.	Oil and grease	mg/l	NDT	NDT	0.02	0.1
21	Coliforms	MPN/100ml	110	490	5000	7500

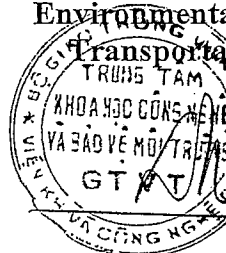
Monitored by

Le Minh Hien

Checked by

Phạm Thị Trà

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Dương Thị Phương Nga



RESULT OF GROUNDWATER MONITORING

Name of project: HO CHI MINH – LONG THANH – DAU GIAY EXPRESSWAY
 Monitoring site: **Package 8 - PHU HUU WARD, DISTRICT 9**
 GW8-1: N 10°47'56,5"; E 106°46'42,7"
 (Lot No. 21, Phu Duc Residential Area, Do Xuan Hop street, District 9)
 GW8-2: N 10°47'58,4"; E 106°46'42,5"
 (Lot No. 01, Phu Duc Residential Area, Do Xuan Hop street, District 9)
 Co-ordinate: GW8-3: N 10°47'54,1"; E 106°46'46,2"
 (Package 8 Headquarter, Phu Duc Residential Area, Do Xuan Hop street, District 9)
 Time of monitoring: 27/03/2014
 Weather condition: Sunny and light winds
 Staff: Nguyen Thien Tu - Le Minh Hien

No	Analysis criteria	Unit	Result analysis			QCVN 09:2008/ BTNMT
			GW8-1 MM130902419	GW8-2 MM130902420	GW8-3 MM130902421	
1	pH	-	6.61	6.32	6.24	5.5 ÷ 8.5
2	Temp.	°C	29.9	29.8	30.1	-
3	Turbidity	NTU	1.31	0.46	0.59	-
4	Conductivity	µS/cm (25°C)	376	353	364	-
5	Color	Pt/Co	4.3	3.2	3.8	-
6	Smell	-	Not Smell	Not Smell	Not Smell	-
7	Hardness level	mgCaCO ₃ /l	16.8	21.3	25.4	500
8	Cl ⁻	mg/l	86.2	93.1	95.5	250
9	SO ₄ ²⁻	mg/l	26.4	41.2	53.4	400
10	NO ₃ ⁻	mg/l	0.326	0.272	0.384	15 (as N)
11	TDS	mg/l	195	181	187	1500



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No	Analysis criteria	Unit	Result analysis			QCVN 09:2008/ BTNMT
			GW8-1 MM130902419	GW8-2 MM130902420	GW8-3 MM130902421	
12	As	mg/l	NDT	NDT	NDT	0.05
13	Cd	mg/l	NDT	NDT	NDT	0.005
14	CN ⁻	mg/l	NDT	NDT	NDT	0.01
15	Fe	mg/l	0.624	0.337	0.346	5
16	Mn	mg/l	0.042	0.029	0.038	0.5
17	Pb	mg/l	NDT	NDT	NDT	0.01
18	E. Coli	MPN/ 100ml	NDT	NDT	NDT	Not detected
19	Coliforms	MPN/ 100ml	3	2	NDT	3

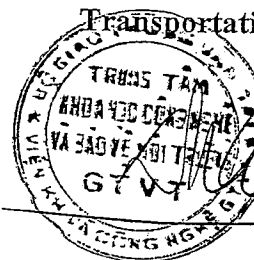
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Le Minh Hien

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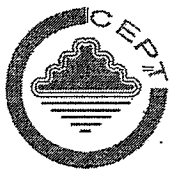
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RESULT OF SOIL MONITORING

Name of project: HO CHI MINH – LONG THANH – DAU GIAY EXPRESSWAY

Monitoring site: Package 8 – NEAR ONG CAI RIVER

Co-ordinate: S8-1: N 10°47'54,5"; E 106°46'48,8"

S8-2: N 10°47'55,6"; E 106°46'48,7"

S8-3: N 10°47'50,4"; E 106°46'44,2"

Time of monitoring: 27/03/2014

Weather condition: Sunny and light winds

Staff: Nguyen Thien Tu - Le Minh Hien

No	Analysis criteria	Unit	Result analysis			QCVN 03:2008/ BTNMT
			S8-1 MM14032422	S8-2 MM14032423	S8-3 MM14032424	
1.	pH	-	6.12	5.86	4.74	-
2.	Organic matters	%	2.18	1.93	1.67	-
3.	Total N	%	0.053	0.081	0.075	-
4.	Cl ⁻	mg/kg	539	625	842	-
5.	SO ₄ ²⁻	%	0.023	0.024	0.019	-
6.	As	mg/kg	0.531	0.427	0.516	12
7.	Cd	mg/kg	NDT	NDT	NDT	5
8.	Cu	mg/kg	7.45	5.63	8.82	70
9.	Hg	mg/kg	NDT	NDT	NDT	-
10.	P	mg/kg	267	214	196	-
11.	Pb	mg/kg	12.35	13.26	10.54	120
12.	Zn	mg/kg	53.12	38.47	35.95	200

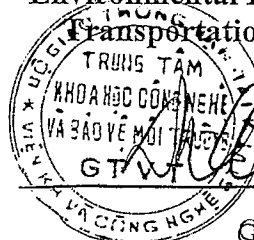
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RESULT OF NOISE MONITORING

Name of project: HO CHI MINH – LONG THANH – DAU GIAY EXPRESSWAY
Monitoring site: PACKAGE 9 - INTERSECTION (Km 4+500)
Co-ordinate: N 10°47'53,5"; E 106°47'26,3"
Time of monitoring: 28/03/2014 (06h - 22h)
Surrounding conditions: Sunny and light winds on day. It's cool and light winds at night
The construction activities is a long way from the sampling location
Staff: Bui Ngoc Chau – Nguyen Thanh Minh

No	Code	Sign	Result (dBA)		
			Leq	Lmax	L50
01	MM14032325	N9.1 (06h-07h)	58.9	79.5	57
02	MM14032326	N9.2 (07h-08h)	56.7	79	54.2
03	MM14032327	N9.3 (08h-09h)	54.1	78.2	53.5
04	MM14032328	N9.4 (09h-10h)	52.4	76.9	51.6
05	MM14032329	N9.5 (10h-11h)	55	80.1	54.6
06	MM14032330	N9.6 (11h-12h)	54.5	78.8	53.1
07	MM14032331	N9.7 (12h-13h)	53.4	77.5	52.5
08	MM14032332	N9.8 (13h-14h)	52.7	76.9	51.4
09	MM14032333	N9.9 (14h-15h)	55.7	79.4	54.4
10	MM14032334	N9.10 (15h-16h)	54.8	77.8	53.2
11	MM14032335	N9.11 (16h-17h)	54.4	78.2	52.9
12	MM14032336	N9.12 (17h-18h)	54	77.9	52.5
13	MM14032337	N9.13 (18h-19h)	64	82.1	60.6
14	MM14032338	N9.14 (19h-20h)	62.1	80.6	59.5
15	MM14032339	N9.15 (20h-21h)	61.5	79.8	60.7
16	MM14032340	N9.16 (21h-22h)	61	79.1	60.1

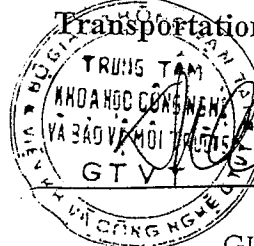
Monitored by

Nguyen Thanh Minh

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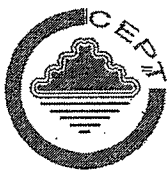
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RESULT OF VIBRATION MONITORING

Name of project: HO CHI MINH – LONG THANH – DAU GIAY EXPRESSWAY
Monitoring site: PACKAGE 9 - INTERSECTION (Km 4+500)
Co-ordinate: N 10°47'53,5"; E 106°47'26,3"
Time of monitoring: 28/03/2014 (06h - 22h)
Surrounding conditions: Sunny and light winds on day. It's cool and light winds at night
The construction activities is a long way from the sampling location
Staff: Bui Ngoc Chau – Nguyen Thanh Minh

No	Code	Sign	Result (dB)	
			Leq	Lveq
01	MM14032341	V9.1 (06h-07h)	48.2	42.2
02	MM14032342	V9.2 (07h-08h)	52	46.4
03	MM14032343	V9.3 (08h-09h)	52.4	46.8
04	MM14032344	V9.4 (09h-10h)	50.6	44.3
05	MM14032345	V9.5 (10h-11h)	52.2	46.6
06	MM14032346	V9.6 (11h-12h)	51.5	45.8
07	MM14032347	V9.7 (12h-13h)	48.6	42.4
08	MM14032348	V9.8 (13h-14h)	50.7	44.8
09	MM14032349	V9.9 (14h-15h)	54.5	48
10	MM14032350	V9.10 (15h-16h)	51.6	42.5
11	MM14032351	V9.11 (16h-17h)	52.2	46.7
12	MM14032352	V9.12 (17h-18h)	54.9	48.7
13	MM14032353	V9.13 (18h-19h)	52.7	46.5
14	MM14032354	V9.14 (19h-20h)	52.5	46.4
15	MM14032355	V9.15 (20h-21h)	54.2	48.5
16	MM14032356	V9.16 (21h-22h)	48.4	42

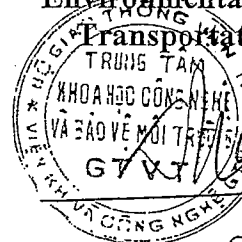
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Phan Chu Phinh Hoa



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RESULT OF AIR QUALITY MONITORING

Name of project: HO CHI MINH – LONG THANH – DAU GIAY EXPRESSWAY
Monitoring site: PACKAGE 9 - INTERSECTION (Km 4+500)
Co-ordinate: N 10°47'53,5"; E 106°47'26,3"
Time of monitoring: 28/03/2014 (06h - 22h)
Surrounding conditions: Sunny and light winds on day. It's cool and light winds at night
The construction activities is a long way from the sampling location
Staff: Tran Dai Nghia, Nguyen Van Chien

1. Results of microclimate parameters:

No	Code	Sign	Temp °C	Humidity %	Wind velocity m/s	Pressure mB	Wind direction
1	MM14032357	A9.1(06h-08h)	29.2	74.5	0.3-0.8	1006.5	ES
2	MM14032358	A9.2 (08h-10h)	31.8	64.2	0.3-1.2	1006.1	ES
3	MM14032359	A9.3 (10h-12h)	34.9	53.8	0.4-1.4	1007.3	ES
4	MM14032360	A9.4 (12h-14h)	35.8	50.6	0.5-1.8	1006.4	SW
5	MM14032361	A9.5 (14h-16h)	34.7	52.3	0.4-2.6	1006.7	SW
6	MM14032362	A9.6 (16h-18h)	31.2	59.8	0.5-3.2	1008.2	S-ES
7	MM14032363	A9.7 (18h-20h)	30.1	68.4	0.2-1.1	1006.4	ES
8	MM14032364	A9.8 (20h-22h)	28.7	76.4	0.3-0.9	1005.5	ES



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2. Results of air quality measurement:

No	Code	Sign	SO ₂ mg/m ³	NO ₂ mg/m ³	HC mg/m ³	TSP mg/m ³	CO mg/m ³
1	MM14032365	A9.1 (06h-08h)	0.049	0.054	KPH	0.152	3.25
2	MM14032366	A9.2 (08h-10h)	0.085	0.076	0.65	0.164	4.26
3	MM14032367	A9.3 (10h-12h)	0.074	0.068	1.48	0.247	4.87
4	MM14032368	A9.4 (12h-14h)	0.076	0.061	1.24	0.253	3.69
5	MM14032369	A9.5 (14h-16h)	0.058	0.062	1.12	0.248	4.53
6	MM14032370	A9.6 (16h-18h)	0.066	0.059	0.32	0.212	5.12
7	MM14032371	A9.7 (18h-20h)	0.054	0.043	KPH	0.165	4.02
8	MM14032372	A9.8 (20h-22h)	0.057	0.048	0.23	0.118	2.64

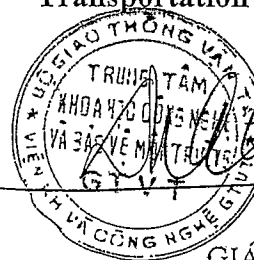
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Tran Dai Nghia

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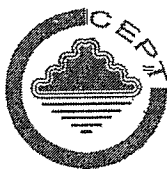
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Tel: (84-4)38346314 Fax (84-4)37663841

RESULT OF GROUNDWATER MONITORING

Name of project: **HO CHI MINH – LONG THANH – DAU GLAY EXPRESSWAY**

Monitoring site: **Package 9 – PHU HUU WARD, DISTRICT 9**

GW9-1: N 10°47'45,1"; E 106°47'29,5"

(26B, 827street, Phu Huu, District 9)

GW9-2: N 10°47'44,2"; E 106°47'27,6"

Co-ordinate: (Nguyen Van Hoang's house, 827 street, Phu Huu, District 9)

GW9-3: N 10°47'43,8"; E 106°47'27,5"

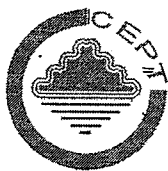
(Hoang Thanh Phong's house, 827 street, Phu Huu, District 9)

Time of monitoring: **28/03/2014**

Weather condition **Sunny and light winds**

Staff: **Nguyen Thien Tu - Le Minh Hien**

No	Analysis criteria	Unit	Result analysis			QCVN 09:2008/ BTNMT
			GW9-1 MM14032373	GW9-2 MM14032374	GW9-3 MM14032375	
1	pH	-	5.64	6.18	6.13	5.5 ÷ 8.5
2	Temp.	°C	29.7	30.1	29.5	-
3	Turbidity	NTU	1.56	1.37	0.68	-
4	Conductivity	µS/cm (25°C)	346	264	257	-
5	Color	Pt/Co	5.1	2.3	2.6	-
6	Smell	-	Not Smell	Not Smell	Not Smell	-
7	Hardness level	mgCaCO ₃ /l	20.4	21.2	19.3	500
8	Cl ⁻	mg/l	89.9	92.1	83.4	250
9	SO ₄ ²⁻	mg/l	38.2	33.1	40.4	400
10	NO ₃ ⁻	mg/l	0.261	0.317	0.363	15 (as N)
11	TDS	mg/l	176	203	194	1500



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No	Analysis criteria	Unit	Result analysis			QCVN 09:2008/ BTNMT
			GW9-1 MMI4032373	GW9-2 MMI4032374	GW9-3 MMI4032375	
12	As	mg/l	NDT	NDT	NDT	0.05
13	Cd	mg/l	NDT	NDT	NDT	0.005
14	CN ⁻	mg/l	NDT	NDT	NDT	0.01
15	Fe	mg/l	3.25	3.16	2.92	5
16	Mn	mg/l	0.164	0.152	0.092	0.5
17	Pb	mg/l	NDT	NDT	NDT	0.01
18	E. Coli	MPN/ 100ml	NDT	NDT	NDT	Not detected
19	Coliforms	MPN/ 100ml	NDT	NDT	NDT	3

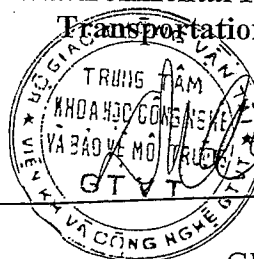
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RESULT OF SOIL MONITORING

Name of project: HO CHI MINH – LONG THANH – DAU GIAY EXPRESSWAY
Monitoring site: **Package 9 – NEAR THE INTERSECTION**
Co-ordinate: S9-1: N 10°47'53,1"; E 106°47'25,2"
S9-2: N 10°47'51,6"; E 106°47'26,3"
S9-3: N 10°47'48,1"; E 106°47'25,7"
Time of monitoring: 28/03/2014
Weather condition: Sunny and light winds
Staff: Nguyen Thien Tu - Le Minh Hien

No	Analysis criteria	Unit	Result analysis			QCVN 03:2008/ BTNMT
			S9-1 MM14032376	S9-2 MM14032377	S9-3 MM14032378	
1.	pH	-	6.68	6.14	5.52	-
2.	Organic matters	%	2.63	2.81	2.94	-
3.	Total N	%	0.076	0.104	0.095	-
4.	Cl ⁻	mg/kg	826	751	806	-
5.	SO ₄ ²⁻	%	0.015	0.02	0.018	-
6.	As	mg/kg	0.236	0.205	0.227	12
7.	Cd	mg/kg	NDT	NDT	NDT	5
8.	Cu	mg/kg	8.65	4.23	5.11	70
9.	Hg	mg/kg	NDT	NDT	NDT	-
10.	P	mg/kg	324	385	352	-
11.	Pb	mg/kg	15.38	14.26	14.75	120
12.	Zn	mg/kg	51.67	49.59	48.63	200

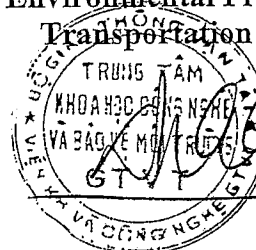
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2. Results of air quality measurement:

No	Code	Sign	SO ₂ mg/m ³	NO ₂ mg/m ³	HC mg/m ³	TSP mg/m ³	CO mg/m ³
1	MM14032347	A7.1 (06h-08h)	0.057	0.041	NDT	0.127	3.72
2	MM14032348	A7.2 (08h-10h)	0.066	0.058	0.53	0.175	3.86
3	MM14032349	A7.3 (10h-12h)	0.065	0.053	0.86	0.168	4.28
4	MM14032350	A7.4 (12h-14h)	0.068	0.061	1.25	0.193	4.37
5	MM14032351	A7.5 (14h-16h)	0.052	0.044	1.41	0.201	4.15
6	MM14032352	A7.6 (16h-18h)	0.055	0.043	1.17	0.148	3.29
7	MM14032353	A7.7 (18h-20h)	0.049	0.038	NDT	0.112	2.14
8	MM14032354	A7.8 (20h-22h)	0.045	0.032	NDT	0.107	1.32

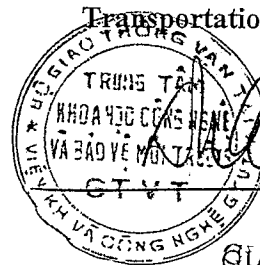
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RESULT OF SURFACE WATER MONITORING

Name of project: HO CHI MINH – LONG THANH – DAU GIAY EXPRESSWAY

Monitoring site: **Package 7 - BA DAI CANAL**

Co-ordinate: SW7-1: N 10°47'42,6"; E 106°45'07,5"
SW7-2: N 10°47'42,1"; E 106°45'06,8"
SW7-3: N 10°47'25,3"; E 106°45'09,4"
SW7-4: N 10°47'25,8"; E 106°45'10,1"

Time of monitoring: 26/03/2014

Surrounding conditions: Sunny and light winds

Staff: Nguyen Thien Tu – Le Minh Hien

1. Results on measuring. Monitoring the surface water at upstream (morning and afternoon):

No	Analysis criteria	Unit	Result analysis		QCVN 08:2008/BTNMT	
			SW7-1 MM14032355	SW7-2 MM14032356	Column A2	Column B1
1.	pH	-	6.71	6.79	6 ÷ 8.5	5.5 ÷ 9
2.	Temp.	°C	30.3	30.6	-	-
3.	Conductivity	μS/cm (25°C)	3612	3345	-	-
4.	DO	mg/l	4.58	4.36	≥ 5	≥ 4
5.	BOD ₅	mg/l	13	15	6	15
6.	COD	mg/l	25	28	15	30
7.	SS	mg/l	46	26	30	50
8.	PO ₄ ³⁻	mg/l	0.084	0.137	0.2 (as P)	0.3 (as P)
9.	NO ₂ ⁻	mg/l	NDT	NDT	0.02 (as N)	0.02 (as N)
10.	NO ₃ ⁻	mg/l	0.562	0.507	5 (as N)	10 (as N)
11.	NH ₄ ⁺	mg/l	0.18	0.24	0.2 (as N)	0.5 (as N)
12.	As	mg/l	NDT	NDT	0.02	0.05



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No	Analysis criteria	Unit	Result analysis		QCVN 08:2008/BTNMT	
			SW7-1 MM14032355	SW7-2 MM14032356	Column A2	Column B1
13.	Cd	mg/l	NDT	NDT	0.005	0.01
14.	Cr ⁶⁺	mg/l	NDT	NDT	0.02	0.04
15.	Cu	mg/l	0.031	0.037	0.2	0.5
16.	Hg	mg/l	NDT	NDT	0.001	0.001
17.	Pb	mg/l	NDT	NDT	0.02	0.05
18.	Zn	mg/l	0.051	0.065	1.0	1.5
19.	Oil and grease	mg/l	NDT	NDT	0.02	0.1
20.	Coliforms	MPN/100ml	1500	2400	5000	7500

2. Result on measuring. Monitoring the surface water at downstream (morning and afternoon):

No	Analysis criteria	Unit	Result analysis		QCVN 08:2008/BTNMT	
			SW7-3 MM14032357	SW7-4 MM14032358	Column A2	Column B1
1.	pH	-	6.91	6.93	6 ÷ 8.5	5.5 ÷ 9
2.	Temp.	°C	30.1	30.2	-	-
3.	Conductivity	μS/cm(25 ⁰ C)	3581	3579	-	-
4.	DO	mg/l	4.42	4.48	≥ 5	≥ 4
5.	BOD ₅	mg/l	16	15	6	15
6.	COD	mg/l	31	28	15	30
7.	SS	mg/l	42	47	30	50



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No	Analysis criteria	Unit	Result analysis		QCVN 08:2008/BTNMT	
			SW7-3 MM14032357	SW7-4 MM14032358	Column A2	Column B1
8.	PO_4^{3-}	mg/l	0.134	0.154	0.2 (as P)	0.3 (as P)
9.	NO_2^-	mg/l	NDT	NDT	0.02 (as N)	0.02 (as N)
10.	NO_3^-	mg/l	0.417	0.473	5 (as N)	10 (as N)
11.	NH_4^+	mg/l	0.21	0.26	0.2 (as N)	0.5 (as N)
12.	As	mg/l	NDT	NDT	0.02	0.05
13.	Cd	mg/l	NDT	NDT	0.005	0.01
14.	Cr^{6+}	mg/l	NDT	NDT	0.02	0.04
15.	Cu	mg/l	0.035	0.041	0.2	0.5
16.	Hg	mg/l	NDT	NDT	0.001	0.001
17.	Pb	mg/l	NDT	NDT	0.02	0.05
18.	Zn	mg/l	0.039	0.068	1.0	1.5
19.	Oil and grease	mg/l	NDT	NDT	0.02	0.1
20.	Coliforms	MPN/100ml	2300	4100	5000	7500

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RESULT OF SURFACE WATER MONITORING

Name of project: HO CHI MINH – LONG THANH – DAU GIAY EXPRESSWAY

Monitoring site: Package 7 - MUONG KENH CANAL

Co-ordinate: SW7-5: N 10°47'47,1"; E 106°45'46,1"

SW7-6: N 10°47'47,8"; E 106°45'46,6"

SW7-7: N 10°47'47,4"; E 106°45'45,2"

SW7-8: N 10°47'47,5"; E 106°45'45,7"

Time of monitoring: 26/03/2014

Surrounding conditions: Sunny and light winds

Staff: Nguyen Thien Tu – Le Minh Hien

1. Results on measuring. Monitoring the surface water at upstream (morning and afternoon):

No	Analysis criteria	Unit	Result analysis		QCVN 08:2008/BTNMT	
			SW7-5 MM14032359	SW7-6 MM14032360	Column A2	Column B1
1.	pH	-	6.96	7.06	6 ÷ 8.5	5.5 ÷ 9
2.	Temp.	°C	30.4	30.2	-	-
3.	Conductivity	μS/cm (25°C)	3382	3602	-	-
4.	DO	mg/l	4.81	4.59	≥ 5	≥ 4
5.	BOD ₅	mg/l	13	16	6	15
6.	COD	mg/l	26	33	15	30
7.	SS	mg/l	33	43	30	50
8.	PO ₄ ³⁻	mg/l	0.145	0.172	0.2 (as P)	0.3 (as P)
9.	NO ₂ ⁻	mg/l	NDT	NDT	0.02 (as N)	0.02 (as N)
10.	NO ₃ ⁻	mg/l	0.479	0.451	5 (as N)	10 (as N)
11.	NH ₄ ⁺	mg/l	0.22	0.24	0.2 (as N)	0.5 (as N)
12.	As	mg/l	NDT	NDT	0.02	0.05



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No	Analysis criteria	Unit	Result analysis		QCVN 08:2008/BTNMT	
			SW7-5 MM14032359	SW7-6 MM14032360	Column A2	Column B1
13.	Cd	mg/l	NDT	NDT	0.005	0.01
14.	Cr ⁶⁺	mg/l	NDT	NDT	0.02	0.04
15.	Cu	mg/l	0.036	0.030	0.2	0.5
16.	Hg	mg/l	NDT	NDT	0.001	0.001
17.	Pb	mg/l	NDT	NDT	0.02	0.05
18.	Zn	mg/l	0.028	0.036	1.0	1.5
19.	Oil and grease	mg/l	NDT	NDT	0.02	0.1
20.	Coliforms	MPN/100ml	490	2100	5000	7500

2. Result on measuring. Monitoring the surface water at downstream (morning and afternoon):

No	Analysis criteria	Unit	Result analysis		QCVN 08:2008/BTNMT	
			SW7-7 MM14032361	SW7-8 MM14032362	Column A2	Column B1
1.	pH	-	7.14	7.17	6 ÷ 8.5	5.5 ÷ 9
2.	Temp.	°C	30.3	30.1	-	-
3.	Conductivity	μS/cm(25°C)	3419	3664	-	-
4.	DO	mg/l	5.6	5.53	≥ 5	≥ 4
5.	BOD ₅	mg/l	12	15	6	15
6.	COD	mg/l	23	29	15	30
7.	SS	mg/l	20	41	30	50



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No	Analysis criteria	Unit	Result analysis		QCVN 08:2008/BTNMT	
			SW7-7 MM14032361	SW7-8 MM14032362	Column A2	Column B1
8.	PO ₄ ³⁻	mg/l	0.092	0.124	0.2 (as P)	0.3 (as P)
9.	NO ₂ ⁻	mg/l	NDT	NDT	0.02 (as N)	0.02 (as N)
10.	NO ₃ ⁻	mg/l	0.581	0.675	5 (as N)	10 (as N)
11.	NH ₄ ⁺	mg/l	0.31	0.34	0.2 (as N)	0.5 (as N)
12.	As	mg/l	NDT	NDT	0.02	0.05
13.	Cd	mg/l	NDT	NDT	0.005	0.01
14.	Cr ⁶⁺	mg/l	NDT	NDT	0.02	0.04
15.	Cu	mg/l	0.033	0.036	0.2	0.5
16.	Hg	mg/l	NDT	NDT	0.001	0.001
17.	Pb	mg/l	NDT	NDT	0.02	0.05
18.	Zn	mg/l	0.024	0.056	1.0	1.5
19.	Oil and grease	mg/l	NDT	NDT	0.02	0.1
20.	Coliforms	MPN/100ml	1500	2700	5000	7500

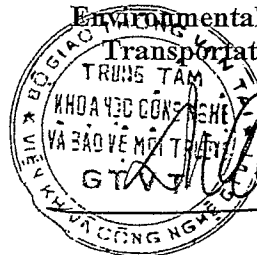
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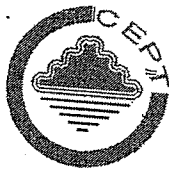
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RESULT OF GROUNDWATER MONITORING

Name of project: HO CHI MINH – LONG THANH – DAU GIAY EXPRESSWAY
Monitoring site: Package 7 - AN PHU WARD, DISTRICT 2

Co-ordinate: GW7-1: N 10°47'42,5"; E 106°45'05,8" (110 Nguyen Thi Dinh, An Phu, District 2)

GW7-2: N 10°47'42,1"; E 106°45'07,2" (133 Nguyen Thi Dinh, An Phu, District 2)

GW7-3: N 10°47'42,6"; E 106°45'06,5" (108 Nguyen Thi Dinh, An Phu, District 2)

Time of monitoring: 26/03/2014

Weather condition: Sunny and light winds

Staff: Nguyen Thien Tu – Le Minh Hien

No	Analysis criteria	Unit	Result analysis			QCVN 09-2008/BTNMT
			GW7-1 MM14032362	GW7-2 MM14032363	GW7-3 MM14032364	
1	pH	-	5.87	5.85	5.88	5.5 ÷ 8.5
2	Temp.	°C	29.8	30.1	30.2	-
3	Turbidity	NTU	1.19	1.11	0.89	-
4	Conductivity	μS/cm (25°C)	356	371	364	-
5	Color	Pt/Co	2.3	3.7	3.5	-
6	Smell	-	Not Smell	Not Smell	Not Smell	-
7	Hardness level	mgCaCO ₃ /l	9.2	10.5	8.6	500
8	Cl ⁻	mg/l	87.1	68.4	83.2	250
9	SO ₄ ²⁻	mg/l	75.2	74.1	82.6	400
10	NO ₃ ⁻	mg/l	0.316	0.284	0.357	15 (as N)
11	TDS	mg/l	205	241	213	1500



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No	Analysis criteria	Unit	Result analysis			QCVN 09:2008/ BTNMT
			GW7-1 MM14032362	GW7-2 MM14032363	GW7-3 MM14032364	
12	As	mg/l	NDT	NDT	NDT	0.05
13	Cd	mg/l	NDT	NDT	NDT	0.005
14	CN ⁻	mg/l	NDT	NDT	NDT	0.01
15	Fe	mg/l	0.218	0.256	0.287	5
16	Mn	mg/l	0.084	0.075	0.103	0.5
17	Pb	mg/l	NDT	NDT	NDT	0.01
18	E. Coli	MPN/ 100ml	NDT	NDT	NDT	Not detected
19	Coliforms	MPN/ 100ml	NDT	NDT	2	3

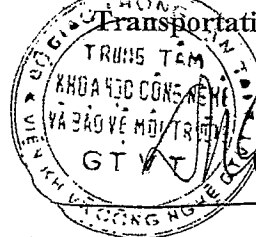
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RESULT OF SOIL MONITORING

Name of project: HO CHI MINH – LONG THANH – DAU GIAY EXPRESSWAY
Monitoring site: Package 7 - NEAR KENH MUONG CANAL, AN PHU WARD,
DISTRICT 2
Co-ordinate: S7-1: N 10°47'45,2"; E 106°45'44,1"
S7-2: N 10°47'48,4"; E 106°45'32,5"
S7-3: N 10°47'46,3"; E 106°45'31,4"
Time of monitoring: 26/03/2014
Weather condition: Sunny and light winds
Staff: Nguyen Thien Tu - Le Minh Hien

No	Analysis criteria	Unit	Result analysis			QCVN 03:2008/BNMT
			S7-1 MM14032365	S7-2 MM14032366	S7-3 MM14032367	
1.	pH	-	5.72	6.15	5.64	-
2.	Organic matters	%	1.76	2.51	2.43	-
3.	Total N	%	0.092	0.078	0.064	-
4.	Cl ⁻	mg/kg	942	1053	836	-
5.	SO ₄ ²⁻	%	0.017	0.025	0.022	-
6.	As	mg/kg	1.12	0.658	0.884	12
7.	Cd	mg/kg	NDT	NDT	NDT	5
8.	Cu	mg/kg	2.59	5.76	5.48	70
9.	Hg	mg/kg	NDT	NDT	NDT	-
10.	P	mg/kg	89	84	71	-
11.	Pb	mg/kg	12.12	14.26	14.51	120
12.	Zn	mg/kg	63.25	45.37	42.78	200

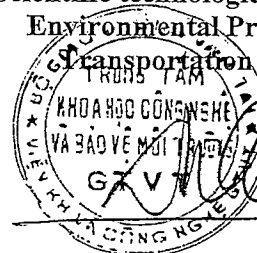
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Checked by

Le Minh Hien

Phạm Phú Tra

Scientific technological Center for
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GIÁM ĐỐC

Đặng Thị Phương Nga



INSTITUTE OF TRANSPORTATION SCIENCE AND TECHNOLOGY
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1252 Lang street, Dong Da district, Hanoi city, Viet Nam

Tel: (84-4)36346314 Fax (84-4)37663841

RESULT OF NOISE MONITORING

Name of project: HO CHI MINH - LONG THANH - DAU GIAY EXPRESSWAY
Monitoring site: PACKAGE 9 - INTERSECTION (Km 4+500)
Co-ordinate: N 10°47'53,5"; E 106°47'26,3"
Time of monitoring: 28/03/2014 (06h - 22h)
Surrounding conditions: Sunny and light winds on day. It's cool and light winds at night
The construction activities is a long way from the sampling location
Staff: Bui Ngoc Chau - Nguyen Thanh Minh

No.	Code	Sign	Result (dB(A))		
			Max	Min	Avg
01	MM14032325	N9.1 (06h-07h)	58.9	79.5	57
02	MM14032326	N9.2 (07h-08h)	56.7	79	54.2
03	MM14032327	N9.3 (08h-09h)	54.1	78.2	53.5
04	MM14032328	N9.4 (09h-10h)	52.4	76.9	51.6
05	MM14032329	N9.5 (10h-11h)	55	80.1	54.6
06	MM14032330	N9.6 (11h-12h)	54.5	78.8	53.1
07	MM14032331	N9.7 (12h-13h)	53.4	77.5	52.5
08	MM14032332	N9.8 (13h-14h)	52.7	76.9	51.4
09	MM14032333	N9.9 (14h-15h)	55.7	79.4	54.4
10	MM14032334	N9.10 (15h-16h)	54.8	77.8	53.2
11	MM14032335	N9.11 (16h-17h)	54.4	78.2	52.9
12	MM14032336	N9.12 (17h-18h)	54	77.9	52.5
13	MM14032337	N9.13 (18h-19h)	64	82.1	60.6
14	MM14032338	N9.14 (19h-20h)	62.1	80.6	59.5
15	MM14032339	N9.15 (20h-21h)	61.5	79.8	60.7
16	MM14032340	N9.16 (21h-22h)	61	79.1	60.1

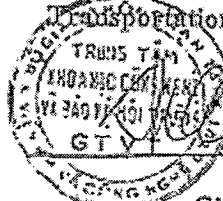
Monitored by

Nguyen Thanh Minh

Checked by

Phan Chu Minh Hoa

Scientific technological Center for
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Dương Thị Phương Nga



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RESULT OF VIBRATION MONITORING

Name of project: HO CHI MINH - LONG THANH - DAU GIAY EXPRESSWAY
Monitoring site: PACKAGE 9 - INTERSECTION (Km 4+500)
Co-ordinate: N 10°47'53,5"; E 106°47'26,3"
Time of monitoring: 28/03/2014 (06h - 22h)
Surrounding conditions: Sunny and light winds on day. It's cool and light winds at night
The construction activities is a long way from the sampling location
Staff: Bui Ngoc Chau - Nguyen Thanh Minh

No	Code	Sign	Result (dB)	
			day	night
01	MM14032341	V9.1 (06h-07h)	48.2	42.2
02	MM14032342	V9.2 (07h-08h)	52	46.4
03	MM14032343	V9.3 (08h-09h)	52.4	46.8
04	MM14032344	V9.4 (09h-10h)	50.6	44.3
05	MM14032345	V9.5 (10h-11h)	52.2	46.6
06	MM14032346	V9.6 (11h-12h)	51.5	45.8
07	MM14032347	V9.7 (12h-13h)	48.6	42.4
08	MM14032348	V9.8 (13h-14h)	50.7	44.8
09	MM14032349	V9.9 (14h-15h)	54.5	48
10	MM14032350	V9.10 (15h-16h)	51.6	42.5
11	MM14032351	V9.11 (16h-17h)	52.2	46.7
12	MM14032352	V9.12 (17h-18h)	54.9	48.7
13	MM14032353	V9.13 (18h-19h)	52.7	46.5
14	MM14032354	V9.14 (19h-20h)	52.5	46.4
15	MM14032355	V9.15 (20h-21h)	54.2	48.5
16	MM14032356	V9.16 (21h-22h)	48.4	42

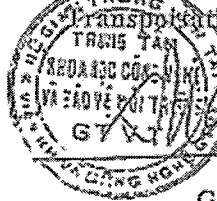
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Nguyen Thanh Minh

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RESULT OF VIBRATION MONITORING

Name of project: HO CHI MINH - LONG THANH - DAU GIAY EXPRESSWAY
Monitoring site: PACKAGE 7 - INTERSECTION AN PHU (Km 00+200)
Co-ordinate: N 10°47'42,5"; E 106°45'01,4"
Time of monitoring: 26/03/2014 (06h - 22h)
Surrounding conditions: Sunny and light winds on day. It's cool and light winds at night
The site is going on 300 m from away sampling location
Staff: Tran Quang Lam - Phan Thi Minh Hoa

No	Code	Site	Result (dB)	
			Leq	L _{max}
01	MM14032324	V7.1 (06h-07h)	51.8	44.8
02	MM14032325	V7.2 (07h-08h)	54	45.4
03	MM14032326	V7.3 (08h-09h)	50.5	43.6
04	MM14032327	V7.4 (09h-10h)	48.4	42.2
05	MM14032328	V7.5 (10h-11h)	51.5	44.6
06	MM14032329	V7.6 (11h-12h)	50.7	44.1
07	MM14032330	V7.7 (12h-13h)	46.4	41.6
08	MM14032331	V7.8 (13h-14h)	48.1	43.2
09	MM14032332	V7.9 (14h-15h)	53.4	44.7
10	MM14032333	V7.10 (15h-16h)	54.6	45.9
11	MM14032334	V7.11 (16h-17h)	52.2	43.8
12	MM14032335	V7.12 (17h-18h)	50.3	42.8
13	MM14032336	V7.13 (18h-19h)	48.1	40.6
14	MM14032337	V7.14 (19h-20h)	49.4	42.6
15	MM14032338	V7.15 (20h-21h)	50.1	43.5
16	MM14032339	V7.16 (21h-22h)	47	40.1

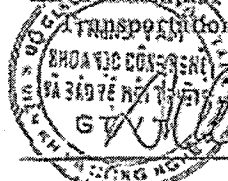
Monitored by

Tran Quang Lam

Checked by

Phan Thi Minh Hoa

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Tel: (84-4)38346314 Fax (84-4)37663841

RESULT OF VIBRATION MONITORING

Name of project: HO CHI MINH - LONG THANH - DAU GIAY EXPRESSWAY
Monitoring site: PACKAGE 7 - INTERSECTION AN PHU (Km 00+200)
Co-ordinate: N 10°47'42,5"; E 106°45'01,4"
Time of monitoring: 26/03/2014 (06h - 22h)
Surrounding conditions: Sunny and light winds on day. It's cool and light winds at night
The site is going on 300 m from away sampling location
Staff: Tran Quang Lam - Phan Thi Minh Hoa

No	Code	Sign	Result (dB)	
			Bed	Level
01	MM14032324	V7.1 (06h-07h)	51.8	44.8
02	MM14032325	V7.2 (07h-08h)	54	45.4
03	MM14032326	V7.3 (08h-09h)	50.5	43.6
04	MM14032327	V7.4 (09h-10h)	48.4	42.2
05	MM14032328	V7.5 (10h-11h)	51.5	44.6
06	MM14032329	V7.6 (11h-12h)	50.7	44.1
07	MM14032330	V7.7 (12h-13h)	46.4	41.6
08	MM14032331	V7.8 (13h-14h)	48.1	43.2
09	MM14032332	V7.9 (14h-15h)	53.4	44.7
10	MM14032333	V7.10 (15h-16h)	54.6	45.9
11	MM14032334	V7.11 (16h-17h)	52.2	43.8
12	MM14032335	V7.12 (17h-18h)	50.3	42.8
13	MM14032336	V7.13 (18h-19h)	48.1	40.6
14	MM14032337	V7.14 (19h-20h)	49.4	42.6
15	MM14032338	V7.15 (20h-21h)	50.1	43.5
16	MM14032339	V7.16 (21h-22h)	47	40.1

Monitored by

Checked by

Tran Quang Lam

Phan Thi Minh Hoa

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RESULT OF AIR QUALITY MONITORING

Name of project: HO CHI MINH - LONG THANH - DAU GIAY EXPRESSWAY
Monitoring site: PACKAGE 7 - INTERSECTION AN PHU (Km 00+200)
Co-ordinate: N 10°47'42,5"; B 106°45'01,4"
Time of monitoring: 26/03/2014 (06h - 22h)
Surrounding conditions: Sunny and light winds on day. It's cool and light winds at night
The site is going on 300 m from away sampling location
Staff: Tran Minh Phuong - Ngo Tung Dien

1. Results of microclimate parameters:

No.	Order	Sign	Temp	Humidity	Wind velocity	Pressure	Wind direction
1	MM14032339	A7.1 (06h-08h)	29.8	74.6	0.1-0.5	1006.3	ES
2	MM14032340	A7.2 (08h-10h)	30.8	67.3	0.2-0.7	1004.2	ES
3	MM14032341	A7.3 (10h-12h)	35.1	50.6	0.2-1.1	1007.2	ES
4	MM14032342	A7.4 (12h-14h)	35.7	49.5	0.3-1.4	1008.5	ES
5	MM14032343	A7.5 (14h-16h)	32.5	52.1	0.4-2.6	1007.6	ES
6	MM14032344	A7.6 (16h-18h)	30.2	62.8	0.3-1.0	1005.1	ES
7	MM14032345	A7.7 (18h-20h)	29.2	72.6	0.4-1.2	1004.7	ES
8	MM14032346	A7.8 (20h-22h)	27.6	75.4	0.2-0.6	1005.3	ES

APPENDIX 5:

MAP OF MONITORING LOCATIONS

MAP OF SAMPLING LOCATIONS

