ENVIRONMENTAL IMPACT ASSESSMENT
(EIA)

SUB-PROJECT:
OVERHEAD LINE BAY EXTENSION AT QUANG NINH 500KV SUBSTATION AND HIEP HOA 500KV SUBSTATION

PREPARED BY
POWER ENGINEERING CONSULTING JOINT STOCK COMPANY 3

(FINAL VERSION)

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HCM city, March 2014
POWER ENGINEERING & CONSULTING JOINT STOCK COMPANY NO. 3

GENERAL DIRECTOR
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ABBREVIATIONS

BOD : Biochemical Oxygen Demand
COD : Chemical Oxygen Demand
DO  : Dissolved Oxygen
TL  : Transmission line
EIA : Environmental Impact Assessment
NTR : National Technical Regulation
PECC3: Power Engineering Consulting Joint Stock Company 3
FFC : Fatherland Front Committee
PC  : People’s Committee
WHO : World Health Organization
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SUMMARY OF EIA REPORT

1. General information of project

Project name: “Overhead Line Bay Extension at Quang Ninh 500kV Substation” belongs to the project “Overhead Line Bay Extension at Quang Ninh 500kV substation and Hiep Hoa 500kV substation”.

Project owner: Central Vietnam Power Project Management Board (CPMB)
- Director: Mr. Nguyen Duc Tuyen
- Address: 478, 2/9 St., Hai Chau Dist., Da Nang city
- Telephone: 0511.2220371 - 2220838     Fax: 0511.2220367

2. Main content of project

a. Location of project:

   Bay Extension part:
   Expanding the existing substation area with the extension area of 17,650m² (50m x 353m) to the east fence of the existing Quang Ninh 500kV substation, which is located in Thong Nhat commune, Hoanh Bo district, Quang Ninh province. The construction items will be made on the expansion area.

   500kV connection line part:
   All the 500 kV transmission line connecting to the Quang Ninh 500kV substation is going to be built in Thong Nhat commune, Hoanh Bo district, Quang Ninh province.

b. Project scale and items

Project scale and items include construction and installation as follows:

- **Extension area of the substation**
  - Extension area of the substation: 50m x 353m = 17,650m²;
  - Installing fully the first and second equipment for the 500kV overhead line bay;
  - Voltage level: 500kV.

- **500kV transmission line connecting to the substation**:
  - New 500kV transmission line: for connecting the bay extension at the Quang Ninh 500kV substation with the Quang Ninh – Thuong Tin 500kV transmission line.
    - Voltage level: 500kV;
    - Length: 280m;
    - No. of circuits: single.

  Transposing and connecting a part of 500kV transmission line: in order to avoid lines crossing between the Quang Ninh - Hiep Hoa 500kV transmission line and the Quang Ninh - Thuong Tin 500kV transmission line:
c. Implementation schedule

According to the Investment Project report implemented by PECC3 in February 2013, the project will be implemented and put into operation in the first quarter of 2015.

d. Total investment capital

According to the Investment Project report in December 2012, the total investment capital of the project is VND 29,248,115,000.

3. Project Environmental Impacts

a. Pre-construction Phase

- Clearance for survey.
- Land acquisition for construction.

<table>
<thead>
<tr>
<th>No.</th>
<th>Impact source</th>
<th>Impacted object</th>
<th>Impact</th>
<th>Impact level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Land acquisition to build bay at the Quang Ninh 500kV substation</td>
<td>Land of local people and a part of public land belonging to the commune</td>
<td>Land acquisition for bay construction at the Quang Ninh 500kV substation. Changing land-use purpose from agricultural/residential land to specialized land. Clearing trees within the bay extension area.</td>
<td>Permanent. The project owner committed to compensate fully for land and properties on land required for bay construction at the Quang Ninh 500kV substation.</td>
</tr>
<tr>
<td>2</td>
<td>Land acquisition for connection line construction</td>
<td>Land of local people</td>
<td>Land acquisition for foundation construction. Changing land-use purpose from agricultural/residential land to specialized land. Clearing trees within the foundation sites and the ROW of the connection line route.</td>
<td>Permanent and temporary. Land and properties on land required of local people will be compensated as stipulated.</td>
</tr>
</tbody>
</table>

b. Construction Phase

<table>
<thead>
<tr>
<th>No.</th>
<th>Impact source</th>
<th>Impact/Waste</th>
<th>Impact level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Air Environment</td>
<td>Noise, dust, exhaust gas</td>
<td>Low, localized</td>
</tr>
</tbody>
</table>
## No.

<table>
<thead>
<tr>
<th>Impact source</th>
<th>Impact/Waste</th>
<th>Impact level</th>
</tr>
</thead>
<tbody>
<tr>
<td>the construction sites</td>
<td>from the transportation vehicles and machines.</td>
<td>along the transport route.</td>
</tr>
<tr>
<td>b. Construction activities such as excavating, backfilling and concreting.</td>
<td>Dust, exhaust gas, vibration from the construction machines.</td>
<td>Low, localized effects on the substation and foundation sites.</td>
</tr>
<tr>
<td>2 Water Environment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Transportation activities on the construction sites</td>
<td>Leaked and waste oil discharged from the vehicles and machines was not treated.</td>
<td>Insignificant</td>
</tr>
<tr>
<td>b. Construction activities such as excavating, backfilling for preparation of the space and building foundations.</td>
<td>In the area having construction activities such as: earthworking, concreting, etc., rainwater can sweep soil, sand, stones, construction waste, etc., into the neighbouring ponds, lakes, streams and increase the turbidity, pollute the surface water, increase erosion capacity.</td>
<td>Low, localized effects on the construction sites.</td>
</tr>
<tr>
<td>c. Gathering a large number of workers for construction.</td>
<td>Amount of domestic waste water of construction workers is about 5m$^3$/day</td>
<td>Low level and under the criteria.</td>
</tr>
<tr>
<td>3 Soil Environment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gathering a large number of workers for construction.</td>
<td>Domestic waste of construction workers on sites if not collected and properly treated will cause aesthetic loss and be the risk of environmental pollution for land and water.</td>
<td>Insignificant</td>
</tr>
<tr>
<td>4 Other impacts</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Transport Activities</td>
<td>Local traffic</td>
<td>Increase traffic pressure and degrade the existing traffic road system.</td>
</tr>
<tr>
<td>b. Gathering a large number of workers for construction.</td>
<td>Culture, socio-economy in local</td>
<td>Increase risk of traffic accidents.</td>
</tr>
</tbody>
</table>
In summary, the impacts in the construction phase are generally small due to construction activities implemented in a short time and can be minimized by appropriate measures.

c. Operation phase

<table>
<thead>
<tr>
<th>No.</th>
<th>Impact source</th>
<th>Impacted object</th>
<th>Impact/Waste</th>
<th>Impact level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Electro magnetic field</td>
<td>Human health</td>
<td>Affect human health if it exceeds the acceptable criteria.</td>
<td>It is intermediate level and can be controlled.</td>
</tr>
<tr>
<td>2</td>
<td>Accidents</td>
<td>Operation workers and staffs and local people in the vicinity.</td>
<td>Working accident, fire hazard, electric interruption, etc.</td>
<td>It is intermediate level and can be mitigated.</td>
</tr>
</tbody>
</table>

During the operational phase, the project will not cause significant adverse impacts on the environment as well as not produce any waste that can cause an adverse effect on the environmental quality. Electromagnetic field problem has been concerned and overcome by design measures to minimize its impact on human health.

d. Environmental Incident

- Pre-construction and construction phases:
  - Fire hazards.
  - Working accidents.

- Operation phase:
  - Incidents of parting cables and short circuit.
  - Fire hazards.
  - Electrical accidents.
  - Working accidents.

4. Mitigation measures

a. Mitigation measures for impacts in the pre-construction phase

- Minimize the impacts due to compensation and ground clearance:
  - Compensation task for site clearance will be carried out in accordance with the current regulations and completed before construction.
  - Compensation for site clearance must also comply with the resettlement policy framework of TEP and resettlement plan of the subproject.
In addition to compensation, some allowances to be delivered to the affected people, such as: support for living rehabilitation, production stabilization and changing jobs, subsidies for the households supported by the government policy and the households having special difficult situations, support for reducing the value of land use.

b. Mitigation measures for impacts in the construction phase

- **Minimize impacts due to dust, exhaust gas:**
  - Using dedicated trucks to transport the equipment and materials.
  - Covering the material ground.
  - Covering materials during transportation.
  - Monitoring air environment in the construction sites.

- **Minimize noise and vibration**
  - Building fences around the tower foundation sites.
  - Construction activities should be performed during the daytime.
  - Providing ear protection equipment for workers working in high noise areas.

- **Minimize impact of waste water:**
  - Do not discharge solid waste and sludge to the water source.
  - Restrict rainwater overflowing into the area storing oil or machineries.
  - Arrange the material storage in the safe location.
  - Use the existing wastewater treatment system at the station.

- **Minimize impact of solid waste:**
  - Cement bags, barrels, wood, scrap metal waste are collected and sold scrap dealers.
  - Construction waste including brick, stone, sand, etc. will be reused for backfilling.
  - Domestic solid waste will be gathered in the collection ground. The project owner will contract with the Ha Long - Quang Ninh urban environment joint stock company to transport and treat hygienically domestic waste from the construction sites.

- **Minimize impact on local traffic**
  - Install enough notice boards at the suitable places according to the regulations.
  - Use scaffolds to stretch cables when crossing the roads.
  - Arrange works logically in order to avoid interruption of traffic, etc.
  - Trucks for material transportation should not load the equipment and materials overweight. For the machines or equipment oversized which need specialized trucks to avoid causing damage or subsidence for road surface.

- **Minimize impacts on the socio-economy**
  - Apply the working regulations at the construction site.
- Extremely use the number of local labourers for suitable works.
- Inform and coordinate with the local authorities to manage the administrative work of manpower for the project.

c. Minimize impacts in the operation phase

- Measures to avoid the electro-magnetic influence

In order to keep safety absolutely for local people and operation workers, the transmission lines have to be designed and operated exactly according to the government regulations on electricity safety.

- Manage ROW

  - Operation and management Organization (Power Transmission Company 1) implements the operation in accordance with the regulations. The related works include:
    - Checking the scope of ROW;
    - Checking, cutting trees or pruning branches of trees lying in the ROW (if they exceed the acceptable height) to guarantee the safety distance;
    - Checking the notice boards of safety distance in case the lines cross through the traffic roads.

d. Accidents during the construction phase

- Prevent and respond to fire incident:

  - Material storages are planned to have security fences;
  - Preparing available facilities, fire prevention and fire-fighting materials and response the methods in the case of fire incidents.

- Minimize working accident:

  - Absolutely comply with the safety regulations when transporting and installing the equipment;
  - Install warning signs at the necessary places;
  - Provide labor protection equipment for construction workers.

e. Accidents during the operation phase

- Prevent the depression of the structures, broken cables, falling towers

  - Frequently examine the quality of the structures to repair timely the depression incidents if any;
  - When cables are broken, automatic relays will disconnect switch and alarm system will inform, operation workers will come quickly to the scene to repair this problem.

- Minimize fire hazards:

  - Completely conform to the regulations on preventing and fighting fire;
  - Regularly propagandize, train workers and staffs in preventing and fighting fire.

- Reduce risk of shock:
- Install notice-board at places where voltage hazard is probable;
- Periodically examine, maintain the transmission line.

- Minimize working accidents:
  - Install warning signs at the necessary places
  - There are full-time staffs to inspect the implementation of safety regulations.

5. Environmental management, observation and monitoring program

- Environmental management program:
  - Training and capacity building about environmental management for operation workers and staffs;
  - Implement mitigation measures to prevent the contamination spreading into the environment.
  - Develop environmental reporting systems in the construction and operation phases corresponding to the levels.

- Environment observation and monitoring program:

**During the construction phase:**
- Project Management Board will contract with a specialized unit to perform environmental monitoring
  + Observed objects: air (02 samples), surface water (01 sample). Frequency of monitoring: 03 month/time
  + Other monitoring: Monitoring collection and disposal of oily waste and domestic solid waste, condition of hygiene and safety at the sites.
  + Monitoring cost: VND 15,000,000/year.

**During the operation phase:**
- Object for environment observing and monitoring
  + Observed objects: Electromagnetic field (02 samples), frequency of monitoring: 1 year/time and measurement of electromagnetic field if complaints.
  + Other monitoring: Monitoring collection and disposal of oily waste, condition of hygiene and domestic solid waste.
  + Monitoring cost: VND 8,000,000/year.
INTRODUCTION

1. BACKGROUND

1.1. Project Summary

The objective of the project is to meet the power transmission need and release the capacity of the thermal power plants in the North East region to the national power system for meeting growing load demand of the Northern region as well as the country.

The project “Overhead Line Bay Extension at Quang Ninh 500kV substation”, which belongs to the project of “Overhead Line Bay Extension at Quang Ninh 500kV substation and Hiep Hoa 500kV substation”, is designed and built to meet the above demands, to ensure the reliability of the power source, and to meet growing load demand of the Northern region, as prerequisite to promote socio-economic development of the country.

The location of the bay extension at the Quang Ninh 500kV substation and the transmission line route belonging to the project was approved by the document No.1407/UBND-QH3 dated March 28th, 2013 of the People's Committee of Quang Ninh province.

Pursuant to the Environmental Protection Law and Decree No.29/2011/ND-CP dated April 18th, 2011 providing on strategic environmental assessment, environmental impact assessment, and environmental protection commitment, the project "Overhead Line Bay Extension at Quang Ninh and Hiep Hoa 500kV substations" has a voltage level of 500 kV belonging to the group of projects that must prepare an environmental impact assessment (EIA) report. The draft EIA report has submitted to the People's Committee of Quang Ninh province for appraisal and approval.

1.2. Authorized Organization and Institution with Responsibility for Investment Project Approval

The Report of the investment project “Overhead Line Bay Extension at Quang Ninh 500kV substation" will be appraised and approved by the Central Power Project Management Board.

1.3. Relation Between the Project and the Master Development Plan

The Project "Overhead Line Bay Extension at Quang Ninh 500kV substation" is entirely consistent with the National Power Master Development Plan (NPMDP) under Decision No.1208/QD-TTg dated July 21st, 2011 of the Prime Minister for the NPMDP from 2011 to 2020 with consideration to 2030.

The relevant projects are as follows:

- The section of transmission line connecting to the bay extension from the Quang Ninh - Hiep Hoa 500kV transmission line is under construction and is expected to put into operation by 2014.

- The extension part of the project is adjacent to the existing Quang Ninh 500kV substation, which has been operated since 2010.

Both projects "Overhead Line Bay Extension at Quang Ninh 500kV substation" and "Quang Ninh - Hiep Hoa 500kV transmission line" are financed by the World Bank, and thus, the implementation of these projects have to comply with the relevant
environmental and social safeguard policies of the World Bank. In addition, there have not been any new projects for 2 years in the project areas.

2. **LEGAL AND TECHNICAL BASIS OF IMPLEMENTATION OF ENVIRONMENTAL IMPACT ASSESSMENT**

2.1. **Legal basis and technical document**

- Environmental Protection Law of the Socialist Republic of Vietnam No.52/2005/QH11 dated November 29th, 2005 passed by the National Assembly;
- Electricity Law No. 28/2004/QH11 approved on December 03rd, 2004 by the National Assembly of the Socialist Republic of Vietnam;
- Land Law No.13/2003/QH11 dated November 26th, 2003 passed by the National Assembly of the Socialist Republic of Vietnam;
- Construction Law No.16/2003/QH11 dated November 26th, 2003 approved by the National Assembly of the Socialist Republic of Vietnam;
- Decree No.106/2005/ND-CP dated August 17th, 2005 of the Government on detailed regulations and guidelines for implementation of some articles of Electricity Law on safety protection of high-voltage power grid;
- Decree No.80/2006/ND-CP dated August 9th, 2006 of the Government on detailed guidelines about some articles of the Environmental Protection Law;
- Decree No.81/2007/ND-CP dated May 23rd, 2007 of the Government regulating professional organizations and departments on environmental protection in state authorities and state enterprise;
- Decree No.21/2008/ND-CP dated February 28th, 2008 of the Government on amending and supplementing a number of articles of Decree No.80/2006/ND-CP dated August 09th, 2006 of the Government on detailed regulations and guiding the implementation of some articles of the Environmental Protection Law;
- Decree No.29/2011/ND-CP of the Government dated April 18th, 2011 on strategic environmental assessment, EIA, environmental protection commitments;
- Circular No.16/2009/TT-BTNMT of the Ministry of Natural Resources and Environment dated October 07th, 2009 issues the national technical regulations on the environment protection;
+ Circular No.25/2009/TT-BTNMT of the Ministry of Natural Resources and Environment dated November 16th, 2009 promulgating the national technical regulations on the environment protection;

+ Circular No.03/2010/TT-BCT dated January 22nd, 2010 of the Ministry of Industry and Trade stipulates some contents on safety protection of high-voltage power grid;

+ Circular No.39/2010/TT-BTNMT of the Ministry of Natural Resources and Environment dated December 16th, 2010 issues the national technical regulation on the environment protection;

+ Circular No.12/2011/TT-BTNMT Circular April 14th, 2011 of the Ministry of Natural Resources and Environment on hazardous waste management;


+ Circular No.47/2011/TT-BTNMT issued on December 28th, 2011 of the Ministry of Natural Resources and Environment issues the national technical regulation on the environment protection;

+ Decision No.04/2008/QD-BTNMT of the Ministry of Natural Resources and Environment dated July 18th, 2008 promulgates the national technical regulation on the environment;

+ Decision No.54/2008/QD-BCT of the Ministry of Industry and Trade dated December 30th, 2008 promulgating the national technical standards of electrical engineering;

+ Decision No.16/2008/QD-BTNMT of the Ministry of Natural Resources and Environment dated December 31st, 2008 promulgating the national technical regulation on the environment;

The safeguard policies of the WB applied to the project include:

**World Bank Safeguard Policies**

An environmental and social screening of the subproject was undertaken in line with the OP 4.01 and it showed that the World Bank’s policies on Environmental Assessment (OP/BP 4.01) and Involuntary Resettlement (OP/BP 4.12) will be triggered for the subproject. The screening has also resulted in categorizing the subproject as a Category B project. In addition, the Bank’s requirements on public consultation and information disclosure will need to be followed.

*Environmental Assessment (OP/BP 4.01):*

Environmental Assessment (EA) is an umbrella policy for the Bank’s safeguard policies. The overarching objective is to ensure that Bank-financed projects are environmentally sound and sustainable, and that decision-making is improved through appropriate analysis of actions and of their likely environmental impacts. The EA process is intended to identify, avoid and mitigate potential impacts of Bank operations. EA takes into account the natural environment (air, water, and land); human health and safety; social aspects (involuntary resettlement, indigenous peoples, and physical cultural resources); and
transboundary and global environmental aspects. EA considers natural and social aspects in an integrated way.

This subproject triggers OP 4.01 because it involves the construction and operation activities related to the expansion of the overhead line bays at the two 500kV substations, requiring the identification, mitigation and monitoring of potential adverse environmental and social impacts. As required by OP 4.01, the subproject prepared an EIA and an EMP that meet the Government’s and the World Bank’s safeguards requirements. By the TEP appraisal, the subproject draft EIA and EMP were disclosed locally on January 15, 2014 at the subproject area and at the InfoShop of the World Bank in Washington DC on January 24, 2014 as required by OP 4.01 and the Bank’s policy on access to information. The final subproject final EIA and EMP were disclosed locally at the subproject sites, at the Bank’s InfoShop, and the Vietnam Development Information Center on April 18, 2014.

**Physical Cultural Resources (OP/BP 4.11):**

This policy is triggered because the subproject involves the relocation of a grave located at the substation expansion site belonging to Thong Nhat commune. Mitigation measures for the relocation of the grave was included in the Resettlement Plan (RP) and EMP.

**Involuntary Resettlement (OP/BP 4.12)**

The Involuntary Resettlement policy seeks to prevent severe long-term hardship, impoverishment, and environmental damage to the affected peoples during involuntary resettlement. OP 4.12 applies whether or not affected persons must move to another location. The Bank describes all these processes and outcomes as “involuntary resettlement,” or simply resettlement, even when people are not forced to move. Resettlement is involuntary when the government has the right to expropriate land or other assets and when affected people do not have the option to retain the livelihood situation that they have.

This policy is triggered because the subproject would have impacts involving the temporary and permanent involuntary taking of land and the loss of structures and assets associated with the land for the construction of the substation and the associated connecting line. By appraisal, the subproject has prepared and disclosed the draft Resettlement Plan (RP) locally on January 15, 2014 at the subproject area and at the InfoShop of the World Bank in Washington DC on January 24, 2014. The RP includes the measures to ensure that the displaced people are: (i) informed about the options regarding resettlement; (ii) consulted and offered alternative resettlement choices; and (iii) provided with effective compensation and livelihood restoration. The final subproject final RP was disclosed locally at the subproject sites, at the Bank’s InfoShop, and the Vietnam Development Information Center on April 18, 2014.

**World Bank Group Environmental, Health, and Safety Guidelines**

World Bank-financed projects should also take into account the World Bank Group Environmental, Health, and Safety Guidelines¹ (known as the "EHS Guidelines"). The EHS Guidelines are technical reference documents with general and industry-specific examples of Good International Industry Practice.

The EHS Guidelines contain the performance levels and measures that are normally acceptable to the World Bank Group and are generally considered to be achievable in new facilities at reasonable costs by existing technology. The environmental assessment process may recommend alternative (higher or lower) levels or measures, which, if acceptable to the

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¹ The EHS Guidelines can be consulted at [www.ifc.org/ifcext/enviro.nsf/Content/EnvironmentalGuidelines](http://www.ifc.org/ifcext/enviro.nsf/Content/EnvironmentalGuidelines).
World Bank, become project- or site-specific requirements. This subproject should conform the Environmental, Health, and Safety Guidelines for Electric Power Transmission and Distribution and the General EHS Guidelines.

The project has been screened for environmental and social issues and classified as Environmental Category B.

2.2. Related legal document

- Decision No.1208/QD-TTg dated July 21st, 2011 of the Prime Minister on approving the National Power Master Development Plan (NPMDP) from 2011 to 2020 with consideration to 2030.
- Decision No.0905/QD-NPT dated September 26th, 2011 of the National Power Transmission Corporation on approving - Total Cost Estimation in technical design stage of project "Installation of the 2nd transformer at the Quang Ninh 500kV substation".
- Decision No.1243/QD-NPT dated October 24th, 2012 of National Power Transmission Corporation on approving the Investment Project Adjustment and Total Cost Estimation in technical design stage of the project "Quang Ninh - Mong Duong 500kV transmission line".
- Document No.1407/UBND-QH3 dated March 28th, 2013 of the People's Committee of Quang Ninh province on the bay extension at the Quang Ninh 500kV substation and building 500kV transmission line to connect to the station at Thong Nhat commune, Hoanh Bo district.
- Document No.98/UBND-KTHT dated October 26th, 2012 of Hoanh Bo district People's Committee on expanding bay at the Quang Ninh 500kV substation and building 500kV transmission line to connect to the station at Thong Nhat commune, Hoanh Bo district.
- Contract signed between the Central Vietnam Power Project Management Board and PECC3.

2.3. Standards and regulations applied

- QCVN 08:2008 BTNMT - National technical regulation on surface water quality;
- QCVN 09:2008 BTNMT - National Technical Regulation on groundwater quality;
- QCVN 14:2008 BTNMT - National technical regulation on domestic wastewater;
- QCVN 02:2009 BYT - National Technical Regulation on water quality;
- QCVN 05:2009 BTNMT - National Technical Regulation on air quality;
- QCVN 07:2009 BTNMT - National Technical Regulation on hazardous waste threshold;
- QCVN 26:2010 BTNMT - National Technical Regulation on noise;
+ QCVN 27:2010/ BTNMT - National Technical Regulation on vibration;
+ QCVN: QTD-5:2009/BCT - National Technical Regulation on electrical engineering- Inspection of equipment of electrical system;
+ QCVN: QTD-6:2009/BCT - National Technical Regulation on electrical engineering- Operation and repair of equipment of electrical system;
+ QCVN: QTD-7:2009/BCT - National Technical Regulation on electrical engineering - Construction of power projects;
+ QCVN: QTD-8:2010/BCT - National Technical Regulation on electrical engineering - low-pressure electrical engineering;
+ Industry standards of "Allowed level of electric field intensity with industrial frequency in the workplace" were issued together with Decision No.183NL/KHKT of the Ministry of Energy dated April 12th, 1994.

2.4. Source established by the project owner
- Topographical, Geological Survey Report of the project "Overhead Line Bay Extension at Quang Ninh and Hiep Hoa 500kV substations" was made by PECC3 in December 2012;
- Report of Construction Investment Project of "Overhead Line Bay Extension at Quang Ninh and Hiep Hoa 500kV substations" was made by PECC3 in December, 2012;
- Results of environmental measurement in December, 2012 were implemented by FPD Analysis Center, Quang Ninh province.

3. APPLICATION METHODS IN EIA PROCESS

The implementation content and steps in this EIA report were done in compliance with the guidance of Decree No. 29/2011/ND-CP of the Government dated April 18th, 2011 and Circular No.26/2011/TT-BTNMT dated July 18th, 2011 of the Ministry of Natural Resources and Environment.

Research on EIA of the project based on the following techniques:
- **Method of field survey**
  Field survey for collecting environmental samples and data, observing the natural environmental state and social and economic situation.
- **Laboratory Method**
  Analysing quality of the environmental samples collected as a basis for assessing the current environmental state
- **Comparison method**
  + Based on the survey results, measured data in the sites, analysed results in laboratory and calculation results based on the theoretics, comparing them with Vietnam regulations and standards to determine environmental quality in the construction area of the project.
- **Statistical Methods**
  Using the statistical methods in collection and processing of monitoring data in
the natural conditions, data of sociology survey in interviewing process of local authorities and local people.

- **Map method**
  Using maps to determine location, scope and level of influence of the project.

- **Rapid assessment method**
  Rapid assessment method suggested by the World Health Organization (WHO) are applied to the following cases:
  + Assessing amount of pollution in exhaust gas and wastewater in the project area;
  + Assessing the effectiveness of pollution control measures.

4. **ARRANGEMENT OF EIA IMPLEMENTATION**

**Project owner:** Central Vietnam Power Project Management Board leading in implementing the EIA report (Director: Mr. Nguyen Duc Tuyen)

**Consulting agency:** Power Engineering and Consulting Joint Stock Company 3 (PECC3) - (General Director: Mr. Thai Tuan Tai. Address: 32 Ngo Thoi Nhiem St., District 3, HCMC, Tel: 08.2221.0801, Fax: 08.2221.0758 - Environment Department).

With the participation of Center of Analysis FPD, Quang Ninh Province (Director: Mr. Nguyen Anh Tuan. Address: 25, Hai Truong, Hong Hai Ward, Ha Long City, Quang Ninh Province).

With the help of:
- People's Committee of Thong Nhat commune, Hoang Bo District, Quang Ninh Province;
- People's Committee of Dai Thanh commune, Hiep Hoa district, Bac Giang province.

**Members directly involved in the EIA report:**
- **Project Owner:** Mr. Nguyen Duc Tuyen - Director of Central Power Project Management Board;
- **Main Consultants:**
  + Duong Thi Thanh Truc - Hydraulic and Information Technology engineer, Head of Information Technology and Environment Department, PECC3;
  + Do Trung Kien - Master of Environment, Deputy of Information Technology and Environment Department, PECC3;
  + Tran Thai Son - Environmental Engineer, PECC3;
  + Tran Hung Liet - Electrical Engineer, Project Manager, PECC3;
- **Secondary Consultant:**
  + Nguyen Anh Tuan - Bachelor of Biology, Director of Center for Analysis FPD, Quang Ninh Province.
CHAPTER 1

PROJECT DESCRIPTION

1.1 PROJECT NAME

Overhead Line Bay Extension at Quang Ninh 500kV substation belongs to "Overhead Line Bay Extension at Quang Ninh 500kV substation and Hiep Hoa 500kV substation" project

1.2 PROJECT OWNER

Project owner : Central Vietnam Power Project Management Board
Director : Mr. Nguyen Duc Tuyen
Address : 478 2/9 St. - Hai Chau Dist. - Da Nang city
Telephone : 0511.2220371 - 2220838
Fax : 0511.2.220367

1.3 GEOGRAPHICAL LOCATION OF THE PROJECT

Because expanding area of the bay extension project was calculated and pre-planned in the previous substation construction phase so it is not necessary to evaluate alternatives in this stage.

Overhead Line Bay Extension at Quang Ninh 500kV substation:

The existing Quang Ninh 500kV substation, which will be expanded with the extension area of 17,650m$^2$ (50m x 353m) to the east fence of the station, is located in Thong Nhat commune, Hoanh Bo district, Quang Ninh province. Now, its surrounding area is vacant land or land planting mixed trees, this place is managed by the administration of Thong Nhat commune. The distance from the project to the resident area is about 1-2km.

The geographical location of the bay extension area at the Quang Ninh 500kV substation as follows:

- To the east: adjacent to vacant land or land having mixed trees of Thong Nhat commune
- To the west: connecting with land having mixed trees of Thong Nhat commune and about 500m from Provincial road 337;
- To the south: bordering with vacant land of Thong Nhat commune
- To the north: adjacent to land planting mixed trees of commune and about 500m from Provincial road 326.

Section of 500kV transmission line connecting to the station

The whole route of 500kV transmission line connecting to the station is planned to build in Thong Nhat commune, Hoanh Bo district, Quang Ninh province.

- Starting point: 500kV busbar of extension bay at the Quang Ninh 500kV
End point: The location of new tower 02M in between two towers 01-02 of the Quang Ninh - Thuong Tin 500kV transmission line.

The 500kV connection line of the project is adjacent to the country roads, and about 10km from Ha Long city along Highway No.337 to the south. The connection line position is about 1km from the Quang Viet 1 breeding pig farm, 5km from the quarry of Thang Long coalfield plant to the west along Highway No.326 and about 3km from the nearest resident area.

Coordinates of angle positions of connection line of the project are as follows:

<table>
<thead>
<tr>
<th>No.</th>
<th>Angle</th>
<th>Coordinate</th>
<th>Elevation h(m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>T02</td>
<td>2327630.81</td>
<td>434853.26</td>
</tr>
<tr>
<td>2</td>
<td>T02M</td>
<td>2327619.04</td>
<td>434955.06</td>
</tr>
<tr>
<td>3</td>
<td>T01M</td>
<td>2327565.71</td>
<td>435119.24</td>
</tr>
</tbody>
</table>

This position was approved by the People's Committee of Quang Ninh province in Document No.1407/UBND-QH3 dated March 28th, 2013 (Negotiation Document about location of station and transmission line route is attached in Appendix 1 of the report). The geographical location of the project is presented in Figure 1.1.

![Map of Quang Ninh province showing the location of the overhead line bay extension at the Quang Ninh 500kV substation.](image)

Figure 1: Location of overhead line bay extension at the Quang Ninh 500kV substation, Quang Ninh province.
Figure 1.2 Extension plan and transmission line route at the Quang Ninh 500kV substation
1.4 THE SITUATION OF THE EXISTING QUANG NINH 500KV SUBSTATION

The Quang Ninh 500kV substation has been put into operation since 2010 in Thong Nhat commune, Hoang Bo district, Quang Ninh province, with a capacity scale consisting of two 500/220kV transformers and one 220/110kV transformer as follows:

- Transformer 500kV AT1, AT2: 500/225/35kv-150/150/50MVA.
- Transformer 220kV AT3: 220/110/22kV-125/125/40MVA.

a. Main equipment at the existing 500kV substation:

- **Mains transformer AT:**
  + Manufacturer : ZTR/Ukraine
  + Voltage : 500±8 x 1.25%/225/35 kV
  + Capacity : 150/150/50MVA

- **Circuit breaker 500kV:**
  + Code 3AP3FI-2/Siemen/Germany; 550kV - 4000A - 63kA/3s.

- **Disconnector 500kV:**
  + Code OH/Coelme; 550kV - 2000A - 40kA/3s.

- **Voltage transformer 500kV:**
  + Code TEMP-500IUH/TRENCH - CHINA; transformation ratio 500000:®/110;®/110:® kV; class of accuracy CL0.5/3P; Capacity 100/100VA

- **Current transformer 500kV:**
  + Code IOSK-550/TRENCH- CHINA; transformation ratio 800-1200-2000/1-1-1-1-1A; class of accuracy CL 0.5/5P20/5P20/5P20/5P20/5P20; Capacity 30/30/30/30/30VA.
  + Code IOSK-550/TRENCH- CHINA; transformation ratio 800-1200-2000/1-1-1-1-1A; class of accuracy CL 0.5/5P20/5P20/5P20/5P20/5P20; Capacity 30/30/30/30/30/30VA.

- **Lightning arrester 500kV:**
  + Code 3EP3 420-4PH53-2CA1/SIEMENS; 420kV – 20kA, continuous voltage 336kV.

b. Relay system for protection, control and measurement

The existing Quang Ninh 500kV substation was equipped integrated control system using SICAM PAS supplied by SIEMENS.

c. Protection system:

Protection relay system for the Quang Ninh 500kV substation mainly uses protection relays of SIEMENS such as 7SD522 (F87L), 7SA522 (F21), 7UT635 (F87T), 7SJ64 (F67), REG-D (F90), etc.

d. Insulators, lightning arrester, ground line

Insulators: include ceramic insulator (tower insulator) and glass ceramic (string
insulator) chosen according to the heavy pollution level (31mm/kV).

e. Auxiliary electrical system

*Auxiliary AC* at the Quang Ninh 500kV substation obtains from auxiliary transformers 35/0.4kV-560kVA and 22/0.4kV-560kVA. Auxiliary transformer 35/0.4kV connected with 35kV winding of transformer 500kV (AT2), auxiliary transformer 22/0.4kV connected with 22kV winding of transformer 220kV (AT3).

f. Preventing and fighting fire

- Fire Alarm Cabinet is located in the control room. At each 500kV transformer, a 500kV reactor is equipped with alarm system by heat sensors, buttons, horns or bells. When the temperature increases, a signal will transmit to the central box and put to solenoid valve and alarm systems. Besides, the control room is also equipped with CO₂ fire hydrant, foam fire-extinguisher.
- Transformer 500kV, transformer 220kV, reactor 500kV are unburned by water and mist sprinkler system fixed around the machines.
- Firefighting water pipeline system of Ø150 steel is put underground when crossing the roads and is put on the ground in the remaining positions in the substation.
- Water supply source for firefighting is exploited from φ150 galvanized steel pipe taking water from the stream to two digging wells with 2.5m diameter, 15m depth. Water for fire preventing and fighting is directly pumped from these wells to two tanks with volume of 2 x 100 m³.
- Pump station for firefighting includes two pumps: One main pump using electricity with capacity Q = 170 m³/h, pump head H = 90 m; one pump using diesel for provision with capacity Q = 170 m³/h, pump head H = 90m; and pressure compensation pump with capacity Q = 5 m³/h, pump head H = 100 m.
1.5 MAJOR CONTENT OF THE PROJECT

1.5.1 Project Objectives

The project "Overhead Line Bay Extension at Quang Ninh 500kV substation" is built for the following objectives:

- Meeting the transmission need, releasing capacity of the thermal power plants in the North East region to the national power system to meet load growing demand of the Northern region as well as the country.
- Improving the reliability, flexibility, security of power supply, the quality of electricity to the regional network, and ensuring safe and reliable operation in normal and incidental circumstances.
- Ensuring energy security and contributing to meeting the growing northern region load, being as prerequisite to promote socio-economic development of the country.
- Providing for thermal power source development in the phase after 2020.

1.5.2 Quantities and Scale of the project items

1.5.2.1 The project main items

- **Bay Extension at Quang Ninh 500kV substation:**

  *Scale:*
  
  - Extension area of substation: 50m x 353m = 17,650m²
  
  - Expanding 3/2 block, installing 2 circuit breakers, equipment installed for 500kV overhead line bay extension (B11) in this phase (including circuit breakers, disconnecting switches, current transformers, voltage transformers, tower insulators, surge arresters) in the extension area.
  
  - Transposing the existing line to connect with new extension bay (B11). Using the B02 bay to connect with Hiep Hoa 500kV transmission line (2nd circuit);
  
  - Installation of 500kV reactor, neutral reactor and switchgears at bay B02 (used for connecting with Hiep Hoa 500kV transmission line (2nd circuit));
- System of control - measurement - automatic and protection devices, SCADA system and disconnecting transmission for new bay (B11) simultaneously installed in the project "Quang Ninh - Mong Duong 500kV transmission line".

**Main connection diagram of 500kV distribution system:**
- Expanding 3/2 block and connecting according to the existing 3/2 scheme of the substation.

**Technology Solution at Quang Ninh 500kV substation:**
In this phase, expanding 500kV overhead line bay with 2 circuit breakers (according to the 3/2 block) and connecting with the existing 3/2 scheme of the substation.

Connection diagram of 500kV distribution system will not change and use the existing 3/2 scheme.

Thus, after the related projects with Quang Ninh 500kV substation and bay extension completed and put into operation, 500kV distribution system of the substation will include 11 bays as follows:
- 02 feeders to Thuong Tin (B11, B01)
- 02 feeders to Hiep Hoa (B02, B03)
- 02 feeders to Mong Duong thermal power plant (B04, B05)
- 01 feeder to Quang Ninh 1 thermal power plant (B08).
- 02 feeders to Quang Ninh 2 thermal power plant (B06, B07).
- 01 feeder of transformer AT1 (B09).
- 01 feeder of transformer AT2 (B10).

**Main technical parameters:**

<table>
<thead>
<tr>
<th>Technical parameter</th>
<th>500kV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal voltage</td>
<td>500kV</td>
</tr>
<tr>
<td>Standard voltage of the device</td>
<td>550kV</td>
</tr>
<tr>
<td>3-phase short circuit</td>
<td>50kA/3sec</td>
</tr>
<tr>
<td>Lightning impulse insulation level</td>
<td>1.550kV</td>
</tr>
<tr>
<td>Manipulation impulse insulation level</td>
<td>1.175kV</td>
</tr>
<tr>
<td>Industrial frequency insulation level</td>
<td>680kV</td>
</tr>
<tr>
<td>The minimum electrical leakage length on insulation</td>
<td>31mm/kV</td>
</tr>
</tbody>
</table>

**System of control, measurement and protection:**
Pursuant to the Decision No.1243/QD-NPT dated October 24th, 2012 of National Power Transmission Corporation approving report of "Investment Project Adjustment and Technical Design - Total Cost Estimation" of the project "Quang Ninh - Mong Duong 500kV transmission line", which has equipped system of control and protection, SCADA system for bay extension in this stage (compartment B11) as follows:
- Installing devices for measuring, control, automatic protection for bay of 500kV transmission line and reactor simultaneously with the existing integrated control system.

- Switchgears, disconnector, grounding switch are controlled in place (by keys) and remote (via HMI) and located in the control room. The control system of circuit breakers, disconnector and grounding switch has enough interlock circuits (hardware and software).

- Protection relays using digital processors have full functions under the current regulations, which are supported by the IEC 61850 communication protocol that allows the system to connect to the existing integrated control system and SCADA/EMS.

**Protection against overvoltage and lightning stroke:**

- In this phase, installing lightning arresters to prevent the spread of lightning to bay extension.

**Grounding system:**

- In this stage, supplementing grounding net at the extension area, setting grounding for new installed equipment with grounding net and connecting with the existing grounding system.

**Lighting system:**

- Providing lighting system for bay extension.

**Communications systems and SCADA**

- Optical Information and SCADA: Use existing information systems, disconnecting transmission for new installed instruments.

- Information system using devices including line trap, connection filter, support or hanger and connection cable: Using existing equipment, relocating high frequency coil from B02 to B01 to reset the existing information system on the Quang Ninh - Thuong Tin 500kV transmission line (1st circuit).

- **Sections of 500kV transmission line connecting with the Quang Ninh 500kV substation:**

  **Scope:**

  - Section 1: building new 500kV transmission line connecting the first circuit of the Quang Ninh - Thuong Tin 500kV transmission line with the Quang Ninh 500kV substation:

<table>
<thead>
<tr>
<th>No.</th>
<th>ITEMS</th>
<th>PARAMETER</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Voltage level</td>
<td>500 kV</td>
</tr>
<tr>
<td>2</td>
<td>Number of circuits</td>
<td>01 (new)</td>
</tr>
<tr>
<td>3</td>
<td>Starting point</td>
<td>Busbar 500kV of the 500kV bay extension at the Quang Ninh 500kV substation (belongs to the project)</td>
</tr>
<tr>
<td>4</td>
<td>End point</td>
<td>New tower 02M-1 (lying between two towers 01-02 of the existing Quang Ninh – Thuong Tin 500kV</td>
</tr>
</tbody>
</table>
### Section 2: Transposing the Second Circuit of the Quang Ninh - Thuong Tin 500kV Transmission Line Connecting with the Quang Ninh 500kV Substation

<table>
<thead>
<tr>
<th>No.</th>
<th>ITEMS</th>
<th>PARAMETER</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Voltage level</td>
<td>500 kV</td>
</tr>
<tr>
<td>2</td>
<td>Number of circuits</td>
<td>01 (Only implementing for hanging cables)</td>
</tr>
<tr>
<td>3</td>
<td>Starting point</td>
<td>Tower 01-1 of the existing Quang Ninh - Thuong Tin 500kV transmission line</td>
</tr>
<tr>
<td>4</td>
<td>End point</td>
<td>New tower 02M-2 ((lying between two towers 01-02 of the existing Quang Ninh – Thuong Tin 500kV transmission line, far from tower 02 about 102m)</td>
</tr>
<tr>
<td>5</td>
<td>Length of the line</td>
<td>212m</td>
</tr>
<tr>
<td>6</td>
<td>Conductor</td>
<td>Aluminium conductor steel -reinforced, dividing phases 4xACSR330/42</td>
</tr>
<tr>
<td>7</td>
<td>Lightning conductor</td>
<td>Aluminium alloy conductor steel -reinforced PHLOX-147</td>
</tr>
<tr>
<td>8</td>
<td>Insulator</td>
<td>Glass or ceramic</td>
</tr>
<tr>
<td>9</td>
<td>Tower</td>
<td>Existing (was built in &quot;section 1&quot;)</td>
</tr>
<tr>
<td>10</td>
<td>Foundation</td>
<td>Existing (was built in &quot;section 1&quot;)</td>
</tr>
<tr>
<td>11</td>
<td>Ground line</td>
<td>Existing (was built in &quot;section 1&quot;)</td>
</tr>
</tbody>
</table>

### Section 3: Transposing the First Circuit of the Quang Ninh - Hiep Hoa 500kV Transmission Line Connecting with the Quang Ninh 500kV Substation

<table>
<thead>
<tr>
<th>No.</th>
<th>ITEMS</th>
<th>PARAMETER</th>
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<tr>
<td>1</td>
<td>Voltage level</td>
<td>500 kV</td>
</tr>
<tr>
<td>2</td>
<td>Number of circuits</td>
<td>01 (Only implementing for hanging cables)</td>
</tr>
<tr>
<td>3</td>
<td>Starting point</td>
<td>Tower 01-1 of the existing Quang Ninh - Hiep Hoa 500kV transmission line</td>
</tr>
<tr>
<td>4</td>
<td>End point</td>
<td>New tower 02M-2 ((lying between two towers 01-02 of the existing Quang Ninh – Hiep Hoa 500kV transmission line, far from tower 02 about 102m)</td>
</tr>
<tr>
<td>5</td>
<td>Length of the line</td>
<td>212m</td>
</tr>
<tr>
<td>6</td>
<td>Conductor</td>
<td>Aluminium conductor steel -reinforced, dividing phases 4xACSR330/42</td>
</tr>
<tr>
<td>7</td>
<td>Lightning conductor</td>
<td>Aluminium alloy conductor steel -reinforced PHLOX-147</td>
</tr>
<tr>
<td>8</td>
<td>Insulator</td>
<td>Glass or ceramic</td>
</tr>
<tr>
<td>9</td>
<td>Tower</td>
<td>Existing (was built in &quot;section 1&quot;)</td>
</tr>
<tr>
<td>10</td>
<td>Foundation</td>
<td>Existing (was built in &quot;section 1&quot;)</td>
</tr>
<tr>
<td>11</td>
<td>Ground line</td>
<td>Existing (was built in &quot;section 1&quot;)</td>
</tr>
</tbody>
</table>
Overhead Line Bay Extension at Quang Ninh 500kV substation EIA
Investment Project

Chapter 1 – Project Description

<table>
<thead>
<tr>
<th>No.</th>
<th>ITEMS</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Voltage level</td>
<td>500 kV</td>
</tr>
<tr>
<td>2</td>
<td>Number of circuits</td>
<td>01 (Only implementing for hanging cables)</td>
</tr>
<tr>
<td>3</td>
<td>Starting point</td>
<td>Busbar 500kV of Thuong Tin 500kV bay(2nd circuit) at the existing Quang Ninh 500kV substation.</td>
</tr>
<tr>
<td>4</td>
<td>End point</td>
<td>Tower 02-1 of the Quang Ninh - Hiep Hoa 500kV transmission line under construction.</td>
</tr>
<tr>
<td>5</td>
<td>Length of the line</td>
<td>432m</td>
</tr>
<tr>
<td>6</td>
<td>Conductor</td>
<td>Aluminium conductor steel -reinforced, dividing phases 4xACSR330/42</td>
</tr>
<tr>
<td>7</td>
<td>Lightning conductor</td>
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<td>Insulator</td>
<td>Glass or ceramic</td>
</tr>
<tr>
<td>9</td>
<td>Tower</td>
<td>Existing (is being built in another project)</td>
</tr>
<tr>
<td>10</td>
<td>Foundation</td>
<td>Existing (is being built in another project)</td>
</tr>
<tr>
<td>11</td>
<td>Ground line</td>
<td>Existing (is being built in another project)</td>
</tr>
</tbody>
</table>

- Section 4:: transposing the second circuit of the Quang Ninh - Hiep Hoa 500kV transmission line connecting with the Quang Ninh 500kV substation.

<table>
<thead>
<tr>
<th>No.</th>
<th>ITEMS</th>
<th>PARAMETER</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Voltage level</td>
<td>500 kV</td>
</tr>
<tr>
<td>2</td>
<td>Number of circuits</td>
<td>01 (Only implementing for hanging cables)</td>
</tr>
<tr>
<td>3</td>
<td>Starting point</td>
<td>Busbar 500kV of Hiep Hoa 500kV bay (1st circuit) being built at the Quang Ninh 500kV substation.</td>
</tr>
<tr>
<td>4</td>
<td>End point</td>
<td>Tower 02-2 of the Quang Ninh - Hiep Hoa 500kV transmission line under construction.</td>
</tr>
<tr>
<td>5</td>
<td>Length of the line</td>
<td>472m</td>
</tr>
<tr>
<td>6</td>
<td>Conductor</td>
<td>Aluminium conductor steel -reinforced, dividing phases 4xACSR330/42</td>
</tr>
<tr>
<td>7</td>
<td>Lightning conductor</td>
<td>PHLOX-147 (is being built in another project)</td>
</tr>
<tr>
<td>8</td>
<td>Insulator</td>
<td>Glass or ceramic</td>
</tr>
<tr>
<td>9</td>
<td>Tower</td>
<td>being built in another project.</td>
</tr>
<tr>
<td>10</td>
<td>Foundation</td>
<td>being built in another project.</td>
</tr>
</tbody>
</table>
### Technical solution of the transmission line route:

**Conductor:**
Because the 500kV transmission line sections connecting with the Quang Ninh and Hiep Hoa 500kV substations have short lengths (60 - 472m), in order to ensure the power transmission ability, to be advantageous for connecting work, construction and operation management, type of conductor ACSR-330/42 was chosen (being used for the Quang Ninh - Thuong Tin 500kV transmission line and the Quang Ninh - Hiep Hoa 500kV transmission line) to use for the connection sections of the project. ACSR-330/42 means aluminum cable steel-reinforced, which has nominal cross section including 330mm\(^2\) aluminum and 42mm\(^2\) steel.

**Lightning conductor:**
Lightning conductor (which is being used for the Quang Ninh - Hiep Hoa 500kV transmission line) will be used for the connection sections of the project. PHLOX-147 is aluminum alloy with total cross-section of 147.11 mm\(^2\) (greater than 1 grade compared with PHLOX-116 being used for the Quang Ninh - Thuong Tin 500kV transmission line).

**Insulator:**
Glass or ceramic insulator (being used for the Quang Ninh - Thuong Tin 500kV transmission line and the Quang Ninh - Hiep Hoa 500kV transmission line) will be used for the connection sections of the project.

### 1.5.2.2 Auxiliary structures

**a. Storehouse, camp**
The temporary construction camps and storehouse will be located in the vacant land inside the station fence. Area of storage and temporary camps are planned as follows:

**Camp**
Position of camps are near or surrounding the construction sites of the extension area and the line route. Temporary camps for workers are built with corrugated iron walls and corrugated iron roofs. Scales are as follows:

<table>
<thead>
<tr>
<th>No.</th>
<th>Type of house</th>
<th>Standard</th>
<th>Unit</th>
<th>Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dormitories S(_1)</td>
<td>4 m(^2)/person</td>
<td>m(^2)</td>
<td>4x48 = 192</td>
</tr>
<tr>
<td>2</td>
<td>Houses for staffs S(_2)</td>
<td>6 m(^2)/person</td>
<td>m(^2)</td>
<td>6x4 = 24</td>
</tr>
<tr>
<td>3</td>
<td>Working houses for staffs S(_3)</td>
<td>4 m(^2)/person</td>
<td>m(^2)</td>
<td>4x4 = 16</td>
</tr>
<tr>
<td>4</td>
<td>Bathroom, toilet S(_4)</td>
<td>1 m(^2)/6 persons</td>
<td>m(^2)</td>
<td>52/6 (\approx) 9</td>
</tr>
<tr>
<td>5</td>
<td>Dining room S(_5)</td>
<td>1 m(^2)/3 persons</td>
<td>m(^2)</td>
<td>52/3 (\approx) 17</td>
</tr>
<tr>
<td>No.</td>
<td>Type of house</td>
<td>Standard</td>
<td>Unit</td>
<td>Area</td>
</tr>
<tr>
<td>-----</td>
<td>-------------------------------------</td>
<td>----------</td>
<td>------</td>
<td>------</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td>m²</td>
<td>258</td>
</tr>
</tbody>
</table>

### Storehouses:

Storehouse position gathering construction materials are placed in a separate area, near the construction site of the substation extension area and the line route to facilitate for transportation of the equipment and construction materials. The storehouse is built with corrugated iron roofs and barrier around it or open ground, depending on the type of construction materials. The area of the storehouses are as follows:

- Indoor storage for cement and accessories \( : 40 \text{ m}^2 \)
- Indoor storage for construction appliance \( : 40 \text{ m}^2 \)
- Workshop for steel rod, formwork, earth line \( : 113 \text{ m}^2 \)
- Open ground for storing construction materials \( : 180 \text{ m}^2 \)

When the control room is completed, it will be used as a place for gathering devices. Foundation of mains transformer must be pre-cast, when the transformer is carried to this place, it must be put properly in the foundation position designed.

Because transportation system are convenient, so temporary construction camps and storehouses are arranged at the vacant land next to the construction site of the substation.

A construction corridor is a necessary space for the construction work, materials and equipment used for the project. The entire machinery, vehicles, equipment and labourers for construction only move and work in this scope, except for works related transport tasks.

A construction corridor is a corridor where houses, trees and crops located in it will be compensated in the construction phase. The necessary width of the 500kV transmission line for clearance is 18m, the corridor width of the 500kV transmission line affecting the houses but no relocation is 60m.

### b. Electricity and Water used for Construction

**Water source:** using water source of the substation.

Water is pumped up to a tank of 10m³ which is put on the place higher the ground level 2m. Water is supplied to the construction sites through by plastic pipes with \( \Phi 32 \). At the starting points and end points of the pipe lines there are valve keys.

At the construction sites, there are many barrels with 200l volume to store water for use.

**Calculation of water volume**

Volume of cement used in the peak months: 40 tons
Volume of concrete used in the peak months: \( 40/0.315 \approx 127 \text{m}^3 \)
Necessary water amount for mixing and maintaining 1m³ of concrete: 0.5 m³
+ Amount of water used daily for concrete:
Overhead Line Bay Extension at Quang Ninh 500kV substation  
Investment Project  
Chapter 1 – Project Description 

V1 = (127 x 0.5)/26 ≈ 2.4 m³

+ Amount of water used for daily activities:

V2 = 52 x 0.05 = 2.6 m³

+ Total amount of water used daily at the peak:

V = 1.2 x (V1 + V2) = 6.0 m³/day
(1.2 is the contingency coefficient)

**Electricity source:**

Electricity used in the construction sites including power for construction machines, domestic power for workers, light for storehouse and workshop, light for protection.

Because in the substation there is auxiliary electrical system so the construction team can negotiate with the operation unit to be supplied electricity for construction.

c. **Compensation for clearance**

In the clearance process for space of the Overhead Line Bay Extension at Quang Ninh 500kV substation, tower foundations and the ROW of the connection line at the Quang Ninh 500kV substation, the project has some effects on trees, houses in the local area.

- According to preliminary survey results in December, 2012 the construction of the project can cause the following effects:

  • **Bay Extension at the Quang Ninh 500kV substation:**
    - Area of permanently required land is 17,650m²;
    - There are 5 households (25 people) whose houses are located in the construction area of bay extension so they have to relocate;
    - Cutting trees lying in the expanding area: 6,355 trees.

  • **Connection line at the Quang Ninh 500kV substation:**
    - Area of permanently required land is 1,550m²;
    - Compensation and support for temporarily affected land due to its position located in the ROW of the line route with an area of 42,840m²;
    - There is a household (5 people)) whose house is located in the construction area of the 500kV connection line so they have to relocate;
    - Cutting trees lying in the ROW for construction of cable stretching and clearance: 598 trees;

1.5.3 **Methods, construction quantity of the project items**

1.5.3.1 **Construction methods**

**Levelling task:**

Because the substation extension area is large therefore bulldozers are chosen to remove vegetation cover of 0.2 m in thickness to level the ground and trucks are used to transport soil, bulldozers for leveling and rollers for compaction. The

The project owner will buy materials for construction and levelling from the local businesses who have operation licences.

Volume of excavation and leveling are as follows:

<table>
<thead>
<tr>
<th>No.</th>
<th>Items</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Substation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Removing vegetation cover</td>
<td>3,836</td>
</tr>
<tr>
<td>a</td>
<td>Digging</td>
<td>13,643</td>
</tr>
<tr>
<td>b</td>
<td>Filling the substation base and side slope</td>
<td>1.1 x 11,850</td>
</tr>
<tr>
<td></td>
<td>Backfilling for the road to recover the road crossing the pond</td>
<td>1.1 x 990</td>
</tr>
<tr>
<td>c</td>
<td>Balance between digging and filling volumes ($V_{digging} - V_{filling}$)</td>
<td>-481</td>
</tr>
<tr>
<td>2</td>
<td>Connection line</td>
<td></td>
</tr>
<tr>
<td>a</td>
<td>Digging</td>
<td>3,528</td>
</tr>
<tr>
<td>b</td>
<td>Filling</td>
<td>2,946</td>
</tr>
<tr>
<td>c</td>
<td>Balance between digging and filling volumes ($V_{digging} - V_{filling}$)</td>
<td>582</td>
</tr>
</tbody>
</table>

Building a road for motor vehicles

The soil layer under the foundation is tightly compacted by rollers, the road foundation in the substation is made by cast-in-place concrete with manual labor, concrete is compacted by surface vibrator.

Building foundation

Excavation: Digging foundations by hand to the design elevation, tamping the ground surface tighter and smoother, after that pouring concrete lining. Absolutely not digging deeper than bed level and keeping the pit dry during foundation construction.

Before pouring concrete for foundation, formworks, bearing rods, bracing rods, steel rods and construction materials such as water, sand, stone and cement must be gathered surrounding the construction sites. Preparing concrete mixers, vibrators, batching plant, equipment of concrete transport and laborers completely and reasonably. When pouring concrete if any foundation hole is deeper than 1.5m, vibrating chute should be used to take concrete down to the pit to prevent concrete free falling from a height of over 1.5 m down. When pouring concrete for foundation is completed, backfilling pit by excavated soil, watering and compacting surface to the design density.
Construction measure of reinforced concrete

- Building formwork, building yard: formwork can be made of steel or wood. Building yard is raised by wood beam, lined with removable shaped boards.

- Steel rods: Processing steel rods at the workshop in the construction field, after that they are carried to the gathering position at the structure base and installed according to the Vietnam regulation 4453-85.

- Processing concrete: Concrete used in the substation including 2 kinds of pre-cast and cast-in-place concrete. Concrete is mixed by hand or mobile batch mixer 250l, compacting concrete by spud vibrator 1.5kW and surface vibrator 1kW.

Erection measures of steel structures

Steel towers are erected by using manual labour and machinery such as cranes, capstan, etc. Before installing, checking operation equipment: winch, kinds of cables, anchor steel pile, etc.

Poles are installed upward, installing main bar first, and connecting link rods. During installing process, always checking capstan and cable system for safety work.

1.5.3.2 Construction quantity

Table 1.1: Construction quantity of items

<table>
<thead>
<tr>
<th>No</th>
<th>Content</th>
<th>Unit</th>
<th>Quantity</th>
<th>Construction measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sprinkle ballast 2x4 for the substation base with 100mm thickness</td>
<td>m³</td>
<td>1,340</td>
<td>Manual labour</td>
</tr>
<tr>
<td>2</td>
<td>Remove vegetation cover on the substation base and side slope with 200mm thickness</td>
<td>m³</td>
<td>3,836</td>
<td>Manual labour and machine</td>
</tr>
<tr>
<td>3</td>
<td>Backfill for the substation base and side slope Backfill for the road to recover the road crossing the pond of 3m depth</td>
<td>m³</td>
<td>1.1 x 11,850 / 1.1x990</td>
<td>Manual labour and machine</td>
</tr>
<tr>
<td>4</td>
<td>Digging the substation bed and drainage ditch</td>
<td>m³</td>
<td>13,643</td>
<td>Manual labour and machine</td>
</tr>
<tr>
<td>5</td>
<td>Masoning rubble for side slope, foundation of side slope, barrier and drainage ditch</td>
<td>m³</td>
<td>1,165</td>
<td>Manual labour</td>
</tr>
<tr>
<td>6</td>
<td>Destroy ditch and side slope made by rubble in the substation</td>
<td>m/m³</td>
<td>403/635</td>
<td>Manual labour and machine</td>
</tr>
<tr>
<td>7</td>
<td>Recover a path of 4m width</td>
<td>m/m²</td>
<td>198/792</td>
<td>Manual labour and machine</td>
</tr>
<tr>
<td>No</td>
<td>Content</td>
<td>Unit</td>
<td>Quantity</td>
<td>Construction measure</td>
</tr>
<tr>
<td>----</td>
<td>----------------------------------------------</td>
<td>-------</td>
<td>----------</td>
<td>----------------------------</td>
</tr>
<tr>
<td>8</td>
<td>Transpose the low voltage line of 5m height</td>
<td>system</td>
<td>01</td>
<td>Manual labour and machine</td>
</tr>
<tr>
<td>9</td>
<td>Road for motor vehicles in the substation with width from 4 to 6m</td>
<td>m/m²</td>
<td>546/2,383</td>
<td>Manual labour and machine</td>
</tr>
<tr>
<td>10</td>
<td>Both sides of the safety corridor along the road</td>
<td>m²</td>
<td>1,795</td>
<td>Manual labour</td>
</tr>
<tr>
<td>11</td>
<td>Dismantle the existing fence</td>
<td>m</td>
<td>351</td>
<td>Manual labour and machine</td>
</tr>
<tr>
<td>12</td>
<td>Build a new fence</td>
<td>m</td>
<td>401</td>
<td>Manual labour and machine</td>
</tr>
<tr>
<td>13</td>
<td>Outdoor distribution:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Galvanized steel</td>
<td>ton</td>
<td>212</td>
<td>Manual labour and machine</td>
</tr>
<tr>
<td></td>
<td>- Round steel</td>
<td>ton</td>
<td>86</td>
<td>Manual labour and machine</td>
</tr>
<tr>
<td></td>
<td>- Anchor bolts</td>
<td>ton</td>
<td>9</td>
<td>Manual labour and machine</td>
</tr>
<tr>
<td></td>
<td>- Cast-in-place concrete B15</td>
<td>m³</td>
<td>1,130</td>
<td>Manual labour and machine</td>
</tr>
<tr>
<td></td>
<td>- Cast-in-place concrete B3.5</td>
<td>m³</td>
<td>225</td>
<td>Manual labour and machine</td>
</tr>
<tr>
<td></td>
<td>- Digging/backfilling pit</td>
<td>m³</td>
<td>8,381/7,025</td>
<td>Manual labour and machine</td>
</tr>
</tbody>
</table>

**Connection line with Quang Ninh 500kV substation**

<table>
<thead>
<tr>
<th>No</th>
<th>Content</th>
<th>Unit</th>
<th>Quantity</th>
<th>Construction measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Excavation</td>
<td>m³</td>
<td>3,528</td>
<td>Manual labour and machine</td>
</tr>
<tr>
<td>2</td>
<td>Backfilling</td>
<td>m³</td>
<td>2,946</td>
<td>Manual labour and machine</td>
</tr>
<tr>
<td>3</td>
<td>Lining concrete B3.5</td>
<td>m³</td>
<td>46.08</td>
<td>Manual labour and machine</td>
</tr>
<tr>
<td>4</td>
<td>Cast-in-place concrete B15</td>
<td>m³</td>
<td>446</td>
<td>Manual labour and machine</td>
</tr>
<tr>
<td>5</td>
<td>Processing steel rod for foundation</td>
<td>ton</td>
<td>39.6</td>
<td>Manual labour and machine</td>
</tr>
<tr>
<td>6</td>
<td>Processing galvanized earth line</td>
<td>ton</td>
<td>2.747</td>
<td>Manual labour and machine</td>
</tr>
<tr>
<td>7</td>
<td>Processing anchor bolts</td>
<td>ton</td>
<td>9.37</td>
<td>Manual labour and machine</td>
</tr>
<tr>
<td>8</td>
<td>Embankment of foundation</td>
<td>position</td>
<td>2</td>
<td>Manual labour and machine</td>
</tr>
<tr>
<td>9</td>
<td>Erection of steel tower</td>
<td>Tower /ton</td>
<td>3/112.4</td>
<td>Manual labour and machine</td>
</tr>
<tr>
<td>10</td>
<td>Stretching conductor ACSR-330/42</td>
<td>km/to</td>
<td>11.618/14.8</td>
<td>Manual labour</td>
</tr>
</tbody>
</table>
### Production and operation technology

The project "Overhead Line Bay Extension at Quang Ninh 500kV substation and Hiep Hoa 500kV substation" is a professional power project, during the operation process, the project will not emit contaminant to affect the environment. The project, which has specific characteristics of the electrical sector, has a production and operation technology different from the other industrial sectors.

### List of equipment and machine

**Table 1.2: List of equipment and machine**

<table>
<thead>
<tr>
<th>No.</th>
<th>Name of equipment</th>
<th>Unit</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><strong>Construction phase</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Crane 10 tons</td>
<td>Set</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Concrete mixer 250 l</td>
<td>Set</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Mortar mixer 150 l</td>
<td>Set</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Spud vibrator capacity of 1kW</td>
<td>Set</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>Surface vibrator capacity of 1kW</td>
<td>Set</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>Cam roller</td>
<td>Set</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>Compaction roller</td>
<td>Set</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>Portable electrical drill 0.6kW</td>
<td>Set</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>Shearing machine 2.8kW</td>
<td>Set</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>MBench grinder 2.7kW</td>
<td>Set</td>
<td>1</td>
</tr>
<tr>
<td>11</td>
<td>Back filler</td>
<td>Set</td>
<td>1</td>
</tr>
<tr>
<td>12</td>
<td>Tilting truck (type 10 tons)</td>
<td>Set</td>
<td>2</td>
</tr>
<tr>
<td>13</td>
<td>Water truck</td>
<td>Set</td>
<td>1</td>
</tr>
</tbody>
</table>
### Operation phase

#### Bay Extension at Quang Ninh 500kV substation

<table>
<thead>
<tr>
<th>No.</th>
<th>Name of equipment</th>
<th>Unit</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>Hydraulic jack 50 tons</td>
<td>Set</td>
<td>4</td>
</tr>
<tr>
<td>15</td>
<td>Oil filter</td>
<td>Set</td>
<td>1</td>
</tr>
<tr>
<td>16</td>
<td>Pump 1.5HP</td>
<td>Set</td>
<td>1</td>
</tr>
</tbody>
</table>

#### Connection line with Quang Ninh 500kV substation

<table>
<thead>
<tr>
<th>No.</th>
<th>Name of equipment</th>
<th>Unit</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Anchor string for conductor</td>
<td>String</td>
<td>30</td>
</tr>
<tr>
<td>2</td>
<td>Support string for conductor</td>
<td>String</td>
<td>30</td>
</tr>
<tr>
<td>3</td>
<td>Anchor string for earth line</td>
<td>String</td>
<td>17</td>
</tr>
<tr>
<td>4</td>
<td>Anchor string for optical fiber</td>
<td>String</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>Install accessories</td>
<td>Set</td>
<td>349</td>
</tr>
</tbody>
</table>

Source: Investment Project, PECC3, Feb-2012

### 1.5.6 Fuels and materials used for the construction phase of the project

#### 1.5.6.1 Electricity for construction

Electricity used on the construction sites are divided into two categories:

- Electricity used for construction tasks (80% – 90% total consumption capacity in the construction sites) includes: Processing materials, mixing concrete, testing and modification of electrical equipment, etc.

- Electricity used for living and lighting (10% ~ 20% total consumption capacity in the construction sites)

- According to the agreement, construction team is permitted to use electricity from the existing 22kV line near the substation.

#### 1.5.6.2 Water source for construction

- Water source in the construction sites has to ensure the suitable quality according to the technical and hygienic standards.
- Water for construction tasks such as mixing concrete, blending mortar, washing stone and gravel, concreting, brick masonry, etc...so water has to be clean and is not polluted by oil or acid.

- Water for daily activities must guarantee the demand including pure, no pathogenic bacteria, no micro-organisms, etc. and meet the standard of domestic water regulated by Ministry of Public Health.

- Water for daily activities in the substation is mainly taken from the water source of the existing substation.

### 1.5.6.3 Supply source of equipment and materials

Supply the source of the equipment and materials, including:

<table>
<thead>
<tr>
<th>No.</th>
<th>Equipment and materials</th>
<th>Source</th>
<th>Destination</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Galvanized steel tower</td>
<td>Ha Noi</td>
<td>Construction site</td>
<td>produced in the country</td>
</tr>
<tr>
<td>2</td>
<td>Cement PC.30</td>
<td>Quang Ninh</td>
<td>&quot;</td>
<td>produced in the country</td>
</tr>
<tr>
<td>3</td>
<td>Steel in several sizes</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
<tr>
<td>4</td>
<td>Conductor</td>
<td>PMB</td>
<td>&quot;</td>
<td>Product imported or produced in the country</td>
</tr>
<tr>
<td>5</td>
<td>Insulator</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
<tr>
<td>6</td>
<td>Accessories</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
<tr>
<td>7</td>
<td>Electrical equipment</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
<tr>
<td>8</td>
<td>Yellow sand</td>
<td>Quang Ninh</td>
<td>&quot;</td>
<td>local material</td>
</tr>
<tr>
<td>9</td>
<td>Ballast in several sizes</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
<tr>
<td>10</td>
<td>Wood used for formwork</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
<tr>
<td>11</td>
<td>Rubble</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
</tbody>
</table>

### 1.5.7 Implementation schedule

According to Investment Project implemented by PECC3 in Feb-2013, the project will be implemented and put into operation in the first quarter of 2015.

<table>
<thead>
<tr>
<th>No.</th>
<th>Content</th>
<th>Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Making and approving Investment and Construction Project</td>
<td>Feb-2013 - Dec-2013</td>
</tr>
<tr>
<td>2</td>
<td>Making and approving Engineering Design</td>
<td>Feb-2013 - Aug-2014</td>
</tr>
</tbody>
</table>
### 1.5.8 Total investment capital

According to the Investment Project in December, 2012, total investment capital of the project is **VND 29,248,115,000** including:

<table>
<thead>
<tr>
<th>No.</th>
<th>Items</th>
<th>Cost (VND)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Construction cost</td>
<td>1,128,256,458</td>
</tr>
<tr>
<td>2</td>
<td>Equipment cost</td>
<td>18,468,315,175</td>
</tr>
<tr>
<td>3</td>
<td>Compensation and land clearance cost</td>
<td>4,223,242,000</td>
</tr>
<tr>
<td>4</td>
<td>Management cost</td>
<td>417,333,255</td>
</tr>
<tr>
<td>5</td>
<td>Consulting cost</td>
<td>702,327,461</td>
</tr>
<tr>
<td>6</td>
<td>Other cost</td>
<td>481,699,122</td>
</tr>
<tr>
<td>7</td>
<td>Provision cost</td>
<td>3,826,941,224</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>29,248,115,000</strong></td>
</tr>
</tbody>
</table>

*Source: Investment Project, PECC3, Feb-2012*

During the construction and operation phases, every year, the project owner spares amount of cost to implement the environment management in the project area. Cost of the environment management of the project is as follows:

<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
<th>Cost/year (VND)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cost for monitoring, observing in the construction phase</td>
<td>30,000,000</td>
</tr>
<tr>
<td>2</td>
<td>Cost for monitoring, observing in the operation phase</td>
<td>10,000,000</td>
</tr>
<tr>
<td>3</td>
<td>Cost for treatment of domestic wastewater</td>
<td>30,000,000</td>
</tr>
<tr>
<td>4</td>
<td>Cost for treatment of solid waste generated</td>
<td>20,000,000</td>
</tr>
<tr>
<td></td>
<td><strong>TOTAL</strong></td>
<td><strong>90,000,000</strong></td>
</tr>
</tbody>
</table>

*Source: Investment Project, PECC3, Feb-2012*

### 1.5.9 Arrangement of management and implementation
Project management method was implemented based on Decree No.12/2009/ND-CP of the Government dated February 10th, 2009. The project management forms are defined as follows:

- Project owner: the Central Power Project Management Board.
- Operational management agency: Power Transmission Company 1.
- Participating agencies in the project implementation process have responsibility and authority stipulated in the Decrees of the Government and the existing guidance circulars of the agencies belonging to the ministries and the government.
CHAPTER 2

NATURAL, SOCIO-ECONOMIC CONDITIONS IN THE PROJECT AREA

2.1 NATURAL ENVIRONMENTAL CONDITION

2.1.1 Geologic, geographical condition

2.1.1.1 Geographical condition

The construction items will be made on the expansion area. The proposed position is adjacent to the east fence of the existing Quang Ninh 500kV substation. The topography of the proposed area of the bay extension is relatively flat.

The line is passing through the region where cajuputs are being planted, this terrain is slope, there is no house in the ROW. The line section from the first point to new tower T01M cuts through a stream with 20m width; the section from tower T01M to tower T02M cuts through a pond with 17m width, 3m depth.

2.1.1.2 Geology condition

According to the geological survey at the tower belonging to the connection line to the bay extension, the background of the tower is divided into several layers as follows:

+ Surface soil layer: soil, loam, brown, yellow brown, distributed from the ground surface to depth of 0.3 m.

+ Layer 1 (CL): Clay, red brown clay, yellow brown, white gray stained, its state is semi-hard - hard. Distribution of layer 1 is from 0.3 m to 10 m depth (maximum depth of drill hole). This layer has the physico-mechanical index as follows:

<table>
<thead>
<tr>
<th>Physico-mechanical index</th>
<th>Layer 1 (CL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gravel</td>
<td>&gt;10 ( \div 2 ) mm</td>
</tr>
<tr>
<td>Sand</td>
<td>2 ( \div 0.06 ) mm</td>
</tr>
<tr>
<td>Dust</td>
<td>0.06 ( \div 0.002 ) mm</td>
</tr>
<tr>
<td>Clay</td>
<td>&lt;0.002 mm</td>
</tr>
<tr>
<td>Natural humidity ( W ) (%)</td>
<td>16.91</td>
</tr>
<tr>
<td>Density ( \text{g/cm}^3 )</td>
<td>Natural ( \gamma_w )</td>
</tr>
<tr>
<td></td>
<td>Dry ( \gamma_d )</td>
</tr>
<tr>
<td>Ratio ( \Delta )</td>
<td>2.70</td>
</tr>
<tr>
<td>Initial void ratio ( e )</td>
<td>0.641</td>
</tr>
<tr>
<td>Porosity ( n ) (%)</td>
<td>39.0</td>
</tr>
<tr>
<td>Saturated degree ( G ) (%)</td>
<td>70.4</td>
</tr>
<tr>
<td>Criteria Atterberg (%)</td>
<td>Liquid criteria: ( W_L )</td>
</tr>
</tbody>
</table>
### Physico-mechanical index

<table>
<thead>
<tr>
<th>Layer 1 (CL)</th>
<th>Plastic criteria: $W_p$</th>
<th>21.4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cs Plastic: $I_p$</td>
<td>21.6</td>
</tr>
<tr>
<td></td>
<td>Consistency: $B$</td>
<td>-0.24</td>
</tr>
<tr>
<td>Shear resistance force (kG/cm²)</td>
<td>$c_t$</td>
<td>0.31</td>
</tr>
<tr>
<td>Internal friction angle (degree)</td>
<td>$\phi_t$</td>
<td>19°11’</td>
</tr>
<tr>
<td>Compressibility coefficient $a_{1-2}$ (cm²/kG)</td>
<td>0.017</td>
<td></td>
</tr>
<tr>
<td>Total deformation module: $E_{1-2}$(kG/cm²) (not included side-expansion deformation)</td>
<td>96.8</td>
<td></td>
</tr>
</tbody>
</table>

At the survey time, underground water was not found. Geological bed is stability and steady.

#### 2.1.2 Meteorological situation

The project area is located in Hoanh Bo district affected by the tropical climate, near the sea, hot, humid and heavy rainy. Every year there are only two distinct seasons including dry and wet seasons. The wet season or the rainy season lasts from May to October. It is hot in the rainy season, the prevailing wind directions are the South and South-East. This season has high evaporation and humidity. The dry season lasts from November to the following April. It is cold in the dry season, the prevailing wind direction is the northeast.

- **Air Temperature**

  Average annual temperature is 23.5°C, the highest average temperature is 28.8°C in July, the lowest average temperature is 16.7°C in January.

<table>
<thead>
<tr>
<th>Month</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>°C</td>
<td>16.7</td>
<td>17.5</td>
<td>20.2</td>
<td>23.8</td>
<td>27.1</td>
<td>28.5</td>
<td>28.8</td>
<td>28.2</td>
<td>27.1</td>
<td>24.7</td>
<td>21.5</td>
<td>18.0</td>
<td><strong>23.5</strong></td>
</tr>
</tbody>
</table>

- **Humidity**

  + The average humidity in years: 82%
  + Highest average humidity: 86% (in April)
  + Lowest average humidity: 75% (in Nov., Dec.).

<table>
<thead>
<tr>
<th>Month</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
<td>78</td>
<td>83</td>
<td>86</td>
<td>86</td>
<td>83</td>
<td>83</td>
<td>83</td>
<td>86</td>
<td>83</td>
<td>79</td>
<td>76</td>
<td>75</td>
<td><strong>82</strong></td>
</tr>
</tbody>
</table>

- **Rainfall:**

  Every year, maximum rainfall usually occurs from May to October. Maximum monthly rainfall is 353.2 mm (August), minimum monthly rainfall is 20.2 mm (January). Maximum daily rainfall can reach 200mm.
Table: Average rainfall (2006-2011)

<table>
<thead>
<tr>
<th>Month</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>mm</td>
<td>45.3</td>
<td>17.4</td>
<td>42.6</td>
<td>77.1</td>
<td>151.8</td>
<td>286.1</td>
<td>315.1</td>
<td>421.6</td>
<td>252.0</td>
<td>78.0</td>
<td>34.7</td>
<td>12.8</td>
<td>1,726</td>
</tr>
</tbody>
</table>

- **Solar radiation and sunshine:**

In summer months, the radiation is greater than 12 Kcal/cm²/month. In winter months, the radiation is less than 10 Kcal/cm²/month. Total average number of sunshine hours is about 1,562.8 hours

Table: Total average hours of sunshine in year

<table>
<thead>
<tr>
<th>Month</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Aver.</th>
</tr>
</thead>
<tbody>
<tr>
<td>hours</td>
<td>76.7</td>
<td>46.2</td>
<td>44.2</td>
<td>82.1</td>
<td>160.3</td>
<td>164.2</td>
<td>177.2</td>
<td>172.8</td>
<td>181</td>
<td>171.5</td>
<td>152.7</td>
<td>134</td>
<td>1,562.8</td>
</tr>
</tbody>
</table>

- **Wind- Storm:**

Wind: Winter lasts from October to March next year under the influence of the North-East monsoon, the prevailing wind directions are the North and North-East, frequency of happening is from 3 to 4 times every month, each time lasts 5-7 days. Summer lasts from May to September, the prevailing wind directions are the South and South-East. There is also "geothermal" wind blowing from the ocean during the daytime, in the night it blows from inland out to create a pleasant feeling.

+ Hurricanes, thunderstorms: Each year, the project area is affected by 5-6 storms on average, sometimes 9-10 storms. Storms can reach to level 8-9, special level 12 and usually hit from July to August. During the rainy season, there is one storm per month on average, sometimes 3-4 storms as Aug-1963 and Oct-1964.

Average annual wind speed ranged between 0.2 to 1 m/s. Speed of the Northeast monsoon winds and wind speed of storms can be greater than 30m/s.

Table: Average wind speed

<table>
<thead>
<tr>
<th>Month</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>m/s</td>
<td>1.9</td>
<td>2.0</td>
<td>1.9</td>
<td>2.2</td>
<td>2.4</td>
<td>2.2</td>
<td>2.3</td>
<td>1.7</td>
<td>1.7</td>
<td>1.8</td>
<td>1.7</td>
<td>1.7</td>
<td>2.0</td>
</tr>
</tbody>
</table>

2.1.3 **Quality situation of physical environment elements**

To assess the environmental quality in the project area, Power Engineering consulting Joint Stock company 3 (PECC3) associated with the Center for observation and analysis of environment in Quang Ninh to measure and analyze results of samples at the specific locations of the environment in the project area in December, 2012.

Location map of sampling quality of ambient air and surface water is presented in Figure 2.1 below:
Figure 2.1: Position taking background environment samples

Notes:
K1, K2, K3: Position taking air samples
NM: Position taking surface water samples
2.1.3.1 Air quality in the project area

Results of air environmental measurement and analysis in the project area are shown in Table 2.1 as follows:

Table 2.1: Analysis results for air quality at the project area

<table>
<thead>
<tr>
<th>Positions</th>
<th>Temperature (°C)</th>
<th>Noise (dA)</th>
<th>Concentration of pollutant (mg/m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Max</td>
<td>Dust</td>
</tr>
<tr>
<td>KK1</td>
<td>21.1</td>
<td>53.4</td>
<td>54.1</td>
</tr>
<tr>
<td>KK2</td>
<td>21.2</td>
<td>49.6</td>
<td>52.1</td>
</tr>
<tr>
<td>KK3</td>
<td>21.3</td>
<td>51.8</td>
<td>58.3</td>
</tr>
<tr>
<td>QCVN 05:2009/BTNMT</td>
<td>-</td>
<td>-</td>
<td>0.3</td>
</tr>
<tr>
<td>QCVN 26:2010/BTNMT</td>
<td>-</td>
<td>≤70</td>
<td>-</td>
</tr>
</tbody>
</table>

Source: Center of FPD analysis, December, 2012

Notes:

Symbol | Air sampling positions | Sampling coordinates
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>KK1</td>
<td>In the entrance area of the Quang Ninh 500kV substation</td>
<td>X = 3023271.688 Y = 435083.731</td>
</tr>
<tr>
<td>KK2</td>
<td>In the construction area of the bay extension at the Quang Ninh 500kV substation</td>
<td>X = 2327146.600 Y = 435241.733</td>
</tr>
<tr>
<td>KK3</td>
<td>In the construction area of the new connection line, near Ms. Luu Thi Sen's house</td>
<td>X = 2325298.913 Y = 433623.226</td>
</tr>
</tbody>
</table>

Remarks:

The result of air analysis in the project area indicates the noise level at the measured points are lower than QCVN 26:2010/BTNMT. Air quality (dust, SO₂, NO₂ and CO) are measured at the points lower than QCVN 05:2009/BTNMT. This result shows that the air quality in the project area is still very good.
2.1.3.2 Electromagnetic field in the project area

Results of electromagnetic field measurement in the project area are presented in Table 2.2 below:

Comparison Standards are used as follows:

- Permissible standards of the electric field intensity issued by Decision No.183/NL-KHKT dated April 12th, 1994.
- Standards of permissible exposure levels of electromagnetic field of the International Committee on Non-Ionizing Radiation Protection (ICNIRP).

Table 2.2: Summary of the value of the electric field strength at the regions

<table>
<thead>
<tr>
<th>No.</th>
<th>Measuring location</th>
<th>$E_{\text{min}}$ (kV/m)</th>
<th>$E_{\text{max}}$ (kV/m)</th>
<th>Comparison Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Outdoor region for equipment</td>
<td>0.01</td>
<td>9.88</td>
<td>- All day long 10kV/m ≤ 25 kV/m</td>
</tr>
<tr>
<td></td>
<td>- Location of disconnector 232-2</td>
<td></td>
<td>13.52</td>
<td>- Short term 30kV/m ≤ 25 kV/m</td>
</tr>
<tr>
<td></td>
<td>- Location of circuit breaker 531</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Area having fences around</td>
<td>0.01</td>
<td>0.75</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Internal road area</td>
<td>0.01</td>
<td>10.8</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Lawn area</td>
<td>0.45</td>
<td>1.71</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>In the control room</td>
<td>0.001</td>
<td>0.007</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Outdoor control kiosk</td>
<td>0.03</td>
<td>0.08</td>
<td></td>
</tr>
</tbody>
</table>

(Source: Environmental Protection Project for the Quang Ninh 500kV Substation)
Remarks
Measurement results show that the electric field strength are within the limits prescribed by the applicable standards. However, Decision No.183/NL-KHKT on April 12th, 1994 (Industrial standard about allowed level of electric field intensity in the workplace) stipulated: for the positions of the electric field strength in ranging from 5kV/m to 25kV/m will limit the exposure working time (t), as follows:

\[ t = \begin{cases} 
0 \text{h} & \text{when } E > 25 \\
\frac{1}{6} \text{h} & \text{when } 20 < E \leq 25 \\
\frac{50}{E} - 2 \text{h} & \text{when } 5 \leq E \leq 20 \\
\text{Time is unlimited} & \text{when } E < 5 
\end{cases} \]

\[ 2.1.3.3 \] Surface water quality in the project area
Results of surface water measurement and analysis in the project area are shown in Table 2.2

<table>
<thead>
<tr>
<th>No.</th>
<th>Indicator</th>
<th>Unit</th>
<th>Result</th>
<th>QCVN 08:2008/BTNMT, column B1</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>pH*</td>
<td>-</td>
<td>7.58</td>
<td>5.5 - 9</td>
</tr>
<tr>
<td>2</td>
<td>Total Suspended Solid*</td>
<td>mg/l</td>
<td>9.6</td>
<td>50</td>
</tr>
<tr>
<td>3</td>
<td>Dissolved Oxygen*</td>
<td>mg/l</td>
<td>3.6</td>
<td>≥4</td>
</tr>
<tr>
<td>4</td>
<td>Biochemical Oxygen Demand (BOD)</td>
<td>mg/l</td>
<td>12.2</td>
<td>15</td>
</tr>
<tr>
<td>5</td>
<td>Chemical Oxygen Demand (COD)</td>
<td>mg/l</td>
<td>17.6</td>
<td>30</td>
</tr>
<tr>
<td>6</td>
<td>HNO_3*</td>
<td>mg/l</td>
<td>0.425</td>
<td>0.5</td>
</tr>
<tr>
<td>7</td>
<td>Nitrate (NO_3*)</td>
<td>mg/l</td>
<td>1.78</td>
<td>10</td>
</tr>
<tr>
<td>8</td>
<td>Nitrite (NO_2*)</td>
<td>mg/l</td>
<td>0.009</td>
<td>0.04</td>
</tr>
<tr>
<td>9</td>
<td>Iron (Fe^{2+}+^{3+})*</td>
<td>mg/l</td>
<td>0.391</td>
<td>1.5</td>
</tr>
<tr>
<td>10</td>
<td>Cu</td>
<td>mg/l</td>
<td>0.0035</td>
<td>0.5</td>
</tr>
<tr>
<td>11</td>
<td>Pb</td>
<td>mg/l</td>
<td>0.0027</td>
<td>0.05</td>
</tr>
<tr>
<td>12</td>
<td>Hg</td>
<td>mg/l</td>
<td>0.0007</td>
<td>0.001</td>
</tr>
<tr>
<td>13</td>
<td>Arsenic</td>
<td>mg/l</td>
<td>0.0017</td>
<td>0.05</td>
</tr>
<tr>
<td>14</td>
<td>Total Coliform</td>
<td>MPN/100</td>
<td>65</td>
<td>7.500</td>
</tr>
</tbody>
</table>

Source: Center of FPD analysis, December, 2012

Notes:

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Surface water sampling positions</th>
<th>Sampling coordinates</th>
</tr>
</thead>
<tbody>
<tr>
<td>NM</td>
<td>at the stream in Village 3</td>
<td>X = 3023281.754</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Y = 435080.652</td>
</tr>
</tbody>
</table>
Remarks:
Currently, the stream in Village 3 is used for irrigation purpose, standards applied for surface water quality in this area is QCVN 08:2008/BTNMT, column B1.

The analysis results above show that the quality of surface water of the stream in Village 3 does not have signs of organic pollution. All targets in water samples met allowable limit in column B1 - National technical regulations QCVN No.08:2008/BTNMT.

2.1.4 Current status of biological resources

Flora: this is low hill zone which has poor flora ecosystem. A planted eucalyptus forest on the hill was cut off. On the ground there are shrubbery moors with some plant species as: Baeckea frutescens, Rhodomyrtus tomentosa, Melastoma candidum, Paspalum sp., Setaria sp., etc… Rate of vegetation cover is low (10-20%).

Fauna: there are only some species of Insectan, Myriapoda, Oligochaeta, Reptilia, Amphibian. Some bird species as Passer montanus malaccensis, Carvus are found. Mammalian species are rarely found in this region.

2.2 SOCIO-ECONOMIC CONDITIONS

2.2.1 Economic condition

* Development Orientation of Hoang Bo District:

Planning orientation of socio-economic development in Hoang Bo District up to 2020 was issued by decision No.3631/2007/QD-UBND dated October 01st, 2007 of the People's Committee of Quang Ninh province, which has pointed out:

Socio-Economic Development of Hoang Bo District becomes a key zone which attracts industrial development investment of construction materials (cement, bricks, tiles, etc.); exploitation and aquaculture; growing services - tourism rapidly and sustainable; building cultural villages to be civilized and modern, improving people's living standards, ensuring social order and national security.

* Development Orientation of Thong Nhat commune:
Development orientation of socio-economic sectors in Thong Nhat commune: is moving from an agricultural commune to an semi-industrial and service commune. Specially paying attention in exploiting and processing construction materials (stones, cement, etc.) and development of aquaculture. Economic development goes along with improving people's living standards, ensuring social order and national security.

* **Infrastructure in the area**

  - **Power supply system:**

    Power source supplying for local is taken from the national grid having stable quality, the percentage of households using electricity is 100%.

  - **Water supply system:**

    Now, there is not a clean water supply system in the project area. Water used in daily activities is mainly taken from wells, springs and rain water.

  - **Drainage system:**

    Rainwater and domestic wastewater from the residential areas will be collected into the general drainage ditches of the area and run into streams to the Dien Vong River and the Cua Luc Bay.

  - **Roads:**

    The local traffic system is advantageous to economic development. In commune, there are Highway No.326 connecting Hoang Bo district to Cam Pha town and Highway No.337 connecting Hoang Bo district with Ha Long city across Bang Bridge.

2.2.2 **Social Condition**

* **Population:**

  Population of Thong Nhat commune according to the inventory to 26th May, 2011 is 9,196 persons, population density is 113 person/km$^2$. The difference percentage between male and female is not significant (49% male, 51% female). Total natural area of commune is 81.2 km$^2$.

* **Employment structure:**

  - Number of agricultural households is 347 households taking about 65% of total households in the commune.

  - The remaining 187 households are in the handicraft industry, services and others.

  - Up to 2011, there are 27 poor households and no hungry households in the commune.

  - Average income of 3.5 to 4 million VND/month/household, the highest income is 6 million VND/month/household, the lowest is 2.5 million VND/month/household.

* **Public health:**

  Now, there is 01 health station including doctors and nurses to serve the primary health care for residents in the area.

* **Education:**

  In the commune there are 01 kindergarten, 01 primary school, 01 secondary school
with approximately 1,200 pupils. The facilities of the schools are quite sufficient to meet the requirements of teaching and learning.

Social situation in the commune has been relatively stable for recent years.
CHAPTER 3

ENVIRONMENTAL IMPACT ASSESSMENT

3.1 IMPACT ASSESSMENT

ý Impact source and Impacted objects and level

Table 3.1: Impact source and Impacted objects and Level related to waste

<table>
<thead>
<tr>
<th>No.</th>
<th>Source</th>
<th>Waste</th>
<th>Impacted objects</th>
<th>Position of impact</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Pre-Construction Phase</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Waste is not arisen in this phase.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>Construction Phase</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Exhaust gas</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a</td>
<td>Excavation and filling 49.650m³</td>
<td>Dust: 0.07mg/m³</td>
<td>- Labors</td>
<td>In the construction position of bay extension and tower foundations of the connection line</td>
<td>See more details in 3.1.2.1.a</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Local people</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b</td>
<td>Operation of construction machinery and material transport vehicles (see table 3.11 on transport volume)</td>
<td>Dust: 1.51mg/m³</td>
<td>&quot;</td>
<td>Along the transportation route</td>
<td>&quot;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>NOₓ: 0.001-0.023mg/m³</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SO₂: 0.02-0.3mg/m³</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>CO: 0.2-3mg/m³</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
<tr>
<td>2</td>
<td>Waste liquid</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a</td>
<td>Daily activities of construction workers (50 persons)</td>
<td>Domestic waste water: 5m³/daily</td>
<td>- Surface water</td>
<td>In the construction area</td>
<td>See more details in 3.1.2.1.b</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Underground water</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b</td>
<td>Water pumped from the foundation holes of equipment</td>
<td>turbid water</td>
<td>- Surface water</td>
<td>In the construction positions of tower foundations of the connection line to the</td>
<td>&quot;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Chapter 3: Environment Impact Assessment

#### No. | Source | Waste | Impacted objects | Position of impact | Note
---|---|---|---|---|---
3 | **Solid waste** | | | | |
3a | Daily activities of construction workers (50 persons) | Domestic solid waste: 12.5-15kg/day/substation | - Soil environment - Air environment - Natural landscape | In the construction position of bay extension at the substation | See more details in 3.1.2.1.b
3b | Due to the construction of the bay extension and the connection line of 50 construction workers. | Hazardous waste: 5-6kg/day | - Soil environment - Air Environment - Workers | The construction position of the bay extension at the substation |

### III Operation phase

1. Waste is not arisen in this phase.

*Source: PECC3, December, 2012*

**Table 3.2: Impact source and impacted objects and level unrelated to waste**

<table>
<thead>
<tr>
<th>No.</th>
<th>Source</th>
<th>Impact</th>
<th>Impacted objects</th>
<th>Impact Level</th>
<th>Position of impact</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Pre-construction Phase</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Clearance</td>
<td>- Changing land use purpose; - Require permanently partial land for building the bay extension at the substation and tower foundations of the connection line (19.200m²); - Cutting trees (5,160m³); - Cutting crops on the permanent required land (1,550 m²).</td>
<td>- Land, houses, trees, crops (Table 3.3, 3.4, 3.5, 3.6, 3.7, 3.8) - Social Economy - Biological Resource, Biodiversity</td>
<td>Low</td>
<td>within the project area</td>
<td>See more details in 3.1.1.2</td>
</tr>
</tbody>
</table>

<p>| II | Construction Phase | | | | | |</p>
<table>
<thead>
<tr>
<th>No.</th>
<th>Source</th>
<th>Impact</th>
<th>Impacted objects</th>
<th>Impact Level</th>
<th>Position of impact</th>
<th>Note</th>
</tr>
</thead>
</table>
| 1   | The construction of bay extension at the substation and tower foundations of connection line | - Soil erosion  
- Increase turbidity of surface water  
- Causing traffic interruption  
- Accidents at work  
- Traffic accidents | - Change land use purpose  
- Surface water  
- Traffic system  
- Local people  
- Workers | Low          | In the construction position of bay extension and tower foundations | See more details in 3.1.2.2                                                  |
| 2   | Clearing the safety corridor (ROW)                                     | Cutting trees in the safety corridor (ROW)                           | Ecological environment (natural vegetation)                                      | Moderate     | In the ROW of the whole connection line                                            |
| 3   | transportation of equipment, machinery and raw materials (See Table 3.11 about transportation quantity) | - Increasing pressure on public transport systems:  
- Increase the density of vehicles in traffic  
- Increase risk of causing damage, surface subsidence, etc. (when transportation of equipment, machinery and raw materials overloaded, oversized, etc.) | Highways, local roads | Low       | Highways, local roads                                                            |
| 4   | Construction operation                                                 | Noise <70dBA                                                         | - Local people  
- Workers | Moderate     | In the construction area                                                   |
| 5   | Installing steel towers and stretching cables                          | - Causing traffic interruption  
- Accidents at work                                                   | - Local traffic system  
- Construction workers | Moderate     | In the connection line                                                      |
<p>| 6   | Gathering                                                              | - Immigration                                                        | - Soil | Moderate     | Mainly in                                                                       |</p>
<table>
<thead>
<tr>
<th>No.</th>
<th>Source</th>
<th>Impact</th>
<th>Impacted objects</th>
<th>Impact Level</th>
<th>Position of impact</th>
<th>Note</th>
</tr>
</thead>
</table>
| workers (50 persons in the peak period) | - Spreading disease  
- Conflict between construction workers and local people  
- Fire hazard, vibration | environme nt  
- Water Environme nt  
- Natural landscape  
- Public Health  
- Socio-Economic Environme nt  
- Biological resources, forest and wildlife  
- Culture, society and economy in local  
- Public Health Care | | the construction sites | |
| 7 | Mines, bombs remaining after the war | Explosion, vibration | - Local people  
- Workers | Low | In the construction sites | |
| **III Operation phase** | | | | | |
| 1 | Weather incidents (wind, lightning, floods, storms, etc.) | - Cable broken  
- Electrical leakage  
- Tower fallen  
- Corona discharge phenomenon | - Local people  
- Workers of maintenance | Low | In the place where weather incidents occur | See more details in 3.1.3.2 |
| 2 | Repairing and maintaining the ROW | To the trees lying in the ROW, cutting trees and pruning branches if they are taller than the allowable height | - Biological Resources, Biodiversity | Low | In the positions of maintenance | |

*Source: PECC3, December, 2012*
3.1.1 Impact Assessment in the pre-construction phase

3.1.1.1 Impacted Objects related to waste
Waste is not arisen in this period.

3.1.1.2 Impacted Objects unrelated to waste
Clearance in the pre-construction phase can cause the following impacts:
- Land acquisition for building the substation, access roads, tower foundations;
- Perform grounding for roof or renovation for houses/structures lying in the ROW;
- Cutting trees and crops on land required permanently;
- Cutting trees in the ROW for construction;
- Reducing ability of using land/buildings/structures in the ROW;
- According to the preliminary survey results in December, 2012 the project construction can cause the following effects:
  • Bay Extension at the Quang Ninh 500kV substation:
    - Area of permanently acquired land is 17,650m²;
    - There are 5 households (25 people) located in the construction land for bay extension at the substation to be relocated;
    - Cutting trees within the extension area: 6,355 trees.
  • Connection line with the Quang Ninh 500kV substation:
    - Area of permanently acquired land is 1,550m²;
    - Compensation and support for temporarily affected land due to its position located in the ROW with 42.840m² area;
    - There is one household (5 persons) whose house is located in the construction land for the 500kV connection line to be relocated;
    - Cutting trees located in the ROW to stretch cables and to clear for space for construction: 598 trees.

According to the survey results and the inventory of losses in the Investment Project, total land area affected by the project is 62,040m². Where, the land occupied permanently for construction of the bay extension at the Quang Ninh 500kV substation and tower foundations is 19,200m² and the temporarily occupied land is 42,840m².

Table 3.3: Total area of affected land

<table>
<thead>
<tr>
<th>No.</th>
<th>Affected area</th>
<th>Permanently affected land</th>
<th>Temporarily affected land</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Land for bay extension at the Quang Ninh 500kV substation</td>
<td>17,650</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 3.4 Inventory of permanently affected land

<table>
<thead>
<tr>
<th>No.</th>
<th>Categories</th>
<th>Bay extension at the substation</th>
<th>Connection line</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Residential land</td>
<td>250</td>
<td></td>
<td>250</td>
</tr>
<tr>
<td>2</td>
<td>Agricultural land</td>
<td>16,400</td>
<td>1,550</td>
<td>17,950</td>
</tr>
<tr>
<td>3</td>
<td>Public land</td>
<td>400</td>
<td></td>
<td>400</td>
</tr>
<tr>
<td>4</td>
<td>Pond, stream, river</td>
<td>580</td>
<td></td>
<td>580</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>17,650</strong></td>
<td><strong>1,550</strong></td>
<td><strong>19,100</strong></td>
</tr>
</tbody>
</table>

Source: Report of Compensation and Resettlement Plan prepared by PECC3 in December, 2012

Note: These quantities were investigated in the preliminary survey period (December, 2012), they will be corrected precisely in the detailed measurement survey period after setting up landmarks.

Table 3.5 Total number of affected houses/structures

<table>
<thead>
<tr>
<th>No.</th>
<th>Province/District/commune</th>
<th>Houses/structures to be relocated (unit)</th>
<th>House grade 4</th>
<th>House grade &lt; grade 4</th>
<th>Temporary house</th>
<th>Piggery (waste)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Bay Extension at the Quang Ninh 500kV substation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Thong Nhat commune, Hoanh Bo district</td>
<td>3</td>
<td>0</td>
<td>2</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td><strong>500kV connection line with the Quang Ninh 500kV substation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Thong Nhat commune</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>
### Chapter 3: Environment Impact Assessment

#### No. Houses/structures to be relocated (unit)

<table>
<thead>
<tr>
<th>No.</th>
<th>Province/District/commune</th>
<th>Houses/structures to be relocated (unit)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>House grade 4</td>
</tr>
<tr>
<td></td>
<td>Hoanh Bo district</td>
<td></td>
</tr>
</tbody>
</table>

*Source: Report of Compensation and Resettlement Plan, PECC3, December 2012*

**Note:**

- *These quantities were investigated in the preliminary survey period (December, 2012), they will be corrected precisely in the detailed measurement survey period after setting up landmarks.*
- *At the time of the survey, affected houses and piggery lying the grounded corridor (18-60m) of the connection line at the Quang Ninh 500kV substation there was no signs of people living and production, so earthing cost will not be included in this report;*
- *Extension at the Hiep Hoa 500kV substation is located entirely within the existing station fence so it does not impact on any houses/structures;*
- *The connection line at the Hiep Hoa 500kV substation does not arise effect due to the 2nd circuit to be suspended, so it does not change the existing safety corridor.*

#### Table 3.6 Acquired land area of every household

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Type of land</th>
<th>Bay extension at the substation</th>
<th>Connection line</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Luu Thi Sen</td>
<td>Residential</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Agricultural</td>
<td>2,733</td>
<td>1,550</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Nguyen Thi Phuong</td>
<td>Residential</td>
<td>45</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Agricultural</td>
<td>3,125</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Nguyen Huu Tu</td>
<td>Residential</td>
<td>50</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Agricultural</td>
<td>2,567</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Ta Thi Canh</td>
<td>Residential</td>
<td>53</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Agricultural</td>
<td>2,350</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Nguyen Huu Manh</td>
<td>Residential</td>
<td>55</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Agricultural</td>
<td>2,900</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Nguyen Huu Linh</td>
<td>Residential</td>
<td>47</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>
Table 3.7: Improving houses/structures and grounding for roof and surrounding walls

<table>
<thead>
<tr>
<th>No.</th>
<th>Province/district/commune</th>
<th>Number of HH</th>
<th>House grade 4 (m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Quang Ninh</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.1</td>
<td>Hoanh Bo</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.1.1</td>
<td>Thong Nhat</td>
<td>1</td>
<td>75</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>1</td>
<td>75</td>
</tr>
</tbody>
</table>


Note:

These amounts were investigated in the preliminary survey period (December, 2012), and they will be corrected precisely in the detailed measurement survey period after setting up landmarks.

According to the survey result, in the grounded corridor (60m far from each outmost wire) there is 01 house with 75m² area to be supported by ground wire for safety.

The household will not need to be relocated, PMB will support fire-proof materials and ground wire for that household to exist safely.
According to the inventory of preliminary survey during the project design process (December, 2012), total number of households/people affected by the project are as follows:

**Table 3.8: Total number of households/people affected by the project**

<table>
<thead>
<tr>
<th>Total number of affected households</th>
<th>HH</th>
<th>Person</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Households have residential land, agricultural land which is required by the project</td>
<td>6 (*)</td>
<td>30</td>
</tr>
<tr>
<td>(a) Required land is less than 30% of the total area of the land holding</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>(b) Required land is from 30% to 70% of the total area of the land holding</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>(c) Required land is more than 70% of the total area of the land holding</td>
<td>3</td>
<td>15</td>
</tr>
<tr>
<td>2. Households have houses/structures on the acquired land and have to be displaced</td>
<td>6</td>
<td>30</td>
</tr>
<tr>
<td>3. Households have residential land, agricultural land located in the safety corridor</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>4. Households have houses/structures located in the safety corridor</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>5. Households have trees/crops which have to be cut down due to the project</td>
<td>5</td>
<td>25</td>
</tr>
</tbody>
</table>


**Note:**

*These amounts were investigated in the preliminary survey period (December, 2012), and they will be corrected precisely in the detailed measurement survey period after setting up landmarks.*

** Compensation for trees to be cut down**

All the trees are existing before the project implementation announcement if they have to be cut down for project construction so their owners will be compensated for their loss. Actual compensation unit price is specified in the support and compensation plan approved by the People's Committee of Quang Ninh province.

**Table 3.9 Total number of affected trees and crops**

<table>
<thead>
<tr>
<th>No.</th>
<th>Affected area</th>
<th>Category</th>
<th>Litchi</th>
<th>Cajuput</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bay extension at the Quang Ninh 500kV substation</td>
<td>205</td>
<td>6,150</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>The connection line with the Quang Ninh 500kV substation</td>
<td>35</td>
<td>725</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>240</td>
<td>6,875</td>
<td></td>
</tr>
</tbody>
</table>
Note:

These amounts were investigated in the preliminary survey period (December, 2012), and they will be corrected precisely in the detailed measurement survey period after setting up landmarks.

All crops are existing before the project implementation announcement if they have to be cleared for the project construction so their owners will be compensated for their loss. Actual compensation unit price is specified in the support and compensation plan approved by the People’s Committee of Quang Ninh province.

Impact on socio-economic environment:

For the bay extension at the Quang Ninh 500kV substation:

In the pre-construction phase for the bay extension at the Quang Ninh 500kV substation, the project needs to require land permanently with 17,650m$^2$ area, in which agricultural land is 16,400m$^2$, residential land is 250m$^2$, the remaining land includes transport land and land of streams.

For the connection line with the Quang Ninh 500kV substation:

Permanently required lands for the construction of tower foundations is on agricultural land with 1,550m$^2$ area, so the impact of the project on the economy is negligible.

In the process of compensation and ground clearance, the project owner will combine with the local authorities to implement the policy of compensation and assistance to households affected by the project.

3.1.2 Impact Assessment in the Construction Phase

3.1.2.1 Impacted objects related to waste

a. Impact on the air environment:

In the construction phase, ambient air quality will be impacted by transportation means, construction equipment, earthworking, and transportation of construction material. Major pollutants are dust, exhaust fume with CO, SOx, NOx, Hydrocacbon.

- Dust:

During the construction phase, the following main activities create dust to impact on the air environment such as (i) earthworking, backfilling for tower foundations and bay of the project; (ii) transportation, loading and unloading construction material and machineries.

The concentration of dust generated varies and depends on intensity of activities, micro-climate conditions, weather and soil characteristics. These activities will not occur continuously and concentration of building is not intense, include:

- Dust is arisen from earthworking activities for the project construction items.
- Earthworking activities for the project construction items are the main generation source of dust affecting quality of air environment.
- Dust is arisen from transport activities and process of loading and unloading construction materials (cement, soil, sand, stone, etc.), and machineries.
addition, when to the gathering place, the construction materials dumped off from a vehicle can create dust to impact on construction workers’ health and the surrounding environment.

**Table 3.10: Total volume of digging and filling**

<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
<th>Unit</th>
<th>Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Bay extension at the Quang Ninh 500kV substation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Digging for the substation ground</td>
<td>m³</td>
<td>13,643</td>
</tr>
<tr>
<td>2</td>
<td>Filling for the substation ground</td>
<td>m³</td>
<td>14,124</td>
</tr>
<tr>
<td>3</td>
<td>Digging for the outdoor distribution part</td>
<td>m³</td>
<td>8,381</td>
</tr>
<tr>
<td>4</td>
<td>Filling for the outdoor distribution part</td>
<td>m³</td>
<td>7,025</td>
</tr>
<tr>
<td></td>
<td><strong>Connection line with the Quang Ninh 500kV substation</strong></td>
<td></td>
<td><strong>49,650</strong></td>
</tr>
<tr>
<td>1</td>
<td>Digging</td>
<td>m³</td>
<td>3,528</td>
</tr>
<tr>
<td>2</td>
<td>Filling</td>
<td>m³</td>
<td>2,946</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td>m³</td>
<td><strong>49,650</strong></td>
</tr>
</tbody>
</table>

*Source: Report of Compensation and Resettlement Plan made by PECC3 in Dec-2012*

Dust emission coefficients due to excavation, levelling, loading and transport is shown in the following table:

**Table 3.11: Dust emission coefficients**

<table>
<thead>
<tr>
<th>No.</th>
<th>Cause of pollution</th>
<th>Estimated emission coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dust due to excavation and levelling activities and wind (sand dust)</td>
<td>$1 \div 100 \text{ g/m}^3$</td>
</tr>
<tr>
<td>2</td>
<td>Dust due to loading and unloading activities of construction materials (cement, soil, sand, stone...) and machines, equipment.</td>
<td>$0.1-1 \text{ g/m}^3$</td>
</tr>
<tr>
<td>3</td>
<td>Exhaust fume of transportation and execution means with dust, CO, hydrocarbon, SO2, NOx, etc. (lorry 3.5 – 16 tons, DO with S=0.5%)</td>
<td>Dust: 4.3 kg/ton DO, SO2: 0.1 kg/ton DO, NOx: 55 kg/ton DO, CO: 28 kg/ton DO, VOC: 12 kg/ton DO</td>
</tr>
<tr>
<td>4</td>
<td>Sand and soil scattered during material transportation process which can cause dust</td>
<td></td>
</tr>
</tbody>
</table>

*Source: Rapid assessment guide of WHO*

In the dust-generating activities, earth working is a major factor. With the amount of earth working of the project mentioned above, according to a rapid assessment document, the amount of dust generated by digging and leveling would blow up about $10 \text{ g/m}^3$ soil. The time of digging, filling and construction is approximately 6 months. With the affected area estimated to
be 3 times of the length of each side of the construction area and emission height of 30m, the average dust concentration per hour can be computed as follows:

At the position of the bay extension at the Quang Ninh 500kV substation:

\[ Q_{\text{Max dust}} = \frac{43,173 \times 10 \times 10^3 \text{mg/m}^3}{(6 \times 30 \times 24 \times 17,650 \times 3 \times 30^3)} \]

\[ = 0.06 \text{ mg/m}^3 < 0.3 \text{ mg/m}^3 \ (QCVN 05:2009/BTNMT) \]

At the position of the connection line with the Quang Ninh 500kV substation:

\[ Q_{\text{Max dust}} = \frac{6,477 \times 10 \times 10^3 \text{mg/m}^3}{(6 \times 30 \times 24 \times 1,550 \times 3 \times 30^3)} \]

\[ = 0.1 \text{ mg/m}^3 < 0.3 \text{ mg/m}^3 \ (QCVN 05:2009/BTNMT) \]

Dust volume arising from transportation and loading and unloading construction materials:

According to a number of domestic and foreign documents (Handbook of Emission, Non-industrial and Industrial sources, Netherlands; Air Environment, 1997 - Pham Ngoc Dang), when passing the 1,000 km distance, light vehicles (weight category < 3.5 tons) usually arise to 0.2 kg of dust; heavy vehicles (3.5 ÷ 16 tons) arise 0.9 kg of dust (i.e: 0.9g/km).

Volume of transport and transport distance are as follows:

The equipment and materials, which will be supplied by the PMB, will be stored in Danang and transported to the station with a distance of about 880km.

Sand, stone, cement, steel will be taken in the local area. Transport distance of these materials to construction sites is 20km, material transportation by motorized means, traffic roads grade 2.

**Table 3.12: Volume of transport and transport distance**

<table>
<thead>
<tr>
<th>No.</th>
<th>Items</th>
<th>Volume (m³)</th>
<th>Distance (km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sand, stone in several sizes</td>
<td>1,340</td>
<td>20</td>
</tr>
<tr>
<td>2</td>
<td>Concrete B15</td>
<td>1,576</td>
<td>20</td>
</tr>
<tr>
<td>3</td>
<td>Concrete B3.5</td>
<td>271</td>
<td>20</td>
</tr>
</tbody>
</table>

*Source: Investment Project, PECC3, Dec-2012*

- Estimated number of vehicles transporting materials (15 ton loading capacity):
  - Transport concrete:
    - \( (1,847 \times 1.5)/15\text{tons} = 185 \text{ trucks} \)
  - Transport sand, rock:
    - \( (1,340 \times 1.5)/15\text{tons} = 134 \text{ trucks} \)
- Estimated amount of dust generated by vehicles with maximum pollution load in 1 hour can be predicted as follows:
  - Transport concrete:
    - \( 0.9 \text{ g/km} \times 20 \text{ km} \times 185 \text{ truck/3,600} = 0.925 \text{ g/s} \)
  - Transport sand, rock:
Because the construction site is about 2 - 3km from road, so there is virtually no impact by dust due to traffic. In the residential areas and at the points where line crosses a road, dust is generated by stretching cables. However, because wire does not being dragged on the ground so the impact of dust concentration in this region is considered negligible. Dust arisen from material transport in/out the construction sites through aggregate roads between villages is paid attention and minimized. This effect is only temporary, not continuous along the length of the route and ends when construction is finished.

Calculation results show that the dust concentration in the construction site of Bay Extension at Quang Ninh 500kV and connection line is lower QCVN 05:2009/BTNMT (300 µg/m³), but dust also affect the health of workers and environmental quality in the project area. Therefore the project have to apply mitigation measures in Chapter 4 and this effect only occurs during earthworking, transportation, loading and unloading materials and terminates when construction is finished.

- **Exhaust gas:**
  - Operation of vehicle and construction machinery arises exhaust gas to the air environment including:
    - Welding fume;
    - Emission from transport means, construction machinery contains dust, CO, hydrocarbon, SO₂, NOx, etc. The construction means mainly comprise excavators of 3m³, dump trucks of 10 tons, etc.
    - During the construction process, the project can use a backup generator, so this would be a source of air pollution. The air pollutants include SO₂, NOx, CO, dust, VOC, etc.
    - Emissions primarily arise from the transportation means in the construction process. At a construction site there are 10 vehicles, average transport distance is 30-40 km/vehicle.hour, maximum number of operation hours is 8 hours. Thus the air pollution amount due to the emissions can be predicted in Table 3.13 below. Table of coefficients of air pollution dispersion for each type of vehicle are as follows:

\[
- 0.9 \text{ g/km} \times 20 \text{ km} \times 134 \text{ truck/3,600} = 0.67 \text{ g/s}
\]
Table 3.13: Coefficient of air pollution dispersion corresponding with type of vehicle

<table>
<thead>
<tr>
<th>Type of vehicle</th>
<th>SO₂ (kg/U)</th>
<th>NOₓ (kg/U)</th>
<th>CO (kg/U)</th>
<th>VOC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Light lorry, diesel engine less than 3.5 tons</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emission coefficient</td>
<td>1.16</td>
<td>0.7</td>
<td>1</td>
<td>0.15</td>
</tr>
<tr>
<td>Emission amount (g/s. vehicle)</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
<td>0.00</td>
</tr>
<tr>
<td><strong>Heavy lorry, diesel engine from 3.5 to 16 tons</strong></td>
<td>4.29S</td>
<td>11.8</td>
<td>6</td>
<td>2.6</td>
</tr>
<tr>
<td>Emission coefficient</td>
<td>0.05</td>
<td>0.13</td>
<td>0.07</td>
<td>0.03</td>
</tr>
</tbody>
</table>

Source: Rapid assessment guide of WHO

Note: S – Percent of sulphur in oil fuel, S = 0.2% ÷ 0.5%.

Based on emission coefficients in table 3.12 and number of vehicles, concentration of pollutants in exhaust gas is calculated according to Berliand method at point of 10m from the road as follows:

\[
C_{t,x} = \frac{10^3 \eta \cdot M \cdot B}{\sqrt{\pi}} \cdot \frac{M}{\sigma_y \cdot u \cdot x^{1-n/2}} \cdot e^{-H^2 / \sigma_z^2} \cdot e^{2-n}
\]

Where:
M – Unit mass of pollutant of road source, g/s.m
H – height of road source compared with the ground surface, H = 1m
x, y – Coordinates; x=10m and y=0
u – Wind velocity, m/s
\( \sigma_y, \sigma_z \) – Diffusion coefficients according to horizontal and vertical directions, in the normal condition \( \sigma_y = \sigma_z = 0.05 \)
n – Coefficient involved in change of climate condition, temperature corresponding with height. For road source with a low height, n = 0
B – Coefficient is calculated from the following formula:

\[
B = \text{erf} \left( \frac{y + \frac{L}{2}}{\sigma_y \cdot x^{1-n/2}} \right) - \text{erf} \left( \frac{y - \frac{L}{2}}{\sigma_y \cdot x^{1-n/2}} \right)
\]

\( \eta \) - Coefficient is based on time of measuring environmental parameters

\[
\eta = 1 + \frac{5 - \Delta \tau}{2 \Delta \tau^{0.9}}
\]

\( \Delta \tau \) - Sampling time, NOₓ and SO₂ : \( \Delta \tau = 20 \) minutes
CO : $\Delta \tau = 5$ minutes

Calculation result is as follows:

Table 3.14: Concentration of pollutants in the area

<table>
<thead>
<tr>
<th>No.</th>
<th>Area</th>
<th>Number of vehicles used in the area</th>
<th>$SO_2$ (mg/m$^3$)</th>
<th>$NO_x$ (mg/m$^3$)</th>
<th>CO (mg/m$^3$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bay extension at the Quang Ninh 500kV substation</td>
<td>8</td>
<td>0.02 $\div$ 0.3</td>
<td>0.001$\div$0.023</td>
<td>0.2 $\div$ 3</td>
</tr>
<tr>
<td>2</td>
<td>Tower foundations of the connection line with the substation</td>
<td>2</td>
<td>0.007 $\div$ 0.1</td>
<td>0.001$\div$0.007</td>
<td>0.07 $\div$ 1</td>
</tr>
<tr>
<td></td>
<td>QCVN 05:2009/BTNMT (average one hour)</td>
<td></td>
<td>0.35</td>
<td>0.2</td>
<td>30</td>
</tr>
</tbody>
</table>

*Source: Investment Project, PECC3, Dec-2012*

Impacts on air environmental quality due to emission gas such as $NO_x$, $SO_2$, CO, etc... from construction activities are locally impacts (within construction and surrounding areas). Data measured shows that all emission gas are in allowable limits compared with QCVN 05:2009/BTNMT. Thus, the impacts mainly affect workers’s health and only occur in the construction phase.

Air pollution and dust caused by construction activities for the connection line will impact on health of the construction workers, especially diseases related respiratory system. However, the construction site is far from the residential areas, so there is no impact on the local people as well as ecosystem in the project area.

b. Impact on the water environment:

Sources of waste water generated in the construction process of the project are mainly domestic wastewater of the construction workers (maximum number of workers is 50 persons in the peak period, mainly gathering in the substation area).

Number of construction workers in the project area depends on the construction phase and construction means: digging, backfilling and pouring concrete at station locations (30 $\div$ 40 persons); fastening steel rods, installing steel towers in foundations (5 $\div$ 10 persons).

According TCXD 33-2006 of Ministry of Construction, amount of water supplies for 1 person is 120 litter/person/day. The amount of domestic wastewater of 1 people is estimated as 80% of the amount of water supplied.

At the bay extension at the Quang Ninh 500kV substation:

40 Workers x 80% x 120 litter/person/day = 3.84 m$^3$/day.

At tower foundations of the connection line with the Quang Ninh 500kV Substation:

10 Workers x 80% x 120 litter/person/day = 0.96 m$^3$/day.

Therefore, volume of domestic wastewater will be generated at the project area is about 5m$^3$/day.
Components of domestic wastewater include suspended matters, grease, high concentration of organic matters, sediments, dissolved organic matters (via criterion such as BOD$_5$, COD), nutriments (Nitrogen, Phosphor) and micro-organism. The characteristics of domestic wastewater are presented in the following table:

**Table 3.15: Concentration of pollutants in domestic wastewater**

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Unit</th>
<th>Concentration of pollutant</th>
<th>QCVN 14:2008/BTNMT (column B)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>untreated</td>
<td>treated by septic tank</td>
</tr>
<tr>
<td>pH</td>
<td>mg/l</td>
<td>5-9</td>
<td>5-7</td>
</tr>
<tr>
<td>BOD$_5$</td>
<td>mg/l</td>
<td>450-540</td>
<td>100-200</td>
</tr>
<tr>
<td>SS</td>
<td>mg/l</td>
<td>700-1,450</td>
<td>80-160</td>
</tr>
<tr>
<td>Nitrat (NO$_3^-$)</td>
<td>mg/l</td>
<td>50-100</td>
<td>20-40</td>
</tr>
<tr>
<td>Total coliform</td>
<td>MPN/100 ml</td>
<td>106-109</td>
<td>reducible</td>
</tr>
</tbody>
</table>

*Source: Wastewater Treatment, Hoang Hue - 1996*

*Note: Column B - Domestic wastewater discharges into water sources unused for domestic purposes.*

Thus, quality of domestic wastewater exceeds permitted standards (QCVN 14:2008/BTNMT, column B) if not treated it can cause deterioration of river water quality and disease could spread to the local inhabitants.

For pumped water from the pits: Water from the pit (if any) overflows on the ground, this amount of water does not affect the production and daily life of local people. To ensure safety, location of tower foundations are usually designed far from rivers, streams, canals and intersection positions.

In addition, rainwater flows through the construction area, sweeps soil, grease and other impurities to create a source of pollution.

c. **Impact due to solid waste:**

Solid waste generated during the construction phase includes construction waste and domestic solid waste of labors.

- Construction waste: consists of construction material refuse such as scrap-iron, scrap-steel, brick, stone, cement, etc. This quantity of waste is estimated approximately 200kg per day. This waste will be not discharged into the environment but reused to backfill (brick, stone, etc.) or reused, or sold to scrap dealers (scrap-iron, scrap-steel, etc.).

In general, most of construction solid waste will be collected to reuse or sold to scrap dealers, therefore, impact of this kind of waste is insignificant.

- Domestic solid waste

Centralization of a crowd of construction workers during a long period will generate a big quantity of domestic solid waste from 12.5 – 15 kg/day (estimated average from 0.25 to 0.35kg/person/day x 50 workers). Main components of domestic solid
waste include:
- Compounds originate from organic matters such as vegetables, leftover food, etc.;
- Kinds of packages, food and drink wraps, etc.;
- Inorganic compounds such as plastic, glass, etc.;
- Metal such as food cans, etc.

- Hazardous solid waste:
  Hazardous waste includes: wipers stained with grease, oil cans, etc… which are generated not much (approximately 5 – 6kg/day) during the construction phase of bay extension at the substation and the tower foundations,

Every day, solid waste is collected, concentrated and sorted at the waste collection area. Every week, Ha Long - Quang Ninh Urban Environment joint stock company will transport wastes to the sanitary treatment place so the impact of this waste is considered small. For hazardous waste, the project owner will contract with a competent organization for collection, transportation and disposal according to regulations.

Construction workers are arranged in the hostels rent by the building contractors in the residential areas. These areas have all necessary sanitary conditions. Therefore, the impact of domestic waste is considered negative but small and can be minimized. However, the contractor should apply measures to manage and supervise the sanitary conditions in each worker team during the construction process.

### 3.1.2.2 Impacted objects unrelated to waste

#### a. Impacts due to noise and vibration:

In the construction process of tower foundations and compartment, the main source of vibration arises from construction machinery and heavy trucks transporting raw materials. Heavy trucks can generate vibration and affect houses along the transportation route of materials. However, because there are not many trucks used (about 5 trucks at construction site of compartment), so the impact of vibration generated by vehicles is considered small.

During the project construction phase, noise pollution can be caused by:

- Due to the feature of the construction work of the project, pile foundations should be reinforced firmly so noise and vibration arisen from the equipment is quite high.
- The equipment, construction machinery (bulldozers, concrete mixers, excavators, compressors etc.).
- Vehicles transport the equipment and materials.

<table>
<thead>
<tr>
<th>No.</th>
<th>Equipment</th>
<th>Noise level at distance of 15m (dBA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hooter</td>
<td>90</td>
</tr>
<tr>
<td>2</td>
<td>Bulldozer</td>
<td>93</td>
</tr>
<tr>
<td>3</td>
<td>Compressor</td>
<td>72 – 88</td>
</tr>
</tbody>
</table>
Refer to the above table, it is estimated that noise level caused by construction machines and equipment can reach to 70 – 96 dBA within 15m in distance.

Level of impact can be estimated based on the following formula:

\[ P_1 - P_2 = 20 \log \left( \frac{D_2}{D_1} \right) \]

Where:

- \( P_i \): level of noise at the distance \( i \) (dBA)
- \( D_i \): Distance from noise source to received point (m)

Maximum noise level, which is caused by horns of car/van and from operation of bulldozers, excavators, compressors, etc., at locations from the residential area to the construction site about 500m, could be calculated as below:

\[ P_{500} = 96 - 20 \log(500/15) = 65.5 \text{ dBA} \]

Most of noise level is lower than the permissible standard at the residential area (from 6:00 to 18:00) according to QCVN 26:2010/BTNMT (70 dBA).

Besides, location of the project is far from the resident area so impact of noise and vibration from the construction equipment is small. In addition, the equipment only operates during the daytime and the project owner also implements the mitigation measures so this impact is considered small, short term, can be controlled and minimized.

Thus, general noise level due to the construction machinery at the construction area can be predicted about 70÷96 dBA. In case labors who have to work with the equipment creating big noise, they will be provided the protection equipment and the project owner needs applying protection measures that are proposed in chapter 4.

b. Impact on public transport:
- Increase the density of vehicles on Highway No.326 and Highway No.337 and the country roads (near the project construction site).
- Increasing risk of damage, road surface subsidence, etc., (when transporting overload and/or oversized equipment, machines and raw materials, etc.).
- Risk of traffic accidents.

The project construction needs using provincial highways including Highway No.326 and Highway No.327 and the country roads as temporary roads to transport construction materials, however the transport operation of motor vehicles on the roads can increase degradation speed of roads and contribute to damage roads especially during the rainy season, the local traffic activities become more difficult.

The process of transporting materials could cause traffic accidents for travelling people. However, construction contractors have to use workers and drivers who have
long year experience to participate in traffic at the time when the roads are clear, so the impact of traffic accidents will be minimized.

c. **Impacts on military zone and historical and cultural monument:**

The project location of bay extension at the substation is adjacent to the existing substation, its surrounding area is agricultural land and only a few HHs are living here, besides there is no military zone and historical and cultural monument in this area.

d. **Impacts due to concentration of construction workers:**

Infectious disease can spread from construction workers to local people and vice versa in unsanitary conditions and daily contact. This impact is considered minor because there is one medical station in every commune where construction workers concentrate, moreover they are propagated prevention knowledge of infectious diseases.

Conflicts between construction workers and local inhabitants will not happen in the project area because most of the construction workers are from the local people, who have knowledge about customs and habits of the local inhabitants.

On the other hand, due to the presence of the construction workers, culture and health in the project area is improved better by the help of active workers for the local people. However, due to short construction period so these impacts can be assessed as positive but small.

For the construction team, the contractors directly prepare the strict regulations and management measures, all employees must abide by these rules. Thus, concentration of the construction workers will not cause much effects on social order.

Due to the feature of the work, the main tasks of the project construction have to be done by the professional staffs of trained technical expertise from the electric construction company, who should not be replaced by the local labors. However, number of tasks such as excavation and transportation of soil, stone, construction materials, etc. can provide temporary jobs for the idle labors in the local area.

e. **Impact of waste transport to the disposal place**

Balance volume in the digging - filling process of expanding the station is 1,457m$^3$ but in fact there is not much excess soil due to compaction during filling process (compaction coefficient $K = 1.1$), balance mass will be pretty smaller. In case there is excess soil which will be used to reinforce existing station foundation or given to the local people who need to raise the floors, etc. The project owner undertakes not to dispose waste indiscriminately in the public areas to affect people.

### 3.1.3 Impact Assessment during the Operation Phase

3.1.3.1 **Impacts related to Waste**

During the operation phase, the project almost does not generate waste.

3.1.3.2 **Impacts unrelated to waste**

a. **Impacts due to noise and vibration**

During the operation phase, the project almost does not generate noise and vibration.

b. **Impacts on Natural Environment**
Impact on the public traffic: Although the project is located near the country roads, but in the operation phase, maximum number of workers is only about 30-50 persons working in the station. Therefore, the project will not much affect the public traffic in the local area.

The project will not affect military works, nature reserve, historical and cultural relics and temples.

c. Impacts on Ecological Environment

Before the project is put into operation and during the operation phase, plants in the ROW will be cut down to ensure the safety distance. However, the project does not go through the natural forest or other sanctuary.

Operation of the bay extension at the Quang Ninh 500kV substation and the connection line will not affect aquatic ecosystems because the volume of waste oil from maintenance operations is very little; furthermore volume of waste oil is collected entirely. Therefore, effects on biological resources will not occur;

Operation of the bay extension at the Quang Ninh 500kV substation and the connection line will not disturb the bird habitat in the project area.

d. Impacts of Electromagnetic Field on public health

According to Electricity & Life Magazine, September, 2007, when electromagnetic intensity exceeding the permitted criteria and time can cause a number of effects on human health as follows:

Thermal Impact

The first manifestation of the electromagnetic energy impact is the heat, which can lead to change, even damage to cells and tissues of living organisms. Energy absorption mechanism is really complicated. When the body absorbs electromagnetic energy which exceeds the permitted regulations and make the body be overheated that leads to change pulse or heart rate and capillary reaction.

Impacts cause neurological disorders

Along with thermal effects, electromagnetic field also adversely affect nervous system. Electromagnetic field impact on the human body is expressed in dysfunction of central nervous system including feelings: increased fatigue, headaches, poor mood, irritability, etc.

Impact on the circulatory system

Electromagnetic field causes dysfunction of cardiovascular and metabolic systems. The long-term effects of electromagnetic field can cause angina phenomenon. Radiation of electromagnetic energy can cause changes in blood pressure: slow pulse leading to fatigue, headaches, etc.

Electrostatic Effects

Along with the biological effects, electromagnetic field can also create charge appearance between a human body and metal items having the different voltages. The contact of the human body, that disconnects with the ground, with metal elements earthed will lead to the phenomenon of electrical transmission from the human body to the ground, which can cause pain especially at the beginning. Sometimes this contact can occur discharges. In case of contact with long metal
Other Impacts

Ultra high frequency electromagnetic field can cause effects on eyes leading to cataracts. The level of biological effects of electromagnetic field on the body depends on oscillation frequency, intensity and duration. Under the influence of electromagnetic fields, the human body can recover in general. In addition to the negative impact to the human body, electromagnetic field has disinfecting effect when the radiation intensity exceeds heat threshold.

Calculation of electromagnetic intensity:

a. Standards of electric field intensity

According to the electricity industry standard "allowed level of electric field intensity with industrial frequency in the workplace" were issued together with Decision No.183 NL/KHKT of the Ministry of Energy dated April 12th, 1994, time t (hours) that allows people to be affected directly by electric field, depends on the electric field intensity (E) as follows:

- $E > 25 \text{kV/m}$, $t = 0$
- $20 < E \leq 25 \text{kV/m}$, $t = 1/6$
- $5 \leq E \leq 20 \text{kV/m}$, $t = (50/E)-2$
- $E < 5 \text{kV/m}$, unlimited time

<table>
<thead>
<tr>
<th>Electromagnetic intensity $E$ (kV/m)</th>
<th>$&lt; 5$</th>
<th>5</th>
<th>10</th>
<th>15</th>
<th>18</th>
<th>20</th>
<th>25</th>
<th>$&gt; 25$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permission exposure duration</td>
<td>&gt; 8h</td>
<td>8h</td>
<td>3h</td>
<td>1h</td>
<td>45’</td>
<td>30’</td>
<td>10’</td>
<td>0</td>
</tr>
</tbody>
</table>

Thus, the influence scope of electric field is the space in which the electric field intensity with industrial frequency is $\geq 5 \text{kV/m}$. For the people living under the transmission line, allowed electric field intensity which does not affect health is $< 5 \text{kV/m}$.

b. The factors affecting electromagnetic intensity

- The distance from the conductor to the ground.
- Geometric diagram laying out conductors on tower: phase distance, number of circuits, laying out conductor horizontally, vertically, triangularly, etc.
- Arrange phase sequences: double circuits put in positive phase, opposite phase.
- Cross section of conductor, number of conductor/phases.
- Number of earth wire on towers, distance between conductor and earth wire.

c. Calculation method

PECC3 used the electromagnetic transient program (EMTP) to calculate the electromagnetic intensity under the high voltage transmission line. Chart of electromagnetic field intensity at point of 1 meter height above the ground is shown in the figure below.
Where:
- Vertical axis: Electromagnetic intensity \( E \) (kV/m)
- Horizontal axis: horizontal distance (m) of the TL. Coordinate \( X=0 \) (m) at the center of the TL.

The curve on the safe distance from the conductor to ground (\( H_{at} = 12\text{m}; 13\text{m}; 14\text{m}; 15\text{m}; 16\text{m} \) and 23m).

d. Results:

![Figure 3.1 Electromagnetic intensity distribution of the 500kV T/L at point of 1 meter height above the ground (two circuits are arranged in the positive phase)](image-url)
From the chart above shows that the electric field intensity of the transmission line that meets the current regulations is ≤5kV/m so the safe distance from the conductor to the ground must be ≥16m. Thus according to the diagram of electric field intensity distribution, in the project of "Overhead Line Bay Extension at Quang Ninh 500kV substation and Hiep Hoa 500kV substation", the designed safety distance from the conductor to the ground is ≥16 m.

Impact of electromagnetic fields on the radio communication system

The communication systems affected include communication lines going near or crossing line and the centers of radio transceivers. However, the 500kV connection line does not go through any radio stations so it does not cause impact on the radio communication system either.

Impact on socio-economic environment

When the project is under construction and put in operation, the main object affected by the project activities is the socio economy of Thong Nhat commune in particular and Quang Ninh province in general.

Service roads:

In the construction for expanding the substation, the project will use the existing
traffic roads which will be strengthened to facilitate the construction as well as after the construction completed these roads will be advantageous for the local people using. The project owner ensures the renovated roads will be more steady than the existing roads and the construction plan of these roads will not cause the traffic interruption of the local people.

**Impacts on Human and Animals**

Human and animals are subjects to the impact of factors related and unrelated to waste. Due to human and animals living in the natural environment and directly affected by the natural elements, therefore, if the environment is contaminated so human suffers the effects of pollution and related activities. In addition, unlike other creatures, human is also affected by the socio economy, so when the project activities have impacts on the socio economy but at the same time they also impact directly on human.

**The main impacts**: directly impact on health and spirit of human and on animals in the area.

**Affected scope:**

- **Affected space**: is the space surrounding the bay extension at the substation and the safety corridor of the connection line, in this case, that is staffs working directly in the existing substation area, the local people and animals living along the safety corridor.

- **Impacted time**: is the duration in which hazardous waste, electromagnetic field arisen from the project affect the habitat of people and animals in the project area.

**g. Impacts due to the clearance process for the ROW:**

- Process of cutting trees outside the ROW has the potential to cause falling trees into line, breaking power lines, damage to power line system or fire,... dangerousness for people living in the surrounding area of the transmission line.


- During the operation phase, transmission line may be sagged or broken due to fallen surrounding trees so high trees outside the safety corridor that have ability to fall into line must be cut. Also, around trees outside the safety corridor must be trimmed if the distance between trees and the lines is not guaranteed for safety.

- At the same time, trees located in the ROW must be cleared periodically during the operation phase.

**3.1.4 Impacts of risks and incidents**

**3.1.4.1 In construction phase**

**a. Accident at work**

Due to a big quantity of construction so accidents at work easily occur, so the problem of labor accident is considered from the beginning and safety measures must be strictly done during the construction phase. The highest risk of labor
accidents often occur in the construction phase related to the installation of equipment on high positions, oversized or overweight equipment.

Labour accidents can occur for construction workers in the construction area near the large load machines, cranes and foundation holes. When construction works are well managed, safety regulations are strictly obeyed, workers are equipped with adequate labor protection means with high quality, the impacts can be minimized.

At the same time, the experience of the professional building contractors, along with strict adherence to safety regulations during construction as well as closely monitoring and timely rescue can minimize loss of life and property.

b. Fire hazard, explosion

Environmental incidents in the construction phase are also implicit in the fuel depots. Ability of leakage and explosion can happen when there is a problem associated with the construction activities such as soldering or short circuit, which is a common cause of fire in construction sites. So safety measures for the storehouses need to be strictly implemented and tightly controlled.

The construction methods do not use explosives but only use manual labors cooperating with motorized means. So, fire safety is guaranteed. However, the fire possibility due to use of a stove or butts of construction workers is a potential risk for fire safety issues during the construction phase in the dry season.

c. Risk from the residual mines after the war

In the pre-construction phase, the investors hired specialized units to dispose residual mines after the war so there is no impact by residual mines in this project area.

Overall, during the construction phase, the project will not cause significant negative impact on the natural environmental quality. The project will not use or discharge any toxic substances into the environment. However, the impact on the socio-economic environment of the project construction is substantial by land acquisition. However, in the pre-construction phase, the compensation program has been researched and implemented to comply with the current regulations of Vietnam.

3.1.4.2 In operation phase

a. Risk of Fire and explosion

Risk of fire and explosion in the project area can also be caused by electrical incidents, lightning stroke. Risk of fire in the project area is potentially huge so the project must have active plan to prevent this incident.

The cause of fire incidents:

- Transportation of flammable liquids such as gasoline, oil through thermal source or near sparks.
- Employee's carelessness throwing butts on the oil or combustible fuel storage;
- Incidents such as electrical leakage, exploded fuses, etc.

If a fire occurs, it will cause huge damage to people, property and the environment. Therefore, the project owner must implement safety measures including prevention
and fighting fire and electrical safety.

**b. Landslide Risk**

According to the survey, flooding and landslides has not happened in the substation construction area yet. In addition, the tower foundations were dug to guarantee depth and the regional geological condition is considered carefully in design, so impacts due to floods and landslides are not here.

### 3.2 COMMENTS ON DETAILED LEVEL, RELIABILITY OF ASSESSMENT

Environmental impact assessment methods are used in this report including:

- **Methods using experts and forecasts**

  Before implementation of the project construction and operation, some impacts need to be predicted based on the similar projects, practical tests and computation tools with consultancy of experts. From prediction results, the impacts will be classified and appropriate mitigation measures will be proposed.

  This method is based on a theoretical basis and experiences to speculate and predict possible impacts. On that basis, impacts of the project on the environmental quality will be considered.

  This method is subjective, result depends on the level of awareness and professional skill of experts.

- **Statistic method and data processing**

  Implementing field investigation at communes where the project will be built. Collecting data by questions in field investigation, direct interviews, etc.; Working with relevant responsible agencies in environmental management for the project such as Department of Natural Resources & Environment, and Natural Resources & Environment office at districts where the project will be implemented.

  After collecting, these data will be evaluated by many methods such as descriptive statistics, deductive statistics, evaluation and test, etc. and processed to analyze data to investigate environmental factors (such as land, water, air...) for the analysis of environmental status and EIA.

  The method was verified and standardized. Results can take random error.

- **Map method**

  Using maps to determine project location, scope and impact levels.

  This approach requires a relatively large number of input data and complicated processing skills. This approach provides results intuitive, both qualitative and quantitative.

- **Rapid assessment method**

  This method was issued by the World Health Organization (WHO) in 1993. The basis of rapid assessment method is based on nature of materials, technologies, laws of natural processes and experience to identify and calculate pollution parameters.

  This method gives a limited result in case parameters and information about the profession, activity is limited. In this report, there are a lot of data about waste...
mass (exhaust gas, wastes, etc.) in the construction phase (earthworking, transportation, etc.) which are estimated based on assumptions of impact scope, climatic conditions, etc. In fact, climate conditions are varying, so that quantitative data about pollution mass can not reach 100% accuracy.

- Comparison method

Based on the survey and measurement results in the field, analysed results in laboratory and theoretical calculation results will be compared with the Vietnam criteria to determine the quality of the environment in the project construction area. Refer to the documentation of the similar projects in scale which were made in the country and in the area where the project going through.

These methods have been studied and published in many specialized documents. They have high accuracy, which provide adequate necessary information for evaluating and forecasting environmental impact, make a pretty solid basis for building environmental monitoring programs in the construction and operation phases of the project.

The assessment in the EIA report is quite accurate because it was based on the solid basis, the specialized technical documentations of the professional units in the country and abroad.

The assessment methods and mitigation measures are selected and based on the actual operation of the similar plants so it has feasibility and achieves high efficiency.

**Table 3.17: Reability of the EIA methods**

<table>
<thead>
<tr>
<th>STT</th>
<th>EIA method</th>
<th>Level of reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Forecast and expert method</td>
<td>High</td>
</tr>
<tr>
<td>2</td>
<td>Statistic and data processing method</td>
<td>High</td>
</tr>
<tr>
<td>3</td>
<td>Map method</td>
<td>High</td>
</tr>
<tr>
<td>4</td>
<td>Rapid assessment method</td>
<td>Medium</td>
</tr>
<tr>
<td>5</td>
<td>Comparison method</td>
<td>High</td>
</tr>
</tbody>
</table>
CHAPTER 4

MEASURES FOR PREVENTING AND MITIGATING ADVERSE IMPACTS, ENVIRONMENTAL INCIDENT RESPONSE

Correspondence with environmental impacts are defined in chapter 3, mitigation measures for adverse impacts will be carried out as follows:

4.1 MEASURES FOR PREVENTING AND MITIGATING ADVERSE IMPACTS DUE TO THE PROJECT

4.1.1 In Pre-construction Phase

4.1.2 Mitigation measures related to waste

Waste is not generated in this phase.

4.1.2.1 Mitigation measures unrelated to waste

Minimizing adverse impacts due to site clearance

The project owner will combine with Compensation Committee to execute compensation and support polices for the project affected households. Unit price of compensation and assistance will be submitted by District Compensation Committee to the People's Committee of Quang Ninh province for approval.

Legal basis for building of policies including clearance, compensation, support are applied as follows:

- Decree No.197/2004/ND-CP dated December 03rd, 2004 on the compensation, assistance and resettlement in case of land acquisition by the State;
- Decree No.69/2009/ND-CP dated August 13th, 2009 of the Government on supplemental regulations on land-use planning, land prices, land acquisition, compensation, assistance and resettlement;
- Decree 81/2009/ND-CP dated October 12th, 2009 of the Government on amending or supplementing a number of articles of the Government’s Decree No. 106/2005/ND-CP dated August 17th, 2005, which details and guides a number of articles of the Electricity Law regarding the safety protection of high-voltage power grid.
- Decision No.499/2010/QD-UBND dated February 11th, 2010 of the People's Committee of Quang Ninh province enacted regulations on compensation, support and resettlement in case of land acquisition by the State;
- Decision No.4166/2011/QD-UBND dated December 26th, 2011 of the People's Committee of Quang Ninh province regarding regulations on land prices within Quang Ninh province in 2012;
- Decision No.398/2012/QD-UBND dated February 27th, 2012 of the People's Committee of Quang Ninh province issued compensation unit price for assets invested in land when the State recovers land within Quang Ninh province;

The project owner and Compensation Committee will carry out the following works:

- Measurement of land area;
- Inventory;
Submit Compensation and Allowance Plan to District People's Committee for approval;

- Payment of compensation to the affected households;

Additional: Total implementation cost for compensation and support:

### Table 4.1: Total implementation cost for compensation and support

<table>
<thead>
<tr>
<th>STT</th>
<th>Items</th>
<th>Value (VND)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Compensation cost</td>
<td>2,567,086,070</td>
</tr>
<tr>
<td>II</td>
<td>Support Cost</td>
<td>751,088,000</td>
</tr>
<tr>
<td>III</td>
<td>Cost of detailed measurement survey</td>
<td>100,000,000</td>
</tr>
<tr>
<td>IV</td>
<td>Arrangement of implementation</td>
<td>469,253,523</td>
</tr>
<tr>
<td></td>
<td>Implementation cost for Compensation = 2% (I + II)</td>
<td>66,363,481</td>
</tr>
<tr>
<td></td>
<td>Management = 2% (I + II)</td>
<td>66,363,481</td>
</tr>
<tr>
<td></td>
<td>Provision for escalation of land price (20%/year) x 1 year</td>
<td>336,526,560</td>
</tr>
<tr>
<td>V</td>
<td>Provision = 10% (I + II + III + IV)</td>
<td>388,742,759</td>
</tr>
<tr>
<td></td>
<td>Total (I + II + III + IV + V)</td>
<td>4,276,170,352</td>
</tr>
</tbody>
</table>


**Note:** This compensation cost was estimated in 2012. If payment implemented is slower than this schedule, this cost needs to add provision due to escalation of land price and generated quantity.

**Feasibility:** implementation of compensation for the affected households must comply with the current regulations of the State, with reference, learning experience from the previous projects in the vicinity areas. So, these mitigation measures are feasible, high effective, they can minimize impacts on the affected households. However, generated quantity ability during the compensation process is unavoidable, the success ability of compensation depends heavily on implementation arrangement which needs the greatest active support of the government and local authorities.

Also, during this period, the consultant unit held a consultation of the affected people with the participation of representatives of the local authorities to record the people's opinion about the project implementation, to detect the sensitive issues of social environment and to take measures promptly so the environmental impact caused by the project can be reduced to the lowest level.

During the compensation and support implementation phase, people's opinions are also noted and considered by Compensation Committee. Grievance Procedure in accordance with the current procedures are notified to the affected households. Therefore, the impact of the project can be minimized.
4.1.3 In the construction phase

4.1.3.1 Mitigation measures related to waste

In the construction phase of the transmission line: Felling trees, clearing the ground, excavation, transporting materials, installing tower, stretching cables, building temporary road, etc., cause certain effects on the environment. Measures to minimize environmental impact in this stage are included in the bidding documents as the required technical conditions to ensure that which will be done by the construction unit and checked by the project owner.

a. Minimizing air pollution:

- Means of transport, machinery, equipment must have and maintain valid operating permission of the Vietnam Register Department, in which the emission standards are determined;
- All vehicles transporting raw materials (soil, sand, cement, stone...) with trunks covered to prevent dust dispersion into the environment; equipment or materials have to be tied carefully complying with the safe regulations for transport. The building contractors have to install and maintain silencers for motorized means if any environment agency or people request;
- The distance from concrete mixers to the local offices and the residential areas is at least 200 m;
- At the construction area of bay extension, installation of temporary fences of brick, wood or plastic to prevent the spread of dust from the construction site to the outside;
- Watering the construction sites and the areas where can generate large dust (roads, material storage area,...) in sunny days is a necessary measure to limit dust pollution, especially at locations close to the residential area

Feasibility: dust from transportation of materials and construction activities is unavoidable, the above mitigation measures are made effectively in reducing dust and mitigating impact of dust on the surrounding area. These measures are simple, easy to carry out and have a low cost.

b. Minimizing impacts on water quality

Collection and disposal of domestic wastewater and rainwater:

For domestic wastewater: wastewater in the construction phase is mainly domestic wastewater of workers. During the construction phase, the workers are living with the local people so they use common wastewater collection and treatment system locally, or use that system in the existing Quang Ninh 500kV substation area.

For rainwater overflowing: in the construction site, there is a drainage system (small canals) to guarantee to take water, not to stand water on the road surface of construction field and not to let rainwater and wastewater flow in the surrounding works.

Minimizing impacts on surface water source

According to the analysis of water EIA in Chapter 3, surface water pollution can be minimized by the following measures:
- Prohibit discharge of construction waste (construction waste, stone, sand, etc.) into rivers, canals, ponds, wells. These wastes are reused for leveling foundations, the rest will be collected and dumped to the local landfill of commune or district;

- In the construction sites there are many workers (as in the bay extension construction area), the contractors arrange construction workers using sanitary facilities hired from the nearby households or using sanitary facilities in the existing substation;

- Prohibit discharge of domestic waste from workers in the water source. The contractor will contract with the local environment agency responsible for the collection and transport domestic waste to the local landfill.

All the above measures are required in the bidding documents.

Feasibility: These measures are simple, easy to implement and have low cost. The mitigation measures are put in the bidding documents as the required technical conditions of the project.

c. Minimizing impacts from solid waste:

Solid waste generated during the project construction includes construction solid waste and domestic solid waste of workers.

- Construction solid waste including construction materials, soil from earthwork, steel scrap, etc., hardly discharge into the environment but reused for levelling (excavated soil, brick, stone, soil, etc.) or collected back to the place of production, reused, sold to scrap dealers (iron, steel, building materials, etc.).

- Domestic solid waste of workers is not much and is collected in the garbage bins at the construction sites. The contractor will contract with Ha Long - Quang Ninh Urban Environment joint stock company for collecting domestic solid waste and transport to the existing garbage collection system.

- Hazardous solid waste (oil stained cloth, oil tank, etc.) arisen not much (about 5-6 kg/day) during construction which will be collected for transportation and disposal according to regulations.

- Regulations prohibiting discharge of waste to the nearby areas.

Plants along the ROW will be cut down to ensure safety for the ROW under Decree No.81/2009/ND-CP of the Government dated October 12th, 2009.

Feasibility: The project can not avoid generating excess soil and domestic solid waste from workers. The control measure of this waste is simple, easy to implement, does not affect the landscape and economic efficiency in the utilization of construction waste for leveling and scrap metal sold to the scrap dealers.

4.1.3.2 Mitigation measures unrelated to waste

a. Mitigating impact due to noise and vibration

- All construction activities is conducted during the daytime, if it is necessary to build at night, the project owner must notice and receive the consent of the local people. Digging activities and transportation of electric equipment and construction materials are conducted at the appropriate time;

- Use methods and equipment emitting low noise and vibration and having permission of registration company (regulations on the permitted noise level);
- Vehicles transporting materials to ensure proper density to reduce noise, just hit the horn when necessary in residential areas, especially areas near schools, clinics, temples, etc...;

- Transportation limit at night if the construction site is far from the residential area \( \leq 100\text{m} \). Workers are not allowed to make noise during the rest time of the local people (specified in the labor regulations in the field).

**Feasibility:** noise arising in construction phase is unavoidable. With these mitigation measures, impact of noise is mitigated. These measures are taken into the bidding documents as required technical conditions of the project.

b. **Mitigating impacts on public transportation**

Measures to minimize the impact on public transport and road traffic accidents are as follows:

- There are signboard systems to notice the project construction, to warn equipment transportation ongoing, etc.

- Arranging and regulating construction tasks reasonably to avoid obstructing traffic, etc.

- Vehicles does not transport overload. If machinery or equipment which is oversized or overweight must have specialized transport vehicle to avoid causing damage; roadbed subsidence;

- Restoring damaged roads due to material transportation to the project area;

- Avoid moving on the traffic roads at the peak hours;

- Raising awareness of drivers.

**Feasibility:** Position of the substation is near the country roads, so it can interfere with traffic in the area but this effect is small and minimized by the above measures. These measures are simple, easy to control and are included in the bidding documents.

c. **Mitigating impacts on the cultural historical heritages**

In the design period, the preservation of cultural historical heritages within the area is highly considered. During excavation and construction process of tower foundations, if any valuable cultural and historical asset in underground is detected, the project owner will stop construction works immediately and notify to Department of Culture and Information in local for resolution according to each specific case. According to the results of the field survey, the project does not go near or cross any military zones or historical and cultural relics. Therefore, the project will not cause any effect on the landscape and protected areas.

d. **Minimize other impacts**

**Preventing social impacts caused by workers**

To avoid conflicts between construction workers and local residents, it needs to apply the following measures:

- The construction contractor will employ local people as many as possible to implement simple tasks such as excavation, backfill, foundation holes, temporary road, etc. to reduce recruited people from other localities.
The construction contractor will rent houses of the local people along the transmission line route for workers to stay. Concurrently, the construction contractor will provide exact figures about the labor force to the local governments. Since then, the People's Committee and the contractor can coordinate and manage workers:

- Registration of temporary residence for workers with the local police;
- Make good relations of solidarity between the workers and the local people;
- Health protection for workers and residents during construction shall comply with the specific provisions of health measures, food hygiene for the construction area.

Feasibility: these measures are referred and learnt experience from the previous projects. Implementation of them will reduce accidents at work and protect health of workers and the local people. All measures are also taken into the bid documents as the required technical conditions.

**Propaganda measures**

During the construction phase of the project, the project owner and PECC3 cooperate with the local authorities about measures to mitigate environmental impacts include:

**Information on local public media:** The project owner shall coordinate with the local government to notify on newspapers, local radio about the project information such as the implementation plan, items, information about environmental impacts and mitigation measures, etc.

**Information leaflets about the environment:** information about impacts and mitigation measures are prepared based on the EIA report approved. This leaflet will be posted at PC headquarters of communes and districts, as well as sent to the local organizations like Farmers' associations, Women's associations, all affected households in the project area. The leaflet includes information as follows:

- Describe the characteristics of the project (project objectives, project categories, project implementation plan);
- Describe the project's impacts on the environment as impacts on the residential areas, affecting soil erosion, noise, etc...;
- Describe measures to minimize the environmental impact applied;
- The agency responsible for monitoring the implementation of plans to minimize environmental impacts;
- Complaint steps and procedure for solving arisen issues in the environmental respect of the project.

**Inform the local authorities about the environmental impact:** if any environmental issue generated during the construction and operation phases is detected, it will be noticed in the public meeting with the local authorities to find out solutions to avoid conflict and influence to the project. The problems (if any) will be solved in monthly meetings on common arisen issues of the project with participation of the local authorities, the project owner, the construction contractors as well as the consultants.
**Solution of clearing site after construction completion**

It is not necessary to build temporary camp for construction workers because the contractors will rent houses for workers along the transmission line route near the construction sites.

For the construction area, clearing storage area is conducted as follows:

- After construction completion, organizations and labors have to clean all construction tools, materials; and return temporary required land for clean land and safety traffic.

- Before handing over the project, the construction constructors have to move all the excess material, machinery and equipment, clear obstacles and repair the damages (if any) of the structures caused by construction;

- After completion of the above works, organizations and individuals have to hand over the construction site, work site for the construction management board and the PMB. The handover must be recorded in writing;

- The project owner has to conduct field inspection, if there are any scenes not to be cleared up, road works or other structures/houses damaged due to construction, but not be repaired and returned as the pre-construction status, they may refuse to receive handover and ask compensation prescribed by law. If any organization or individual have fully implemented the requirements prescribed by law, the project owner is responsible for receiving the handover procedure of sites, and arrangement, management, maintenance in accordance with the law.

4.1.4 In Operation Phase

4.1.4.1 Mitigation measures related to waste

In the operation phase, the project will not generate waste so it is not necessary to implement mitigation measures.

4.1.4.2 Mitigation measures unrelated to waste

a. Minimizing noise and vibration

In the operation phase, the project will not generate noise and vibration.

b. Mitigating impact due to electromagnetic field

To ensure safety for people and operation workers, the transmission lines are designed and operated in accordance with regulations of the Decree No.106/2005/ND-CP dated Aug 17th, 2005 and Decree No.81/2009/ND-CP dated Oct 12th, 2009 of the Government on amending and supplementing a number of articles of Decree No.106/2005/ND-CP and other legal documents related the power sector.

In the safety corridor of the power line, houses of people had been displaced entirely. In addition, a grounded corridor (60m far from each outmost wire) according to the Circular No.03/2010/TT-BCT dated January 22nd, 2010, houses and structures in the safety corridor are grounded and renovated before the project operation.

The electric intensity must be checked at the project operation beginning and periodically as prescribed by Electricity of Vietnam to ensure that the electromagnetic intensity does not exceed the current regulations.
Managing the ROW

Operation organization of the project (Power Transmission Company No.1) performs operation as the existing regulations of Electricity Vietnam on safe protection of high-voltage power grid works stipulated in Decree No.106/2005/ND-CP dated August 17, 2005 of the Government, Decree 81/2009/ND-CP dated October 12th, 2009 of the Government on amending or supplementing a number of articles of Decree No.106/2005/ND-CP. Related works include:

- Checking the ROW range (from the outermost line of the 500kV route is 7m in the horizontal distance and 16m in the vertical distance);
- Checking, trimming high plants under the safety corridor to ensure the safety distance mentioned above. Cutting trees which violate the regulations of the safety corridor is made after informing to the agency, local, private owning trees at least 10 days. Quickly moving trees, branches cut out the safety corridor. It is strictly forbidden to abuse repair of damaged grid to cut trees indiscriminately;
- Checking signs of safe distance when the lines cross roads to ensure safety of vehicles within the ROW;
- Checking and do not permit building houses, offices, commercial, industrial production facilities, handicraft industry within the ROW;
- Periodic inspection and penalties for any objects which violate protection regulations of the safety corridor and intensity according to the provisions of the above decrees.

4.2 MEASURES FOR PREVENTING AND RESPONSE TO RISK AND INCIDENT

4.2.1 In construction Phase

4.2.1.1 Safety measures during construction phase

At all construction sites, the project owner always appoints officials to monitor labor safety issues. Training programs on safety for workers are held periodically. Safety measures during the construction phase of the project must obey QCVN:01/2008/BCT. The following specific measures are implemented:

- Establish working days;
- Establish barriers, warning signs and signals under construction;
- Ensure public safety;
- Before working in high positions, workers have to check the working tools, safety wire. Instruments must be neat, lightweight, easy to operate;
- Workers mustn't work in high positions when it is dark, foggy, rainy, lightning or wind having level 4 or higher;
- Workers working on the ground have to wear helmets and keep a safe distance in a dangerous position;
- All workers' health are checked periodically to ensure health standards for working in high positions, to be trained for the work they undertake and are
propagated procedure on labor safety. Appoint a medical staff for care and treatment of common diseases such as influenza, other infectious diseases and first aid for injured workers before moving victims to district health center or provincial hospital.

- Absolutely complying with safety regulations on installation and operation of electric equipment;

- Periodically inspecting and removing of branches of trees which are higher than 6m in the safety corridor to make sure not to touch the transmission lines when they are broken. Ensuring labor discipline, safety rules and implementing regulations on the labor protection equipment (helmets, gloves, safety belts...);

- Construction area is isolated by fences and installed warning signs of the area under construction and only let people on duty go in and out;

- There are drainage systems in the construction sites to ensure no water standing on the construction site and no rainwater or wastewater overflowing into the surrounding buildings;

- Foundation holes on the construction site are covered tightly or enclosed to ensure safety for travellers. Trenches, pits located near roads are enclosed with barrier of 1m in height, there must be signal lights at night;

- For safety of fire prevention and fighting in the construction sites there are tools and fire-fighting materials such as sand, fire hydrant CO₂, shovel, etc... and there are also working regulations and fire prevention and fighting regulations;

- Building facilities for food sanitation for workers to limit infections. Providing protection equipment preventing from noise, vibration and dust for labours working near the polluting equipment.

**4.2.1.2 Preventing incidents and ensuring safe in installation of structures**

- During the construction phase explosive solution is not used but mainly using manual labors or motorized vehicles combined with manual labors in earthworking.

- When using hand tools which are operated by electricity or compressed air, workers do not stand at stairs for handling; they must stand on bracket to ensure safety. For heavy devices, it is necessary to have bracket or other safety guarantee devices.

- When there is break time, power loss, transporting devices or there is incident happening, energy source must be interrupted (close valves of compressed gas, and cut off electricity).

- When driving under the existing transmission lines, it is necessary to ensure that distance from the highest point of vehicle to the lowest point of transmission lines does not exceed permitted values of the electricity standards.

- Steel structures with large size must be reinforced by temporary bracing devices to ensure stability when mounted by crane. Before mounting steel structure, it is necessary to check carefully position of hook fastening and to ensure the cables stretched evenly. Paying special attention to a safe distance with wires carrying electricity.
- Absolutely conforming to safety regulations on installation and operation of electrical devices. Installation and transportation workers are trained safety regulations on transportation and installation of electrical devices.

- Transportation and installation of electrical devices must use specialized devices; not use steel wire to fasten and cable chain to fasten insulators and tangential points of the base hole.

- Before running test of network and electrical devices, it is necessary to stop all related works, at the same time all people in distribution room must get out of the dangerous area.

- Fuses of electrical network which connect with erection equipment have to be taken down during construction. Just place these fuse into the power network to adjust equipment after everyone was in safe location.

- All steel equipment, structures must have the grounding system. When installing structures in high positions must comply with the safety rules about protective clothing and safety belt. In case of fire due to electrical problems, first of all, it is necessary to cut off the power, then conform to the normal firefighting process.

- Installing warning boards at the necessary sites.

- All of the towers are installed lightning arresters.

4.2.1.3 Scanning and removing residual mines after the war before date of commencement

The project area was planned and the project owner coordinated with the competent agency to scan and remove residual mines after the war in the region. Thus, there is no effect of residual mines on structures and workers’ health.

4.2.1.4 Fire prevention, response to accidents

- Equipment system for firefighting need to be provided by the investor and approved by the provincial police.

- Establishing a rescue team in case of fire incident and broken cables.

- Frequently training firefighting with guidance of Firefighters.

- Training, improving staff’s awareness and operating workers about firefighting.

- Checking, maintaining and testing construction facilities and firefighting equipment periodically to rescue readily in case of incident.

- The safety corridor must ensure technical conditions in accordance with Decree No.106/2005/ND-CP dated August 17th, 2005 of the Government on electrical safety, Decree No.81/2009/ND-CP dated October 12th, 2009 of the Government on amending and supplementing a number of articles of Decree No.106/2005/ND-CP. Thus, there will be no fire incident due to the transmission line problem.

4.2.1.5 Safety for erecting towers of the transmission line

Implementing safety measures during installing towers, beams, spreading cables, connecting cables, stretching cables, measuring deflection and assembling other auxiliaries;
- Process of construction must be done in compliance with design, regulations and technical procedures about construction for foundation and transmission line;

- Before stretching cable through roads, rivers and canals, the project owner shall notify the competent authorities to coordinate in temporary traffic suspension and management for small roads or implement solution of stretching mesh and place notice boards crossing road on major roads;

- Before working on high positions, workers have to check labor tools and safety belt. These tools should be neat, lightweight, easy to handle.

- When pulling wire across other transmission lines, it is necessary to have detailed plan and notify relevant agencies to combine for temporary cut-off to ensure safety for workers and the local people during construction.

- Before mounting equipment, it is necessary to check fastening wire, and cable hooked carefully. The workers are not allowed to stand under the scope of crane operation;

- Installation of electrical the equipment and materials must comply with the principles of the prevention of the equipment and materials from scratches and damage.

- Adjustment and testing must be carried out in compliance with specified regulations for each type of the equipment and materials.

- Construction machines and devices will be checked carefully on quantity and quality before using. Besides construction leader, there is a staff for monitoring safety and environment (if necessary). This staff has responsibility to check tools, protective equipment and guide regularly workers on safety and environmental protection during construction.

- When using hand tools which are operated by electricity or compressed air, workers do not stand at stairs for handling; they must stand on bracket to ensure safety. For heavy devices, it is necessary to have bracket or other safety guarantee devices

- When there is break time, power loss, transporting devices or there is incident happening, energy source must be interrupted (close valves of compressed gas, and cut off electricity).

- When driving under the existing transmission lines, it is necessary to ensure that distance from the highest point of vehicle to the lowest point of transmission lines does not exceed permitted values of the electricity standards.

- Steel structures with large size must be reinforced by temporary bracing devices to ensure stability when mounted by crane. Before mounting steel structure, it is necessary to check carefully position of hook fastening and to ensure the cables stretched evenly. Paying special attention to a safe distance with wires carrying electricity.

- Absolutely conforming to safety regulations on installation and operation of electrical devices. Installation and transportation workers are trained safety regulations on transportation and installation of electrical devices.

- Transportation and installation of electrical devices must use specialized
devices to fasten; not use steel wire and cable chain to fasten insulators and tangential points of the base hole.

- Before running test of network and electrical devices, it is necessary to stop all related works, at the same time, all people in the distribution room must get out of the dangerous area.

- Fuses of electrical network which connect with erection equipment have to be taken down during construction. Just place these fuse into the power network to adjust equipment after everyone was in safe location.

- All steel equipment, structures must have the grounding system.

- When installing structures in high positions must comply with the safety rules about protective clothing and safety belt.

- In case of fire incident due to electrical problems, first of all, it is necessary to cut off the power, then conform to the normal fire fighting process.

- Installing warning boards at the necessary sites.

- All of the towers are installed lightning arresters

### 4.2.2 Prevention measure and response to environmental incident during operation phase

#### 4.2.2.1 Fire Prevention, response to accidents, fire safety during operation phase

- Establishing a rescue team in case of fire incident and broken cables.

- Frequently training firefighting.

- Checking, maintaining and firefighting equipment periodically

- Training, improving staff’s awareness and operating workers about firefighting.

- In operation phase, in case of incident, protection relays put on transmission lines will cut off automatically.

- The safety corridor must ensure technical conditions in accordance with Decree No.106/2005/ND-CP dated August 17th, 2005 of the Government on electrical safety, Decree No.81/2009/ND-CP dated October 12th, 2009 of the Government on amending and supplementing a number of articles of Decree No.106/2005/ND-CP. Thus, there will be no fire incident due to the transmission line problem.

#### 4.2.2.2 Preventing subsidence of structures, broken cable, fallen tower

- Geological survey of the station area has to be implemented fully and meet the technical requirements before construction.

- Design of foundations of equipment and towers are based on geological survey results with reference to geological documents of the project area and surrounding locations.

- The process of construction and design must be done in compliance with regulations and technical procedures of the tower foundation construction.

- Periodically checking the quality of structure and timely overcome subsidence incidents.
In the operation phase of the project, in case of incident all relays will break circuits automatically, and alarm system will turn on. Then, operation workers quickly come to the scene to solve the problem.

4.2.2.3 Safety in management, operation, repair and maintenance

Management, operation and repair of power grid belonging to scope of project include repair, routine maintenance and repair, promptly overcoming problems of transmission line, which will be directly undertaken by management and operation agency. Safety measures during the operation process of the project must comply with NTR: 01/2008/BCT.

Minimize negative impacts, reduce types of power grid incidents, ensure safe operation of power grid, limit accident at work in the operation phase. Operation and maintenance workers have to strictly conform to the safety regulations about management, operation and repair. Making worksheet, operating sheet and working procedures as prescribed. Complying with specific regulations on major safety measures as follows:

- Safety measure incase of getting in touch with electrical devices.
- Safety measure incase of management, operation and repairment.
- During the operation phase, in case of incidents all relays of transmission lines will break circuits automatically to minimize adverse impacts.
- Checking and maintaining periodically transmission lines to detect and resolve timely subsidence problems, and to prevent broken wires, towers fallen and discharge.

Feasibility: these safety measures are referred and learnt experience from previous projects, they will be defined in operation regulations. Implementation of them will reduce accidents at work, protect health of workers and decrease damages on assets.
CHAPTER 5

ENVIRONMENTAL MONITORING AND MANAGEMENT PLAN

5.1 ENVIRONMENTAL MANAGEMENT PLAN

5.1.1 Organization structure

Central Vietnam Power Project Management Board (CPMB) is the project owner, who is responsibility to implement, follow and monitor implementing of mitigation measures of negative impacts on environment in construction and operation phases. The Project owner establishes an environmental management group who is responsibility for implementing environmental monitoring in construction phase. PTC1, who is management and operation organization, will be responsibility for implementing Environmental Management and Monitoring Plan in operation period.

Table 5.1: Implementation Arrangement

<table>
<thead>
<tr>
<th>Role</th>
<th>Responsibility</th>
<th>Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Project owner</td>
<td>Responsible for overall project management, guide and conduct environmental management plan implementation</td>
<td>Central Vietnam Power Project Management Board (CPMB)</td>
</tr>
<tr>
<td></td>
<td>Specific responsibility and contact for environmental issues</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Responsible for detailed implementation. Activities are included:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Planning and implementation of environmental management activities during construction</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Coordinating with other parties in relation to environmental management activities.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Supervising and providing budget for monitoring activities.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Reporting on environmental information to concerned parties</td>
<td></td>
</tr>
<tr>
<td>Project Operator</td>
<td>Responsible for operation of the project including environmental management and monitoring activities in operation phase.</td>
<td>Power Transmission Company No.1. PTC1</td>
</tr>
<tr>
<td>Consultant</td>
<td>Responsible for consulting, preparation EIA report and submit to the People's Committee of Quang Ninh province for appraisal and approval.</td>
<td>Power Engineering and Consulting Joint Stock Company No. 3 (PECC3)</td>
</tr>
<tr>
<td>Construction Supervision</td>
<td>Responsible for supervision of Construction Contractors during construction, including implementation of environmental management</td>
<td>CPMB</td>
</tr>
</tbody>
</table>
### Role | Responsibility | Organization
--- | --- | ---
Construction Contractor | • Applying mitigation measures during the construction phase.  
• Ensuring safety for construction workers and local people during construction. | Contractor chosen by CPMB

#### 5.1.2 Environmental Management Plan

The Environmental Management Plan is described in the below Table 5.2:
### Table 5.2: Environmental Management Plan

<table>
<thead>
<tr>
<th>No.</th>
<th>Activities</th>
<th>Environmental Impacts</th>
<th>Measures to protect environment</th>
<th>Cost</th>
<th>Execution and completion time</th>
<th>Execution Responsibility</th>
<th>Monitoring Responsibility</th>
</tr>
</thead>
</table>
| 1.1 | If compensation is not commonsense, it will impact on local people and it can not ensure schedule of the project. | If compensation is not commonsense, it will impact on local people and it can not ensure schedule of the project. | - Compensation has to obey current regulations and approval decisions of the People\'s Committee of Quang Ninh province  
- Compensation must be open and obvious  
- Ensuring compensation cost.  
- Ensuring compensation in compliance with regulations for all assets within the ROW. | Cost for compensation and allowance is estimated VND 4.28 billion (included provision) | Executing and finish before commencement of construction activities | CPMB, Compensation committee | Local authorities |

### 2. CONSTRUCTION PHASE

| 2.1 | Activities of machineries and transportation vehicles | Noise, dust and emission gas from vehicles will cause negative impacts on air environment. | Transportation of devices, materials and heavy equipment must use specialized vehicles. Loads, fastening wires must be checked before use.  
- Construction fencing wall for construction sites to decrease noise and dust from the project area to the environment. | Including construction cost  
Measure 2 air quality samples | During the construction phase | Contractors, CPMB | CPMB, DONRE, Local authorities and Environment staffs |
<table>
<thead>
<tr>
<th>No.</th>
<th>Activities</th>
<th>Environmental Impacts</th>
<th>Measures to protect environment</th>
<th>Cost</th>
<th>Execution and completion time</th>
<th>Execution Responsibility</th>
<th>Monitoring Responsibility</th>
</tr>
</thead>
</table>
|     | of constructon materials | Leakage oil and eliminated oil from vehicles and machineries can cause surface water pollution, especially in rainy season. | - surrounding areas.  
- Monitoring emission gas at the construction sites. | - Collection: VND 3 million  
Transportation: VND 3 million/year | During construction phase | Contractors, CPMB | CPMB, DONRE, Local authorities and Environment staffs |
| 2.2 | Building equipment foundations and substation yard | Construction activities cause noise, dust and emission gas and negative impacts on air environment. | - Build fence wall to enclose the construction sites to reduce noise and dust from the project into the surrounding area.  
- Provide noise protective equipment for construction workers when they work at places with high noise level.  
- Use methods and equipment with low noise and vibration levels.  
- All construction activities are executed during the daytime.  
- Monitor the air environment in the construction site. | Included in construction cost | During construction phase | Contractors, CPMB | CPMB, DONRE, Local authorities and Environment staffs |
<p>|     | At construction site, excavation, concrete | | - Do not discharge solid waste (construction solid waste, stone, sand, | Included in construction cost | During construction | Contractors, CPMB | CPMB, DONRE, |</p>
<table>
<thead>
<tr>
<th>No.</th>
<th>Activities</th>
<th>Environmental Impacts</th>
<th>Measures to protect environment</th>
<th>Cost</th>
<th>Execution and completion time</th>
<th>Execution Responsibility</th>
<th>Monitoring Responsibility</th>
</tr>
</thead>
</table>
| 1   | Mixing, etc. rain water sweep away sand, stone, construction waste into adjacent surface water sources. This increases turbidity, water pollution, soil erosion and sedimentation in downstream, and impact on aquatic ecosystem. Leakage and residual oil from machineries and equipment can cause soil and water pollutions if they are not collected and disposed in appropriate places. | - Collecting solid waste, material, etc. at the construction site.  
- Building isolated fence for the construction sites.  
- Restoring landscape after the construction finished | Included in construction cost | During construction phase | Contractors, CPMB, DONRE, Local authorities and Environment staffs | CPMB, DONRE, Local authorities and Environment staffs |
| 2   | Construction waste is mainly soil, stone, scrap iron, cement bag and scrap timber. If they are not disposed in appropriate place, they will impact on natural | - Do not create pond, plash within the construction area to prevent polluted water.  
- Arrange storehouses of materials in the safe locations to avoid oil overflowing.  
- Collect and discharge oil sludge in compliance with the regulations  
- Monitor surface water near construction sites | Measure 1 surface water sample | on phase | Local authorities and Environment staffs | |

- Collecting solid waste, material, etc. at the construction site.  
- Building isolated fence for the construction sites.  
- Restoring landscape after the construction finished
<table>
<thead>
<tr>
<th>No.</th>
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<th>Environmental Impacts</th>
<th>Measures to protect environment</th>
<th>Cost</th>
<th>Execution and completion time</th>
<th>Execution Responsibility</th>
<th>Monitoring Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>landscape of the area.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 2.3 | Worker concentration       | Domestic solid waste of workers at construction sites which is not collected and disposed in appropriate places, will impact on natural landscape of the area and cause soil and water environments. Average volume of domestic wastewater is estimated by 80% water supply water consumption (about 120 liter/day/person). This waste water can cause water pollution if it is not treated appropriately. | - Domestic solid waste will be collected daily at a landfill. The project owner will contract with Ha Long - Quang Ninh Urban Environment joint stock company to treat this domestic solid waste.  
- Labors of the construction contractors stay in rent houses from the local people.  
Arrange outhouses with septic tank for construction workers in the construction sites  
Labourers from other areas will disorder traditional lifestyle of the local people, increase the risk of conflict between them. - Use and train local labors for compatible works.  
- Establish regulations and manage discipline for all workers, including temporary workers.  
- The project will inform and combine them included in construction cost | During construction phase | Contractors CPMB, DONRE, Local authorities and Environment staffs |
<table>
<thead>
<tr>
<th>No.</th>
<th>Activities</th>
<th>Environmental Impacts</th>
<th>Measures to protect environment</th>
<th>Cost</th>
<th>Execution and completion time</th>
<th>Execution Responsibility</th>
<th>Monitoring Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>construction workers and local inhabitants.</td>
<td></td>
<td>with the local authorities to manage all employees of the project in order to avoid social evils and mitigate conflicts between workers and local people</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 2.4 | Fire safety, work and traffic accident        | Leakage oil and fuel can cause fire and explosion. However, the risk is very small because functional partitions will be planned separately and there are specific preventive measures. Work and traffic accident may occur, however experienced contractors will have mitigation measures to limit these risks | - Arrange materials storages with cover, barrier, and spray water during hot, dry conditions.  
- Always control and maintain equipment and machines to avoid oil leakage.  
- Emergency reaction alternatives and means shall be available when it comes to fire  
- Build and disseminate, and require workers to adhere to the safety regulations and labor rules to minimize labor accidents. | Included in construction cost | During construction phase | Contractors CPMB, DONRE, Local authorities and Environment staffs |                          |

### 3. OPERATION PHASE

| 3.1 | Accident at work                               | During operation, repair and maintenance phases, accidents at work may occur if labors don’t execute rigorously safety | Testing health of Workers and staff periodically to detect timely diseases (including occupational diseases).  
- Workers and staffs working at places where electric shock may occur will be equipped safety clothing, shoes, gloves, | Included in operation cost | During operation phase | PTC1 CPMB, DONRE, Local authorities and Environment staffs |                          |
<table>
<thead>
<tr>
<th>No.</th>
<th>Activities</th>
<th>Environmental Impacts</th>
<th>Measures to protect environment</th>
<th>Cost</th>
<th>Execution and completion time</th>
<th>Execution Responsibility</th>
<th>Monitoring Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>regulations and helmets to prevent shocking - Training and checking technical safety periodically.</td>
<td></td>
<td></td>
<td></td>
<td>t staffs</td>
</tr>
<tr>
<td>3.2</td>
<td>Clearance the ROW</td>
<td>Cutting and trimming of plants around the station to ensure the safety distance in case of fallen trees to avoid impact on the station fence and connection line</td>
<td>- Supervising cutting and trimming of plants around the station</td>
<td>Included in operation cost</td>
<td>During operation phase</td>
<td>PTC1</td>
<td>DONRE, Local authorities</td>
</tr>
<tr>
<td>3.3</td>
<td>Electromagnetic field</td>
<td>The safety distance between electrical equipment and connection line, Electromagnetic field impacts on human's health</td>
<td>- Checking electrical equipment within the ROW - Monitoring Electromagnetic field</td>
<td>Included in operation cost</td>
<td>During operation phase</td>
<td>PTC1</td>
<td>DONRE, Local authorities</td>
</tr>
</tbody>
</table>

Source: PECC3, Dec-2012
5.2 ENVIRONMENTAL MONITORING PLAN

Environmental Monitoring Plan is one of the important contents in environmental quality management and impact assessment during the construction and operation phases of the project to the environment. The evolution of environmental quality can help to redefine forecasts in the EIA or the level of discrepancy between the calculation and reality.

In order to ensure that all activities of the project during the pre-construction, construction and operation phases will not cause negative impacts on the environment and to assess effectiveness of the mitigation measures, the environmental pollution monitoring program of the project, which is managed and supervised by Department of Natural Resources and Environment of Quang Ninh province, will be implemented during the construction and operation phases.

5.2.1 Monitoring Waste

5.2.1.1 Monitoring waste during construction phase

- **Solid Waste:**
  Procedure of solid waste collection, management and monitoring will be executed regularly during construction phase:
  - Monitoring procedures of solid waste collection, management and treatment;
  - Monitoring quantities of solid waste related to every components
  - Monitoring frequency: 3 months per time;

5.2.1.2 Monitoring waste during operation phase

- **Solid Waste:**
  Procedure of solid waste collection, management and monitoring will be executed regularly during operation phase:
  - Monitoring procedures of solid waste collection, management and treatment;
  - Monitoring quantities of solid waste related to every components;
  - Monitoring frequency: 6 months per time;

5.2.2 Monitoring the Surrounding Environment

<table>
<thead>
<tr>
<th>Table 5.3: Monitoring the Surrounding Environment of Construction area</th>
</tr>
</thead>
<tbody>
<tr>
<td>No.</td>
</tr>
<tr>
<td>-----</td>
</tr>
<tr>
<td>A</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>No.</th>
<th>Parameters</th>
<th>Coordinates of Monitoring location</th>
<th>Frequence</th>
<th>QCVN for comparison</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ambient air</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Total dust (TSP)</td>
<td>02 samples include: - 01 sample at the construction site of bay extension. Coordinates: $X_{GXDK1} = 2327146.600; Y_{GXDK1} = 435241.733$ and - 01 sample at the construction site of the connection line. Coordinates: $X_{GXDK2} = 2325298.913; Y_{GXDK2} = 433623.226$</td>
<td>06 month/time</td>
<td>QCVN 05:2009/BTN MT, QCVN 26:2010/BTN MT</td>
</tr>
<tr>
<td></td>
<td>- SO$_2$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- NO$_x$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- CO</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Noise</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Surface Water</td>
<td>01 sample - 01 sample at the stream of village 3. Coordinates: $X = 3023281.754; Y = 435080.652$</td>
<td>06 month/time</td>
<td>QCVN 08:2008/BTN MT, column B1</td>
</tr>
<tr>
<td></td>
<td>- pH</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- TSS</td>
<td></td>
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<tr>
<td></td>
<td>- COD</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- BOD$_5$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Total N</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Total P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Coiliform</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: PECC3, Dec-2012

5.2.3 Other Monitoring

5.2.3.1 Construction phase

Monitoring of hygiene conditions and labor safety during the construction phase

5.2.3.2 Operation phase

- Electromagnetic field will be monitored during the operation phase (02 samples);
  - Frequency: 1 year per time
  - Coordinates: $X_{GXDK1} = 2327146.600 - Y_{GXDK1} = 435241.733$ and $X_{GXDK2} = 2325298.913 - Y_{GXDK2} = 433623.226$;
  - Comparison standard: industry standard "allowed level of the electric field strength with industrial frequency in the workplace" issued together with Decision No. 183 NL/KHK dated April 12th, 1994 of Department of Energy;

- Monitoring annually health test for employees (01 year/time);

- Regularly monitoring operation and maintenance of compartment and lines.

- Location map of environmental monitoring in the construction and operation phases is presented in Figure 5.1 and 5.2 as follows.
Figure 5.1: Environmental monitoring location in the construction phase

Note:
KK1, KK2: Position of ambient air monitoring
NM: Position of surface water monitoring
Figure 5.2: Environmental monitoring location in the operation phase
5.2.4 Estimated cost for observing and monitoring environment, Cost of sample analysis:

5.2.4.1 Construction Phase

Cost of sample analysis:
- Ambient air: 02 sample/time x 1,600,000 VND = 3,200,000 VND
- Surface water: 01 sample/time x 1,300,000 VND = 1,300,000 VND
- Cost for other monitoring activities: 3,000,000 VND
- Cost of collection and transportation of oily rags and oil sludge to treatment agencies: 2,500,000 VND/time.

Cost of writing and submitting environmental monitoring reports = 5,000,000 VND/time.

Total cost of environmental observing and monitoring in the construction phase: 15,000,000 VND (included in investment costs of the project).

5.2.4.2 Operation Phase

Cost of sample analysis:
- Electromagnetic fields: 02 sample/time x 1,000,000 VND= 2,000,000 VND
- Expenses for other monitoring activities = 3,000,000 VND/time.

Cost for writing and submitting report of environmental monitoring = 3,000,000 VND/time.

Total cost of environmental observing, monitoring in the operational phase is 8,000,000 VND/time. Monitoring costs will be paid by Power Transmission Company 1 who is responsible for implementation according to the regulations.
CHAPTER 6
PUBLIC CONSULTATION

Based on the provisions of Clause 3, Article 14 of Decree No.29/2011/ND-CP dated April 18th, 2011 regulating on strategic environmental assessment, EIA, environmental protection commitments and Circular No.26/2011/TT-BTNMT dated July 18th, 2011 detailing a number of articles of Decree No.29/2011/ND-CP, the project owner sent Document No. 5487/AMT-TD dated November 08th, 2012 to the People 's Committee of Thong Nhat commune about "Suggestion of giving consultation opinions in the process of making EIA report of the project " Overhead Line Bay Extension at Quang Ninh 500kV substation and Hiep Hoa 500kV substation" (attached Summary report of EIA of the project) informed about the basic content of the project, the environmental negative impact of project, mitigation measures applied and propose CPC for feedback in writing. The project owner has received written replies of PC of Thong Nhat commune as follows:

6.1 OPINION OF THONG NHAT COMMUNE PEOPLE'S COMMITTEE

Comments on environmental issues of PC of Thong Nhat commune are summarized as follows:

- Basically agree with the content of the summary report about the EIA of the project;
- Recommend appropriate compensation for people whose land is affected and support to households to rehabilitate their lives;
- During the construction process, construction workers do not have to disturb security and order of local area;
- The project owner must pay compensation for environmental incidents, repair damage or degrading the road surface during construction and operation of the project.
- The project owner must undertake not to pollute the environment and be fully responsible to the law for environment violation if any;
- The project owner must commit to implement mitigation measures to adverse environmental impacts of the project;
- Ward People's Committee in their scope and authorities should support the project owner and competent agencies in the implementation of measures to minimize negative environmental impacts during project implementation;

Minutes of meeting on public consultation are shown in Appendix 2.

6.2 OPINION OF FATHERLAND FRONT COMMITTEE OF THONG NHAT COMMUNE

Comments on environmental issues of FFC of Thong Nhat commune are summarized as follows:

- Basically agree with the content of the summary report about the EIA of the
project;
- The project owner must commit to implement mitigation measures to adverse environmental impacts of the project;

6.3 OPINION OF REPRESENTATIVES OF AFFECTED HOUSEHOLDS

- Suggest that the construction schedule of the project must be implemented correctly;
- Adequate compensation for affected households;
- Recover the ground at least the same as the situation prior to construction;
- During the project implementation, the contractors should coordinate closely with local authorities to carry out the works of surveying, clearance for the project.

6.4 FEEDBACK AND COMMITMENT OF THE PROJECT OWNER

- The project owner will have to implement mitigation measures to adverse environmental impacts of the project during construction and operation phases;
- During construction phase of the project, project owner undertakes to comply with the legal provisions on environmental protection;
- The project owner undertakes to keep the environment hygiene and treat domestic wastewater generated in the operation phase of the project before being discharged to the outside;
- The project owner will carry out the construction of treatment facilities and monitoring environmental quality in accordance with the content presented in Chapter 4 and Chapter 5;
- Closely manage safety and fire prevention and fighting.
- Some photos of environment consultation at affected households:
<table>
<thead>
<tr>
<th>Consultation at Ms. Ta Thi Canh's house</th>
<th>Leading delegation of DONRE of Quang Ninh province to survey and investigate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consultation at Mr. Nguyen Huu Hai's house</td>
<td>Consultation at Ms. Nguyen Thi Phuong's house</td>
</tr>
</tbody>
</table>
CONCLUSIONS, RECOMMENDATIONS AND COMMITMENT

1. CONCLUSION

After conducting research on the environmental status, assessment of impacts on the natural environment, ecology and society, it is possible to summarize the main impacts of the project "Overhead Line Bay Extension at Quang Ninh 500kV substation at Hięp Hoa 500kV substation and 500kV connection line in Quang Ninh province" as follows:

Project construction can cause some environmental effects on the project area, which is mainly land.

Ecological characteristics of the project area: To plants, affected land is mainly agricultural land, no natural forests or protected areas. Therefore, there are not any impacts on biological resources due to the project construction.

The project area does not affect historic - cultural heritages, military areas and not affect operation of airline industry either.

During the construction phase, transportation of materials generates dust and noise affecting health of the local people, but this impact is low and only temporary.

After completion of the construction, during the operation phase, there will be no waste, no noise generated and that ensures safety for people living nearby if current regulations on safety distances and measures have to be complied accurately.

The negative impacts of the project can be completely overcome and controlled by the mitigation measures mentioned in the report.

From the above characteristics, we can assess the environmental impact of the project in the construction and operation phases as insignificant if the environmental management plan is fully implemented.

2. RECOMMENDATION

Socio-economic benefits which are given by the project is very huge, especially for promotion of economic development of the region. So the project implementation is necessary and suitable for the development needs of the country.

We would like to suggest that the People’s Committee of Quang Ninh province should be interested in facilitating and accelerating compensation payment and clearance when the construction deployment starts.

3. COMMITMENT

1. The project owner commits implementing mitigation measures for negative impacts which described in chapter 4; concurrently, the project owner commits implementing all measures, general regulations on environmental protection related to development and implementation of the project.

2. The project owner commits construction and operation of all project items according to the current Vietnam regulations and standards as below:
   - Law on Environmental Protection No.52/2005/QH11 on November 29th, 2005;
   - Decree No.80/2006/ND-CP dated August 09th, 2006 of the Government
detailing and guiding the implementation of some articles of the Law on Environmental Protection;

- Decree No.21/2008/ND-CP dated February 28th, 2008 amending and supplementing a number of articles of Decree No. 80/2006/ND-CP dated August 09th, 2006;

- Decree No.29/2011/ND-CP of the Government dated April 18th, 2011 on strategic environmental assessment, EIA, environmental protection commitments;

- Decree No.59/2007/ND-CP of the Government dated April 09th, 2007 on solid waste management;


- Decree No.106/2005/ND-CP dated August 17th, 2005 of the Government detailing and guiding the implementation of some articles of Electricity Law on safety protection of high-voltage power grid;

- Decree No.81/2009/ND-CP dated October 12th, 2009 of the Government amending and supplementing a number of articles of Decree No.106/2005/ND-CP dated August 17th, 2005 of Government detailing and guiding the implementation of some articles of electricity Law on safety protection of high-voltage power grid;

- Circular No.12/2011/TT-BTNMT dated April 14th, 2011 of the Ministry of Natural Resources and Environment guiding the practice conditions and documented procedures, registration, practice license, codes for hazardous waste management;

- Circular No.26/2011/BTNMT dated July 18th, 2011 detailing a number of articles of Decree No.29/2011/ND-CP dated April 18th, 2011 of the Government on strategic environmental assessment, EIA, environmental protection commitments;

  - The Vietnam current environmental standards and regulations include:

    - QCVN 05:2009/BTNMT - National Technical Regulation on ambient air quality;

    - QCVN 08:2008/BTNMT - National technical regulation on surface water quality;

    - QCVN 14:2008/BTNMT - National technical regulation on domestic wastewater;

    - QCVN 26:2010/BTNMT - National Technical Regulation on noise;

    - QCVN 27:2010/BTNMT - National Technical Regulation on vibration;

    - Solid waste is managed closely, gathered and stored and thoroughly treated in accordance with Decree No.59/2007/ND-CP dated April 09th, 2007 of the Government on solid waste management. Hazardous waste must be collected and handled in accordance with Decision No.155/QD-TTg dated July 16th, 1999 of the Government promulgating regulations on management of hazardous waste and Circular No.12/2011/TT -
BTNMT dated April 14th, 2011 of the Minister of Natural Resources and Environment on the management of hazardous waste.

3. Project Owner commits to implement compensation and allowance policy in compliance with regulation.

4. Project Owner commits to recover environmental incident; and repair roads if there are any damage or degradation.

5. Project owners commits to cooperate with local governments to solve issues related to the environment in the construction and operation phases.

6. Pollution treatment works will be carried out in the construction process and ensure to be completed before the project goes into operation.

7. Programmes including supervising and monitoring environment, safety training, information of environment report will be implemented in the construction and operation phases; and these budgets will be ensured by the Project Owner.

8. Project Owner commits to recovery environment under regulations of Law on Environmental Protection when finishing the project construction.

9. Project Owner commits not to use prohibited chemicals and microorganism under Vietnam regulations and international conventions.

10. Project Owner commits during operation phase, if the project violates any international convention or Vietnam technical regulations and in case any environmental issues occur, the Project Owner will take full responsibility under the law of Socialist Republic of Vietnam.
REFERENCES

- Hydro-meteorological data - Quang Ninh province, 2010;
- Data of socio-economic development conditions - Quang Ninh province, 2012;
- Report of socio-economic situation in 2012 of Thong Nhat commune, Hoang Bo District, Quang Ninh province;
- Cadastral map of the project area in scale of 1/1000, VN 2000 coordinate system;
- Technical documents of the World Health Organization (WHO) and World Bank (WB) on establishing EIA report;
- Treatment of air pollution and emission, volume 1, Publisher Science and Technology, Prof. Dr. Tran Ngoc Chan, 2000;
- Treatment of wastewater, Hoang Hue, 2002;
APPENDIX

Appendix 1: Legal documents related to the project
Appendix 2: Minutes of meeting on public consultation
Appendix 3: Photos of the project area
Appendix 4: Results of the environmental analysis of the project area
APPENDIX 1

LEGAL DOCUMENTS RELATED TO THE PROJECT
Kính gửi: Ban QLDA các công trình điện miền Trung

UBND huyện Hoành Bồ nhận được Hồ sơ đề nghị phê duyệt chủ trương xin cấp đất mở rộng Trạm biến áp 500kV Quảng Ninh tại thôn Chấn Đào, xã Thông Nhất, huyện Hoành Bồ

1. Hiến trang và Quy hoạch tại khu vực Ban QLDA các công trình điện miền Trung đề nghị mở rộng Trạm biến áp 500kV Quảng Ninh tại thôn Chấn Đào, xã Thông Nhất:
   - Hiến trang: bao gồm đất ở của 03 hộ dân và đất rừng çev lầu nằm, đất rừng rừng san xua. Tông diện tích khoảng 1,7ha.

2. Quan điểm của UBND huyện Hoành Bồ:
   - Về chủ trương, UBND huyện Hoành Bồ nhất trí với đề xuất mở rộng trạm biến áp 500kV của đơn vị để đảm bảo mục tiêu nâng công suất phục vụ nhu cầu phát triển xã hội.
   - Đề nghị Công ty nghiên cứu kỹ hiện trạng khu vực để đảm bảo tính khả thi của việc mở rộng quy mô xây dựng Trạm biến áp (khu vực phân bối bờ sông và tái định cư các hộ dân có đất ở trong khu vực) và tổng hợp báo cáo UBND tỉnh xem xét chấp thuận chủ trương để làm cơ sở triển khai các bước tiếp theo.

UBND huyện Hoành Bồ trả lời Ban QLDA các công trình điện miền Trung biết và thực hiện.

Nơi nhận:
- Như kính gửi;
- UBND tỉnh (b/e)
- Lưu VPHNDND-UBND, P, KT-HT.

Triều Văn Hải

TM: UBND HUYỆN HOÀNH BỒ
KT: CHỦ TỊCH
P: CHỦ TỊCH
QUYẾT ĐỊNH

Về việc phê duyệt Quy hoạch chi tiết xây dựng&type le 1/500 mô rộng trạm biến áp 500kV Quang Ninh và xây dựng đường dây 500kV đầu nối vào trạm tại xã Thông Nhạt, huyện Hoành Bồ,

UỶ BAN NHÂN DÂN TỈNH QUANG NINH

Căn cứ Luật Tổ chức HDND và UBND ngày 26/11/2003;
Căn cứ Luật Quy hoạch đô thị của Quốc hội khóa XII, kỳ họp thứ 5 số 30/2009/QH12 ngày 17/6/2009;
Căn cứ Quy hoạch chung xây dựng Khu vực phía Bắc cầu Bang và điểm trực đường Trời - Vũ Quang, huyện Hoành Bồ giai đoạn đến 2020 đã được Uỷ ban nhân dân tỉnh phê duyệt tại Quyết định số 3637/QĐ-UBND ngày 17/11/2009;
Xét đề nghị Số Xây dựng tại Tố trình số 270/TTr-SXD ngày 28/10/2013; Hồ sơ Quy hoạch chi tiết xây dựng&type le 1/500 mô rộng trạm biến áp 500kV Quang Ninh và xây dựng đường dây 500kV đầu nối vào trạm tại xã Thông Nhạt, huyện Hoành Bồ đã được Uỷ ban nhân dân huyện Hoành Bồ thỏa thuận, Số Xây dựng thẩm định, trình.

QUYẾT ĐỊNH

Điều 1. Phê duyệt: Quy hoạch chi tiết xây dựng&type le 1/500 mô rộng trạm biến áp 500kV Quang Ninh và xây dựng đường dây 500kV đầu nối vào trạm tại xã Thông Nhạt, huyện Hoành Bồ với nội dung sau:

1. Phạm vi, ranh giới, diện tích:

1.1. Phạm vi ranh giới: tại xã Thông Nhạt, huyện Hoành Bồ, vị trí cụ thể như sau: Phía Bắc giới độ dát làm nghiệp; Phía Nam gi do đường giao thông liên thôn; Phía Đông gi do trạm biến áp 500kV hiện có; Phía Tây gi do dát làm nghiệp.

1.2. Diện tích nghiên cứu lập quy hoạch: 20.033 m2, trong đó:
- Diện tích mở rộng ngăn lỏ theo ranh giới A,B,C,D là 17.650m2; diện tích xây dựng trong hàng rào (A1, B1, C1, D1) 17.550m2.
- Diện tích xây dựng hoàn truy nguyên 792m2;

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2

- Diện tích đất xây dựng mong trục 01M: 441m² (21mx21m);
- Diện tích đất xây dựng mong trục 02M: 1150m² (25mx46m);

2. Mục đích: Mở rộng tram biến áp 500kV Quảng Ninh và xây dựng đường dây đấu nối vào tram.

3. Quy hoạch sử dụng đất:

<table>
<thead>
<tr>
<th>Stt</th>
<th>Loại đất</th>
<th>Diện tích (m²)</th>
<th>Tỷ lệ (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Đất mở rộng ngăn lỗ (A,B,C,D)</td>
<td>17.650</td>
<td>88.10</td>
</tr>
<tr>
<td></td>
<td>(Trong đó phân trong hàng rào)</td>
<td>17.550</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Đất xây dựng mong trục 01M</td>
<td>441</td>
<td>2.20</td>
</tr>
<tr>
<td>3</td>
<td>Đất xây dựng mong trục 02M</td>
<td>1150</td>
<td>5.74</td>
</tr>
<tr>
<td>4</td>
<td>Đất xây dựng hoàn trả tuyến đường</td>
<td>792</td>
<td>3.96</td>
</tr>
<tr>
<td></td>
<td>Tổng</td>
<td>20.033</td>
<td>100</td>
</tr>
</tbody>
</table>

4. Giải pháp bố trí mặt bằng và hoàn thiện đường dây:

- Xây dựng 01 ngăn đường dây 500kV trên diện tích mở rộng và các thiết bị phụ trợ.

- Các tuyến đường dây 500kV liên quan đến hoàn thiện, hiện hữu được đầu nối vào tram như sau: Ngàn B01: Đầu nối đường dây 500kV Quảng Ninh-Thương Tín (mạch 2); ngàn B02: Đầu nối đường dây 500kV Quảng Ninh-Thương Tín (mạch 1); ngàn B03: Đầu nối đường dây 500kV Quảng Ninh-Hải Hòa (mạch 2); Ngàn B04, B05: Đầu nối đường dây 500kV Quảng Ninh-Mỏ Duong;

- Sau khi mở rộng ngăn lỗ mới (B11), thực hiện hoàn thiện tiền đầu nối các đường dây 500 kV vào tram như sau: Ngàn B11: Đầu nối đường dây 500kV Quảng Ninh-Thương Tín (mạch 2); ngàn B01: Đầu nối đường dây 500kV Quảng Ninh-Thương Tín (mạch 1); ngàn B02: Đầu nối đường dây 500kV Quảng Ninh-Hải Hòa (mạch 1); ngàn B03: Đầu nối đường dây 500kV Quảng Ninh-Hải Hòa (mạch 2); ngàn B04, B05: Đầu nối đường dây 500kV Quảng Ninh-Mỏ Duong.

5. Quy hoạch hạ tầng kỹ thuật:

Ha tăng kỹ thuật trong ngăn lỗ mở rộng yêu cầu kết nối và triển khai động bộ theo trạm biến áp 500kV đã xây dựng.

6. Tổ chức thực hiện:

- Ủy ban ban hành huyện Hoàng Bò có trách nhiệm quản lý quy hoạch, giải phóng mặt bằng; công bố, công khai quy hoạch; quản lý giám sát việc xây dựng công trình theo quy hoạch được duyệt; đỉnh chỉ xây dựng, xử phạt hành chính, cung chế phạt đủ những công trình xây dựng trái phép, xây dựng sai phép, xây dựng không tuân theo quy hoạch được duyệt theo quy định, triển khai các bước tiếp theo của dự án theo quy định và quy hoạch được duyệt.

Điều 2. Các Ông (Bà): Chánh Văn phòng Uỷ ban Nhân dân tỉnh; Giám đốc các Sở, ngành: Kế hoạch và Đầu tư, Tài chính, Xây dựng, Tài nguyên và Môi trường; Giao thông vận tải; Nông nghiệp và phát triển nông thôn. Uỷ ban nhân dân huyện Hoành Bồ; Giám đốc Ban quản lý dự án công trình Điện Miền Trung; Giám đốc Công ty cổ phần tư vấn xây dựng Điện 3; Thầu trưởng các ngành và đơn vị liên quan cần có quyết định thi hành./. 

Nơi nhận:
- C1, cựu CPT UBND tỉnh (B/c);
- Như đàm 2 (thực hiện);
- VÜ - V3, QH2, QLĐE2, XD1-2;
- Lựa: VT, KSTT, OH3.
18h - Q09/10

CHỨNG THỨC BÁN SÀO ĐẸP VỚI BẢN CHÍNH
Sê chung mục... 457... Đơn vị... ECT/05
Ngày... 16/12/2013
PHÓ CHỦ TỊCH UBND XÃ VINH THỊỆP

Đỗ Thống

Nguyễn Thị Xuân Thới
APPENDIX 2

MINUTES OF MEETING ON PUBLIC CONSULTATION
Kính gửi: Ban QLDA các công trình điện miền Trung

UBND xã Thông Nhạt nhận được Công văn số 568/AM-TT ngày 15 tháng 11 năm 2013 của Ban QLDA các công trình điện miền Trung kẹm theo tài liệu tóm tắt về các hạng mục đầu tư chính, các vấn đề môi trường, các giải pháp bảo vệ môi trường của Dự án Mở rộng ngăn lỏng đường dây tại trạm 500kV Quảng Ninh. Sau khi xem xét tài liệu này, UBND xã Thông Nhạt có ý kiến như sau:

1. Ý kiến về các tác động xâu của Dự án đến môi trường tự nhiên và kinh tế - xã hội: UBND xã Thông Nhạt đồng ý với các nội dung được trình bày trong bản thông báo về trên của Chủ dự án;

2. Ý kiến về các giải pháp, biện pháp giảm thiểu các tác động xấu của Dự án đến môi trường tự nhiên và kinh tế - xã hội: UBND xã Thông Nhạt đồng ý với các nội dung được trình bày trong bản thông báo về trên của Chủ dự án;

3. Kiến nghị đối với Chủ dự án:
   - Chủ dự án phải cam kết thực hiện các biện pháp, giải pháp giảm thiểu các tác động xấu đến môi trường của Dự án;
   - Chủ dự án phải tiến hành bồi thường, hỗ trợ cho người dân có đất bị ảnh hưởng bởi Dự án theo đúng quy định của Nhà nước;
   - Trong quá trình thi công, xây dựng Dự án đảm bảo không gây mất an ninh mạng tự, xã hội tại địa phương do công nhân làm việc tại công trường xây dựng;
   - Chủ dự án phải đảm bảo, khắc phục sự cố môi trường, sửa chữa đường vận chuyển nếu làm làm hư hỏng, xưởng cấp trong quá trình xây dựng, vận hành của Dự án.

Trên đây là ý kiến của UBND xã Thông Nhạt gửi Ban QLDA các công trình điện miền Trung để xem xét và hoàn chỉnh báo cáo đánh giá tác động môi trường của Dự án./.

Nơi nhận:
- Như trên;
- Lưu VP.
UB. MẶT TRĂN TỔ QUỐC
XÃ THÔNG NHẤT

CỘNG HÒA XÃ HỘI CHỦ NGHĨA VIỆT NAM
Độc Lập - Tự Do - Hạnh Phúc

Số: .....................

V/v: ý kiến tham vấn về Dự án Mỏ rộng
ngạn lỏ đường dây tại trạm 500kV
Quảng Ninh

Kính gửi: Ban QLDA các công trình điện miền Trung

UBMTTQ xã Thong Nhất nhận được Công văn số 2594/TM/QĐ... ngày... tháng... năm 2013 của Ban QLDA các công trình điện miền Trung kẹm theo tài liệu tổng thể về các hạng mục đầu tư chính, các vấn đề môi trường, các giải pháp bảo vệ môi trường của Dự án Mỏ rộng ngạn lỏ đường dây tại trạm 500kV Quảng Ninh. Sau khi xem xét tài liệu này, UBMTTQ xã Thong Nhất có ý kiến như sau:

1. Ý kiến về các tác động xấu của Dự án đến môi trường tự nhiên và kinh tế - xã hội: UBMTTQ xã Thong Nhất đồng ý với các nội dung được trình bày trong bản thông báo neu trên của Chủ đầu tư;

2. Ý kiến về các giải pháp, biện pháp giảm thiểu các tác động xấu của Dự án đến môi trường tự nhiên và kinh tế - xã hội: UBMTTQ xã Thong Nhất đồng ý với các nội dung được trình bày trong bản thông báo neu trên của Chủ đầu tư;

3. Kiến nghị đối với Chủ đầu tư:

- Chủ đầu tư phải thực hiện các biện pháp về an ninh trật tự tại phương trang quí trình thi công xây dựng, tránh làm xao lộ trên diện đất song ngữ người dân;
- Chủ đầu tư phải đảm bảo yêu cầu thiết kế về diện, tránh các tác động, sự cố ảnh hưởng đến người dân;
- Chủ đầu tư phải khắc phục sự cố môi trường, sửa chữa đường vận chuyển neu làm lầm hối họng, xưởng cấp trung quí trình xây dựng, vận hành.

Trên đây là ý kiến của UBMTTQ xã Thong Nhất gửi Ban QLDA các công trình điện miền Trung để xem xét và hoàn chỉnh báo cáo đánh giá tác động môi trường của Dự án./.

Nội nhận:
- Như trên;
- Lưu VP.

[Signature]
APPENDIX 3

PHOTOS OF THE PROJECT AREA
APPENDIX 4

RESULTS OF THE ENVIRONMENTAL ANALYSIS OF THE PROJECT AREA
PHIÊU KẾT QUẢ QUAN TRÁC VÀ PHÂN TÍCH

(Số: 01/06/01/2012/QTP)

Ten khách hàng: Công ty Cổ phần TV vẫn Xây dựng điện 3
Ten dự án: Làm báo cáo đánh giá tác động môi trường Dự án: Mô tơ ngang lớn đường tỷ lệ tại trạm 500KV Quảng Ninh và 500KV Hiệp Hòa
Tài liệu đi kèm: Báo cáo ban bảo mẫu số 01/38/12 - 2012
Loại mẫu: Khống kết xung quanh
Phương pháp lấy mẫu: Trong ứng với phương pháp thứ
Điểm quan trắc, lấy mẫu: Khu vực công trình dự án 500KV Quảng Ninh (K1).
Thời gian quan trắc, lấy mẫu: 9h15' - 9h35' ngày 28 tháng 12 năm 2012.
Thời gian phân tích: Ngày 28/12/2012

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<td>%</td>
<td>-</td>
<td>84</td>
<td>-</td>
</tr>
<tr>
<td>3</td>
<td>Hưỡng gió</td>
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<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>4</td>
<td>Tốc độ gió</td>
<td>m/s</td>
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<td>Đáp ổn cực đại</td>
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<td>22 TCN 353: 89</td>
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Ghi chú: **Thống số các chất nguy hại hiện trạng: ** Khống quy định
- QCVN 05: 2009/ BTNMT Quy chuẩn kỹ thuật quốc gia về chất lượng không khí xung quanh.
- QCVN 06: 2010/ BTNMT Quy chuẩn kỹ thuật quốc gia về tổng ô nhiễm.

Quảng Ninh, ngày 6 tháng 01 năm 2013

TM. NHÓM THỦ NGHIỆM

TP. THỦ NGHIỆM

GIÁM ĐỐC

Bài Thái Sen
Duong Văn Xuân
Nguyễn Anh Tuấn
PHIÊU KẾT QUẢ QUAN TRÁC VÀ PHÂN TÍCH
(Số: 02/6/01/2012/QTPT)

Tên khách hàng: Công ty Cổ phần Tư vấn Xây dựng điện J.
Tên dự án: Lập báo cáo đánh giá tác động môi trường Dự án: Мос mention bằng được Dự án từ tải 500Kv Quang Ninh và 500Kv Hiệp Hòa
Tài liệu dự kiến: Báo cáo đánh giá môi trường số 01/28/12-2012
Lõi máu: Không kí xung quanh
Phương pháp lấy mẫu: Tương ứng với phương pháp thử
Điểm quan trắc, lấy mẫu: - Khu vực trung tâm Dự án (K2).
- Khu vực nhà đầu tạo Tập Bắc Dự án (K3).
Thời gian quan trắc, lấy mẫu: 9h47’ - 10h44’ ngày 28 tháng 12 năm 2012.
Thời gian phản tích: Ngày 28/12/2012

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Ghi chú: * **Thống số khác được lấy nguyên trạng - Không quy định
  - QCVN 05: 2009/BTNMT Quy chuẩn kỹ thuật quốc gia về chất lượng không khí xung quanh.
  - QCVN 50:2010/BTNMT Quy chuẩn kỹ thuật quốc gia về ô nhiễm bụi.

Quảng Ninh, ngày 6 tháng 01 năm 2013

TM. NHÓM THỦ NGHIỆM
TP. THỦ NGHIỆM
GIẢM ĐỐC

Bùi Thị Sen
Đặng Văn Xuân
Nguyễn Anh Tuấn
# PHIÊN KẾT QUẢ QUAN TRÁC VÀ PHÂN TÍCH

(Số: 03/6/01/2012/QTP'T)

Tên khách hàng: Công ty Cổ phần Tư vấn Xây dựng điện 3
Tên dự án: Lập báo cáo đánh giá tác động môi trường Dự án: Mở rộng cấp điện đường dây tải trạm 500KV Quảng Ninh và 500KV Hiệp Hòa
Tài liệu đi kèm: Biên bản lấy mẫu số 01/28/12 - 2012
Loại mẫu: Nước mạt
Phương pháp lấy mẫu: TCVN 6663 - 6: 2008
Điểm quan trắc, lấy mẫu: Mường thơm một chung cư đầu vào
Thời gian quan trắc, lấy mẫu: Ngày 28 tháng 12 năm 2012.
Thời gian phân tích: Ngày 28/12/2012 - 03/12/2012

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Chữ chú: *, - Phép đo được công nhận "-" không quy định
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QCVN 08:2008/BTMQT Quy chuẩn kỹ thuật quốc gia về chất lượng nước mặt - Cớt B2: Giao đường đối hoặc các nước khác với yêu cầu chất lượng tap

Quảng Ninh, ngày 6 tháng 01 năm 2013

TM. NHÓM THỤ NGHIỆM
TP. THỤ NGHIỆM
GIÁM ĐỐC

Bùi Thị Sen
Duong Văn Xuân
Nguyễn Anh Tuân