

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.

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(as of 31 March 2014)

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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

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)

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DIRECTOR

DANG THI PHUONG NGA

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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/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.

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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 Riovibro 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. (°C)	Moisture (%)	Wind (m/s)	Pressure (mB)	Wind direction
<i>Average result (6h-22h) (03/2014)</i>	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 (6h-22h) (03/2014)</i>	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 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	-	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

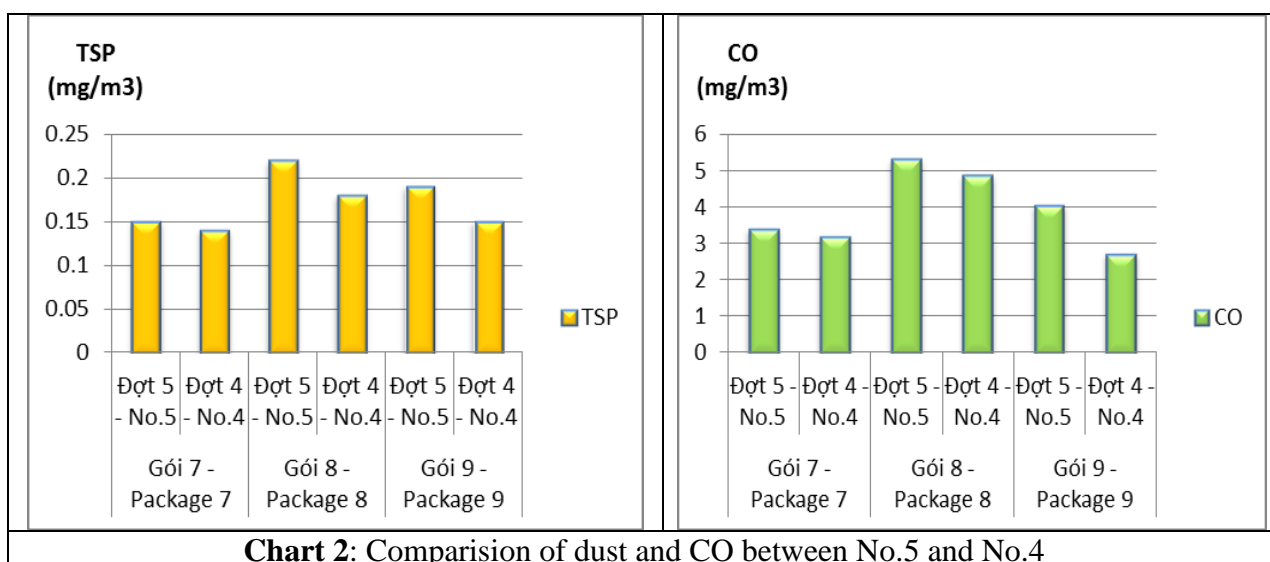
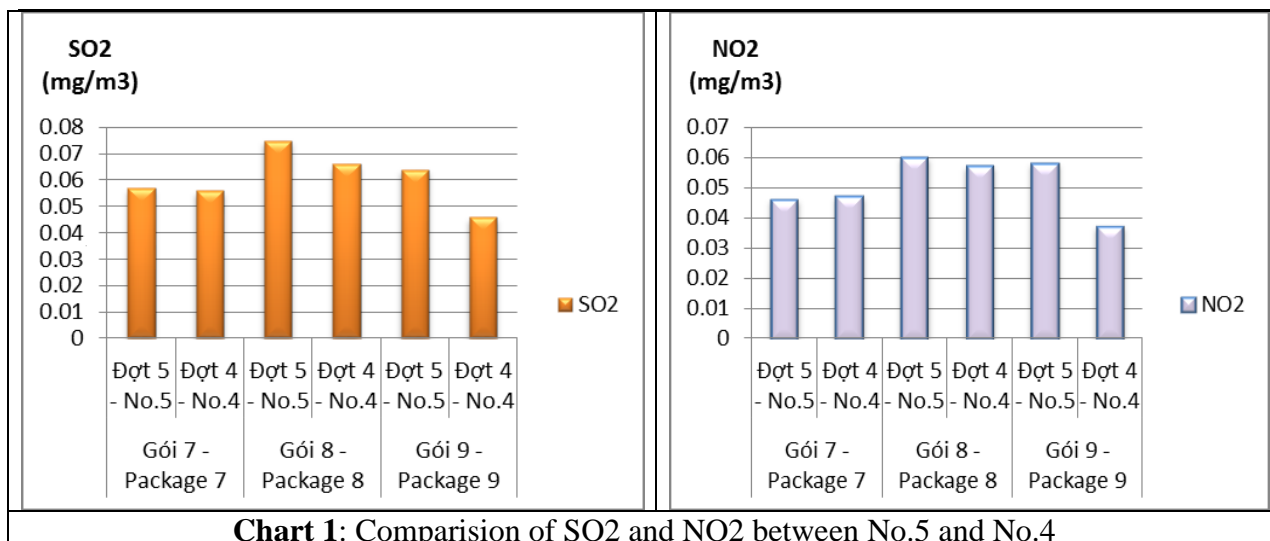
Packages	Series	SO ₂	NO ₂	HC	TSP	CO
		mg/m ³	mg/m ³	mg/m ³	mg/m ³	mg/m ³
Package 7	No.5	0,057	0,046	1,04	0,15	3,39
	No.4	0,056	0,047	1,04	0,14	3,2
Package 8	No.5	0,075	0,06	1,04	0,22	5,3
	No.4	0,066	0,057	0,71	0,18	4,85
Package 9	No.5	0,064	0,058	0,84	0,19	4,04
	No.4	0,046	0,037	0,71	0,15	2,7
QCVN 05:2013/BTNMT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

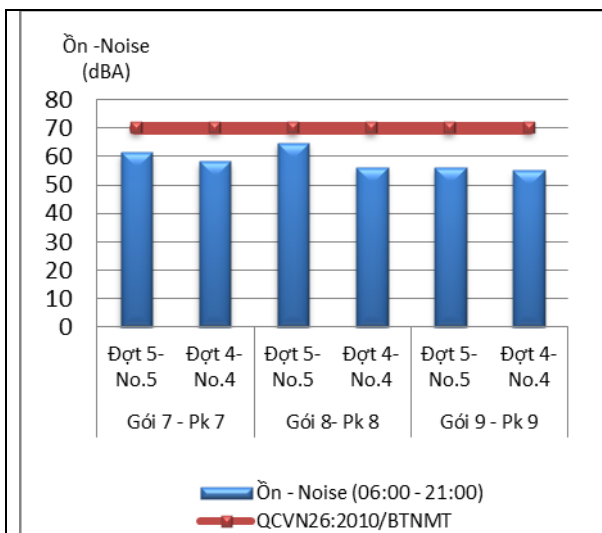


Chart 3: Comparison of noise level between No.5 and No.4 during period from 6:00 to 21:00

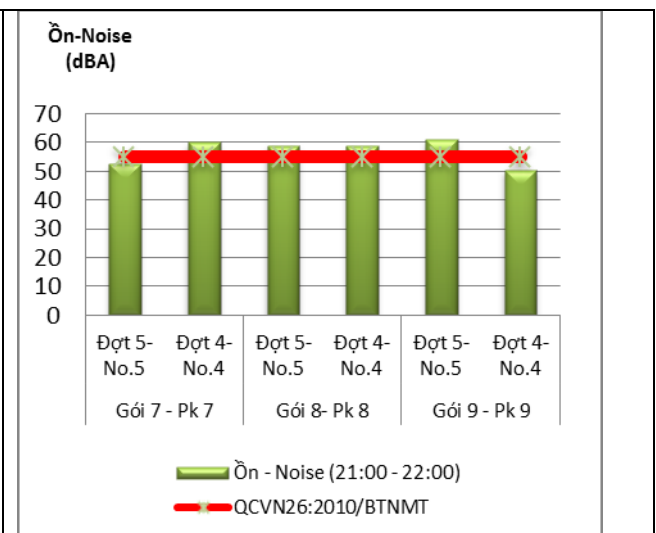
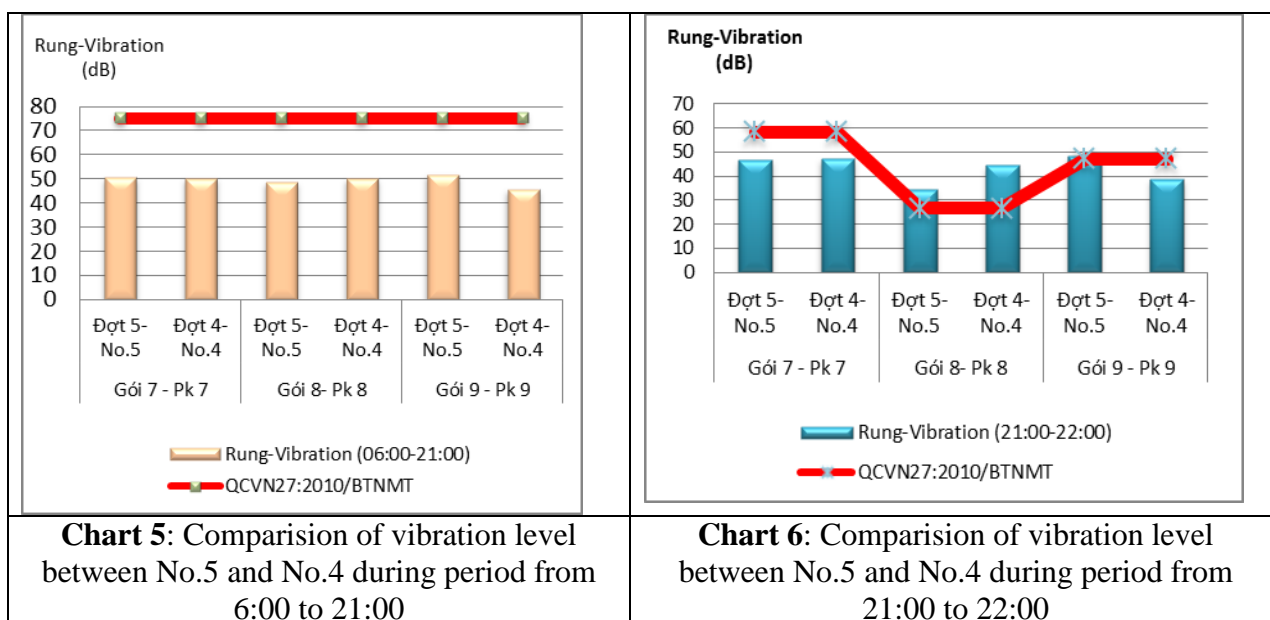


Chart 4: Comparison of noise level between No.5 and No.4 during period from 21:00 to 22:00

▪ **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:

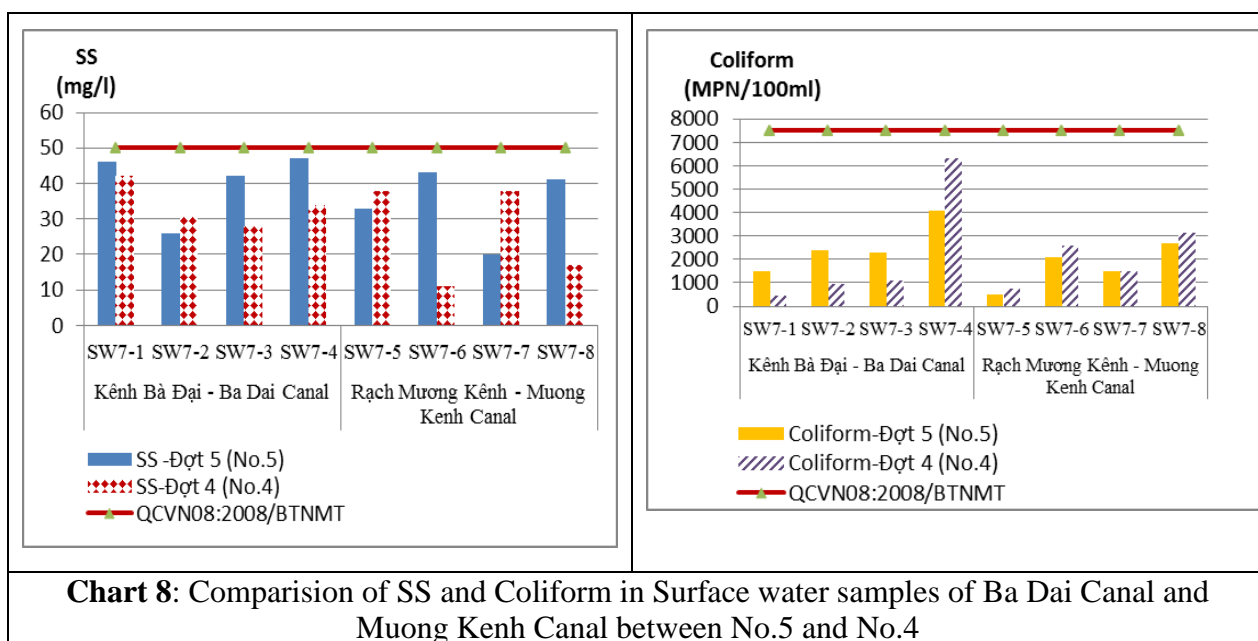
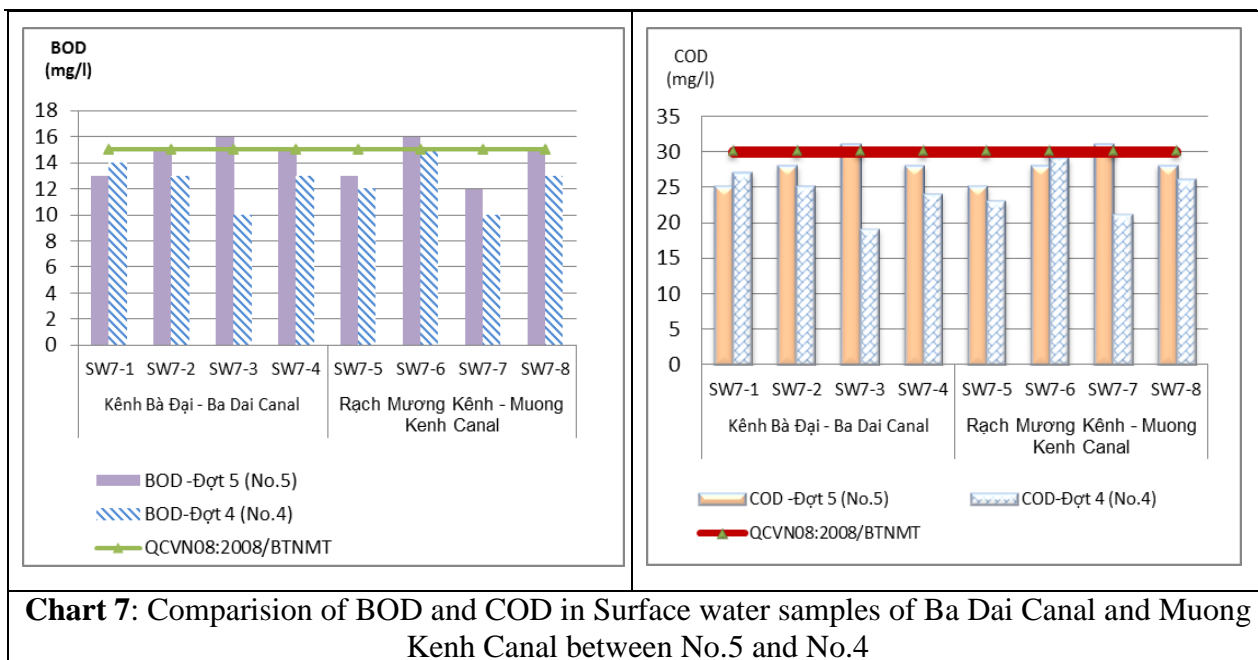
Table 4.33. Comparison of surface water quality between No.5 and No.4

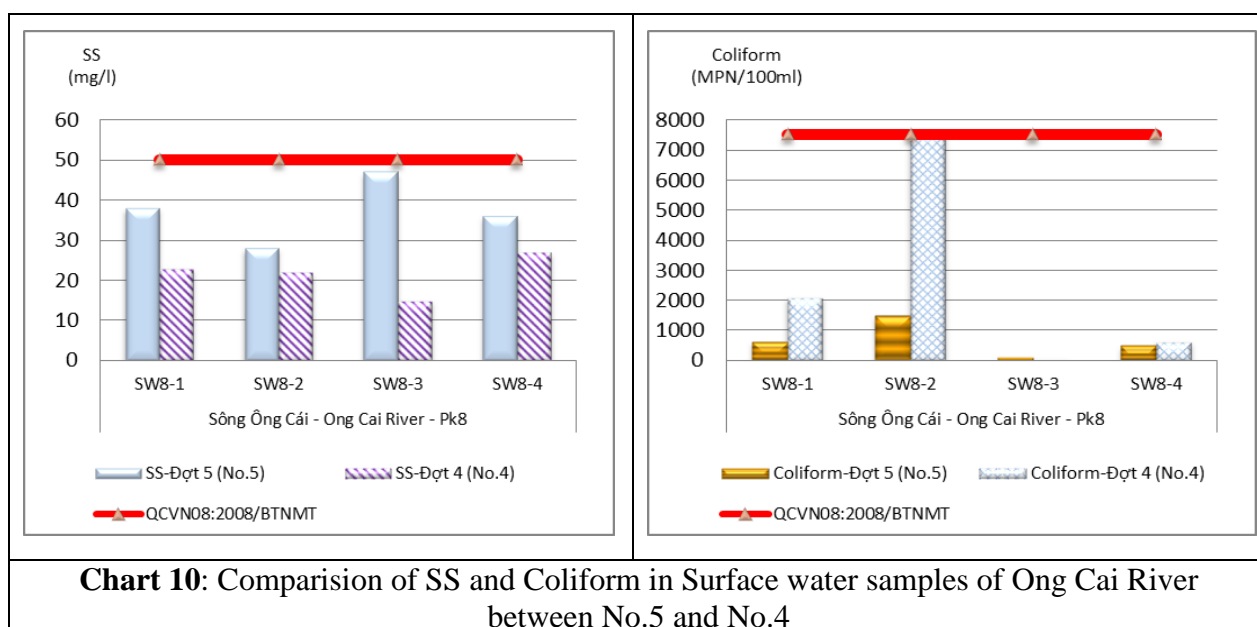
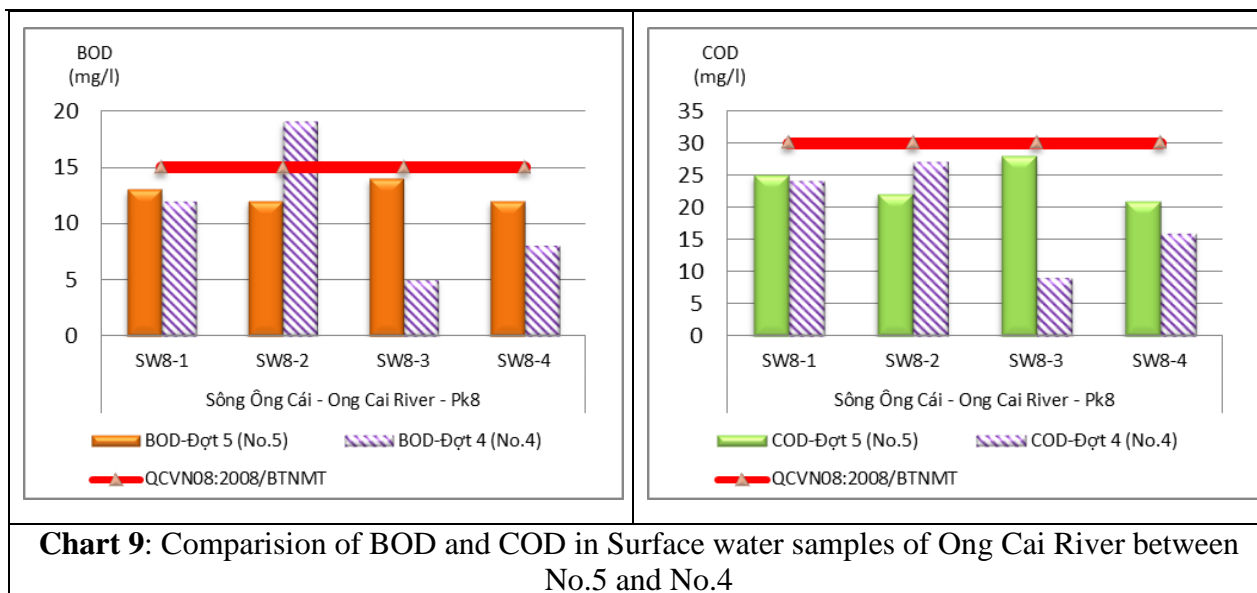
Location	Parameters									
	No.5 (March 2014)					No.4 (December 2013)				
	pH	SS (mg/l)	BOD ₅ (mg/l)	COD (mg/l)	Coliform MPN/ 100ml	pH	SS (mg/l)	BOD ₅ (mg/l)	COD (mg/l)	Coliform MPN/ 100ml
Package 7: Ba Dai Canal										
SW7-1	6,71	46	13	25	1500	6,41	42	14	27	460
SW7-2	6,79	26	15	28	2400	6,89	31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

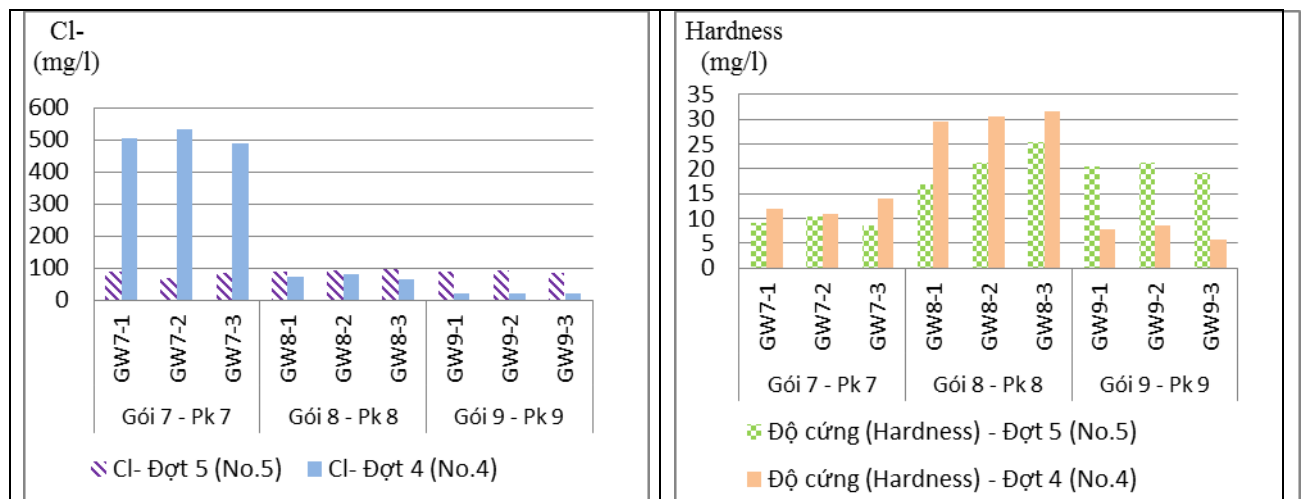
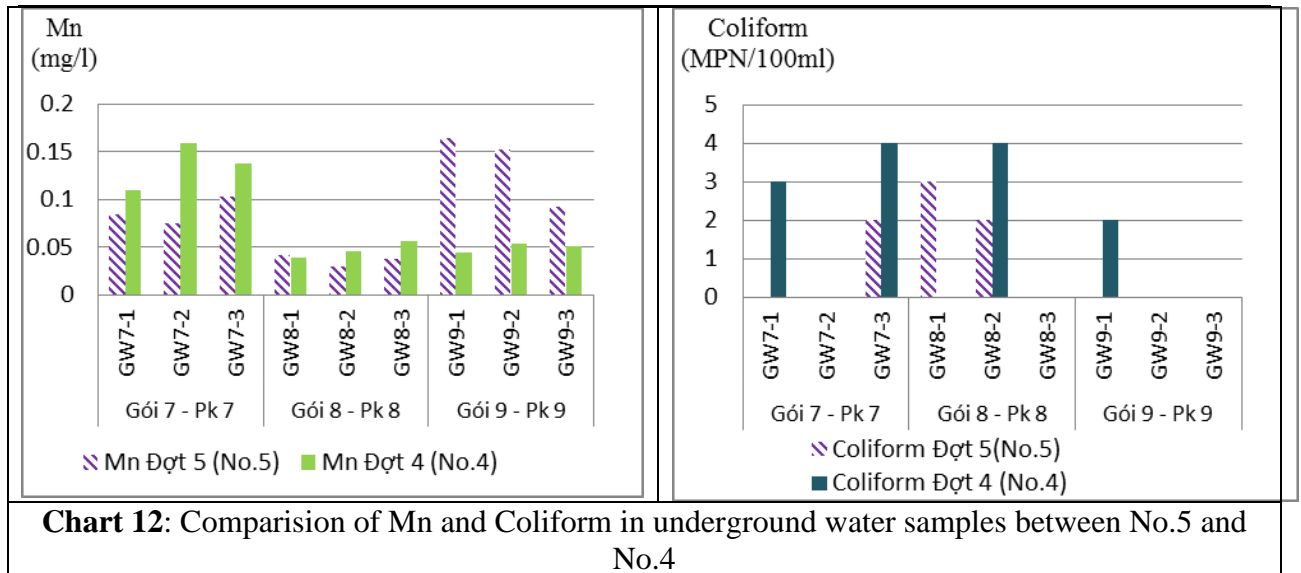


Chart 11: Comparison of Cl⁻ and hardness in underground water samples between No.5 and No.4



4.4.5. Assessment of environmental changing tendency of soil quality

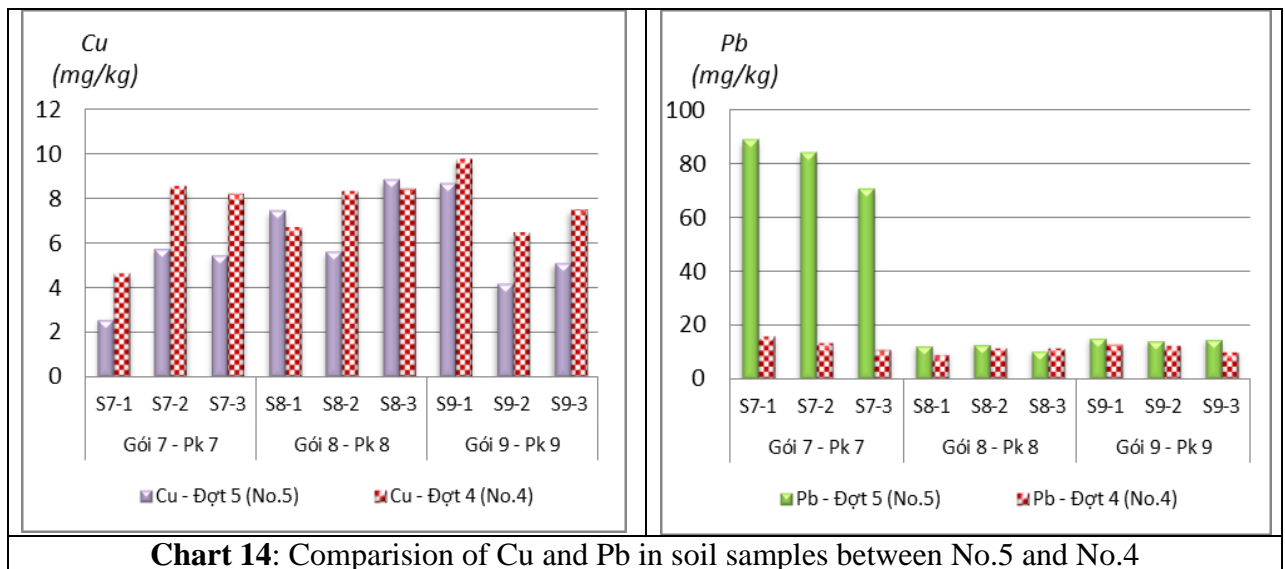
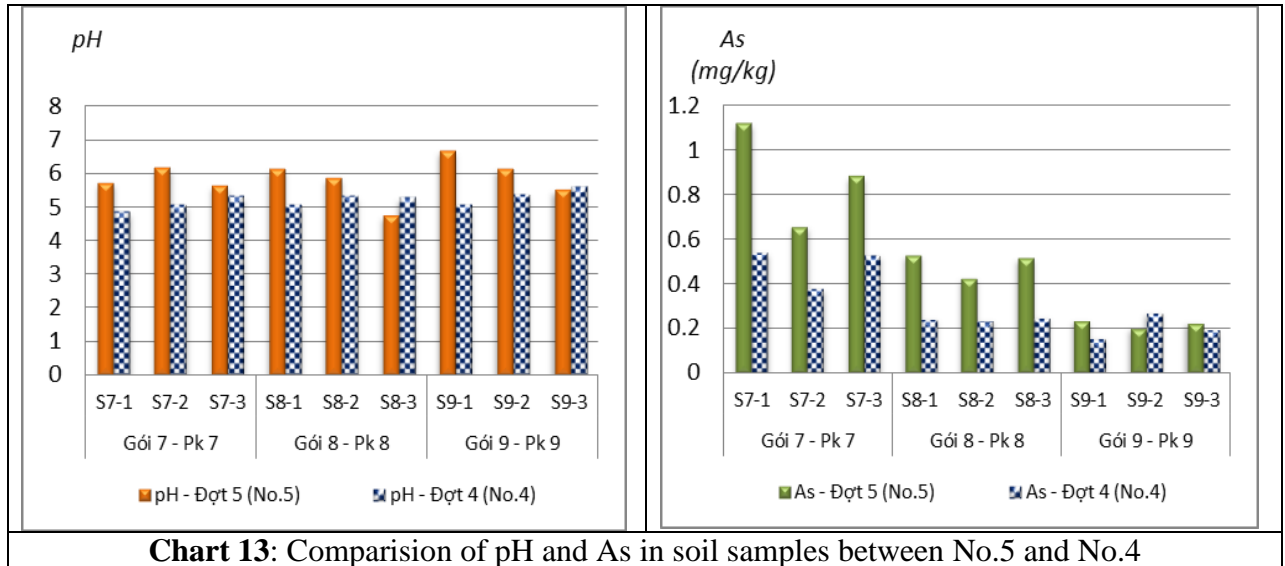
We just compare some of the key parameters which is a large variation observed during two series of monitoring. They are shown in the following table:

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




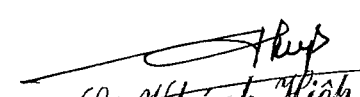
Mẫu số: EMW01

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) Accepted/	 Trần Quang Trần	 Đoàn Thị Chinh	 Lê Duy Trung	 Lê Khánh Thiệp

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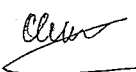


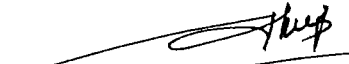
Project/ (Tên dự án): North-Southe Expressway Construction Project (Ho Chi Minh City - Dau Giay section); DA-XD đường cao tốc Bắc Nam (Đoạn TP HCM- Dầu Giây)

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 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	 Trần Quang Thiên	 Đoàn Thị Thủy	 Lê Duy Trung	 Lê Khánh Thiệp

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 Tân	Đoàn Thị Hằng	Cô Duyệt Trý	Trần Minh Quý

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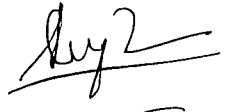

Project/ (Tên dự án): North-Southe Expressway Construction Project (Ho Chi Minh City - Dau Giay section); DA-XD đường cao tốc Bắc Nam (Đoan TP HCM- Dầu Giây)

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/ (Nghị quyết)				
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

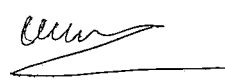
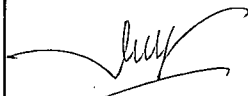

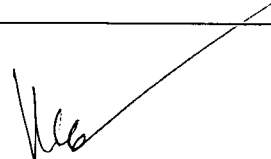
CHECKING EQUIPMENT AND PERSONAL AT SITE
(Biên bản kiểm tra máy móc thiết bị và nhân lực tại hiện trường)

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 Thủy	 Lê Duy Trung	

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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):.....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)				
Accepted	Trần Quang Truân	Đoàn Thị Chinh	Lê Duy Truân	

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 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

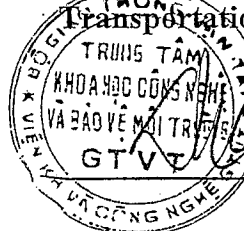
Monitored by

Nguyen Thanh Minh

Checked by

Phan Thi Nhat Hoa

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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: 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

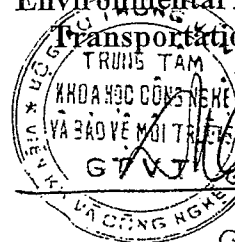
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RESULT OF AIR QUALITY MONITORING

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

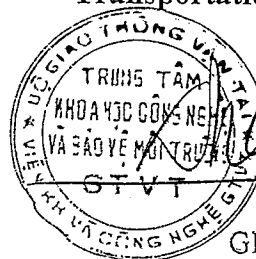
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Tran Dai Nghia

Checked by

Nguyễn Văn Chuan

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Đặng Thị Phương Nga



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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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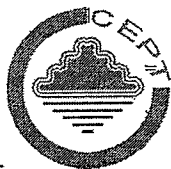
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No	Analysis criteria	Unit	Result analysis		QCVN 08:2008/BTNMT	
			SW8-1 MM14032415	SW8-2 MM14032416	Column A2	Column B1
13.	Cd	mg/l	NDT	NDT	0.005	0.01
14.	Cr ⁶⁺	mg/l	NDT	NDT	0.02	0.04
15.	Cu	mg/l	0,032	0,041	0.2	0.5
16.	Hg	mg/l	NDT	NDT	0.001	0.001
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

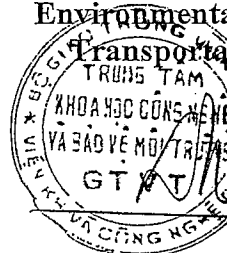
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RESULT OF GROUNDWATER MONITORING

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"
(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

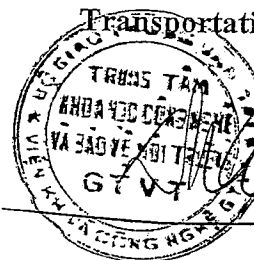
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RESULT OF SOIL MONITORING

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

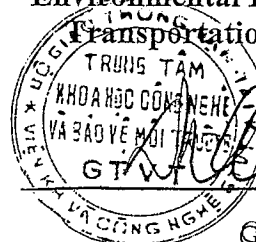
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RESULT OF NOISE MONITORING

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

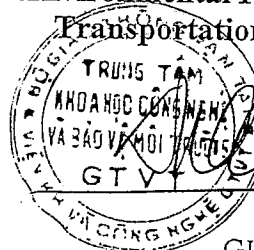
Monitored by

Nguyen Thanh Minh

Checked by

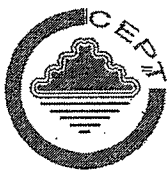
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RESULT OF VIBRATION MONITORING

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

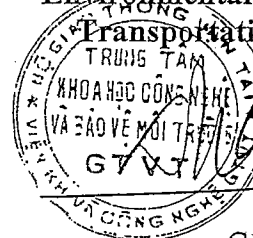
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Nguyen Thanh Minh

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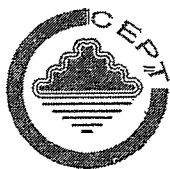
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RESULT OF AIR QUALITY MONITORING

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

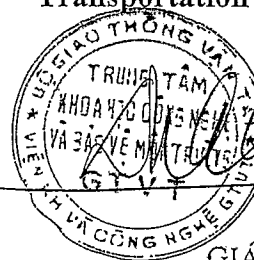
Monitored by

Tran Dai Nghia

Checked by

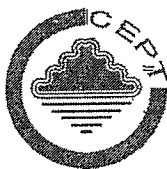
Nguyen Van Chuan

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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

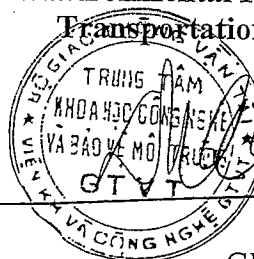
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Le Minh Hien

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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

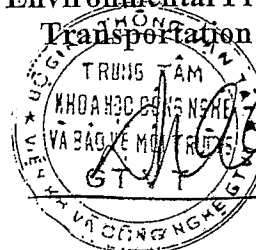
Monitored by

Le Minh Hien

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Phạm Thu Tia

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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

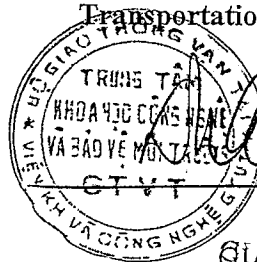
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RESULT OF SURFACE WATER MONITORING

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/BIENMT	
			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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Le Minh Hien

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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

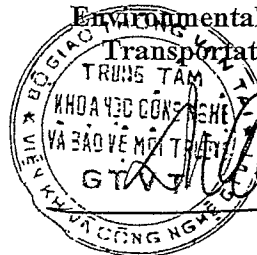
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Dương Thị Phương Nga



RESULT OF GROUNDWATER MONITORING

Name of project:

HO CHI MINH – LONG THANH – DAU GIAY EXPRESSWAY

Monitoring site:

Package 7 - AN PHU WARD, DISTRICT 2

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

Co-ordinate:

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

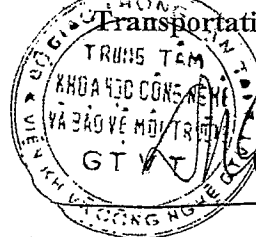
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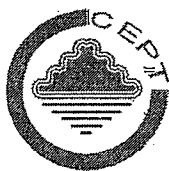
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RESULT OF SOIL MONITORING

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

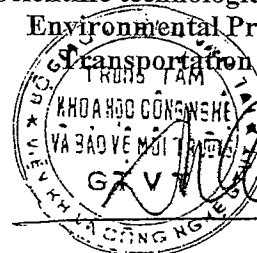
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RESULT OF NOISE MONITORING

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

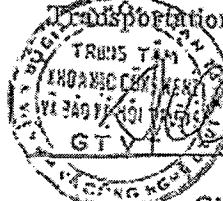
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RESULT OF VIBRATION MONITORING

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

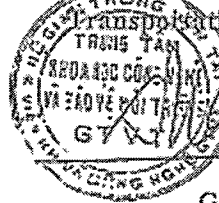
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RESULT OF VIBRATION MONITORING

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

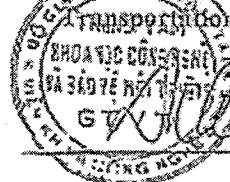
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RESULT OF VIBRATION MONITORING

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	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

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RESULT OF AIR QUALITY MONITORING

Name of project: HO CHI MINH - LONG THANH - DAU GLAY 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

