Initial Environmental Examination

Project Number: 48325-001
January 2015

PHI: 150 MW Burgos Wind Farm Project

Prepared by EDC Burgos Wind Power Corporation for EDC Burgos Wind Power Corporation and the Asian Development Bank.

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150 MW BURGOS WIND FARM PROJECT

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A. EXECUTIVE SUMMARY

EDC Burgos Wind Power Corporation (EBWPC) is a wholly-owned subsidiary of Energy Development Corporation (EDC). In line with EDC's program to expand its renewable energy projects, EBWPC intends to construct and operate the 150 MW Burgos Wind Farm Project (the "Burgos Wind Project" or the "Project") located in Burgos, Ilocos Norte. Electricity will be generated from wind turbine generators (WTGs) at the Project site and will be conveyed to the proposed substation and transmission line which will be connected to the existing Laoag City substation.

The Project will have the capacity to generate 150 MW using 50 WTGs, each of which will have a capacity of 3 MW. A 115 kV transmission line of approximately 42 kilometers (km) in length was constructed to convey the electricity from the Project site to the nearest substation of the National Grid Corporation of the Philippines (NGCP) in Laoag City, Ilocos Norte. The transmission line will be supported by 128 lattice-type transmission towers and 20 steel poles. A substation was constructed in the Municipality of Burgos, and interconnection facilities at the NGCP substation located in Laoag City for the connection of the transmission line to the national grid.

The Project is located in a relatively hilly and rocky coastal area largely composed of forestland and pastureland used for communal grazing. The transmission line route passes through agricultural lands where cash crops are grown and through a public forestland generally made up of fruit trees and fuel wood species.

Vegetative species recorded included grasses, shrubs and few coastal trees. Terrestrial fauna species recorded included birds which comprised the majority followed by amphibian and reptiles and mammals. Vegetation in the project area provides a variety of products and services that contribute to well-being of the locals and for biodiversity conservation. Ambient noise sources include both natural sources from moderate winds, livestock, and birds and anthropogenic sources such as from traffic movement. The Project site is located under Type 1 climate area, based on the Modified Coronas system of classification which has two distinct seasons, dry season from November to April or May where the northeast trade wind prevails and wet season from June to October, during which the southwest monsoon and typhoon season prevails.

In accordance with the Asian Development Bank (ADB) Safeguard Policy Statement (SPS), the Project is classified as category B for environment. The potential environmental impacts of the Project are generally site-specific, reversible, and mostly occur during the construction stage. The activities include soil excavation, land grading and vegetation clearing for site preparation and internal road network development, installation of wind turbines, usage of vehicles and heavy machineries and the consumption of fuel, oil and water resources. Construction materials are sourced from authorized suppliers and water is sourced from nearby creek and spring as well as from bulk water suppliers in the neighboring municipality. Bio-engineering measures to prevent and control soil erosion and sedimentation of surface and marine waters are implemented. Potential hazards and risks associated with occupational health and safety such as exposure to excessive noise, vibration, working at heights and risk to falling objects are addressed by periodic occupational health and safety (OHS) training and providing appropriate personal protective equipment (PPE) to workers.

During operation, noise produced by the wind turbines is expected to be within acceptable limits and will be monitored so that mitigation measures can be implemented if needed. Actual

shadow flickers will also be monitored and mitigation measures are in place. EBWPC will also rehabilitate the pastureland and develop new forage production areas. The wind farm is expected to serve as added attraction to the eco-tourism in the area. Exposure of community members to the hazards of blade throw and tower collapse is minimized through installation of warning signs. Access to the area for grazing purposes is generally unrestricted and members of the local pasture association are employed to serve as foot patrols to keep cattle and livestock from wandering around the site. The project is not expected to affect aircraft navigation safety as well as that of telecommunication and television systems. The Project site is not considered a major fly route for migratory birds as there are no known major riparian areas and food source for the migratory species to feed and rest in the vicinity. The wind turbine generators and blades are also painted with matte gray finish to minimize blade glint and reflections from the structures. Climate change risks have been assessed and measures to address them have been incorporated in the project design.

EBWPC has engaged with Project stakeholders and has acquired endorsements from the local, municipal, and provincial government units. Information disclosure and consultations with affected people will be conducted in an ongoing manner. The company has designed a grievance mechanism that aims to offer communities an effective avenue for expressing concerns and achieving fair remedies. An environmental and social management and monitoring plan are also in place.

Since the Project is beyond its pre-construction phase, an environmental and social compliance audit was done by a third party auditor. The audit confirmed that EBWPC has complied with the Philippine environmental impact statement system requirements and acquired key permits pursuant to applicable laws and regulations. The Project was issued an environmental compliance certificate by the Department of Environment and Natural Resources (DENR). It has engaged a Pollution Control Officer cum Environment, Health and Safety Officer as well as an Environment Officer who are guided by the personnel from the head office. The engineering, procurement and construction (EPC) contractor as well as the civil contractor for the wind farm and transmission line have environmental management systems that are certified in accordance with the requirements of ISO 14001, health and safety management systems according to OHSAS 18001, and a quality management system in line with ISO 9001. The audit also determined that the construction activities were in accordance with ADB SPS requirements.

EBWPC is compliant with Philippine legislation. However, it was identified that there are manageable ‘gaps’ between the Project’s environmental and social assessment and management process and the requirements of ADB SPS. EBWPC is committed to implement the corrective action plan/environmental and social action plan and to bridging the gaps to meet ADB SPS requirements.

EBWPC has prepared a corrective action plan with measures to address the gaps in line with the ADB SPS. EBWPC has the institutional capacity and commitment to manage the Project’s social and environmental impacts. EBWPC will submit annual environmental safeguards monitoring report on progress of implementation of the management plans and corrective actions.

B. INTRODUCTION

Background

EDC Burgos Wind Power Corporation ("EBWPC" or the "Company"), is a special purpose vehicle that is directly and wholly owned by EDC Wind Energy Holdings Inc. (EWEHI), a Philippine holding company created to hold all of the wind power projects of Energy Development Corporation (EDC). EBWPC will develop, construct, operate, and maintain the 150 MW Burgos Wind Farm Project (the "Burgos Wind Project" or the "Project") located in Barangays Saoit, Nagsurot, and Poblacion, in the Municipality of Burgos, Province of Ilocos Norte, Philippines. EDC is formerly the PNOC-Energy Development Corporation (PNOC-EDC).

This Initial Environmental Examination (IEE) is prepared to comply with the requirements of the Asian Development Bank (ADB) Safeguard Policy Statement (SPS), 2009. The assessment is based on a several documents submitted to the national regulatory authorities and due diligence exercise. The Project is classified as category B for environment, category B for involuntary resettlement, and category C for indigenous peoples in accordance with the 2009 ADB SPS.

Overview and status of the Burgos Wind Project

The Burgos Wind Project has been issued various environmental permits and contracts pursuant to requirements of the national government namely, Department of Energy (DOE) and the Department of Environment and Natural Resources (DENR).

A Wind Energy Service Contract (WESC) was issued by the DOE to EBWPC on 14 September 2009 to develop the Burgos Wind Project in Ilocos Norte. The WESC (DOE Certificate of Registration No. WESC 2009-09-004) is valid for 25 years or until 2034, and is renewable for another 25 years.

Environmental Compliance Certificates (ECCs) were issued by the DENR starting 2000 prior to the issuance of WESC from the DOE in accordance with the Philippine Environmental Impact Statement System (PEISS) under Presidential Decree (PD) 1586.

The environmental impact assessment (EIA) of the Burgos Wind Project started as early as year 2000 when the project was conceptualized as the Northern Luzon Wind Power Project (NLWPP). Several EIA reports were submitted to the Environmental Management Bureau (EMB) Region 1 for the application of the ECC from year 2000 to 2013 due to amendments on project development plans as a result of evolving design concepts. These amendments included changes in design capacities, type of WTGs to be used, change in location, and increase in development area, reshaping of the development block, and amendments to the ECC conditions.

In 2000, an ECC was acquired for a 42 MW Northern Luzon Wind Power Project (NLWPP Phase 1) covering an area of about 255 hectares located at Barangays Pagali and Saoit, Municipality of Burgos, Province of Ilocos Norte which covers the installation of about 63 WTGs each with a rating of 750 kW. In 2002, an ECC was acquired for the development of an 80 MW Project (NLWPP Phase 2) located at Barangays Bayog, Saoit, Ablan, Poblacion, Buduan, Tanap and Nagsurot, in the Municipality of Burgos, Province of Ilocos Norte covering the installation of 133 WTGs, each with a maximum rating of 1,300 kW, within a 2,433-hectare lot area. In 2008, NLWPP Phase 1 and Phase 2 ECCs were amended primarily to reflect larger

rating capacities of up to 2.5 MW for each WTG and in 2010, NLWPP Phase 1 and 2 projects were integrated with only one ECC for ease of monitoring and implementation.

Recent developments in WTG technology have allowed manufacturers to increase the rated capacity of the WTGs to 3 MW per unit and based on recent wind flow analysis and iterations in the micro-siting of WTGs, it was revealed that the wind farm area can accommodate up to 55 units of 3 MW WTGs. This has allowed EBWPC to increase the capacity estimate of the Project up to 165[1] MW within the same project development area of which an ECC Amendment was issued on 08 July 2013.

[1] While the Project has a capacity estimate of up to 165 MW, the current design of the wind farm will have a capacity of 150 MW with 50 units of WTGs at 3 MW each.

Existing wind/energy projects

In December 2008, the Philippine legislature passed Republic Act (RA) No. 9513[2], or the Renewable Energy (RE) Act of 2008, that aims to "accelerate the exploration, development and utilization of renewable energy resources such as, but not limited to, biomass, solar, wind, hydro, geothermal and ocean energy sources, including hybrid systems, to achieve energy self-reliance, through the adoption of sustainable energy development strategies to reduce the country's dependence on fossil fuels and thereby minimize the country's exposure to price fluctuations in the international markets."

As reported in the DOE website, the Philippines exhibits a promising potential for wind energy because it is situated on the fringes of the Asia Pacific monsoon belt. This was confirmed by the data of the Philippine Geophysical Astronomical Services Administration (PAGASA) which shows that the country has a mean average of about 31 watts per square meter (W/m^2) of wind power density. Moreover, a study conducted by the US National Renewable Energy Laboratory (NREL) in 1999 shows over 10,000 km^2 of windy land areas estimated to exist with a good-to-excellent wind resource potential. Using conservative assumptions of about 7 MW per km^2, the windy land area could theoretically support over 70,000 MW of potential installed capacity.

Since the passage of RA 9513, various energy companies started the exploration and development of renewable energies including wind energy. As of April 2014, at least 45 wind projects were awarded to 24 energy development companies in the Philippines. These projects are being proposed in nine regions in the country, including Cordillera Administrative Region (CAR), Ilocos Region (Region 1), Cagayan Valley (Region 2), Central Luzon (Region 3), CALABARZON (Region 4A), MIMAROPA (Region 4B), and Bicol Region (Region 5) in the Island of Luzon, and Western Visayas (Region 6) and Central Visayas (Region 7) in the Visayas3. Seven wind projects are being proposed in the Municipality of Burgos, Ilocos Norte that include the Burgos Wind Project of EBWPC.

Project need

The Burgos Wind Project was proposed for the following reasons:

The Project addresses 1.5% of the projected demand growth for electricity in the Philippines' Luzon Grid

The 2012–2030 Philippine Energy Plan of the Department of Energy (DOE) shows that the energy demand in the country is expected to grow with the Philippine economy. With electricity demand expected to grow at 4.8 percent per annum, an additional 10,500 MW of new capacity is needed in the Luzon grid onwards to 2030. Of the 10,500 MW, 600 MW is needed by 2016 to meet the forecasted demand. The Project is expected to contribute up to 150 MW to the grid by 2015.

The Project promotes fuel diversification and improves fuel security and sufficiency

The Luzon grid accounts for approximately 75 percent of the total electricity consumption in the Philippines. In 2008, out of the 60,821 GWh of electricity generated in the Philippines, the

[2] The Act is also known as the "Renewable Energy Act of 2008" – An Act Promoting the Development, Utilization and Commercialization of Renewable Energy Resources and For Other Purposes.
[3] Awarded Wind Projects as of 30 April 2014 (https://www.doe.gov.ph/awarded-projects/awarded-wind)

Luzon grid carried a total of 44,200 GWh. Of this figure, 31 percent was contributed by coal plants and four percent was contributed by oil-fired plants. The Philippines imports over 75 percent of its total coal consumption and almost all of its oil consumption.

In terms of dependable generating capacity, the Philippines greatly depended on imported fuels for its power generation. Out of the Luzon grid's total installed capacity of 10,664 MW, 5,085 MW or 48 percent run on imported fuels wherein 3,657 MW and 2,866 MW are coal and oil fired plants, respectively.

The electricity generated by the Project is expected to offset the power generated by coal and oil-fired power plants in the Luzon grid. Since the Project harnesses wind to generate power, the Project is further expected to promote Philippine fuel security and help reduce the country's dependence on imported fuel.

The Project supports the regulatory framework that grants financial benefits to the host communities

The RA 9513 establishes the regulatory framework for the exploration, development, utilization and commercialization of renewable energy sources. The RE Law provides for a one percent government share based on gross income which the developer is required to remit to the Philippine government. Forty percent of the government share fee shall be distributed to the local government units in the manner provided by the Republic Act (RA) No. 7160, or the Local Government Code, as follows:

Local government unit	Percentage allocation
Province	20%
Municipality:	45%
Barangay	35%

Further financial benefits to the local government units will be provided through the Energy Regulation No. 1-94 (ER 1-94) as mandated by Rule 29 of the Implementing Rules and Regulations (IRR) of the Republic Act No. 9136, or the Electric Power Industry Reform Act (EPIRA) of 2001. Under Rule 29, a generation company, as defined under the EPIRA, shall set aside one centavo per kilowatt-hour (PHP0.01/kWh) of the total electricity sales as financial benefit of the host communities of the generation facility. The amount collected shall be allocated as follows:

ER 1-94 Financial Benefits	Percentage allocation
Electrification fund	50%
Development and livelihood fund	25%
Reforestation, watershed management, health and/or environment enhancement fund	25%

The Project benefits from the establishment of a Feed-In Tariff System

The Philippine Feed-in Tariff System (FiT) is patterned after other successful international schemes. It guarantees the purchase of all output from FiT-eligible technology such as wind at a FiT rate for a period of at least 15 years. Below are some specific features of the scheme that are aimed at improving the financial viability of wind farms while reducing project risks:

- Priority connections to the grid for electricity generated from emerging renewable resources, such as wind.

- The priority purchase, transmission of, and payment for such electricity by the grid system operator. This eliminates the need to sign individual off-take agreement with provincial electric cooperatives and distribution utilities.

- A cost sharing mechanism that will allow additional cost of the FiT to be recovered equally from all consumers connected to the transmission and distribution grids. The scheme is therefore more robust since it does not rely on any government budget allocations for it to be successfully implemented.

Purpose and structure of the Initial Environmental Examination (IEE)

This Initial Environmental Examination (IEE) is prepared for purposes of complying with the requirements of the 2009 ADB SPS. This IEE takes stock of information and findings from previous assessments and plans, as well as of the Environmental and Social Impact Assessment (ESIA)[4] which was conducted consistent with the International Finance Corporation (IFC) Performance Standards and its guidance notes, the Equator Principles used by the financing institutions, and to the host country's environmental assessment laws and regulations.

These assessment reports include the Initial Environmental Examination (IEE) reports submitted on April 2000 and February 2002 and the Environmental Performance Report and Management Plans (EPRMP) submitted on September 2010 and July 2013 to the Department of Environment and Natural Resources-Environmental Management Bureau Region 1 (DENR-EMB R1) in compliance with the PEISS under PD 1586.

Since the Project was already under construction when ADB financing was considered, an environment and social compliance audit was undertaken to identify past or present concerns related to impacts on the environment, involuntary resettlement, and indigenous peoples. The compliance audit determined whether actions were in accordance with ADB's safeguard principles and requirements so that a corrective action plan agreed on by ADB and EBWPC is prepared where outstanding non-compliance issues are identified.

[4] EBWPC engaged GHD Consultants to prepare the ESIA in 2013.

C. POLICY, LEGAL, AND ADMINISTRATIVE FRAMEWORK

Introduction

Existing environmental laws and regulations, require that appropriate permits from relevant government agencies must be obtained by a project proponent prior to the construction of power plants utilizing renewable energy resources. Relevant permits are also required once the power plant goes into commercial operation.

The ADB also has safeguard requirements for projects that it will finance.

National Policy, Legal and Regulatory Requirements

The Philippines implements an environmental impact assessment (EIA) system by virtue of PD 1586. PD 1586 was originally devised as an administrative procedure for an action forcing policy that requires proponents of development projects to systematically study and disclose the environmental impacts of their projects. Thus, projects with potential adverse effects on the environment are required to obtain an ECC as a prerequisite for project implementation. The impact on the environment may be determined by way of several assessment mechanisms, depending on the scope of the project:(i) environmental impact statement, (ii) initial environmental examination (IEE), or (iii) a project description (PD). The EIS/IEE/PD is a written report, with varying details and depth of assessment and discussion on the likely impacts of the project on the environment and on the people in the areas to be affected by the project.

The DENR has procedures for screening and scoping of projects under DENR Administrative Order (AO) 2003–30, as amended. The said order outlines the types of projects covered by the EIS system and the type of documentary requirements to be submitted to DENR. The order also prescribes the processing time of the ECC/CNC[5] application.

Aside from PD 1586, the other environmental laws and regulations that are applicable to the Project are:

- RA 8749: Philippine Clean Air Act of 1999 and its IRR (DENR DAO 2000-81)
- PD 1067: Water Code of the Philippines and its IRR
- RA 9275: Philippine Clean Water Act of 2004 and its IRR (DENR DAO 2005-10)
- DENR DAO 1990-34: Revised Water Usage and Classification/Water Quality Criteria
- DENR DAO 1990-35: Revised Effluent Regulations of 1990
- DOH DAO 2007-0012: Philippine National Standards of Drinking Water (PNSDW) of 2007
- RA 9003: Ecological Solid Waste Management Act of 2000 and its IRR (DENR DAO 2001-34)
- RA 6969: Toxic Substances, Hazardous and Nuclear Waste Control Act of 1990 and its IRR (DENR DAO 1992-29, as implemented by 2004-36, the latter as amended by DENR DAO 2013-22)
- RA 9729: Climate Change Act of 2009 and its IRR (CCC AO 2010-10)

[5] Certificate of Non-Coverage. Per Section 3(a) of DENR DAO 2003-30, it is a certification issued by the EMB certifying that, based on the submitted project description, the project is not covered by the EIS System and is not required to secure an ECC.

- Department of Labor and Employment (DOLE) AO 1998-13: Guidelines Governing Occupational Safety and Health in the Construction Industry
- DOLE Occupational Safety and Health Standards
- PD 856: Sanitation Code of the Philippines
- RA 9147: Wildlife Resources Conservation and Protection Act of 2001 and its IRR (Joint DENR-PAMB DAO 2004-01)
- RA 7586: National Integrated Protected Areas System Act of 1992 and its IRR (DENR DAO 1992-25, as amended by DAO 2008-26)
- DAO 2004-15: Establishing the List of Terrestrial Threatened Species and their Categories and List of Other Wildlife Species Pursuant to RA 9147
- DAO 2007-01: Establishing the National List of Threatened Philippine Plants and their Categories, and the List of Other Wildlife Species
- RA 8371: The Indigenous Peoples Rights Act of 1997 and its IRR (NCIP AO 1998-01)
- RA 10066: National Cultural Heritage Act of 2009 and its IRR
- RA 7356: An Act creating the National Commission on Culture and the Arts

Applicable standards include:

- DENR AO 1990-34: Revised Water Usage and Classification/Water Quality Criteria
- DENR AO 1990-35: Revised Effluent Regulations of 1990
- PNSWD 2007: Philippine National Standards of Drinking Water

Applicable permits and approvals include those issued by different government agencies and local government units. These include Forest Land Use Agreement (FLAg) by the DENR Forest Management Bureau (FMB), National Water Regulatory Board (NWRB) Water Permit, Memorandum of Agreement with LGUs (for ER 1-94 or consent under the IPRA), tree cutting permit from DENR FMB, and building and occupational permit from the local government building official, among others.

Asian Development Bank (ADB) Safeguard Requirements

Since the Asian Development Bank (ADB) will be supporting the financing for the Project, the Project will also comply with ADB's safeguard requirements in accordance with 2009 ADBSPS. Below are short descriptions of the applicable safeguards requirements of ADB to the Project.

ADB's Safeguard Requirements 1 on Environment outlines the requirements that borrowers/clients are required to meet when delivering environmental safeguards for projects supported by the ADB. It discusses the objectives and scope of application, and underscores the requirements for undertaking the environmental assessment process. These requirements include assessing impacts, planning and managing impact mitigations, preparing environmental assessment reports, disclosing information and undertaking consultation, establishing a grievance mechanism, and monitoring and reporting. The document also includes particular environmental safeguard requirements pertaining to biodiversity conservation and sustainable management of natural resources, pollution prevention and abatement, occupational and community health and safety, and conservation of physical cultural resources. The applicability of particular requirements is established through the environmental assessment process and

compliance with the requirements is achieved through implementation of environmental management plans agreed to by ADB and the borrower/client.

ADB's Safeguard Requirements 2 on Involuntary Resettlement outlines the requirements that borrowers/clients are required to meet in delivering involuntary resettlement safeguards to projects supported by ADB. It discusses the objectives, scope of application, and underscores the requirements for undertaking the social impact assessment and resettlement planning process, preparing social impact assessment reports and resettlement planning documents, exploring negotiated land acquisition, disclosing information and engaging in consultations, establishing a grievance mechanism, and resettlement monitoring and reporting.

ADB's Safeguard Requirements 3 on Indigenous Peoples outlines the requirements that borrowers/clients are required to meet in delivering indigenous peoples safeguards to projects supported by ADB. It discusses the objectives and scope of application, and underscores the requirements pertaining to (i) undertaking the social impact assessment and planning process; (ii) preparing social impact assessment reports and planning documents; (iii) disclosing information and undertaking consultation, including ascertaining consent of affected Indigenous Peoples community to selected project activities; (iv) establishing a grievance mechanism; and (v) monitoring and reporting. This set of policy requirements will safeguard indigenous peoples' rights to maintain, sustain, and preserve their cultural identities, practices, and habitats and to ensure that projects affecting them will take the necessary measures to protect these rights.

Project Category

ADB carries out project screening and categorization at the earliest stage of project preparation when sufficient information is available. Screening and categorization is undertaken to (i) reflect the significance of potential impacts or risks that a project might present; (ii) identify the level of assessment and institutional resources required for the safeguard measures; and (iii) determine disclosure requirements.

Based on the 2009 ADB SPS, the process of determining a project's environment category is to prepare a rapid environmental assessment (REA) screening checklist, taking into account the type, size, and location of the proposed project. A project is classified as one of the four environmental categories (A, B, C, or FI) as follows:

- Category A: Projects with potential for significant adverse environmental impacts that are irreversible, diverse or unprecedented. These impacts may affect an area larger than the sites or facilities subject to physical works. An environmental impact assessment is required.
- Category B: Projects judged to have some adverse environmental impacts, but of lesser degree and/or significance than those for category A projects. Impacts are site-specific, few if any of them are irreversible, and in most cases mitigation measures can be designed more readily than for Category A projects. An initial environmental examination (IEE) is required.
- Category C: Projects likely to have minimal or no adverse environmental impacts. No environmental assessment is required although environmental implications are still reviewed.
- Category FI: Projects are classified as category FI if they involve investment of funds to or through a financial intermediary. Where the FI's investment has minimal or no

adverse environmental risks the FI project will be treated as category C. All other FI's must establish and maintain an environmental and social management system and must comply with the environmental safeguards requirements specified in SPS 2009 if the FI's subprojects have the potential for significant adverse environmental impacts.

Based on available project information, then proposed Burgos Wind Project of EBWPC can be categorised under Category B for Environment, Category B for Involuntary Resettlement, and Category C for Indigenous Peoples.

D. DESCRIPTION OF THE PROJECT

EDC Burgos Wind Power Corporation

EBWPC is a wholly-owned subsidiary of EDC. The Board of Directors of EDC authorized the organization, incorporation, and registration with the Securities and Exchange Commission (SEC) of a wholly-owned subsidiary to be known as EBWPC. The Board of Directors of EDC also authorized the assignment and transfer to EBWPC of all contracts, assets, permits and licenses relating to the establishment and operation of the Project under the the DOE WESC No. 2009-09-004. EBWPC is also authorized by its Board of Directors to apply and secure all the required and necessary permits, licenses, accreditation, and/or authorization relating to the establishment and operation of the Project.

Project location

The wind farm is located in the Municipality of Burgos in the Province of Ilocos Norte, which is located approximately 500 kilometers north of Manila, or approximately 50 kilometers north of Laoag City, the provincial capital of Ilocos Norte.

Figure 1 shows the location of the Project. The Project required the construction and installation of 50 WTGs, access roads, and a substation within the project development block. The Project also includes the construction of a 42 kilometer (km) long 115 kV transmission line (Figure 2).

There are 11 barangays in the Municipality of Burgos. These are Barangays Poblacion, Ablan, Agaga, Bayog, Bobon, Buduan, Nagsurot, Paayas, Pagali, Saoit, and Tanap. Out of these 11 barangays, seven are coastal areas: Ablan, Bayog, Bobon, Paayas, Pagali, Saoit and Poblacion.

While the Project area covers 1,296 hectares, the wind farm component is located within an area of approximately 618 hectares which is largely unpopulated and undeveloped. The wind farm and future development will be confined only within the 618 hectares across three (3) barangays, namely: Saoit, Poblacion and Nagsurot. Figure 3 presents the Project development map.

Potential Impact areas

In terms of physical environment, the direct impact areas are those areas where all Project facilities are constructed or located and where all operations are undertaken. The impact zone has extended within 300 m of the Project development block boundaries based on the noise modelling and impact assessment undertaken for this Project. The stretch of river that crosses within the wind farm boundary and drains into the coastal area within the project development block is also considered as direct impact area.

The indirect impact areas, on the other hand, are those outside of the Project development block boundaries, still within the WESC, and under the jurisdiction of Barangays Saoit, Poblacion, and Nagsurot. These include areas extending outside the 300 m radius from the wind farm boundary. The road network that was used during the delivery of construction materials/equipment was considered as indirect impact area.

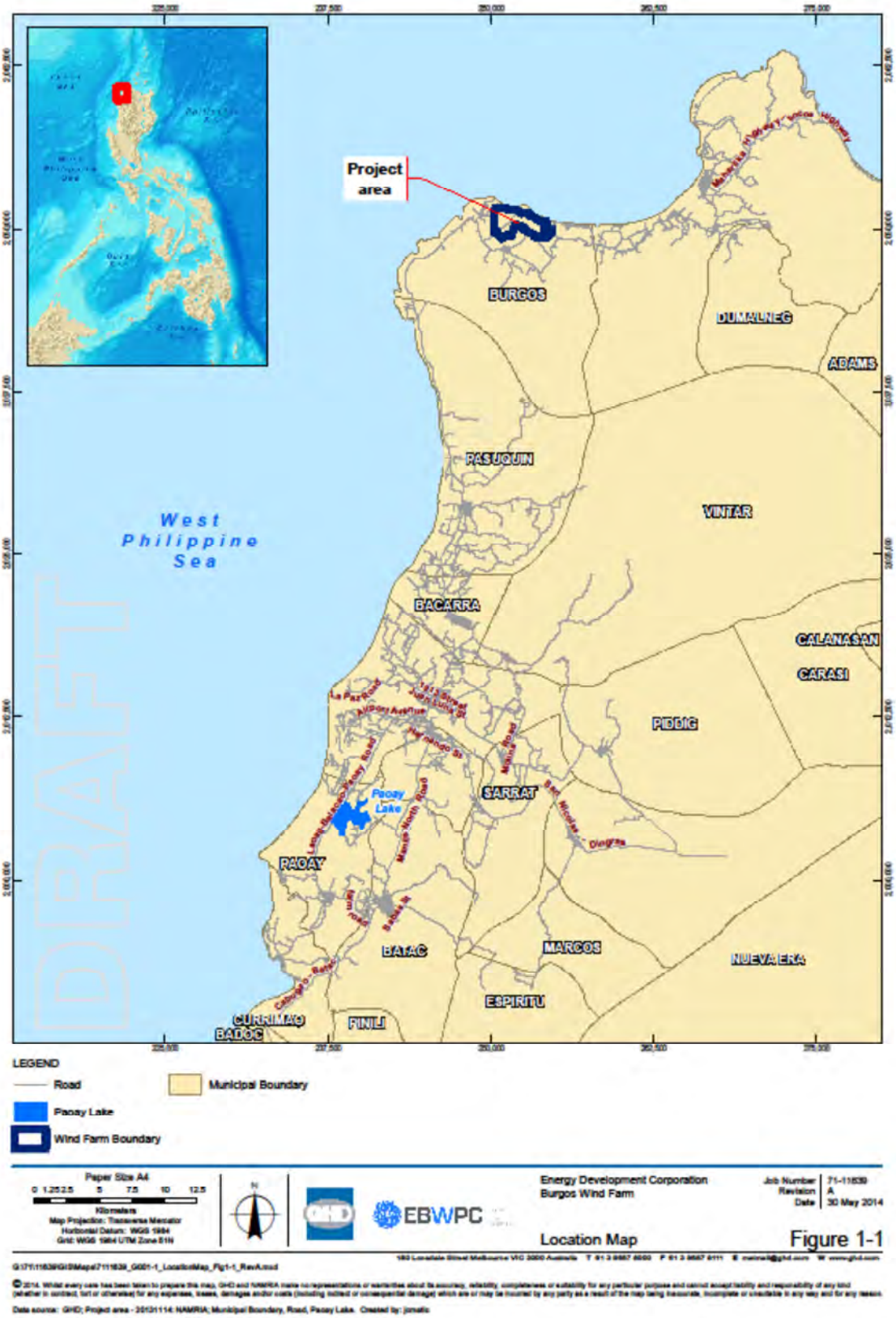

Figure 1. Project location map.

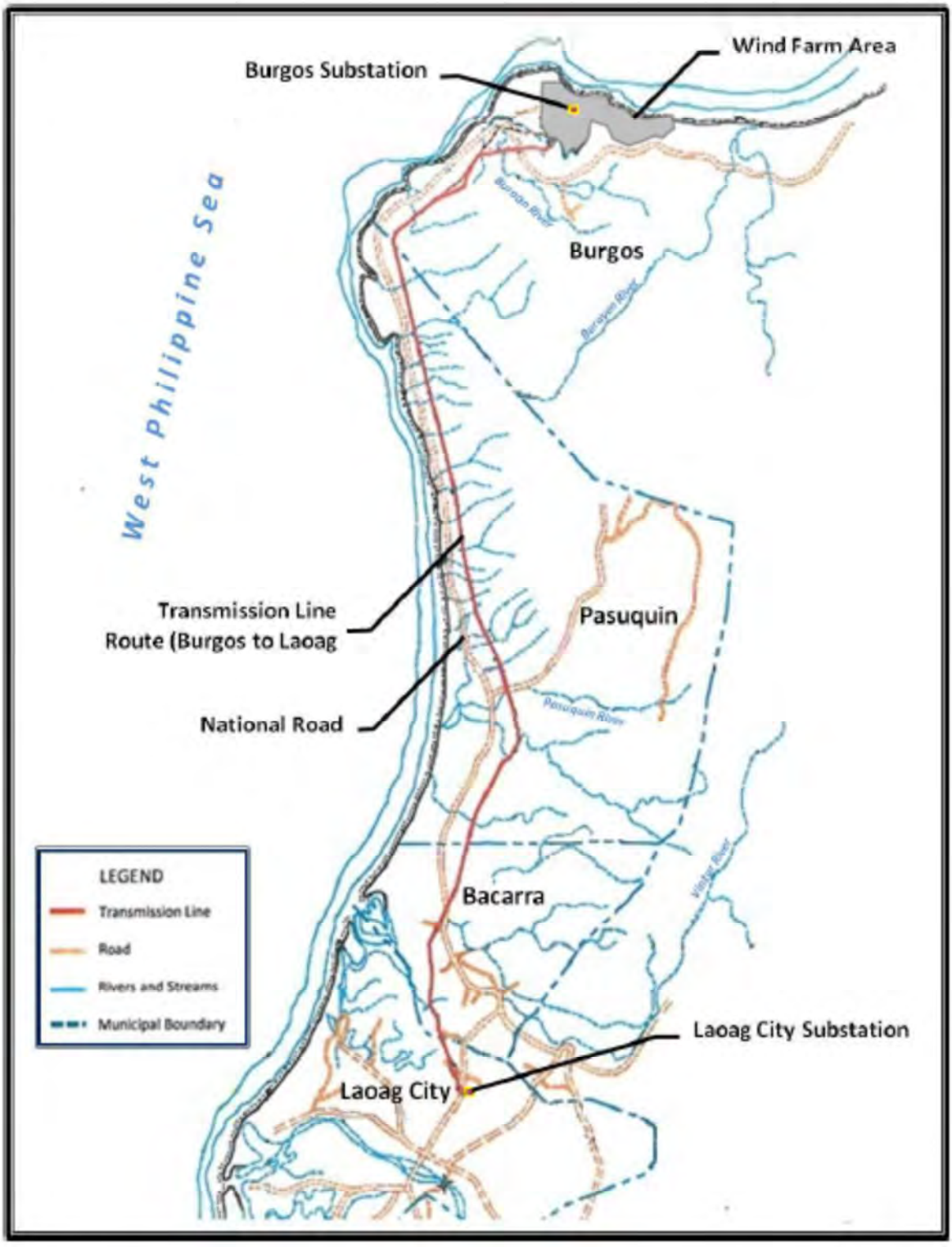

Figure 2. Transmission line alignment.

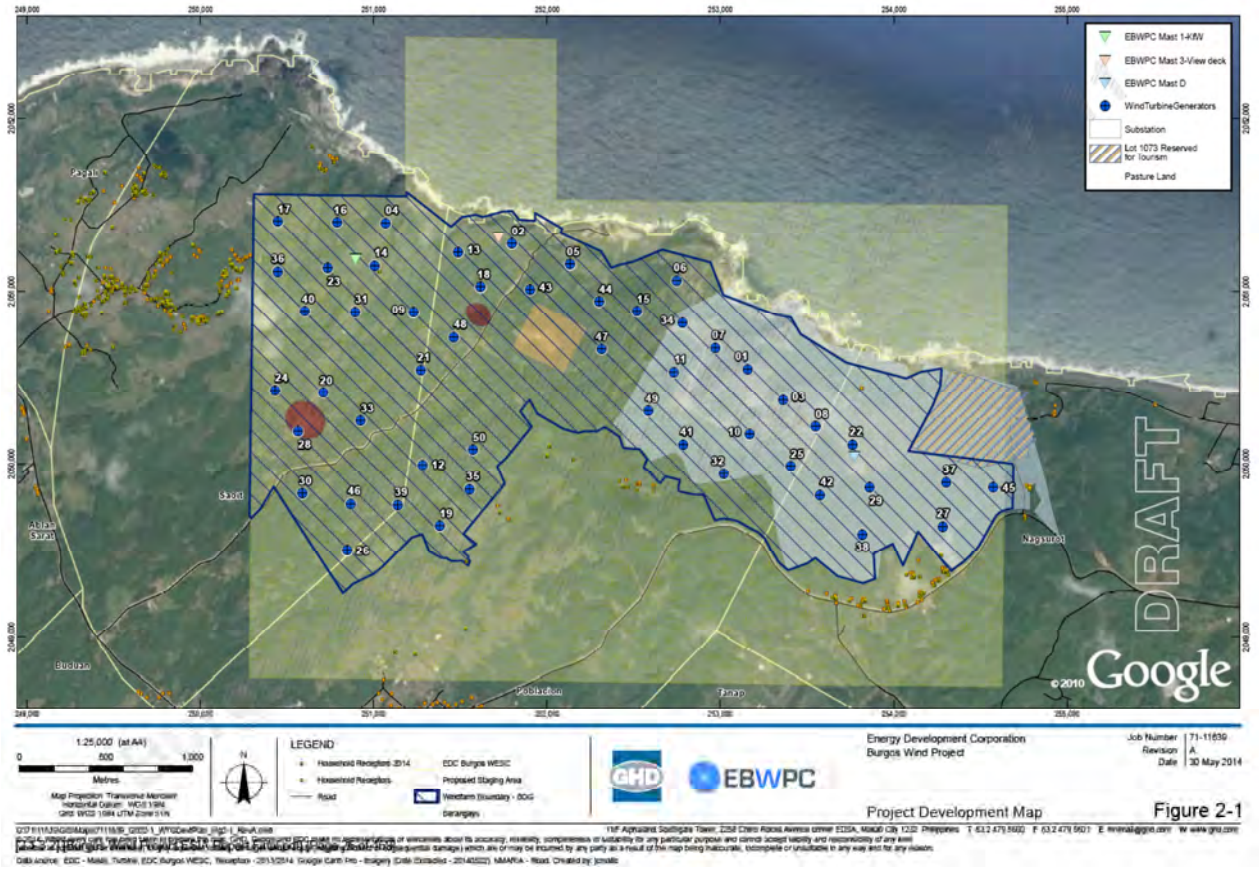

Figure 3. Project development map.

The 115 kV Burgos-Laoag Transmission Line route traverses 29 barangays located within the Municipalities of Burgos, Pasuquin and Bacarra, and the City of Laoag, Ilocos Norte.Steel poles will be installed at both ends of the transmission line route, (i.e., along roads within the Burgos wind farm area and at just before entry into Laoag City substation) while lattice-type transmission towers will be installed along the rest of the route. One (1) transmission tower (number 110) is located on the riverbank of the Bacarra River.

Project features

The Project consists of 50 WTGs, a control center, an administration and maintenance building, warehouse buildings, access roads, a substation/switchyard and a transmission line. Meteorological masts is also be utilized during operation.

The following temporary facilities were required during the construction stage: staging areas, batching plant, take-off gantry, perimeter/security fencing and construction facilities (e.g. worker accommodation and offices).

Wind turbines

Based on the design, the Project has a total capacity of 150 MW and will utilize 50 WTGs, each having a capacity of 3 MW.

The WTGs are spaced approximately three to five rotor diameters from each other. The hub height (75 m) is the height from the ground level to the center of the blades.

Power output from the WTGs will be transmitted by cables, which will be connected via a substation to the 115 kV transmission line. The cables are located underground in a trench approximately 1 meter in width and 1.2 meters in depth.

The major construction component of the Project is the foundation for each WTG. Each foundation requires an area of approximately 20 meters in diameter and an excavation at a depth of approximately 5 meters which may vary depending on the final foundation requirements. Foundation design may vary from one WTG to the next, dependent on the ground conditions encountered.

Ancillary buildings and access roads

An on-site control room contains a fully equipped office with data collection and communication equipment. The facility is used to monitor the performance and control the operation of the WTGs and the wind farm.

At least three meteorological wind masts are installed and maintained within the Project area for monitoring of wind speed and other pertinent meteorological parameters.

Access roads were developed within the Project area to facilitate ingress and egress of equipment and WTG components during construction, and operation, and maintenance activities. The access roads are approximately 8 to 10 meters in width.

Substation and transmission line

A 115 kV transmission line will convey the electricity from the wind farm site to the existing NGCP substation in Laoag City, Ilocos Norte. The transmission line is approximately 42 kilometers (km) in length and will be supported by 128 lattice-type transmission towers and 20 steel poles. The steel poles are installed at both ends of the transmission line route (i.e. along roads within the Burgos wind farm area and just before entry into Laoag City substation). The lattice-type transmission towers are installed along the remainder of the route.

The existing NGCP substation in Laoag City is the nearest substation to the Project. The substation is owned and operated by the National Grid Corporation of the Philippines (NGCP), which is responsible for the operation and maintenance of the Luzon grid. The substation and transmission line projects consist of the following components:

a. Substation at the Project site in Ilocos Norte;
b. 128 lattice towers and 20 steel poles;
c. The footprint of the tower, approximately 250 square meters, with slight variations dependent on the soil condition at each tower location;
d. Aluminum conductor steel reinforced (ACSR) conductor with total length of approximately 126 km (42 km x 3 sets);
e. Suspension and strain insulators and revenue metering equipment; and
f. Interconnection equipment and/or works at the NGCP substation in Laoag City.

The design of the lattice towers is based on a tower height of 20 meters. Under certain terrain, body extensions are being attached to increase the height of a tower up to 39.5 meters. The average tower height expected across the 42 km route is 35 meters. The average distance between each tower is approximately 354 meters whilst poles are spaced approximately 80-150 meters apart. The detailed design of each tower has been based on topographic survey and geotechnical studies. The transmission tower on the bank of the Bacarra River has a different design to allow for the different soil conditions in that area. The alignment has an easement or right-of-way of 30 m.

The construction of access tracks for the transmission line are included as part of the contractor's scope of works. Access tracks were used to transport tower parts during construction phase but will not be maintained during the operations phase.

Temporary construction facilities

A temporary take-off gantry consists of gantry or cranes that are used for unloading/loading and installation of the WTG components during the construction phase.

A temporary batching plant was installed within the Project area for concrete mixing during construction activities (e.g. for the supply of concrete materials for the WTG foundation).

Temporary staging areas were used as locations for the contractor and storage facilities during the construction of the project. These included a lay-down area where WTG components were stored prior to installation.

Perimeter fences were installed at construction areas, and on other areas where required to enhance security during construction. The construction contractors set up field /site offices within the Project area. The temporary construction facilities were decommissioned after completion of the construction phase.

Project phases and schedule

There are four (4) distinct development phases of the Project:

a. Pre-construction – prior to June 2013;
b. Construction – commenced in June 2013, with major works starting on September 2013 and testing and, based on current works progress, commissioning and testing scheduled took place end of 2014;
c. Operation and maintenance – scheduled for early 2015; and
d. Abandonment/decommissioning.

Pre-construction phase

The pre-construction phase involved preliminary engineering design and preparation of conceptual drawings by EBWPC's design and engineering contractor. A geotechnical survey was conducted to determine the actual soil conditions and ground stability of the site for foundation construction.

This phase included topographic surveys to generate a detailed contour map of the Project site. The data produced from ground surveys was used in the detailed wind flow modeling, micrositing of the WTG foundations, and producing detailed road design of the road network. As part of preliminary construction works, a tree inventory was conducted and the corresponding tree balling permit was secured from the DENR (i.e. prior to site clearing activities).

EBWPC conducted a series of consultation activities with the host communities to discuss the development of the Project. This was required for the information education and communication (IEC) campaign for the Project. It was at this phase that EBWPC started to secure right-of-way access for the transmission line towers and alignment.

Construction phase

In summary, the construction phase involved:

- Improvement of the existing barangay road
- Construction of new access roads
- Transport of WTGs and components to the site
- Excavation and laydown of foundations for WTGs and transmission towers
- Installation of WTGs and ancillary buildings.
- Installation of the transmission towers, insulators and power cables.

Vegetation clearing, site grading, and excavation activities is necessary for the staging or laydown area, for the erection of other wind farm facilities, for the improvement of existing barangay roads, and developing new access roads. Land clearing is confined within the area where the foundation and support facilities were constructed to minimize disturbance at the site. Perimeter fences were installed at construction areas for security and safety purposes.

Based on the Project development information, the total volume for earthworks is approximately 10,000 m^3. A portion of the excavated soil was used as fill material for construction of the access roads whilst the remaining was hauled to a designated disposal area.

Components for the Project, including the blades, are supplied by the engineering, procurement, and construction (EPC) contractor and were delivered to the site via a jetty which was constructed approximately 2.4 km to the west of the Project site. The components were then transported to the site by land via the national and barangay roads.

Operation phase

The operation phase of the Project involves the operation and routine maintenance works of the WTG, transmission towers, transmission lines, and maintenance of vegetation (mainly through cutting/pruning) along easement or beneath the transmission lines. Maintenance activities

require vehicle access to the site and the operation of heavy equipment when large components need to be replaced. Lubricants, hydraulic fluids, and other industrial wastes will be generated during this period. A proper waste management scheme is being implemented at the Project site for these types of wastes. Heavy equipment are housed in a designated area at the Project site.

A control center/office facility was established at the Project site. This is fully equipped with data collection and communication equipment that is operated throughout the design life of the Project.

Abandonment /decommissioning

In the event of abandonment or the Project reaching the end of its design life (i.e. 25 years), the Project site will be rehabilitated, as far as reasonably practicable, to its original condition. This will involve the removal of the WTG, support facilities, the excavation of trenched cables and its components in addition to other requirements that may be required by law.

Other management measures for abandonment/decommissioning will be as follows:

- All excess chemicals, materials and supplies will be transported from the Project site.
- WTG, office buildings, pipelines, electrical, and all other structures will be removed from the site, where applicable.
- Waste materials and other residual solid wastes will be collected and hauled to a designated disposal area.
- Recyclable wastes such as metals, glass, rubber, plastics will be collected and donated to the community materials recovery facility.
- Waste oil and other hazardous waste will be transported from the Project for off-site disposal in accordance with government regulations.
- Rehabilitation or restoration measures in areas within public forest land including surface compaction, leveling, plowing, where necessary and, re-vegetation with suitable forest species.
- Depending on the agreements with the land owners (for privately leased land) and with applicable tenurial instruments from the concerned LGUs and the DENR (for areas located in public lands), access roads may be closed and re-vegetated.
- The applicable abandonment reports will be submitted to the DENR Region 1 and to the DOE.

Employment

Manpower required during pre-construction, construction, and operational phases of the wind farm and the transmission line will be dedicated to IEC activities, negotiations for land lease agreements, and supervising studies for preliminary construction activities, construction and installation of the WTGs and the substation and transmission line as well as for operation and maintenance.

Tourist areas

As discussed with the Mayor Cresente Garcia of Burgos in 2012, two areas to the north and north east of the wind farm area (between the wind farm site and Bangui Bay) have been

reserved by the municipal and provincial governments for development of tourist-related developments.

E. DESCRIPTION OF THE ENVIRONMENT (BASELINE DATA)

This section presents the baseline status of the Project's area of influence. The baseline status comprises existing condition of various physical, biological, and cultural attributes of the area. These data have been collected from various available secondary and primary sources.

Land Use

The wind farm site was an undeveloped greenfield site located in a relatively hilly and rocky coastal location. The land in the Project area has four (4) main uses: forestland, communal pastureland, the WESC and as potential tourist area. The Project development block is classified as forestland, and alienable and disposable (A&D) land with areas of 219 ha. and 399 ha., respectively. A Forest Land Use Agreement (FLAg) was issued by the DENR FMB to EBWPC for the use of the public land. The 618 ha project development block is located within the WESC which has a total area of 1,296 ha. A communal pastureland with an area of 209 ha. is located within the block. Other areas considered as A&D are being used by the locals for various purposes such as harvesting of forest products for charcoal making.

The wind farm site is located approximately 27 km west of Kalbario-Patapat Natural Park and 48 km north of Paoay Lake National Park. Local tourist areas adjacent to the Project area at Kapurpurawan rock formations and the nearby caves attract both local and foreign tourists.

The transmission line transverses A&D land and public forestlands, where the public forestlands comprise an aggregate of 22.374 ha. The public forestland is densely vegetated with trees of lesser known species and shrubs while agricultural lands are grown mainly with garlic and corn. The current land use in the Project site is presented in Figure 4 below.

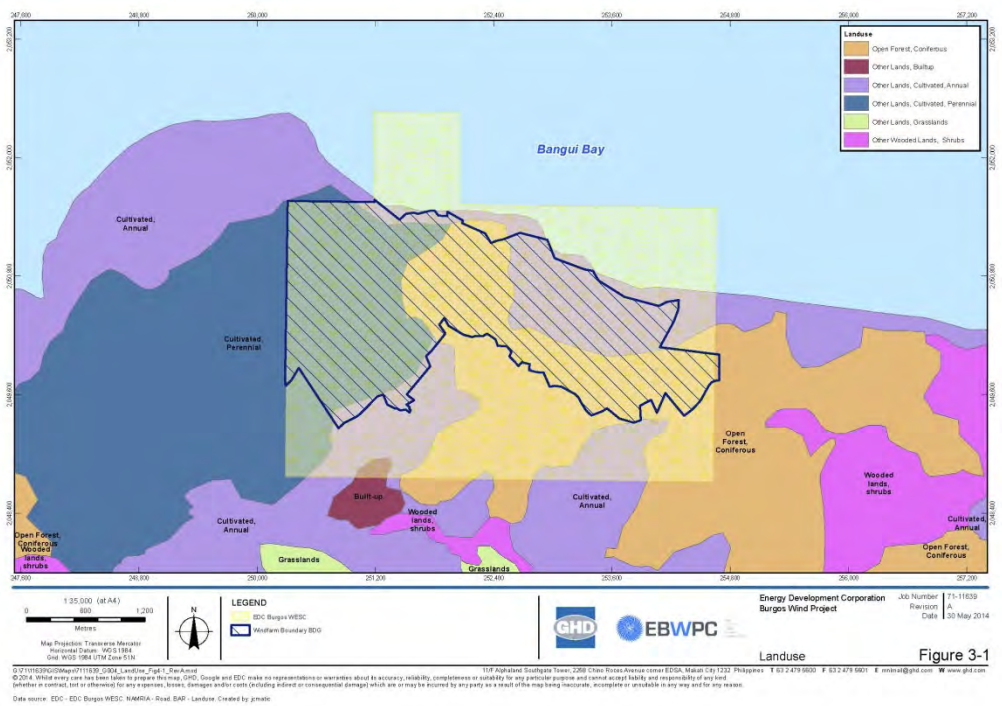

Figure 4. Current land use at the Project site.

Noise

Measurement of ambient noise condition in the Project site was conducted during the assessment and receptors that may potentially be affected were identified. The assessment used both applicable local and international standards which is consistent with the guidelines provided in ADB SPS. Recorded ambient noise levels were generally within the range of 44–55 dB(A) (see Table 1).

Table 1. Summary of ambient noise levels (dBA).

Station	Morning (0500-0900) Class A=50 dB(A)	Daytime (0900-1800) Class A=55 dB(A)	Evening (1800-2200) Class A=50 dB(A))	Nighttime (2200-0500) Class A=45 dB(A)
N1	46	47	46	**46**
N2	45	48	47	45
N3	45	46	44	45
N4	47	52	46	**52**
N5	49	49	50	**49**
N6	48	50	47	**48**
N7	47	47	47	**46**
N8	46	55	45	**46**

Station	Morning (0500-0900) Class A=50 dB(A)	Daytime (0900-1800) Class A=55 dB(A)	Evening (1800-2200) Class A=50 dB(A))	Nighttime (2200-0500) Class A=45 dB(A)
N9	48	52	46	**46**
N10	46	48	**53**	**49**

Noise levels were assessed against Class A guideline values from NPCC MC 1980-002 and IFC EHS 2007 Guidelines. Exceedance is indicated in red font. Assessment against adopted NPCC and IFC guidelines revealed the following results:

- Compliance to NPCC Class A standard of 50 dB(A) for morning and evening periods at most stations except for Station 10, which recorded 53 dB(A) during evening period;
- Compliance to NPCC Class A standard and IFC standard of 55 dB(A) for daytime period at all stations; and
- Non-compliance to NPCC Class A standard and IFC standard of 45 dB(A) for nighttime period at most stations, except for stations N2 and N3.

Sampling stations (Figure 5) were located along busy roads characterized with regularly passing traffic consisting of light to medium vehicles. It is also noted that some stations were close to the coastline and subject to moderate-to-strong winds and crashing waves. Noise sources include both natural (e.g. moderate winds, livestock, birds) and anthropogenic (e.g. traffic movement).

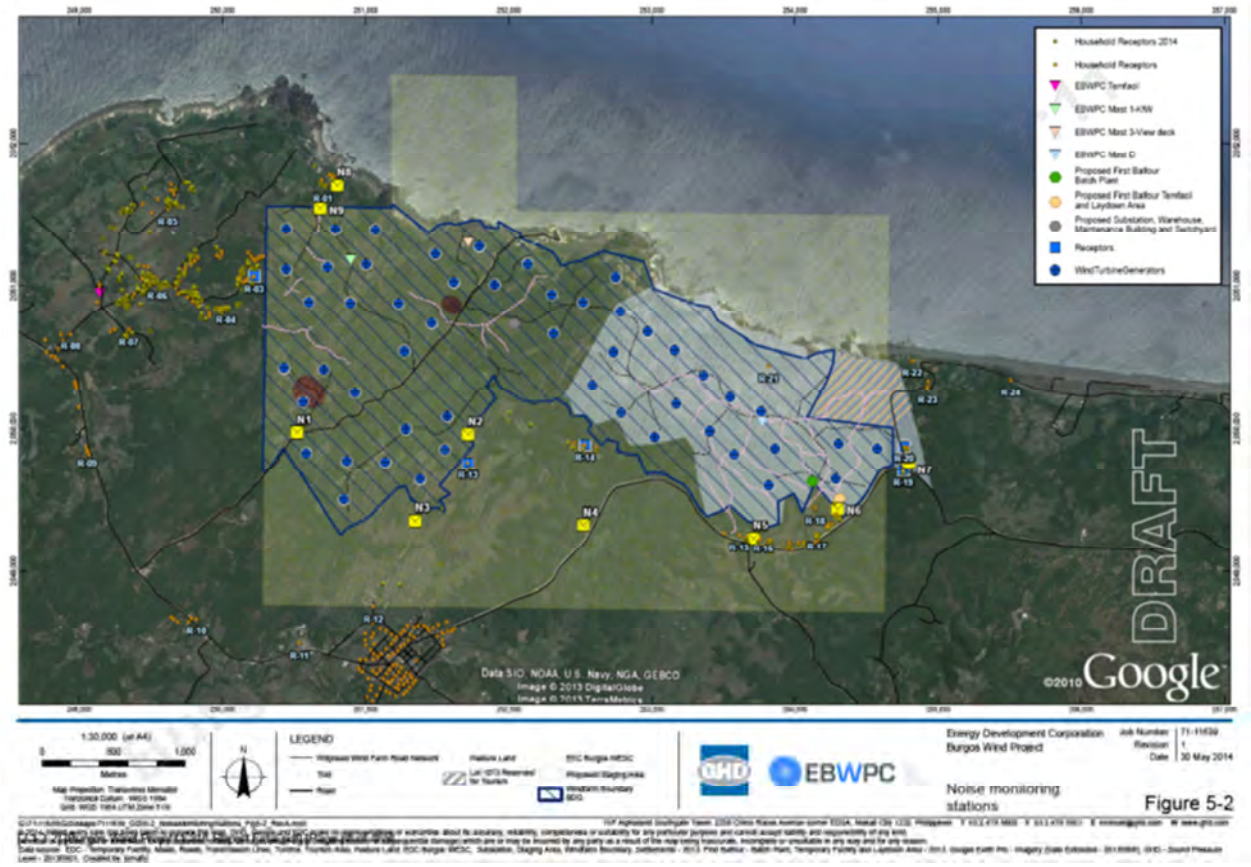

Figure 5. Noise monitoring stations.

Biodiversity and Conservation

The existing landscape in the project impact area is composed of patches of coastal, freshwater, and terrestrial ecosystems. It is made up of natural habitats with characteristic remnant species of the original vegetation and modified habitats, due to land use conversion for agricultural and tourism purposes. The vegetation in the natural habitat is composed of small patches of Karst or Limestone Forest, also called Molave Forest, and Ultramafic Forest.

The karst landscape in Burgos is characterised by the unique, white Kapurpurawan Rock formation and a cave. Due to iron oxide formation from iron carbonate impurities, the coral terraces are reddish.

The remnant vegetation in ultramafic conditions is distinguished generally by their characteristic short, irregularly formed stems although some large, deformed trees were also seen growing alongside beach forest species consisting of low herbaceous creepers to tree species. Remnants of freshwater swamp forest species are likewise growing along the creeks within the direct impact area (Figure 3). These isolated remnant vegetation are the most vulnerable to extirpation because of landscape fragmentation due to changes in land use.

Figure 6. Beach forest species found within the project study area.

An intact Mangrove Forest is found outside the Project development block, wherein mangrove and associated vegetation grow in brackish and seawater which may serve as alternate roosting area for bats aside from the cave formation at Kapurpurawan area (Figure 7).

Modified habitats found in the Project impact area include agricultural and grassland ecosystems devoted to rice production and livestock grazing, respectively. The rice production area is located where there was originally Freshwater Swamp Forest species prior to conversion as evidenced by remnant riparian species such as *Nauclea orientalis*. Agricultural lands are located outside and within the boundaries of the project development block in flat terrain and with water sources. Majority of the people in the municipality of Burgos are engaged in growing commercial crops like rice, garlic, tomato, mongo and corn. Farmers plant a hybrid variety of rice which has 2-3 times cropping per year.

Figure 7. Mangrove ecosystem at the eastern section of the indirect impact area.

The grazing area is a brushland/grassland ecosystem composed of *Imperata cylindrica* bordered by dominant thickets of thorny *Acacia farnesiana* (Figure 8).

Figure 8. Grassland/brushland/pasture land) dominated by I. cylindrica.

Flora

The vegetation in the study area reflects the influences of altitude, topography, wind aspects, soils, and land use history. The Project area occupies both A &D lands and forest land. The

forest land is used as communal pasture or grazing land. The Project study area is characterized by flat to gently rolling topography with occasional steep and sloping particularly towards the south. Northern shorelines are cliffs and made of rocky material formed thru wave action.

The IEE Report for 42 MW NLWPP (2000) submitted to DENR stated that the land uses at Saoit were wasteland at the coastal side, grassland/shrubland towards the hills, and other areas are agricultural lands planted with rice and garlic. There were 27 species recorded and identified during the vegetation survey and were mostly grasses, shrubs and few coastal trees. *Callophyllum* sp. dominated the coastal vegetation during the year 2000 IEE study.

On the other hand, about 351 species were recorded in the vegetation analysis of PNOC-EDC in 2006. The species in the area were dominated by cogon, *Themedia sp.*, and *Cyperus sp*., lagunding dagat (*Vitex negundo* L.), *Chorchorus sp*., kandi-kandilaan (*Stachytarpheta jamaicensis*), Hyptis sp. guava (*Psidium guajava* L.), gonoi (*Chromolaena odorata* (L.) R.M. King & H. Rob.), aroma (*Acacia farnesiana* (L.) Willd.), and kakauate (*G. sepium*). Out of 351 species, 42 of these were trees dominated by balinghasai, kandung, duhat, uas, and molave. Appendix Table 1 lists the plants recorded at the project site.

Fauna

A total of 112 terrestrial fauna species were recorded during the field survey. Birds comprised the majority of the list with 91 species, followed by herpetofauna (amphibian and reptiles) with 12 species, and mammals, with 11 species. Appendix Table 2 lists the birds recorded in the area while Appendix Table 3 lists the amphibians and reptiles recorded in the area.

Of the 12 herpetofauna species recorded, five are snakes, six lizards, and a frog species. For mammals, eight bat species, one murid (rat), one civet cat, and one monkey species were recorded.

Domesticated species such as cows (*Bos indicus*), horse (*Equus sp.*), goat (*Capra sp.*), chicken (*Gallus sp.*) and cat (*Felis catus*) were also recorded in the area (Figure 9).

Figure 9. Domesticated species found in the area.

In terms of species distribution, resident and common widespread species dominated the list with 69 species recorded representing 61 percent of the total species recorded. The categories "resident with migrant population" and "introduced", with three species each, have the least number of species, with three percent of total species recorded. Appendix Table 4 lists the mammals recorded in the area.

Ecosystem services

Vegetation in the project area provides a variety of products and services that contribute to well-being of the locals and biodiversity conservation. These come in the form of provisioning ecosystem goods and services, such as fuelwood, timber for construction materials, furniture, medicine, fruit, and other economic activities for the communities; regulating services in the form of erosion control.

As a standard procedure in ecological assessments, use of each species or biodiversity is emphasized to highlight not only its ecological importance but also its potential utility to man. Out of 122 species found in the transects established in the impact areas, 23 species are herbal/medicinal plants, 22 species are used for erosion control, 17 species are used for landscaping and 17 species are fruit bearing and edible. However, there was no survey conducted to document the ethnobotanical uses by the locals in the area. The figure below shows the distribution of uses of plant species found in the project study area.

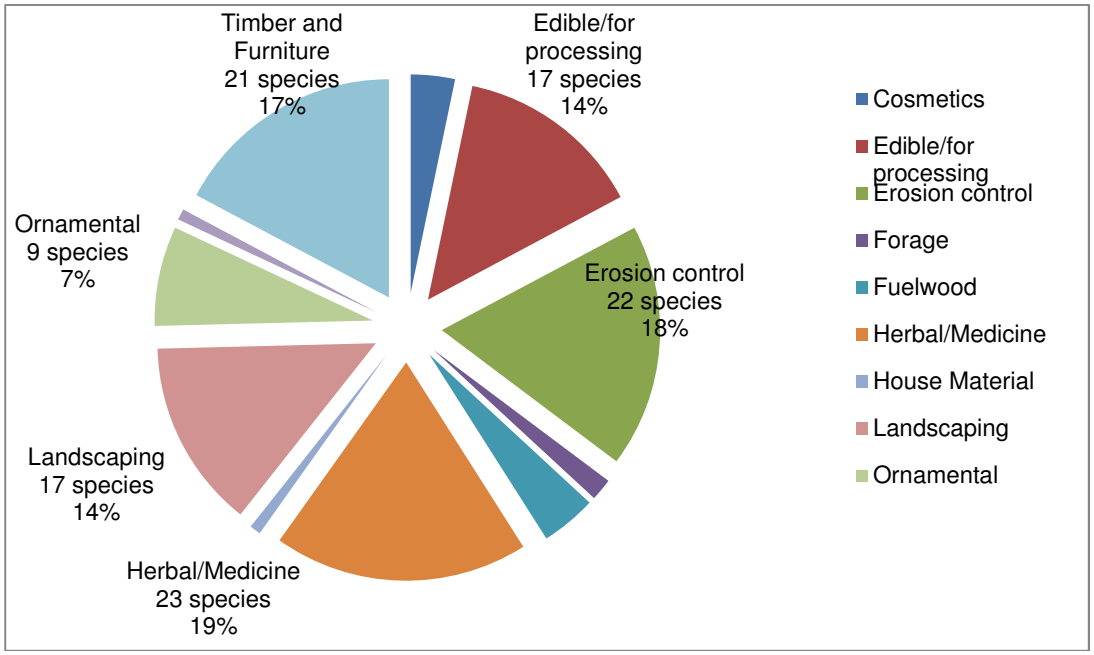

Figure 10. Distribution of uses of plant species found in the Project study area.

The provisioning services provided by the grassland ecosystem present in the area serve a key role in the food chain where livestock forage for food to provide people meat and/or money as proceeds from sale. It also supports and serves as habitat for other forms of wildlife like birds, small mammals, and various species of insects which in turn serve relevant ecological roles themselves. Water is also identified as one provisioning ecosystem service that serves domestic and irrigation demands. An undated DENR Region 1 Wetlands Assessment Report

stated that potable water is supplied by the Buraan River System through the Pusuak Spring Development Project which caters to the water needs of Barangay Poblacion. Presently, water from Buraan River as well as Baruyen River serves the water and aquatic resource requirements of the community. Buraan River is also the main source of irrigation water of the Derap-it Communal Irrigation System which covers part of Barangays Buduan, Saoit, and Pagali. Vintar watersheds are also servicing irrigation projects downstream.

The ecosystem services provided by the adjoining forested area in the Project study area also provides for erosion regulation, an ecological function provided by its species diversity, multilayered canopy structure, and litter layer trapped by the buttresses, the typical root architecture of forest over limestone because this forest type does not have a thick soil layer.

Cultural services, such as nature tourism, are being highlighted by the Kapurpurawan Rock Formation, being a distinctive formation that is at the periphery of the indirect impact area. A cave (reportedly man-made) near the area serves as the natural habitat of birds and bats in the area. The population of birds and bats in turn provide Regulating Services such as pollination, seed dispersal, and biological control by maintaining normal insect populations.

On the other hand, the hunting of wild animals such as civet cats result in seed dispersal. Said activity likewise provides protein source for the locals.

Drainage and Hydrogeology

The baseline conditions of the water bodies and available water resources that lie within the Project site are presented here.

Hydrology

The Municipality of Burgos is principally drained by two rivers namely: Baruyen River and Buraan River.

Baruyen River traverses the eastern portion of the municipality emanating from Barangay Agaga and flowing northwards towards Bangui Bay. It is about 11 km in length with a drainage area of approximately 62 km^2. Baruyen River has its water submerged underground at a certain point in Barangay Agaga and surge back to surface at Barangays Tanap and Nagsurot and ultimately ends at Barangay Baruyen of the adjacent Municipality of Bangui.

Along the Baruyen River, within the jurisdiction of Burgos municipality, and with geographical coordinates N 18°28'48.4'', E 120°40'22.1'' using Luzon-Mindanao datum, is the Tanap Natural Dam and waterfalls. Records of the National Water Resources Board (NWRB) show that the Tanap Natural Dam has a flow rate of 264.80 lps (4,197 gpm). It is assumed that this is the dependable low flow rate of the Baruyen River at this location.

Buraan River, on the other hand, has a drainage area of about 29 km^2 and is about 2.8 km long. It generally flows westwards with its upper reaches at the northwestern part of Barangay Poblacion, cutting through Barangays Buduan and Ablan, and drains to the West Philippine Sea (Burgos CLUP, 2002-2010). The mouth of the Buraan River and up to 1.5 km inland is affected by tidal salinity intrusion and both banks of the river in this stretch are covered with mangrove

and palm trees. Research undertaken by the NWRB showed that the recorded dependable low flow rate of the freshwater portion of Buraan River is 554 L/s (8,781 gpm).

In terms of the Project area, it is drained by several unnamed small creeks mostly leading to Bangui Bay. Majority of these creeks become dry (or intermittent) during summer months due to very small drainage areas and limited water recharge from rainfall. The most prominent creek draining the wind farm area is the Kapurpurawan Creek which has a drainage area of approximately 352 hectares covering the central portion of the project area. Based on the previous flow measurements conducted in Kapurpurawan Creek, average discharge during the dry season is approximately 0.5 L/s (BTCSI 2012). Flow measurement conducted during the September 2012 wet season indicates an approximate discharge of 15.77 L/s. Inland waters located at the west boundary of the project block are Pekkang Creek and Puttot Creek. Results of flow measurement using the Float Method for Pekkang Creek (April 2013 field survey) indicate an estimated discharge of 8.95 L/s. This flow rate includes irrigation water coming from Pusuak River.

Surface water resources

The Tanap Natural Dam and waterfalls area located along the Baruyen River has some of the river water diverted to an irrigation canal. From field measurements made on 25 September 2012 using the Pricetype flow meter, it has a flow rate of 776 L/s (12,300 g/m), while as aforementioned, NWRB states that the Tanap Natural Dam has a flow rate of 264.80 L/s (4,197 g/m) assumed to be the dependable low flow rate of the Baruyen River at this location. In addition, the excess river water that goes to the lower portion of the river, already within the jurisdiction of Bangui municipality, is about 3,104 lps (49,198 gpm). However, it is reported that this water source, which drains from the extensive forested limestone mountains in the south, is reported to yield limited water supply during the dry/summer months. Flow rate during the rainy season is expected to be higher.

The irrigation canal in Barangay Tanap is 7.5 km by road and 5.1 km aerial distance from the proposed substation location. Also, the Tanap Natural Dam, where the intake structure of the irrigation system is located, is 9.5 km by trail and road and 6.5 km aerial distance from the proposed substation location. However, water rights to the Tanap Natural Dam have been fully allocated to the local irrigator's associations.

The Buraan River from the mouth to 1.5 km inland is presumed to be sea water grading into brackishwater, therefore not really utilizable for consumptive purposes. Its freshwater portion, with a dependable low flow rate of 554 L/s (8,781 g/m) is fully allocated to the Derap Saoit Irrigators Association (439 L/s) and the Barat Commercial Irrigators Association (124 L/s). Buraan River, at the Buraan Bridge has geographic coordinates of 18°31'51.3'' North Latitude and 120°36'44.5'' East Longitude (using Luzon-Mindanao datum). Figure 11 shows the location map of water resources.

Hydrogeology and groundwater resources

Based on the results of the hydrogeological study conducted by BahayTubig Consultancy and Services Inc. (BTCSI) in 2012, four rock formations comprise the Project site (discussed below). From oldest to youngest, these rock formations are: (a) volcanics, (b) limestone, (c) old consolidated sediments, and (d) unconsolidated alluvial sediments. No water-bearing geologic structure was observed within the project area. Based on the characteristics of the underlying rock formations found within the project area, the development of springs and/or surface waters

was found to be the most feasible option for the water supply of the project. With this, the conduct of geo-resistivity survey and drilling of deepwells were not recommended for the project.

Volcanics (Bojeador Formation)

The western portion of the Project site is covered with volcanics consisting of interlayered basalt, volcanic breccia and agglomerate. The basalt is vesicular and tightly fractured. The agglomerate and volcanic breccia comprise fragments of vesicular basalt set in tuff matrix, with the breccia showing angular fragments while the agglomerate has sub-rounded clasts.

Groundwater is stored in the interface between the soil and the bedrock, in the thin veneer of weathered rocks and in a few fractured zones. Groundwater storage is very limited because it has low porosity and permeability, and thus, it is a poor aquifer. Shallow drilled and dug wells are common and yields are sufficient only for household use (Punsal et al,1979). It could be correlated to the Bojeador Formation (MGB, 2010) which is Early Miocene in age.

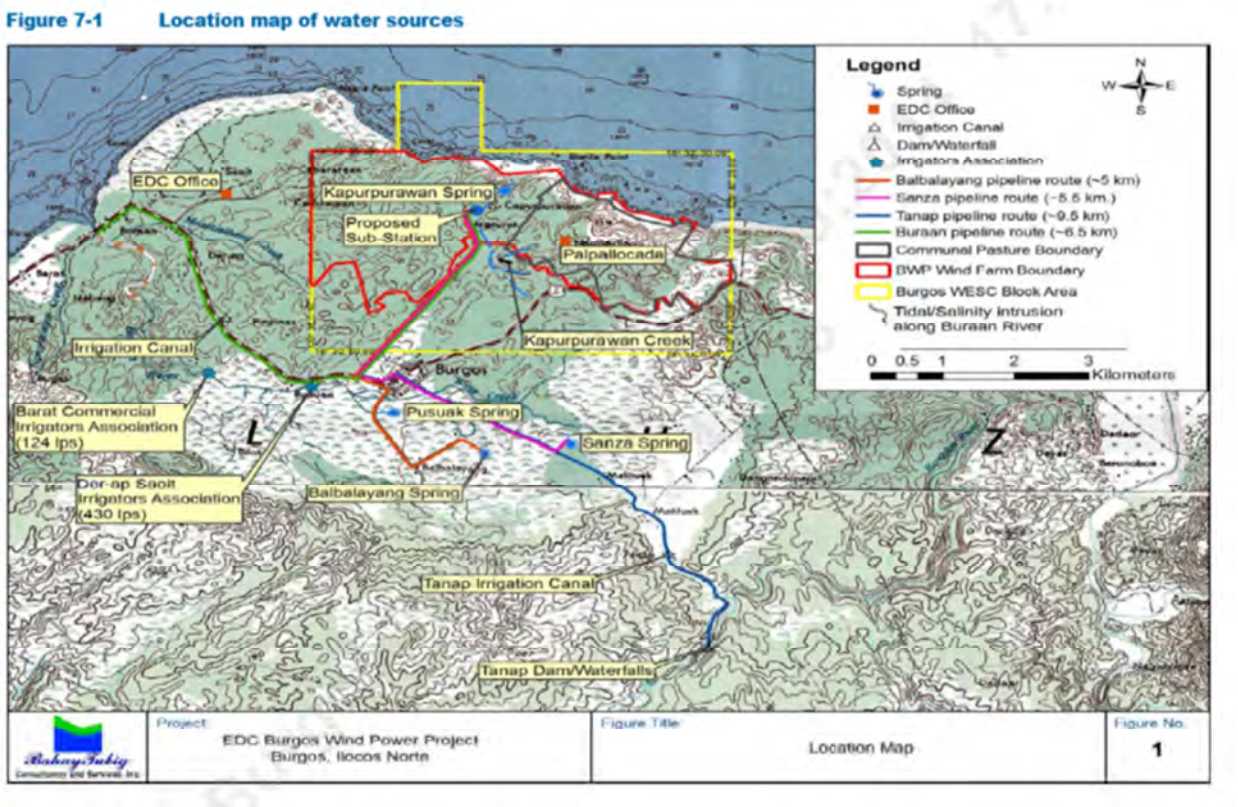

Figure 11. Location map of water resources.

Limestone (Pasuquin Limestone)

The middle portion of the Project site is occupied by an approximately 350 meters thick limestone formation comprising of coralline and fragmental limestone, which unconformably overlies the Bojeador Formation. It is silty to sandy in some places, specifically in the Kapurpurawan tourist site. Solution cavities, caverns and caves along vertical joints or bedding

planes were observed. It is Late Miocene in age. It could be correlated to the Pasuquin Limestone (MGB, 2010). Sinkholes on the surface, aided by the solution openings and caverns serve as the entry points of rainfall recharge. The limestone area is drained by the Kapurpurawan Creek with an estimated discharge of 15.77 L/s or 250 g/m during the wet season. The creek eventually exits to the Bangui Bay as a "spring-like" discharge with a flow rate of about 9.46 L/s (150 g/m). The flow measurements were taken on 25 September 2012. The limestone is a good aquifer but the streams and springs that drain thru it are reported to be almost dry during summer.

Old Consolidated Sediments (Batac Formation)

The eastern portion of the Project site is covered by tuff, tuffaceous sandstone, siltstone and mudstone. The sequence is well compacted, consolidated and cemented and tightly fractured. It is probably correlated to the Batac Formation (MGB, 2010). It is probably Late Miocene in age. It is impermeable to slightly permeable, and thus, it is a poor aquifer. Groundwater usually occurs along the interface between the soil and bedrock and along few fractured zones such as in the Palpallocada area.

Unconsolidated Alluvial Sediments (Quaternary Alluvium)

Located south and at the southern portion of the Project site are unconsolidated clayey to silty sand which are underlain by sand and gravel in some places (e.g. in buried old river channel deposits). It also includes beach sand deposits, coral reefs and minor colluvial and residual deposits (Punsal et al, 1979). These deposits belong to the Quaternary Alluvium (QAl) Formation which is 10,000 years to present in age. It is a good aquifer when thick. Three of the major springs in Burgos municipality seep out of the QAl, namely the Balbalayang, Sanza and Pusuak springs.

Groundwater

Potable water for the entire Burgos Municipality is supplied through developed springs in Barangays Poblacion, Ablan, Agaga, Tanap and parts of Barangays Buduan, and Pagali. The said springs are Level II water systems wherein communal faucets are installed in strategic places. Spring water is stored and distributed through gravity or through the use of electric water pumps. In the event that water supply from springs is scarce, households usually tap shallow wells (public or privately-owned) and open dug wells for their water supply. Average depth of these open dug wells and shallow wells is 8.30 m with water levels ranging from 0.93 to 8.12 m or an average of 4.52 m. (Burgos CLUP, 2002-2010).

Some of these developed springs were visited during the field surveys conducted by EDC in April 2013 for the preparation of the EPRMP and by BTCSI in September 2012 for the hydrogeological study. This is in addition to the wells and undeveloped springs that were also located during the field surveys. Results of the groundwater inventory are presented in the succeeding sections. Five springs, one shallow well, and one dug well were listed during the field survey totalling seven groundwater resources surveyed. Out of the seven, three of these groundwater resources were located inside the project area.

Soil, Water Quality, and Geology

Soil

The soil texture in the Project area is Bolinao Rocky Phase with portions of Nagsurot Clay and Coral Reef types. The soil and slope characteristics in Barangays Saoit, Poblacion and Nagsurot in Burgos Municipality are presented in the table below:

Table 2. Slope and soil classification in some barangays in Burgos.

Soil ID	Soil Texture	Slope (%)	Location
BdAB	**Buduan Clay 1**	**1 – 2**	**Barangays Buduan, Poblacion, and Ablan**
BdAC	**Buduan Fine Clay**	**1 – 5**	**Barangays Buduan and Poblacion**
BoBC	**Bolinao Clay**	**2 – 5**	**Barangays Pagali and Saoit**
BoHB	**Bolinao Clay Loam**	**1 – 2**	**Barangays Pagali, Bayog and Poblacion**
BoHC	**Bolinao Clay Loam**	**2 – 5**	**Barangays Pagali, Bayog and Poblacion**
BORKY	**Bolinao Rocky Phase**	**–**	**Barangays Tanap, Agaga, Buduan, and Nagsurot**
MaBB	**Malituek Clay**	**1 – 2**	**Barangays Buduan, Tanap, Agaga and Poblacion**
NgBB	**Nagsurot Clay**	**1 – 2**	**Barangays Nagsurot, Tanap, and Buduan**
NgBC	**Nagsurot Clay**	**2 – 5**	**Barangays Tanap and Nagsurot**
NgHB	**Nagsurot Clay Loam**	**1 – 2**	**Barangays Nagsurot, Bayog and Bobon**
TeBC	**Tigue Clay**	**2 – 5**	**Barangays Paayas, Bobon and Saoit**
TnHB	**Tanap Clay Loam**	**1 – 2**	**Barangays Tanap and Nagsurot**

The transmission line route is located at flat to moderately sloping areas, specifically from Laoag to Bojeador lighthouse in Burgos, Ilocos Norte, and the risk to landslide is considered low along this route. From Bojeador lighthouse to Saoit, the terrain is moderately sloping, and risk to landslides is again considered low due to absence of steep terrain along the traverse route. The geological formations are quite hard or indurated and are not prone to weathering and mass movement. There is no major fault structure along the traverse route. The nearest major structure is the Digdig fault, which is approximately 80 kilometers away. Bangui fault, though nearer, is inactive. It should be noted that the substation and the transmission towers are designed to withstand the effects of an intensity 10 earthquake in the Modified Moralli Intensity Scale. Further, the expected earthquake intensity in the area is 7, based on historical records. As regards vegetation, the transmission line traverses above existing vegetations, which are

generally fruit trees and fuel wood species. No watershed or forest reservation will be affected by the transmission line component.

Water Quality

Groundwater and inland surface waters

At present, there is no water district in the municipality. As mentioned in the previous sections, the main sources of water supply of Burgos are the springs that abound the area. Most of these springs were developed as Level II water systems wherein communal faucets are installed in strategic places for domestic use. Springs are also being utilized for irrigation. In case water from the springs is scarce, shallow wells and open dug wells are also being tapped as domestic water source.

Inland surface waters such as creeks and rivers, on the other hand, are mostly utilized for irrigation and for livestock watering. Some rivers and creeks in Burgos are also used for fishery production (Burgos CLUP, 2002–2010).

Coastal marine waters

Coastal marine waters of Burgos are being utilized for fishing and seaweed gathering. Fishing is undertaken usually during the months of March to August and intermittently from October to February. On the other hand, seaweeds gathering is usually done during the months from September to February when seaweeds are usually abundant and deep fishing is almost impossible due to weather conditions (Burgos CLUP 2002–2010).

Baseline water quality data

Surface waters (inland freshwater and coastal marine) within the project area have not yet been classified by the DENR. To be able to compare the results of analysis to applicable DENR standards (i.e. DAO 90-34), surface waters were classified based on their current and future beneficial use as discussed in the previous sections. For groundwater/spring water samples, the Department of Health (DOH) AO 2007-0012 standards for drinking water, or PNSDW 2007, and DENR DAO 90-34 Class A and D criteria, were used to assess their baseline water quality. Results of water analysis were also compared to previous baseline values from the 2010 EPRMP and 2012 BTCSI study.

Results of the baseline water quality analysis indicate generally clean waters in the study area. For inland freshwaters, only the pH of water at Kapurpurawan Creek downstream (BWP-SW5) went slightly beyond the range for Class C waters with a pH value of 8.59. The rest of the results for all parameters in all inland surface water stations were within the standards for Class C and Class D waters. Comparing the results with the 2010 EPRMP baseline, it can be concluded that there is no significant change in the water quality of Kapurpurawan Creek. There was a slight increase in pH and TDS values while a decrease in TSS values was observed for all sampling stations. Results of marine water quality analysis follow the same trend as that of inland freshwaters. Only pH values for the two marine stations went slightly beyond Class SC standards.

For springs, results were all within DAO 34 Class A and Class D standards. For this study, the springs in the area were categorized as surface waters since most of the springs observed are

exposed to surface contaminants as these springs usually form a pond above the area where the groundwater comes to the surface and flows as surface water. Water samples from wells, on the other hand, exhibit water quality that is appropriate for their current beneficial use of domestic use and livestock watering (i.e. Class D). Although the springs and wells sampled are currently not utilized as potable water source, results were also compared to PNSDW to assess if these can be potentially used as potable water based on their physicochemical characteristics. Results show that the water samples from Kapurpurawan Spring, Vira Spring and from the two wells may need further treatment in order to meet the PNSDW in terms of acceptability aspects (sensory).

Air Quality and Meteorology

Luzon climate patterns

The Philippine climate is influenced by three main weather systems as follows:

- The northeast trade winds, which occur during the months of November to February
- The southwest monsoon, which dominates the months of July to September
- Typhoons, which generally occur from July to November

Climate patterns in Luzon are strongly influenced by the presence of high mountain ranges (approximately 800–1,000 masl) running in a north-south direction along the eastern coastline. The mountain range in the north is known as the Cordillera Central, which links to Sierra Madre mountain range that extends through the central and southern parts of Luzon.

The northeast trade winds, which pick up moisture over the Pacific, become drier as they cross the Cordillera Central and Sierra Madre mountain ranges from east to west. Consequently, areas located on the western side of the ranges have relatively lower rainfalls during the November–February period, when the northeast trade winds prevail. These same areas are exposed to the effects of the southwest monsoon and experience their heaviest rainfall during the July–September period, when the southwest monsoon prevails.

Based on the Modified Coronas system of classification, the Philippines is divided into four climate types based on the influence of the abovementioned weather systems and topography. The extent of each climate type is shown.

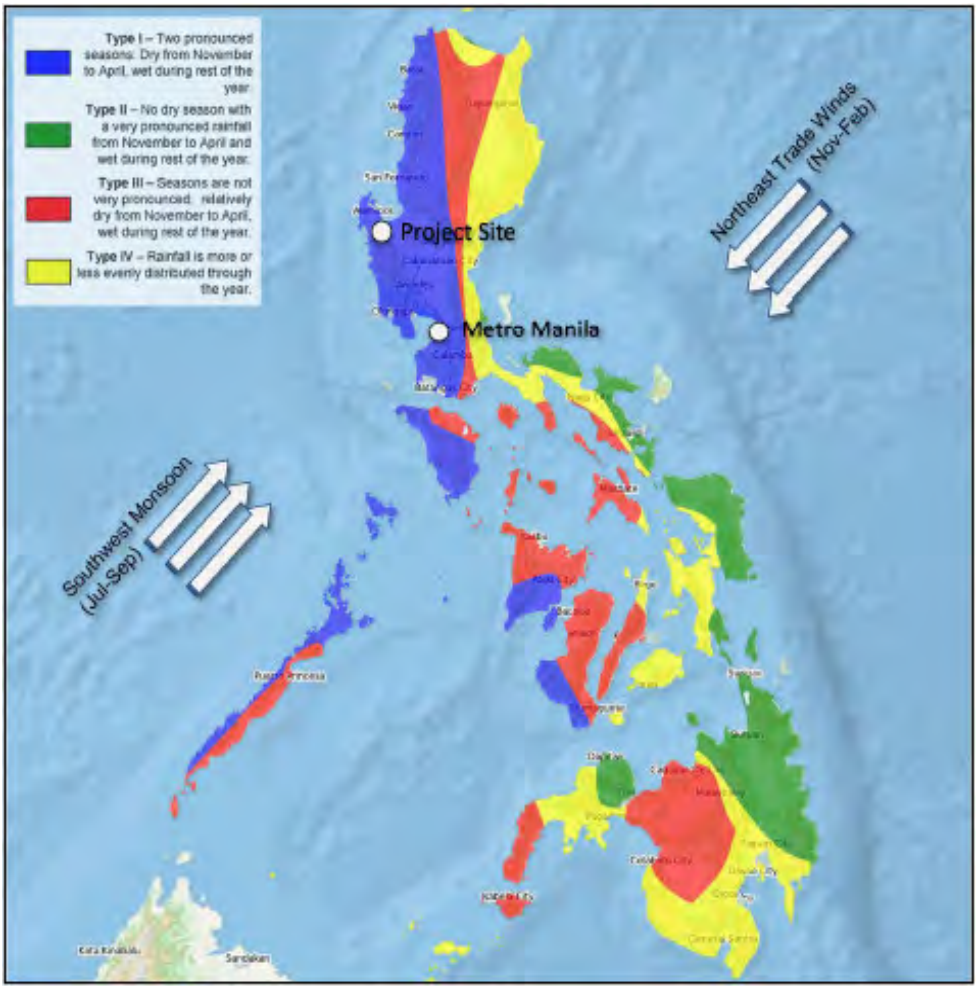

Figure 12. Philippine climate classification.

Site climate classification

The Project is located in the northwest of Luzon, Province of Ilocos Norte, with the Cordillera Administrative Region and Cagayan Valley as its eastern border and the Central Luzon as its southern border. The Project site is classified under Type 1 climate area, based on the Modified Coronas system of classification. This type of climate has two distinct seasons, dry season from November to April or May where the northeast trade wind prevails and wet season from June to October, during which the southwest monsoon and typhoon season prevails.

Climate change vulnerability and projections

According to Maplecroft's 2014 Climate Change Vulnerability Index (CCVI), the Philippines ranked ninth among the most at risk countries out of the 193 rated by the CCVI[6]. Additionally, Germanwatch reported in their 2014 Global Climate Risk Index[7] (CRI) that in 2012, the Philippines is among the most affected countries and ranked 7th in the long-term Climate Risk

[6] Source: http://maplecroft.com/portfolio/new-analysis/2013/10/30/31-global-economic-output-forecast-face-high-or-extreme-climate-change-risks-2025-maplecroft-risk-atlas/ Accessed on 1 October 2014.

[7] Kreft, Sönke and David Eckstein. 2014. Global Climate Risk Index 2014. Germanwatch. Accessed from http://germanwatch.org/en/download/8551.pdf on 1 October 2014.

Index (1993-2012) from among the countries most affected by extreme weather events. The World Risk Index of the 2012 World Disasters Report[8] ranked the country as third out of 173 countries in terms of susceptibility to disasters.

The climate change scenarios in the Philippines as presented by PAG-ASA used the PRECIS (Providing Regional Climates for Impact Studies) model which is a PC-based regional climate model developed at the UK Met Office Hadley Centre for Climate Prediction and Research. Two time slices centered on 2020 (2006-2035) and 2050 (2036-2065) were used in the climate simulations using three emission scenarios; namely, the A2 (high-range emission scenario), the A1B (medium- range emission scenario) and the B2 (low-range emission scenario). The climate simulations used boundary data that were from the ECHAM4 and HadCM3Q0 (the regional climate models used in the PRECIS model software).

The projected seasonal temperature increase, seasonal rainfall change and frequency of extreme events in 2020 and 2050 under the medium range emission scenario in Ilocos Norte were analyzed to relate the effects of climate change to the project. Climate change projections data of PAGASA (2011) were used in the assessment.

Seasonal temperature increases

Projected seasonal temperature increases in 2020 ranged between 0.8 °C to 1.0 °C increase. Temperature increases in 2050 are greater ranging from 1.7 °C to 2.2 °C.

Seasonal rainfall change

Based on PAGASA projections, rainfall during dry months are generally projected to decrease while rainfall during wet months is projected to increase (Figure 13).

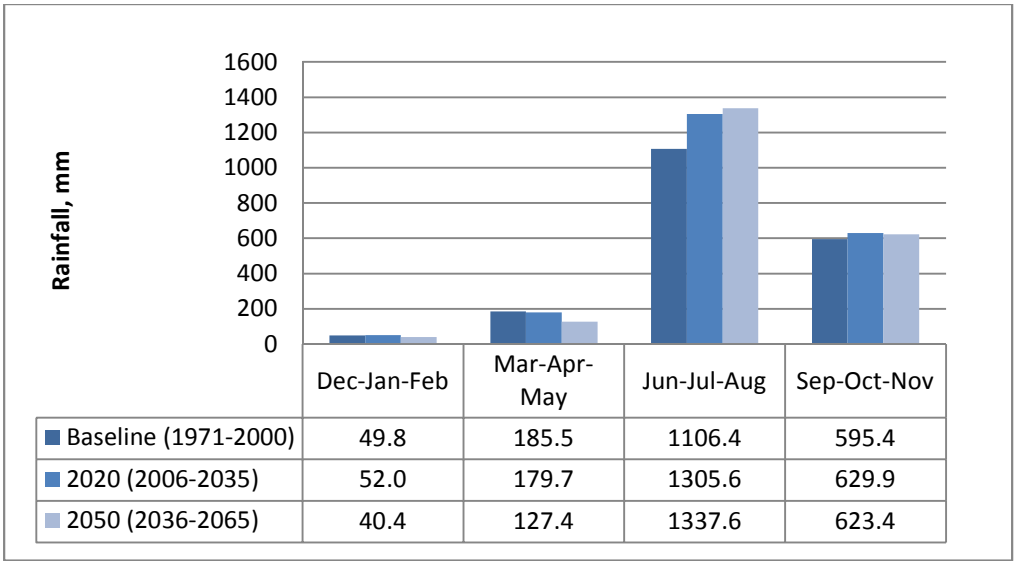

Figure 13. Ilocos Norte seasonal rainfall changes in 2020 and 2050.

Projected rainfall changes indicate a potential increase in surface runoff during the rainy season and the potential water shortage during the dry season. A water management plan must be

[8] Source: http://www.ehs.unu.edu/file/get/10487.pdf Accessed on 1 October 2014.

developed to manage the excess water during the rainy season and possibly use the excess water during the dry season.

Frequency of extreme events

The number of days with extreme temperature is projected to increase. However, the number of dry days is generally decreasing in trend. The number of days with extreme rainfall is also projected to increase in 2020 and 2050. A disaster management plan is being developed in EBWPC's HSE Plan to cope with the projected hotter environment and extreme rainfall (Figure 14), as required and should be coordinated with the LGU Disaster Risk Reduction and Management (DRRMC) Plan pursuant to RA 10121 (the Philippine Disaster Risk Reduction and Management System).

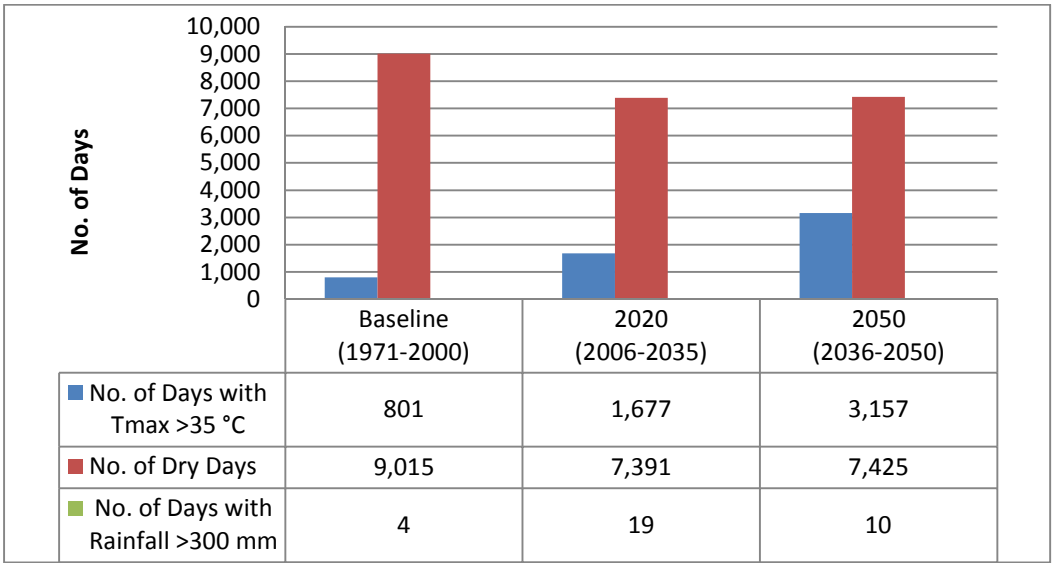

Figure 14. Ilocos Norte projected frequency of extreme events in 2020 and 2050.

The projected seasonal temperature increase, seasonal rainfall change and frequency of extreme events in 2020 and 2050 under the medium-range emission scenario in the provinces in Region 1 (where the Project is located) are presented in Tables 3, 4 and 5, below[9].

Table 3. Seasonal temperature increase in Region 1.

Table a: Seasonal temperature increases (in °C) in 2020 and 2050 under medium-range emission scenario in provinces in Region 1

	OBSERVED BASELINE (1971-2000)				CHANGE in 2020 (2006-2035)				CHANGE in 2050 (2036-2065)			
	DJF	MAM	JJA	SON	DJF	MAM	JJA	SON	DJF	MAM	JJA	SON
Region 1												
ILOCOS NORTE	25.3	28.1	28.3	27.4	0.8	1.0	0.8	0.9	2.1	2.2	1.7	1.8
ILOCOS SUR	23.1	25.7	25.4	24.8	0.9	1.1	0.8	1.0	2.0	2.1	1.6	1.8
LA UNION	20.5	22.9	22.8	22.2	0.9	1.1	0.7	1.0	2.0	2.1	1.6	1.8
PANGASINAN	25.0	27.4	26.9	26.4	0.9	1.1	0.9	1.0	2.2	2.2	1.8	2.0

[9] Source: http://www.pagasa.dost.gov.ph/climate-agromet/climate-change-in-the-philippines/116-climate-change-in-the-philippines#1. Accessed on 3 October 2014.

Table 4. Seasonal rainfall change in Region 1.

Table b: Seasonal rainfall change (in %) in 2020 and 2050 under medium-range emission scenario in provinces in Region 1

	OBSERVED BASELINE (1971-2000) mm				CHANGE in 2020 (2006-2035)				CHANGE in 2050 (2036-2065)			
	DJF	MAM	JJA	SON	DJF	MAM	JJA	SON	DJF	MAM	JJA	SON
Region 1												
ILOCOS NORTE	49.8	185.5	1106.4	595.4	4.4	-3.1	18.0	5.8	-18.8	-31.3	20.9	4.7
ILOCOS SUR	17.5	288.8	1575.4	672.9	-4.6	-2.0	36.3	23.0	-0.1	-27.6	58.1	33.3
LA UNION	14.7	395.6	1852.3	837.8	-0.4	4.5	43.1	30.0	-1.1	-24.6	72.5	39.0
PANGASINAN	19.4	298.0	1608.9	707.8	54.3	-6.0	6.1	5.9	1.1	-11.2	22.9	11.9

Table 5. Seasonal frequency of extreme events in 2020 and 2050 in Region 1.

Table c: Total frequency of extreme events in 2020 and 2050 under medium-range emission scenario in provinces in Region 1

Provinces	Stations	No. of Days w/ Tmax >35 °C			No. of Dry Days			No. of Days w/ Rainfall >300mm		
		OBS (1971-2000)	2020	2050	OBS	2020	2050	OBS	2020	2050
ILOCOS NORTE	Laoag	801	1677	3157	9015	7391	7425	4	19	10
ILOCOS SUR	Vigan	110	130	627	8728	8105	7939	1	17	6
PANGASINAN	Dagupan	1280	2265	3728	8303	6443	6419	2	13	20

Baseline air quality

Ambient air quality sampling locations were within the boundaries of the Project site and along potential receptor areas (e.g. households). Results of 24-hour air sampling showed the levels of NO_2, SO_2, TSP and PM_{10} are within the National Ambient Air Quality Guideline for Criteria Pollutants.

Heritage and Cultural Resources

Project development block

Palpalokada Landscape, a proposed tourism area of the Municipality of Burgos, is the only cultural resource that is found within the project development block. It is a unique landscape providing a panoramic view of the Kapurpurawan Rock Formation, the Bangui Windmills and the West Philippine Sea. Based on interview with the Municipal Planning and Development Officer (MPDO) of Burgos, the Palpalokada Landscape is being developed by their tourism office to be a potential tourist attraction in addition to other sites in the municipality.

Figure 15. Palpalokada Landscape.

Municipality of Burgos

Presented in Figure 16 and Figure 17 are the heritage and cultural resources found in the Municipality of Burgos. The Kapurpurawan Rock Formation, located near the boundary of the Project development block facing the sea, is a massive rock formation that juts out into the sea. The Kapurpurawan Rock Formation is a famous tourist attraction in the area where the monthly average number of tourist in 2013 is 11,980 based on records provided by the Provincial Tourism Office.

Similar with Kapurpurawan Rock Formation, the Cape Bojeador Lighthouse is a famous tourist attraction in the area found in Barangay Paayas, Burgos. It is about 9-10 km southwest of the project development block. The Cape Bojeador Lighthouse, also known as Burgos Lighthouse, was declared as National Historical Landmark on 13 August 2004 and a National Cultural Treasure on 20 June 2005 by the Philippine Government.

Kapurpurawan Rock Formation.
Barangay Poblacion
18° 32' 18" N and 120° 39' 13" E
One of the golden estates of the town of Burgos is this massive rock formation that juts out into the sea. Seen up close, it is a dazzling bright white rock that sparkles in the sun. Kapurpurawan is a showcase of the wind and water power on rock and coral.

Figure 16. Kapurpurawan Rock Formation.

Cape Bojeador Lighthouse
Barangay Paayas
18° 30' 43" N and 120° 35' 51" E
The lighthouse was inaugurated on 30 March 1892. It was declared a National Historical Landmark on 13 August 2004 and a National Cultural Treasure on 20 June 2005 by the Philippine Government. It is one of the tallest of its kind in the country and it served as a signal to ships passing by the Cape along the South China Sea. Up to this day, the lighthouse remains functional.

Figure 17. Cape Bojeador Lighthouse.

Other areas of cultural and natural significance

The Bangui Windmills is found in the Municipality of Bangui, a neighboring town of Burgos. The Bangui Windmills is located about 5-10 km from the project location and can be viewed from the Palpalokada Landscape.

Figure 18. Bangui Wind Farm. (Municipality of Bangui).

Traffic, Access, and Safety Assessment

Road network

All barangays in the Municipality of Burgos is accessible by public transport. The roads, with a total of 120.32 km, are made of concrete, asphalt, and gravel. The road network comprises 16 km of national roads, 20.5930 km of provincial roads, 5.25 km of municipal roads, and 78.478 km of barangay roads.

Also called the Manila North Road, the national highway (Pan-Philippine Highway) will be used as access to transport equipment and other construction materials from the proposed port in Barangay Buraan. The national highway is undivided two-lane road running on the north-south direction. The national highway provides linkage between Laoag City in the south and other municipalities of Ilocos Norte in the north such as Bangui, Pagudpod and Dumalneg. It is also used to connect the province to other provinces such as Cagayan and Isabela of Region 2.

Via this national highway, the project site is about 500 km north of Manila or about 50 km north of Laoag City, the Provincial Capital of Ilocos Norte. From the national highway, the project site is about 2 kilometres through the cement concrete paved two-lane Kapurpurawan Rock Formation Road. The project site can also be accessed through an unpaved graded road in Barangay Nagsurot.

Public transport

Public transportation in the municipality is dominated by motorized tricycle. As of 2010, there are 165 tricycle units, which are regularly used as inter-town and inter-barangay transport; and one jeepney plying Agaga–Poblacion route.

Regular buses and public utility jeepneys that ply Laoag City–Burgos and vice versa and those that ply Laoag City–Pagudpud/Bangui/Dumalneg, Laoag City-Cagayan/Isabela routes run and connect the municipality to its neighbouring municipalities as far north and south.

Traffic movement

At present, traffic is manageable in the municipality, even on school days or market days, which include Mondays, Wednesdays and Fridays.

F. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

The key impacts of various Project components on physical and biological environmental components during the planning, construction, and operation which require measures to avoid, mitigate and compensate are presented below.

Land Use

One of the impacts of the Burgos Wind Project is the conflict in land use. As initially discussed, about 219 ha of the Project development block is being used by residents as communal pasture land. Likewise, the local government of Burgos is planning to develop the area as potential tourist attraction in addition to the adjacent tourist spots in the municipality. The Project might even enhance the Palpalokada Landscape as potential tourist attraction, as proven by the fact that locals are drawn to the Bangui Windmills located adjacent to the proposed project.

This conflict in land use can be mitigated through coordination with the small-scale livestock-raisers occupying the area. Based on consultation activities conducted between EBWPC and livestock-raisers, with the presence of the Municipality of Burgos LGU, specific areas within the pasture land that will not be used for the wind project infrastructure development will remain as foraging areas. In the event that currently utilized foraging area will be needed for project development, a suitable area within the pasture land to replace the foraging area that has been allocated for the infrastructure development will be identified.

To this end, a Joint Memorandum of Agreement (MOA) between the Local Government of Burgos Municipality, representing the communal pasture land organization (Burgos Agri-Business Association or BABA) and Energy Development Corporation (EDC), parent company of EBWPC, was signed in October 2008 for the common use, for mutually beneficial purposes, of the communal pasture land by the EDC for the construction, erection, operation and maintenance of a wind farm and by LGU for breeding, raising, and pasturing of the community's livestock and other livelihood activities compatible with the operation and maintenance of EDC's wind farm.

Design and engineering measures as well as proper siting of WTGs and other project components was also undertaken during the detailed design stage to prevent areas with critical slope.

Noise

With regard to the Project's construction phase, civil works and use of fixed/mobile equipment during construction of the WTG foundation and associated infrastructure are the primary activities influencing noise levels. Construction activities of the Project were seen as possibly resulting in disturbance to sleep especially during night time, nuisance to daily household/work activities, and disturbance of livestock and native fauna. However, it was noted that residences within the vicinity of the project area are generally located 250 m from the nearest WTG. At such distances, construction noise is unlikely to generate adverse noise impacts during daytime, although it can be expected to be audible especially during night time. Since construction (i.e. civil works) noise levels are unlikely to cause adverse impacts to receiving environs during daytime, direct mitigation measures were deemed not necessary during this phase. However, mitigation measures were in place to address impacts during the night time period and in the event that a complaint was received.

During operations, of the 24 identified receptors considered in this assessment, receptors R-02, R-03, R-13 and R-18 to R-20 are the closest to a WTG unit, with distances from WTGs within 250 m.

Based on the noise modelling conducted (using CadnaA), only household clusters R-02 (>10 households near WTG C36) and R-03 (<10 households near WTG C36) are the receptors which will be impacted most by the project. Cluster R-02 is expected to experience noise levels (with values ranging from 47–48 dB(A)) exceeding the IFC standard of 45 dB(A) for night time especially at times when wind speeds are greater than 10.6 m/s. However, generated wind rose from nearest wind mast from R-02 and R-03 suggests that the area experiences wind speeds of more than 10.6 mps for approximately 35% for the year only. Cluster R-03 is expected to experience night time noise levels of 46 dB(A) at wind speeds equal to or greater than 15.2 m/s. The WTGs will not have adverse impacts to communities that are at least 250 m away from the nearest WTG unit.

Based on the results of the noise modelling, mitigation of noise impacts will be addressed by limiting project construction activities during daytime period to eliminate potential sleep disturbance and nuisance during night time.

The figure below (Figure 19) shows the potentially impacted noise receptors.

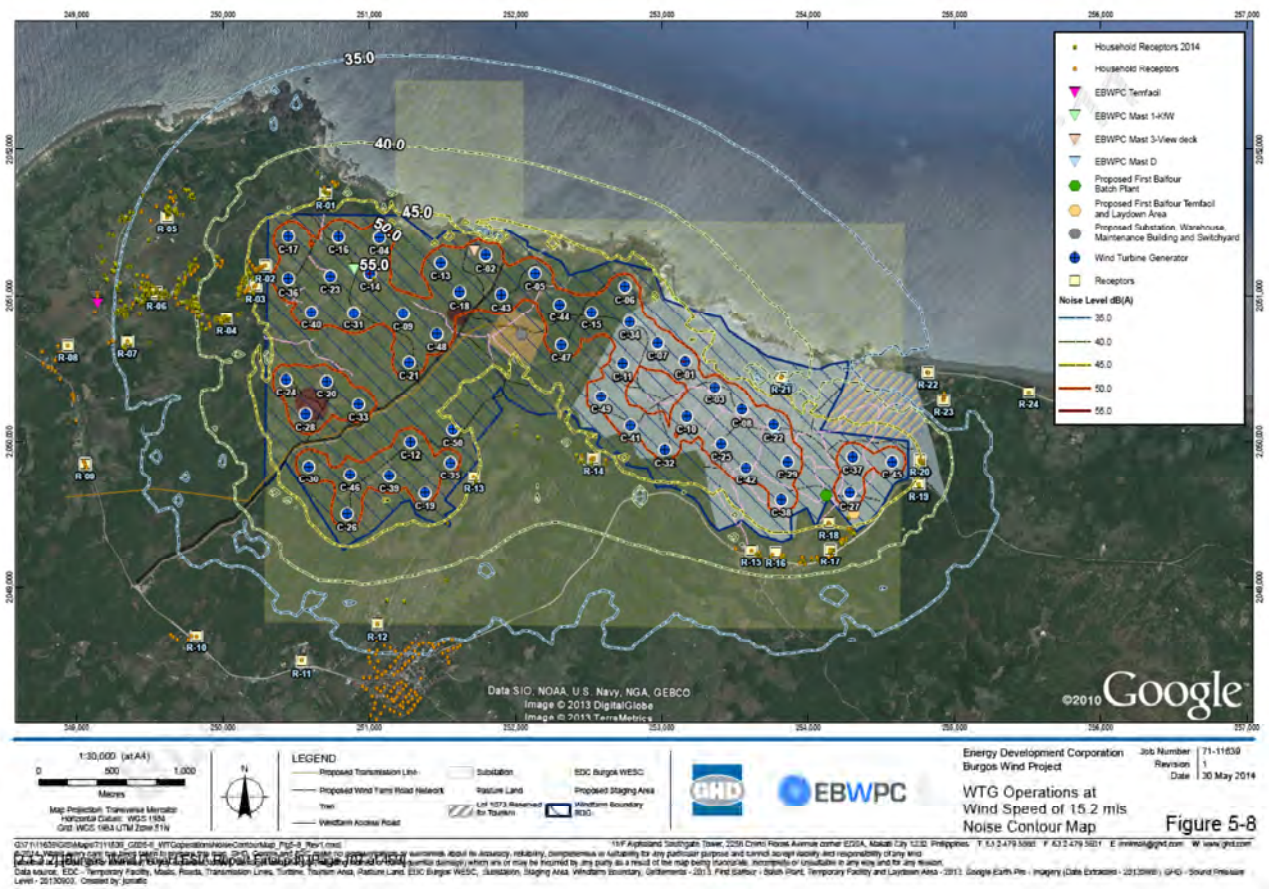

Figure 19. Noise contour map showing potentially impacted receptors.

Cumulative ambient noise level in the project area was estimated at 48 dB(A) based on regression analysis of recorded noise levels and corresponding wind speeds. Therefore, a 51 dB(A) guideline value was used to assess the compliance of the cumulative impacts of WTG operations against IFC Guidelines. The assessment showed that cumulative noise levels at all receptors are within the required 3 dB(A) maximum increase in background levels and have values less than 51 dB(A) at all wind speeds.

For the transmission line, noise emissions from construction equipment were expected during the construction period. The noise impact, however, was seen to be temporary and construction works were to be limited at daytime.

EBWPC has crafted a management program to address concerns on noise. The table below presents the summary matrix of the noise monitoring and mitigation program. Timelines have been agreed with the lenders.

Table 6. Summary Matrix of the Noise Monitoring and Mitigation Program.

PROGRAM	SPECIFIC ACTIVITY
Information, Education, and Communication (IEC) Campaign	Inform the residents of the affected household clusters on the impact assessment on noise and the validation monitoring to be conducted
	Conduct quarterly meeting sessions to update on the status of the validation monitoring
Validation Monitoring	Establish one monitoring station for each of the household clusters (R-02 and R-03)
	Conduct monthly discrete monitoring at the stations during morning, daytime, evening, and nighttime. The validation monitoring will be conducted for at least one year to cover all seasonal changes
	Conduct noise measurements as soon as possible when complaints are reported
Grievance Mechanism	Establish a grievance mechanism in coordination with the community
Mitigation Program	If necessary, mitigating measures will be conducted once the one-year validation monitoring has been concluded or if there are enough data to make conclusions
	Initial mitigating measures will be engineering control which includes house improvements to minimize noise impact particularly during evening and nighttime periods, and if necessary, provide for relocating these houses to a suitable proximate location.

Biodiversity and Conservation

Flora

The Project was seen to have significant impact on terrestrial flora during the construction phase. Site preparation, construction of access roads, excavations for turbine tower erections and temporary accommodation, staging and working area were assessed as definitely require clearing of land and/or cutting of vegetation. Although some parts of the area were already cleared or has an existing road and only needed to be improved, the hauling of large construction materials and heavy equipment was seen as requiring wider roads and large areas for staging.

There were other projected, albeit temporary, impacts of the activities. However, the impact on removal of vegetation in the WTG areas was viewed as permanent. The removal of vegetation was project to affect the following: species composition, biometrics and population density, ecological Indices, habitat of other wildlife species (flora and fauna); and micro climate of the area.

The potential impacts to ecosystem services identified during the risk assessment workshop were loss of species and habitat fragmentation. These pose high base risk rating for environment and social aspects.

During construction, the clearing of vegetation in the affected areas of the Project was inevitable. To mitigate this, the identification of safe zone or boundaries was seen to help to prevent over-clearing in non-permitted area. To compensate the loss of vegetation during clearing, measures such as re-vegetation of temporarily affected areas and offset planting beyond the permanently affected areas are recommended. Indigenous species especially those threatened species affected inside direct impact areas may be selected to reduce loss of species (e.g. narra (*P. indicus*), molave (*V. parviflora*), malaikmo (*C. philippinensis*), bitaog (*C. inophyllum*), ebony (*D. ferrea*), and anang (*D. pyrrhocarpa*)).

A Memorandum of Agreement (MOA) dated February 1, 2013 with the stakeholders, which include conditions specific to the establishment of alternative pasture land and hiring of foot patrol to protect the livestock, has been executed.

During project operation, minimal impact to the vegetation is expected since there will be no intensive activities except for maintenance of the Burgos Wind Farm. Minimal impacts such as pruning of trees and other vegetation during maintenance activity near or within the location of the wind towers, transmission lines and access roads is expected.

Fauna

The construction of wind-energy facilities was assessed as resulting in the loss of habitat and habitat fragmentation of species, thereby affecting ecosystem structure and functioning. Direct impact to species (e.g. threatened species) and on habitat structure and functioning by either ground vibration during earthworks or collapse of the habitat due to groundworks in spatial and temporal scale was expected.

To mitigate these impacts, the Project limited clearing activities to designated construction area. As much as practicable, the re-routing of access roads based on on-site condition (i.e. location of threatened tree species as food source to wildlife) was done. The Project has also

established and maintained corridor or buffer zones within the project area for species' refuge and food source. To enhance habitat vegetation and species' food source, EBWPC will plant native fruit-bearing trees and shrubs. No exotic and invasive alien species of plants and animals must be introduced to the area during habitat enhancement process.

EWBPC will also implement offsets such as contributing to the DENR National Greening Program[10], to EDC's BINHI program[11] and other conservation programs (i.e. Adopt-a-Species and Habitat).

Based on previous site studies and assessment, the area is not a migratory pathway, but bird strikes and bat fatalities through collision with turbine blades were seen as potential risks. To manage these risks, EBWPC have been i) implementing appropriate stormwater management measures to avoid creating attractions such as small ponds which can attract birds for feeding and foraging near the wind farm, ii) Using paint finish that will reduce blade glint (e.g. matte grey paint) to minimize reflection which possibly "blinds" bird species flying in the area resulting to fatalities from WTG blade collision, and iii) implementing and conducting regular monitoring but not limited to carcass retrieval. Monitoring frequency must be increased during migratory season or in the event that significant numbers of bird and bat species mortalities were recorded. However, Alviola (2001) also noted that the electric transmission line would have an over-all positive impact on resident and migratory birds in the area. The transmission lines were seen as providing perching, resting, and roosting accommodation to resident and migratory birds and also hunting posts for predatory birds.

Other Ecosystem Services

The cultural ecosystem service that will potentially be affected positively is ecotourism. However, at construction phase, the incoming visitors of the Kapurpurawan Rock Formation may be negatively impacted (reduced due to the disturbance caused by the project), or may increase because of plain curiosity, up to operation stage. The access road to this tourist spot is similar with the access road towards the Project development block.

Aesthetic values and some supporting services was viewed as being possibly affected, for those who use the view as nature backdrop for advertisements, movies and the like.

Temporary loss of vegetation that serve as food for birds, bats and even mammals (cows, goats, horses) and other agents of biological control such as insects, that also sustain seed for natural dispersal by excretion of these animals, should be considered in the reforestation activities of EBWPC. These are not limited to fruit and forest trees but also other vegetation such as grasses, shrubs, herbs, vines, climbers/creepers, epiphytes, and others. Growth of these other vegetation should be left undisturbed in areas where they are appropriate.

Mitigation measures were designed as early as the construction phase such as the implementation of the replacement ratio of 1:100 on trees cut to seedling/sapling replacement and maintenance. The standard conditionality for trees cut, as stated in the DENR Memorandum Order No. 2012-02 or the Uniform Replacement Ratio for Cut or Relocated Trees, is at least two years.

[10] The National Greening Program (NGP) is a massive forest rehabilitation program of the government established by virtue of Executive Order No. 26 issued on Feb. 24, 2011 by President Benigno S. Aquino III. It seeks to grow 1.5 billion trees in 1.5 million hectares nationwide within a period of six years, from 2011 to 2016.

[11] BINHI - Tree for the Future Project is the greening program of Oscar M. Lopez, chairman of the Lopez Group Inc. and is being implemented by Energy Development Corporation (EDC).

Continued appreciation of cultural services while the area is being developed is possible as long as safety issues are addressed, especially on the use of the same access road both by the project and the tourists. Opening up of a temporary trail may be a safer alternative for the tourists, as well as putting up of proper and friendly signages/notices pertaining to active areas thus considered dangerous for people.

Populations of wild agents of crop pollination and seed dispersal (e.g. birds and bats) may be affected resulting in changes in vegetation cover. The natural vegetation may slowly be dominated or replaced by those that are not being eaten and excreted on site by these pollinators and seed dispersers (e.g. wind pollinated species, seed transfers via water or humans).

Recreation and ecotourism services, as well as spiritual services, are foreseen to be affected. Vendors of food and souvenirs and others who would be establishing their businesses in the immediate vicinity of the area may also gain from the additional presence of the wind farm as industrial tourism attraction in addition to the cultural heritage. However, spiritual concerns wherein people place high value on maintaining connection with their natural environment may not find the Project a positive addition to the view. Nevertheless, Others may not be as affected.

Drainage and Hydrogeology

To avoid water competition and opposition from other water users, EBWPC had to utilize other sources of water supply for their construction activities. This will include the purchase of water from external sources, such as from Pasuquin, a neighbouring municipality of Burgos.

Mitigation measures had been implemented to minimize impacts of access road construction to drainage morphology. This will include installation of culverts and improvement of drainage system. Culvert construction would have been preferably scheduled during dry season or low flow periods and will be completed promptly to minimise impacts. Regular maintenance and inspection of culverts will also be undertaken during operation.

During operation phase, no significant impact on water availability and drainage is perceived.

Soil, Water Quality, and Geology

Permanent soil loss

Permanent soil loss was seen to potentially occur due to earthwork activities during construction of wind turbine foundations, access roads and other structures such as substation and laydown areas that require various degrees of soil excavation and earthwork activities. This was expected to lead to increase in surface runoff and down slope sedimentation.

Permanent soil loss was mitigated through the implementation of progressive soil removal per WTG location and appropriate stockpiling of soil material to minimize size of exposed areas. Progressive rehabilitation (planting of grass) was likewise undertaken over exposed areas to reduce areas that are permanently affected by soil cover loss.

Furthermore, topsoil and overburden materials from road construction was conserved, stockpiled and re-used whenever possible.

A Sediment Control Plan (e.g. silt traps) and/or other best management control measures such as proper slope and surface drainage management and proper stockpiling procedures of spoils were undertaken to prevent sedimentation.

Increase in spoil

During the installation of WTGs and construction of ancillary facilities, earthworks were carried out in a systematic way such that cut and fill volumes were balanced off to minimize spoil generation. Further, earthworks were limited only to the location of the WTGs and access roads as possible.

Spoils generated from the excavation works were properly managed by temporarily placing them in designated areas away from natural drainages and later on will be used as backfill material.

Water quality

To avoid adverse impacts of construction activities to the water bodies, appropriate measures were implemented by EBWPC. Appropriate planning and design were undertaken to locate the WTGs at least 20 m away from stream banks (e.g. Kapurpurawan Creek). Likewise, construction camps and temporary administrative offices were located relatively far (at least more than 30 m) from the coastal areas.

During construction activities, various control measures were also implemented. EBWPC ensured the implementation of the Sediment Control Plan, which included the installation of physical barriers (e.g. silt traps) where appropriate, aimed at preventing soil and other sediments from intruding into coastal and ocean areas. Dust control methods, such as road dust spraying by trucks, were likewise employed. Moreover, stockpiled earth materials near river/road crossings were stored in bundled areas and kept away from waterways (ideally more than 20 m) to avoid sediment entering the waterway. Immediate revegetation will also be conducted after construction phase to minimize soil erosion and stabilize disturbed areas.

Proper management of waste was also implemented during construction to avoid contaminants from entering the water bodies. Proper storage and disposal facilities for solid waste, used oil and fuel were provided to avoid potential water contamination. Likewise, construction camps were provided with bathing and toilet facilities and/or sewage facilities. Enclosed and, dry areas with lining at the bottom were also provided for storing spoils. Moreover, EBWPC ensured that no inadvertent disposal of excess concrete in streams or other water bodies was done. Workers were instructed to wash vehicles in designated motor pool areas, away from waterways or drainage channels. Regular repair and maintenance of vehicles and other machineries were likewise undertaken to prevent any leakage.

Change in surface landform/topography/terrain/slope

The Burgos Wind Project was foreseen to have little impact on surface landform, topography, terrain, or slope. Earthworks, with estimated volume of about 10,000 m^3, were undertaken but did significantly impact any of the existing topographic features of the study area.

Progressive rehabilitation (such as planting of Vetiver grass and shrubs) over the exposed areas was implemented immediately surrounding the built-up areas to prevent soil cover loss and sedimentation due to surface runoff.

Change in subsurface/underground geomorphology

WTG foundation required an area of about 20 m in diameter and an excavation of a depth of about 5 m. Likewise, each WTG was connected to the substation using cables which were installed underground trenches one meter in width and 1.2 m in depth. These activities, however, were perceived as not having impact subsurface/underground geomorphology.

The potential for ground cracking or subsurface rupture and any significant displacement due to earthquake is mitigated by the absence of active faults passing directly to the Project site and also due to the tight nature of discontinuities observed at the site.

Inducement of landslides/other natural hazards

The generally flat terrain of the Project site negates or lessens the probability of landslides as well as erosion hazards in the area. Exceptions, however, are considered in the precipitous slopes and small divides or valleys in the coastal section of the Project site.

Sinkhole hazards may be remote in the area as no surface manifestations were observed. An abnormal increase in sea level and tsunami waves can flood and damage edifices built near shore and near creek mouths north of the project where elevation is less than 10 m and distance to shore is around 50 m. Probable locations for the turbine sites are Plateau Levels 2 and 3 where elevation ranges from 50–100 m. A relatively high elevation, that is, greater than 20 m, is less prone to tsunami events.

Though the Project site is within an active seismic zone, earthquake-generated hazards such as ground vibration, pose little or no threat to the Project site in general due to the highly competent and rigid rock formations present in the area (PNOC-EDC, 2002). Based on the map of active faults in Northern Luzon, no active fault is shown passing through the Project site. Though there are local faults observed in the Project site, as well as in the southern sector thereof, the tight nature of the faults and fractures mapped as well as their inactive nature, generally mitigates the potential of earthquake hazard. However, caution should still be observed when constructing infrastructures within the faults or fault zones, as these still constitute structural weaknesses on the lithology beneath (PNOC-EDC, 2004).

Rockfall/rockslide hazard is envisaged in the northern cliff edges and precipitous slopes in the inland portion of the Project area. Thus an appropriate buffer distance was observed near cliff edges. Unless provided with appropriate slope protection, no tower structures were built near the cliff edges in the northern sector of the Project site and likewise in the inland portion where precipitous slopes occur to prevent potential rock fall and slope failures.

The project is foreseen not to pose potential threat on soil, geology, and topography during the operation phase.

As regards waste, there is a need to provide waste disposal and toilet facilities in areas to be frequented by tourists/visitors. Sewage generated from office operation/workers are treated using legally prescribed facilities (e.g. portalets or septic tank). Moreover, the proper management and disposal of hazardous substances, such as waste oil and lubricants, is being implemented.

For the transmission line, minimal hazardous waste and solid waste was expected during construction phase. The only solid waste generated during said phase were food waste and garbage at temporary workers area/site. Hazardous waste then generated were only used fuels from vehicles and other equipment during construction.

Air Quality

Dust impacts during construction were seen as possibly affecting receptors that are located near the Project site or route(s) used by construction vehicles on the public highway. A receptor, human or ecological, is defined as a location that may be affected by dust emissions during construction activities. Human receptors include locations where people spend time and where property may feel the impact of dust while ecological receptors are habitats that might be sensitive to dust.

The nearest human receptors or settlements are located approximately 250 m from the project site. The Project site is surrounded by different ecosystems, such as second growth forest, beach/coastal ecosystems, grassland and shrubland (locally called "parang"). However, these are not considered as sensitive habitats as indicated in the ESIA. Human settlements are considered as highly sensitive receptor while the tourist attraction (i.e. Kapurpurawan Rock Formation) and access road can be considered as low sensitive receptors since people are expected to be present in the area only for limited periods of time.

Measures to control adverse impacts of dust to receptors included the development and implementation of a Dust Management Plan (DMP). The DMP include the monitoring of dust deposition, real-time PM_{10} monitoring, and/or visual inspections and employing dust suppression methods such as watering/dampening of roads especially when surface winds are high and during dry seasons. Monitoring of DMP implementation was also be conducted.

Likewise, proper site selection was deemed important such that machinery and dust causing activities were located away from receptors. Solid screens and barriers were erected around dusty activities or site boundary. Vegetation around the Project site was also maintained to serve as natural barrier. Revegetation of earthworks and exposed areas/soil stockpiles was conducted immediately to stabilise surfaces.

EBWPC ensured that vehicles and/or heavy equipment used on site have complied with DENR emission testing requirements and had undergone regular maintenance checks for the duration of the construction phase. Vehicles and/or equipment were switched off when not actively used in construction activities so as not to contribute air emissions.

To minimise dust dispersion from moving vehicles, speed limits were imposed. The Construction Logistics Plan (CLP) and Travel Plan were prepared to manage delivery of goods and materials and encourage sustainable travel (use of public transport and car-sharing), respectively.

Moreover, project personnel were provided with the appropriate personal protective equipment (PPEs) such as face masks, whenever high dust level was unavoidable in work areas.

During operations, effects of tourism activity on air quality are perceived to be temporary since the influx of tourists is seasonal. Therefore, the effect will not require any mitigation or enhancement measure based on current ambient air quality requirements.

For the transmission line, air emissions, in the form of dust or air suspended particulates, were expected to be generated during excavation works when surface winds are high and at dry seasons. This was seen, however, as likely be confined within the perimeter of the proposed transmission tower sites.

Circuit breakers at the substation will utilize sulfur hexafluoride (SF6), a colorless and odorless gas. Leak-proof equipment or breakers to contain SF6 will be utilized to avoid release of SF6 to the atmosphere. The power transformer will also utilize Mineral Oil non-PCB type, a non-hazardous oil. The emergency generator set will utilize diesel fuel with specific storage and containment on the area.

Climate Change Assessment and Adaptation

Based on the potential climate change vulnerability of the project, the following are the adaptation measures that were implemented:

The WTGs and transmission line towers were designed to withstand the potential extreme weathers brought about by climate change. In general, the Project components were designed to meet or exceed all applicable codes, structures, specifications and practices, including the National Structural Code of the Philippines 6th edition. The following climate change adaptations were incorporated in the project:

1) **Class 1 Wind Turbines**. The Vestas V90 WTGs selected for the use of the Project are International Electrotechnical Commission (IEC) Class 1 certified, the highest rating for wind turbines. The WTGs can withstand wind speeds of up to 70 mps (252 kph).
2) **Typhoon Class Towers**. The wind turbine towers supplied by Vestas were special typhoon towers developed for use in Japan. The special typhoon towers are stronger than conventional towers making use of thicker steel and shorter hub height. The towers have a hub height of 75 m as compared to the standard 80 m for Vestas V90 WTGs.
3) **Robust Turbine Tower Foundation Design**. The turbine tower foundation was specifically designed for the Project site's geology and susceptibility to typhoons. It consists of large 650 to 850 cubic meter reinforced concrete foundations, one of the largest in the world for an onshore V90 WTGs.
4) **Yaw Back-up System (YBS).** The YBS enables the nacelles to pivot to face the incoming wind with the blades pitched flat. This is the orientation that will most likely enable the turbines to withstand high wind speeds. The YBS is a combination of sensors and software to control the turbine when winds exceed cut-out speed. A back-up generator will be installed at the project site to allow continuous operation of the YBS even during power outage or grid failure.
5) **High Wind Rating of Transmission Line Towers**. The 147 transmission line towers and poles are designed to withstand wind speeds of up to 75 mps (270 kph). This exceeds Wind Zone 2 requirements mandated by the National Structural Code of the Philippines 6th edition.
6) **Elevated Platform for Transmission Line Tower 110**. The tower is located near the banks of Bacarra River. Although Bacarra River was not observed to reach the vicinity of the tower location, a concrete platform was installed below the tower to elevate it by 2 meters.

EBWPC made arrangements with the WTG suppliers for rectification of any failure or breakage of the WTGs caused by wind speeds in excess of 70 m/s. The WTG suppliers will likewise cover

the liability for any availability loss due to failure or breakage caused by wind speeds in excess of 70 m/s. These are additional measures for the Project in the event that any failure or breakage occurs during an extreme weather event.

The Project is not expected to be affected by flooding and sea level rise. Majority of the WTGs have base elevations of more than 50 masl. The least elevated turbines are WTGs C16, C17, and C36 with elevations of approximately 20 masl.

Heritage and Cultural Resources

The potential source of adverse impacts of the Project to the heritage and cultural resources were predicted to be brought about by the construction phase of the Project. It was anticipated that designated laydown areas within the Project development block may have an impact on visual amenity especially if the vantage point is from a relatively higher elevation than the Project site (e.g. Cape Bojeador). However, during the site validation, it was ascertained that the Project development block cannot be seen from the foot of the lighthouse because of natural barriers (i.e. vegetation). The foot of the lighthouse was used as vantage point since nobody is allowed to go up the lighthouse for safety reasons.

Dust generated from the transport of construction materials and the use of the same access road leading to Palpalokada was seen as a cause for inconvenience for tourists and locals alike. As indicated in the impact management plan, dust suppression measures will be implemented to minimize the inconvenience brought about by trucks plying the route of the access road.

Other archaeological, cultural and natural heritages are relatively distant from the Project site—not even in the adjacent municipalities to Burgos. The identification alone ascertains that the Project will not cause adverse and lasting impacts to heritage and cultural resources of Ilocos Norte.

During operation, beneficial impacts are identified in this assessment. Similar to Bangui Windmills, the Project will become a tourism asset of the host area. However, there may be adverse impacts if there is no coordination between the EBWPC and the LGU. Adverse impacts of increase in tourism activity in the area include solid waste generation and trampling of vegetation. This can be avoided through the formulation of a coordinated tourism management plan by the EBWPC with the Burgos LGU. The tourism management plan should include clear rules on access to facilities in the Project (i.e. WTG, access roads). EBWPC may also coordinate with the LGU to operate and manage educational visitor centers for tourists and learners.

Traffic, Access, and Safety Assessment

Due to increased number of workers, material delivery, and various activities during construction phase, increased traffic was perceived as possibly leading to various risks, such as potentially affecting traffic in the area. However, impact of traffic is temporary and minimal. Similar impact is expected during operation and maintenance phase. However, the impact is expected to be minimal.

Traffic impact during material delivery, construction and operation phases was mitigated by implementing the appropriate traffic management plan, which included the installation of traffic warning signs, conduct of IEC, coordination with LGUs, and establishment of speed limits,

among others. Proper timing of material delivery was also implemented to avoid accidents. Regular maintenance of vehicles and installation of mufflers were likewise undertaken.

Transport management plan

The Project was expected to transport materials that are overload/over dimensional such as WTG components and other equipment. For purposes of the traffic impact management, these were scheduled as 'special' trips rather than as regular traffic/transport activity. These activities were undertaken (or accommodated) during lean hours or lean days of the week (i.e. Saturday and Sunday to avoid school children) or month (i.e. off-peak tourist season).

For such activities, occupational health and safety rules, as well as and regulations for overload/over dimensional goods transport were followed. Moreover, relevant permits and/or clearances from the relevant municipality and barangay were obtained.

Based on observed traffic condition on-site, traffic generally follows the traditional peaking conditions occurring from 8:00 to 9:00 for the morning peak and from 5:00 to 6:00 for the afternoon condition. Off peak period from 9:00 am to 5:00 pm provides an 8-hour window which is more than sufficient to accommodate these type of transport requirement for the delivery of construction equipment. Likewise, evening off-peak condition beginning at 7:00 pm also provides opportunity for the transportation of materials/equipment to address safety and security concerns.

Moreover, the following activities were implemented to ensure safety and security not only of the workers but of other road users (i.e. tourists, school children and local people):

- Coordination with the LGUs and the Philippine National Police (PNP) to provide convoy in transporting the WTGs
- Dissemination of information on the movements of abnormal load convoys to the relevant local media to help inform the public
- Establishment of a temporary traffic control and protective set-up to ensure that destructions and other hindrances are reduced
- Installation of traffic signals (traffic lights, advance warning signs, pavement markings)
- Road improvements, when necessary

Tourism

No impact on the tourist area was noted. Project souvenirs had been made by the local people and were being sold at the tourist area as shown in Figures 20 and 21. The sales of these Project-related souvenirs are likely to have a positive impact on livelihoods.

Figure 20. Locals sell Burgos Wind Project souvenir shirts.

Figure 21. Locals sell Burgos Wind Project souvenir replicas.

Visual Impact

Kimberly Graphics Philippines, Inc. (KGPI) was engaged to undertake the landscape and visual impact assessment (LVIA) component of the ESIA. 20 initial viewpoints were established and sensitive receptors with potential views of the wind farm were identified. Six viewpoints were chosen for further assessment. Receptor sensitivity and magnitude of potential impacts were

established to determine the significance of both positive and negative visual impacts for the construction and operation stages. Figure 22 shows the location of viewpoints.

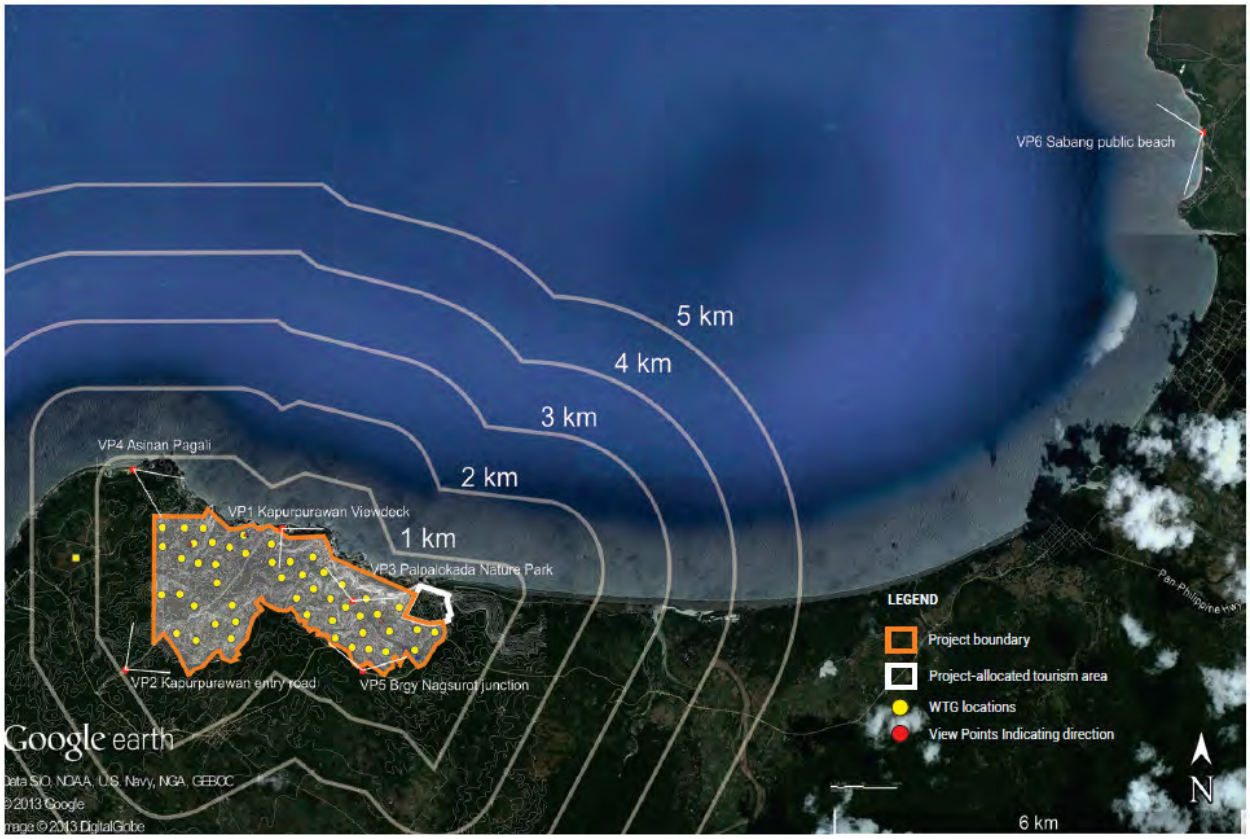

Figure 22. Map showing the location of viewpoints.

The predicted visual impact was demonstrated in photomontages (Figures 23 to 28) and is summarized as:

- Generally the views of the Project from the south along Manila North Road (represented by VP5) are filtered or screened by vegetation and topography and pose no major impacts.
- VP1 located adjacent to the Project site, and VP3 located within the Project site, generally indicate that these areas will experience the greatest change in views. In VP1 the Project is seen to intrude into the natural scenery due to the 'disconnect' of the areas on the top (the WTGs) and at the bottom of the escarpment (Kapurpurawan). In contrast, in VP3 the WTGs are seen to become integral to and part of Palpalokada's scenery, framing much of its borrowed vistas. Changes at VP1, VP2 and VP3 are positive during operation phase due to the added 'attraction' it would bring to the areas from an eco-tourism point of view.
- Predictably, the Project's impact on the visual amenity gradually reduces as one goes farther out. VP4 located approximately 2 km to the west of the site is predicted to be moderately impacted, whilst the impact on VP6 17 km across Bangui Bay is of almost no significance.

Figure 23. Rendered photomontage of VP1 showing proposed WTGs.

Figure 24. Rendered photomontage of VP2 showing proposed WTGs.

Figure 25. Rendered photomontage of VP3 showing proposed WTGs.

Figure 26. Rendered photomontage of VP4 showing proposed WTGs.

Figure 27. Rendered photomontage of VP5 showing proposed WTGs.

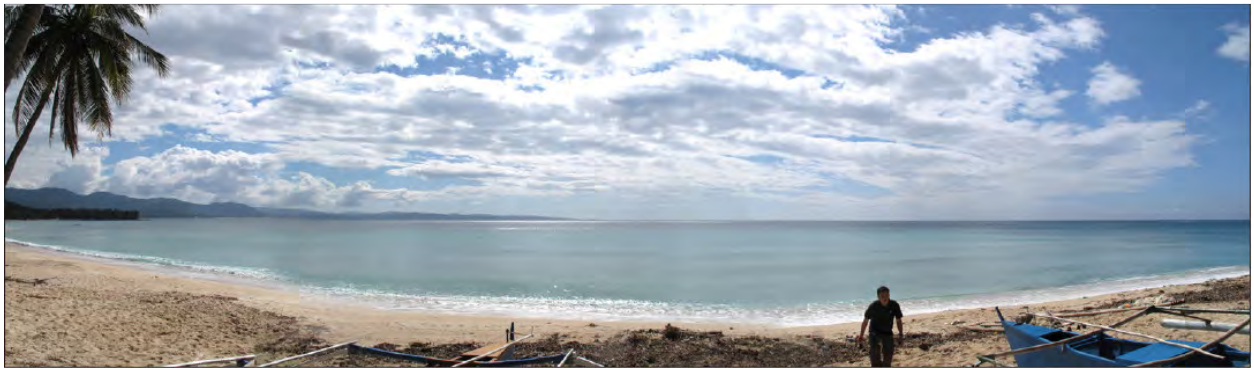

Figure 28. Rendered photomontage of VP6 showing proposed WTGs.

There have been no reported public concerns regarding the potential visual impact of the WTGs. In a stakeholder engagement meeting on April 24, 2012, no issues or concerns were raised with respect to visual impacts. Nevertheless, EBWPC developed a management program for this impact.

Table 7. Summary Matrix of the Visual Impact Monitoring and Mitigation Program

PROGRAM	SPECIFIC ACTIVITY
Information, Education, and Communication (IEC) Campaign	Inform stakeholders (including the local government units, non-government organizations, tourist board, and community members) of the results of the ESIA on visual impact assessment and the existence of a grievance mechanism
Grievance Mechanism	Establish a grievance mechanism in coordination with key stakeholders

Shadow Flicker

Shadow flicker modelling was done to simulate the “real case” scenario using the following parameters: wind data from one of the wind farm’s met masts; cloud cover information; and details about the orientation and location of windows for houses in the surrounding area.

The following methodology was used to model the ‘real case’:

1. Data gathering, including: wind data speed/direction from a mast on the site to represent a typical meteorological year; sourcing cloud cover data from a nearby base station from previous years, and calculating average cloud cover values for each month. Field survey of houses surrounding the wind farm, including location and size of windows facing the turbines, and any obstructions that might limit shadow flicker impacts were recorded.
2. Input of additional information into WindPRO (v2.6) wind modelling software.
3. Shadow flicker simulation.
4. Qualitative assessment made of visual obstructions.
5. Adjustment of shadow flicker simulation results.

In the absence of a Philippine standard for shadow flicker, the *Draft National Wind Farm Development Guidelines for Australia (2010)*[12] (Draft Guidelines) has been adopted for this Project. The Draft Guidelines sets limits on the levels of acceptable shadow flicker effect:

- An astronomic 'worst case' scenario limited to a maximum of 30 hours per year
- A 'real case' scenario including meteorological parameters limited to a maximum of 10 hours per year.

Based on the Draft Guidelines, the following parameters have been used:

Table 8. Assessment criteria for shadow flicker.

Parameter	Limit/Description
Shadow flicker limit – worst case	30 hours/year at the receptor
Shadow flicker limit – real case	10 hours/year at the receptor
Zone of influence of shadows	Zone of Influence = 265 m x max chord (3.5 m) = 928 m 20% of sun covered by blade
Receptor height	1.5 m
Receptor mode	Fieldwork was undertaken to record location of houses and direction and size of windows facing turbines.
Impact of cloud cover	Included as part of real case scenario from closest meteorological station.
Turbine orientation and rotation	Included as part of real case scenario using wind data from Mast D using 2012.

The WindPRO model results showed that there are 83 houses that exceeded the real-case shadow flicker limits (19 of which have values exceeding 'worst case' scenario of 30 hours per year with 62.6 hrs/yr as the highest value; and 64 with real-case values between 10 and 30 hours per year). The highest value of 62.6 hours per year is equivalent to 10.3 minutes per day which is within the 30 minutes per day identified in the report by Massachusetts Department of

[12] http://www.scew.gov.au/publications/pubs/draft-national-wind-farm-development-guidelines-july-2010.pdf

Environmental Protection (MassDEP) and Massachusetts Department of Public Health[13] which states that "there is limited scientific evidence of an association between annoyance from prolonged shadow flicker (exceeding 30 minutes per day) and potential transitory cognitive and physical health effects."

Based on the study of the Environment Protection and Heritage Council (EPHC, 2009 as cited in Wind Turbine and Health), the chance of conventional horizontal axis wind turbines causing seizure for an individual experiencing shadow flicker is less than 1 in 10 million.

To supplement the model results, an assessment of visual obstructions was done to characterize the potentially affected 83 houses that exceeded real-case shadow flicker limits as a result of the WindPRO model. The table below presents the ratings used in the assessment.

Table 9. Probability of Visual Obstruction Results Ratings.

RATING	DESCRIPTION
Low Reduction	No vegetation/fence/obstruction in close proximity to window. Shadow flicker can directly penetrate into house
Moderate Reduction	Vegetation/fence/obstruction in close proximity to window that would partly protect interior of house from shadow flicker
High Reduction	Vegetation/fence/obstruction in close proximity to window that would protect interior of house from shadow flicker
N/A	Insufficient information collected

The results suggest that there are two houses where the probability of shadow flicker reduction was deemed high enough to remove the affected houses from the real-case results.

Meanwhile, 24 houses appear to have a medium probability of shadow flicker reduction. Based on the assessment criteria, these houses cannot be completely removed from the real-case results, but could potentially be argued as having a lower probability of excessive shadow flicker.

A total of 38 houses are candidates for possibly exceeding real-case shadow flicker limits due to the absence of any vegetation/fence/obstruction, and a further 19 houses have insufficient information to be removed from the real-case results.

EBWPC will revalidate results during the actual operations phase. This is in addition to the previously mentioned management program for this impact due to the absence of Philippine regulation. The table below presents the summary matrix of the shadow flicker monitoring and mitigation program. Timelines have been agreed with the lenders.

[13] http://www.mass.gov/eea/docs/dep/energy/wind/turbine-impact-study.pdf

Table 10. Summary Matrix of the Shadow Flicker Monitoring and Mitigation Program.

PROGRAM	SPECIFIC ACTIVITY
Information, Education, and Communication (IEC) Campaign	Inform the residents of the affected household clusters on the impact assessment on shadow flicker
Validation Monitoring	Finalize metrics, and collect information on the 19 households categorized under N/A and rate them as low, moderate, and high reduction
	Conduct a survey among the identified houses to validate results
Grievance Mechanism	Establish a grievance mechanism in coordination with the community
Mitigation Program	Conduct tree planting at houses categorized as medium and high reduction if possible
	Provide curtains to all 83 affected houses, if necessary Potential change in the WTG operating regime during times of shadow flicker to affected houses. Provide for relocating these houses to a suitable proximate location, if necessary

Electromagnetic Interference

Transmission lines do not usually interfere with normal television and radio reception. In some cases, interference is possible at a location close to the right of way due to weak broadcast signals or poor receiving equipment.

Transmission lines in the Project were of the same design as those transmission lines which were installed and in operation on both rural and urban areas. These transmission lines do not show significant interference to TV, radio, and phone signals. The WTGs are also expected not to interfere with normal television and radio reception.

G. ANALYSIS OF ALTERNATIVES

No Project scenario

Portions of the Project development block are currently utilised by local residents as communal pasture land. The local government of Burgos is also planning to develop the Palpalokada Landscape as potential tourism site since it is adjacent to current tourism areas (i.e. Kapurpurawan Rock Formation and Bangui Wind Mills).

It was also mentioned by the Municipal Development and Planning Officer (MPDO) of Burgos that several energy companies already applied for locational clearances in various areas in the municipality for the exploration and development of wind power.

Without the Burgos Wind Project, the proposed location of the Project will continuously be used by local residents as communal pasture land. Tourists may continue to flock to the area because of LGU development of the Palpalokada Landscape as tourism area.

If EBWPC had not pursued the development of the Project, other energy companies nonetheless would have developed wind projects in the area as mentioned by the Burgos MPDO. This scenario is due to DOE's efforts in promoting the development of alternative energy resources in the Philippines to minimize the dependence of the country on fossil fuels. Moreover, based on US-NREL study, which was confirmed by the JETRO feasibility study, the proposed area has 'good to excellent' wind resources.

Alternative design

EBWPC approached several turbine manufacturers in order to select the type of turbine to be used for the development of the Project. *Vestas* and *Siemens* were considered by EBWPC for the Project since they are recognized as the most significant turbine vendors. Vestas and its proposed project design layout were chosen upon EBWPC's technical evaluation, which incorporated the use of the Vestas V90-3MW turbine.

Different factors were also considered in determining the final location of each WTG, which include:

- Engineering Geological and Geohazard Assessment Report (EGGAR). About three WTGs were moved to avoid areas of potential geological hazard
- Visual consideration. WTG C11 was relocated from its original location as recommended by the LGU of Burgos because of visual consideration
- Consideration of the presence of a man-made tunnel. EBWPC considered relocating WTG C02 located near a cave. However, further studies confirmed that the foundation for WTG C02 will not be affected by the manmade tunnel.

Alternative location

In 1999, the DOE tapped the PNOC-EDC to develop what was then envisioned as the first wind farm in Southeast Asia based on Wind Atlas produced by the US National Renewable Energy Laboratory (NREL). In view of this, a feasibility study was prepared by the Japan External Trade Organizations (JETRO). The Province of Ilocos Norte was identified by NREL as having "good to excellent" wind resources while the JETRO study concluded that a 120 MW wind farm situated in Burgos, Ilocos Norte was feasible.

In 2000, then PNOC-EDC mobilized a project team to commence the project feasibility activities where they identified the development of a 42 MW wind farm. In 2002, a possible additional 80 MW was proposed.

In 2000, then PNOC-EDC engaged Garrad Hassan to conduct an initial wind resources assessment using 30 m meteorological masts. The study of Garrad Hassan was positive and based on their recommendations, two 50 m wind masts were erected in the project study area to select the exact site for the 165 MW Burgos Wind Power. The wind masts of about 70 m high comprise the following elements:

- Sensors to measure wind speed at different heights (e.g. 40 m, 50 m and 60 m)
- Sensors to measure wind direction at different heights (e.g. 50 m and 60 m)
- Sensors to measure temperature at height of 6-7 m
- Data logger installed at height of 50 m
- Data logger installed at a height of 7 m

EDC has chosen the 618 ha Project development block located within Barangays Saoit, Poblacion, and Nagsurot for the development of the Project based on the following considerations:

- Positive results of measurement of wind speed and direction performed over a period of at least eight years
- Avoidance of residential areas in the three impact barangays
- Avoidance of environmental critical areas (ECA) such as critical slope and potential tourist areas

H. INFORMATION, DISCLOSURE, CONSULTATION, AND PARTICIPATION

Stakeholder engagement activities were done as early as 2000 by then PNOC-EDC. Community members were informed that there was a plant to build a wind farm in the area.

Stakeholder engagement activities were also undertaken by EBWPC between 2010 and 2014 (Table 11). These activities were aimed at informing the locals about the Project and to address their issues and concerns by including these in EBWPC's Environmental and Social Management Plan. In these consultative meetings, the stakeholders were encouraged to actively participate and fully utilize the open and transparent dialogue with the EBWPC as the Project proponent. The stakeholders were given opportunities to provide inputs for the development of the Project. The issues and concerns raised during these consultative meetings are summarized in Table 13.

The majority of issues and concerns raised pertained to Project description and ownership, timeframe of the Project since it influences the host municipality's development and budget plan, compliance to the terms and conditions of permits issued, and safety and status of livestock raisers. The basis for land compensation was also raised as well as potential noise pollution generated by the project during project operation. Benefits expected by the stakeholders were also communicated to EBWPC such as CSR programs, manpower requirement, and training opportunities.

Table 11. Stakeholder engagement activities conducted by EBWPC.

DATE	AUDIENCE AND TOPIC
February 12 and 24, 2000	EBWPC met with the Mayor of Burgos and municipal/barangay officials where they were informed of the proposed Project.
April 12, 2000	An information drive session for the Project was undertaken at Burgos Central Elementary School. In general, the Project was well received with no indication of opposition due possibly to early EBWPC coordination in Burgos town. The information drive was conducted in local dialect (Ilocano) and a simple comic strip was prepared and distributed to the attendees. The session was attended by then Mayor of Burgos, municipal councilors, barangay captains of Pagali and Saoit and municipal officers as well as the CENRO and representative from the local pasture association, Burgos Agri-Based Association (BABA). there was a total of 104 attendees.
August 23, 2007	Consultation with Burgos stakeholders on EDC's Clean Development Mechanism (CDM) application
April 7, 2010	A stakeholders' consultation was held at the Burgos Central Elementary School as part of the requirements for registration to the CDM. There were 60 participants including municipal councilors, barangay captains of Pagali and Saoit and municipal officers, the CENRO, and a BABA representative.
April 11, 2011	Consultation with residents of Barangay Nagsurot regarding the transmission line
July 20, 2010	Consultation with Mayor Nicomedes de la Cruz, Jr.

July 21, 2010	Consultation with officials of Burgos and Bacarra barangays regarding the transmission line
July 22, 2010	Consultation with officials of Pasuquin barangays (Davila, Dilavo, Sulongan, Nagsanga, Sulbec, Tabungao, San Isidro, and Carusipan) regarding the transmission line
July 25, 2010	Community consultation with residents of two Laoag City barangays (Barit and Vira) regarding the proposed transmission line
July 27, 2010	Consultation with officials of Pasuquin barangays (Caruan, Estancia, Susugaen, Salpad, Poblacion 2, and Ngabangab) regarding the transmission line
September 3, 2010	Consultation with Burgos residents and BABA members regarding land zoning
January 16, 2012	Consultation with the members of the Ilocos Provincial Council regarding the entire project
April 24, 2012	A follow-up stakeholders' consultation was held at the Burgos Central Elementary School as part of the requirements for the CDM application. According to the list of attendees, there were 25 participants including municipal councilors, barangay captains of Pagali and Saoit and municipal officers, CENRO, and a BABA representative. The consultation aimed to validate the results of the consultation held in 2010 and gather the community's other concerns (if any). The meeting was also attended by two (2) auditors from Bureau Veritas.
July 24, 2012	A forum on the Pasture Development Project was held to discuss progress and ways to further develop the communal pasture area in line with the need to improve the municipality's livestock industry. The participants, composed of representatives from BABA, local officials from the Municipal Agriculture Office, Provincial Veterinarian Office, Municipal Council and Municipal Development Office, agreed to form a discussion group to prepare a Pasture Development and Management Sustainability Plan that incorporates its other uses namely wind farm by EBWPC and Tourism by the Burgos LGU as the lead agency.
April 30, 2013	Consultation with BABA members, Burgos LGU, and First Balfour Inc.
May 11, 2013	Consultation with Barangay Saoit regarding Project expansion to 150 MW
May 19, 2013	Consultation with Barangay Nagsurot regarding Project expansion to 150 MW
May 21, 2013	Consultation with Barangay Poblacion regarding Project expansion to 150 MW

During ADB's August 2014 site visit, the following consultations were also held.

Table 12. ADB Community Consultations.

DATE	AUDIENCE
August 8, 2014	Barangay Saoit wind farm lot owners and community members
August 8, 2014	Members of BABA
August 8, 2014	Burgos Barangay Captains
August 9, 2014	Barangay Ablan transmission line lot owners

August 9, 2014	Barangay Estancia and Sulongan transmission line lot owners

Table 13. Major issues and concerns of the Stakeholders and EBWPC's Response.

Issues and concerns	Raised by Stakeholder/ Sector	EBWPC Response
21 July 2010 Consultation		
Timeframe for Project implementation because the Project has been proposed 10 years ago. People are enthusiastic about the Project because of potential economic development	Municipal Vice Mayor of Burgos	EBWPC apologised for the delay of the Project and reasoned that if it was implemented 10 years ago, the total Project cost will be expensive. At present, it is cheaper to develop a wind power because of the signing of the RE Act Project development may start in September when Notice to Proceed will be approved by the Energy Regulatory Commission (ERC)
There are other energy companies who are looking at your Project area as potential for energy development	Vice Mayor of Burgos	EDC, the sister company of EBWPC, has been in the area for almost 10 years which proves that they are committed to continue implementation of the project EBWPC went through legal process in order to implement the Project
Basis of compensation of affected land owners	Barangay Chairmen of Bobon and Ablan	The lease or compensation is based on fair market value
Benefits from the Project	Barangay Chairman of Paayas	During construction, there will be a need for construction workers During operation, the provisions of ER 1-94 will be implemented. ER 1-94 is a regulation requiring power plants to set up a community fund as financial benefit for the relevant host community/ies.
7 April 2010 Consultation		
Use of oil or petroleum-based products for the project	Municipal Mayor of Burgos	EBWPC stated that the wind turbines would require a periodic oil changes, particularly lubricants for the nacelle, but the process (of changing/using oil or lubricant) will be carried out as prescribed by the manufacturer. They were given the assurance that EDC/EBWPC will do this in a clean way, including the disposal of the oil, in compliance with applicable local codes for the disposal of wastes.

Issues and concerns	Raised by Stakeholder/ Sector	EBWPC Response
Reminded to religiously follow the terms and conditions provided for in the permits that will be issued to the company/proponent	Provincial Environment and Natural Resources Officer (PENRO) of Ilocos Norte	EBWPC assured the PENRO that they will take note of his reminder. EBWPC also maintained it is a basic requirement in all projects to comply with the conditions and requirements of all government instrumentalities. EBWPC added that when applying for loans, the banks also follow a rigorous system of audits in the performance and compliance with permit requirements. EBWPC assured the participants that EBWPC will always comply.
Mr. Rodolfo Garcia, Jr., representative of the Municipal Agrarian Reform Office of Burgos brought up the issue of noise pollution produced by wind turbines. He shared his observation of the wind turbines of North Wind Power, which produce annoying sounds. He inquired whether such annoying sounds will scare the livestock grazing in the area away.	Representative of Burgos Municipal Agrarian Reform Office (MARO)	EBWPC admitted that the turbines might cause temporary short-term annoyance or disturbance, but farm animals will eventually be able to adjust. He added that the Project will comply with the required noise levels. A representative from EBWPC shared that there is an existing standard for noise levels which the Project comply with. EBWPC stressed that EBWPC's minimum requirement in all its power projects is full compliance with all laws, regulations and permits.
Concern of the pasture association and inquired whether there is a planned fencing of spring	Municipal Mayor of Burgos	EBWPC explained that the spring is not within the contract area of BWP as it is already allocated for tourism purposes. EBWPC recognises that the area is needed by the livestock and it has not actually been closed or fenced. EBWPC is committed and will coordinate with the pasture group and other parties responsible for the pasture area to come up with an agreement, especially regarding the access of farm animals to the water source inside the ecotourism area.
Start of project development because it will have an impact in the preparation of municipal development plan and budget	Municipal Planning and Development Officer of Burgos	EBWPC is working to obtain the Notice to Proceed within the third quarter of 2010. EBWPC emphasised, however, that the ability of EBWPC to start the construction by the third quarter will depend on the approval of the FiT by the DOE and ERC. They can be assured that the level of activity at the wind farm site will increase with the presence of the contractors working on the civil works, cable trenches, site surveying, etc.
Query on reports that EBWPC is offering new lease contracts to the landowners and if lump sum payments are for 25 years.	Barangay Captain of Saoit	EBWPC confirmed that they are actually approaching the landowners and are negotiating the new lease contracts with the landowners because they want to extend the period of the lease until 2034 (same as the term of the service contract). It was also confirmed that EBWPC are offering lump sum payments for the lease agreement for 25 years.

Issues and concerns	Raised by Stakeholder/ Sector	EBWPC Response
21 May 2013 Consultation with Barangay Poblacion, Ilcos Norte		
Qualifications of the manpower required by EBWPC?	Barangay	Qualifications will be based on the position being applied for, e.g. driving experience for drivers, etc.
Hiring of foot patrol for the wind farm	Barangay	Foot patrol qualifications are the following: should at least be physically fit; foot patrol in the pasture land will prioritise members of BABA but non-BABA members may also apply as foot patrol in the private land section of the wind farm
How can we assure that benefits entitled to us or the CSR projects will benefit us?	Barangay	Projects/activities to be determined will be based on the needs of the community
How many people will be trained under the MOA dated 1 February 2013MOA between EBWPC and Ilocos Norte	Barangay	EBWPC confirmed that 15 representatives from Burgos will be selected. First trainings will be on masonry and carpentry. Schedule of application will be posted and disseminated.
Will EBWPC directly hire participants of the skills training program of CSR?	Barangay	Hiring of workers will be done by its contractors (First Balfour and Vestas) but EBWPC requests its contractors to prioritise hiring of workers from the host communities
16 January 2012 Consultation		
Three members of the Provincial Council requested EBWPC to support the improvement of its public education.	Provincial council	EBWPC noted the request and explained about ER 1-94, which include education benefits to host communities
Will EBWPC increase its CSR programs as it starts to generate electricity	Provincial council	The level of activities and commitment are commensurate to the level of activities that EBWPC is able to do and the kind of revenues that is able to generate.
Will the development, ownership, construction, installation, operation and maintenance of the proposed project be done by a wholly-owned direct subsidiary of EDC	Provincial council	The Project will be implemented by EBPWC, a wholly-owned subsidiary of EDC

Issues and concerns	Raised by Stakeholder/ Sector	EBWPC Response
Status of the livestock-raisers and their cattle during construction period	Municipal Mayor of Burgos	EBWPC will identify specific areas within the pasture land that will not be used for the Project once the access road design is completed. Only then can EBWPC identify which areas will be allocated for pasture use. *Major agreements:* 1) Construction sites will be cordoned or fenced off temporarily as a safety and security measure but fencing will not be done at the same time since wind towers will not be constructed simultaneously. 2) EBWPC and its contractor will hire foot patrols from BABA whose main responsibility is to ensure the safety of the cattle owned by its members 3) With hired foot patrols from BABA, it was made clear that BABA will be responsible for any loss or damage to their livestock 4) EBWPC and its contractors will provide insurance, supplies/accessories, etc. for the foot patrols
Area where BABA can continue to use the land for pasture purposes	Municipal Mayor of Burgos	Only about 5000 m^2 of the 5 ha forage production in Barangay Nagsurot will be used by contractors for their Temporary Facilities. The rest of the pasture land will be available for pasture use.
Safety measures for the livestock	Municipal Mayor of Burgos	Hiring of foot patrol as discussed above. BABA and Municipal LGU of Burgos requested EBWPC to provide necessary fencing materials around the pasture area as the need arises, as stipulated in the Joint-Use Agreement. It was agreed that BABA will help in the maintenance of the perimeter fence in the long run because it is the BABA who will be benefited
Areas that will be affected by the construction activities	Municipal Mayor of Burgos	EBWPC and its contractors will restore areas to their old condition that will be affected by the construction activities

An IEC Campaign Plan was crafted with the following objectives in mind – (1) to gain public acceptance for the Project, (2) to provide the public with balanced information and assist them in understanding the solutions or measures related to the impacts of the Project, and (3) to gather feedback from the communities on their issues related to the Project and their ideas of alternatives or preferred solution to the problem. The table below summarizes the activities. Timelines have been agreed with the lenders.

Table 14. Information, Education, and Communication Campaign Plan.

TARGET SECTOR	CONTENT/TOPICS	STRATEGY/METHOD	INFORMATION MEDIUM
Lot owners in Wind Farm	- Project description & status - Actual impacts & measures - Grievance mechanism - Reinstatement/ rehabilitation plan - CSR projects - Land acquisition process	- Use of multi-media - Group/ Cluster meetings -Posters, flyers, and newsletters	- illustrative primer about the project - Poster on renewable/wind energy -Poster on the grievance mechanism - Posters on CSR projects -Newsletter on updates
Lot owners in TL areas	- Project description & status - Land acquisition process - Actual impacts & measures - Grievance mechanism - CSR projects	- Use of multi-media - Group/ Cluster meetings - Posters, flyers, and newsletters	
Community residents	- Project description & status - Results of noise study & shadow flicker studies - Actual impacts & measures - Grievance mechanism	- Use of multi-media - Group/ Cluster meetings - Posters, flyers, and newsletters	
LGU Officials	- Project description & status - Actual impacts & measures - Reinstatement/ rehabilitation plan - Grievance mechanism - CSR projects	- Council session/ meetings - Consultations - Newsletter	- Brief updates

I. GRIEVANCE REDRESS MECHANISM

EBWPC views that effective grievance mechanisms are an important part of its corporate responsibility to respect human rights. This is embodied in one of the core values of EDC which highlights that each person should be treated with respect regardless of individual differences. As EBWPC commits to building community relations where trust is an integral component, it designed a grievance mechanism that aims to offer communities an effective avenue for expressing concerns and achieving fair remedies – promoting a mutually constructive relationship as the local people and the company find effective solutions together.

1. Receive and Register a Complaint

In receiving and registering complaint or grievance, EBWPC will provide multiple channels where people can express or forward their concerns. The following EBWPC staff comprising the Grievance Committee shall be designated to receive and register complaints:

- Community Partner (Grievance Head Officer/Complaint Coordinator)
- Forester/Watershed Management Department Team
- Land Team
- Security Officer
- Safety Officer
- ROW Patrol

Complainant/s can send their complaint or grievance to EBWPC in the form of a letter or by filling out the prescribed company form. They can also call any of the designated staff directly. In addition, they can email the project team through EDCBurgoswind@gmail.com

The Grievance Committee member who accepted the complaint, in the prescribed form, shall record them said complaint/s in the grievance log form. The Grievance Head Officer shall oversee the progress of all recorded grievances.

When a complaint or grievance is received directly by any of Grievance Committee members, he/she shall proceed to discuss the complaint with the complainant in order to gain first-hand understanding of the situation, as well as to explore possible approaches for resolution. It is important during this first step to be sensitive to the way in which the complainant experiences the issue. Therefore, an understanding may be important to achieving a successful outcome in a quick and timely manner.

2. Acknowledge

Upon logging of their complaint by a member of the Grievance Committee in the grievance log, complainants will receive a timely acknowledgement that their case is registered. Acknowledgement shall be communicated in an appropriate manner, such as a letter, telephone call or a copy of the grievance form. The acknowledgement will include information about the next steps in the process, time frame in which a response can be expected to be in place and contact details of the Grievance Head Officer or complaint coordinator, the one responsible in handling the case. This may be done at the time the grievance is received or subsequently.

3. Assess the Grievance

Once logged, the grievance team composed of the designated staff will conduct a rapid assessment to verify the nature of the grievance. During the assessment, the team gathers

information about the complaint and key issues and concerns and helps determine whether and how the complaint will be resolved. To gather information about the complaint, the following will be done:

- Identify parties involved
- Clarify issues and concerns raised by the complaint
- Gather views of the stakeholders, including those of the company (the person or company unit associated with the problem shall be informed that a complaint has been filed and the grievance team will collect information about the complaint from their perspective)
- Determine initial options that parties have considered and explore various approaches for settlement.

The team shall classify the complaint in terms of its seriousness or severity (high, medium, or low) according to specific criteria. The level of severity will determine who needs to be informed, who will manage the case (complaint coordinator) and whether the senior management has to be advised. The complaint coordinator shall be responsible for overseeing a particular grievance.

Grievances classified as low may be handled by the designated field personnel whereas grievances ranked as high may have to be handled by the senior management. Issues that are low severity from the point of view of the complainant and the company will be resolved immediately through a fast track process. In principle, EBWPC has bias towards resolving grievances on-the-spot, if such can be resolved informally and rapidly. Whether the resolution process is fast-track or requires a period of time, the EBWPC will employ a strategy that engages the complainant in the assessment and in determining resolution or settlement options.

4. Formulate a Response

Once the assessment is complete, EBWPC will provide a response or feedback to the complainant. The EBWPC response may suggest an approach on how to settle the issues, or it may also offer a preliminary settlement or proposal. The response may be presented or discussed with the complainant through a meeting with the complaint coordinator, manager or personnel of the relevant company unit, and the complainant. The site manager may participate in feedback, depending upon the seriousness of the complaint. If a direct meeting is not possible a neutral third party may be considered to serve as facilitator.

The complainant may accept the proposition, offer an alternative for further discussion, or reject it or consider another dispute resolution process. If the case is complex and a resolution time frame cannot be met, provide an interim response—an oral or written communication—that informs the person of the delay, explains the reasons, and offers a revised date for next steps.

5. Consider recourse or appeal

If the complaints are not resolved on the initial attempts, the grievance mechanism incorporates an appeals provision. This covers exceptional cases and should be required infrequently. Several recourse options are described below:

- Elevate the issue to a review committee composed of senior managers to consider whether additional reasonable actions are appropriate.
- Elevate the issue to a review committee consisting of company and community representatives or other stakeholders to consider whether additional reasonable actions are appropriate.
- Propose the use of an independent mediator agreed upon by both the company and the complainant to facilitate further dialogue
- Involve a trusted, independent external party to assess the grievance and propose an impartial resolution.
- Establish a standing appeals committee jointly with the community. The committee should consist of individuals who enjoy credibility with affected communities and are viewed as impartial by both sides.

Should the appeals process fail to lead to a mutually acceptable resolution, the complainant shall be free to pursue other avenues of remedy.

The final agreement should be specific, time bound, and agreed upon by both parties. If not self-executing, it should include a monitoring plan. If the complaint is found to be unsubstantiated, the Grievance Head Officer shall explain the reasons and may indicate other possible avenues of remedy.

6. Follow up and close out

Once a resolution has been agreed upon or a decision is made to close out, the final stage is to implement the resolution, monitor outcomes and close out the grievance. Monitoring will address problems that develop during implementation. In some cases, adjustments may be necessary to ensure that root causes of complaints are addressed and outcomes are consistent with the spirit of the original agreement.

Closing out the grievance shall occur after the implementation of an agreed resolution has been verified. Parties may be requested to provide feedback about their level of satisfaction with the grievance handling process and the outcome.

Even when an agreement is not reached, it is important to close the case, document the results, and request the parties' evaluation of the process and its outcome.

Throughout the process, EBWPC will adopt a system that will effectively track and monitor grievances in line with its commitment to promote timely and fair resolution of grievances. By doing so, the concerned parties (complainant and appropriate company personnel) are constantly informed about the status of the case and the progress being made toward resolution.

J. ENVIRONMENTAL MANAGEMENT PLAN

A compliance monitoring team was formed to ensure implementation of the environment and social management and monitoring plan. The team has four key members on site – the Site Manager, the Environment/Pollution Control Officer, the Environment Officer/Forester, and the Community Relations Officer. The members all report to the Business Unit Head who is based at the headquarters. The table below describes the responsibilities of each member.

Table 15. Members of Compliance Monitoring Team.

POSITION	RESPONSIBILITIES
Site Manager	Monitor and update the over-all performance of the Project
Environment/Pollution Control Officer	-Implement environment management-related programs -Monitor the Project's operation on environment management-related compliance and facilitate necessary actions
Environment Officer/Forester	-Implement forestry and ecosystem conservation-related programs. -Monitor the Project's compliance to Forest Management Bureau-related permits and its overall impact to the environment, and implement necessary actions
Community Relations Officer	Implement CSR-related activities and monitor community concerns and feedback on the project and its necessary actions

Various departments and groups within EDC provide support to the Project site. These departments ensure that best practices are implemented across all sites.

The Environmental Management Department (EMD) guides the Pollution Control Officer and the Forester on ensuring that all environment-related regulatory standards are met. Concerns releating to air, water, noise, shadow flicker, and waste are all consulted with EMD. On the other hand, concerns of the Forester on flora, fauna, and reforestation efforts are discussed with the Watershed Management Department (WMD). The Community Relations Officer seeks advice from the Corporate and Social Responsibility Department (CSRD) on how to better serve the local communities. The Public Relations Department is tapped for the crafting communications plans to implement the various programs. The succeeding figure presents the Compliance Monitoring Team Organizational Chart.

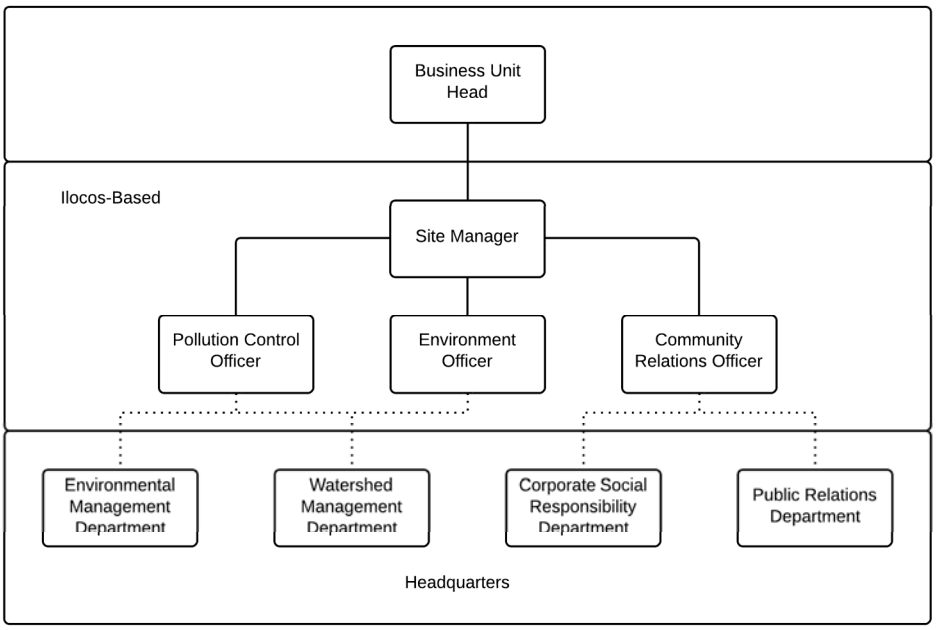

Figure 29. Compliance Monitoring Team Organizational Chart.

The succeeding tables present the environmental and social impact management plan as well as the monitoring plan for the Project.

Table 16. Environmental and social management plan.

Potential environmental impact	Phases				Options for prevention or mitigation of enhancement	Responsible entity	Cost
	Pre-construction	Construction	Operation	Closure			
Land							
Land use							
Displacement of area classified as pasture land		✓			This can be mitigated through coordination with the small-scale livestock-raisers occupying the area. EBWPC and livestock owners identified specific areas within the pasture land that will not be used for the wind project infrastructure development and will remain as foraging areas. A suitable area within the pasture land will be identified as replacement in case currently utilised foraging area will be used for the wind project infrastructure development. EBWPC will assist small scale livestock raisers in the development of alternative foraging area. Progressive rehabilitation will be implemented over exposed areas to mitigate impacts on forestland vegetation and wildlife habitat. Development of conservation plan and landscaping scheme in accordance with the project development plan. Securing of necessary permits (e.g. special land use permit)	EBWPC	Part of Project cost

Potential environmental impact	Phases				Options for prevention or mitigation of enhancement	Responsible entity	Cost
	Pre-construction	Construction	Operation	Closure			
Loss of topsoil		✓			The project will have minimal impact on loss of topsoil since topsoil will be returned in majority of the areas to be disturbed and will be stabilised and rehabilitated immediately after construction. Topsoil excavated from the WTG foundation trench will be stockpiled away from natural drainage and will be respread over the foundation or will be used as backfill material. Loss of topsoil as a result of erosion during construction phase prior to the stabilisation of the disturbed land will be managed through a detailed Topsoil Management Plan as well as Erosion and Sediment Control Plan	EBWPC and Contractors	Part of project cost

Potential environmental impact	Phases				Options for prevention or mitigation of enhancement	Responsible entity	Cost
	Pre-construction	Construction	Operation	Closure			
Geology/Geomorphology							
Change in surface landform/ topography/terrain/slope		✓			The Project will have little impact on surface landform, topography, terrain and slope. Progressive rehabilitation over exposed areas will be implemented immediately surrounding the built up areas to prevent soil cover loss	EBWPC and Contractors	Part of project cost
Change in subsurface/underground geomorphology		✓			WTG foundation of about 20 m in diameter and 5 in depth would have no impact to subsurface/underground geomorphology The absence of active faults passing directly through the Project site and the tight nature of discontinuities observed in the site can mitigate potential for ground cracking or subsurface rupture and any significant displacement due to earthquake.	EBWPC	Part of project cost
Inducement of landslide/other natural disasters		✓			The generally flat terrain lessens the probability of landslides and erosion hazards in the area Sinkhole hazards may be remote as no surface manifestations were observed Earthquake generated hazards, such as ground vibration, pose little or no threat to the project site due to highly competent and rigid rock formation in the area	EBWPC	Part of project cost

Potential environmental impact	Phases				Options for prevention or mitigation of enhancement	Responsible entity	Cost
	Pre-construction	Construction	Operation	Closure			
Pedology							
Permanent soil loss		✓			Implementation of progressive soil removal per WTG location and appropriate stockpiling of soil material to minimise size of exposed areas Progressive rehabilitation will be undertaken over exposed areas to reduce areas that are permanently affected by soil cover loss Conservation, stockpiling and re-using, whenever possible, of topsoil and overburden materials Implementation of sediment control plan (e.g. silt traps), proper slope and drainage management measures, stockpiling procedures	EBWPC and Contractors	Part of Project cost
Increase in spoil		✓			Earthworks will be carried out in a systematic way such that cut and fill volumes are balanced off to minimise spoil generation. Earthworks will be limited only to the location of the WTGs and access roads Proper management of spoils by placing them in designated areas away from natural drainage Spoils will be used as backfill material	EBWPC and Contractors	Part of Project cost
Flora							
Clearing of land and removal/ cutting of vegetation.		✓			Identification of buffer zone or buffer boundaries will help to prevent over-clearing in non-permitted area for clearing. Re-vegetation of temporarily affected areas and offset planting beyond the permanently affected areas. Use of indigenous species as replacement for the disturbed flora species during the construction such as narra (*P. indicus*), molave (*V. parviflora*), malaikmo (*C. philippinensis*), bitaog (*C. inophyllum*), ebony (*D. ferrea*), and anang (*D. Pyrrhocarpa*).	EBWPC and Contractors	Part of Project cost

Potential environmental impact	Phases				Options for prevention or mitigation of enhancement	Responsible entity	Cost
	Pre-construction	Construction	Operation	Closure			
Pruning of trees and other vegetation during maintenance activity near or within the location of the Wind Tower and access roads is expected.			✓		Maintaining the natural vegetation of the area will be done and offset planting in other areas will be implemented. Limit cutting of vegetation at areas adjacent to the foundations of transmission tower; provide just compensation for crop damage (if any); and proper disposal of plant litter/cleared materials during trimming of plants beneath transmission line. Training and information dissemination for local communities, LGUs and other agencies concerned about the potential increase of tourist in the area that will affect the vegetation cover around and within the project. Frequent monitoring of the existing vegetation will be made in order to know their condition during the operation phase.	EBWPC	Part of Project cost
Fauna							
Loss of species habitat and habitat fragmentation leading to loss food sources and displacement of wildlife		✓	✓		Limit clearing activities to designated construction area, and if possible, re-route access roads based on on-site conditions. Establish and maintain corridor or buffer zone within the project area as refuge of food source of wildlife. Plant native fruit-bearing trees and shrubs to enhance habitat vegetation and food source for wildlife. Not introduction of exotic and invasive alien species of plants and animals. Implementation of offsets such as DENR National Greening Program, EDC BINHI program and other conservation efforts.	EPWPC	Part of Project cost

Potential environmental impact	Phases				Options for prevention or mitigation of enhancement	Responsible entity	Cost
	Pre-construction	Construction	Operation	Closure			
Bird strikes and bat fatalities through collision with turbine blades			✓		Use of finish that will reduce blade glint (e.g. matte grey paint) to minimise reflection which possibly blind bird species flying in the area Implementation and conduct of regular monitoring but not limited to carcass retrieval. Monitoring frequency increased during migratory season. A monitoring plan and documentation will be formulated including feedback mechanism to regulatory agency	EPWPC	Part of Project cost
Air							
Air Quality							
Dust generation and resuspension from civil works/construction activities		✓			Development and implementation of Dust Management Plan (DMP), to include dust suppression methods (watering or dampening of road), visual inspection, etc. Monitoring of DMP implementation Installation of solid screens or natural barriers Revegetation of earthworks and exposed areas to stabilise surfaces	EPWPC and contractors	Part of project cost
Exhaust from heavy equipment or running vehicles (e.g. generator sets, cement trucks, excavator, etc.)		✓			Ensure that the vehicles and/or heavy equipment to be used on site have complied with DENR emission testing requirements Ensure that vehicles and/or equipment will undergo regular engine maintenance checks for the duration of the construction phase When not in operation, vehicle and construction equipment must be switched off Maintenance checks of vehicles	EBWPC and contractors	Part of project cost

Potential environmental impact	Phases				Options for prevention or mitigation of enhancement	Responsible entity	Cost
	Pre-construction	Construction	Operation	Closure			
Dust generation from vehicular activity in access roads during delivery and installation of equipment		✓			Speed limits will be imposed to minimise dust dispersion from moving vehicles Employing dust suppression method Provision of appropriate PPEs to workers Preparation and implementation of Construction Logistics Plan and Travel Plan	EBWPC and contractors	Part of project cost
Influx of tourists will likely increase the volume of vehicles resulting to increase in vehicular emissions			✓		Effects are temporary, thus no mitigation or enhancement measure id required based on current ambient air quality		Part of project cost
Noise							
Noise generation		✓	✓		Construction activities will be prioritised during daytime to minimise night time disturbances. Implement and maintain a stakeholder engagement program to address and monitor impacts resulting from the implementation of project. The program will include: > Provision of delineation markers and signages where construction areas are located and which areas require the use of personal protective equipment (e.g. noise mufflers and/or ear plugs); > Provision of information (e.g. IEC brochures and construction schedule) to identified receptors regarding construction and operational activities, and how to contact EBWPC if noise issues/complaints arise; and > A continuously monitored community liaison phone number and email address that allows noise complaints to be received and addressed in a timely manner.	EBWPC and Contractors	Part of project cost

Potential environmental impact	Phases				Options for prevention or mitigation of enhancement	Responsible entity	Cost
	Pre-construction	Construction	Operation	Closure			
Water							
Water Quality							
Increased sedimentation in streams as a result of earthmoving, excavation and other infrastructure construction activities		✓			Location of wind turbine generators should be at least 20 meters away from stream banks (e.g. Kapurpurawan Creek). Ensure implementation of an Erosion and Sediment Control Plan where appropriate (e.g. silt traps) and/or other best management control measures. Revegetate disturbed land after construction phase to minimise soil erosion that would potentially cause sedimentation.	EBWPC and contractors	Part of project cost
Contamination of stream and spring water by sewage generated from construction workers		✓			Supply construction camps, ablution facilities (e.g. bathing and toilet facilities) and/or sewage facilities. Provide also proper storage and disposal facilities for solid wastes, used oil and fuel to avoid potential water contamination.	EBWPC	Part of project cost
Contamination of stream waters from stockpile of excavated soil through surface run-off		✓			Stockpiled earth material near river/road crossings will be stored in bunded areas and kept away from waterways (ideally more than 20 m) to avoid sediment entering the waterway. Immediate revegetation will be implemented on disturbed areas.	EBWPC and contractors	Part of project cost
Run-off from construction camps carrying silt and sediment		✓			Locate construction camps relatively far (at least more than 30 m) from the coastal and ocean areas. Implement physical barriers that will prevent soil and other sediments from intruding into the coastal and ocean areas.	EBWPC and contractors	Part of project cost
Dispersion of dust particulates, if any, during delivery of construction materials, site grading and road profiling, which may settle into waterways and contribute to elevated TSS levels		✓			Dust suppression methods should be employed, as needed, such as road dust spraying by trucks during construction phase. Allocate a dry area for storing spoils, preferably in an eclosed area with lining at the bottom.	EBWPC and contractors	Part of project cost

Potential environmental impact	Phases				Options for prevention or mitigation of enhancement	Responsible entity	Cost
	Pre-construction	Construction	Operation	Closure			
Contamination of stream waters from excess concrete spills		✓			Avoid inadvertent disposal of excess concrete in streams or water bodies. Allocate a dry area for storing excess concrete materials, preferably in an enclosed area with lining at the bottom.	EBWPC and contractors	Part of project cost
Oil and grease spill from the use of vehicles, machinery and heavy equipment could enter waterways and impact downstream water quality and stream ecology.		✓			Washing of vehicles should be done in designated motorpool areas, away from waterways or drainage channels. Likewise, vehicles and machinery should be maintained to prevent any leakages.	EBWPC and contractors	Part of project cost
Contamination of stream and spring waters by sewage/waste generated by tourist as a result of influx of tourists			✓		Provide waste disposal and ablution facilities in areas to be frequented by tourists/visitors.	EBWPC and LGU	Part of project cost
Contamination of stream and spring water by sewage generated from office operation/workers			✓		Sewage generated from office operation/workers will be treated using acceptable facilities (e.g. portalets or septic tank).	EBWPC	Part of project cost
Impact on drainage morphology		✓			Installation of culverts Improvement of drainage system Regular maintenance and inspection of culverts	EBWPC and contractors	Part of project cost
People							

Potential environmental impact	Phases				Options for prevention or mitigation of enhancement	Responsible entity	Cost
	Pre-construction	Construction	Operation	Closure			
Social acceptability							
Social non-acceptability and restricted access due to failure in negotiations	✓				Acquisition of all LGU endorsements, permits and lease/acquisition agreements Public consultation and information, education and communication (IEC) campaign Conduct of on-going stakeholder activities to prevent social issues regarding the project Compliance with the terms and conditions of the lease agreement and regulatory permits	EBWPC	Part of project cost

Potential environmental impact	Phases				Options for prevention or mitigation of enhancement	Responsible entity	Cost
	Pre-construction	Construction	Operation	Closure			
Benefits from the project							
Employment and livelihood opportunities		✓	✓		*Construction* Implementation of locals first hiring policy Conduct of skills training program to train local people prior to construction Coordination with different schools as well as government agencies in training programs and to provide additional income to host communities Provide benefits to employees on top of regular monthly salary *Operation* Provide training on small scale business management Implementation of SDP	EBWPC and Contractors	Part of project cost
Taxes and fees		✓	✓		Compliance with national and local rules and regulations on payment of taxes and permits	EBWPC	Part of project cost

Potential environmental impact	Phases				Options for prevention or mitigation of enhancement	Responsible entity	Cost
	Pre-construction	Construction	Operation	Closure			
Displacement/disturbance of settlers							
Economic displacement		✓	✓		Identification of suitable area within the pasture land to replace foraging area allocated for the infrastructure development. Installation of temporary perimeter fences around the construction area to prevent cattle and livestock from wandering around. Development and implementation of social development and management plan that will present alternative and sustainable livelihood and continuing agricultural programs Proper valuation of affected properties During operation, long term agreement on shared use of land will be implemented	EBWPC EBWPC and LGU	Part of project cost
Public health and safety							
Dust and other emissions		✓			Implementation of environmental controls such as water trucks or sprinklers Limiting dust generating activity during high-wind periods Noxious substances will occur in open environment and distant from community receptors allowing for dispersal of any harmful substances Dust levels and ambient air quality and periodic public reporting of air quality data Health education and promotion of initiatives to address underlying health vulnerabilities and conditions	EBWPC and Contractors	Part of project cost

Potential environmental impact	Phases				Options for prevention or mitigation of enhancement	Responsible entity	Cost
	Pre-construction	Construction	Operation	Closure			
Noise generation		✓	✓		Conduct of on-site validation of predicted noise levels from WTG operations prior to or during the project commissioning Stakeholder engagement program will be implemented to include the following: Provision of delineation markers where construction areas are located and which areas require the use of PPEs Provision of IEC materials to identified receptors regarding construction and operational activities Contact number will be disseminated to receptors that will allow noise complaints to be received and addressed in a timely manner Provide for relocating these houses to a suitable proximate location, if necessary	EBWPC	Part of project cost
Water contamination		✓			Active management strategies at high erosion potential areas (i.e. installation of erosion and sediment control measures) Implementation of solid waste and wastewater management plan Collection and removal from site of all putrescible and non-recyclable wastes Provision of septic tank and portalets	EBWPC and Contractors	Part of project cost

Potential environmental impact	Phases				Options for prevention or mitigation of enhancement	Responsible entity	Cost
	Pre-construction	Construction	Operation	Closure			
Injury		✓	✓		Implementation of traffic management plan which include speed limits, vehicle load limits, car maintenance requirements, limiting driving hours, compulsory use of seatbelt Coordination with LGUs to ensure appropriate signage and traffic-calming devices are installed in identified high-risk areas Provision of notifications, warnings and other signages to LGU, residents and tourists on the maintenance and delivery schedules Ensure safe road crossing points and pedestrian safety barriers are installed in built- up areas or near sensitive sites (e.g. schools) Limit project vehicle speed along community roads, limit heavy vehicle use of community roads and ensure project vehicles are as safe as possible Support local authorities/police to improve road behaviour of drivers Support road safety IEC campaigns	EBWPC and Contractors	Part of project cost
Injury due to non-performance/ negligence of workers		✓			Objective recruitment and hiring policies to avoid non-performance/negligence of workers that may potentially lead to work-related accident/injury. Provision of safety officer/s depending on the number of workers at the site Ensure all workers are provided with Personal Protective Equipment (PPEs) Conduct of regular toolbox meetings.	EBWPC and Contractors	Part of project cost

Potential environmental impact	Phases				Options for prevention or mitigation of enhancement	Responsible entity	Cost
	Pre-construction	Construction	Operation	Closure			
In-migration							
Competition for employment, project benefits, natural resources, local health facilities and manpower, welfare services and infrastructure		✓	✓		Prioritisation of locals in employment and livelihood opportunities Conduct of public consultations to identify applicable benefits to host communities Coordinate with LGU to handle monitoring the entry of migrant workers Assistance to LGUs to manage population movement and housing demands by organising information sessions that discuss the possible effects of poor environmental conditions of informal settings. Constant consultation activities to develop and implement a successful and sustainable community/social development and management plan	EBWPC and Contractors	Part of project cost
Social problems (i.e. gambling, use of illegal drugs, alcoholism, prostitution, crimes, etc.)		✓	✓		Conduct of public consultations and IEC programs to promote cohesion and harmony between stakeholders	EBWPC	Part of project cost
Threat to peace and order situation		✓	✓		Strengthening of the company's security department to mitigate any threat on security and peace and order Coordination with the local security personnel (i.e. PNP and "Lupong Tagapamayapa" or village level "Pacification Committee") to maintain peace and order in the area Implementation of Site Security and Safety Protocols to protect life and help prevent unauthorised exposure, destruction, removal and modification of company assets	EBWPC	Part of project cost
Cultural/Lifestyle change Due to displacement of livestock raisers		✓			Identify suitable area within the pasture land to replace foraging area Implementation of SDP to develop livelihood support directed to the local livestock raisers	EBWPC	Part of project cost

Potential environmental impact	Phases				Options for prevention or mitigation of enhancement	Responsible entity	Cost
	Pre-construction	Construction	Operation	Closure			
Threat to delivery of basic services/Resource Competition							
Basic services and infrastructure		✓			Coordinate with the municipal LGU to monitor and ensure basic services are within the capacity needs of local population Implementation of appropriate management strategies to minimise potential strain of population increase on local infrastructure and service	EBWPC LGU	Part of project cost
Public clamour		✓	✓		Conduct of ongoing consultations with local community Establishment of grievance redress mechanism allowing the affected people to lodge a complaint without cost and with assurance of timely consideration and response Implementation of community restoration plans and applicable livelihood alternatives	EBWPC	Part of project cost
Shadow flicker and blade glint			✓		Conduct of IEC activities to disseminate information on the absence health impact of wind turbine operation Screen planting of affected properties Potential changes to the wind farm operating regime to minimise operation of the offending turbines during times of shadow flicker Blades will be coated with a low reflectivity treatment to prevent reflective glint from the surface of the blade Provide for relocating these houses to a suitable proximate location, if necessary	EBWPC	Part of project cost

Potential environmental impact	Phases				Options for prevention or mitigation of enhancement	Responsible entity	Cost
	Pre-construction	Construction	Operation	Closure			
Landscape and visual impact							
Impact of construction activities to identified viewpoints during construction		✓			Protection of existing trees that would be retained on site prior to commencing construction activities Removal of temporary works (barriers, traffic signage, fencing, etc.) as soon as no longer needed Using minimum required site lighting for safety and security Maintaining temporary access roads and stockpile areas free of dust and mud as far as practicable Proper disposal of construction spoils and debris prior to completion of construction activities Provision of vegetation screening to stockpile areas	EBWPC	Part of project cost
Negative impact of WTGs in some viewpoints			✓		Fencing in and screening with native vegetation Maintaining tree and vegetation screening along the southern boundary adjacent to Manila North Road Painting structures a matte pale gray to minimise aesthetic clashing of colors between the structures and the environment	EBWPC	Part of project cost

Table 17. Environmental and social monitoring plan.

Key environmental aspects per project phase	Potential impact per environmental sector	Parameter to be monitored	Sampling and measurement plan			Lead person
			Method	Frequency	Location	
PRE-CONSTRUCTION PHASE						
Acquisition of permits and government approvals, land lease negotiations, etc.	Potential non-compliance issues to environmental and local government requirements	Permits (i.e. Environmental Compliance Certificate, Forest Land Use Agreement, tree cutting permits, building permits, etc.	Secure from relevant government agencies and local government units	Prior to construction	Responsible authority	EBWPC Permitting Officer
CONSTRUCTION PHASE						
Land - terrestrial flora	Removal of vegetation in specific areas such as access roads, location of wind turbine generators and staging areas	Volume of trees to be removed	100 percent tree inventory	One-off, prior to construction	Project facilities footprint	Forestry specialist to be engaged by EBWPC
Land - terrestrial flora	Habitat fragmentation and alteration of natural landscape	Species composition	Transect method	Annual	Pre-established transect (refer to flora sampling map in Section 7)	Terrestrial ecology specialist to be engaged by EBWPC

Key environmental aspects per project phase	Potential impact per environmental sector	Parameter to be monitored	Sampling and measurement plan			Lead person
			Method	Frequency	Location	
Land - terrestrial fauna	Disturbance and displacement to wildlife species status and distribution, habitat and behaviour	Species abundance and composition	Transect method	Annual	Pre-established transect (refer to fauna sampling map in Section 7)	Terrestrial fauna specialist to be engaged by EBWPC
Water quality	Sedimentation of waterways from surface water runoff as it comes in contact with excavated (or loose) soil materials from construction of road access and tower foundation, especially during rainy days	Total suspended solids (TSS), total dissolved solids (TDS) Turbidity, conductivity, dissolved oxygen (DO) and temperature	Grab sampling In situ using water quality meter	Monthly	Pre-established water sampling stations (refer to map in Section 8)	Project Pollution Officer (PCO) or Environmental Officer
Water contamination	Potential spill of diesel fuel, engine oil, grease from heavy equipment maintenance or POLS from construction equipment to receiving water body	Oil and grease	Grab sampling (surface water)	Monthly	Pre-established water sampling stations (refer to map in Section 8)	Project PCO or Environmental Officer

Key environmental aspects per project phase	Potential impact per environmental sector	Parameter to be monitored	Sampling and measurement plan			Lead person
			Method	Frequency	Location	
Air	Increase in concentration of particulates due to dust generation from movement of heavy equipment during construction of foundation and installation of wind turbine towers/generators	PM10, TSP, SO2, NO2	High volume sampler	Quarterly	Pre-established air sampling stations (refer to map in Section 10)	Project PCO or Environmental Officer
Noise - terrestrial fauna	Disturbance or displacement to wildlife species status and distribution, habitat and behaviour	Noise level	Noise meter	Monthly or as needed	Pre-established noise sampling stations (refer to map in Section 6)	Project PCO or Environmental Officer
Noise-people	Nuisance and discomfort to people especially on residential communities living close by the wind farm	Noise level	Noise meter	Monthly or as needed	Pre-established noise sampling stations (refer to map in Section 6)	Project PCO or Environmental Officer

Key environmental aspects per project phase	Potential impact per environmental sector	Parameter to be monitored	Sampling and measurement plan			Lead person
			Method	Frequency	Location	
People - employment	Increase in employment	Number of employees hired	Recording of hired personnel prioritising qualified workers from host communities	Monthly	EBWPC office Contractor's field office	Human resources personnel
People-access road	Nuisance to ecotourism especially during movement of heavy equipment along access road to tourist spots (e.g. Kapurpurawan rock formation)	Road accidents and/or traffic obstruction incidences	Recording of accidents and/or traffic obstruction incidences	Daily	Project construction areas including access roads	Project Safety Officer
People - health and sanitation	Threat to health and sanitation	Effluent quality (as per DAO 35 effluent standards)	Grab sampling	Monthly	Sewage outfall	Project PCO or Environmental Officer
People - in migration	Encroachment of local informal industries (e.g. entertainment, food and lodging establishments)	Population	Census	Yearly	Project affected barangays Municipality of Burgos	Coordination between EBWPC-CSR and Municipal/ Barangay LGU

Key environmental aspects per project phase	Potential impact per environmental sector	Parameter to be monitored	Sampling and measurement plan			Lead person
			Method	Frequency	Location	
People - in migration	Increase of communicable diseases due to pressure in health and sanitation facilities and manpower	Morbidity	Record incidences of morbidity cases	Daily to be summarised annually	Project affected barangays Municipality of Burgos	Coordination between EBWPC-CSR and Municipal/ Barangay Health Worker
People - peace and order	Increase in crime incidence due to in-migration	Crime incidence	Record of reported cases of crime incidence	Daily	Project affected barangays Municipality of Burgos	Coordination between EBWPC-CSR and PNP/ Barangay Tanod
OPERATION PHASE						
Land - terrestrial flora	Pruning of vegetation surrounding turbine location and along access roads	Pruning permit and records		Semi-annual		Project forester
Land-terrestrial fauna	Incidence of bird and/or bat mortality due to rotating wind turbine blades	Species identification	Recording of incidences	Daily or as needed	Within the perimeter or vicinity of wind turbine towers	Project PCO or Environmental Officer (EBWPC also encourages community to report incidences)

Key environmental aspects per project phase	Potential impact per environmental sector	Parameter to be monitored	Sampling and measurement plan			Lead person
			Method	Frequency	Location	
Air	Increase in concentration of particulates due to dust generation from using access road	PM10, TSP, SO2, NO2	High volume sampler	Quarterly	Pre-established air sampling stations (refer to map in Section 10)	Project PCO or Environmental Officer
Water contamination	Potential spill of diesel fuel, engine oil, grease from heavy equipment maintenance or POLS from maintenance activities into receiving water body	Oil and grease	Grab sampling (surface water)	During preventive maintenance activities or as needed	Pre-established water sampling stations (refer to map in Section 8)	Project PCO or Environmental Officer
Noise - people	Nuisance and discomfort caused by wind turbine operation to people especially on residential community living close by the wind farm	Noise level	Noise meter	Quarterly or whenever there are complaints from the community	Pre-established noise sampling stations (refer to map in Section 6)	Project PCO or Environmental Officer
Shadow flicker and blade glint	Nuisance and discomfort to people especially on residential communities living close by the wind farm					Project PCO or Environmental Officer

Key environmental aspects per project phase	Potential impact per environmental sector	Parameter to be monitored	Sampling and measurement plan			Lead person
			Method	Frequency	Location	
People - in migration	Encroachment of local informal industries (e.g. entertainment, food and lodging establishments)	Population	Census	Yearly	Project affected barangays Municipality of Burgos	Coordination between EBWPC-CSR and Municipal/ Barangay LGU
People - in migration	Increase of communicable diseases due to pressure in health and sanitation facilities and manpower	Morbidity	Record incidences of morbidity cases	Daily to be summarised annually	Project affected barangays Municipality of Burgos	Coordination between EBWPC-CSR and Municipal/ Barangay Health Worker
People - peace and order	Increase in crime incidence due to in-migration	Crime incidence	Record of reported cases of crime incidence	Daily	Project affected barangays Municipality of Burgos	Coordination between EBWPC-CSR and PNP/ Barangay Tanod

EBWPC will provide periodic monitoring reports to ADB during construction and annual monitoring reports during operation.

K. ENVIRONMENTAL COMPLIANCE

Audit and site investigation procedure

As the Project is already ongoing, EBWPC commissioned Parsons Brinckerhoff (Asia) Ltd. (Parsons Brinckerhoff) to undertake an environmental due diligence on the Project. Parsons Brinckerhoff undertook an environmental due diligence assessment of the Project's compliance with (i) environmental and social legislation applicable in the Philippines and relevant to wind energy projects and (ii) Asian Development Bank (ADB)'s safeguards requirements.

Parsons Brinckerhoff's initial due diligence included a review of documentation provided by EBWPC and a site visit which was undertaken on 10 and 11 April 2012 (i.e. at the Project planning stage). The initial due diligence assessment was originally completed in September 2012, but was subsequently revised in September 2013 to incorporate a review of new Project documentation in relation to size of the Project. In June 2014, EBWPC requested that Parsons Brinckerhoff undertake an updated assessment of the Project against the Equator Principles. Parsons Brinckerhoff undertook a further site visit in July 2014, reviewed further Project data and discussed the Project with EBWPC and the construction contractors. In August 2014, EBWPC requested that Parsons Brinckerhoff include an assessment of the Project against Asian Development Bank's (ADB's) safeguards to the report.

Findings and areas of concern

Following the July 2014 site visit, Parsons Brinckerhoff has the following observations:

- Sediment control had been installed on the drains in the construction area. Parsons Brinckerhoff considers that whilst the sediment control features are not conventional measures, they are likely to prevent sediments affecting the receiving waters. Parsons Brinckerhoff recommends that EBWPC and the contractors monitor the effectiveness of the sediment control features by i) visual inspection, and ii) taking samples of the downstream runoff (i.e. after flowing through the sediment control features).

- Parsons Brinckerhoff noted that additional dust suppression measures (e.g. more frequent spraying with water trucks) could be implemented during dry weather conditions on the access roads and on local roads adjacent to construction areas. Considering the wet season will commence soon, this is unlikely to be an issue for most of the remaining construction period.

- Trees which have been removed from the private land are stored in designated areas. EBWPC advised that the trees are awaiting transport and return to the land owners. The land owners require the trees from the land for firewood and building materials. During Parsons Brinckerhoff's meeting with the PAPs, people advised that they would like to receive the trees as soon as possible. Some people advised that they were concerned that their trees had been lost in the construction spoil, however, EBWPC advised that this was not the case.

- The Project has already had a positive impact on local livelihoods with vendors selling Project-related merchandise at the tourist area near the Kapurpurawan Rock Formation.

- There is a property located within the wind farm development area, to the south of WTG-20. The property appeared to be in inhabited as there were crops and goats in the fenced

garden area, but the resident was unavailable for interview at the time of the site visit. Based on Parsons Brinckerhoff's visual assessment from the property boundary, there appeared to be no issues with regard to obstruction or safety as no construction activities were taking place adjacent to the structure.

- Water was stored in troughs reportedly for washing the wheels on the trucks. First Balfour advised that this water was no longer required since the trucks are washed at the construction sites. Parsons Brinckerhoff noted that the water was stagnant and recommended that the troughs be drained in order to prevent breeding of mosquitoes.

- General housekeeping at the construction sites is good and contractors have an EMS in place. The main contractor (Vestas) and the civil contractor (First Balfour) both have an EMS certified to ISO 14001.

- Agricultural activities were on-going around the WTGs and transmission alignment. There are considered to be no significant issues with regards to these activities.

- Limited stakeholder consultation has been undertaken and that EBWPC recognized that this is an area they need to develop and are committed to do this for the remaining construction period.

The key findings of the report, as regards assessment in relation to ADB's environment safeguards principles by Parsons Brinckerhoff, are presented below.

ADB environmental safeguard 1: Screening

Screening of the Project was undertaken by EBWPC to determine the studies were undertaken in accordance with the legislation in the Philippines and to obtain the relevant approvals.

ADB environmental safeguard 2: Environmental assessment

An ESIA was prepared to fill gaps in the Environmental Performance Report and Management Plan (EPRMP) assessment so that better alliance with lenders requirements could be achieved.

However, limited baseline data and assessment has been undertaken for the transmission line. The assessment of the transmission line in the Community Development and Management Plan report covers part of the transmission line (i.e. 18 of the 128 towers), however, this is considered to be the most sensitive part of the transmission line as it is located in land classified as forest land. The impacts of the construction and operation of the jetty, the access roads, the concrete batching plant and the transmission line were not assessed in the ESIA report. Impacts related to the planning and construction stages of this infrastructure generally needed to be managed through mitigation.

ADB environmental safeguard 3: Alternatives

Alternatives have been considered by EBWPC for the Project. These alternatives pertain to location, design and the "no project" scenario.

ADB environmental safeguard 4: Mitigation and EMP

An Environmental and Social Management and Monitoring Plan (ESMMP) has been prepared. Management of environmental impacts during construction is undertaken by the contractor (i.e. Vestas) and its sub-contractors (i.e. First Balfour, Cendaur, Delta and Alstom). Environmental monitoring is undertaken by EBWPC. Vestas and First Balfour have an Environmental Management System (EMS) which is certified under ISO14001. An ESMMP is also included in the Comprehensive Development and Management Plan (CDMP) report for the transmission line.

However, while potential environmental impacts are considered to be generally well managed, they are managed in accordance with the legislation in the Philippines and the contractors' EMS. The contractors' EMS do not refer to the ESIA and social issues. Vestas' EMS during operation should refer to (a) the ESIA mitigation measures, (b) applicable legislation, and (c) the IFC EHS guidelines. The EMS of Vestas shall also include a grievance mechanism and procedures for stakeholder consultation and records should be maintained accordingly.

The environmental monitoring program shall be fully described in the EMS with schedule, responsibilities, instructions for records/reporting and corrective actions. The EMS for the construction stage (i.e. that implemented by Vestas and First Balfour) shall be extended to cover social impacts and mitigation. The EMS shall include the wind farm, the transmission line, the substation, access roads and, if applicable, the jetty.

ADB environmental safeguard 5: Stakeholder consultation

Stakeholder consultation activities were undertaken from 2007 to 2014. In addition to the LGUs, different government agencies were also consulted. The Project shall continue with its stakeholder consultation activities to address outstanding concerns and communicate issues such as the results of the landscape and visual impact assessment (i.e. with the photomontages), and the results of the noise assessment or the shadow flicker assessment. A grievance mechanism shall also be communicated and implemented as soon as possible and all grievances should be recorded and managed accordingly.

ADB environmental safeguard 6: Disclosure

The Project needs to continue its IEC campaign activities including a disclosure of the results of EPRMP, CDMP, and ESIA to stakeholders.

ADB environmental safeguard 7: Implementation of EMP and monitoring

Vestas (the main EPC contractor) and First Balfour (the civil contractor for the wind farm and transmission line) have implemented their respective EMS in accordance with ISO 14001. Environmental monitoring of noise, air, and water is undertaken by EBWPC in accordance with the EPRMP and CDMP. Reports are submitted every six (6) months to the DENR in accordance with the ECC.

ADB environmental safeguard 8: Critical habitats

One of the aims of the Project site selection process was to avoid environmental critical areas (ECA). The Project was determined to be located outside of any critical habitats. However, the information in the EPRMP, CDMP, and ESIA does not indicate where the individual plants of the identified species are located and how many there are.

ADB environmental safeguard 9: Pollution prevention

In addition to the ISO 14001 certifications of the Vestas and First Balfour EMS, their respective health and safety management systems are in accordance with OHSAS 18001, while their respective quality management system are in accordance with ISO 9001. In general, EHS issues are considered to be well managed by a well implemented system. However, the EMSs of the contractors do not refer to the mitigation proposed in the ESIA. Hazardous materials and wastes management and spill prevention in the CDMP report for the transmission line is considered to be in general compliance.

ADB environmental safeguard 10: Worker H&S and emergency preparedness

Health and safety is considered to be well managed. All visitors and employees are required to undergo a health and safety induction and wear PPE. Alstom (the substation subcontractor), Vestas and First Balfour employ nurses at the respective construction areas. Emergency plans have been prepared as part of the contractors' EMSs.

ADB environmental safeguard 11: Conserve physical cultural resources

A heritage and cultural assessment has been undertaken and considered the cultural and heritage importance in the wider vicinity of the wind farm site in Ilocos Norte and resources in the vicinity of the transmission line alignment are possibly already identified.

Corrective Action Plan (CAP)/Environmental and Social Action Plan (ESAP)

Based on the findings above, a Corrective Action Plan (CAP)/Environmental and Social Action Plan (ESAP) was crafted to ensure full compliance to Lenders' requirements. EBWPC commits to providing funds to implement the measures at agreed timelines with the Lenders. Below is a matrix of the CAP/ESAP for the Project.

Table 18. Corrective Action Plan (CAP)/Environmental and Social Action Plan (ESAP).

No.	Action	Responsible Group / Person	Target Schedule
1.1	Appoint and maintain an on-site personnel responsible for overseeing occupational health and safety programs; personnel will report directly to the site manager	Site Manager / Project Management/ Independent Environmental and Social Manager	2014
1.2	Appoint and maintain an on-site personnel responsible for overseeing environmental and social compliance/ monitoring programs; personnel will report directly to the site manager	Site Manager / Project Management/ Independent Environmental and Social Manager	2015
2.1	Manage construction noise levels and minimize disturbance to nearby households by: ▪ Limiting construction work schedules; ▪ Implementing traffic management plan; and ▪ Conducting noise level monitoring at impact areas	Site Manager / Environmental/ Safety Officer/ Independent Environmental and Social Manager	2014
2.2	Monitor noise levels during operation of wind turbines and conduct mitigating measures, as necessary. The following actions are identified: ▪ Conduct an Information, Education, and Communication (IEC) campaign to all stakeholders; ▪ Conduct validation monitoring based on the results of the noise modelling; ▪ Establish a grievance mechanism in coordination with the stakeholders; and ▪ Implement mitigation program through engineering controls and resettlement, if necessary	Site Manager / Environmental/ Safety Officer and Community Partnership Officer	2014-2015
3.1	Monitor shadow flicker at identified households during operation of wind turbines and conduct mitigating measures, as necessary. The following actions are identified: ▪ Conduct an Information, Education, and Communication (IEC) campaign to all stakeholders; ▪ Conduct a re-assessment on shadow flicker impact of the 19 households with insufficient information during study time; ▪ Conduct validation monitoring based on the results of the shadow-flicker modelling; ▪ Establish a grievance mechanism in coordination with the stakeholders; and ▪ Implement mitigation program through engineering controls and resettlement, if necessary	Site Manager / Environmental/ Safety Officer and Community Partnership Officer/ Independent Environmental and Social Manager	2014-2015
4.1	Ensure minimal removal of vegetation in the wind farm and transmission towers by conducting the following: ▪ Limit clearing activities and cutting of trees at designated construction areas	Site Manager/ Environmental Officer/ Independent Environmental and Social	2014

No.	Action	Responsible Group / Person	Target Schedule
	only. Forestry permits will be secured prior to cutting of trees; ▪ Implement alternatives to tree cutting, if possible, such as tree pruning or removal of branches; ▪ Avoid cutting of critical species such as the Bantigue trees along the coast of the project. If cannot be avoided, such trees will be earth-balled. If cutting, the same species will be planted as replacement following the 1:100 ratio of DENR; Prepare terminal report for submission to DENR on project compliance with tree cutting permit (TCP) conditions and implementation of reforestation program; and ▪ Implement forest protection activities by monitoring illegal logging and poaching activities	Manager	
4.2	Conduct a reinstatement program which includes landscaping and tree planting at disturbed areas	Site Manager/ Environmental Officer/ Independent Environmental and Social Manager	2014-2015
4.3	Minimize loss of species, habitat, and habitat fragmentation by conducting the following: ▪ Limit clearing activities and cutting of trees at designated construction areas only; ▪ Secure forestry permits prior to cutting of trees; ▪ Maintain safe zones by avoiding critical habitats such as the Kapurpurawan coastal area; ▪ Protect ecosystems/habitats which are not affected by site clearing by maintaining the natural vegetation; ▪ Use native species in re-vegetation activities and avoid introduction of invasive alien species; and ▪ Implement biodiversity offsets as part of the reforestation program ▪ Develop and implement mitigating measures for each identified threatened species (if any)	Site Manager/ Environmental Officer/ Independent Environmental and Social Manager	2014-2015
4.4	Minimize bird strikes by using paint finish that will reduce blade glint. To monitor bird/bat strikes, the following action plan is proposed: ▪ Foot patrols and security guard will conduct regular monitoring through carcass retrieval. The frequency of monitoring will be increased during migratory season; and ▪ As the need arises, conduct a fauna study especially if there is an increasing	Site Manager/ Environmental Officer/ Independent Environmental and Social Manager	2014-2015

No.	Action	Responsible Group / Person	Target Schedule
	frequency of bird/bat strikes		
5.1	Conduct annual assessment of the structural integrity of wind turbines, transmission towers, substation, and other support facilities.	Engineering Department/ Project Management Independent Environmental and Social Manager	Annual
5.2	As necessary, conduct upgrade work/reinforcements, repairs, or other mitigating measures to ensure the adaptability of the facilities to extreme weather events	Site Manager / Project Management/ Independent Environmental and Social Manager	Annual
6.1	Develop and implement a continuing Stakeholder Engagement Plan	Site Manager / Community Partnership Officer/ Independent Environmental and Social Manager	2014-2015
6.2	Develop and implement a Grievance Management Procedure for affected communities and workers	Site Manager / Community Partnership Officer/ Independent Environmental and Social Manager	2014-2015
7.1	Prepare a focused Environmental and Social Impact Assessment (ESIA) or similar studies for the transmission line route and the jetty used in delivering wind turbine parts	Site Manager / Environmental/ Safety Officer, Forester, and Community Partnership Officer	2015
7.2	Execute an environmental monitoring and mitigation plan, as necessary, for the transmission line and jetty	Site Manager/ Environmental/ Safety Officer, Forester, and Community Partnership Officer	2015
8.1	Ensure that contractors are properly handling, storing, and disposing hazardous wastes such as used oil, used batteries, and other Petroleum Fuel, Oil, and Lubricants (POL) by: ▪ Conducting routine inspection of the on-site storage facilities. Inspection will check the compliance of the facility with regulatory requirements including secondary containment and safety equipment (i.e. spill kits, fire extinguishers, eye wash); ▪ Conduct water quality monitoring for oil and grease to ensure that no wastes are spilled into nearby waters; and ▪ Dispose hazardous wastes through an accredited transporter and disposal	Site Manager/ Environmental Officer/ Independent Environmental and Social Manager	2014-2015

No.	Action	Responsible Group / Person	Target Schedule
	facility by end of the construction period or when on-site storage facilities fill up, whichever is sooner.		
8.2	Develop and implement a hazardous waste management plan which includes the following: ▪ Identification of an on-site hazardous waste storage facility; ▪ Construction of an on-site hazardous waste storage facility based on regulatory and safety requirements; and ▪ Identification of accredited transporters and disposal facility	Site Manager/ Environmental Officer/ Independent Environmental and Social Manager	2014
9.1	Minimize environmental impact during decommissioning of the batching plant by: ▪ Removing all remained materials prior to decommissioning of the facility; ▪ Ensure through inspection the contractor's proper storage, handling, and disposal of unused materials, hazardous wastes, and general refuse; ▪ Conduct air quality and noise level monitoring to check impacts to nearby households; and ▪ Re-instate the area through landscaping and tree planting	Site Manager/ Environmental Officer/ Independent Environmental and Social Manager	2015
10.1	Develop and implement a security management plan to ensure the safety of locals and tourists from potential WTG breakage and also prevent vandalism and property damage of WTGs	Site Manager / Safety Officer / Security Officer / Community Partnership Officer/ Independent Environmental and Social Manager	2015
11.1	Secure water rights permits from the water regulatory board for the water supply needs during operations phase	Site Manager/ Environmental Officer/ Independent Environmental and Social Manager	2015
12.1	Develop and implement an EMS which includes ESIA mitigating measures and compliance to local regulations and IFC EHS Guidelines	Site Manager / Safety Officer / Security Officer / Community Partnership Officer/ Independent Environmental and Social Manager	2016
12.2	The EMS shall be extended to cover social impacts and mitigation.	Site Manager / Safety Officer / Security Officer / Community Partnership Officer/ Independent Environmental and Social Manager	2016

L. CONCLUSIONS AND RECOMMENDATIONS

EBWPC holds the ECC for the wind turbine site and CNCs for the transmission line and access roads which have been granted for the Project to be developed under the EIA system of the Philippines.

EBWPC holds FLAgs for the wind farm and transmission alignment covering 219 hectares and 22.374 hectares of public forest land, respectively.

The potential environmental and social risks which can be associated with a wind energy project are being managed by EBWPC and its contractors in accordance with applicable legislation.

EBWPC is compliant with Philippine legislation. Nevertheless, a few manageable 'gaps' between the Project's environmental and social assessment and management process and the requirements of 2009 ADB SPS requirements have been noted. EBWPC is committed to implement the corrective action plan/environmental and social action plan and to bridging the gaps to meet ADB's requirements.

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APPENDIX

Appendix Table 1 – Checklist of plants recorded in the proposed project

Family	Scientific Name	Common name	Local name	Uses	Habit
ANACARDIACEAE	*Buchanania arborescens*	balinghasai		Timber and Furniture	Tree
ANNONACEAE	*Goniothalamus amuyon (Blanco)*	amuyong		Landscaping	Tree
	Phaeanthus ebracteolatus (Presl) Merr.	kalimatas		Landscaping	Shrub
APOCYNACEAE	*Alstonia macrophylla*		dalipawen	Timber and Furniture	Tree
	Alstonia scholaris (L.) R. Br.	dita	palo-palo	Timber and Furniture	Tree
	Ervatamia ecarinata (Merr.) Pich		busbusilak	Herbal/ medicine	Shrub
	Ervatamia sp.		.	Herbal/ medicine	Shrub
	Tabernaemontana pandacaqui Poir.	pandakaki		Herbal/ medicine	Shrub
	Voacanga globosa (Blanco) Merr.	bayag-usa		Herbal/ medicine	Shrub
	Wrightia pubescens R. Br. subsp. laniti (Blanco) Ngan	lanete		Timber and Furniture	Tree
ARACEAE	*Amorphophallus paeoniifolius*	pongapong		Ornamental	Herbs
	Rhaphidophora merrillii Engl.	amlong		Ornamental	Herbs
ARECACEAE	*Caryota cumingii*	pugahan		Landscaping	Palm
			Cocos nucifera L.	coconut Timber and	
ASTERACEAE	*Chromolaena odorata (L.) R.M.*	gonoi		Herbal/ medicine	Shrub
			BIGNONIACEAE *Radermachera gigantea*	leea Timber and	Tree
BORAGINACEAE	*Cordia dichotoma*	anonang		Landscaping	Tree
BURSERACEAE	*Canarium luzonicum (Blume)*	piling liitan		Landscaping	Tree
CANNABACEAE	*Trema orientalis (L.) Blume*	anabiong	anabiong	Herbal/ medicine	Tree
CAPPARIDACEAE	*Crateva negliogiosa*		balay lamok	Landscaping	Shrub
CARICACEAE	*Carica papaya L.*	papaya		Edible/for processing	Herbs
CELASTRACEAE	*Gymnosporia sp.*		sisik daga	Erosion control	Tree

	Gymnosporia spinosa	palutan	amumot	Fuelwood	Tree
CELTIDACEAE	*Celtis philippinensis Blanco*	malaikmo		Timber and Furniture	Tree
	Celtis sp. celtis sp.			Fuelwood	Tree
CLUSIACEAE	*Calophyllum inophyllum L.*	bitaog		Timber and Furniture	Tree
	Cratoxyllum celebium	paguringon	bugsor	Landscaping	Tree
CONVULVULACEAE	*Ipomoea pescapre*	dalaidai	dalayday	Erosion control	Vine
CUCURBITACEAE	*Coccinia grandis (L.) Voigt*	tamling		Herbal/ medicine	Vine
CYPERACEAE	*Cyperus kyllingia Endl.*	busikad	tawat siha	Herbal/ medicine	Grass
EBENACEAE	*Diospyros elmeri Merr*		balingagta	Timber and Furniture	Tree
	Diospyros ferrea (Willd.) Bakh.	ebony	batolinau	Timber and Furniture	Tree
	Diospyros pyrrhocarpa Miq.	anang		Timber and Furniture	Tree
EUPHORBIACEAE	*Balakata luzonica*	balakat gubat		Landscaping	Tree
	Macaranga tanarius (L.) Muell-Arg.	binunga		Landscaping	Tree
	Mallotus philippensis (Lamk) Muell-Arg.	banato		Landscaping	Tree
	Melanolepis multiglandulosa (Reinw. Ex Blume) Reichb. F. & Zoll.	alim		Landscaping	Tree
FABACEAE	*Acacia farnesiana*	aroma		Cosmetics	Shrub
	Centrosema pubescens Benth.	dilang butiki		Forage	Grass
	Centrosema sp.	centrosema sp.		Forage	Shrub
	Flemingia strobilifera (L.) Roxb. ex W. Aiton	payang-payang		Herbal/ medicine	Shrub
	Gleditsia rolfei Vid.	tirri		Herbal/ medicine	Tree
	Gliricidia sepium (Jacq.) Kunth ex Walp.	kakauate		Fuelwood	Tree
	Leucaena leucocephala (Lam.) de Wit	ipil-ipil		Timber and Furniture	Tree
	Leucaena sp.	malaipil-ipil		Erosion control	Herbs

	Macroptilium atropurpureum (Moc. & Sesse ex, (DC) Urb	siratro		Erosion control	Grass
	Mimosa pudica L.	makahiya		Herbal/ medicine	Grass
	Parkia timoriana (DC.) Merr.	kupang		Ornamental	Tree
	Pterocarpus indicus Willd.	narra		Timber and Furniture	Tree
	Samanea saman (Jacq.) Merr.	rain tree	acacia	Timber and Furniture	Tree
	Tamarindus indica L.	sampalok		Edible/for processing	Tree
	Tephrosia dichotoma	katurai		Erosion control	Herbs
LAMIACEAE	*Gmelina arborea Roxb.*	gmelina		Timber and Furniture	Tree
	Vitex negundo L.	lagundi		Herbal/ medicine	Herbs
LAURACEAE	*Vitex parviflora Juss.*	molave		Timber and Furniture	Tree
	Litsea glutinosa (Lour.) C.B. Rob.	sablot		Landscaping	Tree
	Persea gratissima Gaertn.	avocado		Edible/for processing	Tree
LEEACEAE	*Leea philippinensis*	kaliantan		Fuelwood	Tree
MALVACEAE	*Hibiscus rosa-*	gumamela		Ornamental	Shrub
	Sterculia foetida	kalumpang	kalumagsi	Herbal/ medicine	Tree
	Triumfetta rhomboidea Jacq.	kolut-kolutan		Herbal/ medicine	Shrub
MELASTOMACEAE	*Memecylon azurinii*	kandog		Erosion control	Tree
	Memecylon obcuvinerve	kandong aso		Erosion control	Tree
MELIACEAE	*Aglaia edulis (Roxb.) Wall.*	malasaging		Timber and Furniture	Tree
	Aphanamixis polystachya (Wall.) R.N. Parker	kangko		Fuelwood	Tree
	Sweitenia macrophylla King	mahogany		Timber and Furniture	Tree
MORACEAE	*Artocarpus blancoi (Elmer) Merr.*	antipolo		Timber and Furniture	Tree
	Artocarpus ovatus Blanco	anubing		Erosion control	Tree
	Broussonetia luzonica	himbabao	alukon	Edible/for processing	Tree

	Ficus irisana	aplas		Erosion control	Tree
	Ficus sp	balete		Erosion control	Tree
	Ficus variegata Blume	tangisang bayawak		Timber and Furniture	Tree
	Morus alba L.	mulberry		Erosion control	Tree
	Streblus asper Lour.	kalios		Erosion control	Tree
MYRSINACEAE	*Ardisia sp.*	ardisia sp.	botinis	Erosion control	Shrub
	Ardisia verrucosa		botbotinis	Erosion control	Shrub
MYRTACEAE	*Psidium guajava L.*	guava		Edible/for processing	Tree
	Sysygium sp.	Sysygium sp.		Edible/for processing	Shrub
NYCTAGINACEAE	*Syzygium calubcob (C.B. Rob.) Merr.*	kalubkob		Edible/for processing	Tree
	Syzygium cumini (L.) Skeels	duhat		Edible/for processing	Tree
	Syzygium jambos (L.) Alst.	tampui		Edible/for processing	Tree
	Syzygium simile (Merr.) Merr.	panglomboien		Edible/for processing	Tree
	Pisonia grandis R. Br.	malluko		Herbal/ medicine	Tree
OCHINACEAE	*Schuurmansia*	moras		Cosmetics	Shrub
OPILIACEAE	*Champereia oblongifolia*	panalapayen		Herbal/ medicine	Shrub
PANDANACEAE	*Pandanus dubius Spreng.*	taboan		Ornamental	Pandan
	Pandanus sp.	pandan		Ornamental	Pandan
	Pandanus tectorius Soland.	pandan dagat		Ornamental	Pandan
PAPILIONACEAE	*Abrus precatorius*	saga-saga	sugod-sugod	Herbal/ medicine	Vine
PHYLLANTHACEAE	*Antidesma bunius (L.) Spreng.*	bignai	bignai	Edible/for processing	Tree
	Antidesma pentandrum (Blanco) Merr.	bignai pugo		Edible/for processing	Tree
	Antidesma pleuricum Tul.	bignai kalabau		Edible/for processing	Tree
	Glochidion sp.		marabaket	Erosion control	Tree

PITTOSPORACEAE	*Pittosporum glaberrinum*		botinis	Erosion control	Herbs
POACEAE	*Chrysopogon*	amorsiko		Landscaping	Grass
	Cynodon dactylon		galud galud	Landscaping	Grass
	Digitaria sp.	Digitaria sp.		Erosion control	Grass
	Imperata cylindrica (L.) Beauv.	cogon		House material	Grass
	Paspalum conjugatum	carabao grass		Erosion control	Grass
	Saccharum spontaneum L.	talahib		Erosion control	Grass
	Themeda triandra	samsarnog		Process for food	Grass
PUTRANJIVACEAE	*Drypetes sp.*	Drypetes sp.		Erosion control	Shrub
	Drypetes sp.		talapnungin	Erosion control	Shrub
RHAMNACAEAE	*Ziziphus talanai (Blanco) Merr.*	balakat		Herbal/ medicine	Tree
RUBIACEAE	*Canthium gynochthodes*		basar-basar	Landscaping	Tree
	Canthium sp.	Canthium sp.		Erosion control	Tree
	Mussaenda philippica A. Rich.	kahoy dalaga		Ornamental	Shrub
	Nauclea orientalis	bangkal		Timber and Furniture	Tree
	Urophyllum candatum	barsik	Landscaping	Shrub	
RUTACEAE	*Citrus sp.*	citrus	citrus	Edible/for processing	Tree
	Clausena anisum-olens (Blanco) Merr.	kayumanis		Herbal/ medicine	Tree
	Murraya paniculate		banlaasi	Herbal/ medicine	Shrub
SALICACEAE	*Flacourtia jangomas (Lour.) Raeuschel*	governor's plum		Edible/for processing	Tree
	Flacourtia rukam Zoll & Maritzi	bitongol		Edible/for processing	Tree
SAPINDACEAE	*Harpullia arborea (Blanco) Radlk.*	uas		Cosmetics	Tree
	Harpullia sp.		uas puti	Cosmetics	Tree
SAPOTACEAE	*Planchonella obovata*		bungalong	Landscaping	Tree
SMILACACEAE	*Smilax bracteata*		banag	Herbal/ medicine	Vine

SOLANACEAE	*Capsicum frutescens Linn.*	siling labuyo		Edible/for processing	Shrub
THYMECACEAE	*Wikstroemia indica*	salago	bales	Herbal/ medicine	Shrub
VERBENACEAE	*Lantana camara L.*	coronitas		Ornamental	Shrub
	Stachytarpheta jamaicensis	kandi-kandilaan		Herbal/ medicine	Herbs

Appendix Table 2 – List of birds recorded in the area.

Family	Scientific Name	Common Name	Distribution Status	Conservation Status	T1	T2	T3	T4	T5	T6	T7	T8
Ardeidae	*Ardea cinerea*	Grey Heron	Migrant	Least concern	0	0	0	0	0	0	0	2
Ardeidae	*Egretta alba*	Great Egret	Migrant	Least concern	0	0	0	0	0	0	2	0
Ardeidae	*Egretta garzetta*	Little Egret	Migrant	Least concern	0	5	0	0	3	0	0	1
Ardeidae	*Egretta intermedia*	Intermediate Egret	Migrant	Least concern	0	0	0	0	1	0	3	0
Ardeidae	*Egretta sacra*	Eastern Reef Egret	Resident	Least concern	1	3	1	0	0	0	0	0
Ardeidae	*Bubulcus ibis*	Cattle Egret	Resident/Migrant	Least concern	0	0	0	0	0	0	1	0
Ardeidae	*Nycticorax nycticorax*	Black-crowned	Migrant	Least concern	0	0	0	0	0	0	0	7
Ardeidae	*Butorides striata*	Little Heron	Resident/Migrant	Least concern	0	1	1	0	0	0	0	2
Ardeidae	*Ixobrychus sinensis*	Yellow Bittern	Resident	Least concern	0	2	0	0	0	0	1	1
Anatidae	*Anas luzonica*	Philippine Duck	Endemic	DENR DAO – Vu IUCN- Vu	0	0	0	0	0	0	0	7
Accipitridae	*Haliastur indus*	Brahminy Kite	Resident	Least concern	0	0	1	0	0	1	0	0
Accipitridae	*Butastor indicus*	Grey-faced Buzzard	Migrant	Appendix II CITES	0	0	0	0	0	1	0	0
Turnicidae	*Turnix suscitator*	Barred Buttonquail	Resident	Least concern	0	0	0	0	0	1	0	0
Turnicidae	*Turnix ocellata*	Spotted Buttonquail	Endemic	Least concern	0	0	0	0	3	4	0	0
Rallidae	*Gallirallus torquatus*	Barred Rail	Resident	Least concern	0	0	0	0	0	1	1	0
Rallidae	*Gallirallus striatus*	Slaty-breasted Rail	Resident	Least concern	0	0	0	0	0	1	1	0
Rallidae	*Porzana cinerea*	White-browed	Resident	Least concern	0	0	0	1	0	0	0	0
Rallidae	*Amaurornis phoenicurus*	White-breasted	Resident	Least concern	0	0	0	0	0	2	0	0
Rallidae	*Amaurornis olivacea*	Plain Bush-hen	Endemic	Least concern	0	0	0	0	1	0	0	0
Rostratulidae	*Rostraula benghalensis*	Greater Painted -	Resident	Least concern	0	0	0	1	0	0	0	0
Charadriidae	*Charadrius alexandrinus*	Kentish Plover	Migrant	Least concern	0	1	3	0	0	0	0	0
Scolopacidae	*Actitis hypoleucos*	Common Sandpiper	Migrant	Least concern	1	2	3	0	0	0	0	0
Scolopacidae	*Heteroscelus brevipes*	Grey-tailed Tattler	Migrant	Least concern	2	3	5	0	0	0	0	0
Scolopacidae	*Numenius phaeopus*	Whimbrel	Migrant	Least concern	0	3	0	0	0	0	0	0
Columbidae	*Phapetreron leucotis*	White-eared brown dove	Endemic	Least concern	0	0	0	0	0	1	0	4
Columbidae	*Streptopelia bitorquata*	Island Collared-	Resident	Least concern	0	0	0	2	0	0	0	0
Columbidae	*Streptopelia tranquebarica*	Red Turtle-Dove	Resident	Least concern	0	2	0	0	0	0	0	0
Columbidae	*Streptopelia chinensis*	Spotted Dove	Resident	Least concern	0	2	1	0	0	2	1	2
Columbidae	*Geopelia striata*	Zebra Dove	Resident	Least concern	0	4	0	0	7	1	2	1

Columbidae	*Chalcophaps indica*	Common Emerald Dove	Resident	Least concern	0	0	0	0	0	6	0	2
Cuculidae	*Eudynamys scolopacea*	Common Koel	Resident	Least concern	0	0	0	1	0	1	0	0
Cuculidae	*Centropus viridis*	Philippine Coucal	Endemic	Least concern	0	0	0	0	0	1	0	0
Cuculidae	*Centropus bengalensis*	Lesser Coucal	Resident	Least concern	0	0	0	1	2	3	0	0
Cuculidae	*Phaenicophaeus cumingi*	Scale-feathered Malkoha	Endemic	Least concern	0	0	0	0	0	3	0	0
Tytonidae	*Tyto capensis*	Grass Owl	Resident	Least concern	0	0	0	0	1	0	0	0
Caprimulgidae	*Caprimulgus affinis*	Savanna Nightjar	Resident	Least concern	0	0	0	0	2	1	0	0
Apodidae	*Collocalia esculenta*	Glossy Swiftlet	Resident	Least concern	24	8	5	12	4	3	4	3
Apodidae	*Collocalia troglodytes*	Pygmy Swiftlet	Endemic	Least concern	18	25	3	18	10	6	5	7
Apodidae	*Cypsiurus balasiensis*	Asian Palm Swift	Resident	Least concern	0	0	0	0	0	0	2	0
Alcedinidae	*Alcedo atthis*	Common Kingfisher	Migrant	Least concern	0	1	0	0	0	0	0	0
Alcedinidae	*Halcyon smyrnensis*	White-throated Kingfisher	Resident	Least concern	0	0	1	0	0	0	3	0
Alcedinidae	*Halcyon chloris*	White-collared Kingfisher	Resident	Least concern	5	3	0	0	0	0	1	0
Meropidae	*Merops viridis*	Blue-throated Bee-eater	Resident	Least concern	0	0	0	0	0	7	0	0
Meropidae	*Merops philippinus*	Blue-tailed Bee-eater	Resident	Least concern	0	0	3	0	0	0	0	0
Megalaimidae	*Megalaima haemacephala*	Coppersmith Barbet	Resident	Least concern	0	0	0	1	0	1	0	0
Picidae	*Dendrocopus maculatus*	Philippine Pygmy Woodpecker	Endemic	Least concern	0	0	0	1	1	6	0	0
Pittidae	*Pitta sordida*	Hooded pitta	Resident	Least concern	0	0	0	1	0	0	0	0
Hirundinidae	*Riparia riparia*	Sand Martin	Migrant	Least concern	0	0	0	0	1	0	0	0
Hirundinidae	*Hirundo rustica*	Barn Swallow	Migrant	Least concern	0	0	0	0	0	0	1	3
Hirundinidae	*Hirundo tahitica*	Pacific Swallow	Resident	Least concern	0	2	2	0	0	0	0	1
Hirundinidae	*Hirundo daurica*	Red-rumped Swallow	Resident/Migrant	Least concern	0	0	0	0	1	0	0	1
Campephagidae	*Lalage nigra*	Pied Triller	Resident	Least concern	0	1	0	0	0	2	0	0
Pycnonotidae	*Pycnonotus goiavier*	Yellow-vented Bulbul	Resident	Least concern	14	3	7	6	8	12	5	10
Pycnonotidae	*Hypsipetes philippinus*	Philippine Bulbul	Endemic	Least concern	0	0	0	2	0	2	0	0
Oriolidae	*Oriolus chinensis*	Black-naped Oriole	Resident	Least concern	0	0	0	0	0	0	0	1
Paridae	*Parus elegans*	Elegant Tit	Endemic	Least concern	0	0	0	0	2	2	0	3
Muscicapidae	*Monticola solitarius*	Blue Rock-Thrush	Migrant	Least concern	3	2	0	0	0	0	0	4
Muscicapidae	*Copsychus saularis*	Oriental Magpie-Robin	Resident	Least concern	0	0	0	0	0	1	0	0
Muscicapidae	*Copsychus luzoniensis*	White-browed Shama	Endemic	Least concern	0	0	0	0	0	0	0	2
Muscicapidae	*Saxicola caprata*	Pied Bushchat	Resident	Least concern	8	6	2	4	6	2	5	2
Muscicapidae	*Cyornis rufigastra*	Mangrove Blue Flycatcher	Resident	Least concern	0	0	0	3	1	0	0	8
Muscicapidae	*Muscicapa griseisticta*	Grey-streaked Flycatcher	Migrant	Least concern	0	0	0	2	2	0	0	1
Phylloscopidae	*Phylloscopus cebuensis*	Lemon-throated Leaf Warbler	Endemic	Least concern	0	0	0	1	1	0	0	0
Phylloscopidae	*Phylloscopus borealis*	Arctic Leaf Warbler	Migrant	Least concern	0	0	0	0	0	0	0	1
Locustellidae	*Locustella ochotensis*	Middendorf's Warbler	Migrant	Least concern	0	0	0	0	0	0	0	1
Locustellidae	*Megalurus timoriensis*	Tawny Grassbird	Resident	Least concern	2	0	0	1	0	0	0	0

Locustellidae	*Megalurus palustris*	Striated Grassbird	Resident	Least concern	1	1	0	1	3	2	1	0
Cisticolidae	*Orthotomus derbianus*	Grey-backed Tailorbird	Endemic	Least concern	0	0	0	0	1	0	0	0
Cisticolidae	*Orthothomus castaneiceps*	Philippine Tailorbird	Endemic	Least concern	0	0	0	1	1	0	0	0
Cisticolidae	*Cisticola exilis*	Bright-capped	Resident	Least concern	0	0	0	0	0	1	0	0
Cisticolidae	*Cisticola juncidis*	Zitting Cisticola	Resident	Least concern	0	0	0	2	1	1	2	0
Rhipiduridae	*Rhipidura cyaniceps*	Blue-headed Fantail	Endemic	Least concern	0	0	0	3	2	8	0	0
Rhipiduridae	*Rhipidura javanica*	Pied Fantail	Resident	Least concern	0	1	3	1	1	2	1	3
Monarchidae	*Hypothymis azurea*	Black-naped Monarch	Resident	Least concern	0	0	0	0	0	2	0	0
Motacillidae	*Anthus novaeseelandiae*	Richard's Pipit	Resident	Least concern	0	0	0	0	0	1	0	0
Motacillidae	*Anthus hodgsoni*	Olive Tree Pipit	Migrant	Least concern	0	0	0	0	1	0	0	0
Motacillidae	*Motacilla cinerea*	Grey Wagtail	Migrant	Least concern	1	1	0	0	0	0	1	0
Motacillidae	*Motacilla flava*	Yellow Wagtail	Migrant	Least concern	2	0	0	0	0	0	1	4
Artamidae	*Artamus leucorhynchus*	White-breasted	Resident	Least concern	0	0	0	2	1	1	0	1
Laniidae	*Lanius schach*	Long-tailed Shrike	Resident	Least concern	2	2	1	0	2	6	3	1
Laniidae	*Lanius cristatus*	Brown Shrike	Resident	Least concern	0	0	0	1	0	1	1	1
Sturnidae	*Sarcops calvus*	Coleto	Endemic	Least concern	0	0	0	1	0	0	0	1
Sturnidae	*Acridotheres cristatellus*	Crested Myna	Resident	Least concern	0	0	0	1	0	0	0	0
Nectariniidae	*Nectarinia jugularis*	Olived-backed	Resident	Least concern	0	0	2	0	0	2	0	0
Dicaeidae	*Dicaeum australe*	Red-keeled Flowerpecker	Endemic	Least concern	0	0	0	2	0	0	0	0
Zosteropidae	*Zosterops meyeni*	Lowland White-eye	Endemic	Least concern	2	0	12	0	4	0	0	16
Passeridae	*Passer montanus*	Eurasian Tree	Resident	Least concern	0	0	0	0	0	0	6	3
Estrildidae	*Lonchura leucogastra*	White-bellied Munia	Resident	Least concern	4	0	12	0	0	0	4	0
Estrildidae	*Lonchura malacca*	Chestnut Munia	Resident	Least concern	0	0	8	0	0	0	22	5
Estrildidae	*Lonchura punctulata*	Scaly-breasted	Resident	Least concern	2	0	11	0	12	0	4	0
Estrildidae	*Padda oryzivora*	Java Sparrow	Introduced	IUCN- Vu Appendix II CITES	0	0	0	1	0	0	0	1

Appendix Table 3 – List of amphibians and reptiles recorded in the area.

Family	Scientific Name	Common Name	Distribution Status	Conservation Status
Bufonidae	*Rhinella marina*	Giant marine toad	Introduced/Widespread, common	Least concern
Scincidae	*Eutropis multifasciata*	Common Mabouya	Widespread, common	Least concern
Scincidae	*Eutropis multicarniata*	Striped Mabouya	Widespread, common	Least concern

Gekkonidae	*Gecko gecko*	Tokay Gecko	Widespread, common	Least concern
Gekkonidae	*Hemidactylus frenatus*	Common House Gecko	Widespread, commo	Least concern
Varanidae	*Varanus marmoratus*	Monitor Lizard	Endemic, common	CITES Appendix II DENR DAO-Vulnerable
Pythonidae	*Python reticulatus*	Reticulated Python	Widespread, common	CITES Appendix II DENR DAO OTS
Agamidae	*Bronchocela marmorata*	Marbled Crested Lizard	Widespread, common	Data deficient
Colubridae	*Ahaetulla prasina*	Asian Vine snake	Widespread, common	Least concern
Colubridae	*Dendrelaphis caudolineatus*	Gray bronzeback snake	Widespread, common	Least concern
Colubridae	*Dendrelaphis pictus*	Common Bronzeback snake	Widespread, common	Least concern
Colubridae	*Gonyosoma oxycephalum*	Red-tailed ratsnake	Widespread, common	Least concern

Appendix Table 4 – List of mammals recorded in the area.

Family	Scientific Name	Common Name	Distribution Status	Conservation Status
Pteropodidae	*Cynopterus brachyotis*	Common short-nosed fruit bat	Widespread, common	Least concern
Pteropodidae	*Ptenochirus jagori*	Musky fruit bat	Widespread, common	Least concern
Pteropodidae	*Rousettus amplexicaudatus*	Common Rousette	Widespread, common	Least concern
Pteropodidae	*Eonycteris spelaea*	Common Dawn Bat	Widespread, common	Least concern
Emballonuridae	*Taphozous melanopogon*	Black-bearded tomb bat	Widespread, common	Least concern
Megadermatidae	*Megaderma spasma*	Common Asian ghost bat / Lesser false vampire bat	Widespread, common	Least concern
Hipposideridae	*Hipposideros diadema*	Diadem round leaf bat	Widespread, common	Least concern
Rhinolophidae	*Rhinolophus arcuatus*	Arcuate Horseshoe Bat	Widespread, common	Least concern
Viverridae	*Paradoxurus hermaphroditus*	Palm civet	Widespread, common	Least concern
Cercopithecidae	*Macaca fascicularis*	Long-tailed macaque	Widespread, common	CITES Appendix II DENR DAO - OTS
Muridae	*Rattus tanezumi*	Oriental House Rat	Introduced/Widespread, common/abundant	Least concern