SENEGAL EMERGENT

« One nation, one aim, one faith »

ADDENDUM

ENVIRONMENTAL AND SOCIAL IMPACT STUDY

PARC EOLIEN DE TAIBA NDIAYE (PETN)

Report –version V0
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Acronyms & Abbreviations

A.O.F	French West Africa/*Afrique Occidentale Française*
ACEI	American Capital Energy & Infrastructure Management, LLC
AEP	Water Supply Network*/Adduction d'Eau Potable*
AESA	Africa Energy SA
AEWA	The Agreement on the Conservation of African-Eurasian Migratory Waterbirds/ *Accord sur la conservation des oiseaux d'eau migrateurs d'Afrique-Eurasie*
ANAM	National Agency of Marine Affairs/*Agence Nationale des Affaires Maritimes*
AIDB	Blaise Diagne International Airport/Aéroport International Blaise Diagne
AIG	African Investment Group
ANAT	National Agency of Territory Planning/*Agence Nationale de l'Aménagement du Territoire*
ANSD	National Statistics and Demography Agency/*Agence Nationale de la Statistique et de la Démographie*
AOI	Area of Influence/*Aire d'Influence*
ARD	Regional Development Agency/*Agence Régionale de Développement*
ASC	Sports and Cultural Association /*Association Sportive et culturelle*
ASECNA	Agency for the Safety of Aerial Navigation in Africa /Agence pour la Sécurité de la Navigation Aérienne en Afrique et à Madagascar
ASUFOR	Borehole Users Association/*Association des Usagers du Forage*
BAP	Biodiversity Action Plan/ *Plan d'action pour la biodiversité*
BAPE	Environmental Public Hearings *Bureau/Bureau d'Audiences Publiques sur l'Environnement*
BBOP	Business and Biodiversity Offsets Programme/ *Programme de compensation pour les entreprises et la biodiversité*
BOS	Opérationnel Monitoring Bureau/Bureau Opérationnel de Suivi
BTP	Public Works Buildings/*Bâtiments Travaux Publics*
CADL	Administrative Committee for Local Development/*Comité Administratif de Développement Local*
CAE	Energy Supply Contract or Power Purchase Agreement /C*ontrat d'Achat d'Energie*
CBD	Convention on Biological Diversity/ *Convention sur la diversité biologique*
CCOD	State-owned Operations Control Commission/*Commission de Contrôle des Opérations Domaniales*
CDE	State Property Code/*Code du Domaine de l'Etat*
CEDEAO	Economic Community of West African States/*Communauté Economique des Etats de l'Afrique de l'Ouest*
CEI	Committee of the Evaluation of Expenses/*Commission d'Evaluation des Impenses*
CEM	Secondary School/*Collège d'Enseignement Moyen*
CERER	Center for the Studies and Research on Renewable Energy/*Centre d'Etudes et de Recherche sur les Energie Renouvelables*
CERP	Multi-Purpose Rural Development Center/*Centre d'Expansion Rurale Polyvalent*
CFA	Financial Cooperation in Central Africa/*Coopération financière en Afrique centrale*

CGO	Great Coast Operations/*Grande Côte Opérations*
CGQA	Management Center for Air Quality/*Centre de Gestion de la Qualité de l'Air*
CHA	Critical Habitat Assessment/*Bilan de l'Habitat Critique*
CIAT	Interministerial Council For Territorial Planning /*Conseil Interministériel de l'Aménagement du Territoire*
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora/*Convention sur le Commerce International des Espèces de Faune et de Flore Sauvages Menacées d'Extinction*
CMP	Construction Management Plan/*Plan de Gestion de la Construction*
CMS	Convention on Migratory Species/*Convention sur les espèces migratrices*
CO	Carbon Monoxide/*Monoxyde de Carbone*
CO2	Carbon Dioxide/*Dioxyde de Carbone*
COMNACC	National Committee for Climate Change/*Comité National du Changement Climatique*
COP	Conference of Parties/*Conférence des Parties*
CR	Critically Endangered/*Espèce en Danger de Disparition*
CR	Rural Community/*Commune Rurale*
CRODT	Oceanographic Research Center of Dakar-Thiaroye /*Centre de Recherches Océanographiques de Dakar Thiaroye*
CRSE	Electricity Sector Regulating Committee /*Commission de Régulation du Secteur de l'Electricité*
RSE	Corporate Social Responsibility/*Responsabilité Sociale des Entreprises*
CSES	Environmental and Social Monitoring Committee/*Comité de Suivi Environnement et Social*
CSPT	The Senegalese Phosphate Company of Taïba/*Compagnie Sénégalaise des Phosphates de Taïba*
D702	Departmental road 702/*Départementale 702*
DAI	Direct Area of Influence/*Aire d'Influence Directe*
DAO	Tender Documents /Dossier d'Appel d'Offres
Db	Decibel/*décibel*
DEEC	Directorate for the Environment and Classified Establishments /*Direction de l'Environnement et des Etablissement Classes*
DGCPT	Directorate General of the Treasury and Public Accounts /*Direction Générale de la Comptabilité Publique et du Trésor*
DGD	Directorate General of Customs/*Direction Générale des Douanes*
DGF	Directorate General of Finances/*Direction Générale des Finances*
DGID	Directorate General of Taxes and Property/*Direction Générale des Impôts et des Domaines*
DGP	Directorate General for Planning /*Direction Générale du Plan*
DI	Inert Waste /*Déchets Inertes*
DIB	Banal Industrial Waste /*Déchets Industriels Banals*
DIS	Special Industrial Waste/*Déchets industriels spéciaux*
DIS	Specific Industrial Waste/*Déchets Industriels Spécifiques*
DMA	Household and Similar Waste /*Déchets Ménagers Assimilés*
DMU	Discreet Management Unit /*Unité de Gestion Discrète*
DPC	Directorate of Civil Defense /*Direction de la Protection Civile*

DPC	Degree of Disturbance to a Component/*Degré de perturbation de la composante*
DRDR	Directorate General for Agriculture and Rural Development */Direction Régionale du Développement Rural*
DREEC	Regional Division for the Environment and Classified Establishments*/Division Régionale de l'Environnement et des Etablissements Classés*
DSCOS	Directorate for the Monitoring and Control of Land Use*/Direction de la Surveillance et du Contrôle de l'Occupation des Sols*
DUA	Directorate of Urban Planning and Architecture*/Direction de l'Urbanisme et de l'Architecture*
ECoW	Ecological Clerk of Works*/Ecologiste des Travaux*
ECOWAS	Economic Community of West African States*/Communauté économique des États de l'Afrique de l'Ouest*
EES	Engineering Environment Services*/ Services-Conseils en Ingénierie et en Environnement* (Bureau d'étude EES-Sarl)
EHS	Environmental, Health and Safety */Environnement, Hygiène et Sécurité*
EHSS	Environmental, Health, Safety and Social/ *Environnemental, Santé, Sécurité, et Social*
EIA	Environmental Impact Assessment*/Evaluation de l'Impact sur l'Environnement*
EIES	Environmental and Social Impact Study/*Etude d'Impact Environnement et Social*
EIS	Environmental Impact Study/*Etude d'Impact Environnementale*
EN	Endangered/En danger
ENVIRON	Ramboll Environ US Corporation, France and UK/Société Ramboll Environ États-Unis, France, Royaume-Uni
EP	Equator Principles/*Principes de l'Equateur*
EPC	Engineering Procurement & Construction*/Ingénierie, Fourniture des Equipements, et Construction (Travaux clé en main)*
EPI	Personal protection equipment/*Equipement de Protection Individuelle*
ESIS	Environmental and Social Impact Study/ *Etude d'Impact Environnement et Social*
ESMP	Environmental and Social Management Plan*/Plan de gestion environnementale et sociale*
ESMS	Environmental and Social Management System*/Système de gestion environnementale et sociale*
ESR	Ecosystem Services Review*/ Examen des services écosystémiques*
FCFA	Franc (Currency) of the African Financial Community */Franc de la Communauté Financière Africaine*
FDE	Energy Development Fund */Fonds Développement Energie*
GC	Great Coast */Grande Côte*
GCO	Great Coast Operations/*Opérations Grande Côte*
GES	Greenhouse Gas Emissions /Gas a Effet de Serre
GHG	Greenhouse gas*/Gaz à effet de serre*
GIIP	Good international industry practice/*bonne pratique internationale de l'industrie*
GTZ	Deutsche Gesellschaft für Internationale Zusammenarbeit /*agence de coopération international allemande pour le développement*
GWh	Gigawatt-hour/*Gigawatt-heure*
Ha	Hectar/*Hectare*

HASSMAR	High Authority in Charge of Coordinating Maritime Safety and Security and Protection of the Marine Environment*/Haute Autorité chargée de la coordination, de la Sécurité maritime, de la Sureté maritime et de la protection de l'environnement Marin.*
HSE	Environmental, Health and Safety*/ Environnement, Santé et Sécurité*
HSS	Hygiene, Health and Security/*Hygiène, Santé et Sécurité*
HT	High tension*/Haute Tension*
IAI	Indirect Area of Influence*/Aire d'Influence Indirecte*
IBA	Important Bird Areas*/Sites Importants pour les Oiseaux*
I.G.T.L.S	General Inspectorate of Labour and Social Laws */Inspection Générale du Travail et des Lois sociales*
ICPE	Classified Installations for the Protection of the Environment /Installations Classes pour la protection de l'Environnement
ICS	Chemical Industries of Senegal */Industrie Chimique du Sénégal*
IFC	International Finance Corporation/*Société Financière Internationale*
ILO	International Labour Organization/ *Organisation Internationale du Travail*
IPCC	Inter gouvernemental Panel on Climate Change*/ Panel Intergouvernemental sur le Changement Climatique*
IRED	Regional Initiative for Sustainable Energy*/Initiative Régionale pour l'Energie Durable*
IREF	Regional Inspectorate for Waters and Forests*/Inspection Régionale des eaux et Forêts*
IRTSS	Regional Inspectorate of Labor and Social Security*/Inspection Régional du Travail et de la Sécurité Social*
ISDL	Higher Institute for Local Development*/Institut Supérieur de Développement Local*
IST	Sexually Transmitted Infection*/Infection Sexuellement Transmissible*
IUCN	International Union for Conservation of Nature*/Union Internationale pour la Conservation de la Nature*
JICA	Japan International Cooperation Agency*/Agence de Coopération Internationale du Japon*
Km	Kilometer/*Kilomètre*
km/h	Kilometer per hour/*Kilomètre par heure*
LLC	Limited liability company*/ Société à Responsabilité Limitée*
LABOSOL	Labosol-AGTS S.A.
LPDSE	Letter of Energy Sector Development Policy */Lettre de Politique de Développement du Secteur de l'Energie*
M	Meter*/Mètre*
m/s	Meter per second*/Mètre par Seconde*
m^3	Cubic meter*/mètre cube*
MDDEP	Ministry of Sustainable Development, the Environment and Parks */Ministère du Développement Durable, de l'Environnement et des Parcs*
MDL	Mineral Deposits Limited*/ Gisements Minéraux, SARL*
MEDD	Ministry of the Environment and Sustainable Development / *Ministère de l'Environnement et du Développement Durable*
MEF	Ministry of Economy and Finance/*Ministère de l'Economie et de Finances*
MST	Sexually Transmitted Diseases/*Maladies Sexuellement Transmissible*

MT	Medium Tension/*Moyenne Tension*
MW	MegaWatt
NF	French Standard/*Norme Française*
NGO	Non-governmental Organization/*Organisation Non Gouvernementale*
NOx	Nitrogen oxide/*Oxyde d'azote*
NP	Performance Standard/*Norme de Performance*
NT	Near Threatened/*Quasi Menacées*.
OECD	Organization for Economic Co-operation and Development/*Organisation pour la coopération et le développement économiques*
OHS	Occupational Health and Safety/ *Santé et Sécurité au Travail*
OIT	International Organization of Labor/*Organisation Internationale du Travail*
OIF	International Organization of the Francophone/*Organisation Internationale de la Francophonie*
OIT	International Organization of Labor/*Organisation Internationale du Travail*
O&M	Operations & Maintenance/*Exploitation et Maintenance*
OMD	Millennium Development Goals /*Objectif du Millénaire pour le Développement*
ONAS	Senegal's National Office of Sanitation /*Office National de l'Assainissement du Sénégal*
ONG	Non-governmental Organization/*Organisation Non Gouvernementale*
ONU	United Nations/*Organisation des Nations Unies*
OPIC	Overseas Private Investment Corporation/*Organisme Fédéral de Promotion des Investissements Privés à l'Etranger*
PAFS	Forestry Action Plan of Senegal/*Plan d'Action Forestier du Sénégal* l
PAN/LCD	National Action Plan to Combat Desertification /*Plan d'Action Nation de Lutte Contre la Désertification*
PAP	Persons affected by the Project/*Personnes Affectées par le Projet*
PCB	PolyChlorinated biphenyl/*PolyChloroBiphényle*
PCH	Potential collision height/*Hauteur de risque de collision*
PDDF	Forestry Director's Plan for Development/*Plan de développement du Directeur des Fôréts*
PETN	Wind Farm of Taiba N'Diaye, Ltd./Parc Eolien de Taiba N'Diaye S.A.
PGES	Environmental and Social Management Plan/*Plan de Gestion Environnemental et Social*
PLD	Local Development Plan/*Plan Local de Développement*
PM	Particulate Matter / *Particules Fines*
PME	Small and medium enterprise/*Petite et Moyenne Entreprise*
PNAE	National Plan of Action for the Environment/*Plan National d'Action pour l'Environnement*
PNASCOT	National Development Programme for the Promotion of Solidarity and Territorial Competitiveness/*Programme National d'Aménagement pour la Promotion de la Solidarité et de la Compétitivité Territoriale*
PNAT	National Spatial Planning Plan/*Plan National d'Aménagement du Territoire*
PNDS	National Programme for the Development of Health/*Programme National de Développement de la Santé*
PODES	Guidance Plan for the Economic and Social Development of Senegal/*Plan D'Orientation pour le Développement Economique et Social du Sénégal*

POI	Internal Plan of Operation/*Plan d'Opération Interne*
PPA	Power purchase agreement/Contrat d'achat d'électricité
PPE	Personal protection equipment/*Équipements de Protection Individuelle*
PRDI	Regional Integrated Development Plans/*Plan Régional de Développement Intégré*
PROCHIMAT	Chemicals and Materials/*Produits Chimiques et Matériaux*
PROFADEL	Francophone Local Development Support Programme/*Programme Francophone d'Appui au Développement Local*
PRRSE	Restructuring and Recovery Plan of the Energy Sector /*Plan de Restructuration et de la Relance du Secteur de l'Energie*
PS	Standard Procédure/*Procédure Standard*
PSE	Emergence of Senegal Plan/*Plan Sénégal Emergent*
PSs	Performance Standards/*Normes de Performances*
RAPTORS MOU	Memorandum of Understanding on the Conservation of Migratory Birds of Prey in Africa and Eurasia/ *Mémorandum d'entente sur la conservation des oiseaux migrateurs de proie en Afrique et en Eurasie*
REV	Revision/*Révison ou Version*
RISE	Regional Initiative for Sustainable Energy/*Initiative Régionale pour l'Energie Durable*
RN	National route/*Route Nationale*
RoW	Right of Way/*Droit de passage*
RSE	Corporate Social Responsibility/*Responsabilité Sociétale de l'Entreprise*
S.A.	Société Anonyme/*Public Limited Company*
SDE	Senegalese Water Company /*Sénégalaise Des Eaux*
SENELEC	National Electricity Company of Senegal/*Société Nationale d'Electricité du Sénégal*
SEP	Stakeholder Engagement Plan/*Plan d'Engagement des Parties*
SFI	International Finance Corporation/*Société Financière Internationale*
SF6	Sulfur hexafluoride/*Hexafluorure de Soufre*
SIDA	Acquired Immunodeficiency Syndrome/*Syndrome de l'Immunodéficience Acquise*
SNDD	National Strategy for Sustainable Development/*Stratégie Nationale de Développement Durable*
SNH	Scottish National Heritage/*Patrimoine National Écossais*
SNMO	United Nations Framework Convention on Climate Change/*Stratégie de mise en œuvre de la Convention Cadre des Nations Unies sur le changement climatique*
SOx	Sulfur oxide/*Oxyde de soufre*
SRAT	Regional Spatial Planning Schemes/*Schémas régionaux d'Aménagement du Territoire*
SRH	*Senegalese Company of Oil Regeneration' Sénégalaise de Régénération des Huiles'*
SRP	Poverty Reduction Strategy/*Stratégie de Réduction de la Pauvreté*
SSPT	Senegalese Phosphates Company of Taiba/*Société Sénégalaise des Phosphate de Taiba*
STE	Technical Services of the State/*Service Technique de l'Etat*

T-Line	Transmission Line*/Ligne de transmission*
TN	Taïba Ndiaye
TP	Tobène Power*/*
TP SA	Tobène Power *SA*
UEMOA	West African Economic and Monetary Union/*Union Economique et Monétaire de l'Afrique de l'Ouest*
UN	United Nations/*Organisation des Nations Unies*
UNCBD	UN Convention on Biological Diversity*/Convention des Nations Unies sur la Biodiversité*
UNICEF	United Nations Children's Fund*/ Fonds des Nations Unies pour l'Enfance*
VEC	Environmental Value of the Component/*Valeur Environnementale de la composante*
VIH	Human Immunodeficiency Virus */Virus de l'Immunodéficience Humaine*
VP	Vantage Point*/Point de Vue*
VU	Vulnerable*/Vulnérable*
WAEMU	West African Economic and Monetary Union/*Union Economique et Monétaire de l'Afrique de l'Ouest*
WBG	World Bank Group*/Groupe de la Banque Mondiale*
WICE	World Institute for Conservation and Environment*/Institut Mondial pour la Conservation et l'Environnement*

1 Introduction

1.1 Project Background

The Projet Eolien Taiba Ndiaye (PETN or the Project) which is the subject of this ESIS Addendum, is a 151.8 MW wind project which will be comprised of 46 Vestas V-126 3.3 MW turbines. The Project is located in Senegal in the municipality of Taiba Ndiaye approximately 75 km northeast of Dakar. Once built, the Project will be the first wind project in Senegal and the largest wind project in West Africa.

The Project has been in development since 2008 by Sarreole sarl (Sarreole), a French renewable energy company which has developed a total of 8 wind projects representing more than 100 MWs of wind power and a number of solar projects in France, and Vigneron Energies, a sister company. PETN is the largest project under development and the only project which the company has developed outside of France. Sarreole is based in the northeast of France close to the German border in Troisfontaines, France.

1.2 Context

In light of the new energy policy set out by the Government of Senegal in its Electricity Sector Development Policy letter (LPDSE) in 2012, the intention is to encourage the introduction of renewable energies into the energy mix, mainly solar and wind power, with a goal of 20% participation in the total capacity for domestic production in 2017. In this context, this Project has been recognized as part of the Emerging Senegal Plan (PME) which is directly supported by the President of Senegal. The new wind farm will, therefore, play an important part in reducing the energy deficit and the reliance on energy generated by fossil-fuels. At the same time, the Project will contribute to the reduction and overall stabilization of energy prices for both industrial and household consumers.

The Senegalese firm HPR Ankh Consultants performed an Environmental and Social Impact Study (ESIS) on this project in 2011. The Project was subsequently issued a certificate of environmental conformity by the Direction de l'Environmental et des Etablissements Classées (DEEC). In accordance with environmental approval procedures, the Ministry of Environment and Sustainable Development issued a decree (no. 003247 dated 9 May 2011) in support of the certificate of conformity which states that the Project and the ESIS conform with the provisions of the Environment Code provisions and provides approval from an environmental perspective to create a Wind Farm in Taiba Ndiaye (Region of Thiès).

Given to a number of successive changes to the design of the Project, the ESIS has been updated several times by the firm HPR Ankh Consultants. In January 2015, as the first certificate of conformity had lapsed, the project developer requested that it be re-instated based on the latest version to date of the ESIS, the REV03 of October 2014. The Ministry responded favorably to the developer's request and the certificate of conformity re-instatement process is currently in progress. The ESIS was subsequently revised to incorporate updated maps of the area and an updated noise analysis. This final version (ESIS REV04 of July 2015), was submitted to the DEEC the first week of August 2015 and is currently under review. A renewal of the certificate of conformity is anticipated within 4-6 weeks from this time.

Although the ESIS REV03 of October 2014 referred to the IFC Performance Standards (2012), the World Bank Group (WBG) EHS Guidelines (2007) and the Equator Principles (EP III, 2013, and together, the International Standards), not all of these International Standards were considered in preparing the ESIS REV03 as was revealed after a gap analysis was performed by EES Sarl and Ramboll Environ. The gap analysis identified all material gaps in comparison with the IFC Performance Standards (2012), the applicable WBG EHS Guidelines (General Guidelines and sector Guidelines for Wind Energy (2007) and the EP III. The final gap analysis (January 2015) served to support the preparation of this ESIS Addendum.

The ESIS Addendum, based on the ESIS REV03, was well advanced prior to HPR Ankh Consultants' recent development of the ESIS REV04. Therefore, all reference in this ESIS Addendum to the ESIS will be to REV03 but we can confirm that there are no material differences between REV03 and REV04 for matters relevant to the Project's compliance with the International Standards.

1.3 ESIS Addendum Objective

The aim of this ESIS Addendum is to complement the ESIS REV03, taking into account the most recent changes to the Project and incorporating the recommendations of the IFC Performance Standards, the applicable WBG EHS Guidelines and the EPIII in order to close the gaps noted in the January 2015 final gap analysis. Please note: prior to completion of the ESIS Addendum, the Project was also assessed against the recently updated EHS Guidelines for Wind Energy (August 2015).

Several initiatives have recently been undertaken (i.e., rural land surveys to assess the extent of land loss by each land user, a second assessment of land compensation for people impacted by the Project, additional public consultations with affected local communities, and an expanded assessment of potential impacts to Biodiversity (i.e., additional baseline studies on birds and bats). The results of these initiatives have been incorporated into this ESIS Addendum.

2 Project description

The Project involves the installation of a 151.8 MW wind farm with an actual total project technical footprint of about 49.5 ha. and includes 46 wind turbines and access roads (together defined as the "Project"). The wind turbine cluster is comprised of five rows of wind turbines covering a total surface area of approximately 7,5 ha. These rows are connected between each other and the departmental road D702 by access roads. It is estimated the wind farm will generate more than 400 GWh per year for 20 years during the production phase at rated power.

The history of the Project, its location, its organization and characteristics are detailed in the following subsections.

2.1 Project location

The installation of the Project will be in the Municipality of Taiba Ndiaye, in the region of Thiès, department of Tivaouane. The closest towns are Tivaouane and Thiès, at 10 and 32 km from the Municipality of Taiba Ndiaye, respectively.

The region of Thiès is one of fourteen administrative regions in Senegal. It is located approximately 70 km to the northeast of Dakar. The region comprises three departments: Thiès, Mbour and Tivaouane.

The department of Tivaouane is comprised of 3 districts: Méouane, Niakhène and Pambal. The Municipality of Taiba Ndiaye is located in the district of Méouane which is located in the northwest part of the department. The main town of the department is also called Tivaouane, and it is located on the main road between Dakar and Saint-Louis via Thiès and situated approximately 92 km away from the capital of Dakar.

Figure 1 below positions the Project in relation to Dakar and the region.

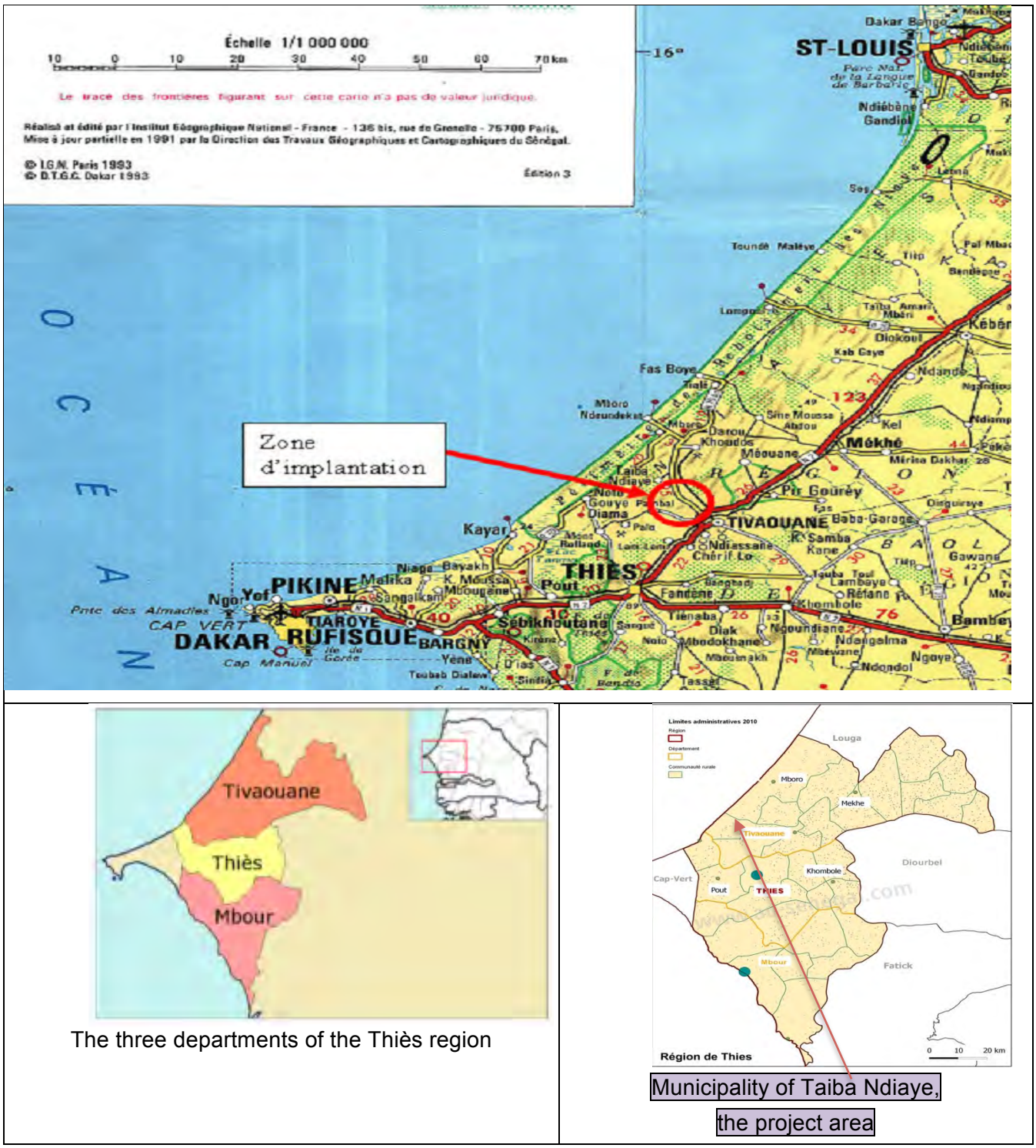


Figure 1 : Project installation area

2.2 Project History

The Project was originally conceived by Sarréole in 2008 and involved installing 50 wind turbines of 2.5 MW each (see Figure 2.2 below). The initial configuration had two turbine groupings:

- A first grouping of twenty wind turbines in three rows, separated by about 720 m; and
- A second grouping, approximately 2.5 km from the first and comprising thirty wind turbines in three rows, separated by about 1000 m.

Sarréole acquired 7 ha of land from the Municipality of Taiba Ndiaye on 1 November 2008 for the basic configuration presented below in Figure 2.

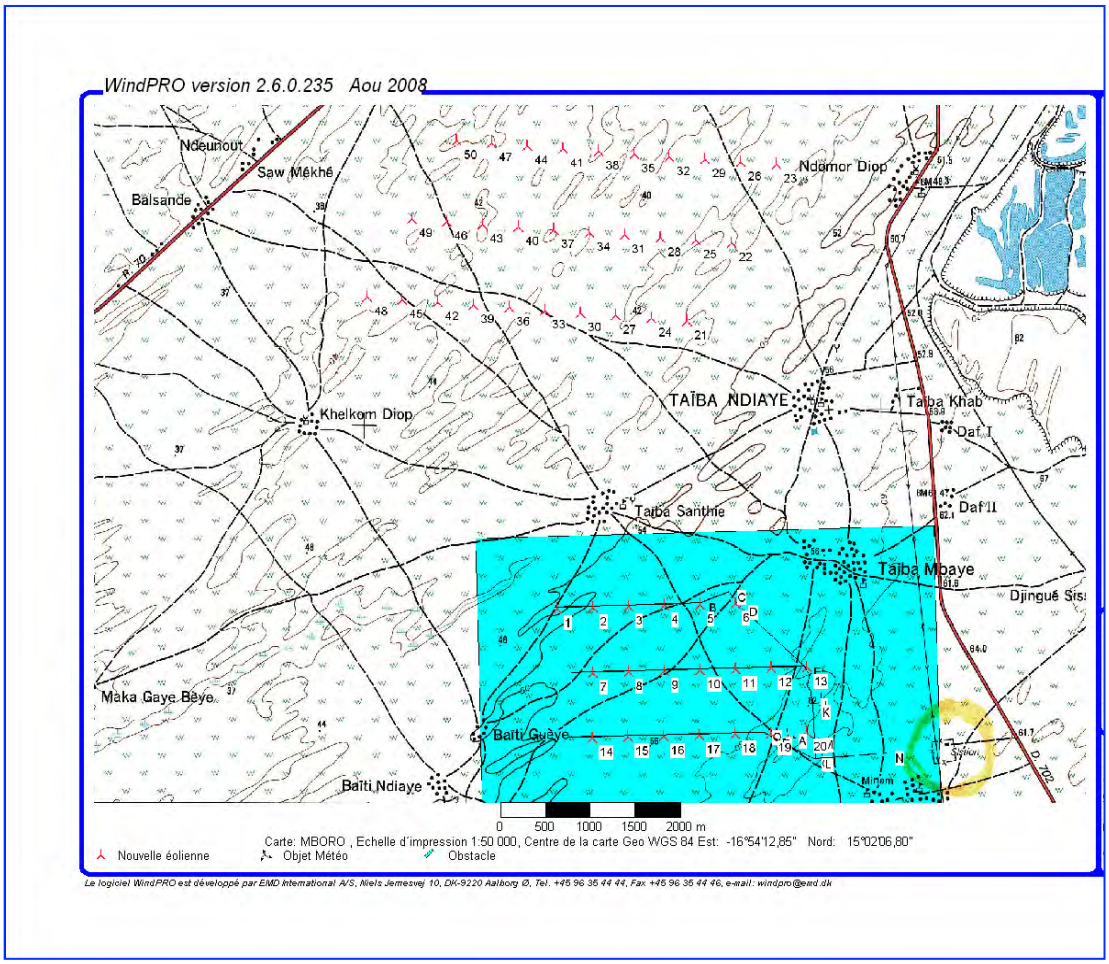


Figure 2: Position of wind turbines in the 2008 (initial) configuration

Given the changing technologies (increased rotor diameter and losses through wakes generated by the presence of a wind turbine on its neighboring areas), the initial Project configuration was altered. The wind farm power was increased to 151.8 MW instead of the 125 MW initially planned, using 46 turbines with a unit power of 3.3 MW. This latest configuration provides for wind turbines installed in five rows with approximately 1.8 km between each row (see Figure 3 below). The installation of these wind turbines will also require the creation of 34 km of access roads.

Ultimately, the estimated annual production for this configuration is 400 GWh.

As per the instruction of the Prefect of the Department of Tivaouane, PETN engaged Labosol-AGTS under the supervision of the Departmental Commission for Assessing Compensation to conduct a survey of the Project area based on this revised configuration from 6 August 2014 to 26 January 2015. The survey included raising awareness of land users primarily farmers working on fields which are to be impacted; listing disbursement expenses per land user; and assessing the amount of compensation to be paid with respect to the footprint of each turbine and the access roads. The results of this survey are presented in the Land Compensation Assessment Report produced by Labosol-AGTS (see Annex D).

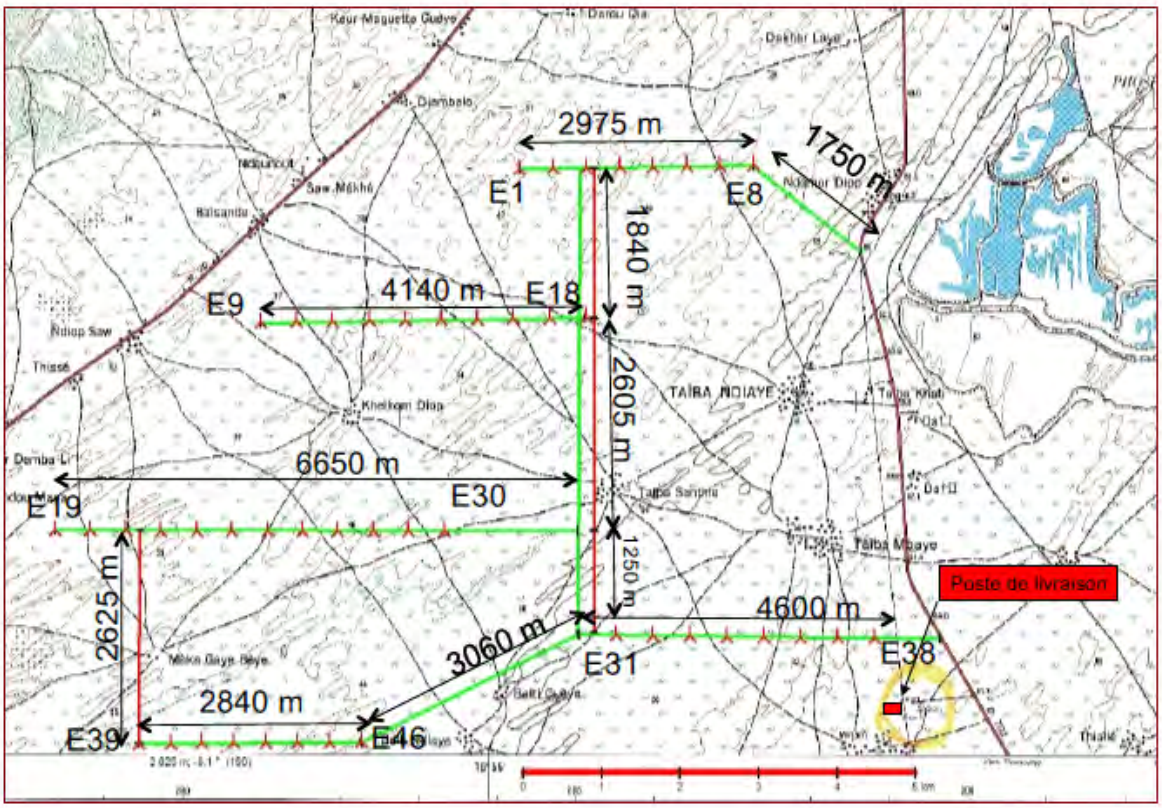


Figure 3: Position of wind turbines in the 2015 configuration

2.3 Project Organization

The Project has been under development by Sarreole and Vigneron Energies, a sister company, since 2008. In 2009, a special purpose vehicle, Projet Eolien Taiba Ndiaye SA (PETN), was formed by Mssrs. Bruno Vigneron and Jeannot Schlernitzauer (owners of Sarreole) to hold all project-related rights and obligations. It is currently estimated the Project will represent an investment of approximately CFA 197 billion and will be financed 30% by equity and 70% by debt. Equity will be contributed by the Mssrs. Bruno Vigneron and Jeannot Schlernitzauer and American Capital Energy & Infrastructure Management, LLC (ACEI) and debt financing will be provided by international financial institutions. Additional Project parties include:

- Vestas: the equipment supplier, the Engineering, Procurement and Construction (EPC) Contractor and the provider of the Operations & Management for the Project;

- Senelec: the sole purchaser of the energy produced by the Project in accordance with a 20-year take-or-pay power purchase agreement signed with PETN; and
- The Government of Senegal: provider of state guarantees required to close the Project financing (see Figure 4 below).

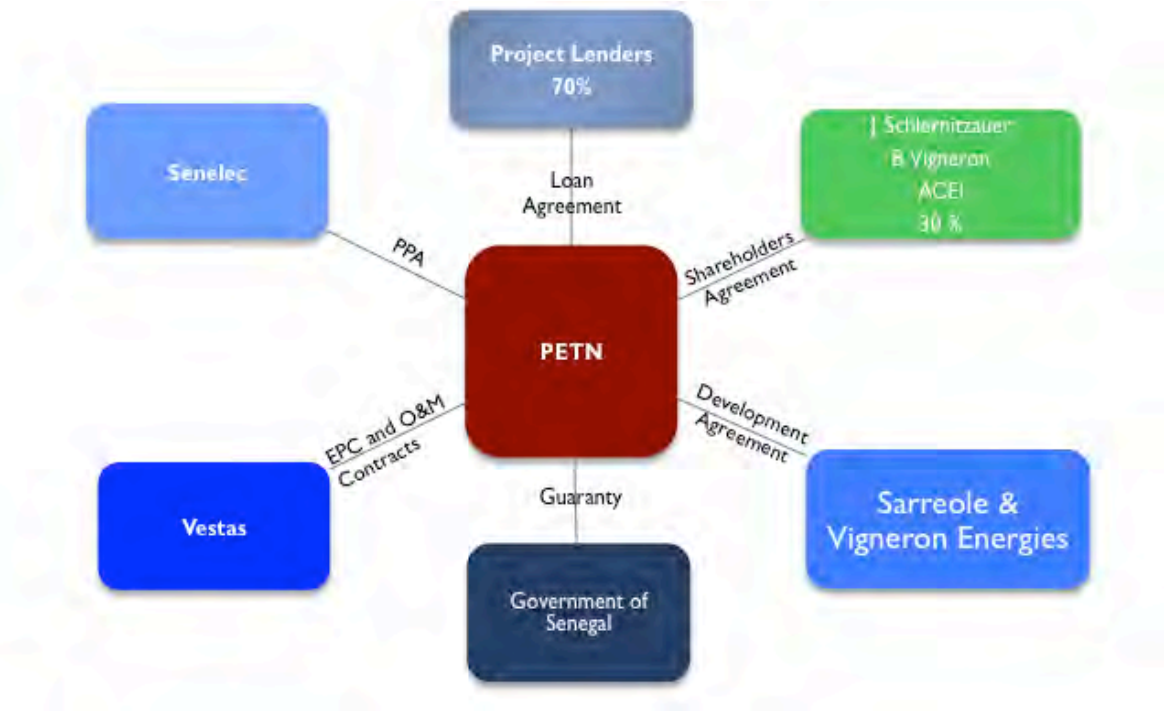


Figure 4: Diagram of the Taiba Ndiaye Wind Farm project parties

PETN is currently managed by Mssrs. Bruno Vigneron and Jeannot Schlernitzauer who has engaged a number of consultants to take interim responsibilities for the financing, engineering and community relations managment. However, prior to the commencement of construction, the intention will be to have a Project Manager in place whose responsibilities will be to manage the Project during construction and operations and a number of staff members as described below and as illustrated by the org. chart in Figure 5 below.

The Technical Director will be responsible for the Construction Manager and the O&M Manager and all contract management and compliance as it pertains to the EPC, O&M, and power purchase agreement from a technical perspective. The Construction manager will likely also have an assistant and the O&M Manager will probably also have an assistant.

The Construction Manager will be responsible for overseeing the day to day construction and implementation of the Vestas EPC contract. He will participate in weekly/monthly construction management meetings and will be the likely liaison between PETN and the Lenders' IE. He will additionally be responsible to ensure that all reports are completed and submitted both to the Lenders and to Senelec, where applicable.

The O&M Manager will be responsible for overseeing the day to day O&M of the Project and insuring that Vestas respects their contractual obligations to the Project. He will also be responsible for all operational reporting to both the Lenders and to Senelec.

The Director of Operations with be responsible for Security, Environmental Compliance and Community Relations.

The Security Manager will be responsible for the management of all security personnel assigned to the Project site. It is envisaged that security patrol of the site will take place 24 hours a day, 7 days a week 365 days a year and work on three 8-hour shifts. It is currently anticipated that 5-10 security persons will be required for each shift.

Environmental, Health and Safety (EHS) Manager will be responsible for the management and monitoring of all aspects of the environment, health and safety of the site during both the construction and operation phase of the Project. This individual will work the Vestas Environmental Manager during construction to ensure that the Project's ongoing activities comply with the ESMS Plan and will ultimately report to the PETN Project Manager. Responsibilities shall include the preparation of monthly, quarterly and/or annual reports as required for lenders and shareholders of the Project.

Environmental Compliance Officer. This person may be a full-time employee of the Project or a consultant, and will be responsible for ensuring that the Project complies will all local environmental requirements, and performing audits with regard to plans like the ESMS Plan, the Stakeholder Engagement Plan and Biodiversity Plan to ensure that they are being respected.

Community Relations Officer will be responsible for a team of 3-4 individuals that will be responsible for communicating with the local community to ensure that all questions, concerns and requests of community members are addressed and recorded. The Community Relations Officer or a member of his team will meet at least once each month during construction and at least one every quarter during operations with communities on an individual or group basis. The purpose of these meetings will be to communicate the progress of the Project during construction and the activities which occurred in the past month and those which shall occur in the coming month. These meetings will also be a platform for community members to express their concerns and ask any questions about the Project.

The Financial Director will be responsible for all things related to finance of the Project. He will have a team of 3-4 people. Responsibilities will include preparation of draw down requests from the lenders during construction, financial compliance and reporting to the lenders during both the construction and operation phase, management of banking relations, invoicing Senelec and any other third parties for services rendered, management of the payment of all invoices received by the project, financial forecasting and budgeting, financial bookkeeping, amongst a number of other financial related tasks.

Please note : the job subscriptions and org. chart below are preliminary in nature and subject to change based on the needs of the Project.

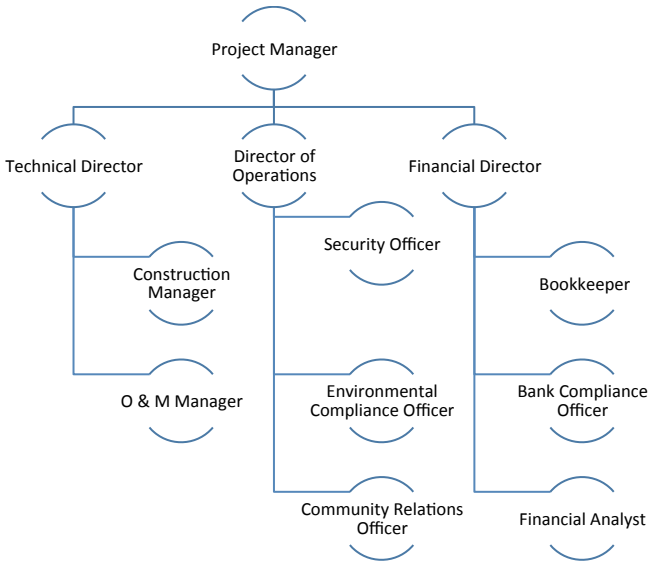


Figure 5: Preliminary organizational chart

2.4 Technical capacity and relevant experience of Sarréole

Sarréole has to date developed 9 wind farm projects with a total installed power of 180 MW (see Figure 6 below).

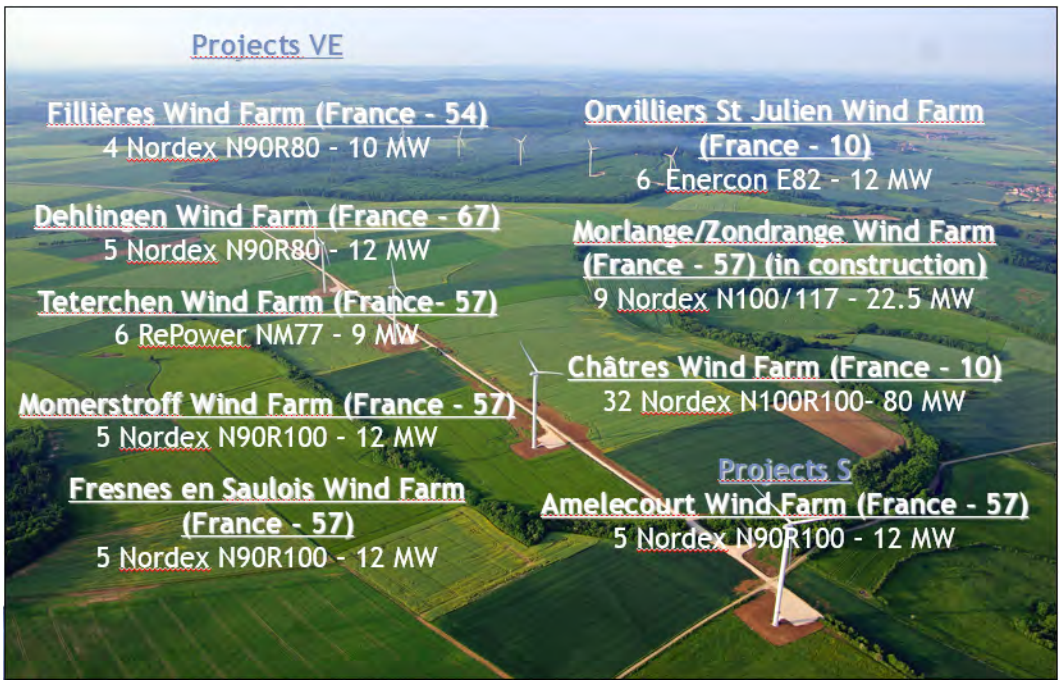


Figure 6: Wind projects developed by Sarréole

2.5 Project schedule

The Project will be constructed in three phases: two construction phases of sixteen wind turbines each and a final construction phase of fourteen wind turbines. The purpose is to enable PETN to work with Senelec to successfully integrate the project into the grid.

The provisional Project timetable provides for work to start at the beginning of the fourth quarter of 2015, with delivery of the first tranche of 52.8 MW after fifteen months. The other two tranches will be delivered 11 months and 19 months later, respectively i.e. a total period of 34 months. The first tranche is planned to enter production before the end of 2016.

Figure 7 below provides the Project's evolution from conception to date.

YEARS		2007	2008	2009	2010	2011	2012	2013	2014	2015
Technical studies										
wind measurments h = 50m										
Site definition	Vigneron Energies									
Production estimate - 50 m mast	DNGV Garrad									
Production estimated - 100 mast - request for	DNGV Garrad									
Final definition of implantation scenario	Vigneron Energies									
Prodcution estimate - 100 m mast - final scenario	DNGV Garrad									
Wind measurements h = 100m										
network studies - scenario 2010-2012	Alstom Grid									
network studies - scenario 2011-2013	Alstom Grid									
network studies - scenario 2016-2018	Alstom Grid									
network studies - scenario 2016-2018	Sargent & Lundy									
Vestas feasibility study of network	Vestas									
Transport studies - Vestas V112	Vestas									
Transport studies - Vestas V126	Vestas									
Geotechnical studies	Esteyco Energia + Labosol									
Permit & Authorization										
1st building permit										
2nd building permit										
3rd building permit										
Land acquisition procedure										
convention with local community of Taiba NDiaye										
Launching of land registration procedure										
Presidential decree for abandonment of land and official declaration of public interest						26/4/2011				
mark up of wind turbines and road boundaries										
registration of agricultural parcel										
lease										
Deed restriction establishment										
Power purchased agreement										
presentation and opening for negociations				01/05/2009						
Negociations										
Signed off - Power purchased agreement								31/12/2013		
Environmental and social studies										
AHNK										
Abba Sonko										
Ramboll Environ / EES Sarl										
Financials										

2.6 Additional information about the sequence of work

This section includes additional Project information not included in the ESIS REV03 or information requiring updating following alterations to the Project.

2.6.1 Human resources management

2.6.1.1 Construction Phase

Vestas and its sub-contractors (international and/or local) will carry out the construction work. Approximately 385 skilled and unskilled laborers, including five engineers, will be necessary during the course of the 34-month construction period. The actual number will depend on the layout and the progress of work. The Vestas construction management team is illustrated by the org. chart in Figure 8 below.

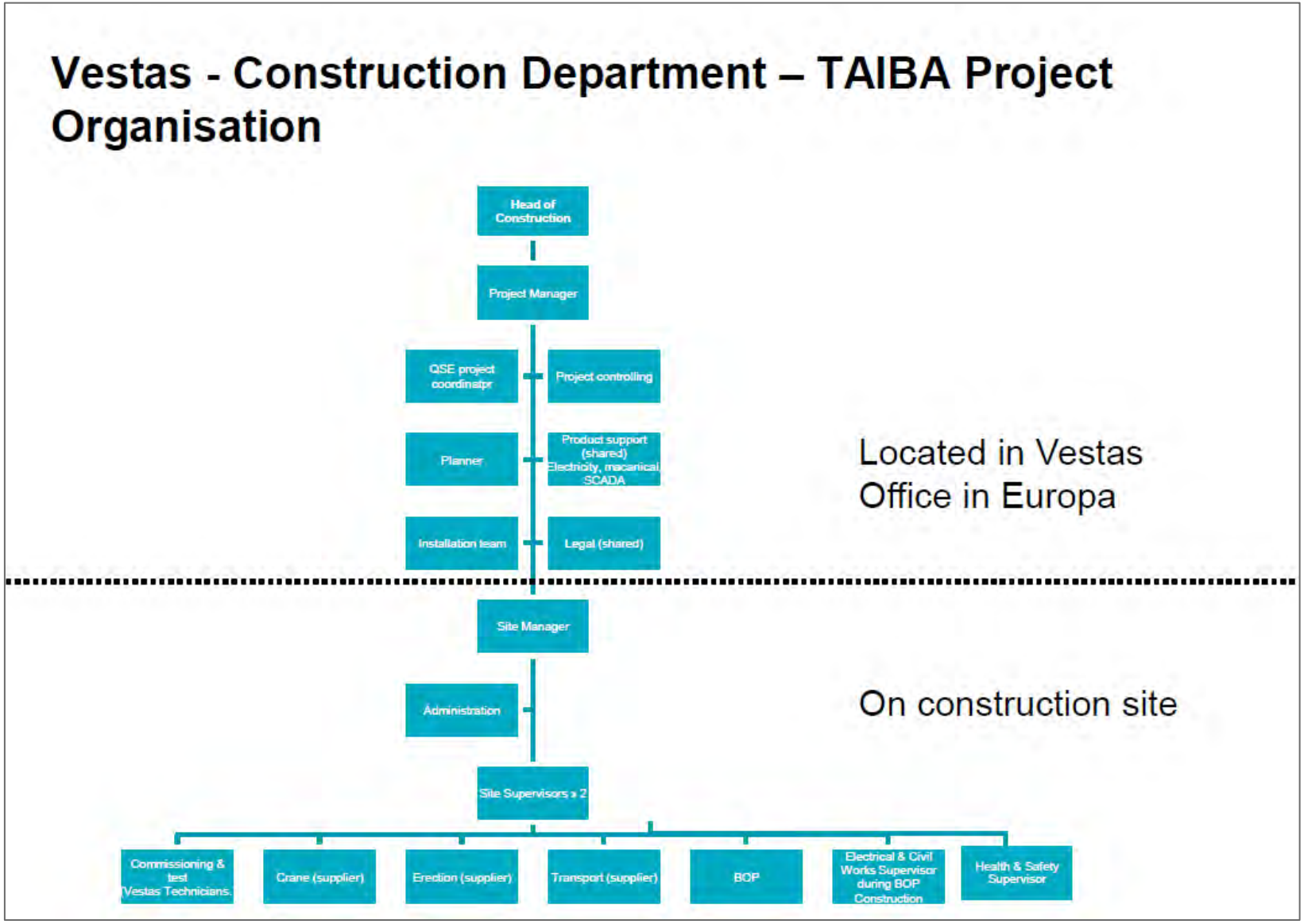


Figure 8: Vestas organizational chart during construction phase

Temporary site facilities[1] will be installed on the Project site. Vestas is planning bus transportation to the Project site for workers, and a canteen and medical facility will be located on site. Workers' accommodation facilities will not be constructed on the Project site. Workers from outside the area will live in a hotel or hotels in the vicinity of the Project, but the hotel has not yet been identified by Vestas.

2.6.1.2 Operations Phase

The personnel planned for the Operations Phase by PETN, for a period of 20 years, is provided in Figure 9 below. This does not include the personel engaged by Vestas for the operations and maintenance contract with the Project which are estimated to be between 12 and 15 additional skilled laborers. The intention will be to train local staff to reduce the number of Vestas expatriates on site during the operations phase.

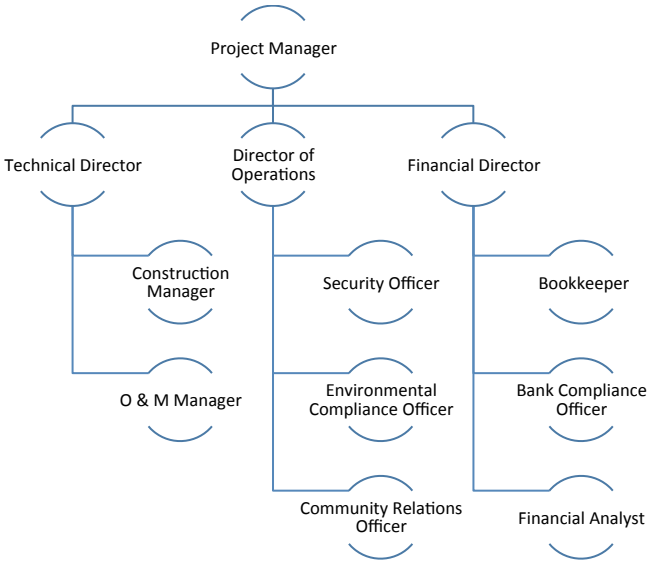


Figure 9: Flow chart of the Taiba Ndiaye Wind Farm in the Operations Phase

The Project has incorporated a framework for a human resources policy consistent with the size of the Project in its ESMS Plan. This policy complies with Senegal's labor-related laws and regulations and the recommendations of IFC PS2. PETN will create and set in place the necessary conditions and arrangements to (i) establish, maintain and improve the employee/management relationship, promote non-discrimination and equal opportunities for employees and compliance with local laws on the right to work and (ii) protect the workforce by prohibiting child labor and forced labor, promote safe and healthy working conditions and protect and promote the health of employees.

[1] See Annex B:Location of storage areas, temporary site facilities and power sub-station**Error! Reference source not found.**

2.6.2 Raw material management

Significant quantities of raw materials (concrete reinforcement bars, gravel, sand for reinforced concrete, cement and mixing water) are needed to construct the foundations of wind towers, specific assembly or maintenance platforms and various buildings. Gravel and sand will be taken when needed from the quarries authorized by the transport and infrastructure authority. The sand could be taken from quarries in Tivaouane, the laterite could come from Lam-Lam quarries (at Mont Rolland and Sindia) and the basalt from the Diack quarry in the municipality of Ngoudiane (Thiénaba district).

2.6.3 Water requirement

During the Construction Phase, water will be required to create 46 foundations (600 to 800 m³ of reinforced concrete/foundation), associated platforms and 35 km of access roads. The water will also be used, after being treated, as drinking water for the workers, and as service water (washing platforms, cleaning machinery, etc.).

2.6.4 Transport of equipment

The materials and equipment required to erect the Project will arrive at the port on cargo vessels. All the equipment will be transported by large and specially equipped flatbed trucks. The trucks will take the national road 1 (RN1) or partly the motorway as far as Tivaouane and from there the departmental road between Tivaouane and Mboro (D702), before moving onto the Project access roads that will connect in advance with the D702. Civil engineering work will be necessary to cross some areas, especially roundabouts. The access roads should, therefore, be operational and in use before the equipment arrives.

2.6.5 Waste management

The various types of waste (inert waste, common industrial waste and special industrial waste) are described in the EIS REV03. A framework for a waste management plan (including a waste disposal unit), established to be in compliance with local regulations and good international industrial practices (GIIP), is included in the ESMS Plan.

Domestic water: domestic potable water will be required by the estimated 385 laborers working on the Project site for both drinking and sanitation purposes. Septic tanks will be used to deal with the domestic water. These tanks will be emptied regularly. The waste will be evacuated into treatment sectors approved by the DEEC or to the Keur Saib Ndoye plant of the Senegal National Sanitation Office (ONAS) in Thiès.

Industrial wastewater: a limited amount of industrial wastewater will be produced during the Construction Phase. Vestas will have a mobile treatment unit and this water will be transferred regularly to the ONAS plant of Keur Saib Ndoye in Thiès.

During the Operations Phase, small amounts of industrial wastewater will be produced from cleaning equipment and cooling water emptied from machinery. The wastewater will be transferred into mobile, kit treatment units; these will be emptied regularly into the Keur Saib Ndoye public treatment plant at Thiès.

During the Operations Phase and during maintenance, 70,000 liters of used oil will be produced from oil change operations. This oil will be recovered and sent to waste oil

regeneration companies in the area (e.g., SRH, TOTAL) or burned in cement plant pyrolysis furnaces.

Contrary to the information provided in the EIS REV03, no PCB will be used under this Project. The oils contained in the transformers will not contain PCB, therefore, reference to use of PCB was deleted in the ESIS REV04.

Particular care will be taken in maintaining equipment containing sulphur hexafluoride SF6. This involves electrical isolation cells built into the base of each wind turbine, each containing 1 to 2 kg of SF6 gas[2]. Despite it being a greenhouse gas (GHG) with high global warming potential, SF6 is the only product (there is currently no possible substitution) used in the electrical separation cells. This gas is not toxic to humans or flammable.

2.7 Analysis of Alternatives

Various studies[3] on the potential of the wind resource show that Senegal is relatively well served, especially on the extensive coast between Dakar and Saint Louis, where wind speeds are between 4 and 6 m/s on average. Thus several wind farms are envisaged for the future in the areas of Kayar, Poitou and Saint Louis, but are only at the project planning stage.

The Saint Louis project, 190 km from the Project site and certainly the most advanced, is a 50 MW wind farm with two tranches of 15 and 35 MW. Our understanding is that this project is being developed by C3E and InfraCo and that no wind measurement has been done on site to date. We note that all future renewable projects will be subject to an international public tender by Senelec. To date no public tender has been announced either by the government or Senelec.

2.7.1 Selection of the first site

This first site (see Figure 2) was chosen on the basis of the assessed wind resource and confirmed by the measurements by Sarréole of the contractual energy capacity guaranteed to Senelec. Another factor was the existence nearby of the Tobène sub-station. Sarréole has been measuring wind speeds since 2008 to estimate the wind resource. Wind anemometers were placed on a mast at miscellaneous altitudes (30 meters, 48.5 meters and 50 meters). The measuring campaign initiated in 2008 lasted twelve months. Based on these measurements, the average wind speed at this height was 5.64 m/s, i.e. 20.3 km/h.

2 Hazard study - Vestas - Page 34

3 Analysis of Wind Data and Wind Energy Potential along the northern coast of Senegal
By Youm, J. Sarr, M. Sall, A. Ndiaye and M.M. Kane
By: Laboratory of Semi-conductors and Solar Energy, Faculty of Science, University Cheikh Anta Diop, Dakar-Fann, Senegal and Centre for Renewable Energies and Research (CERER),
BP 476, Dakar, Senegal

2.7.2 Selection of the current site

During this time, wind technology was rapidly evolving and in light the energy shortages being experienced by Senelec, it became possible to configure a project with fewer but larger turbines which could provide close to 20% more energy then previously contemplated. In August 2010, Sarreole installed a second wind mast. This time at 100 m height which was closer to the hub height of the turbines envisaged to be installed. The new wind mast which is still collecting date was installed approximately 5 km north of the existing 50 m mast. The data collected from the new mast was used to redimension the Project and culminated in the current configuration (see Figure 3) that uses 3.3 MW wind turbines.

3 Legal and regulatory framework

3.1 Supplement to the political and institutional framework

3.1.1 Summary of the content of the Political and Institutional framework

The Project ESIS REV03 of October 2014 sets out partially the applicable political and institutional provisions, namely:

In terms of policy

- The policy of the Energy Sector Recovery Plan 2007-2012;
- The national environmental management policy (2004) (LPSE);
- The National Action Plan for the Environment;
- The National Action Programme for Combating Desertification;
- The strategy and action plan for preserving biodiversity; and
- The implementation strategy for the United Nations Framework Convention on Climate Change (SNMO).

In terms of institutions

The institutions listed in the ESIS REV03 are the Ministry of Energy; the Electricity Sector Regulatory Commission (CRSE), the Ministry of Biofuels, Renewable Energies and Scientific Research; the Ministry of Environment and Sustainable Development and its various branches (Classified Establishments Division (DEEC); the Technical Committee and the Water and Forestry Division); the local authorities; basic community bodies; and non-governmental organizations.

The political and institutional framework will be supplemented by the following texts:

3.1.2 Political framework

3.1.2.1 National Strategy for Sustainable Development (SNDD)

The aim of the National Strategy for Sustainable Development (SNDD) is to:

- Make the policies, strategies and programs currently being executed consistent and encourage better synergy between the various actions performed by attempting to identify and mobilize the interfaces or competition areas (March 2005 version).

The strategy is broken down into six sections or major guidelines, including:

- Promoting sustainable production and consumption methods (section 2);
- The challenge is to exploit the natural resources by encouraging new methods of energy production, promoting a balanced and harmonious development (section 3); and
- Reinforcing measures and actions that could contribute to achieving the Millennium Development Goals (MDG) in section 6.

The Project is in line with the SNDD by encouraging a new, environmentally-friendly method of energy production.

3.1.2.2 Energy Sector Development Policy Letter (LPDSE)

In 2003, the authorities adopted an Energy Sector Development Policy Letter (LPDSE). This was updated in 2008. The LPDSE targeted a national electrification rate of 75%, with 50% in rural locations and 95% in towns and at least a 20% commercial independence rate by 2020 (against 4% in 2004) through input from biofuels, hydro-electric power and renewable energies. In addition, the use of renewable energies and biofuels was encouraged.

Despite the efforts made, the sector went through a major crisis. After the presidential elections held on 25 March 2012, the new authorities, based on the diagnosis of the energy sector, decided to introduce a new energy policy.

The new policy was adopted on 29 October 2012 and set out in the LPDSE 2012. It revolves around two sections: (i) sector situation and constraint and (ii) vision and goals of the new energy policy. The Government's strategy is targeting "an emerging economy guaranteeing sustainable development with positive impact that is distributed in a unified manner”.

The strategic areas adopted include the guarantee of energy safety and increased access to energy for all to promote strong economic growth and equitable social development.

The new policy has a vision in the electricity sub-sector of a Senegal where competitive, quality electric power is available in quantity and produced from a diversity of technologies including especially coal, gas, hydro-electric power, wind energy and solar power. The Government has thus decided to amplify the renovation and development efforts of the offer system and transmission/distribution networks as well as management of the demand.

These strategies are in in line with the implementation of the Project.

3.1.3 Institutional framework

3.1.3.1 Energy Division

The Energy Division is in charge of:

- Preparing and monitoring the execution of development and energy plans;
- Dealing with authorization requests for the prospecting, search and exploitation of liquid and gaseous hydrocarbons;
- Providing the liaison and collaboration with sub-regional bodies operating in the field of energy;
- Scheduling and monitoring the development work for rural and urban electrification in relation with the parties and structures involved;
- Implementing renewable energy development and promotion actions and energy savings;
- Providing administrative and technical control and monitoring petroleum and gas processing activities and the distribution of petroleum products;

- Monitoring, along with the Electricity Sector Regulatory Commission, the execution of delegated electricity management contracts;
- Monitoring the supply of the domestic market with petroleum products;
- Monitoring companies and other autonomous administrative bodies involved in the energy sector; and
- Explaining and monitoring Government policies in the domestic fuel sub-sector and thereby encouraging cooperation with the local parties involved.

3.1.3.2 Senelec

The Senegal National Electricity Company (SENELEC) is governed by the Ministry of Energy and was created by Law 83-72 of 5 July 1983. It was converted into a majority State-owned limited company by Law 98-06 dated 28 January 1998. SENELEC has the concession for the production, transmission, distribution and sale of electric power and is also in charge of identifying, financing and constructing new structures in its scope. It is alone authorized for bulk buying, bulk transmission and sale of electric power throughout the country. In addition, it is responsible for developing production through recourse to new generation installations that it owns or by independent production.

SENELEC signed an Energy Purchase Contract (CAE) regarding the Project on 31 December 2013. The CAE states SENELEC's undertaking to purchase all the electric power generated by the Project at a price agreed by the parties and to be amended during the twenty-year contract using an indexing coefficient applicable every year. The CAE sets out the contractual obligations between SENELEC and the Project (calculation of the KWh purchase price, calculation of the indexing coefficient of this purchase price every year, description of the technology, case of force majeure, calculation of payments, bank guarantees, etc.).

3.1.3.3 National Energy Council

The National Energy Council was instituted by Decree 2011-91 of 24 January 2011 under the implementation of the Plan to Restructure and Relaunch the Energy Sector (PRRSE). It is under the direct authority of the President of the Republic and is responsible for:

- Coordinating, supervising, controlling and assessing the implementation of the PRRSE and the parties;
- Fixing the guidelines, arbitrating, redirecting the measures, financing and all the means required to implement the Emergency Plan; and
- More generally, taking all necessary decisions for the monitoring and smooth implementation of the PRRSE to culminate in a sustainable recovery of the energy sector (Art. 2).

The Council is made up of various parties involved in the energy sector.

The National Energy Council set up a permanent secretariat by interministerial Order 1552 dated 15 February 2011. Under the supervision of the Ministry of Finance, the Secretariat is mainly involved in the following fields:

- Defining the Emergency Plan management chart;
- Controlling the implementation of Emergency Plan measures;
- Watching over the execution of interventions by all the public or private structures involved in the implementation of the Emergency Plan; and
- Making all useful recommendations to the National Energy Council.

Under its mission, the Project will be part of the portfolio of Energy Production Installations to which special attention will be paid by the permanent secretariat.

3.1.3.4 Ministry of Economy and Finance (MEF)

The Ministry of Economy and Finance (MEF) is responsible for approving the Project as meeting the macro-economic framework defined in the Guidance Plan for the Economic and Social Development of Senegal (PODES) and the Poverty Reduction Strategy (SRP). As the only delegated authorizing body for the State budget, the MEF is responsible for negotiating with the development partners, including the Project in the budget and the financial execution through its General Directorates such as the Directorate General for Tax and Estates (DGID), Directorate General for Customs (DGD), General Directorate for Public Accounting and the Treasury (DGCPT), the General Directorate for Finance (DGF) and the Directorate General for Planning (DGP). The MEF initiates the decree relating to the Project's declaration of public utility.

The MEF is extensively involved in this Project as the only authorizing body delegated by the State to supply State guarantees, miscellaneous exemptions, etc.

3.1.3.5 Directorate for Town Planning and Architecture (DUA)

The Directorate for Town Planning and Architecture (DUA) is responsible for:

- Preparing and installing urban management tools;
- Studies, design and implementation of urban planning and schemes and detailed urban planning and urban development and housing development planning;
- Preparing town planning and architecture regulations; and
- Implementing and monitoring the restructuring and land regularization policy.

Under this Project, the DUA will be consulted during the preparation of the construction permit.

3.1.3.6 Directorate for Land-use Surveillance and Control (DSCOS)

The overall mission of the Directorate for Land-use Surveillance and Control is to prevent and control irregular land use and constructions and to manage related disputes. It is in this context responsible for:

- Land-use surveillance and control in urban sites and in urban areas and interventions on site;
- Checking the land use;
- Assisting local authorities in controlling irregular use and constructions; and
- Noting infringements in land use.

3.1.3.7 National Spatial Planning Plan (PNAT)

The National Spatial Planning Plan (PNAT), the planning instrument for our national space, was adopted in an Interministerial Council for Spatial Planning (CIAT) in 1994. The aim of the PNAT is to implement a coherent spatial planning policy through firstly, improved knowledge and promotion of the country's resources and potential and secondly, by serving as a reference and spatial coherence framework for various sectoral policies. This plan is supplemented locally by Regional Spatial Planning Schemes (SRAT) and Regional Integrated Development Plans (PRDI).

3.1.3.8 National Spatial Planning Agency (ANAT)

The National Spatial Planning Agency (ANAT) was created by Decree 2009-1302 of 20 November 2009 and has the status of a public legal entity. It is responsible for coordinating the implementation of spatial planning strategies provided for by the PNAT and the implementation of the National Development Programme for the Promotion of Solidarity and Territorial Competitiveness (PNASCOT).

The agency is governed by the Ministry of Spatial Planning and Local Authorities. ANAT's missions are to promote and implement government policy on spatial planning, geographical and mapping work and improving the living environment of populations.

The Thiès PRDI (region on which the Project depends) developed since 2002 and has gradually incorporated all industrial units listed in the region. The main industrial units (located near the Project) are as follows: Compagnie Sénégalaise des Phosphates de Taïba (CSPT), Société Sénégalaise des Phosphates de Taiba (SSPT), Compagnie de Produits Chimiques et Matériaux (PROCHIMAT) (chemical products), Cimenterie les CIMENTS DU SAHEL (cement plant), Industries Chimique du Sénégal, ICS (chemicals) and the future project and future power plant Africa Energy and Tobène Power (TP), respectviely.

The construction of the Project, the Taiba Ndiaye Wind Farm, in the municipality of the same name, falls directly within the PNAT policy and thus expands the installation of industrial activities and the decentralization of economic activities.

3.1.3.9 Regional Development Agency (ARD) of Thiès

Decree 2008-517 of 20 May 2008 lays down the organization and functioning modalities for Regional Development Agencies. This support structure for the local authorities is responsible for:

- Supporting and facilitating local development planning;
- Supporting the consistency of interventions between local authorities in a same region and also with the national policies and plans; and

- Monitoring and assessing local development programs and action plans (Art. 2).

It is also provides data and studies for all the Taiba Ndiaye development plans.

3.1.3.10 National Climate Change Committee (COMNACC)

The National Climate Change Committee (COMNACC) created by ministerial Order 1220 MEPN/DEEC dated 7 March 2003 intervenes in all areas relating to the activities considered by the United Nations Framework Agreement on Climate Change and its additional legal instructions, mainly in the transfer of suitable technologies; protection of biodiversity; management of the marine and coastal environment and conservation of wetlands, waste and pollution management; promotion of new and renewable energies; and promotion of energy efficiency in industry. The final two areas are applicable to the Project.

3.1.3.11 Parties involved in the land acquisition procedures

Various national institutions are involved in the framework of land acquisition and securing procedures necessary to the Project. These institutions are listed below.

a) **Directorate for the Registration of Estates and Stamp Duty** which is responsible for stipulating the opening of the public utility survey to start the expropriation phase. The Estates Receiver known as the "investigation commissioner" holds the survey file. The Ministry in charge of estates (in this instance, the Ministry of Economy and Finance), or if appropriate, the Ministry on which the project to be executed depends, establishes a report based on which the declaration of public utility is decreed.

b) **The Land Registry Directorate** is competent for all matters relating to land development and registry. As such, it is responsible for:

   - Land organization, which includes drawing up land and cadastral documents, reparcelling, identifying, delimiting and other operations required for the application of the land and estate regime;
   - Controlling the occupation of administrative housing developments;
   - Organizing and maintaining the land registry, which includes the establishment and storage of cadastral documents, coordination, control and centralization of topographical work carried out by the public services and private bodies, reproducing plans and issuing extracts of plans;
   - Assessing and controlling the rental value of built and non-built properties;
   - Listing and identifying built and non-built properties and their occupants; and
   - Revising assessments and listings.

   The Land Registry Directorate relies especially on the office for housing developments and land affairs and the assessment office to implement its mission.

c) **State-owned Operations Control Commission (CCOD)** is provided for under Article 55 of the State Property Code. The CCOD gives its opinion mainly on the following land issues:

   - The amount of indemnities to be proposed in terms of expropriation for public utility purposes;
   - Recourse to the emergency procedure in terms of expropriation; and

- Regularity and financial conditions of all operations concerning the private domain of the State, local authorities and public institutions.

d) **The Regional Land Assessment Commission** exists in all regions. It is responsible for suggesting values per square meter to be put on registered plots.

e) **The Departmental Maintenance Expenditure Assessment Commission** is set up in each department. Its goal is to determine the value of property affected in all land recovery operations from natural persons or legal entities. It is broken down as follows:

- Prefect of the Méouane department, Chairman;
- Head of the Town Planning department;
- Head of the Land Registry department;
- Head of the Agriculture department;
- Head of the Public Works department;
- Representative of the expropriating structure;
- Representative of the local authorities involved;
- Populations and village associations; and
- All natural persons or legal entities, as assessed by the prefect.

Implementation of the Project requires action by the Departmental Maintenance Expenditure Assessment Commission.

f) **The National Land Assessment Commission** is in charge of assessing the proposals by regional land assessment commissions.

3.2 Supplement regarding the legal and normative framework

3.2.1 Succinct summary of text mentioned in the EIS of 2013.

As presented in the ESIS REV03, Senegal has a whole arsenal of national legislation in terms of protecting and safeguarding the environment. The following points have been sited:

- The law on the Environment Code and the application orders and decrees supplementing it;
- The Health, Water and Forestry Codes;
- The Labor Code and its application orders and decrees; and
- Law 64-46 of 17 June 1964 relating to the national domain and Law 76-67 of 2 July 1976 relating to the expropriation for public utility purposes and its application decree.

Details on the provisions of these laws, decrees, standards and orders are given in the ESIS REV03.

3.2.2 Additional measures

The following additional texts should be added to the provisions listed above:

3.2.2.1 Additional text on Noise

A few relevant points on noise not mentioned in the ESIS REV03 are included below.

Law 2001-01 of 15 January 2001, relating to the Environment Code, Title III, Protection and Enhancement of Receiving Environments, Article L84 relating to sound pollution, which stipulates that "noise emissions are prohibited that are likely to be detrimental to human health, constitute excessive annoyance for the neighborhood or undermine the environment. The natural persons or legal entities behind these emissions must do everything possible to eradicate them. Where warranted by urgency, the Minister for Environment, in conjunction with the Minister for Interior and the Ministry of Armed Forces, must take all enforcement measures intended without consultation to stop the disorder".

Title VI, Article R84 of Decree 2001-82 of 12 April 2001 stipulates that the maximum noise thresholds that should not be exceeded without exposing the human body to harmful consequences are fifty-five (55) to sixty (60) decibels during the day and forty (40) decibels at night".

Decree 2006-1252 of 15 November 2006 setting the minimum prevention requirements for certain physical environmental factors (Chapter IV - Noise). Articles 13 and 14 are of particular significance:

> Art. 13. - The noise exposure level must be as low as possible and remain within an intensity limit that does not run the risk of adversely affecting the health of workers, particularly their hearing. To achieve this result, the employer must, in particular:
>
> - Opt for the least noisy manufacturing processes;
> - Reduce the noise emitted by the professional equipment, especially machinery, at source;
> - Isolate, in specific rooms, noisy equipment that requires a limited number of workers to operate;
> - Avoid diffusing noise from one workshop to the next;
> - Lay out the work premises so that noise reverberating on the glass walls or ceiling is reduced; and
> - Organize the work so that the employees are well away from the noise.
>
> Art. 14. - The daily noise exposure level experienced by a worker throughout his working day must not exceed eighty-five (85) A-weighted decibels (dB(A)). If it is not technically possible to reduce the daily noise exposure level below 85 dB(A), the employer must make suitable individual protection equipment available to employees. The employer must also make sure that this equipment is actually used. This limit of 85 dB(A), which is required for the use of personal protective equipment, may be lowered depending on the nature of work (intellectual or other sorts of work) requiring concentration.

Given the existing noise regulations, the project developer should comply with the following provisions throughout the project:

- *At the nearest villages (targets): the maximum audible thresholds that should not be exceeded will be fifty-five (55) dBA during the day and forty (40) dBA) at night4.*
- *Taking these noise-related values into account in the choice of personal and collective protective equipment and of machinery and equipment in both the construction and operating phases.*

3.2.2.2 Additional decrees to the Water Code

In addition to Law 81-13 of 4 March 1981 relating to the Water Code, the developer should ensure compliance with the various application decrees of the 1981 Water Code, especially:

- **Decree 98-555 of 25 June 1998** on the application of the provisions of the Water Code relating to the construction permits and use of catchment structures.

  Compliance with the provisions of this decree is essential under the Project. This project requires substantial amounts of water, mainly in the construction phase, when making 46 solid concrete foundation blocks of 700 to 800 m35 and creating 34 km of access roads.

- **Decree 98-556 of 25 June 1998** on the application of the provisions of the Water Code relating to the policing of water, both surface water and groundwaters. The decree provides for measures to control water pollution and water regeneration to satisfy certain demands, including those relating to the supply of drinking water to populations, the biological life of the receiving environment and specially the birdlife, the protection of sites and water conservation.

  This decree applies to the Project. All measures to prevent water pollution must be taken.

3.2.2.3 Application Decree 98-164 on the application of the Forestry Code

As a supplement to Law 98-03 of 8 January 1998 on the Forestry Code, the Project should ensure compliance with the provisions set out in application Decree 98-164 of 20 February 1998 prohibiting any excavation altering the soil and forest formations in classified forests, except if authorized by the Minister for Water and Forests.

The developer should ensure compliance with the planned procedure for land clearance and with the ban on depositing rubble, garbage, plastic material, greasy paper, detergents and refuse of any kind in the classified forests and reforestation areas (Art. 44), mainly in the belt of causarinas at Darou Khoudoss (reforestation area located 6 km from the Project site) and the classified forest of Pire Goureye (located 12 km from the Project site).

[4] IFC-EHS guideline - page 53-April 2007
[5] Currently being assessed with the developer

Under the terms of Article L.44, any excavation altering the soil and the forest formations must be authorized by the Chairman of the Regional Council on the advice of the Rural Council involved. However, authorization can only be granted subject to a file including mainly a report from the Water and Forest department, an environmental impact study, the assessment of reinstatement costs for the location, the assessment of taxes to be paid before any trees are felled, a location plan and maps of the vegetation, soils and surface water including runoff water.

The Project should comply with the stipulations of the Code in terms of land clearance, partially-protected species that cannot be felled without authorization from the Water and Forests department (Art. R.61) and fully-protected species that cannot be touched.

The Project is also covered by this decree in the context of land clearance for the release of land taken by the future Project structures (i.e., positioning of access roads and wind turbines).

3.2.2.4 Mining Code and its application decree

The mining of mineral resources in the Senegal sub-soil is governed by Law 2003-36 of 24 November 2003 and its application decree 2004-647 of 17 May 2004.

Article 8, sub-paragraph 1 of Law 2003-36 of 24 November 2003 relating to the Mining Code states that "open cast mining of unconsolidated materials and the gathering of materials intended for the purpose of construction or public works can be authorized temporarily under the decreed conditions". This authorization is only granted for a maximum period of six months, renewable once.

The Project could be concerned by this decree if the developer has to remove materials from local or distant quarries as brought-in supplies (i.e., sand, laterite and gravel).

3.2.2.5 Text on occupational health, hygiene and safety

The following additional texts are not taken into account under the ESIS REV03 and apply to the Project:

- Law 73-37 of 10 March 1997 amended on the Safety Code deals with accidents at work and occupational illnesses in its Title II and gives indications and guidelines to be considered during project implementation;
- Decree 2006-1255 of 15 November 2006 on the legal intervention means of the Labor Inspectorate in the field of occupational health and safety;
- Decree 2006-1259 of 15 November 2006 on the safety sign measures at work during both the construction and the operating phase;
- Decree 94-244 of 07 March 1994 laying down the organization and functioning modalities for occupational health and safety committees;
- General Order 8845 IGTLS: AOF (French West Africa) of 15 November 1955, listing the establishments where unsanitary or dirty work is carried out and the conditions under which shower baths are made available to the personnel in these establishments; and
- Law 2010-03 of 9 April 2010 relating to HIV AIDS.

3.2.2.6 Text on decentralization

The ESIS REV03 only mentions Act III of the decentralization that henceforth only retains two levels of community in Senegal: the municipality and the department.

However, the following prior laws that were used to validate the impact study have not been listed. These laws are as follows:

a) Laws 96-06 and 97-07 of 22 March 1996

It can be considered when taking Act III of the decentralization into account that these decrees transfer part of the authority of regions to the municipalities in terms of environment and management of natural resources (EGRN).

b) Decree 96-1134 of 27 December 1996

This decree relates to the transfer of skills to the regions, municipality and rural communities in terms of environment and management of natural resources. It provides for the rural council to give its opinion throughout the commodo and incommodo survey when an installation must function within the boundaries of a Communauté Rurale (i.e., municipality) (Art. 41).

Under this Project, the municipality of Taiba Ndiaye should, therefore, be involved in the process of constructing the classified installation.

3.2.3 Other measures

3.2.3.1 Regulations for historical monuments, excavations and discoveries

Law 71-12 of 25 September 1971 sets out the regulations for historical monuments, excavations and discoveries. It is supplemented by Decree 73-746 of 8 August 1973.

The first article of this law states "objects which are classified as historical monuments, public or private, movable or immovable property, including natural monuments and sites and old stations or deposits for which the preservation or conservation is of historical, artistic, scientific, legendary or picturesque interest".

Under the Order of 12 September 2007 on publication of the list of classified sites and historical monuments, most sites classified in the department of Tivaouane are religious sites. No site is involved in the Project area. Nevertheless, the stipulations of this code should be taken into account, especially during excavations resulting from the construction of 34 km of access roads.

3.2.3.2 Town Planning Code

The Town Planning Code is not deemed relevant in the ESIS REV03.

The Town Planning Code is a result of Law 2008-42 of 20 August 2008, supplemented by Decree 2009-1450 of 30 December 2009. The regulatory part of the Code contains a chapter III devoted to industrial establishments and a chapter IV on classified establishments. In this context, industrial-use buildings should be built in areas set aside for this purpose by urban development plans or schemes (Art. 359). All plots on which an industrial building is to be built must have a minimum surface area of 500 m2 capable of containing a quadrilateral of 150 m² having excluded yard and reversing requirements and a street façade at least 20 m long. The yard spaces must not be less than 5 m from the side and back separating limits.

The Code provides for a distance between two buildings of no less than half the height of the highest of the two buildings, with a minimum of 5 m. Between two façades, where one at least has windows serving to light or ventilate the working premises, the distance can be no less than the height of the one facing these windows with a minimum of 10 m. The construction surface area must not exceed 60% of the total area of the plot of land on which the construction must be built. If factory chimneys are planned, they should rise at least 10 m above neighboring roofs in a 100 m radius (Art. R.363).

Any authorization to build a classified installation is subject to the prior authorization of departments from the Ministry of Environment and the Ministry of Civil Protection (Art. R.367), indicating all the necessary information as per Article R.368 of the Code. In addition, Article R.38 on the Town Planning Master Plan requires that the graphic documents show the classified installations under the Environment Code.

The project developer will have to apply these stipulations to obtain the construction permit and erect the Project, including the construction of various storage, control or maintenance buildings for the wind turbines and the interconnection station.

3.2.3.3 Sanitation Code

This is the result of Law 2009-24 of 8 July 2009 covering the Sanitation Code. The Sanitation Code deals with the system of industrial effluents in Chapter IV, Section III. Thus, if a public sewer is accessible less than sixty meters from a location producing industrial effluents, the evacuation system from this location must be connected to the public sewer (Art. 52). It is mandatory for any classified installation likely to discharge polluted water to attach to its application for a construction permit a file describing the type of activity, the treatment system that it intends to install to comply with the provisions of this law and the commitment to comply with the clean-up standards laid down by the various codes and their application texts (Art. 53).

All provisions for managing industrial water (Art. R.19-26) are detailed in application Decree 2011-245 of 17 February 2011 of the law on the Sanitation Code. Under this Project, all these sanitation obligations should be respected by the developer in dealing with industrial effluents in operating and maintenance phases (if there are collection pits or a treatment or pre-treatment system).

3.2.3.4 Order and decrees relating to the chemical risks

Decree 2006-1257 of 15 November 2006 setting the minimum requirements for protection against chemical risks.

The Project will use a variety of chemical products during the construction and operating phases. Measures to protect the personnel from the risks inherent to the use of these products must be introduced and comply with the stipulations of the decree mentioned above.

3.2.3.5 Text relating to the land

Land regime

The land regime in Senegal is organized by various texts that determine three land categories: national property, State-owned property and privately-owned property.In addition to
Law 64-46 of 17 June 1964 relating to national property and Law 76-66 of 2 July 1976 on the State Property Code (CDE) already quoted in EIS REV03, the following legislative texts must also be considered:

Law 2002-01 of 10 January 2002 mainly repealing Chapter IV of Law 98-29 of 14 April 1998 on the cleanliness of generation, transmission and distribution installations, that lays out in its Article 29 (cleanliness system): "the following are owned by the State:

- Existing generation facilities on the effective date of this Act and the property rights attached to them acquired by SENELEC as part of the operation of the public electricity grid;
- Public electricity transmission and distribution sub-stations and the property rights attached to them and, in general, the existing structures on the effective date of this Act and to be constructed by SENELEC, that it requires to carry out its activity of transmission and supply of electric power; and
- The existing power lines, including their supports, anchoring devices, supply lines, coupling or adaptation equipment and their outbuildings.

Law 2011-07 of 30 March 2011 on the land ownership regime and organizing the privately-owned property that is constituted of registered land belonging to private individuals. This law repeals the decree of 26 July 1932 reorganizing the property system in French West Africa and allows a land title to be obtained for some land.

Law 76-67 of 2 July 1976 relating to expropriation for public utility purposes.

3.2.4 Supplement to the international and community legal framework

3.2.4.1 International legal framework

The ESIS REV03 takes into account the international conventions ratified by Senegal and which, therefore, are part of applicable legal texts. The ESIS REV03 also describes all of the International Finance Corporation (IFC) Performance Standards (six are applicable) and applicable World Bank Environmental, Health and Safety (EHS) Guidelines, which are requirements of international financial institutions. As stated in the ESIS REV03, the Project should comply with the requirements of international financial institutions and especially the applicable IFC Performance Standards (1-6) and World Bank EHS Guidelines.

The Equator Principles III (2013) also apply to the Project.

It is important to add the laws and conventions below to the conventions mentioned in the ESIS REV03, as some are ratified by Senegal and others are GIIPs required by financial institutions:

a) Law 2004-27 of 26 July 2004

It authorizes the President of the Republic to ratify the African Energy Commission Convention adopted in Lusaka (Zambia).

The aim of this convention is to allow the African States to remedy serious power shortages that hamper their industrial development efforts.

The convention states in Article 4(m) that it must assist in the development, operation and use of new and renewable energy sources.

The Project is working in this direction by participating in the reduction of the energy gap with clean energy.

b) Applicable ILO conventions

Senegal has ratified several conventions of the International Labour Organization (ILO).

In accordance with the requirements of IFC PS02, the following conventions are applicable:

- ILO conventions: 87, 98, 29, 105, 138, 182, 100 and 111;
- UN Convention on the Rights of the Child (Article 32.1) and on the protection of rights of all migrant workers and their families.

The Project will introduce a human resources policy consistent with the size of the project before work starts. This policy will comply with the country's requirements and the IFC PS02 guidelines.

3.2.4.2 Community framework (WAEMU)

Various texts relating to the energy and environment sector have been adopted under the community framework and are part of the legal arsenal to be taken into account in the execution of the Project. These texts are as follows:

- The additional Act 04-2001 of 19 December 2001 on adopting the community policy of the West African Economic and Monetary Union (WAEMU). The objectives of this act are to:
  - Ensure the safety of the Union's energy supplies;
  - Promote and ensure optimum management of the Union's energy resources by systematic interconnection of grids and building community structures;
  - Promote renewable energies;
  - Promote energy efficiency; and
  - Develop and improve access by rural populations in the Union to energy services and help to protect the environment.

- Decision 02/2009/CM/WAEMU dated 27 March 2009 on creating, organizing and operating the Regional Committee of Regulators. This decision is responsible for assisting the Commission to prepare and apply community texts on policy harmonization, legislation, regulations and regulation practices in the energy sector. The Committee thus provides support, mainly to monitor the application of actions by the Union in the energy sector and to coordinate and cooperate in managing infrastructures and supplies of energy services in the Union.
- Decision 6-2009 CM-WAEMU dated 25 September 2009 on adopting the WAEMU strategy entitled "Regional Initiative for Sustainable Energy" (RISE). This decision is a WAEMU initiative to provide appropriate responses to the energy crisis in the member States by entering into a strategic approach towards finding optimum and sustainable solutions in the medium and long term, namely building up production capacities and ultimately using alternative energy sources.
- Decision 07/2009/CM/WAEMU dated 25 September 2009 on the implementation modalities of the strategy entitled "Regional Initiative for Sustainable Energy" (RISE).
- Decision 08/2009/CM/WAEMU of 25 September 2009 on creating the Energy Development Fund (EDF).
- Decision 02/2012/CM/WAEMU of 10 May 2012 on creating, organizing and operating the Regional Committee of producers, transmission companies and distributors of electric power of the WAEMU member States.
- Decision A/DEC.3/5/82 of 29 May 1982 of the Conference of Heads of State and Government of the Economic Community of West African States (ECOWAS) relating to the ECOWAS energy policy.

Law 2006-15 of 30 June 2003 authorizing the President of the Republic to ratify the ECOWAS Protocol A-P4-1-03 on Energy, adopted in Dakar on 21 January 2003. The aim is to establish a legal framework to promote long-term cooperation in the field of energy and is founded on complementarities and mutual advantages, with a view to increasing investment in the energy sector and expanding energy trade in West Africa. Article 19 of the Protocol on the environment invites each contracting party to "reduce to a minimum, in an economically efficient manner, any impact harmful to the environment, produced inside or outside its area by all energy cycle operations conduced in this area, ensuring compliance with safety standards".

4 Area of Influence

This chapter describes the areas of influence (or study areas) and the villages, as well as the persons and properties affected by the Project within these various areas of influence.

4.1 Areas of influence and villages impacted

4.1.1 Definition of areas of influence

The Project's environmental and social impact assessment requires a definition of its areas of influence in accordance with the recommendations of IFC PS01.

Three areas of influence have been defined under the ESIS REV03. These areas have been first defined in accordance with the stipulations taken from the Guide for Environmental Impact Studies of Wind Farms (Definition of study areas) from the French Ministry of Ecology and Energy, Sustainable Development and the Sea. The three areas are:

- The ***immediate*** area of influence;
- The ***close*** area of influence (area located near clusters of wind turbines and including the transport routes); and
- The ***distant*** study area (that incorporates the municipalities around the project).

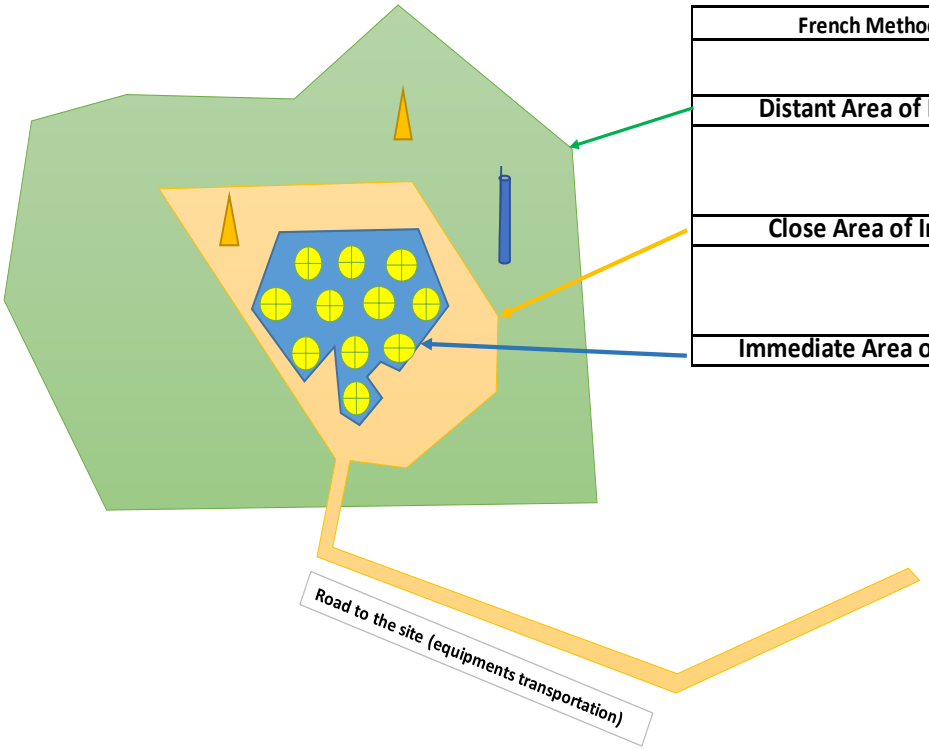
To take into account modifications to the Project (i.e., change in the number and location of wind turbines) and recommendations of IFC PS01, the limits of each of these areas have been redefined so as to consider all areas likely to be affected by the Project, the related installations and the areas potentially affected by cumulative impacts.

Note that only two areas of influence are defined under IFC PS01:

- The ***direct*** area of ***influence***: this area groups the immediate and close areas of influence (as defined under the French methodology),
- The ***indirect*** area of ***influence***: this area can be assimilated with the distance study area(as defined in the French methodology).

To maintain consistency with the ESIS REV03, the areas of influence listed below used the terminology from the French methodology. The definition of these three areas nevertheless matches the recommendations of IFC PS01. (See Figure 10 below for the cross-referencing between the terminologies for the French standards (NF) and IFC standards).

CORRELATION OF THE AREA OF INFLUENCE DEFINITIONS BETWEEN THE FRENCH METHODOLOGY AND THE IFC PERFORMANCE STANDARD PS01



French Methodology	IFC PS01
Distant Area of Influence	Indirect Area of Influence
Close Area of Influence	Direct Area of Influence
Immediate Area of Influence	

Industrial facilities

Village

Wind turbine

4.1.1.1 The immediate area of influence

The definition of the immediate area of influence has taken into account the footprint of main structures (i.e, positioning of future wind turbines) and the surface area where hazardous phenomena are likely to occur. This surface area has been assessed in accordance with the hazard study by Vestas, which highlighted the following hazards:

- Wind turbine collapse (24% occurrence);
- Breaking blade (38% occurrence);
- Falling and breaking blade taking off (5%); and
- Fire (33%).

These data and the wind turbine model considered under this project determined the direct impact surface areas on the ground included in Table 1.

Table 1: Impact area vs adverse events

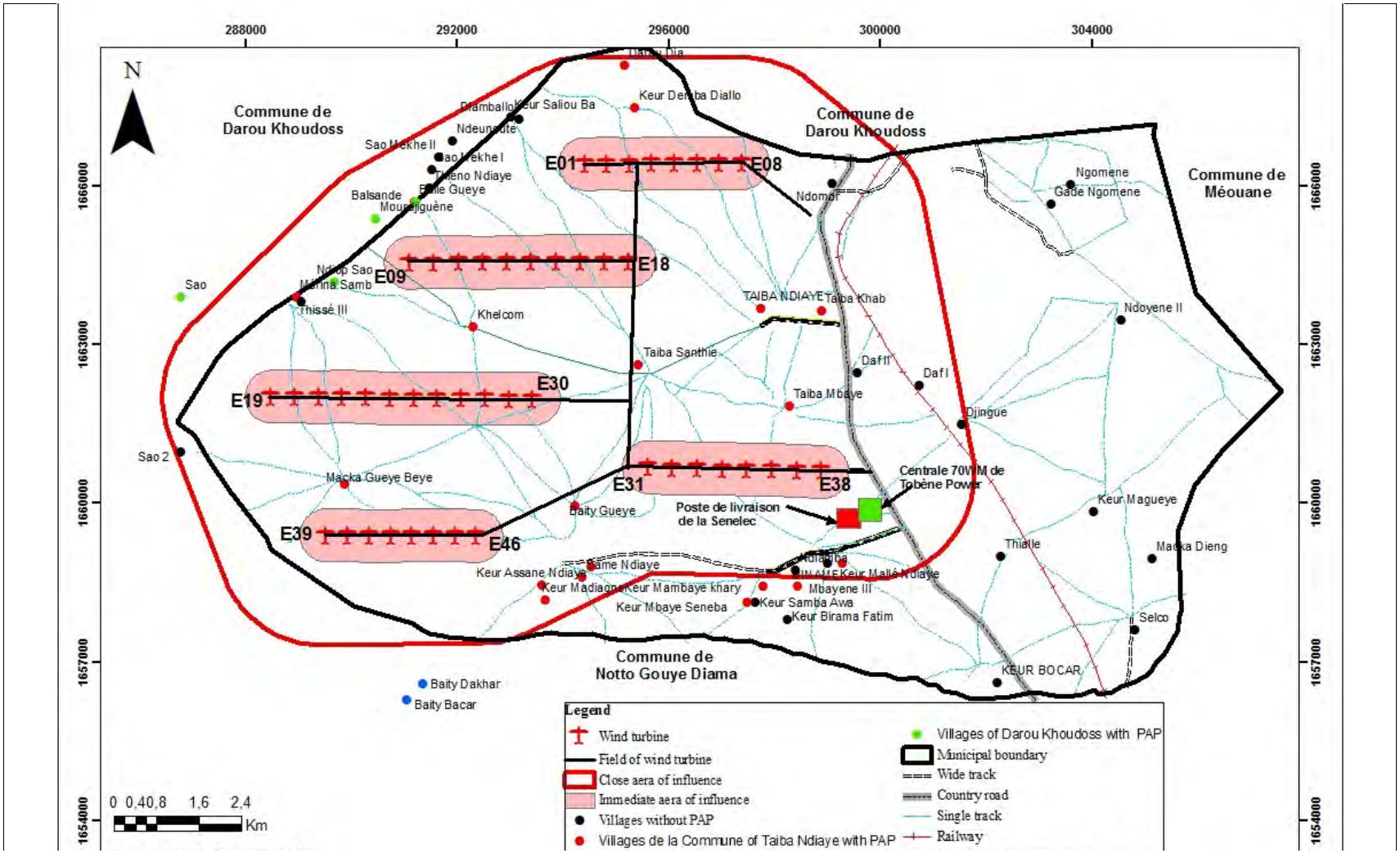
Adverse Events	Collapse	Component falling from the wind turbine	Blade or piece of blade flying through the air over the area
Direct impact area in m^2	922 m²	124 m²	114 m²
Reach	R= 180 m	R= 126 m	R= 500 m (max.)

As shown in **Error! Reference source not found.** below, and taking into account distances for the various scenarios considered, the direct impact areas correspond to distances reached of between 180 m and 500 m.

To take account of all scenarios studied and in accordance with the stipulations of the Ministry of Environment of the State of Senegal relating to industrial units and recommending compliance with a safety distance of 500 m, the immediate area of influence has been calculated based on a reach of 500 m around each wind turbine.

Ultimately, the surface area of each immediate area of influence is estimated to be 2 200 ha or 22 km².

Error! Reference source not found. below shows the immediate areas of influence in five clusters of wind turbines. Note that there are no villages in the Project's ***immediate*** area of ***influence.*** A small number of people will only be present periodically (i.e., during mango and other crop cultivation, soil preparation and picking periods, and also for cattle grazing).


288000
292000
296000
300000
304000
1666000
1663000
1660000
1657000
1654000
N
Commune de Darou Khoudoss
Commune de Darou Khoudoss
Commune de Méouane
Commune de Notto Gouye Diama
Keur Saliou Ba
Keur Demba Diallo
Ndeungoute
Sao Mekhe II
Sao Mekhe I
Balsande
Mourdjguène
E01
E08
E09
E18
E19
E30
E31
E38
E39
E46
Ngomene
Gade Ngomene
Ndomor
Sao
Thissé III
Khelcom
TAIBA NDIAYE
Taiba Khab
Ndoyene II
Taiba Santhie
Daf II
Daf I
Taiba Mbaye
Djingue
Sao 2
Macka Gueye Beye
Baity Gueye
Centrale 70MW de Tobène Power
Poste de livraison de la Senelec
Keur Magueye
Thiatle
Macka Dieng
Keur Assane Ndiaye
Keur Mamba Ndiaye
Keur Mallé Ndiaye
Keur Madiagne
Keur Mambaye khary
Mbayene III
Keur Mbaye Seneba
Keur Samba Awa
Keur Birama Fatim
Selco
KEUR BOCAR
Baity Dakhar
Baity Bacar
0 0,40,8 1,6 2,4
Km
Legend
Wind turbine
Field of wind turbine
Close aera of influence
Immediate aera of influence
Villages without PAP
Villages de la Commune of Taiba Ndiaye with PAP
Villages of Darou Khoudoss with PAP
Municipal boundary
Wide track
Country road
Single track
Railway

4.1.1.2 Close area of influence

Sound, visual and other effects and the risks from the construction of wind turbine clusters and other infrastructures are potentially present or perceptible in this area. The area includes the villages in a radius of 2 km around wind turbine clusters and also the transport routes.

The area is outlined in red on **Error! Reference source not found.**. It encompasses five wind turbine clusters, the access roads and the cultivation lands.

This close area of influence includes 33 villages. Table 2 below gives the characteristics of these villages in relation to the positioning of wind turbines, the municipality to which they belong and their status.

The close area of influence (DAI as per IFC PS01) also includes the roads between Dakar and the Project site that will be used for the transportation of equipment, as well as the roads between the quarries and the Project site (see **Error! Reference source not found.**).

Table 2: Villages in the close area of influence and their distance from the closest wind turbines

ID	Village	Closest Wind turbine	Distance in km	Municipality	Status (Presence of PAP)
1	Diamballo	E01	1,4	Darou Khoudoss	No
2	Keur Saliou BA	E01	1,6	Taiba NDIAYE	No
3	Ndeunoute	E01	1,7	Darou Khoudoss	No
4	Keur Demba Diallo	E03	1	Taiba NDIAYE	Yes
5	Darou Dia	E03	1,8	Taiba NDIAYE	Yes
6	Ndomor	E08	1,5	Taiba NDIAYE	No
7	Taiba Khab	E38	3	Taiba NDIAYE	Yes
8	Balsandre (Bal Samb)	E09	0,96	Darou Khoudoss	Yes
9	Mourdjiguene	E09	0,826	Darou Khoudoss	Yes
10	Baal Gueye	E09	1	Taiba NDIAYE	Yes
11	NDiop Sao	E09	1,2	Darou Khoudoss	Yes
12	Thierno Ndiaye	E10	1,3	Taiba NDIAYE	No
13	Sao Mékhé 1	E10	1,6	Darou Khoudoss	No
14	Sao Mékhé 2	E11	1,7	Darou Khoudoss	No
15	Taiba Ndiaye	E18	2,6	Taiba NDIAYE	Yes
16	Mérina Samb	E19	1,8	Taiba NDIAYE	Yes
17	Sao2	E19	1,7	Darou Khoudoss	No
18	Thissé III	E19	1,8	Taiba NDIAYE	Yes
19	Khelcom (Baal Diop)	E12	1,04	Taiba NDIAYE	Yes

Table 2: Villages in the close area of influence and their distance from the closest wind turbines

ID	Village	Closest Wind turbine	Distance in km	Municipality	Status (Presence of PAP)
20	Baïty Guèye	E31	1,4	Taiba NDIAYE	Yes
21	Taiba Santhie	E31	1,4	Taiba NDIAYE	Yes
22	Baïty Ndiaye	E31	1,9	Taiba NDIAYE	Yes
23	Taiba Mbaye	E37	0,86	Taiba NDIAYE	Yes
24	Ndiamba	E37	1,6	Taiba NDIAYE	Yes
25	Macka Gueye Bèye	E40	0,96	Taiba NDIAYE	Yes
26	Keur Mallé Ndiaye	E38	1,2	Taiba NDIAYE	Yes
27	Miname	E38	1,2	Taiba NDIAYE	No
28	Daf2	E38	1,8	Taiba NDIAYE	No
29	Daf1	E38	1,9	Taiba NDIAYE	No
30	Djingue	E38	2,5	Taiba NDIAYE	No
31	Keur Assane Ndiaye	E46	1,2	Taiba NDIAYE	Yes
32	Keur Madiagne	E46	1,7	Taiba NDIAYE	Yes
33	Same Ndiaye	E46	1,9	Taiba NDIAYE	Yes

4.1.1.3 Extended area of influence

The effects of the Project are potentially perceptible in this area. The area takes account of indirect effects and areas potentially affected by the cumulative impacts resulting from the cumulative effect on the areas or resources used. For this project, the area corresponds to a radius of 15 km around the Project area.

The extended area of influence encompasses the municipalities of Taiba Ndiaye, Darou Khoudoss, Noto Gouye Diama, Méouane, Pire Goureye, Cherif Lo and Mont Roland.

The area is shown on **Error! Reference source not found.**.

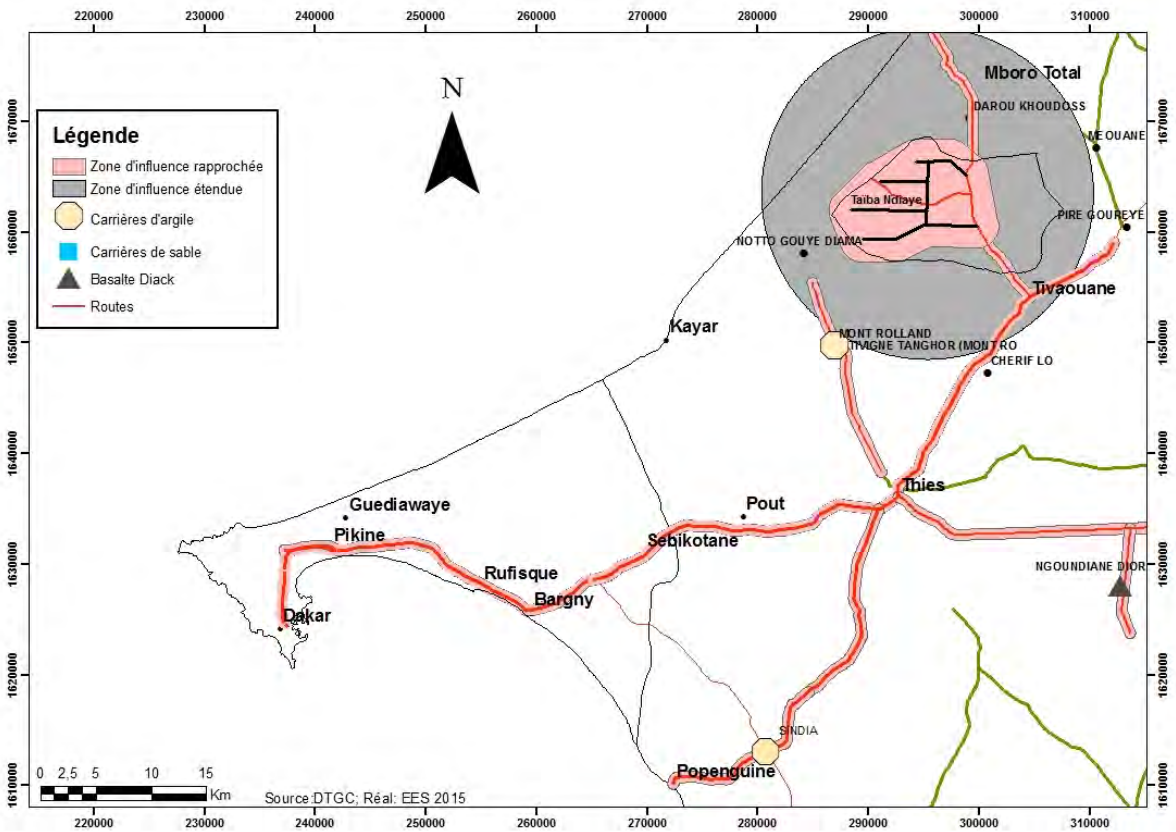


Figure 12 : Municipalities within the extended area of influence plus roads between Dakar and the site for transporting equipment – RN, departmental roads D704 and D704 C

This area is also home to the following industries and infrastructures:

- Part of the Grande Côte Operations (GCO) property that runs for 106 km along the coast. This property relates to the company that mines zircon and ilmenite along the large coast (mine extraction has started near Diogo).
- The Senegal chemical industries (ICS).
- The Senelec interconnection station (Tobène).

In addition, the following projects are currently under development:

- A project for a Tobène Power combustion plant running on heavy fuel oil (70 MW). The Power plant is currently under construction.
- A project for an African Energy coal-fired plant of 360 MW located at Darou Khoudoss. The proponent has already signed the Power Purchase Agreement (PPA) with Senelec.
- A project of phosphoric acid production by the company African Investment Group. The site remains to be determined with the DEEC and the directorate of Mines.

The distance between these existing and future industrial units and the closest wind turbines are given in Table 3 below.

Table 3: Distance between the Project and the existing or future industrial infrastructures

Projects	Distance from the wind turbines (km)	Status
Industrial units and projects within the extended study area		
ICS property	6	Operational
MDL property	2	Operational
Senelec power sub-station	1.21	Operational
Africa Energy coal-fired plant	2.4	Work not started
Tobène Power plant	1.09	Under construction

4.1.2 Identification of villages impacted in the different areas of influence

Based on the cadastre rural report issued by Labosol in September 2015 regarding the assessment of the extent of land loss per affected person in the local communities impacted by the PETN Project (see Annex E), 26[6] villages and hamlets are home to people engaged in livelihood-related activities which are likely to be impacted by the Project in the installation area, these people are referred to in this ESIS Addendum as Persons Affected by the Project (PAP). The main activities PAP engage in on the Project site are agricultural production and cattle grazing.

In addition to identifying the PAP, Labosol has determined the number of properties within the Project site where PAP activity occurs (listed in Table 4 and Table 5), and these properties are referred to in this ESIS Addendum as Properties Impacted by the Project (PIP).

Based on the cadastre rural report (see Annex E), a total of 341 PAP and 459 PIP were identified. The difference between both numbers is explained by the fact that some PAP own more than one property that will be impacted by the Project. Detailed information regarding the extent of the Project impact on PAP livelihood is presented in chapter 10.

The villages in the three areas of influence are listed below:

4.1.2.1 Villages in the immediate area of influence

No villages are located in the immediate area of influence.

[6] In the Labosol report, Khelcom and Bal Diop are one and the same village. There are 26 villaes and some hamlets (without names) See Table in Annex G.

4.1.2.2 Villages with PAP in the close area of influence (direct)

Villages that are home to PAP within the close area of influence are located in the municipalities of Taiba Ndiaye (sixteen villages) and Darou Khoudoss (four villages).

4.1.2.3 Villages with PAP in the extended area of influence (indirect)

Villages that are home to PAP within the extended area of influence are located in the municipalities of Taiba Ndiaye (three), Noto Gouye Diama (two) and Darou Khoudoss (one). This involves:

- For the municipality of Taiba Ndiaye: Keur Mambaye Khary, Keur Mbaye Seneba and Mbayene III;
- For the municipality of Noto Gouye Diama: Baïty Bacar and Baity Dakhar; and
- For the municipality of Darou Khoudoss: Sao1.

Error! Reference source not found. below shows the spatial distribution of villages and PAP in the extended area of influence.

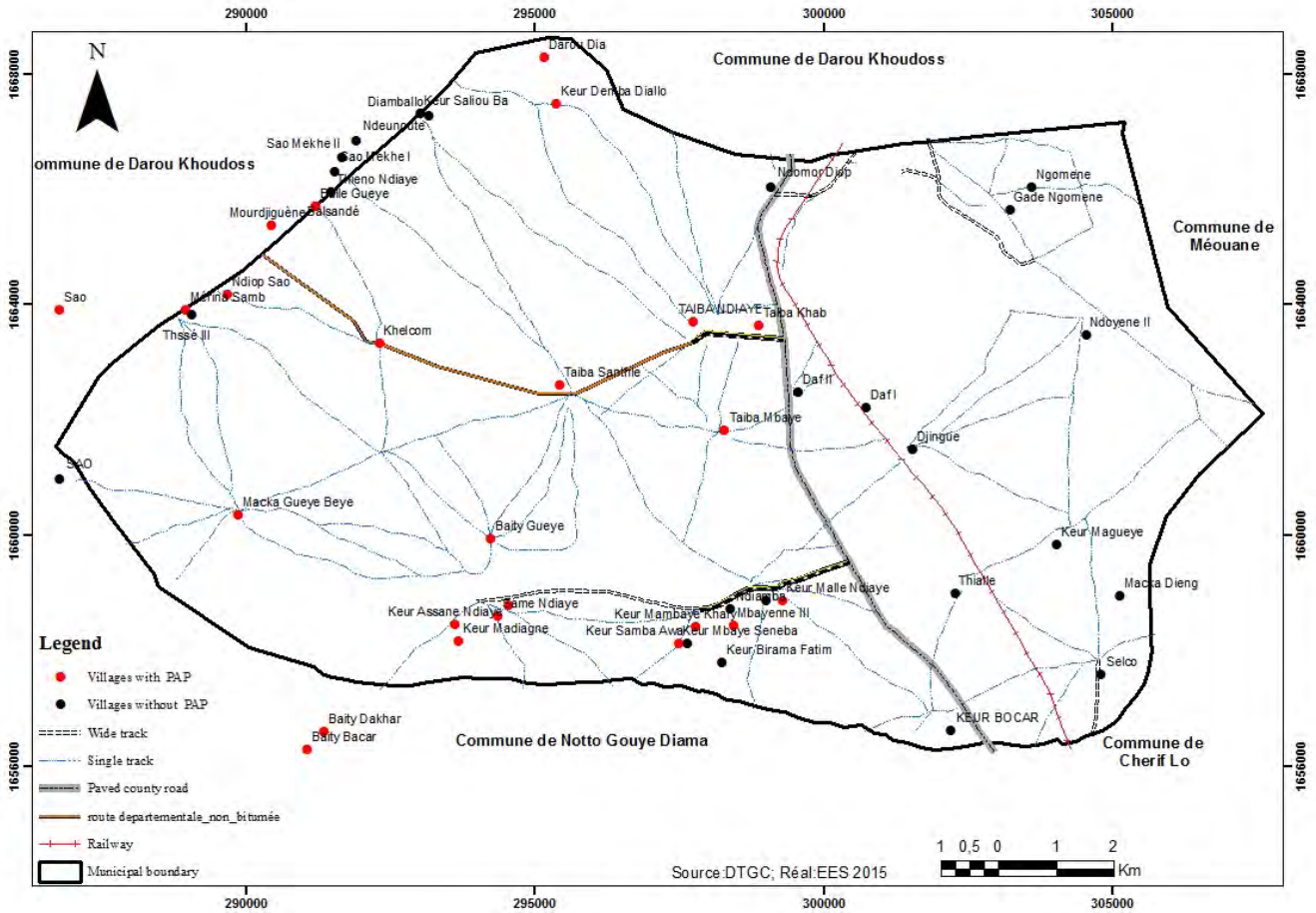


Figure 13 : Villages home to PAP within the Project area

4.1.2.4 People impacted per village in the Municipality of Taiba Ndiaye

The Municipality of Taiba Ndiaye includes sixteen villages and hamlets in the close area and three villages in the extended area of influence where PAP have been listed.

The PAP total 309 (i.e., 91 % of PAP), and are broken down per village as indicated in Table 4 below:

Table 4: Taiba Ndiaye villages home to PAP

No.	Villages	Number of PAP
1	Baïty Gueye	17
2	Baïty Ndiaye	5
3	Bal Diop	11
4	Bal Gueye	2
5	Darou Dia	2
6	Keur Assane Ndiaye	7
7	Keur Demba	1
8	Keur Madiagne	17
9	Keur Mallé	1
10	Keur Mambaye Khary	1
11	Keur Mbaye Seneba	2
12	Maka Gaye Beye	8
13	Mbayene 3	28
14	Sam Ndiaye	2
15	Taiba Khab	2
16	Taiba Mbaye	52
17	TaibaNndiaye	62
18	Taiba Santhie	65
19	Khelcom	24
20	Hamlets	0
Total		309

4.1.2.5 Villages and people impacted outside the Municipality of Taiba Ndiaye

The other seven villages that are home to PAP are split between the municipalities of Noto Gouye Diama and Darou Khoudoss and belong to the extended area of influence (see Table 5 below). They number 32 out of 341 PAP (i.e., around 9 % of PAP).

Table 5: Villages outside Taiba Ndiaye home to PAP

No.	Villages	PAP	Municipality
1	Baïty Bacar	6	Noto Gouye Diama
2	Baïty Dakhar	6	Noto Gouye Diama
3	Bal sand	3	Darou Khoudoss
4	Mbourdjiguene	1	Darou Khoudoss
5	Merina samb	1	Darou Khoudoss
6	Ndiop sao	4	Darou Khoudoss
7	Sao	11	Darou Khoudoss
	TOTAL	32	

4.1.2.6 Villages in the Municipality of Taiba Ndiaye not directly impacted

Seventeen (17) villages in the municipality of Taiba Ndiaye are not home to PAP but will benefit indirectly from the Project (e.g., employment, impact of taxes to be paid by PETN, use of access roads).The list is provided in Table 6 below:

Table 6: Villages of Taiba Ndiaye in the direct and indirect areas of influence and without PAP

No.	Villages	Area of influence
1	Daf1	direct
2	Daf2	direct
3	Djingue	direct
4	Keur Saliou Ba	direct
5	Miname	direct
6	Ndiamba	direct
7	Ndomor	direct
8	Thierno Ndiaye	direct
9	Gade	indirect
10	Keur Birama Fatim	indirect
11	Keur Magueye	indirect
12	Keur Samba Awa	indirect
13	Maka Dieng	indirect
14	Ndame LO	indirect
15	Ndoyène Bar (Ndoyène II)	indirect
16	Ngoméne,	indirect
17	Thiallé	indirect

5 Socio-economic Baselines Conditions

The aim of this chapter is to complete the basic socio-economic data presented in ESIS REV03 of October 2014. Although basic national and regional socio-economic data are well documented in the ESIS REV03 and still valid, little information is given at the local level.

The additional information provided in this chapter is taken from the 2013-2018 Local Development Plan (PLD) prepared in April 2013. The PLD results from the collaboration between the Francophone Local Development Support Programme (PROFADEL) run by the International Organization of the Francophonie (OIF) with technical support from the Higher Local Development Institute (ISDL) and the Thiès Regional Development Agency (ARD). The PLD was prepared to serve as a rural community planning tool for the Municipality of Taiba Ndiaye and has the following objectives:

- to support and facilitate local development planning;
- to support the consistency of interventions between local authorities in the same region and also with the national strategies of the Government of Senegal for development of the country; and
- to monitor and assess local development programs and action plans.

The 2003 data presented in this section was provided by the Méouane Local Development Support Centre (CADL) and was includedin the Taiba Ndiaye PLD of 2003.

The 2011 data was obtained from the administrative census of the population conducted in July 2011 and developed for the CADL of Méouane.

5.1 Geographical location

As previously mentioned, the Municipality of Taiba Ndiaye is located in the region of Thiès, department of Tivaouane, district of Méouane and includes 357 villages following the inclusion of the villages of Selco and Keur Bacar in the department of Tivaouane.

The Municipality of Taiba Ndiaye covers an area of 155 km² and had an estimated population of 28,962 in 2012[8], i.e. a density of 187 inhabitants per km² (source: the administrative census)[9].

5.1.1 Location of PAP

There are 309 Persons[10] Affected by the Project (PAP) living in 19 of the 35 villages of the Municipality of Taiba Ndiaye. 32 PAPs living in villages belonging to the municipalities of Darou Khoudoss and Noto Gouye Diama also have fields in the Project's DAI.

91% of the total PAP are living in the 19 villages within the Municipality of Taiba N'Diaye, however 100% of the affected property is located within the confines of the municipality of

[7] Taiba Ndiaye PLD reference Period 2013-2018 (April 2013), page 9

[8] During this census, the villages of Selco and Keur Bocar were still part of the Municipality of Taiba Ndiaye

[9] During this census, the villages of Selco and Keur Bocar were still part of the Municipality of Taiba Ndiaye

[10] According to the most recent data, presented in the Cadastre Rural Report From the Labosol Company

Taiba Ndiaye. 16 of the villages are located in the Project DAI and 3 in the IAI. The others villages of Taiba N'Diaye (which do not have any PAP) are located either in the DAI (8) or in the IAI (9).

For PAP living in the IAI: in addition to the villages that are home to PAP within the Municipality of Taiba N'Diaye (three), the IAI includes PAP who are living in the municipalities of Noto Gouye Diama (two) and Darou Khoudoss (one). These six villages are identified below:

- Three for theMunicipality of Taiba Ndiaye: Keur Mambaye Khary, Keur Mbaye Seneba and Mbayene III;
- Two for the municipality of Noto Gouye Diama: Baïty Bacar and Baity Dakhar; and
- One for the municipality of Darou Khoudoss: Sao1.

For further information, see data detailed in the Cadastre Rural Report produced by Labosol (see Annex E).

5.1.2 Population evolution between 2003 and 2011

Given the fact that the Municipality of Taiba Ndiaye is home to 91 of the PAPs, data from this municipality were used to describe population demography and other socioeconomic characteristics within the DAI.

The population growth rate in the villages in the Project's DAI has been assessed in accordance with the available data (see CADL data of 2003 and PLD data of 2012).

Demographic data for the population located within the DAI and for the Municipality of Taiba Ndiaye are included in Table 7 below.

Table 7: Population evolution between 2003 and 2011			
Population evolution in the Project area between 2003 and 2011			
Category	**2003**	**2011**	**average annual growth rate**
Men	10 311	12 889	2,8%
Women	11 260	12 666	1,5%
TOTAL	21 571	25 555	2,1%
Population evolution in the Municipality between 2003 and 2012			
Category	**2003**	**2012**	**average annual growth rate**
Men and women	21 571	28 962[11]	2,4%[12]

[11] This value includes the population of Selco and Keur Bocar

[12] This value takes into account deduction of the population of Selco and Tivaouane

During this period (between 2003 and 2012), the population in the Municipality of Taiba Ndiaye grew by about 2.4 %, as compared with the national demographic growth rate of close to 3% per year.

Table 8 below provides the results of the population census of the Municipality of Taiba Ndiaye during the execution of the PLD in 2013.

Table 8: Taiba Ndiaye villages (Source : 2013 Taiba Ndiaye PLD – 2013-2018 Action Plan)

Areas	Village	Number of villages	Total population
Area of Niayes	Keur Madiagne, Keur Assane Ndiaye, Baity Ndiaye, Baity Gueye, Sam Ndiaye, Khelcom, Maka Gueye Bèye, Baal Gueye, Thiéno Ndiaye, Keur Demba Diallo, Keur Saliou Ba, Darou Dia and Ndame LO	13	5,885
Industrial area	Gade, Daf1, Daf2, Ndomor, Djingué, Ngoméne, Maka Dieng and Keur Magueye	8	7,734
Continental area	Taiba Ndiaye, Taiba Mbaye, Taiba Santhie, Taiba Khab, Mbayene 3, Keur Mbaye Sénéba, Keur Birama Fatim, Minam, Keur Mallé Ndiaye, Keur Mambaye Khary, Keur Samba Awa, Ndiamba, **Keur Bacar, Selco** and Thiallé. Ndoyène Bar	16	18,243[13]
	TOTAL	**37**	**28,962**

Table 9 below, groups the demographic data for the Project area between 2003 and 2011 and illustrates the population evolution during this period.

[13] In this census, the villages of Selco and Keur Bocar were still part of the Municipality of Taiba Ndiaye

Table 9: Population distribution per village inhabited by the majority of PAP

		Men				Women				Totals per village			
	Village	2003	2011	Simple growth rate 2003-2011	Annual growth rate 2003-2011	2003	2011	Simple growth rate 2003-2011	Annual growth rate 2003-2011	2003	2011	Simple growth rate 2003-2011	Annual growth rate 2003-2011
1	Baity Gueye	210	363	72,9%	7,1%	202	354	75,2%	7,3%	412	717	74,0%	7,2%
2	Baity Ndiaye	279	385	38,0%	4,1%	299	395	32,1%	3,5%	578	780	34,9%	3,8%
3	Ball Gueye	100	82	-18,0%	-2,5%	5	82	1540,0%	41,9%	105	164	56,2%	5,7%
4	Daff Bambara	100	123	23,0%	2,6%	89	118	32,6%	3,6%	189	241	27,5%	3,1%
5	Daff Wolof	97	120	23,7%	2,7%	81	124	53,1%	5,5%	178	244	37,1%	4,0%
6	Darou Dia	141	187	32,6%	3,6%	137	177	29,2%	3,3%	278	364	30,9%	3,4%
7	Djingué	393	488	24,2%	2,7%	388	454	17,0%	2,0%	781	942	20,6%	2,4%
8	Gade	172	205	19,2%	2,2%	137	134	-2,2%	-0,3%	309	339	9,7%	1,2%
9	Keur Assane Ndiaye	117	148	26,5%	3,0%	99	155	56,6%	5,8%	216	303	40,3%	4,3%
10	Keur Birama Fatim	25	31	24,0%	2,7%	20	38	90,0%	8,4%	45	69	53,3%	5,5%
11	Keur Demba Diallo	36	48	33,3%	3,7%	32	41	28,1%	3,1%	68	89	30,9%	3,4%
12	Keur Madiagne	432	663	53,5%	5,5%	394	676	71,6%	7,0%	826	1339	62,1%	6,2%
13	Keur Maguéye	200	257	28,5%	3,2%	185	223	20,5%	2,4%	385	480	24,7%	2,8%
14	Keur Mallé	455	544	19,6%	2,3%	456	507	11,2%	1,3%	911	1051	15,4%	1,8%
15	Keur Mambaye Khary	179	228	27,4%	3,1%	160	204	27,5%	3,1%	339	432	27,4%	3,1%

		Men				Women				Totals per village			
	Village	2003	2011	Simple growth rate 2003-2011	Annual growth rate 2003-2011	2003	2011	Simple growth rate 2003-2011	Annual growth rate 2003-2011	2003	2011	Simple growth rate 2003-2011	Annual growth rate 2003-2011
18	Keur Samba Awa	206	263	27,7%	3,1%	178	248	39,3%	4,2%	384	511	33,1%	3,6%
19	Khelcom	382	472	23,6%	2,7%	412	482	17,0%	2,0%	794	954	20,2%	2,3%
20	Maka Dieng	175	230	31,4%	3,5%	175	225	28,6%	3,2%	350	455	30,0%	3,3%
21	Maka Gueye Béye	234	281	20,1%	2,3%	209	246	17,7%	2,1%	443	527	19,0%	2,2%
22	Mbayene 3	695	789	13,5%	1,6%	605	839	38,7%	4,2%	1300	1628	25,2%	2,9%
23	Minam	402	472	17,4%	2,0%	386	496	28,5%	3,2%	788	968	22,8%	2,6%
24	Ndam Lô	49	57	16,3%	1,9%	43	56	30,2%	3,4%	92	113	22,8%	2,6%
25	Ndiamba	105	129	22,9%	2,6%	98	134	36,7%	4,0%	203	263	29,6%	3,3%
26	Ngoméne	195	243	24,6%	2,8%	177	235	32,8%	3,6%	372	478	28,5%	3,2%
27	Ndomor	690	787	14,1%	1,7%	694	768	10,7%	1,3%	1384	1555	12,4%	1,5%
28	Ndoyene	173	143	-17,3%	-2,4%	143	135	-5,6%	-0,7%	316	278	-12,0%	-1,6%
29	Sam Ndiaye	63	106	68,3%	6,7%	45	91	102,2%	9,2%	108	197	82,4%	7,8%

		Men				Women				Totals per village			
	Village	**2003**	**2011**	**Simple growth rate 2003-2011**	**Annual growth rate 2003-2011**	**2003**	**2011**	**Simple growth rate 2003-2011**	**Annual growth rate 2003-2011**	**2003**	**2011**	**Simple growth rate 2003-2011**	**Annual growth rate 2003-2011**
30	Taïba Khab	77	126	63,6%	6,3%	74	128	73,0%	7,1%	151	254	68,2%	6,7%
31	Taïba Mbaye	1489	1726	15,9%	1,9%	1362	1706	25,3%	2,9%	2851	3432	20,4%	2,3%
32	Taiba Ndiaye	944	1381	46,3%	4,9%	2577	1470	-43,0%	-6,8%	3521	2851	-19,0%	-2,6%
33	Taïba Santhie	587	638	8,7%	1,0%	526	599	13,9%	1,6%	1113	1237	11,1%	1,3%
34	Thiallé	531	647	21,8%	2,5%	524	642	22,5%	2,6%	1055	1289	22,2%	2,5%
35	Thierno Ndiaye	97	162	67,0%	6,6%	100	127	27,0%	3,0%	197	289	46,7%	4,9%
		10311	**12889**	**25,0%**	**2,8%**	**11260**	**12666**	**12,5%**	**1,5%**	**21571**	**25555**	**18,5%**	**2,14%**

Sources: Méouane CADL, 2013 Taiba Ndiaye PLD - 2013-2018 Action Plan

5.2 State of access to basic social services

5.2.1 Access to Health Care

The health care system in Senegal has a pyramidal structure. Under the Senegalese health care system,the best quality health care is available at hospitals and health centers in Dakar, along with other cities throughout the country. The next level of health care is available at health posts in the chief towns and larger villages within municipalities. In rural areas, basic health care is provided at village health huts and rural maternity units. While the central, regional and local health administrations have responsibility to establish and make operational health care faciities, in some rural villages, people have themselves built and manage basic health care facilities.

Central Adminstration

The central administration of the Senegalese health care system includes the Office of the Minister of Health and the directorates and services attached to it.

Regional Adminstration

Medical regions are the coordination structures at the regional level. Each medical region corresponds to an administrative region. It is directed by a public health doctor who is the main facilitator of the executive team made up of all heads of services attached to the medical region.

Health Districts

Health districts, comprehensive care systems, are assimilated with an operational area including at least one health center and a network of health posts. A health center covers a geographical area that may include an entire department or part of a department. Senegal currently has fifty health districts. Each district or operational area is managed by a head doctor.

Health Centers

Health centers serve as engines to the health districts they belong to and are driven by a core team (i.e., head nurses, assisted by health committees and community-based organizations). Health centers offer a range of medical, obstetrical-gynecological, and minor surgery services, besides ensuring the implementation and supervision of primary health care. They combine public health missions with quality care requirements. They also serve as reference resources for health posts, private religious health facilties, etc.

Health Posts, health huts and rural maternity units

Health posts are installed in the municipalities (i.e., the chief towns of rural communities or fairly well-populated villages). In rural areas, basic health care is provided at village health huts and rural maternity units.

The first health check in rural areas is done at the closest facility, most likely at a health hut, then if a solution is not found, the patient is referred to the nearest health post, and then, if necessary, to the nearest health center before going to a hospital.

Municipality of Taiba Ndiaye

Access to health care in the Municipality of Taiba Ndiaye is measured by the availability and type of health care facilities.

The survey performed as part of preparing the PLD of the Municipality of Taiba Ndiaye for 2013-2018 illustrated that there is an insufficient availability of quality health care facilities in this municipality, along with an unequal distribution in the community areas.

Two health posts currently located at Taiba Ndiaye and Mbayene are within the Municipality of Taiba Ndiaye. Although, the health post installed in the village of Mbayène is ill-equipped with non-functional and dilapidated facilities[14].

The other operating health care facilities are health huts installed in four other villages (i.e., Taiba Mbaye, Ndomor, Thiallé and Keur Madiagne), along with rural maternity units at Taiba Ndiaye and Mbayene 3. The figure below indicates where these health care facilities are installed (see **Error! Reference source not found.**).

The six existing facilities provide health care services to villages in the Municipality according to the following distribution:

- The Taïba Ndiaye health post provides services to the villages of Taïba Mbaye, Baal Diop, Taïba Santhie, Maka Gueye Béye, Taïba Khab, Ndomor, Gad Ngoméne, Ndoyéne Bar, Daff 1 and Daff 2.
- The Mbayene 3 health post provides servicesto the villages of Keur Mallé, Minam, Keur Mbaye Sénéba, Keur Mambaye Khary and Keur Birama Fatim.
- The Thiallé health hut provides servicesto the inhabitants of Selco, Maka Dieng, Keur Bokar and Djingué.
- The Ndomor health hut provides servicestothe villages of Gad and Ngomène.
- The Keur Madiagne health hut provides servicestothe villages of Baity Ndiaye, Baity Gueye, Keur Assane and Sam Ndiaye.
- The fourth health hut is in Taiba Mbaye and provides servicesto its own community members.
- The Baal Diop and Maka Gaye Bèye health huts are no longer functioning.

There is a single pharmacy in the Municipality of Taiba Ndiaye located in its chief town.

Given this distribution, the PLD concluded that the health care facilities in the Municipality, especially in the Project area, are insufficient and ill-equipped (i.e., lack of equipment and caregivers). The number of health care facilities for the Municipality of Taiba Ndiaye (i.e., one health post for 14,000 inhabitants) does not comply with the standards defined by the National Health Development Programme (PNDS), which stipulates one post for 5,000 inhabitants in rural areas. Four additional posts would be necessary to comply with the PNDS objectives.

[14] Reference: 2013 Taiba Ndiaye PLD - 2013-2018 Action Plan

Other health care facilities do, however, exist and are not too far away:

- A private health care facility built by the Industries Chimiques du Sénégal (ICS) is located at Mboro (about 13 km from Taiba Ndiaye); and
- Health care facilities are located in the towns of Tivaouane (9 and 15 km away), and Thiès (20 to 30 km away), respectively, and for each town, includes both hospitals and a health center within a health district).

According to the 2013-2018 TN PLD, Health Investment Plan, improvements are planned to the Municipality's existing health care facilities (by 2018 - see Table 4 below). Note, therefore, projects such as the construction of two health huts, the conversion of seven health huts into health posts and the creation of a health center are planned by 2018. This investment effort, if it comes to fruition, will enable the Municipality to close the gap and comply with the PNDS standards.

Table 10 below provides the Health Investment Plan for 2013 to 2018 in Taiba Ndiaye.

Table 10: Health Investment Plan – 2013 Taiba Ndiaye PLD – 2013-2018 Action Plan

	Projects /Actions	Location	Budget	PERIOD					
				2013	2014	2015	2016	2017	2018
Health	Construction and Equipment of 2 Health Huts	Gad Ngomene Taiba Santhie	30 000 000					X	
	Construction and equipment of Mbayenne II Health Post	Mbayene III	75 000 000	X	X				
	Revitalization of the Health Hut	Bal DIOP Maka Gueye Beye	10 000 000		X	X			
	Upgrade of 7 Health Huts to Health Posts	Ndomor-Taiba Ndiaye Thiallé -Keur Madiagne	100 000 000			X	X	X	X
	Acquisition of a medical ambulance	Rurale community	30 000 000	X					
	Creation of a health center	Taiba N'Diaye	200 000 000		X	X	X		
	TOTAL	445 000 000							

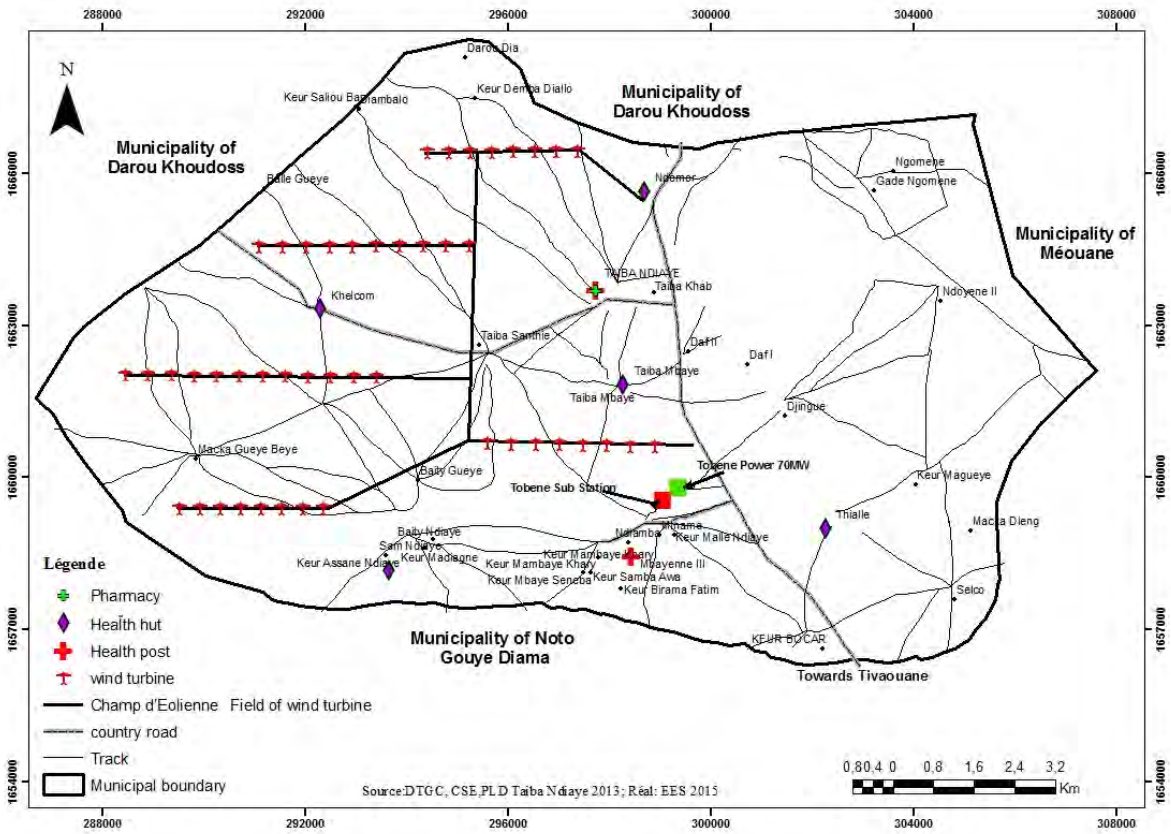


Figure 14 : Location of Health Care Facilities within the Project area

5.2.2 Access to drinking water

The Municipality residents' access to drinking water (see Table 11) is via the following means:

- Two boreholes in the village of Taiba Ndiaye are managed by the ASUFOR (Borehole Users Association). The ASUFOR are made up of members subscribing to the borehole's drinking water supply (AEP) network. This network supplies eighteen villages in the Project area home to the PAP with drinking water (17 of these villages are located in the DAI). This network is, however, poorly designed: very low flow rate (drop by drop) noted in villages far away from Taiba Ndiaye, like Khelcom.To resolve the situation, a third borehole is being drilled in the village of Miname Diop. The work to connect villages has been completed and the borehole is scheduled to start operation at the end of September 2015. This borehole is aiming to supply the villages in the South-West of the Municipality (mainly the area called "eight villages" which groups Miname, Mbayene, Keur Male, Keur Mambaye Khary, Keur Samba Awa, Ndiaba, Keur birama Fatim and Keur Mbaye). Six of these villages are located within the DAI, while the remaining two villages are located within the IAI, close to the boundary of the IAI.
- The Water Supply Network (AEP) installed by the ICS supplies three villages outside the Project's DAI (i.e., Gag, Ngomène and Ndoyène).
- The Sénégalaise Des Eaux (SDE) network that relates primarily to the villages bordering on the department of Tivaouane (South of the Municipality) supplies Keur Bakar, Thiallé, Selco, Keur Magueye and Maka Dieng. These villages are not in the Project's DAI. This network is considered as obsolete (very low pressure).

- Traditional wells and manual pumps: these structures supply few villages and are only seen in villages with low demographics located in the North of the Municipality, namely: Darou Dia, Balle Guèye and Keur Demba Diallo. These traditional structures are also seen in villages supplied by a network. They also provide a top-up facility.

With the third borehole under construction and the planned rehabilitation, repair and connection operations to the existing network, all villages in the Project's DAI will soon benefit from improved access to quality drinking water.

5.2.3 Access to water for market gardening

The Municipality currently has no access to water for agricultural production such as, irrigation boreholes.

Given the large number of market gardeners in the Municipality, mainly in the Keur Madiagne area, the Municipality is including in its 2015 budget an amount of CFA 450,000,000 for the construction of two boreholes specifically[15] for agriculture. The Municipality is seeking partners and is also counting on the State participating in this project.

5.2.4 Access to education

There are two categories of education in the Municipality of Taiba Ndiaye - formal education and informal education.

Formal education is instruction given in the public pre-school, primary, junior high and high schools. The following education levels are available within the Municipality:

- 1 high school;
- 2 junior high schools;
- 19 primary schools; and
- 2 pre-school/day nurseries.

There are two categories of informal education: teaching the Koran and reading. The Koran is taught in all the villages in the Municipality. There are thirteen reading classes available in the following villages: Taïba Ndiaye, Taïba Mbaye, Taïba Santhie, Ndomor, Mbayène, Balle Guèye, Keur Madiagne, Sam Ndiaye, Djingué, Thiallé, Maka Gaye Bèye, Ndame Lô and Keur Bakar.

There are no classrooms set aside exclusively for teaching the Koran or reading. These lessons are given in primary school classrooms or temporary huts.

Table 11 and **Error! Reference source not found.** below list all schools located in the Project area in 2013. Nineteen primary schools are listed in 2013 whereas only twelve primary schools were counted in the same area in 2000.

[15] Reference Taiba Ndiaye 2013 PLD - priority action programmes

This school infrastructure expansion has nevertheless not been supported by the acquisition of equipment needed to ensure minimum learning conditions (i.e., access to water).

The current school situation in the Municipality is, therefore, as follows:

- 11 incomplete-cycle schools in the entire Municipality of Taiba Ndiaye;
- 7 schools of 12 classes in temporary shelters;
- 7 schools with no washroom; and
- 9 schools with no water point.

The current school situation is as follows in the Project area:

- 4 schools have a shortage of classrooms (Miname, Maka Gueye Beye, Taiba Mbaye and Mbayene III);
- 14 schools without an enclosure wall;
- 5 schools with no washrooms;
- 2 schools without running water (Djingue and Khelcom); and
- 2 schools with temporary shelters (Djingue and Maka Gueye Bèye).

This description of the situation shows the lack of functionality of schools, especially in terms of washroom requirements.

However, it must be said that these “modern” public schools are competing against the Arabic-Koran teaching schools. Thus, in 2003, the gross primary school attendance rate was 51%, which was lower than the attendance rate in the Region of Thiès and at the national level. Historically, rural populations prefered to send theirs children to traditional Arab schools where they could memorize the Koran and learn more about Islam. But today, it appears that this trend is being reversed.

Table 11: Summary of school conditions in the Project area

No.	Schools	Area of influence	Type of cycle	Physical classrooms	Educational groups	Special classrooms	In temporary shelter	Water point	Enclosure wall	Yes= Washroom No= without washroom
1	Taiba Mbaye	Direct	Complete	10	10	0	1 classe		No fence	yes
2	Khelcom	Direct	Incomplete	6	6	0	0		No fence	no
3	Maka Gueye Béye	Direct	Incomplete	1	2	0	1classroom		No fence	no
7	Ndam Lo	Direct	Incomplete	0	0	0	0	Non-existent	No fence	yes
5	Djingué	Direct	Incomplete	6	6	2	0	Non-existent	No fence	yes
6	Maka Dieng	Indirect	Incomplete	0	2	2	2 classroom		No fence	no
7	Keur Bakar	Direct	Complete	0	0	0	2 classrooms		No fence	yes
8	Keur Madiagne	Direct	Incomplete	0	0	3	0		No fence	yes
9	Daff 2	Direct	Incomplete	7	6	2	2 classrooms		No fence	yes

Table 11: Summary of school conditions in the Project area

No.	Schools	Area of influence	Type of cycle	Physical classrooms	Educational groups	Special classrooms	In temporary shelter	Water point	Enclosure wall	Yes= Washroom No= without washroom
12	Keur Mbaye Seneba	Indirect	Incomplete	3	0	7	0	Non-existent	No fence	no
13	Selco (outside of Taiba	Indirect	Incomplete	0	0	0	0	Non-existent	No fence	no
14	Matar Mamour Ndiaye	Direct	Complete	12	0	0	0		With fence	yes
15	Ndomor	Direct	Complete	7	7	0	3 classrooms	0	With fence	yes
16	Thiallé	Indirect	Incomplete	0	0	0	0	Non-existent	With fence	yes
17	Minam	Direct	Complete	6	6	2	0		With fence	no
18	Taiba Santhie	Direct	Complete	0	0	0	0	Non-existent	No fence	yes
19	Gad Ngoméne	Indirect	Incomplete	0	0	0	0		With fence	no

Source: 2013 Taiba Ndiaye PLD - 2013-2018 Action Plan

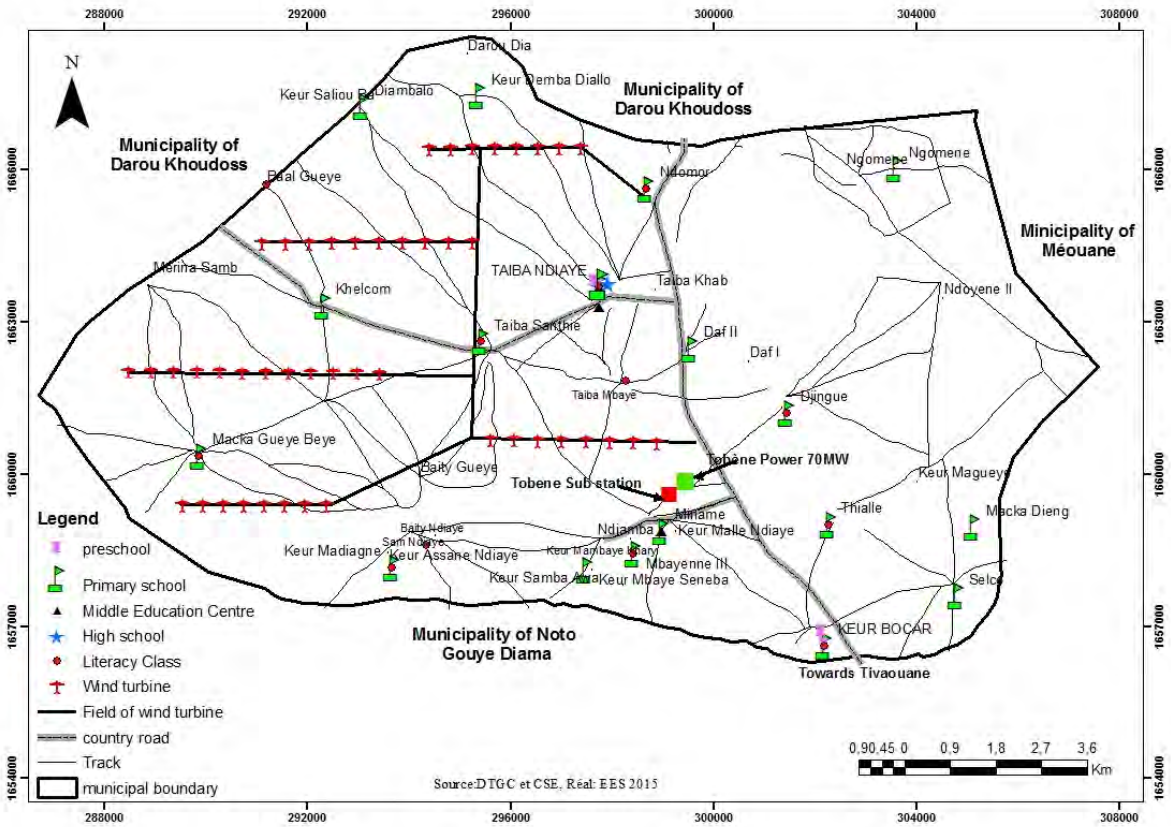


Figure 15 : Distribution of school infrastructures in the municipality of Taiba Ndiaye

5.2.5 Access to electricity

17 out of 35 villages within the The Municipality of Taiba Ndiaye have electricity; and these 17 villages represent 80-90% of the total population of Taiba Ndiaye. Of the 23 villages in the Municipality of Taiba Ndiaye that are located in the Project's DAI, more than half (thirteen villages) are without electricity. Of the ten villages with electricity located within the Project's DAI, five[16] have PAP. The other five villages (Daf 1, Daf 2 ,Ndomor, Miname and Ndiamba) do not have any PAP for this Project.

With the construction of the Tobène Power plant and the Project, a vast program to bring electricity to rural areas is envisaged by the Municipality with respect to villages without electricity. This program to bring electricity also aims to increase the density of the grid in the villages already connected.

The Municipality is planning to bring electricity to the large villages of Taiba Santhie, Bale Diop, Beity Gueye and Beity Ndiaye, all located in the Project's DAI, for an investment amount of 150,000,000 CFA francs in 2015. The plan is also to supply the Minam borehole with solar power with the assistance of the Japan International Cooperation Agency(JICA).

[16]These are Taiba Khab, Keur Mallé, Taiba Ndiaye, Taiba Mbaye and Djingué.

Table 12: The infrastructures and collective equipment in the Project's close area of influence

Infrastructure	Children's day nursery	Primary school	CEM	High school	Water supply type	Health hut	Health post	Borehole
Ndiallo (KEUR DEMBA DIALLO)					AEP network TN borehole			
Maka Gueye Béye		1			AEP network borehole			
Darou Dia					AEP network TN borehole			
Ball Gueye					Manual pump			
Keur Assane					AEP network TN borehole			
Baity Gueye					AEP network TN borehole			
Baity Ndiaye					AEP network TN borehole	1 health hut		
Sam Ndiaye					AEP network TN borehole			
Keur Madiagne		1			AEP network TN borehole			
Taiba Ndiaye	1 hut for toddlers	2	1	1	AEP network TN borehole		1 health post	1
Khelcom		1			AEP network TN borehole	1 health hut		
Taïba Santhie		1			AEP network TN borehole			
Taïba Mbaye		1			AEP network TN borehole	1 health hut		
Djingué		1			Manual pump			
Keur Maguéye					SDE network			
Keur Mallé					AEP network TN borehole			

Table 12: The infrastructures and collective equipment in the Project's close area of influence

Infrastructure	Children's day nursery	Primary school	CEM	High school	Water supply type	Health hut	Health post	Borehole
Keur Mambaye					AEP network TN borehole			
Taïba Khabe					AEP network TN borehole			
Keur Samba Awa					AEP network TN borehole			
Keur Mbaye Sénéba		1			AEP network TN borehole			
Mbayene 3		1			AEP network TN borehole		1 health post	
Minam		1	1		AEP network TN borehole			
Total		**11**	**2**	**1**		**3 health huts**	**2 health posts**	

Sources: 2013 Taiba Ndiaye PLD - 2013-2018 Action Plan, PEPAM,

N.B.: TN = Taïba Ndiaye – **AEP =** Drinking water supply - **CEM =** Junior High School

5.3 The productive activities of local populations

The active population of the Municipality of Taiba Ndiaye is involved in the two main sectors of agriculture and livestock and, on an ancillary basis, in two others - transport and trade.

Agriculture is extremely varied due to the geographical location of the Municipality, from rainfall farming to market gardening crops with large numbers of fruit trees, mainly mangos and, to a lesser extent, citrus fruit.

5.3.1 Rainfall farming

With rainfall isohyets fluctuating between 250 and 440 mm a year for rainfall (i.e., number of days of rain) of no more than thirty days, rainfall farming in the Municipality can only be based on cereals and other short-cycle crops. The crops noted within the Project area are multi-seasonal (such as cassava) and able to make the most of the humidity to complete their cycle.

The main crops noted within the Project area are:

- Cassava, which takes up nearly 27% of sown surface areas every year;
- Peanut, 21%; and
- Millet and black-eyed pea, 23%.

Table 13 below provides the sown surface areas:

Table 13: Estimation of sown areas and yields in 2011

Speculations	Surface area sown		Yields	Average productions (tonnes)	Commercial value	
	ha	%	Average (Kg/Ha)		CFA francs	%
Cassava	5 571	26.8	1 172	6 529	415 090 000	30.8
Peanut	4 290	20. 7	1 079	4 629	218 595 400	16.3
Millet	2 839	13.7	257	730	88 235 000	6.5
Black-eyed pea	1 935	9.3	110	213	101 085 000	7.5

Source: 2013 Taiba Ndiaye PLD - 2013-2018 Action Plan

There are many constraints to the development of this rainfall farming, namely:

- The random nature of the rainfall;
- The gradual impoverishment of soils whilst chemical or organic fertilizers are insufficient. Added to this is the lack of fallow land given the lack of land to meet demand;
- Farming equipment is rudimentary with hand-operated tools, making it impossible to cultivate large areas;

- The abundance of pest attacks on crops whereas plant protection products are commercially inaccessible; and
- The gradual reduction in rainfall crop areas given the phenomenal emergence of fruit trees. The only crop that manages to resist this is cassava, which can be grownclose to mango trees.

5.3.2 Fruit trees

The production of fruit trees is the emerging activity in the Municipality of Taiba Ndiaye, by virtue of its increasing importance, given the declining rainfall crops.

The mango is the favorite tree for this arboriculture with the introduction of improved varieties by grafting. This fruit species plays a commercial role by generating income in most rural communities and also meets the food requirements of local populations.

Table 14: Evolution of mango production between 2000-2010 and 2011 in the Municipality

Periods	Sown surface areas		Yields kg/ha	Average productions in tonnes	Monetary value	
	ha	%			CFA francs	%
2000-2010	3,391	14.4	1,951.8	6,618.7	229,880 000	17.4
2011	4,821	23.2	1,469	7082	372,408 000	28.1

Source: 2013 Taiba Ndiaye PLD - 2013-2018 Action Plan

These data highlight a drop in yields in mango cultivation, which can be explained as follows:

- The presence of a pest that is especially harmful to mangoes: the fruit fly, called whitefly, that causes 30% losses in production;
- The lack of technical supervision of fruit growers, who are using traditional production techniques; and
- The significance of post-harvest losses due to the lack of a storage and processing units.

5.3.3 Market gardening

This is an emerging activity just like the fruit trees, as it can rely on the potential of traditional lands of the Niayes (a coastal region where the bulk of the vegetable production takes place) and also on the land of the old, phosphate-rich mines freed up by the ICS.

Potatoes, cabbage, onions, tomatoes, green beans and lemons are all grown.

Yields could be better if requests for water connections for market gardening activities had been met.

Table 15: Evolution of vegetable production between 2000-2010 and 2011 in the municipality

Periods	Sown surface areas		Average yields kg/ha	Average productions in tonnes	monetary value	
	ha	%			CFA francs	%
2000-2010	1951	8.2	727.8	1,420	139,340 000	10.5
2011	1298	6.2	4,419.3	5,736.3	150,780 000	11.2

Source: 2013 Taiba Ndiaye PLD - 2013-2018 Action Plan

Table 15 above shows a decrease in sown surface areas between the 2000-2010 period and 2011 which was compensated by gains in average yields in market gardening.

The expansion of sown surface areas is restricted due to the poor access to water, the price of inputs and the scarcity of cultivation equipment.

5.3.4 Livestock

Given the presence of crops, livestock is raised within the Municipality in semi-intensive, even intensive fashion, mainly due to the lack of grazing and livestock trails.

The livestock, therefore, feeds on residues of farming products from the cassava and also the straw of certain crops like peanuts and black-eyed peas.

Peanuts and black-eyed peas are both part of the villagers' diet, as well as cash crops that improve their financial situation. Peanut straw and black-eyed pea residues are used as extra forage for fattening the livestock that is raised inside concessions.

5.3.5 Trade

This activity is a direct result of farming activities, mainly due to the transport of cultivated produce and is carried out along the main roads. Shops are found in all villages and specialize in the sale of farming produce, such as fruit (mangos) and vegetables (cassava, cabbage). These traders also play the role of intermediaries between the local producers and the wholesalers or end consumers. Note that this socio-professional category is mainly comprised of women.

The activity is nevertheless restricted in certain parts of the Project area due to the isolation of certain villages (i.e., impassable tracks and mobility problems) and limited financing possibilities (i.e., working capital from often inadequate micro-credit finance).

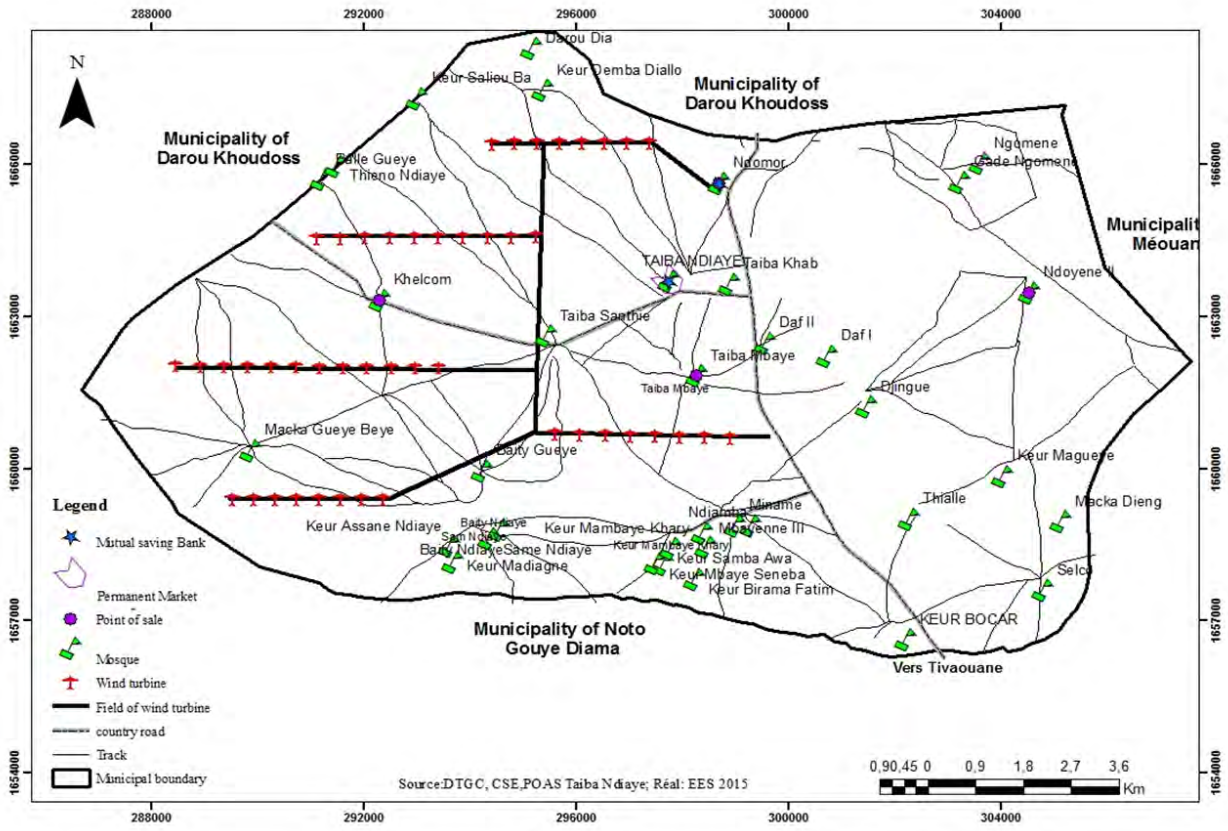


Figure 16 : Permanent market, points of sale, mutual savings banks in the Project area

5.3.6 Road network

The Project area is crossed by the following departmental roads:

- Tarmacked departmental road D702 linking Tivaouane and Mboro. It goes through the Municipality for 10 km and crosses the villages of Keur Bocar, Daf II, Taiba Khab and Ndomor;
- The departmental road D702C which runs from the crossroads with the D702 in the village of Taiba Khab to the Ndiaye road. It crosses the villages of Taïba Ndiaye, Taiba Santhie and Khelcom (Baal Diop). This is a 19 km laterite road. Only the section linking the D702 to Taiba Ndiaye, the chief town in the municipality, is tarmacked.

In addition to these roads, the other villages are connected to each other and the chief town in the Municipality by natural sandy tracks and/or laterite tracks. The natural (sandy) tracks are usually fairly impassable, especially in the rainy season.

The laterite tracks include:

- Djingué - Mboro road (2 km);
- Maka Dieng-Selco (4 km); and
- Ndiamba-Keur Madiangne (4 km)

5.3.7 Transport

Just like trade, transport is also dependent on farming. The main means of transport (i.e., carts drawn by donkeys or horses and automobiles (vans, lorries)) are mainly used to convey the miscellaneous farming produces to their markets and points of sale.

Thus, new establishments tend to spring up progressively near main roads.

The local communities also place a great deal of importance on the goods transport vehicles known also as "luggage taxis". These vehicles are a substantial source of income for their owners and are always a major component in the local economy, given that these vehicles take the farming products to the markets and points of sale.

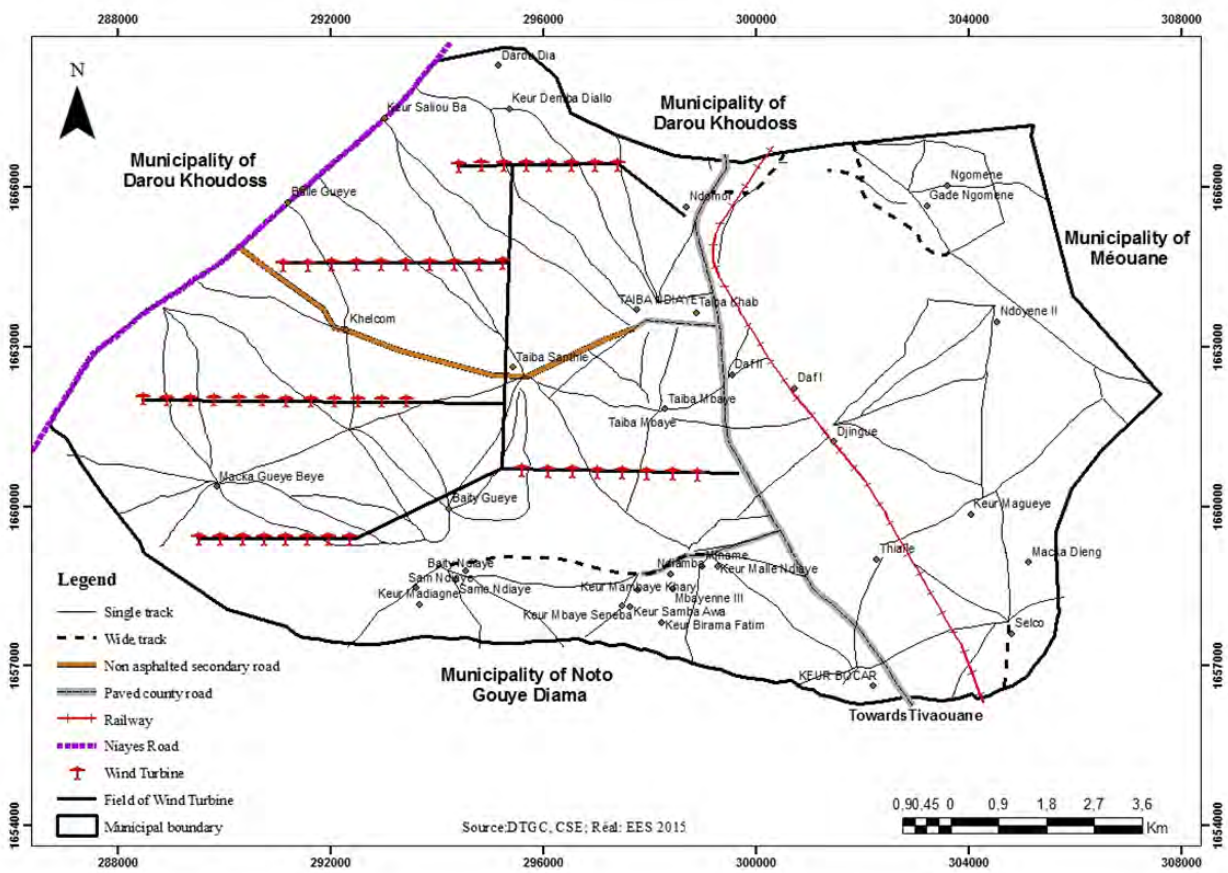


Figure 17 : Road network of the Taiba Ndiaye municipality

5.4 Sacred sites

5.4.1 Presence of sacred cemeteries and trees

People living in the villages of the Project area consider cemeteries to be sacred, a belief that is shared with the entire population of Senegal. This is the place where they gather to not only pray for the dead, but also for themselves.

In the DAI and in the vicinity of the Project, a census survey was conducted by EES; the responses are based on testimonies of the elderly and the village chiefs. The census focused on cemeteries and trees to which people have conferred mystical and/or sacred attributes.

Presence of cemeteries

Within the 31 villages near the Project area, 40 cemeteries were listed, as well as a specific number of trees which people believe are sacred (see Table below).

Of the 40 listed cemeteries, 7 of them, or 18%, are less than 100 years of age (between 57 and 94 years); 13 of them, or 33%, are between 109 years and 180 years old; 12 of them, or 30%, are between 208 and 300 years old; and 8, or 20%, are between 369 and 449 years of age.

According to testimonies collected, some of these cemeteries constitute a religious heritage of great importance to people because of the high degree of spirituality of some of the people buried there, or the fame (marabout, king ...) of the cemetery's founder. This is the case with the Miname Cemetery, 411 years old, whose founder might have been a Damel or a King of Kayor. **This cemetery is not located within the Project's footprint**.

At Keur Maka Beye, there is a cemetery that is located very close to the Project's boundaries. PETN will fence off the cemetery and take all measures to prevent encroachment of the Project's infrastructure on the cemetery.

Trees identified that are important to the local communities

The Project site also contains many baobab trees. In Senegal, baobab trees are part of the cultural and religious heritage for certain groups of people, often serving as tombs for some groups or sheltering objects of pagan rituals when they are hollow. Baobab trees are partially protected in Senegal.

Depending on location, local communities can also assign a sacred aspect to a given species, for various reasons (e.g., tree planted by the founder of the village, or a tree that "offered its shadow" to a famous religious figure). This is the case for a tamarind tree in Maka Gueye Beye

According to Labosol, 29 baobab trees , 8 tamarind trees with no special status and located within the Project footprint must be felled, along with several other species (see the Labosol report Rev 4 dated June 1st, 2015).

In the area near the Project, 3 baobab trees, 1 tamarind tree and 1 black tamarind tree (or “dialium guineense”) were identified which local communities view as sacred. For the 5 trees located in Project footprint:

- None of the black tamarind trees will need to be removed, according to the Labosol Survey;
- The Baobab of Mbayene III will be preserved because it is not located under the axis of the line of wind turbines E31 to E38; and
- For the 2 others baobabs and one tamarind, in the immediate Project area (axis of the line of wind turbines E19 a E30), it is recommended to preserve them, if possible. Others directives are also given in notes below, regarding these trees.

5.4.2 Conclusions

a) There are no active cemeteries located within the Project's footprint, however, particular attention should be paid to the preservation of at least one cemetery, the cemetery of Masongo –it is a closed cemetery and must be fenced off because of the special cultural interest of the population.

b) A total of 5 sacred trees were identified in the Project area, PETN will do its best to preserve them , when possible, given their close proximity to the Project footprint and its access roads.

The identified sacred cemeteries and trees must be preserved in accordance with IFC's PS8.

PETN will need to obtain a logging permit, to be issued by the Water and Forests Ministry, in order to fell the baobab trees that are located within the Project footprint.

Table 16: Sacred cemeteries and trees in the Project area

Villages	Area of influence	Number of cemeteries	Creation date	Age	Trees that are important to the local communities	Comments
Baïty Bacar	indirect					
Baïty Dakhar	indirect					
Baïty Gueye	direct	1	1806	208		Shares the cemetery with Baity Ndiaye Presence of a cemetery that is the final resting place of the grandfather of the village founder
Baïty Ndiaye	direct					
Bal Diop / Khelcom	direct	**2**	1838	176		
Bal gueye	direct	2	1905	109		
Bal sand	direct	1	1957	57		
Darou dia	direct	1	1925	89		
Djingué	direct					
Keur assane Ndiaye	direct	**1**	1700	314		
Keur Demba Diallo	direct	**1**	1935	79		
Keur Madiagne Ndiaye	direct	**1**	1727	287	1 black Tamarind tree	Presence of a black Tamarind tree Will not be removed as per the Labosol survey report
Keur mallé Ndiaye	direct	**3**	1784	230		
Keur mambaye Khary	indirect	**2**	1920	94		
Keur mbaye seneba	indirect	**2**	1900	114		
Maka gaye Bèye	direct	**2**	1905	109	1 tamarindtree &1 baobab tree	Presence of a sacred tamarind tree –and one baobab tree. These trees can be removed after consultation with village elders and a mystical ceremony. The closed cemetery of Masongo will be avoided. PETN plans to fence it and preserve it.

Table 16: Sacred cemeteries and trees in the Project area

Villages	Area of influence	Number of cemeteries	Creation date	Age	Trees that are important to the local communities	Comments
Mbayene III	indirect	1	1932	82	1 baobab	Sacred baobab tree that is very close to the Project footprint. PETN will avoid it and it wil be preserved.
Mourdjiguene	direct					
Merina Samb	direct					
NDiop Sao	direct	3	1565	449	1 sacred baobab tree	This baobab is revered because of its age – it can be removed subject to consultation with village elders and after a mystical ceremony
Sam Ndiaye	direct	1	1620	394		
Sao	indirect	1	1645	369		
Taiba Khab	direct					
Taiba mbaye	direct	5	1715	299		The oldest cemetery to date was built in 1715.
Taiba Ndiaye	direct	4	1903	111		
Taiba Santhie	direct	1	1727	287		
Keur samba Awa	indirect	1	1930	84		
Ndiamba (Touba Fall)	direct	1	1892	122		
Keur Birima	indirect	1	1780	234		
Miname DIOP	direct	2	1603	411		This cemetery is particularly revered by the local community.
Total		**3 Baobab trees and 1 black tamarind tree & 1 tamarind tree**				

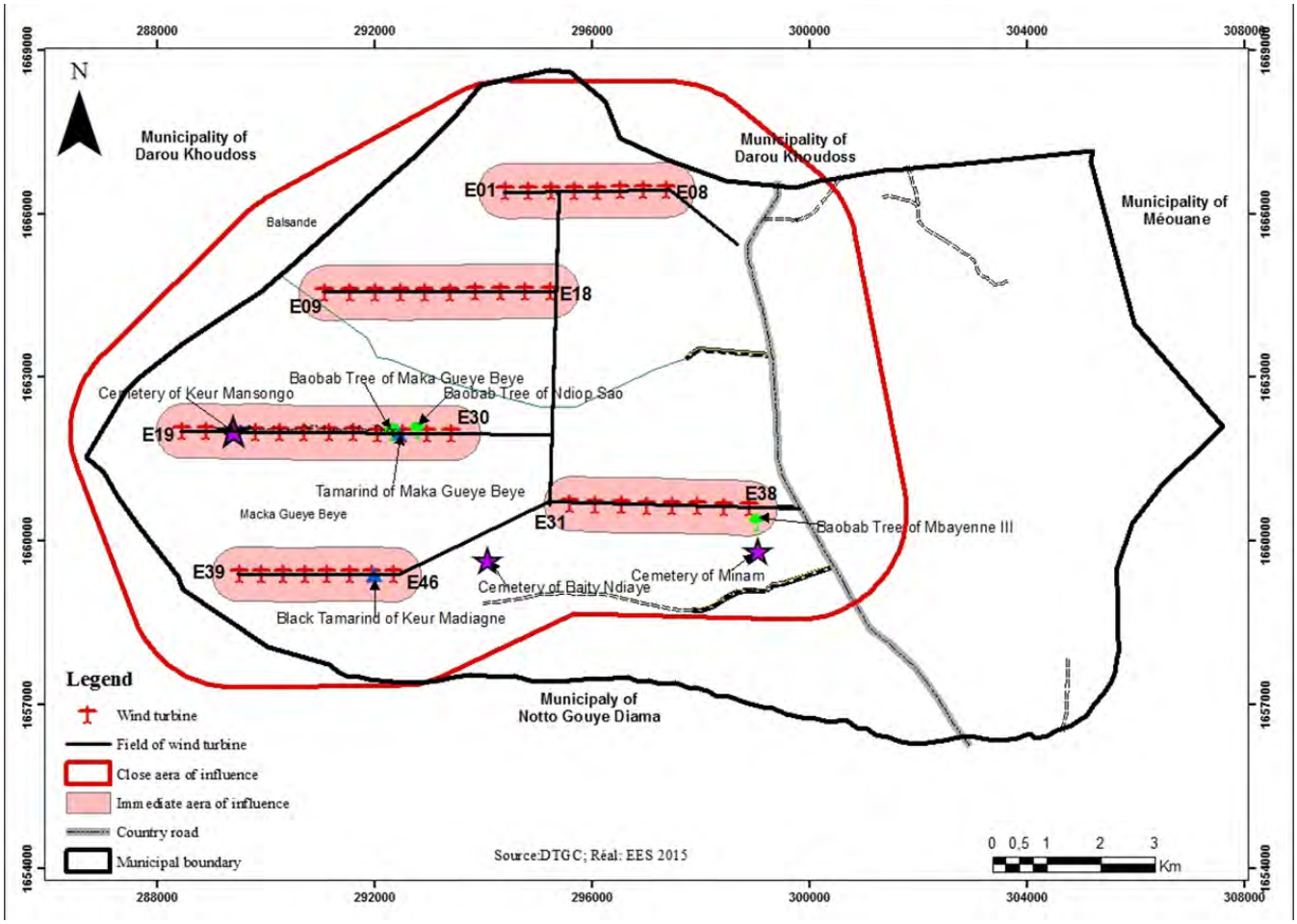


Figure 18 : Location of cemeteries and sacred trees

Notes applicable to Map 5 above.

1) Some of the names and locations of the trees relate to the village of the PAP owner – For example, the two very close baobab trees in the immediate area of influence of the line E19-E30 are named NDIOP SAO and MAKA Gueye Beye trees because they are located on the land of 2 PAP from these two villages.

2) The cemetery of Masongo is located in the immediate area of influence of line E19 to E30; it is a closed cemetery and must be fenced off because of the special cultural interest of the population.

3) Also in the immediate area of influence of line E19 to E30, there is one Tamarind and two baobab trees, all having a sacred character, due to their ages. They can be removed subject to consultation with village elders and performing some mystical ceremonies.

4) The black tamarind of Keur Madiagne, located in the immediate Project area of influence of line E39 to E46, is a sacred tree that must be preserved. As stated in the Labosol survey, none of the four (4) Black Tamarind trees within the Project's close area of influence will be destroyed.

The baobab tree and cemetery close to line E31 to E38 will not be under the axial line of a wind turbine and can be preserved.

6 Socioeconomic Impacts

6.1 Preamble

The various points covered in this chapter only concern the socio-economic environment and include:

- Identification of the sources of socio-economic impacts;
- Assessment of the impacts;
- Identification of the mitigation measures which may be integrated into the Project in order to eliminate or reduce the scope and severity of these impacts;
- Identification and assessment of the Project's residual environmental impacts; and
- Identification of the appropriate measures for compensating any residual impacts identified.

The impacts will be identified by examining the situation of the Taiba N'diaye Wind Farm, which may be the source of several types of environmental and social impacts, particularly impacts related to its location, the construction works, and its operations.

6.2 Determining impact sources

The methodology firstly consists of identifying the impact sources prior to assessing how they will affect the various components of the environment.

The Project is an industrial one and consists of installing equipment, and carrying out various activities such as the construction, operation, maintenance and decommissioning of the wind farm at the end of its life.

The Project equipment and activities may be considered to be sources or disruptions that will tend to bring about changes to the environmental and social components that are significant to a greater or lesser extent.

During Project construction, the potential sources of impacts include those resulting from:

- Land acquisition;
- Site preparation;
- Construction of the wind farm;
- Use of labor; and
- Procurement of goods and services.

For each of these potential sources, we have listed the following related components in the tables below.

Table 17: Potential sources of impacts during construction	
Potential sources of impacts	**Components of the sources of impacts during construction**
Land acquisition	Lease of land (approved by the Municipality of Taiba N'diaye) executed with the State of Senegal[17]
	Compensation to be paid to the 341 PAPs
Site preparation works	The earthworks and excavation works
	Setting up the worksite installations
Construction of the Project	Erection of the wind turbines, laying underground cables, and the connection and construction of the high-voltage sub-station
	Removal of excavated materials
	Transport and traffic relating to movements of labor, worksite machinery and construction materials
	Civil Engineering works
	Water consumption
	Management of wastewater and drainage water from the site
Use of labor and the procurement of goods and services	Creating jobs
	Purchasing goods and services

Potential sources of impacts related to the operations phase are, in particular, linked to:

- The presence and operation of the wind turbines at the Project site;
- The possible presence of hazardous products and waste oils that are not collected and/or which have accidentally been spilled;
- Maintenance and repair works;
- Use of labor; and
- Purchases of goods and services

For each of these potential sources, we have listed the following components.

[17] Refer to Chapter 10- Land Acqusition and Compensation Process

Table 18: Potential sources of impacts during operations	
Potential sources of impacts	**Components of the sources of impacts during operations**
The presence of production equipment	During the operation of the wind farm's equipment
	The presence of equipment items during their useful lives; and Production of wind turbine electrical power
The presence of hazardous products	Production and management of waste and hazardous materials
	Waste oils
Equipment maintenance work	Work concerning maintenance and possible major repairs of the equipment
Use of labor and the purchases of goods and services	Purchasing of goods and services
	Creating jobs

These sources of impacts will have an effect on the physical, biological and human environment.

In this section, we will mainly focus on the Project's impacts on the socio-economic environment and significant modifications of this component attributable to equipment items, processes, and activities linked to the Project within the DAI.

6.3 Method for qualitative assessment of the significance of the impact

6.3.1 Potential impacts considered

At the social level, and in the immediate zone of the Project (i.e., the DAI in accordance with the recommendations of IFC PS1), we will examine the impacts to the PAPs related to:

- Losses of land; and
- Reductions or losses of income/revenue.
- In terms of the living standard of the local populations and workers in the DAI, we will examine:
- Noise;
- Air pollution;
- Water pollution;
- Water consumption;
- The waste generated;
- The health and safety of local populations;
- The health and safety of workers;

- Transmissible diseases; and
- Preservation of the cultural heritage.

NB: Further details on the Project's potential impacts to the health and safety of local populations are addressed in Chapter 9: Community Health, Safety and Security.

In terms of the local economy and of infrastructures within the Project's DAI, the following will be noted:

- Use during operations;
- The production of an additional 440 GWh per year;
- Public infrastructure and equipment;
- The landscape;
- Traffic; and
- Access roads and paths for transporting agricultural products to market.

6.3.2 Environmental effects assessment approach

When all of the Project's potential impacts on the socio-economic component have been identified, the significance of foreseeable changes to this component will be assessed. The approach and the table for assessing the significance of this effect are provided in brief in the following paragraphs.

The methodological approach used to assess the Project's socio-economic impacts rely mainly on assessing the intensity, extent and duration of the impact ascertained. These three qualifying factors are aggregated into a summary indicator of the significance of the impact, which enables an overall qualitative judgement to be made about the anticipated effects for a component following an intervention in relation to the environment.

The significance of the impacts will be assessed based on the following criteria:

- The intensity;
- The duration; and
- The study.

6.1.3.2 Determining the intensity of the impact

The intensity of the impact (or its seriousness) is the conjunction of the scale of the disruption and the value assigned to the environmental component impacted. The **value of the component** integrates both its **eco-system value** and its **socio-economic value**.

The **eco-system value** of a given component is considered to be:

- **High** when the component is of major interest due to its eco-system role in relation to diversity and its outstanding qualities, the preservation and protection of which form the subject of a consensus within the scientific community;
- **Medium** when the component is of substantial interest and has recognised qualities. The conservation and protection status of this component constitutes a matter of concern, discussed within the scientific community; and
- **Low** when the component is of an interest and has qualities, the protection of which are not a matter of great concern.

The **socio-economic value** of a given component is considered to be:

- **High** when the component is the subject of legal or regulatory protection measures (e.g., threatened or vulnerable species, conservation park) or proves to be essential to human activities (e.g., land-based activities);
- **Medium** when the component is valued (i.e., in economic terms or any other terms) or is used by a significant portion of the population concerned without, however, being subject to legal protection; and
- **Low** when the component is little used or valued or is not used or valued at all by the population.

The **value of the component** integrates both its eco-system value and the socio-economic value, adopting the stronger of these two values, as indicated in the following table.

Table 19: Table for determining the value of the component

Socio-economic value	**Eco-system value**		
	High	Medium	Low
High	High	High	High
Medium	High	Medium	Medium
Low	High	Medium	Low

For physical and biological environments, the environmental value is based on the establishment and integration of 2 factors (the eco-system factor and the social factor).

In the case of the human environment, only the social value is factored in for the purpose of determining the environmental value. The social value states the relative significance attributed by the public, the various State technical services, the local administration, or any other legislative or regulatory authority to a given environmental component. It indicates the public or political desire or determination to maintain the integrity or the original nature of a component. This determination is expressed via the legal protection granted to it or by the interest that the public shows it at a local or regional level. The social value is established depending on the concerns of the population with the environmental component. The perceptions and concerns gleaned from the local populations, especially during public consultations, are used as factors for establishing this value.

The **level of disruption** of a component defines the scale of the structural and functional modifications that it risks undergoing. It depends on the sensitivity of the component in light of the interventions proposed. The modifications may be positive or negative, or direct or indirect. The level of disruption is deemed to be:

- **High** when the effect foreseen calls the integrity of the component into question or greatly and irreversibly changes that component or the use that is made of it;
- **Medium** when the effect leads to a reduction or an increase in the quality or use of the component, without going so far as to compromise its integrity;
- **Low** when the effect only changes the quality, use or integrity of the component in a way that is not very perceptible; and
- **Indeterminate** when it is impossible to foresee how or to what extent the component will be affected. When the level of disruption is indeterminate, assessment of the environmental effect cannot be assessed for this component.

The intensity of the environmental effect, which varies from very strong to low, is the result of combinations of three levels of disruption (high, medium and low) and three value categories for the component (high, medium and low).

The following table indicates the various combinations obtained.

Table 20: Table for determining the intensity of the impact

Level of disruption	Value of the component		
	High	**Medium**	**Low**
High	Very strong	Strong	Medium
Medium	Strong	Medium	Low
Low	Medium	Low	Low[18]

6.2.3.2 Determining the extent of the impact

The extent of the disruption expresses the scope or spatial sphere of influence of the effects or the proportion of the population adversely affected. It can be:

- **Regional** when the impact adversely affects a huge space or several components located a major distance away from the project, or when it is felt by all of the population in the study zone or by a substantial proportion of the population of the recipient region (e.g., across the national territory, or the Thiès Region);
- **Local** when the impact adversely affects a relatively limited space or a certain number of components located within, in the vicinity of, or a certain distance from, the project's site, or

[18] It should be noted that the intensity of the effect corresponding to a combination with a low environmental value and level of disruption could have been qualified as very low in order to follow the table's logic. If this is not the case, it is in order to limit the possible number of combinations to the later stages of the assessment. The bias thereby introduced is negligible and errs on the side of overestimating the importance of the effects.

when it is felt by a limited proportion of the population in the study zone (e.g., the Municipalities of Taiba N'diaye, Darou Khoudoss, or Noto Gouye Diama); and

- **Spot** when the impact only adversely affects a very limited space or a component within or in the vicinity of the project's site, or it is only felt by a small number of individuals in the study zone (e.g., when the impact is felt by a specific element in the environment, such as a piece of land where a sub-station is installed).

6.3.3.2 Determining the duration of the impact

The duration of the disruption determines the period during which the residual effects will be felt. It is not necessarily the same as the period of time for which the direct source of the effect will have an influence, as this may continue after the phenomenon which caused it has ended. When an effect is intermittent, we describe the frequency of it as well as the duration of each episode. The duration may be:

- **Long** when the effects are felt continuously throughout the lifespan of the equipment or the activities and even beyond this in the case of irreversible effects (e.g., the presence of the wind turbines);
- **Medium** when the effects are felt continuously over a relatively long period of time, but one which is less than the lifespan of the equipment or the activities (e.g., re-establishment of vegetation following clearance of the bush); and
- **Short** when the effects are felt over a limited time period, which generally corresponds to the period required for construction of the equipment or for starting up activities (e.g., road transport).

6.4.3.2 Determining the significance of the impact

The interaction between the intensity, the extent and the duration enables determination of the **significance of the environmental effect** on a component affected by the Project (see Table 21 below).The table distinguishes five levels of significance, varying from very high to very low.

The significance of each of the environmental impacts is assessed by taking into account the standard reduction or improvement measures integrated into the Project.

When the impacts assessed are not negligible, specific **Mitigation measures** should be proposed in order to enable optimal integration of the Project into its environment. The **Mitigation measures** are aimed at avoiding, reducing or compensating for the negative social and environmental impacts of a project whilst first and foremost giving priority to avoiding the impact.

In the case of a positive impact, the measures are aimed at improving or optimising it. The measures proposed obviously take into account the economic, financial, social and environmental measures stemming from their implementation.

Table 21: Table for determining the significance of the environmental impact

Intensity	Extent	Duration	Significance
Very strong	Regional	Long	Very high
		Medium	Very high
		Short	Very high
	Local	Long	Very high
		Medium	Very high
		Short	High
	Specific	Long	Very high
		Medium	High
		Short	High
Strong	Regional	Long	Very high
		Medium	High
		Short	High
	Local	Long	High
		Medium	High
		Short	Medium
	Specific	Long	High
		Medium	Medium
		Short	Medium
Medium	Regional	Long	High
		Medium	Medium
		Short	Medium
	Local	Long	Medium
		Medium	Medium
		Short	Low
	Specific	Long	Medium
		Medium	Low
		Short	Low
Low	Regional	Long	Medium

		Medium	Low
		Short	Low
	Local	Long	Low
		Medium	Low
		Short	Very low
	Specific	Long	Low
		Medium	Very low
		Short	Very low

The last stage of the assessment consists of determining the residual significance of the environmental impact following the implementation of special **Mitigation measures**. **Figure 6-1** below provides a schematic presentation of the bulk of the process leading to assessment of the significance of the impact.

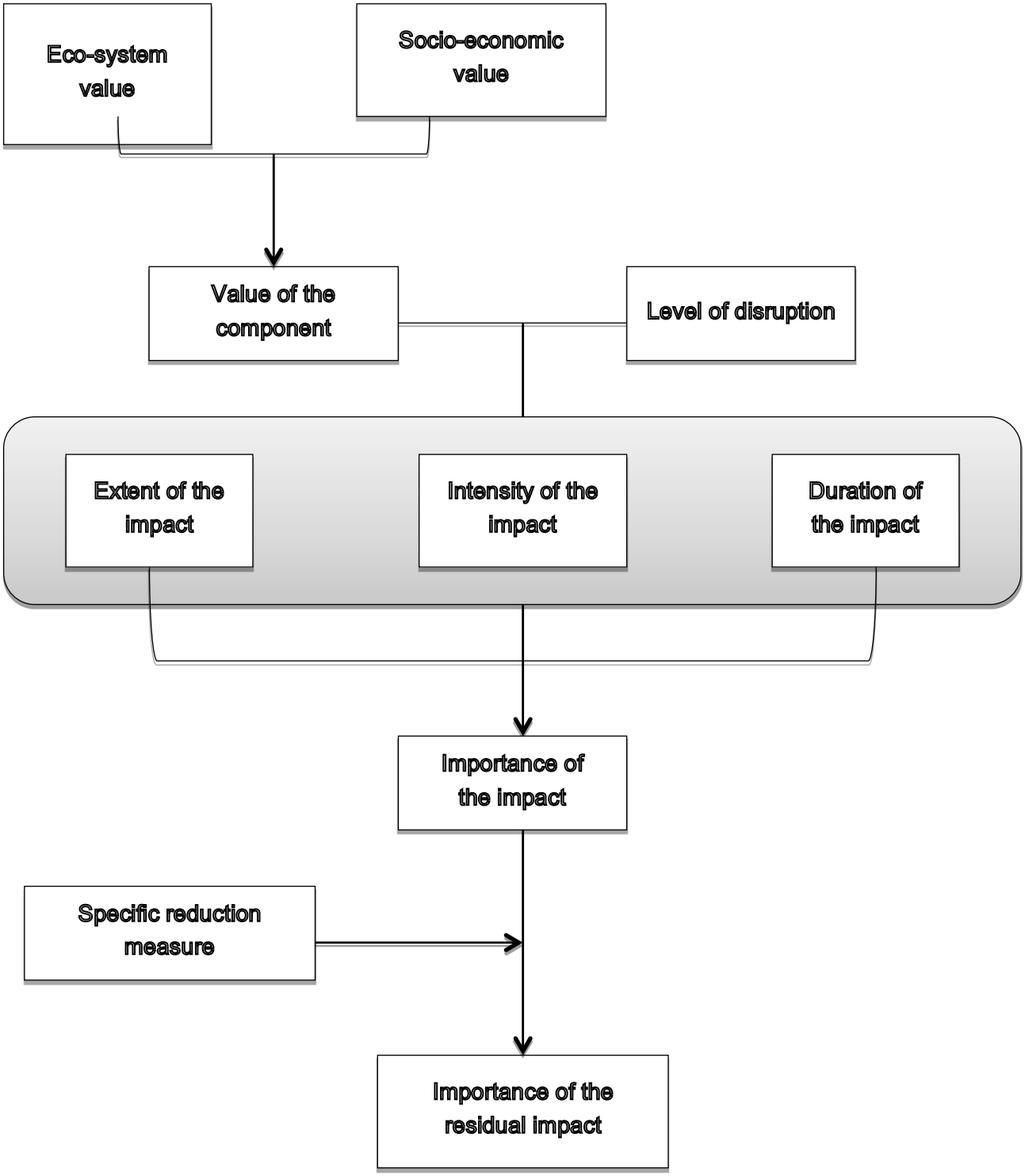


Figure 19: Process for assessing the significance of the impact

6.4 Assessment of the impacts

The positive or negative impacts in this chapter concern both the construction and the operations phases of the Project. Each time, the phase (construction or operations phase) is specified, along with the positive or negative nature.

6.4.1 Assessment of the positive impacts

6.1.4.1 Direct and indirect jobs during the construction phase

Direct jobs

The construction phase will last 34 months and, among other things, will involve job creation with equal opportunity so that local labor can be recruited (qualified and unqualified labour) throughout the construction period for the Project. During the peak period, according to Vestas, 365 jobs are foreseen (including 102 expatriate personnel) and, for PETN, 30-35 local jobs (security, potentially 30 security guards working in 3 shifts (10 per shift) in order to cover security 24 hours a day, 7 days a week, 365 days of the year, and 2 drivers and 1 cleaning person), making a total of approximately 395-400 direct jobs.

Major expectations have been expressed by the local populations and local elected officials in the Municipality of Taiba N'diaye regarding the employment opportunities provided by the Project. The PAP (those who will lose a percentage of their land) are expecting to find temporary unqualified work either for themselves or for their relatives during the construction phase. Although, during the construction phase, only a small percentage of the workforce (i.e., the unskilled workers) will be able to be sourced from the local communities.

Sub-contracting and indirect jobs

Creating opportunities for sub-contractors and other operators intervening in the earthworks and construction works also constitutes a major opportunity due to the scale of the works, which will give rise to major investments in the building and public works and industrial construction sub-sectors and, generally speaking, in all trades at the local and even at the national level; people from the Project DAI who have certain qualifications will be able to work for sub-contractors and small and medium-sized enterprises (SMEs; e.g., welders, ironworkers, bricklayers).

We also note the creation of commercial activities around the construction worksite that will provide work for young women from villages in the immediate zone of influence for 34 months: (e.g., laundry, catering, accommodations, small businesses, cleaners).

QUALIFIED SENEGALESE PERSONNEL				
Phase	**Tasks**	**Qualification**	**Number**	**Source**
Construction	Transport	Professional driver	3	Local & external
	Civil engineering	Civil engineering	34	Local & external
		Electricians	14	Local & external
TOTAL			51	

SENEGALESE PERSONNEL (WORKERS, LABORERS, CLEANERS, ETC.)				
Phase	**Tasks**	**Qualification**	**Number**	**Source**
Construction & Operations	Civil engineering	Suitable for civil engineering works	191	Local & external
	Cleaning parquets and offices	Cleaners & Domestic Staff	21	Local
	Domestic staff			
TOTAL			212	

SPECIALISED EXPATRIATE PERSONNEL				
Phase	**Tasks**	**Qualification**	**Number**	**Source**
Construction	Construction	Qualified technicians	102	Expatriates
TOTAL			102	

OPERATIONS				
Operations	Operational staff	Supervisors	20	Local & external
Operations	Operational staff	Security guard	35	Local & external
TOTAL			52	

Figure 20: Personnel foreseen in the Construction and Operations phases

Assessment of the intensity of the environmental effect

The municipality and the rest of the region face a very high unemployment rate, particularly among young people. All the stakeholders, including the PAP, have devoted a great deal of attention to the issue of employment. The Environmental Value of the Component (VEC) associated with job creation is High.

Thus, the Project will also positively change the work environment at the national level by enabling the employment of approximately 298 Sengalese who will be recruited during the construction phase, depending on the available resources, in terms of the level of priority 1) within the Municipality of Taiba N'diaye, 2) within the *Department* in Tivaouane, 3) from within the Thiès region and 4) at the national level;

The related DPC will be medium (an employment offer over 34 months for approximately 298 Senegalese) - consequently, the intensity resulting from crossing the VEC and the DPC will be Strong.

Parameter	**Value**	**Intensity**
Environmental Value of the Component (VEC)	High	**Strong**
Disruption Level (DPC)	Medium	

Assessment of the significance of the impact on direct jobs:

The impact associated with the employment offer during the construction phase will be positive (of High significance) due to a strong intensity in spite of the duration of the construction works which is considered to be medium (34 months), with the extent being local.

VEC	**DPC**	**Intensity**	**Extent**	**Duration**	**Significance**
High	Medium	**Strong**	Local	Medium	**High**

Assessment of the significance of the impact on indirect jobs

The construction works will also facilitate the emergence of indirect jobs through sub-contractors and SMEs for approximately 34 months. During this phase, employment of approx. 400 workers will facilitate the emergence of jobs which may be beneficial to local female labor (e.g., cleaners, laundry, small businesses). It is a *positive impact of medium significance* due to its medium intensity, its medium duration, and the local extent.

Parameter	**Value**	**Intensity**
Environmental Value of the Component (VEC)	High	Strong
Level of Disruption (DPC)	Medium	

VEC	DPC	Intensity	Extent	Duration	Significance
High	Medium	Strong	Local	Medium	High

6.2.4.1 Operations phase

Direct and indirect jobs, recruiting SMEs

The Project makes provision in the Operations phase for the creation of approximately 20 qualified direct salaried jobs over a duration equalling that of the Project (at least 20 years); a small number of these jobs may benefit from local labor and the rest of the qualified jobs will be able to benefit from qualified regional and national labor.

In addition, thirty to thirty-five unqualified personnel will be recruited as security guards and staff in order to do the rounds of the wind turbines, and as cleaners to take care of cleaning work. These jobs will be able to benefit from local labor.

The Project will also resort to SMEs to carry out maintenance of the wind farm. Moreover, indirect jobs will be generated.

Assessment of the intensity of the environmental effect.

Major employment expectations (regardless of their origin) remain and the Environmental Value associated with this is high (High VEC).

Within the local context of a very sluggish labor market, it will be possible to make provision for approximately 35 positions in addition to 20 local jobs – with this applying over a long period of 20 years, this corresponding to a Low level of disruption of the component (DPC). Also, the resulting Intensity of the environmental effect is Medium.

Parameter	Value	Intensity
Environmental Value of the component (VEC)	High	Medium
Level of Disruption (DPC)	Low	

Assessment of the significance of the impact for permanent positions

For **permanent positions such as those for Wind Farm Operators**, the Impact linked to employing the Wind Farm's operating staff will be *positive (of Medium significance)* due to the Medium intensity of the 20-year duration, which is considered to be long, and of the local extent.

VEC	DPC	Intensity	Extent	Duration	Significance
High	Low	Medium	Local	Long	**Medium**

Assessment of the significance of the impact on indirect jobs

During this phase, the creation of indirect jobs will also be noted. The new staff employed residing in the Project's DAI will facilitate the emergence of jobs which may be beneficial to local female labor (e.g., cleaners, laundry, small businesses). It is a *positive impact of medium significance* due to its medium intensity, its long duration, and the local extent.

Parameter	Value	Intensity
Environmental Value of the Component (VEC)	High	Medium
Level of Disruption (DPC)	Low	

VEC	DPC	Intensity	Extent	Duration	Significance
High	Low	Medium	Local	Long	**Medium**

Assessment of the significance of the impact on SMEs

Likewise, throughout the lifespan of the Project, it is possible that SMEs, major repair and maintenance companies, suppliers of small parts and other services will work with the Project contractor and/or sub-contractors within the context of maintenance for the Project, with this taking at least 15 to 30 days per year. During this period, external personnel will also be taken on, a major portion of whom will consist of people from the local population in the Project's DAI in the case of unqualified jobs. In the event SMEs are engaged to work for the Project, it will be a positive impact of medium significance due to its medium intensity, its long duration, and the local extent.

Parameter	Value	Intensity
Environmental Value of the Component (VEC)	High	Medium
Level of Disruption (DPC)	Low	

VEC	DPC	Intensity	Extent	Duration	Significance
High	Low	Medium	Local	Long	Medium

Increase in the production of electricity and local electrification

At the national level, Senegal is experiencing difficulties in satisfying the strong demand for energy. Injecting over 400 GWh into the interconnected network will enable quantitative and qualitative improvements in access to electricity and will raise the quality of service across the entire national territory whilst at the same time boosting the local, regional and national economy.

Moreover, the Municipality of Taiba N'diaye plans to seize on this opportunity in order to extend the electrical network to the non-electrified villages of Taiba Santhie, Bale Diop, Beity Gueye and Beity N'diaye, and for this purpose, has allocated the sum of 150,000,000 CFA Francs in its 2015 budget. The Project's electricity production should facilitate achieving this goal.

Assessment of the intensity of the environmental effect

The Environmental Value associated with it is High and the Level of Disruption (DPC) is High due to the massive injection of energy into the network – and the accelerated electrification of villages in the DAI. The outcome of this is a very strong environmental intensity.

Parameter	**Value**	**Intensity**
Environmental Value of the Component (VEC)	High	**Very strong**
Level of Disruption (DPC)	High	

Assessing the related impact

It is a *positive impact that is of very high significance* due to its *very strong intensity*, its long duration, and its national extent. It is the major positive impact sought after insofar as it will contribute to increasing national wealth and in addition could facilitate the electrification once and for all of unelectrified villages in the Project's DAI.

VEC	**DPC**	**Intensity**	**Extent**	**Duration**	**Significance**
High	High	Very strong	National	Long	**Very high**

Headquarters and taxes

PETN foresees signing a headquarters agreement with the Municipality of Taiba N'diaye and locating its head office within the Municipality in order to enable the Municipality to benefit from the tax benefits that it would be able to lay claim to. The amount for the licence and for the other taxes which should be paid by PETN to the Tax Centre would amount to 2.5 million Euros, part of which could constitute approximately 40 % or 800,000,000 CFA Francs and would be paid back to the Municipality by the State. This constitutes over 5 times the investment budget foreseen for the Municipality of Taiba N'diaye. This agreement addresses the greater part of the social demand issues, as well as the issues relating to renovation of basic infrastructures within the DAI (e.g., schools, health huts, training, miscellaneous equipment) , which will be resolved in the medium term.

Assessment of the intensity of the environmental effect

The Environmental Value associated with it is High and the Level of Disruption (DPC) is High due to the more or less instantaneous five-fold increase in revenues which will enable the Municipality of Taiba N'diaye to deal with the social expectations of the local populations and with the Municipality's development issues. The resulting intensity will be *Very strong*.

Parameter	Value	Intensity
Environmental Value of the Component (VEC)	High	Very strong
Level of Disruption (DPC)	High	

Assessment of the related impact

It is a positive impact that is Very Strong (i.e., Very Strong intensity, long duration (over 20 years), of local, regional and national extent (i.e., impact on the economic activities of the Municipality, the region and the nation).

VEC	DPC	Intensity	Extent	Duration	Significance
High	High	Very strong	National	Long	**Very high**

Constructing access tracks within the Project site

Constructing access tracks featuring reinforced laterite within the Project site (with this cost being borne by the Project), may give rise to some negative impacts (i.e., partial land loss to a limited number of PAPs). However, these new access tracks will greatly contribute to breaking the isolation of the DAI's villages and will be a powerful instrument for economic development. They will be used by the local villagers not only for facilitating access to their fields, but will also facilitate exchanges between villagers, as well as the more rapid transport of harvests to local and regional markets.

Assessment of the intensity of the environmental effect

The Environmental Value related to Departmental roads as well as to access tracks is deemed to be *high* both by the institutions and by the villagers.

The Level of Disruption (DPC) will be *medium* due to the very positive spin-offs referred to above (i.e., breaking isolation, exchanges between villagers, and transport of harvests to markets). The resulting intensity will be *strong.*

Parameter	Value	Intensity
Environmental Value of the Component (VEC)	High	**Strong**
Level of Disruption (DPC)	Medium	

Assessment of the related impact

The related impact will be positive and the significance will be high (i.e., strong intensity, long duration over 20 years, and a local and even regional extent).

VEC	DPC	Intensity	Extent	Duration	Significance
High	Medium	Strong	Local	Long	**High**

6.4.2 Assessment of the negative impacts

6.1.4.2 Construction phase

Impacts on land tenure

Freeing up the Project's siting, covering a surface area of 49 ha, will give rise to partial land losses for 341 PAPs with one or more fields on the location of the future Project site; the total .land acquisition impacts 459 properties. The PAPs live in twenty villages in Taiba N'diaye and 7 villages in Noto Gouye Diama and Darou Khoudoss. Table 22 below presents the home villages of PAPs whose fields will be impacted by the Project, the number of plots of land per village, and the total land surface area impacted by the Project for each village. The details of the breakdown of these surface areas (i.e. inventory and classification of the various trees and crops) per village are presented in the Departmental Commission of Census and Compensation Report and are presented in Annex E.

Table 22: Breakdown of the Properties and Persons Impacted by the Project per Village

Villages	Number of PIP (properties impacted)	Number of PAP (persons affected by the Project)	PAP distributioin each village
Baïty Bacar	6	6	1.8%
Baïty Dakhar	5	6	1.8%
Baïty Gueye	18	17	5.0%
Baïty Ndiaye	8	5	1.5%
Baal Diop	15	11	3.2%
Baal gueye	3	2	0.6%
Bal sand	3	3	0.9%
Darou dia	1	2	0.6%
Djingué	1	0	0.0%
Keur assane ndiaye	10	7	2.1%
Keur demba	2	1	0.3%
Keur madiagne	25	17	5.0%
Keur mallé	1	1	0.3%
Keur mambaye khari	1	1	0.3%
Keur mbaye seneba	4	2	0.6%
Khelcom	28	24	7.0%
Maka gueye beye	10	8	2.3%
Mbayen 3	40	28	8.2%
Mbourdjiguene	1	1	0.3%
Merina samb	1	1	0.3%
Ndiop sao	9	4	1.2%
Sam ndiaye	1	2	0.6%
Sao	13	11	3.2%
Taiba khab	2	2	0.6%
Taiba mbaye	70	52	15.2%
Taiba ndiaye	83	62	18.2%
Taiba santhie	93	65	19.1%
NON IDENTIFIE	5	0	0.0%
TOTAL	**459**	**341**	**100.0%**

The Project site is entirely within an agricultural zone where rainfall agriculture, cash cropping agriculture and market gardening are the local populations' main activities. The land acquisition required for this Project will, for the people affected, entail a partial loss of land used for crop production. Clearing land in order to free up the space required fore the Project and occupying the lands with construction activities will have the consequence of a *partial loss of revenue* due to the reduction in_production resulting from the various types of crops grown on the site (rainwater agriculture, cash cropping and market gardening).

For survey details on the percentages of land and tree loss per PAP, please refer to the Labosol Cadastre Rural Report of September 2015 (Annex E) and Annex L.

Financial assessment of the Compensation

Financial assessment of the compensation linked to any infrastructure project is governed by a legal framework. In this capacity, PETN has, with all the PAP present, conducted an inventory of all the crops and all the trees impacted on the Project's siting. Moreover, an assessment was carried out by the Departmental Commission of Census and Compensation, chaired by the Prefect of Tivaouane. The details of the members comprising the Departmental Commission of Census and Compensation are provided in Annex D.

The scale adopted by the Departmental Commission is the scale applied in the DAI by the other developers (ICS, Senelec, GCO). This scale provides 1,050,000 (1 million and fifty thousand) CFA Francs per hectare of land, to which the price of the trees, depending on their maturity, is added. On top of this scale, PETN freely decided to add additional compensation of 1,950,000 (one million nine hundred and fifty thousand) CFA Francs per hectare for rainfall crops, bringing the total to 3,000,000 (three million) CFA Francs per hectare, plus tree-related compensation as per the scale used by the Departmental Commission. Thus, the total compensation will constitute 140% of the amount initially raised by the Departmental Commission of Census and Compensation. See Annex E for the scale used within the Departmental Commission of Census and Compensation.

Assessment of the intensity of the environmental effect

The transfer of 49 ha of parts of land plots used for growing crops has been done in a situation where scarceness has been noted in the Department – Moreover, the villagers consider the lands to be their main sources of income and means of subsistence. Consequently, the Environmental Value associated with this Component (VEC) is *high.*

It may therefore be concluded, subject to the proviso that the PAP use the compensation wisely, that their previous livelihood will be restored. A Project Livelihood Restoration Plan will be developed and implemented to monitor and support the PAPs as they progress in restoring their livelihood. Consequently, the related Level of Disruption (DPC) will be Medium. The resulting intensity from crossing the VEC and the DPC is *Strong*.

Parameter	**Value**	**Intensity**
Environmental Value of the Component (VEC)	High	Strong
Level of Disruption (DPC)	Medium	

Assessment of the significance of the impact

The impact is *negative, of high significance* (strong intensity with a long duration of 20 years and a local extent).

Land					
VEC	**DPC**	**Intensity**	**Extent**	**Duration**	**Significance**
High	Medium	Strong	Local	Long	**High**

Impact on agricultural production for the municipality

The reduction of crop land is going to result in a potential reduction in agricultural production in the municipality. However, the lands transferred to the Project only constitute approximately 1%[19] of the surface areas planted in cereals and the agricultural production losses and, as a corollary, the theoretical loss of revenues for the municipality will be marginal and amply compensated for by the payment of taxes

Assessment of the intensity of the environmental effect

The Environmental Value related to the crop lands is still *High* but the Level of Disruption (DPC) will be *low* because the lands transferred (49.5 ha) for the Project constitute less than 1% of the surface areas planted in cereals[20] in the case of the crops planted within the Municipality of Taiba N'diaye. The resulting intensity will be *Medium.*

Parameter	**Value**	**Intensity**
Environmental Value of the Component (VEC)	High	Medium
Level of Disruption (DPC)	Low	

Assessment of the significance of the impact

It is a negative impact of medium significance (medium intensity, long duration (over 20 years), and with a local extent (limited to the crops lands within the Municipality).

VEC	**DPC**	**Intensity**	**Extent**	**Duration**	**Significance**
High	Low	Medium	Local	Long	**Medium**

Impacts on infrastructures and traffic

[19] The surface area of Taiba N'diaye is 16,100 ha: at least 5,000 ha are dedicated to agriculture
[20] According to the PLD (Local Development Plan) for Taiba N'diaye - 2013

a) Transport of equipment from the port to the Project Site via road RN1, national roads, regional roads and Departmental roads:

When equipment is received at the Port of Dakar, it will be organised and transferred to the Project site. Forty-six convoys for the 46 wind turbines (11 trucks per convoy) consisting of heavy ltrucks with special flatbeds, container carriers, and trailers loaded for this transfer will be mobilised for transporting equipment to the Project site. The transport will be assigned over periods defined depending on the construction phasing. It should be noted that the convoys are scheduled at the rate of 2 (being the equivalent of 2 wind turbines) per week and will only be able to travel at night between 10 pm and 5 am in the morning.

- Phase 1: 16 wind turbines transported + the equipment and assembly cranes, over a period lasting approximately 2 months;
- Phase 2: 16 wind turbines transported + the equipment and assembly cranes, over a period lasting approximately 2 months; and
- Phase 3: 14 wind turbines transported + the equipment and assembly cranes, over a period lasting approximately 7 weeks.

These operations will be intermittent and escorted in order to minimise traffic congestion problems; they will be handled by transport specialists under Vestas's supervision and responsibility. The height of the containers will not require any medium-/high voltage overhead lines to be cut, and the toll motorway will not be used. Under these conditions, the disruption caused to traffic by the convoys will be minimised.

The axle loads of all the trucks forming part of the convoys will be calibrated in order to avoid damaging the surface of the national road; that of the Departmental road (D702 Tivaouane Mboro), which has a connecting road with Departmental road D702C, and which links up to the zone where the Project is located.

The contractor will make every arrangement to ensure that any deterioration of the road surface of national and Departmental roads and tracks that is attributable to its transport activity will be repaired immediately.

Assessment of the intensity of the environmental effect

The Environmental Value related to the road infrastructures, Departmental roads and access tracks is deemed to be *high* both by the institutions and villagers.

In the case of transporting the equipment from the Port of Dakar to the Project site via a well-organised convoy that is escorted, and with *the organisation of the convoys announced in advance*, the Level of Disruption (DPC) will be *low* due to the organisational measures taken (i.e., escort, night transport, intermittent nature of the convoys, immediate repair of the road surface, and reconditioning of damaged infrastructures where need be by Vestas's sub-contractors).- The resulting intensity will be *Medium.*

Parameter	Value	Intensity
Environmental Value of the Component (VEC)	High	Medium
Level of Disruption (DPC)	Low	

Assessment of the significance of the impact

It is a negative impact of medium significance (medium intensity, short duration and regional extent).

VEC	DPC	Intensity	Extent	Duration	Significance
High	Low	Medium	Regional	Short	**Medium**

b) Negative impacts on the tracks, Departmental roads D702 and D702C, and on the villages passed through:

A preliminary task to transporting the wind turbines and the equipment required for erecting the wind turbines to the Project site will be the gradual construction of access tracks dedicated to the Project, capable of supporting the axle weight of the heavy trucks.

Moreover, Vestas will take care to calibrate the trucks in order to adapt the axle loads to the nature of the tracks and the Departmental roads.

The municipality has a 19 km-long Departmental road with a laterite surface and various secondary tracks with sandy surfaces; some of these natural tracks will not be capable of bearing the weight of the convoys for transporting equipment to the Project site. Consequently, Vestas will have to construct tracks beforehand on-site and link them up to the Tivaouane Mbour road before transporting the equipment to the Project site.

The construction of these access tracks dedicated to the Project and foundations, as well as other platforms made from reinforced concrete, will require the supplying of raw materials, lime or basalt gravel, sand and clay from various quarries located at various distances from the Project site (Bandia, Lam Lam, Toglou, etc.) as well as cement from three cement works at Rufisque, Bandia or Pout, which are also quite far away from the Project site.

The supply of clay, water, cement and stones to the Project site, both for laying foundations and maintenance areas as well as access tracks will be done at a sustainable pace.

It will be necessary to have 16 to 20 trucks (8, 16 or 30 m^3) which will be mobilised for transporting the water and clay, and these trucks will complete 5 to 7 round trips per day. The cement supply will occur at a rate scheduled with the cement works, subject to conditions that avoid disrupting traffic – all these trucks will be in order on the technical inspection plan, with the axle load calibrated and checked so as to avoid any deterioration of the road surface. Those trucks transporting powdery products such as sand and laterite will have tarpaulins over them in order to prevent dust from flying around.

These trucks will take the Tivaouane Mboro road (D702), which is 10 km long, before turning off onto Departmental road D702C; moreover, village tracks (with natural, laterite or sandy surfaces) may be used in order to get to the unloading zones.

These trucks will pass through a lot of villages in the immediate zone of influence (Keur Bocar, Daf II, Taiba Khab and Ndomor Taiba N'diaye, Taiba Santhie, and Khelcom (Baal Diop), the Djingué - Mboro road, Maka Dieng Selco Ndiamba - Keur Madiagne).

Due to their limited number and subject to the proviso of optimised organisation, these trucks will not give rise to intense traffic on the Tivaouane - Mboro road (approximately 15 to 20 trucks operating at different periods of the day) and on the Departmental road with a reinforced laterite surface that is 19 km long. Nor will such traffic be a factor in hastening the deterioration of this road either.

Transport between the sites the laterite is taken from and the construction worksite may cause disturbances such as disrupting traffic and causing pollution due to the dust raised where inhabited zones are passed through, and along fields alongside the roads or taken by the trucks; also we cannot rule out the risks of accidents within the zones passed through.

Given the limited number of trucks, these disturbances will be limited by Vestas adopting appropriate measures included in its HSE plan, such as placing tarpaulins on vehicles, erecting warning signs in the villages passed through, imposing speed limits on the trucks, raising the awareness of local populations, travelling outside peak traffic hours, and confirming in the technical inspection of the trucks that drivers have been trained.

Assessment of the intensity of the environmental effect

The Environmental Value related to the Departmental roads and the tracks is deemed to be *high* both by the institutions and by the villagers.

The Level of Disruption (DPC) will be *low* due to the organisational and HSE measures that will be taken by Vestas in order to avoid damaging the tracks and roads, raising dust, or causing accidents in the villages passed through, as well as the low number of trucks and the relatively limited number of return trips. Furthermore, Vestas will immediately repair damaged road surfaces if need be. The resulting intensity will be *Medium*.

Parameter	**Value**	**Intensity**
Environmental Value of the Component (VEC)	High	**Medium**
Level of Disruption (DPC)	Low	

Assessment of the significance of the impact

The relative impact will be negative and of low significance (medium intensity, short duration and local extent).

VEC	DPC	Intensity	Extent	Duration	Significance
High	Low	Medium	Local	Short	**Low**

Assessment of the impacts on living standards

Assessment of the Project's negative impacts on the human environment and living standards in the Project's immediate zone relates to pollution of the aquifers that supply the local populations, the use of drinking water, the noise environment, the waste generated, the population's state of public health, and the public infrastructures and equipment that have an impact on the life of local populations within the Project's immediate zone.

a) Noise pollution:

Laying foundations and the construction of tracks involving major civil engineering works, digging trenches for cables, erecting wind turbines and, generally speaking, preparation and construction works, will require the use of various mobile and stationary equipment items. This machinery can, due to the noise it generates, become an environmental nuisance that may adversely affect the living standards of local people and the natural environment which is exposed. The following may be cited:

- Mobile equipment (transport trucks, loaders, diggers, bulldozers, cranes, etc.);
- Fixed equipment (concrete mixers, drilling machines, compressors, small machinery, generator sets, etc.).

Given the remoteness of the site (the two closest villages are more than 800 m away from the wind turbines) the noise from the assembly worksites should not be perceptible in the closest adjoining villages. For the workers and other people exposed in the worksites, wearing individual protective equipment will be mandatory, if need be, in accordance with Vestas HSE directives.

The construction will also give rise to additional vehicle traffic, and particularly trucks. The traffic will be slightly greater during the first few weeks, particularly on the Tivaouane – Mboro road and on Departmental road D702C.

Vestas will set up an optimised organisational structure for the transport which will enable a substantial reduction of the noise level in the villages while the trucks are passing through (staggered return trips, off-peak transport, choice of routes and bypass roads, if need be).

Assessment of the intensity of the environmental effect

The Environmental Value related to the living standards and its related component (i.e., noise) is deemed to be *high* generally by all the stakeholders. With the HSE measures taken and those that will be implemented by the sub-contractor, the Level of Disruption (DPC) will therefore be *low*. The resulting intensity will be *Medium*.

Parameter	Value	Intensity
Environmental Value of the Component (VEC)	High	Medium
Level of Disruption (DPC)	Low	

Assessment of the significance of the impact

The impact will be *negative* of *medium* significance (medium intensity, local extent- in the works zone and neighboring villages, medium duration of 34 months).

VEC	DPC	Intensity	Extent	Duration	Significance
High	Low	Medium	Local	Medium	**Medium**

b) Deterioration of the air quality:

The works involved in preparing the Project site, erecting the wind turbines, and constructing access tracks and new buildings will last approximately 34 months and will involve three phases. During these periods, the earthworks and civil engineering works, combined with the transport and temporary storage of materials (excavated materials, backfill), will have a localised impact on the air quality in terms of the emission of dust and exhaust gases from machinery and vehicles, particularly during the peak works period and during very windy periods.

Emissions of dust and exhaust gases, therefore, constitute a disruptive factor due to the planned activities. Locally, the air quality following the emission of dust will therefore be temporarily affected at the current site.

Combustion gas emissions will come from trucks, worksite generator sets, and concrete mixers towed using a diesel engine. During the peak phases (i.e., three phases when equipment will be transported from the Port of Dakar to the Project site) the works will require a large number of trucks (up to twenty-two per peak week). These trucks and equipment items burn diesel oil and emit CO, CO_2, SOx, NOx, PM, etc.

If you consider the transport of materials, wind can spread dust right along the route leading from the loading sites to the unloading sites. Indeed, if the loads (sand, gravel, etc.) are not covered with a tarpaulin, the trucks will lose part of their loads all along the route, with this quite often being accompanied by dust that may constitute a disturbance for the villages passed through.

All this dust generated could adversely affect the quality of the air and, through a knock-on effect, the health of the workers at the worksites and, to a lesser extent, the health of the local populations located in the vicinity of the site.

Assessment of the intensity of the environmental effect

The Environmental Value related to the living standards and its related component (i.e., air quality) is deemed to be High generally by all the stakeholders.

Parameter	**Value**	**Intensity**
Environmental Value of the Component (VEC)	High	Medium
Level of Disruption (DPC)	Low	

Assessment of the significance of the impact

The impact will be *negative* and of *medium* significance (medium intensity, local extent- within the works zone and neighboring villages, medium duration of 34 months).

VEC	**DPC**	**Intensity**	**Extent**	**Duration**	**Significance**
High	Low	Medium	Local	Medium	**Medium**

c) Worksite waste during construction:

The preparation and construction works for the site where the Project will be established and the operations related to laying access tracks, and setting up the wind farm's equipment and installations, will generate a volume of inert waste, excavated materials, ordinary industrial waste, rubble and waste consisting of packaging and metals, cable waste, and cement grout.

The technical buildings will only host offices, storage containers, and workshops, and will not include a section dedicated to housing workers. The waste that the buildings may generate includes some special industrial waste, such as penetrating oil, solvents, welding X-ray waste products, etc. in limited quantities.

In addition to this waste, there will be other waste considered to be hazardous; particularly waste oil (spent oil) produced by worksite vehicles and machinery which could accidentally pollute the site's soil.

Removal and disposal of this waste off-site could give rise to impacts on living standards and the natural environment.

In practice, a waste management plan will be implemented with the setting up of a waste collection center which will comply with GIIP in this field (i.e., sorting, regular collections, and transfer to waste treatment plants, authorised by the DREEC (Directorate of the Environment and Listed Establishments), with monitoring of traceability of the waste disposal. Certain types of packaging, wood waste, scrap metal, cable waste, etc. will be recycled; waste oils and solvents will be sent to waste oil recycling companies.

The Environmental Value related to the living standards and its related component (i.e., waste) is deemed to be *high*generally by all the stakeholders. With the Vestas HSE measures taken

and those that will be implemented by the sub-contractor, the Level of Disruption (DPC) will therefore be *low*. The resulting intensity will be *Medium.*

Parameter	Value	Intensity
Environmental Value of the Component (VEC)	High	**Medium**
Level of Disruption (DPC)	Low	

Assessment of the significance of the impact

Thanks to the establishment and implementation of the Vestas sub-contractor's HSE directives, the impact of the worksite waste on the living standard will be *negative* and of *medium* significance (medium intensity, local extent in the works zone and within the municipality (i.e., waste disposal facilities, medium duration of 34 months).

VEC	DPC	Intensity	Extent	Duration	Significance
High	Low	Medium	Local	Medium	**Medium**

d) Health and hygiene of agricultural workers and people living nearby:

During the construction phase, the noise and fumes generated by worksite equipment and heavy trucks and cranes, and the fine particles created as the result of working fine materials (cement, sand and gravel) may be a source of disturbance and be harmful to the tranquillity and health of agricultural workers in the zone, as well as workers and people living near the Project site. The villages likely to be affected are those on the Tivaouane Mboro road (D702) and along Departmental road D702, and a lot of them are located within the DAI.

Assessment of the intensity of the environmental effect

The Environmental Value related to the living standards and its related component (i.e., health and hygiene) is deemed to be *high* generally by all the stakeholders.

Due to the establishment and implementation of HSE directives (from the Vestas and sub-contractor's environmental management plans), the impact of the pollution related to the works on the hygiene, health and safety of workers and people living nearby will be limited and the Level of Disruption of the component will be deemed *low*. The resulting intensity will be *medium*.

Parameter	Value	Intensity
Environmental Value of the Component (VEC)	High	**Medium**
Level of Disruption (DPC)	Low	

Assessment of the significance of the impact

The impact will be *negative*, and of *Medium* significance (medium intensity, local extent – work zone and neighbouring villages – medium duration (34 months).

VEC	DPC	Intensity	Extent	Duration	Significance
High	Low	Medium	Local	Medium	**Medium**

e) Risks of accidents:

During the construction phase, consideration should also be given to the risks of accidents due to the machinery, the presence of poorly protected/covered construction materials (e.g., formwork metal) and the presence of personnel, particularly unqualified personnel. There is a risk of falls for any authorised or unauthorised people on the worksite. The accident risk is not negligible. There are also accident risks linked to road traffic for routing construction materials.

Assessment of the intensity of the environmental effect

The Environmental Value related to the living standards and its related component (i.e., safety) is deemed to be *high* generally by all the stakeholders. The Level of Disruption is deemed *low* (the arrival of external workers, working in an unfamiliar environment); the value of the environmental component is deemed to be *high, and the resulting intensity will be medium*.

Parameter	Value	Intensity
Environmental Value of the Component (VEC)	High	**Medium**
Level of Disruption (DPC)	Low	

Assessment of the significance of the impact

The impact will be *negative and of medium significance*, (medium intensity, local extent- work zone and neighboring villages, and medium duration of 34 months).

VEC	DPC	Intensity	Extent	Duration	Significance
High	Low	Medium	Local	Medium	**Medium**

f) Public health risks:

An increase in the public health risks due to the arrival of worksite workers, particularly with the spread of risky sexual behaviour; one of the openly expressed fears stated in public consultations is that the villagers recruited may be exposed to contamination from all sorts of diseases which may be brought in, particularly by non-local workers who have come to take part in the Project's construction work. An increase in this risk will primarily be attributable to the expected arrival of external workers (coming from various places and different cultures) during the peak construction period.

The other fears relate to the fact that the substantial incomes received by the externalworkers who will stay in hotels in the surrounding villages may lead to the development of forms of

behavior that are harmful to the health of individuals in question and sometimes this will have a rebound effect on the local communities (e.g., alcoholism, prostitution, smoking, the emergence of STDs including AIDS).

These public health risks and disturbances will be limited by Vestas implementing its workers' Code of Conduct and adopting appropriate measures included in its HSE plan.

Assessment of the intensity of the environmental effect

The Environmental Value related to the living standards and its related component (i.e., public health) is deemed to be *high* generally by all the stakeholders. The Level of Disruption is deemed to be *Medium* ; as the value of the Environmental Component is High, the resulting intensity will be Strong.

Parameter	**Value**	**Intensity**
Environmental Value of the Component (VEC)	High	**Strong**
Level of Disruption (DPC)	Medium	

Assessment of the significance of the impact

The impact will be *negative and the significance high* (with a strong intensity, local extent- work zone and neighboring villages, and medium duration (34 months).

VEC	**DPC**	**Intensity**	**Extent**	**Duration**	**Significance**
High	Medium	Strong	Local	Medium	**High**

g) Risk of pollution of groundwater aquifers near the villagers:

If the effluents and various solid wastes from the worksite works are not managed properly at worksite level (regular collection and removal of the worksite waste), they could become dissolved and end up as suspended solids floating in water.

The intervention of worksite machinery is a potential source of groundwater pollution; in particular, pollution due to the seepage of hydrocarbons (i.e., fuel, waste oils) in the case of leaks or accidental spillage.

The storage and handling of chemicals and wastes in small quantities (i.e., oils, degreasing agents, glues, fuel, etc.) may be the source of accidental spillages likely to cause local contamination due to the seepage into soils and groundwater.

The same applies for fuel filling or distribution operations for worksite machinery. Run-off water, possibly fouled by the worksite's operations, may also seep into the soil and groundwater and adversely affect their quality. Likewise, in the event of accidental seepage, the wastewater may accidentally affect the quality of the groundwater. PETN will implement appropriate HSE measures in order to avoid any pollution of the aquifers.

Assessment of the intensity of the environmental effect

The Environmental Value related to water, including water from aquifers that supply the village wells, is deemed *high* both by the institutions and by the villagers. During construction, appropriate HSE measures will be implemented in order to prevent any pollution of the aquifers. The Level of Disruption (DPC) will therefore be *low*. The resulting intensity will be *Medium.*

Parameter	Value	Intensity
Environmental Value of the Component (VEC)	High	**Medium to Low**[21]
Level of Disruption (DPC)	Low	

Assessment of the significance of the impact

The related impact will be negative and of low significance (medium intensity, specific extent in the works zone, medium duration of 34 months).

VEC	DPC	Intensity	Extent	Duration	Significance
High	Low	Medium	Specific	Medium	**Low**

h) Impacts on the water resources used by the local populations:

The construction phase will require relatively modest water needs for the civil engineering and building erection works, human needs, cleaning operations, sprinkling soils, etc.

These needs are assessed as follows[22], based on the following hypotheses:

- Laying 35 km of tracks, on the basis of 400 linear metres per day
- Maximum volume of reinforced concrete of the foundations: 550 m^3 per foundation
- Thickness of the laterite layer for the approach tracks; 20 cm

Based on these assumptions, the water needs at a maximum will be 30,000 m^3 for the 34-month construction phase, and the needs in terms of laterite will be approximately 42,000 m^3.

These quantities are not very large and will, in terms of resources, require the following:

For the tracks:

- 4 x 8 m^3 water trucks making 5 round trips per day; and

[21] The table for determining the intensity does not make provision for a Level of Disruption (DPC) of the component that is very low, as is the case here, and which would have brought about a low intensity and a very low impact importance.
[22] After discussions with the Project's developer.

- 5 x 16 m^3 water trucks making 5 round trips per day.

For a foundation (base: 550 m^3 of reinforced concrete):

- 12 x 8 m^3 water trucks making 6 round trips per day (extreme case).

The number of trucks and round trips will depend on the organisation of the construction worksite but clearly shows that the pace of the round trips will not be very high.

Water will be transported to the site using 8 m^3 water trucks that will be filled outside the municipality on an intermittent basis, depending on the scheduling of the works, and during the 34 months of the construction phase.

These relatively modest water needs, with the water coming from an external source, will not compete with the municipality's needs or lead to a shortage for local populations.

Assessment of the intensity of the environmental effect

The Environmental Value related to drinking water and water for crops is deemed *high* both by institutions and by villagers. The existence of village associations for managing drinking water from boreholes (ASUFOR - the borehole users association) attests to this. Within the Project's context, the water required for construction will not be drawn from local resources and the Level of Disruption (DPC) will therefore be *low.* The resulting intensity will be *Medium.*

Parameter	**Value**	**Intensity**
Environmental Value of the Component (VEC)	High	**Medium**
Level of Disruption (DPC)	Low	

Assessment of the significance of the impact

In theory, there is no impact related to this component. However, it may be assumed that local water will also be used as drinking water or water for toilets by the approx.400 employees, for the Project's construction phase. The related impact will be *negative* and will be of *very low* significance (medium intensity, specific extent in the works zone, medium duration of 34 months).

VEC	**DPC**	**Intensity**	**Extent**	**Duration**	**Significance**
High	Low	Medium	Specific	Medium	**Low**

In addition, during the Operations phase local water will also be used by employees (estimated as being a maximum of 20 people who will work on the site maintaining and operating the wind power station, as well as some of the 35 security guards. This use will be marginal.

i) Transport of goods and people during construction:

The disruption of transporting people and goods on roads and tracks in the Project's zone will result from traffic due to trucks transporting mainly raw materials and water. This disruption will be reduced by the moderate number of trucks envisaged (a maximum of 25 during the peak period per day): this is a *negative impact of medium significance* due to its medium intensity, its local extent, and its medium duration of 34 months.

Assessment of the intensity of the environmental effect

Parameter	**Value**	**Intensity**
Environmental Value of the Component (VEC)	High	**Medium**
Level of Disruption (DPC)	Low	

Assessment of the significance of the impact

VEC	**DPC**	**Intensity**	**Extent**	**Duration**	**Significance**
High	Low	Medium	Local	Medium	**Medium**

j) Cultural and historic heritage:

Within the Project site, to date, no archaeological sites, historical monuments, or religious sites that are likely to be adversely affected or threatened with being destroyed by the Project works have been noted. Only one cemetery has been located in the Project zone and it was taken into account in the layout of the Project infrastructure. No works will occur where the cemetery is located.

Assessment of the intensity of the environmental effect

Parameter	**Value**	**Intensity**
Environmental Value of the Component (VEC)	High	**Medium**
Level of Disruption (DPC)	Low	

Assessment of the significance of the impact

The *negative impact will be low* due to its medium intensity, its specific extent in the works zone, and its short duration (i.e., construction in the vicinity of the cemetery) .

VEC	**DPC**	**Intensity**	**Extent**	**Duration**	**Significance**
High	Low	Medium	Specific	Short	Low

6.2.4.2 Operations phase

During the operations phase, the significance of the impacts on utility water consumption (insignificant), the impact of the noise of the wind turbines (medium), changes to the landscape (high), the waste generated (medium), and shadow flicker, (medium) are summarised in Table 26 below, and mitigation measures are provided in Table 29.

a) Shadow flicker effects

Wind turbines in operation will induce shadow flickers phenomenon that may become a problem with the residential properties located nearby, and for some of them, having a specific orientation to the wind energy facility. Results of modeling of the shadow flickers phenomenon is in the ESIS REV04 dated July 2015 (see p. 238-242) and show when worst case scenario is taken in consideration that effects are limited to the wind turbines closest vicinity and only for Baiti Ndiaye (shadow flicker was estimated to last a maximum of 19 minutes per day) and Balsande II (estimation of 33 minutes per day). Potential impacts to local communities from shadow flickers are also discussed in Chapter 9 of this ESIS Addendum (see section 9.2.6).

Assessment of the intensity of the environmental effect

The Environmental Value related to the shadow flickers and its related component (i.e., visual perception) is deemed to be *high.* The Level of Disruption (DPC) will therefore be *low* (due to two villages out of a total of 17 considered –in a worst case scenario). The resulting intensity will be *medium.*

Parameter	**Value**	**Intensity**
Environmental Value of the Component (VEC)	High	**Medium**
Level of Disruption (DPC)	Low	

Assessment of the related impact

The impact will be *negative and of medium significance*, (medium intensity, specifc extent- two neighboring villages, and long duration).

VEC	**DPC**	**Intensity**	**Extent**	**Duration**	**Significance**
High	Low	Medium	Specific	Long	**Medium**

b) Light Pollution during operation phase

To ensure the safety of air navigation, each wind turbine is equipped with obstacle markers lights device. The Obstacle Lighting System installed on each wind turbine will be operational during the days with white strobe lights (of 20.000 candelas) and during night with red lights (of 2.000 candelas (cd.) These obstacle lights are installed on top of the nacelle and must ensure the visibility of wind turbines in all directions. The lights are synchronized and this flashing system can sometimes be annoying for residents.

Assessment of the intensity of the environmental effect

The Environmental Value related to the light pollution and its related component (i.e., visual disturbance) is deemed to be *high.* The Level of Disruption (DPC) will therefore be *low.* The resulting intensity will be *Medium.*

Parameter	**Value**	**Intensity**
Environmental Value of the Component (VEC)	High	**Medium**
Level of Disruption (DPC)	Low	

Assessment of the related impact

The impact will be *negative and of medium significance*, (medium intensity, local extent- work zone and the DAI, and long duration).

VEC	**DPC**	**Intensity**	**Extent**	**Duration**	**Significance**
High	Low	Medium	Local	Long	**Medium**

6.3.4.2 Summary

The Tables below summarise the positive and negative impacts identified and their significance during the construction and operation phases.

Positive impacts during the construction phase

Table 23: Summary of the assessment of the positive impacts of the Project in the construction phase

Impact sources	Summary of the potential positive impacts +	Resources or utilities allocated	Qualitative Environmental Value	Level of Disruption	Intensity	Extent	Duration	Significance
Project Preparation and Construction	Creation of temporary jobs over 34-month construction phase	Socio-economic	High	Medium	Strong	Local	Medium	High
	Indirect job creation (cleaners, small businesses, restaurants etc.)	Socio-economic	High	Medium	Strong	Local	Medium	High
	Participation of SMEs from the zone, the region and at national level	Socio-economic	High	Medium	Strong	Local	Medium	High

Positive impacts during the operations phase

Table 24: Summary of the assessment of the positive impacts of the Project in the operations phase

Impact sources	Summary of the potential positive impacts	Resources or utilities likely to be adversely affected	Environmental Value	Level of Disruption	Intensity	Extent	Duration	Significance
Operation and maintenance of the wind farm	Creation of full-time jobs (technical staff at the wind farm and caretakers)	Socio-economic	High	Low	Medium	Local	Long	Medium
Operation and maintenance of the wind farm	Indirect job creation (cleaners, small businesses, restaurants etc.)	Socio-economic	High	Low	Medium	Local	Long	Medium
Operation and maintenance of the wind farm	Creation of temporary jobs during shut-downs -development of SMEs in the zone	Socio-economic	High	Low	Medium	Local	Long	Medium
Production of 440 GWh	Deficit reduction - Rural electrification	Socio-economic	High	High	Very strong	National	Long	Very High
Establishment of the Wind Farm at Taiba N'diaye	Headquarters agreement and payment of taxes to Taiba N'diaye	Socio-economic	High	High	Very strong	National	Long	Very High
Establishment of the Wind Farm at Taiba N'diaye	Long-term access tracks leading to the wind turbines and for taking away agricultural production - Facilitation of mobility - development of trade between villages and outside themunicipality	Socio-economic	High	Medium	Strong	Local	Long	High

Negative impacts in the construction phase

Table 25: Summary of assessment of the Project's negative impacts in the construction phase

Impact sources	Summary of the potential negative impacts	Resources or utilities allocated	Environmental Value	Level of Disruption	Intensity	Extent	Duration	Significance
Construction of the wind farm and tracks over 49 ha of land required for the project.	Partial losses of land plots. Related losses of income derived from cash crops, rainfall agriculture and market gardening.	Socio-economic /land	High	Medium	Strong	Local	Long	High
Construction of the wind farm and tracks over 49 ha of land required for the project.	Loss/reduction of agricultural production in the municipality	Socio-economic	High	Low	Medium	Local	Long	Medium
Transfer of the equipment from Port of Dakar to the wind farm site	Disruptions to traffic following the routing of equipment from Port of Dakar to the site via National road RN1, Departmental road D 702 and Departmental road D 702C –possible deterioration of roads and tracks	Infrastructures (Departmental roads D702 and D702C)	High	Low	Medium	Regional	Short	Medium

Table 25: Summary of assessment of the Project's negative impacts in the construction phase

Impact sources	Summary of the potential negative impacts	Resources or utilities allocated	Environmental Value	Level of Disruption	Intensity	Extent	Duration	Significance
Intensive use of heavy trucks between quarries and the site and various types of equipment transport	Disruptions to traffic following round trips made by trucks during the preparation and construction work for excavation work, removing excavated materials, transporting sand and gravel between the quarries and the Site. Attributable accident risks on RN1, and Departmental roads D702 and D702C - deterioration of roads and tracks	Infrastructures (Departmental roads D702 and D702C)	High	Low	Medium	Local	Short	Low

Impact sources	Summary of the potential negative impacts	Resources allocated	Environmental Value	Level of Disruption	Intensity	Extent	Duration	Significance
Operating machinery, equipment and trucks at the worksite	Change in the noise conditions due to noise generated by worksite equipment	Living standards Noise	High	Low	Medium	Local	Medium	Medium
Emissions from machinery, trucks etc. on the site; dust raised	Change in the air quality due to emissions caused by dust and exhaust gases from vehicles and machinery, and trucks raising dust	Living standards Air quality	High	Low	Medium	Local	Medium	Medium
Various types of waste and emissions attributable to the worksite	Generating various types of waste (everyday and special industrial waste, waste oils, etc.) – Nuisances caused by raising dust and polluting fumes from machinery, trucks and worksite units	Living standards Waste	High	Low	Medium	Local	Medium	Medium
Generating noises, combustion gases and wastewater	Disturbing the tranquillity and health of agricultural workers at the project site, and workers and people living near the site due to noise, fumes from worksite machinery, and the fine particles generated. Risks of diseases linked to discharges of wastewater and stagnant pools of it on the worksite.	Living standards: Hygiene, Health and Safety (HHS)	High	Low	Medium	Local	Medium	Medium
Traffic involving machinery, worksite	Risks of accidents attributable to traffic involving machinery, works	Living standards Hygiene, Health	High	Low	Medium	Local	Medium	Medium

Impact sources	Summary of the potential negative impacts	Resources allocated	Environmental Value	Level of Disruption	Intensity	Extent	Duration	Significance
works, and people	and labour.	and Safety (HHS)						
An influx of external workers	Public health risks due to the influx of workers (STDs - AIDS)	Living standards - Hygiene, Health and Safety (HHS)	High	Medium	Strong	Local	Mdium	High
Occupation of natural run-off zones	Aquifer pollution caused by changing run-off and filtration conditions during the Civil Engineering works. Indirect pollution caused by effluents and solid wastes from the works	Living standards Water resources	High	Low	Medium	Specific	Medium	Low
Water required for the works	Competition between the Project's consumption and local populations' consumption	Living standards Water resources	High	Low	Medium	Specific	Medium	Low
Preparation and construction works for the wind farm	Disruption of the transport of goods and people	Living standards – mobility of local populations	High	Low	Medium	Local	Medium	Medium
Preparation and construction works for the wind farm	Harming the integrity of the cultural heritage	Living standards - cultural heritage	High	Low	Medium	Specific	Short	Low
Preparation and erection works for the wind farm; the presence of	Temporary modification of the visual landscape	Living standards – visual landscape	High	Low	Medium	Local	Short	Low

Impact sources	Summary of the potential negative impacts	Resources allocated	Environmental Value	Level of Disruption	Intensity	Extent	Duration	Significance
equipment,and of the technical buildings								

Negative impacts in the operations phase

Table 26: Summary of the assessment of the negative impacts of the Project in the operations phase

Impact sources	Summary of the potential negative impacts	Resources allocated	Environmental Value	Level of Disruption	Intensity	Extent	Duration	Significance
Utility water consumption	There is no risk of excessive water consumption for utility needs to the detriment of local consumption	The zone's water resources	High	Low	Medium	Specific	Long[23]	Medium
Visual Landscape	Impact of the new wind farm modifying the landscape, with the wind turbines being visible from very far away	Living standards	High	Medium	Strong	Local	Long	High
Noise environment Background noise from the wind turbines	Impact on the surrounding population of the noise pollution due to noise and vibrations generated by the functioning of the wind turbines	Living standards	High	Low	Medium	Local	Long	Medium[24]
Waste generated during operations	Harming living standards and possible contamination of the natural environmental by the wind farm producing special industrial waste (waste oils, empty containers, electrical equipment, etc.) and similar household waste during maintenance	Living standards	High	Low	Medium	Specific	Long	Medium

[23] Once a year during maintenance for 15 to 30 days, and the needs of day labourer personnel

[24] A perceptible level that is very low according to the modelling (see results from the predictive noise survey, presented in the ESIS REV03)

Table 26: Summary of the assessment of the negative impacts of the Project in the operations phase

Impact sources	Summary of the potential negative impacts	Resources allocated	Environmental Value	Level of Disruption	Intensity	Extent	Duration	Significance
Wind Farm in operations	Shadow Flicker effects Difficulties of acceptance Visual gene	Living standards	High	Low	medium	Specific	Long	Medium
Obstacle lighting system- Wind Farm in operations	Acceptance difficulties of the flashing lights Visual landscape	Living standards	High	Low	Medium	Local	Long	Medium

6.5 Plan for mitigation measures and reducing impacts

Four (4) measures are foreseen for managing potential Project impacts:

- Implementation of the Project's Environmental and Social Management System (ESMS) Plan;
- Compliance with national and local regulatory requirements and the applicable international guidelines;
- Specific measures for reducing the Project's potential negative impacts;
- Compensation measures for negative impacts and support measures for the Project's positive effects.

The main environmental management factors for the Project are summarised below.

6.5.1 Improvement measures for positive impacts

6.1.5.1 During the construction phase

Table 27: Improvement measures in the construction phase

IMPROVEMENT MEASURES FOR POSITIVE SOCIAL AND ENVIRONMENTAL IMPACTS DURING THE CONSTRUCTION PHASE

Impact sources	Potential impacts	Improvement measures	Significance after the improvement measures	Implementation manager	Monitoring	Implementation period
Construction and erection preparatory works	Creation of temporary jobs over 34- month construction phase	Favour PAP, particularly for unqualified jobs; Set up a commission responsible for managing recruiting under transparent conditions and for fulfilling the developer's commitments;	High	Vestas	PETN ESMC[25]	Construction
	Creation of indirect jobs (cleaners, small businesses, restaurants etc.)	Favor local villagers with equal opportunity for women for linen services, catering services, and small businesses;	High	Brought about by the worksite	PETN ESMC	Construction
	Participation of SMEs in the zone, the region and at national level	Favor construction companies and national and local SMEs as much as possible by encouraging them to recruit from the municipality's available resources.	High	PETN & Vestas	PETN ESMC	Construction

Table 28: Improvement measures in the construction phase

IMPROVEMENT MEASURES FOR POSITIVE SOCIAL AND ENVIRONMENTAL IMPACTS DURING THE OPERATIONS PHASE

	Potential impacts	Improvement measures	Significance after the improvement measures	Implementation manager	Monitoring	Implementation period
Operations phase for the wind farm	Deficit reduction - Rural electrification	Favor electrification in general and rural electrification of the zone in particular;	Very High	PETN	ESMC	Operations
	Creation of 20 permanent jobs for operating the wind farm for 20 years, and 35 security and cleaning positions	If possible, recruit unqualified personnel *in situ*. (35) For qualified positions, when faced with applicants who have the same skills, favur local villagers;	Medium	PETN	ESMC	Operations
	Creation of temporary jobs during shut-downs - development of SMEs in the zone	Favor national labor insofar as is possible in order to combat the under-employment of young people;	Medium	PETN	ESMC	Operations
	Creation of long-term indirect jobs (cleaners, catering and linen staff, etc.);	Favour unqualified local labour;	Medium	PETN	ESMC	Operations

Table 28: Improvement measures in the construction phase						
IMPROVEMENT MEASURES FOR POSITIVE SOCIAL AND ENVIRONMENTAL IMPACTS DURING THE OPERATIONS PHASE						
	Creation of work opportunities for maintenance of the wind farm for 20 years;	Favour SMEs and specialist enterprises from the local area and the rest of the country;	Medium	PETN	ESMC	Operations
	Headquarters agreement and payment of taxes to Taiba N'diaye	Sign an agreement to this end with the project developer before the wind farm is connected	Very High	PETN	ESMC	Operations

6.5.2 Mitigation measures for negative impacts

Table 29: Mitigation measures for negative impacts						
MITIGATION MEASURES FOR THE LAND IMPACT						
Impact source	Potential impacts	**Mitigation measures**	Significance after mitigation (assessment of residual impacts)	Implementation manager	Implementation period	Cost
Erection of the Taiba N'diaye wind farm	• Permanent loss of land • Losses of income; • Reduction in agricultural production;	• A costs assessment commission was created via an Order signed by the Prefect of Tivaouane: the commission includes State technical services and other competent stakeholders, including representatives of the developer, PAP representatives, village chiefs, youth associations, women's associations, and any other resource deemed necessary by the administration. The committee assessed the costs and the compensation amount for PAP using the scale applied in the Department • The commission will have to ensure PAP receive compensation within a reasonable timeframe • Use local sub-contractors' services as much as possible; • Recruit as a matter of priority from local populations who have lands that will be impacted by the project; • Implementation of high-profile initiatives for providing compensation to the Municipality(dispensaries, support for NGOs and women's groups who will particularly be affected); • Lay access paths and ensure they are maintained by PETN • Draw up a protocol involving PETN, the administration, the local populations and local elected officials regarding the commitments by the various parties.	Low	PETN, Backers, costs assessment commission, local elected officials and villagers	Before the start of the works	Included in the Tender Documents (DAO) and the worksite works

MEASURES FOR REDUCING NEGATIVE IMPACTS ON INFRASTRUCTURES						
Impact source	Potential impacts	**Mitigation measures**	Significance after mitigation (assessment of residual impacts)	Implementation manager	Implementation period	Cost
Transfer of equipment from the Port of Dakar to the site. Intensive use of heavy lorries between quarries and the site	• Disruptions to traffic due to routing of the equipment from Dakar to the Project's site by road; • Disruptions to traffic due to return trips by the trucks for excavation work, removing excavated materials, and transporting sand and gravel between the quarries and the site	Convoy from Dakar to the Site: • Implementation/development of a transport management plan concerning the equipment and raw materials • Informing the stakeholders (municipalities, boroughs, local populations, MEDD (Ministry of the Environment and Sustainable Development) of the date of the convoy (via radio, newspapers, telephone, mail), as well as about the itineraries, the risks, and the measures to be taken in order to avoid accidents; • Use of suitable platforms/containers; • Resorting to a professional escort between Dakar and the site; • Repairing damaged roads and tracks	Low	Vestas & PETN	During the period	Taken into account in the DAO by the contracting company

MEASURES FOR REDUCING NEGATIVE IMPACTS ON INFRASTRUCTURES						
Impact source	Potential impacts	**Mitigation measures**	Significance after mitigation (assessment of residual impacts)	Implementation manager	Implementation period	Cost
	• Risks of accidents • Deterioration of Departmental, borough and village roads	Quarries Site Transport: • Use of trucks that comply with the technical inspection for transport in terms of the site; • People living nearby to be informed via community radio stations, going door to door, and meetings; • Training drivers and raising their awareness; • Speed limit of 30 kmph between the site and certain stretches of the D702 and D702C Departmental roads; • Repairs to damaged roads and tracks • Appropriate signage	Low	The contracting company PETN	Throughout the Project's preparation and construction period	Taken into account in the DAO by the contracting company

ATMOSPHERIC ENVIRONMENT - AIR QUALITY						
Impact source	Potential impacts	**Mitigation measures**	Significance after mitigation (assessment of residual impacts)	Implementation manager	Implementation period	Cost
Preparatory and construction works	Change in the air quality due to emissions of dust and exhaust gases from vehicles, and due to dust being raised by trucks;	• Require rental vehicle service providers to comply with the technical inspection. For heavy goods vehicles, require a new technical inspection every six (6) months; • For concrete mixers and for back-up generators, carry out regular maintenance and emissions checks regularly during construction; • 30 kmph speed limit along stretches of road leading to villages and the Departmental road. • Protective tarpaulins over trucks transporting rubble, sand and worksite products; • Minimising the heights of potential falls within the context of activities involving the transfer of raw materials such as unloading friable materials; • Ongoing cleaning of the roadway or sprinkling paths in the vicinity of the nearest houses using equipment that prevents dust from being raised; • Washing the wheels of vehicles leaving the site; • Reduction of the open-air stockpiling of sand to the strict minimum necessary and covering the piles with tarpaulins if necessary; • Strict maintenance and technical inspection of vehicles in order to minimise pollution as the result of poor combustion; • Avoid the unnecessary use of vehicles by planning activities in such a way as to minimise the need for them; • Make sure that the vehicles and machines are switched off when they are not in use; • Implement environmental management plans with external contractors;	Low	PETN and contractors intervening in the works	At the start of the worksites and up to the end of the works	Integrated into the costs of the DAOs/and the contracting companies

THE HUMAN ENVIRONMENT - THE LIVING STANDARDS OF POPULATIONS LIVING NEARBY						
Impact source	**Potential impacts**	**Mitigation measures**	**Significance after mitigation (assessment of residual impacts)**	**Implementation manager**	**Implementation period**	**Cost**
Operating machinery, equipment and worksite trucks (trucks, concrete mixers, drilling machines, compressors, etc.)	A change in the noise environment due to noise generated by worksite equipment;	• Setting up a schedule and a procedure limiting noisy work at night to the maximum extent; at night-time, give priority to work that does not generate noise; • Choose equipment items which comply with the limit of 85 dB at a distance of 1 metre • Maintain pneumatic tools, machinery and equipment in order to keep the noise level generated to an acceptable level; • Check that the values set out in the IFC PS for sound levels for populations living nearby are, at most, 55 dB during the day and 45 dB during the night	Low	Vestas, PETN	Throughout the preparatory and construction phase	Included in the DAO and worksite works

Impact source	Potential impacts	Mitigation measures	Significance after mitigation (assessment of residual impacts)	Implementation manager	Implementation period	Cost
Production of miscellaneous waste and emissions attributable to the worksite and to the living quarters	• Generating various sorts of miscellaneous waste (oily emulsions, waste oils, miscellaneous metal packaging etc.); • Nuisances due to raising dust and emitting polluting fumes;	• Organising waste management and sorting, regular collection of waste and its transfer/treatment in authorised locations (system for managing waste using procedures); • Setting up a specific waste collection centre during construction • Organise the management of hazardous wastes (oils, solvents, sump oils, etc.) and especially recovery of it, and its treatment, with specialist companies on the market; • Unexpected visits to the worksite by State services such as the Hygiene Service, and the DEEC	Low	Vestas Hygiene Department, DREEC	Throughout the preparatory and construction phase	Included in the DAO and worksite works
Access paths and setting up various items of equipment, parking trucks and return trips made by them	Temporary modification of the visual landscape;	• Minimise the spaces taken up for the worksite's needs as much as possible; • Level surfaces, and dismantle and transfer all unnecessary equipment and materiel off-site	Low	Vestas	During and after removal of the worksite	Included in the DAO and worksite works

Impact source	Potential impacts	Mitigation measures	Significance after mitigation (assessment of residual impacts)	Implementation manager	Implementation period	Cost
The presence of a number of external employees	The development and spread of risky behaviour that could have an impact on the health of local populations, the spread of transmissible and chronic diseases, etc.;	• Prior medical inspection of workers at the living quarters; • Compliance with HSE recommendations by contractors and their workers; • Raising the awareness of workers concerning risks and discipline on the site • Regular mandatory public health checks of the workers	Low	Vestas and PETN	During and after removal of the worksite	Included in the DAO and worksite works

AVOIDING SOIL, SUB-SOIL AND AQUIFER POLLUTION						
Impact source	**Potential impacts**	**Mitigation measures**	**Significance after mitigation (assessment of residual impacts)**	**Implementation manager**	**Implementation period**	**Cost**

Infrastructures construction and erection preparatory works	• Impacts on the soil due to civil engineering works: Making soils fragile and slumping of them; • Contamination of the soil and the aquifer due to accidental spillages of waste oils, chemicals, miscellaneous liquid wastes, cleaning water, and waste;	• Raising the awareness of the staff of local companies regarding HSE requirements, both indoors and out in the field; • All service provider companies will have to have established an environmental policy that has been proven in-house and applied out in the field; • Within the context of setting up the living quarters, as a minimum, make provision for portable toilets that do not come into direct contact with the ground, at a rate of one toilet for every 15 people, to be emptied off the worksite by specialist companies; • Avoid any spillage of oils, solvents or chemicals that may pollute the aquifer; • Set up workshops dedicated to replenishing or repairing trucks and vehicles at the worksite; in the absence of these areas, transfer these operations off-site; • Making anti-pollution kits available (absorbent products, containment equipment) for operators who have had their awareness raised beforehand and who have been trained in how to use them; • Collect sewage and route it to the station nearest the site so it can be treated before being discharged; • Collect, store and eliminate construction waste in accordance with a waste management plan compliant with the national regulatory provisions and international codes of good practice; • Comply with the limits authorised in Standard NS-05 061 concerning the quality of the effluents treated; • Analysis of water from the nearest wells once a year by the Institut Pasteur in Dakar	Low	Vestas	Before and throughout the preparation and construction phase	Taken into account by the DAO and by the contracting company

PRESERVATION OF GROUNDWATER RESOURCES						
Impact source	**Potential impacts**	**Mitigation measures**	**Significance after mitigation (assessment of residual impacts)**	**Implementation manager**	**Implementation period**	**Cost**
Construction and track-laying preparatory works	• Water consumption to the detriment of villages' local consumption; • Disruption of the natural system for the flow of run-off water and surface water during the construction of 35 km of tracks. • Soil depletion and a reduction in the aquifers replenishment rate;	• Supply the worksite from a tanker truck or using *a specific borehole* dedicated to the Project – the borehole could then be transferred to the local authorities • Raise the awareness of staff about issues relating to the scarcity of water • Construct works for regulating drainage water from the start of the tracks construction phase in order to ensure that run-off water is routed to natural networks for run-off water • Do not block natural routes for run-off water; • Avoid any construction or storage on natural stormwater run-off paths; • Comply with the limits authorised in Standard NS-05 061 concerning the quality of the effluents treated; • Plant trees along tracks, using suitable species, in liaison with the Forests and Water authorities;	Low	Vestas	Before the start of the worksite and during the preparation and construction phase	PM

LIVING STANDARDS - HYGIENE, HEALTH AND SAFETY OF WORKERS AND PEOPLE LIVING NEAR THE SITE						
Impact source	**Potential impacts**	**Mitigation measures**	**Significance after mitigation (assessment of residual impacts)**	**Implementation manager**	**Implementation period**	**Cost**
Generating noise, combustion gases, and wastewater Traffic involving machinery, works on the worksite and labour	• Disturbing the tranquillity and harming the health of workers and people living near the site due to the noise and fumes from worksite equipment, as well as the fine particles generated; • Risks of diseases linked to discharges and pools of stagnant waste water at the worksite; • Risks of accidents attributable to traffic involving machinery, works and labour;	• Implement the mitigation measures and the recommendations presented in the impact study report and in the hazard study in the report from October 2014 updated in July 2015; • Set up an HSE management system both for the worksite during the erection phase and for the living quarters, in liaison with a consultancy specialising in environmental assessments. The body selected will have to come up with proposals about the following points: • Drawing up and implementing an HSE policy for the worksite and for the living quarters • Drawing up and implementing a POI (Internal Operations Plan) • Provide personal protective equipment generally to all staff and visitors accessing the site and set up first aid kits; • Install signboards and boards for providing the pictograms required by law; • Provide mandatory HSE training to the personnel and any service provider that accesses the site; • Define the location and the installation of safety showers; • Write all the accident management procedures;	Low	Vestas and PETN	Start of the works and throughout the project	Normally included in the DAO; if not, an additional clause is necessary

LIVING STANDARDS - HYGIENE, HEALTH AND SAFETY OF WORKERS AND PEOPLE LIVING NEAR THE SITE (CONTINUED)						
Impact source	**Potential impacts**	**Mitigation measures**	**Significance after mitigation (assessment of residual impacts)**	**Implementation manager**	**Implementation period**	**Cost**
Generating noise, combustion gases, and wastewater Traffic involving machinery, works on the worksite and labour	• Disturbing the tranquillity and harming the health of workers and people living near the site due to the noise and fumes from worksite equipment, as well as the fine particles generated; • Risks of diseases linked to discharges and pools of stagnant waste water at the worksite; • Risks of accidents attributable to traffic involving machinery, works and labour.	• Define the conditions for setting up and installing a temporary infirmary with a doctor on duty and a permanent nurse as well as an ambulance on stand-by 24 hours a day; • Establish a methodology for raising awareness and informing personnel and villagers about the risks of STDs and AIDS; • Set up schedules and procedures which limit noisy night work to the maximum extent; • Choose the equipment so that, for the resulting noise levels, there is a permissible threshold for populations living nearby of 55 dB at daytime and 45 dB at night-time • Have a traffic plan on the worksites as well as in the living quarters	Low	Vestas and PETN	Start of the works and throughout the project	Normally included in the DAO; if not, an additional clause is necessary

LIVING STANDARDS – Shadow flickers effects-Light						
Impact source	**Potential impacts**	**Mitigation measures**	**Significance after mitigation**	**Implementation manager**	**Implementation period**	**Cost**
Wind Farm in operations	• Shadows Flickers effects • Difficulties of acceptance • Visual gene	• Remoteness of the wind turbine by a distance of at least 800m from closest villages • Monitoring of the shadow flickers at these villages	Medium to low	Vestas and PETN	During construction	Normally included in the DAO; if not, an additional clause is necessary
	• Acceptance difficulties of the flashing lights • Visual gene	• W-Rot Technology which delivers a variable light intensity according to the line of sight (height) (lower intensity on the ground) • Modulation of the light intensity as a function of the visibility • Adaptation of lighting according to need. The wind farm will be equipped by aircraft detection in order to turn on the lighting only when an aircraft approaches. • Lighting marking will be white during the day and red at night	Medium to low	Vestas and PETN	During design and construction	Normally included in the DAO; if not, an additional clause is necessary

6.6 Parties involved in implementation of the ESMP (environmental and social management plan) and their responsibilities

The various parties involved in the implementation of the environmental monitoring and surveillance programme are:

6.6.1 PETN

PETN is the Project company, and it is responsible for setting up and operating the future wind farm at Taiba N'diaye, as well as for managing and implementing measures and periodically reporting to the authorities and to the **Environmental and Social Monitoring Committee** through periodic monitoring reports. PETN will ensure that the contracting company and its sub-contractors comply with the environmental and social clauses.

6.6.2 The HSE Manager (PETN)

The PETN HSE Manager is responsible for the implementation of the Environmental, Hygiene and Safety policy. Taking safety and environmental concerns into account is thus assigned to a body with recognised expertise in this field. Its mission will be to ensure the monitoring, assessment, and supervision of measurements with a view to assessing the effectiveness of factoring in environmental measures. The HSE Manager will be responsible for implementing the periodic environmental report, implementing the HSE policy in force, developing procedures, work instructions, etc. The HSE Manager will also be the focal point for the ESMC insofar as it will be responsible for gathering data, issuing reports, etc.

6.6.3 The contracting company (EPC) (Vestas)

Vestas , the contracting company, was selected for turnkey execution of the wind farm on behalf of the developer. At the same time, Vestas will carry out its HSE policy and will be an important party in the execution of decisions and recommendations of the Project. It is responsible for the full construction of the wind farm, starting with clearing bush through to testing generator sets. The contracting company will receive general support from Senegalese SMEs and companies for the sub-contracting of various activities. All these enterprises are required to have an HSE policy and to comply with the environmental and social clauses imposed by PETN.

6.6.4 The Operator of the wind farm (PETN)

PETN will be responsible for the operation and maintenance (O&M) of the wind farm. PETN will take over from the contracting company after commissioning, and will be responsible throughout the lifespan of the wind farm.

6.6.5 The local authorities

These are the Governor, the Prefect of Tivaouane, and the Sub-Prefect of Méouane. They act under the framework of transferred powers and represent the State authorities.

6.6.6 The ESMC (Environmental and Social Monitoring Committee)

This committee will be established under the direction of the Governor, who appoints its members by order on the recommendation of the Prefect of Tivaouane and the Sub-Prefect of Méouane.

The committee will be responsible for the even-handed management of all the environmental and social aspects. It will consist of (but shall not be limited to) the following members:

- The local authorities (the Governor, the Prefect, and the Sub-Prefect);
- The representatives of the populations concerned;

- State technical services and their representatives;
- The relevant parties concerned (NGOs, the representative of women's groups, the representative of young people, the representative of fishermen, and of market gardeners; and
- The representatives of the Ministries of Industry, Water and Forests, Fisheries, the Interior, etc.

This committee will be supported by PETN and its partners for effective monitoring of the management plan. It will meet periodically in order to assess the experts' reports concerning environmental monitoring, hygiene, safety and the implementation of social measures applied by the developer under the framework of Corporate Social Responsibility (CSR), where applicable. On this basis, the committee will issue recommendations and directives to be followed.

6.6.7 The DEEC (Directorate of the Environment and Listed Establishments)

The Directorate of the Environment and Listed Establishments will be responsible for implementation of the measures and recommendations approved by the technical committee (measures concerning reductions and improvements, surveillance and monitoring), and to do this it will work with the IREF, the IRTSS, the DPC, the CRODT, and the CGQA (entities defined below) for the implementation and monitoring of measures for surveilling air quality, monitoring hydrodynamic data, fisheries resources, artificial reefs where need be, reforestation, and the safety of goods and people.

6.6.8 State technical services

The services below, among others, are concerned. The ESMC reserves the right to seek the skills of people from other services not cited here:

- The CGQA (Air Quality Management Centre);
- The IRTSS (Regional Inspectorate of Labour and Social Security);
- The DPC (Civil Defence Directorate);
- The Tivaouane Departmental Livestock Rearing Service;
- The Mboro Departmental Fisheries Service;
- The Police and Gendarmerie;
- The Thiès ARD (Regional Development Agency);
- The IREF (Regional Inspectorate of Water, Forests and Hunting);
- Health services;
- The DRDR (Regional Directorate of Rural Development);
- Statistics services;
- The ANAM (National Agency of Maritime Affairs); and
- HASSMAR (the high authority responsible for co-ordination, maritime safety and protection of the marine environment).

7 Biodiversity

7.1 Introduction

This chapter provides a description of the ecological baseline of the proposed Project and identifies the potential impacts on the biological environment arising from the proposed Project activities. The assessment follows the recommendations and requirements of the IFC Performance Standard 6 (PS6): Biodiversity Conservation and Sustainable Management of Living Natural Resources[26]. Surveys to inform this assessment have been completed by Abba Sonko, based in Dakar, Senegal, since December 2012 with advice on survey methodologies and scope provided by Adam Fitchet MCIEEM and Peter Burston CEnv MCIEEM (both of Ramboll Environ) since March 2015.

This chapter is set out according to the following structure:

- Section 7.2 Policy, Regulatory and Administrative Framework: provides an overview of the legal and policy framework for the protection and conservation of nature in Senegal and related national and international requirements.
- Section 7.3 Assessment Methodology: gives a summary of the baseline assessment methodologies and the assessment criteria specifically relating to biodiversity. This section also describes the spatial scope for the assessment.
- Section 7.4 Baseline Information: This section provides a description of the ecological baseline, which is based on the findings from the desk study and field surveys conducted in 2014 and ongoing in 2015 to inform this assessment.
- Section 7.5 Potential Impacts: describes potential impacts (e.g. habitat loss, fragmentation, and disturbance) of the Project during the construction, operational and decommissioning phases. The sensitivity of receptors identified is also assessed in this section.
- Section 7.6 Mitigation: sets out mitigation measures that have been agreed as project commitments to be implemented by the Project. According to IFC PS6, mitigation measures should be designed to follow the 'mitigation hierarchy', where impacts are progressively avoided, minimised, restored or offset.
- Section 7.7 Residual Impacts: considers the residual impacts that would remain following the implementation of the agreed mitigation measures and assesses whether any those impacts would result in ecologically significant effects for the identified ecological receptors.
- Section 7.8 Conclusions: provides a summary of the studies completed and ongoing, the key findings from those studies, key mitigation commitments required to comply with PS6 and a tabulated summary of Project impacts.

26 http://www.ifc.org/wps/wcm/connect/bff0a28049a790d6b835faa8c6a8312a/PS6_English_2012.pdf?MOD=AJPERES

7.2 Policy, Regulatory and Administrative Framework

7.2.1 International Agreements

Senegal is a signatory to a number of conventions relevant to this assessment. These are listed below:

- United Nations (UN) Convention on Biological Diversity (CBD)[27]. The Convention has three main objectives: 1. the conservation of biological diversity; 2. the sustainable use of the components of biological diversity; and 3. the fair and equitable sharing of the benefits arising out of the utilisation of genetic resources. Senegal became a party to the convention in 1995.
- Convention on Migratory Species (CMS)[28]. The Convention, also known as the Bonn Convention, aims to conserve terrestrial, aquatic and avian migratory species throughout their range. Senegal and has since published four national reports, the latest in 2011.
- Convention on Wetlands of International Importance, especially as Waterfowl Habitat (Ramsar Convention)[29]. Senegal became a contracting party in 1977. The Ramsar Convention provides a framework for national action and international cooperation for the conservation and wise use of wetlands and their resources.
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)[30]. CITES aim is to ensure that international trade in specimens of wild animals and plants does not threaten their species' survival. The principles of CITES are based on sustainability of the trade in order to safeguard ecological resources (e.g., live animals and plants, as well as the vast array of wildlife products derived from them, including food products, exotic leather goods). Senegal acceded to the Convention in 1977.
- Convention concerning the Protection of World Cultural and Natural Heritage[31]. The Convention sets out the duties of States in identifying potential World Heritage Sites and their role in protecting and preserving them. Senegal ratified the Convention in 1976.
- Convention for the Conservation of European Wildlife and Natural Habitats (Bern Convention)[32]. The principal aims of the Convention are to ensure conservation and protection of wild plant and animal species and their natural habitats (listed in Appendices I and II of the Convention), to increase cooperation between contracting parties, and to regulate the exploitation of those species (including migratory species) listed in Appendix III of the Convention. To this end, the Convention imposes legal obligations on contracting parties, protecting over 500 wild plant species and more than 1,000 wild animal species. The Convention is open to non-European countries and Senegal acceded to it in 1987.
- The Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA)[33] is an intergovernmental treaty dedicated to the conservation of migratory waterbirds and their habitats across Africa, Europe, the Middle East, Central Asia,

[27] https://www.cbd.int/convention/
[28] http://www.cms.int/
[29] http://www.ramsar.org/
[30] http://www.cites.org/
[31] http://whc.unesco.org/en/conventiontext/
[32] http://www.coe.int/t/dg4/cultureheritage/nature/Bern/default_en.asp
[33] http://www.unep-aewa.org/

Greenland and the Canadian Archipelago. It was developed to establish coordinated conservation and management of migratory waterbirds throughout their entire migratory range. Senegal became a party to the agreement in 1999.

- Memorandum of Understanding on the Conservation of Migratory Birds of Prey in Africa and Eurasia (Raptors MOU)[34]. This memorandum of understanding aims to promote internationally coordinated actions to achieve and maintain the favourable conservation status of migratory birds of prey throughout their range in Africa and Eurasia and to reverse their decline when and where appropriate. Senegal signed the MOU in 2008.

Amongst the conventions and agreements listed above, the UN CBD sets the stage for this chapter, by providing a globally recognisable definition of biological diversity and also defining clear strategies on conservation of biodiversity that are addressed within the scope of the Project. Senegal ratified the Convention in 1994, and since then has prepared five National Reports on Biological Diversity, the latest of which was issued in 2014.

In 2010, the Conference of Parties (COP) of the Convention adopted a revised and updated Strategic Plan for Biodiversity, which also included the Aichi Biodiversity Targets for the period of 2011-2020. The targets provide a framework for action by all stakeholders to save biodiversity and enhance its benefits for people[35].

- Strategic Goal A: Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society;
- Strategic Goal B: Reduce the direct pressures on biodiversity and promote sustainable use;
- Strategic Goal C: To improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity;
- Strategic Goal D: Enhance the benefits to all from biodiversity and ecosystem services; and
- Strategic Goal E: Enhance implementation through participatory planning, knowledge management and capacity building.

7.2.2 Senegalese Legal Requirements

The National Plan of Action for the Environment

In February 1995, Senegal began a process of participatory and decentralized engagement in the preparation of its national strategy for the management of natural resources and the environment.

The integration and synthesis of the results of this work helped lead to the adoption, in September 1997, of a National Plan of Action for the Environment (Plan National d'Action pour l'Environnement: PNAE).

It is one global frame of reference for ensuring the consistency of the various sectoral policies in the field of the environment.

The development of the PNAE is part of the implementation of the initiatives taken by the Government of Senegal, in accordance with the recommendations of the Earth Summit, held in Rio de Janeiro in June 1992.

[34] http://www.cms.int/raptors/en
[35] https://www.cbd.int/sp/targets/

The PNAE notes that certain industries are responsible for the loss of large areas of vegetation cover and consequently focuses on the need to promote a consideration of the environmental impacts that result from the process of economic and social development of Senegal.

National Plan of Action against Desertification

The United Nations Convention on Combating Desertification has helped Senegal, at the national level, to develop its National Plan of Action against Desertification (Plan d'Action National de Lutte Contre la Désertification: PAN/LCD), adopted in October 1998.

This plan was revised and updated in June 2014 to reflect the changes to the United Nations Convention and to take account of the recommendations and instructions common to all countries party to the Convention as well as changes to the political, legal and socio-economic context in Senegal.

PAN/LCD is one of the major pillars of the PNAE, namely its component fight against deforestation and land degradation.

In alignment with the ten-year strategy of the Convention, the PAN/LCD focuses on combating desertification and land degradation in order to contribute to poverty reduction and sustainable development for the environment.

National Strategy for Biodiversity Conservation

The national strategy aims to achieve the conservation of biodiversity in Senegal while accommodating sustainable continuation of necessary human activities such as agriculture, hunting and fishing.

The strategy and the National Action Plan are inspired by strategic directions and the guiding principles of the PNAE, with the key objectives based on the findings of the Senegalese National Biodiversity Study.

Developed in 1998, it focuses on four objectives:

- Conservation of biodiversity in high density sites;
- The integration of biodiversity conservation in programs and production activities;
- The equitable sharing of the roles, responsibilities and benefits of biodiversity conservation; and
- The education of all stakeholders on the importance of biodiversity and the need for its conservation.

Sectoral policy letter on the Environment and Natural Resources (2009-2015)

Adopted in January 2009, this policy considers the emerging themes of a green economy and sustainable development and provides guidelines for the new authorities created during institutional changes in 2012 which helped refresh and fill the axes of intervention for the sector of environment and natural resources policy.

The policy includes strategic objectives to halt the current trend towards degradation of the environment and natural resources, by limiting deforestation and land degradation, improving conservation of biodiversity and management of wetlands, decreasing the use of environmentally damaging chemicals, a reduction in pollution and nuisances, measures to

combat climate change, the promotion of sustainable production and consumption patterns and the restoration and enhancement of degraded physical environments.

Strategy for Implementation of the United Nations Framework Convention on Climate Change

This strategy intends to meet the needs of Senegal's development while integrating the need to address climate change. It sets out how this should be achieved within the priority objectives of economic and social development.

Within this framework, the major measures to be taken concerning water resources and energy include:

- Changes in policies to promote more efficient and sustainable practices;
- The development of new, renewable and more sustainable energy sources;
- The introduction of economic incentives to adopt technologies that emit less greenhouse gases; and
- Improved energy efficiency in industrial processes and equipment.

Forest of Senegal (2005-2025) policy

The forestry policy of Senegal for the period 2005-2025 was developed in the context of decentralization and poverty alleviation.

It follows the Forest of Senegal (PAFS) Action Plan which itself was an extension of the Forestry Director's Plan for Development (PDDF) of 1981.

The forest policy of Senegal document was updated in 2014 to strengthen the option to promote an effective permanent forest resources management model.

The policy goal is to contribute significantly to the reduction of poverty through the conservation and sustainable management of forestry, the consistent implementation of the policy of decentralization cooperation and regional partnership.

In order to achieve the policy goal, it provides several strategies or plans of action that are based on the following principles:

- Development and sustainable management of forest and wildlife resources;
- Capacity-building of local communities;
- Strengthening the response capabilities of the forest service;
- Involvement of the private sector in forestry; and
- Development of urban and semi-urban forestry.

Forest Code

The Senegal Forest Code was created by Act No. 98-03 of January 1998, supplemented by Decree No. 98-164 of February 1998. The Code governs all plant resources and protected areas.

The Code prohibits any activities altering soil and forest conditions in classified forests, unless authorized by the Minister in charge of water and forests.

Additionally, any operation must comply with the procedure for clearing as well as complying with the prohibition to deposit waste of any kind in the classified forests and reforestation areas.

Similarly, felling, grubbing-up, damage or the cutting of fully protected plant species is strictly prohibited, unless authorised by the Department of Water and Forests, for scientific or medicinal purposes. Partially protected species may only be felled, cut or uprooted under authorisation.

7.2.3 Standards and Guidelines for International Financing

The Project is committed to implementing the IFC Performance Standards (PSs) in order to manage social and environmental risks and impacts. IFC PS6 covers areas of biodiversity conservation, ecosystem services and sustainable management of living resources, which are all fundamental to achieve sustainable development. The objectives of PS6 are outlined as follows:

- To protect and conserve biodiversity;
- To maintain the benefits from ecosystem services; and
- To promote the sustainable management of living natural resources through the adoption of practices that integrate conservation needs and development priorities.

The requirements of PS6 are applied to projects: (i) located in modified, natural, and critical habitats; (ii) that potentially impact on or are dependent on ecosystem services over which the client has direct management control or significant influence; or (iii) that include the production of living natural resources (e.g. agriculture, animal husbandry, fisheries and forestry) based on the risks and impacts identification process.

Within modified, natural and critical habitat, the following requirements are applicable, inter alia:

Modified Habitats

"The client should minimise impacts on such biodiversity and implement mitigation measures as appropriate".

Natural Habitats

"The client will not significantly convert or degrade natural habitats, unless all of the following are demonstrated:

- *No other viable alternatives within the region exist for development of the project on modified habitat;*
- *Consultation has established the views of stakeholders, including Affected Communities, with respect to the extent of conversion and degradation; and*
- *Any conversion or degradation is mitigated according to the mitigation hierarchy.*

In areas of natural habitat, mitigation measures will be designed to achieve no net loss of biodiversity where feasible. Appropriate actions include:

- *Avoiding impacts on biodiversity through the identification and protection of set-asides;*
- *Implementing measures to minimise habitat fragmentation, such as biological corridors;*
- *Restoring habitats during operations and/or after operations; and*

- *Implementing biodiversity offsets."*

Critical Habitats

"In areas of critical habitat, the client will not implement any project activities unless all of the following are demonstrated:

- *No other viable alternatives within the region exist for development of the project on modified or natural habitats that are not critical;*
- *The project does not lead to measurable adverse impacts on those biodiversity values for which the critical habitat was designated, and on the ecological processes supporting those biodiversity values;*
- *The project does not lead to a net reduction in the global and/or national/regional population of any Critically Endangered or Endangered species over a reasonable period of time; and*
- *A robust, appropriately designed, and long-term biodiversity monitoring and evaluation programme is integrated into the client's management programme.*

In such cases where a client is able to meet the requirements defined in paragraph 17 [of PS6], the project's mitigation strategy will be described in a Biodiversity Action Plan and will be designed to achieve net gains of those biodiversity values for which the critical habitat was designated."

7.3 Assessment Methodology

7.3.1 Scope

The main objective of the ecological baseline studies is to describe the biological environment of the Project Area, which is considered to be the footprint of the Project's infrastructure plus a buffer of approximately 500m. This corresponds with the (immediate) DAI as set out in Chapter 4. This assessment also considers a wider potential area of influence within which impacts from the Project may affect ecological receptors. No single area of influence size is defined as it can vary between impacts and also between the receptors, however, unless specified it is considered to be similar to the (distant) IAI as set out in Chapter 4.

This assessment should be read in conjunction with the ESIS REV03 completed for the Project in October 2014. Particular focus is paid in this ESIS Addendum to potential impacts from the Project on bird and bat species, however it considers all elements of the biological environment. The biological environment includes designated sites (Internationally Recognised Areas and those protected by Senegalese Law), habitats (including terrestrial and freshwater) and their component species. The ecological baseline has been characterised through a combination of secondary data (desk study) and field surveys. The field surveys were conducted in 2012, 2014 and ongoing in 2015 include:

- Flora: Detailed surveys were completed previously and are reported in the ESIS REV03. New surveys have not been completed for this assessment, however, the

protected status of tree species within the Project Area is discussed in the Land Compensation Assessment Report by Labosol dated 4 June 2015 (see Annex D).

- Habitats: The previously compiled floral data has been used to create a habitat map of the Project Area and provide brief descriptions of the main habitat types present.
- Herptiles (Reptiles and Amphibians): Endangered, vulnerable or threatened species which might occur within the Project Area were identified during the desk study.
- Birds: Vantage Point (VP) surveys are ongoing on site, having started in March 2015. Five locations, overlooking each of the turbine arrays are being used. A breeding bird survey focussing on the turbine locations and access track routes was completed between June and July 2015. These surveys build upon transect surveys completed in 2014 to compile a species list for the site and a survey of the nearby coastline for migratory species.
- Mammals: a combination of survey techniques were used to target different species groups, including walked transects searching for signs of mammals such as tracks, droppings or sightings. Night time ultrasonic detector surveys commenced in July 2015 for bats.

7.3.2 Desk Study

A desk study was completed by Ramboll Environ in March 2015 and updated in June 2015. The following publicly accessible sources of information on designated sites, flora and fauna in the vicinity of the Project Area were consulted:

- The International Union for Conservation of Nature (IUCN) Red List of Threatened Species[36];
- Protected Planet Database[37];
- ECOLEX Environmental Law Database[38];
- Birdlife International Important Bird and Biodiversity Areas[39]; and
- World Institute for Conservation and Environment (WICE) Senegalese Bird List[40];

7.3.3 Field Surveys

Flora

A transect survey was completed in June 2014 and used to gather a representative sample of flora across the site. The transect routes followed are shown in the report in Annex O. A list of all floral species, including trees and shrubs that were seen during the transects, was recorded.

Additionally, as part of a wider study completed by Labosol to assess the impacts of the Project on the local communities, studies of the Project area were completed between August 2014 and January 2015 and an inventory of all tree species was prepared, including a list of all species protected or partially protected in Senegal.

Habitats

[36] http://www.iucnredlist.org/
[37] http://www.protectedplanet.net/
[38] http://www.ecolex.org/start.php
[39] http://www.birdlife.org/worldwide/programmes/important-bird-and-biodiversity-areas-ibas
[40] http://www.birdlist.org/senegal.htm

No additional field surveys were completed for the habitat mapping. It was completed based upon previously completed floral surveys.

Herptiles

Herptile species have not been specifically surveyed within the Project Area. Information has been compiled from a desk study.

Birds–Transect Surveys

Transect based surveys were completed in August 2012, December 2012 and April 2014. In order to complete the transect surveys, three bird surveyors observers were driven in a vehicle to record all of the bird species seen. At regular stopping points (stations) which corresponded with the proposed turbine locations, ten minutes was spent observing bird species present. Each observer either recorded the birds in front, to the left or to the right of the vehicle. Birds were also recorded on the journeys between stopping points. Detailed lists of birds were recorded at each transect stopping points and an estimation of the flight height of the birds recorded.

Birds - VP Survey

An initial desk based exercise was completed to identify suitable VP locations. Five VP locations were chosen as they provided coverage of all of the proposed turbine locations. Surveyors use suitable locations within the Project Area in the vicinity of the locations shown, that provide unobstructed views of the proposed turbine arrays. The observation points are all located more than 500m away from proposed turbine locations to avoid the presence of a surveyor influencing the activity of the birds.

Surveys are being completed at a constant survey effort in each month of the year. In each month, each VP is surveyed on three occasions for 3 hours each time, totalling 9 hours per month or 108 hours per VP over the course of the year of survey. The constant survey effort approach ensures that the minimum of 36 hours is completed in each season in order to comply with best practice guidance as set out by Scottish Natural Heritage (SNH)[41], but by completing surveys in each month, differences in bird activity recorded are true reflections of differences in bird activity rather than the result of surveys being targeted at particular periods. It provides a much more scientific and clearer picture of the usage of a site across the year.

During each VP survey, flights by larger species such as raptors or wildfowl that might collide with turbines are mapped and the details of all such flights also collected. The details collected for all flights are:

- Flight number ;
- Date;
- Time;
- Species;
- Number of birds;
- Flight height; and
- Total time of flight including time spent at each height.

[41] http://www.snh.gov.uk/planning-and-development/renewable-energy/onshore-wind/windfarm-impacts-on-birds-guidance/

Flights are subsequently analysed to identify if they occur at potential collision height (PCH) which is the lowest point in the turbine rotor-swept area up to the highest point in the turbine rotor-swept area, below PCH or above PCH. Based upon the various possibilities of turbines that might be used for the Project, the heights used are as follows:

- Below PCH: 0-35m;
- PCH: 35-200m;
- Above PCH: >200m

Results of the surveys completed to date are provided in the survey report that can be found in Annex O.

Birds – Breeding Bird Survey

In addition to the VP survey, a breeding bird survey was completed to record if any species use the area for breeding. For large projects, such as this one, it is appropriate to restrict the breeding bird survey to the footprint of the Proposed Development (i.e., a survey of a 200m buffer area around all turbine locations, access tracks and other infrastructure).

A two-visit survey was undertaken in June and July to coincide with the period when most of the resident species are likely to be breeding. The breeding bird survey involves surveyors walking the full extent of the survey buffer and marking the location of all birds encountered noting their behaviour such as:

- Singing;
- Calling;
- Alarm calling;
- Feeding; and
- Nesting.

By repeating the survey with a second visit, it is possible to identify if birds are continuing to hold territories in particular locations within the survey area and therefore derive a picture of the bird territories present.

Birds – Migratory Species Coastal Survey

This survey was completed in January 2015 along the coastal region approximately six km west of the site which forms the Niayes (from Dakar to St Louis) IBA. It was completed using transects driven by vehicles containing three ornithological surveyors to identify all birds seen from a primary transect parallel to the coastline as well as any additional secondary transects allowed by the terrain and vegetation. The 126 km length of coastline being surveyed was divided into three sections and each section was surveyed separately. Each section was surveyed over a single day. Full details of the survey are provided in the survey report in Annex O.

Terrestrial Mammals

All sightings of mammals or signs of mammals were recorded during the initial transect survey completed in June 2014. Additionally, incidental sightings of all mammal species seen whilst surveying on site have been collated.

Bats

A variety of bat survey techniques are being used to identify bat activity within the Project Area. Survey methods follow best practice guidance[42][43].

Bats- Mist Netting

A single night of mist netting was completed in June 2014 in the south of the site close to the location of the southernmost turbine array.

Bats – Roost Surveys

Following the initial mist netting survey, local towns and villages were visited in June 2014 to search for signs of bat roosts. In particular, the survey searched for fruit bat species which typically roost in the open in large groups, usually in trees.

Bats - Ultrasonic Detector Surveys

Fruit bats do not use echolocation to navigate and so acoustic surveys would not be appropriate for this species. However, there are also many insect-eating bat species Microchiroptera in Senegal that do use echolocation to navigate and find food and these are typically crepuscular and nocturnal species. As yet, little is known of the behaviour of these species within the Project Area. Best practice guidance suggests a combination of approaches with both passive and active acoustic surveying completed.

Transect Survey

A monthly transect survey commenced in July 2015 following existing tracks across the Project Area. The monthly surveys will be completed between July 2015 and February 2016.

Each transect is being completed using a vehicle which is driven slowly (<20 kph), with an AnaBat SD2 ultrasonic bat detector held out of the window or attached to the vehicle in some way. Every one km, there is a stopping point of three minutes. Subsequent analysis of the recordings will allow all bat records to be assigned either to a stopping point or a section of transect between stopping points and, therefore, create a detailed map of bat activity across the Project Area.

Passive Surveys

In addition to the transect and emergence surveys, it is also best practice to undertake passive acoustic surveys. These are completed by installation of AnaBat SD2 ultrasonic bat detectors at strategic locations across the Project Area and recording for a minimum of five nights each month at each location. In order to monitor for bats in habitats representative of the wider Project Area, one location on each line of turbines is being monitored. This ensures that both of the broad habitat types within the Project Area are being surveyed namely the more open scrubby vegetation in the north and the denser vegetation dominated by mango trees in the south.

[42] Hundt, J.(2012) *Bat Surveys, Good Practice Guidelines*, 2nd Edition, Bat Conservation Trust, London.
[43] Rodrigues, L.et al. (2014) Guidelines for consideration of bats in wind farm projects, EUROBATS.

7.3.4 Impact Assessment Methodology

Within this chapter, receptor evaluation, impact categorisation and significance have been evaluated with reference to definitive standards, published criteria and legislation, where available. Where it has not been possible to quantify impacts and effects, qualitative assessments have been carried out, based on expert knowledge, GIIP and professional judgement. The following sections detail the process followed for each stage.

Receptor Sensitivity Evaluation

The sensitivity of each receptor considered in this assessment has been assessed according to a three point scale of Low, Medium and High as set out in Table 30 details the criteria used to assign ecology receptors to the appropriate sensitivity level. Ecological receptors that are of less than Low sensitivity have not been taken forward within the impact assessment.

Table 30 : Receptor Sensitivity Evaluation

Sensitivity Level	Receptor	Criteria
High	Designated Sites	Internationally Recognised Areas (e.g. UNESCO Natural World Heritage Sites, UNESCO Man and the Biosphere Reserves, Key Biodiversity Areas, and wetlands designated under the Convention on Wetlands of International Importance (the Ramsar Convention)).
	Habitats	Habitats that trigger critical habitat under the following IFC PS6 Criteria: Criterion 4: Highly threatened and/or unique; and/or ecosystems Criterion 5: Key evolutionary processes Habitats that support species of High sensitivity
	Species	Species populations that trigger critical habitat under the following IFC PS6 Criteria: Criterion 1: Critically Endangered (CR) and/or Endangered (EN) species; Criterion 2: Endemic and/or restricted-range species; and/or Criterion 3: Migratory and/or congregatory species.
Medium	Designated Sites	Nationally designated areas.
	Habitats	Areas of habitat that represent >1% distribution within Senegal or are threatened at a national level. Habitats that support species of Medium sensitivity.

Sensitivity Level	Receptor	Criteria
	Species	Nationally/regionally important concentrations of a Vulnerable (VU) species, or locally important concentrations of Critically Endangered (CR) and/or Endangered (EN) species. Locally important populations of endemic / range-restricted species. Populations of migratory species that represent >1 % of the national (Senegal) population.
Low	Designated Sites	N/A.
	Habitats	Natural habitats that do not meet the criteria for either medium or high sensitivity. Habitats that support species of Low sensitivity.
	Species	Locally important populations of Near Threatened (NT) or Vulnerable (VU) species, or locally important populations of species listed on Annexes to the Bern Convention.
Negligible	All	Receptors that do not meet the criteria listed for Low to High sensitivity.

Impact Characterisation

Seven key parameters are considered to describe the characteristics of an impact. These are set out in Table 31 below.

Table 31 : Parameters considered to characterize an Impact

Parameter	Description
Likelihood of Impact	The likelihood of an impact occurring. The following convention, adapted from the Intergovernmental Panel on Climate Change (IPCC), is adopted: • Virtually certain > 99% probability of occurrence • Extremely likely 96 - 99% • Very likely 91 - 95% • Likely 67 - 90% • More likely than not 51 - 66% • Possible 34 - 50% • Unlikely 11 - 33% • Very unlikely 6 - 10% • Extremely unlikely < 5%
Direction	Impacts are either adverse (negative) or beneficial (positive).
Size or amount	The size or amount of an impact, determined on a quantitative basis where possible, e.g. a specified percentage, partial or total loss of an area of

Parameter	Description
	habitat or impacts upon a specified proportion of a population. Where exact amounts are unquantifiable, this is stated.
Extent	The area over which an impact occurs. If the receptor being considered is a habitat type, magnitude and extent may be synonymous.
Duration	The time for which the impact is expected to last prior to recovery of the receptor or replacement of the receptor by similar resource (in terms of quality and / or quantity). This is expressed as a short term, medium term, or long term effect relative to the receptor that is impacted.
Reversibility	Irreversible impacts: permanent changes from which recovery is not possible within a reasonable time scale or for which there is no reasonable chance of action being taken to reverse it. Reversible impact: temporary changes in which spontaneous recovery is possible or for which effective mitigation (avoidance / cancellation / reduction of effect) or compensation (offset / recompense / offer benefit) is possible.
Timing / Frequency	When the impact will occur and whether it is repeated or a one-off event.

The parameters above are considered to reach an overall impact magnitude of either high, moderate, low or negligible. Table 32 and Table 33 illustrate what that might mean for habitats and species respectively.

Table 32 : impact Magnitude - Habitats

Magnitude	Description
High (4)	The impact has the potential to adversely affect the integrity of an area/region, by substantially changing in the long term its ecological features, structures and functions, across its whole area, that enable it to sustain the habitat, complex of habitats and/or population levels of species that makes it important.
Moderate (3)	The area/region's integrity is predicted to not be adversely affected in the long term, but the project is likely to affect some, if not all, of the area's ecological features, structures and functions in the short or medium term. The area/region may be able to recover through natural regeneration and restoration.
Low (2)	Neither of the above applies, but some minor impacts of limited extent, or to some elements of the area, are evident but easy to recover through natural regeneration.
Negligible (1)	Indiscernible from natural variability.

Table 33: Impact Magnitude - Species

Magnitude	Description
High (4)	Impact on a species that affects an entire population to cause a decline in abundance and/or change in distribution beyond which natural recruitment (reproduction, immigration from unaffected areas) would not return that population or species, or any population or species dependent upon it, to its former level within several generations[1], or when there is no possibility of recovery.
Moderate (3)	Impact affects a portion of a population and may bring about a change in abundance and/or a reduction in the distribution over one or more generations*, but does not threaten the long-term integrity of that population or any population dependent on it. The size and cumulative character of the consequence is also important. A moderate magnitude impact multiplied over a wide area would be regarded as a high magnitude impact.
Low (2)	A low magnitude impact on a species affects a specific group of localized individuals within a population over a short time period (one generation or less), but does not affect other tropic levels or the population itself.
Negligible (1)	Indiscernible from natural variability.

Impact Significance

In this assessment an ecologically significant impact is defined following IEEM (2006), as resulting from "an impact (beneficial or adverse) on the integrity of a defined site or ecosystem and / or the conservation status of habitats or species within a defined geographical area." The determination of ecological significance is based on professional judgement.

The significance of an impact on a receptor is determined as a relationship between the magnitude of a predicted impact and the sensitivity of the receptor upon which it is acting. Table 34 illustrates this relationship and shows the likely level of significance increasing from not significant to minor to moderate to major significance.

[1] These are generations of the animal/plant species under consideration not human generations

Table 34 : impact Significance

		Receptor Sensitivity (vulnerability and value)			
		Negligible	**Low**	**Moderate**	**High**
Impact Magnitude	**Negligible**	Not significant	Not significant	Not significant	Minor
	Low	Not significant	Minor	Minor/ Moderate	Moderate
	Moderate	Not significant	Minor/ Moderate	Moderate	Major
	High	Minor	Moderate	Major	Major

In addition to the criteria set out in Table 34, IFC PS6 sets out definitions for modified, natural and critical habitats as follows:

- *Modified habitats: 'areas that may contain a large proportion of plant and/or animal species of non-native origin, and/or where human activity has substantially modified an area's primary ecological functions and species composition. Modified habitats may include areas managed for agriculture, forest plantations, reclaimed coastal zones, and reclaimed wetlands.'*
- *Natural habitats: 'areas composed of viable assemblages of plant and/or animal species of largely native origin, and/or where human activity has not essentially modified an area's primary ecological functions and species composition'.*
- *Critical habitat: 'areas with high biodiversity value, including (i) habitat of significant importance to Critically Endangered and/or Endangered species; (ii) habitat of significant importance to endemic and/or restricted-range species; (iii) habitat supporting globally significant concentrations of migratory species and/or congregatory species; (iv) highly threatened and/or unique ecosystems; and/or (v) areas associated with key evolutionary processes.'*

Each of the habitats described in the baseline description section of this chapter are categorised as being either modified or natural habitat according to the IFC PS6 definitions. Annex M provides a detailed Critical Habitat Assessment (CHA) within the Project Area, and the findings are summarised in section 7.7.2 of this chapter. All critical habitats are assessed to be of high sensitivity according to the criteria detailed in Table 30.

IFC PS6 sets out a series of requirements in relation to modified, natural and critical habitat. Of particular relevance to the impact assessment are the requirements to achieve no net loss of biodiversity in areas of natural habitat and a net gain of biodiversity values for which the critical habitat was designated.

Within the scope of IFC PS6, it is important to evaluate ecosystem services that a particular site offers, which include "benefits that people, including businesses, derive from ecosystems". Accordingly, IFC defines four types of ecosystem services (IFC, 2012):

- Provisioning services, which are the products people obtain from ecosystems;
- Regulating services, which are the benefits people obtain from the regulation of ecosystem processes;
- Cultural services, which are the non-material benefits people obtain from ecosystems; and
- Supporting services, which are the natural processes that maintain the other services.

IFC requires that a project owner carries out a systematic review to identify priority ecosystem services, which are referred to as an Ecosystem Services Review (ESR). For the purposes of PS6 implementation and the ESR, ecosystem services are categorised as two types:

- Type I: Provisioning, regulating, cultural and supporting ecosystem services, over which the client has direct management control or significant influence, and where impacts on such services may adversely affect communities; and
- Type II: Provisioning, regulating, cultural and supporting ecosystem services, over which the client has direct management control or significant influence, and on which the project directly depends for it.

The ESR for the Project is provided in Annex N.

7.4 Baseline Information

7.4.1 Designated Sites

International Sites

Niayes (Dakar to St. Louis) Important Bird and Biodiversity Area

This IBA is characterised by a series of permanent and temporary (niayes) waterbodies situated behind the line of coastal sand dunes for a 150 km long stretch between Dakar and St. Louis. At its closest point, it lies approximately 700 m from the Project Area and was designated in 2001 for trigger populations of the following species[44]:

- Little Grebe *Tachybaptus ruficollis*, breeding and winter (250 pairs/500 individuals);
- Black Heron *Egretta ardesiaca*, breeding (250 pairs);
- Purple Swamphen *Porphyrio porphyrio,* winter (104 individuals);
- Slender-billed Gull *Larus genei*, winter (145 individuals); and
- White-winged Tern *Chlidonias leucopterus*, winter (2,000 individuals).

In addition to those species, the site supports roosts of black kite Milvus migrans, as well as occasional large groups of waterbirds such as avocet Recurvirostra avosetta, lesser flamingo Phoenicopterus minor and tern Sterna species.

The IBA is considered to be particularly important for wintering migratory species which is why a survey was completed of the IBA area for the Project.

[44] BirdLife International (2015) *Important Bird Areas factsheet: Niayes (from Dakar to St Louis)*. Downloaded from http://www.birdlife.org on 10/06/2015

The section of the IBA adjacent to the western edge of the Project Area is also the Darou Community Nature Reserve.

La Petite Côte Important Bird and Biodiversity Area

This IBA is a 70 km long coastal strip south of Dakar from Bargny south to the village of Mbodiène and contains sand dunes, offshore sandbars, beaches and some permanent and temporary waterbodies. At its closest point, it lies approximately 45 km from the Project Area and was designated in 2001 for trigger populations of the following species[45]:

- Pink-backed Pelican *Pelecanus rufescens*, breeding (1,500-2,000 pairs);
- Audouin's Gull *Larus audouinii*, winter (160 individuals);
- Slender-billed Gull *Larus genei*, winter (1,185 individuals); and
- Caspian Tern *Hydroprogne caspia*, winter (240 individuals)

It is the most important breeding area in Senegal for pink-backed pelican. In addition to the trigger species, the site regularly supports large numbers of curlew sandpiper Calidris ferruginea, as well as frequent wintering Montagu's harrier Circus pygargus. Large groups of herons and egrets breed within the site.

Cap Vert Important Bird and Biodiversity Area

This small IBA comprises a 19 km strip of coastline on the Cap Vert peninsula at the western edge of Dakar. It includes rocky shore, reefs and two offshore islands. At its closest point, it lies approximately 60 km from the Project Area and was designated in 2001 for trigger populations of the following species[46]:

- Audouin's Gull *Larus audouinii*, winter (280 individuals)
- Sandwich Tern *Thalasseus sandvicensis* winter (13,000 individuals); and
- Black Tern *Chlidonias* niger passage (23,923 individuals)

It is an extremely important site for migratory seabirds with huge numbers passing through in spring and autumn. Dolphins are also a common sight in the waters between the islands.

National Sites

Forest of Pire Goureye and Bandia

These two forest reserves lie 6 km east and 40 km south of the Project Area, respectively. Information on the species supported is limited but they are likely to support many of the small passerine bird species also found on site as well as bats and terrestrial mammals.

[45] BirdLife International (2015) *Important Bird Areas factsheet: La Petite Côte*. Downloaded from http://www.birdlife.org on 11/06/2015

[46] BirdLife International (2015) *Important Bird Areas factsheet: Cap Vert*. Downloaded from http://www.birdlife.org on 11/06/2015

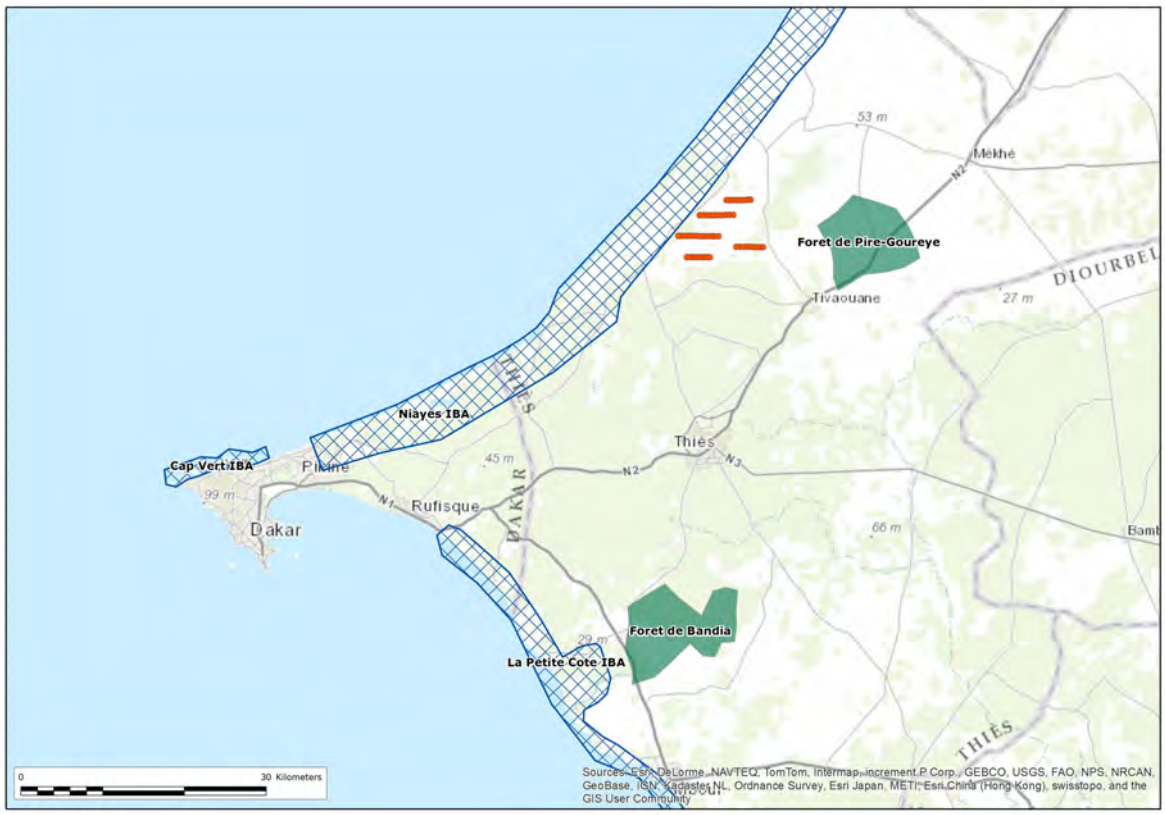


Figure 21 – Designated Sites

Receptor Sensitivity Evaluation

The IBAs are internationally recognised areas which support important populations of overwintering and breeding birds. In particular, the Niayes IBA is considered to represent Critical Habitat under PS6. As such they are considered to have high sensitivity.

The National Forests are nationally recognised areas which are likely to support a number of nationally important species. As such they are considered to have medium sensitivity.

7.4.2 Flora

Desk Study

Full details of the flora found within the Project Area were provided in the ESIS REV03 and are not repeated here. Since that assessment, the protected status of a number of species found within the Project Area has been considered further. No species of greater conservation concern than vulnerable occurs within Senegal. Of the tree species recorded within the Project Area, the following six tree species are partially protected under the Senegalese Forest Code:

Table 35 : Protected Tree Species

Species	Number of Trees Recorded in Immediate Vicinity of Project Infrastructure

Species	Number of Trees Recorded in Immediate Vicinity of Project Infrastructure
African Palmyra Palm *Borassus aethiopum*	225 mature, 76 immature
Apple-ring Acacia (Kad) *Faidherbia albida* (formerly *Acacia albida*)	498 mature, 337 immature
Baobab *Adansonia digitata*	26 mature, 3 immature
Ber *Ziziphus mauritiana*	76 mature, 4 immature
Somb tree *Prosopis africana*	4 mature
Tamarind *Tamarindis indica*	8 mature

These species may only be felled or cut under authorisation of the Department of Water and Forests.

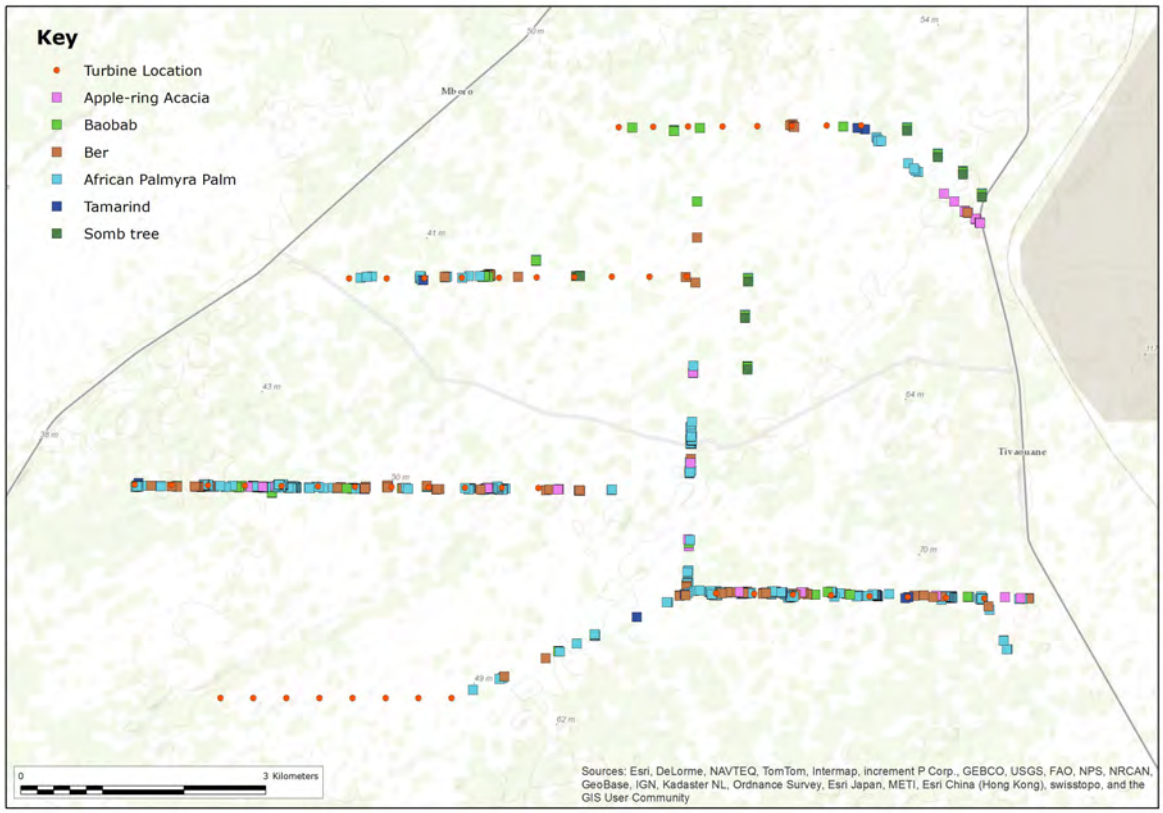


Figure 22 - Tree Species within the Project Area

Receptor Sensitivity Evaluation

The flora of the Project Area and particularly the trees listed in Table 35, are considered to have low sensitivity as although they receive partial protection, they are not rare or declining species in Senegal.

7.4.3 Habitats

Fruit Tree Production Areas

The Project Area is dominated by fruit tree production with mango Mangifera indica the most abundant species. The usage of the area for fruit production can be explained by its location close to the sea which provides both a suitable climate and has allowed a fertile soil for horticulture to develop. Neem Azadiracta indica trees are common under and amongst the trees but is something of a pest species. Very little ground flora occurs with bare ground apparent in most areas.

Scattered Trees

Standing amongst the fruit trees are scattered single or small groups of native tree species including those listed previously in Table 35. Many of the trees are utilised by local people to provide fodder for livestock. Additionally, trees such as the Apple-ring acacia are retained as they perform a nitrogen fixation role. Many such trees are scattered at the margins of the various villages within the Project area.

Savanna

An area within the northern part of the Project Area, close to where the northernmost turbine array is proposed to be located, is a more open scrub vegetation type with grasses dominating and occasional small trees and patches of scrubby bushes.

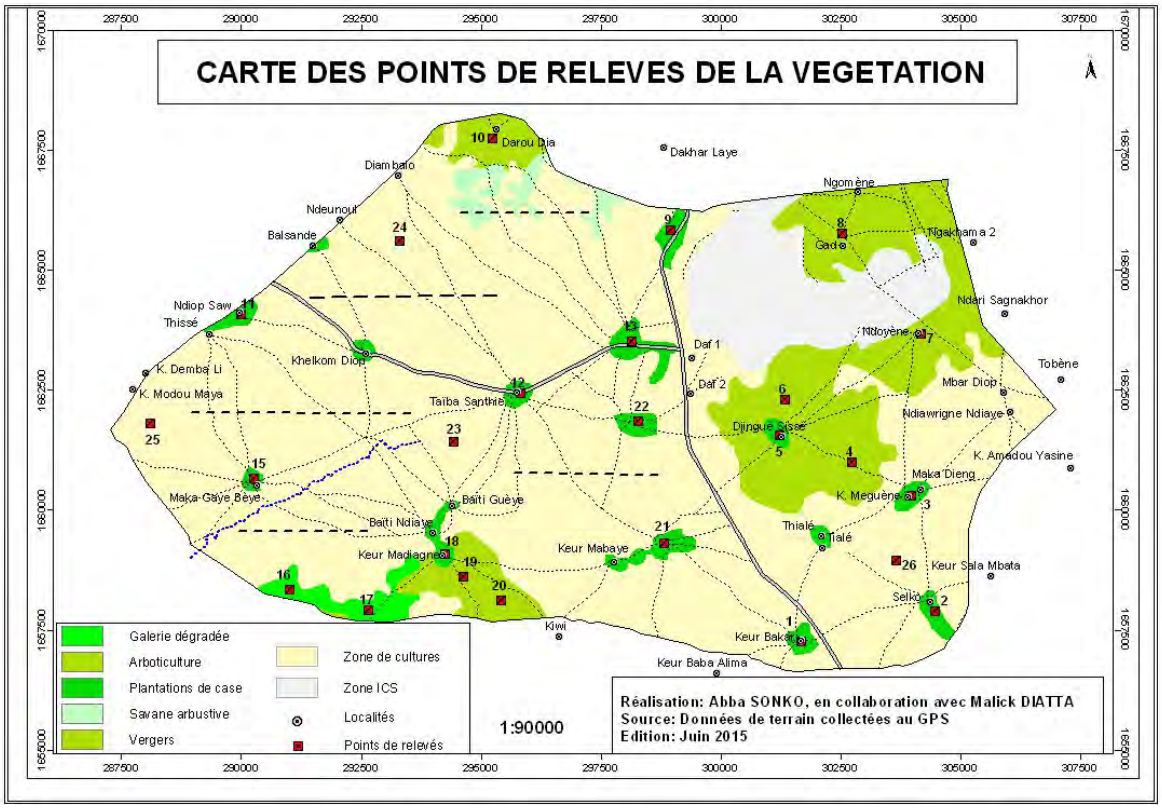


Figure 23 – Habitats within the Project Area

Receptor Sensitivity Evaluation

The habitats of the Project Area are considered to have low sensitivity as they are all human influenced habitats that have been created or altered by human activity. They are not rare or declining habitats in Senegal and are considered to be modified habitats under IFC PS6.

7.4.4 Herptiles

Desk Study

Three reptile or amphibian species of near-threatened, vulnerable, endangered or critically endangered IUCN red list status occur in Senegal:

- Slender-snouted crocodile *Mecistops cataphractus* (Critically endangered);
- African spurred tortoise *Centrochelys sulcata* (Vulnerable); and
- Armitage's cylindrical skink *Chalcides armitagei* (Near Threatened).

However, of these three species, only the African spurred tortoise's range overlaps with the Project Area.

Receptor Sensitivity Evaluation

The herptiles of the Project Area are considered to have low sensitivity as there are no endangered species that occur. African spurred tortoise is a desert specialist which has a declining population. The Project Area provides very limited potential to support the species.

7.4.5 Birds

Desk Study

Four IUCN red list endangered species occur in Senegal. All four species are vultures and all four have declining populations. The distribution of the white-backed, Rüppell's and hooded vultures overlaps with the Project Area. The distribution of Egyptian vulture does not overlap the Project Area, however breeding populations occur to the north of Senegal in Mauritania and in the south-east of Senegal and into the neighbouring countries of Mali and Guinea. Two distinct overwintering populations occur in the region with some birds overwintering in the area around the mouth of the Senegal River on the boundary with Mauritania and others overwintering in Gambia. As shown in Table 36, the range of five vulnerable species and nine near-threatened species also overlap with the Project Area. The populations of all of those species are decreasing.

Table 36 : Bird Species of Near-threatened, or worse, status which occur in Senegal

Common Name	Scientific Name	IUCN Red list Status	Range Overlaps Project Area
White-backed vulture	*Gyps africanus*	Endangered[47]	Yes
Rüppell's vulture	*Gyps rueppelli*	Endangered[48]	Yes
Hooded vulture	*Necrosyrtes monachus*	Endangered[49]	Yes
Egyptian vulture	*Neophron percnopterus*	Endangered	No

[47] It is proposed to change the status of this species to Critically Endangered: http://www.birdlife.org/globally-threatened-bird-forums/2015/07/proposed-status-changes-for-six-species-of-african-vulture/
[48] Ibid
[49] Ibid

Common Name	Scientific Name	IUCN Red list Status	Range Overlaps Project Area
Aquatic warbler	*Acrocephalus paludicola*	Vulnerable	Yes
Black crowned-crane	*Balearica pavonina*	Vulnerable	No
Yellow-casqued hornbill	*Ceratogymna elata*	Vulnerable	No
Beaudouin's snake-eagle	*Circaetus beaudouini*	Vulnerable	Yes
Marbled teal	*Marmaronetta angustirostris*	Vulnerable	Yes
Martial eagle	*Polemaetus bellicosus*	Vulnerable	Yes
Secretarybird	*Sagittarius serpentarius*	Vulnerable	No
Lappet-faced vulture	*Torgos tracheliotos*	Vulnerable[50]	Yes
White-headed vulture	*Trigonoceps occipitalis*	Vulnerable[51]	Yes
Arabian bustard	*Ardeotis arabs*	Near-threatened	No
Ferruginous duck	*Aythya nyroca*	Near-threatened	Yes
Pallid harrier	*Circus macrourus*	Near-threatened	Yes
European roller	*Coracias garrulus*	Near-threatened	Yes
Great snipe	*Gallinago media*	Near-threatened	Yes
Audouin's Gull	*Larus audouinii*	Near-threatened	No
Black-tailed Godwit	*Limosa limosa*	Near-threatened	Yes
Denham's Bustard	*Neotis denhami*	Near-threatened	No
Eurasian Curlew	*Numenius arquata*	Near-threatened	Yes
Lesser Flamingo	*Phoenicopterus minor*	Near-threatened	Yes
Fea's Petrel	*Pterodroma feae*	Near-threatened	No
African Skimmer	*Rynchops flavirostris*	Near-threatened	No
Crowned eagle	*Stephanoaetus coronatus*	Near-threatened	Yes
Bateleur	*Terathopius ecaudatus*	Near-threatened	Yes

Transect Survey (2014)

A list of bird species was provided with the ESIS REV03. This was derived from the transect surveys completed in 2012. That information is not repeated here. A review of the list of species did not identify any of the previously listed endangered bird species as having been recorded.

Sixty six species were recorded during the 2014 transect survey with no endangered species recorded and all of the species are of least concern on the IUCN red list. No IBA trigger species from the three IBAs closest to the Project and detailed in previous sections were recorded within the Project Area.

[50] It is proposed to change the status of this species to Endangered: http://www.birdlife.org/globally-threatened-bird-forums/2015/07/proposed-status-changes-for-six-species-of-african-vulture/

[51] It is proposed to change the status of this species to Critically Endangered: http://www.birdlife.org/globally-threatened-bird-forums/2015/07/proposed-status-changes-for-six-species-of-african-vulture/

Table 37 : Bird Species Recorded During 2014 Transect

Common name	Scientific Name	Number of Records
Brown snake eagle	*Circaetus cinereus*	1
Lizard buzzard	*Kaupifalco monogrammicus*	3
Black kite	*Milvus migrans*	20
African palm swift	*Cypsiurus parvus*	36
Grey heron	*Ardea cinerea*	1
Cattle egret	*Bubulcus ibis*	4
Red-billed hornbill	*Tockus erythrorhynchus*	164
African grey hornbill	*Tockus nasutus*	47
Senegal thick-knee	*Burhinus senegalensis*	4
African wattled lapwing	*Vanellus lugubris*	6
Black-headed lapwing	*Vanellus tectus*	27
Spur-winged lapwing	*Vanellus spinosus*	2
Blue-naped mousebird	*Urocolius macrourus*	28
Speckled pigeon	*Columba guinea*	16
Namaqua dove	*Oena capensis*	15
Mourning collared dove	*Streptopelia decipiens*	11
Red-eyed dove	*Streptopelia semitorquata*	47
Laughing dove	*Streptopelia senegalensis*	154
Vinaceous dove	*Streptopelia vinacea*	18
Abyssinian roller	*Coracias abyssinica*	10
Rufous crowned roller	*Coracias naevius*	10
Pied crow	*Corvus albus*	26
Piacpiac	*Ptilostomus afer*	45
Senegal coucal	*Centropus senegalensis*	11
Rufous-tailed scrub robin	*Cercotrichas galactotes*	2
Peregrine falcon	*Falco peregrinus*	2
Common kestrel	*Falco tinnunculus*	2
White rumped seedeater	*Crithagra leucopygius*	32
Yellow billed shrike	*Corvinella corvina*	4
Yellow crowned gonolek	*Laniarius barbarus*	19
Woodchat shrike	*Lanius senator*	8
Black-crowned tchagra	*Tchagra senegala*	3
Green bee-eater	*Merops orientalis*	4
Western plantain eater	*Crinifer piscator*	9
Scarlet chested sunbird	*Chalcomitra senegalensis*	25
Beautiful sunbird	*Nectarinia pulchella*	6
White-shouldered tit	*Parus guineensis*	556
Double spurred francolin	*Francolinus bicalcaratus*	19

Common name	Scientific Name	Number of Records
Cut-throat finch	*Amadina fasciata*	9
White-billed buffalo weaver	*Bubalornis albirostris*	100
Red-Cheeked Cordon Bleu	*Estrilda bengala*	44
Red billed firefinch	*Lagonosticta senegala*	5
African silverbill	*Lonchura cantans*	5
Bronze mannikin	*Lonchura cucullata*	10
Sudan golden sparrow	*Passer luteus*	45
House sparrow	*Passer domesticus*	28
Northern grey headed sparrow	*Passer griseus*	68
Village weaver	*Ploceus cucullatus*	234
Little weaver	*Ploceus luteolus*	149
Black-headed weaver	*Ploceus melanocephalus*	10
Village indigobird	*Vidua chalybeata*	15
Senegal parrot	*Poicephalus senegalus*	24
Rose-ringed parakeet	*Psittacula krameri*	28
Common bulbul	*Pycnonotus barbatus*	276
Long-tailed glossy starling	*Lamprotornis caudatus*	102
Greater blue-eared starling	*Lamprotornis chalybaeus*	52
Chestnut bellied starling	*Lamprotornis pulcher*	88
African reed warbler	*Acrocephalus baeticatus*	12
Zitting cisticola	*Cisticola juncidis*	4
Willow warbler	*Phylloscopus trochilus*	3
Subalpine warbler	*Sylvia cantillans*	4
Brown babbler	*Turdoides plebejus*	7
Black scrub robin	*Cercotrichas podobé*	34
White-fronted black chat	*Myrmecocichla albifrons*	128
Whinchat	*Saxicola rubetra*	2
Black scimitarbill	*Rhinopomastus aterrimus*	1

Migratory Species Coastal Survey

A total of 28 species were recorded during the survey within the Niayes IBA which lies outside of and to the west of the Project Area. No endangered species were recorded and all but one of the species are of least concern on the IUCN red list. The exception is Audouin's gull which is near-threatened. Of the five IBA trigger species previously listed, only slender billed gull was recorded.

Table 38 : Bird Species seen during Migratory Species Coastal Survey

Common Name	Scientific Name	Number of Records
Grey heron	*Ardea cinerea*	20
Ruddy turnstone	*Arenaria interpres*	91
Cattle egret	*Bubulcus ibis*	90
Sanderling	*Calidris alba*	4,734
Little ringed plover	*Charadrius dubius*	41
Ringed plover	*Charadrius hiaticula*	312
Black tern	*Chlidonias niger*	29
Speckled pigeon	*Columba guinea*	10
Audouin's gull	*Larus audouinii*	110
Grey-headed gull	*Larus cirrhocephalus*	44
Lesser black-backed gull	*Larus fuscus*	14,116
Slender billed gull	*Larus genei*	1,690
Dark-chanting goshawk	*Melierax metabates*	1
Black kite	*Milvus migrans*	9
Whimbrel	*Numenius phaeopus*	34
Osprey	*Pandion halietus*	209
Great white pelican	*Pelecanus onocrotalus*	6
Pink backed pelican	*Pelecanus rufesens*	6
Long-tailed cormorant	*Microcarbo africanus*	3
Grey plover	*Pluvialis Squatarola*	10
Little tern	*Sterna albifrons*	3,484
Lesser crested tern	*Sterna bengalensis*	4
Caspian tern	*Sterna caspia*	2,949
Common tern	*Sterna hirundo*	14
Royal tern	*Sterna maxima*	2,274
Sandwich tern	*Thalasseus sandvicensis*	2,043
Laughing dove	*Streptopelia senegalensis*	2

Vantage Point Surveys – March 2015 Onwards

Standardised VP surveys as described in the methodology, commenced in March 2015 from the locations shown in Figure 7.4.

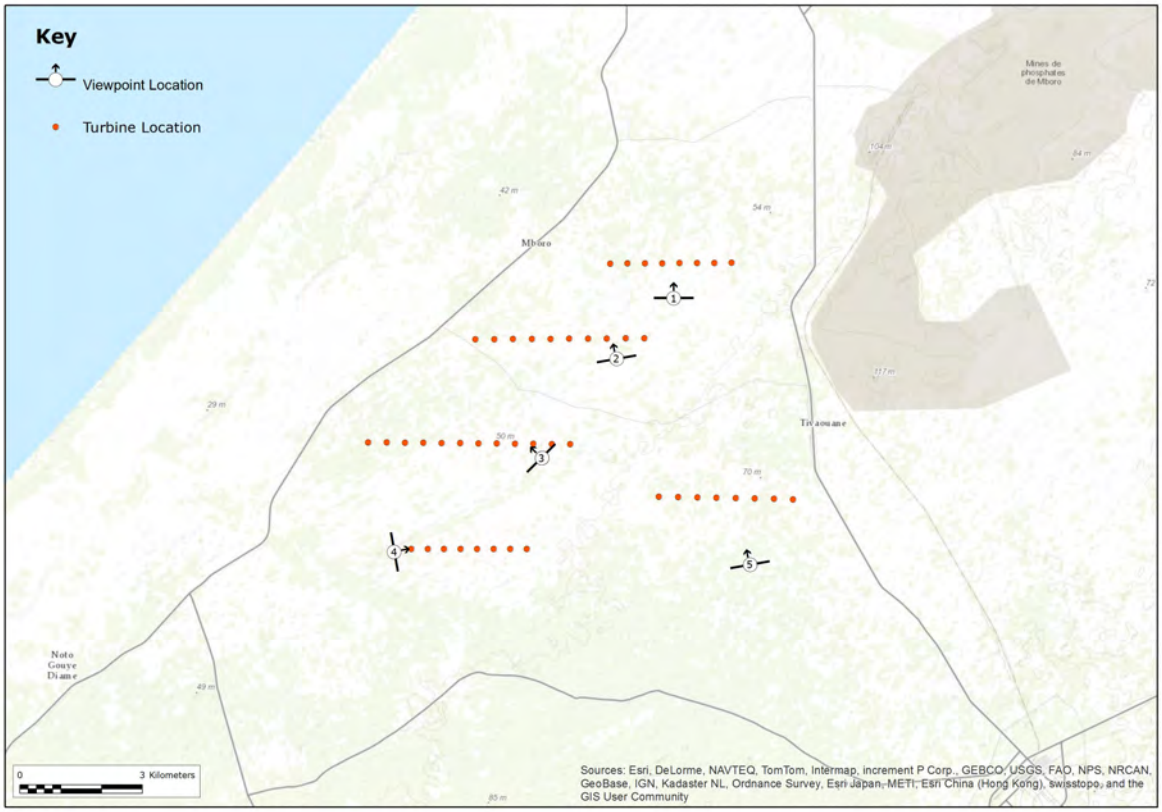


Figure 24 - Bird VP Locations

During the observations completed up to and including August 2015, 27 species were recorded in total from the VPs with 11 separate species recorded in March 2015, 14 species in April 2015, 13 species in June 2015, 16 species in July 2015 and 16 species in August 2015. No flights by trigger species from the three coastal IBAs closest to the Project Area were recorded. The majority of flights were by pied crow and black kite52 flying below PCH and with the exception of two flights, were all made by species of least concern on the IUCN red list. Those two flights were made by hooded vulture which is currently listed as Endangered on the IUCN red list. The first observation was made on 10th April 2015 from VP one in the north of the Project Area. The flight occurred during the daytime VP completed between 11 am and 2 pm and the bird flew to a maximum height of 15 m, which is below PCH. The second observation was made on 30th August 2015 from VP two, again in the north of the Project Area. This flight was also seen during the daytime 11 am-2 pm observation period and flew at 35 m which is the lowest limit of PCH. The species was also

[52] All records of black kite simply identify the bird as *M. migrans* a migrant species that overwinters in Africa and breeds in Europe. However, as seen during the Ramboll Environ site visit and in discussion with the in country specialists completing the surveys, many of the black kites seen in Senegal are resident yellow billed kites *M. aegypticus*, considered by some to be a subspecies of black kite but now more often considered to be its own species. However, the two are still considered to be one species in the IUCN red list.

recorded on one occasion during the breeding bird observations in June/July. The observations are consistent with occasional but consistent use of the Project Area by the species. This is discussed in more detail in the (CHA) in Annex M.

Of the other species recorded, most are resident in Senegal with only a few exceptions. African cuckoo Cuculus gularis and Levaillant's cuckoo Clamator levaillantii are both intra African migrants. Common cuckoo Cuculus canorus, Pallid harrier Circus macrourus and short-toed snake eagle Circaetus gallicus are all western palearctic migrants which overwinter in Africa. However, short-toed snake eagle was recorded throughout the summer suggesting that it might be a juvenile bird (or more than one) as juveniles sometimes don't migrate in their first summer.

Table 39 : Bird Species Recorded in March 2015 from VPs in Project Area

Common name	Scientific Name	Number of Flights Recorded
Dark chanting goshawk	*Melierax metabates*	1
Brown snake eagle	*Circaetus cinereus*	1
Pied crow	*Corvus albus*	18
Black-winged kite	*Elanus caeruleus*	1
Common kestrel	*Falco tinnunculus*	5
Great egret	*Ardea alba*	1
Grey heron	*Ardea cinerea*	1
Cattle egret	*Bubulcus ibis*	6
Black-headed heron	*Ardea melanocephala*	6
Black kite	*Milvus migrans*	54
Western plantain eater	*Crinifer piscator*	14

Table 40 : Bird Species Recorded in April 2015 from VPs in Project Area

Common name	Scientific Name	Number of Flights Recorded
Dark-chanting goshawk	*Melierax metabates*	2
Short-toed snake eagle	*Circaetus gallicus*	6
Pied crow	*Corvus albus*	18
Black-winged kite	*Elanus caeruleus*	3
Common kestrel	*Falco tinnunculus*	9
Double spurred francolin	*Francolinus bicalcaratus*	1
Grey heron	*Ardea cinerea*	2
Cattle egret	*Bubulcus ibis*	25
Black-headed heron	*Ardea melanocephala*	5
Black kite	*Milvus migrans*	16
Black-bellied bustard	*Lissotis melanogaster*	2
Rufous crowned roller	*Coracias naevius*	1
Western plantain eater	*Crinifer piscator*	1

Common name	Scientific Name	Number of Flights Recorded
Hooded vulture	*Necrosyrtes monachus*	1

Table 41 : Bird Species Recorded in June 2015 from VPs in Project Area

Common name	Scientific Name	Number of Flights Recorded
Dark-chanting goshawk	*Melierax metabates*	1
Short-toed snake eagle	*Circaetus gallicus*	2
Speckled pigeon	*Columba guinea*	3
Pied crow	*Corvus albus*	21
Black-winged kite	*Elanus caeruleus*	1
Common kestrel	*Falco tinnunculus*	10
Double spurred francolin	*Francolinus bicalcaratus*	1
Grey heron	*Ardea cinerea*	1
Cattle egret	*Bubulcus ibis*	17
Black-headed heron	*Ardea melanocephala*	2
Black kite	*Milvus migrans*	13
Western plantain eater	*Crinifer piscator*	2
African grey hornbill	*Tockus nasutus*	1

Table 42 : Bird Specied Recorded in July 2015 from VPs in Project Area

Common name	Scientific Name	Number of Flights Recorded
Dark-chanting goshawk	*Melierax metabates*	6
Brown snake eagle	*Circaetus cinereus*	1
Pied crow	*Corvus albus*	11
Black-winged kite	*Elanus caeruleus*	1
Common kestrel	*Falco tinnunculus*	9
Grey heron	*Ardea cinerea*	3
Cattle egret	*Bubulcus ibis*	9
Black-headed heron	*Ardea melanocephala*	3
Black kite	*Milvus migrans*	12
Black-bellied bustard	*Lissotis melanogaster*	1
Speckled pigeon	*Columba guinea*	35
Western plantain eater	*Crinifer piscator*	1
Peregrine falcon	*Falco peregrinus*	1
Lanner falcon	*Falco biarmicus*	1
African grey hornbill	*Tockus nasutus*	1
African cuckoo	*Cuculus gularis*	1

Table 43 : Bird Species Recorded in August 2015 from VPs in Project Area

Common name	Scientific Name	Number of Flights Recorded
Dark-chanting goshawk	*Melierax metabates*	1
Pied crow	*Corvus albus*	12
Common kestrel	*Falco tinnunculus*	1
Grey heron	*Ardea cinerea*	1
Cattle egret	*Bubulcus ibis*	6
Black-headed heron	*Ardea melanocephala*	2
Black kite	*Milvus migrans*	18
Hooded vulture	*Necrosyrtes monachus*	1
Levaillant's cuckoo	*Clamator levaillantii*	2
Speckled pigeon	*Columba guinea*	5
Red necked falcon	*Falco chicquera*	2
Common cuckoo	*Cuculus canorus*	1
White-faced whistling duck	*Dendrocyna viduata*	2
Pallid harrier	*Circus macrourus*	1
Peregrine falcon	*Falco peregrinus*	1
Senegal thick knee	*Burhinus senegalensis*	1

Table 44 : Bird Species Recorded during Breeding Bird Survey

Common name	Scientific Name	Number of Records	Breeding Y/N
Dark-chanting goshawk	*Melierax metabates*	3	N
Short-toed snake eagle	*Circaetus gallicus*	7	N
Pied crow	*Corvus albus*	36	Y
Black-winged kite	*Elanus caeruleus*	4	Y
Common kestrel	*Falco tinnunculus*	14	N
Double spurred francolin	*Francolinus bicalcaratus*	1	Y
Great egret	*Egretta alba*	1	N
Grey heron	*Ardea cinerea*	3	N
Cattle egret	*Bubulcus ibis*	31	Y
Black-headed heron	*Ardea melanocephala*	3	N
Black kite	*Milvus migrans*	70	Y
Black-bellied bustard	*Lissotis melanogaster*	2	Y
Rufous crowned roller	*Coracias naevius*	1	N
Western plantain eater	*Crinifer piscator*	15	Y
Hooded vulture	*Necrosyrtes monachus*	1	N

Additional Records

During mist netting surveys for bats within the Project Area, two northern white-faced owls Ptilopsis leucotis and three sooty chats Myrmecocichla nigra were also caught. Both are species not previously identified within the Project Area.

Additionally, whilst within the Project Area for a site visit in April 2015, Ramboll Environ experts also recorded tawny-flanked prinia Prinia subflava, fork-tailed drongo Dicrurus adsimilis and pearl spotted owlet Glaucidium perlatum within the Project Area.

All five of these additional species are species of least concern.

Receptor Sensitivity Evaluation

The majority of the bird species recorded within the Project Area are common species of low conservation concern with extensive distributions. As such, with the exception of hooded vulture, the suite of birds recorded within the Project Area is considered to have low sensitivity.

Hooded vulture is an endangered species with the bird(s) seen within the Project Area likely to be from the local resident population. The CHA (Annex M) considers the area within which the Project is located (Discreet Management Unit (DMU as described in the CHA) to qualify as Critical Habitat for the species under Criterion 1, Tier 2. As such, it is considered to have high sensitivity.

7.4.6 Terrestrial Mammals

Desk Study

Sixteen species of mammal that occur in Senegal are either critically endangered (one species), endangered (three species) vulnerable (eight species), threatened (zero species) or near-threatened (four species) according to the IUCN red list. Only one species, striped hyaena Hyaena hyaena, has a known distribution range which overlaps the Project Area. Its population is decreasing.

Table 45: Terrestrial Mammal Species of Near-threatened, or worse, status in Senegal

Common name	Scientific Name	IUCN Red List Status	Range overlaps Project Area
Dama gazelle	*Nanger dama,*	Critically Endangered	No
African wild dog	*Lycaon pictus,*	Endangered	No
Chimpanzee	*Pan troglodytes*	Endangered	No
West-African red colobus	*Procolobus badius*	Endangered	No
Cheetah	*Acinonyx jubatus*	Vulnerable	No
Sooty mangabey	*Cercocebus atys*	Vulnerable	No
Red-fronted gazelle	*Eudorcas rufifrons*	Vulnerable	No
Dorcas gazelle	*Gazella Dorcas*	Vulnerable	No
Hippopotamus	*Hippopotamus amphibius*	Vulnerable	No

Common name	Scientific Name	IUCN Red List Status	Range overlaps Project Area
African elephant	*Loxodonta africana*	Vulnerable	No
Lion	*Panthera leo*	Vulnerable	No
Giant ground pangolin	*Smutsia gigantea*	Vulnerable	No
African golden cat	*Caracal aurata*	Near-threatened	No
Striped hyaena	*Hyaena hyaena*	Near-threatened	Yes
Leopard	*Panthera pardus*	Near-threatened	No
Guinea baboon	*Papio papio*	Near-threatened	No

Transect Surveys

The transect survey in 2014 recorded sightings or signs of seven mammals within the Project Area. All are species of least concern in the IUCN red list with none of the species listed in Table 46 recorded within the Project Area.

Table 46 : Mammal Species Recorded within the Project Area

Common Name	Scientific Name	Number of Records
Hare	*Lepus sp.*	6
Striped ground squirrel	*Xerus erythropus*	37
Golden jackal	*Canis aureus*	field signs
African civet	*Civettictis civetta*	field signs
Banded mongoose	*Mungos mungo*	field signs
White-tailed mongoose	*Ichneumia albicauda*	field signs
Gambian sun-squirrel	*Heliosciurus gambianus*	4

Receptor Sensitivity Evaluation

The mammals recorded within the Project Area are all species of low conservation concern. Of the species of higher conservation concern that occur within Senegal, only the range of striped hyaena overlaps the Project area and no signs of that species have been recorded. As such, the suite of mammals recorded within the Project Area is considered to have low sensitivity.

7.4.7 Bats

Desk Study

Forty five species of bat are known to occur in Senegal with the ranges of 15 of those species overlapping the Project Area. Only two species of bat which are known to occur in Senegal are considered to be threatened, vulnerable or endangered. The species are:

- Guinean horseshoe bat *Rhinolophus guineensis*; and

- African straw-coloured fruit bat *Eidolon helvum*.

The Guinean horseshoe bat is listed as vulnerable but its known range does not overlap the Project Area. Straw coloured fruit bat is near threatened with a declining population and its known range does overlap the Project Area.

Mist Netting

The mist netting survey in 2014 caught one species of bat within the Project Area, six African straw-coloured fruit bats were caught.

Roost Surveys

The roost surveys identified four bat roosts in the vicinity of the Project Area.

Two large roosts were identified in Tivaouane and Thies, 9 km and 20 km, respectively, from the Project Area. The Tivaouane roost contained 10,391 bats when surveyed in June 2014, with 11,468 in the Thies roost when surveyed. The roosts contained the following species of bat:

- Gambian epauletted fruit bat *Epomophorus gambianus*;
- African straw-coloured fruit bat *Eidolon helvum*;
- Peter's dwarf epauletted fruit bat *Micropteropus pusillus*; and
- Egyptian fruit bat *Rousettus aegyptiacus*.

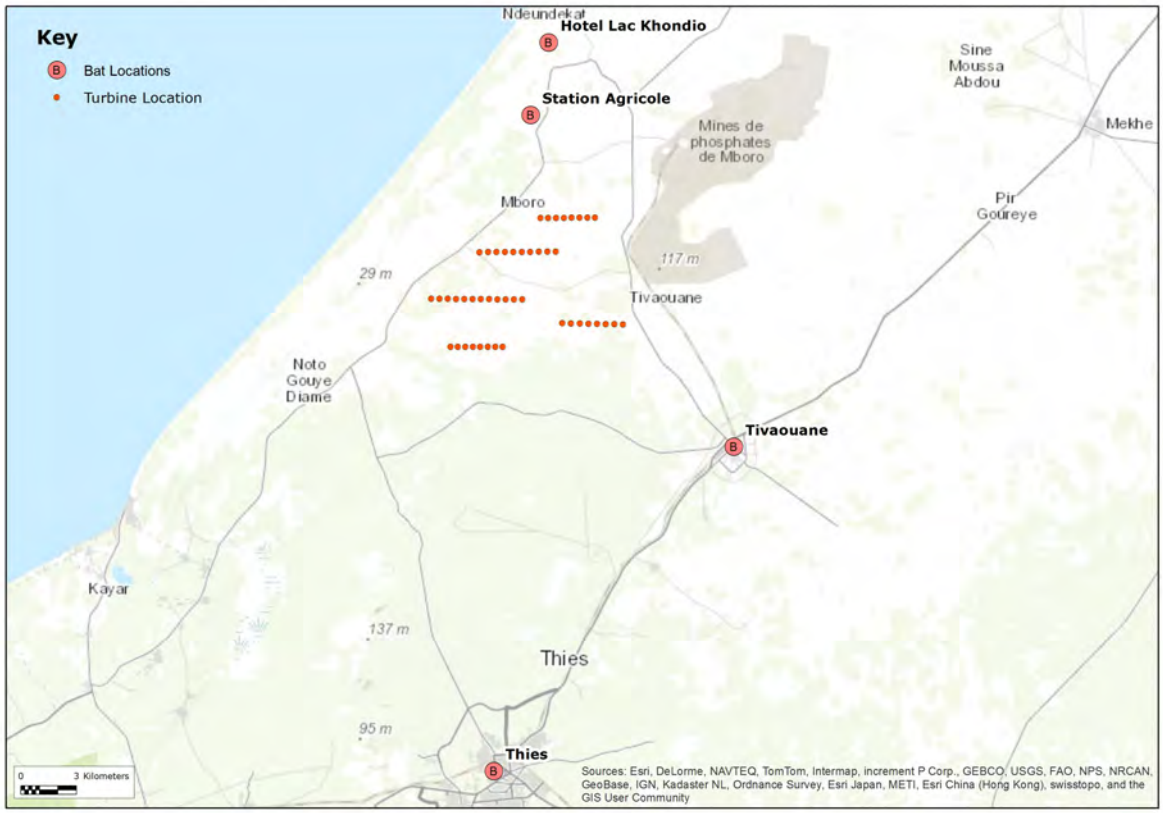


Figure 25 – Bat Roost Locations

The three species not previously described in this assessment are all species of least concern on the IUCN red list.

Two smaller roosts of unknown bat species were also recorded to the north of the Project Area, with a roost at the farm station at Mboro and another in the Hotel at Lake Khondio. The roosts are 4 km and 7 km north of the Project Area, respectively.

Ultrasonic Detector Surveys

Ultrasonic bat surveys in the form of transect surveys commenced in early July 2015. Four species of bat were recorded during the initial transect surveys:

- Guinean pipistrelle bat *Neoromicia guineensis*;
- Rendall's serotine *Neoromicia rendalli*;
- Greater mouse-tailed bat *Rhinopoma microphyllum*; and
- Yellow winged bat *Lavia frons.*

All species were only recorded within villages along the transects with no registrations of bats made in the open habitats outside of the villages. All species were recorded in low numbers with only single bats encountered at any one time.

Receptor Sensitivity Evaluation

The African straw coloured fruit bat, the only endangered bat species confirmed within the Project Area at present, is a vulnerable species with a declining population. As such, it is considered to have medium sensitivity.

At present only four species have been recorded within the Project Area. Some other bat species could occur, particularly smaller Microchiroptera which feed on insects. A number of new species have recently been recorded in nearby Gambia and the Project Area offers good feeding and roosting opportunities for bats. As such, in order to be precautionary, the overall suite of bat species is also considered to have medium sensitivity.

7.5 Limitations to Assessment

No significant limitations to the assessment are considered to exist. The absence of May 2015 VP data is lamentable, however that period falls between the key migratory period and the breeding period so it is considered extremely unlikely that it has resulted in any key species or movements being missed. This is because the migratory period was well covered and the VPs completed between June and August 2015 provide more than sufficient time for resident species regularly using the Project Area during that period to be identified. Ideally, all VP survey work would be complete ahead of completion of an assessment, however, the desk study and the field work completed to date have identified that the key period for bird movements within the Project Area is the migration period. Surveys have identified one endangered species overflying the Project Area and this led to its inclusion as Critical Habitat for that species. With such an assessment comes a requirement to ensure a net gain for the receptor in question, in this case, hooded vulture. As such, mitigation has been developed that would deliver a net gain. This mitigation is adaptive and flexible and even if other endangered species of bird are subsequently identified flying over the Project Area where impacts from the Project such as collision risk, or barrier effects might affect them, the proposed mitigation could easily be adapted to also include those species. However, it is important to note that whilst standardised VP surveys only commenced in March 2014,

specialist ornithologists have completed surveys of the Project Area in 2012 and 2014 and have not identified any such endangered species previously.

Similarly, bat survey work is ongoing and results are incomplete at the time of this assessment and so a similarly precautionary approach to the assessment of impacts on bird species has been adopted for the assessment of impacts on bat species. The potential for the Project Area to support other, smaller and potentially higher flying bat species has been considered and appropriate mitigation developed to address the potential impacts identified.

7.6 Summary of Receptor Sensitivity Evaluations

Table 47 : Summary of Receptor Sensitivity Evaluation

Receptor	Sensitivity
Important Bird and Biodiversity Areas	High
Forest Reserves	Medium
Flora (partially protected trees)	Low
Habitats	Low
Herptiles	Low
Birds (excluding Hooded vulture)	Low
Hooded vulture	High
Terrestrial Mammals	Low
Bats	Medium

7.7 Potential Impacts

7.7.1 Construction and Decommissioning Impacts

Impacts on Designated Sites

Accidental releases of silt, fuel or lubricants during the construction phase of the westernmost turbines closest to the Niayes IBA, may indirectly degrade the condition of watercourses or waterbodies that have hydrological connectivity with the IBA by affecting biological and chemical water quality and the physical character of substrates. In most cases, degradation would be temporary. Such an impact would be a high magnitude, adverse impact that could affect a small section of the IBA, which is considered to be Critical Habitat under PS6. The impact would have at least a short-term duration, but depending on the pollutant released could result in a long term or even permanent effect. A high magnitude, adverse impact upon the Niayes IBA would have major significance and would result in an ecologically significant effect.

Habitat Loss or Degradation

Construction activities have the potential to degrade or destroy terrestrial habitat directly as a result of, for example, excavation, compaction, or modification (e.g. vegetation removal, covering). Alternatively, there could be indirect effects as a result of, for example,

dewatering, or from the accidental release of fuels, lubricants or other chemicals. Some habitats could be degraded indirectly as a result of accidental releases of silt, fuel, lubricants or chemicals. Some activities could cause permanent degradation or destruction, for example where turbine foundations are constructed or permanent new access tracks are formed, but in most cases, damage would be temporary. Such impacts would range from high magnitude in the case of habitat destruction to low magnitude for short-term pollution events. All impacts would be adverse but unlikely to extend beyond 10 m from wind farm infrastructure. Habitat destruction in the form of removal of tree species partially protected under the Senegal Forest Code would result in an impact of moderate significance and would result in an ecologically significant effect.

Disturbance of Herptiles

Construction activities could result in direct disturbance of individual Herptiles. Construction activities could also have the potential to degrade or destroy reptile habitat either directly as a result of, for example, excavation, compaction, or modification (e.g. vegetation removal, covering) or indirectly as a result, for example, of dewatering, or from the accidental release of fuels, lubricants or other chemicals. Some activities could cause permanent degradation or destruction, for example where turbine foundations are constructed or permanent new access tracks are formed, but in most cases, damage would be temporary. Given the abundance of unaffected available habitat, this would be a low magnitude impact of limited extent. The impact would be of minor significance but would not result in an ecologically significant effect.

Bird Habitat Loss (Displacement)

Birds have the potential to be displaced by construction works as their nesting or feeding habitats are removed. It is possible that habitats can be removed during decommissioning also, with additional land being used during this process. This would be a moderate magnitude adverse impact for the species recorded nesting within the Project Area but of limited extent as only small areas are being lost relative to those being retained. It would be a short term impact. The impact would have minor/moderate significance but would not result in an ecologically significant effect.

Bird Nest Destruction

Construction and decommissioning activities have the potential to result in the destruction of nests which occur within the Project Area. This would be a high magnitude adverse impact of limited extent but of permanent duration. This impact would have moderate significance and would result in an ecologically significant effect.

Bird Disturbance

Construction activity may result in short term temporary disturbance of birds. During construction, birds would be disturbed by the activities of personnel and the movements of vehicles and other machinery. Birds are known to habituate to constant and regular visual disturbance, but impacts could arise from noise disturbance. These impacts are also likely to occur during decommissioning of the site. Impacts would be of moderate magnitude and adverse occurring up to hundreds of metres from the construction activity. This impact would have minor/moderate significance but would not result in an ecologically significant effect.

Disturbance of Terrestrial Mammals

Construction activities giving rise to noise, vibration and light could directly disturb mammals using the Project Area. Such adverse impacts would be of moderate magnitude, short-term for the period of activity and limited in extent to those areas closest to construction works. This impact would have minor/moderate significance but would not result in an ecologically significant effect.

Disturbance of Bats

Construction activities giving rise to noise, vibration and light could directly disturb bats using the Project Area for roosting. Surveys to date have not recorded any bat roosts within the DAI of the Project, however, the species of insectivorous bats recorded within the wider Project Area can roost in trees so there is the potential for them to be roosting in trees within the DAI. Tree felling could also remove potential roosting and foraging locations. Disturbance impacts would be of moderate magnitude, short-term for the period of construction and limited in extent to those areas closest to construction works. Destruction of roost features would be a high magnitude impact and permanent. Destruction of a bat roost would be an impact of major significance and would result in an ecologically significant effect. Disturbance of a bat roost would be an impact of moderate significance and would result in an ecologically significant effect.

7.7.2 Operational Impacts

Birds Collision Risk

Birds flying over the site, but especially raptors and large waterbirds, are at potential risk of collision with the turbines. Collision with a turbine may result in death of the bird and consequently impact on the population of that species. Studies so far have shown very few birds to be flying at PCH for the Project. As such the impact would be of low magnitude, adverse and of varying extent depending on the range of the species affected. In particular, the Project Area is considered to be Critical Habitat for hooded vultures. The duration of the impact would depend on the effect on the population of the species colliding with the turbine, with shorter term impacts on abundant short lived species than on rarer, longer lived species such as hooded vulture. The collision risk impact for most species would be of minor significance and would not result in an ecologically significant effect. The collision risk impact on hooded vulture would be of moderate significance and would result in an ecologically significant effect.

Disturbance (Displacement)

When operational, the Project would require a low level of staffing and consequent activity by site personnel both on foot and in vehicles. This activity may disturb bird species. In addition, the Project may result in disturbance impacts arising from noise and visual impacts associated with the turbines. Such impacts would be low magnitude adverse impacts of limited extent but permanent for the life of the Project. This impact would be unlikely to impact hooded vulture overflying the Project Area. This impact would be of minor significance and would not result in an ecologically significant effect.

Barrier Effects

The Project may result in a barrier effect on the movement of bird species with the vertical configuration of turbines creating an actual or perceived barrier which bird species may not cross or at the very least would need to habituate to crossing. Such adverse impacts would be of low magnitude to the species inhabiting the Project Area but potentially of moderate magnitude to any species that might use the Project Area for migration. Surveys to date have not recorded high levels of migratory bird activity and certainly not by larger soaring species

of greatest risk of collision with turbines. The impact would be of limited extent but permanent for the life of the Project or temporary until birds habituate to the impact. The impact would be of minor significance and would not result in an ecologically significant effect for resident species. For migratory species overflying the Project Area, the impact would be of major significance and would result in an ecologically significant effect.

Collision Risk to Bats

Studies in the USA have shown that bat species can be attracted to wind turbines and that bats can be struck by the turbine blades when flying close to the turbines. At present, five species of bat have been identified within the Project Area with others known from the surrounding area. The African straw coloured fruit bats have been observed to fly low from fruit tree to fruit tree, typically below PCH. The four species of Microchiroptera recorded within the Project Area were flying below PCH and in close association with villages. However, there remains the potential for other bat species to occur within the Project Area and they may fly higher and within PCH and therefore be at risk of colliding with operational turbine blades. The magnitude and extent of the impact could vary, with the loss of a rarer species of bat on the edge of its range, potentially a higher magnitude impact on that species' population than if a more common species were killed. The Microchiroptera bats recorded are all close to the edge of their ranges. The impact would be permanent. The impact on Straw coloured fruit bats and the Microchiroptera recorded so far within the Project Area is considered to be of minor/moderate significance and would not result in an ecologically significant effect. Impacts on other, higher flying and potentially rarer species, were they to occur within the Project Area would be of moderate significance and would result in an ecologically significant effect.

Barotrauma Impacts on Bats

Other studies, also in the USA, have shown that at some wind farms, over 90% of the recorded bat mortality resulted not from direct contact with turbines but from internal haemorrhage. Research is ongoing, but it appears that if bats fly close to turbines that the vortex of lower air pressure created by the turbine blades could result in barotraumas, i.e. a sudden expansion of the lungs causing the blood vessels to burst. A recent study in the USA appears to call into question whether wind turbines could cause such pressure changes. However, whilst there is debate about the potential for impacts, the precautionary approach is to consider that barotrauma impacts are possible. It is, however, believed to be a phenomenon which affects smaller bat species, not larger fruit bat species. The magnitude and extent of the impact could vary, with the loss of a rarer species of bat on the edge of its range, potentially a higher magnitude impact on that species' population than if a more common species were killed. The impact would be permanent. The impact on Straw coloured fruit bats and the Microchiroptera recorded so far within the Project Area is not considered to be significant and would not result in an ecologically significant effect. Impacts on other, smaller and potentially rarer species, were they to occur within the Project Area, would be of moderate significance and would result in an ecologically significant effect.

7.8 Mitigation

The following section details the mitigation strategy to avoid, reduce and offset potential impacts from the Project. The mitigation measures proposed are those required to reduce impacts to non-significant levels. Where there is uncertainty over the magnitude or other characteristics of an impact, the mitigation is necessarily precautionary to ensure that as appropriate, impacts are either avoided or reduced and where necessary a net gain is achieved.

7.8.1 Construction and Decommissioning Phases

General Measures

A set of general mitigation measures would be implemented during the construction phase to protect ecological receptors. These measures would be incorporated into a Construction Management Plan (CMP). Measures to be incorporated into the CMP include:

- Strict limitation of construction workers, materials and machinery to the defined construction areas to avoid impacts to surrounding habitats;
- Project workers would not be allowed to bring any live animals or plants into the construction site to avoid the risk of pest/invasive species establishing in the Project Area;
- An invasive species risk assessment would be undertaken. If the findings indicate there is a significant risk of introducing alien invasive species then appropriate mitigation would be implemented;
- In-line with Good International Industry Practice (GIIP), all construction sites would have appropriate sediment and erosion control practices applied. If work is carried out during the wet season, this would minimise the runoff associated with disturbance at construction areas and limit the likelihood of any effects on receptors remote from the immediate vicinity of the works;
- Project workers would be trained in litter/waste control procedures and fire emergency response procedures. This would reduce the risk of accidental fires in surrounding vegetation. Suitable firefighting equipment would be made available on site. Emergency response plans would be developed and coordinated with the relevant national authorities;
- The lighting of fires and open burning would be strictly prohibited at all times during construction;
- Project workers would be forbidden from hunting or collecting wild plants and animals;
- The use of herbicides would be forbidden on-site;
- In general, very little night time working would be required, avoiding the need for artificial night time lighting. The exception would be the delivery phases where infrastructure such as turbine sections would be delivered, however no construction of turbines would occur at night. If any artificial lighting is required (e.g. for security at work compounds), the lights would be carefully located and directed downwards to avoid light spill into adjacent vegetation areas, especially mature trees;
- Measures to reduce the potential for soil runoff and scouring of bare soil following vegetation clearance (e.g. avoiding ground works during the wet season);
- Measures to prevent pollution events and to reduce their severity should they occur would be required. This would include following best practice in pollution prevention by having spill kits available.

- Measures to reduce noise disturbance;
- Measures to reduce dust and air pollution; and
- Only the designated access roads would be used to access the construction areas. Machinery shall not be allowed to move outside these designated access roads and construction areas. Traffic during the Operational Phase shall travel along designated routes, marked with clear and lasting markings.

Environmental and Social Management System (ESMS)

An ESMS Plan has been developed for the Project and explains how environmental and social commitments would be captured from the ESIA to ensure they are implemented during the construction and operational phases. This framework would form the basis for complimentary, more detailed management plans or programmes (including a CMP and a Waste Management Plan) that would be prepared and implemented by the Project. The management plans would be developed to detail mitigation measures to be applied for the Project.

Ecological Clerk of Works (ECoW)

A suitably qualified ECoW would be appointed by the Project, independent of the construction site contractors, for the entire duration of the Construction phase of the Project. The ECoW would be tasked with overseeing construction activity and with ensuring that all mitigation measures are implemented in accordance with the ESMS Plan and associated documentation. Furthermore, the ECoW would be given the responsibility of compiling weekly / monthly reports on issues such as non-compliance and on modification or supplementation of the ESMS Plan, and these reports would be submitted to the Project management and to the construction contractor. The ECoW would have responsibility, not limited to:

- Monitoring the implementation of the CMP and other associated plans;
- Providing ecological awareness training to construction workers;
- Supervising the marking out of the construction site;
- Supervising vegetation clearance;
- Monitoring for the presence of alien invasive species during construction; and
- Checking that the construction zone fencing is intact and arranging repairs for any damage.

Site Personnel Training

Information on the ecological sensitivity of the habitats and species surrounding the Project Area would be included within a site induction package for all site personnel. This would ensure that all personnel working on site are aware of the sensitivities of the protected sites, habitats and species and are aware of the mitigation measures that need to be employed to minimise adverse effects of the Project.

Specific Measures

The following sections provide details of mitigation measures that address potential impacts to specific ecological receptors during the construction phase.

Habitats

Avoidance of Mature trees

The master plan was prepared with the aim of avoiding impacts on as many mature trees as possible especially Baobab and Kad. Where possible, during the marking out of the access road, further micro-siting (i.e. local re-adjustment of locations by a few metres) would be carried out in conjunction with the ECoW, with the aim of avoiding the need to fell mature trees.

Vegetation Clearance

Vegetation clearance from the construction zone would follow local authority regulations regarding such activities. As far as possible, it would be completed outside of the main bird breeding season (May-July). The vegetation clearance would be carried out carefully, using hand-held machinery where possible. This would reduce the risk of harming animals and also improve the quality of the harvested material for reuse. The minimum possible area of vegetation clearance required to facilitate construction would be completed. The vegetation clearance would be supervised by the Project ECoW. Cut vegetation would be removed from the construction zone in a timely manner, to avoid stockpiled material providing a new habitat which could attract animals. Cut vegetation would not be burnt, but instead offered to the local community for use as fuel and animal forage.

Protection of Retained Vegetation

The edge of the construction zone would be clearly demarcated and fenced to ensure that construction vehicles and worker do not stray into surrounding areas and damage vegetation.

Tree Re-planting

If any native trees other than fruit trees are felled during construction, measures would be taken to encourage replacements to be planted with land users receiving cash compensation for the loss of the trees being removed. This may require liaison with the local community to explain the benefits of replanting trees as well as identifying suitable locations and agreeing appropriate long-term maintenance. Replacements trees would be of locally native species. To ensure equitable compensation of the provision of young trees for the loss of mature trees, an appropriate multiplier would be applied to adjust the loss of eco-services over time. This calculation would conform to the Business and Biodiversity Offsets Programme (BBOP) principles for biodiversity offsets. The strategy for the replacement of trees and other vegetation post-construction would be developed and implemented through a Project Biodiversity Action Plan (BAP), a framework for which is set out in Annex P.

Herptiles

The immediate footprint of construction (access track, turbine pad and ancillary laydown areas) should have all vegetation removed prior to works commencing. This would cause reptiles to move on from those areas into surrounding habitats away from the construction activity. The Project ECoW would search for reptiles in construction areas prior to works commencing and relocate any that are found.

Bats

If any mature trees with potential for bats are required to be felled, this would only be completed following an inspection by the ECoW to ensure no bats were present. If no bats were present, the tree would be felled as normal. The approach for any trees found to

contain roosting bats would vary depending on circumstance with measures taken to exclude individual bats to allow felling but any trees with large breeding roosts retained in situ until all young bats have left the roost.

Apart from delivery of infrastructure, no night time working would be required, avoiding the need for artificial night time lighting. If any artificial lighting is required (e.g. for security at work compounds), the lights would be carefully located and directed downwards to avoid light spill into adjacent vegetated areas, especially mature trees.

7.8.2 Operations Phase

General Measures

The Project is located within a populated area and therefore has a great deal of opportunity to act as a force for positive change and interaction with neighbours. A long-term stakeholder engagement programme would be developed and implemented through the life time of the Project. Biodiversity and ecosystem services would be integrated into the stakeholder engagement process. One such measure would be to work with local schools to increase knowledge and understanding of biodiversity. This may include provision of suitable learning materials such as wildlife books and binoculars.

Specific Measures

The following sections provide details of mitigation measures that address potential impacts to specific ecological receptors during the operations phase.

Internationally Recognised Areas

Although no significant impacts to Niayes (from Dakar to St Louis) Important Bird Area (IBA) are predicted, long-term monitoring of potential disturbance to bird populations of the IBA would be completed to ensure that this situation does not change as construction and operation progresses. An adaptive management system would be used to review the results of the monitoring and determine if additional mitigation measures are required to avoid, reduce or offset impacts. The monitoring programme would be developed and implemented through the Project BAP.

To deliver a net gain to this internationally recognised area, the Project BAP would investigate potential measures that could be implemented to improve the conservation status of this unprotected site. Engagement with proponents of future developments, as well as the relevant public authorities, would be completed with the aim of promoting the protection of the IBA.

Birds

Domestic Waste Management

Stakeholder engagement would be undertaken with the surrounding communities to investigate the development of effective domestic waste management. The aim would be to devise a low-cost and low-maintenance scheme of waste disposal that would avoid the current practice of leaving waste in the open air at the edge of villages where they attract scavenging bird species such as black kites and vultures. Once in place, measures would be implemented to remove and dispose of the existing piles of waste. The scheme would need to be robust enough to cope with potential future population expansion in the surrounding villages for the life-time of the Project. The development of the scheme would be managed

through the Project BAP and stakeholder engagement process and would serve as an initiative under the Corporate Social Responsibility Policy,

Research

In order to deliver the net gain for the species required under IFC PS6, a research programme would be developed as part of the Project BAP into the population of hooded vultures that is resident in western Senegal around Thies, Tivaouane and therefore over the Project Area. This would include three main strands of work:

- Firstly, completion of a baseline study of the population size and distribution of the birds in the vicinity of the Project Area... The research would also aim to identify any breeding locations of the species in the vicinity of the Project Area.
- Secondly, research would also focus on the main threats to the species in the vicinity of the Project Area including (but not limited to) poisoning, use of veterinary products, hunting, collision and electrocution.
- Lastly, the information gained would be used to develop an effective conservation programme to deliver a net gain in the hooded vulture population. This would be communicated to local people as part of the other community engagement work described elsewhere in this ESIS Addendum.

The research work would be likely delivered in collaboration with local academics and students.

Monitoring

A detailed monitoring programme for birds has been initiated prior to construction, and would continue through the Operations Phase. The development and implementation of the bird monitoring programme would be in alignment with international best practice (e.g. SNH, 2009) and managed through the Project BAP. The monitoring programme would have three main objectives:

- Filling gaps in the current baseline, especially hooded vulture pre-construction;
- Assess behavioural changes that may be attributable to the presence of wind turbines, including potential post-construction barrier effects to hooded vultures through VP surveys; and
- Monitoring potential collision mortality through carcass searches, especially of hooded vulture.

In addition, the proposed monitoring programme would also verify the assessment of no likely significant effects to Niayes (from Dakar to St Louis) IBA, although this is a secondary objective.

Pre-construction surveys

Ongoing VP surveys have been commissioned to take place between March 2015 and February 2016. These surveys are taking place at five locations, providing coverage of the entire Project Area. Each VP location is subject to nine hours of survey per month, spread between three periods lasting 3 hours each. Completion of this survey beyond the period reported in this assessment would enable identification of important periods of movements throughout the year, including both spring and autumn migrations.

Additional Pre-construction surveys would be commissioned based on the results of the initial surveys.

Post-construction surveys

The long-term monitoring would continue annually for the life-time of the Project (SNH, 2009 recommends a minimum of 15 years53). The precise methodology of the surveys would be developed as part of the monitoring programme within the Project BAP, and based on on-going review of pre-construction survey results. However, they would, as a minimum, likely involve revisits to the five vantage points used for pre-construction surveys in those periods shown to be key for bird activity in the Project Area by the pre-construction surveys.

Carcass searches

Carcass searches are the most direct way of estimating the number of collisions and hence the likely impact on species of conservation importance. The carcass searches methodology would be developed in detail as part of the Project BAP, but would include the following elements, taking into account published recommendations from other schemes (e.g. Duffy and Steward, 2008, Fennelly, 2015) :

- Searches would be completed on a monthly basis for the same periods as the post-construction VP surveys.
- The potential use of search dogs;
- Cover all of the turbines in the Project Area;
- Assessment trials of searcher-efficiency and scavenger bias; and
- Span the initial 15 years of the Project with monitoring completed in years 1, 2, 3, 5, 10 and 15.

Other approaches that rely on remote sensing or use of technology to record collision mortality such as radar collision detectors would be assessed as part of the Project BAP.

The issue of potential bird collision would be included within the stakeholder engagement programme and local people would be encouraged to report any suspected instances of bird collision. This could utilise a standard reporting form, such as that developed by SNH.

The results of the monitoring programme would be reviewed on an annual basis as part of the adaptive management programme integrated in the Project BAP. If potential impacts are identified as part of the monitoring programme, additional mitigation measures would be developed and implemented. Similarly, if no impacts are identified and it is deemed appropriate, it may be possible to reduce the level of post-construction work.

Bats

Detailed mitigation would be devised once survey results are available and agreed with OPIC and EKF prior to commencement of works. However, it is important to note that no impacts on Straw coloured fruit bat are predicted as their flight activity keeps them far below PCH and initial results don't indicate a level of bat activity by Microchiroptera outside of villages that would require specific mitigation. As such, no mitigation for bats is currently required.

[53] This does not necessarily require surveys in all of the 15 years, it would likely be more appropriate to complete surveys in years 1, 2, 3, 5, 10 and 15 after construction.

Detailed bat mitigation would be developed in the unlikely event that future bat survey results indicate that it may be required. The mitigation measures proposed would depend on the types of impacts. Examples of potential mitigation measures include: The loss of potential or confirmed bat roost locations would require replacement bat roosts to be provided, or the discovery of high bat activity within or above trees close to turbine locations might require the consideration of additional felling to make those areas close to turbines less attractive to bats.

7.9 Residual Impacts

7.9.1 Construction and Decommissioning Phase

Impacts on Designated Sites

The predicted pre-mitigation impact on designated sites was limited to the Niayes IBA as all other sites are too far from the Project Area to be subject to the potential impacts. No clear pathways for pollution to reach the Niayes IBA are apparent and with the best practice construction mitigation suggested in Section 5.8.1, no residual impacts on designated sites are predicted and no ecologically significant effects would occur.

Habitat Loss or Degradation

The construction of the Project would result in the loss of an area of habitat, to be replaced by windfarm infrastructure and hardstanding. However, as shown by the habitat map, the majority of the project area is already heavily modified fruit tree horticulture with little or no natural vegetation. Measures to protect key features such as mature trees and vegetation peripheral to the development would ensure that this impact is reduced to negligible significance and no ecologically significant effects would occur.

Disturbance of Herptiles

Few reptiles and no amphibians are believed to occur within the Project Area. Measures are proposed that would avoid significant disturbance of those that may be present and this impact is reduced to negligible significance and no ecologically significant effects would occur.

Bird Habitat Loss (Displacement)

Measures have been proposed in the mitigation section to minimise felling and to protect those trees and features likely to support most nesting and feeding activity. This impact is reduced to negligible significance and no ecologically significant effects would occur.

Bird Nest Destruction

Pre-construction ECoW surveys of any trees to be felled would avoid any such impact occurring and so no ecologically significant effect is predicted.

Bird Disturbance

Birds would be disturbed by the construction of the Project. Measures have been proposed that would avoid or reduce impacts within the construction areas however no additional measures are proposed to address bird disturbance in the wider area as this would be a short term impact and would not result in an ecologically significant effect.

Disturbance of Terrestrial Mammals

No specific mitigation measures are proposed for mammals. The Project ECoW would consider mammals during pre-construction surveys and would advise if any measures are required. This is considered unlikely as the species present within the Project Area are mobile, common species. No ecologically significant effect is predicted to occur.

Disturbance of Bats

Both the destruction and disturbance of any bat roosts located within the Project DAI, should any be identified in subsequent surveys, are predicted to result in ecologically significant effects from impacts of major and moderate significance, respectively. Whilst specific mitigation has not been developed as no roosts are currently known to occur, in the event that this is required, this would encompass measures to avoid the destruction or disturbance of any such roost or the provision of sufficient replacement roosting to offset the impact with felling of the tree occurring under supervision of the ECoW. As such, any impacts would be reduced to minor or negligible significance and would not result in ecologically significant effects.

7.9.2 Operations Phase

Birds Collision Risk

Measures to address potential impacts upon bird species are outlined in the mitigation section. At present, there is no indication that there would be a high collision risk for any of the species recorded within the Project Area and so no ecologically significant effect is predicted. Given the consideration that the Project Area falls within a Critical Habitat DMU for hooded vulture, regardless of the fact that the birds seen all flew below collision height, a number of species-specific measures are proposed to ensure a net gain for the species and thereby avoid an adverse ecologically significant effect and potentially result in a beneficial ecologically significant effect for hooded vulture.

Bird Disturbance (Displacement)

No additional mitigation is proposed but the impact remains minor significance and would not result in an ecologically significant effect.

Bird Barrier Effects

The species specific measures proposed to ensure a net gain for hooded vulture, thereby avoiding an adverse ecologically significant effect and potentially resulting in a beneficial ecologically significant effect for the species, outlined for bird collision risk apply equally to barrier effects.

Collision/Barotrauma Risk to Bats

Specific measures for bats would be developed based upon forthcoming survey results. However, potential measures to reduce the attractiveness of the area around turbines would allow impacts to be reduced to negligible significance and thereby avoid any ecologically significant effects.

Table 48 : Summary of Impacts

Impact	Potential Significance Prior to Mitigation	Design, Enhancement or Mitigation Measures	Residual Significance
Construction: Impacts on IBA	Major	Best Practice pollution prevention, adherence to construction routes	Not Significant
Construction: Habitat loss or Degradation	Moderate	Avoidance of mature trees, protection of peripheral vegetation	Negligible
Construction: Disturbance of Herptiles	Minor	Preconstruction vegetation clearance, ECoW	Negligible
Construction: Bird Displacement	Minor/Moderate	Measures to reduce tree loss	Negligible
Construction: Nest Destruction	Moderate	Pre-construction ECoW surveys	Not Significant
Construction: Bird Disturbance	Minor/Moderate	No action	Minor/Moderate
Construction: Disturbance of Terrestrial Mammals	Minor/Moderate	Pre-construction EcoW surveys	Negligible
Construction: Disturbance of Bats	Major or Moderate	Avoidance of roost destruction, replacement of lost roosts	Minor or Negligible
Operation: Bird Collision Risk	Minor (Moderate for hooded vulture)	Additional monitoring of hooded vulture	Not Significant (Minor beneficial for hooded Vulture)
Operation: Bird Displacement	Minor	No action	Minor
Operation: Bird Barrier Effects	Minor (Major for hooded vulture)	Additional monitoring of hooded vulture	Not Significant (Minor beneficial for hooded Vulture)
Operation: Bat Collision Risk	Moderate	Measures to reduce attractiveness of turbine areas to bats	Negligible
Operation: Bat Barotrauma	Moderate	Measures to reduce attractiveness of turbine areas to bats	Negligible

7.10 Conclusions

This assessment considered the potential impacts on biodiversity from the construction and operations of the proposed Taiba N'Diaye Wind Farm near Tivaouane in western Senegal. Surveys commenced in 2012, with more detailed survey for birds and bats completed in 2014 which established the main species resident within the Project Area.

Further surveys commenced in January 2015 with a study of the birds completed in the nearby Niayes IBA, during the migration period. Standardised VP surveys of the Project Area to allow an assessment of bird collision risk commenced in March 2015 and are ongoing until February 2016. This assessment is based upon the results of bird activity in both the migratory and summer breeding periods and it is considered that the surveys have allowed a clear picture of bird flight activity to be established with this to be augmented as further surveys are completed.

Monthly bat surveys commenced in late July 2015 to identify which Microchiroptera species utilise the Project Area along with the already identified large numbers of African straw-coloured fruit bats. To date, four additional species have been recorded, all closely associated and only occurring within the villages of the Project Area.

Bird Surveys have, to date, shown that the majority of flights within the Project Area are completed by common, resident species flying below collision risk height. Three observations of hooded vultures have indicated that this species uses the Project Area and as such it has been considered to be Critical Habitat as the species is listed as Endangered on the IUCN Red List.

This assessment outlined the potential impacts on various receptors and has proposed appropriate mitigation to address the impacts. This includes, but is not limited to, additional research into the local population of hooded vultures, measures to compensate for any bat roosts affected should that be required, avoidance of felling mature partially-protected trees where possible and provision of an ECoW during construction works.

As a result of some uncertainty due to the ongoing fieldwork, the impact assessment has been necessarily precautionary. However, all but one residual impact is of minor significance or lower with the one other being an impact of minor/moderate significance. **Crucially, none of the impacts are considered to result in adverse ecologically significant effects and as a result of the proposed mitigation it is possible that a beneficial impact may occur for hooded vulture.**

8 Cumulative Impacts and Effects

8.1 Introduction

This chapter addresses the analysis of cumulative impacts of the Project with other existing infrastructures, or from future projects in the Project area.

This assessment is based on the methodology described in the Cumulative Effects Assessment Practitioners' Guide published in February 1999 by the Canadian Environmental Assessment Agency, guidelines which are recognized as international best practice by IFC for the assessment of cumulative impacts.

The principle of this assessment is to analyse the environmental and social impacts of present and future projects within the Project area, to identify any interactions between them and the potential generation of cumulative effects on the environment.

The assessment includes the following stages:

- The description of present or future actions and projects that are likely to interact with one of the valued environmental components (VEC);
- The determination of valued environmental components (VEC) as perceived by the stakeholders during consultations;
- The analysis of potential cumulative effects affecting the VEC; and
- The preparation of mitigation measures for the identified cumulative impacts.

8.2 Description of present or future actions and projects:

The projects listed below, in development, or currently being constructed in the perimeter of the Project's DAI or transportation routes - and those that have been the subject of an impact study or which are reasonably predictable (e.g., project opinion, ministerial order) are:

- The Tobène 70 MW heavy fuel power plant at Taiba N'Diaye, currently under construction;
- The Africa Energy 300 MW coal-fired power plant project at Darou Khoudoss. This project, detailed under its ESIS is in its preparation phase and PAP were already compensated.
- The new 50 MW coal-fired plant project from Industries Chimiques du Sénégal (ICS);
- A phosphoric acid production project financed by AIG (African Investment Group); the site is yet to be determined with the DEEC and the Mines Division; and
- The phosphate exploration and extraction project at Taiba N'Diaye by Gretta Resources Mining SUARL. This project which would have encroached on the PETN Project area is currently the subject of arbitration by the PSE (Emerging Senegal Plan) Operational Monitoring Office. According to the most recent information, PSE has deliberated: this project will be relocated outside of the PETN Project area (see Annex Q - Official letter from the Ministry of Industry and Mines).

In addition to the projects listed above, the following industrial infrastructures are already in operationoutside the perimeter of the Project area:

- The ICS property that mines for phosphate and produces phosphoric acid.
- The Grande Côte Opérations (GCO) property that mines zircon and ilmenite. Mining started in 2014 near DIOGO, 26 km from the PETN project, but the project has a permit to develop mining activities along the coast (see potential extension area located in black in Figure 1).

The location of these projects is shown in Figure 1 below.

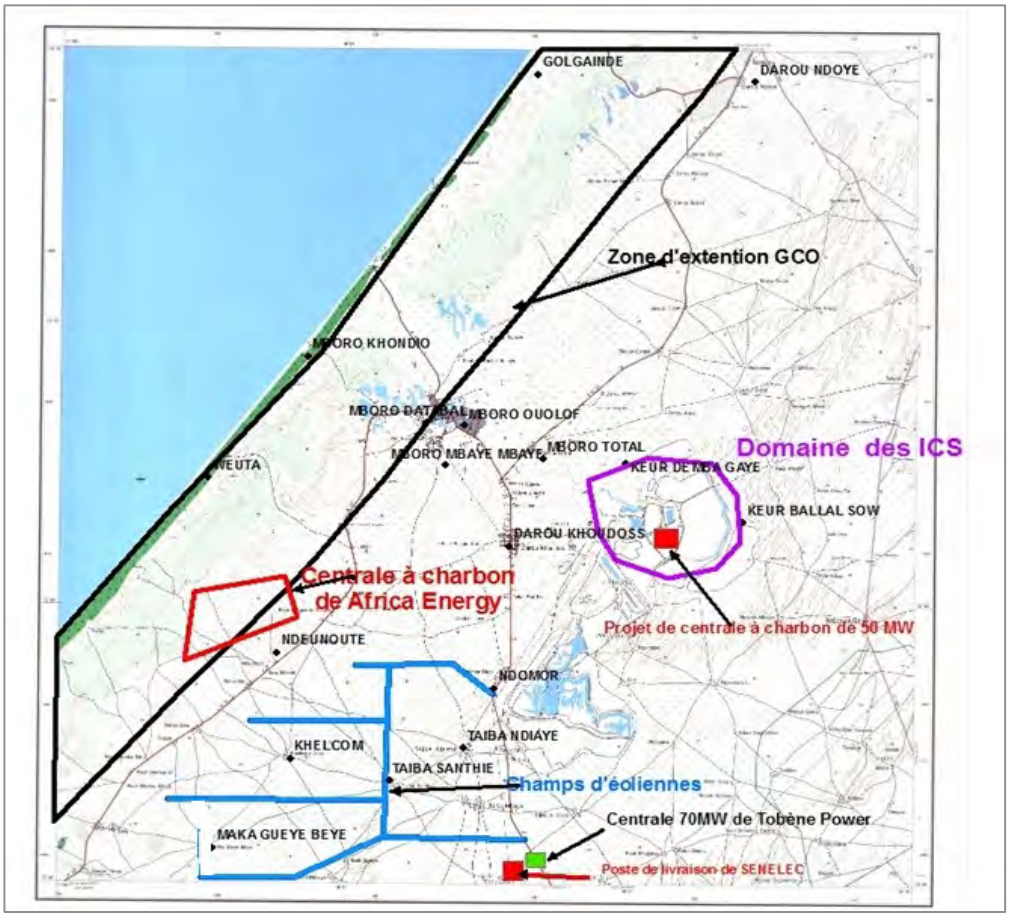


Figure 26 : Other industrial projects located or planned in the PETN project vicinity

8.3 Project status

The section below describes the projects listed in section 8.2. The projects' status are then classified as follows:

- Project certain to be developed or considered as such;
- Reasonably predictable project;
- Very uncertain hypothetical project: these projects will not be considered for this cumulative impacts assessment.

8.3.1 TOBENE POWER 70 MW power plant project

TOBENE POWER 70 MW POWER PLANT AT TAIBA N'DIAYE	
Project purpose	Installation and operation by TOBENE POWER SA of a 70 MW heavy fuel power plant at Miname, in the Municipality of Taiba N'Diaye. Estimated annual production is 558 GWh for twenty years.
Details of the operation	• Developer: Tobène Power S.A. • Project type: Energy - Generation of electric power for Senelec • Location: Miname in the Municipality of Taiba N'Diaye • Construction start date: Novembre 26, 2014 • Commissioning date: January 2016 • Distance from the project: 1.1 km <u>Other information</u> • 250 people (estimated) recruited during construction with 500 at peak periods; • 50 people (estimated) recruited permanently for the operations phase, with an additional 20 to 25 during maintenance operations. • The plant will be fully operational in January 2016.
Project status	Certain project - operational in January 2016 - duration twenty years

8.3.2 The AFRICA ENERGY 300 MW coal-fired plant project

300 MW COAL-FIRED POWER PLANT AT DAROU KHOUDOSS	
Project purpose	Africa Energy SA (AESA) has already signed a power purchasing contract with Senelec and is intending to construct and operate a 300 MW power plant that will produce 2600 GWh/year and provide power to the national interconnected grid.
Details of the operation	• Developer: Africa Energy SA • Project type: Electric power • Location: Municipality of Darou Khoudoss • Construction date: Nov. 2015 for 36 months • Commissioning date: from November 2016, May 2018 and Nov. 2018 • Distance from the project: 2.4 km Other information • 3000 (estimated) workers will be recruited at peak periods during the construction phase; and • Between 180 and 300 workers will be recruited during the operating phase • AESA has obtained the certificate of conformity from the Ministry of the Environment.
Project status	Action reasonably predictable - Construction should start in November 2015.

8.3.3 The ICS 50 Mw Coal-Fired Power Plant Project

ICS 50 MW COAL-FIRED POWER PLANT	
Project purpose	ICS is intending to produce steam and electric power for its own mining process and sell the excess energy produced to Senelec. The plant would have a capacity of 50 MW.
Details of the operation	• Developer: ICS • Project type: Energy & Mines • Location: Municipality of Taiba N'Diaye • Construction start date: Unknown • Commissioning date: Unknown • Distance from the project: 6 Km Other information • Impact study in progress
Project status	Action reasonably predictable, although little information was available on this project

8.3.4 The AIG phosphoric acid production plant project at TAIBA N'DIAYE

PHOSPHORIC ACID MANUFACTURING UNIT AT TAIBA N'DIAYE	
Project purpose	African Investment Group (AIG) plans to build a phosphoric acid production unit
Details of the operation	• Project title: AIG phosphoric acid manufacturing plant at Taiba N'Diaye • Project type: Mines - Phosphoric acid production • Location: possibly in the Municipality of Taiba N'Diaye • Construction date: Unknown • Commissioning date: unknown • Distance from the project: unknown Other information This project is currently looking for a site area. The location might be in Taiba N'Diaye.
Project status	Action reasonably predictable although, little information was available on this project

8.3.5 The GRETTA RESOURCES MINING SUARL project

<table>
<tr><th colspan="2">PHOSPHATE EXPLORATION LICENSE - GRETTA RESOURCES MINING SUARL</th></tr>
<tr><td>Project purpose</td><td>Exploration for lime phosphates over 59 km^2 by GRETTA RESOURCES MINING, that was authorised by Ministerial Order 15771 dated 20 October 2014 to explore for lime phosphate in the following coordinate triangle:
<table>
<tr><td></td><td>X</td><td>Y</td></tr>
<tr><td>P1</td><td>298,785</td><td>1,662,297</td></tr>
<tr><td>P2</td><td>296,905</td><td>1,673,782</td></tr>
<tr><td>P3</td><td>287,724</td><td>1,662,259</td></tr>
</table>
This phosphate exploration triangle encroaches partly on the PETN Project.</td></tr>
<tr><td>Details of the operation</td><td>• Developer: GRETTA RESOURCES MINING SUARL
• Project type: Phosphate mines
• Location; Taiba N’Diaye; see coordinates and diagrams
• Construction date: Unknown
• Commissioning date: Unknown
• Distance from the project: encroaches on the project area (overlapping of the two projects over 800 ha in the immediate areas of influence of wind turbine rows 1, 2 and 3 in the PETN project)
<u>Other information</u>
• Exploratory drilling were performed on the northern border of the PETN Project area to assess the potential of phosphate deposit.</td></tr>
<tr><td>Project status</td><td>• Given the incompatibility of the Gretta Mining and PETN projects, an arbitration procedure was engaged by PETN and concluded in favor of PETN. As stated in the official letter from the Ministry of Industry and Mines, the Gretta Mining Project will be relocated outside the PETN Project area (see Annex Q).
• The new location of this mining project is currently unknown. Therefore, this project was not taken into account for this cumulative impact assessment.</td></tr>
</table>

8.3.6 Summary of the status of projects

Table 49 : Summary of Project status

PROJECT	Developer	Status	Decision for Inclusion in the Cumulative Impact Assessment
The Tobène 70 MW heavy fuel power plant at Taiba N'Diaye	Tobène Power S.A.	Certain Project-information available	Included
The Africa Energy S.A.300 MW coal-fired plant project at Darou Khoudoss	AESA	Predictable - information available	Included
The new ICS 50 MW coal-fired plant project	ICS	Predictable but lack of information	Included for certain aspects (noise, waste and miscellaneous transport)
The phosphoric acid production project with the company African Investment Group (AIG)	AIG	Predictable but lack of information	Not included
The phosphate exploration and extraction project at Taiba N'Diaye.	GRM Suarl	Abandoned – see Annex Q	Not included
PROJECTS IN OPERATION			
Industries Chimique du Sénégalphosphate mine	ICS	Existing	Included for certain aspects (waste and miscellaneous transport)
GCO Grande Côte Opération zircon and ilmenitemine	GCO	Existing	Included for certain aspects (traffic disruption for transport of supplies and personnel)
Tobène HV inter-connectionstation	SENELEC	Existing	Not included

8.4 Present or future actions and projects taken into account in assessing cumulative impacts - justifications

The cumulative impacts are essentially going to be assessed for the existing projects, actions or installations when certain events overlap, such as construction work timetables, both during the construction period and during simultaneous functioning of installations in the operating phase. The possibilities of simultaneous occurrence of events and the associated aspects for each company or target project are presented in the following sections.

8.4.1 Power plant under construction: Tobène Power S.A.

The Tobène Power S.A. 70 MW heavy fuel power plant is under construction and is scheduled to start operating in January 2016. It is about 1 km from the PETN project. When assessing the cumulative impacts during the PETN construction phase, only the inputs of noise and transport generated by this plant (mainly the fuel between Dakar and the Tobène Power site), along with the workforce,and a potential impact on the overall traffic in the Project area will be taken into account.

8.4.2 Power plant under development: africa energy

Africa Energy S.A. (AESA) is developing a 300 MW coal fired power plant, located about 2.4 km from the PETN project site. The project has already received its Certificate of Conformity from the Ministry of Environment and has signed a power purchasing contract with Senelec. The project is now in its site preparation phase, its PAP were already compensated, and it is scheduled to begin construction in November 2015.

The planned activities will include construction of the following components:

- The seashore infrastructure for conveying the coal (the pier), pumping stations and the cooling water discharge;
- The power plant which will carry the production facilities and their auxiliaries (boilers, turbines, transformers, and all ancillary involved in the production of energy, fuel processing plants, water, etc.);
- The connecting corridor between the pier and the power plant; this corridor has 2 high flow conveyors, removing coal from the pier to the stockpiles in the factory;
- The wastewater treatment station;
- Production plants of raw water;
- The ash handling system; and
- The station for desalination and demineralization by reverse osmosis.

During construction, AESA plans to hire more than 3 000 workers at peak periods. Predictable cumulatives aspects where the AESE project will be involved are :

- Preservation of the human environment /living style;
- Preservation of the fauna & flora;
- Protection of the surface water and groundwaters;
- Waste management during construction;
- Circulation and mobility populations;
- Influx of workers;
- Transportation requirements; and
- Protecting the landscape

8.4.3 Existing mining infrastructures: Industries Chimiques du Sénégal (ICS) and Grande Côte Opérations (GCO)

The ICS phosphate mine is located 6 km to the north-east of the Project. ICS is planning to develop a 50 MW coal-fired power plant on its mine site; an impact study is in progress.

GCO started its mining operation for zircon and other rare minerals in the vicinity of the village of DIOGO, located 28 km from the PETN Project area. The GCO mining activities are planned to be extended within ten to fifteen years towards the PETN project site, near Darou Khoudoss.

The GCO mining activities, like those of ICS, were already taken into account in the baseline data included in the Project's ESIS REV03. They will not be taken into account when assessing the cumulative impacts for the VEC that will be considered.

For ICS, only the risks and impacts of transporting the phosphate, phosphoric acid and the coal to fuel the future power plant will be taken into account.

For GCO, the minerals mined are already being transported by a specific operational train and will, therefore, only have a minor impact on local traffic. The traffic generated that can be attributed to procurement of supplies and personnel transport, will also be considered.

8.4.4 Project announced but ultimately relocated

As presented in section 8.3.5, an exploration licence was delivered to GRETTA RESOURCES MINING SUARL to assess potential phosphate deposits within a 60 km^2 triangle within the footprint of the PETN Project site. As both projects are not compatible, an arbitration procedure was initiated by PETN. Based on lastest information received from the Ministry of Industry and Mines (see Annex Q), the GRETTA Project will be relocated outside the PETN project area. Therefore, the GRETTA project was not taken into account when assessing the cumulative impacts.

8.4.5 Present and future activities and projects considered

In conclusion, the cumulative impacts assessment will take into account:

- The PETN Project;
- The activities relating to the operation of the Tobène Power plant that will become operational in January 2016;
- The development of Africa Energy (AESA)'s coal fired power plant, located 2.4 km from the site, in the Municipality of Darou Khoudoss;
- The various transportation activities attributable to the ICS mine andfuture power plant and the potential traffic disruption attributable to the transportation of personnel and supplies for GCO; and
- The roads.

The Senelec interconnection station plays no part in the assessment of cumulative impacts.

The PETN project and the AESA coal fired power plant construction schedules seem to overlap (work starting towards the end of 2015, and lasting between 34 and 36 months, respectively). Therefore, cumulative effects during that period of time will mainly be attributable to these two projects.

During the operating phase, all operational units located within the Project's DAI and the roads can be considered.

8.5 Determining Valued Environmental Components (VEC)

It remains clear that the specific impacts must be determined for each project site and an environmental and social management system (ESMS) and monitoring plan implemented to mitigate negative impacts and improve positive impacts throughout the life of each project.

Consultations with local communities, State technical departments and the local governmental administration were performed as part of the ESIS Addendum in order to determine the main preoccupations of the Project's key stakeholders.

According to the feedback received, the main issues for the local communities are:

- Maintaining the living environment (air quality, noise and vibration);

- Protecting surface water and groundwaters;
- Waste management;
- Protecting the landscape;
- Circulation and mobility of local villagers/populations;
- Influx of workers (more than 3200 at peak construction periods, primarily for the AESA project); and
- Miscellaneous transportation requirements.

These valued environmental components (VEC) are reviewed in the assumed context of construction work starting almost simultaneously for both projects (PETN and AESA).

8.6 Cumulative impacts during the construction phase

Tables below present a potential cumulative impact assessment for each VEC. Project impacts, cumulative impacts and the mitigation measures associated with cumulative impacts were assessed for each VEC.

Tables also refer to activities and projects that contribute in generating these cumulative effects.

8.6.1 Modification of air quality and greenhouse gas emissions (GHG)

Construction of the PETN Project and the AESA coal fired power plant are scheduled to commence between 4th Qtr. 2015 and 1st Qtr. 2016. The machinery used for both projects (e.g., site machinery, trucks, cranes) will produce combustion gas emissions. Similarly, both projects could generate considerable dust emissions when clearing undergrowth and carrying out civil engineering work.

The Tobène Power S.A. power plant, located 1 km from the Taiba N'Diaye site, will be operational in January 2016 and will also emit greenhouse gases.

Where dispersion conditions are unfavorable (even if this is a low probability due to the distance between the different sites), the emissions of combustion products and dust from these sites might overlap and result intemporarily higher atmospheric concentrations for target villages.

The overall GHG contribution attributable to the two sites will however be very low.

Recommendations and mitigation measures

- Application of good practices developed in the environmental and social management plans for each site;
- Compliance with use of tarpaulins on trucks and watering the ground to minimize dust; and
- If possible, joint organisation between the different project developers to optimise truck transportation itineraries and working periods.

8.6.2 Accumulation of noise impacts

Noise level increases in the respective PETN and AESA construction site areas may be noted. These noise emissions will be added onto the Tobène Power plant background noise that, according to the modelling by the Tobène Power study, should be imperceptible.

Raised noise levels in line with sensitive points (i.e., villages) may be noted when noisy work is carried out at the same time by the companies during construction. However, it seems unlikely that such an accumulation will be noted given the distance between the two sites (2.4 km). A measurement campaign should confirm this assumption.

Mitigation measures

- If the construction works take place at the same time, carry out noise measuring campaigns in line with villages in the project areas of PETN and AESA; and
- If appropriate, envisage deferred programming and/or limiting certain noisy tasks over time.

8.6.3 Management of excavated soil

Earth levelling, undergrowth clearance and civil engineering works are going to produce large amounts of cuttings on both projects.

Mitigation measures

Coordinated cuttings management is recommended between the two developers, with the participation of Water and Forests, the Regional Mines Department and the Thies DREEC, to optimise its removal.

8.6.4 Pollution of surface water and groundwaters

The proximity of both projects (PETN and AESA) during construction could increase the risk of pollution of surface water and groundwaters through the use of polluting products on the two respective sites (e.g., hydrocarbons, dilutants).

Mitigation measures

- Raise developer awareness and apply specific ESMP (Environmental and Social Management Plan) guidelines; and
- Surface and groundwater monitoring on a regular basis and through target analyses.

8.6.5 Exploitation of groundwaters and surface water

The PETN project will have no impact on the surface water and no groundwater well will be drilled for the construction works.

The AESA project will require a single groundwater well for construction purposes and will have a desalination plant to supply water during the operation phase.

There will, therefore, be no cumulative impacts in regards to surface water and groundwater supply during the construction and operation phases of these two projects.

8.6.6 Waste management

The PETN, AESA and Tobène Power plant projects will simultaneously produce:

- Site waste specific to PETN, with temporary site facilities and the presence of about 400 workers, on average, during construction;
- Site waste specific to AESA (with its 3000 workers at peak construction periods for 36 months);
- Tobène Power plant waste during the operating phase; and
- Waste from the ICS coal-fired power plant site if this project is constructed at the same time.

Each project will likely use the same waste disposal facilities.

The large volume of waste from the construction (PETN and AESA) and operation (Tobène Power plant) sites, plus, if confirmed, the waste from the construction site of the ICS coal-fired plant, could saturate waste discharging and treatment centers.

Mitigation measures

Establish a coordination unit for the various projects, under the supervision of the DEEC and departments involved, to prevent the saturation of landfill centers and plan for new landfill areas, if appropriate.

8.6.7 Impact on the landscape

The multiplicity of projects (i.e., PETN on 49 ha with wind turbines and roads, AESA on 700 ha, including 125 ha built up, the Tobène Power SA power plant on 4.5 ha built up - extracted from a 50 Ha Senelec site) will have an impact on the visual and landscape aspects of the area.

Recommendations - mitigation measures

In collaboration with AESA, Tobène Power SA and the Water and Forests Directorate, study the possibilities of enhancing the landscape in this area through forest developments and tree planting.

8.6.8 Influx of workers onto the site

The projects' proximity will mean a massive influx of external workers (approx. 250 workers in peak periods for PETN and more than 3000 in peak periods for AESA). The AESA external workers will be housed in site facilities located at Darou Khoudoss (2.4 km from PETN), while the PETN external workers will be accommodated in hotels in towns nearby (locations to be determined).

The associated impacts will be as follows:

- Positive aspects (i.e., jobs creation and reduced unemployment); and
- Negative aspects, such as the development of sexually transmitted diseases and the potentially negative impacts on the ways and customs of local populations.

Mitigation measures

- Apply mitigation measures provided for in each project's ESMP including project Codes of Conduct;
- Strict application of HSE guidelines by project developers;
- Organisation and coordination of worker mobility taking into account local population mobility; and
- Raising awareness of populations and workers to projects' applicable guidelines through effective communication.

8.6.9 Miscellaneous transport needs and road traffic

During the two projects' overlapping construction periods, the following risks and impacts may exist:

- Road traffic disruptions that can be attributed to the transportation of raw materials, cuttings and waste at the sites, sometimes with trucks following the same transportation routes and itineraries;
- Increased risks of accidents from trucks passing through villages;
- At peak periods, possible temporary congestion on the departmental roads;
- Major traffic disruptions on the main roads when transporting equipment from the port to the project sites; and
- Traffic disruptions on the municipal roads within the Municipality of Taiba Ndiaye (between main towns and villages) due to the transporting of workers at peak periods from workers' accommodations to the project sites

Project managers at both project sites, at the same time, should address the risks and impacts described above, mainly focusing on the transportation routes taken by passenger vehicles. Unless this risk is well managed, there is a risk that the mobility of goods and people may be severely disrupted, albeit temporarily.

Mitigation measures

The following measures are recommended:

- Specific measures regarding the traffic circulation at the approaches to the project sites;
- Coordination of the project site traffic;
- Specific measures organising the traffic passing through the villages;
- Driver training and awareness raising;
- Training and awareness raising for the workers and local populations as well;
- Application of specific measures defined in the respective projects' ESMPs.

It is essential to coordinate large equipment convoys between the port and the project sites to prevent simultaneous convoys causing traffic congestion on the main road.

For further details on the PETN project's relevant impacts and mitigation measures, refer to Chapter 9 on Community Health, Safety and Security.

8.6.10 Light emissions:

The project sites will be lit at night and, therefore, sources of light emissions. These light emissions have the potential to disturb the tranquillity of the nearest villages.

Mitigation measure

- Lighting reduced to the strict minimum (safety measures);

The next pages summarise the cumulative impacts presented in the previous paragraphs and display a qualitative assessment of the significance of cumulative impacts.

Table 50 : Summary of cumulative impacts given the hypotheses developed

Environmental theme	Project impacts	Potential cumulative impacts	Grande Côte Opérations	Industries Chimiques du Sénégal (ICS)	Tobène Power in Taiba N'Diaye	Taiba N'Diaye Wind Farm	Africa Energy coal-fired plant	ICS coal-fired plant	Mitigation measures
Climate - Alteration in air quality	Emission of dust by the transport trucks of the PETN and AESA projects Tobène Power Greenhouse gas (GHG) emissions GHG emissions during construction phase by the site machinery, handling equipment, transport and emergency generator sets - alteration in air quality (PETN and AESA)	In unfavorable dispersion conditions, accumulation of emissions from simultaneous sites for both combustion products and dust and transfer to the target villages.			x	x	x		• Apply the recommendations of good practices developed in the environmental and social management plans for each project • Tarpaulins to be used on trucks • Watering the ground to minimize dust • Joint coordination, if possible, of truck transportation routes, itineraries and circulation periods

Environmental theme	Project impacts	Potential cumulative impacts	Grande Côte Opérations	Industries Chimiques du Sénégal (ICS)	Tobène Power in Taiba N'Diaye	Taiba N'Diaye Wind Farm	Africa Energy coal-fired plant	ICS coal-fired plant	Mitigation measures
Noise and vibrations	Increase in the noise level and vibrations in each project area with construction works (PETN and AESA). Addition of Tobène Power plant background noise (but this noise is imperceptible according to the modelling by the Tobène Power study)	Change in the noise level at sensitive points (villages) when noisy work is carried out at the same time by different companies during construction A cumulative impact is unlikely given the distance between the project sites (located 1 km and 2.4 km from PETN). A measurement campaign should confirm this assumption.			x	x	x		• If the construction works take place at the same time, carry out noise measuring campaigns in line with villages in the project areas of Taiba N'Diaye and Darou Khoudoss. • Proposed solution, such as deferred programming. • Limitation of certain noisy tasks over time.
Topography (management of excavated soil)	Production of cuttings	Cumulative cuttings management needs				x	x	x	• Coordination of cuttings management with participation of Water and Forests, the Regional Mines Department and the DEEC

Environmental theme	Project impacts	Potential cumulative impacts	Grande Côte Opérations	Industries Chimiques du Sénégal (ICS)	Tobène Power in Taiba N'Diaye	Taiba N'Diaye Wind Farm	Africa Energy coal-fired plant	ICS coal-fired plant	Mitigation measures
Groundwaters	Risk of groundwaters pollution by infiltration of runoff water, itself polluted during construction work onsite	Increased risk of groundwaters pollution on both sites simultaneously				x	x		• Raise developer awareness and apply specific guidelines. • Regular groundwater monitoring
Exploitation of groundwaters and surface water	The PETN project will have no impact on surface water runoff and nogroundwater well will be drilled for the construction. The AESA project will drill a groundwater well for construction works only. A desalination plant will be implemented to supply water during the operations phase	No cumulative impact associated with the projects				x	x		• No cumulative impact

Environmental theme	Project impacts	Potential cumulative impacts	Grande Côte Opérations	Industries Chimiques du Sénégal (ICS)	Tobène Power in Taiba N'Diaye	Taiba N'Diaye Wind Farm	Africa Energy coal-fired plant	ICS coal-fired plant	Mitigation measures
Site waste	Production of specific site waste by AESA, with approx. 3000 workers during the 36-month construction phase Production of specific site waste by PETN, with approx. 400 workers during the 34-month construction phase Simultaneous production of waste at the Tobene power plant during its operating phase Use of waste disposal facilities by each project company	Accumulation of waste during construction and operating phases Risk of saturation for existing waste disposal facilities and treatmentcenters	x	x	x	x	x	x	Coordination of the various projects to be set up under the supervision of the DEEC and departments involved, to prevent the saturation of existing landfill centers and schedule new landfill areas, if needed.

Environmental theme	Project impacts	Potential cumulative impacts	Grande Côte Opérations	Chimiques du Sénégal (ICS)	Tobène Power in Taiba N'Diaye	Taiba N'Diaye Wind Farm	Africa Energy coal-fired plant	ICS coal-fired plant	Mitigation measures
Flora	The PETN project would result in the loss of areas of modified habitats used for fruit tree agriculture and the loss of some mature tree species including Baobab and Kad Impacts, which are not considered to be significant, particularly with the implementation of project mitigation. The Tobene Power and Senelec developments immediately to the southeast of the PETN project are considered to have resulted in the loss of similar modified habitats with all other developments impacting other habitat types.	Cumulative projects have the potential to result in the loss of similar habitats and mature trees			x	x			The mitigation measures on the PETN project site to replace mature trees (e.g., Baobabs) that must be removed with young trees, where needed, prevent even the cumulative effect from being ecologically significant due to the small footprint of the cumulative projects
Fauna	Few impacts on faunal species are predicted from the PETN project that are considered to be significant. Only impacts on hooded vulture had the potential to be prior to mitigation but none of the cumulative developments would impact that species. Potential impacts on the Niayes IBA from the Project have been identified (see section 7.7.1) and the proposed GCO and ICS have the potential to significantly impact the IBA	Loss of habitat in the IBA as a result of the GCO and ICS projects could act cumulatively with potential pollution impacts during construction of the projects.	x	x		x			Mitigation measures proposed would avoid impacts on the IBA from the PETN project, thereby avoiding cumulative impacts.

Environmental theme	Project impacts	Potential cumulative impacts	Grande Côte Opérations	Chimiques du Sénégal (ICS)	in Taiba N'Diaye	Taiba N'Diaye Wind Farm	Africa Energy coal-fired plant	ICS coal-fired plant	Mitigation measures
Landscape	Impact on the local landscape by the 3 following projects: • TOBENE POWER power plant • AESA (700 ha including 125 for power island) • PETN (49 ha)	Multiple projects in close vicinity to the PETN project site will impact the visual and landscape aspects			x	x	x		• In collaboration with AESA, Tobène Power S.A. and the Water and Forests Directorate, study the possibilities of enhancing the landscape in this area through forest developments and tree planting. • Other forms of compensation to be defined
Circulation and mobility of the population	Disturbances in population movements during construction phase • 700 ha AESA • 49 ha PETN • Screen effect	Increase in diversion distances. Projects might prevent population passage, thus increasing diversion distances.				x	x		• Development of diversion tracks and shortcut paths across Project sites, where possible • Minimum footprint occupation as far as possible • Gradual release of the footprint at the end of each construction work phase

Environmental theme	Project impacts	Potential Cumulative impacts	*Grande Côte Opérations*	*Industries Chimiques du Sénégal ICS*	*Tobène Power in Taiba N'Diaye*	*Taiba N'Diaye Wind Farm*	*Africa Energy coal-fired plant*	*ICS coal-fired plant*	Mitigation measures
Influx of external workers into the project area during the construction phases	Influx of workers with the positive impact of creating jobs and reducing unemployment. Potential negative impacts, such as external workers passing on sexually transmitted diseases, etc. 3000 AESA workers in site facilities and approx. 250 PETN external workers being housed in hotels in nearby towns	Positive aspects (jobs creation,reduced unemployment and boost to local economy) Potential negative aspects (increased risk of passing on sexually transmitted diseases, and impacts on the customs of local populations)				x	x		• Implement the mitigation measures provided in each project's ESMP and their Codes of Conduct • Strict application of HSE guidelines by both project developers • Organisation and coordination of worker mobility. • Raising awareness of local populations and workers to projects' guidelines

Environmental theme	Project impacts	Potential Cumulative impacts	Grande Côte Opérations	Industries Chimiques du Sénégal ICS	Tobène Power in Taiba N'Diaye	Taiba N'Diaye Wind Farm	Africa Energy coal-fired plant	ICS coal-fired plant	Mitigation measures
Miscellaneous transport and road traffic	Traffic disruption attributable to the transportation of raw materials, cuttings and waste Increased risks of accidents from trucks passing through villages Possible temporary congestion on departmental roads Major traffic disruption on the main road when transporting equipment from the port to the project sites Traffic disruptions on the municipal roads within the Municipality of Taiba Ndiaye (between main towns and villages) due to the the transporting of workers at peak periods from workers' accommodations to the two project sites	• Increased risks and impacts when work is done simultaneously. • Risk of taking the same transportation routes and under the same time schedule • to reach an area. • Hindrance to mobility	x	x	x	x	x	x	• Specific measures regarding the traffic circulation in projects' vicinity • Traffic coordination • Specific measures organising traffic in villages • Driver training and awareness raising • Awareness raising for the workers and local populations as well • Application of specific measures defined in the respective projects' ESMPs • Coordinated transportation of equipment from the port to the project sites.

Environmental theme	**Project impacts**	**Potential Cumulative impacts**	***Grande Côte Opérations***	***Industries Chimiques du Sénégal ICS***	***Tobène Power in Taiba N'Diaye***	***Taiba N'Diaye Wind Farm***	***Africa Energy coal-fired plant***	***ICS coal-fired plant***	***Mitigation measures***
Light emissions	Light emissions from the construction sites.	Projects (mainly in the construction phase) risk emitting light which might result in disturbing the tranquillity of the closest villages			**x**	**x**	**x**	**x**	Light emissions reduced to the strict minimum during the night

Table 51 : Negative cumulative impacts - Assessment of the significance

Environmental theme	Potential cumulative impacts	Environmental value	Level of disruption	Intensity	Extent	Duration	Significance	Mitigation measure	Significance after mitigation measures
Climate - Alteration in air quality	In unfavorable dispersion conditions, accumulation of emissions from simultaneous sites for both combustion products and dust and transfer to the target villages.	High	Medium	High	Local	Short	Medium	• Apply the recommendations of GIIP developed in projectESMPs • Tarpaulins on trucks • Watering the ground to minimize dust • Joint organisation, if possible, of truck transportation routes and schedules and circulation periods	Low
Noise levels during work on the construction sites	Change in the noise level at sensitive points (villages) when noisy work is carried out at the same time by different companies during construction A cumulative impact is unlikely given the distance between the project sites (located 1 km and 2.4 km from PETN).	High	Low	Medium	Local	Short	Low	• If the works take place at the same time, carry out noise measuring campaigns in line with villages in the project areas of Taiba N'Diaye and Darou Khoudoss • Proposed solution such as deferred programming • limitation of certain noisy tasks over time	Low

Environmental theme	Potential cumulative impacts	Environmental value	Level of disruption	Intensity	Extent	Duration	Significance	Mitigation measure	Significance after mitigation measures
Topography	Cumulative cuttings management needs	High	Medium	High	Local	Short	Medium	• Coordination of cutting management with participation of Water and Forests, the Regional Mines Department and the DEEC	Low
Groundwaters	Increased risk of groundwaters pollution on both sites simultaneously	High	Medium	High	Local	Short	Medium	• Raise developer awareness and apply specific project guidelines. • Regular groundwater monitoring	Medium
Waste management	Accumulation of waste during construction and operating phases Risk of saturation for existing waste disposal facilities and treatmentcenters	High	Medium	High	Local	Medium	High	• Application of specific waste management guidelines • Coordination of the various projects to be set up under the supervision of the DEEC and departments involved • to prevent the saturation of landfill centers and schedule new landfill areas, if appropriate.	Medium

Environmental theme	Potential cumulative impacts	Environmental value	Level of disruption	Intensity	Extent	Duration	Significance	Mitigation measure	Significance after mitigation measures
Landscape	Multiple projects in close vicinity to the PETN site will impact the visual and landscape aspects	High	Medium	High	Local	Long	High	• Compensation in community forestry or orchards. • Other forms of compensation to be defined	Medium
Circulation and mobility of the population	Increase in diversion distances. Projects might prevent population passage, thus increasing diversion distances.	High	Medium	High	Local	Short	Medium	• Development of diversion tracks and shortcut paths • Minimum footprint occupation as far as possible • Gradual release of the footprint at the end of each construction work phase	Low

Environmental theme	Potential cumulative impacts	Environmental value	Level of disruption	Intensity	Extent	Duration	Significance	Mitigation measure	Significance after mitigation measures
Influx of approx. 3250 external workers into the project area during the construction phases	Positive aspects (jobs creation, reduced unemployment and boost to local economy) Potential negative aspects, (increased risk of passing on sexually transmitted diseases, and negative impacts on the customs of local populations	High	High	Very High	Local	Medium	Very High	• Implement the mitigation measures provided for each respective project's ESMP. • Strict application of HSE guidelines by developers. • Organisation and coordination of worker mobility. • Raising awareness of local populations and workers to projects' guidelines.	Medium

Environmental theme	Potential cumulative impacts	Environmental value	Level of disruption	Intensity	Extent	Duration	Significance	Mitigation measure	Significance after mitigation measures
Miscellaneous transportation and road traffic	Increased risks and impacts when work is simultaneous. Risk of taking the same transportation routes and under the same time schedule to reach an area Hindrance to mobility	High	high	Very High	Local	Short	High	• Specific measures regarding the traffic circulation in project vicinitys • Traffic coordination • Specific measures to organize traffic within villages • Driver training and awareness raising • Training and awareness raising for the workers and local populations • Application of specific measures defined in the ESMP of projects ESIS • Coordinated transportation of equipment from the port to the site.	Medium
Light emissions	Projects (mainly in the construction phase) risk emitting light which might result in disturbing the tranquillity of the closest villages	High	Medium	High	Local	Short	Medium	Light emissions reduced to the strict minimum during the night	Low

Environmental theme	Potential cumulative impacts	Environmental value	Level of disruption	Intensity	Extent	Duration	Significance	Mitigation measure	Significance after mitigation measures
Flora	Cumulative projects have the potential to result in the loss of similar habitats and mature trees	High	Medium	High	Local	Medium	High	The mitigation measures on the PETN project site to replace mature trees (e.g., Baobabs) that must be removed with young trees, where needed, prevent even the cumulative effect from being ecologically significant due to the small footprint of the cumulative projects	Low
Fauna	Loss of habitat in the IBA as a result of the GCO and ICS could act cumulatively with potential pollution impacts during construction of the project.	High	Medium	High	Local	Medium	High	Mitigation measures proposed (see Chapter 6) would avoid impacts on the IBA from the Project, thereby avoiding cumulative effects.	Low

9 Community Health, Safety and Security

As mentioned in Chapter 2, PETN construction works will occur in three phase duration of 34 months. Following construction works, PETN will be operational f Potential community health, safety and security hazards specific to wind ene were assessed for both periods based on the IFC Environmental Health and S General Guidelines and the Guidelines for Wind Energy[54] and national standards

9.1 Community health and safety hazards specific to construction

Potential community health, safety and security hazards specific to constructio primarily include the following:

- Transportation;
- Public access; and
- Noise levels associated with construction works.

9.1.1 Transportation

PETN construction works will involve the transportation of oversized or heavy components (i.e., blades, nacelle, transformers) from the Port of Dakar to the Pro components will be shipped by the EPC Contractor to Dakar and transported fror the Project site by specially equipped flatbed trucks. The transportation of all will comply with national and local legislation and will be accompanied by appro vehicles. All road transportation will be performed at night to minimize impa communities along the route. Current construction planning (not yet approv authorities) anticipates 46 convoys (i.e., one convoy of 11 trucks per wind tu transport will be scheduled over three defined periods based on the constructior should be noted that the convoys are scheduled at the rate of 2 (being the equ wind turbines) per week and will only be able to travel at night between 10 pm an

The EPC Contractor has short-listed a few local subcontractors for the task of the oversized or heavy wind turbine components from the port to the Project access survey was performed on June 5th, 2015 by the preferred subcontractor the road access from the port of Dakar to the Project site in Taiba Ndaiye. Ba survey, preliminary road works will involve: removal of street furnitures at certa along the route, vegetation clearing in road corners and soil levelling roundabouts. All these works are detailed in the road access survey and ca available after the subcontractor has been selected. However, given that som construction works were undergoing at the time of this survey, the need preliminary road works will be confirmed prior to the beginning of Project construc

Project-related road construction works identified in the June 2015 road ac might require acquisition or temporary transfer of land for vegetation clearing in Assessment of any compensation related to land clearing will be performed contractor prior to the beginning of construction work. All road works identified i will be addressed in a transportation plan, to be developed by PETN, the EPC and with appropriate input by the subcontractor; and will be based on the Tr Plan framework included in the Project ESMS Plan (see Chapter 12). Th implement specific EHS guidelines to minimize potential transportation impa

[54] Reference to the IFC EHS General Guidelines (2007) and the Guidelines for Wind Energy (Augu

communities and will comply with relevant IFC EHS Guidelines as required by the ESMS Plan.

A second transportation plan will also be developed, prior to the transportation of wind turbines components, to address any potential impacts associated with the construction of access roads within the Project area. Construction of access roads will require the supplying of raw materials; trucks will be travelling from quarries located at various distances from the Project site. All trucks will be compliant with national regulations. Specific preventive measures will be applied to minimize any potential air pollution impacts: trucks transporting powdery products will have tarpaulins over them in order to prevent dust from flying around. Trucks of raw materials and other project components transportation will be scheduled to minimize air pollution impacts along access roads.

All preventive and mitigation measures to avoid traffic disruption and minimize adverse impacts on local communities' health, safety and security will be included in the Project Transportation plan and will be in compliance with HSE specific guidelines.

Based on the road survey reviewed, EPC Contractor HSE guidelines and specific procedures, transportation of oversized or heavy wind turbines components and materials associated with the construction of access roads should have a limited impact on local communities' health, safety and security (see section 9-4-2-1-3 b in Chapter 6 related to Socioeconomic Impacts).

9.1.2 Public access

Wind turbines will be assembled on site in three phases: two construction phases of sixteen wind turbines each and a final construction phase of fourteen wind turbines. Wind turbines will be assembled one at a time within each construction phase. Access roads construction will precede each phase.

Local communities will have access to the Project area during construction works. Access will be temporarily restricted only locally (within a safety buffer established around the turbine being assembled) when contractors are erecting the wind turbines and during heavy civil works of road access construction. Monthly Project newsletters displayed in each village and information communicated by the Project community relations officer will keep local communities informed regarding construction work schedules and restricted areas.

During construction work, all excavation areas will be fenced and access to construction area will be monitored. Security services will be operated round the clock by personnel recruited in priority from the local communities.

All specific safety and security measures associated with construction works will be presented in the Occupational Health and Safety (OHS) Monitoring/Accident Prevention plan to be developed by PETN and the EPC Contractor prior to the commencement of construction work. This plan will be based on the OHS Monitoring/Accident Prevention Plan framework included in the Project ESMS Plan and will comply with relevant IFC EHS Guidelines as required by the ESMS Plan (see Chapter 12).

9.1.3 Noise

Noise producing activities during the construction phase include transportation of wind turbine components, construction of roads and turbine foundations and the erection of

turbines themselves. The closest village, Taiba Mbaye (see Table 4-2: in Chapter 4), is located 0.86 km from the nearest row of wind turbines. Given this distance and predicted noise level associated with construction engines (e.g., cranes, trucks), expected noise level at sensitive receptors (i.e. closest residential areas) should be compliant with thresholds included in the IFC General EHS Guidelines (i.e. noise level should be below 55dB during daytime in residential area).

Overpassing of regulatory thresholds might occur for very specific operations and for a very limited period of time. EHS hazards (including noise exposure) associated with specific construction operations and associated mitigation measures (e.g., the wearing of personal protective equipment) will be addressed in the Project's Health and Safety plan and specific operations procedures.

Noise control measurements will be performed throughout the construction phase to monitor EHS impacts on the nearest residential areas and ensure compliance with the IFC EHS Guidelines.

9.2 Community health and safety hazards specific to the operations phase

Potential community health, safety and security hazards specific to the operations phase will include the following:

- Blade throw;
- Aircraft navigation safety;
- Electromagnetic interference;
- Public access;
- Noise; and
- Shadow flicker.

9.2.1 Blade throw

A failure of the rotor blade can result in the "throwing" of a rotor blade, or part thereof, which may affect public safety. According to Tay and Rand study[55], the likelihood of being affected by a blade or piece of blade falling within a radius of 210 m is 10-7. The closest houses should not be affected by blade throw hazard as they are located at least 800 m away. However, given the fact that local populations will have free access to the Project area, risk management strategies will be applied and include the following:

- Wind turbines will be equipped with vibration sensors that can react to any imbalance in the rotor blade and shut down the turbine, if necessary;
- Periodic inspection and maintenance operations will be performed to detect and repair any defect that could affect blade integrity;
- Warning and information signs will be installed around the immediate areas for each line of wind turbines;

[55] Taylor, D. and M. Rand. 1991. How to Plan the Nuisance out of Wind Energy. Town and Country Planning (p. 152-155).

- An evacuation plan will be established in the event of an accident in the wind turbine areas;
- Ongoing communications will be maintained with local communities to ensure they are aware of the risks associated with operating wind turbines.

9.2.2 Aircraft navigation safety

A wind turbine stands 178 m high overall. Such height may impact aircraft safety directly through potential collision or alteration of flight paths.

Although the PETN project is not located near a military or civilian airport (the closest operational airport is located in Dakar, at a distance of 62 km from the Project area), the following prevention and control measures will be applied:

- Consult with the relevant aviation authorities (ASECNA, AIDB), in accordance with air traffic safety regulations and prior to the commencement of the construction phase; and
- Installation of an anti-collision lighting and marking system, compliant with national standards.

9.2.3 Electromagnetic interference

As mentioned in the IFC EHS Guidelines for Wind Energy, wind turbines could potentially cause electromagnetic interference with telecommunication systems (e.g. microwave, television, and radio). This interference could be caused by three main mechanisms, namely near-field effects, diffraction, and reflection or scattering. Near field refers to the potential of a wind turbine to cause interference due to electromagnetic fields emitted by the turbine generator and switching components. Diffraction occurs when the wind turbine not only reflects but also absorbs a telecommunications signal. Reflection and scattering occur when a wind turbine either obstructs or reflects a signal between a transmitter and receiver. The nature of the potential impacts depends primarily on the location of the wind turbine relative to the transmitter and receiver, characteristics of the rotor blades, signal frequency receiver characteristics, and radio wave propagation characteristics in the local atmosphere.

Based on current wind turbine surveys, electrical and magnetic fields generated during the operations phase, are very low and lessens with the distance from the wind turbine. As the closest houses to the Project area are located at least 800 m away, the electromagnetic radiation level is virtually nil at these residential locations. Therefore, this impact should not be considered for residential areas.

9.2.4 Public access

During the operations phase, local populations will continue to work in their fields located within the Project area. Any attempts to access the internal wind turbine structures will be restricted by implementing the following measures:

- Round-the-clock security inspection - guards will not be armed;
- State of access doors controlled from the control room (i.e., closed/locked/open);
- Remote surveillance of immediate areas and access doors to the turbine towers;

- Installation of warning signs prohibiting access to the tower access doors written in both French and Wolof with Arabic characters; and
- Information boards regarding EHS wind turbine risks.

9.2.5 Noise

9.2.5.1 Audible Noise level

During operation, wind turbines produce noise through mechanical mechanisms (e.g., gearbox, generators) and aerodynamic mechanisms (i.e., interaction of air and turbine blades). Given the presence of sensitive receptors in a radius of 2 km from the wind turbines, noise impact assessments were performed in 2012 using onsite measurements and WindPRO software.

Based on onsite measurements, assessing expected wind turbine noise levels from initial noise background measurements (see p.150-159 of ESIS REV04 of July 2015), predicted noise levels in sensitive receptors (closest villages near wind turbines) are negligible, below the Senegalese regulatory threshold (mentioned in the Code of Environment) and the French regulatory threshold (Public Health Code). Results are also compliant with the IFC EHS General Guidelines (i.e; noise impacts should not result in a maximum increase in background levels of 3 dB). In addition, the results are also in compliance with the IFC General EHS Guidelines noise thresholds for residential areas (i.e., 55dB at daytime and 45 dB at night-time).

A detailed modelling of predicted noise levels in the wind turbines vicinity was performed using WindPRO software. These results (displayed in the ESIS REV04 – see p.223-224) are the following:

- Noise levels are below 35 dB for wind speed below 7 m/s; and
- Noise levels are under 40 dB for wind speed ranging between 7-8 m/s.
- Given that the average wind speed measured onsite during preliminary studies is 5.64 m/s (with a maximum monthly wind speed of 6.7 m/s in April), noise levels resulting from the operations phase should be below 35 dB in the closest village. Based on these results, noise is unlikely to be an issue for local communities. However, control noise measurements should be performed to ensure minimal adverse impact on local communities' health and ensure compliance with the IFC EHS General Guidelines and the Guidelines for Wind Energy.

9.2.5.2 Infrasounds

Infrasounds are defined as sounds with a frequency of less than 20 Hertz. Wind turbines generate infrasounds when operating. Miscellaneous studies[56] tend to demonstrate that infrasounds generated by wind turbines have sound levels much lower than the audition and perception thresholds.

Even though scientific studies tend to demonstrate that infrasound generated by wind turbines have very limited impact on human health, no habitation should be located in a radius of 250 m from the wind turbines.

Given the fact that the closest village is located at more than 800 m from wind turbines, EHS risks associated with infrasounds are considered to be very limited.

9.2.6 Shadow flicker

Shadow flicker occurs when the sun passes behind the wind turbine and casts a shadow. As the rotor blades rotate, shadows pass over the same point causing an effect termed shadow flicker. Shadow flicker may become a problem when potentially sensitive receptors (e.g., residential properties) are located nearby, or have a specific orientation to the wind energy facility.

In order to identify the distance to which potential shadow flicker might extend, WindPRO software was used to model expected shadow flicker. Results are presented in the ESIS REV04 dated July 2015 (see p. 238-242). Based on these results and the modelling of a worst case scenario, these effects are limited to the wind turbines closest vicinity. In a worst case scenario (turbines are functioning permanently in sunny conditions and with the rotor axis perpendicular to sun ray), shadow flicker could occur in 2 villages: Baiti Ndiaye (shadow flicker was estimated to last a maximum of 19 minutes per day) and Balsande II (estimation of 33 minutes per day). In a reasonable case scenario, shadow flicker effects duration can at least be divided by two. Monitoring will be performed at these two locations in order to insure limited impacts on local populations.

[56] Jacques, H. 2006. Exposure limit values for ultrasonic and infrasounds. CHATILLON INRS, Department of Equipements Engineering – Occupationnal safety and security - Notebook (p.203) http://www.inrs.fr/media.html?refINRS=ND%202250 (infrason & ultrason by the French insytitue INRS
French Ministry of Ecology, Sustainable Development and Energy. 2015. Wind turbines: Infrasounds impacts on health
http://www.lfu.bayern.de/umweltwissen/doc/uw_117_eoliennes_infrasons_sante.pdf

10 Land acquisition and Compensation Process

10.1 Land Acquisition and securing the land

As explained in Chapter 2, the Project will involve erecting 46 wind turbines and constructing access roads within the Project area. The surface of land required for erecting the wind turbines is 7.5 ha; this surface includes the wind turbines foundations and the land surface required for construction work. The construction of access roads will require 42 additional ha. Maps of the various Project components footprints (i.e., wind turbines, roads, construction areas, such as temporary storage areas) are presented in Annex 2 of the Labosol Land Compensation Assessment Report of June 2015 (see Annex D).

In order to secure long-term land access for the Project, a right of way (RoW) procedure on a 2,200 ha land plot will be initiated in accordance with Article L13 of the Environmental Code related to classified installation for the protection of the environment (ICPE) and defined in the Ministerial Decree that will declare the Project as an ICPE.

10.1.1 The Project's lands regime

The land regime in Senegal is organized according to various legislative texts which determine three land categories: national domain, State domain, and private domain.

National domain lands are regulated under the law No. 64-46 dated June 17 1964 and its associated implementation legislations. Land constituting the national domain are divided into four zones:

- Urban areas: located in towns;
- Classified areas (forests);
- Rural areas: these areas are the most important ones and are generally used for agriculture and cattle grazing; and,
- Pioneer areas: intended for major development projects.

The Project is located in a rural area in the Municipality of Taiba N'diaye.

10.1.2 The project's land needs

10.1.2.1 The wind turbines' immediate space requirements

46 land plots are required for laying the foundations and for the crane hoisting area for each of the wind turbines. In addition, an optional land plot was also considered for installing the sub-station. The surface area required is 75.014 m² or 7.5 ha.

10.1.2.2 The space requirements of Easements for tracks, cable paths and temporary storage areas

In addition to the 7.5 ha necessary for wind turbine construction, the Project requires additional land for roads and access tracks construction, for burying cables underground and for temporary storage areas. The total surface area associated with these Project components is 42 ha.

10.1.2.3 Extended Easement area

The PETN project is an ICPE classified project. In accordance with Article 13 of the Senegalese Code of Environment, a protection area defined within a radius of 500 m around each Project component (i.e., wind turbines, technical building, access roads) will be delineated around the Project components. This RoW procedure will be initiated for the Project and is currently under review by the Ministry of Environment and Sustainable Development.

The Project RoW area will cover approximately 2,200 ha. Within this surface area, no other industrial activity will be permitted.

10.1.3 Procedure for acquiring and securing the land

The Project will be established on National Domain land. The land surface required for this Project must be registered on behalf of the State once the land is declared as a Public Utility. This registration process enables the securing of land by implementing an administrative process which will allow the Project to acquire a lease from the State of Senegal.

In order to comply with the management of rural land and to involve all relevant stakeholders, the following actions must be undertaken prior to any State registration:

- The Rural Council's prior opinion is required via a deliberation process; and
- Local people impacted by the Project must be compensated for the value associated with the loss of land and its usage (e.g., loss of agricultural crops).

Following the Rural Council deliberation and after receiving a favourable opinion from the concerned State services, a Presidential decree is issued to register the land on behalf of the State. At the same time, the Departmental Commission of Census and Compensation (the "Commission") must assess the amount of compensation assigned to all PAPs.Once the Presidential Decree is issued, the land is considered a State property (i.e., as part of the State's internal domain). The State may then grant titles, including a long-term lease for this area to the project developer.

The various stages involved in acquiring and securing the Project land are summarized below:

- Request and obtain a favourable opinion from the Rural Council of Taiba N'diaye for allocating the land to the Project;
- Public utility declaration and the registration requirements for the Project;
- Abandonment of land assigned to rural land areas and transfer to the State's internal domain;
- Land compensation assessment for PAPs (this specific requirements is addressed in section 10.2);
- Land registration in the State's internal domain;
- Reassignment of the land to the Project with a lease contract between the State of Senegal and PETN.

The procedure described above is currently under process for:

- The acquisition of the 7.5 ha required for the foundations and the crane hoisting areas;
- The acquisition of the 42 ha required for the RoW regarding tracks, access roads and cable paths.

For gaining the RoW in regards to the extended area of approximately 2,200 ha, the ICPE procedure will be followed in compliance with Article L13. This procedure involves the following stages:

- Carry out an ESIS (Environmental and Social Impact Study). This study must be validated by the Limited Technical Committee of the MEDD;
- A compliance certificate must be issued by the MEDD;
- Confirmation of compliance with the ICPE Procedure ; and
- Issuance of a Ministerial Order authorising ICPE operation and including the delineation of a protection area (retaining a 500 m distance around each ICPE).

10.1.4 Status of the acquisition and securing of the 7.5 ha for the foundations and crane hoisting zones

The different stages of the procedure followed for acquiring and securing the land plots required for erecting the wind turbines are described below:

Table 52 : Status of the administrative approaches for acquiring and securing the 7.5 ha of land

STAGE	DATE
Allocation of the land by the rural community	
Land allocation request for a limited surface area (7.5 ha), was submitted by Sarréole SARL (Sarréole) to the Chairman of the Taiba N'diaye Rural Council (PCR).	Deliberation of the Rural Council, Reference No. 04/CRTND dated 29/05/2008 and approved on 25/06/2008.
Request formulated by Sarréole to obtain a deliberation extract	"Deliberation extract concerning land allocation" signed on 11/11/2008 by the Chairman of the Rural Council of Taiba N'diaye, and the Sub-Prefect of Méouane
Regularization via a long-term lease	
Lease request made by Sarréole to the Tax and Domains Authority of the Thiès	Favorable opinion of the Thiès Tax Services Centre No. 00000129/MEF/DGID/CFS dated 27/01/2009

Table 52 : Status of the administrative approaches for acquiring and securing the 7.5 ha of land

STAGE	DATE
Region	
Opinion of the CCOD (Domain Operations Control Commission)	Favourable opinion of the CCOD dated 25/8/2010
Request for transfer of the lease from Sarréole to PETN	Agreement for Lease Commitment transfer from Sarréole to PETN SA by the Chairman of the Rural Council on 25/11/2009 for 7.5 ha of land recorded under Number 004 on 29/05/2008.
Public Notice	Public Notice following the favourable decision 03010/MEF/DGID/DEDT dated 14/09/2010
Decree concerning land registration: abandonment of land as registered within the National Domain rural area	Presidential Decree No. 2011-532 MEF/DGID/DEDT dated 26 April 2011 concerning the: • Public Utility Declaration of the project; • Registration prescription on behalf of the State for 75.014 m² of land; and • De-allocation from the National Domain and transfer to the State's internal domain
Lease establishment	Requisition No. 998 dated 25 May 2011 for land registration
PAPs inventory and land compensation assessment	The Commission met from 6 August 2014 to 26 January 2015, and assessed financial land compensation for each PAP within the 49.5 ha of land required.
Request for registration in the Senegalese State Land Register	Registration request dated 17 February 2015 for 71.514 m² of land following requisition No. 1025
Registration of land	Registration on behalf of the State of 46 plots of land dedicated to wind turbines and of the optional block of land under Nos. 6712 to 6757 as notified by the notary on June 4th, 2015

10.1.5 Status of the acquisition and securing of the 42 ha easement

The procedure for acquiring and securing the 42 ha of land for the easement will be the same as the one undertaken to acquire and secure the 7.5 ha of land required for erecting the wind turbines.

In accordance with this procedure, an allocation by deliberation of the Rural Council, approved on 26 May 2012, was obtained by PETN. Following this deliberation, a registration request for a RoW of 42 ha was lodged by PETN.

This procedure is in the process of being validated by the authorities. Once validated, a public utility declaration will be issued. The land will be reallocated and registered within the State's internal Domain and a lease contract will be signed between the State of Senegal and PETN.

It should be noted that, as part of this procedure, a compensation assessment of PAPs is required. This survey was carried out by the Commission for the PAPs inventory and financial land compensation assessment from 6 August 2014 to 26 January 2015. Details regarding land compensation for each PAP are presented in the section 10.2 below.

10.1.6 Status of the acquisition and securing of the extended RoW area of approximately 2,200 ha for conservation

Under the framework of Article L13 of the Environment Code, prescribing the delineation of a protection area of 500 m around wind turbines, an additional land requirement of approximately 2,200 ha was identified for a conservation easement. Moreover, the delineation of this additional protection area will ensure compliance with PETN's requirements and applicable International Standards.

PETN's approach is to require that this protection area be defined in consultation with the State services in accordance with Article L13 of the Environment Code. Therefore, a request was sent by PETN to the Environment Director in August 2015. A decree to establish this conservation easement is expected in November.

It should be noted that this easement procedure is a process for securing land (and, therefore, controlling activities carried out within the Project area), which should be dissociated from the securing procedure of the 7.5 ha and 42 ha of land. Indeed, this 2,200 ha easement will not lead to any further land being acquired by the Project: access to local communities to this conservation area and agricultural land will be maintained.

10.2 Economic displacement and PAP compensation

As part of the land acquisition process described in section 10.1, a land compensation assessment for each PAP must be conducted. In regards to the Project, no physical relocation of people or households will be required. However, economic displacement will occur as land required for erecting the wind turbines is mainly used by the local population for agricultural purposes. Land secured for the Project (49.5 ha) will entail a partial loss of assets and sources of income for 341 local people.

The national compensation procedure involves taking into account regional practices when assessing the financial compensation associated with the loss of agricultural land. As mentioned in section 10.1, an assessment was performed by the Departmental Commission of Census and Compensation to assess land usage and determine the amount of financial

land compensation for each PAP. This assessment was conducted from August 2014 to January 2015 with all concerned local village and PAP representatives and with the support of Labosol, who was engaged to measure the field surface impacted by the Project for each PAP.

Results from the land compensation assessment conducted by the Commission, with the support of Labosol, are summarized in the Land Compensation and Assessment Report presented in Annex D. Based on this survey, 49.5 ha of impacted land were delineated onsite by Labosol, resulting in the impact of 457 fields owned by 335 PAPs. One PAP can own up to 10 different parcels of land. Although this survey was assessing the impacted land surface for each PAP, it did not assess the overall Project impact on each PAP (i.e., loss of land, along with loss of trees and/or crops).

In order to assess the percentage of income loss generated by the Project for each PAP, a second survey was conducted by Labosol from July to August 2015. This survey consisted of developing a rural cadastre of the Project footprint, assessing the percentage of land and revenue loss for each PAP. Results of this second survey are presented in the Cadastre Rural Report in Annex E. Based on this second survey, 48 ha of impacted land were delineated onsite, resulting in the impact of 459 fields owned by 341 PAPs. The difference in results between the land compensation study conducted by the Commission and the Cadastre rural survey is due mainly to the change in the Project configuration. The wind turbines locations were indeed reassessed by PETN in order to bypass a cemetery considered as a sacred site by local communities (see section 5.4). This change of configuration occurred at the end of 2014, while the Commission was onsite and thus was not taken into account in the Land Compensation and Assessment Report. An additional land compensation assessment for the additional 7 PAPs will be conducted by the Commission before the beginning of construction works in order to ensure land compensation for all PAPs.

Details regarding the assessment of land compensation and the level of impact on each PAP are presented in the sections below. For further information regarding land compensation, refer to the Land Compensation and Assessment Report (Annex D) prepared by the Commission and Labosol. For further information regarding the level of impact on each PAP, refer to the second Labosol study presented in the Cadastre Rural Report (Annex E).

10.2.1 Assessment of Land compensation

10.2.1.1 Composition of the Departmental Commission for assessing costs

The Commission was summoned by the Prefect of the Tivaouane Department, at the request of PETN, as part of the land securing procedure of the 49.5 ha necessary for the Project implementation within the Municipality of Taiba N'diaye. The Commission worked in close collaboration with the Municipality of Taiba N'diaye from August 2014 to January 2015, while involving the PAP and their representatives.

The Commission was constituted by the following members:

- The Prefect of the Department of Tivaouane;
- The Sub-Prefect of the Arrondissement of Méouane;
- The 1st Deputy of the Mayor of the Municipality of Taiba N'diaye;
- The HOD of the Tivaouane Departmental Rural Development Service;
- The Head of the Tivaouane Water and Forests Sector;

- The HOD of the Tivaouane Departmental Town and Country Planning and Housing Service (Secretary of the Commission);
- The Head of the Tivaouane SDADL (Departmental Local Development Support Service);
- The Head of the Méouane CADL (Local Development Support Centre) (Reporter);
- An Agriculture official from Méouane;
- The Méouane Water and Forests Brigade Leader;
- The ANCAR (National Agricultural and Rural Advisory Agency) official from Darou Khoudoss and Taiba N'diaye;
- The Sarréole representative;
- The Chairman of the Domains Commission of the Municipality of Taiba N'diaye; and
- Mr Mamadou Diop: a Resource Person who is the Representative of the Association of Village Chiefs of the Municipality of Taiba N'diaye;

The Commission's work consisted of the following:

- Preliminary land inspection and meetings for planning activities were conducted;
- Sessions were held for providing information to the village populations located in the DAI and for raising population awareness;
- Several meetings were held with the authorities (government and local authorities);
- Field Activities: the land surface owned by each PAP was assessed in the presence of all interested parties and village chiefs;
- Visual markers were used for delineating impacted surface areas for each PAP with technical support from Labosol;
- Recordings were done of items observed within each impacted surface area (i.e., the number of trees, the type of species, their approximate age as well as the types of crops); and
- Financial compensation associated with the loss of land was determined for each PAP and a provisional report was produced.

10.2.1.2 Principles adopted by the Commission

The Commission assessed financial land compensation for each PAP based on the following principles:

- The land itself is not compensated for because it belongs to the National Domain; the only thing for which compensation is provided is land use (i.e., agricultural activities, or market gardening, cash cropping or even fallow land).
- After the PAPs approval of the compensation, all compensation will be provided in cash. Under the regulatory framework for land compensation, PAPs can choose between compensation in kind or in cash. As all PAP preferred cash compensation (see Annex D – Labosol Land Compensation Assessment Report), the Commission carried out a financial assessment of land compensation.
- An eligibility date was determined.

- The compensation assessment survey conducted by the Commission is related to PAP located in the 49.5 ha surface which encompassed the 7.5 ha (surface required for erecting the 46 wind turbines) and the 42 ha necessary for the access roads.

10.2.1.3 Calculation of Compensation

The economic displacement of PAP will lead to a loss of land use, along with the potential loss of sources of income (i.e., fruit trees, agricultural crops).

Loss of land

Based on the Commission's work, no compensation is foreseen for the land itself as it belongs to the State (as part of the National Domain).

Compensation for losses of income

The land compensation rate is determined by the Commission taking into consideration the practices in force within the Project's DAI.

All impacted cultivated parcels (whether agricultural crops, or left fallow) were considered by the Commission as being assets that generate stable sources of income, the loss of which would lead to a reduction in means of livelihood and/or subsistence. Crop compensation rates applied by the Commission was 87,500 CFA francs per month per hectar, regardless of the products and the type of crops (i.e., rainfall crops, fruit crops, citrus crops, farming forest, or even land left fallow). The compensation is calculated for one year and amounts to 1,050,000 CFA francs per hectar per year for any surface associated with agricultural usage.

Of the Project's 49.5 ha surface area, the compensation granted by the Commission for cultivable surfaces concerns 47.3 ha. Details on crop compensation for each PAP are presented in the Land Compensation Assessment Report produced by Labosol in collaboration with the Commission (see Annex D). With a crop compensation rate of 1,050,000 CFA francs per hectar per year, the cash compensation for all impacted cultivated areas amounts to 49.7 million CFA francs.

Compensation for loss of income related to loss of trees

Annual compensation for loss of trees and other species was also considered by the Commission. Loss of trees was compensated as a unit price assigned to each tree. The tree compensation rate established by the Commission amounts to the revenue provided by tree farming over a one year period (12 months). Unit prices were estimated by the Commission depending on the trees species, their age, and their potential for producing income to the farmer. These unit prices are set on a regional scale (for the Thiès Region), regardless of the project. The trees compensation rates applied by the Commission are presented below.

Table 53 : Tree compensation rate set by the Departmental Commission for the Project region

#	Espèces rencontrées sur les surfaces affectées	Statut	Unité	Prix unitaire
1	"Teumb"	NP	pied	1 000 CFA
2	Anacardier jeune	NP	pied	4 000 CFA
3	Anacardier adulte	NP	pied	40 000 CFA
4	***Baobab jeune***	***PP***	***pied***	***5 000 CFA***
5	***Baobab adulte***	***PP***	***pied***	***20 000 CFA***
6	***Cadd jeune***	***PP***	***pied***	***1 000 CFA***
7	***Cadd adulte***	***PP***	***pied***	***12 000 CFA***
8	Citronnier jeune	NP	pied	2 500 CFA
9	Citronnier adulte	NP	pied	13 000 CFA
10	Dibutone jeune	NP	pied	1 000 CFA
11	Eucalyptus adulte	NP	pied	12 000 CFA
12	Forestier	NP	pied	1 000 CFA
13	Fuden jeune	NP	pied	1 000 CFA
14	Fuden adulte	NP	pied	4 000 CFA
15	Fuf	NP	pied	1 000 CFA
16	Haie vive	NP	m/l	1 000 CFA
17	***Hir***	***PP***	***pied***	***10 000 CFA***
18	Jatrofa	NP	pied	1 000 CFA
19	Kheule ad	NP	pied	12 000 CFA
20	Leungue	NP	pied	1 000 CFA
21	Manguier jeune	NP	pied	3 500 CFA
22	Manguier adulte	NP	pied	50 000 CFA
23	Neem jeune	NP	pied	1 000 CFA
24	Neem adulte	NP	pied	7 000 CFA
25	New jeune	NP	pied	1 000 CFA
26	New adulte	NP	pied	10 000 CFA
27	Ngotote	NP	pied	1 000 CFA
28	Nguiguis jeune	NP	pied	1 000 CFA
29	Nguiguis adulte	NP	pied	10 000 CFA
30	Prosopis	NP	pied	12 000 CFA
31	Rand	NP	pied	1 000 CFA
32	***Ronier jeune***	***PP***	***pied***	***2 000 CFA***
33	***Ronier adulte***	***PP***	***pied***	***30 000 CFA***
34	Sap sap	NP	pied	1 000 CFA
35	***Seedem jeune***	***PP***	***pied***	***1 000 CFA***
36	***Seedem adulte***	***PP***	***pied***	***5 000 CFA***
37	Séhaw	NP	pied	1 000 CFA
38	Sendiene	NP	pied	6 000 CFA
39	Solom	NP	pied	5 000 CFA
40	Soump jeune	NP	pied	1 000 CFA
41	Soump adulte	NP	pied	6 000 CFA
42	***Tamarinier***	***PP***	***pied***	***24 000 CFA***

PP=partiellement protégé NP = Non protégé

Based on the compensation rate, all trees and plant species that have some commercial value within the impacted land plot were inventoried by the Commission and corresponding compensation amounts were calculated for each PAP (results are presented in the Land Compensation Assessment Report in Annex D).

For the 49.5 ha Project area, the compensation for the loss of income relating to losses of trees over a one year period is estimated by the Commission to amount to approximately 164.8 million CFA francs.

Compensation via replacing the land surface area

As stated in the regulatory framework for land compensation, PAPs can choose between compensation in kind (replacing the impacted land surface by another plot of land) or cash compensation. PAPs were asked to choose between both types of compensation by Labosol during land compensation assessment fieldwork (see Annex D). However, all of the PAP have selected cash compensation.

10.2.1.4 Results of the Commission's work

Upon completion of the PAP inventory, the Commission assessed the financial losses for each PAP and proposed a compensation rate for all impacted land that complies with Senegalese legislation and regional practices (see the Land Compensation and Assessment Report produced by Labosol – Annex D).

The total financial compensation to be paid by PETN to PAPs amounts to 214,529,416 CFA francs.

In accordance with the Senegalese legislation of land registered as National Domain, this amount does not include compensation for the land itself as the land belongs to the State.

10.2.1.5 PETN's approach to land compensation

During the first public meetings, the land compensation rate for impacted agricultural crops (within the 49.5 ha of the Project area) considered by PETN and communicated to local people was 3,000,000 CFA francs per hectare, in addition to the tree compensation assessment performed by the Commission.

The total compensation amount for such a scenario would then be 312 million CFA francs. This amount is far higher than the amount of 215 million CFA francs assessed by the Commission.

Following the Commission conclusions, PETN acknowledged the difference between both crop compensation rates and confirmed its commitment to the local people. PETN will be supplementing the amount set by the Commission (215 million CFA francs) with an additional 97 million CFA francs, in order to reach the 312 million as calculated in the first compensation scenario.

This additional 97 million CFA francs will represent an additional amount of almost 2 million CFA francs per hectar for each impacted land parcel.

10.2.1.6 Provisional payment dates for the compensation

Payment to the PAPs will be made in the month following the financial closure (i.e., on the occasion of the first disbursement of loan proceeds), which means that PAP will be compensated well before the beginning of construction work. There will be a one-time payment of compensation and it will cover all amounts due, in spite of the construction being staggered over 3 phases for a total period of 34 months.

10.2.2 Assessment of the level of impact for each PAP

In accordance with IFC PS5, and in order to mitigate potential impacts on PAPs resulting from the Project, the level of economic impact was assessed for each individual PAP. Labosol was engaged by PETN in 2015 to draw up the Rural Cadastre associated with the Project footprint in order to assess the percentage of land loss for each PAP in relation to the actual surface area cultivated by PAP.

Results of this assessment are presented in the sections below.

10.2.2.1 Assessment of land loss for each PAP

Surface of land owned by PAPs ranged between 1 and 16 ha. Impacted surface area for each PAP are comprised between few m2 to almost 9 ha. The level of the Project impact on cultivated surface areas owned by each PAP is the following:

- Land loss for 86 % of PAPs is less than 10% of their cultivated surface;
- Land loss for 11 % of PAPs ranged from 10 to 20 % of their cultivated surface;
- Land loss for 2 % of PAPs ranged from 20 to 30 % of their cultivated surface. 7 PAPs have between 20 and 25% of their fields impacted by the Project and 1 PAP has 29% of his field surface impacted;

- Less than 1 % of PAPs have 40 to 60% of their field surface impacted by the Project: two PAPs are losing 40 and 44% of their field surface, respectively, and one PAP is losing almost 60% of his field.

Results are summarised in the table below:

Table 54 : Assessment of land loss for each PAP

Category	Land Compensation	
% of land loss for each PAP	Number of PAP	% of PAP
]0 ; 5]	232	68.04%
]5 ; 10]	61	17.89%
]10 ; 15]	28	8.21%
]15 ; 20]	9	2.64%
]20 ; 25]	7	2.05%
]25 ; 30]	1	0.29%
]30 ; 35]	0	0.00%
]35 ; 40]	0	0.00%
]40 ; 45]	2	0.59%
]45 ; 50]	0	0.00%
]50 ; 55]	0	0.00%
]55 ; 60]	1	0.29%
]60 ; 65]	0	0.00%
]65 ; 70]	0	0.00%
]70 ; 75]	0	0.00%
]75 ; 80]	0	0.00%
]80 ; 85]	0	0.00%
]85 ; 90]	0	0.00%
]90 ; 95]	0	0.00%
]95 ; 100]	0	0.00%
Total	**341**	**100.00%**

10.2.2.2 Assessment of tree loss for each PAP

Assessment of tree loss for each PAP was performed for each tree category in order to take into account the economic value of each tree.

Based on the Rural Cadastre survey, the total number of trees impacted by the Project amounts to 3044:

- 71% of impacted trees are Mango trees;
- 1% of impacted trees are other fruit trees; and
- 28 % of trees are “wild trees” (i.e., that can used by local populations for leaves and bark).

In order to assess the Project’s impact on trees and their associated economic value, Labosol assessed the economic value of impacted trees plus the value of the total of trees owned by each PAP. Tree economic value was calculated using unit prices estimated by the Commission for tree compensation (see table 1), which amount to the revenue provided by tree farming over a one year period (12 months).

Trees located within the 49.5 ha Project footprint were considered to be impacted. However, the Project surface assessed by PETN took into account some safety buffer areas, mainly on each side of access roads. This buffer area was considered in order to take into account

any potential impacts that could result from transportation of oversize equipment. Trees will be removed prior to construction works in areas that will be directly impacted by the Project. Trees located in the buffer areas should not be removed. Although, tree compensation was estimated taking into account the overall Project footprint, the amount of compensation might be overestimated as some trees will not be removed.

The level of impact for each tree category (i.e., mango trees, fruit trees, wild trees) is presented in sections below.

Impact on Mango trees

Results from the Rural Cadastre survey (see table below) are the following:

- Almost 70% of PAP might lose up to 10 % of their revenue associated with mango trees;
- 8% of PAP might lose between 10 and 20% of their revenue;
- 7% of PAP might lose between 20-30%;
- 7% of PAP might lose between 30-40%;
- 2% of PAP might lose between 40-50%; and
- 6% of PAP might lose between 50 and 100% of their revenue associated with Mango trees. The Project might impact all mango trees owned by 5 PAPs as a very limited number of mango trees is owned by each PAP (between 1 and 7 mangos trees are owned by these 5 PAPs), all located in the impacted area of their field. Detailed survey results show that although 5 PAPs are losing 100% of their mango tree, the Project impact on their land surface is less than 5% for 4 PAP and less than 15% for one PAP.

Table 55 : Assessment of mango trees loss for each PAP

Category	Mango trees	
% of mango tree loss for each PAP	Number of PAP	% of PAP
]0 ; 5]	215	63.05%
]5 ; 10]	22	6.45%
]10 ; 15]	16	4.69%
]15 ; 20]	10	2.93%
]20 ; 25]	12	3.52%
]25 ; 30]	13	3.81%
]30 ; 35]	11	3.23%
]35 ; 40]	12	3.52%
]40 ; 45]	4	1.17%
]45 ; 50]	3	0.88%
]50 ; 55]	1	0.29%
]55 ; 60]	4	1.17%
]60 ; 65]	3	0.88%
]65 ; 70]	1	0.29%
]70 ; 75]	4	1.17%
]75 ; 80]	2	0.59%
]80 ; 85]	0	0.00%
]85 ; 90]	1	0.29%
]90 ; 95]	1	0.29%
]95 ; 100]	6	1.76%
Total	**341**	**100.00%**

Impact on Fruit trees

A total of 44 other fruit trees owned by PAP might be impacted by the project. The table below shows that the loss of revenue associated with the loss of these trees will be less than 5% for 96 % of PAP. Few PAPs will lose 100% of their fruit trees. These PAP owned a limited number of fruit trees (up to 5 trees) all located within the impacted surface area of their field.

Table 56 : Assessment of other fruit trees loss for each PAP

Category	Other Fruit trees	
% of Fruit tree loss for each PAP	Number of PAP	% of PAP
]0 ; 5]	328	95.91%
]5 ; 10]	0	0.00%
]10 ; 15]	3	0.88%
]15 ; 20]	0	0.00%
]20 ; 25]	0	0.00%
]25 ; 30]	0	0.00%
]30 ; 35]	0	0.00%
]35 ; 40]	0	0.00%
]40 ; 45]	0	0.00%
]45 ; 50]	0	0.00%
]50 ; 55]	1	0.29%
]55 ; 60]	1	0.29%
]60 ; 65]	0	0.00%
]65 ; 70]	1	0.29%
]70 ; 75]	1	0.29%
]75 ; 80]	0	0.00%
]80 ; 85]	0	0.00%
]85 ; 90]	1	0.29%
]90 ; 95]	0	0.00%
]95 ; 100]	6	1.75%
Total	341	100.00%

Impact on other trees

A total of 841 other impacted trees were identified during this survey. Although these trees do not have a high economic value, they can represent a resource for local communties and can be used for their leaves or their bark. The value associated with these trees was estimated by the Commission (see Table 53). Based on the Commission tree compensation rate, the following impact values were calculated:

- Almost 60% of PAP might lose up to 20% of revenue that could be provided by these trees;
- 29% of PAP might lose between 20 to 50% of their revenue associated with these trees; and
- 12% of PAP might lose between 50 to 100% of their revenue associated with these trees. These PAPs own a limited number of trees (up to 15 trees for each PAP), all located within the impacted area.

Table 57 : Assessment of "wild trees" loss for each PAP

Category	Other trees	
% of other tree loss for each PAP	Number of PAP	% of PAP
]0 ; 5]	141	41.35%
]5 ; 10]	24	7.04%
]10 ; 15]	26	7.62%
]15 ; 20]	12	3.52%
]20 ; 25]	16	4.69%
]25 ; 30]	23	6.74%
]30 ; 35]	18	5.28%
]35 ; 40]	12	3.52%
]40 ; 45]	9	2.64%
]45 ; 50]	20	5.87%
]50 ; 55]	1	0.29%
]55 ; 60]	12	3.52%
]60 ; 65]	3	0.88%
]65 ; 70]	4	1.17%
]70 ; 75]	3	0.88%
]75 ; 80]	4	1.17%
]80 ; 85]	1	0.29%
]85 ; 90]	2	0.59%
]90 ; 95]	0	0.00%
]95 ; 100]	10	2.93%
Total	341	100.00%

10.3.2.2 Overall Level of the Project impact on each PAP

The overall Project impact on each PAP was assessed taking into account the Project impact on land and tree resources. To confirm, the level of impact was assessed for each PAP based on the Commission compensation rate and their land loss even though each PAP will be compensated with the higher compensation rate set by PETN prior to Commission works. The PETN compensation rate of 3,000,000 CFA francs per hectares (instead of the Commission rate of 1,050,000 CFA francs per hectare) per year should mitigate the overall level of the Project impact on each PAP. Moreover, all trees will be subject to compensation even though some of them are located in the safety buffer area and might not be removed.

Based on the Commission compensation rate, the overall Project impact on each PAP shows the following results:

- The loss of revenue due to the Project will be less than 10 % for 67 % of PAP;
- 17% of PAP might lose from 10 to 20% of revenue associated with their land;
- 7% of PAP might lose from 20 to 30% of revenue associated with their land;
- 4% of PAP might lose from 30 to 40% of revenue associated with their land;
- 1% of PAP might lose from 40 to 50% of revenue associated with their land;
- Less than 1% of PAP might lose 59 % of revenue associated with their land. Two PAPs (M. Madiagne Ndiaye and Yatma Dia) are concerned. Both PAPs have less than 5 % of their land surface impacted but 74-75% of their mango trees are impacted by the Project.

- One PAP might lose up to 75% of its revenue associated with its land. This PAP (M. Abdou Gueye from Bayti Gueye) has 14% of his land surface impacted. However, almost 90% of his mango trees (25 trees out of 28) might be impacted by the Project.

Table 58 : Assessment of the overall level of the Project impact on each PAP

Category	Total revenues (FCFA)	
% of loss (land & trees) for each PAP	Number of PAP	% of PAP
]0 ; 5]	169	49.56%
]5 ; 10]	60	17.60%
]10 ; 15]	44	12.90%
]15 ; 20]	24	7.04%
]20 ; 25]	19	5.57%
]25 ; 30]	6	1.76%
]30 ; 35]	7	2.05%
]35 ; 40]	5	1.47%
]40 ; 45]	3	0.88%
]45 ; 50]	1	0.29%
]50 ; 55]	0	0.00%
]55 ; 60]	2	0.59%
]60 ; 65]	0	0.00%
]65 ; 70]	0	0.00%
]70 ; 75]	1	0.29%
]75 ; 80]	0	0.00%
]80 ; 85]	0	0.00%
]85 ; 90]	0	0.00%
]90 ; 95]	0	0.00%
]95 ; 100]	0	0.00%
Total	**341**	**100.00%**

10.2.3 Conclusions

The overall level of the Project impact on PAPs was assessed taking into account the loss of income generated by the loss of land use (mainly used for agricultural crops) and the loss of trees (mainly fruit trees). Potential loss of revenue generated by the Project footprint of 49.5 ha were assessed based on the Commission compensation rate.

Based on the land compensation assessment conducted by the Commission and Labosol, 335 PAP will be compensated according to compensation amounts presented in Annex D. Given the latest change of the Project configuration, which occurred at the end of 2014, 7 additional PAPs were not taken into account in this survey. Assessment of land compensation for these 7 additional PAPs will be conducted by the Commission in the upcoming months.

According to the Rural Cadastre survey (which does take into account the 7 additional PAPs), the extent of the Project's impact on PAPs' properties is mainly driven by the loss of trees, especially Mango and other fruit trees which represent a trading value in the region. 32% of PAPs could have between 10 to 50% of their revenue associated with agricultural practices impacted and 3 PAPs could have more than 50% of their revenue impacted. However, these statistics might not be representative of the Project's impact on all PAPs' livelihood as some PAPs have other sources of revenue (e.g., cattle grazing, trade). As part of this Rural Cadastre survey, household surveys were conducted and all PAPs were

interviewed by Labosol to assess the level of the Project's impact on their livelihood. PAPs answers are presented in Annex 4 of the Rural Cadastre report presented in Annex E.

For the Project's 49.5 ha surface area, the compensation granted by the Commission for the loss of cultivable surfaces (land usage) and the loss of trees amounts to 214,529,416 CFA francs (with a rate of 1,050,000 CFA francs per hectar per year for land loss). However, in accordance with PETN's commitment to local populations made prior to the Commission's report, a rate of 3,000,000 CFA francs per hectare per year will be applied to compensate all PAPs for land loss. Therefore, the total compensation amount paid to the PAPs will be 312 million CFA francs. The difference between the Commission and PETN crop compensation rates should therefore mitigate the overall level of the Project impact on each PAP. The same amount of compensation will be paid by the Commission and PETN for the trees.

In order to minimize the Project's impacts on the PAPs' livelihood, a livelihood restoration plan will be developed and implemented, and the plan will be based on the Livelihood Restoration Plan framework included in the Project ESMS Plan (see Chapter 12).

11 Public Consultation and Disclosure of Information

Consulting the public is a crucial stage in the Environmental and Social Impact Study of a project insofar as it submits the project for assessment to local communities, administrative, local and technical authorities and various interested parties involved (e.g., NGO or associations, local sectoral programs or projects). This approach offers the various stakeholders a chance to state their views on the implementation of the project in an area impacting them.

11.1 Summary of consultation in 2012-2014

The aim of the public consultation in 2012 was to gather the opinion of stakeholders and their recommendations regarding the Project. Chapter 8 of the ESIS REV03 of October 2014 presents the results of this consultation in a summary of the perceptions, concerns and recommendations of key stakeholders (i.e. villagers, local and regional administrations) with respect to the change in the Project configuration.

This consultation phase nevertheless had a few gaps as no details were given with respect to the methodology used for disclosing Project information. Thus, in the 26 villages and hamlets home to 341 listed PAPs (see the Cadastre Rural Report by Labosol-AGTS S.A. dated 22nd September 2015 in Annex E), only twelve villages (Diambalo, Balsandre, Taïba N'diaye, Taïba Mbaye, Baïty N'diaye, Baïty Guèye, Miname Diop, Mbayène, Khelcom Diop, Taïba Santhie, Maka Gaye Bèye and Ndomor Diop) were consulted during the public consultation program carried out on 22-28 December 2012.

The 2012 study also does not specify the selection criteria used to choose villages and administrative bodies consulted. As an example, the consultation included the sub-prefecture of Ouadiour which is some distance away from the Project and even outside the extended area of influence.

Following the 2012 consultations, Labosol carried out an additional public consultation program in 2014 under their support mission to the PAP census and the Departmental Commission of Census and Compensation. The aim of these consultations was to raise awareness of the local communities to the Project, its characteristics, its changes, its potential social and economic impacts and also to compile the opinions of the local communities involved. The dates of these meetings are provided in Table 59 below.

Table 59: Public consultation program conducted by Labosol and the Departmental Commission of Census and Compensation

Date	Locality	Activities	Responsible parties
11/12/2014	Taïba Ndiaye Tivaouane	Field fact-finding visit and Activity planning meeting	Labosol
12/12/2014	Taïba Ndiaye	Information and awareness-raising of Village Leaders	Labosol
15/12/2014 to 19/12/2014	Taïba Ndiaye	Surveying of the temporary storage areas	Labosol

Table 59: Public consultation program conducted by Labosol and the Departmental Commission of Census and Compensation

Date	Locality	Activities	Responsible parties
From 13/01/2015 to 15/01/2015	Taïba Ndiaye Tivaouane	Field verification with the village leaders	Labosol team &Departmental Committee of Census and Compensation (facilitators for villager meeting and researchers)
20/01 to 26/01/2015	Tivaouane	Financial assessment and production of the provisional report	Labosol team & Departmental Committee of Census and Compensation (facilitators for villager meeting and researchers)

Ultimately, despite the relevance of the information collected from the 2012 and 2014 consultations, there was no guarantee that all the local communities were informed. In addition, these consultations did not give rise to a stakeholder engagement plan.

To ensure the public consultation of all local communities involved, EES carried out an additional consultation program in February 2015. A further consultation was also arranged in June 2015 during the site visit by the financial institutions (OPIC, EKF). The results of the 2015 consultations are presented below.

11.2 Public consultation in February 2015

11.2.1 Consultation objectives

The process leading to the development of the Project was lengthy and underwent alterations, mainly following the original ESIS submitted to the DEEC and for which the Certificate of Conformity was delivered. A public consultation program was organized for the 16-18 February 2015 to inform the local communities of changes made to the Project since the last consultations. This latest consultation program was a chance for the local communities to express their views on the changes to the Project.

The villages that had not been consulted in 2012 were included in the most recent consultation program. These latest public consultations targeted 23 villages and hamlets out of the 35[57] in the municipality of Taiba Ndiaye. The villages outside the municipality of Taiba Ndiaye (located in the municipalities of Noto and Darou Khoudoss) and home to some People Affected by the Project (PAP) were also consulted. The PAP from these municipalities were included in the Diambalo meeting. When PAP from these villages did not attend the Diambalo meeting, they were interviewed directly in their villages by a team from EES.

[57] Following the attachment of Selco and Keur Bakar, the municipality of Taiba Ndiaye counts 35 villages.

11.2.2 Public consultation methodology

The February 2015 public consultations were based on scheduling meetings with the Project stakeholders: the administrative authorities, the competent State technical services (STE) working in the Project area at regional, departmental and local levels and the local communities. There were two phases to this consultation program:

- A preparation phase, consisting of making contact with the various people involved, to target all participants during the consultations; and
- A consultation phase with the various parties.

The following consultations took place during the preparation phase:

11.2.2.1 For the public consultations in local communities

The announcement of public consultation scheduling was made on 11-16 February with the assistance of:

- Mr Ndiaye Samba Thiam[58] (resource person in the firm, living in Miname),
- Mr Lamine Diop (Ndomor Village Chief and chairman of village chiefs of Taiba Ndiaye)
- Mr Malick Ndiaye (First Deputy to the Mayor of Taiba Ndiaye)

A brief notice, prepared by EES, and a copy of the monthly newsletter on the Project were made available to the resource persons to advise them of the agenda and the nature of the discussions.

11.2.2.2 For the Administration

The Prefect of Tivaouane and the Sub-Prefect of Méouane were advised by post dated 12 February 2015 of the upcoming public consultation in the targeted villages of Taiba Ndiaye scheduled for 16-18 February 2015.

Note that two representatives from Ramboll Environ visited the Project area in February 2015 to familiarize themselves with the Project's area of influence prior to organizing this public consultation program. During this visit, a discussion-format consultation took place at Taiba Gueye and involved a discussion among Ramboll Environ, EES, PETN and the village chiefs of Taiba Gueye and Baiti NDiaye, along with several villagers from Taiba Gueye. During the consultation, PETN explained the changes to the Project since 2012.

[58] Mr Samba Thiam; resource person of the firm EES

11.2.3 The stages involved in the consultation

Thanks to the cooperation of the local communities and the administration, large numbers of people from the local communities attended these discussion-format consultations. The participants for these consultations were as follows: Village Chiefs, dignitaries (men and/or women), NGO and associative movements, representatives of young people and women, directors of public and Koranic schools, managers of boreholes and associated networks, parent-teacher associations plus, of course, people affected or not by the Project living in the Project's Direct Area of Influence.

11.2.4 Meeting with the administrative authorities

A delegation from EES led by Serigne Diop, Head of Mission, and including Ely Sy, Mbaye Sarr (socio-economist) and Aïssatou Sene (geographer) met with the following administrative authorities:

- The Prefect of Tivaouane and the Sub-Prefect of Méouane;
- The members of the Departmental Committee of Census and Compensation, a governmental committee that is in charge of the census, and determining land assessment and compensation for PAP; and
- The Regional Development Agency (ARD) and the National Statistics and Demography Agency (Thiès regional agency).

The other administrative parties listed below were not consulted as they had already been consulted for the 2012 consultation program (22-28 December 2012)[59] and for preparation of the ESISREV03 of October 2014:

- The National Technical Directorates, namely:
  - The Directorate of the Environment and Listed Establishments; and
  - The Civil Defence Directorate.
- The technical services of the Thiès Region, namely:
  - The Regional Division of the Environment and Listed Establishments;
  - The Regional Directorate for Rural Development;
  - The Regional Water and Forests Inspectorate;
  - The Regional Development Agency; and
  - The Regional Development Directorate.

[59] Chapter 8.1.3 of ESIS REV03 of October 2014 - Page 169

11.2.5 Meetings with the local communities

To achieve the objectives assigned to the 2015 Public Consultation program (i.e., disclosure of additional information following modifications to the basic Project configuration), the list of communities to consult was expanded to include all local communities affected, whether or not they belonged to the Municipality of Taiba Ndiaye.

Six meetings with local communities were scheduled according to the timetable shown in Table 60 below.

Table 60: Public Consultation Program From February 16th to 18th, 2015

Date and Time	Villages Consulted	Place Planned for the Meeting	Activities	Responsible Parties
Monday 16th, Februaryat 9 a.m.	Taïba Ndiaye, Taïba Santhie, Taïba Mbaye and Taïba Khab	In the square of the headquarters of the Municipal Council at Taiba Ndiaye	Village meeting Household surveys for the PAP from the sample	EES team (facilitators for the villager meeting and researchers) and Laye NDiaye, Community Relations Officer of PETN
Monday 16th, February at 3 p.m.	Group of eight villages (Minam, Keur Mallé, Mbayène 3, Keur Mbaye Sénoba, Keur Samba Awa, Keur Fatim, Keur Mambaye and Ndiamba)	In the public square near the school in Minam	Village meeting Household surveys for the PAP from the sample	EES team (facilitators for thevillager meeting and researchers)and Laye NDiaye, Community Relations Officer of PETN
Tuesday 17th, February at 9 a.m.	Group of five villages (Keur Madiagne, Sam Ndiaye, Keur Assane Ndiaye, Baïty Ndiaye and Baïty Guèye)	In the public square near the village school in Keur Madiagne	Village meeting Household surveys for the PAP from the sample	EES team (facilitators for thevillager meeting and researchers)and Laye NDiaye, Community Relations Officer of PETN
Tuesday 17th, February at 3 p.m.	Khélcom Diop (Bal Diop) and Maka Guèye Bèye	In the public square in the village of Khelcom Diop	Village meeting Household surveys for the PAP from the sample	EES team (facilitators for thevillager meeting and researchers)and Laye NDiaye, Community Relations Officer of PETN
Wednesday 18th, February at 9 a.m.	Ndomor Diop	To be decided with the Ndomor Diop Village Chief	Village meeting Household surveys for the PAP from the sample	EES team (facilitators for thevillager meeting and researchers)and Laye NDiaye, Community Relations Officer of PETN
Wednesday 18th, February at 3 p.m.	Group of villages in the North (Diambalo, Bal Guèye, Keur Maguette Guèye, Keur Demba	In the village of Diambalo	Village meeting Household surveys for the PAP from the sample	EES team (facilitators for thevillager meeting and researchers)and Laye NDiaye, Community Relations

11.2.6 Results of the public consultation

11.2.6.1 Positive impacts of the Project

As a whole, the Project has received positive feedback due to its potential to ben
and national economies.

Alleviation of Power Shortages

The Project will result in the injection of 400 GWh, i.e. 14% of domestic product
will boost the national economy while helping to reduce the price of electricit
Energy Mix and decrease Senegal's overall dependence on fossil fuels.

Job Creation

Locally, the construction work will encourage the creation of direct and indirect j
local emergence of SME. The construction of 34 km of laterite access roads
encourage the development of inter-villager trade and the easy transport of cu
cash products to local and regional markets. In addition, the Project will enc
electrification of villages in the municipality with the possible creation of small
(e.g., tailors, joiners, boilermakers, welders).

Payment of Patente Tax

The decision of PETN to establish its headquarters in Taiba Ndiaye and t
significant financial gain for the municipality will assist in meeting the local c
social expectations for health, education, farming, etc. which have been slow to
due to the municipality's current limited budget. This in particular pertains to the
the Patente Tax (described below), which is projected to be approximately €2.
year.

Patente Tax

As explained by the Mayor of Taiba NDiaye, Mr. Ale Lo, each Municipality ha
account with the Ministry of Finance (MoF). When the Patente Tax is paid, it is
this account. Each year, the Municipal Council, which is comprised of 43 coun
representing the 37 villages within the Municipality of Taiba Ndiaye, meets and
budget (approved by the prefect of the department of Tivaouane) which must be
MoF regional office of Tivouane for approval. Each council member has the abil
a budget request on behalf of his/her village. Only once the budget is appro
Municipality withdraw money from this account. In addition to the budget, ea
Municipal Council must also submit a statement of accounts detailing the mone
and what it was used for and this amount is compared to the former year'
maintain transparency in the Patente Tax system.

PETN will pay the Patente tax directly to the Prefecture of Tivaouane (on behalf
When the Municipality of Taiba Ndiaye's annual budget is approved and they
effect payments for the Project, they will send the Project contractors to the Pre
contractors will be paid out of the Municipality's account with the MoF.

[60] Report CRSE-2013-Net national production in 2013 is 2945 GWh injected into the Interconnecte

Fair Compensation

Lastly, the local communities welcomed enthusiastically the Project's commitment to consider their requests for effective, fair and equitable compensation for lands and crops at the best possible scales.

These consultations also gave the local communities a chance to express their expectations and concerns. All topics addressed during the consultations are presented below in terms of Project acceptability, doubts, concerns and expectations. The recommendations of the local communities are also presented for each topic.

11.2.6.2 Concerns, Expections and Requests of the Local Communities

Loss of farmland, compensation for these losses

Some of the concerns relate to the loss of means of subsistence due to the occupation of the land by the Project and the compensation to be paid for these losses.

The following concerns were raised:

- Possible prohibited access to the wind cluster area thereby preventing free movement of people and property and the exploitation of remaining fields;
- The destruction of mango fields;
- The loss of cultivation lands; and
- The low compensation rates applied did not allow people to regain their means of subsistence.

The local communities, therefore, suggested during the meetings:

- That the Project developers consider the importance of cultivation lands and mango plantations and reflect this in the compensation policy for victims of loss;
- Full compensation (lands and maintenance expenses) to be paid as per scales indexed to the importance of cultivation lands that each year bring substantial income or means of subsistence to the farmers;
- A more accurate assessment of maintenance expenses taking account of lost cultivation lands;
- The granting of a periodic annuity to compensate for loss of income;
- An agreement protocol be established between PETN and the Municipality confirming the Project developer's intentions;
- Free access to the Project's access roads. The local communities request that the Project's access roads interconnect with the existing tracks wherever possible.

<u>EES & PETN responses:</u>

Based on information received from PETN, EES made the following clarifications:

- The scale set by the commission is the one in force in the department, taking into account current practices in the Project's area of influence. It is less advantageous than the one that had been proposed by PETN.

About the land, the commission does not compensate for land that belongs to the government; instead, it will compensate the villagers, based on 1,050 000 F CFA / ha / year for crop activity, to be reported on the actual surface loss. PETN has agreed to consider a financial reassessment related to this loss of land.

- There are no plans to pay alimony as it is a private project. Only the financial compensation will be paid.
- An agreement is expected between PETN and the municipality to ratify the parties' commitments .

Regarding access within the Project site, it was stated clearly that the local communities would have a right to total access of the Project's tracks and access roads during the wind farm operating phase. During the construction phase, access will be restricted to the work areas for a limited period. The request for the prospective interconnection between the existing paths and the Project's access roads will be submitted to the Project developer

To assess the losses relating to the Project and to compensate the PAP, the Departmental Committee of Census and Financial Compensation, in collaboration with Labosol (who provided techical support to assist in evaluating such compensation), conducted a land compensation assessment study. The report providing the conclusions of this Departmental Committee of Census and Financial Compensation and Labosol study (see Annex D) were not, however, passed on during these February 2015 consultations, as the work of the assessment commission and of Labosol were still being finalized when the consultations took place.

11.2.6.3 Participation in local life and its development

The local communities suggested that the Project developer implement a corporate social responsibility (CSR) policy. This will have a positive impact on the socio-economic development of the area, especially in terms of employment and access to electricity.

Local labor

The local communities have expressed concern that project hirings often do not focus on giving the local workforce priority for tasks that it can undertake for projects.

They thus recommend:

- Hiring young labor from PAP families and from the Project’s area of influence;
- That the Project developer offers vocational training to the local workforce, especially to the youngest workers;
- A recruitment policy favoring the most vulnerable groups like youth and women.

<u>EES & PETN responses:</u>

The Project developer will respect the request for priority recruitment of local people with equal skill. The other points will be addressed when reasonable under the Project’s CSR policy.

Electricity:

The local communities expect the Project to help to facilitate their access to electricity.

The following requests were also expressed:

- Bringing electricity to the few villages that are currently without electricity;
- An electricity subsidy (for wells, school, etc.); and
- A subsidy for the electricity consumed by the boreholes/and for the people who deem the cost of electricity too high.

EES response:

According to the Project developer, PETN will consider favorably the continuation of the rural villages electrification plan in progress and will discuss the conditions of participation with the municipality.

In regards to electric bills for drilling and infrastructures, this is the responsability of the Municipality, and the annual payment of the Patent tax to the Municipality will help to resolve these problems.

11.2.6.4 Additional Concerns, Expectations & Requests

The Corporate Social Responsibility (CSR) incentive through effective participation by the Project in social works and support actions for the social sectors like education, health, access to drinking water and making villages and agricultural production areas less isolated was also raised. The local communities would like the Project developer to commit to the following under its CSR policy:

- New wells for planting off-season crops and drinking water supplies. Note that this request has been raised repeatedly at every meeting. It seems that local populations would like wells for off-season crops in priority;
- The refurbishment of both French and Koranic schools and the supply of educational equipment, if possible;
- The refurbishment of health structures, with assistance, to dispense medicines and pay the nurse;
- Assistance to NGOs and women's groups;
- Participation in developing micro-credit with a credit line for women;
- Helping to make available a processing unit for local produce (e.g., mangoes, vegetables) ;
- Constructing community markets to help women sell their crops and other products; and
- Purchasing a vehicle to transport crops to market.

EES response:

It is the Municipality's responsibility to create, develop and perform maintenance of social infrastructures. According to the Project developer, PETN will sign a convention with the Municipality of Taiba Ndiaye for a CSR budget of around 46 million F CFA (1 million F CFA per turbine) per year, in addition to the payment of the annual Patente Tax that will provide financial means to implement these development actions.

Domiciliation of the Project in the municipality, payment of the local "patente" tax and its use

One concern raised by the local communities is the payment and use of the local "patente" tax. They fear non-transparent and inefficient use of financial benefits received from the Project in the Municipality's budget.

They recommend:

- Domiciling the Project headquarters in the Municipality of Taiba Ndiaye; this would therefore mean paying the patent to the municipality (the taxes paid by PETN to the Tax Office would be around 2.5 million euros, of which about 800 million to 900 million CFA francs would come to the municipality of Taiba Ndiaye);
- Using this windfall for developing the community, without discrimination; and
- That the patent is covered by an agreement protocol.

EES response:

According to the Project developer, the company's headquarters will be set up in Taiba Ndiaye, and the Municipality will benefit directly from the patente tax revenues.

This decision to establish the company's headquarters in Taiba Ndiaye takes into account the financial concerns of the Municipality as there is no obligation to do so.

Communication between the Project developer and the local communities

The local communities consider that Project communication is lacking and they make the following recommendations:

- That the Project team introduces a policy of consultation and permanent communication with the populations to keep them up to speed with Project implementation;
- Publicizing compensation rates;
- Publicizing the list of PAP; and
- Paying PAP before any work takes place and publicizing the construction schedule to avoid PAPs being evicted unexpectedly.

The local communities have expressed uncertainties over the construction works schedule, due to the upcoming rainfall crops that have to be prepared. The farmers should start preparing the earth in March for commercial crops. They, therefore, request that the construction schedule be made known so that they can organize themselves.

A problem of confusion over the existence of two commissions was also raised. EES stated that there was only one Departmental Committee of Census and Compensation and that there must have been confusion with the work conducted by Labosol. Comments were also made by community members about the intrusion by the commission or consultants without consent of the owners, resulting in damage inside fields.

EES response:

- The Project developer is currently establishing a communication plan, which will include the publication of a free newsletter. An information letter is currently published every month to advise on changes to the Project;
- The erection work for the first tranche is scheduled to start at the beginning of the fourth quarter of 2015. The construction timetables will be made available to everybody as soon as possible; and
- The Project developer has clarified that there is only one commission. Some PAPs have perhaps related surveys made by Labosol, in charge of topographical readings, to a second commission. In the future, the PAPs will be advised in advance of any visit by the commission.

11.2.6.5 Concerns relate directly to the wind farm and its potential hazards

Speakers expressed the following concerns:

- Impact on the flowering of mangoes and crop yields;
- Widening of roads from 6 m to 12 m;
- Risks of wind turbines falling;
- Breaking components (blades, nacelle, etc.); and
- End of Wind Farms useful life.

EES responded as follows:

- The Project will not impact either the flowering or yield of mangos.
- According to the Project developer, the roads have been widened from 6 to 12 m to take account of a distance of 3 m either side of the road (6 m wide) in calculating the compensation. This 3 m safety distance also takes into account wide loads, with dimensions that could exceptionally cause some damage.
- The likelihood of machine breakages are within the acceptable limits and measures to prevent or minimize them will be taken during the design, construction and operating phases. Note that ESIS REV03 of 2014 includes a study of these impacts.
- At end-of-Project-life, the wind farm will either be dismantled or refurbished as is practical at the time. The manufacturer, Vestas, is totally familiar with this process. Note that an impact study will be conducted for this decommissioning and closure phase if dismantling is the chosen option.

11.2.6.6 Summary of Topics addressed

Topics addressed are summarized in Table 61 below:

Table 61: Summary of Topics Discussed During The Public Consultations in February 2015

Topic	Comment	Consultant or Project Developer Response
1-Project acceptability	General acceptability for the majority of local communities and PAP. Qualified acceptability for a few highly-impacted PAP who understand that these lands belong to the State and that the Project is of public interest that will benefit the entire country. The people involved are looking for fair and equitable compensation that will allow them to regain their means of subsistence. They also suggest that the Project developer operates a bold CSR policy that will have a positive impact on the socio-economic development of the area.	Very special attention will be paid to the compensation for PAP to offset the partial loss of means of subsistence. We note that the Project has agreed to pay double that recommended by the government compensation committee. The social request raised will be brought to the attention of the Project Developer who will advise on the policy to participate in the socio-economic development of the municipality
2-Concerns about the hazards attributable to the Wind Farm	The primary concerns of the local communities are expressed below: Possible negative impact on the flowering of mangos and crop yields; Risks of wind turbines falling; Breaking components (blades, nacelle, etc.); Widening of roads from 6 m to 12 m; and Negative impacts with regard to the end of the useful life of the wind farm.	The Project will not impact either the flowering or yield of mangos. The likelihood of machine breakages are within the acceptable limits and measures to prevent or minimize them will be taken during the design, construction and operating phases. According to the Project developer, the roads have been widened from 6 to 12 m to have sufficient room for maintenance 3 m either side of the road (6 m wide) and to take account of wide loads, with dimensions that could exceptionally cause some damage if this additional area was not included. At the end of its useful life, the plant will either be dismantled or refurbished as is practical at the time. The manufacturer, Vestas, is totally familiar with this process and an impact study will be conducted for this phase if dismantling is the chosen option.
3-Mistrust of the commitments made by the developers sponsoring the project.	A few stakeholders expressed concern over the failure of companies currently in the area (MDL, ICS, Tobène Power) to meet their commitments. The villagers would like PETN to respect its commitments through a convention or agreement protocol signed by the different stakeholders. Questioning of PETN about recruitment, CSR policy set out by the developer, Patente tax, etc.	The Project developer has confirmed that the Municipality will benefit from the patente tax as the Project headquarters will be set up in Taiba Ndiaye. In addition, the Project developer will commit by signing one or more conventions or agreement protocols that will commit the Project developer
4-Loss of lands,	Concerns expressed and attributable to the loss of means of	The Project developer said that he has been made aware of the

Table 61: Summary of Topics Discussed During The Public Consultations in February 2015

Topic	Comment	Consultant or Project Developer Response
compensation of PAP	subsistence: the destruction of mango fields; the loss of cultivation lands; the low compensation rates applied do not allow people to regain their means of subsistence. Compensation wishes from the villagers expressed during the various meetings: fair compensation that will give them back the means of subsistence in the very short term; granting of a periodic annuity to compensate for loss of income; Publicizing compensation rates;. a more accurate assessment of compensation payments taking account of lost cultivation lands; Publicizing the list of PAP; Paying PAP before any work takes place and publicizing the construction schedule to avoid PAPs being evicted unexpectedly; and Agreement protocol between the stakeholders confirming the Project developer's promises.	compensation scales and especially the possible loss of means of subsistence for some PAP. The Project in fact is paying twice the compensation rate recommended by the Compensation Commission. The commission is currently at work and the relevant points will be taken into account.
5-Jobs	Recruitment of young people and women from the area is a priority. Project developer to offer occupational training. Early training of young people	The Project developer will respect the request concerning the priority recruitment of local people, with equal skill.
6-Communication between Project developer and PAP	Insufficient communication and suggestions were made for a more efficient communication plan	The Project developer is currently setting up a stringent communication plan, including the publication of a free newsletter.
7-Work in the fields to prepare crops in 2015	Uncertainties over the works schedule despite the upcoming rainfall crops that have to be prepared.	The construction timetables will be made available to everybody as soon as possible and will be restated in the monthly newsletter published by PETN.

Table 61: Summary of Topics Discussed During The Public Consultations in February 2015

Topic	Comment	Consultant or Project Developer Response
	Imminent start to preparing the earth in March for commercial crops. No construction schedule.	The construction works will take place by tranche. Not all the land will therefore be involved at the same time.
8-Patente in Taiba Ndiaye	Approval and incentive of PETN's headquarters in Taiba Ndiaye Use of benefits from the patente tax to develop the community, with no discrimination.	According to the Project developer, PETN's headquarters will be established in Taiba Ndiaye. As a result, 2.5 million euros will be paid to the Tax Office, of which CFA francs 800 million/year approximately will be reallocated to the Municipality of Taiba Ndiaye. A percentage of the patente tax wil be tranferred to the Municipality. The patente tax is entirely at the discretion of the municipality but a formal budget must be presented to and approved by the regional government for funds to be released to the municipality.
9-Right of access to roads	Concern: lack of access to the land during construction and operation The villagers ask for free access to the Project's roads. interconnection between the Project's access roads and existing tracks whenever possible	The local communities will have a right of total access to the Project's tracks and access roads during the operating and construction phases, provided they comply with any safety measures in place The request for interconnection between the tracks and the Project's access roads has been submitted to the developer.
10-Developer's CSR policy	A very considerable involvement by the Project in the actions intended to improve the living environment and reduce poverty was expressed strongly during the meetings. The following points were reiterated in almost all the meetings. High demand for new wells for planting off-season crops and human supplies Refurbishment of both French and Koranic schools and the supply of educational equipment if possible Refurbishment of health structures, with assistance, to dispense medicines and pay the nurse who is frequently a volunteer Assistance to NGOs and women’s groups Participation in developing micro-credit with a credit line for women Helping to make available a processing unit for local produce (mangos,	The Project developer will be advised of your CSR expectations.

Table 61: Summary of Topics Discussed During The Public Consultations in February 2015		
Topic	**Comment**	**Consultant or Project Developer Response**
	vegetables, etc.) Constructing community markets to help women. Purchasing a vehicle to transport crops to market. Support through micro-credit and women's associations springing up around miscellaneous projects Bringing electricity to the few villages without it Electricity subsidy (for boreholes, school, etc.) Subsidy for the electricity consumed by the boreholes/and for the populations who find electricity too expensive	
11-Work of the commissioN	Confusion over the existence of two commissions Problem with the intrusion by the commission or consultants without consent of the owners, resulting in damage inside fields.	The Project developer has clarified that there is only one commission. Perhaps some owners have confusedly thought that Labasol (in charge of topographical readings) was a second commission. Owners of fields will henceforth be advised in sufficient time if the commission has to enter their fields.

11.3 Public Consultation in June 2015

A public consultation program was organized on 18 June 2015, attended by the financial institutions (OPIC, EKF), SARREOLE (Project developer), VESTAS (construction manager), ACEI (equity provider) and the consultancy firms (Ramboll-Environ, EES and Mott MacDonald) to engage with the affected local communities and get their views on the Project in terms of acceptability, expectations, doubts and suggestions.

11.3.1 Meetings with the local communities

This consultation program involved a large-scale meeting (attended by many representatives from eight villages), participation in a municipal council session and discussion-format consultations in two villages. The detail of these consultations is presented in Table 62 below:

Table 62: Public Consultation Program on June 18th 2015

Date and time	Villages Consulted	Activities	Responsible parties
Thursday, 18 June at 10 a.m.	Group of eight villages: Keur Mallé, Miname, Mbayène 3, Keur Mambaye, Khary, Ndiamba Touba Fall, Keur Mbaye Seneba, Keur Samba Aura and Keur Birima	Village meeting Attended by the village chiefs and community members	PETNwith assistance from EES (translation)
Thursday, 18 June at 3 p.m.	Taiba Ndiaye	Municipal session to discuss the convention regarding the draft easements Session attended by the Mayor of the Municipality, the Sub-Prefect and 36 municipal counsellors	PETN with assistance from EES (translation)
Thursday, 18 February at 4 p.m.	Taiba Santhie	Discussion with villagers impacted directly by the Project Attended by the village chief	PETN with assistance from EES (translation)
Thursday, 18 February at 5.30 p.m.	Baïty Gueye	Discussion with villagers impacted directly by the Project Attended by the school teacher	PETN with assistance from EES (translation)

The public's perception of the Project (acceptability of the Project, doubts, concerns expectations and recommendations) were gathered during these consultation sessions. The results are presented below.

11.3.2 Results of the Public Consultation

11.3.2.1 Village Meeting at Mbayene 3

The points raised during the large-scale meeting of village chiefs from eight villages and community members within these villages (men, women, children and representatives of youth and women associations, etc.) are listed in the table below:

Table 63: Summary of results of public consultation meeting

Topics Discussed	Action By The Developer
Project acceptability: the speakers expressed general acceptability for the Project. **Lands** The people affected agreed to the compensation method, but asked that this compensation be substantial, fair and equitable Clarifications about the payment were also requested **Expectation of women** The female population evoked the need for covered markets especially before winter sets in. Women also wished for financing (micro credit) to be available for their trading activities. **Infrastructures** Speakers evoked the dilapidated condition of community infrastructures and their need for refurbishment and equipment. The health and school structures are especially very much affected. **Jobs** The villagers present (young people, women, village elders) urged equal opportunities (no discrimination) in jobs during construction. - They want to take advantage of these job opportunities during construction. The chairman of the parent-teacher association suggested training young people so that they could benefit from job opportunities set at the moment of operation. **Patentes** Huge expectation of the local communities with respect to the amount announced (about 1 billion CFA francs) to develop the socio-economic aspects and community infrastructures. **Electrification** The villagers sought electrification of villages	The commission has completed its work and all the amounts have been calculated. The Project developer agreed to compensate the PAP on the basis ABOVE the scale defined by the departmental maintenance expenditure financial assessment commission + additional compensation to keep its promises to the PAP. The Project developer indicated that the crops could be sown apart from cassava as the maturation time was too long (at least ten months). No payments had yet been made. Payment would be made promptly onthe first drawing after the financial closure. Headquarters: the Project developer confirmed the transfer of the headquarters to Taiba Ndiaye. Regarding the patente, the Project developer announced that €2.5M would be paid to the Tax Office every year and part of this amount, set by the administration in joint agreement with the municipality, would be paid to the municipality. This part could be 1 billion CFA francs a year for twenty years. These resources would be at the disposal of the municipality and the Project would unfortunately not have any influence on how such funds would be distributed or used. In addition, the Project developer suggested a convention with the municipality whereby it would subsidize rural electrification projects under its social responsibility from renewable energy facilities and micro enterprises would make 1 million francs per year and per turbine available to the municipality, representing 46 million per year for twenty years used for development actions or for the numerous requests of the local communities. The Project developer would take into account wherever possible the requests of local communities in complying with applicable laws and regulations and taking account of existing skills in the area. However, very few qualified jobs would in all probability be available given the level of experience required by the Project. The Project developer intended to participate in electrification activities in ways yet to be defined.

currently without electricity.	

11.3.2.2 Session at the Municipal Office of Taiba Ndiaye

The topics raised during the session of the Municipality of Taiba Ndiaye (attended by the Mayor of the Municipality of Taiba Ndiaye, the Sub-Prefect and 36 municipal counsellors) are given in the table below:

Table 64: Summary of Topics Discussed During the Municipal Public Consultation in June 2015

Topics Discussed By The Project Developer	Response From The Municipality
The Project developer evoked the need to secure the wind farm against the mining risk - opening a phosphate mine in line with infrastructures was not compatible with wind turbine operation. An area of 2,845 ha is necessary (500 m either side of rows of wind turbines and 200 m either side of approach roads). The Project developer requested that this area be covered by an easement and registered in the name of the State or the municipality to be made secure. The Project developer emphasised that this additional request would not mean commandeering additional lands. The Project developer also spoke of the patente and the availability of 46 million CFA francs a year for development actions	A commission would be created to rule on the draft easement. Should this draft be accepted, a convention would be implemented by the Municipality in order to secure the Wind Farm.

11.3.2.3 Discussion With the PAP From the villages of Taiba Santhie and Baïty Gueye

Discussions took place in the villages of Taiba Sauthie and Baity Gueye, and were opportunities to assess the views of PAP directly.

To assess the level of impact of the project for a PAP, the PAP were asked to assess the surface area of their lands and the surface area of land impacted by the Project. The PAP questioned stated that they each held about 3 ha of land. They estimated that the Project could have a 50% impact in terms of cultivable area. Note, however, that the figures presented during these discussions did not fall entirely in line with the surveys already conducted within the Project area (see the Land Compensation Assessment Report dated June 4, 2015 prepared by Labosol). In addition, Labosol has been engaged to carry out an additional study to assess the actual level of impact of the Project on each PAP.

The PAP also confirmed that they were informed of the project due to the public consultations that had been arranged. The discussions also covered the choice of compensation method (choice of financial compensation or compensation in kind). Although some PAP had not been advised of this choice, they nevertheless confirmed their preference for financial compensation which would allow them to buy up land and regain the means of subsistence. A household survey would be carried out in addition to the Labosol study to assess the impact of the Project within each household.

11.4 Summary/General conclusion

The consultations conducted between 2012 and 2015 compiled accounts for the most part favorable to the Project. These conclusions must nevertheless be qualified for a few highly-impacted PAP (especially those losing plots with Mango trees) and who might consider that they will lose a portion of their livelihood. Note that during the last consultation program in June 2015, the land compensation assessment study was still being finalized, and the villagers at the meetings were informed that the commission will calculate and communicate the rate and amounts to be paid, based on the best practices inside the department.

The 2015 consultations have shown that virtually all stakeholders accept the Project. Those losing many mango trees or other cash crops seem to be the most worried, but acknowledge the public interest of the Project. The same topics were raised several times, namely Project acceptance, reduction in cultivation lands, with the risk of impoverishment of PAP as a result, and the wish to implement strong social measures through the developer's CSR policy. Questions relating to the safety of PAP have not been frequently raised.

11.5 Stakeholder Engagement Plan

A Stakeholder Engagement Plan (SEP) to support the affected local communities and other Project stakeholders will be part of a comprehensive Community Relations Management Plan, which will be developed, approved, and issued prior to commencement of the Project's construction phase, and will remain in effect over the life of the Project. The SEP and Community Relations Management Plan will be implemented as part of the Environmental and Social Management System (ESMS) and will be based on the plan frameworks included in the Project ESMS Plan (see Chapter 12). Implementation of the SEP will ensure that all stakeholders are kept informed about the Project on an ongoing basis and that the Project complies with the national regulations in regards to consultation and stakeholder engagement, and the requirements of applicable international standards (i..e, IFC PS1, EHS Guidelines and EP III).

11.5.1 Summary of Stakeholders

The Project stakeholders include:

- The State institutions or technical services that can intervene in the process of constructing and operating the Project due to their environmental protection or energy management missions:
  - Regional authorities: Governor, Prefect and Sub-Prefect
  - State technical services:
    - Regional Water and Forests Inspectorate (IREF);
    - Regional Division of the Environment and Listed Establishments (DREEC); and
    - Regional Agriculture Department
- Chairman of the Municipality of Taiba Ndiaye (municipal administration)
- Representatives of affected villages (Village Chiefs or their representatives)
- All residents and enterprises located within the Project's area of influence

- Women's groups and NGOrepresentatives
- Senelec CRSE
- Banks and financial institutions

To complement the Community Relations Management Plan, the Project will develop a (CSR) Policy, a distinct procedure to ensure communication with the local communities (the "Communications Plan"), as well as a Community Grievance Mechanism.

11.5.2 CSR Policy

The Project recognizes its commitment to the community and will assist in smaller more targeted community projects. Requests for funds for larger projects such as clinics, refurbishment of schools, etc. must be addressed to their local politicians to be included within the annual budget of the municipality. The Project has expressed that although they will have the obligation to pay the Patente tax, they will have no authority or jurisdiction over how the money is spent. This responsibility is entirely in the hands of the people who democratically elect the people who represent the village during municipal counsel meetings.

11.5.3 Communications Plan & Commmunity Grievance Mechanism

The Project will employ a Community Relations Officer who will have a staff of 3 to 4 people based at the Project's headquarters in Taiba Ndiaye. The team will be responsible for communicating with the local communities to ensure that all questions, concerns and requests of community members are addressed and recorded. The Community Relations Officer or a member of his team will meet at least once each month during construction and at least one every quarter during operations with communities on an individual or group basis. The purpose of these meetings will be to communicate the progress of the Project during construction and the activities which occurred in the past month and those which shall occur in the coming months. These meetings will also be a platform for community members to express their concerns and ask any questions about the Project. In addition to meetings, the team will be responsible to ensure that the PETN Village bulletin boards (described below) are updated on a regular basis to ensure that those who are not able to attend meetings can go some where to obtain information on the Project.

The Project's Communication Plan will include publication of a free newsletter and the installation of a free-standing bulletin board in all 37 villages which as the date of this Addendum has already been implemented. This bulletin board will be one of the Project's main means of communicating to all the villages. At the moment, the monthly newsletter is posted in the bulletin board. In the future, larger poster like communications will be made to explain when and where compensation will be paid and when certain construction activities will take place.

General protocols for documenting and managing complaints and inquiries from stakeholders will be managed in accordance with the "Community Grievance Procedure", in order to ensure that any stakeholder complaints or inquiries detected are documented and brought to the attention of management and properly considered. The "Community Grievance Procedure" will be in compliance with IFC PS1.

12 Environmental & Social Management System (ESMS Plan)

12.1 Environmental and Social Management System Description

12.1.1 General Requirements

In accordance with International Finance Corporate (IFC) Performance Standard 1 (PS 1)[61], Parc Eolien Taiba N'Diaye S.A. (PETN) will establish an Environmental and Social Management System (ESMS) for the Taiba N'Diaye Wind Farm in Senegal (referred to hereafter as the Project). PETN are the owners of the Project, and the ESMS will apply over the entire Project life cycle, including construction, operation, and site decommissioning and restoration. It applies to the oversight activities conducted by PETN as well as Vestas, who will serve as the Project's engineering, procurement, and construction (EPC) contractor and the Project operator via a long-term operations and maintenance contract.

The ESMS is embodied in this ESMS Plan and various management/mitigation plans and management system procedures (MSPs) to be developed by PETN and Vestas as discussed herein. This initial version of the ESMS Plan will apply specifically to the construction phase of the Project; the various ESMS support documents cited herein will be completed and issued prior to commencing construction. Collectively, the ESMS Plan and its supporting documents are designed to comprise a flexible management system framework that is based directly on PS 1 and can be readily and periodically updated to accommodate the changing needs of the Project.

As noted in Table 1-1, in addition to the requirements of IFC, the ESMS also considers:

- the IFC Environmental, Health, and Safety (EHS) General Guidelines (IFC, 2007a) and EHS Guidelines for Wind Energy (IFC, August 2015) the IFC Performance Standards (PSs)(IFS, 2012), and other good international industry practices (GIIPs) as referenced therein;
- the ISO 14001 environmental management system standard[62]; and
- the OHSAS 18001[63] occupational health and safety (OHS) management system standard.

These standards have been widely and successfully applied in many different industries and national settings, and collectively provide an appropriate basis for the development of an effective, fully integrated ESMS capable of addressing applicable Senegalese regulatory

[61] See http://www.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/ifc+sustainability/our+approach/risk+management/performance+standards/environmental+and+social+performance+standards+and+guidance+notes

[62] ISO 14001:2004, *Environmental management systems – Requirements with Guidance for Use*; International Organization for Standardization, Geneva, Switzerland, 2004. ISO 14001 is considered as a GIIP only. References to this standard do not represent any commitment to undertake third-party certification.

[63] OHSAS 18001:2007, *Occupational health and safety management systems – Specification*; OHSAS Project Group Secretariat, London, United Kingdom 2007. OHSAS 18001 is selected as a GIIP for OHS program management, as well as for its structural and contextual compatibility with PS-1 and ISO 14001. References to this standard do not represent any commitment to undertake third-party certification.

requirements as well as international norms for the management of the environmental, occupational health and safety (OHS), and other social aspects of wind energy project operations. It should also be noted that Vestas maintains an integrated corporate management system based on ISO 14001, OSHAS 18001, and the ISO 900164 quality management system standard; as discussed in Section 12.1.2 and Table 67, the documents prepared to support the Vestas corporate management system are typically adapted to the needs of individual projects and represent a significant resource in the development of the ESMS for this Project.

[64] ISO 9001: 2008, Quality management systems; International Organization for Standardization, Geneva, Switzerland, 2008

Table 65 : ESMS Plan – Primary References for Structure and Content

ESMS Plan Sections/Subsections	*Applicable IFC Performance Standard 1 Requirements*	*Applicable IFC EHS Guidelines for Wind Energy*	*Applicable IFC EHS General Guidelines*
1.0 INTRODUCTION			
1.1 ESMS Description	• Requirements, item 5	N/A	N/A
1.2 ESMS Documentation	• Requirements, item 5	N/A	N/A
1.3 Change Management	• Requirements, item 5	N/A	N/A
2.0 POLICY	• Requirements, item 6	N/A	N/A
3.0 IDENTIFICATION OF RISKS AND IMPACTS			
3.1 Legal and Other Requirements	• Requirements, item 7	N/A	N/A
3.2 Social and Environmental Aspects and Impacts, Risk Assessment, and Risk Management Planning	• Requirements, items 7-12	• Section 1.1, "Environmental (Impacts and Management)" • Section 1.3, "Community Health and Safety(Impacts and Management)"	– Section 1, "Environmental" (inclusive) – Section 3, "Community Health and Safety (inclusive) – Section 4, "Construction and Decommissioning" - 4.1, "Environment"; 4.3 "Community Health & Safety"
3.3 Occupational Health and Safety Hazard Identification, Risk Assessment, and Risk Management Planning	• Requirements, items 7-12	• Section 1.2, "Occupational Health and Safety (Impacts and Management)" • Section 1.3, "Community Health and Safety(Impacts and Management)"	– Section 2, "Occupational Health and Safety" (inclusive) – Section 4, "Construction and Decommissioning" - 4.2, "Occupational Health and Safety"
4.0 MANAGEMENT PROGRAMS			
4.1 Environmental, Social and Health & Safety (ESHS) Objectives and		• Section 1.1, "Environmental (Impacts and Management)" • Section 1.2, "Occupational Health and Safety (Impacts and Management)" • Section 1.3, "Community Health and	– Section 1, "Environmental" (inclusive) – Section 2, "Occupational Health and Safety" (inclusive)

ESMS Plan Sections/Subsections	*Applicable IFC Performance Standard 1 Requirements*	*Applicable IFC EHS Guidelines for Wind Energy*	*Applicable IFC EHS General Guidelines*
		• Section 2.1, "Environment (Performance Indicators and Monitoring)" • Section 2.2, "Occupational Health and Safety (Performance Indicators and Monitoring)	Decommissioning" (Inclusive)
4.3 Operational Control			
4.3.1 Operational Planning Process	Requirements, items 13 - 16	• Section 1.1, "Environmental (Impacts and Management)" • Section 1.2, "Occupational Health and Safety (Impacts and Management)" • Section 1.3, "Community Health and Safety(Impacts and Management)"	– Section 1, "Environmental" (inclusive) – Section 2, "Occupational Health and Safety" (inclusive) – Section 3, "Community Health and Safety (inclusive) – Section 4, "Construction and Decommissioning" (Inclusive)
4.3.2 Management of Social and Environmental Impacts	Requirements, items 13 - 16	• Section 1.1, "Environmental (Impacts and Management)" • Section 1.3, "Community Health and Safety(Impacts and Management)"	– Section 1, "Environmental (inclusive) – Section 2, "Occupational Health and Safety" (inclusive) – Section 3, Community Health and Safety (inclusive) – Section 4, "Construction and Decommissioning" (Inclusive) –
4.3.3 Control of Contractor Operations	Social and Environmental Management System, Element (ii), "Management Program"	• Section 1.1, "Environmental (Impacts and Management)" • Section 1.2, "Occupational Health and Safety (Impacts and Management)" • Section 1.3, "Community Health and Safety(Impacts and Management)"	– Section 1, "Environmental" (inclusive) – Section 2, "Occupational Health and Safety" (inclusive) – Section 3, "Community Health and Safety (inclusive) – Section 4, "Construction and Decommissioning" (Inclusive)
5.0 ORGANIZATIONAL CAPACITY AND COMPETENCY			
5.1 Structure and Responsibility	Requirements, items 17 - 19.	N/A	N/A
5.2 Training, Awareness, and Competence	Requirements, items 17 - 19.	• Section 1.2, "Occupational Health and Safety (Impacts and Management)"	– Section 2, "Occupational Health and Safety", 2.2, "Communication and Training"
6.0 EMERGENCY PREPAREDNESS AND RESPONSE	Requirements, items 20-21	• Section 1.1, "Environmental (Impacts and Management)" • Section 1.2, "Occupational Health and Safety (Impacts and Management)" • Section 1.3, "Community Health and Safety(Impacts and Management)"	– Section 3, "Community Health and Safety – 3.7, "Emergency Preparedness and Response"
7.0 MONITORING AND REVIEW			

ESMS Plan Sections/Subsections	Applicable IFC Performance Standard 1 Requirements	Applicable IFC EHS Guidelines for Wind Energy	Applicable IFC EHS General Guidelines
7.2 Monitoring and Measurement			
7.2.1 ESHS Monitoring	Requirements, items 22-24	• Section 2.1, "Environment (Performance Indicators and Monitoring)" • Section 2.2, "Occupational Health and Safety (Performance Indicators and Monitoring)"	– Section 2, "Occupational Health and Safety" – 2.9, "Monitoring"
7.1.2 Regulatory Compliance Verification Audits	Requirements, items 22-24	• Section 2.1, "Environment (Performance Indicators and Monitoring)" • Section 2.2, "Occupational Health and Safety (Performance Indicators and Monitoring)"	– Section 2, "Occupational Health and Safety" – 2.9, "Monitoring"
7.2.3 ESHS Performance Measurements	Requirements, items 22-24	• Section 2.1, "Environment (Performance Indicators and Monitoring)" • Section 2.2, "Occupational Health and Safety (Performance Indicators and Monitoring)"	• Section 2,"Occupational Health and Safety" – 2.9, "Monitoring"
7.3 Non-conformance Reporting and Corrective and Preventive Action	Requirements, items 22-24	N/A	N/A
7.4 Internal ESHS Management System Audits	Requirements, items 22-24,	N/A	N/A
7.5 Management Review	Requirements, items 22-24	N/A	N/A
8.0 STAKEHOLDER ENGAGEMENT			
8.1 Stakeholder Analysis and Engagement Planning	Requirements, items 26-28	• Section 1.3, "Community Health and Safety(Impacts and Management)"	– Section 3, "Community Health and Safety (inclusive)
8.2 Disclosure of Information	Requirements, item 29	• Section 1.3, "Community Health and Safety(Impacts and Management)"	– Section 3, "Community Health and Safety (inclusive)
8.3 Consultation	Requirements, item 30	• Section 1.3, "Community Health and Safety(Impacts and Management)"	– Section 3, "Community Health and Safety (inclusive)
8.4 Informed Consultation and Participation	Requirements, item 31	• Section 1.3, "Community Health and Safety(Impacts and Management)"	– Section 3, "Community Health and Safety (inclusive)
8.6 Private Sector Responsibilities Under Government-Led Stakeholder Engagement	Requirements, items 33	• Section 1.3, "Community Health and Safety(Impacts and Management)"	– Section 3, "Community Health and Safety (inclusive)
9.0 EXTERNAL COMMUNICATIONS AND GRIEVANCE MECHANISMS			

ESMS Plan Sections/Subsections	*Applicable IFC Performance Standard 1 Requirements*	*Applicable IFC EHS Guidelines for Wind Energy*	*Applicable IFC EHS General Guidelines*
9.2 Grievance Mechanism for Affected Communities	Requirements, item 35	• Section 1.3, “Community Health and Safety(Impacts and Management)”	• Section 3, “”Community Health and Safet (inclusive)
10.0 ONGOING REPORTING TO AFFECTED COMMUNITIES	Requirements, item 36	• Section 1.3, “Community Health and Safety(Impacts and Management)”	– Section 3, “Community Health and Safety (inclusive)

12.1.2 ESMS Documentation

The overall hierarchy of documents that comprise the Project ESMS is depicted in Figure 27.

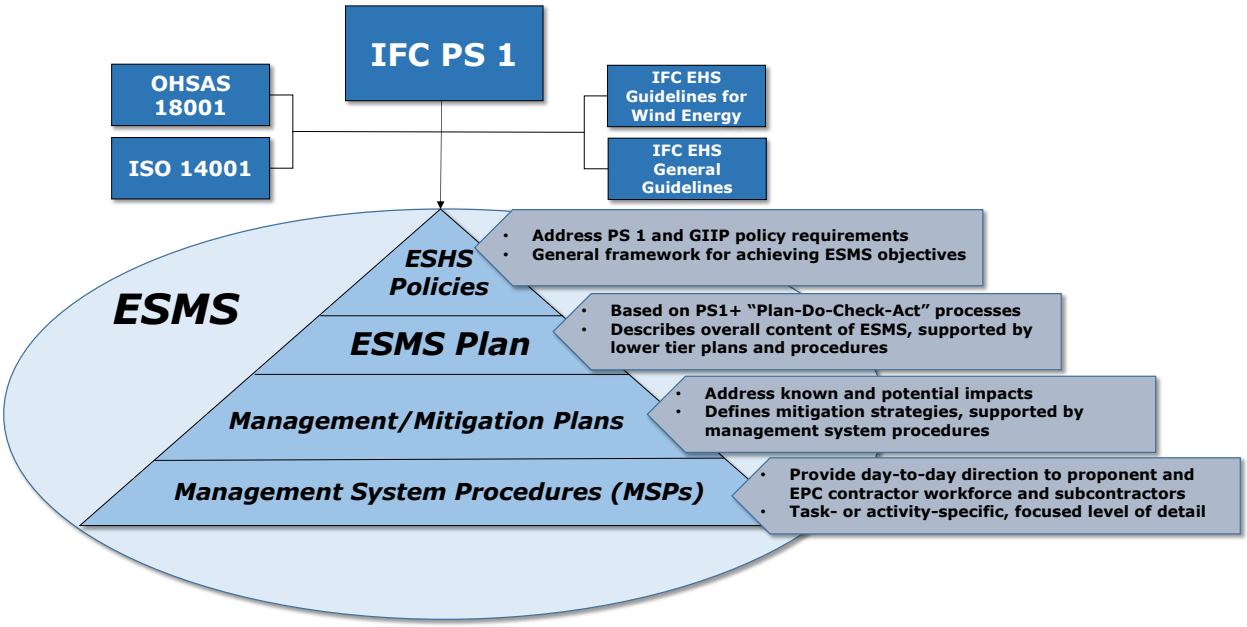


Figure 27 : ESMS Document Hierarchy

The ESMS Plan will be periodically reviewed and updated in response to the changes that will occur in various phases over the life of the Project. It will serve as a primary reference for the overall design and contents of the ESMS, and is meant to serve as a key communication tool in the presentation of the ESMS to the Project's lenders and equity partners, regulatory authorities, and other external stakeholders.

The ESMS Plan will be supported by a suite of management/mitigation plans and management system procedures (MSPs) to be prepared by PETN and the EPC contractor, under PETN direction. The management/mitigation plans and MSPs so prepared will consider the requirements of the underlying standards noted in Table 65, and will be focused on the management or mitigation of the specific environmental and social issues or impacts associated with one or more phases of the Project. An initial list of the management/mitigation plans anticipated for the Project is presented in Table 66.

Table 66 : Management/Mitigation Plans
Environmental Monitoring Plan
Occupational Health and Safety Monitoring/Accident Prevention Plan
Emergency Preparedness and Response Plan
Spill Prevention, Control, and Contingency Plan
Hazardous Materials Management Plan
Surface Water/Stormwater Management Plan
Waste Management Plan
Biodiversity Action Plan
Transportation Management Plan
Stakeholder Engagement Plan
Livelihood Restoration Plan
Site Reclamation and Closure Plan

The general scope and purpose of each of these plans is summarized as follows:

- **Environmental Monitoring Plan** – this plan will be designed to capture all of the specific water quality, wildlife mortality, and other environmental monitoring needs identified in individual management/mitigation plans and supporting management system procedures (MSPs), as well as the Project's latest available Environmental and Social Impact Assessment (ESIA) results. It will provide for the development and maintenance of a spreadsheet or planning tool that facilitates the planning, execution, and reporting actions associated with the environmental monitoring requirements that will apply over the construction, operation, and decommissioning/closure phases of the Project.

- **Occupational Health and Safety/Accident Prevention Plan** – the initial iteration of the Occupational Health and Safety/Accident Prevention Plan will be based on the draft "Health and Safety Plan: Construction of the Wind Farm of TAIBA in Senegal" (Vestas, 2014) and will be issued prior to the start of construction to permit ample time for workforce training. This plan addresses all aspects of occupational health and safety on the Project, with emphasis on the identifying required safety behaviors, preventive/protective measures, and the routine implementation of MSPs to minimize the potential for accidents, injuries, and illness within the PETN and contractor workforce.

- **Emergency Preparedness and Response Plan** – this plan will be designed to minimize the potential for accidents and emergency situations involving major

equipment transportation and construction operations, as well as the project's wind turbines and other physical structures or operational practices. The Emergency Preparedness and Response Plan will address the minimum safety requirements of (IFC, 2007a) and (IFC, 2007b) as well as appropriate GIIPs.

- **Spill Prevention, Control, and Contingency Plan** – this plan will contain requirements for periodic inspections of bulk-stored fuel, lubricants, and other hazardous materials storage areas; containment integrity; management of accumulated precipitation; management of field fuelling operations; and checks on the functionality or readiness of personal protective equipment (PPE), fire suppression systems or equipment, and other emergency systems.

- **Hazardous Materials Management Plan** – the Hazardous Materials Management Plan will contain requirements for weekly inspections of small-quantity storage areas for paints, degreasers, cleaners, solvents, insecticides, and other hazards materials for containment integrity, segregation of incompatible and materials, the condition of warning or access control signage, and the functionality or readiness of PPE and fire suppression and other emergency systems.

- **Surface Water/Stormwater Management Plan** – the Surface Water/Stormwater Management Plan will address daily inspections of stormwater management infrastructure to ensure that all deterrent systems remain functional, and that no ponding occurs near the turbine areas that would represent an attractant to birdlife.

- **Waste Management Plan** – this plan will provide for monitoring the accumulation and disposal of containerized hazardous waste and medical waste; the accumulation and disposal of nonhazardous waste; daily cover of temporary landfills or licensed solid waste landfills; and sampling for landfill leachate quality. The Waste Management Plan will also include requirements for periodic inspections to ensure the erosional stability of landfill earthworks.

- **Biodiversity Action Plan** – this plan will be designed to:
  - identify and fill information gaps with respect to critical habitats;
  - develop an effective mitigation strategy to prevent or to the extent possible minimize impacts to the population of endangered species, as well as to achieve net gains in certain biodiversity values for which critical habitats have been identified;
  - assess whether biodiversity offsets are required, and if necessary, develop an effective and meaningful offset strategy;
  - provide a robust biodiversity monitoring and evaluation program for the construction and operational phases of the Project as the basis for adaptive management of the Project's biodiversity aspects and impacts, including residual impacts; and
  - provide a framework for engaging stakeholders on conservation and other topics related to the biodiversity-related aspects of the Project.

- **Transportation Management Plan** – this plan will address the management of truck/convoy traffic on the access roadways to the site. The plan will also describe

rules of the road, travel security, monitoring for erosional damage and illegal or undesirable human influx into the Project concession, sharing of maintenance responsibilities with other road users; appropriate cross references to the Emergency Preparedness and Response Plan will also be provided.

- **Stakeholder Engagement Plan** – this plan will describe the methods PETN and Vestas will use to engage the workforce, affected communities and other potential stakeholders directly affected by the Project, and to ensure that relevant environmental and social information is disclosed and disseminated through appropriate outreach and communications procedures. The Stakeholder Engagement Plan will also invoke procedures for managing evaluation and response to external grievances, complaints, and questions.

- **Livelihood Restoration Plan** – this plan will describe the anticipated range of impacts to livelihoods as a result of project land acquisition and/or restrictions to land use during construction. It will identify the Persons Affected by the Project (PAPs) and provide a detailed plan for compensation and livelihood restoration. The Livelihood Restoration Plan will include:
  - an introduction to the project;
  - a summary of relevant project impacts;
  - a summary of applicable legal and regulatory requirements, as managed via the processes defined by Section 3.1 of this ESMS Plan;
  - a summary of the socioeconomic baseline;
  - results of a detailed socio-economic census of PAPs, and an inventory of affected land and assets at the household level;
  - eligibility criteria for compensation;
  - an entitlement matrix;
  - a summary of the stakeholder engagement requirements defined by Stakeholder Engagement Plan;
  - the projected timeframe for Livelihood Restoration Plan implementation;
  - a discussion of organizational capacity;
  - specific requirements for monitoring, evaluation, and reporting; and
  - a summary of available budget and resources

  With respect to the latter, the Livelihood Restoration Plan will also describe the retention of a competent resettlement professional to provide advice on compliance with the relevant sections of IFC PS 5 and as a resource in monitoring the effectiveness of plan implementation via the ESMS auditing and management review mechanisms discussed in Sections 12.7.4 and 12.7.5. The Livelihood Restoration Plan will also specifically require that PAPs be consulted during the monitoring processes so described.

- **Site Reclamation and Closure Plan** – this plan will include specific requirements for monitoring the completeness of required end-of-Project turbine demolition or removal actions, removal of other infrastructure, and the effectiveness of the restoration and re-vegetation of the reclaimed disturbed areas. Specific erosional issues associated with closed areas will be monitored, and if necessary, remediated.

All of the management/mitigation plans listed above will consider appropriate resources and source materials drawn from the Vestas Management System Manual (Vestas, 2015) and its supporting plans and procedures. Individual plans will be organized to emphasize end user effectiveness and unless other specific requirements are noted in the previous descriptions typically include:

- a clear statement of objectives or purpose;
- brief discussion of the relationship to the overall structure and purpose of the Project ESMS;
- regulatory and/or GIIP references, as applicable;
- roles and responsibilities of key personnel;
- specific measures, procedures, or practices to prevent or mitigate the environmental or social issues or impacts that are the primary focus of a given Plan;
- training requirements (see Section 12.5.2);
- any applicable inspection and/or monitoring requirements;
- any external or internal reporting requirements; and
- a brief discussion of applicable plan review, approval, and update (change management) protocols

Modifications may be periodically required to incorporate the results of regular environmental, social, and OHS risk reviews as discussed in Sections 12.3.2 and 12.3.3. Changes and modifications will be controlled per Section 12.1.3.

The ESMS Plan and the management/mitigation plans noted above may also require the support of various MSPs written to guide PETN and Vestas workers and subcontractor personnel in the day-to-day performance of specific activities. Development and implementation of these procedures will be led by either PETN or Vestas. As shown in Table 67, PETN will generally have responsibility for procedures that support project oversight or general administrative management functions, while Vestas-developed procedures will be more focused on day-to day Project operations. The greater portion of these procedures will be based on (or their development in some part will be supported by) templates or models already developed by Vestas for similar international projects.

Table 67 : Project Procedures

Number	Title	Lead	Template/Resources Reference[65]
MSP-01	"Grievance Mechanism"	PETN	• INS RSK-SBU-MEX "Grievance Mechanism V3" • Vestas Closing Report- "Grievance Mechanism"

[65] References and resources in this column will be provided from Vestas corporate resources.

Table 67 : Project Procedures

Number	Title	Lead	Template/Resources Reference[65]
MSP-02	"Employee and Contractor Training"	Vestas	• SUS TRA SAI, "Administrate Safety Awareness Induction" • SUS TRA TED, "Plan and Execute Sustainability Training and Education" • INS SUS TRA TED [MED] "Sustainability Training"
MSP-03	"Preparation, Review, Approval, and Update of Management System Procedures"	PETN	To Be Developed (TBD)
MSP-04	"ESMS Document Distribution and Control"	PETN	• Vestas procedures "Document and Record Lifecycle" and "Guidelines and Requirements to Document and Record Management"
MSP-05	"Management of Records"	PETN	• Vestas "Document & Record Management Policy" • Vestas procedures "Document and Record Lifecycle" and "Guidelines and Requirements to Document and Record Management"
MSP-06	"Field Inspections"	Vestas	• SUS-MEA-SCH "Plan and Perform (HSE) Safety Checks" • INS SUS MEA SCH [MED] "Checks and Inspections"
MSP-07	"Management of Non-conformances and Corrective/ Preventive Action"	Vestas	• Vestas Incident Management System
MSP-08	"Chance Archaeological Finds"	Vestas	• INS SUS ASM ENV [MED] "Cultural Heritage"
MSP-09	"Environmental and Social Footprint Surveys and Land Clearances"	Vestas	TBD
MSP-10	"Community Meetings"	PETN	• Implementation and Control Guideline Community Relations Wind Farms Under Construction
MSP-11	"Management of Stakeholder Communications"	PETN	• INS SUS COM EXC, "Manage E&OHS Communication with External Parties" • INS SUS COM EXC [MED] "Communication with External Parties"

Table 67 : Project Procedures

Number	Title	Lead	Template/Resources Reference[65]
MSP-12	"Bird and Bat Mortality Monitoring"	Vestas	• INS SUS ENV ASM [MED], "Wildlife Protection"
MSP-13	"Control of Erosion and Sedimentation"	Vestas	• INS SUS ASM ENV [MED] "Soil Protection"
MSP-14	"Environmental and Social Objectives, Targets, and Performance Improvement Action Plans"	PETN	• SUS ASM ENV "Map and Assess Environmental Aspects and Impacts"
MSP-15	"Legal and Regulatory Requirements Register"	PETN	• SUS ASM LOR "Monitor and Implement HSE Legal and Other Requirements"
MSP-16	"Compliance Verification Audits"	PETN	• QMA AUA PPA "Preparing and Performing Audits and Assessments"
MSP-17	"ESMS Audits"	PETN	• QMA AUA PPA "Preparing and Performing Audits and Assessments"
MSP-18	"ESMS Management Reviews"	PETN	• QMA MAR PMR "Performing Management Review"
MSP-19	"Project Safety Hazard Identification, Reporting, and Risk Assessment"	Vestas	• SUS ASM HRA "Identify Hazards and Assess Risks"
MSP-20	"Prevention of Communicable Diseases"	Vestas	TBD
MSP-21	"Personal Protective Equipment"	Vestas	• "Vestas Guideline: Personal Protective Equipment" • SUS IEM EMR, "Plan and Check Emergency Response"
MSP-22	"First Aid and Emergency Medical Response"	Vestas	• SUS IEM EMR, "Plan and Check Emergency Response"
MSP-23	"Operational Safety Meetings"	Vestas	• SER-SBM-SSS-OSM [MED] "Service Operations Safety Meetings" • SUS CMT SWM "Perform Safety Walk for Managers"
MSP-24	"Dust Suppression"	Vestas	• INS SUS ASM ENV [MED] "Air Emissions Control"
MSP-25	"Transportation Safety"	Vestas	• Vestas Corporate OHS Manual, Chapter 16, "Vehicles, Heavy Transport and Lifting Equipment"

Table 67 : Project Procedures

Number	Title	Lead	Template/Resources Reference[65]
MSP-26	"Handling and Storage of Hazardous Materials"	Vestas	• SUS CHM HCH "Handle Chemicals" • SUS-CHM-DNG "Manage Dangerous Goods" • INS SUS-CHM-HCH [MED] "Handling, Storage and Transportation of Chemicals"
MSP-27	"Welding and Cutting Safety"	Vestas	• Vestas Corporate OHS Manual, Chapter 07, "Fire Protection and Prevention"
MSP-28	"Electrical Safety/Lockout and Tagout Requirements"	Vestas	• SUS MET ELS "Manage Electrical Safety - Hazardous Energy"
MSP-29	"Working from Heights"	Vestas	• Vestas Corporate OHS Manual, Chapter 10, "Working at Heights"
MSP-30	"Vehicle Fueling and Spill Prevention"	Vestas	• SUS IEM EMR "Plan and Check Emergency Response"
MSP-31	"Fire Prevention Program"	Vestas	• Vestas Corporate OHS Manual, Chapter 07, "Fire Protection and Prevention" • SUS IEM EMR "Plan and Check Emergency Response"
MSP-32	"Site Security"	Vestas	• Vestas Site Security template

All procedures will be consider the minimum applicable requirements of the references noted in Table 65; they will be prepared with a level of detail commensurate with the phase of the project, the complexity of the task, current staffing levels, and the capabilities and experience of the workforce.

12.1.3 Change Management

This iteration of the ESMS Plan is prepared to support the start of the construction phase of the project; ESMS Plan adequacy and effectiveness will be evaluated and updates initiated for later phases of the Project, as appropriate, in response to the internal audit and management review processes described in Section 12.7.4 and 12.7.5. MSP preparation, review, approval, controlled distribution, and update requirements will be defined by MSP-03, "Preparation, Review, Approval, and Update of Management System Procedures." Latest approved versions of all levels of ESMS documents will be subject to controlled distribution in accordance with MSP-04, "ESMS Document Distribution and Control."

12.2 Policy

PETN has prepared three key policy statements for the Project that collectively define the Project's commitment to Corporate Social Responsibility:

- Corporate Social Responsibility Policy: Community Relations;
- Corporate Social Responsibility Policy: Human Resource; and
- Corporate Social Responsibility Policy: Environment, Health, and Safety.

These policy statements are included in Appendix A; they are benchmarked against the specific requirements of IFC PS 1, ISO 14001, and OHSAS 18001, and will be signed by PETN project officers and issued prior to the commencement of the construction phase. Taken in combination, these policies emphasize open communications and consideration of the social and environmental interests of affected communities and residents, regulatory authorities, the Project workforce, and other stakeholders. The suitability and effectiveness of these policies will be evaluated at least annually as part of the management review process described in Section 12.7.5. Corporate Social Responsibility (CSR) policy contents will also be communicated to the Project workforce through periodic human resources, social, environmental, and OHS awareness training (see Section 12.5.2), and by visual posting of the policy documents in key locations at the Project site. Vestas and other Project contractors will also be advised on applicable CSR policy requirements through their individual procurement documents, as noted in Section 12.4.3.2. Copies of these policies will also be distributed in response to specific requests for information, or as may otherwise be directed by Project management.

12.3 Identification of Risk and Impacts

12.3.1 Legal and Other Requirements

The Project will maintain understanding of the full scope of legal and regulatory requirements that apply to all phases of the Project life cycle, as well as any associated planning, operating, monitoring, or reporting requirements. Prior to the initiation of the major construction phase of the Project, however, procedure MSP 15, "Legal and Regulatory Requirements Register" will be implemented in order to provide guidance for routinely integrating required permitting actions into the advance planning and scheduling of construction and regular operations of the wind farm. This understanding will be considered in the risk and impact evaluation process described in Section 12.3.2. MPS-16 will also provide for the development and regular update of a Project-specific register of regulatory requirements, as well as other voluntary lender and industry-specific standards that PETN will adopt for this Project (e.g., applicable IFC Performance Standards and EHS Guidelines). MPS-16 will also require that the Project establish and maintain access to appropriate information sources as the means to identify new or modified regulatory requirements that may affect any phase of Project operations.

As noted in Section 12.7.2.2, after the initiation of the major construction phase, the Project's regulatory compliance status will be subject to an internal verification audit on at least an annual basis in accordance with MSP-16, "Compliance Verification Audits." Any compliance issues that may be detected in the verification audit process will be formally resolved in accordance with MSP-08, Management of Non-conformances and Corrective/Preventive Action".

12.3.2 Social and Environmental Aspects and Impacts, Risk Assessment, and Risk Management Planning

The social and environmental impacts identified in the Project ESIS Addendum will be summarized and documented in a project-specific list or register, which will be evaluated on at least an annual basis in accordance with MSP-15, "Environmental and Social Impacts, Objectives, Targets, and Performance Improvement Action Plans." MSP-15 will be designed to address the identification of new impacts or any subsequent additions or modifications to the results of the Project ESIS Addendum that may be prompted by changes in environmental or operational conditions, lender requirements or other stakeholder interests, regulatory requirements, or other relevant changes. The input provided by local/external stakeholders will also be identified and specifically considered in the evaluation of social and environmental aspects and impacts. Any necessary changes in the aspects/impacts register will be reflected in appropriate modifications or additions to the Project's management/mitigation plans or other performance improvement measures, as discussed in Section 12.4.3 and MSP-14, .

12.3.3 Occupational Health and Safety Hazard Identification, Risk Assessment, and Risk Management Planning

As noted in Table 67, PETN and Vestas will develop an initial group of OHS-related MSPs to address predicted hazards and OHS risks. Work area-specific risks that will need to be addressed as the Project progresses will be evaluated and documented in a periodically updated register of risks and mitigation measures, in accordance with MSP-19, "Project Safety Hazard Identification, Reporting, and Risk Assessment." The results of this periodic evaluation will form the basis of the OHS component of an ongoing performance improvement program, which will be implemented at the start of construction. Hazards or unsafe conditions that may be observed will be investigated and considered, as appropriate, in updates or additions to affected management/mitigation plans. Should additional MSPs be required to address newly observed conditions or other planning needs, they will be developed in accordance with MSP-03, "Preparation, Review, Approval, and Update of Management System Procedures."

12.4 Management Programs

12.4.1 Environmental, Social, and Health & Safety (ESHS) Objectives, Targets, and Performance Improvement Action Plans

At the start of the construction phase of the Project and on at least an annual basis thereafter, performance objectives and targets will be set in an effort to further minimize or mitigate the environmental and social impacts described in Section 12.3.2, as well as any identified OHS hazards and risks as discussed in Section 12.3.3, over and above the measures that may already be in effect in existing management/mitigation plans or MSPs. This process will be documented in MSP-15, "Environmental and Social Impacts, Objectives, Targets, and Performance Improvement Action Plans", and will be designed to ensure that objectives and targets are prioritized for improvement action on the basis of:

- the relative significance of their associated impacts;
- the presence or absence of specific regulatory, stakeholder, or OHS issues; and
- the presence, adequacy, or effectiveness of current management/mitigation plans or MSPs.

12.4.2 ESHS Performance Improvement Management Program/Management/mitigation plans

At the start of the construction phase, PETN will implement an annual social, environmental, and OHS performance review and improvement process that updates management/mitigation plans to address specific impacts or undertake specific performance improvements, based on the performance objectives and targets discussed in Section 12.4.1 and MSP-15, "Environmental and Social Impacts, Objectives, Targets, and Performance Improvement Action Plans." MSP-15 will require that technical guidance and appropriate scheduling information be provided for each performance improvement action. Current regulatory requirements (see Section 12.3.1) and communications from external stakeholders (see Section 12.8.1) will also be considered in the process of preparing and updating individual management/mitigation plans. Progress toward the completion of the improvement actions so defined will be monitored as described in Section 12.7.2.1 of this ESMS Plan. Final review and approval of specific performance improvement actions will be conducted as part of the annual management review process described in Section 12.7.5.

12.4.3 Operational Control

12.4.3.1 Management of Social and Environmental Impacts

As noted in Section 12.4.2 and Table 66, a series of detailed management/mitigation plans will be developed to address those areas of Project operations for which the ESIA process has indicated that potentially significant environmental and social impacts are known to exist, or could potentially occur in one or more phases of the Project life cycle. Where necessary, these management/mitigation plans will be supported by MSPs. All such documents are subject to periodic evaluation, refinement, and update in response to changing regulations, process changes or improvements, or other change requirements, in accordance with the processes described in Section 12.1.3.

The specific environmental impacts associated with any field investigation or preliminary construction activity that involves a surface disturbance will be identified, documented, and appropriately mitigated in accordance with the process that will be defined in MSP-09, "Environmental and Social Footprint Surveys and Land Clearances." MSP-09 will specifically require the identification, flagging, protection, documentation, reporting, and controlled investigation of environmentally sensitive areas or species. MSP-08, "Chance Archaeological Finds" will be invoked if artifacts or structures with potential archaeological, historical, or cultural value are identified in a footprint survey. Also, as discussed in Section 12.3.2, at the start of the construction phase, the Project will also commence an annual evaluation of the OHS hazards and risks associated with its operations, in accordance with procedure MSP-19, "Project Safety Hazard Identification, Reporting, and Risk Assessment." The results of this evaluation may prompt OHS performance improvements as described in Section 12.4.2, or updates or additions to the MSPs or management/mitigation plans listed previously. Hazardous or unsafe conditions that may be observed in the course of the Project are to be documented in accordance with MSP-19, investigated, and, if appropriate, also considered in updates or additions to the management/mitigation plans and/or MSPs. Additional procedural controls may be established for newly observed conditions, as appropriate, in accordance with MSP-03, "Preparation, Review, Approval, and Update of Management System Procedures."

12.4.3.2 Control of Contractor Operations

PETN and Vestas purchasing or contracts staff will co-ordinate with the Vestas Environmental and OHS Managers as necessary to ensure that appropriate environmental, OHS, and safety behavioral controls are included in the purchase orders or contracts issued to suppliers and contractors. PETN policy, management/mitigation plan, or MSP requirements may be invoked directly without modification, or selected requirements may be invoked as appropriate for the nature of the procurement and the capabilities of the contractor. Contractor training needs will also be defined as appropriate. Other appropriate contractual requirements will be invoked to ensure that the delivery of hazardous materials as well as non-hazardous materials and equipment or other contractor operations do not negatively impact the regulatory compliance status of the Project or compromise the effectiveness of the ESMS. Contractor staff may be requested to participate in emergency response drills or other training exercises, at the discretion of the Environmental/OHS Managers; participation requirements will be incorporated in the governing procurement document.

12.5 Organizational Capacity and Competency

12.5.1 Structure and Responsibility

Figure 28 depicts the organization of key ESMS implementation roles during the construction phase of the Project.

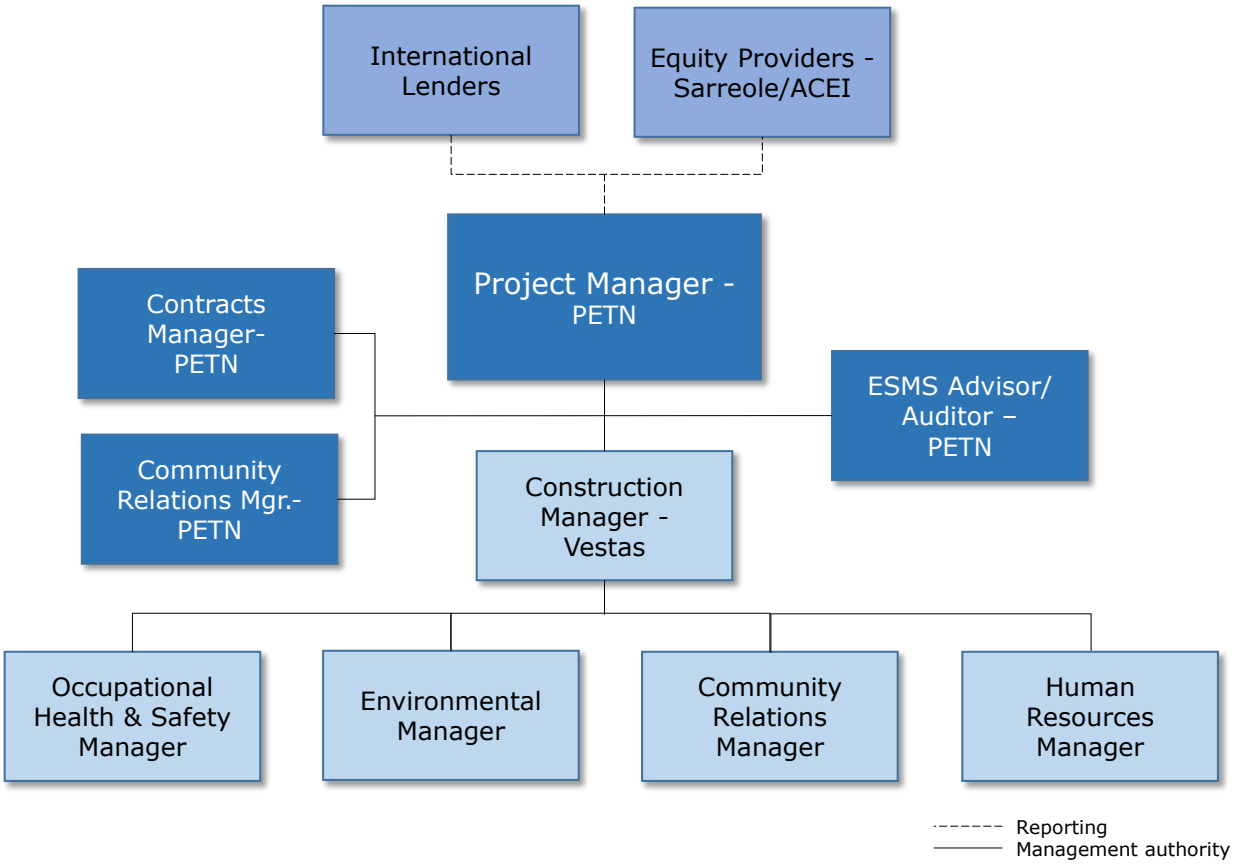


Figure 28 : ESMS Organizational Chart – Construction Phase

Individually and collectively, all Project employees are responsible for:

- working safely, within the guidelines and requirements established by this ESMS Plan and the supporting Management/mitigation plans and procedures cited herein ;
- supporting the environmental, social, and OHS policies established for the Project in the day to day performance of their work;
- notifying their supervisors, the Environmental Manager, or the OHS Manager of any observed spills, equipment malfunctions, unsafe or unhealthy situations, improper environmental practices, or other issues that could represent a nonconformance with the requirements this ESMS Plan.

Other specific responsibilities associated with the key positions noted in Figure 28 are summarized as follows:

- **Project Manager - PETN:** The PETN Project Manager will have overall responsibility for successful completion of Project activities in the manner described in this ESMS Plan and the supporting management/mitigation plans and MSPs described herein, and will serve as PETN's primary liaison contact with the Vestas Construction Manager and management staff. The PETN Project Manager will also assume a lead role in the investigation and resolution of any community relations or labor grievance that may occur in the course of the Project.
- **Contracts Manager - PETN:** The PETN Contracts Manager, among their other responsibilities, will work with the ESMS Advisor/Auditor to ensure that appropriate elements of the ESMS Plan are reflected in the Vestas contract in particular, and to other contractor procurement documents as appropriate for the goods or services provided.
- **ESMS Advisor/Auditor - PETN:** The PETN ESMS Advisor/Auditor will work with the Contracts Manager to ensure that appropriate elements of the ESMS Plan are reflected in the Vestas contract in particular, and to other contractor procurement documents as appropriate for the goods or services provided. The ESMS Advisor/Auditor will also be responsible for coordinating or conducting the compliance verification, internal audit, and management review processes described in Sections 12.7.2.2, 12.7.4, and 12.7.5, as well as serving as an overall technical resource to the Vestas Environmental and OHS Managers with respect to ESMS implementation.
- **Community Relations Manager - PETN:** The PETN Community Relations Manager will be responsible for overseeing the activities of the Vestas Community Relations Manager and the overall implementation of the Vestas Stakeholder Engagement Plan. The Community Relations Manager will also coordinate with the PETN Project Manager and the Vestas Community Relations Manager in the investigation and resolution of any community grievances or other issues that involve local communities or external stakeholders.
- **Construction Manager:** The Vestas Construction Manager will be responsible for overseeing day-to-day environmental clearance and/or construction activities. These duties include review of construction reports to monitor progress and issues encountered, and in providing the resources and otherwise assisting the Environmental and Health and Safety Officers in the timely resolution of any observed health, safety, and environmental (HSE) issues.
- **Environmental Manager**: The Vestas Environmental Manager will be responsible to the Construction Manager and the PETN Project Manager for administering the environmental aspects of the ESMS, and will participate in the review, approval, and as

necessary, update or modification of this ESMS Plan and supporting management/mitigation plans and MSPs in response to changing project conditions. The Environmental Manager will also be responsible for the regular monitoring of project activities to ensure continuing compliance with this ESMS Plan; see Section 12.7. The Environmental Manager will provide input to periodic HSE monitoring reports, and may also conduct focused inspections of specific environmental issues at the request of the Construction Manager or the PETN Project Manager or ESMS Advisor/Auditor.

- **OHS Manager:** The Vestas OHS Manager will be responsible to the Construction Manager and the PETN Project Manager for administering the OHS aspects of the ESMS, and will participate in the review, approval, and as necessary, update or modification of this ESMS Plan and supporting management/mitigation plans and MSPs in response to changing project conditions. The OHS Manager will also be responsible for periodic monitoring of project activities to ensure continuing compliance with the OHS elements of the ESMS Plan. The OHS Manager will also provide input to HSE monitoring reports, and may also conduct focused inspections of specific health and safety or social/community relations issues at the request of the Construction Manager or the PETN Project Manager or ESMS Advisor/Auditor.
- **Community Relations Manager:** The Vestas Community Relations Manager will be responsible for managing interactions with local communities with respect to public health and safety, security, and other social concerns as defined in the Stakeholder Engagement Plan. The Community Relations Manager will also coordinate with the PETN Community Relations Project Manager in the investigation and resolution of any community grievances or other issues that involve local communities or external stakeholders
- **Human Resources Manager:** The Vestas Human Resources Manager will assist the Construction Manager in the resolution of any workforce concerns or complaints that may be encountered in the course of the Project. The Human Resources Manager will also support the PETN Project Manager in the investigation and resolution of any labor grievances that may occur in the course of the Project.

12.5.2 Training, Awareness, and Competence

The Project workforce will be provided appropriate types and levels of training in accordance with MSP-03, “Employee and Contractor Training.” Training subjects and methods will be selected that are commensurate with routine and emergency work assignments, as well as any OHS hazards or environmental and social impacts that may be associated with those assignments. Training methods will be selected based on job descriptions and the experience and qualifications of the employee. At a minimum, all employees and new hires will receive awareness training that (as appropriate for the phase of the Project) addresses:

- community relations, human relations, and HSE policy commitments (see Section 12.2 and Annex U);
- the significant social and environmental impacts of the Project and the measures that will be employed to manage or mitigate such impacts;
- the major OHS hazards likely to be encountered in the construction and operation of the Project, and how to avoid such hazards or mitigate the associated risks (see MSP-20, “Project Safety Hazard Identification, Reporting, and Risk Assessment”); and
- any significant regulatory or community stakeholder concerns that must be considered in day-to-day operations (see MSP-01, “Grievance Mechanism” and MSP 12, “Management of Stakeholder Communications”).

Refresher training will be provided to all staff on at least an annual basis. Additional training on specific management/mitigation plans or MSP requirements will be provided as appropriate for individual work assignments. Training requirements specifically applicable to suppliers or contractors will be defined within the context of individual contracts or purchase orders as discussed in Section 12.4.3.2.

12.6 Emergency Preparedness and Response

The Emergency Preparedness and Response Plan will be designed to minimize the potential for accidents and emergency situations during the construction and operations phases of the Project.

The Emergency Preparedness and Response Plan will be developed in conjunction with the other management/mitigation plans noted in Section 12.4.2, and will be reviewed and if necessary updated on at least an annual basis. The Emergency Preparedness and Response Plan will identify key emergency-related roles and responsibilities, and will provide direction on required responses to operational or environmental emergencies. The Emergency Preparedness and Response Plan will also be supported by several key MSPs, including:

- MSP-02, “Employee and Contractor Training”
- MSP-19, “Project Safety Hazard Identification, Reporting, and Risk Assessment”
- MSP-22, “First Aid and Emergency Medical Response”
- MSP-23, “Operational Safety Meetings”;
- MSP-31, “Fire Prevention Program” and
- MSP-32, “Site Security.”

The Emergency Preparedness and Response Plan will also contain requirements for periodic tests and drills to ensure that necessary response actions are understood by PETN’s designated rescue team, other Project staff, contractors, and, as appropriate for the given location, community emergency response personnel. In addition to the emergency notification requirements addressed in the Emergency Preparedness and Response Plan, the circumstances and response actions associated with any significant spills, releases, accidents, near-misses, or other emergency situations for which the Project has direct responsibility will be documented and investigated, and appropriate corrective and preventive actions will be taken in conformance with Section 12.7.3 and MSP-07, “Management of Non-conformances and Corrective/Preventive Action.” Preventive actions in such cases will require a mandatory review of the adequacy and effectiveness of the Emergency Preparedness and Response Plan and its supporting procedures, and subsequent updates as warranted by the results of the review.

12.7 Monitoring and Review

12.7.1 ESMS Records

Records generated as output from the implementation of the ESMS Plan and its supporting plans and procedures will be filed and maintained by administrative staff under the direction of the Environmental Manager, in accordance with procedure MSP-05, "Management of Records." MSP-05 will define records organization, retention, and storage and retrieval requirements, as well as access control and other requirements designed to preserve the accessibility and integrity of records.

12.7.2 Monitoring and Measurement

12.7.2.1 ESMS Monitoring

Specific ESMS monitoring considerations may be addressed in individual management/mitigation plans and supporting MSPs. However, a comprehensive Project Environmental Monitoring Plan will also be developed to capture all of the specific monitoring needs identified in these documents and the final ESIA for the Project. The Environmental Monitoring Plan will provide for the development and maintenance of a spreadsheet documenting the planning, execution, and reporting actions associated with the environmental monitoring requirements that will apply in the construction, operation, decommissioning/closure phases of the Project. The sources of these requirements may include:

- environmental, social, and OHS monitoring parameters that may be identified by Senegalese regulations;
- progress monitoring requirements associated with the performance improvement process described in Section 12.4; and
- other specific environmental monitoring requirements established by individual management/mitigation plans.

Maps depicting monitoring locations for surface water flow and water quality, groundwater levels, groundwater quality and meteorological information, as appropriate for the construction phase of the Project will be included in the initial iterations of the Environmental Monitoring Plan. Appropriate updates shall be made as the Project proceeds from construction to operation and eventually, decommissioning and closure. Specific sampling and monitoring procedures and required laboratory analytical procedure requirements will be invoked by reference.

Non-conformances noted in monitoring activities will be resolved through the corrective and preventive action process discussed in Section 12.7.3. The Environmental Monitoring Plan will also describe the preparation and independent review, approval, and issue of an annual performance monitoring report that will be submitted to PETN as well as the International Lenders and Equity Providers to the Project (see Figure 28). Consideration of the annual performance monitoring report results will represent a major component of the management review process described in Section 12.7.5.

12.7.2.2 Regulatory Compliance Verification Audits

No later than one year after the commencement of the construction phase (and annually thereafter), the PETN Project Manager will request that the ESMS Advisor/Auditor conduct

or coordinate a detailed verification of Project compliance with applicable regulations, in accordance with MSP-17, "Compliance Verification Audits" as described in Section 12.3.1. Audits may be conducted by PETN or Vestas personnel or qualified contractors, subject to the functional independence, training, and qualification requirements that will be noted in MSP-16. The current version of the regulatory requirements list developed in accordance with Section 12.3.1 will be used as a primary reference for the audit, and audit results will be considered in any subsequent updates. Any non-conformances will be promptly documented and resolved as required by Section 12.7.3 and MSP-07, "Management of Non-conformances and Corrective/Preventive Action."

12.7.2.3 ESHS Performance Measurements

After the initiation of the construction phase, the Project will conduct an annual evaluation of OHS hazards and risks, in accordance with MSP-19, "Project Safety Hazard Identification, Reporting, and Risk Assessment." Per MSP, evaluated documents will include corrective and preventive action records generated for significant near-misses and/or accidents that occurred in the previous year, as well as the number of OHS training sessions conducted, the number of staff trained in comparison to the average annual employment level, and records of specific physical improvements to infrastructure made to correct OHS deficiencies or other OHS-related purposes. The results of this evaluation will form the basis of the OHS component of the performance improvement program described in Section 12.4.2, and will also be reported to management as part of the performance data required by the management review process discussed in Section 12.7.5.

12.7.3 Non-conformance Reporting and Corrective and Preventive Action

All Project staff are responsible for bringing suspected non-conformances, spills or releases of potentially hazardous wastes or materials, or other existing or potential emergency situations to the immediate attention of their supervisor or the Environmental or OHS Managers for evaluation. In addition to the specific response actions that may be required by individual management/mitigation plans or the current Emergency Preparedness and Response Plan (see Section 12.6), such situations will be promptly evaluated, documented, and thoroughly investigated, and appropriate management actions will be taken in accordance with the corrective and preventive action processes that will be described in MSP-07, "Management of Non-conformances and Corrective/Preventive Action."

In addition to direct observation, the requirements of MSP-07 will also be invoked for the resolution of non-conformances identified through external stakeholder communications (see Sections 12.8.1 and 12.9.1); periodic regulatory compliance verifications (see Section 12.7.2.2); annual internal ESMS audits (see Section 12.7.4); or external inspections or audits conducted by or at the request of regulatory agencies or other external stakeholders.

Non-conformances are defined as conditions that PETN and Vestas can control or substantially influence that:

- are contrary to PETN's CSR policy commitments (see Section 12.2 and Appendix A);
- can be classified as accidents or significant near-misses;
- violate a legal or regulatory requirement, or represent a worsening condition that could result in a violation if not corrected;
- could potentially result in negative environmental or social impacts to the Project; or
- represent a lack of conformance with this ESMS Plan or its supporting management/mitigation plans and procedures.

If a non-conformance is judged to exist, Corrective/Preventive Action Requests (CPARs) will be initiated and tracked until closure in accordance with MSP-07. CPAR documents and tracking logs are considered to be key ESMS performance records and will be maintained as described in Section 12.7.1 and MSP-05, "Management of Records." CPAR information will be routinely evaluated, as appropriate, in the planning of regulatory compliance verification audits, internal ESMS audits (see Section 7.4), and management reviews (Section 12.7.5).

12.7.4 Internal ESMS Audits

After the start of the major construction phase, a comprehensive internal audit of the functionality and effectiveness of the ESMS will be performed at least every two years in accordance with MSP-17, "ESMS Audits." MSP-17 will be based on ISO 1901166, a combined environmental/quality management system auditing standard that is cited by both ISO 14001 and OHSAS 18001. Audit responsibilities will be assigned to properly qualified personnel and/or independent contractors or consultants who are functionally independent from the operational areas being audited. Additional audits may be performed at the discretion of PETN's senior management. Any non-conformances detected in the audit process will be resolved in accordance with MSP-07, "Management of Non-conformances and Corrective/Preventive Action."

12.7.5 Management Review

After the beginning of the construction phase, the PETN Project Manager will request the performance of an internal management review of the overall suitability and effectiveness of the Project ESMS, in accordance with MSP-18, "ESMS Management Reviews." Such reviews will involve the independent examination of several layers of environmental, social, and OHS performance information, developed through the routine implementation of this ESMS Plan and its supporting management/mitigation plans and MSPs. This information will be assembled by or at the direction of the Vestas Environmental and OHS Managers, and will include:

- open and closed C/PARs generated from the reporting of environmental, social, or OHS-related non-conformances, periodic regulatory compliance audits, monitoring trends or results, internal ESMS audits, or inspections or evaluations that may have been conducted by regulatory agencies, lending institutions, equity partners, or other external organizations;
- known or potential environmental and social issues and the concerns of interested parties, as documented in current communication logs and supporting correspondence (see Sections 12.8 and 12.9 and MSP-01, "Grievance Mechanism");
- environmental, social, and OHS performance monitoring results, or other reports or information collected to assess progress towards the completion of specific mitigation measures or performance improvement actions;
- reports from previous management reviews conducted in accordance with this Section; and
- other pertinent information.

This information will be evaluated against the requirements of the current versions of PETN CSR policy documents (see Appendix A) and the current regulatory requirements register (see Section 12.3.1). Any anticipated changes in regulatory compliance requirements, facility changes, organizational changes, or new directives that potentially affect the

[66] See ISO 19011:2002, *Guidelines for quality and/or environmental management systems auditing*; (International Organization for Standardization, 2002).

company's environmental, social, and/or OHS management practices will also be considered.

The management review will be documented in report format, and, as appropriate, will include specific recommendations for ESMS improvements, external sharing or publication of annual monitoring report results, or other appropriate management actions. It will be presented to PETN's Project Manager for final review and approval. Recommended performance improvement tasks will be documented that address any required ESMS Plan, management/mitigation plan, or MSP updates; policy modifications; external communications; or other appropriate improvement actions.

If previously undetected non-conformances are observed in the management review process, they will be documented and resolved as discussed in Section 12.7.3.

12.8 Stakeholder Engagement

12.8.1 Stakeholder Analysis and Engagement Planning

PETN and Vestas will prepare a comprehensive Stakeholder Engagement Plan which will be developed, approved, and issued prior to the Project's construction phase, and will remain in effect over the life of the Project. General protocols for documenting and managing complaints from stakeholders will be managed in accordance with MSP-01, "Grievance Mechanism", in order to ensure that any stakeholder complaints or inquiries detected are documented and brought to the attention of management and properly considered as the Stakeholder Engagement Plan is developed. Additional MSPs will be issued in support of the Stakeholder Engagement Plan; these will include:

- MSP-32, "Site Security", which will address general site security issues, as well as appropriate actions to be taken in direct encounters with individuals or groups who may be trespassing or are engaged in illegal activities; and
- MSP-19, ""Project Safety Hazard Identification, Reporting, and Risk Assessment", which will include guidance on handling potential hazards to members of the local communities who may grow crops or graze cattle on the Project site or transient groups or individuals that may be encountered in the Project area.

12.8.2 Disclosure of Information

As noted in Section 12.8.1, a comprehensive Stakeholder Engagement Plan will be developed prior to the start of construction that will incorporate the social management themes reflected in the latest Project ESIA, including specific requirements for the disclosure of Project information. Should unauthorized individuals be directly encountered in the field, MSP-32, "Site Security" will require that all such contacts be documented and appropriate hazard avoidance measures be implemented.

12.8.3 Informed Consultation and Participation

As noted in Section 12.8.1, a comprehensive Stakeholder Engagement Plan will be prepared and implemented. Pursuant to Stakeholder Engagement Plan requirements, community information and consultation meetings will be periodically conducted. Should either community information and consultation meetings or any community health and safety awareness meetings result in specific complaints or information requests, they will be documented and referred to management for follow-up in accordance with MSP-01, "Grievance Mechanism" or MSP-11, "Management of Stakeholder Communications", as appropriate for the circumstances.

12.8.4 Indigenous Peoples

It is assumed that the requirements of Section 32 of PS 1 (which require obtaining "Free, Prior, and Informed Consent") will not apply, as no indigenous peoples will be impacted by the Project. Should the Project receive specific complaints or information requests, they will be documented and referred to management for appropriate follow-up in accordance with MSP-01, "Grievance Mechanism."

12.8.5 Private Sector Responsibilities under Government-Led Stakeholder Engagement

It is assumed that the requirements of Section 33 of PS 1 will not apply, as stakeholder engagement is understood to be a PETN/Vestas responsibility, and is not specifically reserved for the Government of Senegal.

12.9 External Communications and Community Grievance Mechanism

12.9.1 External Communications

As noted in Section 12.8.1, a comprehensive Stakeholder Engagement Plan will be developed prior to the start of the construction phase of the Project. The Stakeholder Engagement Plan will incorporate MSP-11, "Management of Stakeholder Communications" for responding to basic information requests and suggestions from external stakeholders, and for communicating information about the Project to stakeholders on an ongoing basis. MSP-11 will require appropriate responses to all stakeholder inquires; responses to more complex information requests and notifications of specific concerns and grievances as defined by the IFC PSs will be managed as described in Section 12.9.2.

12.9.2 Grievance Mechanism to Affected Communities

As previously noted, a comprehensive Stakeholder Engagement Plan will be developed prior to the start of construction. The Stakeholder Engagement Plan will incorporate MSP-01, "Grievance Mechanism" specifically for the review and management of responses to all complex information requests, concerns, and grievances as defined by the IFC PSs.

12.10 Ongoing Reporting to Affected Communities

As many of the management/mitigation plans discussed in Section 12.1.2 will not be fully implemented until the start of the construction phase, formal reporting to affected communities on the overall effectiveness of the ESMS in the management and mitigation of the environmental and social aspects of the Project will occur at the end of the first year of major construction activities. Reporting requirements will be elaborated in the Project Stakeholder Engagement Plan.