

SUMMARY INITIAL ENVIRONMENTAL EXAMINATION REPORT

**Supplementary Appendix to the
Report and Recommendation of the President
to the Board of Directors**

on the

NORTHERN POWER TRANSMISSION SECTOR PROJECT

SOCIALIST REPUBLIC OF VIET NAM

This report was prepared by the Borrower and is not an ADB document. The IEE is available on request.

December 2004

CURRENCY EQUIVALENTS

(as of 30 April 2004)

Currency Unit	–	dong (D)
D1.00	=	\$0.00000636
\$1.00	=	D15,712.50

GLOSSARY OF TERMS

ADB	Asian Development Bank
AOD	Above Ordnance Datum
DB	Decibels
DoNRE	Department of National Resources and Environment
EMD	Environmental Management Division
EMF	Electromagnetic Fields
EMP	Environmental Management Plan
EVN	Electricity of Vietnam
GOV	Government of Viet Nam
GSO	General Statistical Office
H/H	Household
HGRC	Human Geography Research Center, of National Center for Social Sciences and Humanities of Vietnam
IEE	Initial Environmental Examination
IFI	International Financial Institution
IoE	EVN's Institute of Energy
Km	kilometer
KV	One thousand volts
KVA	One thousand volt amps
KW	Kilowatt
KWh	Kilowatt hour
LEP	Law on Protection of the Environment
M	Million (=10 ⁶)
MNRE	Ministry of Natural Resources and Environment
MPI	Ministry of Planning and Industry

MW / MWh	megawatt / megawatt hour – 1000 kW / 1000 kWh
NGO	nongovernmental organization
NPP	Northern Power Project
NPPMB	Northern Power Project Management Board
NRPB	National Radiological Protection Board (UK)
OHL	Overhead Line
Pa	Per annum (yearly)
PAH	Project Affected Households
PAP	Project Affected Person
PB	Parsons Brinkerhoff Ltd
PC	Power Company (e.g. PC1, PC Hanoi). These are responsible for distributing electricity within their designated area.
PCB	Polychlorinated Biphenyl
PCC	EVN's Power Construction Company
PECC4	Power Electric Consulting Company 4
PPTA	Project Preparatory Technical Assistance
RAP	Resettlement Action Plan
RF	Resettlement Framework
ROW	right-of-way
RVS	Replacement Value Survey
SIEE	Summary IEE
TOR	terms of reference
UNDP	United Nations Development Programme
USD	US dollar
VND	Vietnamese Dong (the currency of Vietnam)

NOTE

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

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I. INTRODUCTION

1. This Summary Initial Environmental Examination (SIEE) report for the proposed Northern Power Transmission Project of Viet Nam analyzes the environmental impacts that may occur during the construction and operation of sample subprojects under the proposed sector loan Project. The sector loan concerns the expansion and strengthening of Electricity of Viet Nam (EVN) extension of the electricity transmission system to the east of Hanoi in northern Viet Nam. The full Initial Environment Examination (IEE) prepared for these sample subprojects by PB Power is available upon request.

2. Under the sector loan sample, the environmental assessments conducted at each of the assessed electricity substations and along the route of the proposed electricity transmission line and included in this report have been undertaken following Asian Development Bank (ADB) and Vietnamese environmental assessment guidelines and regulations. Where site visits to the project areas (notably along the route of the transmission line) was not possible due to the absence of access, the nature of the terrain and the lack of points of visibility, prediction of environmental impacts has been based on field notes, by knowledge of the area, discussions with local residents, and through interpolation from the nearby environment that could be inspected. Consultations with national and provincial governments and party officials have taken place prior to finalization of the Project.

II. DESCRIPTION OF THE SAMPLE SUBPROJECTS ASSESSED

3. The assessed sample subprojects of the proposed Project consist of three distinct elements that have the potential to impact upon the environment:

- Extension of three existing urban substations at Trang Bach, Vat Cach, Dong Hoa (Haiphong) to cover urban load growth, and four existing substations to cover planned development of a region—Thai Binh, Nam Dinh, and Nghi Son.
- Construction and operation of two new substations at Van Tri and Quang Ninh to cover perceived local growth.
- Construction of 151 kilometers (km) of double circuit transmission line from Quang Ninh to Thuong Tin.

4. The purpose of the Project is to support the Government's strategy for continued poverty reduction through sustained economic growth by assisting in the preparation of a power transmission project to ensure a sufficient and stable power supply for the Hanoi-Haiphong-Quang Ninh development triangle, which has been identified as one of the key economic zones of Viet Nam. The project will also improve system stability and security, reduce losses, and improve reliability. A list of candidate subprojects to be selected and assessed is provided in Section VII. Their environmental assessment and review procedures, as well as the selection criteria, are also described in that section in detail. Sector and cumulative impacts assessment was however not included as it is not considered necessary in view of the nature and scale of the subprojects.

III. DESCRIPTION OF THE ENVIRONMENT FOR THE SAMPLE PROJECTS

5. The proposed sample project transmission line which is approximately 151 km long traverses five provinces of Northern Viet Nam—Quang Ninh, Hai Duong, Bac Ninh, Hung Yen, and Ha Tay. All these provinces, except Quang Ninh Province, lie within the Northern Plain of Viet Nam, which are normally occupied by rice fields and densely populated areas. Quang Ninh is located at the North-eastern plain which consists of slightly sloping mountains and hills. There is a considerable area of agriculture and planted forests within the corridor of the route; none of the wooded/forest areas that will be impacted upon are old-growth.

6. The line crosses three large rivers in the western section of the proposed route (each of which are approximately 300–400 meters wide); the Hong (Red River), Thai Binh and Kinh Thay rivers. The three large rivers and the associated drainage ditches provide abundant water for irrigation as well as potable water for residents. In addition, this area also has plenty of groundwater. Groundwater is located between 2.0 to 6.0 meters depth.

7. There are no reported or known areas of sensitive or protected ecology or habitats along the line of the route. A search for such sites within 2 km of the proposed route from existing Government records and other related sources has been conducted and no such sites were identified. At its eastern end, the overhead line lies close to the Noi Bai–Ha Long National Highway, which is under construction; the environmental impact assessment report for this route confirmed that only common flora and fauna species were present.

8. Even though the route of the proposed line has been aligned to avoid passing densely populated areas, particularly in the northern plain, there are still some residential areas or villages within the right-of-way in the provinces of Hung Yen, Bac Ninh, and Hai Duong.

9. There are no sites with high social, historical, or cultural value within 2 km from the route. Ha Long Bay, while recognized by United Nations Educational, Scientific and Cultural Organization as a natural and geological World Heritage Site in 1994, and is located near to the eastern end of the proposed line at Quang Ninh. At its closest point the proposed line would be approximately 9 km from the boundary of the United Nations Educational, Scientific and Cultural Organization core area designation and about 7.5 km from the coast. Therefore, the proposed transmission line does not fall within or lie close to the world heritage site of Ha Long Bay.

10. The noise environment along the route of the transmission line varies enormously depending upon the location along the line. Generally however, the route is located through two different noise environments—in the eastern sections of the line, the area is rural and there are no major sources of noise and the western section where the proximity to other noise sources is greater due to the more developed nature of the area.

11. None of the sample subproject substation sites are located in, or cross-areas of, virgin forest. They are not close to any areas of significant or sensitive ecological habitats or are located in areas identified as being of very specific scenic value.

12. The proposed location for the Van Tri substation is occupied by rice fields and there are no houses within 300 m of the site; the noise environment is dominated by a highway to the east. Background noise levels at Quang Ninh are low due to the absence of any noise sources apart from the occasional vehicle.

13. In the eastern sections of the line, the topography is considerably more undulating and small rivers are located in steep valleys. The presence of local drainage systems varies in this area along the route of the proposed line depending on the proximity of residential and farming areas to rivers.

14. There are no specific large-scale developments planned in the proximity of project areas in the Ha Tay, Hung Yen, Hai Duong, and Bac Ninh provinces. The Noi Bai-Quang Ninh Expressway located in Quang Ninh Province is currently under construction. No other developments are currently officially planned in this province; this was confirmed by the local Peoples Committee.

15. The climate of the study area is typified by two distinct seasons: winter and summer. Winter is quite cool and wet and usually lasts from November to April. February and March

are marked by a persistent drizzling rain. The hot summers run from May to October. The area can be affected by occasional typhoons in the summer. Total rainfall throughout the year measures some 2,000 millimeter (higher in the elevated areas along the eastern portions of the proposed route), the wettest months being July and August. Temperatures will vary from 5–10°C in the coldest month (January) to 25–35°C in June, July, and August.

16. Data collection on geological conditions in Viet Nam is difficult due to the absence of published data. The Van Tri substation will be located in the western plain of the Red River Delta where fertile alluvial soils overly clays and sand. At Quang Ninh, limestone underlies the alluvial soils, which will be thicker in the valley bottoms while on sides of hills etc. Soil thicknesses are less and easily lost where deforestation occurs. Soils along the route of the line from Quang Ninh to Van Tri vary from those described above at Quang Ninh (along with the limestone karst formations present) to flat more fertile alluvial soils overlying aciisoils or alum soils. Further west near to the rivers, alluvial soils dominate further and reinforcement of soils through flooding.

17. In the far eastern sections of the line, the land is very rural with only isolated villages and houses. Roads are few and those in place do not have hard sealed surfaces and would be impassable in the wet season and are the source of dust in the dry season. The topography is undulation with hills covered with a variety of coppiced timber and fruit trees. Dramatic limestone karst foundations are present which rise from the largely flat valley floor.

18. Further to the west, steeper valleys are present with more natural vegetation; development in this area is also limited but several overhead transmission lines are present. In addition, the Noi Bai–Ha Long Bay Expressway is currently under constriction in the vicinity.

19. Further west, the topography becomes progressively flatter and there is increasing density of development but the area is still dominated by agriculture.

20. Still further west, along the proposed route, several very large rivers dominated the low lying topography with a wide system of drainage channels. The area is difficult to traverse as a consequence and there are several existing overhead transmission lines and numerous distribution lines.

21. At the western end of the proposed line, the topography is largely level and the area is considerably more developed with linear towns and villages being present along the roads in the area.

IV. FORECASTING ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

22. A reconnaissance survey of all sample subproject sites has been undertaken in order to identify the potential environmental impacts that will occur as a result of the proposed developments at each site and along the route of the proposed transmission line. Environmental impacts will be site specific and will vary between the types and scale of development proposed and the nature of the surrounding environment at each site.

23. It should be noted that while the route of the transmission line has been assumed as per that described in the feasibility study report, local slight variation is likely to occur. Similarly, with the exception of pylons or towers at the point at which the line changes direction or crosses a river, the location of pylons or towers is currently unknown.

24. It is important to establish the context of much of the proposed works considered in the IEE. For the majority of the works at substation sites, the works proposed will be small-scale construction works within the curtilage of the existing sites. At one of the proposed new

substation sites (Van Tri) while the site is currently occupied by agricultural land use, it is understood that large-scale development of the surrounding area is imminent and in comparison with the scale of impacts that would result from this industrialization/commercialization of the area, the impacts from the new substation will be negligible. With regards to the transmission line, the route mostly crosses through areas either already developed for residential or agricultural purposes or lies in close proximity to another overhead transmission line or a proposed major highway; again in the context of these other developments, the relative scale and nature of environmental impact of the proposed Project will be low.

25. At those sites where a substation is already located, there will be no additional need for land take as the transformers etc. will be installed within the boundary of the existing sites. At each of these locations, the new equipment will fill vacant space. At all existing substation sites this location is away from the perimeter wall and as such will largely be unnoticed except at Dong Hoa where residential areas lies within 5 m of the substation perimeter walls. However, even at this site the extent of landscape impact will be negligible as the new plant will just add to the already existing plant and steel towers that are present.

A. Landscape and Visual

26. Van Tri Substation. Landscape impacts at the sites of the proposed two new substations have the potential to be greater than those that may occur as a result of the transmission line. At Van Tri, the substation will be located on what are currently rice fields. While in principle the raising of land at this site by 1–2 m and the construction of the substation and access road will result in a negative impact for the surrounding area, the actual impact is likely to be insignificant. The reason for this is the imminent development of the surrounding area as an industrial zone and the substation will represent a modest part of this commercialization of the area.

27. Quang Ninh Substation. Landscape impacts at the proposed Quang Ninh substation site have the potential to be greater than at Van Tri as the area is firstly rural and secondly located in hilly terrain. The location of the proposed substation will require the excavation of a small raised hill and the subsequent infilling of surrounding lower ground that is currently occupied by agricultural land such as rice fields. Improvements to the road running near to the Quang Ninh site will also have some impacts on the landscape and visual environment.

28. While unavoidable impacts on landscape quality and visual impact will occur at Quang Ninh, the extent and scale of impact is considered to be moderate. Mitigation through careful restriction on the site footprint, through the use of appropriate landscaping, more careful and sensible design of substation architecture and towers, and integration of the station walls and landscaping, etc. will assist in minimizing the level of impact once construction is complete.

29. Existing Substations Extension. No major impact is expected as a result of the proposed work to three existing substations in terms of landscape and visual quality.

30. Transmission Line. Visual impacts due to transmission line construction and operation is unavoidable but is anticipated to be minor. Pylons along the transmission lines will be carefully sited to minimize its visual impacts as much as possible.

B. Land Loss

31. The route of the new transmission line has been designed to avoid passing through markets, densely populated areas, villages, pagodas, protected areas and historical or cultural assets. A total of 1,649 households will be affected by land acquisition, of which 204

households will have to move from their houses, but shall be able to re-build on the same plot of land, and 80 households will lose more than 10 percent of their productive assets, but will be able to buy replacement land or increase productivity on remaining land.

32. Van Tri Substation. Construction of the Van Tri Substation on very productive paddy land will severely affect 62 households and marginally affect 33. Compensation will be paid in cash at replacement cost. Rehabilitation assistance will be provided for lost income generating assets.

33. Quang Ninh Substation. The proposed substation site at Quang Ninh is under a mixture of eucalyptus trees, rice fields, other agricultural use, and scrubland. The total area to be affected is 94,500 m². Construction will severely affect five households and marginally affect 31. Compensation will be paid in land, if available, or cash at replacement cost. Rehabilitation assistance will be provided for lost income generating assets.

C. Electromagnetic Fields

34. The addition of transformers and associated plant and equipment at the existing substations is not expected to have an additive effect on electromagnetic fields (EMF) outside the existing site boundary. All new plant will be sited away from perimeter walls generally towards the centre of the sites and as such the EMF levels that are being produced currently are unlikely to be increased for residents outside the site boundary. Most existing substation sites are located in rural areas without any residential properties being located nearby.

35. Because of issues relating to need to ensure health and safety issues relating to the line such as fire safety, safe voltages on metallic parts of buildings, and safety clearances to avoid flashover, the transmission line will not pass directly over any residential properties and as such the potential for EMF effects to occur will be further diminished. Given that it will be necessary to ensure that there are no properties in the ROW beneath and to the sides of the overhead line, automatic mitigation against EMF will be provided between the source of potentially high strengths (the transmission line) and the residential properties.

D. Noise and Vibration

36. Existing Substations. Addition of further plant to existing substations will result in impacts during the construction and operational phase through firstly the construction related activities necessary for the excavation of ground, the installation of foundations and the fabrication and erection of steel work. Traditional forms of construction in Viet Nam are relatively labor intensive rather than equipment intensive and as such construction noise levels are likely to be low.

37. At the existing substation sites, the addition of further transformers is likely to raise the noise level slightly; typically the addition of a further noise source of the same level will add 3dB(A) to the highest received noise level (assuming the plant are operating at the same time). No data exists at this stage as to the likely level of noise that will be generated by the new plant but considering that they will be new equipment; they will almost certainly be quieter than existing transformers. As such the additive effect of the new transformers will be less than 3dB(A). Given that differences of less than 5dB(A) are difficult for the human ear to detect, the impact of siting new additional transformers is considered to be insignificant.

38. Van Tri Substation. Construction of the new substation sites will necessitate considerable construction activities on sites, which are currently green field or laid to agricultural use. The plant activities associated with these operations have the potential to generate considerable noise. However for there to be a noise impact, a receiver must be

located nearby. As noted above, the proposed Van Tri substation site is located in rice fields and the nearest residential properties are located 300–400 m away and impacts therefore will be negligible.

39. Noise impacts during the construction of the new substations have been predicted to be negligible at the Van Tri substation site and this can be further assured through the implementation of the environmental monitoring plan (EMP) for the site.

40. Impacts during operation of the substation at Van Tri are unlikely to be of concern due to the lack of any residential properties in the area as well as the development of the area for commercial and industrial purposes.

41. Quang Ninh Substation. The proposed Quang Ninh substation site is located in a rural area with a number of houses located nearby. Due to the currently very low ambient noise levels in this area, any construction activity will result in an unavoidable increase in background levels and therefore noise impacts are likely to occur. At Quang Ninh, noise impacts during the construction phase (for the substation and road improvements) will be unavoidable but their scale and significance can be mitigated by using standard mitigation measures that will ensure that work is restricted to day time periods and that operating plant numbers are kept low as is possible.

42. For the substation at Quang Ninh, given the very low ambient noise level in this area, operation of the transformers and associated equipment will result in an increase (during all hours of operation) of background noise levels. Noise generating plant at this substation will be located in acoustic enclosures. It is expected that this straightforward measure will reduce the level of noise impact at these properties to a level that is acceptable and in compliance with noise regulations.

43. Transmission Line. Construction of the transmission line will be undertaken using a range of mechanical plant and manual labor. Short access roads may be required to be constructed in order to reach some of the sites and this activity in itself will have the potential to create some noise disturbance. However, both the construction of any access roads and the erection of pylons etc. will be both short term in nature (weeks rather than months) and localized to the particular site. As such, the extent of noise disturbance during the construction of the transmission line is considered to be short-term and minimal.

44. Noise calculations have been undertaken based on various assumptions regarding the proposed site layout and current position of transformers. The noise predictions have identified that night time noise levels will be 43 dB(A) at the nearest residential property which will comply with the night time noise limit set at 45 dB(A).

45. Vibration impacts have been predicted to be minimal during both the construction and operation phases due to the lack of significant vibration sources. Some minor impact on properties very close to roads used for access during the construction stages may occur but the impact will be short term and of temporary duration.

E. Air Quality

46. Air quality impacts will be restricted to the construction phase as there will be no emissions to air during ordinary operation of the substations and transmission line. Impacts on air quality in the vicinity of the work sites (for existing, proposed substation sites and at points along the route of the transmission line where pylons are required to be located) have the potential to occur as a result mainly of excavation and construction activities. During excavation and material handling activities (for example, the works necessary to create a flat site at Quang Ninh) dust and particulates may be generated. The scale of the impact will be

determined by the proximity of any residential properties (that could be affected by dusts etc.) to the work sites, the nature of the material being excavated, its soil water/moisture content and the prevailing weather conditions at the time of excavation.

47. Existing Substations. It is not considered that the excavation and construction works at the existing substation sites will create an unacceptable level of impact on the surrounding air quality.

48. Quang Ninh Substation. At Quang Ninh substation, considerable earth movement will be necessary to create the level site needed for the proposed substation and improvements to the road are necessary. Given that there are a number of residential properties located nearby, impacts on air quality near to these properties has the potential to occur. Impacts are however, likely to be moderate at worst and can be controlled through the strict implementation of measures listed in the EMP.

49. Transmission Line. For the erection of the transmission line, excavations will be necessary for the construction of foundations for each of the four legs of each pylon along the route. In addition, depending on the nature of the topography at each pylon site, additional earth works may be necessary to either elevate the base of the pylon above the surrounding ground or to level the site to allow subsequent foundation excavation and placement. This will result in the potential for dust and particulates to be generated that could be emitted to the air. However, these works will be of a small scale at each site and taking only a matter of days to construct. The impacts will therefore be of a small scale, be localized to the nearby area and of a temporary nature. As such, impacts on air quality from construction activities associated with the transmission line are considered to be insignificant.

F. Ecology

50. Existing Substations. The existing substation sites, where additional plant and equipment will be sited, are already developed (or about to be) and the new equipment will be located within the boundaries of the existing sites and as such there will be minimal impacts on ecological resources. Neither of the proposed substation sites or any part of the route of the transmission line has been identified as being sensitive or contain valuable ecology that will be affected by the proposed developments.

51. Van Tri Substation. At the proposed Van Tri substation site, the area to be developed by the proposed substation is occupied by rice fields and a couple of small shallow ponds. The surrounding area is similar in nature and as a consequence the loss of a relatively small area is not of significant ecological concern.

52. Quang Ninh Substation. The Quang Ninh substation is due to be located in a lowly populated area and the ground where the station will be located is currently occupied by rice fields, arable crops and eucalyptus and willow trees. The existing road that will be improved is bordered by similar land uses.

53. Given that the proposed substation is to be located largely on arable land, impacts on ecology are considered to be minimal. Restriction of the boundaries of the work (at the substation site and along the route of the road to Quang Ninh) such that only the smallest area possible is affected will be enforced and the works will not spill onto surrounding ground or into the small stream running around the site (potential impacts on water quality are discussed below) and this will be an important element of the EMP for the works.

54. Transmission Line. Pylons are required to be located every 300–350 m along the route of the transmission line and each of these will require an area to be cleared for the

pylon foundations to be excavated and sunk. Similarly, short access routes to these bases will be required to be cleared to enable materials and the pylons themselves to be delivered. Access control during construction of these access roads will be adopted to ensure high level of safety to the local communities and low degree of disturbance. Most of these access roads will remain for future maintenance of the transmission line, and their impacts on water quality and air and noise will be monitored regularly. Given that the route of the transmission line traverses arable areas for almost its entire route, the impact on ecology will be relatively minor. Vegetation management program, with restrictions on use of hazardous chemicals as pesticide or herbicides, will be adopted to minimize potential pollution to the soil and ground water.

G. Water Environment

55. Existing Substations. At the existing substation sites, where excavations will be required, the scale of impact from sediment runoff is not considered to be significant as the quantity of material will be minimal given the relatively small scale of works taking place and that this will be occurring within the boundaries of the substations and the water is likely to enter the storm water system and be diluted prior to discharge with water from the rest of the site.

56. Van Tri Substation. At the proposed Van Tri substation site, potential exists for the land raising activity necessary before the substation can be erected for site runoff to occur to the surrounding lower ground. Temporary discoloration of the water surrounding the sites is expected to be the only impact and in reality this will not be distinguishable from the discoloration, which already occurs after every rainfall event due to most of the areas surrounding the site not having paved surfaces.

57. Quang Ninh Substation. Water quality at the proposed Quang Ninh substation site is of potentially greater sensitivity due to the presence of firstly rice fields adjacent to the site but also due to the close proximity of a small river that passes around the site on its northern, western and southern boundaries. While this stream is considered too small for use as a fishery, it is expected to be used for extraction for drinking water and irrigation purposes both upstream of the site and down stream. Releases of any kind to this stream could therefore have the potential for impacts to occur further away from the site rather than just in areas adjacent to the site. Timing the construction works away from the wet season will ensure impacts on water quality are minimized as well as physical placement of barriers to prevent erosion into the river. This will be monitored regularly during the works.

58. The greatest potential for impact from operation of the substation sites will be the loss of coolant from the transformers either through leaks or through accidental release. Inspection of existing sites reveals that all existing transformers were located within a bunded area, which drained to a storage tank. New substation sites will be designed and constructed in a similar manner, thus ensuring no uncontrolled release of oils from the storage tank in the event of a spillage or release from the transformers occurring.

59. Operational impacts on the water environment during normal operation of the substations and transmission line will be restricted to storm water run-off from the paved areas and disposal of effluent from the small number of workers based at each of the sites. The impacts from these two areas will be negligible providing that appropriate measures are in place such as correct siting of discharge points, connection to foul water drainage systems where they exist and installation of septic tanks where they do not.

60. It is stated practice for existing substations, that in the event of a release of oil from the transformers, that this is collected in the dedicated tanks, removed from site, cleaned and returned/reused. For both the proposed new substations the drainage systems beneath

the transformers will be fitted with oil interception equipment as well as having the capacity of 100% of the largest element of the transformer oil tank.

H. Waste Management

61. Existing Substation and Transmission Line. The excavation of ground for the sinking of foundations at the existing substation sites and for the pylons of the proposed transmission line will generate quantities of earth and stone. The majority of this material will be backfilled into the trenches but it is likely that because of bulking some excavated soils require disposal.

62. It is not considered that this will represent a significant disposal problem at the existing substation sites, partly due to the relatively small quantities involved and for the pylon locations due to the widespread nature of the points of generation. Careful disposal and regular monitoring will still be practiced for minimizing the potential impacts.

63. Quang Ninh Substation. The construction of the new substations at Quang Ninh will result in the generation of a wide range of construction wastes. While there will be some inevitable impacts through the production of waste, efficient reuse of materials in Viet Nam means that any materials such as plastics, metals or timber (used in the delivery of materials and equipment to site for example) will be segregated and either reused off site or recycled. Small amounts of waste products will be generated such as excess concrete, broken timber etc. and these will be disposed of appropriately rather than being dumped on adjacent land. At the remote site of Quangh Ninh, delivery vehicles visiting site to remove waste generated by the construction activities will be used.

64. Van Tri Substation. The construction of the new substation sites at Van Tri will require the importation of fill materials in order to achieve a site above the surrounding ground (some 56,000 m³ will be required). The materials imported will be from a reliable and unpolluted/ uncontaminated source. Handling of contaminated soils is likely to result in liberation or release of any contaminants present and could threaten surrounding ground and water bodies if present. As such, the need to raise/level these sites should not be used as an opportunity to dispose of contaminated materials.

65. Normal operation of the substation sites will result in the generation of relatively small amounts of commercial type waste including paper, cardboard, plastics, food waste etc., which will be disposed of properly.

66. As there are no known elements of heritage or archaeology within the area or nearby to be affected either by the proposed works, insignificant impact is expected.

V. INSTITUTIONAL REQUIREMENTS AND ENVIRONMENTAL MANAGEMENT PLAN

67. An Environmental Management Plan (EMP) is required in order to comply with ADB requirements as the project was classified as Class B (even though the project does not impact upon any ecologically sensitive areas). An EMP is proposed to reflect best practice and to ensure that those impacts that do occur are minimized where possible. This section generally follows the format set out in the ADB *Environmental Assessment Guidelines* (2003) for an EMP.

A. Description of Proposed Mitigation Measures

68. Environmental management measures proposed to mitigate overall adverse impacts are summarized in Table 1 by project stage and activity.

69. Each mitigation measure is listed against the project stage when that measure will predominantly be implemented. For example, where a mitigation measure has to be incorporated into project design, this measure is included in the "Pre-construction" stage of project development. It is considered that the Contractor will be responsible for the implementation of each measure. The exception to this is the Operational Measures, which will obviously fall as the responsibility of the power operating company.

Table 1: Summary of Mitigation Measures

Project Stage	Project Activity	Potential Environmental Impact	Proposed Mitigation Measure
Pre-construction	Transmission line and substation design	Safety hazards	PCBs not used in substation transformers or other project facilities or equipment. Preparation of an Occupational Health and Safety Plan and provision of related training and instructions to all staff before each person commences duties.
		Radio and TV interference	Transmission line design to comply with the limits of electromagnetic interference from overhead power lines.
		Noise	Design of plant enclosures at Quang Ninh to comply with Vietnamese regulations
		Landscape and Visual Water/Ecology	Specific consideration of location of towers to take account of local conditions and environment (avoid water bodies/trees/houses where the towers can be located nearby)
		Heritage	Consultation with residents where graves may be located and affected (Quang Ninh)
		Soil and water contamination from equipment leakage	Substations constructed above at least the 1:10 year flood level by raising the foundation pad.
			Substation transformers located within secure and impervious bunded areas with a storage capacity of at least 110% of the capacity of oil in transformers and associated reserve tanks.

Project Stage	Project Activity	Potential Environmental Impact	Proposed Mitigation Measure
		Overall	GOV and ADB requirements will be complied with for environmental safeguard purposes at this stage by NPPMB and its consultants.
Construction	Easement tree clearance, line and substation construction	Disruption to cropping activities, crop damage or loss, damage to bund walls, canals and drains	Construction techniques and machinery selection seeking to minimize ground disturbance.
			Construction activities on cropping land timed to avoid disturbance of field crops within one month of harvest wherever possible.
			Established roads and tracks used for construction and maintenance access to the line wherever possible.
			New access ways restricted to a single carriageway width within the ROW unless more direct and lower impact access can be gained.
			Temporary placement of fill in drains/canals not undertaken where impeded drainage could cause flooding or damage.
			Noise/Air Quality
Construction of perimeter walls to new substations as soon as possible in order to mitigate noise generated from inside the station.			
Easement tree clearance	Loss of and damage to trees, habitat loss	Use of trained and qualified ecologist as part of the route alignment design team to confirm acceptability of route at ground level	
Trees can be retained within the ROW where they are not within 6m of the OHL			
			Trees that can survive pruning to comply will be pruned instead of cleared.

Project Stage	Project Activity	Potential Environmental Impact	Proposed Mitigation Measure
			<p>Marking of vegetation to be removed prior to clearance, and strict control on clearing activities to ensure minimal clearance.</p> <p>Felled trees and other cleared or pruned vegetation (wood, branches and foliage) retained by owner of the vegetation for his/her use, or removed if requested by owner.</p> <p>Transmission line construction workers prohibited from harvesting or collecting fuel wood or other tree products in the project area during their employment, apart from locally employed staff continuing current legal activities.</p>
	Excavation of tower foundations	Land disturbance and reduced land capability	<p>Spoil excavated from tower footings reused to elevate the site where possible or disposed of by placement along roadsides, or at nearby house blocks if requested by landowners, to improve these features.</p> <p>Minimizing land take and prevention of overspill from construction site.</p>
	Winning of fill for sub-station sites	Land disturbance and reduced land capability	Fill for the substation foundations obtained by creating or improving local water supply ponds or drains, with the agreement of local communities.
	Construction activities	Erosion and sedimentation/Airborne dust and noise, water quality	<p>Construction activities involving ground disturbance (i.e. substation landforming) not undertaken during the wet season.</p> <p>Communication with residents close to sub-station sites to advise of construction program</p> <p>Water and soil contamination</p> <p>Fuel and other hazardous materials securely stored above flood level.</p>

Project Stage	Project Activity	Potential Environmental Impact	Proposed Mitigation Measure
		Noise	Construction activities only undertaken during the day and local communities informed of the construction schedule prior to commencement.
		Safety hazards	Public health information provided to the construction workforce prior to the commencement of on-site work, primarily covering the prevention of HIV/AIDS.
			Construction workforce facilities to include proper sanitation, water supply and waste disposal facilities.
Operation and Maintenance	Substation operation	Waste Management	Disposal of wastes in appropriate manner.
		Water Management	Maintenance and regular checking of oil interception facilities.
		Noise	Regular maintenance of transformers to assure compliance with design criteria.

B. Description of Monitoring Programs

70. Monitoring the implementation of environmental mitigation measures is required to ensure they are undertaken in accordance with the EMP, and to enable mitigation to be adapted and refined as required. Auditing the success or otherwise of implemented mitigation, is also required to identify ineffective measures or implementation procedures, and thus enabling the design and incorporation of improved measures and the implementation of corrective actions.

The monitoring requirements for the project have been derived as follows:

Transmission	Table 7.2
Van Tri Substation	Table 7.3
Quang Ninh	Table 7.4
Upgraded substations – requiring additional land take	Table 7.5
Upgraded substations – not requiring additional land take	Table 7.6

Table 2: Summary of Monitoring Requirements – Transmission Line

Project Stage	Proposed Mitigation Measures	Parameter To Be Monitored	Location	Measurement	Frequency
Pre-construction	Setback of dwellings to ONL route designed in accordance with Permitted Level of Power Frequency and the Regulation of Supervision at Working Sites – Decision No 183.	Line Design	Office & Route	Setback distances to nearest houses	Once
	Transmission line design to comply with the limits of electromagnetic interference from overhead power lines.	Line design	Office	Line design compliance with relevant standards	Once
	Local routing to consider topography where possible	Line design	Office	Consultation with local authorities and site inspection	Once
	Flexible approach to tower location on local housing	Line design	Office	Consultation with landowners	Once
	Transmission line to avoid proposed golf course in Dong Trieu District.	Line route design	Office	Consultation with Provincial Government	Once
	Access control	Line design	Office	Consultation with local authorities and incorporation of design measures	Once
	Local routing to consider topology where possible	Line design	Office	Consultation with local authorities and site inspection consultation with landowners	Once
	Flexible approach to tower location on local housing	Line design	Office	Consultation with landowners	Once
	Local routing to consider use of existing access roads or tracks	Line design	Office	Consultation with local authorities and landowners	Once
	Consideration of tower location at where they could be located to avoid water bodies or agricultural land.	Line design	Office, ROW	Consultation with local authorities and land owners	All official landowners once
	Consultation with residents regarding grave location and possible relocation	Line design	Office, ROW	Consultation with residents	All official landowners once
Construction	Building materials from structures removed from the ROW made available to the relocating household for its use.	Household ownership of materials	Route	Household use of materials	As required along route
	Construction techniques and machinery selection seeking to minimize ground disturbance.	Construction techniques and machinery	Field	Construction techniques and machinery creating minimal ground disturbance	Once at the start of each const. Season

Project Stage	Proposed Mitigation Measures	Parameter To Be Monitored	Location	Measurement	Frequency
	Construction activities on cropping land timed to avoid disturbance of field crops within one month of harvest wherever possible.	Timing of start of construction	ROW	Crop disturbance within one month of harvest	Once per site
	Construction equipment to be well maintained	Construction equipment	Field	Complaints received by provincial/Government District	Every 2 weeks
	Turning off plant not in use	Construction equipment	Field	Complaints procedure by provincial/Government District	Every 2 weeks
	Existing roads and tracks used for construction and maintenance access to the line wherever possible.	Access routes	ROW	Use of established roads wherever possible	Every fortnight
	New access ways restricted to a single carriageway width within the ROW	Access width	Field	Access restricted to single carriageway width within ROW	Every 2 weeks
	Temporary placement of fill in drains/canals not permitted	Temporary fill placement	ROW and substations	Absence of fill in sensitive drainage areas	Every 4 weeks
	Marking of vegetation to be removed prior to clearance, and strict control on clearing activities to ensure minimal clearance.	Vegetation marking and clearance control	ROW	Clearance strictly limited to target vegetation	Every 2 weeks
	Trees up to 6 m mature height retained within the ROW.	Species-specific tree retention	ROW	Presence of target species in ROW following vegetation clearance	Every 2 weeks
	Trees that can survive pruning to comply will be pruned instead of cleared.	Species-specific pruning	ROW	Presence of target species in ROW following vegetation clearance	Every 2 weeks
	Felled trees and other cleared or pruned vegetation offered to the owner for their use, or removed if requested.	Availability of cleared vegetation to owners	ROW	Use or intended use of vegetation by owners	Every 2 weeks
	Minimize land loss	Land perimeter marking	ROW and access routes	Compliance with boundary limits	Every pylon site, road access – once per site
	Implement access control	To be determined	ROW	To be determined	Every 2 Weeks
	Dismantling of access roads to be undertaken promptly on completion of pylon	Timing of works	Field	As required along route	Once per site
	Appropriate disposal of access road material	Waste management	Field	As required along route	Once per site

Project Stage	Proposed Mitigation Measures	Parameter To Be Monitored	Location	Measurement	Frequency
	Construction workers prohibited from harvesting wood in the project area during their employment, (apart locally employed staff continuing current legal activities).	Illegal vegetation harvesting	Near camps and const. sites	Complaints by local people or other evidence of illegal harvesting	Every 2 weeks
	Spoil excavated from tower footings disposed of by placement along roadsides, or at nearby house blocks if requested by landowners.	Spoil disposal locations	Disposal sites	Acceptable spoil disposal sites	Every 2 weeks
	Tree clearance for easement establishment to only involve cutting trees off at ground level or pruning as appropriate, with tree stumps and roots left in place and ground cover left undisturbed.	Ground disturbance during vegetation clearance	ROW and substations	Amount of ground disturbance	Every 2 weeks
	Excess fill from tower foundation excavation disposed of next to roads or around houses, in agreement with the local community or landowner.	Location of fill disposal	ROW	Appropriate fill disposal locations	Every 2 weeks
	Fuel and other hazardous materials securely stored above flood level.	Location of hazardous material storage	Field	Fuel storage in appropriate locations and receptacles	Every 2 weeks
	Construction activities only undertaken during the day and local communities informed of the construction schedule.	Timing of construction	Field	Daytime construction only	Every 2 weeks
	Construction workforce facilities to include proper sanitation, water supply and waste disposal facilities.	Workforce facilities	Field	Presence of proper sanitation, water supply and waste disposal facilities	Once each new facility
Operation and maintenance	Removal of construction waste from sites	Cleared sites	Pylon locations	Visual assessment	Once on completion of site works

Table 3: Summary of Monitoring Requirements – Van Tri Substation

Project Stage	Proposed Mitigation Measures	Parameter To Be Monitored	Location	Measurement	Frequency
Pre-construction	PCBs not used in substation transformers or other project facilities or equipment.	Transformer design	Office	Exclusion of PCBs in transformers stated in tender specification	Once
Construction	Construction techniques and machinery selection seeking to minimize ground disturbance.	Construction techniques and machinery	Field	Construction techniques and machinery creating minimal ground disturbance	Once at the start of each const. Season
	Construction activities on cropping land timed to avoid disturbance of field crops within one month of harvest wherever possible.	Substation	ROW and substations	Crop disturbance within one month of harvest	Once per site
	Construction equipment to be well maintained	Constructive equipment	Field	Complaints received by provincial/Government District	Every 2 weeks
	Turning off plant not in use	Construction equipment	Field	Complaints procedure by provincial/Government District	Every 2 weeks
	Existing roads and tracks used for construction and maintenance access to the line wherever possible.	Access routes	ROW and substations	Use of established roads wherever possible	Every fortnight
	Temporary placement of fill in drains/canals not permitted	Temporary fill placement	Substation	Absence of fill in sensitive drainage areas	Every 4 weeks
	Minimize land loss	Land perimeter marking	Field	Compliance with boundary limits	Every 4 weeks
	Construction workers prohibited from harvesting wood in the project area during their employment, (apart locally employed staff continuing current legal activities).	Illegal vegetation harvesting	Near camps and const. sites	Complaints by local people or other evidence of illegal harvesting	Every 2 weeks
	Fill for the substation foundations obtained by creating or improving local water supply ponds or drains, with the agreement of local communities.	Borrow area siting	Borrow areas	Acceptable borrow areas that provide a benefit	Every 2 weeks
	Construction activities involving significant ground disturbance (i.e. substation land forming) not undertaken during the monsoon season.	Seasonal start and finish of major earthworks	Substations	Timing of major disturbance activities	Prior to commencement of major construction activities

Project Stage	Proposed Mitigation Measures	Parameter To Be Monitored	Location	Measurement	Frequency
	Fuel and other hazardous materials securely stored above flood level.	Location of hazardous material storage	Field	Fuel storage in appropriate locations and receptacles	Every 2 weeks
	Construction activities only undertaken during the day and local communities informed of the construction schedule.	Timing of construction	Field	Daytime construction only	Every 2 weeks
	Construction workforce facilities to include proper sanitation, water supply and waste disposal facilities.	Workforce facilities	Field	Presence of proper sanitation, water supply and waste disposal facilities	Once each new facility
Operation and Maintenance	Substations constructed above at least the 1:10 year flood level by raising the foundation pad.	Substation designs and base heights	Substations	Base height as per flood design	Once
	Substation transformers located within secure and impervious bunded areas with a storage capacity of at least 110% of the capacity of oil in transformers and associated reserve tanks.	Substation bunding	Substations	Bunding capacity and permeability	Once
	On site management through landscaping and planting to match existing substations	Landscaping	Substation	Planting to be undertaken	Once, 12 months after completion of substation

Table 4: Summary of Monitoring Requirements – Quang Ninh Substation

Project Stage	Proposed Mitigation Measures	Parameter To Be Monitored	Location	Measurement	Frequency
Pre-construction	PCBs not used in substation transformers or other project facilities or equipment.	Transformer design	Office	Exclusion of PCBs in transformers stated in tender specification	Once
	Design of plant enclosures at Quang Ninh to comply with noise regulations.	Substation design	Office and substation site	Compliance with regulations	Once
	Consultation with residents regarding grave location and possible relocation	Line design	Office, ROW substations	Consultation with residents	All official landowners once
Construction	Construction techniques and machinery selection seeking to minimize ground disturbance, where possible.	Construction techniques and machinery	Field	Construction techniques and machinery creating minimal ground disturbance	Once at the start of each const. Season
	Construction activities on cropping land timed to avoid disturbance of field crops within one month of harvest wherever possible.	Timing of start of construction	Substation	Crop disturbance within one month of harvest	Once per site

Project Stage	Proposed Mitigation Measures	Parameter To Be Monitored	Location	Measurement	Frequency
	Construction equipment to be well maintained	Constructive equipment	Field	Complaints received by provincial/Government District	Every 2 weeks
	Turning off plant not in use	Construction equipment	Field	Complaints procedure by provincial/Government District	Every 2 weeks
	Existing roads and tracks used for construction and maintenance access to the line wherever possible.	Access routes	Substation	Use of established roads wherever possible	Every fortnight
	Minimize land loss	Land perimeter marking	Field	Compliance with boundary limits	Every 4 weeks
	Temporary placement of fill in drains/canals not permitted	Temporary fill placement	Substation	Absence of fill in sensitive drainage areas	Every 4 weeks
	Marking of vegetation to be removed prior to clearance, and strict control on clearing activities to ensure minimal clearance.	Vegetation marking and clearance control	Substation	Clearance strictly limited to target vegetation	Every 2 weeks
	Felled trees and other cleared or pruned vegetation offered to the owner for their use, or removed if requested.	Availability of cleared vegetation to owners	Substation	Use or intended use of vegetation by owners	Every 2 weeks
	Construction workers prohibited from harvesting wood in the project area during their employment, (apart locally employed staff continuing current legal activities).	Illegal vegetation harvesting	Near camps and const. sites	Complaints by local people or other evidence of illegal harvesting	Every 2 weeks
	Fill for the substation foundations obtained by creating or improving local water supply ponds or drains, with the agreement of local communities.	Borrow area siting	Borrow areas	Acceptable borrow areas that provide a benefit	Every 2 weeks
	Construction activities involving significant ground disturbance (i.e. substation land forming) not undertaken during the monsoon season.	Seasonal start and finish of major earthworks	Substations	Timing of major disturbance activities	Prior to commencement of major construction activities
	Tree clearance for easement establishment to only involve cutting trees off at ground level or pruning as appropriate, with tree stumps and roots left in place and ground cover left undisturbed.	Ground disturbance during vegetation clearance	Substation	Amount of ground disturbance	Every 2 weeks

Project Stage	Proposed Mitigation Measures	Parameter To Be Monitored	Location	Measurement	Frequency
Operation and Maintenance	Fuel and other hazardous materials securely stored above flood level.	Location of hazardous material storage	Field	Fuel storage in appropriate locations and receptacles	Every 2 weeks
	Construction activities only undertaken during the day and local communities informed of the construction schedule.	Timing of construction	Field	Daytime construction only	Every 2 weeks
	Construction workforce facilities to include proper sanitation, water supply and waste disposal facilities.	Workforce facilities	Field	Presence of proper sanitation, water supply and waste disposal facilities	Once each new facility
	Substations constructed above at least the 1:10 year flood level by raising the foundation pad.	Substation designs and base heights	Substations	Base height as per flood design	Once
	Substation transformers located within secure and impervious bunded areas with a storage capacity of at least 110% of the capacity of oil in transformers and associated reserve tanks.	Substation bunding	Substation	Bunding capacity and permeability	Once
	On site management through landscaping and planting to match existing substations	Landscaping	Substation	Planting to be undertaken	Once, 12 months after completion
	Dust control measures	Dust nuisance	Substation and access void	Complaints from residents	As required

Table 5: Summary of Monitoring Requirements – upgraded substations requiring additional landstake

Project Stage	Proposed Mitigation Measures	Parameter To Be Monitored	Location	Measurement	Frequency
Pre-construction	PCBs not used in substation transformers or other project facilities or equipment.	Transformer design	Office	Exclusion of PCBs in transformers stated in tender specification	Once
	Consideration of nuisance impacts during delivery of plant to site	Delivery schedule	Substations	Consultation with local authority	Once
	Consideration of short term construction noise impacts	Confirm no new residential properties constructed nearby	Field	New properties	Once

Project Stage	Proposed Mitigation Measures	Parameter To Be Monitored	Location	Measurement	Frequency
Construction	Construction techniques and machinery selection seeking to minimize ground disturbance.	Construction techniques and machinery	Field	Construction techniques and machinery creating minimal ground disturbance	Once at the start of each const. Season
	Construction activities on cropping land timed to avoid disturbance of field crops within one month of harvest wherever possible.	Timing of start of construction	ROW and substations	Crop disturbance within one month of harvest	Once per site
	Minimize land loss	Land perimeter markings	Field	Compliance with boundary limits	Every 4 weeks
	Construction equipment to be well maintained	Constructive equipment	Field	Complaints received by provincial/Government District	Every 2 weeks
	Turning off plant not in use	Construction equipment	Field	Complaints procedure by provincial/Government District	Every 2 weeks
	Existing roads and tracks used for construction and maintenance access to the line wherever possible.	Access routes	ROW and substations	Use of established roads wherever possible	Every fortnight
	Temporary placement of fill in drains/canals not permitted	Temporary fill placement	Substation	Absence of fill in sensitive drainage areas	Every 4 weeks
	Marking of vegetation to be removed prior to clearance, and strict control on clearing activities to ensure minimal clearance.	Vegetation marking and clearance control	Substations	Clearance strictly limited to target vegetation	Every 2 weeks
	Felled trees and other cleared or pruned vegetation offered to the owner for their use, or removed if requested.	Availability of cleared vegetation to owners	Substations	Use or intended use of vegetation by owners	Every 2 weeks
	Construction workers prohibited from harvesting wood in the project area during their employment, (apart locally employed staff continuing current legal activities).	Illegal vegetation harvesting	Near camps and const. sites	Complaints by local people or other evidence of illegal harvesting	Every 2 weeks
Fill for the substation foundations obtained by creating or improving local water supply ponds or drains, with the agreement of local communities.	Borrow area siting	Borrow areas	Acceptable borrow areas that provide a benefit	Every 2 weeks	

Project Stage	Proposed Mitigation Measures	Parameter To Be Monitored	Location	Measurement	Frequency
	Construction activities involving significant ground disturbance (i.e. substation land forming) not undertaken during the monsoon season.	Seasonal start and finish of major earthworks	Substations	Timing of major disturbance activities	Prior to commencement of major construction activities
	Fuel and other hazardous materials securely stored above flood level.	Location of hazardous material storage	Field	Fuel storage in appropriate locations and receptacles	Every 2 weeks
	Construction activities only undertaken during the day and local communities informed of the construction schedule.	Timing of construction	Field	Daytime construction only	Every 2 weeks
	Construction workforce facilities to include proper sanitation, water supply and waste disposal facilities.	Workforce facilities	Field	Presence of proper sanitation, water supply and waste disposal facilities	Once each new facility
Operation and Maintenance	Substation transformers located within secure and impervious bunded areas with a storage capacity of at least 110% of the capacity of oil in transformers and associated reserve tanks.	Substation bunding	Substations	Bunding capacity and permeability	Once

Table 6: Summary of Monitoring Requirements – Upgraded substations not requiring additional land

Project Stage	Proposed Mitigation Measures	Parameter To Be Monitored	Location	Measurement	Frequency
Pre-construction	PCBs not used in substation transformers or other project facilities or equipment.	Transformer design	Office	Exclusion of PCBs in transformers stated in tender specification	Once
	Consultation with residents regarding grave location and possible relocation	Line design	Office, ROW substations	Consultation with residents	All official landowners once
	Consolidation of <u>very</u> short term nuisance impacts during delivery of plant to site	Delivery schedule	Substations	Consultation with local authority	Once
Construction	Construction techniques and machinery selection seeking to minimize ground disturbance.	Construction techniques and machinery	Field	Construction techniques and machinery creating minimal ground disturbance	Once at the start of each const. Season
	Construction equipment to be well maintained	Constructive equipment	Field	Complaints received by provincial/Government District	Every 2 weeks

Project Stage	Proposed Mitigation Measures	Parameter To Be Monitored	Location	Measurement	Frequency
	Turning off plant not in use	Construction equipment	Field	Complaints procedure by provincial/Government District	Every 2 weeks
	Existing roads and tracks used for construction and maintenance access to the line wherever possible.	Access routes	ROW and substations	Use of established roads wherever possible	Every fortnight
	New access ways restricted to a single carriageway width within the ROW	Access width	Field	Access restricted to single carriageway width within ROW	Every 2 weeks
	Temporary placement of fill in drains/canals not permitted	Temporary fill placement	Substation	Absence of fill in sensitive drainage areas	Every 4 weeks
	Construction workers prohibited from harvesting wood in the project area during their employment, (apart locally employed staff continuing current legal activities).	Illegal vegetation harvesting	Near camps and const. sites	Complaints by local people or other evidence of illegal harvesting	Every 2 weeks
	Fill for the substation foundations obtained by creating or improving local water supply ponds or drains, with the agreement of local communities.	Borrow area siting	Borrow areas	Acceptable borrow areas that provide a benefit	Every 2 weeks
	Fuel and other hazardous materials securely stored above flood level.	Location of hazardous material storage	Field	Fuel storage in appropriate locations and receptacles	Every 2 weeks
	Construction activities only undertaken during the day and local communities informed of the construction schedule.	Timing of construction	Field	Daytime construction only	Every 2 weeks
	Construction workforce facilities to include proper sanitation, water supply and waste disposal facilities.	Workforce facilities	Field	Presence of proper sanitation, water supply and waste disposal facilities	Once each new facility
Operation and Maintenance	Substation transformers located within secure and impervious bunded areas with a storage capacity of at least 110% of the capacity of oil in transformers and associated reserve tanks.	Substation bunding	Substations	Bunding capacity and permeability	Once

C. Responsibilities for Monitoring

71. The following organizations will have a key role in implementing and monitoring the EMP.

- Electricity of Viet Nam (EVN) as the main proponent of the project.
- Northern Power Project Management Board (NPPMB) responsible for the project as part of EVN with specific responsibility for

overall planning, coordination and management of the EMP
 ensuring compliance with environmental regulations
 coordination with provincial and district peoples committees
 management of environmental training courses
 auditing of contractors activities
 reporting on environmental issues to EVN.

- Contractor – full responsibility for ensuring environmental protection as per the IEE is incorporated, specifically:

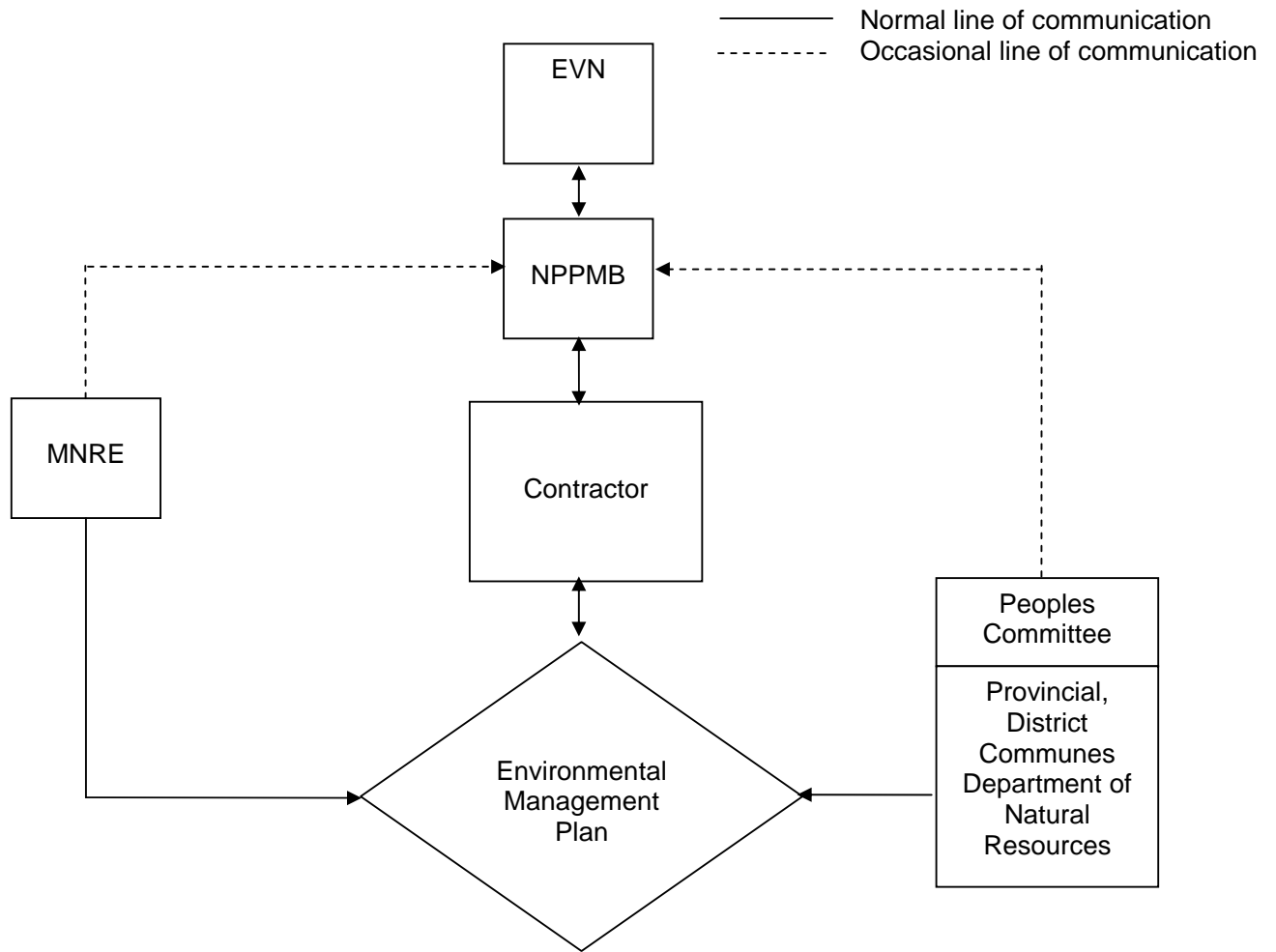
full implementation of mitigation measures
 undertaking all monitoring elements as defined in the EMP
 supervision of implementation of mitigation and monitoring
 reporting on environmental issues regularly to NPPMB
 ensuring compliance with all Vietnamese environmental legislation during construction activities.

- People's Committee (PC) both the District and the Communes Peoples Committee will play an important role in the EMP through:

contributing during the preparation of detailed EMP
 identify impacts where they occur and reporting to Contractor and NPPMB.

- Ministry of Natural Resources and Environment (MNRE) responsible for establishing policies and guidelines on environmental management. The EIA division will be consulted on the implementation of the detailed EMP.
- Departments of Natural Resources and Environment (DNRE) Provincial Peoples Committee representative with considerable local knowledge of their provinces will be involved at all stages of the EMP preparation as well as receiving reports from the Contractor as to environmental compliance.

72. The proposed relationship between the above will be confirmed prior to commencement of the project but a schematic figure illustrating the suggested linkages is illustrated in Figure 1.



a. Figure 1. Proposed Relationship between Parties

73. The Contractor will implement the EMP based on the finding enclosed in the IEE. The Contractor will identify the following details:

- time line for monitoring/visits to site (only possible when the route and sub-station construction plan has been subject to detailed design)
- what elements will be monitored at what locations based on the recommendations in Tables 2 - 6 (including activities to be undertaken prior to construction commencing)
- reporting structure following such visits including proposed response in the event of an environmental incident (such as an oil spillage)
- staffing proposals for a) undertaking the monitoring, b) reporting and c) liaison with People's Committee representatives and the client (NPPMB).

74. The details above-mentioned will be provided for comment and agreement to NPPMB, the Peoples Committee at Provincial and District level and also to MNRE not less than 2 months prior to proposed commencement of work.

D. Preliminary Cost Estimates

75. Cost estimate summaries for the implementation of environmental mitigation measures, independent audit activities, recruitment of staff and training is provided in Table 7. Costs associated with reducing noise impact at Quang Ninh have been included as part of the engineering costs.

Table 7: Summary of Estimated Costs for EMP Implementation

Item	Sub Item	Total Cost (\$)
Recruitment of technical specialist	Permanent recruitment of environmental specialist	17,500
Training	Workshop	1,000
	Environmental Operational Handbook	2,000
Environmental Information Booklet	Non technical summary document	3,000
Monitoring Activities	\$3,000/subproject	30,000
Contingency	10% contingency	5,350
Total		56,000*

* Rounded up to the nearest \$1000

VI. PUBLIC CONSULTATION AND DISCLOSURE

76. As part of the feasibility study, EVN undertook some preliminary consultation exercises with Government, Peoples Committee representatives, and members of the public. As part of this IEE study, a consultation exercise was undertaken at six separate locations. This was managed by a consultant, under the supervision of EVN and ADB. A representative from ADB attended one of the meetings. Further and structural consultations will continue to take place during the design phase. A summary of the consultations taken thus far is provided below. Details of which are given in the full IEE.

Table 3: Time and Locations of the Public Consultation Workshops

No.	Location	Time	Date	Public Consultation Purpose
1	Ha Noi City	13h30–16h00	5 Jan 2004	The whole Project and Van Tri substation
2	Ha Tay Province	13h30–17h00	6 Jan 2004	The part of transmission line that passes Ha Tay Province
3	Bac Ninh Province	13h30–16h30	7 Jan 2004	The part of transmission line that passes Bac Ninh Province
4	Hung Yen Province	13h30–16h30	8 Jan 2004	The part of transmission line that passes Hung Yen Province
5	Hai Duong Province	13h30–16h30	9 Jan 2004	The part of transmission line that passes Hai Duong Province
6	Quang Ninh Province	13h30–16h30	16 Jan 2004	The part of transmission line that passes Quang Ninh Province and Quang Ninh substation

77. The objectives of the workshops were as follows:

Disseminating information on the project to the stakeholders and thereby helping them better understand the trade-offs between project benefits and disadvantages.

Helping identify key causes of environmental problems.

Gaining a better understanding of existing environmental conditions.

Helping the stakeholders contribute meaningfully to the project design.

Gaining greater trust with the project proponent and support for the Project.

Reducing potential conflicts and substantial delays.

Helping recognize possible alternatives.

Helping to establish a comprehensive environmental management plan by incorporating local input and know-how.

Helping to determine project programs that fit the needs and priorities of the affected people.

Ensuring the sustainability of the Project.

78. The information provided at the workshops was well received. It was clear that people in the provinces, in general, welcomed the Project in terms of the socio-economic benefits that it will bring. Most of the issues raised were typical for power transmission line projects. The most concerned issues were identified to be EMF and land use impacts. The workshops provided a great opportunity to inform stakeholders of the nature of the Project, the role of the consultants, and to clarify certain issues of concern at this early stage. Moreover, the public consultation meetings helped the Executing Agency to understand the existing local conditions.

79. As per the Power Electric Consulting Company 4 recommendation, an environmental information booklet will be prepared in Vietnamese by EVN or the Northern Power Project Management Board on the basis of the detailed design for the transmission line and as approved by the Vietnamese authorities. The environmental information booklet will be

displayed at offices of the Peoples' Committees of relevant communes and districts and sent to local Unions such as Farmers Association, Women's Association, and to all heads of villages.

VII. ENVIRONMENTAL ASSESSMENT AND REVIEW OF CANDIDATE SUBPROJECTS

A. Overview of subprojects to be selected

80. A list of candidate subprojects is provided as follows:

Tuyen Quang - Yen Bai 220 kV Transmission Line (TL)
 Yen Bai - Lao Cai 220 kV TL
 Lao Cai 220 kV Substation(S/S)
 Hai Phong TPP - Dinh Vu 220 kV TL
 Hai Phong TP P- Vat Cach 220 kV TL
 Van Tri - Soc Son 220 kV TL
 Van Tri - Chem 220 kV TL
 Hai Duong 220 kV S/S
 Ban La - Vinh 220 kV TL
 Phu Ly 220 kV S/S
 Son La 220 kV S/S
 220 kV and 110 kV Line Connections to Hai Duong and Phu Ly Substations

81. All of these candidate subprojects are either extension of existing substations, construction of new substations, or construction or upgrade of transmission lines which are similar in nature and scope of those sample subprojects already selected and assessed above. Scale and characteristics of potential environmental impacts—if any—are expected to be similar to those already assessed in this SIEE, and anticipated to be insignificant.

B. Environmental Criteria for Subproject Selection

82. Specific criteria for selecting the subprojects will be: (i) the substations will not be located within or cross areas of virgin forests, ecologically significant or environmentally sensitive areas such as national parks, nature reserves, or wetland as designated by MNRE; (ii) the transmission line alignment will not traverse any environmentally sensitive areas as identified by MNRE; (iii) any likely environmental and social impacts (including resettlement, land take, cultural, or religious sites) associated with locations will be minimized by re-alignment or re-allocation of the subprojects; and (vi) all subprojects will be subject to an IEE process.

C. Environmental Assessment and Review Procedures of Subprojects

1. Application of Selection Criteria

83. Any subproject, which does not meet the criteria listed above, may be rejected. A final check on conformity with the selection criteria will be the submission of selected subprojects for ADB's clearance. Based on the assessment of subprojects in previous sections of this SIEE, it is anticipated that no category "A" or sensitive "B" project component will be selected. The main consideration is that a full, rigorous environmental impact assessment will not be necessary based on these selection criteria. An initial environmental examination and its summary such as this current one (with an EMP) will suffice.

2. Environmental Classification

84. Environmental categorization process using checklist approach in compliance with the ADB environmental assessment guidelines will be applied. Any "A" or environmentally sensitive "B" subproject may not be selected.

3. Preparation of IEEs

85. After identifying the categories of the subprojects, an IEE/SIEE including an EMP of the subproject, will be adequately conducted. At least one public consultation will be conducted with local community and potentially affected people for each subproject IEE. IEE will be approved before commencement of detailed design while IEE results will be communicated to the local community before commencement of construction. As no category "A" or environmentally sensitive "B" subproject will be selected, a full-scaled EIA study is not anticipated.

4. Responsibilities/Authorities of Various Agencies

86. With the assistance of the project implementation consultant, EVN will be solely responsible for the implementation of the entire environmental assessment and review procedures of selecting subprojects. This include, among others, ensuring that the selection criteria are adhered to strictly, the preparation of IEE/SIEEs be done in a timely and adequate manner, environmental monitoring and institutional requirements be fully met while public consultations be carried out satisfactorily. EVN will provide the categorization checklist and IEE/SIEEs and monitoring reports to ADB for review.

87. The Ministry of Natural Resources and Environment, being the ministry in charge of impact assessment and environmental safeguard requirements, will be responsible for providing EVN with detailed locations and boundaries of the ecologically significant and environmentally sensitive areas including national parks, nature reserves, or wetland to be avoided by the Project. Reference to relevant data sources will be made/confirmed by MNRE.¹

88. ADB will be responsible for regular review and timely approval of subprojects checklists and IEE/SIEEs. Technical guidance will be provided by ADB to the borrower if needed. ADB will also be responsible for reviewing regular monitoring reports and officially disclosing the IEEs for selected subprojects in its website.

5. Preparation of Detailed Design

89. Detailed design work for each subproject will follow the recommendations of the IEE. To ensure this, detailed designs will be checked by the environmental engineer within the Northern Power Project Management Board (NPPMB) before contracts are let and modifications made, if considered necessary. Confirmation from EVN to ADB that the detailed designs comply with IEE recommendations will be required before contracts can be officialized.

¹ Websites and sources such as the IUCN site (http://www.mekong-protected-areas.org/vietnam/n_report.htm) will be included).

6. Preparation of Construction Contracts

90. Early in the implementation period, model construction contracts will be prepared incorporating general environmental safeguards and practices. The environmental section of the model contracts will be drafted with the assistance of a qualified specialist and be given to ADB for approval. Specific, individual contracts will be based on the model contracts, but checked by environmental specialists within EVN to ensure that any special or particular safeguard recommended by the IEE for the particular subproject is incorporated within the contract.

7. Monitoring During the Construction Period

91. Monitoring during construction will be mainly EVN's responsibility. This will include the NPPMB, which will be mainly responsible for monitoring contractor compliance if the particular subproject entails activities of concern and such monitoring responsibilities have been allocated and agreed upon during the IEE.² NPPMB will be given the responsibility to monitor the general and overall environmental soundness of construction works. Monitoring will relate to compliance with construction contracts, the state and health of the environmental resource, and the effectiveness of mitigation measures. Reporting will be to EVN, MNRE, and ADB, on a regular basis.

8. Monitoring of Subproject Operations

92. Although the IEE is formulated to minimize recurrent responsibilities and costs in circumstances where staff, expertise and finances are limited, some aspects of subproject design will require continuous monitoring of environmental impacts.

9. Cost Estimate

93. In general the cost for implementing the IEE inclusive of environmental monitoring can be borne by engineering aspects of the project for which costs have already been identified. The preparation of the IEE and EMP and environmental monitoring will require funds from the overall project budget, for hiring both international and local consultants, for logistic arrangements and special studies as required. Budget for environmental assessments is estimated as follows:

Item	Rate/Unit	Unit	Budget (\$)
International environmental specialist	\$15,000	3 person-months	45,000
Local environmental consultant	\$2,000	20 person-months	40,000
Monitoring activities	\$3,000/subproject	12 subprojects	36,000
Logistics (reporting, inspection, etc.)	\$1,000/subproject	12 subprojects	12,000
Total			133,000

VIII. FINDINGS AND RECOMMENDATIONS

94. This SIEE has identified that, for those sample subprojects assessed, no significant environmental impacts are expected to occur during the project implementation. Environmental

² In some cases, monitoring responsibilities will need to be formally agreed upon with the assistance of the Provincial Governor's Office.

impacts are likely to result from the proposed development but none are considered significant. Those impacts that do occur can be reduced through the use of mitigation measures, most of which will be standard methods of working for construction sites, or through the careful selection of access road routes.

95. Environmental assessment of sector impacts, including cumulative/synergistic impacts, is not considered necessary because of the insignificant scale and nature of the subprojects proposed in a wide geographic area under the Project. It has not been possible to precisely predict the impacts, under the sample subproject's IEE, that are likely to occur at pylon locations and those that may occur resulting from the construction of temporary access roads leading to pylon sites or as part of improvement to the road near to the Quang Ninh as these have yet to be detailed. It is recommended that access control will be adopted during construction of the roads allowing high safety and low disturbance to the local community and ecosystem, after the detailed alignment of the access roads are finalized.

96. However, no impacts are expected beyond those already predicted that would change the conclusions of this report. Extra care will be taken during the detailed design phase to take account of the unknowns and ensure that appropriate procedures are incorporated as part of the construction works. This will be achieved through the use of an EMP provided in this SIEE.

97. It is considered that with careful mitigation and monitoring, none of the environmental impacts from the proposed sample subprojects will be of significant concern. In addition, specific selection criteria and review/assessment procedures for candidate subprojects have been adopted for future activities under the Project to ensure minimal impacts to take place and adequate mitigation and monitoring to address them.

IX. CONCLUSIONS

98. For the proposed sector loan of Northern Power Transmission Project in Viet Nam, the works proposed for the existing substations will consist of replacement or upgrading of existing facilities. No new land take will be required in these instances and impacts will largely be confined to short-term construction impacts of a minimal nature. Two new substation sites will be constructed where unavoidable land-take will be expected. The expected impacts are likely to be both short-term construction impacts during the construction phase and the potential for longer-term permanent impacts as a result of the operation of the facilities. Impacts will be adequately mitigated and the significance of the remaining impact after successful implementation of mitigation will be minimal.

99. The construction of the overhead transmission line is likely to result in short-term environmental impacts. Permanent impacts are likely to be restricted to those on landscape and visual elements but given the existing and/or planned development unconnected with this Project, the impacts are considered insignificant.

100. This study has not identified any environmental impacts that would necessitate a more detailed Environmental Impact Assessment to be conducted. However, an EMP has been prepared in order to ensure that mitigation measures identified are successfully implemented and environmental impacts are managed in an appropriate manner during the construction phase, and be monitored regularly.