



**INITIAL ENVIRONMENTAL EXAMINATION (IEE) OF
50 MW WIND POWER PROJECT IN JHIMPIR, SINDH
PAKISTAN**



February, 2016

PROJECT COMPANY

Hawa Energy (Pvt.) Ltd

PROJECT CONSULTANTS

Renewable Resources (Pvt.) Limited

Disclaimer Notice

This report has been prepared for the benefit of Hawa Energy (Private) Ltd. (the “Client”), and may not be relied upon or disclosed to any other person for any purpose, other than as stated below, without the Client’s prior written consent in each specific case. The information contained in this report is intended for purposes of seeking an approval from the Environment Protection Agency in accordance with the requirements of the Pakistan Environment Protection Act, 1997, and may be used by the Client for such other purpose as may be necessary for the development and implementation of the Project.

Copyright Notice

The report and its content remain the sole property of Renewable Resources (Pvt.) Ltd (RE2) and may be used by the Client for the above-stated purpose. None of the information contained and provided in the report may be modified, reproduced, distributed, sold, published, broadcasted or circulated, in whole or in part, in any form or by any means, electronic or print, including photocopying, or the use of any information storage and retrieval system, without the express written permission of RE2. Further, RE2 shall not be responsible for any kind of modification of this report and any text, photograph or illustrations which are extracted from this report. Except with the prior written consent of RE2, this report is not to be referred to or quoted in whole or in part, in any prospectus, registration statement, offering circular, public filing, loan or other agreement or document.

Prepared in February, 2016

RENEWABLE RESOURCES PRIVATE LIMITED (RE2)

Islamabad Office

No. 1002, 10th Floor,
Green Tower, Jinnah Avenue,
Islamabad, Pakistan
Tel: +92-51-8358591
Fax: +92-8358592

Karachi Office

B-18, Darakhshan
Villas, Phase VI, DHA
Karachi, Pakistan
Tel: +92-21-35347122
Fax: +92-21-35347123

www.renewableresources.com.pk

Document Title:	Consultant Name:	Document No	Date of Approval
Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Renewable Resources (Pvt.) Ltd	RE2-131-121-001	February, 2016
	Project Sponsor:	Document Issue	Page
	Hawa Energy (Pvt.) Ltd	01	3

TABLE OF CONTENTS

EXECUTIVE SUMMARY	15
1 INTRODUCTION AND PURPOSE OF STUDY	21
1.1 PROJECT PROPONENT	21
1.2 THE PROFESSIONAL ADVISORS	21
1.3 PROJECT BACKGROUND & JUSTIFICATION	22
1.4 PROSPECTS OF WIND ENERGY IN PAKISTAN	24
1.5 PROJECT OVERVIEW & OBJECTIVES	25
1.6 NEED AND OBJECTIVES OF EIA STUDY	26
1.7 BASIS PROJECT CATEGORIZATION OF EIA STUDY	27
1.8 Scope of IEE Study	28
1.9 Methodology for Initial Environmental Examination Study	29
1.9.1 Scoping	30
1.9.2 Impact Assessment	31
1.9.3 Documentation	32
1.10 METHOD FOR EVALUATING IMPACT	32
2 LEGISLATIVE REQUIREMENTS	33
2.1 NATIONAL ENVIRONMENTAL LAWS	33
2.2 POLICY GUIDELINES	33
2.2.1 National Conservation strategy	33
2.2.2 The Biodiversity Action Plan	35
2.3 ENVIRONMENT INSTITUTIONS AND ADMINISTRATION	35
2.4 LAWS, REGULATIONS, AND GUIDELINES	35
2.5 PAKISTAN ENVIRONMENTAL PROTECTION ACT, 1997	36
2.6 SINDH ENVIRONMENTAL PROTECTION ACT, 2014	36
2.7 PAKISTAN ENVIRONMENT PROTECTION AGENCY REVIEW OF IEE AND EIA REGULATION, 2000	37
2.8 SINDH ENVIRONMENT PROTECTION AGENCY REVIEW OF IEE AND EIA REGULATION, 2014	38
2.9 SECTORAL GUIDELINES FOR ENVIRONMENTAL REPORTS-WIND POWER PROJECTS	39
2.10 POLICY FOR DEVELOPMENT OF POWER GENERATION PROJECTS, 2006	39
2.11 PROJECT DEVELOPMENT IN TERMS OF POLICY FRAMEWORK	39

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd Project Sponsor: Hawa Energy (Pvt.) Ltd	Document No RE2-131-121-001 Document Issue 01	Date of Approval February, 2016 Page 6
--	---	--	---

2.11.1	Letter Of Intent (LOI)	40
2.11.2	Acquisition of Land	40
2.11.3	Submission of Feasibility Study	40
2.11.4	Generation License	40
2.11.5	Tariff Determination	40
2.11.6	Letter of Support (LOS)	41
2.11.7	Energy Purchase Agreement (EPA)	41
2.11.8	Implementation Agreement (IA)	41
2.11.9	Financial Close	41
2.12	NATIONAL AND INTERNATIONAL ENVIRONMENTAL STANDARDS	42
2.12.1	National Environmental Quality Standards	42
2.12.2	National Environmental Policy, 2005	42
2.12.3	Land Acquisition Act, 1984	43
2.12.4	Telegraph Act, 1985	44
2.12.5	The Sindh Wildlife Protection Ordinance, 1972	44
2.12.6	The Sindh Fisheries Ordinance, 1972	44
2.12.7	The Forest Act 1927	45
2.12.8	Canal and Drainage Act, 1873	45
2.12.9	The Antiquities Act, 1975 & the Sindh Cultural Heritage (Preservation) Act, 1994	45
2.12.10	Factories Act, 1934	45
2.12.11	Employment of Child Act, 1991	46
2.12.12	Civil Aviation Rules, 1994	46
2.12.13	Pakistan Penal Code, 1860	47
2.12.14	National Resettlement Policy / Ordinance	47
2.12.15	Sindh Local Government Ordinances, 2001	48
2.12.16	The IUCN Red List	48
2.12.17	Motor Vehicles Ordinance, 1965, and Rules, 1969	48
2.12.18	Cutting of Trees (Prohibition) Act, 1975	49
2.13	OPIC- ENVIRONMENTAL AND SOCIAL POLICY STATEMENT	49
2.13.1	Screening and Categorization	49
2.13.2	Applicant Role and Responsibilities	50
2.13.3	Tailored Reviews	50
2.14	ASIAN DEVELOPMENT BANK (ADB) POLICIES & STANDARDS	50
2.14.1	2009 Safeguard Policy Statement	51
2.14.2	Policy on Gender and Development	51
2.14.3	Social Protection Strategy	52
2.14.4	2005 Public Communications Policy	53
2.14.5	Core Labor Standard	53
2.15	WORLD BANK GUIDELINES ON ENVIRONMENT	54
2.16	Equator Principles	55
2.17	IFC Performance Standards on Social and Environmental Sustainability	57
2.18	IFC- Environmental, Health, and Safety Guidelines	62
2.19	INSTITUTIONAL SETUP FOR ENVIRONMENTAL MANAGEMENT	63

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 7

2.20	OBLIGATION UNDER INTERNATIONAL TREATIES	64
3	DESCRIPTION OF PROJECT	65
3.1	PROJECT LOCATION	65
3.2	ROAD ACCESS	68
3.3	PROJECT SIZE AND COMPONENTS	72
3.3.1	Preconstruction Phase	72
3.3.2	Construction Phase	72
3.3.3	Operation and Maintenance Phase	73
3.3.4	Decommissioning Phase	73
3.4	PROJECT SCHEDULE	74
3.5	LOCATION OF GRID	75
3.6	WIND TURBINE DETAILS	76
3.7	NET ENERGY YIELD AND CAPACITY FACTOR	76
4	BASELINE ENVIRONMENTAL CONDITIONS	77
4.1	CLIMATIC CONDITIONS	77
4.2	SURFACE AND GROUND WATER HYDROLOGY AND DRAINAGE	79
4.3	AMBIENT AIR QUALITY	83
4.4	NOISE QUALITY	83
4.5	SEISMIC HAZARDS	83
4.6	FLOODS	86
4.7	GEOLOGICAL SETTINGS	87
4.8	SOIL CLASSIFICATION	88
4.9	LAND USE CAPABILITY	88
4.10	SOCIO ECONOMIC FEATURES	89
4.10.1	Local Settlement Pattern and Population	89
4.10.2	Health and Education Facilities	90
4.10.3	NGOs Working in the Area	92
4.10.4	Occupational Pattern	92
4.10.5	Infrastructure and Industry	92
4.10.6	Archaeological Sites	93
4.11	ECOLOGY	93
4.11.1	Vegetation	96
4.12	NATURAL MINERAL RESOURCES	98
5	ANALYSIS OF PROJECT ALTERNATIVES	100

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 8

5.1	WITH OR WITHOUT PROJECT	100
5.2	ALTERNATIVE FUEL	101
5.3	Location Alternative	101
6	POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES	103
6.1	LAND USE	103
6.2	AIR QUALITY	104
6.3	NOISE QUALITY	105
6.4	NOISE FROM WIND TURBINES	106
6.5	SHADOW FORECASTING	109
6.6	WATER USE AND QUALITY	110
6.7	GROUNDWATER CONTAMINATION	111
6.8	Solid Waste Generation	111
6.9	Wastewater Generation	112
6.10	BIOLOGICAL ENVIRONMENT	113
6.10.1	Wetland and Wildlife Sanctuaries	113
6.10.2	The Indus Flyway	115
6.10.3	Birds/Avian Collision	117
6.10.4	Flora and Vegetation	123
6.11	SOCIO ECONOMIC ENVIRONMENT	123
6.11.1	Archeological Sites	123
6.11.2	Re-Settlement	124
6.11.3	Visual Impact on Landscape	124
6.11.4	Aviation Hazard	126
6.11.5	Traffic Management	126
6.11.6	Labor Welfare and Safety	127
6.11.7	Seismic Hazards	128
	PUBLIC CONSULTATION	129
7	PUBLIC CONSULTATION	129
7.1	Objectives of Public Consultation	129
7.2	Consultation Process	130
7.2.1	Scope	130
7.2.2	Community Consultation	130
7.2.3	Government Agencies	132
7.2.4	Non-Governmental Organizations	134
8	ENVIRONMENT MANAGEMENT PLAN	138

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 9

8.1	PURPOSE AND OBJECTIVE OF EMP	138
8.2	COMPONENT OF EMP	139
8.3	INSTITUTIONAL ARRANGEMENT	139
8.3.1	PROJECT DEVELOPER	139
8.3.2	Supervision Consultant (RE)	141
8.3.3	Lead Contractor	141
8.4	MITIGATION & MONITORING PLAN	143
8.5	GRIEVANCE REDRESSAL MECHANISM	144
8.6	REPORTS AND DOCUMENTATION	145
8.7	ENVIRONMENTAL AND SOCIAL TRAININGS	146
8.8	PUBLIC DISCLOSURE REQUIREMENTS	146
8.9	BUDGETARY ESTIMATES FOR EMP IMPLEMENTATION	146
ANNEXURE		152

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 10

LIST OF FIGURES

Figure 1.1: Electricity Mix of Pakistan by Source	22
Figure 1.2: Wind Map of Pakistan by NREL	24
Figure 3.1: Hawa Energy Project Site Layout	66
Figure 3.2: Ariel View of Complete Track (Through Karachi-Hyderabad Motorway)	68
Figure 3.3: Orientation of Site from Port Qasim (Aerial View).....	69
Figure 3.4: Detailed Access from Port Qasim to the Site.....	70
Figure 3.5: HEPL Site with Respect to Neighbouring Wind Farms in Jhimpir.....	71
Figure 3.6: Nearest HESCO grid station	75
Figure 4.1: Graph of Average Maximum and Minimum Temperature (°C)	78
Figure 4.2: Satellite View of Keenjhar/Kalri Lake near Project Site	80
Figure 4.3: View of Kinjhar/Kalri Lake near Project Site	81
Figure 4.4: Booster Pumping Station from Kinjhar Lake to Nooriabad Industrial Estate.....	82
Figure 4.5: Seismic Hazard Zones of Pakistan.....	84
Figure 4.6: Seismic Map of Pakistan	85
Figure 4.7: Flood Map of Pakistan.....	86
Figure 4.8 A Basic Health Unit in Jhimpir.....	90
Figure 4.9: Tomb of Syed Hussain Shah (Left), Shivmaha Dev Temple(Right)	93
Figure 4.10: Geological and Sub Surface Details of Jhimpir.....	99
Figure 6.1: Noise Generating from Wind Turbine.....	107
Figure 6.2: Noise Generating from Wind Turbine.....	108
Figure 6.3: Shadow Flicker of Wind Turbine.....	109
Figure 6.4: Wetlands of Pakistan	113
Figure 6.5: Wetland located in Sindh.....	114
Figure 6.6: Indus Flyway for Migratory Birds/Green Route No.04	118
Figure 6.7: Birds Flying and Staying Patterns on Keenjhar Lake with Respect to Wind Farms.....	120
Figure 8.1: Framework of Environment and Social Management Cell (ESMC)	142

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 11

LIST OF TABLES

Table 1-1: Project at a Glance	25
Table 2-1 World bank Guidelines for Noise levels.....	55
Table 3.1: Land Coordinates	67
Table 3.2: Technical Specifications of Wind Turbine	76
Table 3.3: Annual Energy Production Estimates.....	76
Table 4-1: Average Maximum and Minimum Temperatures in Jhimpir Region (°C)	78
Table 4-2: Average Precipitation and Rainfall Days in Jhimpir Region	79
Table 4-3: Geologocal Formations covered in the Wind Corridor of Jhimpir	87
Table 4-4: Land Use Capability Class in Jhimpir.....	89
Table 4-5 List of Settlements and Population details.....	89
Table 4-6 Floral Composition found in Project Area	96
Table 4-7 Faunal Attributes in the Project Area	97
Table 6-1: Migratory and Local Birds of Keenjhar Lake	116
Table 7-1: Summary of Concerns Raised during Stakeholder Consultation	131
Table 7-2 General Public Interviewed during Public Consultation at Jhimpir	132
Table 7-3 List of Public and NGO Sector Stakeholders	135
Table 8.1: Identification of Activities and Potential Impact (O & M Phase).....	144

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 12

LIST OF ABBREVIATIONS

ADB	Asian Development Bank
AEDB	Alternative Energy Development Board
CBD	Convention on Biological Diversity
CITES	Convention on Trade of Endangered Species
CLs	Core Labor Standards
Db	Decibel
DMC	Developing Member Countries
EIA	Environmental Impact Assessment
EHS	Environment Health and Safety
EMP	Environment Management Plan
ESMC	Environmental and Social Management Cell
EPA	Energy Purchase Agreement
EMMP	Environment Monitoring and Management Plan
GAD	Gender and Development
GHG	Greenhouse Gas Emissions
GRM	Grievance Redressal Mechanism
IEE	Initial Environmental Examination
IFC	International Finance Corporation
JICA	Japan International Cooperation Agency
Km	Kilometers
LAA	Land Acquisition Act
LOS	Law of Seas
MEA	Multilateral Environmental Agreements
MW	Mega Watt

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 13

MWh	Mega Watt Hour
NCS	National Conservation Strategy
NEP	National Environmental Policy
NEQS	National Environmental Quality Standards
NGO	Non-Government Organization
NOx	Nitrate Oxides
NREL	National Renewable Energy Laboratories
NTDC	National Transmission and Dispatch Company
O & M	Operation and Maintenance
OPIC	Overseas Private Investment Corporation
PEPA	Pakistan Environment Protection Act
POPs	Persistent Organic Pollutants
Pak-EPA	Pakistan Environment Protection Agency
PV	Photo Voltaic
RE2	Renewable Resources (Pvt.) Ltd
SCR	Social Complaint Register
SHEE	Safety Health Environment and Energy
Sox	Sulfur Oxides
WWF	World Wildlife Foundation

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 14

EXECUTIVE SUMMARY

Introduction

This document is an **Initial Environmental Examination** (IEE) of a **50 MW Wind Power Project** (Project) being developed by Hawa Energy (Pvt.) Ltd in Jhimpir, Sindh Pakistan. The Project is at an advanced stage of development with a valid Letter of Support (LOS), secure land, tariff awarded, EPC contract being finalized and the EPA signed. The project has an approved IEE from EPA Sindh with a No Objection Certificate (NOC) number [2012/12/17/IEE/23]. The Project was recently required to extend its land westward while still keeping the old land. This was the result of the fact that the Project (along with some other projects in Jhimpir) was required to relocate some of WTGs due to the Pakistan Air Force construction activity in that area. This resulted in the Hawa Project being located on a strip of land that comprises some of the old land and continues on to the new land.. Accordingly, the IEE report is being updated here in the form of an amended and reinstated version.

The sponsors of the Project consist of Hawa Holdings Limited (the “Developers”).

Consultant

Renewable Resources is the Project consultant engaged for Project development including the Initial Environmental Examination (IEE) of the Project.

The contact details of consultant are given below;

Renewable Resources (Pvt.) Ltd	
Islamabad Office	No.1002, 10 th Floor, Green Tower, Jinnah Avenue, Islamabad – Pakistan Tel: 0092 51 8358591 Fax: 0092 51 8358592
Karachi Office	86/I Khayaban-e-Behria, Phase V, Karachi – Pakistan Tel: 0092 21 35347122 Fax: 0092 21 35347123
Website	www.renewableresources.com.pk
Contact Person	Irfan Afzal Mirza, CEO
Email	irfanmirza@renewableresources.com.pk

Document Title:	Consultant Name:	Document No	Date of Approval
Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Renewable Resources (Pvt.) Ltd	RE2-131-121-001	February, 2016
	Project Sponsor:	Document Issue	Page
	Hawa Energy (Pvt.) Ltd	01	15

Further information on the qualifications and experience of the Project Sponsors can be found in the body of this Report at **Section 1**.

Project Sponsors

The Project Sponsors are a limited liability company incorporated under the laws of Pakistan, called Hawa Energy (Private) Limited. Contact details are as follows:

Hawa Energy Pvt. Limited	
Address	<p>Registered Office: 68 Nazimuddin Road, Sector F 8/4 Islamabad, Pakistan</p> <p>Corporate Office: 14 Islamabad Terraces, Diplomatic Enclave, Islamabad, Pakistan</p>
Contact Persons	<p>Bruno C Bucari, CEO-designate +1404 543 3766 (US); +92300 828 0153 Email: bcbucari@gmail.com</p> <p>M Ali Khan Afridi, Director +92300 854 4516; +09251 260 0523 Email: aafridi@afridi-angell.com</p>

Study Methodology

The study was conducted using standard methodology prescribed by national and international agencies to facilitate the review of identified environmental issues. This entailed an understanding and description of the environment within the activities, which will occur or potentially have influence on the social and biological environment. The IEE study was conducted in four phases.

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 16

- Phase-I involved the definition and categorization of the Project components, collection of baseline data and information of the defined Project area through physical survey and consultation with the local inhabitants near the Project area.
- Phase-II involved the laboratory analysis of the different environmental parameters, which includes (Ambient Air Monitoring, Ambient Noise, and Water quality analysis of the project area).
- Phase-III involved assessment of potential impact assessment of the pre-construction, construction, operation and decommission phase of the Project.
- Phase-IV involved the mitigation measures, formulation and monitoring of an Environmental Management Plan (EMP) to minimize the environmental impacts of the Project during construction and operation phase.

The approach of IEE study includes the following steps:

- ❖ Describing the Project and details of Project Proponents
- ❖ Review of applicable Statutory Requirements and compliances
- ❖ Establishing environmental baseline conditions through survey and consultation with the local stakeholders
- ❖ Scoping the issues and establishing the boundaries of the assessment
- ❖ Review of Project Alternatives
- ❖ Assessing the potential environmental effects of the Project, including residual and cumulative effects
- ❖ Identifying potential mitigation measures to eliminate or minimize the potential adverse environmental impacts
- ❖ Environmental Management & Monitoring Plan and follow-up programs

Statutory Requirements

The report fulfills the following regulatory requirements:

- ❖ Pakistan Environmental Protection Agency (Review of IEE and EIA) Regulations, 2000 with reference to Pakistan Environmental Protection Act, 1997
- ❖ Sindh Environmental Protection Agency (Review of IEE and EIA) Regulations, 2014 with reference to Sindh Environmental Protection Act, 2014
- ❖ OPIC - Environmental and Social Policy Statement
- ❖ Asian Development Bank Policies and Guidelines
- ❖ Performance Standards of IFC and World Bank group

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd Project Sponsor: Hawa Energy (Pvt.) Ltd	Document No RE2-131-121-001 Document Issue 01	Date of Approval February, 2016 Page 17
--	---	--	--

The details of the statutory requirements and compliances of this IEE report to the national and international regulations or guidelines are explained in **Section 2** of this report.

Project Overview

The wind farm Project of 50 MW of Hawa Energy is located in Jhimpir, District Thatta Sindh. The land has been allotted by Government of Sindh. The Karachi Hyderabad Motorway (Super Highway) is the connecting road to the Hawa Energy site. The total land area of the Project is 1200 acres according to previous land allocation and now the land has been extended and additional area of 351 acres is also added to the previous land.

Subject to finalization of the EPCC, the Project will install 29 units of General Electric-103 turbine generators (WTGs), each with rated output of 1.7MW. The other options of wind turbine generators (WTGs) are also available like, Gold wind GW121 wind turbine generators (WTGs) rated output of 2.5MW total 20 WTGs, Gamesa G114 wind turbine generators (WTGs) rated output of 2.0 MW total 25 WTGs.

Further details about the Project and its location are given in **Section 3** of this report.

Description of Environment

A data collection survey was undertaken that included geology, meteorology, hydrology, ambient air quality, water quality, soil characteristics, noise levels, shadow forecasting, flora and fauna, land use pattern, and socio-economic conditions, based on available secondary information or data collected in the field. Primary data was collected to establish baseline conditions for the soil, water (surface and ground) quality, flora and fauna, and noise. Secondary data was collected for land, climate, and socioeconomic factors.

The physical survey of the site was conducted by Mr. Umair Ali Khilji of Renewable Resources Pvt. Limited. The environmental and social baseline conditions observed in the Project area are presented in **Section 4** of this report.

Impact Assessment and Mitigation

A detailed analysis of Project alternatives are discussed in **Section 5**. During the IEE, the Project potential social and environmental impacts were identified. Each identified environmental and social impact was then characterized with respect to its nature, reversibility, geographical extent, consequence-severity and likelihood. Based upon this characterization, the impacts were then assessed to be of high, medium or low significance. The IEE has recommended

<p>Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan</p>	<p>Consultant Name: Renewable Resources (Pvt.) Ltd Project Sponsor: Hawa Energy (Pvt.) Ltd</p>	<p>Document No RE2-131-121-001 Document Issue 01</p>	<p>Date of Approval February, 2016 Page 18</p>
--	--	--	--

appropriate mitigation measures to address the potential environmental and socio-economic impacts. The details of impact assessment and mitigation measures are provided in **Section 6**, which is further supplemented by the Environmental Management Plan (EMP) provided in **Section-8** of this report.

Stakeholder Consultation

Stakeholder consultation was carried out as part of IEE study. The details of the consultation are documented in **Section-8** of the report.

Finding and Recommendations

- Wind Power Project is a green energy Project and, therefore, there is no major long lasting social or environment impact foreseen.
- Air quality of the area may be slightly disturbed only during construction phase of the Project.
- The Project Area does not fall under any sensitive, protected area.
- No threatened / Near-Threatened species of wildlife was recorded in the Project Area.
- There are three settlements near the project area. Only one settlement is inside the project boundary but the Project turbines will be located so that the settlement will be at least 500 meters from the nearest turbine. The other two settlements are outside the project land area at a distance of 5.9-6.5 Kilometers therefore no disturbance to the inhabitants is foreseen.
- Regarding bird mortality due to collision, it is found that birds landing area is around 24 km away from the wind farm and the migratory birds are not seen in the wind farm area and there are minimal to zero chance of bird collision from these wind turbines.
- Noise impacts will be less than 70 DB (A) which is within the range as per National Environmental Quality Standards (NEQs) of Pakistan.
- The environmental disturbance normally associated with construction activities will be minimized through an Environment Management Plan (EMP), implementation of which will continue during Project operation and which includes monitoring arrangements.
- The Project will bring a positive development in the area and improve the socio-economic conditions through generation of employment opportunities and opening of avenues for the development of this area. Power projects constructed and then operated in the area will cause development of good infrastructure, which will benefit the local population.
- The Project will also help promote renewable energy in Pakistan and will contribute positively by meeting the energy supply demand of the country.

<p>Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan</p>	<p>Consultant Name: Renewable Resources (Pvt.) Ltd Project Sponsor: Hawa Energy (Pvt.) Ltd</p>	<p>Document No RE2-131-121-001 Document Issue 01</p>	<p>Date of Approval February, 2016 Page 19</p>
--	--	--	--

- This IEE study concludes that the proposed Wind project will not lead to significant adverse environmental and social impacts of such nature or magnitude that would require a more detailed report in the form of an EIA. Additionally careful implementation of the EMP will ensure that environmental impacts are managed and minimized and that the project proponent meets all statutory requirements.

The project has been discussed with local people, government officials and NGO (like Wildlife department, Forest department, SEPA, WWF and IUCN). The consultations elicited general support for the project. There were no serious environmental issues raised or matters that the Consultant had overlooked. The main concerns expressed were to ensure that local people get employment on the project and that measures were in place to avoid excessive noise or dust and bird mortality.

In the view of all above, 50 MW wind power Project of Hawa Energy can be regarded as **Environmental Friendly Green Project**. The details of EIA findings and recommendations are discussed in **Section-9** of this report.

The following Annexures are attached with the report in order to support the results and findings of the report.

- Annexure-I: Environmental Management and Monitoring Plan
- Annexure-II: EMP Implementation Cost Estimates
- Annexure-III: Pakistan Environmental Protection Agency Act 1997 and (Review of IEE and EIA) Regulations, 2000
- Annexure-IV: Sindh Environmental Protection Agency Act 2014 and (Review of IEE and EIA) Regulations, 2014
- Annexure-V: Pakistan National Environmental Quality Standards
- Annexure-VI: IFC HSE Guidelines for Wind Energy Sector
- Annexure-VII: Laboratory Analysis Reports of Ambient Air Quality, Noise and Drinking Water Quality
- Annexure-VIII: List of Flora and Fauna Recorded in Project Area
- Annexure-IX: Snapshots of Biological Environment
- Annexure-X: Social Survey Forms
- Annexure –XI: Snapshots of Community Consultation
- Annexure –XII: Snapshots of Stakeholders Consultation

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 20

SECTION 1

INTRODUCTION AND PURPOSE OF STUDY

1 INTRODUCTION AND PURPOSE OF STUDY

1.1 PROJECT PROPONENT

The sponsors of the Project consist of Hawa Holdings Limited.

Keeping in line with OPIC funding requirements, the US Developers intend to retain a minimum 25% beneficial ownership interest in the Project's share capital.

The Developers have further collaborated with professional firms that are highly qualified and committed to developing and commissioning the Project on a fast track basis. Collectively, the Sponsors along with their professional alliances (the "Development Team"), presents a vastly experienced team of power sector professionals of international repute.

1.2 THE PROFESSIONAL ADVISORS

Renewable Resources (Pvt.) Ltd is the professional technical advisor for the Project. Renewable Resources is a consulting company specialized in Renewable Energy (RE), Energy Efficiency (EE) and Environment (Env) Projects. The company is owned by group of professionals who have been intimately involved in the renewable energy program of Pakistan, and have a fundamental understanding of issues relating to power project development, which include but are not Ltd to feasibility studies, regulatory approvals, concession and security documents, and applicable policies.

RE2 is capable of conducting full feasibility package featuring power production estimates, grid interconnection and tariff model. RE2 also has the expertise to deal with all technical aspects regarding the legal documents of power projects. The professional team of RE2 is well acquainted with the policies, regulations, methodologies and standards of RE power Projects and its work output meets international standards. RE2 is presently a consultant for various power Projects in Pakistan sponsored by local and international investors, with international banks.

Document Title:	Consultant Name:	Document No	Date of Approval
Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Renewable Resources (Pvt.) Ltd	RE2-131-121-001	February, 2016
	Project Sponsor:	Document Issue	Page
	Hawa Energy (Pvt.) Ltd	01	21

RE2 has gained significant experience in conducting Environmental and Social Impact Assessments (ESIA) and Initial Environmental Examinations (IEE) of renewable energy projects in accordance with national and international laws and standards. These studies cover all baseline environmental conditions and anticipated environmental impacts of projects and provide comprehensive Environmental Management Plans.

To date, RE2 has conducted twenty seven (27) environmental studies of renewable energy projects, which have all been approved by the relevant Environmental Protection Agencies.

1.3 PROJECT BACKGROUND & JUSTIFICATION

Pakistan’s major electricity sources are thermal and hydro generation, meeting approximately 70% and 28% (respectively) of the country’s annual electricity demand. The primary thermal generation fuels employed are furnace oil and gas. While both are produced domestically, demand already outstrips domestic supply by a considerable margin. Oil import is a significant burden on the national exchequer and the increasing import bill continues to exert further pressure on the foreign exchange reserves. Electricity mix of Pakistan (2013-2014) is presented in the figure below:

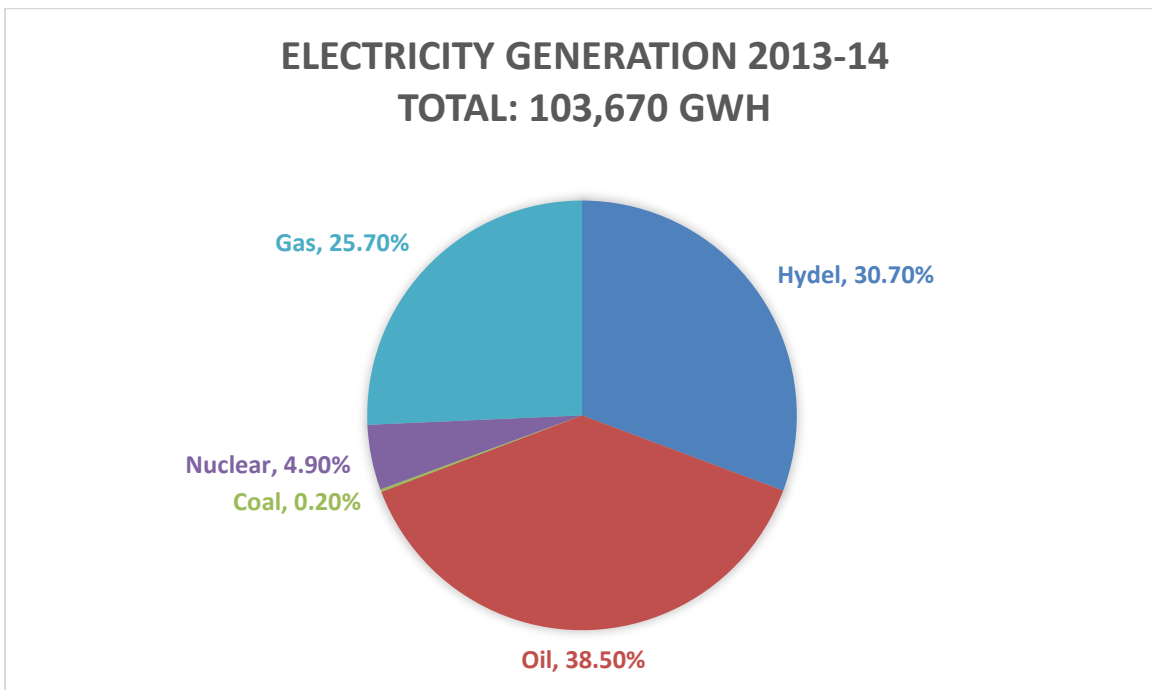


Figure 1.1: Electricity Mix of Pakistan by Source¹

¹ Energy Year Book of Pakistan 2011

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 22

Import of gas could be seen as a viable option to overcome the depleting domestic reserves. However, gas import has significant challenges, such as the need for substantial capital investment in infrastructure, security difficulties and physical terrain concerns. Moreover, it would increase Pakistan’s reliance on imported fuels with associated foreign exchange burdens. This must be considered in the context of rising costs for gas and oil-based fuels as a result of uncertainty over future supply.

Alternatives to further fuel imports for electricity generation are the production of domestic coal, generation from hydro-electric power, or other renewable sources, such as wind and solar power. These options will assist in reducing Pakistan’s reliance on imported oil and protect against resulting vulnerability to changes in global oil prices, which will in turn also have a positive effect on the current trade deficit and inflating import bill.

As with gas, securing future supplies of domestic coal and hydro-electric power would require significant spending on infrastructure. While Pakistan has domestic reserves of coal, it currently makes up a very small proportion of the country’s total power generation. This is due, in part, to the fact that most of the reserves are located in the remote Thar Desert region. Exploiting the coal reserves would require significant upfront investment in local infrastructure (including provision of water supplies), development of mines, housing and related infrastructure, and investment in transmission lines, as a pre-requisite to any power plant development. Hydro-electric power already supplies almost 30% of the domestic electricity that is generated, and numerous sites for future investment exist. However, due to their locations, this would also require significant investment in transmission and other infrastructure. Moreover, there are various political issues relating to the development of hydro-electric and coal generation power plants, which remain to be resolved.

In light of the prevailing circumstances, wind generation appears to be a viable and environmentally friendly alternative for meeting Pakistan’s urgent electricity demands. The development of wind generation projects could reduce dependence on oil-based thermal power generation, increase diversity in Pakistan’s electricity generation mix, and reduce greenhouse gas (GHG) emissions, all of which will contribute towards projecting a positive image of Pakistan within the international community. Also the per kWh tariff for wind power projects are now comparatively lower than that of furnace oil projects, particularly the Rental Power Projects, which were previously inducted to meet the urgent needs of electricity shortfalls.

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 23

1.4 PROSPECTS OF WIND ENERGY IN PAKISTAN

Pakistan has considerable potential for wind energy in the coastal belt of its southern provinces Sindh and Balochistan, as well as in the central desert areas of Punjab and Northern Sindh. This potential source of renewable energy has however, not been properly realized thus far. According to a study conducted by NREL, and data collected from the wind masts installed in the Gharo and Keti Bandar wind corridor, the average wind speed in this wind corridor is 7.4 m/s making a regional potential of more than 50,000 MW. The Wind Map of Pakistan as comprised by NREL is shown in Figure 1.2 below.

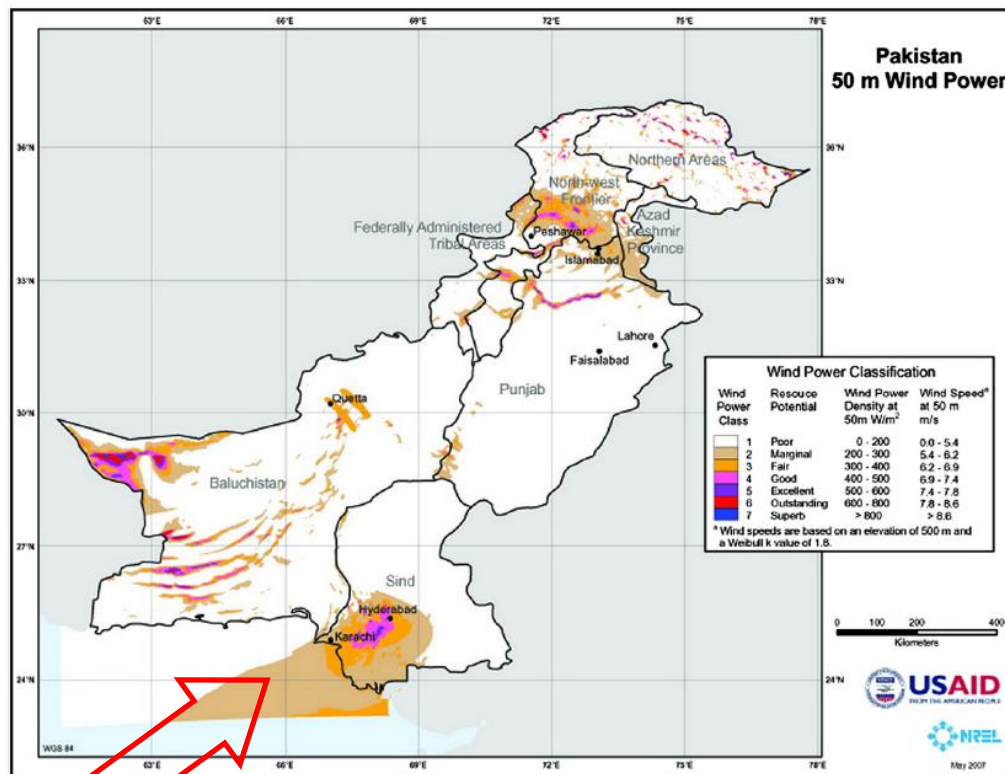


Figure 1.2: Wind Map of Pakistan by NREL

Wind Corridor

The Government of Pakistan (GOP) is diversifying its energy mix on a fast track basis to ensure Energy Security, Sustainable Development, Social Equity and Environmental Protection. Given its overall economics, wind energy is envisaged as an important ingredient of Pakistan’s future energy mix.

Document Title:	Consultant Name:	Document No	Date of Approval
Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Renewable Resources (Pvt.) Ltd	RE2-131-121-001	February, 2016
	Project Sponsor:	Document Issue	Page
	Hawa Energy (Pvt.) Ltd	01	24

Keeping in view the anticipated future energy needs and the significant potential for renewable energy, the GOP has set a target of at least 5% of the total national power generation capacity to be generated through renewable energy technologies, especially through wind energy by the year 2030.

1.5 PROJECT OVERVIEW & OBJECTIVES

The Wind Farm Project is located in Jhimpir, which is approximately 136 km from Karachi, Pakistan’s commercial hub and main coastal/port city. The Project site consists of 351 acres of land, which has been leased by the Government of Sindh. The Karachi-Hyderabad Motorway (Super Highway) and National Highway are the connecting roads to the Project site.

Subject to finalization of the EPCC, the Project presently contemplates installing a total of 29 GE wind turbine generators (WTGs), each with rated output of 1.7 MW. The other options are also available as mentioned in the table given below.

The brief overview of Project is summarized in **Table 1.1** below.

Table 1-1: Project at a Glance

S. No	Particulars	Description
1	Project Site	Jhimpir, Province of Sindh, Pakistan
2	Project Capacity	50MW
3	Turbines considered	General Electric GE 1.7-103 – Total 29 WTGs Gold wind GW121-2.5 – Total 20 WTGs Gamesa G114-2.0 – Total 25 WTGs
4	Estimated .Project Cost	127 million US \$

The Project is being developed with the following objectives:

- i. Contribute to meeting the electricity supply deficit in south west of Pakistan in particular; and country in general;
- ii. Provide electricity to stimulate and support the expansion of local industry and service businesses;

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 25

- iii. By using indigenous renewable resources of power generation, avoid depletion of natural resources for future generation and environmental stability;
- iv. Create employment during construction and operation and provide opportunities for developing ecotourism;
- v. Improve microeconomic efficiency of the power sector by reducing fossil fuel usage;
- vi. Reduce greenhouse gas emissions from power generation and contribute to negligible emission, effluent, and solid waste intensity of power generation in the system;
- vii. Conserve natural resources including land, forests, minerals, water, and ecosystems; and
- viii. Improve local physical infrastructure such as access roads and transmission network in the Project area.

1.6 NEED AND OBJECTIVES OF EIA STUDY

Pakistan Environmental Protection Act 1997 (PEPA 1997) requires the proponents of every development project in the country to submit either an Initial Environmental Examination or Environmental Impact Assessment to the concerned environmental protection agency.

Sindh Environment Protection Agency Act 2014 (SEPA 2014)

Sindh Assembly has passed the Sindh Environmental Protection Act 2014; Environmental protection became the provincial subject; SEPA have developed Act, regulations and sectorial guidelines to develop its own Act and regulation and guidelines.

The IEE/EIA Regulations 2000 issued under PEPA 1997 and IEE /EIA regulations issued under SEPA Act 2014

Both guidelines provide separate lists for the projects requiring IEE or EIA. This Initial Environmental Examination (IEE) report has been prepared in accordance with the provisions in the Pakistan Environmental Protection Agency (Review of IEE and EIA) Regulations, 2000. According to these regulations, an IEE is required for projects falling in any category listed in Schedule-I of the regulations, and an EIA is required for projects listed in Schedule-II of the regulations.

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 26

1.7 BASIS PROJECT CATEGORIZATION OF EIA STUDY

Section 12 of Pakistan Environmental Protection Act 1997 and other regulatory documents such as Pakistan Environmental Protection Agency (Review of IEE/EIA) Regulations 2000 requires that every new development project in Pakistan has to be preceded by an Initial Environmental Examination (IEE) or Environmental Impact Assessment (EIA) depending upon the magnitude of the project and severity of impacts anticipated at the time of commissioning of the project.

PEPA (Review of IEE/EIA) Regulations 2000 categorize projects into two separate schedules depending on whether a project requires an IEE (Schedule-I) or an EIA (Schedule-II). The Regulations also require that all projects located in environmentally sensitive areas need submission of an EIA.

Section 17 of Sindh Environment Protection Agency 2014 and Sindh Environmental Protection Agency (Review of IEE/EIA) Regulations 2014 requires wind project to conduct the IEE under schedule I, Sindh Environmental Protection Agency (Review of Initial Environmental Examination and Environmental Impact Assessment) Regulation, 2014, the list of projects requiring an EIA includes wind energy projects if it falls under any sensitive, protected area. It defines “Environmental Sensitive Areas” as the area which falls under sensitive sites like protected areas, or the sites which may have crucial and growing importance. The Project Area does not fall under the said category, accordingly IEE report has been prepared.

Accordingly an IEE Study has been conducted, and the same will be submitted for approval prior to project initiation.

This report conforms to the requirements of the IEE report addressed in **IFC and World Bank group performance standards**.

In the context of the scope of the Project, the IEE report has addressed the following objectives, where applicable:

- ❖ Category of the Project consistent with Pakistan Environmental Protection Act, 1997, Sind Environment Protection Act 2014 and IFC’s and World Bank group performance standards.
- ❖ Highlight baseline environmental and social conditions of the Project area along with identification of environmentally sensitive area and concerned stakeholders like Government officials and different NGOs.

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 27

- ❖ Relevant host country laws, regulations, applicable treaties and agreements
- ❖ Protection of human health, cultural properties and biodiversity including endangered species and sensitive ecosystems.
- ❖ Major hazards; occupational health and safety; fire prevention and life safety
- ❖ Socio-economic impacts; land use: land acquisition; involuntary resettlement
- ❖ Impacts on indigenous peoples and communities, if applicable
- ❖ Cumulative impacts of existing, proposed, and anticipated future projects
- ❖ Efficient production, delivery, and use of energy
- ❖ Pollution prevention and waste minimization, pollution controls (liquid effluent and air emissions), and solid and chemical waste management.

1.8 Scope of IEE Study

This IEE study is focused at developing the environmental profile of the project area so as to evaluate the existing physical, biological and socioeconomic aspects leading to respective impacts due to construction and operations at the Wind Farm.

The main purpose of the IEE study is to ensure that:

- ❖ Any major adverse impact on the environment (physical, ecological and social) during different phases of projects viz. siting, design, construction and operation are identified.
- ❖ Adverse impacts are appropriately addressed and adequate mitigation measures are incorporated in the siting, design, construction and operation phases of project.

Socioeconomic aspects are identified, and mitigation measure has been suggested.

- ❖ Alternatives to achieve the objectives are analyzed.
- ❖ Environmental Management Plan (EMP) for sustainable development and operation of the project is developed for implementation and monitoring of the project activities.

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 28

The present IEE report has identified the significant environmental aspects and screened the potential aspects to ensure that the likely impacts due to proposed activities during construction, installation of masts and WTGs and operation of the proposed project, and the residual impact on adoption of mitigation measures have been critically assessed with respect to compliance with the Pakistan Environmental Protection Act 1997, Sindh Environment Protection Act 2014 and World Bank, IFC.

1.9 Methodology for Initial Environmental Examination Study

The environmental assessment (examination and evaluation) is primarily based on simple comparative evaluation approach. Initially the baseline or the profile of the project area is developed by site surveys, collecting data, records and information on physical, ecological /biological as well as socioeconomic environment. The data are compiled then projected or modeled for different phases of projects, i.e. design, construction, and operations. The likely changes in the critical environmental aspects or significant changes in the ambient environmental parameters are identified. Identification, assessment and evaluation of significant impact either in qualitative or quantitative terms is carried out for which appropriate mitigation measures are proposed.

The Project Team of environmentalists and sociologists held consultations based on the detailed contents of the Project with the main stakeholders. Environmental and social considerations being an essential component of the implementation phase of this project, the following points were underscored for implementing the IEE recommendations:

Identifying the need, if any, for involuntary resettlement and for land acquisition and to prepare an appropriate Involuntary Resettlement Program.

Reducing the impact on the living environment during the construction period, selecting appropriate construction methods and construction schedule.

Accordingly the IEE study has:

- Conducted public consultation at the early stage
- Held stakeholders meetings during the study.
- Understood in detail the concerns of Persons resident in the villages that are outside the HAWA Energy land area.
- In consideration of:

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 29

The agreement between AEDB and HAWA Energy Pvt. Limited, allowing HAWA Energy land for installation of Wind Power Generation requires no payment for land acquisition,

- Consultation Meetings with the residents of one village located within the HEPL project boundary and one on the outside of the land area, have confirmed the issue that establishment of the Wind Farm on HEPL land will not require land acquisition or involuntary resettlement, and will have insignificant impact on the ecology and living environment, It is implicit that there will be no need for involuntary resettlement or acquisition of land.
- This IEE report presents the existing environmental scenario and the results from the assessment and evaluation of the environmental aspects emerging during the installation and operation phases of wind turbines. Following screening of potential environmental aspects, the assessed and evaluated impacts requiring necessary mitigation measures are suggested in the report. The report also includes the Environmental Management and Monitoring Program that will be implemented during siting, construction operation phases and decommission phase.

The methodology specifically adopted for conducting the IEE of The Project may be summarized as follows:

1.9.1 Scoping

The key activities of this phase include:

Project Data Compilation: A generic description of the proposed activities relevant to environmental assessment was compiled with the help of the proponent.

Published Literature Review: Secondary data on weather, soil, water resources, wildlife, and vegetation were reviewed and compiled.

Legislative Review: Information on relevant legislation, regulations, guidelines, and standards was reviewed and compiled.

Identification of Potential Impacts: The information collected in the previous steps was reviewed and potential environmental issues identified.

Baseline Data Collection:

Primary Data Primary data for Environmental Monitoring including Ambient Air, Ambient noise, ground water and surface water was developed through EPA Certified Laboratory, in

Document Title:	Consultant Name:	Document No	Date of Approval
Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Renewable Resources (Pvt.) Ltd	RE2-131-121-001	February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 30

addition to that Birdlife and wildlife survey was also conducted during this study and previous studies conducted by the Project team. A field visit was conducted to verify and collect primary data on the site alternatives. A questionnaire was developed and views of local inhabitants were taken about the wind power Project.

Secondary Data Reasonable data of baseline information on the Project area available from existing literature and other studies conducted close to the Project area have also been referred to in this study.

1.9.2 Impact Assessment

The environmental, socioeconomic, and Project information collected was used to assess the potential impact of the proposed activities. The issues studied included potential Project impact on:

- ❖ Geomorphology
- ❖ Groundwater and surface water quality, with particular reference to the coast
- ❖ Ambient air quality and ambient noise levels
- ❖ Ecology of area, including flora and fauna especially with reference to migratory birds
- ❖ Local communities
- ❖ Noise impact
- ❖ Shadow impact

Wherever possible and applicable, the discussion covers the following aspects:

- ❖ The present baseline conditions
- ❖ The potential change in environmental parameters likely to be effected by Project related activities
- ❖ The identification of potential impacts
- ❖ The evaluation of the likelihood and significance of potential impacts
- ❖ The definition of mitigation measures to reduce impacts to as low as practicable
- ❖ The prediction of any residual impacts, including all long-term and short-term, direct and indirect, beneficial and adverse impacts
- ❖ The monitoring of residual impacts







Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 31

1.9.3 Documentation

This report documenting the IEE process and results is prepared in accordance with the relevant guidelines set by the Pakistan Environment Protection Agency (Pak-EPA) in general and Sindh Environmental Protection agency in specific.

1.10 METHOD FOR EVALUATING IMPACT

The description of baseline conditions represents the basis for evaluating the Project's impact. The description and evaluation of the environmental impact, and proposals for measures to be taken to mitigate and compensate for any determined environmental impact during the construction and operation phase, are presented in the Environment Management Plan (EMP) (Annexure-I). In the interest of transparent presentation and evaluation, tabulated evaluation procedures have been applied. The severity of a particular environmental impact together with its general trends (i.e. negative or positive) is described on the basis of a point system. The evaluation scale applied is as follows:

	=High
	=Medium
	=Low
	=No Impact
	=Locally Favorable
	=Regionally Favorable

Both national and international standards, such as those of the World Bank and WHO, are used as a basis for this judgment. According to these standards, impacts are evaluated as follows;

High	International and national standards are exceeded
Medium	Between international and national standards
Low	International and national standards are met

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 32

SECTION 2

LEGISLATIVE REQUIREMENTS

2 LEGISLATIVE REQUIREMENTS

This chapter describes the relevant: (i) national and international policies; (ii) legal and administrative framework; and (iii) institutional setup, in respect of the environmental and social assessment of the proposed Project.

2.1 NATIONAL ENVIRONMENTAL LAWS

There are several laws in Pakistan which contain provisions relating to the protection of the environment. However, the enactment of comprehensive legislation on the environment, in the form of an act of parliament, is a relatively new phenomenon. Most of the existing laws on environmental and social issues have been enforced over an extended period of time, and are context specific. The laws relevant to development projects are briefly reviewed below.

2.2 POLICY GUIDELINES

2.2.1 National Conservation strategy

The National Conservation Strategy (NCS) is the primary policy document of the Government of Pakistan (GOP) on national environmental issues. The Strategy approved by the Federal Cabinet in March 1992 was also recognized by International Financial Institutions, principally the World Bank. The NCS had identified 14 core areas including conservation of biodiversity, pollution prevention and abatement, soil and water conservation and preservation of cultural heritage. It had also recommended immediate attention to the stated core areas in order to preserve the environment of Pakistan.

A mid-term review of the NCS in 2000 concluded that achievements under the NCS were primarily awareness raising and institutional building rather than meaningful improvement of the environment and natural resources and that the NCS was neither designed nor adequately

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd Project Sponsor: Hawa Energy (Pvt.) Ltd	Document No RE2-131-121-001 Document Issue 01	Date of Approval February, 2016 Page 33
--	---	--	--

focused as a national sustainable development strategy (GoP, November 2002). Thus the need for a more focused National Environmental Action Plan (NEAP) was formulated and approved by the Pakistan Environmental Protection Council in 2001 to practically improve the national environment with emphasis on poverty reduction, and economic as well as sustainable development.

NEAP now constitutes the national environmental agenda and its core objective is to initiate actions that would safeguard public health, promote sustainable livelihoods and enhance the quality of life of the people of Pakistan.

The GOP and United Nations Development Programme (UNDP) have jointly initiated an umbrella support programme called the NEAP-Support Programme that was signed in October 2001 and implemented in 2002. The development objective supported by NEAP-Support Programme is environmental sustainability and poverty reduction in the context of economic growth. The objectives of new policy has total 171 guidelines on sectorial and cross sectorial issues. The objectives of new policy include assurance of sustainable development and safeguard the natural wealth of country. The following are the approved Sectorial Guidelines:

- Water Supply and Management
- Air Quality and Noise
- Waste Management
- Forestry
- Biodiversity and Protected Areas
- Climate Change and Ozone Depletion
- Energy Efficiency and Renewable
- Agriculture and Livestock
- Multilateral Environmental Agreements
- Biodiversity Action Plan

The key to protection of the biological heritage of Pakistan lies in the involvement of local people and in the support provided by competent institutions for conservation and sustainable use. The Government of Pakistan has recognized the importance of these measures in the preparation of National Conservation Strategy and in becoming a signatory to, and ratifying, the Convention on Biological Diversity (CBD) in 1994. Developing the Biodiversity Action Plan for Pakistan, 2000 has been the most significant direct steps towards addressing the biodiversity loss.

<p>Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan</p>	<p>Consultant Name: Renewable Resources (Pvt.) Ltd Project Sponsor: Hawa Energy (Pvt.) Ltd</p>	<p>Document No RE2-131-121-001 Document Issue 01</p>	<p>Date of Approval February, 2016 Page 34</p>
--	--	--	--

2.2.2 The Biodiversity Action Plan

The Biodiversity Action Plan (BAP), which has been designed to complement the NCS and the proposed provincial conservation strategies, identifies the causes of biodiversity loss in Pakistan and suggests a series of proposals for action to conserve biodiversity in the country.

The BAP recognizes that an IEE is used as a tool at the project level to identify environmental effects of a proposed project and to plan for the reduction of adverse effects. The BAP further stipulates that an IEE needs to be initiated at an early stage of project development and that public participation in the review of potential effects is important.

2.3 ENVIRONMENT INSTITUTIONS AND ADMINISTRATION

The Constitution of Pakistan distributes the legislative powers between the federal and the provincial governments through Federal and Concurrent Lists. The Federal list depicts the areas and subjects on which the Federal government has exclusive powers. The Concurrent list contains areas and subjects on which both Federal and Provincial governments can enact laws.

The Ministry of Climate Change, Local Government and Rural Development are responsible for environmental issues at the federal level. The NCS unit within the Ministry ensures implementation of the National Conservation Strategy.

The Pakistan Environment Protection Agency is the federal body responsible for administering the provisions of the Pakistan Environment Protection Act. It is responsible for ensuring compliance with the NEQs, developing monitoring and evaluation systems and initiating legislation when necessary.

The provincial Environment Protection Agencies, i.e. the Environment Protection Department in Sindh, are responsible for environmental planning and development and approval of Initial Environmental Examination (IEE) and Environmental Impact Assessments (EIA) of new Projects at the provincial level.

2.4 LAWS, REGULATIONS, AND GUIDELINES

The Pakistan Environment Protection Act, 1997, is the basic law that empowers the Government of Pakistan to develop policies and guidelines for the protection of the country's natural environment. A brief description of the laws is given below.

Document Title:	Consultant Name:	Document No	Date of Approval
Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Renewable Resources (Pvt.) Ltd	RE2-131-121-001	February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 35

2.5 PAKISTAN ENVIRONMENTAL PROTECTION ACT, 1997

The PEPA, 1997, is the basic legislative tool empowering the government to frame regulations for the protection of the environment. The act is applicable to a broad range of issues and extends to air, water, soil, marine, and noise pollution, as well as to the handling of hazardous wastes.

The key features of the law that have a direct bearing on the proposed Project relate to the requirements for an initial environmental examination (IEE) and EIA for development Projects. Section 12(1) requires that: “No proponent of a Project shall commence construction or operation unless he has filed with the Federal Agency an initial environmental examination or, where the Project is likely to cause an adverse environmental effect, an environmental impact assessment, and has obtained from the Federal Agency approval in respect thereof.” Pak-EPA has delegated the power of review and approval of environmental assessments to the provincial environmental protection agencies. As the proposed Project will be located near Karachi, it falls under the jurisdiction of the EPA Sindh.

2.6 SINDH ENVIRONMENTAL PROTECTION ACT, 2014

The Sindh Environmental Protection Act, 2014 (SEPA) is the basic legislative tool empowering the provincial government to frame regulations for the protection, conservation, rehabilitation and improvement of the environment. The SEPA 2014 is broadly applicable to air, water, soil, hazardous waste, marine and noise pollution. Penalties have been prescribed for those contravening the provisions of the Act. The powers of the provincial Environmental Protection Agencies (EPAs) were also considerably enhanced under this legislation and they have been given the power to conduct inquiries into possible breaches of environmental law either of their own accord, or upon the registration of a complaint. Sindh Environmental Protection Act, 2014 (SEPA) attached as **Annexure IV**.

- ❖ It equally lays emphasis for the preservation of the natural resources of Sindh and to adopt ways and means for restoring the balance in its eco-system by avoiding all types of environmental hazards.
- ❖ Under section 17 of SEPA, “no proponent of a project shall commence construction or operation unless he has filed with the Agency an initial environmental examination or environmental impact assessment and has obtained from Agency approval in respect thereof. ”

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd Project Sponsor: Hawa Energy (Pvt.) Ltd	Document No RE2-131-121-001 Document Issue 01	Date of Approval February, 2016 Page 36
--	---	--	--

- ❖ SEPA shall review the IEE & EIA and accord approval subject to such terms and conditions as it may prescribe or require. The agency shall communicate within sixty days its approval or otherwise from the date IEE is filed failing which the IEE shall be deemed to have been approved.

2.7 PAKISTAN ENVIRONMENT PROTECTION AGENCY REVIEW OF IEE AND EIA REGULATION, 2000

The Pakistan Environment Protection Agency Review of IEE and EIA Regulations provide the necessary details in respect of the preparation, submission, and review of the IEE and EIA. Categorization of Projects of IEE and EIA is one of the main components of the Regulations.

The following is a brief step-wise description of the approval process:

- ❖ A project is categorized as requiring an IEE or EIA using the two schedules attached to the Regulations.
- ❖ An EIA or IEE is conducted as per the requirements of the EPA guidelines.
- ❖ The EIA or IEE is submitted to the concerned EPA—provincial EPAs if the project is located in the provinces, or the Pak-EPA if it is located in Islamabad.
- ❖ A fee, depending on the cost of the project and the type of the report, is submitted along with the document.
- ❖ The submittal is also accompanied by an application in the format prescribed in Schedule IV of the Regulations.
- ❖ EPA conducts a preliminary scrutiny and replies within 10 days of the submittal of a report by:(a) confirming completeness;(b) asking for additional information, if needed; or (c) returning the report requiring additional studies, if necessary.
- ❖ EPA is required to make every effort to complete the IEE and EIA review process within 45 and 90 days, respectively, upon confirmation of completeness.
- ❖ If the EPAs accord their approval subject to certain conditions, then before commencing construction of the project, the proponent is required to submit an undertaking accepting the conditions as per mentioned in schedule vii.
- ❖ Before commencing operation of the project, the proponent is required to obtain from the EPA a written confirmation of compliance with the approval conditions and requirements of the IEE.
- ❖ An Environment Management Plan (EMP) is to be submitted with a request for obtaining confirmation of compliance.
- ❖ The EPAs are required to issue confirmation of compliance within 15 days of the receipt of request and complete documentation.

Document Title:	Consultant Name:	Document No	Date of Approval
Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Renewable Resources (Pvt.) Ltd	RE2-131-121-001	February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 37

- ❖ The IEE approval is valid for three years from the date of accord.

A monitoring report is to be submitted to the EPA after completion of construction, followed by annual monitoring reports during operation.

Complete guidelines of Preparation of EIA/IEE along with details of other concerned laws and regulations outlined in the Pakistan Environment Protection Act 1997 are provided in Annexure- III for reference

2.8 SINDH ENVIRONMENT PROTECTION AGENCY REVIEW OF IEE AND EIA REGULATION, 2014

The SEPA review of IEE and EIA regulations, 2014 (the ‘regulations’), prepared by the SEPA under the powers conferred by section of Sindh Environmental Protection Act, 2014 provide the necessary details on the preparation, submission and review of the IEE, EIA and environmental checklist of the project.

These regulations classify projects on the basis of expected degree of severity of environmental impacts and list them in three separate schedules. Schedule-I lists projects that may not have significant environmental impacts and require an IEE. Schedule-II lists projects of potentially significant environmental impacts requiring preparation of an EIA. Schedule-III list projects of screening and requiring preparation of environmental checklist. The Regulations also require under the schedule-II Clause-A6: Wind energy projects if they fall under any sensitive, protected area and under the Clause-J: that all projects located in environmentally sensitive areas require preparation of an EIA. SEPA (Review of IEE /EIA regulations) 2014 has been provided in the report . The Project Area does not fall under the protected areas; accordingly an IEE report has been prepared. Wind Projects, transmission lines less than 11KV and grid station falls in Schedule I - lists of projects requiring an IEE while the wind energy projects if they fall under any sensitive, protected areas and transmission lines (11KV and above) and distribution projects fall in Schedule II - lists of projects require an EIA.

Complete guidelines of Preparation of EIA/IEE along with details of other concerned laws and regulations outlined in the Sindh Environment Protection Act are provided in Annexure- IV for reference

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 38

2.9 SECTORAL GUIDELINES FOR ENVIRONMENTAL REPORTS-WIND POWER PROJECTS

The wind power sectorial guidelines form part of a package of regulations and guidelines, to be read in conjunction with the overall EIA /IEE guidelines package. These guidelines have been prepared by the Federal EPA in collaboration with other key stakeholders, which include: the provincial EPAs; the Federal and Provincial Planning Development Divisions; NGOs; representatives of chambers of commerce and industry; and other consultants.

These guidelines consist of comprehensive guidelines and procedures for the environmental assessment of wind power projects in Pakistan. It is emphasized that the various guidelines should be read as a package; reliance on the sectorial guidelines alone is inadequate.

2.10 POLICY FOR DEVELOPMENT OF POWER GENERATION PROJECTS, 2006

The Alternative Energy Development Board was established as an autonomous body attached to the Cabinet Division on 12th May 2003. The AEDB was established to act as a central agency for the development, promotion, and facilitation of renewable energy technologies; the formulation of plans and policies; and the development of a technological base for manufacturing of renewable energy equipment in Pakistan. In February 2006, the administrative control of the AEDB was shifted from the Cabinet Division to the Ministry of Water & Power. The AEDB has developed the national policy for promoting renewable energy sources in the medium and long term, which is known as the Policy for Development of Renewable Energy for Power Generation, 2006 (Power Policy). AEDB is also responsible for procuring land leases from the Revenue department for wind farm projects.

The current Project is developed under provisions of the Policy for Development of Renewable Energy for Power Generation, 2006.

2.11 PROJECT DEVELOPMENT IN TERMS OF POLICY FRAMEWORK

The following paragraphs describe the progress of the Project in terms of the Power Policy:

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd Project Sponsor: Hawa Energy (Pvt.) Ltd	Document No RE2-131-121-001 Document Issue 01	Date of Approval February, 2016 Page 39
--	---	--	--

2.11.1 Letter Of Intent (LOI)

The first step for the development of a project pursuant to the Policy is to register with the AEDB and obtain a Letter of Intent. The sponsors of the Project successfully filed their application and obtained their LOI from the AEDB on, February, 06, 2012 and the extension date of LOS is 16 November 2015 after depositing their bank guarantee. The LOI is the official mandate for the Project Company to commence working on the Project, with the support of the AEDB and other government departments. The LOI heralds the commencement of activities leading to the preparation of a feasibility study and acquisition of land for the Project.

2.11.2 Acquisition of Land

The land is being allocated by the Government of Sindh in the Jhimpir area. Land measures 1,200 in the original tract and 351 acres in the newly allocated tract for a total area of 1551 acres

2.11.3 Submission of Feasibility Study

The Project Company is required to submit a detailed feasibility study, including Technical Feasibility, Electrical Grid Studies, and Environmental Studies, to the AEDB for their approval which has already been done for the previous land and now it's in modification process due to addition in land for the project.

2.11.4 Generation License

In order to produce and sell electricity in Pakistan, a project is required to obtain a "Generation License" from the regulator, NEPRA. The Project Company obtained the Generation License on January 1, 2016 and an amendment on January 16, 2015.

An application for a new amendment to the generation license necessitated by the change in turbines is being submitted to NEPRA on March 7, 2016.

2.11.5 Tariff Determination

A separate application is submitted by the Project Company to NEPRA for approval of its power tariff. The Project Company received the Determination of Tariff from NEPRA on August 10, 2015.

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 40

2.11.6 Letter of Support (LOS)

Once the tariff has been approved, the Project Company can engage with its lenders to finalize its financing terms and conditions. At this stage, AEDB will issue a Letter of Support to the Project Company as soon as the Project Company submits a bank guarantee in respect of its obligation to achieve Financial Close. The amount of the Bank Guarantee is calculated at US\$2,500 per MW.

The Letter of Support provides the Project Company with a continued mandate to develop the Project, and provides certain assurances of support from governmental entities and departments. The Letter of Support remains valid until the effectiveness of the EPA and IA. The Project Company has been issued an LOS which remains valid until August 9, 2016.

2.11.7 Energy Purchase Agreement (EPA)

The agreement between the Power Purchaser and the Project Company is called the Energy Purchase Agreement (EPA). This agreement lists terms and conditions for the sale and purchase of electricity between the two parties. Discussions relating to the EPA normally commence as soon as the feasibility study is submitted and the tariff petition is filed with NEPRA. The Project Company signed the EPA with NTDC on March 10, 2015.

2.11.8 Implementation Agreement (IA)

The Implementation Agreement (IA) is an agreement between the Project Company and the GOP, where in the GOP mandates the Project Company to develop the power project, and provides certain assurances and concessions to the Project, its lenders, shareholders and contractors. Importantly, the IA provides certain guarantees in respect of the performance of the power purchaser. The IA also assures the project of compensation in case of any termination resulting from a default or force majeure. These discussions normally commence alongside the EPA. Negotiations are completed and now signing is being arranged.

2.11.9 Financial Close

Upon approval of feasibility study, grant of generation license, approval of tariff, and the signing of Project documents (EPA and IA); the Project Company shall move forward to financial close which will be done in 3rd Quarter 2016.

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd Project Sponsor: Hawa Energy (Pvt.) Ltd	Document No RE2-131-121-001 Document Issue 01	Date of Approval February, 2016 Page 41
--	---	--	--

2.12 NATIONAL AND INTERNATIONAL ENVIRONMENTAL STANDARDS

2.12.1 National Environmental Quality Standards

The National Environmental Quality Standards (NEQS) were first promulgated in 1993 and were last revised in 2010. The NEQS specify the standards for industrial and municipal effluents, gaseous emissions, ambient air requirements, vehicular emissions, noise levels and water quality standards.

The National Environmental Quality Standards (NEQS) specify the following standards:

- Maximum allowable concentration of pollutants (16 parameters) in gaseous emissions from industrial sources
- Maximum permissible limits for motor vehicle exhaust and noise
- For power plants operating on oil and coal:
 - Maximum allowable emission of sulfur dioxide
 - Maximum allowable increment in concentration of sulfur dioxide in ambient air
 - Maximum allowable concentration of nitrogen oxides in ambient air
 - Maximum allowable emission of nitrogen oxide for steam generators as function of heat input
 - Maximum allowable concentration of effluent pollutants (32 parameters) in municipal and liquid industrial effluents discharged to inland waters, sewage treatment and sea (three separate set of numbers)

Selected NEQS for liquid effluents discharged to inland waters, gaseous emission from industrial sources, emissions from motor vehicles, noise, ambient air quality and water quality standards are provided in Annexure-V

2.12.2 National Environmental Policy, 2005

The National Environmental Policy (NEP) was approved by the Pakistan Environmental Protection Council in its 10th meeting in 27th December 2004 under the chairmanship of the Prime Minister of Pakistan and thereafter approved by the Cabinet on 29th June 2005. NEP is

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd Project Sponsor: Hawa Energy (Pvt.) Ltd	Document No RE2-131-121-001 Document Issue 01	Date of Approval February, 2016 Page 42
--	---	--	--

the primary policy of the Government of Pakistan that addresses the environmental issues of the country.

The broad Goal of NEP is, “{to protect, conserve and restore Pakistan’s} environment in order to improve the quality of life of the citizens through sustainable development.” The NEP identifies the following set of sectorial and cross-sectorial guidelines to achieve its Goal of sustainable development.

a. Sectorial Guidelines:

Water and sanitation; air quality and noise; waste management; forestry; biodiversity and protected areas; climate change and ozone depletion; energy efficiency and renewable; agriculture and livestock; and multilateral environmental agreements.

b. Cross Sectorial Guidelines

Poverty; population; gender; health; trade and environment; environment and local governance; and natural disaster management. The NEP suggests the following policy instruments to overcome the environmental problems throughout the country:

- Integration of environment into development planning
- Legislation and regulatory framework
- Capacity development
- Economic and market based instrument
- Public awareness and education
- Public private civil society partnership

NEP is a policy document that does not apply to the Project directly, development projects, such as wind power generation projects, are not expected to negatively impact the environmental issues identified by NEP. In any event, mitigation measures would be adopted to minimize or avoid any negative impact. Furthermore, renewable sources of energy, such as wind power projects, provide an environmentally positive means for increasing power production and development.

[2.12.3 Land Acquisition Act, 1984](#)

The Land Acquisition Act (LAA) of 1894, amended from time to time, has been the de-fact policy governing land acquisition and compensation in the country. The LAA is the most commonly used law for acquisition of land and other properties for development projects. It comprises of

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 43

55 sections pertaining to area notifications and surveys, acquisition, compensation and apportionment awards and dispute resolution, penalties and exemptions.

For the proposed Project, the proponents have leased land from the Government of Sindh and no settlement or structure exists at the site. The LAA is therefore not applicable to the acquisition of land for the proposed Project.

2.12.4 Telegraph Act, 1985

This law was enacted to define the authority and responsibility of the Telegraph authority. The law covers, among other activities, installation and maintenance of telegraph lines and posts (poles). The Act defines the mechanism to determine and make payment of compensation associated with the installation of these lines and posts.

Under this Act, the land required for the poles is not acquired (or purchased) from the owner, nor the title of the land transferred. Compensation is paid to the owner for any structure, crop or tree that exists on the land; cost of the land is not paid to the owner.

2.12.5 The Sindh Wildlife Protection Ordinance, 1972

The Sindh Wildlife Protection Ordinance, 1972 empowers the government to declare certain areas reserved for the protection of wildlife and control activities within these areas. It also provides protection to endangered species of wildlife. As no Project activities are planned in declared protected areas, provision of this law is not applicable to the proposed Project.

2.12.6 The Sindh Fisheries Ordinance, 1972

The Sindh Fisheries Ordinance, 1980 regulates fishing in public waters, including the coastal areas of Sindh. It empowers the Government of Sindh to issue licenses for fishing in public waters, place restrictions on the type of equipment that can be used for fishing, restrict fishing in certain areas or of certain species of fish, regulate the onshore trade of fish catch, and regulate the fish processing industry. Article 8 of the Ordinance prohibits the discharge of wastewater to public waters without the consent of the Director Fisheries.

As no activities are planned for this Project which can breach this Ordinance, provision of this law is not applicable to the proposed Project.

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 44

2.12.7 The Forest Act 1927

The Forest Act, 1927 empowers the government to declare certain areas as reserved forest areas. As no reserved forest exists in the vicinity of the proposed Project, the provisions of this law are not applicable to the proposed Project.

2.12.8 Canal and Drainage Act, 1873

The Canal and Drainage Act (1873) prohibits corruption or fouling of water in canals (defined to include channels, tube wells, reservoirs and watercourses), or obstruction of drainage. This Act will be applicable to the construction and O&M works to be carried out during the proposed Project.

2.12.9 The Antiquities Act, 1975 & the Sindh Cultural Heritage (Preservation) Act, 1994

The Antiquities Act of 1975 ensures the protection of Pakistan’s cultural resources. The Act defines “antiquities” as ancient products of human activity, historical sites, or sites of anthropological or cultural interest, national monuments, etc. The Act is designed to protect these antiquities from destruction, theft, negligence, unlawful excavation, trade, and export.

The law prohibits new construction in the proximity of a protected antiquity and empowers the Government of Pakistan to prohibit excavation in any area that may contain articles of archaeological significance.

Under the Act, the Project proponents are obligated to ensure that no activity is undertaken within 61m (200 ft.) of a protected antiquity, and to report to the Department of Archaeology, Government of Pakistan any archaeological discovery made during the course of the Project. The Sindh Cultural Heritage (Preservation) Act, 1994, is the provincial law for the protection of cultural heritage. Its objectives are similar to those of the Antiquity Act, 1975. No antiquity protected under these two laws was identified in the vicinity of the proposed Project.

2.12.10 Factories Act, 1934

The clauses relevant to the proposed Project are those that address the health, safety and welfare of the workers, disposal of solid waste and effluents, and damage to private and public property. The Act also provides regulations for handling and disposing toxic and hazardous

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd Project Sponsor: Hawa Energy (Pvt.) Ltd	Document No RE2-131-121-001 Document Issue 01	Date of Approval February, 2016 Page 45
--	---	--	--

substances. The Pakistan Environmental Protection Act of 1997 (discussed above), supersedes parts of this Act pertaining to environment and environmental degradation.

2.12.11 Employment of Child Act, 1991

Article 11(3) of the Constitution of Pakistan prohibits employment of children below the age of 14 years in any factory, mines or any other hazardous employment. In accordance with this Article, the Employment of Child Act (ECA) 1991 disallows child labor in the country. The ECA defines a child to mean a person who has not completed his/her fourteenth year of age. The ECA states that no child shall be employed or permitted to work in any of the occupations set forth in the ECA (such as transport sector, railways, construction, and ports) or in any workshop wherein any of the processes defined in the Act is carried out. The processes defined in the Act include carpet weaving, bidi (kind of a cigarette) making, cement manufacturing, textile, construction and others. Hawa Energy and its contractors will be bound by the ECA to prohibit any child labor at the Project sites or campsites.

2.12.12 Civil Aviation Rules, 1994

These rules apply to flight operations within Pakistan by aircrafts other than military aircrafts and, except where otherwise prescribed, to flight operations by air crafts registered, acquired or operating under these rules, wherever they may be. The rules with relevant significance to the power Project:

- No person shall erect any temporary or permanent structure, nor position a vehicle or other mobile object on or in the vicinity of an aerodrome (airport), that will be within the clearance area, or will protrude through an obstacle limitation surface, at that aerodrome.
- No person shall operate a light in the vicinity of an aerodrome which because of its glare is liable to dazzle pilots of aircraft taking off from or landing at that aerodrome; or which can be mistaken for an aeronautical ground light. If such a light is operated it shall be extinguished or satisfactorily screened immediately upon notice being given to the person or persons operating the light, by the Director-General or by the Manager or by a person authorized by him.
- No person or persons shall operate a radio station or electrical equipment in the vicinity of an aerodrome or of a radio aid to navigation serving an airway or an air route in Pakistan which is liable to cause interference with radio communications between aircraft and an Air Traffic Services Unit, or which is liable to disturb the signal from a navigational radio aid.

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 46

- A captive balloon or a kite shall not be flown at a height above 200ft within 6km of an aerodrome, and a free balloon shall not be flown at any place, except with the express permission of the Director-General and in compliance with the conditions attached to such permission.
- An aircraft shall not be flown over congested areas of cities, towns, or settlements or over an open air assembly of persons, except by permission of the Director-General, unless it is at such height as will permit, in the event of an emergency, a landing to be made without undue hazard to persons on the ground, and except when it is taking off or landing, shall not be flown closer than 500ft to any person, vessel, vehicle or structure.
- It is recommended for projects to seek the relevant permission from Civil Aviation Authority for the installation of wind turbines. The blade tips of wind turbines will be marked in red to make the structure more visible from a distance to aircrafts.

2.12.13 Pakistan Penal Code, 1860

The Code deals with offences where public or private property or human lives area affected due to intentional or accidental misconduct of an individual or organization. The Code also addresses control of noise, noxious emissions and disposal of effluents. Most of the environmental aspects of the Code have been superseded by the Pakistan Environmental Protection Act, 1997.

2.12.14 National Resettlement Policy / Ordinance

The Ministry of Environment, Local Government and Rural Development formulated a draft policy in 2004 on involuntary resettlement with technical assistance from ADB. The policy aims to compensate for the loss of income to those who suffer loss of communal property including common assets, productive assets, structures, other fixed assets, income and employment, loss of community networks and services, pasture, water rights, public infrastructure like mosques, shrines, schools and graveyards.

The government has also developed a document entitled "Project Implementation and Resettlement of the Affected Persons Ordinance, 2002", later referred to as the "Resettlement Ordinance", for enactment by provincial and local governments, after incorporating local

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 47

requirements. The Ordinance, being a new law, shall be supplementary to the LAA as well as other laws of Pakistan, and wherever applicable under this policy. However, if necessary, appropriate amendments to the LAA 1894 will also be proposed to facilitate the application of the Resettlement Ordinance.

There has not been much progress on the enactment of the Resettlement Ordinance; hence this is not relevant for the proposed project.

2.12.15 Sindh Local Government Ordinances, 2001

These ordinances were issued under the devolution process and define the roles of the district governments. These ordinances also address the land use, conservation of natural vegetation, air, water and land pollution, disposal of solid waste and wastewater effluents, as well as matters relating to public health.

2.12.16 The IUCN Red List

Some animal species are already extinct in Pakistan, and many are internationally threatened. The 1996 IUCN Red List of Threatened Animals classifies 37 species and 14 sub-species of mammals that occur in Pakistan as internationally threatened or near-threatened.

The Red List is based on field data that is more than 10 to 15 years old and needs to be re-assessed. The country also provides critical habitat to 25 internationally threatened bird species and 10 internationally threatened reptiles.

According to the National Avian Research Centre in Abu Dhabi, with Houbara's birth rate of 5 per cent a year and if number of Houbara keeps decreasing at the same rate with more than 6,000 being bagged by hunting parties and more than 4000 smuggled out of country, the worst scenario are that the Houbara bustard would disappear as the species in the near future.

There are a number of organizations that were formed to protest the illegal hunting and preserve the wildlife. This includes National Council for Conservation of Wildlife (NCCW), established in 1974 and supported by the UN, which breaks into three groups: Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), Convention on wetland of International Importance Especially as Waterfowl Habitat (RAMSAR) and Convention on the Conservation of Migratory Species of Wild Animals (CMS).

2.12.17 Motor Vehicles Ordinance, 1965, and Rules, 1969

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 48

The Motor Vehicles Ordinance, 1965, was extended in 1978, to the whole of Pakistan. The ordinance deals with the powers of motor vehicle licensing authorities and empowers the Road Transport Corporation to regulate traffic rules, vehicle speed and weight limits, and vehicle use; to erect traffic signs; and to identify the specific duties of drivers in the case of accidents. It also describes the powers of police officers to check and penalize traffic offenders at the provincial level. At the same time, the ordinance also empowers the Regional Transport Authority to operate as a quasi-judicial body at the district level to monitor road transport, licensing requirements, and compensations for death or injury to passengers on public carriers.

2.12.18 Cutting of Trees (Prohibition) Act, 1975

This Act prohibits cutting or chopping of trees without permission of the Forest Department. During the site survey conducted by the team of environmentalist and socialist, there is no tree on the site. Hence this law is not relevant to the proposed project.

2.13 OPIC- ENVIRONMENTAL AND SOCIAL POLICY STATEMENT

This Environmental and Social Policy Statement (“Policy Statement”) addresses OPIC’s commitments regarding the environmental and social dimensions of sustainable development and provides Applicants notice of the general environmental and social requirements that OPIC applies in evaluating prospective Projects seeking OPIC support and monitoring on-going OPIC-supported Projects.

This Policy Statement implements applicable environmental and social requirements and procedures contained in U.S. law. Additionally, this Policy Statement reflects specific policy commitments that have been made by OPIC with respect to environmental and social policies and procedures. Finally, this Policy Statement adopts, as a standard for the environmental and social review process, the International Finance Corporation’s (“IFC”) Performance Standards on Social and Environmental Sustainability and Industry Sector Guidelines and any subsequent revisions to those standards.

2.13.1 Screening and Categorization

OPIC categorizes projects based on OPIC’s preliminary assessment of (1) the potential environmental and social risks and impacts of a project in the absence of any required mitigation, (2) the Applicant’s commitment and capacity to effectively manage the environmental and social risks and impacts, including the ability to implement any required

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd Project Sponsor: Hawa Energy (Pvt.) Ltd	Document No RE2-131-121-001 Document Issue 01	Date of Approval February, 2016 Page 49
--	---	--	--

mitigation and (3) the potential role of third parties in achievement of successful outcomes. OPIC categorizes all projects as Category A, B, C, or D based on environmental and social factors.

The wind energy projects fall in “Category C” as these are likely to have minimal adverse environmental or social impacts. In categorizing projects, OPIC considers direct, indirect, induced, regional, trans-boundary and cumulative environmental and social impacts. Risks are assessed at key stages in the project life cycle including pre-construction, construction, operations, decommissioning, and closure.

2.13.2 Applicant Role and Responsibilities

For Category C Projects, applicants are required to submit sufficient information necessary to confirm the absence of potential adverse environmental and social risks.

OPIC requires essential Environmental and Social Action Plan (ESAP) only for Category A and Category B Projects. ESAP is not necessarily required for Category C Projects.

2.13.3 Tailored Reviews

OPIC undertakes detailed, tailored environmental and social reviews for certain sectors and types of Projects in response to OPIC policies and practices and new OPIC products or initiatives, which are based on emerging trends in international best practices related to environmental and social safeguards.

The detailed OPIC Environmental and Social Policy Statement is attached as Annexure-VI.

2.14 ASIAN DEVELOPMENT BANK (ADB) POLICIES & STANDARDS

The following ADB policies and standards designed to manage social and environmental risks and impacts are considered:

- Safeguards Policy Statement
- Policy on Gender and Development
- Social Protection Strategy
- Public Communications Policy

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 50

- Core Labor Standards

2.14.1 2009 Safeguard Policy Statement

ADB operational policies include three basic safeguard policies mentioned below. This safeguard policy statement applies to all ADB-financed and/or ADB-administered sovereign and non-sovereign projects, and their components regardless of the source of financing, including investment projects funded by a loan; and/or a grant; and/or other means, such as equity and/or guarantees (hereafter broadly referred to as projects).

The Involuntary Resettlement Policy: Minimize, mitigate, and/or compensate for adverse project impacts, on the environment and affected people when avoidance is not possible.

Policy of Indigenous Peoples: Help borrowers/clients to strengthen their safeguard system and develop the capacity to manage environmental and social risks.

Environmental Policy: Avoid adverse impacts of projects on the environment and affected people where possible.

2.14.2 Policy on Gender and Development

The Asian Development Bank (ADB) first adopted the Policy on the role of Women in Development (WID) in 1985 and over the passage of time has progressed from WID to Gender and Development (GAD) approach that allows gender to be seen as a cross cutting issue influencing all social and economic processes.

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 51

ADB's Policy on GAD will adopt mainstreaming as a key strategy in promoting gender equity. The key elements of ADB's policy will include the following:

Gender sensitivity: to observe how ADB operations affect women and men, and to take into account women's needs and perspectives in planning its operations.

Gender analysis: to assess systematically the impact of a Project on men and women, and on the economic and social relationship between them

Gender planning: to formulate specific strategies that aim to bring about equal opportunities for men and women

Mainstreaming: to consider gender issues in all aspects of ADB operations, accompanied by efforts to encourage women's participation in the decision making process in development activities

Agenda setting: to assist Developing Member Country (DMC) governments in formulating strategies to reduce gender disparities and in developing plans and targets for women's and girl's education, health, legal rights, employment, and income-earning opportunities.

2.14.3 Social Protection Strategy

It is the set of policies and programs designed to reduce poverty and vulnerability by promoting efficient labor markets, diminishing people's exposure to risks and enhancing their capacity to protect themselves against hazards and interruption/loss of income. Social Protection consists of five major elements:

Labor Markets policies and programs designed to facilitate employment and promote efficient operation of labor markets;

Social Insurance programs to cushion the risks associated with the unemployment, health, disability, work injury, and old age;

Social Assistance and Welfare Service program for the most vulnerable groups with no other mean of adequate support;

Micro and Area Based Schemes to address vulnerability at the community level; and

<p>Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan</p>	<p>Consultant Name: Renewable Resources (Pvt.) Ltd Project Sponsor: Hawa Energy (Pvt.) Ltd</p>	<p>Document No RE2-131-121-001 Document Issue 01</p>	<p>Date of Approval February, 2016 Page 52</p>
--	--	--	--

Child Protection to ensure the healthy and productive development of future Asian workforce.

Social Protection System in Asia and Pacific Region

In considering the demand of social protection with Asian sub regions, it is important to identify the circumstances faced by their vulnerable groups. A common trait to all countries in the region is the need to address child and youth priorities, extend coverage to poorer communities, improve governance, and promote institutional development.

2.14.4 2005 Public Communications Policy

ADB’s public communications policy provides a framework to enable ADB to communicate more effectively. The policy aims to enhance stakeholders trust in an ability to engage with ADB. The policy promotes:

- ❖ Awareness and understanding and results of ADB activities, policies, strategies, objectives and results;
- ❖ Sharing and exchange of development knowledge and lessons learned, so as to provide fresh and innovative perspectives and development issues;
- ❖ Greater two-way flow of information between ADB and stakeholders, including Project affected people, in order to promote participatory development; and
- ❖ Transparency and accountability of ADB operations.

2.14.5 Core Labor Standard

ADB adopted a commitment to Core Labor Standards (CLS) as part of its Social Protection Strategy in 2001. Since then, ADB ensures that CLS are duly considered in the design and implementation of its investment Projects. In this regard, a handbook for CLS has been developed by ADB with the cooperation of the International Labor Organization (ILO). The objective is to convince decision makers that the introduction of CLS and labor standards in general will not impede development. The labor standards are simply the rules that govern the treatment of workforce. Labor standards cover a very wide variety of subjects, mainly concerning basic human rights at work, respect for safety and health and ensuring that people are paid for their work. CLS are a set of four internationally recognized basic rights and principles at work:

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 53

- ❖ Freedom of association and the effective recognition of the right to collective bargaining;
- ❖ Elimination of all forms of forced or compulsory labor;
- ❖ Effective abolition of child labor; and
- ❖ Elimination of discrimination in respect of employment and occupation.

2.15 WORLD BANK GUIDELINES ON ENVIRONMENT

The principal World Bank publications that contain environmental guidelines are listed below.

- ❖ Environmental Assessment Operational Policy 4.01. Washington, DC, USA. World Bank 1999. Environmental Assessment Sourcebook, Volume I: Policies, Procedures, and Cross Sectorial Issues. World Bank Technical Paper Number 139, Environment Department, the World Bank, 1991, Pollution Prevention and Abatement Handbook: Towards Cleaner Production, Environment Department, the World Bank, United Nations Industrial Development Organization and the United Nations Environment Program, 1998. Environmental Health and Safety (EHS) guidelines, International Finance Corporation (IFC) World Bank Group, 2007.
- ❖ The first two publications listed here provide general guidelines for the conduct of an IEE, and address the IEE practitioners themselves as well as project designers. While the Sourcebook in particular has been designed with Bank projects in mind, and is especially relevant for the impact assessment of large-scale infrastructure projects, contains a wealth of information which is useful to environmentalists and project proponents.
- ❖ The Sourcebook identifies a number of areas of concern, which should be addressed during impact assessment. It sets out guidelines for the determination of impacts, provides a checklist of tools to identify possible biodiversity issues and suggests possible mitigation measures. Possible development project impacts on wild lands, wetlands, forests etc. are also identified and mitigation measures suggested. The Sourcebook also highlights concerns in social impact assessment, and emphasizes the need to incorporate socio-economic issues in IEE exercises.

The EHS guidelines published by IFC are technical reference documents that address IFC's expectations regarding the industrial pollution management performance of its projects. They are designed to assist managers and decision makers with relevant industry background and technical information. This information supports actions aimed at avoiding, minimizing, and controlling EHS impacts during construction, operation, and decommissioning phase of project or facility.

Document Title:	Consultant Name:	Document No	Date of Approval
Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Renewable Resources (Pvt.) Ltd	RE2-131-121-001	February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 54

The World Bank Guidelines for noise are provided in Table 2-1

Table 2-1 World bank Guidelines for Noise levels			
No.	Receptor	Day (07:00-22:00)	Night (22:00-07:00)
1.	Residential & Institutional educational	55	45
2.	Industrial & Commercial	70	70
Source: Pollution Prevention and Abatement Handbook World Bank Group (1998)			
Notes: Maximum allowable log equivalent (hourly measurements) in dB(A)			

2.16 Equator Principles

The Equator Principles are a set of guidelines, promoted by the International Finance Corporation (IFC) that address the environmental and social issues associated with major development projects worldwide. They provide a common baseline and framework for the implementation of internal environmental and social procedures and standards for project financing activities across all industries.

Principle 1: Review and Categorization (of projects)

Principle 2: Social and Environmental Assessment

Principle 3: Applicable Social and Environmental Standards

Principle 4: Action Plan and Management System

Principle 5: Consultation and Disclosure

Principle 6: Grievance Mechanism

Principle 7: Independent Review

Principle 8: Covenants

Principle 9: Independent Monitoring and Reporting

Principle 10: EPFI Reporting

Review and categorization

An EPFI will categorize a project, based on the magnitude of the potential social or environmental impacts and risks of that project, in accordance with IFC classification criteria.

These categories are:

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd Project Sponsor: Hawa Energy (Pvt.) Ltd	Document No RE2-131-121-001 Document Issue 01	Date of Approval February, 2016 Page 55
--	---	--	--

Category A: Projects with potential significant adverse social or environmental impacts that is diverse, irreversible or unprecedented.

Category B: Projects with limited adverse social or environmental impacts that is few in number, generally site specific, largely reversible and readily addressed through mitigation measures.

Category C: Projects with minimal or no social or environmental impacts.

Wind Energy projects, by their nature; tend to fall into Categories B or C, being medium or low risk. Certain EPFIs as a matter of policy for example treat every wind turbine project as

Category D: The Equator Principles apply to projects over 10 million US dollars. The Principles state that adopting financial institutions will provide loans directly to projects only under the following circumstances:

This IEE study has adequately addressed the Equator Principles applicable to risky projects as stated hereunder:

Principle 1 (Review and Categorization): The study has reviewed the National and International Laws and Guidelines on different environmental aspects and has categorized the Hawa Energy Pvt. Ltd Wind Power Project in Category C (Low Hazard).

Principle 2 (Social and Environmental Assessment): The Study has been prepared to respond to the National and International requirements and to satisfactorily address the key environmental and social issues.

Principle 3 (Applicable Social and Environmental Standards): For the purpose of this IEE Study, primary data on the baseline environmental and social conditions have been generated wherever necessary to address the requirements of National laws and regulations; applicable International Treaties and Agreements; sustainable development and use of renewable natural resources; protection of human health, cultural properties, and biodiversity and other physical, ecological and socioeconomic issues required to be addressed under this Principle.

Principle 4 (Action Plan and Management System): Section-6 of this study screens the potential environmental impacts and proposes/provides Mitigation Measures to reduce the severity of impact. The study also includes the Environmental Monitoring and Management Plan.

Principle 5 (Consultation and Disclosure): Being a project of Category C, the public consultation is limited to the scoping sessions with stakeholders and an extensive socio economic survey of the villages/hamlets that are all outside the boundary of the Project area. The surveys and consultation meetings have established that no major resettlement or temporary relocation or acquisition of land is involved.

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 56

Principle 6 (Grievance Mechanism): This Principle will not apply since ‘no’ resettlement or temporary relocation or acquisition of land is involved.

Principle 7 (Independent Review): Being placed in Category C, an independent review is not required.

Principle 8 (Covenants): The IEE study has incorporated Covenants linked to compliance. Moreover, No Objection Certificates are issued to Proponents of Project under conditions of compliance with the Mitigation and Performance Monitoring Plan. Needless to say that if the proponent does not comply with the agreed terms, Sindh EPA is authorized to take corrective and even coercive action.

Principle 9 (Independent Monitoring and Reporting): This Principle will be not be applicable to the HEPL Wind Power Project since it falls in category of projects requiring an IEE .

Principle 10 (EPFI Reporting): The concerned EPFI may safely commit to report publicly at least annually about its Equator Principles implementation processes and experience.

2.17 IFC Performance Standards on Social and Environmental Sustainability

International Finance Corporation (IFC) applies the Performance Standards to manage social and environmental risks and impacts and to enhance development opportunities in its private sector financing in its member countries eligible for financing. The Performance Standards are also applied to the projects in emerging markets. Together, the eight Performance Standards establish standards that the Proponent is to meet throughout the project.

The objectives of Performance standards are given below:

- ❖ To identify and assess social and environment impacts, both adverse and beneficial, in the project's area of influence.
- ❖ To avoid, or where avoidance is not possible, minimize, mitigate, or compensate for adverse impacts on workers, affected communities, and the environment.
- ❖ To promote improved social and environment performance of companies through the effective use of management systems.

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 57

Performance Standard-1: Social & Environmental Assessment and Management System

This Performance Standard seeks to:

- ❖ Identify and assess social and environment impacts in the project's area of influence;
- ❖ Avoid, minimize, mitigate, or compensate for adverse impacts on workers, affected communities, and the environment;
- ❖ Ensure that affected communities are appropriately engaged on issues that could potentially affect them; and
- ❖ Promote improved social and environment performance of the project through the effective use of management systems.

Under this Standard, the project is required to establish and maintain a social and environmental management system appropriate to the nature and scale of the project and in accordance with the level of social and environmental risks and impacts. The management system is required to incorporate the following elements:

- Social and Environmental Assessment;
- Management program;
- Organizational capacity;
- Training;
- Community engagement;
- Monitoring; and
- Reporting

This IEE study has been conducted to respond to requirements of national legislation and international Guidelines as well fulfills the above requirements of the IFC Performance Standards PS1.

Performance Standard-2: Labor and Working Conditions

This PS seeks to establish, maintain and improve the worker-management relationship; promote fair treatment, non-discrimination and equal opportunity for workers, and compliance with national labor and employment laws; protect the workforce by addressing child labor and forced labor issues; and promote safe and healthy working conditions, and to protect and promote the health of workers.

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd Project Sponsor: Hawa Energy (Pvt.) Ltd	Document No RE2-131-121-001 Document Issue 01	Date of Approval February, 2016 Page 58
--	---	--	--

The Sponsors of proposed project and their contractors will be required to adhere to this PS, in particular with regard to compliance with national labor and employment laws; employment of child labor, and promoting safe and healthy working conditions, besides protecting and promoting the health of workers.

Performance Standard-3: Pollution Prevention and Abatement

The PS 3 seeks to avoid or minimize adverse impacts on human health and the environment by avoiding or minimizing pollution from project activities, and to promote the reduction of emissions that contribute to climate change. The Standard requires the project to consider during its entire lifecycle ambient conditions and apply pollution prevention and control technologies and practices that are best suited to avoid or, where avoidance is not feasible, minimize or reduce adverse impacts on human health and the environment while remaining technically and financially feasible and cost-effective.

PS 3 will be applicable to all stages of the Hawa Energy Wind Power Project. Various aspects of pollution prevention and abatement of the proposed project are discussed separately in this report.

Performance Standard-4: Community Health, Safety and Security

The PS 4 seeks to avoid or minimize risks and impacts on the health and safety of local community during the project lifecycle from both routine and non-routine circumstances, and to ensure that the safeguarding of personnel and property is carried out in a legitimate manner that avoids or minimizes risks to the community’s safety and security. The PS requires the project to evaluate the risks and impacts to the health and safety of the affected community during the design, construction, operation, and decommissioning of the project and establish preventive measures to address them in a manner commensurate with the identified risks and impacts.

The present assessment addresses the requirement of PS 4 for the proposed project, and has evaluated the impacts of sitting the project on health, safety and security of the community in the microenvironment as well as the macro-environment. The Environmental Management Plan also addresses company community aspects.

<p>Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan</p>	<p>Consultant Name: Renewable Resources (Pvt.) Ltd Project Sponsor: Hawa Energy (Pvt.) Ltd</p>	<p>Document No RE2-131-121-001 Document Issue 01</p>	<p>Date of Approval February, 2016 Page 59</p>
--	--	--	--

Performance Standard-5: Land Acquisition and Involuntary Resettlement

This PS aims to address the adverse impacts associated with land acquisition and involuntary resettlement caused by the project. The PS seeks to:

- ❖ Avoid or at least minimize involuntary resettlement wherever feasible by exploring alternative project designs.
- ❖ Mitigate adverse social and economic impacts from land acquisition or restrictions on affected person's use of land by: (i) providing compensation for loss of assets at replacement cost; and (ii) ensuring that resettlement activities are implemented with appropriate disclosure of information, consultation, and the informed participation of those affected.
- ❖ Improve or at least restore the livelihoods and standards of living of displaced persons.
- ❖ Improve living conditions among displaced persons through provision of adequate housing with security of tenure at resettlement sites.

There is a small hamlet within the designated area. The project Land has been leased by the Sindh Government to HEPL.

Performance Standard-6: Biodiversity Conservation and Sustainable Natural Resource Management

The PS 6 seeks to protect and conserve biodiversity, and promote sustainable management and use of natural resources through adoption of practices that integrate conservation needs and development priorities.

The present environmental assessment addresses the potential impacts of the proposed project on the biodiversity. This IEE has recommended measures for the conservation of flora, fauna and other natural resources.

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 60

Performance Standard-7: Indigenous Peoples

The PS 7 seeks to address the impacts of the project on the indigenous people. Specifically, the objectives of the PS are to:

- ❖ Ensure that the development process fosters full respect for the dignity, human rights, aspirations, cultures and natural resource-based livelihoods of Indigenous Peoples.
- ❖ Avoid adverse impacts of projects on communities of Indigenous Peoples, or when avoidance is not feasible, to minimize, mitigate, or compensate for such impacts, and to provide opportunities for development benefits, in a culturally appropriate manner.
- ❖ Establish and maintain an ongoing relationship with the Indigenous Peoples affected by a project throughout the life of the project.
- ❖ Foster good faith negotiation with and informed participation of Indigenous Peoples when projects are to be located on traditional or customary lands under use by the Indigenous Peoples.
- ❖ Respect and preserve the culture, knowledge and practices of Indigenous Peoples
No indigenous people - with a social and cultural identity distinct from the existing dominant society that makes them vulnerable to being disadvantaged in the development process of the proposed project are known to exist in and around the proposed site. No such people were found in the area during the present study either. Therefore, this PS is not applicable for the proposed project.

Performance Standard-8: Cultural Heritage objectives have been set in the IFC performance standards to achieve sustainable development.

The objectives of this PS-8 are to protect cultural heritage from the adverse impacts of project activities and support its preservation, and to promote the equitable sharing of benefits from the use of cultural heritage in project activities.

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 61

No sites of cultural heritage are known to exist at or in the immediate vicinity of the project location. There are also no indications of any old settlement in the area, nor is there any site covered under the listing of cultural heritage sites. This PS will therefore not be applicable to the Project.

2.18 IFC- Environmental, Health, and Safety Guidelines

The Environmental, Health, and Safety (EHS) Guidelines are technical reference documents with general and industry specific examples of Good International Industry Practice (GIIP). For Wind Energy the EHS Guidelines for wind energy include information relevant to environmental, health, and safety aspects of onshore and offshore wind energy facilities.

Construction activities for wind energy projects typically include land clearing for site preparation and access routes; excavation, and filling; transportation of supply materials and fuels; construction of foundations involving excavations and placement of concrete; operating cranes for unloading and installation of equipment; and commissioning of new equipment. Decommissioning activities may include removal of project infrastructure and site rehabilitation.

Environmental issues associated with the construction and decommissioning activities may include, among others, noise and vibration, soil erosion, and threats to biodiversity, including habitat alteration and impacts to wildlife. Due to the typically remote location of wind energy conversion facilities, the transport of equipment and materials during construction and decommissioning may present logistical challenges.

Environmental issues specific to the operation of wind energy projects and facilities include the following:

- Visual impacts
- Noise
- Species mortality or injury and disturbance
- Light and illumination issues
- Habitat alteration
- Water quality
- Electric Power Transmission and Distribution

<p>Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan</p>	<p>Consultant Name: Renewable Resources (Pvt.) Ltd Project Sponsor: Hawa Energy (Pvt.) Ltd</p>	<p>Document No RE2-131-121-001 Document Issue 01</p>	<p>Date of Approval February, 2016 Page 62</p>
--	--	--	--

The EHS Guidelines for Electric Power Transmission and Distribution include information relevant to power transmission between a generation facility and a substation located within an electricity grid, in addition to power distribution from a substation to consumers located in residential, commercial, and industrial areas.

Examples of the impacts addressed in the General EHS Guidelines include:

- Construction site waste generation;
- Soil erosion and sediment control from materials sourcing areas and site preparation activities;
- Fugitive dust and other emissions (e.g. from vehicle traffic, land clearing activities, and materials stockpiles);
- Noise from heavy equipment and truck traffic;
- Potential for hazardous materials and oil spills associated with heavy equipment operation and fuelling activities. Environmental issues during the construction phase of power transmission and distribution projects specific to this industry sector include the following:
 - Terrestrial habitat alteration.
 - Aquatic habitat alteration.
 - Electric and magnetic fields.
 - Hazardous materials

IFC Guidelines for Environment Health Safety specific to Wind Power Project are attached as Annexure VI

2.19 INSTITUTIONAL SETUP FOR ENVIRONMENTAL MANAGEMENT

The apex environmental body in the country is the Pakistan Environmental Protection Council (PEPC), which is presided by the Prime Minister (referred to as the “Chief Executive”) of the Country. Other bodies include the Pakistan Environmental Protection Agency (Pak-EPA), provincial EPAs (for four provinces, AJK and Northern Areas), and environmental tribunals. The EPAs were first established under the 1983 Environmental Protection Ordinance (PEPO, 1983); PEPA 1997 further strengthened their powers. The EPAs have been empowered to receive and review the environmental assessment reports (IEEs and EIAs) of the proposed projects, and provide their approval (or otherwise). The proposed Project would be located in the Sindh Province, hence this IEE report will be sent to the Sindh-EPA for review.

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 63

2.20 OBLIGATION UNDER INTERNATIONAL TREATIES

Pakistan is signatory of several Multilateral Environmental Agreements (MEAs), including:

- Basel Convention on the Control of Trans-boundary Movements of Hazardous Wastes and their Disposal
- Convention on Biological Diversity (CBD)
- Convention on Wetlands (Ramsar)
- Convention on International Trade in Endangered Species (CITES)
- UN Framework Convention on Climate Change (UNFCCC)
- Kyoto Protocol
- Montreal Protocol on substances that deplete the ozone layer
- UN Convention to Combat Desertification
- Convention for the Prevention of Pollution from Ships (MARPOL)
- UN Convention on the Law of Seas (LOS)
- Stockholm Convention on Persistent Organic Pollutants (POPs)
- Cartina Protocol

These MEAs impose requirements and restrictions of varying degrees upon the member countries. However, the implementation mechanism for most of these MEAs is weak in Pakistan, and administrative/institutional setup is practically non-existent. Although almost all of the above MEAs would apply to the Project in one way or the other, the ones which have direct relevance for the proposed Project include the Basel Convention, Montreal Protocol, Stockholm Convention, UNFCCC, and Kyoto Protocol.

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 64

SECTION 3

DESCRIPTION OF PROJECT

3 DESCRIPTION OF PROJECT

3.1 PROJECT LOCATION

The wind farm Project is located in Jhimpir, which is located approximately 136 km from Karachi, Pakistan's commercial hub and main coastal/port city. The Project site initially consisted of 1200 acres and now the land has been extended by 351 acres. The Karachi-Hyderabad Motorway (Super Highway) and National Highway are the connecting roads to the Project site. The Jhimpir wind corridor is identified as potential area for the development of wind power projects. The layout of the project site is shown in Figure 3.1.

The Project site has very sparse vegetation consisting of small shrubby bushes and flat terrain area. Location of the Project is shown in Figure 3.2. The land profile in red color is for original piece of land and yellow color refer to the extended part of the land.

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 65

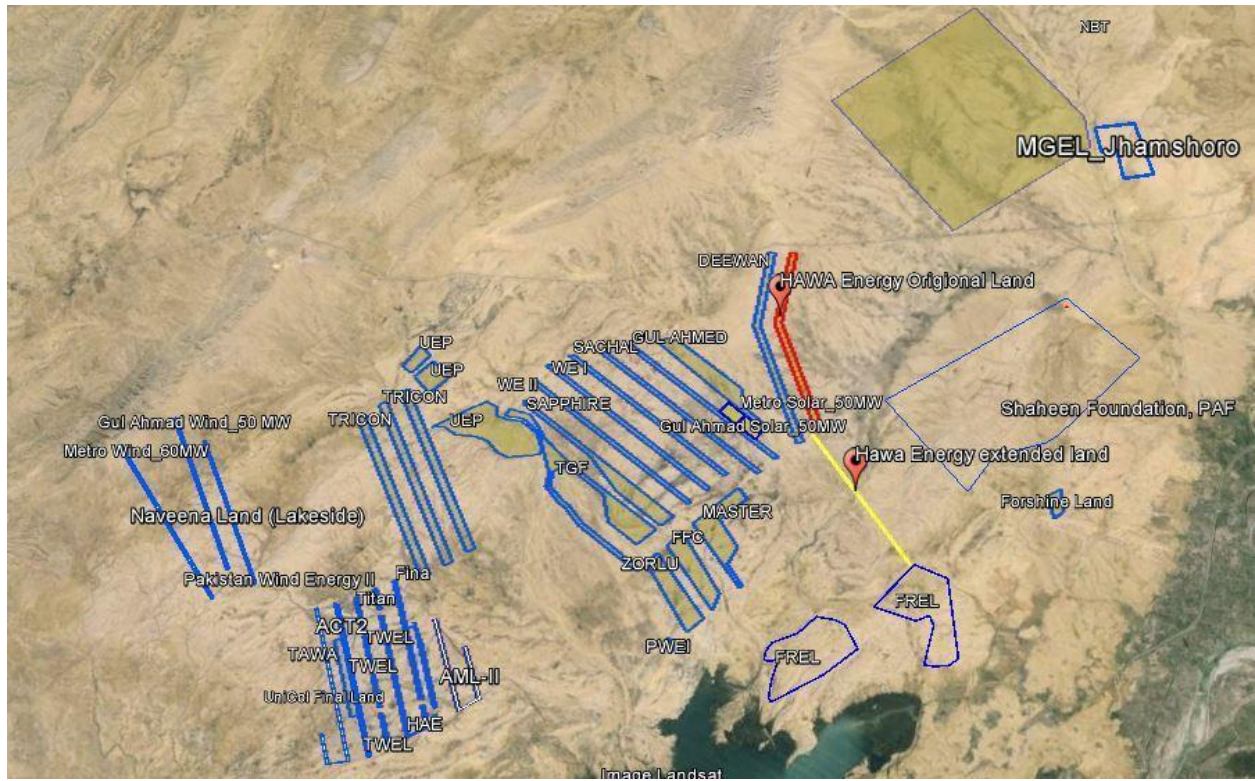


Figure 3.1: Hawa Energy Project Site Layout

<p>Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan</p>	<p>Consultant Name: Renewable Resources (Pvt.) Ltd Project Sponsor: Hawa Energy (Pvt.) Ltd</p>	<p>Document No RE2-131-121-001 Document Issue 01</p>	<p>Date of Approval February, 2016 Page 66</p>
--	--	--	--

Table 3.1: Land Coordinates

S. No.	Latitude	Longitude
1.	25° 9'38.09"N	68° 1'38.21"E
2.	25° 9'34.06"N	68° 1'35.26"E
3.	25° 6'45.93"N	68° 6'17.70"E
4.	25° 6'41.46"N	68° 6'15.51"E

The Project area is open and can be seen from images below in Figure 3.2;



Figure 3.2: A View of Project Site

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 67

3.2 ROAD ACCESS

The Project site is easily accessible throughout the year.

The major track from Karachi to Nooriabad is via the Karachi-Hyderabad Motorway, and another access to the Project site is through Jhampir. When travelling via the Karachi-Hyderabad Motorway, the access from Nooriabad to the site is a single track, which turns toward the site. However, the terrain is flat and long and heavy vehicles can easily navigate through this road. There are number of neighboring wind farms in the surrounding area of Jhampir. There is no requirement to establish roads or tracks for movement of traffic. The total distance from Karachi to the site is approximately 136 km.

The satellite overview of the track from Karachi to the Project site through Karachi-Hyderabad Motorway is shown in Figure 3.2.

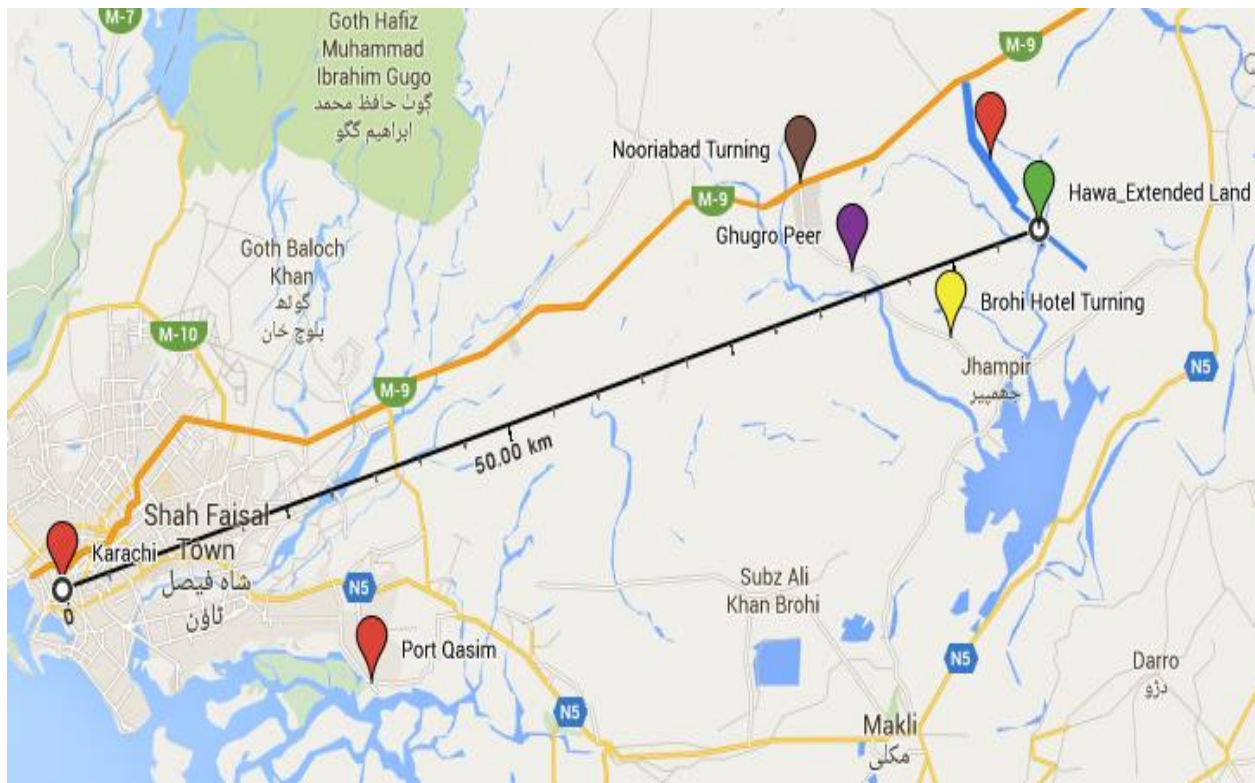


Figure 3.2: Ariel View of Complete Track (Through Karachi-Hyderabad Motorway)

Document Title:	Consultant Name:	Document No	Date of Approval
Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhampir Sindh Pakistan	Renewable Resources (Pvt.) Ltd	RE2-131-121-001	February, 2016
	Project Sponsor:	Document Issue	Page
	Hawa Energy (Pvt.) Ltd	01	68

The major track from Karachi to site is two-way road. Port Qasim is the one of the major ports of Pakistan and is the point of delivery of equipment for the proposed wind power project. It is located towards east of the site as shown in Figure 3.3.

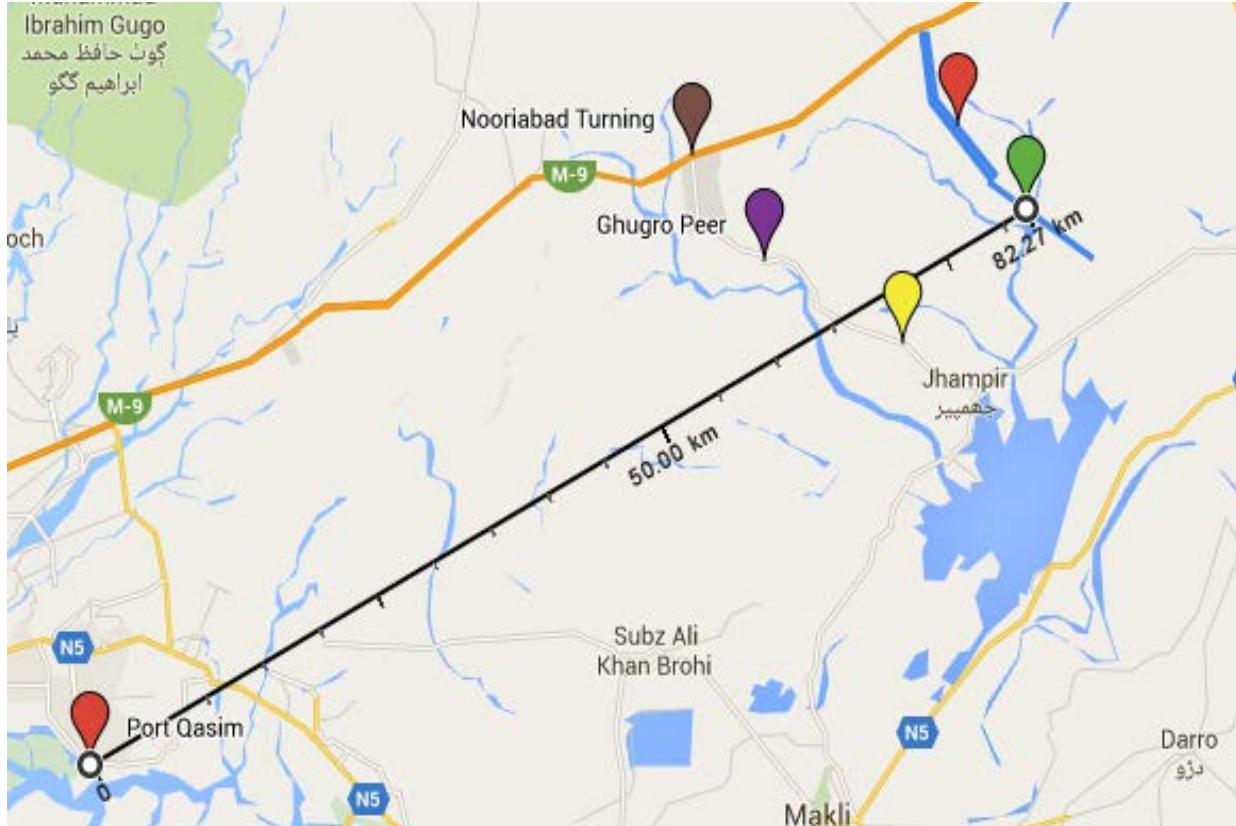


Figure 3.3: Orientation of Site from Port Qasim (Aerial View)

Aerial distance between the Port to the site is 82.2 km. Total track length between Port Qasim Karachi and site is approximately 127 km. Detail access to site is shown in Figure 3.4.

The track from Port to the Nooriabad Super Highway is good but the site access Road that turns to the site needs minor development.

<p>Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhampir Sindh Pakistan</p>	<p>Consultant Name: Renewable Resources (Pvt.) Ltd Project Sponsor: Hawa Energy (Pvt.) Ltd</p>	<p>Document No RE2-131-121-001 Document Issue 01</p>	<p>Date of Approval February, 2016 Page 69</p>
--	--	--	--

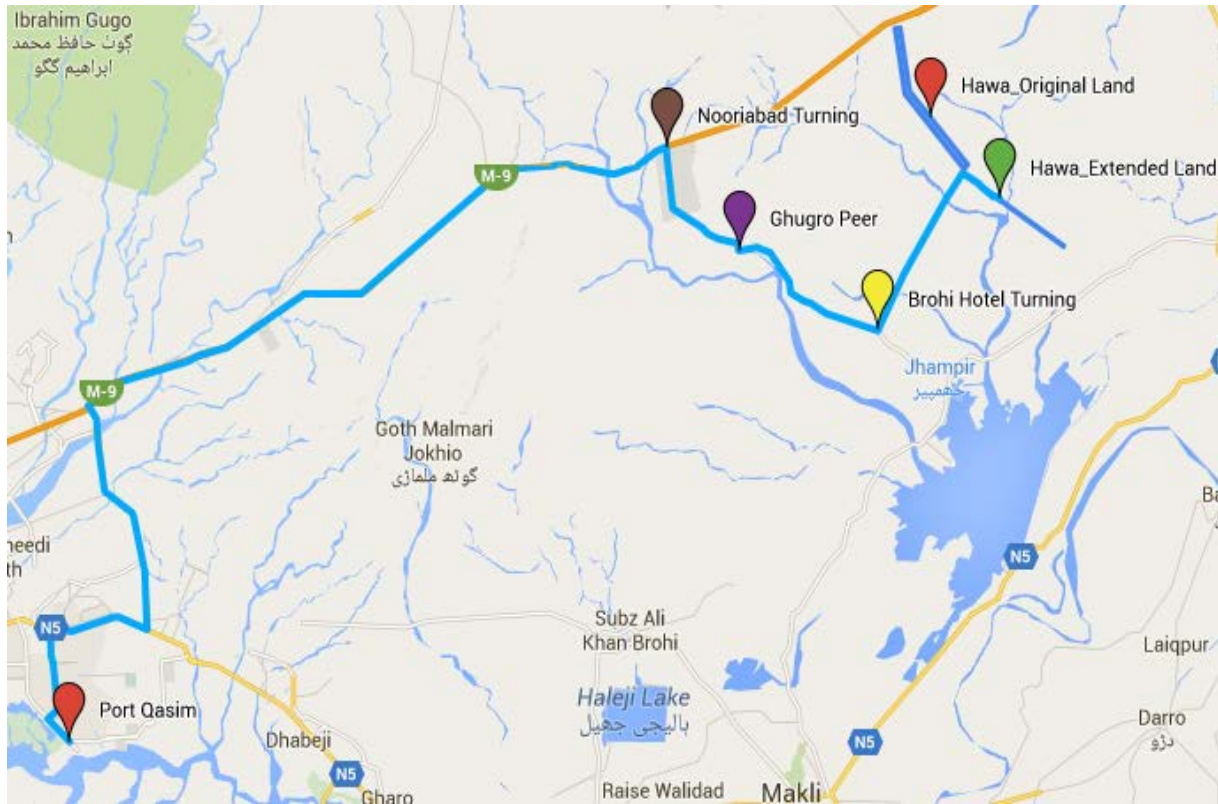


Figure 3.4: Detailed Access from Port Qasim to the Site

There is a number of neighboring wind farms under various stages of development in the Jhampir region of various capacities ranging from 05 MW to 250 MW. The view of different tracks of land allocated to the wind farm project developers in Jhampir is shown in Figure 3.5.

<p>Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhampir Sindh Pakistan</p>	<p>Consultant Name: Renewable Resources (Pvt.) Ltd Project Sponsor: Hawa Energy (Pvt.) Ltd</p>	<p>Document No RE2-131-121-001 Document Issue 01</p>	<p>Date of Approval February, 2016 Page 70</p>
--	--	--	--

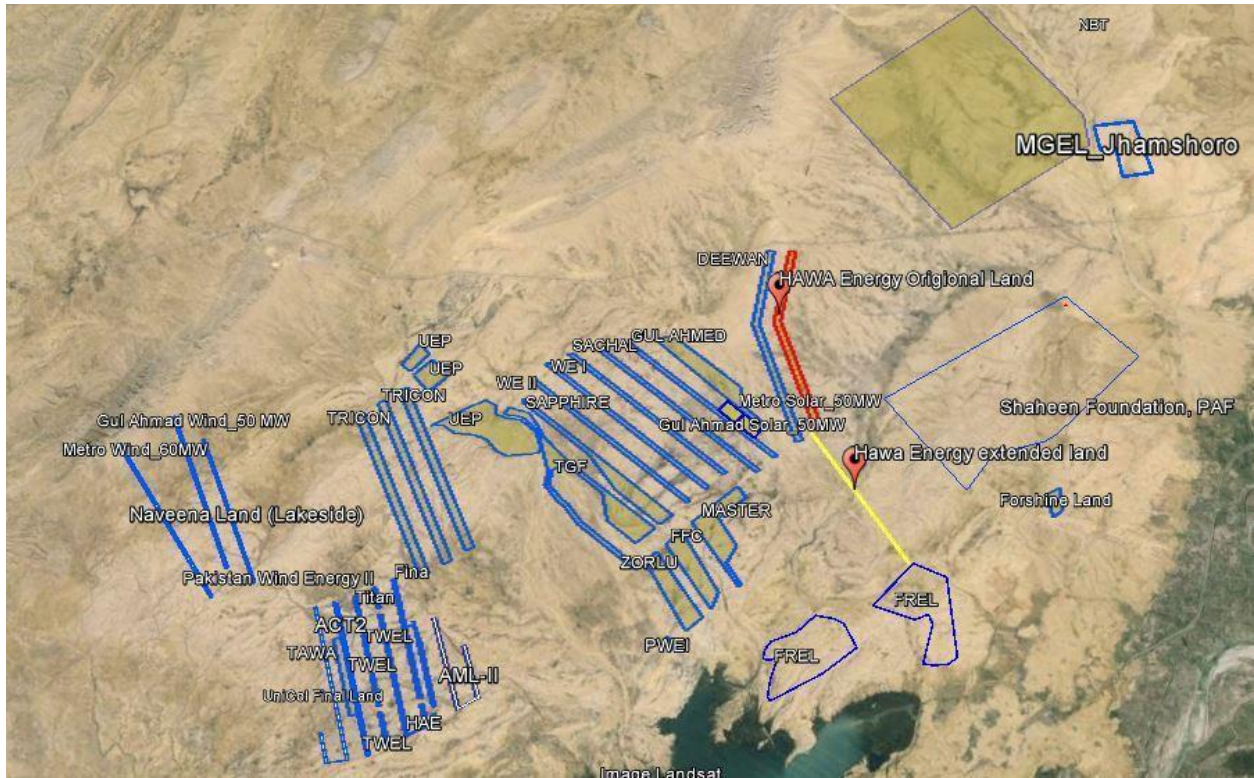


Figure 3.5: HEPL Site with Respect to Neighbouring Wind Farms in Jhimpir

<p>Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan</p>	<p>Consultant Name: Renewable Resources (Pvt.) Ltd Project Sponsor: Hawa Energy (Pvt.) Ltd</p>	<p>Document No RE2-131-121-001 Document Issue 01</p>	<p>Date of Approval February, 2016 Page 71</p>
--	--	--	--

3.3 PROJECT SIZE AND COMPONENTS

The Project is of 50 MW capacities. Following WTGs will be installed:

- General Electric GE 1.7-103 – Total 29 WTGs

The Project can be divided into four major phases:

- Pre-Construction Phase
- Construction Phase
- Operation and Maintenance Phase
- Decommissioning Phase

3.3.1 Preconstruction Phase

Pre-construction phase consists of:

- Land Procurement
- Soil and topographic Survey
- Installation of wind measuring mast
- Wind Resource Assessment and Micrositing
- Approvals from Government Departments (discussed in section 2.9)

3.3.2 Construction Phase

Construction Phase of the Project will be awarded to an EPC firm selected through a competitive bidding process. It is estimated that direct manpower required during the Construction phase will be approximately 500 persons, with unskilled jobs being offered mainly to local inhabitants, particularly during the Construction Phase.

Construction activities will be comprised mainly of:

- Construction of site roads and crane pads at each wind turbine site
- Construction of turbine foundation and transformer pads
- Installation of electrical systems, underground and some overhead lines
- Assembly and erection of the wind turbines
- Construction and installation of substation
- Commissioning and Testing

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd Project Sponsor: Hawa Energy (Pvt.) Ltd	Document No RE2-131-121-001 Document Issue 01	Date of Approval February, 2016 Page 72
--	---	--	--

All supplies both for construction and for the camp will be transported by trucks from Karachi. This will include all fuels and oils, drilling equipment, spare parts for construction machinery, and food supplies for construction camps.

3.3.3 Operation and Maintenance Phase

In order to maintain a high level of performance, a maximum staff of 10 persons per shift will be maintained for the wind farms, in addition to the security staff.

3.3.4 Decommissioning Phase

The Project's wind power generation systems, if operated prudently, should maintain certain residual value upon decommissioning, following the estimated 20 year life-cycle of the Project, as agreed in the EPA. Its continued performance would demand up-grading rather than decommissioning of the plant. The tower and turbine may need replacement while the old ones may be sold as scrap to be appropriately disposed-off.

However, if the site is to be decommissioned prior to the designated plant life, it will be initiated by dismantling the turbines, supporting towers and substation, and transporting them out of the Project area. The activity will take approximately six (06) months and will require 400-500 truck- loads to transport the material. The turbine material and the tower will be sold as scrap, and concrete will be broken and moved to the landfill site. The stored fuel or oil will be transported out of the area for sale or disposal at a suitable landfill site. The site will be leveled to make it available for regular use.

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 73

3.4 PROJECT SCHEDULE

No	Milestone	Anticipated Date
1	Feasibility Study	Done
2	Generation License	Done – Modification in process due to land adjustment
3	Tariff Determination	Done
4	EPC Contract Signing	EPC draft being sent to OPIC on March 7, 2016
5	EPA	Done – Modification in process due to new turbines and Tariff.
6	IA	Final Stage of negotiation to begin in late March.
7	Financial Close	3 rd QTR of 2016
8	Project COD	1 st QTR of 2018

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 74

3.5 LOCATION OF GRID

The Project is planned to be built in the Jhimpir region. The electrical network within the vicinity of the site of the plant comprises of LV (11 kV) and HV (132 kV and 220 kV) lines. For projects with installed capacity in excess of 10 MW, connection must be made with HV lines.

Hyderabad Electrical Supply Company 132/11 kV grid station is in Nooriabad. The distance of the grid station from the Project site is approximately twenty one (21) Kilometers.



Figure 3.6: Nearest HESCO grid station

Another Grid Station of 220kV is under construction and will be available by end of 2016 as per the plans of NTDC and will then be used to evacuate power from the Project.

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 75

3.6 WIND TURBINE DETAILS

The Project shall use a total of 29 wind turbines of 1.7 MW each.

Brief technical specification of wind turbine model is given in Table 3.2.

Table 3.2: Technical Specifications of Wind Turbine

Make	G.E
Rated Power	1.7
Hub Height	80 meters
No of Turbines	29

3.7 NET ENERGY YIELD AND CAPACITY FACTOR

The net energy yield and capacity factor of 50 MW wind farm is calculated and presented in Table 3.1.

Table 3.3: Annual Energy Production Estimates

Number of WTG	29
Approximate Net Energy Production [MWh/a] of G.E	531,209MWh/a
Capacity Factor [%] of G.E	35.0%

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd Project Sponsor: Hawa Energy (Pvt.) Ltd	Document No RE2-131-121-001 Document Issue 01	Date of Approval February, 2016 Page 76
--	---	--	--

SECTION 4

BASELINE ENVIRONMENTAL CONDITIONS

4 BASELINE ENVIRONMENTAL CONDITIONS

A data collection survey that included geology, meteorology, hydrology, ambient air quality, water quality, soil characteristics, noise levels, flora and fauna, land use pattern, and socioeconomic conditions was undertaken, based on available secondary information or data collected in the field. Primary data was collected to establish baseline conditions for the soil, water (surface and ground) quality, flora and fauna, and noise. Secondary data was collected for land, ecology, climate, and socioeconomic factors.

4.1 CLIMATIC CONDITIONS

The climate of the Project area can be broadly classified as arid, moderate, hot and humid. The mild winter is restricted to the November-February period. The summer extends from May to September, which overlaps the short spells of the main rainy season during July-August. The weather tends to be very humid during June, July, and September and is pleasant during March and April.

The climate of this area is characterized by fluctuating temperatures and sparse rainfall. The summer seasons are hot and humid with average temperatures ranging between 33°C to 37°C. The temperature in summer seasons may reach up to 45°C. The winters are pleasant with average temperature in the range of 15°C to 25°C. The months of July and August generally observe the annual monsoon rainfalls. The meteorological stations of Badin and Hyderabad are located within the wind corridor. However, the meteorological data from Karachi station is also representative of the prevailing climatic conditions of coastal areas in the wind corridor. The climate information of Jhampir is shown in Table 4.1.

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhampir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 77

The climatic conditions of Thatta and Badin districts may be taken as moderate as a whole. The climate is tempered by the cool sea breeze which blows for eight months of the year from March to October. During the monsoon season the sky is overcast but there is very little precipitation. The climate in summer is generally moist and humid. The cold weather in the districts start from the beginning of November when a sudden change from the moist sea breeze to the dry and cold north-east wind brings about as a natural consequence, an immediate fall in temperature. The data has been gathered or extracted through by using Meteororm 7.1 and also the onsite monitoring during the laboratory analysis. The annual average of maximum and minimum temperatures of Jhimpir is given in Table 4.1 and presented in Figure 4.1.

Table 4-1: Average Maximum and Minimum Temperatures in Jhimpir Region (°C)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
24	28	33	38	41	40	37	35	36	36	31	26
12	15	19	23	26	28	27	26	25	23	19	14

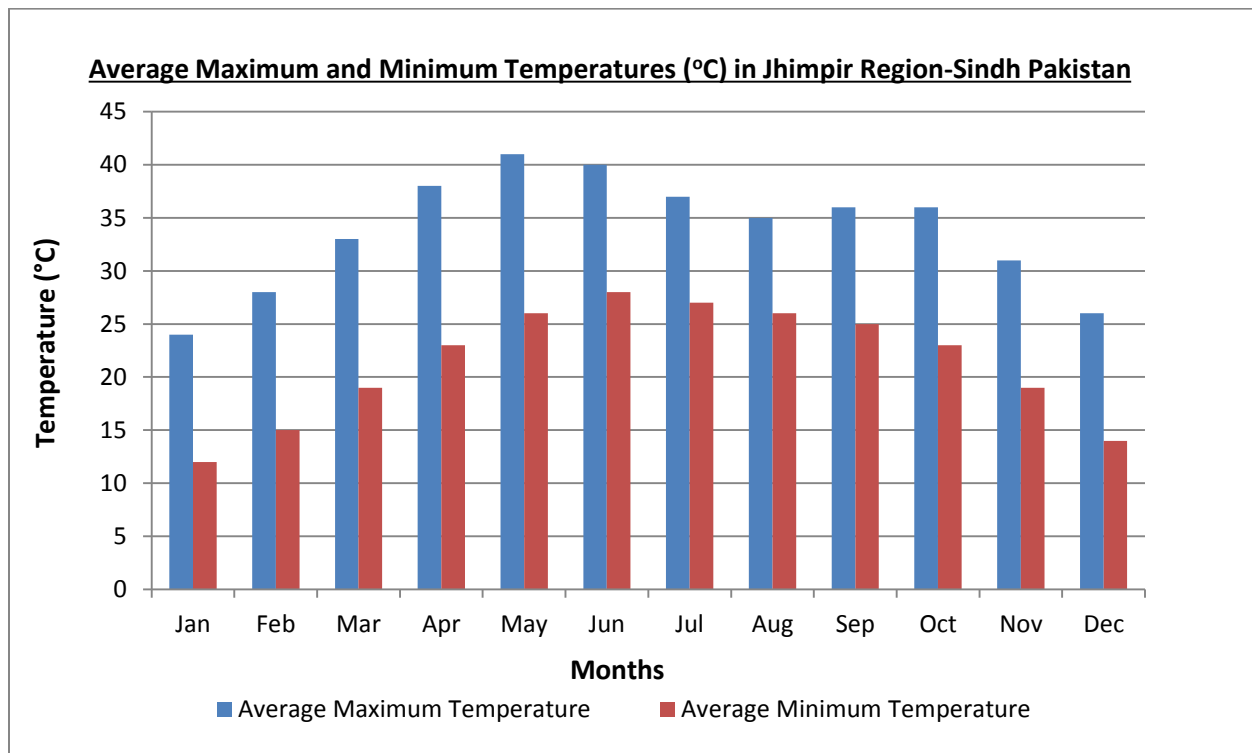


Figure 4.1: Graph of Average Maximum and Minimum Temperature (°C)

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 78

The annual precipitation takes place mainly during summer. It is unevenly distributed. The average rainfall most of which occurs in monsoon season, from April to September, is shown on the table below.

Table 4-2: Average Precipitation and Rainfall Days in Jhimpir Region

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
14mm	6mm	7mm	6mm	5mm	12mm	21mm	50mm	13mm	3mm	0mm	16mm
2	1	0	1	0	1	3	4	1	0	0	1

4.2 SURFACE AND GROUND WATER HYDROLOGY AND DRAINAGE

Major water reserve of the area is Keenjhar Lake, also known as Kalri Lake. The lake is located approximately 10.3 km from the Project site. It is 24 km long and 6 km wide and has an area of 14000 ha (35,583 acres). The lake is fed by the Kalri Bagar feeder canal from the North-West as well as by small seasonal streams entering into it from the North and the West. The feeder is also the conduit for the industrial wastes of Kotri town. Keenjhar is a wild life sanctuary and a Ramsar site. Keenjhar Lake which is shown in Figure 4.2.

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 79



Figure 4.2: Satellite View of Keenjhar/Kalri Lake near Project Site

The only perennial water channel in the area is the KalriBaghar (KB) Upper Feeder which feeds Keenjhar Lake with Indus water from Kotri Barrage. The KB Feeder is approximately 20km away from the Jhampir wind farm sites and lies on its eastern side. The KB feeder is about 61km long and its design discharge is about 258 cubic meters per second (cumecs). Kinjhar Lake is also being fed by hill torrents during floods from the western side. The catchment area of these hill torrents are about 1664 sqkm and have their outfall into the Kinjhar Lake. These hill torrents include Rodh Nai and Liari Nai. Baran Nai, which is the principal source of flood drops into the River Indus downstream of Kotri barrage.

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhampir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 80



Figure 4.3: View of Kinjhar/Kalri Lake near Project Site

Kinjhar Lake is the main source of fresh water for drinking and irrigation for the areas downstream of Jhimpir including the city of Karachi. Kinjhar Lake is an artificial water storage reservoir located in District Thatta. It came into existence as a consequence of implementation of the Kotri Barrage canals Irrigation Project. This artificial reservoir has been formed out of natural depressions of Sonheri and Kinjhar Dhands. The gaps between the surrounding hills of the dhands were closed with the construction of earthen embankments having an average height of about 7.6m. Apart from KB Feeder, hill torrents and Kinjhar Lake there is no other source of surface water available in the area. The quantity of water in Kinjhar Lake is ample to fulfill the requirements of the downstream areas for irrigation and drinking purposes.

Regular Surveys have not been carried out to assess the availability and quality of Ground water in the Province of Sindh. Various sources estimate that the volume is 3-5 MAF scattered in 28% of the geographical area of Sindh. This water is found mainly along the Indus water channels and in a few underground streams. In recent years, drought has caused excessive extraction of groundwater to make up for the lack of irrigation water. This, in turn, has resulted in rapid depletion of the groundwater and filling up of the underground freshwater channels and reservoirs with brackish water.

<p>Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan</p>	<p>Consultant Name: Renewable Resources (Pvt.) Ltd Project Sponsor: Hawa Energy (Pvt.) Ltd</p>	<p>Document No RE2-131-121-001 Document Issue 01</p>	<p>Date of Approval February, 2016 Page 81</p>
--	--	--	--

During social survey, it was learned that the availability of drinking water is the major problem in the area. The water of shallow wells present in the expansion areas contains higher values of TDS and mostly saline in nature therefore is not suitable for human consumption. The results are also attached in **annexures VII**.

The depth of water table is also depleting over the period. Due to increased number of private tube wells being installed in the location of sub project, the ground water is depleting. Recharge from surface /rain water is helping in reduction of depth of sub soil water table. During dry periods, the situation sometimes becomes quite serious.

The project activities will not disturb the water bodies located nearby. As there is no water discharges from the Wind turbines during operations and during construction wastewaters will not be disposed in any water body. However, water from domestic activities like Labor camps will be treated through septic tank / soaking pits.

The area is very poor with respect to piped water, which is available to only about 14% of the housing units. About 13% of rural households have hand pumps inside the housing units, while 16% use outside ponds for fetching water, and 6% of housing units use dug wells. The ground water level of the site is 115 meters.

The drainage system in the area is not developed. The booster pumping station for the water supply pipeline is established to supply water from Keenjhar Lake to Nooriabad Industrial State. Nooriabad Industrial state is located at a distance of approximately 28.5 km from Keenjhar Lake.

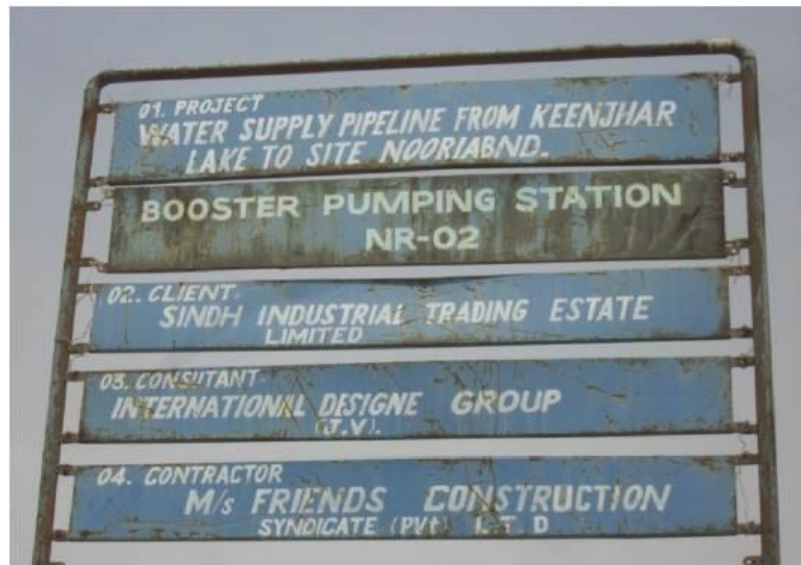


Figure 4.4: Booster Pumping Station from Kinjhar Lake to Nooriabad Industrial Estate

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 82

4.3 AMBIENT AIR QUALITY

The area in and around the Project site is underdeveloped with no industrial development nearby, but the area is likely to develop into a modern city after development of wind power projects in the area. The primary sources of air pollution include traffic near Karachi Hyderabad Motorway. The impact of exhaust emissions from vehicular traffic operating on Highway N5 is limited to the microenvironment of the highway. No sources of anthropogenic sources of air pollution exist in the immediate vicinity of the site; therefore the ambient air of the area is likely to be free from the key pollutants such as carbon monoxide (CO), oxides of nitrogen (NOx), sulfur dioxide (SO₂) and particulate matter (PM). But in very minor quantities. In general, the air quality of the area is high with no significant air pollutants (PM). Ambient air quality was recorded by the (SGS) during this study. It may be seen that the average level of each parameter in ambient air is on lower side in comparison with National Environmental Quality Standards (NEQS). The results are attached in **annexure VII**.

4.4 NOISE QUALITY

There is no continuous source of noise emission within or around the proposed project wind farm site.

The Noise level recorded at the unpolluted site in ranges between 37.5 dB (A) and 45 dB (A) with the average at 44.0 dB (A), which is characteristic of wilderness and well within 75 dB (A) the level suggested by NEQS.

There is very minor human settlement near the Project area. Traffic near the Project site is consequently very low. Industrialization is also very low, thus baseline noise levels are low.

4.5 SEISMIC HAZARDS

According to the seismic zoning map of Pakistan, the Jhimpir region falls in **ZONE II-B** with moderate to severe damage area probability with G Factor of $g=0.1-0.3$, as shown in the map in Figure 4.5. Earthquake records indicate that this region has experienced several earthquake tremors in the past, as well as recently. The region has some major tectonic features, including the Runn Kutch-Karachi fault, Pab fault, Ornach-Nal fault, Surjan fault, and Jhimpir fault.

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd Project Sponsor: Hawa Energy (Pvt.) Ltd	Document No RE2-131-121-001 Document Issue 01	Date of Approval February, 2016 Page 83
--	---	--	--

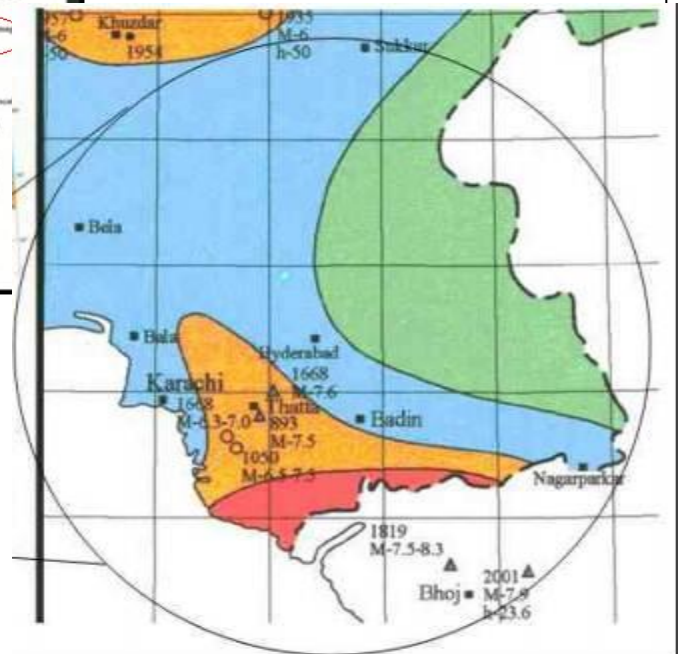
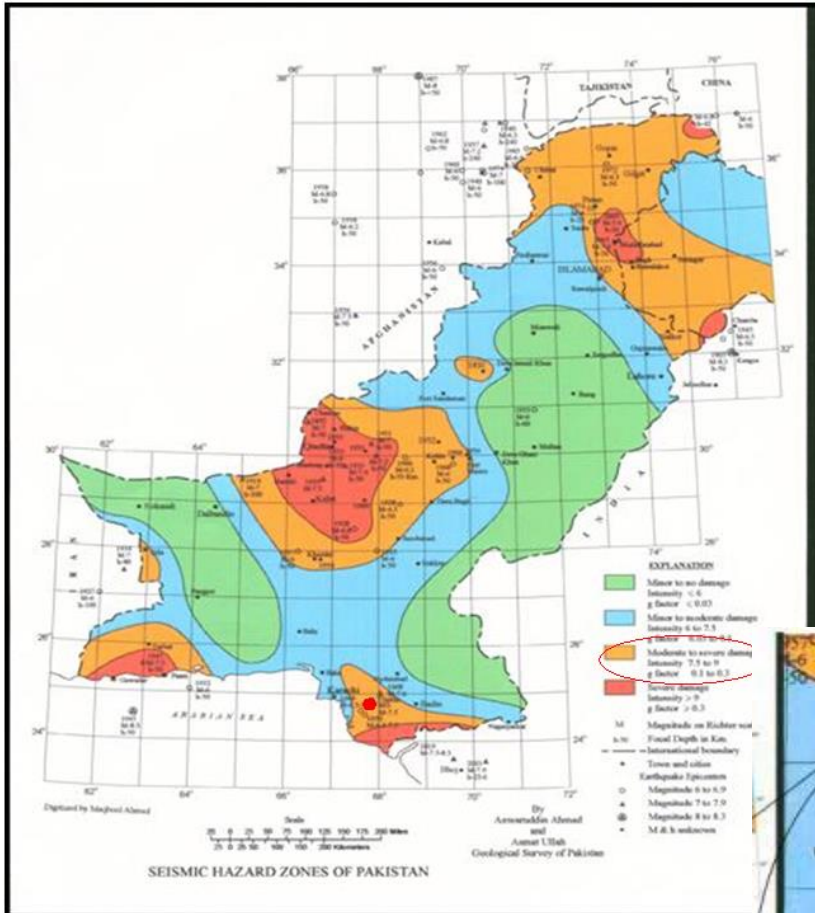


Figure 4.5: Seismic Hazard Zones of Pakistan

<p>Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan</p>	<p>Consultant Name: Renewable Resources (Pvt.) Ltd Project Sponsor: Hawa Energy (Pvt.) Ltd</p>	<p>Document No RE2-131-121-001 Document Issue 01</p>	<p>Date of Approval February, 2016 Page 84</p>
--	--	--	--

4.6 FLOODS

Sindh province has two sources of flooding. The Riverine flood is more predictable and allows ample time to react, whereas the torrential floods leave almost no time to respond. Torrential floods have lesser frequency and duration but very high intensity; therefore, impact is often severe. These floods normally occur in monsoon months of July and August when the catchment areas in Balochistan receive heavy rains. The Western boundary of Sindh is connected with Balochistan through the Khirthar hills.

In 2011, torrential floods devastated more than 11,000 villages in Kacha and the surrounding areas of Sindh, displacing more than 213,000 households from their villages along with 1,065,000 numbers of livestock. District Thatta was the worst affected in Sindh because it was the last district on the Indus River where the flood remained for around two months. Official data reveals that approximately one million people were directly hit in this district of the province.

According to the flood map of Pakistan, Sindh province falls under a moderate to heavy flooding zone.



Figure 4.7: Flood Map of Pakistan

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 86

4.7 GEOLOGICAL SETTINGS

The Project area has a wide range of soil types due to its diverse land forms, which include sandy, deltaic, alluvial, gravel, coastal, and mountainous.

The Prevailing geologic conditions in the region are the results of extensive sedimentation, coastal movements, and erosion over a long period of time in the geological ages. The geology of the region is closely related to the formation process of Himalayan Ranges. This has resulted in intense deformation with complex folding, high angle strike-slip faults, and crust thickening expressed in a series of thrust faults. The important tectonic changes which have had so much influence in the region are freely visible, particularly in the Indus plain. Ultimately, it is only by considering the geology on a broader regional scale, as well as in site specific detailed, that the effect can be appreciated.

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 neighborhood that there is some exposure of rocks belonging to the next older system; the cretaceous with the exceptions of some volcanic beds associated with these cretaceous strata, all the rocks formation of western Sindh are the sedimentary origin. All of the more important hills masses consist of limestone. A vast majority of this limestone deposit is from the nummulitic period and is largely built up of the accumulated shells of foraminifera; principally those belonging to the genus nummulites.

Table 4-3: Geological Formations covered in the Wind Corridor of Jhimpir

Geological Symbol	Description	Percentage (%) of Total Area
Q	Unconsolidated surface deposits of silt and gravel of recent period	32.57
Te	Eocene Sedimentary Rocks (Mostly Limestone) of Tertiary Ages	67.43

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 87

4.8 SOIL CLASSIFICATION

The texture of soils in the wind corridor ranges from loamy saline, silty, and clayey in the coastal areas to gravely, mainly loamy, and clayey soils in the inland areas.

The loamy soils in the coastal areas are strongly saline (hence devoid of any agriculture), moderately alkaline (pH of 7.9 to 8.4) and strongly calcareous (CaCO₃ content greater than 15%). The soil in the inland areas, especially those areas covered under the lower Indus basin, consists mainly of loamy and clayey soils. These soils have little or no salinity (0 to 4dSm⁻¹) and are moderately alkaline (pH of 7.9 to 8.4). The soils are generally non-saline, non-sodic except local saline patches in inter-dual valleys and some parts of the alluvial plain.

The soil of Jhimpir is classified as mainly loamy saline and part gravely. The soil is similar in nature to the soil of Ghara area. However the soils in some patches may be different with a slight salinity (between 4dSm⁻¹ to 8dSm⁻¹). This type of soil is usually neutral (with a pH of 6.6 to 7.3), and moderately calcareous (with CaCO₃ content in the range of 3% to 15%). Properties of soil in some patches of the wind farm may be different to the ones stated above with moderately alkaline (pH of 7.9 to 8.4), strongly calcareous (with CaCO₃ content of greater than 15%) with little or no salinity (between 0dSm⁻¹ to 4dSm⁻¹). This type of soil is usually neutral (with a pH of 6.6 to 7.3), and moderately calcareous (with CaCO₃ content in the range of 3% to 15%).

4.9 LAND USE CAPABILITY

The land area of the Project consists of a complex of agriculturally unproductive (rock) land and some poor grazing (gravely land) (Class VIII, VII). This area constitutes about 38.3% of the total wind farm area and is also incapable of agriculture as the soil underneath mainly consists of rock and gravel. The remaining portion (about 61.7%) of the land is a complex of poor torrent-watered crop land and poor (loamy) grazing land. Some part of this land is capable of agriculture being fed by torrent water whereas the remaining portion comprises of grazing area (capable of growing grass and shrubs).

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 88

Table 4-4: Land Use Capability Class in Jhimpir

Classification No	Soil (Class)	Capability	Percentage (%) of Total Area
7	IV, VII	Complex of poor torrent-watered cropland and poor (loamy) grazing land	61.68
10	VIII,VII	Agriculturally un-productive(rock) land and some poor grazing (gravelly) land	38.32

The Project site consists of areas that have variable land use. The rocky and gravelly soil formation devoid the major land area for any agricultural use. However the land area is also influenced by perennial grazing consisting of short grasses shrubs and scrubs. This area is dependent on residual moisture from torrent overflows. The major bushes found in the area include Devi, Chali, Damral, and Darathi (local names). No medicinal value is associated with these plant species found in the area.

4.10 SOCIO ECONOMIC FEATURES

4.10.1 Local Settlement Pattern and Population

Jhimpir, being in the administrative control of District Thatta, is unique in terms of population sensibility and characteristic. The total area of Thatta is 17,355 sq/km, the total population consists of 1,113,194 persons scattered in several *goths/paras*. Gender distribution shows a figure of 589,341 males and 523,853 females. The population density of Thatta is 64.1 per sq/ km, and the percentage of the total population residing in an urban area is 11.2 %. The average household size is approximately 5 persons. The average growth rate of the population has remained at 2.26% from 1981-98.

Table 4-5 List of Settlements and Population details

S.No	Name of Settlement/Goth	Coordinates	Distance from Project Site (km)	Population	Status /Type
1.	Goth Budo Chang	25° 6'38.42"N 67°59'34.42"E	6.5km	40-50	Permanent
2.	Goth Sadiq / Sajan	25° 6'59.29"N 67°59'48.88"E	5.9km	20-30	Permanent
3.	Goth Muhammad Sadeeq Bhroi	25° 8'9.11"N 68° 3'59.00"E	500m	40-50	Permanent

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 89

Average household size is 5; houses built in nearby villages are single room houses, made of mud and bushes; there are three settlements found in the proximity of the proposed project area and also there is one settlement inside the boundary and other nearest settlement are found at the distance of 4.5 kilometer. Budo Chang Goth, Sadiq / Sajan Goth and Goth Muhammad Sadeeq Bhroi are the only permanent settlements and there are no seasonal /temporary settlements near the project site. The population of the settlements varies from 80 – 100+ inhabitants and houses from 8 – 10. Table shows the GPS coordinates of the settlements observed during the survey. During Micrositing study of the towers, due consideration will be given to avoid any disturbance to locals.

4.10.2 Health and Education Facilities

The health infrastructure in District Thatta is scant. Three out of the six coastal Talukas do not have any Rural Health Centre or any Veterinary Dispensary. A particular problem of access to health services is the scattered nature of the population. Thus, many people have no access to health services within a convenient location from their homes. Serious ailments have to be treated at Thatta, Hyderabad, or Karachi. Many of the diseases occurring in the area are water-borne and are due to lack of sanitation facilities. A basic health care center is present in the area with minimum facilities and staff.



Figure 4.8 A Basic Health Unit in Jhimpir

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 90

The literacy rate in District Thatta was reported to be 22% in 1998. The male literacy rate was three times higher at 32% compared to the female literacy rate of only 11%. The literacy rate in urban areas was much higher at 46% compared to only about 19% in rural areas. A single primary school is located in the area.

One government primary school has been observed in the vicinity, but was not functional. The people of these goths are in need of teachers as well as middle schools. A private school is located far away at Bachal Jhakro Goth. The area is in dire need of a high school and a functioning primary school.



Figure 4.9: A View of School nearby Project Area

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 91

4.10.3 NGOs Working in the Area

Different national and international NGOs are working in District Thatta with the help of their local partners. Their scope of work ranges from relief operations in the coastal areas of Thatta to social welfare and livelihood improvement initiatives. Certain NGOs are working on CPI (Community Physical Infrastructure) projects, and others are active in providing microfinance to local communities through social collateral. A few of these NGOs are also working on awareness and advocacy. NGOs and institutions working in the area includes NRSP (National Rural Support Program), Aga Khan Planning and Building Services (AKPBS), PPAF (Pakistan Poverty Alleviation Fund), IUCN, WWF, and Pakistan Fisher Folk Forum.

4.10.4 Occupational Pattern

The area does not offer opportunities for employment and the population is primarily engaged as cheap unskilled labor force either in Nooriabad, Thatta, Hyderabad or Karachi. Skilled labor from this area mainly comprise of vehicle drivers, agriculture activities, Shepherd, welders, plumbers, and electricians. Government service is relatively rare; a few locals are working in the Pakistan Steel Mill Dolomite Project and the Pakistan Railway Station in Jhimpir.

During the social assessment visit it was observed that the people in the area are barely meeting their dietary needs. The local population is looking forward to the Hawa Energy project because it is expected to bring job opportunities and raise the living standard of locals.

4.10.5 Infrastructure and Industry

The district is linked by road with other districts. The National Highway from Karachi to Peshawar passes through Thatta for a length of approximately 200 km.

The main railway line from Karachi to Peshawar also connects the district. The nearest railway station is Jhimpir.

Electricity is only available in 21% for the rural housing units, while kerosene oil is still used in 77% of the rural dwellings. Firewood is used as the main cooking fuel in about 91% of rural households and 77% of urban households.

The district is also equipped with digital and non-digital telecommunication systems, besides postal service and telegraph service.

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd Project Sponsor: Hawa Energy (Pvt.) Ltd	Document No RE2-131-121-001 Document Issue 01	Date of Approval February, 2016 Page 92
--	---	--	--

From an industrial point of view, The Thatta district has progressed considerably. There are about 30 industrial units established in the district.

The nearest industrial hub is Nooriabad at the distance of approximately 22 kilometers, Nooriabad has different types and sizes of industries; which includes Textile, Power, Cement, etc.

4.10.6 Archaeological Sites

There are no archaeological sites close to the Project site. The Tomb of Syed Hussain Shah, situated near Keenjhar Lake, is located over 25-30 km away from the Project site. Local villagers and people from other villages visit the Tomb to pay homage to Syed Hussain Shah and Ameer Peer. Shivmaha Dev Temple, which is a Hindu place of worship, is also near Keenjhar Lake, at a distance of over 10.3 km from the Project site.

Figure 4.9: Tomb of Syed Hussain Shah (Left), Shivmaha Dev Temple(Right)



4.11 ECOLOGY

The RE2 project team (Flora and fauna experts) aided by Dr. Syed Ali Ghalib have conducted the field survey for the study using the following methodology. This section gives the main habitat types, flora and fauna, rare and threatened species existing threats to the species and to their habitats, environmental impacts of the proposed development and mitigation measures.

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 93

A. Methodology

Data in respect of fauna and flora were gathered both from primary and secondary sources. The sampling locations were randomly selected, ensuring that representative locations are sampled for each habitat and the maximum possible number of species belonging to each habitat is recorded.

Secondary data were collected through literature search, studies conducted within and in the surroundings of the Project Area, and the information collected from the local communities and the Sindh Wildlife Department.

Field Surveys were made in the project area in March, 2016 to collect data about the fauna of the area. Standard direct and indirect methods were applied to record the occurrence, distribution and population of various animal species in the area, which included point count surveys, roadside or track counts, line transect method and tracks/ signs counts.

Prior to the start of actual field work, there is a need to collect a sift of information to form a general overview on the wildlife populations on the site (and nearby areas) and their likely sensitivity.

This is largely a secondary data collection exercise during which information is sought and collected on:

- (i) Mammals, birds, reptiles, amphibians and plants:**
- (ii) Habitats:**
- (iii) Designated / protected / sensitive sites in the vicinity of the proposed development**

After having made a general overview of the likely animal populations on the site, their likely sensitivity and the proximity of the designated / protected sites forms the main objective of the field survey programme. This allows the selection of target / key species¹ and their principal habitats in the Area.

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd Project Sponsor: Hawa Energy (Pvt.) Ltd	Document No RE2-131-121-001 Document Issue 01	Date of Approval February, 2016 Page 94
--	---	--	--

The vegetation surveys were carried out by laying 20 x 20m quadrates within the study area. The plant communities were determined within the habitat.

Field Surveys were undertaken in the project area to collect data about the fauna of the area. Standard direct and indirect methods were applied to record the occurrence, distribution and population of various animal species in the area, which included point count surveys, roadside or track counts, line transect method and tracks/signs counts.

Survey Methods

There are two main survey types involved in such studies.

Distribution and status surveys: These are meant to record the occurrence, distribution and population / seasonal status of the various species using the site as breeding, wintering or staging site.

Vantage Point Surveys: These surveys comprise a series of observations from a certain fixed chosen location to quantify the flight activities of the birds at a proposed development site, which provides data to estimate the collision risk of the birds (particularly the migratory ones) against the blades of the turbine.

The survey area must adequately cover the entire development area. This includes access tracks; borrow pits, nearby villages, forested area, water points, farmland, vegetative area and wastelands.

Habitat loss and displacement may affect animals out with the project site. Therefore, surveys are also made in the area extending at least 500m beyond the project area boundary on either side.

Snap shots of Biological Environment survey are attached as Annexure IX.

B. Principal Habitats

The Project Area is mostly a wasteland comprising of the following main habitats.

- Sandy Plain Area

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 95

- Rocky Plain Area
- Rocky Area
- Scrubland and base land
- Ali Babbar Goth lies in the surrounding area.

4.11.1 Vegetation

Flora survey conducted by Project team experts revealed that, during the fieldwork in the Project Area, 17 plant species belonging to 12 families were identified / sampled in the main locations within the Project Area, the quantitative analysis of the floral composition was made and four distinct plant communities were identified. The dominant vegetation includes *Cymbopogon jwarancusa*, *Rhazia stricta*, *Euphorbia caducifolia*, *Ziziphus nummularia*, *Salvadora oleoides*, *Capparis decidua*, *Cassia italic*, *Indigofera oblongifolia* and *Prosopis glandulosa*.

Project Area has 17 plant species belonging to 12 families were identified sampled in the main locations within the project Area. Out of these, 13 species were perennial, 5 were annual and 02 were herbs the. The quantitative analysis of the floral composition was made and four distinct plant communities were identified based on life forms of the identified species. Summary of Floral composition found in project area is shown in table 4-6;

Table 4-6 Floral Composition found in Project Area

S. No	Life Form	Number
1	Trees	02 species
2	Shrubs	09 species
3	Herbs	05 species
4	Grasses	01 species

The following Table provides the list of floral species observed in the three main habitats viz. Flat Plains, Streambeds and hillocks/ foothills in quadrates measuring 20 x 20 m and 2 x 2 m.

The wildlife in the area has been affected by colonization of the area, and many wild life species have either diminished or vanished. No threatened wildlife species has been reported from the Project Area. Faunal attributes recorded during the study period is given below in table 4-7

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 96

Table 4-7 Faunal Attributes in the Project Area

Attributes	Numbers
Mammals	10 species
Birds	21 species
Reptiles	09 species
Plants	17 species

A. Mammals

During the present survey, 10 species were recorded. The area has very thin population of mammals. Only solitary individuals of big mammals such as Indian Jackal and Desert Fox could be sighted. Small mammals such as Five Striped Palm Squirrel, Indian and Desert Gerbils, House Mouse were less common. Desert Hedgehog and Desert Hare were scarce. Indian Porcupine and Ratel have been reported from the area as rarely occurring species.

B. Birds

21 species were recorded from the area (Table 2). The area supports Grey Partridge, Pigeon, Doves, Mynah, Crested Lark, Grey Shrike, White-cheeked, Bulbul, Desert Wheatear, Indian Robin, Purple Sunbird, Black Kite, Common Babbler, House Sparrow and House Crow Short-toed Eagle was once sighted in the area.

C. Reptiles

As regards the Reptiles, 07 species were recorded during the present survey. Snakes such as Saw-scaled Viper, Indian Krait, Indian Sand Boa, and Plain Racer have been reported from the area. Indian Desert Monitor w found to be scarce, while Indian Garden Lizard and Indian Spiny tailed Lizard was frequent in the area.

List of Flora and Fauna found in the Project area is attached as Annexure VIII

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 97

D. Protected Areas

There is no Wildlife Protected Area in the close vicinity of the site. Keenjhar Wildlife Sanctuary is more than 6.38 miles away from the site. No Protected / Reserve Forest or any Rangeland lies in the vicinity of the Project Area. Two Ramsar Sites are located within this wind corridor viz. Haleji Lake, and Keenjhar Lake.

4.12 NATURAL MINERAL RESOURCES

The area near the Project site area is very rich in natural resources. Coal reserves of approximately 28 million tons covering an area of 350 sq. miles are present in the area of Jhimpir. The major bushes found in the area include Devi, Chali, Damral, and Darathi (local names). No medicinal value is associated with these plant species found in the area.

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 98

SECTION 5

ANALYSIS OF PROJECT ALTERNATIVES

5 ANALYSIS OF PROJECT ALTERNATIVES

Setting up of a wind power project involves selection of environmentally and techno economically suitable site, land characteristics, meteorology, infrastructure, grid availability, water availability, rail and road connectivity, accessibility and shading aspects etc. This chapter elaborates analysis of project alternatives which can be considered in the project area.

5.1 WITH OR WITHOUT PROJECT

Pakistan's major electricity sources are thermal and hydro generation, meeting approximately 70% and 28% (respectively) of the country's annual electricity demand. The primary thermal generation fuels employed are furnace oil and gas. While both are produced domestically, demand already outstrips supply by a considerable amount. Oil import is a significant burden on the national exchequer and the increasing import bill continues to exert further pressure on the foreign exchange reserves.

Alternatives to further fuel imports for electricity generation are the use of domestic coal, or generation from hydro-electric or other renewable sources, such as wind and solar power. These options will assist in reducing Pakistan's reliance on imported oil, and consequent vulnerability to changes in global oil prices which will in turn have a positive effect on the current trade deficit and inflating import bill. As with gas, securing future supplies of coal and hydro-electric power would rely on significant spending on infrastructure. Pakistan has domestic reserves of coal. However, coal currently makes up a very small proportion of total generation, largely the result of most of the reserves being located in one area, the Thar Desert. Exploiting the reserves would require huge and costly upfront investment in local infrastructure (including provision of water supplies), development of mines, housing and related infrastructure, and investment in transmission lines before power plant development could commence. Hydroelectric power already supplies almost 30% of electricity, and numerous sites for future investment exist, but due to their locations, this would also require significant

Document Title:	Consultant Name:	Document No	Date of Approval
Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Renewable Resources (Pvt.) Ltd	RE2-131-121-001	February, 2016
	Project Sponsor:	Document Issue	Page
	Hawa Energy (Pvt.) Ltd	01	100

investment in transmission to meet the expected power needs. Moreover, there are varying political stands on hydro-electric power options.

Looking at how the country’s future electricity needs might be met in a way that supports the environmental objectives of the Government of Pakistan; wind power generation has the potential of being a strong contributor. The development of wind power generation projects could reduce dependence on fuels for thermal power generation, increase diversity in Pakistan’s electricity generation mix, and reduce greenhouse gas (GHG) emissions avoiding thermal power generation. The project will also add to the power generation from Renewable energy resources and help in meeting target of Government to achieve 5 % power generation from RE.

In view of the above, the “Without Project” option is not a preferred alternative.

5.2 ALTERNATIVE FUEL

The only viable generating options for energy production to meet the supply-demand gap in project region are fossil fuel energy. Pakistan is already facing huge short fall in fulfilling the coal requirement for already existing thermal power plant. The quality of coal is also low to medium in the region resulting in fly ash, carbon footprints and sulphur fume emission when it’s burnt.

Coal power generation causes serious environmental threats including air pollution, coal dust, contamination of ground water, emissions of heavy metal pollutants which in turn can cause serious health issues.

So, it is imperative to look for alternatives to fossil fuel based power generation to achieve long term power solution of the country.

5.3 Location Alternative

The area where the project is located is the identified wind corridor of Jhimpir. The location of the project is selected on the base of suitable terrain and wind speed availability in the area.

Jhimpir Wind Corridor is also considered as most suitable land for wind power project other than Gharo. Also there are number of wind farms already in the development stage in this area. Therefore the infrastructure for the development of wind power generation in this area is already in development phase. The availability of land in this area is also a major reason for the

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 101

selection of land in this area. As there are a number for wind masts already installed in the area, it's easier to use reference wind data of the neighbouring wind masts for the feasibility study which is more reliable and actual site based.

The major reasons for the selection of this site are;

- Adequate wind resource that allows for the operation of utility-scale wind turbines;
- Proximity and sufficient access to an adequate electric transmission/Grid;
- Contiguous areas of available land resource;
- Compatible land use;
- Limited sensitive ecological issues;
- Sufficient distance from major population centers; and
- Compliance with Provincial, and Federal laws and regulations.

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 102

SECTION 6

POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

6 POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

6.1 LAND USE

The total land allocated for the Project is 1200 acres and now the land has been extended by 351 acres. At the Project site, there has been an absence of the following since the past few decades:

- Any agricultural activity on the land
- Any commercial activity on the land to support the livelihood of local residents nearby
- Any green field, wetland or protected area







There are three settlements/Goths near the Project area, which are located approximately 5.5 Km from the Project site and one settlement is located inside the project area. The one within the Site is less than 10 temporary households. The Project is planning to locate the turbines in a way to provide adequate distance from the settlement. The distance from nearest turbine is expected to be at least 500 meters from the nearest house. This distance is considered adequate to insure minimal disturbance to the settlement. Moreover, the Project will bring employment opportunity in the form of unskilled labor and security jobs. The Project will also bring social uplift in the area alongside the Project activities. Therefore, the inhabitants are looking forward to the Project and the development that it will bring.

Therefore, there is no threat to the existing land use or degradation, and there is no net impact on the land use.

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd Project Sponsor: Hawa Energy (Pvt.) Ltd	Document No RE2-131-121-001 Document Issue 01	Date of Approval February, 2016 Page 103
--	---	--	---

Extent of displacement of existing land use or other environmental resources

 = Low Impact


-  =High
-  =Medium
-  =Low
-  =No Impact
-  =Locally Favorable
-  =Regionally Favorable







6.2 AIR QUALITY

The Project involves power generation using wind energy—a clean source of energy (i.e., no fuels are used). Air pollution will increase during construction due to truck/vehicle traffic to the Project site, minor construction required to erect the WTG, earthwork, development of access roads, vehicle traffic on un-metalled road, etc. Also, the use of construction vehicles and equipment and idling of vehicles carrying construction raw materials will add to the emissions during the construction period.

However, the increase in air pollution is temporary. Also, the nearest major human habitat is approximately 5.5 km away from the project site. Thus, the impact of the construction activity on air pollution will be low and temporary. Construction emissions will be higher than emissions from Project operation activities, but still limited in volume. Emissions will be monitored and controlled through effective implementation of EMP.

Impact on Air Quality

 = Low

-  =High
-  =Medium
-  =Low
-  =No Impact
-  =Locally Favorable
-  =Regionally Favorable

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 104

6.3 NOISE QUALITY

Project construction involves a variety of noise generating activities that include the use of grading, excavating/drilling/, concrete batching, tower erection, the construction of ancillary structures, concreting, material movement, site cleanup, etc.

Noise levels generated by construction equipment vary significantly depending on the type and condition of equipment, the operation method and schedule and the site of the activity.

Construction activities at site are expected to produce noise levels in the range of 75–85 dB (A), with most works carried out during daytime.

The noise levels produced during construction will not have a significant impact on existing ambient noise levels at receiving sites, as noise generating activities are dispersed and most construction activities will occur during the day when higher noise levels are tolerated due to higher background noise levels. In addition, the constructions phase will be restricted to a few months, therefore the intermittent impact from construction noise is deemed to be negligible.

During Project operation, noise will be generated from rotor movement through the air, turbine operation, vehicle movements, and machinery operation around the site for maintenance and repair purposes. Blades moving through the air produce an aerodynamic noise. This noise is detectable when it is greater than the background noise, generally at wind speeds between the turbine cut-in wind speed (when the turbine starts to generate power) and up to 8-9 m/s (before the background noise starts to mask the noise from the blades and turbine). In addition, the operating turbine may produce a tonal noise.

The modern tubular towers contribute towards minimizing the noise emissions.

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 105

Impact on Noise Quality during Construction
Impact on Noise Quality during Operation



Medium
Low



=High



=Medium



=Low



=No Impact



=Locally Favorable



=Regionally Favorable

6.4 NOISE FROM WIND TURBINES

No landscape is ever completely quiet. The modern tubular towers contribute toward minimizing the noise emissions. Birds and human activities emit sound, and at wind speeds around 4-7 m/s and up to the noise from the wind in leaves, shrubs, trees, masts etc. will gradually mask (drown out) any potential sound - from wind turbines. This makes it extremely difficult to measure sound from wind turbines accurately. At wind speeds around 8m/s and above, it generally becomes a quite abstruse issue to discuss sound emissions from modern wind turbines, since background noise will generally mask any turbine noise completely.

The sound power level from a single wind turbine is usually between 90 and 105 dB(A). This creates a sound pressure level of 50-60 dB (A) at a distance of 40 meters from the turbine, i.e. about the same level as conversational speech.

Figure 6.1 is released by GE, which shows the comparison of various common sounds with respect to the sound generated from Wind turbines. The research explains that a large wind turbine isn't very loud from an objective standpoint. According to this data, at a distance of 300 meters, a turbine will be somewhere between an air conditioner (50 decibels) and a refrigerator (40 decibels). At about 500 meters, the levels drop to about 38 decibels, which is well below the typical 40-45 decibels of background noise in a populated area.

Therefore, wind turbines are not any louder than what an average person is already used to.

The quality of wind farm noise is one factor. Researchers are looking at whether the low-frequency sound of blades has a different psycho-social impact than noise from highways or

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 106

airports. It's very common that people living close to turbines call the sound “penetrating.” Of course, different people handle the sound in different ways. Many residents are unfazed by turbines at close distances.

However, noise analysis have been done to make the baseline data which ranges between 43-55 dB (A), close noise monitoring will be performed during construction and operation phases to keep in permissible limits.

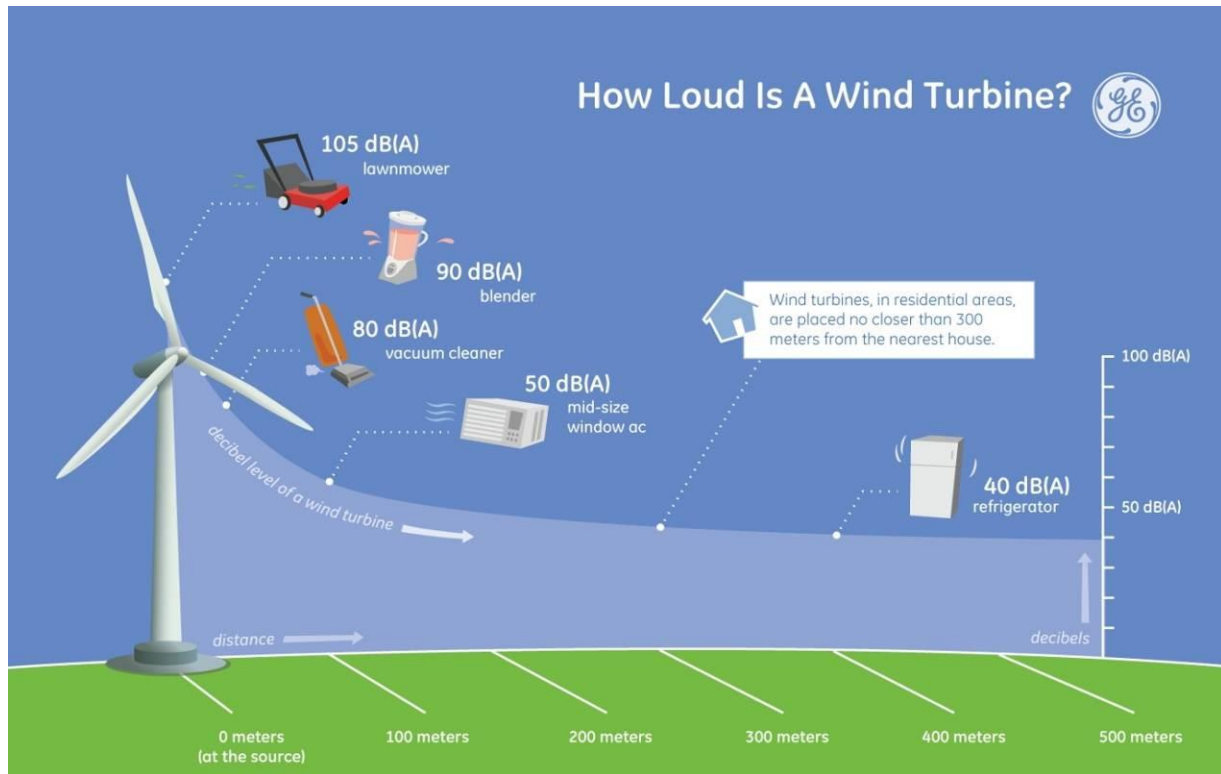


Figure 6.1: Noise Generating from Wind Turbine²

The Project will use modern wind turbine models, which have advanced technology that includes upwind rotors, tubular towers and sound proof nacelles to reduce mechanical noise. Noise from wind turbines varies with wind speed, but is generally comparable to the background sound in a typical household at 40 to 60 dB. The noise from wind turbines is usually measured in relation to ambient noise. If the wind is at higher speeds, the ambient noise level will be higher. Most new wind turbines will have noise levels at or close to ambient level.

² GE Global Research; National Institute of Deafness and other Communication Disorders (NIDCD part of NIH)

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd Project Sponsor: Hawa Energy (Pvt.) Ltd	Document No RE2-131-121-001 Document Issue 01	Date of Approval February, 2016 Page 107
--	---	--	---

Distances of 100 feet are usually sufficient to keep noise levels below 60 dB, which has been suggested as a reasonable regulatory limit.

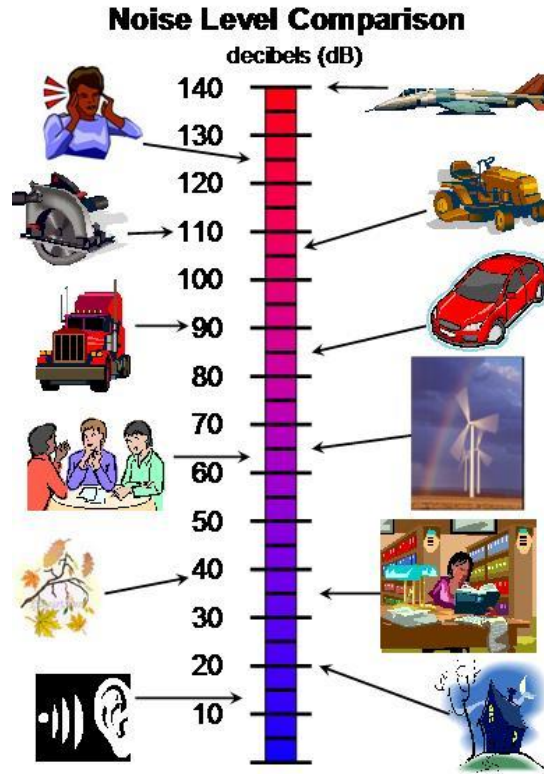


Figure 6.2: Noise Generating from Wind Turbine³

Impact of Noise Generated from Turbine	= Medium
--	----------

- =High
- =Medium
- =Low
- =No Impact
- =Locally Favorable
- =Regionally Favorable

³ GE Global Research; National Institute of Deafness and other Communication Disorders (NIDCD part of NIH)

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 108

6.5 SHADOW FORECASTING

Wind turbines, like other tall structures, will cast a shadow on the neighboring area when the sun is visible. For a community living very close to the wind turbine, it may be annoying if the rotor blades chop the sunlight, causing a flickering (blinking) effect while the rotor is in motion.

The probability of when and for how long there may be a flicker effect may be predicted. It might not be known in advance whether there is wind, or what the wind direction is, but using astronomy and trigonometry a likely, or a "worst case" scenario can be predicted.

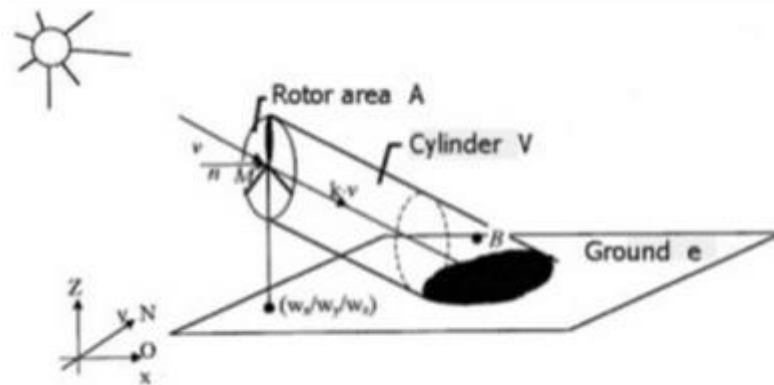


Figure 6.3: Shadow Flicker of Wind Turbine


In a study conducted by the Department of Energy and Climate Change, UK, the data of wind turbines of 18 countries were selected to study the shadow flicker impact. The study concluded that the so-called "shadow flicker" caused by wind turbines does not pose a significant risk to health of the nearby residents. There is no case reported about any significant impact of shadow flicker in any of the wind farms in the countries included in the study.⁴







At distances of greater than 1,000 feet between wind turbines and receptors, shadow flicker usually only occurs at sunrise or sunset when the cast shadows are sufficiently long. Moreover, in Pakistan, there is a common trend for people to build homes in shady areas.

⁴ <http://www.decc.gov.uk>

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd Project Sponsor: Hawa Energy (Pvt.) Ltd	Document No RE2-131-121-001 Document Issue 01	Date of Approval February, 2016 Page 109
--	---	--	---

Impact of Shadow flicker

 = Low


-  =High
-  =Medium
-  =Low
-  =No Impact
-  =Locally Favorable
-  =Regionally Favorable







6.6 WATER USE AND QUALITY

The volume of water used during Project construction and operation is low. i.e., approximately 1500 to 2000 gallons per day water is required during construction of the project. Water required for plant civil works, will be sourced from ground water. During operation phase, approx. 100 gallons per day water is required. RO Plant will be installed to make water free from any contamination. Water is available and quantities required are negligible than requirement.

Once the wind farm is operational, water is only required for the domestic use of Project staff at the site.

Water Use & Quality

 = Low


-  =High
-  =Medium
-  =Low
-  =No Impact
-  =Locally Favorable
-  =Regionally Favorable

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 110

6.7 GROUNDWATER CONTAMINATION

Groundwater contamination can occur if chemicals or any other waste materials are not properly handled or are incorrectly disposed of and leach into the water table or if wastewater from plant activities is not properly disposed of.

All the waste material will be handled and disposed of in accordance with accepted safe practices, with no harmful substances released by the Project. Therefore, there will be no effect on surface water quality or ground water contamination.

Groundwater contamination	 = No Impact
---------------------------	---

	=High
	=Medium
	=Low
	=No Impact
	=Locally Favorable
	=Regionally Favorable








6.8 Solid Waste Generation

Solid waste generated on site may spread over or create hazard for community and employees of the project.

Two type of solid waste will be generated during construction and operation phases; it is estimated that average 200kg/day domestic (non-hazardous waste) will be generated, which will be disposed at TMA identified waste disposal point at Jhimpir city.

All the hazardous waste material will be handled and disposed of through EPA certified waste disposal contractors (like, Petro waste, KMC). Therefore, there will be no effect on general sites condition and cleanliness of project boundaries.








Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 111

Solid Waste Generation	 = No Impact
	=High
	=Medium
	=Low
	=No Impact
	=Locally Favorable
	=Regionally Favorable

6.9 Wastewater Generation

Wastewater will be generated on site from domestic activities; and from construction activities; Wastewater from camp (Black water) will be stored in the septic tanks this must be transferred through tankers to the nearby located TMA disposal point (if hazardous wastewater is present). The effluent water will be transported to the evaporating pond that will be constructed temporarily within project premises. The effluent water will then be evaporated naturally. The protected fence and all other precautionary measures will be taken in place. It will be ensure that wastewater from site shall not enter into the water body.

Wastewater from construction activities must be stored in the settling tanks after settling of the particles it can be re-used for the sprinkling at the connecting roads for dust supersession.

Wastewater Generation	 = Low Impact
	=High
	=Medium
	=Low
	=No Impact
	=Locally Favorable
	=Regionally Favorable

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 112

6.10 BIOLOGICAL ENVIRONMENT

6.10.1 Wetland and Wildlife Sanctuaries

Around 1967, an exploration sponsored by WWF—UK revealed that wildlife and wetlands resources in Pakistan were severely threatened and, in most areas, declining in condition. The expedition report prepared by Mountfort (1967) recommended that a range of wetland sites be declared Protected Areas. The Convention on Wetlands came into force for Pakistan on 23 November 1976. Pakistan presently has 19 sites designated as Wetlands of International Importance, with a surface area of 1,343,627 hectares.

The wetlands of Pakistan are shown in Figure 6.4.



Figure 6.4: Wetlands of Pakistan⁵

⁵ www.pakistanwetland.org

Document Title:	Consultant Name:	Document No	Date of Approval
Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Renewable Resources (Pvt.) Ltd	RE2-131-121-001	February, 2016
	Project Sponsor:	Document Issue	Page
	Hawa Energy (Pvt.) Ltd	01	113

Out of 19 Ramsar sites, 10 sites are located in the province of Sindh, which are shown in Figure 6.5.



Figure 6.5: Wetland located in Sindh

Keenjhar lake is the nearest declared wildlife sanctuary, and the Ramsar site is located at a distance of 10.3 km from the Project site. It is the largest fresh water lake in Pakistan. It is an important source that provides drinking water to Thatta District and Karachi city. The area is favored as a habitat for winter migratory birds like ducks, geese, flamingos, cormorants, shorebirds, herons, egrets, ibises, terns, coots, and gulls. It has been observed that it is the breeding area of the night heron, cotton teal, purple moorehen, and pheasant tailed jacana. The natural vegetation of the surrounding area is tropical thorn forest. The lake is rich in fish and fauna, and supports the livelihood of about 50,000 local people. Main activities at this Ramsar site are commercial fishing, nature conservation, and public recreation.

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 114

6.10.2 The Indus Flyway

Pakistan is one of the principal wintering grounds for water birds in South Asia. The lakes in the Indus Valley are major refuge for the migratory water birds which breed in Northern Eurasia. Pakistan forms part of their “Indus River Green Route”. When the climate in their breeding grounds in Russia becomes too rigorous and the food gets scarce, then the birds leave the place and disperse to their winter resorts further south along the following distinct flyways.

1. Northern Europe Scandinavia-North Sea.
2. Central and Southern Europe-Black Sea-Mediterranean.
3. West Siberia-Caspian Sea-Nile.
4. Siberian-Kazakhstan-Pakistan/Central Asian Flyway.
5. East Siberia- Tibet-Ganges/ East Asian- Australian Flyway.
6. Far East- Kamchatka –China / Japan. West Pacific Flyway.
7. North East Siberia- Chokotka- California / Pacific Flyway.

Most of the sub-continent’s visitors come through Pakistan route to India and Sri Lanka or Africa. Majority of winter visitors to the sub-continent enter via Indus Plain. Some come down the Indus River Valley and its far northern tributaries as well as the Chenab and Jhelum rivers further east. A very significant number enter from further west coming over the Peiwar Pass and following down the Kurram River. Some of these autumn migrants fan out eastwards into Northern India and thus avoid the Rajasthan Desert to the South, while other follow the Indus River down to the Indus Delta.⁶

⁶ Roberts, T.J. 1991. The Birds of Pakistan. Volume 1. Oxford University Press, Karachi

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 115

Table 6-1: Migratory and Local Birds of Keenjhar Lake⁷

List of Migratory Birds of Keenjhar Lake	List of Local Birds of Keenjhar Lake
White pelican	Marsh Harriers
Dalmatian pelican	Ospreys
Large cormorant	Cuckoos
Grey heron	Swifts
Large egret	Swallows
Black bittern	Pigeons
Yellow bittern	Doves
Spoonbill	Parrots
Flamingo	Sandgrouses
Pintail	Mynas
Common teal	Shrikes
Mallard	Larks
Gadwall	Grebes
Wigeon	Pelicans
Garganey	Carmorants
Shoveller	Flamingos
Common pochard	Hérons and Bitterns
White eyed Pochard	Ibises and Spoonbills
Tufted duck	Ducks
Common coot	Morhens/Waterhens
Grey plover	Coots
Dunlin	Waders
Little stint	Gulls and Terns
Avocet	Babblers
Ruff	Sunbirds
Herring gull	Bushchats
Blackheaded gull	Bee-eaters
Whiskered tern	Drongos
	Crows
	Prinias
	Warblers
	Wagtails
	Sparrows
	Weaverbirds

⁷ www.wfpak.org

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 116

6.10.3 Birds/Avian Collision

Birds can be affected by wind farm development through loss of habitat, disturbance to their breeding and foraging areas, and by collisions caused by the rotating turbine blades. Pakistan receives a large number of migratory birds from Europe and Central Asian States every year. These birds spend the winter seasons in Pakistan and go back to their native habitats in the summer. The route of these birds take from Siberia to Pakistan is known as International Migratory Birds Route Number 4. It is also called the Green Route or Indus Flyway. Out of seven flyways of the world, the Indus Flyway is one of the busiest routes. Birds begin their journey in November. February is the peak time, and by March they start flying back.

At present there is no atlas available for bird migratory routes within Pakistan. However, extensive research has been done based on the literature available on bird migratory flyways and the wetlands map developed by Pakistan Wetland Organization. A map of Indus flyway also known as Green Route or Migratory Route No 4 is shown in Figure 6.6. The Indus flyway route is marked with arrows in red.

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 117

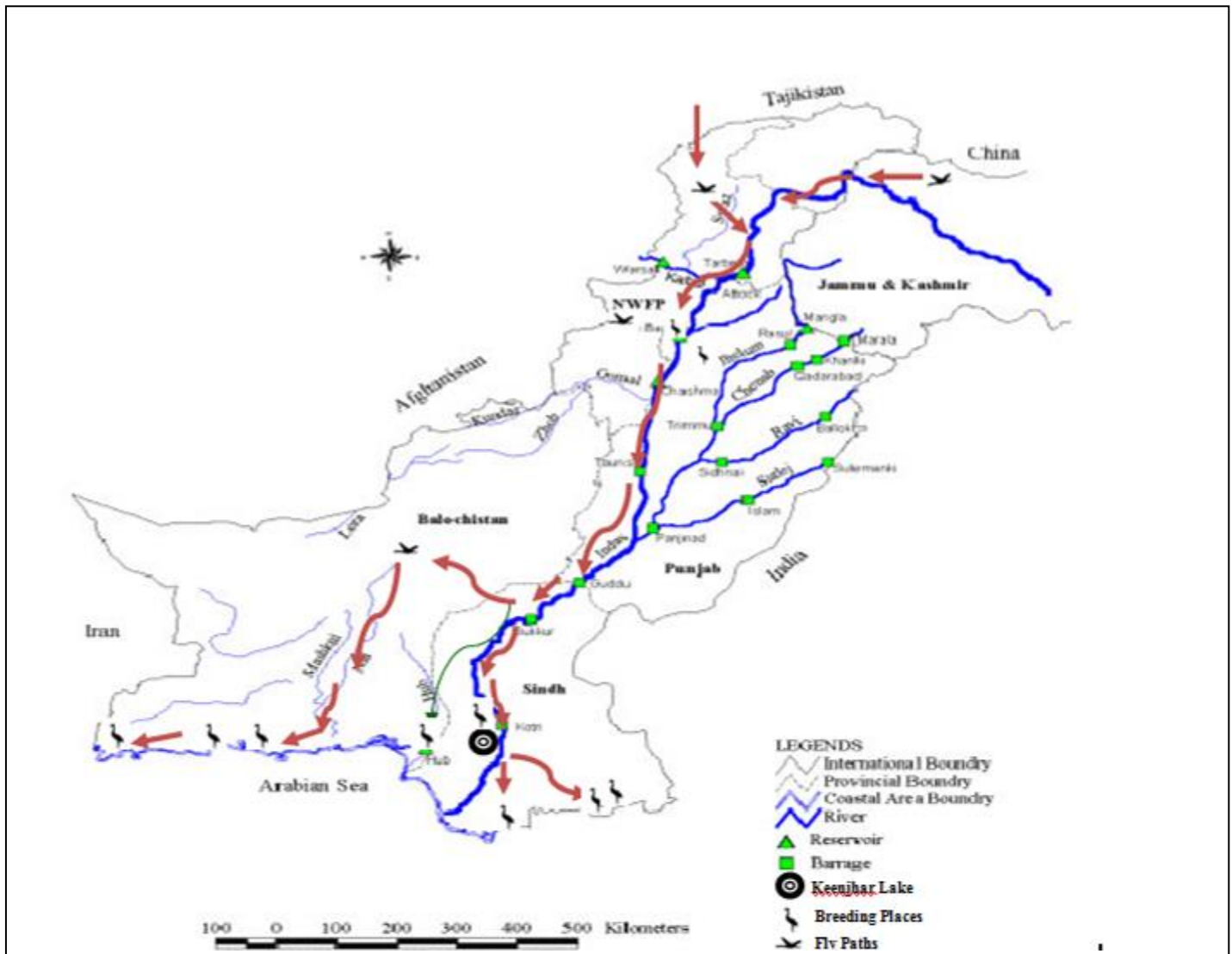


Figure 6.6: Indus Flyway for Migratory Birds/Green Route No.04

The main migrants to South during the winter season are the Water birds, Raptors, Houbara Bustard and the Passerines (Warblers, Pipits, Wagtails and Buntings).

The water birds migrate fairly large number in winter. They are very diverse group of species comprising mostly of Pelicans, Flamingo, Cormorants, Darter, Herons, Egrets, Bitterns, Storks, Ibises, Spoonbill, Ducks, Cranes, Water Cock, Rails, Crakes, Coot, Waders, Gulls and Terns.

<p>Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan</p>	<p>Consultant Name: Renewable Resources (Pvt.) Ltd Project Sponsor: Hawa Energy (Pvt.) Ltd</p>	<p>Document No RE2-131-121-001 Document Issue 01</p>	<p>Date of Approval February, 2016 Page 118</p>
--	--	--	---

The wintering birds of Prey include: Eurasian Griffon, and Cinereous Vulture, Marsh Harrier, Montagu's Harrier, Common Buzzard, Long legged Buzzard, Booted Eagle, Greater Spotted Eagle, Steppe Eagle, Common Kestrel, Merlin and Eurasian Hobby.

A list of 236 species of birds is available, both resident and migratory, whose range of occurrence covers the most important wetland of the surrounding area of the Wind Farms in the Jhimpir Wind Corridor viz. Keenjhar Lake. The list is quite comprehensive and is based mainly on the experience gained during the water bird surveys undertaken during the last ten years. It gives an overall idea about the resident and migratory birds, many of which may be expected to be observed on their migration / local movement to and from the lake and the surrounding areas.

From the review of literature and interviews with local residents of the area, it was observed that migratory birds come and land on the Eastern side of the Keenjhar Lake, which is towards the river Indus. Whereas all the wind farm sites are located towards the West and Northwest direction of the Keenjhar Lake. The detailed view and description of the birds' living areas in Keenjhar Lake is described in Figure 6.7. It is found from the study that there is very little probability of bird hit from the wind farms as the Project is located approximately 24 km away from Keenjhar Lake, and birds usually do not land and stay in the western part of Keenjhar Lake.

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 119

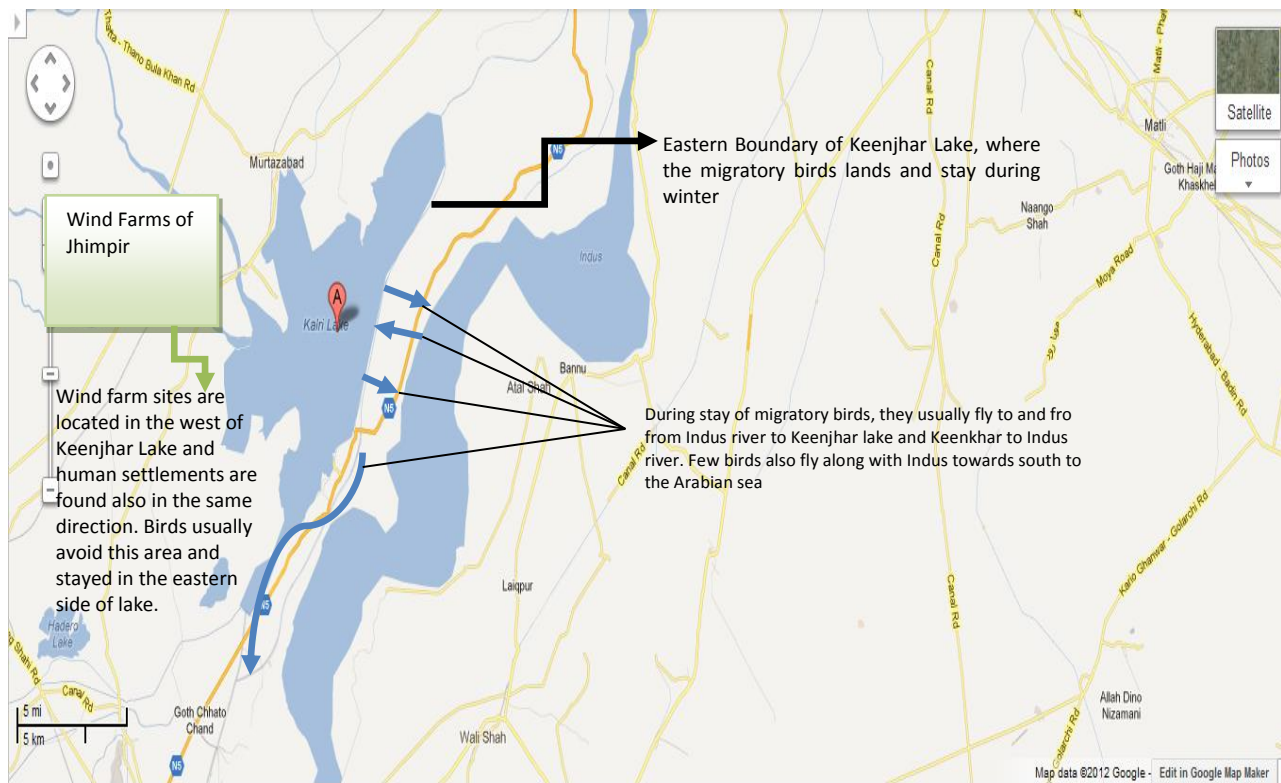


Figure 6.7: Birds Flying and Staying Patterns on Keenjhar Lake with Respect to Wind Farms

Compared to other causes of mortality among birds, the effect of wind power is relatively minor. Non-collision impacts on birds such as site avoidance and disruption of migratory behavior could also be significant. However, according to a survey conducted by WWF in 2009, the number of birds in and around Keenjhar Lake has reduced drastically in recent years. Furthermore, these birds have a tendency to fly at an altitude of 400 to 500 meters, thereby negating any chance of collision with wind towers at this specific Project site.

As a general rule, birds notice new structures and learn to avoid them in movements, thereby sustaining their ability to continue feeding and breeding in the location. Wind farm technology is new to Pakistan, but this technology has now been used in western and developed countries for over a decade. A study report (Sept. 2005) by the U.S Government Accountability Office (GAO) on the effects of wind energy development on wildlife determined that fewer birds fly into wind turbines than is generally thought.

<p>Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan</p>	<p>Consultant Name: Renewable Resources (Pvt.) Ltd Project Sponsor: Hawa Energy (Pvt.) Ltd</p>	<p>Document No RE2-131-121-001 Document Issue 01</p>	<p>Date of Approval February, 2016 Page 120</p>
--	--	--	---

Although several hundred utility-scale wind farms currently operate across the United States, such problems appear to be limited to two project areas, according to the report. In the context of other sources of avian mortality, it does not appear that wind power is responsible for a significant number of deaths, the report states in its conclusion⁸.

The impact of wind energy development on bird populations came to prominence due to the high number of mortalities associated with one of the world’s largest wind farm developments in California’s Altamont Pass.⁹This wind farm had up to 5,600 wind turbines in operation and is located in a year-round, high activity, area for raptors. Additional factors included prey abundance; high-speed rotor blades; lattice tower structures, which provided horizontal cross-bars for perching; rapid blade movement; and the close proximity of turbines.

Another research cited by the European Wind Energy Association shows that the risk of bird deaths through collision with wind turbines is low. For example, it is estimated that 33,000 birds are killed annually by wind turbines operating in the U.S., an average of 2.2 fatalities for each of the 15,000 turbines.

In Spain, a study showed 0.13 dead birds per year per turbine. Furthermore, in the U.S., over 100 million birds are estimated to die each year from colliding with vehicles, buildings, power lines, and other structures, with wind power responsible for just 1 out of every 5,000 – 10,000 avian fatalities.

There seems no threatened or endangered bird species found at the site. Any development of the wind farm will have no impact on the existing bird life. Also, an emission-free power generation is clearly beneficial to all fauna.

However, due to the minimal expected impact of bird’s collision with the wind turbines, the following mitigation measures are proposed:¹⁰

The wind towers to be erected minimum at a distance of 300 meters to avoid the avian collision and to give the birds a wider corridor for access in the Project area.

- Regular checking of the vacuums or holes in the towers to avoid nesting facility of any of the birds monitoring the birds during the migratory season be undertaken to record their distribution and migratory pattern and use of the area during the season.



⁸<http://www.gao.gov/new.items/d05906.pdf>







⁹American Wind Energy Association: Facts about Wind Energy & Birds, 5pp.-Internet Article

¹⁰ Ghalib, S.A., Khan, M.Z., Ahmed, S.M., Begum, A., Hussain, B. and Ahmed, W. 2014. Study of the Wildlife of Jhimpir Wind Corridor, district Thatta, Sindh and Development of Bird Monitoring Strategy in the Area. African Journal of Science and Research. 6(3) : 01-09.

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 121

- Hunting, feeding or harassment of wildlife is strictly prohibited during the entire course of construction and operation phases.
- Food wastes not to be disposed of in the open. Food wastes collected in waste segregation unit is disposed of according to waste disposal procedure on a regular and strict basis.
- Night work during construction be prohibited, night travelling not is allowed unless absolutely necessary.
- Operation camp is located 500m away from perennial water bodies.
- Hawa Energy will work with the local WWF located in Thatta and remain involved in the conservation efforts of threatened species








Impact on Migratory Birds	 = No Impact
Impact on Local Birds	 = Low

-  =High
-  =Medium
-  =Low
-  =No Impact
-  =Locally Favorable
-  =Regionally Favorable

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 122

6.10.4 Flora and Vegetation








As there is no dense vegetation or forestation in the Project site area, there will be no damage to any kind of vegetation or forests. However, there will be a requirement for minimal vegetation clearing or deforestation during the Project. It is anticipated that once the Project is operational, new plants shall be re-planted in the empty spaces around wind turbines. Enough space will be allocated for green belts.

Impact on Flora and vegetation	 = No Impact
	=High
	=Medium
	=Low
	=No Impact
	=Locally Favorable
	=Regionally Favorable

6.11 SOCIO ECONOMIC ENVIRONMENT

6.11.1 Archeological Sites


No archaeological sites are present near the Project site.






Archeological Sites	 = Regionally Favorable
	=High
	=Medium
	=Low
	=No Impact
	=Locally Favorable
	=Regionally Favorable

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 123

6.11.2 Re-Settlement

Project is located on government land leased by the GoS to the Project sponsors. There is one settlement which is located inside the project boundary and two other settlements located outside the project boundary at a distance in excess of 5 kilometers. The positioning of the turbines is being designed to insure that no resettlements will be required. However, any resettlements, if required, will be done as per IFC performance standard PS-5.

Resettlement	 = No Impact
--------------	---


	=High
	=Medium
	=Low
	=No Impact
	=Locally Favorable
	=Regionally Favorable







6.11.3 Visual Impact on Landscape

The addition of the Project to the local landscape will have a significant visual impact, as it would be the first such structure in Pakistan. In European countries, wind turbines are considered to give insignificant visual impact due to the fact that wind power technology is very common there and large numbers of wind turbines are installed. But as far as Pakistan is concerned, wind power is an emerging technology for local inhabitants, and it would give a noteworthy positive visual impact.

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 124

Visual Impact on Landscape


 = Regionally Favorable







-  =High
-  =Medium
-  =Low
-  =No Impact
-  =Locally Favorable
-  =Regionally Favorable

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 125

6.11.4 Aviation Hazard


No aviation hazard will be created by the Project as it is located 93.5 km from the nearest airport at Karachi. There are some future plans for a Pakistan Air Force base in the vicinity of Jhimpir which caused Hawa to partly relocate the Project but that will not cause an impact on the construction or operation of the Project.







Aviation Hazard	 = No Impact
-----------------	---

-  =High
-  =Medium
-  =Low
-  =No Impact
-  =Locally Favorable
-  =Regionally Favorable

6.11.5 Traffic Management

The impact on traffic will be minimal and due to trucks carrying construction material and WTG components as well as vehicles to carry personnel. Traffic will need to be planned and managed effectively to avoid inconvenience for the local populace and/or endanger public safety.


Traffic Management	 = Low
--------------------	---







-  =High
-  =Medium
-  =Low
-  =No Impact
-  =Locally Favorable
-  =Regionally Favorable

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 126

6.11.6 Labor Welfare and Safety

Large amounts of labor will be deployed during construction. The labor camps need to provide proper water supply and sanitation facilities (toilets with septic tanks). Otherwise insects may proliferate and lead to public health hazard. The safety aspects to be covered include proper handling of electrical devices, tools, equipment, and construction materials to prevent accidents to personnel. Local will be preferred for the unskilled jobs. Overall impact will be low.


Labor Welfare & Safety	 = Low
------------------------	---







-  =High
-  =Medium
-  =Low
-  =No Impact
-  =Locally Favorable
-  =Regionally Favorable

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 127

6.11.7 Seismic Hazards

The damage zone classification of the region where the site is located is ZONE II-B (moderate to severe damage). The foundation design of the wind turbine generator (WTG) will take account of this seismic factor.

Labor Welfare & Safety	 = Low
------------------------	---

-  =High
-  =Medium
-  =Low
-  =No Impact
-  =Locally Favorable
-  =Regionally Favorable

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 128

SECTION 7

PUBLIC CONSULTATION

7 PUBLIC CONSULTATION

This section provides the details of the consultation meetings held with stakeholders as part of the environmental and social soundness assessment process requiring information disclosure and sharing. For this purpose consultation meetings were held at the outset for the scoping process of IEE study, followed by a series of meetings at the proletarian level. Dr. Syed Ali Ghalib and our team member Mr. Farooq Ali Khan (RE2) have performed the consultations with different departments and officials. These stakeholders are the different government officials and NGOs like IUCN Pakistan, WWF department, Karachi (Senior Director, Mr. Rabnawaz), SEPA representative (Dr. Aashiq Hussain Langah), Sindh Wildlife department Hyderabad office (Mr. Ghulam Muhammad Gadani, Deputy Conservator wildlife), Sindh Forest department, Karachi (Divisional Forest officer), Archeological department, Karachi.

7.1 Objectives of Public Consultation

The overall objectives of the consultation process were as follows:

- To inform all interested people on the likely positive and negative effects of the wind power proposed project and encourage feedback from stakeholders on IEE findings, principally the impacts and proposed mitigation measures;
- To gain a consensus on the impacts identified, their importance and the relevance and effectiveness of the mitigation measures proposed;
- To provide confidence that all relevant issues and mitigation measures have been identified, agreement that the mitigation measures are adequate, and that nothing significant has been missed;

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd Project Sponsor: Hawa Energy (Pvt.) Ltd	Document No RE2-131-121-001 Document Issue 01	Date of Approval February, 2016 Page 129
--	---	--	---

- To enable incorporation of stakeholder views and concerns in the IEE.

7.2 Consultation Process

7.2.1 Scope

The social survey team conducted meetings and interviews with local communities. During these meetings a description of the project was given along with an overview of the projects likely social and environmental impact.

7.2.2 Community Consultation

Community consultations consisted of formal and informal meetings at Jhimpir residential area, and project vicinity. The consultation exercise was conducted in both Sindhi and Urdu languages. A non-technical oral description of the project was given providing an overview of all likely positive and negative impacts. Following which, an open discussion was held so that the participants could voice their concerns and opinions. All participants were encouraged to voice their concerns and opinions. Participants were also asked to suggest alternatives where they had particular concerns.

Feedback obtained from the stakeholders was documented, and all issues and suggestions raised were recorded in survey forms. Both social and environmental issues were raised.

The people interviewed (Table 7-2) had worries /concerns related to basic needs and generally agreed that most of the effects would be temporary only during construction. Some common concerns regarding the lack of educational facility, shortage of clean drinking water, lack of basic health unit, lack of waste disposal, lack of electricity, poor roads condition and minimal employment opportunities issues were raised. None of these issues related specifically to proposed wind power project but were general complaints. Most of the participants appreciated the project and said that it would boost the local employment opportunities, while some said that business and economic situation in the area will also improve.

A matrix of concerns by community members was prepared as given in Table 7-1. The register of attendance is provided as Table 7-2. A pictorial record of the meetings is included as **Annexure XI**.

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 130

Table 7-1: Summary of Concerns Raised during Stakeholder Consultation

Issues	Concerns raised by community	Remarks
Health Care Facilities	Healthcare centers particularly for women and children Schools	Basic health unit is available in the Jhampir with very little facilities, A dispensary may be provided.
Employment	Provision of semi-skilled and unskilled jobs for local labor in the project construction period.	Unskilled jobs will be given to locals people where possible. Training will be provided.
Safety of Community	Comply with the traffic management rules.	Proper traffic management will be resorted to during the construction period.
Drinking water	Community member rated Safe drinking water at highest priority during our survey.	As part of the Social development program HEPL shall provide the safe drinking water through RO filter plant to nearby communities
Educational Facility	Unavailability of Teachers, and School (Primary and Secondary) Vocational training	NGO working in social sector and proponent shall provide the required facilities for the local peoples.
Other issues	Black top link roads	Linking roads will be developed as part of the project component will benefit the local residents as well.

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhampir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 131

Table 7-2 General Public Interviewed during Public Consultation at Jhimpir

S.NO	NAME	OCCUPATION	LOCATION
1	Imam Bushk	Labour	Goth Badu Chang
2	Ramzan	Labour	Goth Badu Chang
3	Ali Akbar	Labour	Goth Badu Chang
4	Allah Bachayio	Labour	Goth Badu Chang
5	Rasool Bushk	Labour	Goth Sadiq / Sajan
6	Sadiq	Driver	Goth Sadiq / Sajan
7	Zakirullah	Labour	Goth Sadiq / Sajan
8	Amam bashk	Labour	Goth Sadiq / Sajan
9	Qadir Bushk	Labour	Goth Sadiq / Sajan
10	Rasool Bushk	Driver	Goth Sadiq / Sajan

7.2.3 Government Agencies

Stakeholders including provincial government officials, international NGOs, and related stakeholders were consulted at their offices. All the stakeholders were given maximum project information and were shown a detailed map of the area. Their concerns and suggestions are reproduced below. Attendance lists of the stakeholders consulted in the proposed project was collated and reproduced in Table 7-3. Pictures of the meetings are provided in **Annexure- XII**.

a) Environmental Protection Agency (Karachi Head Office) (Director Technical EIA/IEE)

The Karachi head office of EPA is responsible for general environment protection in the project area. A meeting was held on January, 28, 2016 with the Mr. Aashiq Hussain Langah (Director EIA) and Mr. Waris Gabool (Deputy Director Technical). The project team provided information about the proposed project site with the help of the project area map and briefed about the salient features of the project and requested that the officers express their views /suggestion and concerns of the Department. Their views concerns / suggestions are re-produced as follows;

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 132

- ❖ The social survey conducted by the social expert must have Livelihood matrix, group discussion, Priorities of locals, pear wise ranking and questionnaire. Only a questionnaire is not enough for the social survey.
- ❖ Analyse Cumulative effect on community
- ❖ Attach the following documents with IEE report
- ❖ Land Lease Document
- ❖ NOC from DC (Deputy Commissioner) of the concern area
- ❖ LOI Copy
- ❖ Laboratory test for air, noise, surface and ground water must be attached with IEE report.
- ❖ Flora and Fauna survey report must be attached with IEE report.
- ❖ Drinking water availability shall be ensured by the proponent throughout the project period.
- ❖ Project activities will support the area at large, and activities will not cause any harm.
- ❖ Removal of vegetation must be avoided, as far as possible. A planting programme should be developed in the Project Area taking care to avoid the introduction of invasive species.
- ❖ A certificate must be obtained from the sindh wildlife department to the effect that the proposed WPP area does not fall within the limits of any Protected Area notified by the Department.

b) Sindh Wild Life Department (Conservator)

A consultation meeting was held on February 02, 2016 with Mr. Ghulam Muhammad Gadani Deputy Conservator Wildlife Department at his Karachi office along with his team. The project team provided information about the proposed project site with the help of the project area map and requested the officers to identify any protected wildlife sanctuary or other concerns of the Department. A set questionnaire was also filled. During the meeting the Conservator expressed his views regarding the project and overall appreciated project activities. Their views and concerns / suggestions are re-produced as follows;

- Mr. Ghulam Muhammad Gaddani along his team identified the Keenjhar Lake as the Wildlife sanctuary and Ramsar site as nearest protected area which is located approx. 10.3 kilometers and he briefed about its importance and patterns of the birds during the different seasons.
- He also suggested that the Project provide the basic facilitates to the communities like School, clean drinking water and sanitation etc.

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 133

c) Sindh Forest Department (Karachi Office)

A consultation meeting was held on January 26, 2016 with Divisional Forest Officer Mr. Shahzad Sadiq Gill, Range Forest Officer Mr. Tahir Latif, Range Forest Officer Mr. Raja Karim and Sub.Division Forest Officer Mr. Rab Dino Khatti at his Karachi office along with his team. The project team provided information about the proposed project site with the help of the project area map and requested the officers to identify any protected wildlife sanctuary or other concerns of the Department. During the meeting the forest officers expressed his views regarding the project and overall appreciated project activities. They do not have any issue / objection with the project in Jhimpir. As they know that this is the barren land and there is very sparse vegetation Their only the concern was, the fact that the Euphorbia (Tree species) is very common in that area, and the Project should minimize its removal. The Department has created some water conservation ponds in the area. These get filled with water during heavy rains and are used by the local people and the livestock for drinking purposes. These should be safeguarded during the Project activities.

7.2.4 Non-Governmental Organizations

A number of NGO's, who are highly involved in the protection of wildlife and nature conservation, were consulted concerning the proposed Project.

a) International Union for Conservation Nature IUCN

A consultation meeting was held on January 28, 2016 with Mr. Muhammad Tahir Qureshi Senior Coastal Ecosystem Advisor and Mr. Kamran Ahmad Naqvi Urban Specialist Technical at IUCN Karachi Office. RE2 team provided information about the proposed project site with the help of the project area map and requested the experts to share their views or other concerns of the IUCN as expert. A set of questionnaires was also completed. During the meeting Mr. Qureshi and Mr. Kamran expressed their reservation regarding the project. Their views and concerns / suggestions are re-produced as follows;

- Raised concern about mortality of birds and said that project is located near birds flying route.
- Raised concern about the noise pollution by wind turbines and were concerned that it may affect local norms and modify the bird's habitats in that area. They seemed reassured when informed that a detailed study of noise pollution has already been conducted and incorporated in our IEE report.

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd Project Sponsor: Hawa Energy (Pvt.) Ltd	Document No RE2-131-121-001 Document Issue 01	Date of Approval February, 2016 Page 134
--	---	--	---

- We explained that the GE turbines noise and shadow effect has been described in detail in our study it does not affect local norms or bring about habitat modification.
- Employment opportunities should be provided and locals must be given preference.
- Mr. Qureshi said that sustainable development of the area should be a goal.

b) WWF (World Wide Fund)

A consultation meeting was held on January 22, 2016 with Senior Director WWF-Pakistan Mr. Rab Nawaz and Technical Advisor WWF and Ex. DG Marine Fisheries department Mr. Mohammad Moazzam Khan. RE2 team provided information about the proposed project site with the help of the project area map and requested the experts to share their views / concerns / suggestions as the expert conservationist. Mr. Rab Nawaz and his team supported and appreciated the project activities; they do not have any objections / issues and are well satisfied with the green energy project and appreciated the fact that (RE2) consulted with all the concerned environmental departments.

c) List of Public and NGO Sector Stakeholder Consulted

A number of stakeholders in addition to the general public, were also consulted (Table- 7-3)

Table 7-3 List of Public and NGO Sector Stakeholders

Name of Stakeholder Representative	Type of Stakeholder	Department / Occupation/ Designation
Mr. Aashiq Hussain Langah	Sindh EPA	Director (EIA)
Mr. Waris Gabool	Sindh EPA	Deputy Director Technical
Mr. Ghulam Muhammad Gadani	Sindh Wildlife Department	Deputy Conservator Wildlife
Mr. Tahir Qureshi	IUCN	Senior Coastal Ecosystem Advisor
Mr. Kamran Ahmad Naqvi	IUCN	Urban Specialist
Muhammad Moazzam Khan	WWF	Technical Advisor and Ex. DG Marine Fisheries department
Mr. Rab Nawaz	WWF	Senior Director
Mr. Shahzad Sadiq Gill	Sindh Forest	Divisional Forest Officer

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 135

Name of Stakeholder Representative	Type of Stakeholder	Department / Occupation/ Designation
	department	
Mr. Tahir Latif	Sindh Forest department	Range Forest Officer
Mr. Raja Karim	Sindh Forest department	Range Forest Officer
Mr. Rab Dino Khatti	Sindh Forest department	Sub. Division Forest Officer

Mitigation Measures:

The following mitigation measures have been suggested.

1. Disturbance to the habitat of the Indian spiny tailed Lizard be minimized controlled.
2. As far as possible, the burrows/ holes of the lizard be safeguarded against any developmental activity. The animals be specially protected during the construction phase.
3. Hunting, feeding or harassment of wildlife be strictly prohibited during the entire course of operation.
4. Vegetation clears and land uptake during the operation be minimized.
5. Development of new access tracks during operations be minimized.
6. Routes involving minimum clearing of vegetation be selected.
7. Operation must avoid disturbing live bird nests and small mammal and reptile holes.
8. Food wastes not to be disposed off in the open. Food wastes collected in waste segregation unit be disposed off according to waste disposal procedure on a regular and strict basis.
9. Night work during construction be prohibited; night travelling not be allowed unless absolutely necessary.
10. All mitigations related to minimizing noise be adhered to.

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 136

11. Construction work near areas which show small mammal and reptile populations should commence after a soft start up and be randomly monitored.
12. Vehicle speeds on access road be controlled to avoid incidental mortalities of reptiles. Any such incident be reported and vehicle speeds be randomly checked.
13. Movement of all project personnel be restricted to work areas.
14. Movement of project vehicles be restricted only to the project access road or to routes approved.

Conclusion

It is assessed that the impacts due to construction and operation activities of the project will be moderate. The species or their habitats will not be affected significantly, as there are no critical wildlife habitats in the Project Area. Moreover, the movement and behavior of migratory birds will not be much affected, as the site is not located on the main water birds flyway.

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 137

SECTION 8

ENVIRONMENT MANAGEMENT PLAN

8 ENVIRONMENT MANAGEMENT PLAN

8.1 PURPOSE AND OBJECTIVE OF EMP

The purpose of Environmental Management Plan (EMP) is to provide a summary of the predicted impacts associated, mitigating measures and monitoring actions so as to minimize potential negative impacts and enhance positive impacts from the Project. The EMP will provide a guide (almost checklist) for the main stakeholders, namely the owner, contractor and operator of the Wind Power Project, on what mitigating actions need to be taken and where and when they are needed. It will thus help to improve the likelihood that adverse impacts are mitigated, project benefits are showcased, and an environmentally beneficial standards of best practice is provided to all those involved. In particular, the EMP:

- ❖ Defines roles and responsibilities for those involved in the implementation of the EMP and identifies areas where these roles and responsibilities can be shared with other stakeholders
- ❖ Define the implementation mechanism for the mitigation measures identified during the present study.
- ❖ Provides concise instructions to project personnel and contractors regarding procedures for protecting the environment and minimizing environmental impact, making these legally binding through their inclusion in contract specifications
- ❖ Defines the requirements for communication, documentation, training, management and implementation of the mitigating measures; and,
- ❖ Specifies actions required to assess compliance with and effectiveness of the mitigation measures through compliance and effects monitoring mechanism, defined in the EMP's two action tables.
- ❖ Provide the mechanism for taking timely action in the face of unanticipated environmental or social situations.

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd Project Sponsor: Hawa Energy (Pvt.) Ltd	Document No RE2-131-121-001 Document Issue 01	Date of Approval February, 2016 Page 138
--	---	--	---

- ❖ Identify environmental as well as social training requirements at various levels.

8.2 COMPONENT OF EMP

The EMP consists of the following:

- Institutional Arrangements
- Mitigation and Monitoring plan
- Grievance Redressing Mechanism
- Reports and Documentation
- Environmental and social trainings
- Public disclosure requirements
- Budgetary estimates for EMP implementation

All the components of EMP are discussed from Sections 8.3 to 8.9.

8.3 INSTITUTIONAL ARRANGEMENT

8.3.1 PROJECT DEVELOPER

The Project Developer (i.e. HEPL) is the ‘owner’ of the project and as such is responsible for ensuring that the conditions of the environmental authorization issued in terms of Sindh Environmental Protection Act, 2014 (should the project receive such authorization) are fully satisfied, as well as ensuring that all necessary permits or licenses are obtained and complied with. It is expected that the Project Developer will appoint the contractor, and the consultant.

Hawa Energy will establish an Environment & Social Management Cell (ESMC) at Corporate and site level, headed by a Project Director to be responsible for day-to-day implementation of the Project. Hawa Energy Pvt. Ltd is responsible for undertaking the Project in accordance with the Environmental Impact Assessment (EIA) and implementing the Environmental and Social Management Plan, which will be consistent with the standards set by OPIC Environmental and Social Policy Statement, 2010, and ADB's Safeguard Policy Statement (2009).

The ESMC is responsible for coordinating and implementing all environmental and social activities. During Project implementation, the ESMC will be responsible for reflecting the occurrence of new and significant impacts resulting from Project activities and integrating sound mitigation measures into the EMP. The ESMC includes a safeguard specialist and

Document Title:	Consultant Name:	Document No	Date of Approval
Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Renewable Resources (Pvt.) Ltd	RE2-131-121-001	February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 139

supporting staff, together forming the Environmental and Social Unit, appointed by Hawa Energy to look after environmental, social and safety issues. The ESMC will be empowered to implement safeguard planning and monitor implementation.

The safeguard specialist provides guidance to the Project Manager and his staff to adopt environmental good practices while implementing the Project. The safeguard specialist is responsible for implementing safeguard issues associated with the Project through a site team composed of Hawa Energy Pvt. Limited (HEPL) site staff and the contractor's staff, to be assigned by the ESMC as necessary.

The duties of the Environmental and Social Unit of the ESMC at the corporate level are to:

- Monitor the implementation of mitigation measures during construction and operation phases of the Project.
- Prepare suitable environmental management reports at various sites.
- Advise and coordinate field unit activity towards effective environment management.
- Prepare environment health and safety manual for the operation of transmission lines/substations.
- Advise during Project planning/design and cells on environmental and social issues while route selection of the alignment at the planning/design stage to avoid negative environmental impact.
- Provide training and awareness on environmental and social issues related to power transmission Projects to the Project/contract staff.

The duties of the Environmental and Social Unit at the site level are to:

- Implement the environment policy guidelines and environmental best practices at the sites.
- Advise and coordinate the contractor(s) activity towards effective environment management.
- Implement environment and safety manual.

<p>Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan</p>	<p>Consultant Name: Renewable Resources (Pvt.) Ltd Project Sponsor: Hawa Energy (Pvt.) Ltd</p>	<p>Document No RE2-131-121-001 Document Issue 01</p>	<p>Date of Approval February, 2016 Page 140</p>
--	--	--	---

- Carry out environmental and social survey in conjunction with the Project planning cell while route selection of the alignment at the planning stage to avoid negative environmental impact.
- Make the contractor staff aware of environmental and social issues so that EMP could be managed effectively.

8.3.2 Supervision Consultant (RE)

The supervision consultant / Project Monitoring Consultant (PMC) (RE) has qualified environment health and safety staff on board to which will be responsible for overseeing the implementation of the EMP during the construction.

8.3.3 Lead Contractor

The contractor will be responsible for the following:

- ❖ Overall construction program, project delivery and quality control for the construction for the wind project.
- ❖ Overseeing compliance with the Health, Safety and Environmental Responsibilities specific to the project management related to project construction.
- ❖ Promoting total job safety and environmental awareness by employees, contractors and sub-contractors and stress to all employees and contractors and sub-contractors the importance that the project proponent attaches to safety and the environment.
- ❖ Ensuring that each subcontractor employ an Environmental Officer to monitor and report on the daily activities on-site during the construction period.
- ❖ Ensuring that safe, environmentally acceptable working methods and best practices are implemented and that sufficient plant and equipment is made available properly operated and maintained, to facilitate proper access and enable any operation to be carried out safely.
- ❖ Meeting on site with the Environmental Officer prior to the commencement of construction activities to confirm the construction procedure and designated activity zones;
- ❖ Ensuring that all appointed contractors and sub-contractors are aware of this
- ❖ Environmental Management Plan and their responsibilities in relation to the plan;
- ❖ Ensuring that all appointed contractors and sub-contractors repair, at their own cost, any environmental damage as a result of a contravention of the specifications contained

Document Title:	Consultant Name:	Document No	Date of Approval
Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Renewable Resources (Pvt.) Ltd	RE2-131-121-001	February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 141

in the Environmental Management Plan, to the satisfaction of the Environmental Officer.

At the time of preparing this draft EMP, the appointment of a lead contractor has not been made and will depend on the project proceeding to the construction phase.

The Framework of Environment and Social Management Cell are shown in **Figure 8.1** and Key responsibilities of ESMC are summarized in **Table 8.1**.

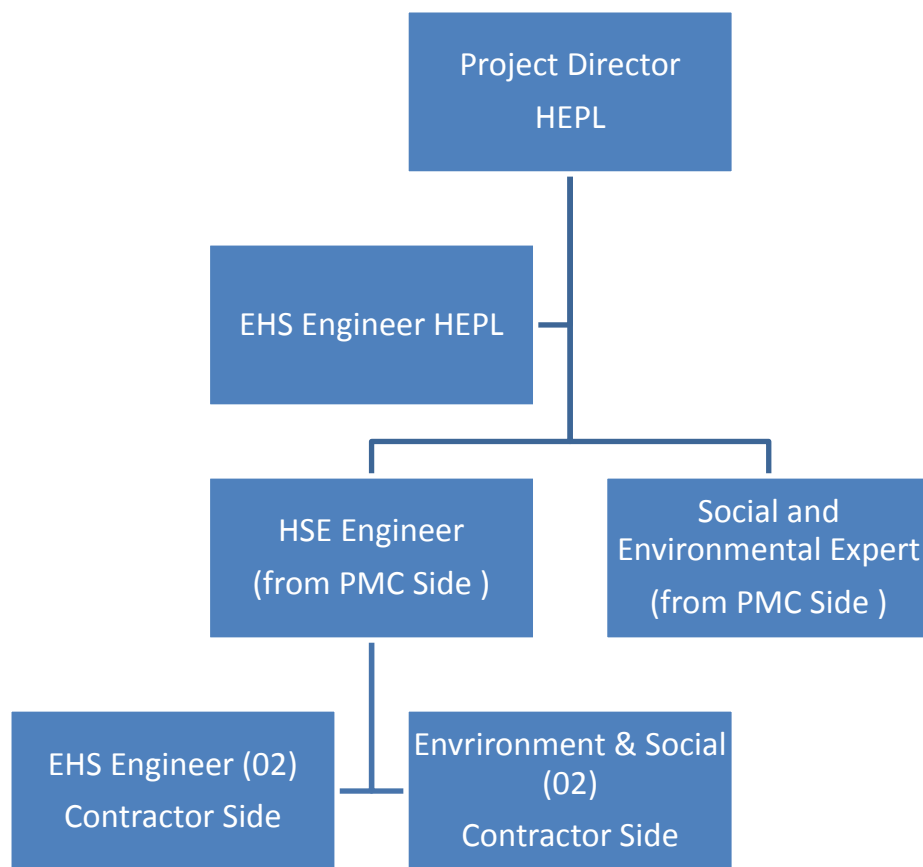


Figure 8.1: Framework of Environment and Social Management Cell (ESMC)

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 142

8.4 MITIGATION & MONITORING PLAN

The mitigation plan is a key component of the EMP. It lists all the potential effects of each activity of the Project and their associated mitigation measures identified in the IEE.

For each Project activity, the following information is presented in the plan:

- ❖ A listing of the potential impact associated with that Project activity
- ❖ A comprehensive listing of mitigation measures (actions)
- ❖ The person(s) responsible for ensuring the full implementation of the action
- ❖ The person(s) responsible for monitoring the action
- ❖ The timing of the implementation of the action to ensure that the objectives of mitigation are fully met
- ❖ It should be emphasized that the mitigation measures will have to be translated into environmental as well as social requirements and specifications to be made part of the contracts for the construction activities, with legal binding.

The objective of the environmental and social monitoring during the various phases of the proposed Project will be as follows:

- ❖ Ensuring that the mitigation measures included in the IEE are being implemented completely
- ❖ Ensuring the effectiveness of the mitigation measures in minimizing the Project's impacts on social and environmental resources

To achieve these objectives, the Environmental Management and Monitoring Plan (EMMP) for construction and operation phase is given in **Annexure-I**.

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 143

Table 8.1: Identification of Activities and Potential Impact (O & M Phase)

S. No	Designation	Responsibility
1	Project Director (01)	❖ Environment and Social Policy and Directions
2	EHS Engineer (01)	❖ Overall in-charge of operation of environment & social management facilities ❖ Ensuring legal compliance by properly undertaking activities as laid down by regulatory agencies from time to time and interacting with the same
3	Social and Environmental Monitoring Expert (02) (from contractor side)	❖ Secondary responsibility for environment & social management and decision making for all environmental issues including Safety and Occupational Health ❖ Ensure environmental monitoring and social issues related to Project as per appropriate procedures

8.5 GRIEVANCE REDRESSAL MECHANISM

Environmental and social grievances will be handled in accordance to the Project Grievance Redress Mechanism. Open and transparent dialogue will be maintained with Project affected persons as and when needed, in accordance with ADB safeguard policy requirements. The Grievance Redress Mechanism (GRM) for the Project provides an effective approach for complaints and resolution of issues made by the affected community in a reliable way. This mechanism will remain active throughout the life-cycle of the Project.

Hawa Energy shall have a standard mechanism to:

- i. inform the affected people (AP) about GRM and its functions;
- ii. set the procedures and mechanisms adopted for making the complaints;
- iii. support the complainants in communicating their grievance and attending the GRM meetings; and
- iv. Implement compliance with a GRMs' decision, its monitoring and communication to the people.

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 144

Under the GRM, the ESMC will maintain the Social Complaint Register (SCR) at the sites to document all complaints received from the local communities or any other stakeholder. The information recorded in the Register will include the date of the complaint, particulars of the complainant, description of the grievance, actions to be taken, the person responsible to take the action, follow up requirements and the target date for the implementation of the mitigation measure. The register will also record the actual measures taken to mitigate these concerns.

As soon as a complaint is received, the ESMC will determine the remedial action. If required, consultations will also be undertaken with the contractor’s site manager. Once the remedial action is decided, implementation responsibility as well as schedule will be determined.

The proposed remedial action will be documented in the SCR, with complete details (by whom and by when). The proposed remedial action will be shared with the complainant. Similarly, the actual action taken will also be documented in a register and shared with the complainant. The complainant’s views on the remedial action taken will also be documented in the register.

The SCR will be reviewed during the fortnightly meetings at the site during the Project, and the action items discussed. The progress on the remedial actions will also be reviewed during the meetings.

8.6 REPORTS AND DOCUMENTATION

The ESMC will produce periodic reports based on the information collected. These will include reports for:

- ❖ Project initiation meetings with each contractor
- ❖ Non-compliances
- ❖ Effects monitoring
- ❖ Summary of SCR under GRM

The reports will also be made available for review, to the external monitoring teams, and to any other stakeholders who visit the site. In addition, the Social and Environmental Monitoring expert will prepare reports for each monitoring visit.

At the end of the Construction Phase, a final report will also be prepared.

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 145

8.7 ENVIRONMENTAL AND SOCIAL TRAININGS

Environmental and social trainings will help to ensure that the requirements of the EIA and EMP are clearly understood and followed by all Project personnel throughout the Project period. The primary responsibility for providing training to all Project personnel will be that of the ESMC.

The environmental and social training program will be finalized before the commencement of the Project, during the detailed design phase. The training will be provided to the Hawa Energy staff, the construction contractors, and other staff engaged for the Project. Training will cover all staff levels, ranging from the management and supervisory to the skilled and unskilled personnel. The scope of the trainings will cover general environmental awareness and the requirements of the EIA and the EMP, with special emphasis on sensitizing the Project staff to the environmental and social aspects of the area.

During the O&M phase of the Project, these trainings will continue to be conducted by ESMC for all relevant staff of the Company.

8.8 PUBLIC DISCLOSURE REQUIREMENTS

Hawa Energy (HEPL) will disclose this IEE and EMP to all the stakeholders before the commencement of the proposed Project. The IEE report will be made available to the stakeholders at the sites designated by the EPA, in accordance with the national legislation (PEPA 1997) and Sindh EPA Act 2014. In addition, the executive summary of the IEE will be translated into the local (Urdu / Sindhi) languages (if necessary), and made available to the affected communities (and also kept at the Project site). This will ensure that the local communities are aware of the Project, its key impacts, the mitigation measures and the implementation mechanism. In addition, the Executive Summary will be disclosed through the HEPL official website.

8.9 BUDGETARY ESTIMATES FOR EMP IMPLEMENTATION

The cost of implementation of the environmental safeguards includes both the direct cost of the mitigation measures and the costs of monitoring the execution of the EMP such as laboratory costs and monitoring visits, training costs, etc. Contractor cost to be included in the BOQ items, while Hawa Energy Pvt. Ltd (HEPL) cost shows the environmental monitoring / training cost that will be borne by the Hawa Energy Pvt. Ltd through the EMSC. Detailed cost is shown in **Annexure –II**.

Document Title:	Consultant Name:	Document No	Date of Approval
Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Renewable Resources (Pvt.) Ltd	RE2-131-121-001	February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 146

SECTION 9

INFORMATION DISCLOSURE, CONSULTATION AND PARTICIPATION

The field studies were conducted for preliminary scoping, survey, and assessment activities and in order to coordinate the field survey and analysis.

A questionnaire was developed to assess the general concerns of the local residents of nearby villages in respect of this Project. Mr. Umair Ali Khilji of Renewable Resources Pvt. Ltd himself filled the questionnaires after directing the questions to the native people. Filled questionnaires are attached in **Annexure-X** and snapshots of consultative meetings are also attached in **Annexure-XI**.

During the construction phase, residents of the local areas selected representatives, local councilors, and informal community leaders, including members of NGOs, will be asked to state their current perceptions of priorities for improvements to the urban environmental infrastructure in their areas and the likely impacts of the Project during construction and operation phases.

The stakeholder consultation is a continuous process, and should be maintained throughout the Project. The consultations carried out during the present IEE and reported in this Chapter are essentially a first step in this process.

During the present IEE, the stakeholder analysis was carried out to identify relevant stakeholders on the basis of their ability to influence the Project or their vulnerability to be negatively impacted from it. This approach ensured that no relevant groups were excluded from the consultations, and appropriate engagement strategies were developed for each stakeholder.

During the stakeholder consultations carried out in the communities near the proposed site, the participants were first provided the salient information about the proposed Project.

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd Project Sponsor: Hawa Energy (Pvt.) Ltd	Document No RE2-131-121-001 Document Issue 01	Date of Approval February, 2016 Page 147
--	---	--	---

Since the Project would not directly affect them, the villagers generally did not have any apprehension or reservation about the Project. On the contrary, they expected that the Project would bring employment and small business/trade opportunities for the local population.

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 148

SECTION 10

CONCLUSION AND RECOMMENDATION

Prime benefit of the Project will be the replacement of conventional power generation with renewable energy. Wind energy will replace fossil fuel powered generation, and therefore reduce suspended particulate matter and greenhouse gas emissions into the atmosphere.

Impacts are manageable and can be managed cost effectively - environmental impacts are likely to result from the proposed power project. Careful mitigation and monitoring, specific selection criteria and review/assessment procedures have been specified to ensure that minimal impacts take place. The detailed design would ensure inclusion of any such environmental impacts that could not be specified or identified at this stage are taken into account and mitigated where necessary. Those impacts can be reduced through the use of mitigation measures such as correction in work practices at the construction sites, or through the careful selection of sites and access routes. Since proposed land is covered with shrubs, thus there is no need for removal of any significant vegetation for the construction of the wind power Project.

The proposed Project will have number of positive impacts and negligible negative impacts to the existing environment as follows:

- ❖ Significant improvement in the economic activities in the surrounding areas due to generation of direct and indirect employment opportunities.
- ❖ The Project Area does not fall under any sensitive, protected area.
- ❖ No threatened / Near-Threatened species of wildlife was recorded in the Project Area.
- ❖ There is negligible removal of trees for the Project.
- ❖ Environment pollution due to cut and fill operations, transportation of construction materials, disposal of debris, nuisance from dust, noise, vehicle fumes, black smoke, vibration are the short term negative impacts due to proposed Project with mitigations being properly taken care.

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd Project Sponsor: Hawa Energy (Pvt.) Ltd	Document No RE2-131-121-001 Document Issue 01	Date of Approval February, 2016 Page 149
--	---	--	---

Proper GRM will have to be implemented by Hawa Energy to overcome public inconvenience during the proposed Project activities.

Based on the environmental and social assessment and surveys conducted for the Project, the potential adverse environmental impacts can be mitigated to an acceptable level by adequate implementation of the mitigation measures identified in the EMP. Adequate provisions are being made by Hawa Energy Pvt. Ltd (HEPL) to cover the environmental mitigation and monitoring requirements, and their associated costs.

An environment and social analysis has been carried out looking at various criteria such as topology, air, noise, water resources and water quality, ecology, demography of the area, climate and natural habitat, community and employee health and safety etc. The impact analysis, found that due to careful consideration of environmental and social aspects during route and site selection by Hawa Energy Pvt. Ltd (HEPL), no major adverse impacts are expected. There is no adverse impact on the migration of habitat, any natural existing land resources and effect in the regular life of people.

The environment and social impact associated with the Project is limited to the extent of construction phase and can be mitigated through a set of recommended measures and adequate provision for environment and social impacts which cover monitoring, measuring and mitigation.

Most impacts are expected to occur during the construction phase and are considered to be of a temporary nature. The transmission corridor will be carefully selected after undergoing an options assessment. This will enable the right of way alignment to bypass villages and important water supplies and resources. The main Project impacts are associated with clearing of shrub vegetation, waste management and excavation and movement of soils.

From this perspective, the Project is expected to have a minimal "environmental footprint". No endangered or protected species of flora or fauna are reported near Project sites.

The project has been discussed with local people, government officials and NGOs. The consultations elicited general support for the project. There were no serious environmental issues raised or matters that the Consultant had overlooked. The main concerns expressed were to ensure that local people got employment on the project and that measures were in place to avoid excessive noise or dust and bird mortality.

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 150

Adequate provisions have been made for the environmental mitigation and monitoring of predicted impacts, along with their associated costs. Adverse impacts if noticed during implementation will be mitigated using appropriate design and management measures. Mitigation measures related to Construction, as specified in the EMP, will be incorporated into civil works contracts, and their implementation will be primarily the responsibility of the contractors. Hence, the proposed Project has limited adverse environmental and social impact which can be mitigated following the EMP & shall be pollution free Renewable source of Power generation with low Environmental foot prints.

This IEE study concludes that the proposed Wind project will not lead to significant adverse environmental and social impacts of such nature or magnitude that would require a more detailed report in the form of an EIA. Additionally careful implementation of the EMP will ensure that environmental impacts are managed and minimized and the project proponent meets all statutory requirements.

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 151

ANNEXURE

Document Title: Initial Environmental Examination (IEE) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval February, 2016
	Project Sponsor: Hawa Energy (Pvt.) Ltd	Document Issue 01	Page 152

ANNEXURE – I

ENVIRONMENT MANAGEMENT PLAN

Document Title: Environmental Impact Assessment (EIA) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd Project Sponsor: Hawa Energy (Pvt.) Ltd	Document No RE2-131-121-001	Date of Approval October, 2012
		Document Issue	01

Environmental Issue	Mitigation Measure	Time frame	Target	Implementation Responsibility	Monitoring Responsibility	Supervision
1. Pre-Construction Period Impacts						
1.1. Lack of environmental technical capacity within HEPL and its ESMU in environmental assessment and design, management, supervision and reporting.	HEPL will establish a unit, ESMC, to manage environmental, social and safety aspects of maintenance projects. The ESMC will be staffed by one full-time suitably qualified Environment Specialist, who will ensure that environmental safeguard measures associated with this and other projects are credibly implemented, including provision of necessary training to HEPL maintenance staff.	A ESMC unit will be established prior to effective-ness, with training completed during detailed design. Contractor training and environmental briefing will be conducted prior to mobilization.		HEPL		HEPL
1.2. Consideration of EIA/EMP in preparation of the detailed design and bid documents.	ESMC will check that design and bid documents are responsive to key environmental, social and safety considerations, and that the proposed method of work reflects the boundaries defined in the EMP.	Before the tendering	NA	HEPL	PMC , RE2	
1.3. Turbine selection, design layout to minimise impact on the visual character of the area	Turbine should have uniform design, speed, height, scale and rotor diameter	Design and implementation planning for HEPL	NA	HEPL	PMC, RE2	ESMC

Environmental Issue	Mitigation Measure	Time frame	Target	Implementation Responsibility	Monitoring Responsibility	Supervision
1.4. Minimise noise emission through selection of appropriate modern turbine technology	Use modern wind turbines to ensure minimum noise emissions	During Planning phase, in parallel with the preparation of bid documents		HEPL	RE2	
1.5. Design of turbines and power lines to minimise risk of collisions for birds.	Turbine blades and towers to be white to maximize conspicuousness to flying birds, Plan power lines between turbines to be underground (except possibly where lines cross water courses) and minimise above-ground connection to sub-station. During Micrositing due consideration will be given to limit the structures erection in buffer zone of to reduce the bird collision.	Review final design to confirm that turbine design color is white; and that the extent of above ground power lines has been minimized	Design of turbines to minimise impacts on birds.	HEPL		RE2
1.6. Manage scarring and dust resulting from road and turbine related infrastructure (e.g. power line excavation, control rooms, temporary site camp etc).	Dust suppression measures to be put in place during design phase and on approval of plans to ensure that dust impacts do not exceed Sindh applicable EQS air quality standards (e.g. dustex, watering soil/gravel/stockpile areas, and speed limits).	During Planning phase, in parallel with the preparation of bid documents	Dust impacts do not exceed Sindh applicable EQS air quality standards	HEPL		RE2

Environmental Issue	Mitigation Measure	Time frame	Target	Implementation Responsibility	Monitoring Responsibility	Supervision
2.Management Plan for Construction Phase						
2.1. Minimise the impact of construction on fauna	Remove fauna from the turbine sites before the start of site clearing construction and relocate such fauna outside of the construction site. Avoid known/observed bird nesting sites. A speed limit of 50 km/h needs to be implemented on the access roads to the site and a 20 km/h speed limit on the construction sites and for the cranes.	Provided the contractor as part of the contract documentation	Minimise impacts on fauna.	Contractor EHS Engineer	PMC/EHS Engineer	HEPL/ ES
2.2. Remove and store all topsoil from areas to be excavated; and use this topsoil in later rehabilitation of disturbed areas, e.g. the lay-down area, construction yard, trenches for electrical cables, foundation areas, and the access roads.	Demarcate the areas to be cleared at each turbine location (e.g. with snow netting), and do not allow vehicles and construction activities to extend outside of these demarcated areas. Excavated topsoil (top 20 cm, if this exists) to be stockpiled in the demarcated areas. Stockpile must not be higher than 2m to avoid compaction and no vehicular and/or workforce activity allowed on topsoil stockpiles. Excavated/disturbed areas on site and		Ensure that topsoil is stored as specified until replaced. Ensure that excavated / disturbed areas have topsoil replaced to a depth of at least 10 cm, (provided material is available).	Contractor EHS Engineer	PMC / EHS Engineer	HEPL / ES

Environmental Issue	Mitigation Measure	Time frame	Target	Implementation Responsibility	Monitoring Responsibility	Supervision
	adjacent to the site (apart from on-site Borrow pits, which are subject of a separate application and approval) have topsoil replaced to a depth of at least 10 cm during the rehabilitation phase of the construction period (provided such soil is available from on-site stockpiles). This applies to the underground electrical cable route, road verges, area around turbine concrete foundation, parts of lay-down area where topsoil was disturbed, and the rehabilitation along on the edges of the access roads.					
2.3. Ensure that the storage and operation of construction equipment and activities of personnel are contained within the designated work areas	Before construction commences, a site map is to be prepared by the PMC, EHS Engineer in consultation with the Contractor, showing designated work areas, locations of temporary toilets, no-go areas, eating & cooking areas, smoking areas, concrete mixing areas (if any), fuel storage areas, vehicle routes and laydown	Project Manager to ensure that all contractors and sub-contractors and other operators on site are briefed at the start of their contract on environmental controls and no-go areas	ES to monitor compliance with the EMP during the construction phase, on weekly or bi-weekly basis, using a report card.	Contractor EHS Engineer	PMC / EHS Engineer	HEPL / ES

Environmental Issue	Mitigation Measure	Time frame	Target	Implementation Responsibility	Monitoring Responsibility	Supervision
2.4. Avoid soil erosion within and in the vicinity of the construction area	<p>areas. Before construction commences, mark the designated work areas on each site.</p> <p>Uncontaminated waste water and excess run off must not be concentrated but allowed to dissipate and seep slowly into the soil in a manner which inhibits soil erosion. Retain as much natural vegetation as possible by clearing only the areas identified for construction; Minimize bare soil exposure by managing grading operations to coincide with construction activities (rather than clearing weeks before construction).</p> <p>Use natural and/or artificial cover on cleared and disturbed areas such as erosion control blankets or plastic sheeting</p> <p>Divert upslope runoff away from disturbed areas; and trap sediment on site.</p>		Minimal erosion inside the construction area and surroundings.	Contractor EHS Engineer	PMC / EHS Engineer	HEPL / ES

Environmental Issue	Mitigation Measure	Time frame	Target	Implementation Responsibility	Monitoring Responsibility	Supervision
2.5. Prevent the spillage of fuel, oil or grease on site and remedy this should it occur	<p>Construction equipment is checked daily (by Contractor) to ensure that no fuel spillage takes place from construction vehicles or machinery, and monitored weekly by the HEPL ES. Drip-trays to be placed under vehicles which are stationary for longer than 24 hours.</p> <p>Spilled fuel, oil or grease is to be retrieved and contaminated soil removed, cleaned and replaced. Contaminated soil to be collected by the EPA registered Hazardous Waste Contractor (under observation of ES).</p>		<p>Clearly demarcate construction areas to minimize disturbance. The construction tender documentation should specify that access roads, power line trenches, overhead line routes, on site substations, control rooms and construction areas are to be demarcated by use of posts at regular intervals (20 meter).</p>	<p>Contractor EHS Engineer</p>	<p>PMC / EHS Engineer</p>	<p>HEPL / ES</p>
2.6. Prevent spillage of cement, sand and stone into soil for concrete mixing and batching	<p>Concrete mixing area (if any) is defined in the site map. If any concrete mixing takes place on site, this is to be done on mortar boards or plastic sheeting, which is to be removed from the site once concreting is completed; or in areas to be covered by further construction.</p>		<p>Minimum spillage of cement into the environment; zero spillage beyond the site</p>	<p>Contractor EHS Engineer</p>	<p>PMC / EHS Engineer</p>	<p>HEPL / ES</p>

Environmental Issue	Mitigation Measure	Time frame	Target	Implementation Responsibility	Monitoring Responsibility	Supervision
	<p>Sand, stone and cement are stored in demarcated areas, and are covered or sealed to prevent wind erosion and resultant deposition of dust.</p> <p>Any excess sand, stone and cement must be removed from site at the completion of the construction period and disposed of at a licensed facility.</p> <p>Empty cement bags to be stored in sealed containers to prevent cement dust contamination and disposed of at a licensed waste facility.</p> <p>Cleaning of cement mixing equipment must be done in proper cleaning trays and waste water treated waste which must be removed by a licensed contractor</p>					
2.7. Ensure disciplined operation of	The terms of this EMP and the potential conditions in the		Complete compliance with specified	Contractor EHS Engineer	PMC / EHS Engineer	HEPL / ES

Environmental Issue	Mitigation Measure	Time frame	Target	Implementation Responsibility	Monitoring Responsibility	Supervision
<p>sub-contractors</p>	<p>environmental authorisation (from EPA) will be included in all tender documentation and contractors and sub-contractors" contracts.</p> <p>Contractors and sub-contractors will use the toilet situated in a designated area of the site and secured to the ground to prevent it capsizing in strong winds. No personal hygiene (e.g. washing) will be permitted outside the designated area (A minimum of 1 chemical toilet for every 15 people must provide).</p> <p>Cooking will take place in a designated area shown on the site map and no firewood or kindling may be gathered from the site or surrounds</p> <p>All litter will be deposited in a clearly marked, closed, animal-proof disposal bin in the construction area; particular attention needs to be paid to food waste.</p>		<p>conditions</p>			

Environmental Issue	Mitigation Measure	Time frame	Target	Implementation Responsibility	Monitoring Responsibility	Supervision
	<p>No one other than the ES or personnel authorised by the ES, will disturb or pick plants outside the demarcated construction area.</p> <p>No one other than the ES or personnel authorised by the ES, will disturb animals on the site (no trapping, shooting etc.).</p> <p>Animals disturbed during construction activities should not be harmed but should be allowed to move off to an undisturbed area of the site</p> <p>Feral dogs and cats should not be fed or encouraged to visit the site</p>					
<p>2.8. Scarring and dust resulting from clearing for road and turbine related infrastructure (e.g. power line excavation, control rooms, temporary site offices etc)</p>	<p>Clearly demarcate construction areas to minimize disturbance. The construction tender documentation should specify that access roads, power line trenches, overhead line routes, on site substations, control rooms and construction areas are to be demarcated by use of posts at regular intervals</p>		<p>Construction areas demarcated and restricted areas adhered to.</p>	<p>Contractor EHS Engineer</p>	<p>PMC / EHS Engineer</p>	<p>HEPL / ES</p>

Environmental Issue	Mitigation Measure	Time frame	Target	Implementation Responsibility	Monitoring Responsibility	Supervision
	(20 m).					
2.9. Minimise visual Impact of construction equipment (e.g. cranes, vehicles and construction yards)	Dust suppression measures to be put in place (e.g. dust ex, watering soil/gravel areas, speed limits) if dust impacts exceed Sindh applicable EQS air quality standards. The construction tender documentation should specify that dust caused by construction should be minimised through the use of compounds such as „dustex“ or through Watering gravel roads.		Visual impact of construction equipment Minimised.	Contractor EHS Engineer	PMC / EHS Engineer	HEPL / ES
2.10. Minimise light pollution from construction yard, cranes and construction activities	The construction tender documentation should specify that lighting at the construction site office should be restricted to security lighting and that such lighting should be restricted to the site area and immediate surrounds and should be down lighting and not up-lighting. Similarly, if night work is required in work areas, lighting is to be down lighting and not up-lighting and directed away from neighbouring		No high mast or spot light security lighting allowed; No up-lighting allowed. Only down-lighting to be used.	Contractor EHS Engineer	PMC / EHS Engineer	HEPL / ES

Environmental Issue	Mitigation Measure	Time frame	Target	Implementation Responsibility	Monitoring Responsibility	Supervision
	farmsteads and the major roads where possible, particularly in close proximity to such areas. Up-lighting will only be allowed for high-angle construction (for safety purposes) and only for the time required to complete such high-angle construction					
2.11. Visibility of roads and related infrastructure (e.g. hard standing areas, power lines, control room etc)	Siting of roads and excavations along contours (which will result in less cut and fill and visual scarring), and off ridgelines which are visually exposed/ highly visible landforms. This specification must also be incorporated in the design phase of the project. Provision of formal erosion management for roads (e.g. stormwater gullies) to prevent erosion scars, especially on ridgelines and slopes.		Visibility of roads and related infrastructure minimised by siting the roads and excavations along contours. Erosion scars, especially on ridgelines and slopes prevented through provision of formal erosion management for roads.	Contractor EHS Engineer	PMC / EHS Engineer	HEPL / ES
2.12. Ensure adequate earthing and lightning protection for the turbines	Ensure proper bonding is carried out inside the turbines; a copper ring is attached below the soil surface to earth down conductors and earthing		Earthing and lightning protection fully functional	Contractor EHS Engineer	PMC / EHS Engineer	HEPL / ES

Environmental Issue	Mitigation Measure	Time frame	Target	Implementation Responsibility	Monitoring Responsibility	Supervision
	rods.					
2.13.Ensure that the facility complies with Civil Aviation Authority requirements for turbine and mast visibility to aircraft, i.e. red pulsating light on the turbine tower and wind monitoring mast(s)	Mount aviation warning lights on turbine nacelle and the wind monitoring mast(s), and/or such measures required by the Civil Aviation Authority		Aviation warning lights or other measures are functional at all times	Contractor EHS Engineer	PMC / EHS Engineer	HEPL / ES
2.14.Colour of turbines to be conspicuous to minimize aircraft collision risks and comply with the Civil Aviation Regulations of 1994	Turbine blades to be white to be conspicuous to aircraft pilots		Turbine design maximizes conspicuousness to aircrafts.	Contractor EHS Engineer	PMC / EHS Engineer	HEPL / ES
2.15.Minimize the risk of birds colliding with power lines and turbines.	Power line connections between the turbines to be underground, except where crossing streams (where erosion could occur. Minimise the length of above-ground power line required to connection from the wind farm to the	Construction /Operation	No collisions by birds during construction phase	Contractor EHS Engineer	PMC / EHS Engineer	HEPL / ES

Environmental Issue	Mitigation Measure	Time frame	Target	Implementation Responsibility	Monitoring Responsibility	Supervision
	<p>sub-station on the grid.</p> <p>For above ground power lines, bird anti- collision markers should be fitted.</p>					
2.16.Minimise the risk of bat foraging/roosting close to turbine locations.	<p>Establishment of artificial bat roosting (e.g. roost boxes) away from where practical and required.</p> <p>Vacant/ derelict buildings which do not house bats at present need to be sealed off.</p>		<p>Minimum bat roosting opportunities close to turbine locations.</p> <p>Prevent bats from using the buildings as roosting sites.</p>	Contractor EHS Engineer	PMC / EHS Engineer	HEPL / ES
2.17.Prevent veld fires as a result of workers smoking and/or making fires for heating or cooking purpose.	<p>Designate smoking areas as well as areas for cooking, where the fire hazard could be regarded as insignificant.</p> <p>Educate workers on the dangers of open and/or unattended fires.</p>		Zero veld fires due to smoking/heating	Contractor EHS Engineer	PMC / EHS Engineer	HEPL / ES
2.18.Avoid any storage of solid, liquid or hazardous waste on site and prevent waste spillages	<p>All construction waste (concrete, steel, rubbles etc.) to be removed from the site.</p> <p>Other non-hazardous solid waste (e.g. packaging material) to be disposed of at a licensed landfill.</p>		No waste storage or disposal on site; all waste disposed of as specified in the Record of Decision and relevant regulations.	Contractor EHS Engineer	PMC / EHS Engineer	HEPL / ES

Environmental Issue	Mitigation Measure	Time frame	Target	Implementation Responsibility	Monitoring Responsibility	Supervision
	<p>All liquid waste (used oil, paints, lubricating compounds and grease) to be packaged and disposed of by appropriate means.</p> <p>Adequate containers for the cleaning of equipment and materials (paint, solvent) must be provided as to avoid spillages.</p> <p>Waste water from construction and painting activities must be collected in a designated container and disposed off at a suitable disposal point off site.</p>					
<p>2.19. Ensure that wastes are managed in an environmentally friendly manner</p>	<p>A refuse control system will be established for the construction period to efficiently separate and remove all forms of solid waste from the site for recycling, or disposal at a licensed disposal site.</p> <p>Under no circumstances is any solid waste to be burned or buried on or in the vicinity of the site.</p> <p>Waste collection points</p>		<p>Recycling of wastes where possible</p> <p>Zero impact of construction wastes on the environment</p>	<p>Contractor EHS Engineer</p>	<p>PMC / EHS Engineer</p>	<p>HEPL / ES</p>

Environmental Issue	Mitigation Measure	Time frame	Target	Implementation Responsibility	Monitoring Responsibility	Supervision
	<p>must be sealed/enclosed to eliminate the risk of wind scatter and scavenging by wildlife.</p> <p>All waste products resulting from electrical installations along the road will be entirely removed from the site.</p>					
<p>2.20.Minimise noise from construction - Vehicles, earth moving and terracing of sites, construction of access roads and hard standing areas.</p>	<p>Construction operations should only occur during daylight hours, if possible.</p> <p>No construction piling to occur at night. Ideally, piling should be during the hottest part of the day when atmospheric conditions are unstable and noise is readily dissipated.</p> <p>Construction staff to be given “noise sensitivity” training so they understand how to minimise noise impacts from construction activities</p>		<p>Construction activities occur during the day. maximum limit is Sindh applicable NEQS guidelines for ambient noise</p>	<p>Contractor EHS Engineer</p>	<p>PMC / EHS Engineer</p>	<p>HEPL / ES</p>
<p>2.21.Handover of the site to the project operator at the end of the construction phase, in a form</p>	<p>Audit the implementation of the EMP requirements for the construction phase.</p>		<p>Full compliance with the EMP specifications & Environmental Protection Agency</p>			

Environmental Issue	Mitigation Measure	Time frame	Target	Implementation Responsibility	Monitoring Responsibility	Supervision
that satisfies all requirements of the Environmental Authorisation for the construction phase.			requirements for construction phase			

3. ENVIRONMENTAL MANAGEMENT PLAN FOR OPERATION PHASE

3.1. Minimise the impact of the wind turbines on birds, caused by collisions or entanglement with structures.	i. Develop and implement a post-construction bird monitoring programme	Throughout the Operation period	Zero bird strikes at turbine sites. This target can be revised based on monitoring data. The database on the effects of the HEPL turbines on Pakistan species of birds contributes to the national database.	Manager Operation HEPL	EHS Engineer HEPL	HEPL Project Manager
3.2. Minimise the impact of the wind turbines on bat mortality	Monitoring – It is recommended that carcass searches be carried out in the morning to minimize the effect of scavengers (which remove carcasses) and should, at the least, be conducted during the periods April to May and August to September when bats are migrating		Create a database of bat mortalities occurring on the wind farm site. Thereby contribute information on the bat species occurring in the area and the	Manager Operation HEPL	EHS Engineer HEPL	HEPL Project Manager

Environmental Issue	Mitigation Measure	Time frame	Target	Implementation Responsibility	Monitoring Responsibility	Supervision
	<p>between summer and winter roosts. This recommendation of acoustic data will be used to determine when bat activity is highest at the site. These carcass searches will play an important role in understanding the impact of wind farms on Pakistan bat species.</p> <p>Should there be increased activity during the migratory period, and this coincides with increased bat fatalities (assessed via carcass searches), one possible mitigation measure would be to increase cut-in speeds to reduce mortality during these time periods.</p>		impact of wind farms on bats.			
3.3. Minimise visual impacts of the permanent structure and ancillary equipment	<p>All outside storage of equipment and spare parts and other ancillary materials should be placed in areas of low visibility.</p> <p>The site should be kept in a clean and well-maintained condition.</p>		Wind project has a clean and harmonious presence in the landscape.	Manager Operation HEPL	EHS Engineer HEPL	HEPL Project Manager

Environmental Issue	Mitigation Measure	Time frame	Target	Implementation Responsibility	Monitoring Responsibility	Supervision
	<p>The exterior of any visible surface of the turbines should be cleaned, repainted, repaired or replaced if it rusts, corrodes or otherwise visibly deteriorates.</p> <p>All fencing should be kept in a clean and repaired condition.</p> <p>All fugitive waste or debris should be collected and removed from the site and properly disposed.</p> <p>Lighting should be designed to minimise light pollution without compromising safety. Investigate using motion sensitive lights for security lighting. Turbines are to be lit according to Civil Aviation regulations.</p>					
<p>3.4. Minimise Impact of light pollution (from lights on each nacelle) on night-time views and sense of place.</p>	<p>This requirement to be considered during the design development phase of the project and to be included in the construction tender documentation. Each turbine should only have</p>		<p>Lighting of turbines adhere to the specifications in the CAA regulations</p>	<p>Manager Operation HEPL</p>	<p>EHS Engineer HEPL</p>	<p>HEPL Project Manager</p>

Environmental Issue	Mitigation Measure	Time frame	Target	Implementation Responsibility	Monitoring Responsibility	Supervision
	one medium intensity type B light fixture (according to the CAA regulations). Lights on each turbine should flash simultaneously. No intermediate level lights to be installed.					
	Only down lighting to be installed on associated infrastructure (e.g. control rooms). This requirement to be considered during the design development phase of the project and to be included in the construction tender documentation		Control room and associated infrastructure lit appropriately to minimise light pollution.			
3.5. Minimise noise impacts during operations	<p>All turbines to be located at a set-back distance of 500 m from any homestead and a noise criteria level at the nearest residents of 55 dB (A) should be used to locate the turbines.</p> <p>b) Ambient noise monitoring is recommended on monthly basis in first year of operation to verify noise modelling predictions.</p> <p>c) The turbine noise</p>		Sindh EQS maximum limit for ambient noise for industrial area	Manager Operation HEPL	EHS Engineer HEPL	HEPL Project Manager

Environmental Issue	Mitigation Measure	Time frame	Target	Implementation Responsibility	Monitoring Responsibility	Supervision
	is less critical above 8m/s as this is when the ambient wind noise is likely to exceed the 55 dB(A) day/night noise rating limit					
3.6. Reduce shadow flicker effect on nearby farm dwellings and road users	Careful site selection, design and planning and good of use relevant software. RE2 will provide calculations (application to windpro software/ Wasp software) to quantify the effect and appropriate preventive measure.		Ensure that less than 30 hours of potential flicker effects per year occurs along expected affecting sections	Manager Operation HEPL	EHS Engineer HEPL	HEPL Project Manager
4. Management Plan for Decommissioning						
4.1. Return the leased area of the turbines to its original state. Note: Below ground foundations would remain.	Develop a closure and rehabilitation plan that satisfies best practice requirements for wind farms and for habitat management. This plan should include the removal of wind farm infrastructure, with the exception of the below ground foundations.		Site returned in a condition that enables ongoing low intensity agricultural practices and does not foreclose other potential options	Decommission Contractor	EHS Engineer HEPL	HEPL Project Manager

A. Air Emissions Monitoring Plan

Air Emissions monitoring of the HEPL will be performed according to the following plan for the given below parameters:

Phase	Source	Parameters	Frequency	Standards	Implementation responsibility
Construction	Diesel generator	SOx, NOx, CO, CO2, PM10	Quarterly	NEQS	EHS Engineer /Contractor

B. Ambient Air Monitoring Plan

Ambient Air Monitoring of the HEPL will be performed according to the following plan for the given below parameters:

Phase	Location	Parameters	Frequency	Standards	Implementation responsibility
Construction	Project site	SOx, NOx, CO, CO2, PM10	Quarterly	NEQS	EHS Engineer /Contractor

C. Ground Water Quality Monitoring

Ground Water quality will be monitored according to the following plan for the given below parameters during Construction & operation phase;

Phase	Location	Parameters	Frequency	Standards	Implementation responsibility
Construction	test well	TDS, TSS, pH, Total Coli form, Fecal Coli form	Monthly	PDWQS	EHS Engineer /Contractor
Operation	test well	TDS, TSS, pH, Total Coli form, Fecal Coli form	Quarterly	PDWQS	

D. Soil Contamination Monitoring

Soil Contamination will be monitored according to the following plan for the given below parameters.

Phase	Location	Monitoring Method	Frequency	Method	Implementation responsibility
Construction and operation	Generator / Turbines	Leakage incidents Review of Complaints log	Monthly	Visual Field Survey	EHS Engineer /Contractor

E. Solid Waste Monitoring Plan

Management of the HEPL has to maintain the waste generation record on monthly basis also ensure the safe disposal of the waste as per following plan.

1. Construction & Operation phase

Parameters	Disposal	Frequency	Implementation Responsibility	Monitoring Responsibility	Supervision Responsibility
Used Oil Filters , Un - used Chemicals, Tube lights, as mentioned in WMP	Incineration through approved Waste contractor	Monthly	Contractor EHS Engineer	PMC /EHS Engineer	EHS Engineer HEPL
Recyclable (Paper,Plastic and Metals, etc.) Materials will be segregated at source through separate bins. As mentioned in the WMP	Recycling using 3rd party waste management contractor	Monthly	Contractor EHS Engineer	PMC /EHS Engineer	EHS Engineer HEPL

Non-recyclable, Construction waste, debris, etc.	Disposal at Landfill site	As per requirement	Contractor EHS Engineer	PMC /EHS Engineer	EHS Engineer HEPL
Non-Recyclables Domestic solid waste	Disposal at landfill site through approved contractor	As per requirement	Contractor EHS Engineer	PMC /EHS Engineer	EHS Engineer HEPL
Used Oil Filters Un-used Chemicals, Tube lights, as mentioned in WMP	Incineration through approved Waste contractor	Monthly	Contractor EHS Engineer	PMC /EHS Engineer	EHS Engineer HEPL
Recyclable (Paper, Plastic and Metals, etc.) Materials will be segregated at source through separate bins. As mentioned in the WMP	Recycling using 3rd party waste management contractor	Monthly	Contractor EHS Engineer	PMC /EHS Engineer	EHS Engineer HEPL
Non-recyclable, Construction waste, debris, etc.	Disposal at Landfill site	As per requirement	Contractor EHS Engineer	PMC /EHS Engineer	EHS Engineer HEPL
Non-Recyclables Domestic solid waste	Disposal at landfill site through approved contractor	As per requirement	Contractor EHS Engineer	PMC /EHS Engineer	EHS Engineer HEPL

F. Drinking Water Quality Monitoring Plan

Drinking water which will be provided to the employees will be monitored as per following plan during the operation phase only:

Stages	Parameters	Locations	Frequency	Standards
Construction	TDS, TSS, pH, Total Coli form, Fecal Coli form	Drinking water sources	Monthly	NSDWQ /WHO

G. Biodiversity Monitoring

Biodiversity will be monitored as per following plan during the operation phase:

Stages	Parameters	Locations	Frequency	Methodology
Construction and Operation	Flora and Fauna (birds, Bats etc.)	Along project boundary	Monthly and during winter season fortnightly	Through Survey and filling checklist