

INTER-AMERICAN DEVELOPMENT BANK

MEXICO

MARENA RENOVABLES WIND POWER PROJECT

(ME-L1107)

ENVIRONMENTAL CATEGORY: A

**ENVIRONMENTAL AND SOCIAL MANAGEMENT REPORT
(ESMR)**

21 November, 2011

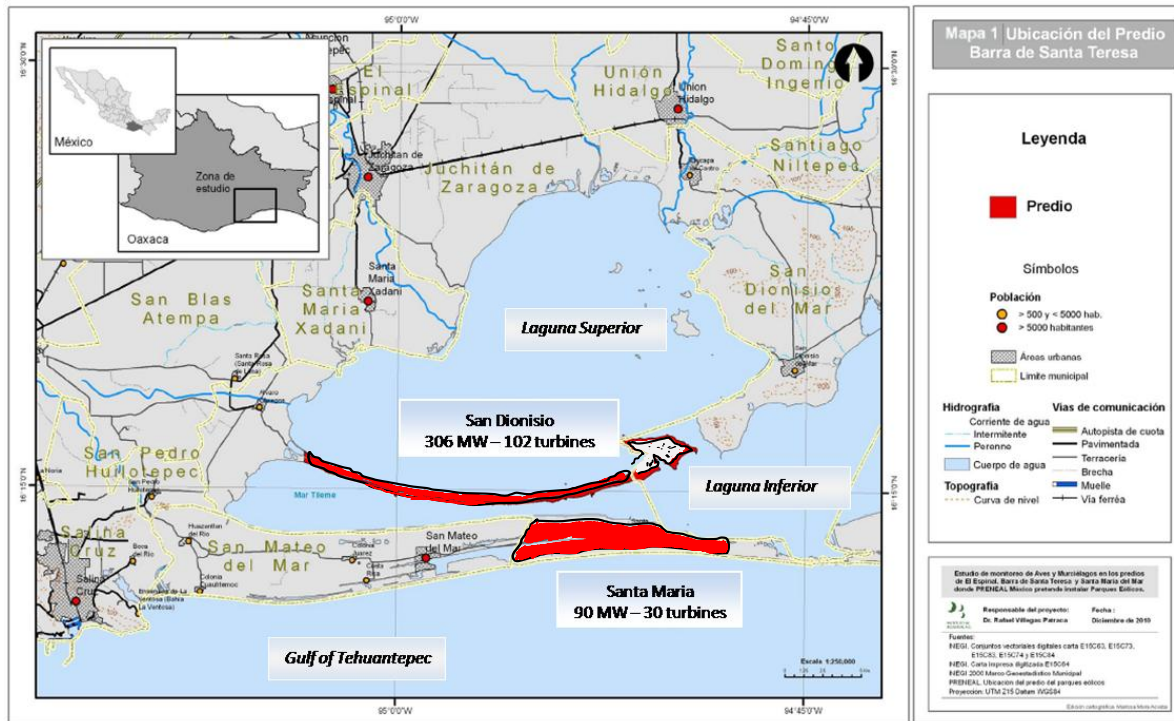
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I. INTRODUCTION

1. **Overview of the Operation.** The proposed Mareña Renovables Wind Power Project (the Project) involves the financing of a wind park with a total capacity of 396 MW constructed over two adjacent land areas, San Dionisio del Mar (306 MW) which is located in an area referred to as *Barra Santa Teresa* and Santa Maria del Mar (90 MW) located in the Isthmus of Tehuantepec in the State of Oaxaca, Mexico (Fig. 1). The Project is being developed by *Fomento Económico Mexicano, S.A.B. de C.V. (FEMSA)*, Macquarie Asset Finance Limited (a subsidiary of Macquarie Capital Group Limited) and Macquarie Mexican Infrastructure Fund, with FEMSA and Macquarie Capital planning to sell their stakes in the Project to a party acceptable to IDB and the other lenders at Financial Close. Total project cost is approximately 14 Billion Mexican Pesos (including related VAT), the IDB has been approached to finance up to 750 million Mexican pesos.

Figure 1. Project location



II. OPERATION DESCRIPTION

2. The Project includes the following components : (1) erection of 132 Vesta wind turbines generators with a nominal capacity of 3 MW each (102 turbines in San Dionisio, 30 turbines in Santa Maria); (2) construction of three substations: Virgen del Carmen in Santa Maria, Tileme in San Dionisio which will be connected through the installation of a submarine cable (less than 1 km long) and, one substation in Santa Teresa (Fig. 2); (3) construction of a 52 km transmission line from Santa Teresa substation to the substation in Ixtepec to be connected to

the national grid (Fig. 2); (4) installation of six docking stations to facilitate maritime access to both sites; and (5) civil engineering works such as construction of new access roads and improvement of existing ones.

3. **Wind turbines characteristics.** The Vesta V90 3 MW turbines correspond to state of the art design to optimize energy production and minimize energy costs. These types of turbines are equipped with anti-corrosion treatment as the project is located within a salty environment. The wind turbines hub height is 80 m and the blades are 40 m long, all turbines will be located approximately 230 m apart. Each turbines will occupy an area of 0.024 ha (foundation) and an additional 0.2 ha of area cleared of vegetation is required per turbines for service and maintenance. As such a total area of 22.848 ha will be occupied by the turbines in San Dionisio and 6.72 ha in Santa Maria.
4. **Substations.** A total of three substations will be constructed for the project: Virgen del Carmen, Tileme and Santa Teresa. The Ixtepec substation is also a new substation but will serve as the point of connection to the national grid of CFE (*Comission Federal de Electricidad*), this substation followed a separated regulatory process. Each substation will occupy an area of 6 ha. The substation Virgen del Carmen and Santa Teresa will be connected through an underground submarine cable of less than 1 km that will cross the lagoon (Fig.2).
5. **Transmission Line.** From the onsite electrical substation in Santa Teresa, a 52 km-long, 220-kV transmission line will connect the Project with the Mexican National grid at the existing Ixtepec substation. The acquisition of right of way for the line (about 25 meters) has started in March 2011 and is expected to be completed prior to financial close. A total of 182 out of 191 negotiations with communal and private landowners have reached acceptance status.
6. **Docking stations.** A total of six docks (jetty) will be built for the project. One will be installed in Santa Maria while five will be erected on the northern side of la *Barra Santa Teresa*. All of these docks will have a length of 4 m and a width of 30 m; all will be made of concrete and reinforced with steel bars. These docks will provide a maritime access to both sites for the transportation of the wind turbines and other equipment.
7. **Access roads.** Road widening and improvement for heavy transport access near Alvaro Obregon community will be required for the construction phase. The construction of new roads needed for the project will be less than 3 km (mostly in the *Barra Santa Teresa*) and will not be asphalted.
8. The project does not contemplate the installation of a workers camp. It is estimated that the bulk of the workforce would be local workers coming from the surrounding communities. During construction, it is expected that the Project will require about 300 workers while 30 workers will be needed during the operational phase which is estimated to be 30 years.
9. **EIA studies.** Two Environmental Impact Assessment studies for both wind farms were completed in June 2009. SEMARNAT authorized the project but set up a set of conditions which are in the process of being fully met by the company (expected date November 2011).

One of the conditions relates to the submission of additional studies such as a Birds and Bats monitoring study covering a one year period, baseline studies and preparation of conservation plans for the marine turtles; the Tehuantepec Jackrabbit (*Lepus flavigularis*); and the cinammon-tailed sparrow (*Aimophila sumichrasti*). All these studies have been delivered to SEMARNAT between March and June 2011 and as such were reviewed during the due diligence process for this operation. Specific additional social studies such as stakeholder identification, risk analysis of conflicts, were also realized by a firm with social expertise retained by the Company. Additional baseline studies on fishing activities are also in the process of being finalized.

Figure 2. Transmission line route, location of substations and submarine cable



III. ENVIRONMENTAL AND SOCIAL CONDITIONS

10. General Setting. The Project is located in the region of the Tehuantepec Isthmus in the State of Oaxaca where wind resources are among the best in the world due to a mountainous topography that levels off at a point where the land mass tapers down to a narrow isthmus.

This creates a natural wind tunnel for air currents flowing between the Gulf of Mexico and the Pacific Ocean. As a result of these excellent wind conditions, development of wind energy projects in the region is attractive, and several large-scale projects are either in planning, under construction or already in operation such Eurus and La Ventosa who benefited from a financing by the Bank in 2009.

11. Both areas set aside for the wind farms consist of two thin strips of land, known as the *Barra Santa Teresa* and the peninsula of San Mateo and Santa Maria. These strips of land are found between the *Laguna superior* and *Inferior* and the Gulf of Tehuantepec (Fig. 1), the lagoons are intermittently connected to the Pacific Ocean and the overall area is often referred as an inner sea. Both sites have been severely affected by anthropogenic activity such as urbanization, agriculture, small-scale salt extraction and cattle grazing. Both sites contain some patches of deciduous tropical forest, spiny forest, halophyte vegetation, aquatic and sub aquatic vegetation, mangroves and sandy areas (Fig. 3, Fig. 4, Fig.5, Fig. 6).

Figure 3. Mangroves along the shore in Santa Maria



Figure 4. Cattle grazing area, Santa Maria



Figure 5. Vegetation patches in Santa Maria



Figure 6. San Dionisio, sandy bar



12. Definition of the Project's areas of influence. The Project's *direct area of influence* (Fig.7) is the area which will be directly impacted by Project's construction and operation. This area comprises two Huave indigenous communities: San Dionisio del Mar and Santa Maria del Mar located in the Mareño area.

- **San Dionisio del Mar.** According to the Environmental Impact Assessment Studies (EIA), there are 4,931 inhabitants of this community, of whom 2,480 are men and 2,451 are women; 2,639 speak an indigenous language. Although there is subsistence agriculture and cattle ranching, the main activity is fishing. Fish and shrimp are mainly traded through intermediaries from Juchitán and Arriaga (State of Chiapas). The economically active population is estimated at 1,465 people: 1,446 primary sector, 146 in the secondary, and 243 in the tertiary sector. There is a "salt farm" in the area, which is

privately owned. Across the water, San Dionisio Pueblo Viejo, located in the eastern tip of the *Barra de Santa Teresa*, has 94 inhabitants, of which 52 are men and 42 women according to official figures from 2005; 56 are older than 18 years. Currently, it is estimated that the total population may be about 150 people.

- ***Santa Maria del Mar.*** Located at the end of the approximately 40km long peninsula, Santa Maria is a community part of Juchitán Municipality. It is estimated that about 1,300 people inhabit this community. In addition to fishing and subsistence agriculture, the main activity is shell-based handicrafts.
- The right of way of the 52 km transmission is also considered as part of the direct area of influence of the project.

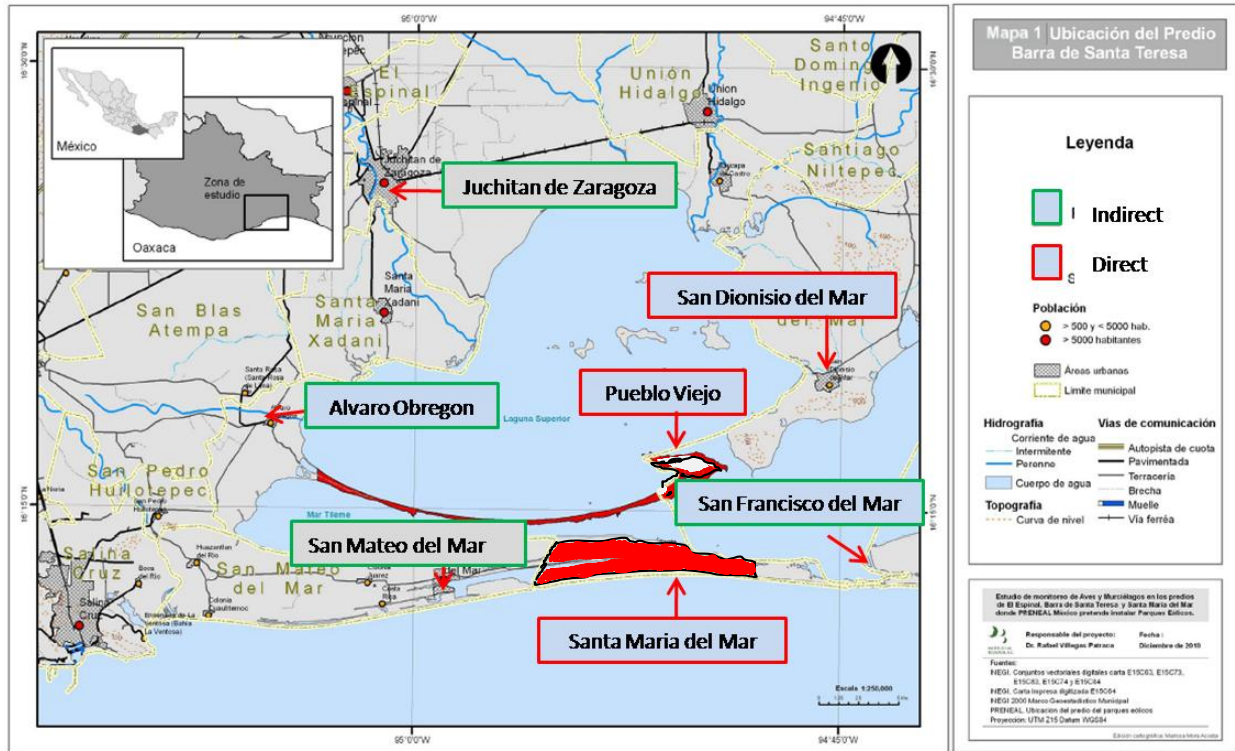
The *indirect area of influence* (Fig.7) encompasses the other Huave or Mareño indigenous populations of San Mateo del Mar and San Francisco del Mar as well as the municipal agency of Álvaro Obregón, and the Municipality of Juchitán de Zaragoza:

- ***San Mateo del Mar.*** The municipality of San Mateo del Mar occupies the landward portion of the peninsular. According to the 2005 census, the total population was 12,667 inhabitants. Approximately 50% of population is engaged in agricultural activities, and 20% in cattle ranching. The main activity is shrimp fishing, which is exported to US and other Mexican cities. The only access route by land to reach Santa Maria del Mar is through San Mateo.
- ***San Francisco del Mar.*** According to the 2005 census, the total population was 6,874 inhabitants. San Francisco Pueblo Viejo is the oldest town in the district. Although a part of the Mareño area, the remoteness of this community makes it less likely to experience direct impacts from the Wind Energy Project.
- ***Álvaro Obregón*** – Ethnically, this area, which is located at the entrance of the so-called *Barra de Santa Teresa* belongs to the Zapotec cultural group that dominates the southern coastal area of the Isthmus corresponding to the State of Oaxaca. It is estimated that the population of this municipal agency of Juchitán is approximately 4,000 people.
- ***Juchitán de Zaragoza*** – The municipality has a total population of 85,869, according to the 2005 census; of which 50,869 speak an indigenous language. Principal economic activities include agriculture (maize, sorghum, beans, sesame, pumpkin, peanuts, tomato, and chilli), cattle raising, and fishing.

3.1 Physical conditions

13. The Project is located in a relatively flat area surrounded by a mountainous topography. The two wind farms are located on land areas but are surrounded by water and as such are prone to flooding. Severe rainfall and flooding events are not uncommon in the region. Given the likelihood of flood, it is worth mentioning that the model of wind turbines selected by the company would also be functional even if their base structures are flooded.

Figure 7. Direct and Indirect area of influence of the Project



3.2 Natural habitat conditions

14. Terrestrial Habitats. The EIA identifies six main vegetation units in the project area: spiny forest (SF), deciduous tropical forest (DTF), halophyte vegetation (HV), aquatic and sub-aquatic vegetation (ASV), palms and, mangroves distributed in isolated sections. The HV has the greatest extent, followed by the DTF forest and to a lesser extent the ASV and palms and mangroves. There are extensive areas of halophyte pastureland in Santa Maria that are used for farming and for grazing livestock, goats, sheep, horses and cattle. Santa Maria contains some isolated patches of vegetation structures that consist in the main habitat for the Tehuantepec Jackrabbit (*Lepus flavigularis*, further details are provided below). Given the proximity of the open ocean and the presence of stretches of sandy bars both la *Barra Santa Teresa* and Santa Maria are potential nesting sites for the marine turtles.

15. Protected areas and priority conservation areas. The Isthmus of Tehuantepec has been classified as an Endemic Bird Area (EBA) by Birdlife International. The Project is found within the migratory routes taken by birds between North America and Mexico and/or further south. The sites on which the Project will be implemented are not regulated by any territorial ecological legislation, nor by any state or local development plan or program. However, the overall lagoon system is considered as a priority marine region by the National Biodiversity Commission of Mexico (CONABIO). This Commission has also stated that the Project encompass two priority land sites for the conservation of biodiversity, one of high priority and one of medium priority, precise location of these two land sites is unclear but it appears to be distributed through some patches of *Barra Santa Teresa* and Santa Maria. There are no

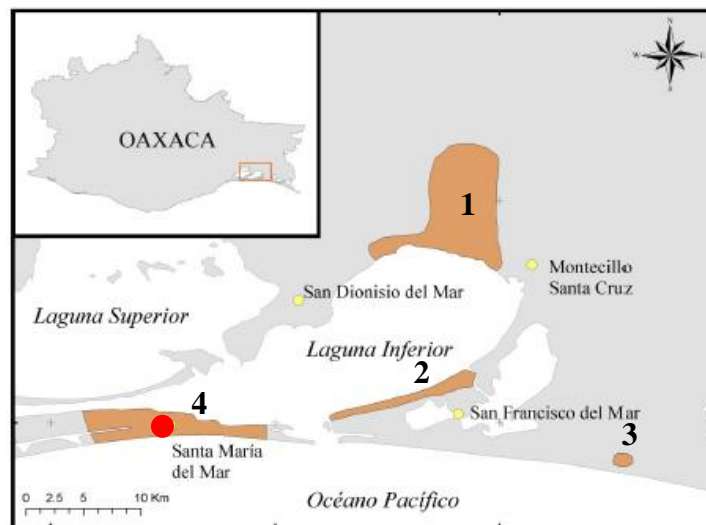
ecological criteria that have been established by CONABIO to restrict or prohibit the installation of the Project. As mentioned previously, both wind farm sites have been exposed to intense human activities in the past decades which have led to a deterioration of the “naturalness” character of the area. CONABIO reviewed the EIAs and did provide recommendations to SEMARNAT, which in turn has requested additional studies to the company to complement the original EIA (cf. alinea 8 section 1).

16. Species of conservation importance. Birds and Bats. Based on the documentation presented in the EIA, one bird species, the Cinammon-tailed sparrow (*Aimophila sumichrasti*) is considered as Near Threatened per the IUCN Red List. At the request of SEMARNAT, specific baseline studies to determine the presence of this species within both sites were conducted. The result indicates that this bird species is not present in the overall project area. It is concentrated in the low-growing thorn forest of the South Tehuantepec wind resource area, which is of considerable distance from the project site. SEMARNAT also requested additional bird’s baseline survey to document flight patterns over 12 months period. Observations conducted during this survey exercise indicate the presence of three Near Threatened bird species in Santa Maria, the Northern Bobwhite (*Colinus virginianus*), the Elegant tern (*Talasseus elegans*) and the Reddish Egret (*Egretta rufescens*). As for the San Dionisio site, both the Reddish Egret and the Elegant tern were observed, and the Painted bunting (*Passerina ciris*) also considered as Near threatened had been recorded. With respect to bats, a 12 months study (which relies on acoustic detection, observation with infrared, and capture of bats with nets) indicates that none of the species observed in Santa Maria pertain to a conservation status that it is of concern, however a species considered as Vulnerable, the Lesser long-nosed bat (*Leptonycteris yerbabuenae*) had been recorded in the San Dionisio site. This bat had been listed as vulnerable because of a population decline of more than 30% in the last 10 years due mainly to a shrinking of its habitat. This species is present in thorn scrub and deciduous forest and roosts in caves and mines. It feeds on nectar and pollen of agaves.

17. Species of conservation importance. Marine turtles. Given that both sites of the project contains sandy areas which are potential nesting sites for marine turtles and; taking into account that maritime traffic will be increased during the construction period which may increase the risk of being exposed to collisions ; a special attention to these species is required. The Laguna Inferior and the Gulf of Tehuantepec are part of the home range of three marine turtles: the Black Turtle (*Chelonia agassizi*) which is considered Endangered, the Leatherback (*Dermochelys coriacea*) listed as Critically Endangered and the Olive Ridley turtle (*Lepidochelys olivacea*) which is Vulnerable. Based on the additional population studies requested by SEMARNAT, the presence of the Black turtle and the Olive Ridley had been confirmed on the southern side of the land strip of Santa Maria. As for San Dionisio, only the Olive Ridley turtle is susceptible to be present on the extreme eastern tip of la *Barra Santa Teresa* where the Laguna Inferior and Superior connect. The additional population studies confirmed the presence of this species at this precise location. The presence of these turtles has been determined through indirect observations i.e. the presence of tracks on the sand and nesting areas. The presence of the Leatherback has not been confirmed in the area.

18. **Species of conservation importance. Tehuantepec Jackrabbit.** The *Lepus flavigularis* is listed as Endangered per the IUCN Red List and Critically Endangered per the Mexican authorities. Habitat loss, fragmentation, overhunting and poaching (for sports and for subsistence by resident people), uncontrolled human-induced fires to increase growth of green forage for cattle, and predation (coyotes but also feral dogs introduced by human settlement) over the years has restricted this species to four isolated habitat patches around the Laguna Superior and Laguna Inferior: (1) Montecillo Santa Cruz, (2) San Francisco del Mar, (3) Aguachil and (4) Santa Maria (Fig 8). The total species population size is estimated to be less than 1,000 individuals, all four groups are isolated from each other and as such there is a low genetic variability. The group inhabiting Santa Maria is of particular interest in the context of the Project. According to scientific studies conducted on the population density of the Jackrabbit in Santa Maria, a density of 15.29 Jackrabbit per km² is estimated. Considering that the Santa Maria site covers an area of 26.8 km², and that it is found within the entire home range of this group, it is plausible that the population summed up to 410 individuals which correspond nearly to 40% of the entire population. Based on direct observations and scientific surveys conducted since the year 2000, the area of occupancy (or the core area where an individual concentrates its activity) of the Jackrabbit in Santa Maria is estimated to be around 5 km².

Figure 8. Habitat range – Tehuantepec Jackrabbit



19. Based on findings of scientific studies done over the last 10 years on habitat range and uses, activity patterns, social behavior, feeding and reproductive habits, a lot has been learnt about the ecology of the Tehuantepec Jackrabbit. The Jackrabbit establishes its home range on grassy habitats but his presence is concentrated within scattered trees and open shrubbery which likely provides foraging individuals with both visibility and escape routes to detect and outrun predators. Specifically, *Nanchal* or sparse shrubbery dominated with bushes of *Byrsonima crassifolia* with a grass-forb understory and *Morro* composed of scattered shrubs and trees dominated by *Crescentia* are the prime core habitat. Based on scientific research on habitat uses conducted in Santa Maria at three different period of the year, the *Nanchal* and *Morro* provides the Jackrabbit with resources required year round such as suitable areas to

feed, rest, hide, breed, take care of leverets, detect predators and evade attacks. As such, these two vegetation structures are considered as critical habitat for the Jackrabbit. These vegetation structures are present within the Project area, but because of their relatively small size, i.e. between 200 m² to 500m² unevenly distributed, it is difficult to be identified with precision on a map but as can be seen from figure 9 and 10, the majority of continuous vegetation patches in Santa Maria are either found south, east or west of the proposed location of the wind turbines. Figure 10, illustrates the original layout of the wind farm, a significant number of wind turbines were initially planned to be erected on the west side in an important portion of scrub grassland or *pastizal matorral*. As can be seen from figure 10, the new layout of the wind farm does not encroach on this type of habitat.

20. The Tehuantepec Jackrabbits do not feed on different area from where they shelter, that means that they do not need to travel between resting and foraging areas. The Jackrabbit is most active during nocturnal hours where it feeds and socializes with other individuals. A radio tracking of 60 individuals conducted over two years indicates that the Tehuantepec Jackrabbits spend diurnal hours sitting in their forms, and most diurnal activity detected from the radio signal probably resulted from grooming, re-ingestion and stretching behaviors. The resting period and lack of mobility during the day is probably to minimize daytime predation.
21. Despite as being listed as Critically Endangered per the Mexican authorities, the Tehuantepec Jackrabbit neither does benefit from any conservation activities nor the presence of a protected area.

3.3 Social conditions

22. The project's direct and indirect influence zone comprises indigenous communities mostly of Huave or Mareño descent next to Juchitan the dominant Zapoteco city in the Tehuantepec Isthmus; rivalries between these two ethnic groups go back to pre-Hispanic times. Although San Dionisio, Santa Maria and San Mateo are three Huave communities, there are conflicts among them. While San Mateo del Mar stands as a municipality with its own government elected according to a customary process (*usos y costumbres*), Santa Maria del Mar lost its status as municipality during the last century. In 1946, Santa Maria disappeared as municipality to become an Agency of Juchitan losing its autonomy, a situation that has contributed to increase the traditional rivalries between Huave and Zapoteco peoples in the region. Among Huave communities the most serious conflict is the land border dispute between San Mateo del Mar and Santa Maria del Mar. Since 2009, the conflict has intensified and violent incidents have become frequent. Last year, San Mateo closed the only road access to Santa Maria, isolating this community causing negative economic and social impacts. In retaliation, Santa Maria closed access to San Mateo's fishermen to the fishing areas in Laguna Superior, initiating yet another dispute and escalating violence. On January 2011 a violent episode between the two communities resulted on injured persons and intensified the conflict.

This conflict, pre-existent to the venue of the Project, may have indirect repercussions on the Project (more details are provided in the section on impacts).

Figure 9. Location of continuous patches of vegetations versus turbines location

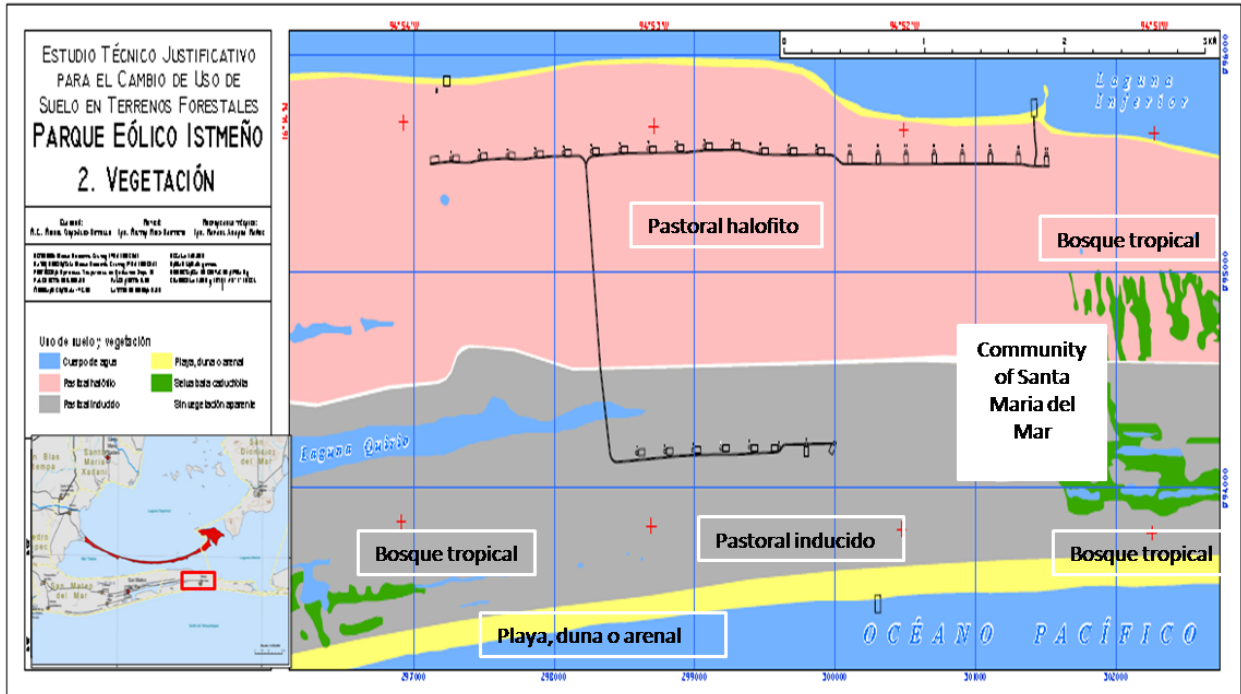
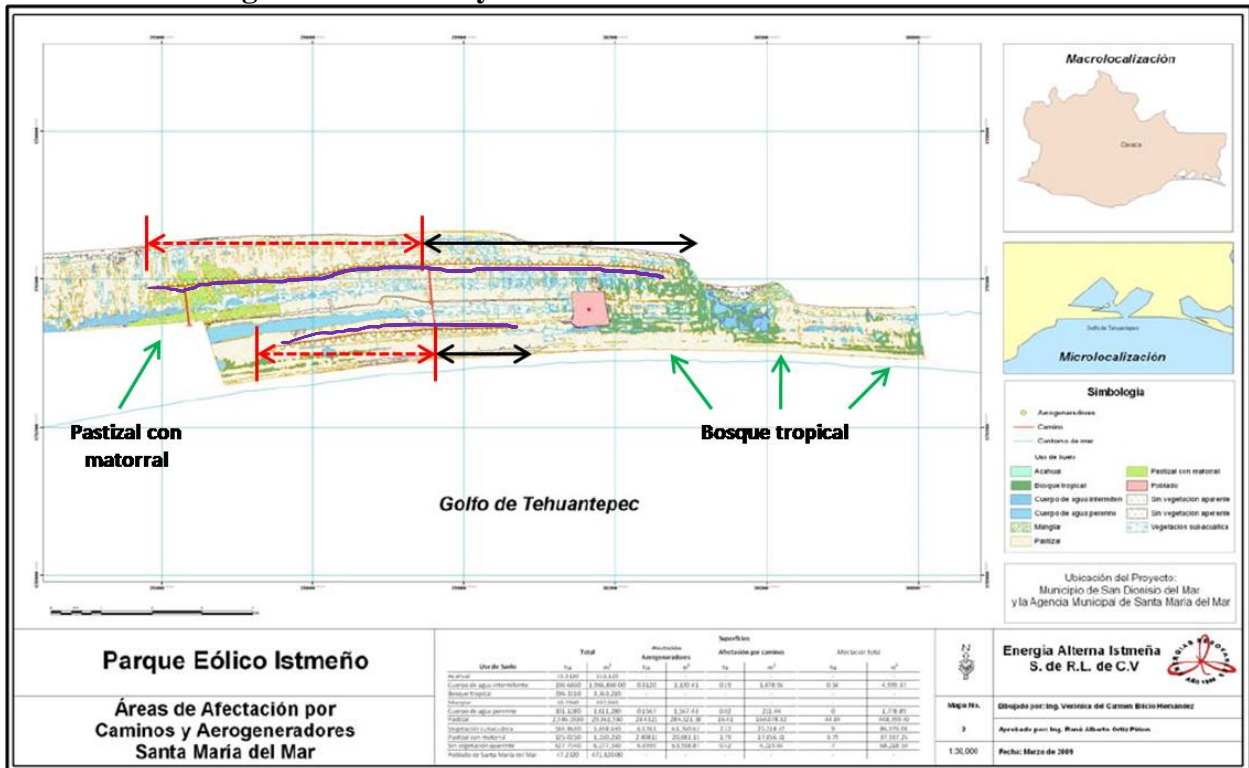


Figure 10. Initial layout of the wind farm versus current one



←-----→ *Additional turbines that were removed*
 — *Original location of the turbines*
←====→ *Final turbines location*

- 23. Livelihood.** Communities depend on fishing as main source of income; they are organized in cooperatives (each one having its own fishing area) with low technical levels and capacity to expand capture and carry out direct commercialization; fish and shrimp are mainly traded through intermediaries from Juchitan and Arriaga (Chiapas). The Cooperatives of San Francisco del Mar and San Dionisio del Mar capture 90% of the fishery production; San Mateo del Mar captures the remaining 10%; in this community cattle-rearing and agriculture activities are as important as fishing. The fishing cooperatives integrated the *Union Regional de Cooperativas "Las Siete Huaves"*; however internal conflicts affected the organization and its role in the region has diminished. Overexploitation and the lack of technical expertise to develop aquaculture as a livelihood alternative are affecting the main source of income of these fishing communities.
- 24. Education and access to social services.** Although the area is poor, Huave people have better access to social health and education services than other indigenous communities in the State of Oaxaca. San Mateo, Santa Maria and San Dionisio each have their own primary and secondary schools and medium technical education is available in San Dionisio. Around 67% have electricity and almost half of the population has in-house connection to potable water. The whole region of the Tehuantepec Isthmus is well connected by roads. The main cities of Juchitan and Tehuantepec offer more specialized social services including tertiary education and third level hospitals. As a result of the road blockade by San Mateo, schools were closed and some of the teachers have not yet come back; high school students being the most affected; access to health services has become more difficult due to the limitations and difficulties of transport by sea; and food and basic products are now more expensive affecting negatively Santa Maria, especially the most vulnerable families.
- 25. Land tenure.** San Dionisio del Mar and Santa Maria del Mar have been recognized by the federal government as communities with the right to their ancestral lands. Accordingly, on 1984 Santa Maria del Mar received 3,733 ha of collectively-owned land to benefit 169 communal land-owners (*comuneros*). In 1999, through the Community Certification Program (*PROCEDE Programa de Certificación de la Comunidad*) Santa Maria's communal land was certified a surface of 3,310 ha for the common benefit of 129 *comuneros*. San Mateo del Mar is disputing 1,148 ha of these communal lands arguing that the limits between both communities are from Paso Tileme to Nigatur instead of Boca Seca to Paso Mangle. This dispute is the source of the conflict which is currently overseen by the Agrarian Tribunal 22 in Tuxtepec, a resolution is expected by the end of 2011. Though, it is unlikely, that this resolution will end the conflict as both communities have claimed that they will not accept a negative outcome. The Project infrastructures will only be built on lands that are legally sound with certified titles; there are no project components that will be installed on the disputed land.
- 26.** In 1970, San Dionisio del Mar was recognized by the federal government receiving officially a surface of 18,223 ha of collective-owned land. Although San Francisco del Mar alleged land rights, its claim was dismissed and San Dionisio was certified on 2001 with a surface of 20,871.32 ha to benefit 1,027 *comuneros*. This situation has been settled. However, Chicapa de Catro, a community of Juchitan, has presented a claim against San Dionisio. The State Government is directly seeking a negotiated solution to this dispute. Land tenure on

communal lands may include both communal land and individual titles of possession granted by the community to individual community members. In the case of San Dionisio and Santa Maria, all land is owned by the community. Communal authorities (*the Comisariado de Tierras Comunales*) play an important role and are the main contact with external actors; however, the top authority is the Communal Assembly where main decisions are taken and is the sole authority about land use and rights. Therefore, in the case of the Project, negotiations about land use contracts were discussed and ratified by the Communal Assembly. All land usufruct contracts required for the Project were obtained and previously approved in communal assemblies.

27. *Indigenous Peoples.* The Project's direct and indirect zone of influence comprises a majority of indigenous population, mainly Huave and Zapoteco People; around 25,000 in total, the majority of Huave descent. Rivalry between these two ethnic groups goes back to pre-Hispanic times and continues to this day with Juchitan as the most important Zapoteco center in Tehuantepec. The Huave People or Mareños, occupy a small strip of coastline (Mareño Area) East of Tehuantepec City. Although Huave People is a minority among indigenous population in Oaxaca (only 1.2% of the total) they are culturally strong and attached to their traditions and natural surroundings. Because Oaxaca State has legally recognized customary indigenous organizations and traditional authorities (*usos y costumbres*) municipal authorities are elected following indigenous procedures empowering indigenous peoples in the State. Such is the case of elected municipal presidents in San Dionisio and San Mateo del Mar. The current State Government has adopted a strong indigenous agenda including the right of this type of community to be informed and consulted according to UN principles. A State law to establish such consultation approach is currently under discussion. The Mexican National Constitution recognizes the rights of indigenous peoples further developed in the National Indigenous Law. Moreover, Mexico has signed the ILO 169 Convention recognizing indigenous rights.

IV ENVIRONMENTAL AND SOCIAL IMPACTS AND RISKS

4.1 Construction phase

a. Environmental Impacts and Risks

28. The primary environmental impacts anticipated during the construction phase relate to clearing of vegetation for construction of the wind turbines foundation, substations and transmission line. The wind farm in Santa Maria will cover a total area of approximately 9.50 ha of which 6.43 ha are halophyte grasslands, 2.23 ha are grasslands induced by human actions, 0.28 ha correspond to beaches, dunes or sandy areas, 0.53 ha are bodies of water. For San Dionisio, the wind farm will cover an area of approximately 37 ha of which 19 ha are halophyte grasslands, 11 ha are without any vegetation, 5 ha are tall grasslands mixed with spiny forest and, 2 ha are tropical deciduous forest. Other typical impacts associated with wind farms during the construction period are the following: soil erosion, noise, dust generation, traffic disruption. Occupational health and safety hazards specific to wind energy facilities and activities primarily include working at heights. Hazards associated with working at heights can generally be prevented with an adequate health and safety

management system. Due to the location of the project, there are risks that marine turtles and the Tehuantepec Jackrabbit will be impacted during the construction period (see below).

29. *Specific risks on threatened species.* The increased maritime traffic during construction to transport the turbines and equipment may augment the risk of exposure to collisions for the marine turtles. However, the equipment will be transported on low-speed barges which should minimize risk of accidental collisions. Nesting areas could also be inadvertently destroyed by the transport of machinery. Noise and lighting of the site could also temporarily alter the behavior of the marine turtles. It is probable that the Tehuantepec Jackrabbit group of Santa Maria will be negatively impacted during construction activities even in the absence of its critical habitat being adversely impacted. During the construction phase, that will extend for more than two years, vegetation clearance and soil striping will take place, access roads will be built, vehicular movement will be important as heavy structures (wind turbines, towers, blades) will be transported, and noise, vibrations will be higher than usual. Potential impacts of such activities on the Jackrabbit are the following: increased mortality due to accidental road kills decreased reproductive success due to disturbance to breeding animals (noise, lights, and traffic), and disturbance in feeding habits. There is also a risk, even if the company committed to not do so, that vegetation patches uses as foraging and concealment area by the Jackrabbit, will be inadvertently cleared. It is difficult to quantify the extent of losses expected during the construction period. Any fatalities of the Jackrabbit will be considered as residual impacts. The monitoring during the construction will confirm the extent of residual impacts and the obligation for the client to compensate such impacts will be determined upon the results of the results of this monitoring. Given the low genetic diversity of this species, the loss of an individual means also the loss of its genetic baggage, the long term effect of this situation on such small the population is very difficult to measure at this time. However, it is worth mentioning at this point, that the social behavior of this species i.e. an animal that is active at night time and rest during the day (low mobility) is an element that must be factored into our risk assessment of impacts (see aline 20). The bulk of construction activities will take place during day time; this should limit exposure of the Jackrabbit to road kills and disturbance to its feeding habit. The section on management of impacts is providing specific insights on the mitigation and protective measures for the Tehuantepec Jackrabbit and its habitat.

30. *Transmission line.* The construction of the transmission line had followed a separated regulatory process and as such its potential site-specific impacts and risks, are not fully known yet. Primary generic environmental impacts and risks from the construction of a 220-kV transmission line include: disturbances to habitats related to the clearance of the 25-m wide Right-of-Way, including direct land use conversion and indirect fragmentation effects; increased soil erosion caused by construction activities; risk of increased access to areas previously difficult to access; and risks of collision for birds.

b. Social Impacts and Risks

31. *Land Acquisition and physical resettlement.* The Project has already identified land required to install the wind turbines, docking stations, substations and transmission lines. Throughout the land acquisition process, the Project layout has been adjusted to minimize impacts and

accommodate communities' priorities, including productive activities and housing area growth. The Project does not lead to any physical resettlement. Land contract agreements have been signed with San Dionisio and Santa Maria where the wind turbines and substations will be located. In view of the land conflict with San Mateo del Mar the project was redesigned to avoid crossing or occupying land in this community. According to information collected on site, San Mateo's communal authorities confirmed they do not want to participate in the project and reiterated that lands under dispute should not be used in any way. The company is fully respecting this position.

32. The land agreement with San Dionisio comprises 1,643 ha of communal lands and in the case of Santa Maria 2,000 ha. In both cases, land agreements were approved in communal assemblies as established in the national law with a 100 percent of the votes in the first case and a 90 percent in the second; this process fully complies with the Bank's directive on public consultation requirements. Usufruct contracts are legally binding, certified and signed by communal representatives and local authorities; include annual payments until construction begins (in compliance); have a duration of 30 years, conditioned to compliance by both parties; all documents were licensed by the National Agrarian Register and registered before Public Notary.
33. Negotiations are yet to be completed with communal and private owners for the right of way (ROW) of the transmission lines; 182 out of 191 negotiations have reached agreements. The acquisition of the ROW is well on track; 87% of the 47 Km have been successfully negotiated (the transmission line has a total of 52 km but the first 5 km had already been successfully negotiated as it is part of the San Dionisio wind concession area). Additional land might be necessary for the road widening and enhancement for heavy traffic nearby Alvaro Obregon but this would be minimal. Project management expects to have completed all agreements and land use change permits prior to December 2011.
34. ***Economic displacement.*** The studies assessing potential impacts on socio-economic activities are not fully comprehensive. Based on available documentation, the following activities are likely to be affected temporarily during construction: fishing; cattle-rearing; and salt production. Fishing is the most important activity for all *Mareño* communities; fishing areas for each community are well delimited and the Project is taking measures to avoid and minimize impacts. Nevertheless, the transportation of heavy equipment and materials as well as increased maritime during construction represent a potential risk to fishing activities that has not yet been fully assessed. Cattle-rearing can be affected since a portion of land for cattle grazing will be severely but temporarily limited during construction. With respect to impacts on salt production, as there is no tangible data about the number of people employed, the extent of impacts is difficult to quantify, the same goes for the salt workers and cattle herders. The company will prepare a mitigation and compensation plan to address any potential impacts that may be experienced by fishermen, cattle herders and salt workers. It is expected that these activities will fully recover once construction is completed.
35. ***Social impacts and risks related to construction.*** The widening and enhancement of roads for the transport of heavy equipment and transportation itself are the main potential risks during construction; however this will be minimal given the segment of new roads (less than

3 km) and the widening of existing one (5-6 km). Construction impacts to communities include risk of traffic accidents with pedestrians, increased noise and dust due to heavier traffic, transport of construction materials and heavy equipment. With respect to noise, a distance of about 300 m from dwellings is sufficient to avoid significant impacts produce by wind turbines. The closest dwellings in Santa Maria are at more than 800 m and at 500 m in San Dionisio. The World Health Organization (WHO) recommends that outdoor noise sources remain below 55 dB (A) during the day and 45 dB (A) at night. The wind turbines used for the Project, corresponds to the state of the art technology and the combined noise produced by the turbine hum and the rotor swish (air movement around the rotor blades), will be less than 45 dB (A) at any time.

36. Fishing and salt production may also be temporarily affected by the construction of the underground submarine cable that will connect the substation of Santa Maria with the one in *Barra Santa Teresa*. The technology for the construction of such cable is well known, it is similar to the installation of underground optic fiber. The work will be conducted over a short period and impacts, if any, will be contained within a very small geographical scale. The compensation plan presented by the company does contain measures to avoid and minimize impacts.
37. With regards to community security and health, based on available documentation, no major impacts are expected. The Project will incorporate local and regional workers and no camp sites will be established. During the construction period, there will be an important flow of workers and contractors crossing through community lands which may cause some problems if a strict construction protocol is not enforced; about 300 workers (about 100 for Santa Maria and 200 for San Dionisio) are expected to be engaged during the construction, the magnitude of this impact on the community will be addressed through mitigation measures contained in the Environmental and Social Management System.
38. As is usual when infrastructures are built, work expectations from communities are high and the impossibility of providing jobs to all may raise some tensions because of competition. Because San Mateo del Mar had decided not to participate in the project, and given the conflict jobs will go to people who live where the projects infrastructures will be built i.e for those living in Santa Maria and San Dionisio. Despite their clear position of not wanting any portion of the Project within the perimeter of their lands, it is unclear how people from Santa Mateo will react to this influx of new jobs creation in their region,. The monitoring of the Project will ensure that a transparent hiring process is followed by the Company to reduce the risk of tensions.
39. **Cultural heritage.** In accord with the Monuments, Archeological and Artistic Sites Federal Law, the National Anthropology and History Institute (INAH), conducted in 2009 archeological feasibility studies at San Dionisio and Santa Maria for the following works area : (i) transmission line Ixtepec-Huilotepec; (ii) wind farm at San Mateo del Mar; (iii) transmission line at San Mateo del Mar; (iv) wind farm of *Barra Santa Teresa*, (v) wind farm of Santa Maria; and (vi) transmission line at *Barra Santa Teresa*. These studies identified a total of 50 archeological sites; 27 within the Project Area and 23 outside; in both cases cultural material identified will be salvaged and protected as recommended by INAH. INAH

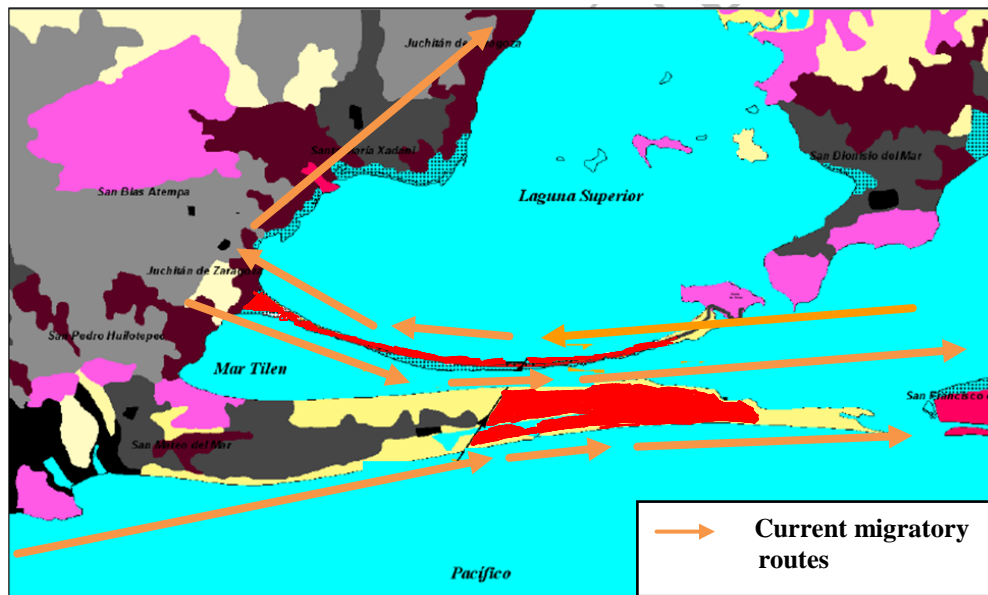
also requested to protect the salt production site located at *Barra Santa Teresa (Salinera del Istmo)* which has been operating from pre-Hispanic times and is valued by Huave People as a traditional site. INAH had made recommendations to modify Project layout in three areas (including the salt production site) to protect identified archeological remains and collect objects. The company did modify the layout accordingly and, as such these sites will not be impacted by the Project.

40. Because the Project layout has been modified since 2009, final clearance by INAH regarding cultural assets is currently in the process of being obtained. Specialists of INAH in Oaxaca will supervise the works in order to protect remains not visible prior to excavation and possible chance findings.

4.2 Operational phase

41. ***Impacts and risks on birds.*** Birds can be killed by collisions with wind turbines and guyed meteorological towers (masts) sometimes in potentially significant numbers if the wind farm is located on the direct path of an important migratory routes. The results of the baseline survey conducted over a 12 months period in Santa Maria indicate the presence of 102 species (10,019 individuals) within the wind concession area. Of all the species registered, 41% are aquatic, 38% are terrestrial while 19% are birds of prey. With respect to bird's flight altitude, a total of 8 species were recorded flying in a zone that may expose them to a collision i.e. between 40 m and 120 m. The Cattle egret (*Bubulcus Ibis*) has a very high probability of collision of 1.00 (all of the 266 individuals observed were flying in the risk zone), the Turkey vulture (*Cathartes aura*) has a probability of 0.95, the Broad-winged hawk (*Buteo platypterus*), a probability of 0.89, the Barn swallow (*Hirundo rustica*), a probability of 0.72, the Black-bellied whistling duck (*Dendrocygna autumnalis*) a probability of 0.44, the three other birds species have a probability below 0.27. All the species flying in the risk zone are listed as Least Concern per the IUCN Red List. Nevertheless, the risk of collision is significant for few species and this will need to be carefully monitored. For San Dionisio, the results of the survey indicate that the wind concession area had been frequented by a total of 87 bird's species (9,649 individuals). Of all the species registered, 59% are migratory and 41 % are residents. With regards to flight altitude, a total of four species were registered flying in the collision risk zone. The Magnificent Frigatebird (*Fregata magnificens*) has the highest probability of collision (0.42), the three other species have low probability of collisions (less than 0.05). The risk of collision in San Dionisio appears to be low; none of the species having a conservation status of concern have been recorded flying in the collision risk zone.
42. According to the information presented in the birds surveys, three main migratory routes have been identified within the Project area (Fig.11) all routes follow a parallel path along the land portions. As can be seen from the map below, there is one migratory route that is crossing the Project area on the eastern tip portion of San Dionisio wind farm site. No wind turbines will be erected in the eastern portion, however given the proximity of the route, this area will be more vulnerable for bird's collisions to occur. There is no transversal migratory that cross the Project lands that have been recorded, which significantly diminish the risk of collisions.

Figure 11. Birds Migratory routes in the Project area



43. Impacts and risks on bats. The incidence of bat mortalities in wind farms in North America, Europe but also in the State of Oaxaca on projects previously financed by the Bank tends to be higher than birds. Bats are attracted to wind turbines, various hypothesis have been raised to explain this attraction, but the most plausible reasons are: they perceive the turbines as roost trees (thermal imaging of flocks of bats trying to land on turbines mast have been recorded in wind farms in Canada and USA); the turbines are seen as a food source (blades and the area near the rotor are full of dead insects), the heat generated by the structure seems may attract them; and the sounds and electromagnetism produced by the turbines may disrupt their echolocation. A significant portion of dead bats found at the bottom of wind farms have shown no signs of external physical injuries, however detailed physical examination demonstrated that bats has suffered severe lung damages that cause their death. The bat has pliable lungs, it's fragile, (not rigid as birds) and when exposed to a sudden change of pressure in the atmosphere (such as in front of a rotor in operation), their lungs expands and they drop dead, this type of incident is known as a "barotrauma".

44. The results of the bats baseline survey conducted in Santa Maria over a 12 months period indicates the presence of four bats species, all of them being listed as Least Concern per the IUCN Red List on Threatened species. The low diversity of bats species is attributed to the low forest cover in Santa Maria and the absence of caves. Over 9 nights of acoustic detection (3 nights in summer, 3 in fall and 3 in winter), a total of 184 passages had been recorded in the area where the turbines will be located. The Northern yellow bat (*Lasiurus intermedius*) had a occurrence of 144 passages, the Palla's Mastiff bat (*Molossus molossus*), 30 passages, the Black Mastif bat (*Molossus rufus*), 8 passages, and the *Myotis sp.* 2 passages. For the San Dionisio wind farm, a total of six bats species had been recorded, one being considered as Vulnerable per the IUCN Red List, the Lesser Long-nosed bat (*Leptonycteris yerbabuenae*), a migratory bat. This species is also the one who is the most abundant, with an occurrence of 67 % of all the bats species observed. Based on documentation presented, this species may travel along the Pacific coast to follow a "nectar route" and enter to the wind concession area

of San Dionisio on its western side where there are some fragments of deciduous forest. This type of bat usually roosts in caves but may use the forest fragment as habitat. According to the documentation available, there is no indication that there is a “nectar route” that stretches along the wind concession area which is plausible as the vegetation is concentrated on the western side. The information presented in the EIA, stipulates that the San Dionisio wind farm will affect a total area of 37 ha of which only 2 ha (0.02 km²) corresponds to deciduous forest. As such, if the forest fragments are used by this species of bat as an habitat, impacts should be minimal due to the small footprint. During the baseline survey, data on flight altitudes of bats had also been collected. According to the results, the average flight altitude is between 3 and 10 m which is well below the Collision risk zone (i.e. between 40 and 120 m). Based on these data, it appears unlikely that the bats will be exposed to a risk of collision. However, they may be exposed to a barotrauma incident, though at this stage it is impossible to determine how bats will react to the presence of the turbines and if they will be attracted to it. The monitoring during and post-construction will help to determine the precise habitat of the Lesser Long-nosed bat and the extent of barotraumas.

- 45. *Impacts and risk on marine turtles.*** During the operation phase, the marine turtles would be much less exposed to impacts than during the construction period as the maritime traffic will come back to its normal level and the vehicular movement on site will be confined near the turbines areas on delimited roads. No vehicular movement will take place on sandy areas where the turtles could establish nesting sites.
- 46. *Impacts and risks on the Tehuantepec Jackrabbit.*** Once the project will be in operation, the Jackrabbit will be much less exposed to risks such as road kills, than during the construction period. Vehicular traffic on site will be limited to maintenance and service operations. Independently of the compensation measures that will be taken, the Project will not contribute to a significant conversion or degradation of the critical habitat of the Jackrabbit.
- 47. *Cumulative impacts.*** If a series of wind farms are built along an important migratory pathway, the effect of having multiple risk zones experienced by the birds may result in significant birds mortality. As all the other projects in the state of Oaxaca are located on the mainland contrary to this project which is located closer to the ocean for which the flow of migratory movement is less important. The project in itself should not pose an issue of significant cumulative impacts for the birds but monitoring results of birds mortalities in Eurus and La Ventosa (two projects currently under supervision by the Bank) combined with the results of this Project will be helpful in determining the extent of cumulative impacts.
- 48. *Greenhouse gases emissions.*** This project will contribute to reduce the carbon footprint of energy generation in Mexico. The company is in the process of documenting, applying for and registering both wind farm sites for Certificates of Environmental Reduction (“CERs”) under the United Nations Framework Convention on Climate Change Clean Development Mechanism (CDM) process. It is expected that the Santa Maria wind farm will be registered by April 2012 while the San Dionisio will be by March 2012. The 396 MW project is expected to displace approximately 1,487 MWh per year of thermal power generation (according to the Project Design document, the GHG emission factor used was 0.61966). Project estimated emission of GHG is 0.9 million tCO₂ per annum.

49. Risks caused by Natural Disasters. Given the location of the Project, between two lagoons, the overall area is vulnerable to flooding. The wind turbines have been designed to be functional even if their base structures are flooded. It is possible that heavy rains and flooding of the roads on site will cause delays in the construction period as access will be limited. The company conducted a flood risk analysis in order to be prepared to address any scenarios. Other types of natural disasters risks may be associated with seismic activity; however the magnitude of earthquakes recorded for the area is usually below 4 on the Richter scale, no severe earthquakes causing damages to human or infrastructures had happened in this region of Mexico.

50. Social impacts and risks during operation. The operation of the wind farm is not expected to cause directly any major risk. The lack of an integral social management plan and inadequate management capacity to address social issues may create negative social impacts during implementation: The main risks are the following:

- *Social stratification:* The flow of external income generated by the Project can cause additional resources for “*comuneros*” with whom the agreements have been signed but not necessarily for the whole population. The risk of creating two different social groups: those who will benefit from increased benefits and the rest of the local population is present;
- *Dependency:* The pressure to maintain agreements and avoid conflicts may result in the Project becoming a source of easy favors with negative consequences for the communities that may lose an opportunity to improve by themselves and become a burden for the Project;
- *Inadequate resources management:* The increase in municipal, communal and family income can have negative consequences if resources are not use in sustainable activities or are misused. The lack of transparency and accountability can lead to corruption and frustration; the Project can be blamed by these negative outcomes while the communities suffer the consequences of the failures to promote local development;
- *Political activity:* The political environment in the Tehuantepec Isthmus is complex and Project’s management will be under pressure from different political groups. The alignment, real or apparent, to any such group can affect credibility and alienate the Project from the communities;
- *Communication issues:* In a region characterized by political and social rivalries, the lack of a communication strategy can result in misinformation, negative rumors and mistrust towards the Project.
- *Increasing social conflicts:* It is prudent to be aware that the conflict between Santa Maria and San Mateo rather than being solved would likely escalate, fueled by opposition political groups operating in the region. Both communities have already stated that they will not accept the Agrarian Tribunal’s ruling if the outcome is adverse to their claims. Even if the Project is not engaged in the conflict and maintain a position of neutrality, it can be indirectly affected if tensions escalate and violence erupts. Moreover, the new flow of income from the Project to Santa Maria may increase existing rivalry with San

Mateo that for its own decision, decided to not participate in the Project. In this situation, it is useful to maintain communication channels with San Mateo, keep it inform of Project progress and possible impacts as its communal authorities have requested.

- **Security personnel:** As mentioned, the possibility of an escalation of the conflict between San Mateo and Santa Maria over the life of the Project should not be discarded. It is difficult to determine if Project infrastructures will be affected should the conflict rise up. For instance, the wind turbines and other installations implemented by the company in Santa Maria could be exposed to acts of vandalism. The company will need to assess risks posed by its security arrangement for the site to those within and outside the project area. In all time, the security arrangement made by the company to protect its installation shall ensure that security personnel act in a manner consistent with good industry practices and national regulations.

V. MANAGEMENT OF ENVIRONMENTAL AND SOCIAL IMPACTS AND RISKS

51. *Environmental and Social Management System.* The company will manage environmental and social impacts through the implementation of an ESMS. The ESMS contains the following elements: (i) social and Environmental Assessment; (ii) management program; (iii) organizational capacity; (iv) training; (v) community engagement; (vi) monitoring; and (vii) reporting. In the context of accepted international frameworks for quality and environmental management systems, this management process can be summarized as follows:

- Identification and review of the social and environmental impacts and risks of the operations;
- Definition of a set of policies and objectives for social and environmental performance;
- Establishment of a management program to achieve these objectives; and
- Monitoring performance against these policies and objectives.

52. As part of the ESMS, the company will need to develop a supervision mechanism and performance assessment of the various contractors retained for the construction phase. The biodiversity conservation plans for the marine turtles, the Tehuantepec Jackrabbit and the post construction monitoring of birds and bats are all part of the ESMS. As of September 2011, the in-house capacity of the company to fully implement the ESMS is not sufficient to ensure that measures found in the various plans presented (Reforestation, Soil restoration, Wildlife rescue and relocation program, traffic management etc.) will be effectively implemented and that results will be monitored carefully. The documentation of results on the efficiency of mitigation measures taken is critical in identifying the necessary corrective and preventive actions needed. A social manager has been hired late August 2011, and the company committed to increase its staff capacity (both at the social and environmental level) prior to construction. The Bank will ensure that this commitment is met by incorporating covenants on this matter in the loan documentation.

53. *Management of social impacts related to land acquisition and construction activities.* As mentioned previously (see details under alinea 31 and 32), land usufruct and lands use agreements have been approved and signed by *comuneros* of Santa Maria and San Dionisio. These agreements do not limit the agrarian rights of the community over their lands and the

use of the natural resources in the area. Both communities granted the right of way for the transmission line in exchange for an annual fixed payment during a period of 30 years. An additional payment of 1.4% of the revenues generated by the turbines located on their lands will also be paid. This amount will then be divided by the number of ha that is currently leased. Once construction is completed, community land will continue to be used for agriculture, livestock.

54. Additionally the communities will benefit from a social program established by the company intended to benefit people found in the project area. For instance, as part of their community plan, the company intends to build a desalination plant on the southern shore of Santa Maria to provide water to residents. The environmental and social studies for this plant are in the process of being completed. The impacts of this desalination plant will be looked at during the supervision phase as the company plans to build it once construction of the wind farms is finalized. The company also plans to establish scholarships grants for young students. Regarding community acceptance of preliminary investment choices by the company, it should be noted that it was community member themselves which identified and agreed on education and water infrastructure investments. The seawater desalination plant was agreed on with the communities at the beginning of the Project and is part of the usufruct agreements with Santa Maria and San Dionisio populations.
55. Potential economic displacement impacts during construction is expected in both wind farms sites. An assessment of potential impacts is currently underway; A compensation framework plan will be completed prior to construction.
56. The Integrated Social Management Plan (ISMP) is currently under preparation. This Plan incorporates several studies namely a baseline study on current socioeconomic conditions (fishing activities, cattle grazing, salt production). This study will help in determining appropriate mitigation and compensation measures. An assessment of social impacts attributed to economic displacement, is also being conducted by an international firm. This study will help in the formulation of appropriate livelihood restoration measures. The ISMP also incorporates a Communication and Consultation program, a Community development program, and a Participatory monitoring program for the construction and operational phases.
57. **Management of social impacts during operation.** Taking into account progress achieved so far for the management of social impacts and risks the following activities should be undertaken prior to construction:
 - *Land acquisition and economic displacement:* Total land required (in ha), taking into account final project layout; inform communities about construction logistics and latest's findings on the results of the social studies; complete the outstanding 9 negotiations for the right of way of the transmission lines In addition, detailed information about economic displacement and the compensation framework plan should be ready prior to construction;
 - *Integrated Social Management Plan:* This plan should cover the three communities under the project's direct influence zone: Santa Maria del Mar, San Dionisio and

Alvaro Obregon. In addition to existing components (cf. alinea 54), the ISMP should include: land acquisition agreements management; economic displacement estimates and compensation framework; indigenous peoples plan (IP); and a monitoring and evaluation system to manage impacts during construction and operation. It should also include a community capacity building program to enable community authorities managing adequately resources. Guidelines and principles for the selection and implementation of the various community initiatives that the company intends to carry out. ;

- *Consultation and disclosure:* Prior to construction, inform communities about construction program and impacts and consult about mitigation measures and security activities, as well as mechanism to address complains. Consultation should include Santa Maria del Mar, San Dionisio del Mar, Alvaro Obregón. Although San Mateo is not under the direct project area, the company is encouraged to continue an open dialogue with people from San Mateo to reassure them that the Project will not affect their lands or the disputed area. A public information campaign in the region is also recommended to prevent misinformation. Consultation process should be adequately registered and keep in the project's files. The information and consultation strategy should continue during the Project's life including adequate monitoring and register of activities conducted;
- *Labor and health policies:* A hiring strategy should be in place to ensure transparency and gender equity in contracting workers; a workers' conduct protocol, enforcement and penalties should be agreed and enforced with contractors; regulations to comply with health work standards should be also established;
- *Community Security and Health:* Contracts with providers, construction firms and private security contractors should specifically integrate regulations to follow agreements with communities and ensure the respect of customs and traditions (*usos y costumbres*); a Contract should also incorporate procedures to report to INAH chance findings of cultural items. During operation maintenance staff and security personnel should follow similar procedures; security personnel in particular should be aware of not getting involved in confrontation with the communities and recur to official authorities instead if necessary.
- *Cultural Assets protection:* Final clearance by INAH should be obtained including protection programs in the areas under the project and the process to follow in the case of chance findings. This process should be integrated into construction contracts;
- *Establishment of the social team:* The Company needs to increase its staff capacity to manage any potential social issues and ensure an adequate monitoring during the course of the Project. ;
- *Gender Equality:* The Project needs to incorporate a gender equity perspective in its set of corporate policies, this to ensure that land women owners, who are a minority, have an opportunity to express their priorities in decision-making regarding the use of

the leased resources. Women's priorities should also be taken into account in decision-making regarding the initiatives under the community plan. The gender traditions of Huave communities should also be incorporated in the policy;

- 58. *Management of impacts and risks on birds.*** Post-construction monitoring of birds is an important tool to manage impacts. The company has developed a monitoring program that will be followed for the first three years of operation and will be continued if significant mortality is found. The monitoring of results will allow rectifying the appropriateness of the mitigations measures initially implemented. The set of mitigation measures for birds that will be implemented by the client consist in the following: (i) technical shutdown of the turbines during peak migration period and on-demand in real time if important flocks of birds are spotted; (ii) vegetation maintenance, the immediate area of the wind turbines will be regularly cleared of any vegetation so it does not attract birds; (iii) some of the blades will be painted in red and white to increase their visibility; and (iv) assessment and adjustment of the measures based on the monitoring results. These measures when applied have proved to be efficient. The Bank will ensure through appropriate covenants in the loan documentation and through supervision, that these are followed throughout the life of the Project.
- 59. *Management of impacts and risks on bats.*** The company will also implement a post construction monitoring for the bats. Unfortunately, the effectiveness of mitigation measures for bats is not as documented as they are with birds. Based on bats fatalities that occur in North America and Europe, we know that bats fly during low wind nights i.e. when the winds are less than 6.0 meter per second. The cut in speed (which is the lowest wind speed at which the rotor blades are spinning and generating electricity for the grid) of a wind turbine is usually set around 3.5 to 4 meters per second. Hence, an increase of the cut-in speed of the wind turbines to a speed of 6 m/s instead of 3.5 to 4 m/ s could substantially reduce bat mortality with relatively minor losses in power generation. In wind farms in Canada, the increase of cut-in speed had reduced bat mortalities, ranging from 44% to 93% with marginal power loss (less than 1% of total annual input), similar statistics were obtained in the United States and Europe. The results of the post-construction monitoring will determine if this measure is required particularly if results shows high level of mortalities of the Lesser long-nosed bat listed as vulnerable.
- 60. *Management of impacts and risks on marine turtles.*** Through its Conservation Plan for the marine turtles the company presented the mitigation measures for these species. First, the baseline efforts for the turtles will be pursued during both construction and operation of the project. Similar to the plan developed for the Jackrabbit, the company will proceed to a careful inspection of the site prior to any construction activities. The area around the docking stations and other portions of sandy areas susceptible to be used and crossed over by heavy machinery, will be inspected everyday for the presence of turtle's tracks, and nesting areas. If nesting areas are encountered, the perimeter will be fenced and data about the site (location, date) will be compiled in order to keep track for the hatching of the turtle's eggs. As mentioned previously, the main threat faced by the turtles in the project area is attributed to local communities who collect the eggs for human consumption. The company will have the sandy portions of the project area patrolled at intervals of two hours between 8pm and 8am to limit this illegal activity. The company intends to work closely with Mexican environmental

authorities who have developed over the year's good conservation program for the turtles. As no patrolling of the area ever took place, this action will likely have a positive effect in diminishing illegal harvesting of turtles eggs. The conservation plan, does not however, propose any mitigation measures to avoid and minimize potential risk of collision of turtles with the maritime traffic that will be significantly increase during the construction period. The Bank will propose to the company a set of guidelines that corresponds to best industry practices to address this potential risk.

- 61. *Management of impacts and risks on the Tehuantepec Jackrabbit.*** Through its Biodiversity Conservation plan, the company will avoid, minimize, monitor, manage and compensate for residual impacts, if any, that the Tehuantepec Jackrabbit may experiment. Despite the fact that the site of the erection of the turbines and the roads are not located within close proximity of critical habitat of the Jackrabbit, these areas are still part of their home range and as such individuals may be encountered in this area on an irregular basis. As a precautionary measure during the construction phase, the company had developed a Wildlife Rescue and relocation program, they will proceed to a careful inspection of the areas prior to erection of the turbines but also prior to temporary storing the heavy equipment (such as blades) on the land. None of the roads will be asphalted and the width will be below 6 m. Additional surveys of the Jackrabbit will be conducted shortly before construction to determine the areas that are more frequented and road signing will be installed to inform the drivers to decrease their speed and be cautionary of any wildlife movement. The site will be inspected for the presence of burrows and the presence of juveniles which are less mobile than adults and may not react because of the stress posed by the noise and vibrations. If juveniles are encountered, the company will proceed to their relocation in safe areas within Santa Maria. As a precautionary measure, the Bank is currently seeking advice from experts of this species, to assess the adequacy of the relocation program.
- 62.** During the operation phase, the home range habitat of the Jackrabbit will not be altered by noise or by heavy vehicular movement. As mentioned earlier, uncontrolled fires by cattle herders are destroying the habitat of the Jackrabbit, this threat will disappear once in operation as the company will not authorized any fires within the project area in order to protect the infrastructures. The project area will be patrolled for any unlawful entries, as such it is expected that illegal hunting of this animal will substantially decrease within the project area. According to the measures contained in the Biodiversity Plan, one of the propositions made by the specialist is to start a sterilization campaign of feral dogs present in Santa Maria as these undernourished dogs are an important cause of mortalities of the juveniles Tehuantepec Jackrabbit. The feasibility of undertaking such initiative, given the local and cultural context, will be explored by the company. Through the hiring of one Biologist and two technicians, the company will ensure that all measures are implemented and that fatalities, if any, are diligently monitored. The company will compile the following: exact location of fatalities, if any; biological characteristics of the individual; and cause of death. These data will help in establishing corrective actions. The company is currently negotiating with *ejidos* the concession of a 200 ha of land located on the eastern tip of Santa Maria, which contains vegetation structures that are critical for the survival of the Tehuantepec Jackrabbit. The plan is to create a *Unidad de Manejo Ambiental* (UMA), a type of protected area for which the management responsibility is incumbent to a private individual or a

company. This UMA consists in the main approach of the company to compensate for any potential loss that may occur during the construction period (for instance mortalities due to a road kill). This UMA will be the first protected area in Mexico specifically created for the Jackrabbit. With all these measures, it is expected that the presence of the company in this area will have a long term positive effect on the population of the Tehuantepec Jackrabbit.

- 63. *Management of impacts on terrestrial habitats.*** The most important measure for managing environmental impacts on habitat is the careful selection of the wind turbines. Upfront in the design process, the company proceeds to a readjustment of the layout of the wind turbines to avoid and minimize potential impacts. For instance, some turbines have been displaced by more than 350 m in Santa Maria to avoid being too close of the mangroves. The location of the 30 turbines in Santa Maria is also concentrated on existing pasture lands where continuous vegetation patches are almost absent (see Fig. 9 and 10). The bulk of vegetation structures, areas that are considered suitable habitat for the wildlife, are indeed concentrated south and east of the turbines location (cf. Fig.9 and 10).

VI. PUBLIC CONSULTATION

- 64. *Public consultation activities carried out and key results.*** Consultation has been carried out at several stages during Project preparation. Communities have received information about the project's objectives and scope; consultation has focused mainly on reaching agreements to obtain the lands and the right of way for the Project. To date, the consultation process did suffer from a lack of a systematic process to register issues, concerns and feedback of affected people. However, it is important to underline that usufruct agreements with Santa Maria and San Dionisio were publicly discussed in communal assemblies; minutes of such assemblies were attached to agreements signed before a Public Notary.
- 65.** Two official communal assemblies have been conducted with Santa Maria del Mar to provide general information about the Project and consult the community regarding land use agreements. In the case of San Dionisio del Mar, three communal assemblies to the same end were called before obtaining the necessary audience requested by law for the assembly to be legal (an attendance of at least 50%). Consultation during this process was carried out in compliance with Mexican Law and Bank's directive. Subsequently consultation has been carried out with customary and official authorities only. No further consultation with the whole community had been conducted after the land contract was signed until recently. Consultation has also included other communities where the Project requires land permits. A formal engagement has taken place with Alvaro Obregon, which is an Agency of Juchitan, located near the inland connection to Santa Teresa Cape. Obregon is relevant because the transmission line will run along the outskirts of the community. Initial contact was also established with San Mateo del Mar located within the Project's direct influence area and the only land access to Santa Maria del Mar. However due to the conflict between these two communities, the Company has limited his contact with San Mateo.
- 66.** To address the gaps in consultation, the Company has conducted during September public information meetings, including all communities in the Project's direct influence area. Consultations with new municipal authorities who took office in January 2011 were also held

to explain the previously agreed contract conditions. The Company had recently hired a Social manager who will be in charge, among other things, of all aspects related to consultation.

67. *Public consultation activities during Project's implementation.* A Community Relations Team will be established to inform, consult and address social issues during Project's implementation. A communication strategy has been drafted but is yet to be completed and become operational. The communication strategy should be in place before construction begins to guide communication and consultation with communities under the project, namely, San Dionisio and Santa Maria. Because all communities within the project area are indigenous, the proposed consultation plan should take into account cultural aspects and language, as well as customary proceedings.

68. *Grievance Mechanism.* A formal Grievance Mechanism had been prepared by the company. This mechanism is in form and substance satisfactory to IDB and was elaborated according to best industry practices.

VII. OPERATION COMPLIANCE EVALUATION

69. *Compliance with national regulatory framework.* The 2009 EIAs has been approved by the relevant authority (SEMARNAT) in 2010. All environmental conditions (such as producing a birds and bat monitoring study, conservation plans for the marine turtles and the Tehuantepec Jackrabbit etc.) have been met by the company but are in the process of being validated by the environmental authority which is expected by December 2011. All fillings for non-environmental applications are almost completed *i.e* crossing permit for the sub-lagoon cable, municipal land use and construction permit, concession titles for the access ramps) and are permits are expected to be delivered prior to construction. The acquisition of the rights of ways is 87 % completed.

70. *Classification.* Per the IDB's Environmental and Safeguards Compliance Policy, the project has been classified as a Category A operation primarily due to the scale of the wind park, the potential for significant direct and indirect impacts on avian and marine fauna, the likelihood of residual impacts on the terrestrial fauna, the presence of social conflicts in the vicinity of the Project area the potential cumulative impacts on avian fauna given the presence of numerous other wind parks in the region.

71. *IDB's safeguard policies and Directive triggered.* The project triggers several directives of the IDB's Environmental and Safeguards Compliance Policy (OP-703): Directive B.5 (Environmental Assessment Requirements), Directive B.6 (Consultations), B.9 (Natural Habitats and Cultural Sites), Directive B.10 (Hazardous Materials), Directive B.11 (Pollution Prevention and Abatement); OP-Involuntary Resettlement Policy (OP-710) in relation to potential economic displacement as well as OP-765 Policy on Indigenous Peoples. The Project also triggers the IDB's Disaster Risk Management Policy (OP-704) based on its location in an area prone to flooding.

72. *Level of Project's compliance with OP-703.* Requirements of OP-703 are either being met by the Project, or are expected to be met by the proposed management and mitigation measures, and implementation system. Requirements of Directive B.9 for the compensation of potential residual impacts on the Tehuantepec Jackrabbit are expected to be met by the end of 2011 through the finalization and implementation of a biodiversity conservation and compensation plan satisfactory to the IDB. Such plan for the Jackrabbit had already been developed by the company but as of today, mitigation and conservation measures contained in this plan needs to be further detailed and/or adjusted to maximize conservation and long term protection of the species. The IDB is currently in discussion with scientific experts of this Jackrabbit so they provide technical guidance to refine measures contained in the Biodiversity conservation and compensation plan. The Project is in compliance with Directive B.6 on Consultation.

73. *Level of Project's compliance with OP-765.* The Project's direct and indirect influence areas comprise indigenous peoples of Huave and Zapoteco descent. The consultation process among indigenous groups has been conducted following Mexican Laws and Bank's principles. There is no opposition to the project from Indigenous groups. Land usufruct agreements were conducted in the respect of land ownership and rights including the use of natural resources. The Project is expected to be in full compliance with OP-765 once the additional baseline studies (currently ongoing) are completed; and once the Company has finalized its consultation activities with Indigenous groups prior to construction.

VIII. REQUIREMENTS TO BE INCLUDED IN THE LEGAL AGREEMENTS

74. *General Requirements.* The Bank (IDB) will require that the Borrower and all portions of the Project shall, at all times during the life of the loan, comply with each of the following:

1. All applicable environmental, social, health and safety, and labor Mexican regulatory requirements.
2. All requirements associated with any environmental, social, health and safety, and labor related permits, authorizations, or licenses that apply to the Project, the Borrower or any party responsible for executing the operation or its mitigation measures.
3. All environmental, social, health and safety, and labor requirements of the Project contracts and any subsequent modifications.
4. All aspects and components of all of the Operation's environmental, health and safety, social and labor documents.
5. Consult with IDB before approving or implementing any and all substantive changes to the Project (including its environmental and social management and mitigation plans) or its timetable which could potentially have negative environmental, social, labor, or health and safety effects.
6. Send written notice of any and all noncompliance with any environmental, health and safety, social and labor requirement of the loan agreement and any significant environmental, social, labor, health and safety accident, impact, event, claim or material complaint.

7. Ensure that all Borrower's contractors hired for construction and operation activities comply with the applicable environmental, labor, social and health and safety requirements of the loan agreement.
8. Implement ongoing information disclosure and consultation activities related to environmental, labor, social, and health and safety aspects of the Project, and, as applicable, participatory monitoring.
9. Implement an environmental, health and safety, social and labor management system that is consistent with ISO 14001.

75. *Specific requirements.* The company will have to be in compliance with the actions and timeline set in the Environmental and Social Action Plan (ESAP). The ESAP will be part of the loan agreement and include the following key components:

- (a) Biodiversity conservation plans (marine turtles, Tehuantepec Jackrabbit);
- (b) Birds and bats monitoring results during construction and post-construction
- (c) Environmental and Social Management system (ESMS);
- (d) Social baseline studies including impact assessment;
- (e) Social management plans (compliance with land agreements and social programs, economic displacement compensation framework, indigenous peoples plan, consultation and information disclosure program);
- (f) Directives for in-house staff capacity.

*These key components will be accompanied by a set of actions for which specific timeline will be negotiated with the client.

76. During the life of the Loan Agreement, the Borrower must prepare and submit an Environmental and Social Compliance Report, in form, content and frequency acceptable to IDB. It is expected that during Project construction (i.e. until Project Technical Completion), the Borrower must prepare a quarterly report and the report must be received by the IDB in the subsequent month. After construction, the report must be prepared annually and must be submitted within 60 days after the close of the Calendar Year. In addition, the Borrower may be required to submit quarterly Environmental Monitoring Reports, in form and content acceptable to IDB, of evolving social or environmental conditions which the parties agree need to be closely monitored during construction, execution or both even if they are not specifically included in any Project environmental or social management or mitigation plan.

77. To provide for Bank monitoring of the Project's environmental, social, health and safety, and labor aspects the Loan Agreement shall provide for:

- a. Direct Bank supervision actions (e.g., site visits, review of documentation, consultations with affected parties and third parties, etc.);
- b. The Bank's requirement to contract an external independent environmental consultant to perform more detailed supervision/monitoring actions during the Project construction and initial operation by the Sponsor/Borrower, and, as needed through the life of the loan.
- c. The Bank's right to contract for the performance of an independent environmental, social, health and safety, and labor audit, if the Bank deems necessary;

- d. The Borrower's agreement to provide access to all relevant documentation, facilities and personnel and cooperate fully with any inspection or audit by the Bank or its designated consultants.
- e. The Borrower's agreement to cooperate fully with the IDB's Independent Consultation and Investigation Mechanism (ICIM).