

50 MW Wind Power Plant by Metro Power Company Limited: *Jhimpir, Pakistan*

Metro Power Company Limited

Non-Technical Summary

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Client		Project No			
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Project Summary		Date			
<p>Metro Power Company Limited is developing a 50 MW Wind Energy Project in association with the sponsors Mr Iqbal Alimohammed and Family and InfraCo Asia at Jhimpir area, Taluka and District Thatta in Sindh Province of Pakistan.</p> <p>ERM has been commissioned by MPCL to upgrade the existing Initial Environmental Examination report for the Wind Energy Project, which was prepared in April 2009 for local regulatory approval from the Environmental Protection Agency of Sindh Province. The IEE report upgrade presented herein has been prepared in accordance with applicable Equator Principles and International Finance Corporation / World Bank guidelines.</p>		23 July 2013			
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ABBREVIATIONS

AEDB	-	Alternative Energy Development Board
ALARP	-	As Low As Reasonably Practicable
AOI	-	Area of Influence
BOD	-	Bio-chemical Oxygen Demand
CBOs	-	Community-based Organisations
CDM	-	Clean Development Mechanism
CEO	-	Chief Executive Officer
CITES	-	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CO	-	Carbon Monoxide
COD	-	Chemical Oxygen Demand
CSR	-	Corporate Social Responsibility
dB	-	Decibel
DCO	-	District Coordination Officer
DEM	-	Digital Elevation Model
DIPL	-	Descon Integrated Project Private Limited
DO	-	Dissolved Oxygen
DOE	-	Descon Engineering FZE, UAE
DOS	-	Descon Engineering Limited
EHS	-	Environment Health and Safety
EHV	-	Electrical High Voltage
EIA	-	Environmental Impact Assessment
EMF	-	Electromagnetic interference
EMMP	-	Environmental Management and Monitoring Plan
EMP	-	Environmental Management Plan
EPA	-	Environmental Protection Agency
EPC	-	Engineering, Procurement and Construction
EPFIs	-	Equator Principles Finance Institutions
ERM	-	Environmental Resource Management
ESAP	-	Environment and Social Action Plan
ESMP	-	Environment and Social Management Plan
ESMS	-	Environmental and Social Management System
FCCC	-	Framework Convention on Climate Change
FFC	-	Fauji Fertilizer Company's Energy Ltd
FGD	-	Focussed Group Discussion
GAEL	-	Gul Ahmed Energy Limited
GATML	-	Gul Ahmed Textile Mills
GAWPL	-	Gul Ahmed Wind Power Limited
GIS	-	Geographical Information System
GoP	-	Government of Pakistan
GoS	-	Government of Sindh
GPS	-	Geographic Positioning System
GRC	-	Grievance Redress Cell
GRM	-	Grievance Redress Mechanism
Ha	-	Hectare
HESCO	-	Hyderabad Electric Supply Company

HSD	-	High Speed Diesel
HT	-	High Tension
IEE	-	Initial Environmental Examination
IFC	-	International Finance Corporation
IGBT	-	Insulated Gate Bipolar Transistor
IP	-	Indigenous People
IPPs	-	Independent Power Producers
IUCN	-	International Union for Conservation of Nature
Km	-	Kilometre
LOI	-	Letter of Intent
LULC	-	Land Use and Land Cover
m	-	meter
m ²	-	Square meter
MPCL	-	Metro Power Company Limited
MPN	-	Most Probable Number
MW	-	Mega Watt
N	-	North
NEPRA	-	National Electric Power Regulatory Authority
NEQS	-	National Environmental Quality Standards
NGO	-	Non-Governmental Organisations
NHCD	-	National Commission for Human Development
NNE	-	North North East
NO _x	-	Oxides of Nitrogen
NREL	-	National Renewable Energy Laboratory
NRSP	-	National Rural Support Program
NSDWQ	-	National Standard for Drinking Water Quality
NSE	-	Nordex Singapore Equipment Private Limited
NSS	-	Nordex Singapore Service Private Limited
NTDC	-	National Transmission and Dispatch Company
NTU	-	Nephelometric Turbidity Unit
O&M	-	Operations & Maintenance
OPC	-	Ordinary Portland Cement
PEPA	-	Pakistan Environmental Protection Act
PEPCO	-	Pakistan Electric Power Company
PIDG	-	Private Infrastructure Development Group
PLC	-	Programmable Logic Controller
PM	-	Particulate Matter
PNR	-	Pakistan National Rupee
PPA	-	Power Purchase Agreement
PPE	-	Personal Protective Equipment
PPI	-	Power Planners International Ltd
PPIB	-	Private Power and Infrastructure Board
PPTA	-	Project Preparatory Technical Assistance
PS	-	Performance Standard
R&DC	-	Research and Development Consultants
RE	-	Renewable Energy
S	-	South
SEP	-	Stakeholder Engagement Plan
SEPA	-	Sindh Environmental Protection Agency
SO _x	-	Sulphur Dioxide

SPLs	-	Sound Power Levels
SRC	-	Sulphur Resistant Cement
STP	-	Sewage Treatment Plant
SUPARCO	-	Pakistan Space and Upper Atmosphere Research Commission
SW	-	South West
TDS	-	Total dissolved solids
TMA	-	Taluka Municipal Administration
TOR	-	Terms of Reference
TSS	-	Total suspended solids
UA	-	Union Administration
UNESCO	-	United National Educational, Scientific and Cultural Organisation
UNFCC	-	United Nations Framework Convention on Climate Change
UTM	-	Universal Transverse Mercator
W	-	West
WAPDA	-	Water and Power Development Authority
WB	-	World Bank
WEP	-	Wind Energy Project
WHO	-	World Health Organisation
WTGs	-	Wind Turbine Generators
ZEPL	-	Zorlu Energy Pakistan Limited

E. EXECUTIVE SUMMARY

E.1 INTRODUCTION

Metro Power Company Limited is developing a 50 MW Wind Energy Project in association with the sponsors Mr Iqbal Alimohammed and Family and InfraCo Asia at Jhimpir area, Taluka and District Thatta in Sindh Province of Pakistan.

ERM has been commissioned by MPCL to update the existing Initial Environmental Examination ("IEE") report prepared in April 2009 for local regulatory approval from the Environmental Protection Agency (EPA) of Sindh Province, to meet the requirements of the specified reference framework as follow:

- Applicable national laws and regulations in Pakistan;
- IFC Performance Standards (2012);
- IFC /WB General EHS guidelines;
- IFC/WB – Environmental, Health and Safety sector specific Guidelines, in particular: IFC Guidelines for Wind Energy; Projects and Power Transmission and Distribution; and
- ILO Conventions and recommendations.

E.2 PROJECT DESCRIPTION

The MPCL WEP will comprise of development, ownership and operation of a 20 wind turbine generators (WTGs), each with a capacity of 2.5 MW resulting in an aggregate capacity of 50 MW. The project site is located in Deh Kohistan 7/1, Union Administration Jhimpir, Taluka and District Thatta. It falls under the Gharo-Jhimpir wind corridor in Sindh Province of Pakistan, about 140 km north-east from the city of Karachi.

The site can be accessed from the Karachi - Hyderabad Super Highway M-9 at 55 km to Hyderabad. The project site is a narrow area which runs approximately 8.5 km in length and 1 km in width from northwest to 0.25 km in southeast. The Wind farm is spread across 1,553 acres land is mostly arid stony wasteland with rocks, sand and gravel. The terrain at the site and surrounding area has elevations varying in between 60 m in the southeast to 120 m in northwest. The key components of the Project are summarized in *Table E.1*

Table E.1 Key Components of MPCL WPP

Project Component	Description	Current Status
Wind Farm with 20 WTGs	Wind Farm at Deh Kohistan in Jhimpir spread across 1553 acres	Micro-sittings plan has been completed as per recommendations of M/s

Project Component	Description	Current Status
Access roads	The site will be provided 18 km internal road to service the WTGs and 12-13 km dirt approach road from the existing Nooriabad to Jhimpir link road.	Garrad Hassan; MPCL has executed an agreement to sub-lease with the AEDB for 1553 acres of land. The approach road is partially constructed (about 4 km) for two existing projects (up to Fauji Fertilizer Company's Energy Ltd (FFC) wind farm) in the area and remaining about 8 km shall be further constructed. Responsibility for strengthening /construction of both internal and approach roads is with Engineering, Procurement and Construction (EPC) Contractor.
Office and Sub-station	Operations and Control Building and Sub-station in middle of the wind farm in between WTG 10 and 11	No site office currently exists. Responsibility of construction lies with EPC Contractor. Exact location of office and sub-station is not yet finalized.
Transmission Line	22 KV underground electrical collection System leading to the Project Sub-station and Overhead Transmission line from the Project Sub-station to connect to the National Transmission and Dispatch Company (NTDC)/ Hyderabad Electric Supply Company (HESCO) 132 KV system	No work has been started till date. Underground cabling up to the site sub-station is the responsibility of EPC contractor. Any line from the sub-station to the NTDC/HESCO grid is responsibility of the power purchaser i.e. NTDC.

E.2.1

Land Requirements

The wind farm will be spread across 1,553 acres of land in Jhimpir which shall be sub-leased to MPCL by AEDB and leased by Government of Sindh (GoS). The site sub-lease deed is yet to be executed between AEDB and MPCL. AEDB will sign the actual lease document referred to as the "Site Sub Lease Deed" (together with the signing of the Energy Purchase Agreement with NTDC).

The individual WTGs will require about 2.5 acres of land for each footprint. Thus, for the 20 WTGs, the actual land utilization is likely to be approximately 50 acres out of the total of 1,553 acres allotted by MPCL. In addition, during the construction phase, land will be required for assembly, warehouse and storage requirements of the EPC contractors. For the Operations and Maintenance phase, additional land may be utilized for the site office, control room etc. Other components for the land requirement include the access road for a length of about 18 km internal road to service the WTGs (~17.5 acres) and the sub-station (~5-10 acres).

E.2.2

Water Requirement

Construction Phase

An estimated 200,000 m³ of water will be required for civil works during the entire construction phase. The daily maximum will be around 40 m³ of water for civil works. This water will be supplied by water tankers from a Kalri Baghar Feeder at Jherruck..

The construction camp will require 10 m³ of potable water each day on-site stored in tanks. Potable water from the Nooriabad/ Jhimpir Pumping Station will be used for the camps. Water for other requirements as washing etc will also be obtained from the Kalri Baghar Feeder by tankers.

Operation Phase

1-1.5 m³ per day of water will be required during the O&M phase. This will be obtained from Nooriabad and stored in a tank on-site. Packaged potable water would also be obtained from Nooriabad for meeting the requirements of 20 persons.

E.2.3

Fuel requirement and Storage

Construction Phase

The onsite fuel requirement during construction will be about 1 million liters which shall be met by tanker trucks. Onsite storage of fuel will be limited to daily requirements and an onsite storage tank of 20,000 liters (on storage wheels) will be provided under due safety and security conditions for the daily on-going activities.

The onsite delivery of fuel or lubricant will be at designated location that will have an impervious base, with a dyke around to contain spills in case an accidental spill occurs.

Operations Phase

There will be above ground storage facility for 1,800 liters of fuel. Fuels and oils will be unloaded in designated areas and stored in the tank.

E.2.4

Power Requirement

Construction Phase

The expected maximum requirement of electricity for construction and the camp is estimated at 1000-1,500 KVA approx. Diesel generators will be used for power generation to operate the construction equipment and for the camp.

Operations Phase

Two small capacity, 200KVA and 100 KVA diesel generators, shall be installed for emergency power supply for the essential loads. The diesel emergency generators will be operated only as back-up.

E.3 ENVIRONMENTAL AND SOCIAL BASELINE

E.3.1 Land Use and Land Cover (LULC)

The Project area contains the following land use / land cover classes *viz.*: built-up, agricultural land, wasteland, water bodies and mining/ excavated area at Level-I classification system. Predominant landuse within the Project site includes wastelands with 94.52 %, followed by agriculture 4.72%, others (mining/excavated) 0.33%, built-up 0.24% and water bodies 0.18%. In the 5 km project area, majority of the land is arid and sandy. The next major category is Land without scrub

E.3.2 Topography

Topographic undulation of the Deh Kohistan area is substantially large with the relative elevation varying between 40 m to 250 m. The hilly areas are located in the north and west while the low lying and flat fields are located on the south west of the area.

Within 5 km of the MPCL Project area, the lowest elevation of 50 m is near the eastern most corner of the project buffer. The region is very near to the Harola Nai (Rod nai). The highest elevation is 130 m on the western side of the 5 km area. The elevation in the Project area ranges from 50 m to 130m. The maximum elevation (110 m) of the project site is at the southwest, southern and western boundary and passes near the proposed wind turbine site MP-1. The maximum depression i.e., about 60 m, is located in the south east and north east side of the project site near wind turbine site MP-20.

The DEM shows that the Project area is plain in the eastern side near the head of the Harola Nai with the elevation value 50 m which increases gradually towards the western side with maximum elevation 120 m within the western most corner of the 5 km buffer. This clearly depicts that the area slopes from west to east.

Within the Project site, the DEM shows that the area is plain in the eastern side with the elevation value 50-90 m up to the proposed wind turbine site MP-7. The elevation near MP-6 is about 100 m. The elevation again increases up to the proposed wind turbine site MP-2 (~106 m) MP-1 and MP-2 has the similar level of elevation.

E.3.3

Geology

The geology of the Sindh region of Pakistan is closely related to the formation process of Himalayan mountain ranges resulting in intense deformation with complex folding, high angle strike-slip faults and crust thickening expressed in a series of thrust faults. Most parts of Sindh are covered either by recent alluvium or wind-borne sand. The principal features of geological significance are to be found in the hilly portions of the province, towards the west of the Indus. Outlying extensions of this hilly tract occur east of the Indus as well, near Sukkur, Hyderabad and Jerruck.

The hilly region of western Sindh consists almost entirely of rocks belonging to the tertiary system of geological nomenclature. It is only along the Laki Range and in its neighbourhood that there are some exposed rocks belonging to the next older system, the Cretaceous. With the exception of some volcanic beds associated with these Cretaceous strata, all the rock formations of western Sindh are of sedimentary origin. All the important hill masses consist of limestone.

A sequence of lateritic clay and shale with beds of arenaceous sandstone of Laki Formation, named as Sonhari Member of Eocene age is found in Deh Kohistan, where the proposed MPCL Project is located.

E.3.4

Soil Types

The soil of Project area comprise of rock outcrops and loamy very shallow steep mountain soils of mainly arid and semi-arid zone. The soil cover of the MPCL Project site and its AOI is very thin due to severe wind erosion and soil erosion in the drainage basin. Most of the rocks contain limestone. Natural vegetation has almost disappeared from the surface plain. The soils are shallow, strongly calcareous silt loam with weak structure. The slope of the entire Project site is towards west to east i.e. towards the river Horola Nai. The outcrops comprise either bare rocks or have very shallow soils.

E.3.5

Natural Hazard

Over the last sixty years, earthquakes of intensity lower than 5 on the Richter scale, including those in 1945 and 1985, have struck the region including the project site and AOI and thus far they have been of minor significance. This is mainly because the earthquakes here are not "Inter-Plate" or "Plate Boundary" earthquakes which occur commonly along narrow zones that follow the edges of tectonic plates.

E.3.6

Climate

The climate of most parts of Sindh region is characterized by arid with maximum temperature observed during May & June and Minimum temperature during December & January.

E.3.7 *Ambient Air Quality*

The IEE report, 2009 includes results of ambient air quality monitored at one location near the MPCL Project site for 24 hour period at 15 minutes interval on 9 March 2009. SO₂ level ranges between 20 to 32 µg/m³ which is much lower than 120 µg/m³ recommended for the 24-hourly average by the NEQS, while NO_x level ranges between 15 to 30 µg/m³ which is much lower than 40 µg/m³ recommended for the 24-hourly average by the NEQS. CO level ranges between 0.22 to 2.1 mg/m³. PM₁₀ concentration ranged between 36.0 µg/m³ and 152 µg/m³ with the average at 134.1µg/m³ which exceeds both NEQS and World Bank guideline values.

E.3.8 *Ambient Noise Levels*

Noise level average around project site ranged between 40 – 48.5 dB(A). At the Project site is calm with noise level ranging between 38 dB(A) and 55 dB(A). The few cluster of huts in the area have an average noise level of 45.0 to 48.5 dB(A). The background noise levels are raised in the area by the peak noise emission from the hissing and rustling of the wind in particular the gusts and whirl wind. It was reported that quite often the rustling of wind induced vibration of the stay wire of the masts, which raised the noise level to over 70 dB(A).

E.3.9 *Surface and Groundwater*

MPCL Project area is located in a dry arid region with no perennial sources of water.

In the Kohistan arid region, groundwater levels are at more than 25 m depth. Ground water quality varies from place to place, being brackish or moderately brackish in areas or sweet in others and suitable for drinking. As per the geotechnical investigation report, the borehole well studies at the Project site reveal that the water table level is much below 20 m and the strata in the vicinity of the water table has dried up.

In general the various parameter of surface water quality of the project site is within guideline value for both WHO and NSDWQ; however the ground water exceeds the guideline value for both.

E.3.10 *Ecology*

Forested areas of the Project site and its surrounding areas can be categorized as degraded forest, rock and gravel areas and irrigated agricultural area. The plant and animal species reported in the IEE report, 2009 and during site visits made by Tekcellent indicate those commonly found in the xeric habitats.

Flora

The floral species reported in the area are: 10 species of trees, 19 species of shrubs, 14 species of herbs and 17 species of grasses.

Fauna

Fauna species reported in the wind farm site and its surrounding are 12 species of reptiles, 59 species of birds, 13 species of mammals and 4 species of livestock.

Protected Areas

No wildlife reserves are located in close vicinity of the Project site. Keenjhar Lake Wildlife Sanctuary is located at 15 km outside of the macro environment.

E.3.11 Social Environment

Demographic Profile

According to the 1998 census of Pakistan, *Thatta* had a population of 1,113,194 of which 88.8% was rural and only 11.2% were urban. Based on available estimations, the population of *Thatta* District (2010) is estimated to be 1.58 million. The gender ratio of the district is 888 females per 1000 males which is lower than the national ratio. In comparison, the taluka of *Thatta* in which the project is located had 22% of the total district population in 2010 with a slightly improved sex ratio of 885 females per 1,000 males.

The primary survey conducted in the Project area suggests that a total of 36 households or 216 persons are located within the MPCL site. There are two settlements/communities that come inside the MPCL project site, namely: *Bacho Jhakro Goth* and *Qasim Burfat Goth*. There are another 498 households or 3,630 people in a 5 km radius from the project boundary.

The average household size within the project site is 6 as compared to that for the Project area which is 8. Overall, approximately 3,846 people reside within a 5 km radius of the project locations, which indicates a low population density of 153 persons/km²

Settlement Pattern

The proposed area for the installation of the MPCL wind farm is set in a rural landscape which is sparsely populated and which has a scattered settlement pattern with each *goth* (village) at least 700 m to 1 km away from one another. The primary data suggests that the number of small hamlets has increased over time. The number of households and population show the preference of habitants to dwell in small groups instead of living in larger communities.

Literacy

Sindhi is the most prominent language in the district with 85.66% people speaking *Sindhi*. It is followed by Urdu (11.20%), *Punjabi* (1.07%), *Pashto* (0.75%), *Balochi* (0.65%), *Seraiki* (0.10%) and others (0.58%).

The Thatta District census report (1998) suggests that the total literacy rate in the district is 22.14%. It was reported that the male literacy rate is less than 30% and female literacy is even below that. It was reported that lack of educational facilities in the area and poverty are the main reasons for very low literacy level in the project area.

Ethnic Profile

The project area of influence is predominantly Islam with major community groups that include *Jhakro*, *Chang*, *Burfat*, *Khaskheli* and *Brohi*. The *Jhakro* community is in majority, whereas *Burfats* are powerful in terms of political networks and influence over the area.

The social setup in the project area exhibits a strong *biradri* (kinship) system, which defines the inter- and intra-community hierarchy, gender dynamics and allegiance, and also plays an important role in conflict resolution at the local level. Every social group has its own *Sardar* or *Mukhia* (Chief), who represents the entire community. Most of the disputes among the community members are resolved at village level by the *Sardar*.

Common Property Resources

In the project area, there are many land-based resources that are used by the community as a whole. This includes grazing land, natural resources such as fuelwood, rocky outcrops which are used for local stone excavation. The most important land use in Deh Kohistan is grazing. Villagers also consider sites such as mosques, grave yard areas as well as school buildings which can be used as 'autaq's' or guestrooms by the villagers.

Land Rights and Landholding Patterns

The arid land scape provides less subsistence or economic opportunities, thus encouraging local communities to share scant resources. Consultations indicate that there is no formal demarcation of land rights amongst communities for land and other natural resources. Since large landholdings are rare and not extremely important in the local economic system, communities have settled into subsistence based livelihoods with a sense of equity in the distribution of available resources.

The status of land and rights of communities in the project area has not been clearly defined. According to government records, the land is classified as unsurveyed government land and does not include any formally owned /used plots of agricultural land or "paimooda". This land has thus been subsequently sub-leased for industrial development, notably wind energy

projects, through the AEDB. Thus, the status of these settlements becomes akin to squatters without a formal or recognizable right on land that is being used for agriculture, mining or grazing even though the available land constitutes the only source of livelihood.

Livelihoods

The rural economy in the Project area is essentially agro-pastoral with dependent upon land-based livelihoods for subsistence.

In the project area, most households have around 30-60 ruminants that include goats and cattle. When natural vegetation dries up and it is costly to buy green or dry fodder and water for animals, the people move their livestock and animals to *Jherruck* where the *Kalri-Baghar* Feeder canal provides sufficient water and moisture for the vegetation to grow. The people are used to this type of living or in-migration for a long time now.

The key markets for livestock and livestock produce in the project area of influence include Mirpur Sakro and Dhabeji which operates once a week. Lack of perennial sources of irrigation and non-availability of veterinary services are key constraints within an area where the community is heavily dependent upon livestock for subsistence and income. The average number of goats in settlements around the project site is 132 and that of cattle is 71, per village visited. Some settlements have a sense of collective ownership and sharing of benefit from livestock.

Physical Infrastructure

Electricity

There is no electricity supply for domestic or any agricultural or commercial use for the villages in the project's area of influence as well as in the 5 km radius. Regular supply of electricity has emerged as a key expectation from wind energy development in the project area.

Drinking water

There is an acute shortage of drinking water in the project area. Ground water level is too deep at ~200 ft. and there is no regular water supply scheme in villages of the project area and residents get water through tanker service. There are hand pumps in selected villages but the quality of water is usually not good. Keenjhar lake provides water to a large portion of villages in the Jhimpir area. MPCL has also provided some bore wells and hand pumps in the villages within their area of influence.

Transport and Connectivity

The Super Highway M-9 (*Karachi-Hyderabad*) is about 9 km from the Project site. A dirt road taking off from *Kohistan* Hotel at 55 km to *Hyderabad* provides alternative access to the Project site.

Health Facilities

Settlements in the project area do not have any healthcare services. Generally, villagers access *Jhimpir*, *Nooriabad*, or *Thano Bola Khan* for general ailments and to *Kotri*, *Jamshoro* or *Hyderabad*, at a distance of 30-40 kms for treatment of major diseases. The cost of healthcare in the project area is exorbitant due to the associated transportation charges, consultation fees and availability of medicines.

Education Facilities

There are two primary school buildings for boys in the Project area but only one, in *Brohi* village is functional. In addition, *Qasim Burfat* village has one *Madressa*. The school building at *Jan Mohamad Burfat Goth* is being used by the village hierarchy as '*autaq*'. Under the circumstances the school going children remain in *Jherruck* where the families have a secondary/ancestral home. MPCL and other wind energy developers have supported these educational facilities by providing salaries of the teachers and other institutional stakeholders.

E.3.12 Cultural Environment

There are no prominent cultural or archaeological features in or around the MPCL Project site. The nearest graveyard is beyond *Harolo Nai* on the north at a distance of approx. 4 km from MPCL Wind Mast 3 and the same does not have marks of antiquity. Places of archaeological, historical and religious significance in District *Thatta* are located in *Thatta* and are 60 km from the Project site. The UNESCO World Heritage site of *Makli Hill* which is one of the largest necropolises of the world is among them

E.4 STAKEHOLDER CONSULTATION

Stakeholder consultation was an important process for the IEE conducted in 2009 and that has been updated in 2013. The consultation process followed so far includes information from both formal and informal discussions with the stakeholders through focused group discussions, semi-structured interviews and general public meetings. **Table E.2** Summarise Key stakeholders Consultations and outcomes.

Table E.2 Identification and Mapping of Key Stakeholder Groups

S. No	Stakeholder	Outcome
IEE Report Preparation Stage(April 2009)		
1	<i>Institutional/ Govt./ Regulatory Agencies</i> <ul style="list-style-type: none">• Sindh Environmental Protection Agency• Ministry of Environment and Alternative Energy Government of Sindh• SUPARCO• IUCN – Pakistan• WWF – Pakistan	Continuous liaisoning through the progress of the project

S. No	Stakeholder	Outcome
2	<ul style="list-style-type: none">Sindh Wildlife DepartmentMinistry of Local Government & Rural DevelopmentDepartment of Archaeology, Government of PakistanMeteorology Department	General community expectations on employment and development needs
	Community <ul style="list-style-type: none">Qasim Burfat GodhJanoo Burfat GodhJakhro JamaliBrohi Goth	
IEE Update Report Prepetition Stage(Feb- March 2013)		
3	Institutional/ Govt./ Regulatory Agencies/NGO/Others <ul style="list-style-type: none">Social Welfare Officer ThattaDistrict Educational Officer ThattaPlan International (Mangi Programme Unit)Teachers of Jhimpir High SchoolSocial activist cum Educationalist	Potential options to improve community support, stakeholder profiling for construction and operations phase
4	Community <ul style="list-style-type: none">Qasim Buraft GodhJanoo Jakhro GodhBacho Jakhro GodhHaji Wallo Jakhro GodhMurad Ali Chang GodhJanoo Burfat GodhVakhio Jakho Godh	Present constraints and concerns over impacts from wind farms, compensation for use of land, other opportunities to continue livelihoods etc.
5	Discussions with vulnerable groups and women	Livelihood challenges and potential support

E.5

ENVIRONMENTAL AND SOCIAL IMPACTS

The project would have various environmental and social impacts that have been identified based on severity/ enhancement and likelihood of the impacts (considering the duration, geographic extent, intensity/ degree of change and sensitivity) and have been rated from insignificant to moderate. Without mitigation, most impacts associated with the proposed project are rated as moderate to major. Once the mitigation measures recommended in this IEE are implemented, most of the project related impacts would remain negligible or minor. *Table E.2* summarizes the impact outcomes and *Table E.3* summarizes impacts with embedded control and with additional mitigation measures.

Table E.3 **Impact Assessment Outcomes**

S. No.	Phase & Resource	Impact Nature	Impact Type	Impact Duration	Impact Extent	Impact Magnitude	Resource Sensitivity	Significance
A	Pre-Construction and Construction Phase							
1	Land Use	Negative	Direct	Short Term	Local	Medium	Low	Minor
2	Soil and Land Environment	Negative	Direct	Long Term	Local	Small	Medium	Minor
3	Water Environment	Negative	Direct	Short Term	Local	Small	Medium	Minor
4	Air Quality	Negative	Direct	Short Term	Local	Small	Medium	Minor
5	Noise	Negative	Direct	Short Term	Local	Medium	Low	Minor
6	Ecology (Loss of Vegetation)	Negative	Direct	Long Term	Local	Small	Medium	Minor
7	Ecology (Loss and Disturbance to Habitat)	Negative	Direct	Long Term	Local	Small	Medium	Minor
8	Settlement and Community Access	Negative	Direct	Permanent	Local	Positive	Low	Negligible
9	Economic and Livelihood	Negative	Direct	Short Term	local	Medium	Medium	Moderate
10	Social and Demographic Structure	Neutral	Direct	Long Term	Local	Small	Medium	Minor
11	Local Economy and employment	Positive	Direct	Short Term	Local	-	-	Positive
12	Cultural Environment	Neutral	Indirect	Short Term	Local	Small	Low	Negligible
13	Community Health and Safety	Negative	Direct	Short- Term	Local	Medium	Low	Minor
B	Operation Phase							
1	Land Use	Negative	Direct	Long Term	Local	Medium	Low	Minor
2	Landscape and Visual	Negative	Direct	Long Term	Local	Small	Medium	Minor
3	Soil and Land Environment	Negative	Direct	Long Term	Local	Small	Low	Negligible
4	Water Environment	Negative	Direct	Short Term	Local	Negligible	Medium	Negligible
5	Air Quality	Negative	Direct	Short Term	Local	Small	Low	Negligible
6	Noise (Day time)	Negative	Direct	Long Term	Local	Small	Low	Negligible
7	Noise (Night time)	Negative	Direct	Long Term	Local	Small	Medium	Minor
8	Settlement and Community Access	Negative	Direct	Permanent	Local	Positive	Low	Negligible
9	Economic and Livelihood	Negative	Direct	Short Term	local	Medium	Medium	Moderate
10	Social and Demographic Structure	Neutral	Direct	Long Term	Local	Small	Medium	Minor
11	Local Economy and employment	Positive	Direct	Short Term	Local	-	-	Positive
12	Cultural Environment	Neutral	Indirect	Short Term	Local	Small	Low	Negligible

S. No.	Phase & Resource	Impact Nature	Impact Type	Impact Duration	Impact Extent	Impact Magnitude	Resource Sensitivity	Significance
13	Community Health and Safety	Negative	Direct	Short- Term	Local	Medium	Low	Minor
C	Cumulative Impacts							
1	Noise Day time	Negative	Direct	Long Term	Local	Small	Low	Negligible
2	Noise Night Time	Negative	Direct	Long Term	Local	Small	Medium	Minor
3	Shadow Flicker, EMR, & Blade Glint and Throw	Negative	Direct	Long Term	Medium	Medium	Moderate	Moderate

Table E.4 *Impact Assessment Outcomes with Embedded Control and Additional Mitigation Measures*

S. No.	Project activities/Impacts	Significance of Impact	
Pre-Construction and Construction Phase		With Embedded Controls	With Additional Mitigation Measures [1]
1.	Change in landuse	Minor	Negligible
2.	Soil and land environment	Minor	Negligible
3.	Water environment	Minor	Negligible
4.	Air environment	Minor	Negligible
5.	Noise environment	Minor	Negligible
6.	Ecological environment- loss of vegetation	Minor	Negligible
7.	Ecological environment- loss and disturbance of habitat	Minor	Negligible
8.	Social and demographic structure	Minor	Negligible
9.	Cultural environment	Negligible	Negligible
10.	Community health and safety	Minor	Negligible
Operation Phase			
11.	Change in landuse	Minor	Negligible
12.	Landscape-visual impacts	Minor	Negligible
13.	Soil and land environment	Negligible	Negligible
14.	Water environment	Negligible	Negligible
15.	Air environment	Negligible	Negligible
16.	Noise environment (day time)	Negligible	Negligible
17.	Noise environment (night time)	Minor	Negligible
18.	Ecological environment-disturbance to birds and bird collision	Exact impact can only be assessed post detailed bird study	
19.	Settlements and community access	Negligible	Negligible
20.	Shadow Flicker	Negligible	Negligible
21.	Economic and livelihood impact	Moderate	Minor

S. No.	Project activities/Impacts	Significance of Impact	
Pre-Construction and Construction Phase		With Embedded Controls	With Additional Mitigation Measures [1]
22.	Social and demographic structure	Minor	Negligible
23.	Cultural environment	Negligible	Negligible
24.	Community health and safety	Moderate	Minor
Cumulative Impacts			
25.	Noise environment (day time)	Negligible	Negligible
26.	Noise environment (night time)	Minor	Negligible
27.	Shadow flicker	Negligible	Negligible

There was not much option on site alternatives as wind corridors exists in specific areas and the Gharo-Jhimpir wind corridor is one of the earmarked zones by AEDB .

The advantages of development of the MPCL wind farm in the Project area are:

- It is suitable for wind classes 4 to 5;
- Wind is the only resource in the area with vast ecologically degraded lands;
- It has accessibility to infrastructure facilities for the establishment of wind farms and for providing energy to NTDC when it goes into operation;
- The area has rural settings with sparse population thus reducing the issue of shadow flicker, noise, electromagnetic interferences among communities when compared to development of wind farms in more urban and populated areas;
- Site is away from ecologically sensitive and protected areas

The ESMP has been formulated to mitigate potential environmental and social impacts for both the construction and operations phases of the MPCL wind energy project in accordance to IFC Performance Standards 1. The proposed ESMP recommends control measures to be adopted during the construction and operation phases. The ESMP discusses the aspect/potential impacts and specific action to be taken for its management. It refers to the responsible person ensuring commitment for implementation and means of verifying whether the same has been implemented. The timing and frequency of monitoring along with the supervision responsibility and reporting requirements are also provided.

As a part of the ESMP, MPCL has committed to recognizing the existing rights of the local communities in Qasim Burfat Goth and Bacho Jhakro Goth within the project site of 1,553 acres. MPCL will not restrict or curtail the rights of these communities, in terms of residence, livelihoods, movements, access to cultural sites or community infrastructure that may be located within the site. In the event of any need to use land occupied by the community or restrictions on certain land use, MPCL will provide the local community with access to a grievance mechanism.

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