Hagler Bailly Pakistan

## Jhimpir Wind Power Projects

# Joint Management and Monitoring Framework for Cumulative Impacts

**Final Report**

HBP Ref.: R1JM4JWR

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**International Finance Corporation (IFC)**

Washington, D.C

# Acronyms

| | |
|---|---|
| ADB | Asian Development Bank |
| AEDB | Alternate Energy Development Board |
| AIS | Alien Invasive Species |
| AKPBS | Aga Khan Planning and Building Services |
| AKRSP | Agha Khan Rural Support Program |
| ARE | Alternative and Renewable Energy |
| AWPPL | Artistic Wind Power Pvt. Ltd |
| CBO | Community Based Organizations |
| CIA | Cumulative Impact Assessment |
| CLO | Community Liaison Officer |
| CPI | Community Physical Infrastructure |
| CR | Critically Endangered |
| DA | District Administrations |
| DEG | Deutsche Investitions- und Entwicklungsgesellschaft |
| EN | Endangered |
| ESAP | Environmental and Social Action Plans |
| ESMP | Environmental and Social Management Plans |
| FMO | Dutch Entrepreneurial Development Bank |
| GAP | Gender Action Plans |
| GCF | Green Climate Fund |
| HESCO | Hyderabad Electric Supply Company |
| IA | Implementation Arrangement |
| IEE | Initial Environmental Examination |
| IFC | International Finance Corporation |
| IFI | International Finance Institutions |
| IUCN-P | International Union for Conservation of Nature |
| JMMF | Joint Management and Monitoring Framework |
| JWR | Jhimpir Wind Farm Region |
| KCN | Keenjhar Conservation Network |
| LC | Least Concern |

| | |
|---|---|
| MoCC | Ministry of Climate Change |
| MoE | Ministry of Energy |
| NB | Non-breeding |
| NEPRA | National Electric Power Regulatory Authority |
| NGO | Nongovernment Organizations |
| NRSP | National Rural Support Program |
| NT | Near Threatened |
| NTDC | National Transmission & Dispatch Company |
| OHS | Occupational Health and Safety |
| PBR | Potential Biological Removal |
| PCP | Planning Commission of Pakistan |
| PPAF | Pakistan Poverty Alleviation Fund |
| PPIB | Private Power and Infrastructure Board |
| RB | Resident Breeding |
| RD | Revenue Department |
| SBI | Sindh Board of Investment |
| SDAA | Sindh Department of Archaeology and Antiquities: |
| SDG | Sustainable Development Goals |
| SEP | Stakeholder Engagement Plan |
| SEPA | Sindh Environmental Protection Agency |
| SFD | Sindh Forests and Wildlife Department |
| SRO | Sindh Radiant Organization |
| SVI | Species Vulnerability Index |
| SWD | Sindh Wildlife Department |
| TVET | Technical and Vocational Education and Training |
| UC | Union Councils |
| USAID | United States Agency for International Development |
| VEC | Valued Environmental and Social Components |
| VU | Vulnerable |
| WAPDA | Water and Power Development Authority |
| WPP | Wind Power Projects |
| WWF-P | World Wide Fund for Nature |

# Contents

# Exhibits

# 1. Introduction

The Jhimpir Wind Farm Region (JWR) is located in Thatta District, Sindh, and is one of two wind resource areas of the Gharo-Jhimpir wind corridor. Within the JWR, there are at least 40 wind power projects (WPPs) at various stages of development, many of which were financed by international finance institutions (IFIs). Hagler Bailly Pakistan (Pvt) has been contracted to develop a Joint Management and Monitoring Framework (JMMF or Study) to address the cumulative impacts from these wind power projects in the Jhimpir Wind Region. Financial support for developing the JMMF is being provided by International Finance Corporation (IFC), Deutsche Investitions- und Entwicklungsgesellschaft (DEG), Dutch Entrepreneurial Development Bank (FMO).

The Joint Management and Monitoring Framework will initially focus on the seven WPPs (or "Priority Projects") financed by the Lenders, namely: ACT II, Artistic, Din Energy, Gul Ahmed, Lakeside, Metro 2 and Lucky Renewables (Private) Limited (formally Tricom Wind Power (Private) Limited) (referred to as Super 6 and Lakeside) WPP. These are known as the Priority Projects. However, the JMMF has been designed so that it can be expanded to other interested developers in the JWR which decide to adopt the JMMF in the future.

This document provides an overview of the JMMF.

## 1.1 Background

The Alternative and Renewable Energy (ARE) Policy 2019 of the Government of Pakistan aims to create a conducive environment for the sustainable growth of ARE sector in Pakistan. The goal outlined in the Policy is to have at least 20% of the country's generation capacity as ARE technologies by 2025, and 30% by 2030 including, but not restricted to biogas, biomass, geothermal, tidal, solar and wind.

Within the country, an optimal area for wind energy development is the Gharo-Jhimpir Wind Corridor located in the southwestern portion of Sindh province with a gross wind energy potential in the region of 50,000MW. Within the Jhimpir Wind Region (JWR), there are at least 19 existing and 12 newly proposed wind power projects (WPPs) at various stages of development, many of which are financed by international finance institutions (IFIs), including the Asian Development Bank (ADB), IFC, FMO and DEG.

In 2015, given the large number of investments anticipated, OPIC (now DFC) commissioned and published a Cumulative Impact Assessment (CIA) for the entire JWR, *viz* the 'Jhimpir Wind Farm Region Cumulative Impact Assessment'.[1] Although the cumulative assessment provided a useful review of the potential collective Environmental and Social (E & S) impacts in the JWR, a collective mechanism to manage cumulative issues was never fully developed in the CIA.

1 Environmental Resources Management, 2015, Jhimpir Wind Farm Region Cumulative Impact Assessment, OPIC

Given that the wind program in the JWR is expanding, and that multiple international financiers are involved, IFC, DEG and FMO (referred to as Lenders in this report) recognized the need to update information in the CIA and develop a Joint Management and Monitoring Framework (JMMF) to address cumulative concerns.

## 1.2 Objectives of JMMF

The objectives of the Joint Management and Monitoring Framework (JMMF) are as follows:

- Create a common understanding of the environmental and social issues faced by the wind power projects in Jhimpir area among the owners of the projects and their managements
- Promote a realization that collective actions will generate additional opportunities and benefits for their businesses and long-term sustainability of their operations
- Evolve leadership and platforms for joint actions
- Help create mutually beneficial and meaningful relationships and partnerships among the stakeholders
- Lay a solid foundation for sustained action to achieve economic benefits in an environmentally and socially responsible manner.

## 1.3 Location

The Jhimpir Wind Farm Region (JWR) is located in Thatta District, within Sindh. It is one of the two wind resource areas of the Gharo-Jhimpir wind corridor. The location of JWR is shown in **Exhibit 1.1.**

## 1.4 Spatial and Temporal Boundaries

This section describes the spatial and temporal boundaries selected for evaluating the cumulative impacts from construction and operation of Wind Power Projects in the Jhimpir Wind Region. Even though the JMMF will focus on the Priority Projects, the Study Area for evaluating the cumulative impacts considers all operational, under-construction, and planned projects in the JWR.

### 1.4.1 Spatial Boundaries

There are currently 19 operational, 12 under-construction projects, 13 committed and 11 planned WPPs in the JWR. These are shown on a map in **Exhibit 1.1.**

The spatial delimitation of the Study Area for cumulative impacts was established taking into consideration:

- Location of operational, under construction, and planned wind power projects in the Jhimpir Wind Region (JWR)
- Spatial expanse of VECs
- Area of influence or impacts from the wind power projects

Information from the following sources has been used for the spatial delimitation:

- Initial Environmental Examination (IEE) of individual WPPs
- Documents and information provided by Sindh Environmental Protection Agency (they issue the No Objection Certificate), Sindh Energy Department, Alternate Energy Development Board (AEDB), Ministry of Energy (MoE), Power Division

The spatial boundary for evaluating cumulative impacts is shown in **Exhibit 1.2.** It covers the administrative divisions of Thatta and Jamshoro. It includes the planned WPP of Master Green Energy in the north and the WPPs Mustaqeem and Novatex in the south. On the south-west, the boundary extends until DHA 3 in view of new wind power developments expected in that areas. In the south east and east, the spatial boundary extends until Haleji Lake and Keenjhar Lake respectively.

The spatial boundaries outlined in this document have altered considerably from those defined in the CIA (2015)[2] as a result of government approval granted to new WPPs which were not approved in 2015.

### 1.4.2 Temporal Boundaries

There are four types of Wind Power Projects in the Jhimpir Wind Region (JWR). All the projects have an estimated life span of 20 years, and land is leased for a period of 30 years.

- Operational: There are currently 19 operational projects having a total installed capacity of 980 MW. These projects started construction in 2009 and have been operational since 2017. These projects are expected to operate till 2038.
- Under-construction: There are currently 12 under-construction projects having total installed capacity of 610 MW. These projects are expected to start operations in 2021 and remain operational until 2042
- Committed: There are 13 projects which have received the Letter of Interest from the Government of Sindh and land for development of their project has been leased to them
- Planned: There are 11 projects which have received the Letter of Interest from the Government of Sindh but the land has not yet been leased to them. These projects are expected to be constructed between 2025 and 2030, and remain operational until 2050.

If the government agrees to purchase electricity, these WPPs may remain operational after 2050. In this case the electricity tariff will have to be negotiated and the land lease extended.

Keeping in view the fact that the wind power industry and the electricity markets are dynamic, the temporal boundary for evaluating the cumulative impacts, has been chosen to extend for the next 15 years until 2036.

2 Environmental Resources Management, 2015, Jhimpir Wind Farm Region Cumulative Impact Assessment, OPIC

**Exhibit 1.1:** Jhimpir Wind Region

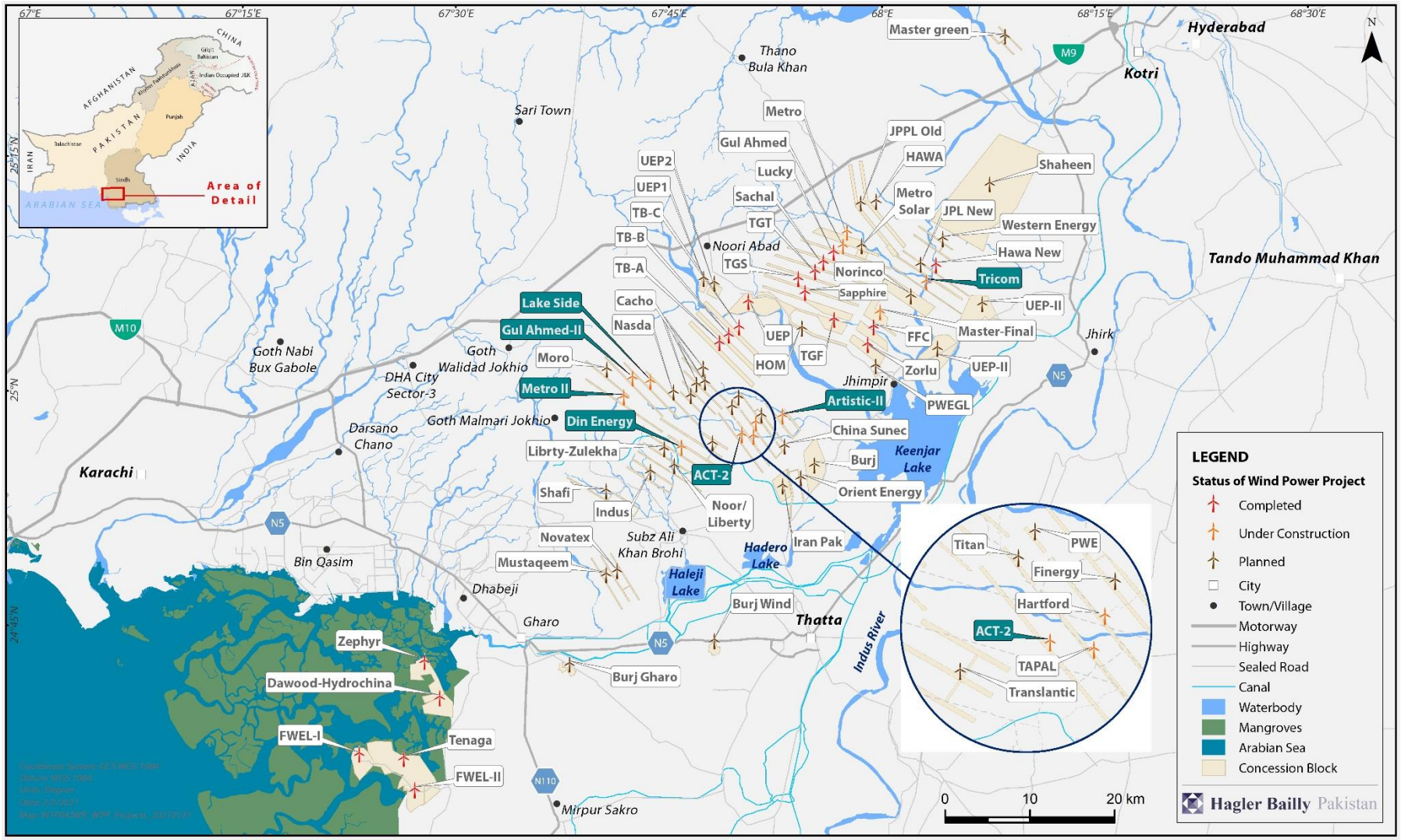
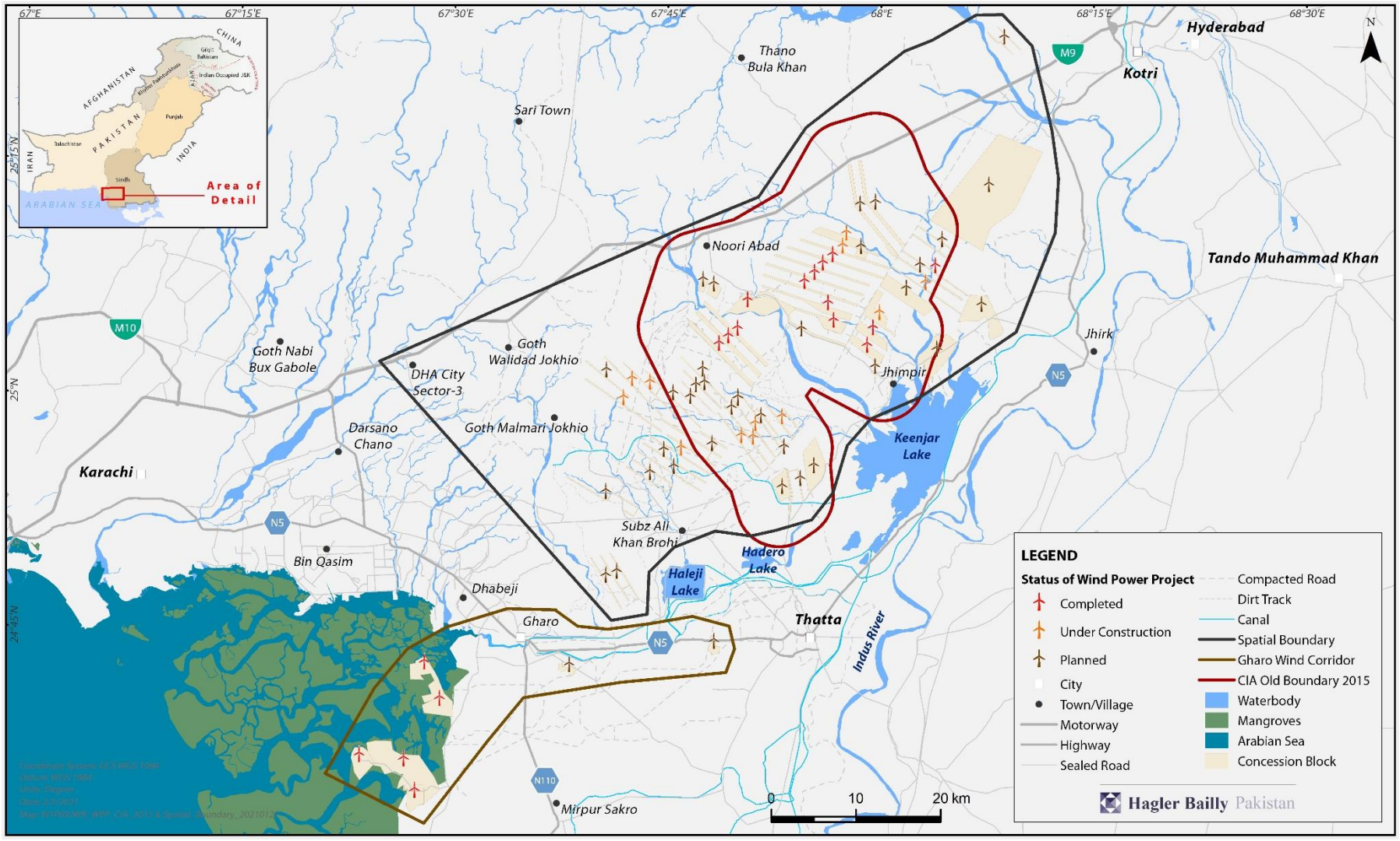


**Exhibit 1.2:** Spatial Boundaries of JMMF



## 1.5 Participating Wind Developers

As outlined earlier, the Joint Management and Monitoring Framework will initially focus on the seven WPPs (or "Priority Projects") financed by the Lenders, namely: ACT II, Artistic, Din Energy, Gul Ahmed, Lakeside, Metro 2 and Lucky Renewables (Private) Limited (formally Tricom Wind Power (Private) Limited) (referred to as Super 6 and Lakeside). These are known as the Priority Projects and a brief description of these projects is provided below. Their locations are shown in **Exhibit 1.1**.

### *Gul Ahmed Electric Limited*

The 50 MW Gul Ahmed Electric Limited Wind Power Project (WPP) is being developed by Gul Ahmed Energy Limited. The land has been leased by the Government of Sindh. The total land area of the Project is 370 acres.

### *Metro Wind Power Limited*

The 60 MW Metro Wind Power Limited WPP is owned by Iqbal Alimohamed and Family. The total land area of the project is 410 acres.

### *Artistic Wind Power (Pvt.) Ltd*

The 50 MW Artistic Wind Power (Pvt.) Ltd (AWPPL) WPP is being developed by Artistic Milliners (Pvt.) Ltd. The land has been allocated by the Government of Sindh. The total land area of the project is 466 acres.

### *Lakeside Energy Limited*

The 50 MW Lakeside Energy Limited WPP is being developed by Naveena Group. The land has been leased by the Government of Sindh. The Karachi Hyderabad Motorway (Superhighway) is the connecting road to the site. The total land area of the project is 360 acres.

### *ACT-II Wind (Pvt.) Ltd*

The 50 MW WPP is being developed by ACT-II Wind (Pvt.) Ltd. The total land area of the Project is 320 acres.

### *Din Energy Limited*

The 50 MW WPP is being developed by Din Energy Ltd. The Project has a total land area of 325 acres.

### *Lucky Renewables (Private) Limited (formally Tricom Wind Power (Private) Limited)*

The Lucky Renewables (Private) Limited (formally Tricom Wind Power (Private) Limited) is a 50 MW WPP developed by Yunus Brothers Group. The project became operational in September 2021. The area of this project is about 347 acres and annual amount of electricity supplied to the grid will be approximately 190,124.5 MWh/yr.

## 1.6 Study Team

**Exhibit 1.3** lists the members of the Study Team.

**Exhibit 1.3:** Study Team

| *Name* | *Designation* | *Responsibilities* |
|---|---|---|
| Vaqar Zakaria | Team Leader /Project Manager | Provide technical guidance to team, review and ensure quality of report |
| Masood Lohar | Project Coordinator | Organize and conduct meetings and consultations with key institutional stakeholders |
| Atif Khan | Senior Environmental Specialist | Identify key environment related issues and concerns in JWR, collect information to verify and prioritize the environment VECs, identify relevant management and monitoring measures for environment |
| Mahe Nau Haider | Senior Social and Gender Specialist | Identify key social issues and concerns in JWR, collect information to verify and prioritize the social VECs, carry out consultations with community men and women in JWR, identify suitable mitigation and monitoring measures for social VECs |
| Hanniah Tariq | CSR Specialist | Propose CSR framework including initiatives which can be implemented individually or collectively |
| Fareeha Ovais | Project Manager | Client communication, quality control, editing and review of reports. |
| Sohaib Anwar | Project Management Support | Provide support with organizing meetings, editing of reports |
| Nooruddin Jahangir Durrani | Ornithologist | Identify and prioritize the bird VECs and indicators to be included in JMMF |
| Ghulam Murtaza | GIS Specialist | Develop GIS maps and model |

# 2. Overview of Environmental and Social Conditions in JWR

This section provides an overview of the environmental and social conditions in Jhimpir Wind Region (JWR) based on a review of available literature and field visit to the JWR from February 7 to 12, 2021 by the Study Team.

## 2.1 Summary of Environmental Conditions in JWR

### *Climate*

The climate of the JWR can be broadly classified as arid, moderate, hot, and humid. The mild winter is from November to February, while the summer extends from May to September. There is a short rainy season between July and August. Compared to earlier years, JWR has experienced higher rainfall since 2017, and in 2020 it received one of the heaviest rainfall in many years. This availability of water changed the landscape (**Exhibit 2.1**) and improved the vegetation in the area.

### *Soil*

The JWR has a wide range of soil types. 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 in-land areas (**Exhibit 2.2**). 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.[3]

### *Water resources*

The major water reserve of the area is Keenjhar Lake, also known as Kalri Lake. The lake is 24 km long and 6 km wide and has an area of 14000 ha (35,583 acres) (**Exhibit 2.3**).

### *Flora and Fauna*

The vegetation of the JWR area is governed by the type of soil and the amount of moisture available. The vegetation comprises of grasses, herbs, shrubs, trees, and sedges (**Exhibit 2.4**). The areas where the wind farm infrastructure is being constructed is largely dominated by sparse herbaceous and scrub vegetation, particularly Mesquite plants. The plant Guggul which is listed as Critically Endangered in the IUCN Red List of Threatened Species has been reported from JWR.

A number of birds of conservation importance have been reported from the JWR particularly from the protected wetlands i.e. Keenjhar Lake and Haleji Lake. Some of the resident breeding species of JWR includes the Black-bellied Tern, Egyptian Vulture, and Pallas's Fish-eagle listed as Endangered in the IUCN Red List, the Tawny Eagle listed as Vulnerable, and the White-rumped Vulture listed as Critically Endangered. Some of the non-breeding or migratory birds reported from JWR include the Houbara Bustard,

3 Renewable Resources (Pvt.) Ltd, 2016, Initial Environmental Examination (IEE) 50 MW Lakeside Energy Limited of Wind Power Project in Jhimpir, Sindh, Pakistan for Naveena Group.

Eastern Imperial Eagle, Greater Spotted Eagle listed as Vulnerable, Painted Stork and Pallid Harrier listed as Near Threatened, as well as the Sociable Lapwing listed as Critically Endangered (see **Section 5.1.1** for details)

The arid climate of Jhimpir and dry soil provide a conducive habitat for herpetofauna. The common species of this area include Skittering Frog, Indus Toad, Indian Garden Lizard, Indian Fringe-toed Lizard, Glossy Bellied Racer and Spiny-tailed Lizard. None of these species are listed as threatened in the IUCN Red List. The Spiny Tail Lizard is included in Appendix II of CITES Species.

Asiatic Jackal, Fox, Indian Mongoose and Long-eared Hedgehog are some of the mammal species reported from JWR. In recent times, some bat species have also been observed from a cave near Jhool Mari. (See **Section 5.1.2** for more details).

**Exhibit 2.1:** Photographs of JWR before and after Summer 2020 Monsoon

*JWR in vicinity of Lucky Renewables (Private) Limited (formally Tricom Wind Power (Private) Limited) Wind Power Project in April 2020 JWR in vicinity of Lucky Renewables (Private) Limited (formally Tricom Wind Power (Private) Limited) Wind Power Project August 2020*

**Exhibit 2.2:** Soil in JWR

*Dirt Track opposite Lucky Renewables (Private) Limited (formally Tricom Wind Power (Private) Limited) Wind Project*

*Excavation site of Gul Ahmed Wind Turbine opposite Gul Ahmed Temporary Site Facility.*

**Exhibit 2.3:** Water Resources in JWR

*Concrete block water storage tank for \livestock and domestic use.*

*Keenjhar Lake*

**Exhibit 2.4:** Photographs of Indigenous Vegetation

Guggul-*Commiphora wightii*
(24°53'46.62"N 67°38'45.63"E)

*Indigenous trees adjacent to a dried water channel*

## 2.2 Summary of Social Conditions in JWR

This section provides an overview of the social conditions in JWR based on a field visit by the Study team from February 7 to 12, 2021.

### *Poverty*

Almost all communities in JWR live in extreme poverty; semi-permanent thatched huts without proper roofing or walls, very few to no assets, limited livestock, improper infrastructure, and no visible signs of prosperity.

### *Hygiene and Sanitation*

Homes, infrastructure and accessories are covered in a layer of dust. Hygiene standards appeared to be abysmal, with no proper sanitary practices in place. In most places, there are no toilets and people practice open defecation.

### *Transport*

The terrain is vast with some areas being more inaccessible compared to others. Except for donkeys and a few motorcycles, other means of transportation are rare.

### *Livelihood and Employment*

A limited number of people who have temporary jobs with the WPPs, but most of the JWR residents do not have permanent jobs or livelihoods. During the consultations carried out by the Study team, most of them claimed that cutting and selling of the mesquite is their main source of income. Some others reported working as wage laborers outside the area. Small-scale agriculture is present in some locations.

### *Education*

There are a limited number of schools and literacy rates are low. No other development or welfare organizations were observed or reported.

### *Tribal System*

Most villages and settlements are small, scattered, and organized into tribes and clans. Each settlement consists of families related to the same tribe or clan with a local head or a representative responsible for local governance.

### *Seasonal Migration*

Seasonal migration is common and almost all the communities reported that majority of them migrate outside the area during dry periods and return in rainy season when the conditions are more favorable to support agriculture and grazing.

### *Access to Potable Water*

Except for two villages, there seemed to be no local water points or water supply available.

### *Health Facilities*

No health facilities were witnessed at the locations visited by the Study Team.

### *Women*

Most of the women were illiterate and unemployed and living in poor sanitary conditions. They were willing to talk and interact with the Study Team in most places.

**Exhibit 2.5:** Photographs of Socio-Economic Conditions in Jhimpir

a. *Typical 'katcha' house in Jhimpir*

b. *House made of bamboo sticks and straws.*

c. *Concrete water storage tank*

d. *Camel grazing*

e. *Fuelwood gathering by local communities*

f. *Tea stall opposite Lakeside Project Temporary Camp Facility*

# 3. Stakeholder Identification and Prioritization

Jhimpir Wind Region is spread over two districts (Thatta and Jamshoro), two Union Councils (UCs) and three Dehs including Kohistan 7/1 and 7/2 (UC Jhimpir) and Kohistan 7/4 (UC Jungshahi). The whole region is typographically and demographically similar and known as Kohistan (hilly desert).

This section provides an overview of the important stakeholders relevant to JMMF.

## 3.1 Stakeholder Definition

Stakeholders are groups or individuals that can affect or take affect from a project's outcome. SPS 20094 and IFC Performance Standards5 specifically identifies affected people, concerned nongovernment organizations (NGOs) and government, as prospective stakeholders to a project. In case of the JMMF, stakeholders are those organizations and individuals who may be interested in managing and minimizing the cumulative impacts from development of multiple WPPs in JWR. These may include the WPP representatives, relevant government departments, civil society organizations, local communities as well as community leaders.

## 3.2 Stakeholder Identification and Prioritization

### 3.2.1 Objectives

The objectives of the stakeholder analysis, described in this section are to:

- Identify the major institutional stakeholders that may have interest in managing cumulative impacts of wind power developments in the Jhimpir Wind Region,
- Identify the community stakeholders likely to be impacted by the development of WPPs in JWR particularly IFC's Super 6 projects and Lakeside project,
- Differentiate between primary and secondary stakeholders based on their level of influence and interest.

### 3.2.2 Methodology

Following is the methodology used for identification and analysis of stakeholders for the JMMF:

- The institutional stakeholders from the JWR were identified based on a literature review of Initial Environmental Examination (IEEs) of the WPPs, websites, as well communication with Wind Power Developers (WPPs) in JWR
- The level of interest and influence of the stakeholders was determined based on the questions below. If the answer was 'yes' to three or more of the seven

[4] Asian Development Bank, June 2009, Safeguard Policy Statement

[5] International Finance Corporation, January 2012, IFC Performance Standards

questions below, the stakeholder was identified as primary stakeholders while the rest were categorized as secondary stakeholders.

- Does this stakeholder have any past, present or planned involvement in managing environmental and social impacts of WPPs in the JWR?
- Will this stakeholder support the development of a Joint Management and Monitoring Framework (JMMF) for the JWR if they are involved?
- Will this stakeholder obstruct/hinder the JMMF if they are not involved?
- Does the stakeholder have a legal mandate for managing environmental and social impacts in JWR?
- Is this stakeholder directly responsible for decisions on issues important to managing environmental and social impacts of WPPs in the JWR?
- Do the stakeholder's goals and expectations either support or conflict with managing environmental and social impacts of WPPs in JWR?
- Does the stakeholder have the ability to mobilize civil society in pursuit of its objectives?

## 3.3 Key Stakeholders

Based on literature review and some primary sources of information, the key stakeholders can be divided into the following broad categories:

- Existing and planned Wind Power Project (WPP) developers in the JWR particularly IFC's Super 6 and Lakeside WPP
- National government departments and regulatory institutions
- Provincial and district level government departments/agencies (including political actors)
- Local leaders /influencers/activists
- Civil society including Non-Government Organizations (NGOs) and Community Based Organizations (CBOs)
- Local communities in JWR and vicinity
- Goods and services suppliers, subcontractors, workers and service providers in the JWR

A list of stakeholders is given in **Exhibit 3.1.** The primary stakeholders are briefly described in subsequent sections.

**Exhibit 3.1:** Relevant Stakeholders

| *No* | *Institutional Stakeholder* | *Abbreviation* | *Type* | *Importance* |
|---|---|---|---|---|
| | **WPP Developers** | | | |
| 1. | Lucky Renewables (Private) Limited (formally Tricom Wind Power (Private) Limited) | | Private sector | Primary |

| *No* | *Institutional Stakeholder* | *Abbreviation* | *Type* | *Importance* |
|---|---|---|---|---|
| 2. | Din Energy Ltd. | | Private sector | Primary |
| 3. | Artistic Wind Power (Pvt) Ltd | | Private sector | Primary |
| 4. | Gul Ahmed Electric Ltd | | Private sector | Primary |
| 5. | Metro Wind Power Ltd. | | Private sector | Primary |
| 6. | Act II Wind (Pvt) Ltd. | | Private sector | Primary |
| 7. | Lakeside Energy Ltd. | | Private sector | Primary |
| | **National Government Departments** | | | |
| 8. | Ministry of Climate Change | MoCC | Government | Secondary |
| 9. | Planning Commission of Pakistan | PCP | Government | Secondary |
| 10. | National Electric Power Regulatory Authority | NEPRA | Government | Primary |
| 11. | National Transmission & Dispatch Company | NTDC | Government | Primary |
| 12. | Ministry of Water and Power | MoE | Government | Secondary |
| 13. | Water and Power Development Authority | WAPDA | Government | Secondary |
| 14. | Private Power and Infrastructure Board | PPIB | Government | Secondary |
| 15. | Alternative Energy Development Board | AEDB | Government | Primary |
| | **Provincial Government Departments** | | | |
| 16. | Sindh Environmental Protection Agency | SEPA | Government | Primary |
| 17. | Hyderabad Electric Supply Company | HESCO | Government | Primary |
| 18. | Sindh Board of Investment | SBI | Government | Secondary |
| 19. | Sindh Forests and Wildlife Department | SFD | Government | Primary |
| 20. | Sindh Department of Archaeology and Antiquities: | SDAA | Government | Primary |
| 21. | Revenue Department | RD | Government | Secondary |
| 22. | District administrations | DA | Government | Primary |
| | **Local leaders/ /influencers/activists** | | **Communities** | **Primary** |
| | **Civil Society** | | | |
| 23. | World Wide Fund for Nature | WWF-P | International NGO | Primary |
| 24. | International Union for Conservation of Nature | IUCN-P | International NGO | Primary |
| 25. | National Rural Support Program | NRSP | National NGO | Secondary |
| 26. | Aga Khan Planning and Building Services | AKPBS | National NGO | Secondary |
| 27. | Keenjhar Conservation Network | KCN | Local NGO | Primary |

| *No* | *Institutional Stakeholder* | *Abbreviation* | *Type* | *Importance* |
|---|---|---|---|---|
| 28. | Sindh Radiant Organization | SRO | Local NGO | Primary |
| 29. | HANDS | HANDS | Local NGO | Secondary |
| | **Communities** | | | |
| 30. | Local communities in close vicinity of Priority WPPs | | Communities | Primary |
| 31. | Other communities in JWR | | Communities | Secondary |

### 3.3.1 Existing and Planned Wind Power Project (WPP) Developers

Within the JWR, there are at least 30 wind power projects (WPPs) at various stages of development. These developers are important stakeholders of the JMMF since the construction and operation of the WPPs will have a cumulative impact on the Valued Environmental and Social Components of the JWR. Priority WPPs include those which will participate in the development and implementation of the JMMF *viz.*

- Lucky Renewables (Private) Limited (formally Tricom Wind Power (Private) Limited)
- Din Energy Ltd.
- Artistic Wind Power (Pvt) Ltd
- Gul Ahmed Electric Ltd
- Metro Wind Power Ltd.
- Act II Wind (Pvt) Ltd.
- Lakeside Energy Ltd.

### 3.3.2 National Government Departments and Regulatory Institutions

Stakeholders from relevant national government departments are listed below.

**Ministry of Water and Power:** This ministry is the executive arm of the Government of Pakistan, responsible for "all issues related to electricity generation, transmission and distribution, pricing, regulation, and consumption" at a national level.[6] It is responsible for the overall sectoral development and policy formulation.

**National Electric Power Regulatory Authority (NEPRA):** NEPRA is the independent regulatory agency responsible for a transparent, competitive, commercially oriented power market in Pakistan. It "issues licenses for generation, transmission and distribution of electric power; establishes and enforces standards to ensure quality, safety, and proper accounting of operation and supply; approves investments and power acquisitions of utility companies; and determines tariffs for bulk generation and transmission"

**Alternative Energy Development Board (AEDB):** Created by the Government of Pakistan in 2003, the AEDB is an autonomous state agency with the objective to assist,

[6] Government of Pakistan. 2006. Policy for Development of Renewable Energy for Power Generation, Employing Small Hydro, Wind, and Solar Technologies.

promote, and facilitate the development and generation of renewable energy in order to achieve sustainable economic growth through a diversified energy generation. It is the national facilitating agency designated as the "one-window" facility for processing renewable energy power projects (hydropower, wind, solar, and bioenergy).[7] The AEDB procured land allotted by the Government of Sindh as special purpose land for the wind power projects in the Jhimpir region.[8] Any wind power proponent which will require public funding or partnership must be approved by the AEDB.

**National Transmission and Dispatch Company (NTDC):** Responsible for the transmission and dispatch of electricity, NTDC is the systems operator for the operation, control, and dispatch of generation facilities and the transmission network operator for the operation and maintenance, planning, design, and expansion of the national transmission network. In the Jhimpir Wind Farm Region, NTDC's network corresponds to a 132-kV system of transmission lines and various substations.[9] NTDC is the general power purchaser of the Jhimpir wind power projects.

### 3.3.3 Provincial and District level Government Departments/ Agencies

Stakeholders from provincial and district level government departments are listed below:

**Sindh Environmental Protection Agency (Sindh EPA):** This department is the local regulatory agency responsible for issuing environmental licenses. Wind power projects that don't fall within a protected area are categorized as Schedule I under the Sindh Environmental Protection Act (2014) and require an Initial Environmental Evaluation (IEE) for the environmental license. Wind power projects that fall within a protected area are categorized as Schedule II and require an Environmental Impact Assessment (EIA).

**Hyderabad Electric Supply Company (HESCO):** HESCO is the power utility company of the Province of Sindh including villages and towns within the JWR, except the city of Karachi.[10]

**Sindh Board of Investment (SBI):** The SBI is responsible for promoting investments in all sectors of the Province of Sindh, including wind energy; facilitating local and foreign investment; enhancing Sindh's international competitiveness; and contributing to economic and social development. The SBI assists investors who intent to invest in the Province (SBI 2015). In some instances, the SBI has provided approvals for independent wind farms in the Jhimpir Wind Farm Region without consultation with the AEDB.

**Sindh Forests and Wildlife Department**: This department is responsible for managing the forests in Sindh. Development of the WPPs in the JWR may lead to cutting of forests as well as increase in spread of alien invasive species.

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7 Government of Pakistan. 2006. Policy for Development of Renewable Energy for Power Generation, Employing Small Hydro, Wind, and Solar Technologies.

8 Environmental Resources Management (ERM). 2013a. Initial Environmental Examination (IEE) Update for Metro Power Wind Power Plant. July 2013.

9 ERM. 2013b. Initial Environmental Examination (IEE) Update for 50 MW Wind Power Plant by Gul Ahmed Wind Power Limited: Jhimpir, Pakistan. December 2013.

10 Hyderabad Electric Supply Company (HESCO). 2010. HESCO: The Organization. Accessed on: August 21, 2015. http://www.hesco.gov.pk/htmls/mainFrame.asp?req=org

**Sindh Department of Archaeology and Antiquities:** This department is responsible for documentation, maintenance and conservation of cultural and archeological sites in Sindh including any in the JWR.

**Revenue Department:** This department has information about the land titles, ownership and lease issued in the JWR.

**District Administration:** Important stakeholders include Deputy Commissioner, Assistant Commissioner, Mukhtiarkars and Tapedars (Patwaris).

### 3.3.4 Local Leaders/opinion-holders/influencers/activists

The key influential tribal headmen are Malik Asad Sikander and Jam Bijar Jokhio. Both are members of the provincial assembly (MPAs) and hold influence on the communities in the region. There are several other political and social actors who also have influence and interest in the area.

### 3.3.5 Civil Society Organizations

Different national and international NGOs are working in District Thatta and Jamshoro with the help of their local partners. They are working in different focus areas including, but not restricted to, relief operations in coastal areas of Thatta, social welfare and livelihood improvement, Community Physical Infrastructure (CPI) and microfinance for local communities. Some of the NGOs working in the JWR include National Rural Support Program (NRSP), Aga Khan Planning and Building Services (AKPBS), Pakistan Poverty Alleviation Fund (PPAF), International Union for Conservation of Nature (IUCN), World Wide Fund for Nature (WWF-P), Pakistan Fisher Folk Forum, Citizens Education Foundation and Aga Khan Building Services.

The NGOs of primary importance are briefly described below:

**WWF – Pakistan:** The Worldwide Fund for Nature (WWF) is an international non-governmental organization that works in the field of wilderness preservation and the reduction of human impact on the environment. WWF-Pakistan is actively working with the CBOs and communities in the JWR, especially near Keenjhar, Hadero and Haleji lakes. It has developed a Conservation Center near the lake which is an active hub of the local CBOs and NGOs.

**IUCN – Pakistan:** IUCN's programme in Asia aims to mobilize communities working for biodiversity conservation, sustainable development, and poverty reduction in common efforts to halt biodiversity loss and apply nature-based solutions to conserve biodiversity, enhance resilience, strengthen equity and reduce poverty. They are active in Sindh but have not implemented projects in JWR.

**Keenjhar Conservation Network (KCN)** is group of nine locally active CBOs which have been working with WWF, UNDP, USAID, and other donors. This network is an active body of CBOs from almost all parts of the Keenjhar-Jhimpir region. These CBOs are socially active and hold a great influence in the whole region. Also, by virtue of their continuous engagement with the international and national donors, these organizations play the role of socio-environmental watchdog. They are active in the mainstream and social media.

**Sindh Radiant Organization (SRO)**

SRO is a Thatta based local NGO which has actively worked in the region. This NGO has been engaged by Lakeside WPP for carrying out community liaison activities and a gender assessment. SRO has been working with several donors and government departments, and is familiar with the local issues and problems in the Jhimpir area.

### 3.3.6 Community Stakeholders

#### *Local Communities in Vicinity of Priority Projects*

The landscape in the area is semi-arid and sparsely populated, with a few isolated villages located in the general vicinity but none within, or immediately next to, the Priority Project boundaries. These are listed in **Exhibit 3.2** and shown on a map from **Exhibit 11.2** to **Exhibit 11.5**. They have been identified based on information outlined in the individual Initial Environmental Examination (IEEs) of Priority Projects.

Most of the population in the region belongs to Sayed, Samma, Jokhio, Palejo, Baloch, Rind, Khaskheli, Khawaja, Memon, Mallah, Mirbahar, Jatt and Lashari castes. The Mirpur Sakro Taluka, particularly the area near the Priority Projects is inhabited by Khaskhelis, Rinds, Mallahs, Jatts, Katiars, Hadyas, Sammas, Sathyas and Lasharis. Also included are Changs, Brohis, Jakhras, Pallaris and Burfats.

#### *Other Communities in JWR*

These are the communities that do not lie in the close vicinity of the Priority Projects and are not likely to be directly impacted by Project construction and operations. These communities are semi-nomadic in nature and move often in search of better pastures for their cattle. They are dependent on large towns in the region including Jhimpir, Nooriabad, Kallo, Saddoro, Baradabad, Jamshoro and Jungshahi. These towns are the hubs of business and commercial activities.

The communities in the towns are active on social media including Facebook, Twitter and Whatsapp. There are discussions and complaints mostly in Sindhi language, about the WPPs and other industries.

**Exhibit 3.2:** List of Settlements in Vicinity of Priority Projects

| *Settlement/Community* | *Type of Settlement and distance from site* | *No of houses and Approx. population (pop)* |
|---|---|---|
| **Act-II: 320 acres** | | |
| Asghar Ali Shoro | Seasonal Migrant | 20 houses (pop N/A) |
| Haroon Shoro | Seasonal Migrant | 10 houses (pop N/A) |
| Ramazan Shoro | Seasonal Migrant | - |
| Goth Ameer Baksh Jhokio | Permanent. 7km | 15 houses (pop. 65) |
| Shafi Mohammad Jokhio | Permanent. 7km | 100 houses (pop. 450) |
| **Artistic: 466 acres** | | |
| Hassan Ali Raees | 1.7 km | 13 houses (pop. 75) |

| *Settlement/Community* | *Type of Settlement and distance from site* | *No of houses and Approx. population (pop)* |
|---|---|---|
| Hashim Gajjan | 600 m | 10 houses (pop. 27) |
| Hayyat Khan Gajjan | 300 m | 15 houses (pop. 44) |
| **Lakeside** | | |
| Ursi Shoro | 1.2 km | 60 houses (pop. 350) |
| Goth Hussain Jakhro | 4.7 km | 30 houses (pop. 150) |
| Bakhar Palari | | 20 houses (pop.40) |
| Ali Mohammad Jakhro | | 10 houses (pop.35) |
| Ghulam Ali Palari | | 25 houses (pop.60) |
| Pakko Pir Maazar | 1.6 km | |
| Ursi Shoro Mosque | 1.2 km | |
| **Lucky Renewables (Private) Limited (formally Tricom Wind Power (Private) Limited): 327 acres** | | |
| Mohammad Siddiq Khaskheli | 200 meters | 17 houses (pop. 159) |
| Haji Mohammad Usman Brohi | 350 meters | 52 houses (pop.229) |
| Mohammad Soomar Babar | 3.5 km | 38 houses (pop. 136) |
| Sono Khan Brohi / Ahmed Khan | 1.5 km | 46 houses (pop. 286) |
| **Din: 365 acres** | | |
| Goth Ameer Baksh Jokhio | 4.5 km | 15 houses (pop. 65) |
| Shafi Mohammad Jokhio | 5.5 km | 100 houses (pop. 450) |
| **Gul Ahmed: 370 acres** | | |
| Allah Rakhiyo Jokhio Goth | Temporary, 6 km | Pop. 350 |
| **Metro** | | |
| Rawal Pallari Goth | Permanent, 10 km | Pop. 400-500 |
| Allah Rakhio Jokhiyo Goth | Temporary, 2.5 km | Pop. 350 |

# 4. VEC Identification and Prioritization

## 4.1 What are VECs?

According to the IFC's Good Practice Handbook on Cumulative Impact Assessment[11] and Management, Valued Environmental and Social Components (VECs) are defined as *"fundamental elements of the physical, biological, or socio-economic environment, (including the air, water, soil, terrain, vegetation, wildlife, fish, birds and land use) that are likely to be the most sensitive receptors to the impacts of a proposed project or the cumulative impacts of several projects".* They may include:

- Physical features, habitats, wildlife population (e.g., biodiversity),
- Ecosystem services (e.g., fishing, timber, food, aesthetic values),
- Natural processes (e.g., water and nutrient cycles, microclimate),
- Social conditions (e.g., health, economics), or
- Cultural aspects (e.g., traditional spiritual ceremonies)[12].

While VECs may be directly or indirectly affected by a specific development, they often are affected by the cumulative effects of several developments. VECs are the ultimate recipient of impacts because they tend to be at the end of ecological pathways. The impacts could be additive, synergistic, masking or countervailing in nature, which means, that while at a project scale the impacts may not be significant as such, at a cumulative level, these impacts could aggregate to transform the behaviors or nature of VECs, particularly sensitive to changes.

## 4.2 Methodology to Scope and Prioritize VECs

The definitions and selection process of the VECs was based on the following documents:

- Good Practice Handbook on Cumulative Impact Assessment and Management: Guidance for the Private Sector in Emerging Markets[13]
- Canada Environment Assessment Office (EAO) (2013) Guideline for the Selection of Valued Components and Assessment of Potential Effects[14]

[11] International Finance Corporation, 2014, IFC Good Practice Handbook on Cumulative Impact Assessment and Management: Guidance for the Private Sector in Emerging Markets

[12] Ibid

[13] International Finance Corporation, 2014, IFC Good Practice Handbook on Cumulative Impact Assessment and Management: Guidance for the Private Sector in Emerging Markets

[14] Environmental Assessment Office, Canada, 2013, Guideline for the Selection of Valued Components and Assessment of Potential Effects

The following steps were taken to identify and prioritize the VECs in the Jhimpir Wind Region (JWR):

- Literature review of journal articles, research papers and studies carried out in the JWR to better understand the physical, biological, and socio-economic environment of the region
- Review of project specific E & S documents including the Environmental Impact Assessment (EIA), Initial Environmental Examination (IEE), Environmental and Social Management Plans (ESMP) prepared by the Priority Projects
- Review of E & S documents prepared by the Priority Project lenders *viz.* Environmental and Social Action Plans (ESAPs), Environmental and Social Review Summary (ESRS) and monitoring reports of Priority Projects in the Jhimpir region prepared from 2014 to date
- Review of 2015 Cumulative Impact Assessment
- A visit to JWR was carried out between January 1 - 2, 2021 and February 7 - 13, 2021 to observe the social and environmental conditions in the area
- Stakeholder consultations were carried out with key institutional and community stakeholders to understand their key concerns and gather their feedback
- A GIS model, which is discussed in **Section 11** was developed to understand the spatial extents of current and proposed future developments. This information provided useful reference for selection and prioritization of VECs.

### 4.2.1 VEC Screening Criteria

VECs that are initially identified, were evaluated based on the four value-based criteria: 1) potential for interaction with WPPs, 2) relevance to the key stakeholders 3) measurability, and 4) efficiency.[15]

The Canada EAO Guideline (2013)[16] suggests a range of questions to help determine whether a VEC is relevant to the cumulative assessment. These questions guided the process of screening and prioritization of the preliminary VECs identified as outlined below:

#### *Potential for Interaction:*

To be relevant for the JMMF implementation, a VEC must be potentially affected by at least one of the WPPs in combination with other developments/external stressors, or by at least two of the WPPs. This is to ensure that the impacts are cumulative, instead of being project specific.

#### *Focus on Key Issues:*

The importance of a VEC is determined based on cultural values or social and / or scientific concern appended to the VEC, for example, via views expressed by the public

[15] International Finance Corporation, Rapid Cumulative Impact Assessment of South Banat Wind Power Projects in Serbia

[16] Guideline for the Selection of Valued Components and Assessment of Potential Effects, Canada, 2013.; Environmental Assessment Office (EAO),

or government, legislative or regulatory requirements, government management priorities etc.; or general sensitivity or vulnerability to disturbance based on scientific evidence. Related to the latter, it should be noted that vulnerability/sensitivity was assessed based on the available information, as described above. No primary assessments were carried out to determine the vulnerability / sensitivity of the VECs.

### *Measurability:*

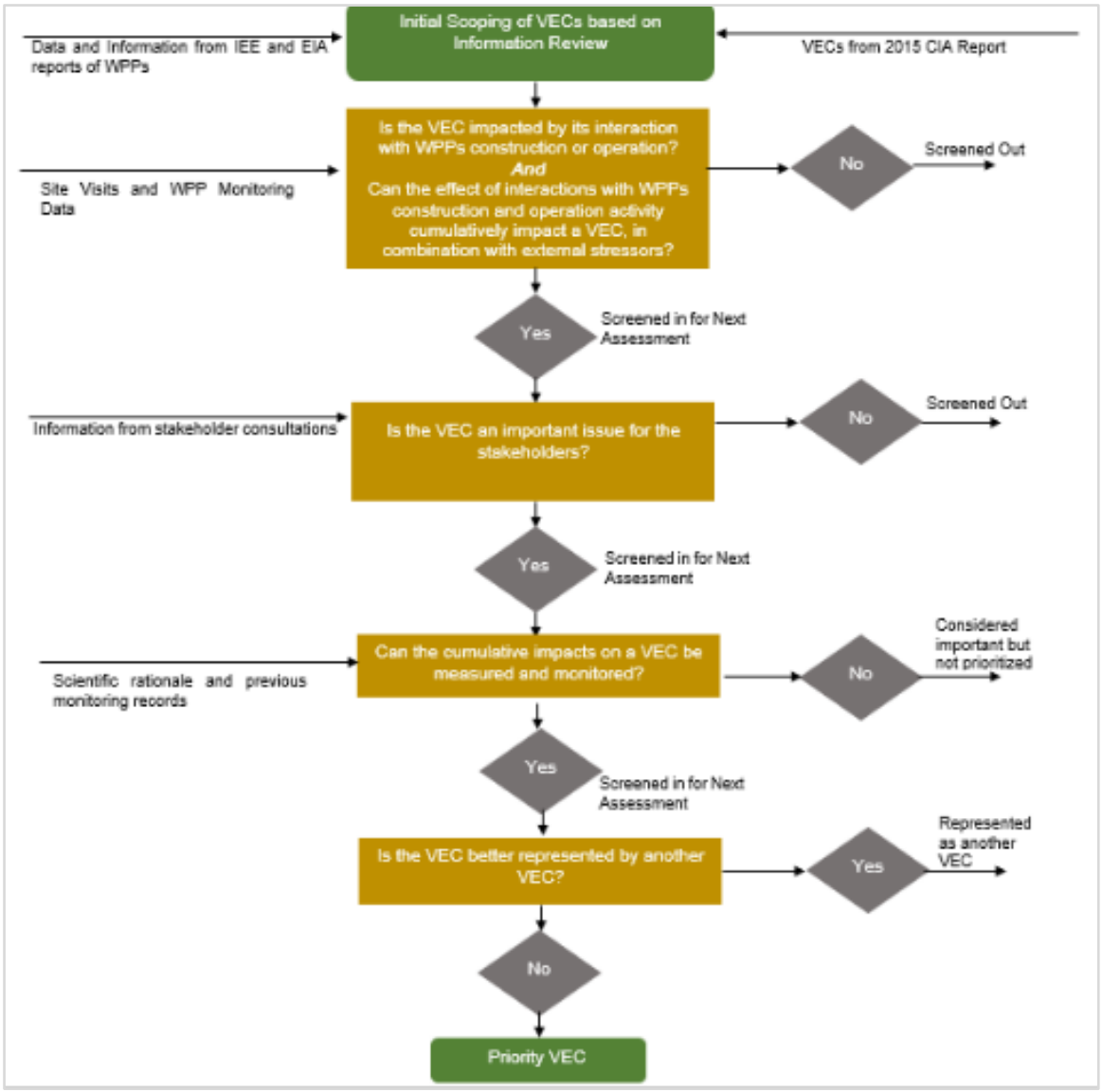
Measurability is an important aspect to ensure that VECs which can be measured and monitored should be prioritized. VECs which cannot be monitored or measured will be difficult to be implemented under the JMMF. The parameters/indicators of measurability will differ for environmental and social VECs. For the latter, more qualitative parameters/ indicators will be considered.

### *Efficiency:*

Some VECs may not directly be impacted, but rather impacted through a pathway of another VEC. To ensure that all the cumulative impacts on VECs, whether through a direct or an indirect pathway, are efficiently monitored and managed, some VECs are grouped into another VEC.

**Exhibit 4.1** shows the value-based screening mechanism for the VECs, while **Exhibit 4.2** shows the rationale for inclusion / exclusion of identified VECs.

**Exhibit 4.1:** Scoping Method for Priority VECs




Source: Modified from Rapid Cumulative Impact Assessment of South Banat Wind Power Projects, Serbia

## 4.3 VEC Prioritization

The rationale and results of VEC prioritization are outlined in **Exhibit 4.2**. Based on the assessments, the following VECs have been prioritized:

### Environmental VECs

- Birds
- Bats
- Habitat and vegetation

**Social VECs**

- Employment
- Gender

An overview of these VECs is outlined in the following sections. Measures to manage and minimize the cumulative impacts of wind power development on these VECs are outlined in **Section 6,** Proposed Management Measures.

**Exhibit 4.2:** Rationale for VEC Prioritization

| *No* | *VECs Reviewed* | *Potential for Interaction* | | *Focus on Key Issues* | | | *Can the potential effect on a VEC be measured and monitored?* | *Can the potential effects on the VEC be effectively considered within the assessment of another VEC?* | *Is the VEC Reported in 2015 CIA?* | *Is the VEC Prioritized for JMMF?* | *Rationale for Prioritization (based on review of IEE, EIA and literature)* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | *On a project scale* | *Cumulatively* | *Important issue for stakeholders?* | *Sensitive or vulnerable to disturbance from project effects?* | *Potential for significant cumulative effects as a result of the project?* | | | | | |
| 1. | Soil and Groundwater | Yes | No | Not considered for further screening | | | | | Yes | No | ♦ Water is a scare commodity for WPPs neighborhood community, however, construction of WPPs is not directly impacting the underground water tables as no boring is allowed inside the project leased land.<br>♦ Water for Priority Projects construction is procured through private water contractors who use Keenjhar Lake and do not use groundwater as per their commitment with the Lenders<br>♦ In the operational phase of WPPs, the water demand of WPPs is quite insignificant and not likely to create any stress for communities (approximately 1500 to 2000 gallons per day water is required during construction of the project and approximately 100 gallons per day during operations)<br>♦ K-IV project is planned to supply water from Keenjhar Lake to meet the requirements of Karachi. Quantities that are presently being taken from Keenjhar Lake for the WPPs are relatively insignificant in comparison, and will not affect the supply capacity of the lake |

| No | VECs Reviewed | Potential for Interaction | | Focus on Key Issues | | | | | Is the VEC Reported in 2015 CIA? | Is the VEC Prioritized for JMMF? | Rationale for Prioritization (based on review of IEE, EIA and literature) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | On a project scale | Cumulatively | Important issue for stakeholders? | Sensitive or vulnerable to disturbance from project effects? | Potential for significant cumulative effects as a result of the project? | Can the potential effect on a VEC be measured and monitored? | Can the potential effects on the VEC be effectively considered within the assessment of another VEC? | | | |
| | | | | | | | | | | | ♦ Little risk of accidental release of pollutants during construction and operation. Any effect of an accidental discharge is restricted to a project, and not considered to be cumulative. |
| 2. | Surface Water Quality | Yes | No | Not considered for further screening | | | | | Yes | No | ♦ No planned discharges nor use of large volumes of hazardous materials during construction/operation.<br>♦ Little risk of accidental release of pollutants during construction and operation.<br>♦ Any effect of an accidental discharge is restricted to a project, and not considered to be cumulative. |
| 3. | Air Quality | Yes | Yes | Yes | No | No | Not considered for further screening | | No | No | ♦ No significant emissions to air have been reported during WPP operations in JWR<br>♦ Air quality in the local environment can be affected by dust during construction activities and by increased traffic during construction. This would only represent a short-term and localized risk that is not significant.<br>♦ Not considered as a priority VEC |

| No | VECs Reviewed | Potential for Interaction | | Focus on Key Issues | | | | | | | Rationale for Prioritization (based on review of IEE, EIA and literature) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | On a project scale | Cumulatively | Important issue for stakeholders? | Sensitive or vulnerable to disturbance from project effects? | Potential for significant cumulative effects as a result of the project? | Can the potential effect on a VEC be measured and monitored? | Can the potential effects on the VEC be effectively considered within the assessment of another VEC? | Is the VEC Reported in 2015 CIA? | Is the VEC Prioritized for JMMF? | |
| 4. | Noise and Visual Environment | Yes | Yes | No | Not considered for further screening | | | | Yes | No | ♦ The communities in JWR are sparsely distributed<br>♦ The disturbances from noise and shadow flicker from the wind turbines are not significant but may require attention under future development scenario, when the number of turbines increase<br>♦ None of the stakeholders consulted complained about disturbances from noise and shadow flicker |
| 5. | Birds | Yes | Yes | Yes | Yes | Yes | Yes | No | Yes | Yes | ♦ There are several internationally/nationally recognized protected areas and areas for nature conservation (e.g., Keenjhar Lake) in the vicinity of the WPPs<br>♦ Bird species of conservation importance (in the IUCN Red List) have been reported from the vicinity of the WPPs<br>♦ Cumulative impact of WPPs on birds likely due to collision of flying birds with wind turbines and other infrastructure |
| 6. | Bats | Yes | Yes | Yes | Yes | Yes | Yes | No | No | Yes | ♦ Some bat species and their caves have been reported from within the JWR region<br>♦ Cumulative impact of WPPs on bats likely due to collision with rotor blades. |

| *No* | *VECs Reviewed* | *Potential for Interaction* | | *Focus on Key Issues* | | | *Can the potential effect on a VEC be measured and monitored?* | *Can the potential effects on the VEC be effectively considered within the assessment of another VEC?* | *Is the VEC Reported in 2015 CIA?* | *Is the VEC Prioritized for JMMF?* | *Rationale for Prioritization (based on review of IEE, EIA and literature)* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | *On a project scale* | *Cumulatively* | *Important issue for stakeholders?* | *Sensitive or vulnerable to disturbance from project effects?* | *Potential for significant cumulative effects as a result of the project?* | | | | | |
| 7. | Terrestrial Fauna | Yes | Yes | No | No | No | Not considered for further screening | | No | No | • No mammal species of conservation importance reported from JWR<br>• Some herpetofauna species of conservation importance reported. However, impact of construction on herpetofauna will be temporary and restricted to construction phase<br>• Herpetofauna not likely to be impacted during operations |
| 8. | Habitat and vegetation | Yes | Yes | Yes | Yes | Yes | Yes | No | Yes | Yes | • Habitats and vegetation in the Jhimpir Wind Region (JWR) have been degraded by vehicles driven off track resulting in widespread erosion of the topsoil<br>• Construction of wind farms without due consideration to erosion control<br>• Construction of access roads without due consideration to erosion control<br>• A critically endangered plant species (in IUCN Red List) has been reported from the JWR which may be affected by cumulative impacts of WPP construction<br>• Invasive plant species are common in the area and there is risk that these species may spread due to land degradation caused by WPP construction |

| No | VECs Reviewed | Potential for Interaction | | Focus on Key Issues | | | Can the potential effect on a VEC be measured and monitored? | Can the potential effects on the VEC be effectively considered within the assessment of another VEC? | Is the VEC Reported in 2015 CIA? | Is the VEC Prioritized for JMMF? | Rationale for Prioritization (based on review of IEE, EIA and literature) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | On a project scale | Cumulatively | Important issue for stakeholders? | Sensitive or vulnerable to disturbance from project effects? | Potential for significant cumulative effects as a result of the project? | | | | | |
| 9. | Land use and grazing | Yes | Yes | Yes | No | No | Not considered for further screening | | No | No | ♦ There is limited seasonal agriculture and livestock grazing in the JWR region<br>♦ During WPP construction, the projects will affect land use and affect associated livelihoods to some extent, since pasturing is the only land uses around the WPPs. But this impact will be localized and will be addressed at the project level. |
| 10. | Employment | Yes | Yes | Yes | Yes | Yes | Yes | No | Yes | Yes | ♦ Employment is a main issue for the local stakeholders; expectations are very high and offer from WPP is limited. |
| 11. | Gender | Yes | Yes | Yes | Yes | Yes | Yes | No | No | Yes | ♦ Gender issues were discussed in the 2015 CIA under the socio-cultural disparities, and not considered as a separate VEC. Gender is now considered as a separate VEC since it holds high value for the local stakeholders<br>♦ Since women are a marginalized community in Jhimpir, the socio-economic and socio-cultural impacts of WPP development will be disproportionately felt by them |
| 12. | Community infrastructure / utilities | Yes | Yes | Yes | Yes | No | Not considered for further screening | | Yes | No | ♦ Cumulative impact of WPP development on community infrastructure /utilities including water |

| *No* | *VECs Reviewed* | *Potential for Interaction* | | *Focus on Key Issues* | | | *Can the potential effect on a VEC be measured and monitored?* | *Can the potential effects on the VEC be effectively considered within the assessment of another VEC?* | *Is the VEC Reported in 2015 CIA?* | *Is the VEC Prioritized for JMMF?* | *Rationale for Prioritization (based on review of IEE, EIA and literature)* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | *On a project scale* | *Cumulatively* | *Important issue for stakeholders?* | *Sensitive or vulnerable to disturbance from project effects?* | *Potential for significant cumulative effects as a result of the project?* | | | | | resources and transport are not expected to be significant.<br>♦ Therefore, this is not considered as a priority VEC. |
| 13. | Community Health | Yes | Yes | Yes | No | No | Not considered for further screening | | Yes | No | ♦ The construction and operation of WPPs is not likely to have significant negative impact on community health<br>♦ Low to negligible impact of WPPs on security and safety of the communities are anticipated<br>♦ Dust due to off-road traffic and soil erosion is likely to have an impact on community health. However, dust indicators will be addressed and monitored under the "Habitat and Vegetation" VEC |
| 14. | Occupational Health and Safety (OHS) | Yes | No | Not considered for further screening | | | | | No | No | ♦ Occupational health and safety are site specific issues and will not be impacted by cumulative construction and operation of WPPs. |
| 15. | Archaeology and Cultural Heritage | Yes | No | Not considered for further screening | | | | | Yes | No | ♦ There is no evidence of immediate or foreseen cumulative impacts on cultural or archaeological sites.<br>♦ Field consultations did not reveal any concerns regarding cultural heritage. |

## 4.4 Determination of Environment Thresholds

Thresholds represent the "limits of acceptable change" that establish the trigger for adaptive management measures. In the context of birds and bats, it refers to the maximum number of priority species birds and bats individuals which may be killed annually without impacting their viable populations.

### *Birds*

The methodology for selection of the thresholds is based on the Potential Biological Removal Analysis. This is a simple, robust, and precautionary test for assessing the potential for animal populations to sustain additional human derived mortality.[17] It uses adult survival rate, year of first breeding, and an estimate of the minimum population size to calculate an annual rate of human-caused mortality that if realized would likely result in a nonviable population in the long term. A summary of the steps involved are outlined below:

- Identify the priority species in the Study Area (**Exhibit 1.2**) based on the conservation importance of the species
- Estimate the relevant population size of each priority species
- Calculate the Potential Biological Removal (PBR) level. This will give an annual fatality rate which if exceeded will likely impact on the long-term viability of the species
- Estimate the number of human derived fatalities occurring in the reference population for each species (for breeding species this will be the national population, for non-breeding this will be the global/flyway population)
- Compare the annual fatality rate estimate from the PBR with the annual fatality rate estimate from human derived sources.
- Set an annual fatality threshold based on an expert judgement informed by the difference between the PBR and human derived fatality rates.

Details are provided in **Appendix A**.

### *Bats*

Priority bats are those species assessed as at highest risk from the cumulative effects of wind power projects in JWR.

Priority bats are identified using a three-step process:

- Step 1 – Develop a 'Species Population List' of all bat species potentially at risk from WPP related activities in the Study Area (**Exhibit 1.2**)
- Step 2a – Assess sensitivity for each species (based on IUCN global conservation status and a measure of susceptibility to wind energy effects).

[17] Dillingham and Fletcher, 2011, Potential biological removal of albatrosses and petrels with minimal demographic information, Biological Conservation 144(6)

- Step 2b - Determine priority bats based on the vulnerability rating applied in Step 2.

Distribution, population size, and collision risk at wind energy projects is poorly understood for bat species in Pakistan. These data gaps mean that although no priority bats were identified during the JMMF assessment for bats, there is potential for species that were not part of the prioritization process to occur within the Study Area (and be recorded as fatalities). Recognizing these data gaps two thresholds have been developed.

- an annual fatality threshold for IUCN Least Concern or Data Deficient species intended to signal that fatalities are likely reaching a level where long term viability needs to be evaluated and
- an annual fatality threshold for IUCN globally threatened species intended to trigger an assessment of the emerging risk level to the species. Currently no globally threatened species are recorded as occurring in Pakistan (IUCN 2021). The presence of a globally threatened species should trigger an assessment of risk.

Details are provided in **Appendix B**.

### *Habitats and Vegetation*

Each participating WPP will make a vegetation baseline of its leased land (if not already available) and a buffer area of 500 m outside the leased land, by June 2022. The baseline can be developed using multi temporal high-resolution satellite imagery, or by conducting field surveys using the quadrat method. This 2022 baseline will be used as the threshold to monitor changes in baseline conditions. For instance, a decrease in Guggul or natural vegetation, or an increase in Alien Invasive Species will cause the threshold to be exceeded. A difference of 20% in the vegetation status can be attributed to natural causes. However, a change greater than 20% will require implementation of management measures as outlined in **Exhibit 6.1**. *Habitat and Vegetation*.

### *Proposed Targets for Social VECs*

The targets for social VECs *viz*. gender and employment were defined after consultation with key stakeholders, mainly the participating WPP developers.

# 5. Overview of Prioritized VECs

This section provides an overview of the baseline conditions of the prioritized VECs in JWR.

## 5.1 Existing Conditions of VECs

### 5.1.1 Birds

There are several international and nationally designated protected wetlands near JWR. These protected areas, such as the Keenjhar Lake and Haleji Lake provide habitat for both resident and migratory bird species.

Several birds of conservation importance have been reported from the JWR particularly from the protected wetlands (**Exhibit 11.7**). These include the Asian Houbara Bustard *Chlamydotis macqueeni* which is listed as Vulnerable in the IUCN Red List and migrates between southwest and central Asia, overwintering in southwest Asia and breeding in the highlands of central Asia. The population of this species has declined considerably in JWR because of illegal hunting.

IUCN distribution maps suggest the potential presence of some Critically Endangered species: the White-rumped Vulture *Gyps bengalensis*, Indian Vulture *Gyps indicus*, Red-headed Vulture *Sarcogyps calvus* and Sociable Lapwing *Vanellus gregarius*. Other IUCN-listed endangered birds with potential presence in the region (as indicated by online IUCN maps) are the Black-bellied Tern (*Sterna acuticauda*), Steppe Eagle *Aquila nipalensis*, Lesser Florican *Sypheotides indicus*, Egyptian Vulture *Neophron percnopterus* and White-Headed Duck *Oxyura leucocephala*. Of these only the Black-bellied Tern and Egyptian Vulture have been recorded from the area.[18] [19] Other species may be occasional visitors. The Saker Falcon *Falco cherrug* is reported in the IEEs of some WPPs and is listed as Endangered in the IUCN Red List. The Jhimpir Wind Farm Region is not considered critical habitat for this species.[20]

Pakistan receives many migratory birds from Europe and Central Asian States every year. These migratory or flyway/global birds spend the winter season in Pakistan and go back to their native habitats in the summer. The route of these birds take from Siberia to

[18] Khan, M. S., Abbas, D., Ghalib,S. A., Yasmeen, R., Siddiqui, S., Mahmood, N., Zehra, A., Begum, A., Jabeen, T. Yasmeen, G., & Latif, T. A. 2012. Effects of environmental pollution on aquatic vertebrates and inventories of Haleji and Keenjhar lakes: Ramsar Sites. Canadian Journal of Pure and Applied Sciences 6(1):1759 – 1783.

[19] Ghalib, S.A., Khan, M.Z., Ahmed, S.M., Begum, A., Hussain, B., & 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 3(6):01-09.

[20] Environmental Resources Management, 2015, Jhimpir Wind Farm Region Cumulative Impact Assessment, OPIC

Pakistan is known as International Migratory Bird Route Number 4. It is also called the Green Route or Indus Flyway.[21] The JWR is located on this Indus Flyway.

Surveys carried out by WWF-P as part of its Indus for All Programme in 2007 and 2008 reported 51 resident and 43 winter birds from the Keenjhar Lake.[22] The number of water birds visiting the Keenjhar Lake during migratory season has fallen considerably in the last decade, mainly due to hunting, disturbance, and habitat degradation. There are also problems of increasing pollution and resulting eutrophication.

Except for Houbara Bustards hunted by some locals and visitors, there are no wild birds known to be of social, economic, or cultural significance to local communities.

Birds are principally included as a priority VEC because of the potential for cumulative impact caused by collision with wind turbines and other infrastructure, such as powerlines. Not all species are susceptible to this type of risk, and priority birds are those assessed as having highest risk from collision with these structures. The conservation importance of birds outlined in the IUCN Red List is also an important determinant in selection of priority birds.

**Exhibit 5.1** provides a list of priority bird species for the JMMF Study Area while some photographs are given in **Exhibit 5.4. Exhibit A.7** and **Exhibit A.8** in **Appendix A** provide the thresholds for the Priority Bird Species.

[21] Renewable Resources (Pvt.) Ltd, 2016, Initial Environmental Examination (IEE) 50 MW Gul Ahmed Electric Limited of Wind Power Project in Jhimpir, Sindh Pakistan, Gul Ahmed Energy Limited

[22] Indus for All Pakistan, World Wide Fund for Nature, 2007 - 2008, Detailed Ecological Assessment of Fauna at Keenjhar Lake

**Exhibit 5.1:** Priority Bird Species in JWR

| *No* | *Common Name* | *Scientific Name* | *Status in JWR* | *Reference Population** | *Status in Pakistan*** | *IUCN Red List Status**** |
|---|---|---|---|---|---|---|
| 1. | Greater Flamingo | *Phoenicopterus roseus* | Local migrant | National | RB | LC |
| 2. | Common Crane | *Grus grus* | Passage migrant | Global | NB | LC |
| 3. | Asian Houbara | *Chlamydotis macqueenii* | Very sparse and migrant | Global | NB | VU |
| 4. | Painted Stork | *Mycteria leucocephala* | Winter migrant | Global | NB | NT |
| 5. | Great White Pelican | *Pelecanus onocrotalus* | Winter migrant | Global | NB | LC |
| 6. | Sociable Lapwing | *Vanellus gregarius* | Rare | Global | NB | CR |
| 7. | Black-bellied Tern | *Sterna acuticauda* | Rare/occasional | National | RB | EN |
| 8. | Egyptian Vulture | *Neophron percnopterus* | Resident/rare/Local migrant | National | RB | EN |
| 9. | Red-headed Vulture | *Sarcogyps calvus* | Resident, very rare | National | RB | CR |
| 10. | Griffon Vulture | *Gyps fulvus* | Rare | National | RB | LC |
| 11. | White-rumped Vulture | *Gyps bengalensis* | Resident /rare | National | RB | CR |
| 12. | Cinereous Vulture | *Aegypius monachus* | Resident /occasional uncommon | National | RB | NT |
| 13. | Greater Spotted Eagle | *Clanga clanga* | Winter migrant | Global | NB | VU |
| 14. | Tawny Eagle | *Aquila rapax* | Local migrant | National | RB | VU |
| 15. | Steppe Eagle | *Aquila nipalensis* | Migrant | Global | NB | EN |
| 16. | Eastern Imperial Eagle | *Aquila heliaca* | Winter migrant | Global | NB | VU |
| 17. | Pallid Harrier | *Circus macrourus* | Winter migrant | Global | NB | NT |
| 18. | Pallas's Fish-eagle | *Haliaeetus leucoryphus* | Resident | National | RB | EN |

* Global refers to birds which do not breed in Pakistan

** RB: resident/breeding, NB: non-breeding

*** LC: Least Concern, NT: Near Threatened, VU: Vulnerable, EN: Endangered, CR: Critically Endangered

### 5.1.2 Bats

A review of available literature indicates that no quantitative baseline assessment of bats has been carried out for the Jhimpir region. Surveys carried out by WWF-P as part of its Indus for All Programme in 2007 and 2008 reported 3 bat species from the Keenjhar Lake and vicinity.[23] The IEEs of the Priority Projects do not have any information on bat abundance and diversity, and no bat surveys were carried out as part of their IEEs.

In 2020, bats were observed by team members of Arch Associates while on a monitoring visit. A species of bat, Indian Flying Fox *Pteropus giganteus* was observed in Neem Trees *Azadirachta indica* at Nabi Bux Palari village in Jhimpir. This village is located 2 km from planned WPP UEP-II and 5 km from operational WPP Zorlu Enerji (**Exhibit 11.1**). The species is listed as Least Concern in the IUCN Red List of Species but is locally rare. Three other bat species have been observed in JWR. **Exhibit 5.2** provides a list of bat species observed in JWR, the location at which they were observed, and their IUCN Red List status. Photographs of bats observed in JWR are given in **Exhibit 5.5**.

Priority bat VECs are those species populations that have high or moderate vulnerability to wind power development. All bat species of the JMMF Study Area have been identified as having low or negligible sensitivity and therefore no priority bats are currently identified for the JMMF Study Area. The annual fatality threshold for the IUCN Least Concern/Data Deficient bat species reported from the Study Area is set to 9 bats per Megawatt (Mw). **Appendix B** provides more details about the identification of Priority bird species and the calculation of thresholds.

**Exhibit 5.2:** Bat Species recorded in JMMF Study Area

| *No* | *Common Name* | *Scientific Name* | *IUCN Red List Status* | *Status in JWR* | *Location Observed* | *GPS Coordinates* |
|---|---|---|---|---|---|---|
| 1 | Greater Mouse-tailed Bat | *Rhinopoma microphyllum* | Least Concern | Common | Caves near Jhimpir Jhool Mari Village | 25.04035N 68.09856E |
| 2 | Indian Flying Fox | *Pteropus giganteus* | Least Concern | Seasonal migrant, rare | Neem Tree in Jhimpir Nabi bux Palari Village | 25.01475N 68.0415E |
| 3 | Serotine | *Eptesicus serotinus* | Least Concern | Not common | Caves near Jhimpir Nabi bux Palari Village | 25.01475N 68.0415E |
| 4 | Fulvus Leaf-nosed Bat | *Hipposideros Fulvus* | Least Concern | Not common | Caves near Jhimpir Nabi bux Palari Village | 25.01475N 68.0415E |

[23] Indus for All Pakistan, World Wide Fund for Nature, 2007 - 2008, Detailed Ecological Assessment of Fauna at Keenjhar Lake

### 5.1.3 Habitats and Vegetation

The texture of soils in the Jhimpir wind corridor ranges from loamy saline, silty, and clayey in the coastal areas to gravely, mainly loamy, and clayey soils in the land areas.[24]

The areas where the wind farm infrastructure is being constructed is largely dominated by sparse herbaceous and scrub desert with little woody vegetation. Two of the dominant woody plants, *Proposis juliflora* and *P. glandulosa*, are alien invasive species (mesquites) from the Americas[25]. A recent study carried out by Arch Associates in 2020 for Indus Wind Energy, Liberty Energy I & II indicated the presence of 70 flora species in the area including *Commiphora wightii* (Guggul) which is listed as Critically Endangered in the IUCN Red List.

Terrestrial landscape and habitats in the JWR are being eroded by vehicles driven off track and away from the access roads built by developers for their projects. This is resulting in soil erosion and dust generation. In addition, construction of wind farms without due consideration to erosion control, particularly when making the access roads, is disturbing the natural habitat.

**Exhibit 5.3** provides a list of the priority vegetation species in JWR while photographs of this species are listed in **Exhibit 5.6.**

**Exhibit 5.3:** Priority Vegetation Species in JWR

| *Common Name* | *Scientific Name* | *IUCN Status* | *Recorded in Vicinity of Wind Projects* |
|---|---|---|---|
| Guggul | *Commiphora wightii* | Critically Endangered | Liberty Energy, Indus Wind, Lucky Renewables (Private) Limited (formally Tricom Wind Power (Private) Limited), Jhimpir Power, Sapphire Wind, Tricon Boston |

### 5.1.4 Employment

People of JWR are engaged as cheap unskilled labor either in Nooriabad, Thatta, Hyderabad, or Karachi. Skilled labor from this area mainly comprises of vehicle drivers, welders, plumbers, and electricians[26]

As a result of other low employment opportunities available, communities in JWR have high expectations for jobs from the WPPs, especially during the construction phase. The decline in manpower needs when the projects move from construction to operation phase, and accompanying layoffs results in conflicts between the projects and the local communities.

[24] Renewable Resources (Pvt.) Ltd, 2016 Initial Environmental Examination (IEE) 50 MW Lakeside Energy Limited of Wind Power Project in Jhimpir, Sindh, Naveena Group.

[25] Ghalib, S.A., Khan, M.Z., Ahmed, S.M., Begum, A., Hussain, B., & 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 3(6):01-09.

[26] RRPL. 2012. Environmental Impact Assessment (EIA) of 50 MW Wind Power Project in Jhimpir Sindh Pakistan. October 2012.

An influx of workers from outside the JWR places additional demands (and limitations) on employment prospects. Newspapers and social media reports suggest regular complaints of locals against WPPs employing guards, waiters, chefs, and gardeners from "outside", depriving locals of the employment benefits. In the context of JMMF, the term local employment shall refer to all those men and women living as permanent residents (bearing National Identity Cards) within, around or in the immediate catchment of one or more WPPs in (i) UC Jhimpir (ii) UC Jungshahi and (iii) UC Mahal Kohistan in district Thatta and UC Moondar Khan in district Jamshoro. (**Exhibit 11.9**). Additional communities may be considered by the Advisory Committee on a case by case basis, or if the position advertised cannot be filled.

There is a risk of communal rifts due to unequal employment opportunities being created by different projects, creating an impression of political favors being given to selected communities based on their influence while others may have a perception of discrimination. This impression can possibly cause tensions among various communities residing within JWR. Opportunities for women employment in project activities are already considered to be negligible.

The rationale for prioritization of this VEC is based on the prevailing unemployment and poverty levels in JWR, and the need for WPPs to manage high employment expectations.

Photographs of unskilled laborers in JWR are given in **Exhibit 5.7**.

### 5.1.5 Gender

The women in JWR are vulnerable due to limited access to clean water, sanitation, health, and education facilities. Review of background information indicates that the vulnerability of women is exacerbated due to a culture of gender discrimination which severely limits their basic rights and decision making. Women cannot benefit from employment opportunities offered by projects due to restrictions in their mobility, cultural barriers, and lack of technical or professional skills.

The influx of laborers and workers, particularly during the construction phase of the WPPs is expected to cause tension and social conflict amongst communities and impose restrictions on women's mobility. Similar problems could arise due to construction traffic and development of project facilities. The presence of security personnel, watchmen and guards, near community tracks and footpaths used by women can be threatening for them and lead to gender-based violence.

**Exhibit 5.8** shows photographs of some local women in JWR.

## **Exhibit 5.4:** Birds

*Dead Griffon Vulture observed near Sapphire Wind Project in February 2021*
*[25.054319, 67.570966]*

## **Exhibit 5.5:** Bat Caves

*Bat Caves near Village Jhool Mari*
*(25.012941, 68.005568)*

*Bats observed inside the caves.*
*(25.012941, 68.005568)*

## **Exhibit 5.6:** Photographs of Habitat and Vegetation

*JWR in vicinity of Lucky Renewables (Private) Limited (formally Tricom Wind Power (Private) Limited) Wind Power Project in February 2021.* Guggul-*Commiphora wightii*
(*24°53'46.36"N 67°38'47.15"E)*

**Exhibit 5.7:** Photographs of Laborers from Local Communities

*Labor during breaktime outside Lakeside's temporary site facility.*

*Local community members in Jhimpir Wind Region complaining about lack of employment opportunities*

**Exhibit 5.8:** Photographs of Women from Local Communities

*Women group from Ursi Shoro Community 1.2 km from Lakeside Wind Farms.*

*Craftswoman sewing traditional stole near Keenjhar Lake*

## 5.2 Existing Stressors on VECs

The term 'stressors' is used to signify sources or conditions that affect or cause physical, biological, or social stress on VECs such as natural environmental and social drivers, human activities, and external stressors. These can include climate change, population influx, natural disasters, or deforestation, among others. This section provides an overview of the external stressors on the prioritized VECs.

### 5.2.1 Birds

A number of local and migratory birds have been reported from the JWR particularly from the water bodies - Keenjhar Lake and Haleji Lake. Natural stressors on the bird population in JWR include changing climate, altered rainfall patterns and increasing temperatures. The declining water quality of these lakes is impacting the abundance and diversity of bird populations. Moreover, once the Greater Karachi Water Supply Scheme (K-IV project) becomes operational, large volumes of water will be extracted from the Keenjhar Lake with consequent negative impact on the bird populations.

Illegal hunting and live trapping of birds, particularly the migratory birds is common in JWR, and has led to a considerable decline in bird populations. This is exacerbated by a loss of natural habitat caused by removal of vegetation cover.

### 5.2.2 Bats

Anthropogenic impacts on the bird population of JWR are not documented in literature but are likely to include habitat degradation and disturbances caused by new developments in JWR.

### 5.2.3 Habitat and Vegetation

Thatta district is vulnerable to various natural and human induced hazards including floods, cyclones, droughts, sea intrusion, water logging and salinity, and earthquakes.[27] Droughts are common in JWR and have worsened in recent years because of climate change.

New developments in JWR, particularly construction of new infrastructure as well as the increasing traffic have led to habitat degradation and soil erosion. Off-road driving generates dust which settles on the plants and inhibits their photosynthetic activity. Alien invasive species such as mesquites have increased in number because of these habitat disturbances.

### 5.2.4 Employment

The Thatta district is rated among one of the poorest districts of Pakistan. The communities in this district have suffered greatly in the wake of disasters and have been displaced, with corresponding harm to their culture and livelihood practices. The absence of rights (over land), lack of access to other productive resources and non-availability of formal protection and social safety nets has reduced the social resilience and coping capacities of the communities. The displacement and migration of people has exacerbated social tensions and placed additional stresses on people and resources.

The local communities of JWR are living on the brink of poverty. There is limited small scale farming in the area constrained by availability of water. Increasing population, uncertain rainfall patterns, drought, and climate change have put pressure on the natural resources leading to an increase in unemployment. Livelihood patterns have altered and the people engaged in traditional livelihoods of agriculture and livestock rearing have largely changed their profession after a reduction in their incomes from such livelihoods.

### 5.2.5 Gender

The women in Jhimpir are marginalized and have limited access to clean water, sanitation, health, and education facilities. There is a pronounced gender disparity and most women are not permitted to take up employment or take part in formal decision-making processes.

All external stressors such as economic hardships, water scarcity, droughts and climate change create gender differentiated impacts or stresses. For women, who already face

[27] District Disaster management Plan Thatta, June 2017-June 2027, PDMA, Sindh.

poverty and marginalization perpetuated by minimal landholdings, rising familial burdens, parochial mind-sets and religious restrictions, these impacts are exacerbated. New and existing developments in JWR are likely to cause additional stresses for women in terms of increased safety and security risks and mobility restrictions.

# 6. Proposed Management Measures

Effective application of the mitigation hierarchy (avoid, minimize, restore, and compensate/offset) in the environmental and social management of expected cumulative impacts is recommended as best practice. This section provides an overview of the relevant management measures which should be implemented by the participating WPP developers to manage and minimize the negative impacts of wind power development on each VEC prioritized in the previous section.

**Exhibit 6.1** describes the management measures which can be implemented by participating WPP developers individually and collectively. For the environment VECs *viz.* birds, bats, habitat and vegetation, thresholds have been determined and are described in more detail in **Appendix A** (Birds) and **Appendix B** (Bats). An essential part of threshold setting is the development of an adaptive management mechanism. An exceeded threshold trigger leads to an adaptive management response which comprises an investigation into the circumstances that led to the threshold being exceeded. Based on the findings of this investigation an appropriate action is taken. In other words, the management/mitigation actions are essentially a set of tools that the project can implement depending on the circumstances that led to the threshold being exceeded. **Exhibit 6.1** for bird and bats is, therefore, divided into two sections i) good practice measures to be implemented by all participating WPP developers and ii) management measures which may be triggered if a threshold is exceeded. This list of management measures is not an exhaustive list. In line with the principle of adaptive management, other relevant management measures may be implemented after an evaluation of the reasons which caused the threshold to be exceeded.

**Exhibit 6.1** also outlines the relevant phase of project development during which a management measure is applicable i.e. design phase, construction phase and operations phase. Management measures for the design phase are not applicable to the Priority Projects since these projects are already in advanced stages of construction.

**Exhibit 6.1** provides targets for the social VECs i.e., local employment, as well as gender - engagement and empowerment. Relevant management measures to achieve these targets are also outlined.

While JMMF implementation is the primary responsibility of the participating wind power project developers, other stakeholders such as government departments and NGOs can also play an important role in managing cumulative impacts of wind power development in JWR. **Exhibit 6.2** provides a list of suggested management measures which can be implemented by these other stakeholders. The participating WPPs will engage individually or collectively with these stakeholders, to encourage them and promote effective environmental and social governance in JWR.

**Exhibit 6.1:** Management Options and Mitigation Measures for WPPs

**Valued Environmental and Social Component (VEC): Birds**

| *Aspect* | *Indicator* | *Threshold* | *Management Action* | *Means of Verification* | *Reporting Frequency* | *Relevant project phase* | *Comments* |
|---|---|---|---|---|---|---|---|
| Bird Collision and Mortality | Corrected bird fatality rates* derived from systematic post-construction fatality monitoring programs (See Appendix C for details) | ***Good practice measures to be implemented by participating WPPs*** | | | | | |
| | | NA | **Development of protocols** to standardize practice:** Appropriate protocols should be developed to ensure that all actions are undertaken in a consistent manner and appropriate data is collected to make decisions. This information should be included in the relevant project documents. Protocols should align with industry good practice guidelines and be designed by an ornithologist experienced in evaluating bird collision risks at wind farm developments. | Protocol documents developed | One time for development of protocols prior to JMMF implementation. The protocols can be reviewed annually to see if revisions are required | Before operations | The IFC's Super 6 WPPs will develop the protocols as part of their operational phase Biodiversity Management Plan, with support from IFC. Other participating WPPs can adopt these protocols. |
| | | | **Establishment of data sharing mechanism:** A forum to be developed to share data and information among the participating WPP developers | Establishment of a Data mechanism overseen by the Advisory Committee. | Quarterly | Before operations | Participating developers can share information on bird fatality monitoring as well as success of management measures. |

| *Aspect* | *Indicator* | *Threshold* | *Management Action* | *Means of Verification* | *Reporting Frequency* | *Relevant project phase* | *Comments* |
|---|---|---|---|---|---|---|---|
| | | | **Bird migration tracking:** Using a series of pre-determined vantage points, the flight activity of birds will be tracked jointly by the WPP field observer teams. | Bird migration tracking route maps. | Bird migratory periods (Spring/Autumn) | Design | This measure is only relevant for WPPs which are in design phase or pre-design phase, and can implement as part of their project specific baseline programs. An assessment of the bird migration routes can help decide placement of the WPP turbines. |
| | | | **Micro-siting and alignment of wind turbines:** Turbines should be micro-sited to provide the maximum gap between turbines, especially along the axis of likely migration routes for birds. | Detailed design reports | One time reporting after completion of project design phase. | Design | This is only relevant for WPPs which are in design phase or pre-design phase. |
| | | | **Joint trainings:** Joint training sessions to ensure comparable observer standards are maintained across all project sites for bird and bat observations. | Training Report | Annual | Operations | The Advisory Committee can coordinate the organization of joint trainings |

| *Aspect* | *Indicator* | *Threshold* | *Management Action* | *Means of Verification* | *Reporting Frequency* | *Relevant project phase* | *Comments* |
|---|---|---|---|---|---|---|---|
| | | | **Coordination between observers' network** Coordination between different project site specific survey teams | Establishment of an Observer Networks Sub-committee, overseen by the Advisory Committee | Quarterly | Operations | This will maximize benefits so different teams can coordinate with each other and share information on number and species of bird fatalities as well as effectiveness of management measures |
| | ***Management measures to be implemented if thresholds exceeded*** | | | | | | |
| | Corrected bird fatality rates derived from systematic post-construction fatality monitoring programs (See **Appendix C** for details) | See **Appendix A*** ** | **Installation of bird flight diverters** in case aerial powerlines are installed**:** Bird flight diverters [28] can be installed on existing project power lines to minimize bird collisions. The configuration, which includes type and frequency of bird flight diverters should be based on industry good practice, relying on local examples of successful installation if available. | No. of bird flight diverters installed | After installation | Construction and operations | In case aerial powerlines are installed, each developer will be responsible for installing these diverters for their project transmission lines - short sections of interconnector line from the WPP to the substation. Need for bird diverters should be identified during the baseline flight |

[28] Reflector card with clip attachment. Cost varies between USD 35 – 110 per diverter and lasts roughly 3 – 5 years.

| *Aspect* | *Indicator* | *Threshold* | *Management Action* | *Means of Verification* | *Reporting Frequency* | *Relevant project phase* | *Comments* |
|---|---|---|---|---|---|---|---|
| | | | | | | | activity monitoring surveys and be installed as part of the construction phase activities if necessary. If a critical risk arises during the operational phase of a project, for instance there is a substantial increase in Houbara Bustard fatalities along these lines. In this case, the individual WPPs may install bird flight divertors as part of lender requirements relating to no-net loss of key biodiversity |
| | | | **Removal of livestock carcass:** Each project developers will be responsible for removing livestock carcasses from their leased area | Record no. of livestock carcasses removed as well as dates of removal | Bi-annual | Operations | Vultures feed on livestock carcasses. These should be removed to discourage vultures from visiting. |

| *Aspect* | *Indicator* | *Threshold* | *Management Action* | *Means of Verification* | *Reporting Frequency* | *Relevant project phase* | *Comments* |
|---|---|---|---|---|---|---|---|
| | | | **On-demand temporary adjustments to operations:** e.g. micro-shut downs will be considered as the last option and can only be implemented if in compliance with the contractual/ legal framework under the EPA, Implementation Arrangement (IA) and other project contracts | Report | Event specific as well as quarterly during operations | Operations | This may be required during a bird migratory period. The shut-down will only be required if the threshold is exceeded for a priority bird species (**Appendix A**) and no other options are viable. Protocols will be established which will include the conditions for shutdown and resumption of operation, required communications between field observers and wind farm operator, and information to be recorded in the event of a shutdown |

Notes:

*Corrected fatality estimates will be calculated using the fatality observed by field surveyors. Details will be provided in the operational phase Biodiversity Management Plans, which are currently being developed by IFC's Super 6 projects with support from IFC.

**Bird monitoring protocols will be defined in the operational phase Biodiversity Management Plans, which are currently being developed by IFC's Super 6 projects with support provided by IFC. These protocols can be adopted by new participating WPPs which decide to participate in the JMMF in the future.

*** If a threshold is exceeded, an investigation will be conducted by the WPP developer's biodiversity specialist to investigate the reason behind the exceeded threshold. The outcome of the investigation will be discussed, and an appropriate action agreed.

## Valued Environmental and Social Component (VEC): Bats

| *Aspect* | *Indicator* | *Threshold* | *Management Action* | *Means of Verification* | *Reporting Frequency* | *Relevant project phase* | *Comments* |
|---|---|---|---|---|---|---|---|
| Bat collision and Mortality | Corrected bat fatality rates* derived from systematic post-construction fatality monitoring programs (See Appendix C for details) | ***Good practice measures to be implemented by participating WPPs*** | | | | | |
| | | NA | **Development of protocols** to standardize practice:** Appropriate protocols should be developed to ensure that all actions are undertaken in a consistent manner and appropriate data is collected to make decisions. | Protocol documents developed | One time for development of protocols prior to JMMF implementation. The protocols can be reviewed annually to see if revisions are required | Before operations | If fatality monitoring shows bat thresholds are being exceeded, the IFC's Super 6 WPPs will develop the protocols as part of their operational phase Biodiversity Management Plan with support from IFC. Other participating WPPs can adopt these protocols. |
| | | | **Establishment of data sharing mechanism:** A forum to be developed to share data and information among the participating WPP developers | Establishment of a Data mechanism overseen by the Advisory Committee. | Quarterly | Before operations | Participating developers can share information on bat fatality monitoring as well as success of management measures. |
| | | | **Joint trainings:** Joint training sessions to ensure comparable observer standards are maintained | Training Report | Annual | Operations | The Advisory Committee can coordinate the organization of joint trainings |

| *Aspect* | *Indicator* | *Threshold* | *Management Action* | *Means of Verification* | *Reporting Frequency* | *Relevant project phase* | *Comments* |
|---|---|---|---|---|---|---|---|
| | | | across all project sites for bird and bat observations. | | | | |
| | | | **Coordination between observers' network** Coordination between different project site specific observer groups on fatality monitoring | Establishment of an Observer Networks Sub-committee, overseen by the Advisory Committee | Quarterly | Operations | This will maximize benefits so different teams can coordinate with each other and share information on number and species of bat fatalities as well as effectiveness of management measures |
| | Corrected bat fatality rates derived from systematic post-construction fatality monitoring programs (See Appendix C for details) | ***Management measures to be implemented if thresholds exceeded*** | | | | | |
| | | See **Appendix B***** | Selective 'curtailment' of turbines with high bat fatality rates. Curtailment involves restricting turbine operation to higher wind speeds when bat activity is relatively low. This will need to be conducted in compliance with the contractual/ legal framework under the EPA, Implementation Agreement (IA) and other project contracts, as relevant | Curtailment report | Event specific as well as quarterly during operations | Operations | The curtailment will only be required if the threshold is exceeded for a bat species (**Appendix B**). Protocols will be established which will include the conditions for curtailment and resumption of operation, required communications between field observers and wind farm operator, and information to be |

| *Aspect* | *Indicator* | *Threshold* | *Management Action* | *Means of Verification* | *Reporting Frequency* | *Relevant project phase* | *Comments* |
|---|---|---|---|---|---|---|---|
| | | | | | | | recorded in the event of a shutdown |

Notes:

*Corrected fatality estimates will be calculated using the fatality observed by field surveyors. Details will be provided in the operational phase Biodiversity Management Plans, which are currently being developed by the Priority Projects with support from IFC.

**Bat monitoring protocols will be defined in the operational phase Biodiversity Management Plans, which are currently being developed by the Priority Projects with support provided by IFC. These protocols can be adopted by new participating WPPs which decide to participate in the JMMF in the future.

*** If a threshold is exceeded, an investigation will be conducted by the WPP developer's biodiversity specialist to investigate the reason behind the exceeded threshold. The outcome of the investigation will be discussed, and an appropriate action agreed.

**Valued Environmental and Social Component (VEC): Habitats and Vegetation**

| *Aspect* | *Indicator* | *Threshold* | *Management Action* | *Means of Verification* | *Reporting Frequency* | *Comments* |
|---|---|---|---|---|---|---|
| Guggul | Percentage decline compared to baseline (2022) in Guggul cover, in WPP leased land and buffer zone of 500 m | More than 20% decline in Guggul cover compared to the baseline will cause the threshold to be exceeded. | **Improving covered area of Guggul:** Plantation of Guggul within WPP leased land and buffer zone of 500 m. | ♦ No. of Guggul saplings planted in WPP leased land and 500 m buffer zone<br>♦ No of Guggul plants which have survived into next year | ♦ Once after revegetation<br>♦ Annually | Each WPPs will carry out plantation of Guggul within their leased land and 500m buffer zone around the leased land |
| Loss of Indigenous Vegetation Cover | Percentage decline compared to baseline (2022), in indigenous vegetation cover, in WPP leased land and buffer zone of 500 m (2022). | More than 20% decline in indigenous vegetation cover from the baseline will cause the threshold to be exceeded. | **Revegetation of cleared land area:** After construction, revegetation of the area if the area is not occupied by any project facility. | ♦ Report on revegetation activity including area revegetated<br>♦ Annual report on changes in land cover in leased land and | Once after revegetation | All areas cleared by WPPs including the EPC contractor should be revegetated |
| | | | **Erosion management:** During construction of project infrastructure and access roads, effort should be made not to block water passageways to minimize blockage and erosion in the event of a rainfall event.<br>Off track driving in JWR will not be permitted and speed limits should | ♦ Record of no. of inspections carried out and reported in the Environmental Management Plan. | Once during design stage and annually | This action is to be carried out by individual WPPs through the EPC contractors |

| *Aspect* | *Indicator* | *Threshold* | *Management Action* | *Means of Verification* | *Reporting Frequency* | *Comments* |
|---|---|---|---|---|---|---|
| | | | be followed by the WPP and construction staff | | | |
| Spread of Alien Invasive Species | Percentage increase in AIS compared to baseline (2022) in WPP leased land and buffer zone of 500 m (2022). | More than 20% increase in AIS cover from the baseline will cause the threshold to be exceeded. | **Harvesting of Mesquite:** Locals can be allowed to cut and harvest mesquite | ♦ Quantity of mesquite removed | Annually | Locals cut mesquite for personal use and sale |
| | | | **Awareness campaign on Alien Invasive Species (AIS):** Awareness sessions on the spread of AIS can be carried out with local and international NGOs and research groups. | ♦ Awareness event report | Annually | Awareness sessions can be arranged with the local communities and can include an introduction to the negative impacts of AIS, how to prevent their growth, and how to remove an AIS plant so it does not grow back. |

## Valued Environmental and Social Component: Employment

| *VEC Aspect* | *Indicator* | *Targets*[29] | *Proposed Management Measures/Actions** | *Means of Verification (MoVs) for Completed Actions*** | *Reporting Frequency* |
|---|---|---|---|---|---|
| Local employment | % of local people in each WPPs full-time staff | 15% | Incorporate local[30] employment requirements (targets) in corporate policies and manuals for achieving the local employment threshold | ♦ Corporate policies and manuals prepared and approved by Management | One time at inception |
| | | | Communicate employment opportunities and criteria regularly through use of appropriate means including staff, media, and other partners | ♦ Community meetings held for communicating employment details.<br>♦ Local media engaged for advertisements and announcements (print and electronic) | Monthly basis or as and when vacancies arise |
| | | | Undertake staff (HR Manager, CLOs) checks to identify issues in adjustment and retention of locally employed staff | ♦ Spot check reports<br>♦ Employee records and surveys<br>♦ Report on recruitment and retention issues of locally employed staff | On-going basis<br>Twice a year |
| | | | Review and assess achievements and limitations in local employment and identify issues for addressing limitations | ♦ Internal reviews, assessments<br>♦ Annual reports | Annual basis |
| Skill development and | No of local people provided on-or-off-job | As actual | ♦ Identify skills requirements and plan skill development programs for employees or community members | ♦ Training needs assessment reports<br>♦ Training plans | As planned (under corporate or CSR plans) |

[29] The proposed targets may be reviewed by the Advisory Committee (**Section 9)** and revised as necessary, in line with the principles of continuous improvement. This is to be achieved in a medium/long term (5-10 years), with the aim of having at least one skilled local staff member in the workforce.

[30] The term local employment shall refer to all those men and women living as permanent residents (bearing National Identity Cards) within, around or in the immediate catchment of one or more WPPs in (i) UC Jhimpir (ii) UC Jungshahi and (iii) UC Mahal Kohistan in district Thatta and UC Moondar Khan in district Jamshoro. The term local can also extend to men and women living in UCs Jangri and Oonghar of district Thatta, followed by the entire tehsil Thatta and finally the entire tehsil Thano Bula Khan. See **Exhibit 11.9**

| *VEC Aspect* | *Indicator* | *Targets*[29] | *Proposed Management Measures/Actions** | *Means of Verification (MoVs) for Completed Actions*** | *Reporting Frequency* |
|---|---|---|---|---|---|
| livelihood promotion*** | skill development training(s) | | ♦ Undertake refresher trainings to enhance and upgrade skills | ♦ CSR training plans | |
| | No of locals with access to alternative livelihoods | As actual | ♦ Livelihoods programmes organized for beneficiaries<br>♦ TVET (Technical and Vocational Education and Training) opportunities organized for locals<br>♦ Locals engaged on petty contracts and/or other service provision (sub-contracts) | ♦ Livelihood programmes/initiatives<br>♦ TVET programmes conducted<br>♦ Copies of contracts and sub-contracts | Annual reporting or as needed |
| **Overall Objective:** The WPPs promote and practice fair and equal work opportunities for all, focusing on employment opportunities for the local population of JWR and undertake initiatives to promote livelihoods of the local community. | | | | | |

Notes:

*The management actions/measures listed above apply to proposed actions/measures taken by the WPPs at the individual level.

**Not all MOVs may be required for confirming compliance. The list consists of key recommended measures and others may be added.

***Skill development and livelihood promotion will be carried out in conjunction with CSR programs. More details are provided in Section 8.

**Valued Environmental and Social Component: Gender**

| *VEC Aspect* | *Indicator* | *Targets* | *Proposed Management Measures/Actions* | *Means of Verification (MoVs) for Completed Actions* | *Reporting Frequency* |
|---|---|---|---|---|---|
| Engagement[31] | • No. of WPP staff trained in gender-sensitive community engagement<br>• No. of meetings conducted with community women<br>• No. of women provided information/basic orientation on WPPs with a focus on promoting empowerment | • At least one gender focal person working with each WPP<br>• One women focused meeting as part of the induction training for new staff<br>• Quarterly meeting with community women | • Allocate a gender specialist to develop a gender plan and facilitate implementation<br>• Engage and train staff on gender issues | • Relevant staff hired/assigned<br>• Gender plan<br>• Staff given gender training | Twice a year |
| | | | • Develop initiatives to foster more participation of community women in the women focused meetings<br>• Develop and disseminate appropriate messages on promoting empowerment for local women<br>• Institute feedback mechanism on how information disseminated has been received, understood and (where applicable) acted upon | • Meeting material<br>• Attendance sheets of women participating<br>• Meetings' minutes<br>• Feedback sheets or similar | Quarterly |

[31] In order to build in the required flexibility, the reporting on engagement indicators can be based on multiple indices such as those given in the matrix above. Other relevant indicators can also be added later on. The term mechanism for instance applies to measures (resources, strategies) that may be employed for engaging with women. Also, in order to measure engagement, it is noted that while the output level indicators are important to ascertain frequency of women engagement and participation, it may be necessary to devise independent and comprehensive third-party assessments to determine the *quality* of women engagement in line with the social mobilization and women empowerment principles e.g. increase in women's voice, agency and inclusion.

| *VEC Aspect* | *Indicator* | *Targets* | *Proposed Management Measures/Actions* | *Means of Verification (MoVs) for Completed Actions* | *Reporting Frequency* |
|---|---|---|---|---|---|
| Women employment and alternative livelihoods support | % of women employed by the WPPs in all categories at head-office | 15% [32] | ♦ Develop and institutionalize gender action plans* (with targets)<br>♦ Integrate more gender inclusive employment strategies<br>♦ Facilitate conducive working conditions and environment for women workers | ♦ Employment data records<br>♦ Monthly, quarterly and annual reports prepared and available on gender disaggregated employment data across all categories | Quarterly and annually |
| | Salary paid to employed men and women in the same position | NA | ♦ Establish company policy that men and women in the same positions will be paid same salary | ♦ Report based on payroll showing parity of salaries paid to men and women in the same position | One-time (for policy)<br>Quarter or annual reports |
| | No. of women supported for alternative livelihoods development (in line with the CSR Framework described in **Section 8**) | NA | ♦ Review/revise, formulate women training needs<br>♦ Plan and implement women focused livelihood development programmes<br>♦ Identify and prioritize women for training | ♦ List of programmes and initiatives<br>♦ List of women beneficiaries<br>♦ List of skills developed/imparted<br>♦ Referrals provided | As actual |
| Grievance redressal for women | Establishment of GRM | 01 (Establish a user-friendly GRM) | ♦ Prepare SOPs and protocols for GRM in documented form | ♦ One-time preparation and revision on an annual basis | One time at inception |
| | | | ♦ Ensure awareness raising and accessibility of GRM for women which is visible, safe and secure, easily accessible | ♦ Records of meetings held<br>♦ Attendance sheets of participants<br>♦ Placement of signs and boxes<br>♦ Print and electronic media records | As actual |

[32] This target is aspirational (to be achieved in 5-10 years), and it should be revised annually in order to ensure a sustained increase over time. This target does not preclude individual WPP to go beyond the common target and/or to employ women at operational sites.

| *VEC Aspect* | *Indicator* | *Targets* | *Proposed Management Measures/Actions* | *Means of Verification (MoVs) for Completed Actions* | *Reporting Frequency* |
|---|---|---|---|---|---|
| | | | and easy to use for all women[33] | ♦ Documented system for verbal and written complaints | |
| | No. of complaints filed by women related to WPPs are received/documented | NA | ♦ Review, filter, and direct complaints received through the GRM | ♦ Receipts and records of complaints<br>♦ Note/report on actions to be taken and responsibility assigned | On-going basis |
| | No. of complaints addressed by the WPPs and the complainant notified | NA | ♦ Address complaints received from women and ensure necessary actions are taken | ♦ Brief reports available on investigation and action taken<br>♦ Documentation of cases and reasons for complaints not entertained<br>♦ Minutes of meetings held for resolution/redressal or referrals provided | On-going basis |
| Overall Objective: The WPPs adopt and integrate gender mainstreaming across the project cycle and take measures to promote women inclusion, engagement and participation across the project cycle including grievance redressal. | | | | | |
| Notes:<br>* It is noted that the Priority Project developers have carried out a number of gender assessments/studies but have not yet developed project specific Gender Action Plans (GAPs). GAPs are a tool used to *ensure* gender mainstreaming and consist of clear activities, targets, resources and responsibilities. GAPs help address gender equality issues, facilitate women's involvement, participation in, and tangible benefits from the project and help form an objective basis for resource allocation. | | | | | |

[33] The GRM is established with well-defined procedures; is fully explained and made visible through appropriate means; is communicated to all stakeholders; the system is user-friendly and compatible with local languages of the JWR; the system includes a system for submitting verbal and written complaints; the system is transparent and allows for issuing complaint numbers or receipts to complainant for tracking purposes and the system is well advertised within the JWR through print and visual aids.

**Exhibit 6.2:** Suggested Measures to be Implemented by Other Stakeholders

| *VEC* | *Management Action* | *Means of Verification* | *Lead Role* | *Supporting Role* |
|---|---|---|---|---|
| Birds | Prepare a baseline report on bird abundance and diversity in the JWR | • Baseline report on bird species of JWR | • Sindh Wildlife Department (SWD) to compile the baseline using information provided by WPPs as well as additional data collected from field surveys | • Participating WPPs to share existing available information from IEEs and monitoring reports<br>• Participating WPPs to fill gaps by collecting additional information from leased land and vicinity<br>• Non-Governmental Organizations and civil society to assist SWD in reviews |
| Bats | Prepare a baseline report on bat abundance and diversity in the JWR | • Baseline report on bat species of JWR | • Sindh Wildlife Department (SWD) to compile the baseline using information provided by WPPs as well as additional data collected from field surveys | • Participating WPPs to share existing available information from IEEs and monitoring reports<br>• Participating WPPs to fill gaps by collecting additional information from leased land and vicinity<br>• Non-Governmental Organizations and civil society to assist SWD in reviews |
| Habitat and Vegetation | Prepare a baseline report on vegetation of JWR | • Baseline report on vegetation in JWR | • Sindh Forest Department (SFD) to compile the baseline using information provided by WPPs as well as additional data collected from field surveys or satellite imagery | • Participating WPPs to share existing available information from IEEs and monitoring reports<br>• Participating WPPs to develop vegetation baseline of their leased and 500 m buffer zone, and share this baseline with the SFD<br>• Non-Governmental Organizations and civil society to assist SFD in reviews |
| | Improve covered area of Guggul in JWR outside the WPP leased land | • No. of saplings planted outside the WPP leased land<br>• No of plants which have survived into next year | • Sindh Forest Department can establish Guggul nursery and try experimental plantations<br>• If successful, the Guggul plantations can be extended to the wider JWR area | • Participating WPPs as part of their CSR activities can support the SFD in plantations |
| | Plantation drives to plant indigenous | • Report on plantation drive | • Sindh Forest Department | • Non-Governmental Organizations can provide support in the plantation activities |

| *VEC* | *Management Action* | *Means of Verification* | *Lead Role* | *Supporting Role* |
|---|---|---|---|---|
| | plants and improve vegetation cover | | | • Participating WPPs as part of their CSR activities can provide funding for the plantation drive |
| | Drive to remove Alien Invasive Species (AIS) | • Report on removal of AIS | • Sindh Forest Department | • Local communities encouraged to remove mesquite and sell for firewood |
| | Maintain vehicle speed limits and discourage off road driving | • Report on number of speed limit violations | • District Administration | • Participating WPPs to ensure speed limits are maintained for company vehicles and staff |
| Employment | Support locals from JWR to participate in government vocational training programs | • Number of individuals trained in a particular discipline | • Government vocational training institutes<br>• NGOs/INGOs | • Participating WPPs as part of their CSR activities |
| | Organize government vocational training programs in JWR | • Number of individuals trained in a particular discipline | • Government vocational training institutes | • Participating WPPs as part of CSR activities |
| Gender | Carry out women focused social mobilization activities | • Number of women groups formed or organized<br>• Number of women reached out to | • Women focused CBOs/NGOs | • Participating WPPs as part of their CSR activities |
| | Carry out awareness raising campaigns | • Number of women reached during campaigns | • NGOs working on gender and women rights | • Participating WPPs as part of CSR activities |
| | Provide technical and vocational skills training to women | • Number of women provided technical and vocational skills opportunities | • UN agencies, Rural Support Organizations | • Participating WPPs as part of CSR activities |

# 7. Monitoring and Reporting

## 7.1 Approach

Successful implementation of the JMMF management measures is key to achieving its objectives i.e., minimizing the cumulative impacts on the VECs of the Study Area. To verify that the management measures are properly implemented, and to evaluate the progress of implementation, monitoring at individual WPP and at collective level is proposed. This is discussed in the following sections.

### 7.1.1 Monitoring by Individual WPPs

It is recommended that all participating WPP developers provide a quarterly update to the Advisory Committee on:

- implementation of the JMMF management measures
- progress made against exceedance of thresholds or achievement of targets
- reasons for lack of progress/gaps and
- what remaining actions are being undertaken to overcome gaps (if any)

The proposed Table of Contents of the reports are outlined in **Appendix C**.

### 7.1.2 Monitoring by the Advisory Committee

An evaluation of successful implementation of the JMMF will be carried out using the method outlined below.

#### *Environment VEC*

For the environment VECs, *viz.* birds, bats, habitat and vegetation, information on the indicators, as well as whether thresholds have been exceeded for these indicators, will be collected by individual WPPs. The status of implementation of the relevant management measures (**Exhibit C.2, Exhibit C.4 and Exhibit C.6**) will also be reported. **Exhibit C.11** provides a template for reporting on the environment VECs.

The leader of the Advisory Committee (or representative from his/her WPP) will compile the information from all participating WPPs and present for discussion during the quarterly meetings of the Advisory Committee.

#### *Social VEC*

**Exhibit C.12** provides a template for reporting on the social VECs *viz.* employment and gender. Information on the indicators as well as to what extent the targets have been achieved will be collected by individual WPPs. The status of implementation of the relevant management measures (**Exhibit C.8, Exhibit C.10)** will also be reported.

The leader of the Advisory Committee (or representative from his/her WPP) will compile the information from all participating WPPs and present for discussion during the quarterly meetings of the Advisory Committee.

# 8. Corporate Social Responsibility

An organization's Corporate Social Responsibility (CSR) refers to how it achieves a balance between its economic, social, and environmental responsibilities to address stakeholder concerns and expectations while maximizing its positive impacts and minimizing its negative impacts. The importance of effective CSR programming in the mitigation of social risks and fostering harmonious community relations in the Jhimpir Wind Region (JWR) cannot be understated. The CSR themes discussed here may help lower risks in areas such as community health, gender equality, and employment, and are aligned with the VECs discussed in earlier sections.

This section summarizes the existing CSR activities of the WPPs in the JWR and outlines a proposed framework for future CSR initiatives. These initiatives can be implemented either individually or collectively to maximize benefits both for the local communities as well as the WPP developers.

## 8.1 Overview of Existing CSR Framework and Activities

The Priority Project developers have implemented several CSR activities in JWR. They view CSR as a voluntary mechanism to contribute towards the well-being of the local communities in JWR, particularly in the vicinity of their WPP. The developers support a range of Sustainable Development Goals (SDGs)[34] in JWR with individual CSR initiatives currently implemented or planned by the developers focusing on:

- Clean Water and Sanitation: Developers provide potable water to the communities in the vicinity of their project through various means, including installing hand pumps and supplying water tankers from local contractors
- Employment and Economic Growth: Preferential employment and business opportunities are provided to local unskilled laborers, suppliers, and contractors. The developers are also exploring providing technical and vocational training to the local communities of JWR, as well as investing in livestock support
- Good Health and Well-being: Medical facilities such as ambulances, medical camps, and onsite dispensaries are provided to the JWR communities by some of the WPP developers
- Quality Education: The Priority Projects support education among the local communities through donations, sponsoring teachers, as well as the construction of schools (in some cases)
- Infrastructure: The Priority Projects have improved or constructed local infrastructure such as access roads.

[34] The Sustainable Development Goals (SDGs), also known as the Global Goals, were adopted by all United Nations Member States in 2015 as a universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity by 2030.

CSR is managed by diverse teams consisting of HSE (Health Safety and Environment) officers, CSR managers, Community Liaison Officers (CLOs), and representatives from the senior management. However, since Priority Projects are in various stages of development, the resources allocated are not uniform. For example, some projects have a dedicated CSR manager and a female community liaison officer, while others do not. Similarly, some WPPs have written CSR policies, whereas others are in the process of formulating them. In some Priority Projects, there are no defined budgets or formal minimum or maximum thresholds for CSR spending, and allocations for CSR initiatives are made according to need, whereas in other projects, there is a budget allocated for community development. Additionally, some Project Developers cannot commit to a CSR budget during the construction phase.

Overall, the developers' current practice of CSR can be observed to be more short-term and philanthropic in nature, as opposed to strategic long-term social investment. However, other WPPs[35] that have operated for longer periods in the region Exhibit similar approaches to CSR. This is likely due to shared contextual limitations including regional socio-economic deprivation, tribal fragmentation,[36] lack of female mobility, seasonal migration, and security concerns. COVID restrictions and the resulting economic fallout have further exacerbated existing problems for some.

## 8.2 Contextual Issues and Concerns

The Study team carried out interviews with the Priority Project developers between February 4 and 13, 2021. Based on information derived from these interviews, this section summarizes the issues, problems, and concerns faced by the Priority Project developers in implementing CSR activities in the JWR.

### Managing Community Expectations

Community expectations and needs in JWR are complex due to the prevalent economic marginalization and lack of infrastructure. Despite limited education and training, the communities have high demands from the WPPs for employment and other benefits.

### Risk Management

Risk management is a significant driver in the selection of CSR initiatives since the Priority Projects belong to reputable groups with international stakeholders and clients. An accident or issue at one site in JWR can jeopardize the reputation of the entire group. Therefore, individual developers prefer investing in conservative programs without an underwriter like the government and cross-sector partners.[37]

### Limited Financial Space Available to Project Developers

The WPPs face financial challenges due to low tariffs offered by NEPRA, delayed payments, and changing government policies. Moreover, due to the long gestation or

[35] Desk research was carried out on initiatives of FFC Energy Wind Project, Master Wind Energy Ltd, and Zorlu Enerji Pakistan.

[36] Tribal fragmentation will not be conducive to large, joint project likes a health center or school as an attitudinal change will take time to achieve.

[37] Respondents were especially concerned at the suggestion of a joint health center as even an accidental death could result in media backlash for the whole group.

breakeven period of the Return on Investments and other financial ratios, the projects are hesitant to commit long-term monetary resources for CSR initiatives. Projects in the construction phase usually do not want to commit to CSR activities until they go into operation.

**Maintaining Gender Balance in CSR Initiatives**

Some developers have observed that due to the complex gender relations in the area, programs or initiatives aimed directly at women's empowerment or mobility pose a risk to community relations. Most CSR teams of the WPP developers try and maintain a gender balance and often engage a female community liaison officer to mitigate the risk of exclusion of female stakeholders in CSR initiatives.

The WPP developers need to evaluate how to implement more gender-sensitive and inclusive programmes, keeping in mind the particular local context. One option is to make investments in livestock and agricultural support as an effective means of increasing the overall well-being of households in a tribal and gender-neutral manner.

**Partnering with Non-Profit Sector**

Due to restricted budgets, partnering with the non-profit sector is challenging. Most NGOs have their own priorities and agenda, and may not always be able to implement activities in line with the requirements of the developers.

**Relationships and management of expectations with Regulatory Agencies and Sindh Government**

There is a new interest from various public sector stakeholders to report on CSR initiatives. These include National Electric Power Regulatory Authority (NEPRA), Sindh Environmental Protection Agency (SEPA), Alternative Energy Development Board (AEDB), and the District Administration. This is problematic since each stakeholder has different priorities, expectations, and reporting requirements.

**Collective Activities**

The developers are open to exploring a collaborative CSR approach among the Priority Projects to generate more sustainable benefits for the local communities and create a united industry voice to interact with institutional stakeholders like NEPRA. However, the potential barriers to collaboration[38] remain unaddressed including the need for transparency, a divergence of objectives, the financial viability of collaboration, additional associated costs, risk of mismanagement, and implementation partners' technical competence. In order to address these concerns, mitigate risks, and position collective CSR activities strategically, any future investments made in jointly developed[39] initiatives should be useful in the complex local context of the region.

## 8.3 Proposed CSR Framework

This section provides an overview of the proposed CSR framework to assist the Priority Projects in planning and implementing CSR programs. It is an optional guidance tool

[38] 'Collaborative Community Investment in the Jhimpir Wind Corridor' evaluation carried out by IFC in 2019.

[39] Multi-stakeholder dialogue and buy-in is suggested for developing sustainable community development initiatives.

designed to facilitate the navigation and achievement of individual and collective CSR goals and can be adapted in line with the priorities of each developer.

### 8.3.1 Individual CSR measures

In the absence of collectively agreed-upon standards for CSR, the ISO 26000:2010 Guidance on Social Responsibility[40] was utilized to derive broad CSR guidelines for assessing the developers' CSR initiatives and provide recommendations for implementing CSR initiatives in JWR.

ISO 26000 defines CSR as an organization's responsibility for the impacts of its decisions and activities on society and the environment, through transparent and ethical behavior that:

- contributes to Sustainable Development, including health and the welfare of society;
- takes into account the expectations of stakeholders;
- is in compliance with applicable laws and consistent with international norms of behavior;
- is integrated throughout the organization and implemented in its relations.

Keeping this in view, the four goals for CSR initiatives in JWR have been selected to include the following:

1. Contribution to sustainable development of the region
2. Incorporation of stakeholder expectations
3. Compliance with applicable regulations[41]
4. Integration within the organization and relationships.

These have further been sub-categorized into potential goals and indicators considering current CSR programming within the Priority Projects and local community issues[42] in the Jhimpir Region. The sub-goals can be adapted by each Priority Project, as they consider relevant.

**Exhibit 8.1** provides a guiding framework including the goals and recommended measures for implementing CSR initiatives individually by the Priority Projects. Current practices among the Priority Projects to meet each goal are also listed. The framework can be extended to other wind power project developers if they agree to participate in the JMMF.

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[40] The framework was chosen due to its comprehensiveness in addressing both the impact of Priority Project CSR programming and the processes directing it.

[41] In view of the evolving role of NEPRA and other organisations in CSR this guideline may be more relevant in the future.

[42] The top issues identified by the developers are 1) Water, 2) Health, 3) Skills & Livelihoods, 4) Education, and 5) Access to Energy. Source: IFC, "Jhimpir Wind – Scoping for Coordinated Approach towards Community Investment."

The term ‘affected communities’ in **Exhibit 8.1** refers to communities living in the vicinity of individual wind power projects[43] which may be impacted by the construction and operation of the wind power project.

[43] For example two km around the wind turbine location.

**Exhibit 8.1:** CSR Guiding Framework

| *Sub-Goal* | *Potential indicators*[44] | *Current Practice among Priority Projects*[45] | *Proposed CSR Measures* |
|---|---|---|---|
| **Goal 1: Contribution to the sustainable development of the region** | | | |
| Provide access to safe and affordable drinking water in affected communities | ♦ No. of people gaining access to basic drinking water services as a result of WPP's assistance<br>♦ No. of people benefiting from the adoption and implementation of measures to improve water resources management | Provision of regular water supply to the communities through:<br>♦ Trucking water<br>♦ Water storage tanks<br>♦ Water pumps | ♦ Provide training to community members from each village in construction and maintenance of water infrastructure (e.g., water storage tanks)<br>♦ Promote community ownership of water infrastructure and resources through regular interaction<br>♦ Train community members on responsible collective water usage for maintaining quality of water resources<br>♦ Provide awareness on the importance of WASH principles<br>♦ Provide basic sanitation facilities (e.g., latrines) |
| Improve access to healthcare in affected communities | ♦ No. of beneficiaries or patients (gender-disaggregated) facilitated | Improving access to quality healthcare through<br>♦ Medical camps and mobile clinics with a female local language doctor present<br>♦ Access to onsite medical facilities<br>♦ Covid awareness campaigns | ♦ Use leverage with government to establish hospitals and clinics in JWR<br>♦ Enable better access to government health resources for the local communities for instance by providing an ambulance |

[44] These indicators can be measured individually or collectively.

[45] As mentioned earlier, Priority Project CSR design and implementation is not uniform and the table lists current initiatives across the group.

| *Sub-Goal* | *Potential indicators*[44] | *Current Practice among Priority Projects*[45] | *Proposed CSR Measures* |
|---|---|---|---|
| | | | ♦ Provide medical camps and mobile clinics with a female local language doctor present<br>♦ Promote access to onsite medical facilities<br>♦ Conduct health and hygiene awareness campaigns<br>♦ Provide training to women as traditional birth attendants |
| Provide access to alternative[46] skills and livelihoods in affected communities | ♦ No. of beneficiaries (gender-disaggregated) of livelihood programs<br>♦ No. of people (gender-disaggregated) gaining access to vocational skills<br>♦ No. of beneficiaries (gender-disaggregated) of microfinance plans<br>♦ Amount (in PKR) of microfinance provided to local communities | ♦ Provision of vocational training to men in electrical, welding, and plumbing trades<br>♦ Skill development training in sewing and stitching for local women | ♦ Provide internships<br>♦ Provide vocational training to both men and women through a purpose-built vocational training center<br>♦ Support non-controversial interventions for women such as vocational training in stitching and the provision of sewing machines<br>♦ Provide micro-finance loans to both men and women<br>♦ Arrange a visiting livestock veterinarian to provide advice<br>♦ Organize training programs in livestock health and care with special quotas for women's participation |

[46] Local employment is captured under cumulative impacts.

| *Sub-Goal* | *Potential indicators*[44] | *Current Practice among Priority Projects*[45] | *Proposed CSR Measures* |
|---|---|---|---|
| Provide access to education in affected communities | • No. of students (gender-disaggregated) benefiting as a result of interventions<br>• No. of schools receiving support to rehabilitate infrastructure or install new equipment<br>• Amount (in PKR) assistance provided to schools for infrastructure improvement, teachers' fees, scholarships, children's uniforms<br>• No. or percentage of the local population using new or rehabilitated school infrastructure | Improving access to education by:<br>• Supporting schools<br>• Sponsoring teachers | • Facilitate transport to shared primary and secondary schools (buses)<br>• Invest in school infrastructure<br>• Sponsor schoolteachers<br>• Provide support for teacher training<br>• Provide scholarships for higher education |
| Provide access to energy in affected communities | • No. of households/people in the affected villages with access to reliable, safe, and affordable energy | • Providing solar power panels | • Provide subsidized solar power units to local communities<br>• Train locals in repair and maintenance of solar equipment |
| **Goal 2. Incorporation of stakeholder expectations** | | | |
| Engage with stakeholders | • No of meetings held with affected communities and other stakeholders<br>• No of stakeholders engaged | • Hiring a female Community Liaison Officer (CLO) who can speak the local language<br>• Conducting stakeholder meetings before project development<br>• Conducting regular stakeholder meetings with local communities as per the project approved Stakeholder Engagement Plan (SEP) | • Organize regular community stakeholder meetings (for example, separate quarterly meetings for males and females in the local language).<br>• Hire at least one female Community Liaison Officer (CLO) who can speak the local language skills as part of the E&S team |

| *Sub-Goal* | *Potential indicators*[44] | *Current Practice among Priority Projects*[45] | *Proposed CSR Measures* |
|---|---|---|---|
| Address issues of concern to stakeholders | ♦ Grievance Redressal Mechanism in place<br>♦ No. of grievances received and addressed | ♦ A Stakeholder Engagement Plan and Grievance Redress Mechanism is developed by the Priority Projects but not always implemented | ♦ Develop and implement a Stakeholder Engagement Plan<br>♦ Put in place a Grievance Redressal Mechanism<br>♦ Make a complaint box accessible to all members of the community, including women<br>♦ Appropriate two-way communication methods like social media engagement[47] are explored for local communities |
| Inclusive and accessible communication | ♦ Information about project and project-sponsored initiatives is accessible to stakeholders | ♦ Some Priority Projects engage regularly with the local communities and provide information about the project | ♦ Provide information about project and project-sponsored initiatives in a form and language accessible to various stakeholders |
| **Goal 3. Compliance with applicable regulations** | | | |
| Compliance with regulatory framework and reporting to relevant authorities | ♦ CSR initiatives comply with local regulations<br>♦ Reports submitted to relevant authorities | N/A | ♦ Identify regulatory compliance requirements<br>♦ Implement measures to comply with regulatory requirements<br>♦ Provide reports to relevant public sector bodies<br>♦ Take into consideration NEPRA Social Investment Guidelines 2021[48]. |

[47] The communities in the towns are active on social media including Facebook, Twitter and Whatsapp. There are discussions and complaints mostly in Sindhi language, regarding the WPPs and other industries.

[48] As per Draft NEPRA Social Investment Guidelines 2021, Part 3:3.4. Licensee will submit an annual report on its social investment, outlining annual spending, objectives and activities carried out.

| *Sub-Goal* | *Potential indicators*[44] | *Current Practice among Priority Projects*[45] | *Proposed CSR Measures* |
|---|---|---|---|
| **Goal 4. Integration within the organization and external relationships** | | | |
| CSR Policy | • CSR policy developed | • Not all Priority Projects have a CSR policy in place | • Prepare CSR policy with objectives, quantifiable and measurable targets, indicators, and performance measures |
| Human resources | • Relevant staff members hired | • Not all Priority Projects have a dedicated CSR manager or team | • A dedicated CSR team or manager is retained |
| Financial resources | • Dedicated annual CSR budget | • There is no consistent policy about funds to be dedicated to CSR | • Allocate an annual CSR expenditure budget |
| Cross-sector collaboration | • Number of organizations partnered with | • Some Priority Projects have partnered with an NGO to implement CSR measures | • Foster partnerships with non-governmental organizations<br>• Implement CSR activities with support of these organizations |
| Monitoring and evaluation | • Baseline data prior to CSR intervention is collected and available<br>• Quarterly internal reports on objectives, targets, and indicators prepared<br>• Annual review by senior management/board on progress and effectiveness of CSR initiatives[49]. | • Most Priority Projects report on CSR to their management | • Prepare a framework for CSR reporting<br>• Submit reports in line with agreed framework to senior management/board |
| External Communication | • Annual report (for external audience) has a section on CSR | N/A | • Prepare CSR section for annual report |

3.5. Licensee will submit a report on social investment for the period of five years immediately preceding the day these guidelines come into force.

3.6. Licensee will annually submit a draft social investment plan to the Authority to obtain input and guidance. The social investment plan may be used by the Authority to align social investment across the licensees.

[49] An external review every 3-5 years can be included to capture more long-term data.

| *Sub-Goal* | *Potential indicators*[44] | *Current Practice among Priority Projects*[45] | *Proposed CSR Measures* |
|---|---|---|---|
| | ♦ CSR information is available to all internal and external stakeholders, including communities (through website, social media, and Basic Information Documents translated into local languages) | | ♦ Update CSR related information on website and social media pages |

### 8.3.2 Potential Collective CSR measures

The previous section outlined measures that can be implemented individually by the WPPs to improve their CSR initiatives and programs. This section provides recommendations for measures that can be implemented collectively by the participating developers with support from the Advisory Committee (See **Section 9**). These are listed in **Exhibit 8.2**.

**Exhibit 8.2:** Potential Collective CSR Measures that can be implemented by Participating Developers

| *Aspect* | *Management Action* | *Management Responsibility* | *Monitoring Responsibilities* | *Foundational Components* |
|---|---|---|---|---|
| CSR working group | Establish and operate a CSR working group representing all developers | Advisory Committee | Advisory Committee | Dedicated staff from each WPP |
| Joint database | Establish a joint database | CSR Working Group | Advisory Committee | Dedicated group CSR database and information manager |
| Joint CSR fund | Establish a Joint CSR fund to carry out collective CSR initiatives | Advisory Committee / CSR Working Group | Advisory Committee | Collectively agreed annual contributions from WPPs and other stakeholders |

#### *CSR Working group*

It is suggested that a CSR working group representing each developer is formed, which can be convened physically or online for ongoing discussions on the feasibility of collaboration. The group can be instrumental in exploring a potential collaborative CSR approach in a structured and facilitated manner, addressing barriers, and refining CSR priorities. Systematic sharing of good practice in successful initiatives may also lead to grounded learning and benefits across the group.

**Composition**

The CSR working group should include representatives or CSR focal persons from each participating WPP developer. It is also recommended that Community Liaison Officers for each developer be included in the CSR working group.

**Objectives**

The purpose of the CSR Working Group is to initiate a conversation on the group's collective understanding of CSR and provide a forum for all involved developers moving forward. The CSR working group may specifically be tasked to:

- Identify common thematic areas for collective CSR initiatives
- Cooperate within identified thematic areas to strengthen cooperation, share good practice and expertise

- Identify economies of scale and scope (financial and non-financial), and provide grounded recommendations for replicating or scaling up successful initiatives
- Identify and address concerns and potential barriers to collaboration
- Support the establishment of a Joint CSR fund to carry out collective CSR projects
- Support the implementation of actions identified under the proposed thematic areas
- Monitor actions taken collectively by developers on activities related to CSR
- Identify inclusive methods for information dissemination of CSR-related information and success stories
- Establish new, and leverage existing cross-sector partnerships for improved implementation
- Present a coordinated front for external stakeholders
- Provide information and feedback to the Advisory Committee

If the working group concludes during an assessment period that sufficient benefits are accruing from potential collaborative CSR initiatives, further steps like a Joint Database and CSR Fund can be refined. Subsequently, tailored workshops, resource mapping exercises, and capacity-building activities addressing specific barriers to collaboration can be carried out.

### *Joint CSR Database*

As outlined earlier, the WPP developers support a range of Sustainable Development Goals (SDGs)[50] in JWR. A Joint Database to share and collate data can establish a baseline for the region and highlight cumulative positive impacts. For example, the total impact of the participating WPPs on improving access to health care or skill development in the JWR can be ascertained and shared with stakeholders. Such group reports could boost group reputation and demonstrate a positive impact in the region.

### *Joint CSR Fund*

For access to capital for any future joint CSR initiatives, a Joint CSR fund can be established with collectively agreed-upon annual contributions from WPPs and other stakeholders.[51]

As a first step, the fund may be used to retain a Joint CSR Manager to:

- Coordinate meetings of the CSR Working Group
- Maintain database and information

[50] The Sustainable Development Goals (SDGs), also known as the Global Goals, were adopted by all United Nations Member States in 2015 as a universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity by 2030.

[51] Some developers are of the view that any fund or investment made by the WPPs must also be supported by the government.

- Identify additional funding methods and streams for joint programs and Joint CSR Fund
- Identify CSR initiatives that can be implemented collectively after approval from the CSR Working Group
- Facilitate implementation of decisions of the CSR Working group meetings once approved by the Advisory Committee
- Prepare documentation and communication pieces on collaborative CSR initiatives

# 9. Institutional Framework

This section outlines the proposed institutional arrangements for implementation of the management and monitoring measures outlined in **Section 6** and **7** of this document.

## 9.1 Advisory Committee

As outlined in the previous sections, the Joint Management and Monitoring Framework will initially focus on the seven WPPs (or 'Priority Projects'). An Advisory Committee consisting of representatives from these Priority Projects was constituted to guide the development of the JMMF. The same Advisory Committee will continue to operate to ensure that the JMMF is implemented in letter and spirit. The Advisory Committee (AC), will therefore, provide a platform for the participating WPP developers to coordinate among each other on JMMF implementation.

### 9.1.1 Constitution

The Advisory Committee (AC) will consist of representatives from the following Priority Projects:

- ACT II Wind Limited
- Artistic Wind Power Limited
- Din Energy Limited
- Gul Ahmed Electric Limited
- Lakeside Energy Limited
- Metro Wind Power Limited
- Lucky Renewables (Private) Limited (formally Tricom Wind Power (Private) Limited)

Additional WPP developers which decide to adopt the JMMF can be added to the Advisory Committee.

The chairperson of the Advisory Committee will be selected from among the participating developers. A new chairperson can be selected every year. The chairperson of the Advisory Committee will act as a coordinator to ensure that the JMMF is implemented, for instance meetings of the Advisory Committee (**Section 9.2**) are held as planned, reports are compiled, and adaptive management is adopted, based on results. He/she will also designate a person as Secretary of the Advisory Committee, either from his/her Company or recruited externally in coordination with the Advisory Committee (with shared costs). The Secretary will be responsible for providing administrative support, for instance compiling the monitoring reports from the participating Wind Power Project developers, (See **Section 7**, *Monitoring and Reporting*), taking meeting minutes, and coordinating meeting logistics.

If there is agreement on developing a joint CSR Fund (**Section 8.3.2**), a Resource Mobilization Coordinator can also be hired to leverage funds from international donors and government departments.

### 9.1.2 Responsibilities

This section outlines the responsibilities of the Advisory Committee (AC):

- Each member of the AC will be responsible for coordinating with the senior management of his/her respective WPP to ensure that the JMMF measures are being implemented
- Each member of the AC will collect information and prepare a report on JMMF implementation (see format given in **Appendix C)**
- Each member of the AC will prepare a report providing an overview of the individual and collective CSR activities undertaken
- The Secretary of the Advisory Committee will compile the reports from all participating developers and present for discussion in the quarterly meetings of the AC (see **Section 9.2**)
- The AC will meet quarterly to review progress on JMMF implementation
- AC may constitute 'sub-committees' when required to address common issues and problems related to E&S risks and CSR aspects
- The AC, or its sub-committees, will engage with external stakeholders on specific topics, as and when required (See **Exhibit 6.2**)

## 9.2 Stakeholder Engagement

While the primary responsibility for JMMF implementation and monitoring will lie with the participating WPP developers and the Advisory Committee respectively, the AC will engage with external stakeholders to promote better environmental and social management in the JWR. External stakeholders include, but are not restricted to, relevant government departments as well as NGOs (See **Section 3.3** for details). Some proposed management measures to be implemented by other stakeholders in JWR are listed in **Exhibit 6.2**. The participating WPPs will use their leverage to expedite the implementation of these measures by government and non-government stakeholders. The important stakeholders are listed below.

### 9.2.1 Primary Stakeholders

The following stakeholders are important or primary stakeholders:

#### *Government Departments*

- Sindh Environmental Protection Agency (SEPA)
- National Electric Power Regulatory Authority (NEPRA)
- Sindh Forests Department (SFD)
- Sindh Wildlife Department (SWD)

- District Administration (DA)

#### *Non-Governmental Organizations and Civil Society*

- Worldwide Fund for Nature (WWF-P)
- Keenjhar Conservation Network (KCN)
- Local influencers/activists/civil society member

#### *WPP Developers*

Other WPP developers in JWR may be engaged by the AC to foster greater collaboration and expand the reach and impact of the JMMF.

#### *Lenders*

Representatives from the lenders, including IFC, DEG and FMO will remain as observers in the JMMF.

## 9.3 Responsibility and Timelines

The actions, responsibilities, and timelines for JMMF implementation are outlined in **Appendix D**.

# 10. Financial Sustainability

The previous sections outline proposed management and monitoring measures for minimizing the negative cumulative impacts of wind power development in JWR. This section provides a brief overview of the approach for financing these measures as well as potential sources of funding.

## 10.1 Financing of Proposed Management and Monitoring Measures

### 10.1.1 Measures to be Implemented by Individual WPPs

Most of the management actions listed in **Exhibit 6.1** and the monitoring activities specified in **Appendix C** will be carried out by individual WPPs. For environment VECs, management measures include i) good practice measures to be implemented by all participating WPPs, and ii) management measures to be implemented only if a threshold is exceeded. All the measures which will be implemented within the leased land of a particular WPP will be financed by that WPP. These may include for instance, installation of bird flight diverters on transmission lines, removal of animal carcasses from vicinity of wind turbines, or temporary shutdown of the wind power project during a bird migration period if thresholds are exceeded.[52]

For the social VECs i.e., employment and gender, recommendations have been provided to improve representation of the local communities in employment provided by the WPPs, and to ensure that WPP operations are gender sensitive and responsive (**Exhibit 6.1**). The cost for implementing these management measures will be borne individual WPPs.

### 10.1.2 Measures to be Implemented Jointly by Two or More WPPs

Some of the measures proposed in **Exhibit 6.1** need collaboration between two or more WPPs. These include, for instance, development of protocols for bird and bat fatality monitoring, development of a data sharing mechanism, and joint staff trainings. In this case each of the participating WPP can make a mutually agreed financial contribution towards the proposed management measure. Alternatively, the participating WPP developers can provide in-kind contribution, for instance one WPP can provide accommodation and venue for training, while the other WPP can provide remuneration for the trainer.

### 10.1.3 Measures to be Implemented by Other Stakeholders

#### *Government Departments*

**Exhibit 6.2**. provide a list of proposed measures to be implemented by other stakeholders such as government departments. These basin-wide activities, for instance, developing a bat baseline, or Guggul plantation campaigns will require financing from government

[52] This will be done in consultation with the power purchaser and will be subject to regulatory frameworks for power and environment.

departments, in this case the Sindh Wildlife Department and Sindh Forest Department respectively. Opportunities for reforestation and improving the vegetation cover, for instance, may be explored under the REDD+ initiative of the Sindh Forest Department or Billion Tree Tsunami program of the federal government. Similarly, educational seminars and vocational trainings can be jointly organized under a government funded program. The participating WPP developers may contribute towards these activities as part of their CSR commitments though this contribution will be voluntary.

#### *Non-Government Organizations or Non-Profit Organizations*

Some of the measures proposed in **Exhibit 6.2** may be implemented by local or international non-government organizations. For instance, campaigns for basin-wide plantation of indigenous plant species may be carried out by NGOs such as IUCN, WWF-P. Similarly, activities for skill development or female empowerment of the local communities may be sponsored by local NGOs such as Agha Khan Rural Support Program (AKRSP) or National Rural Support Program (NRSP). The participating WPP developers may contribute towards these activities as part of their CSR commitments though this will be contribution will be voluntary.

## 10.2 Donor Funding

The participating WPPs may approach donors such as UNDP, USAID, UKAID to finance management measures in JWR. The Green Climate Fund (GCF) is one of the world's largest funds that assists developing countries in implementing projects for mitigating and adapting to the impacts of climate change. The WPPs in partnership with relevant government departments may prepare a bankable concept note and submit this for financing through a GCF accredited organization.

## 10.3 Financing of CSR Activities

**Section 8.3.2** provides an overview of potential CSR activities which can be carried out by individual WPPs. In addition to this, one or more WPP may collaborate on joint CSR initiatives, to develop, for instance, a training institute, school, or medical camp for the local communities of JWR.

Though not mandatory, it is recommended that a CSR Fund be established by the participating WPPs with collectively agreed-upon annual contributions from WPPs. Priorities for spending from this CSR Fund can be collectively decided by a CSR Working Group (See **Section 8.3.2** for details).

# 11. GIS Model

A GIS model for the JWR has been developed. An open-source library named 'Leaflet' has been used for this model which is the leading open-source Java Script library for interactive maps. The GIS model consists of layers and has an option to turn on or off certain features. The model is available at the following link:

https://haglerbaillypakistan.github.io/jhimpirwindpower/

The GIS model maps the following:

- Wind Power Projects
  - Location of operational, under-construction, committed and planned WPPs including their concession areas (**Exhibit 9.1**).
- Communities in the JWR (**Exhibit 11.3** to **Exhibit 11.5**)
  - Location of settlements and villages
  - Population size of the villages
  - Location of transitory nomadic communities
- Land use areas (**Exhibit 11.6**)
  - Habitat types and habitat quality
  - Agricultural areas
  - Grazing areas
  - Scrublands
  - Grasslands
  - Settlements
- Biodiversity
  - Protected Areas (**Exhibit 11.7**)
  - Location of Critically Endangered Plant *Commiphora wightii* (Guggul) (**Exhibit 11.8**)
  - Bird nets **(Exhibit 11.8**)
  - Bird kills (**Exhibit 11.8**)
  - Bat nests (**Exhibit 11.8**)
- Corporate Social Responsibility
  - Locations of CSR projects or activities
  - Type of project e.g. educational institution, health facility
  - Cost of project

- Status of project – active/completed
- Number of persons who benefited from this

**Exhibit 11.1:** Location of Wind Power Projects in JWR

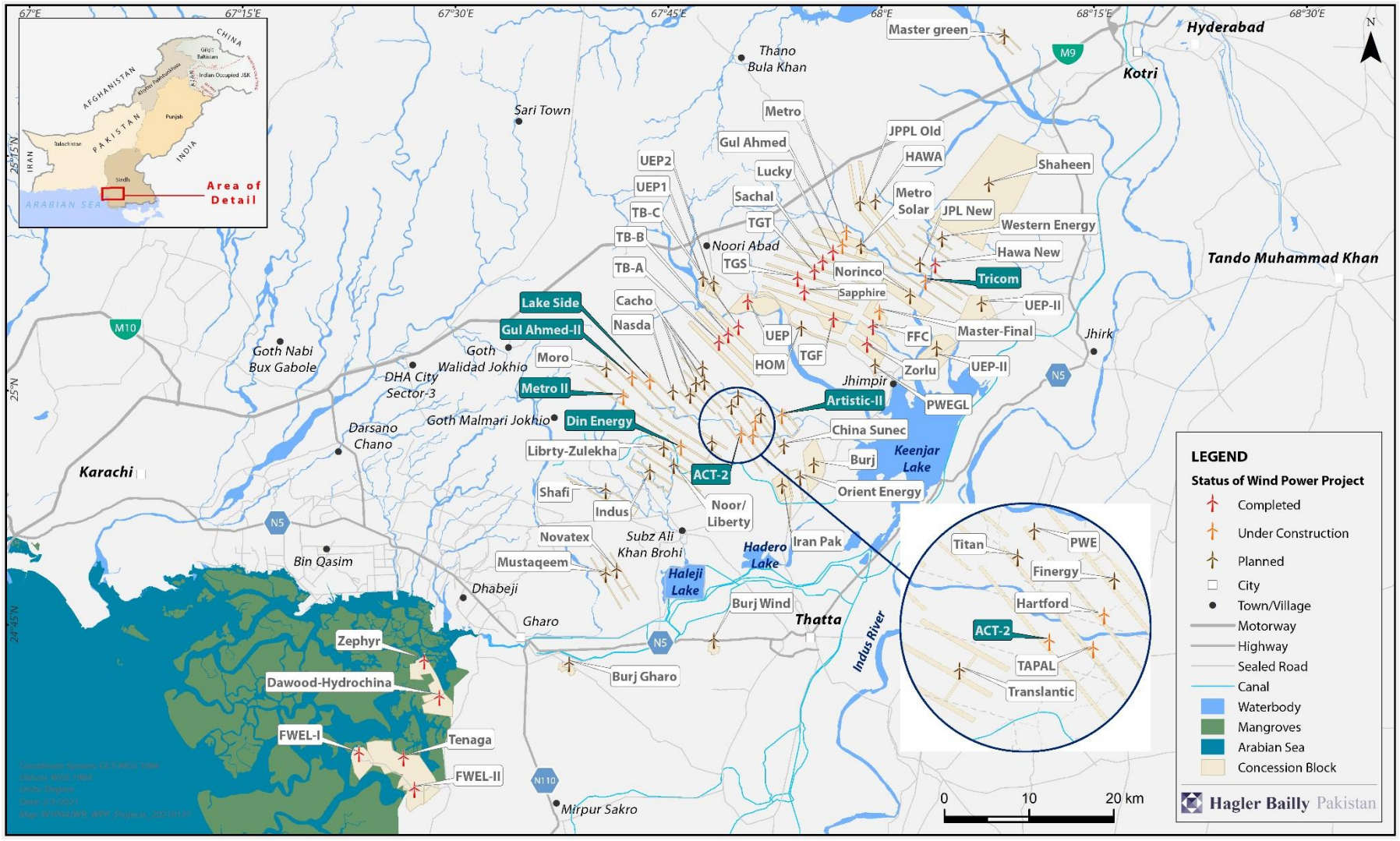


**Exhibit 11.2:** Villages in Jhimpir Wind Region, Index Map

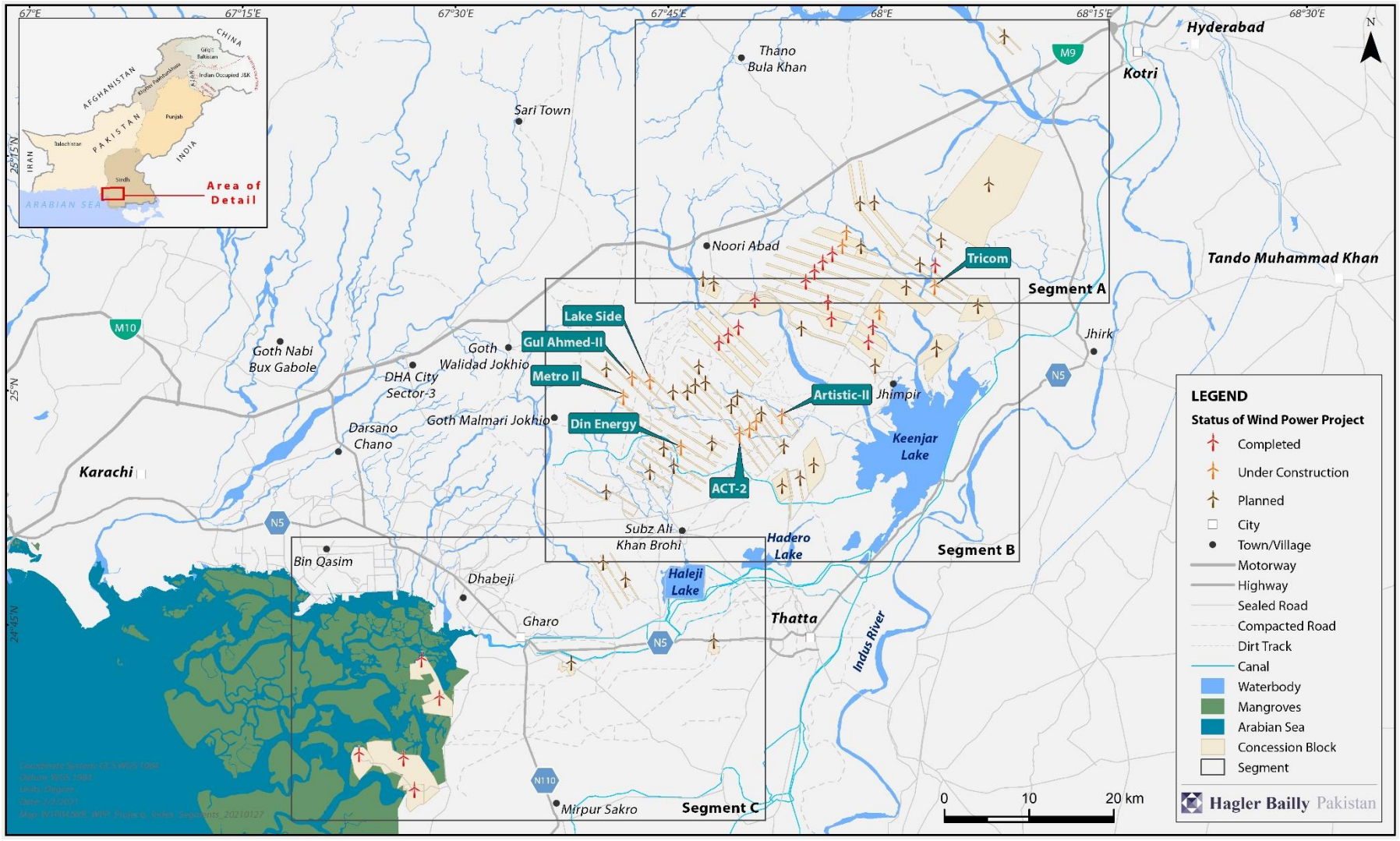


**Exhibit 11.3:** Villages in Jhimpir Wind Region, Segment A

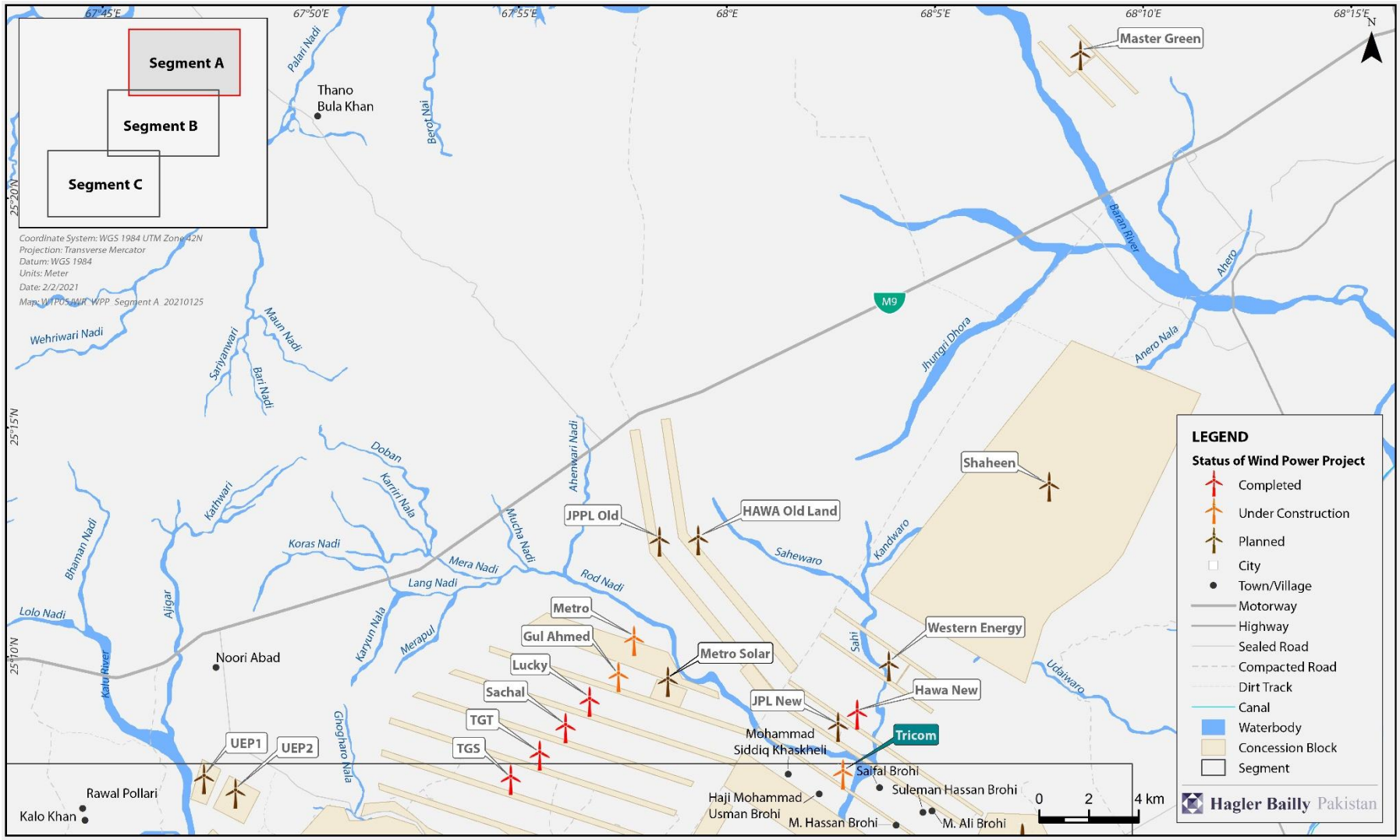


**Exhibit 11.4:** Villages in Jhimpir Wind Region, Segment B

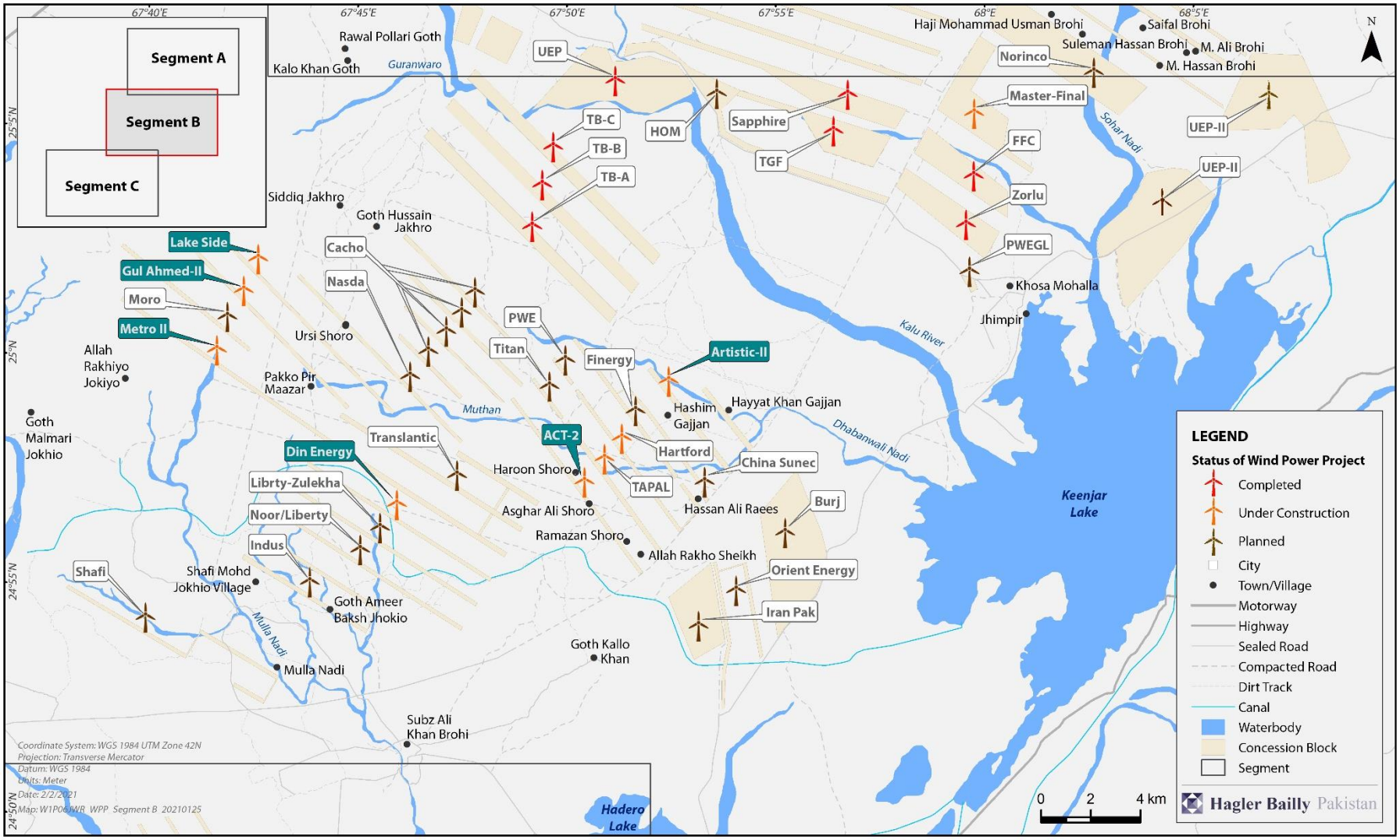


**Exhibit 11.5:** Villages in Jhimpir Wind Region, Segment C

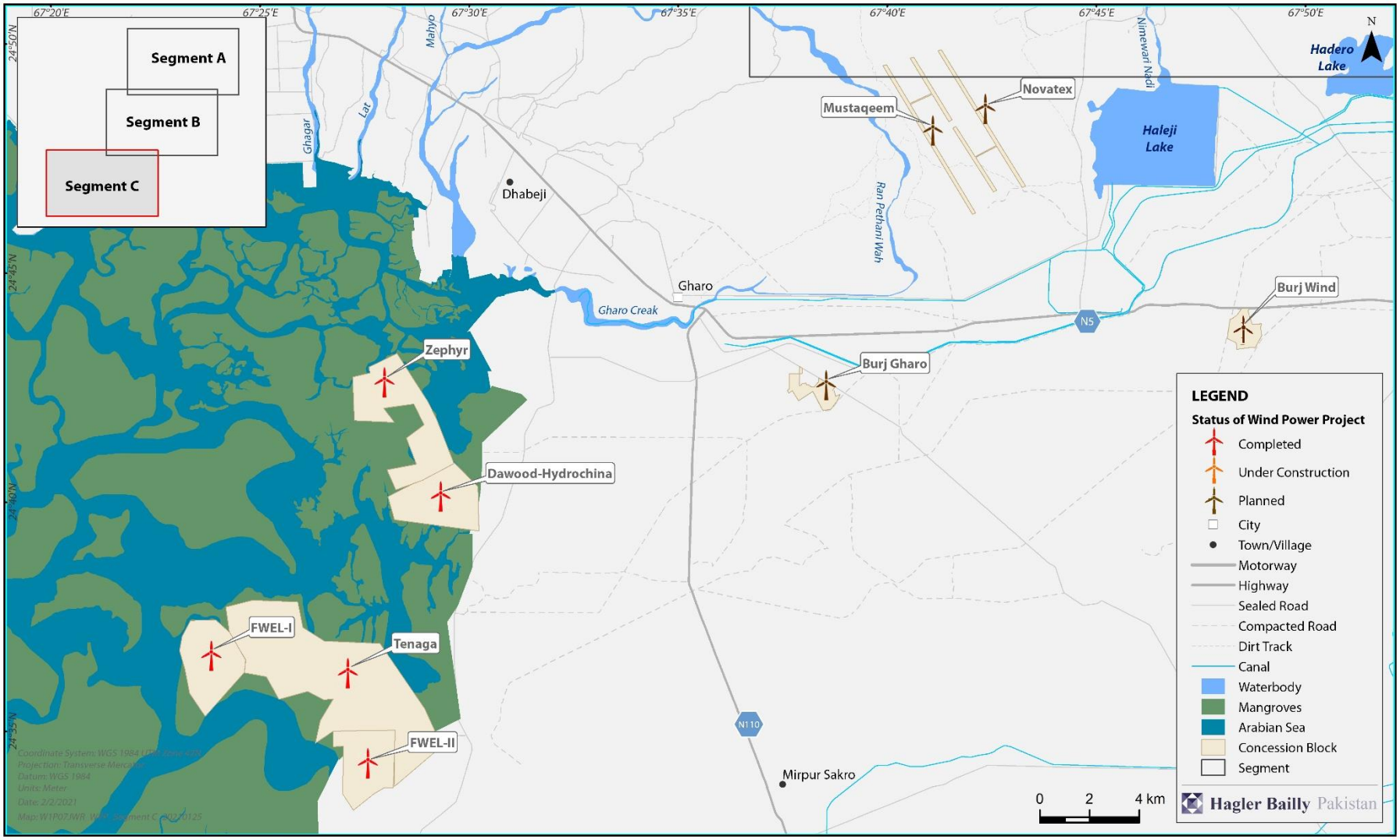


**Exhibit 11.6:** Land Cover in Jhimpir Wind Region

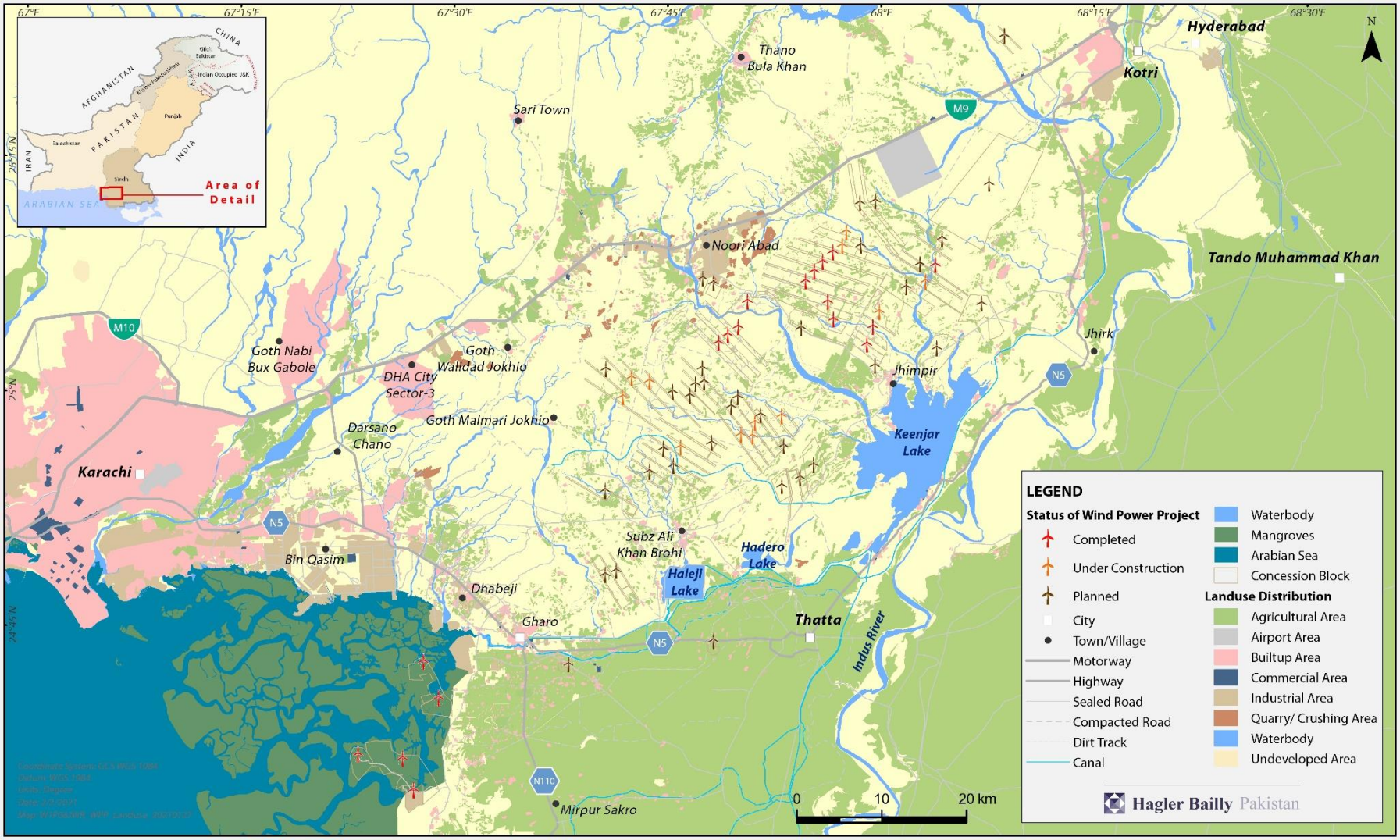


**Exhibit 11.7:** Protected Areas

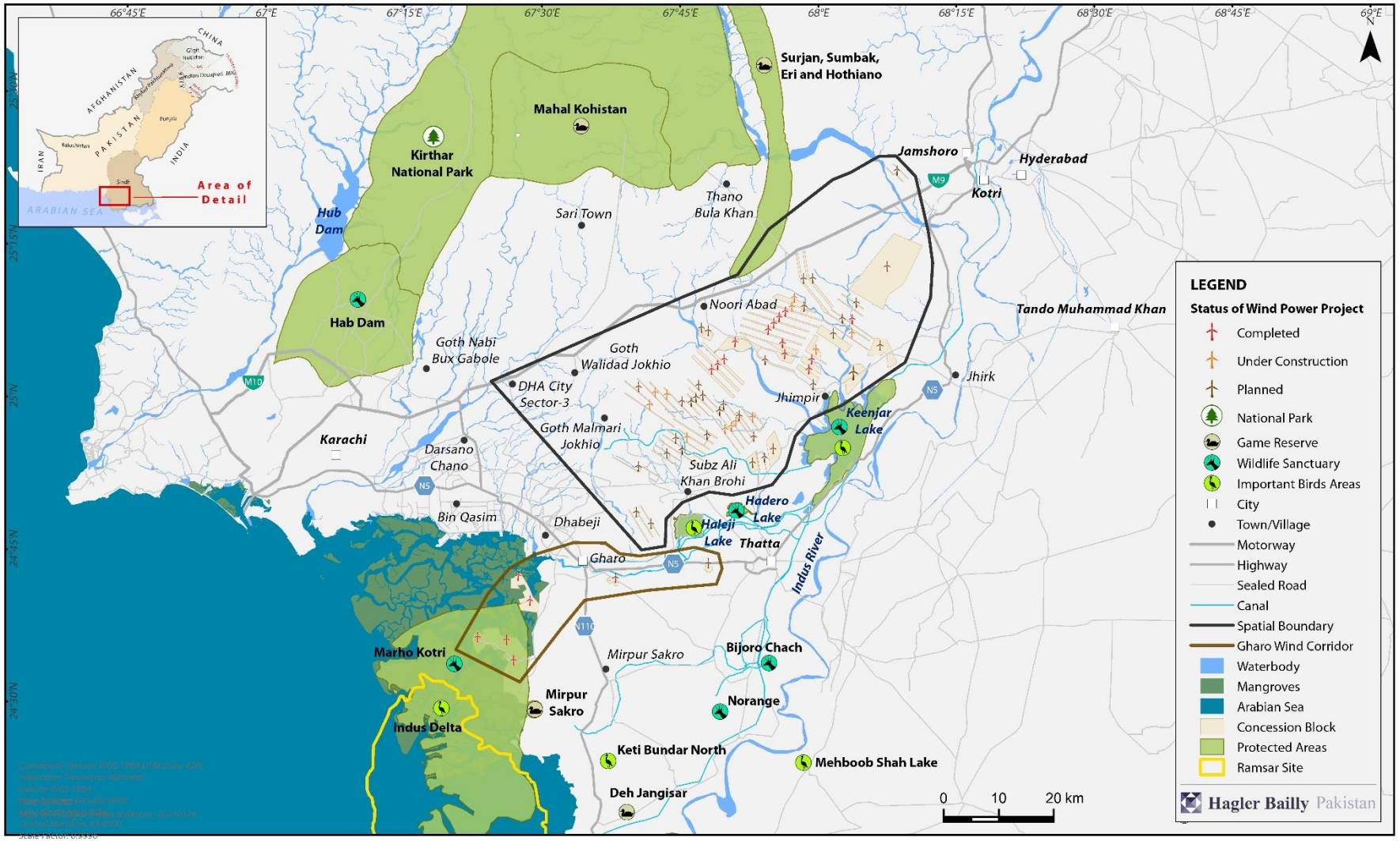
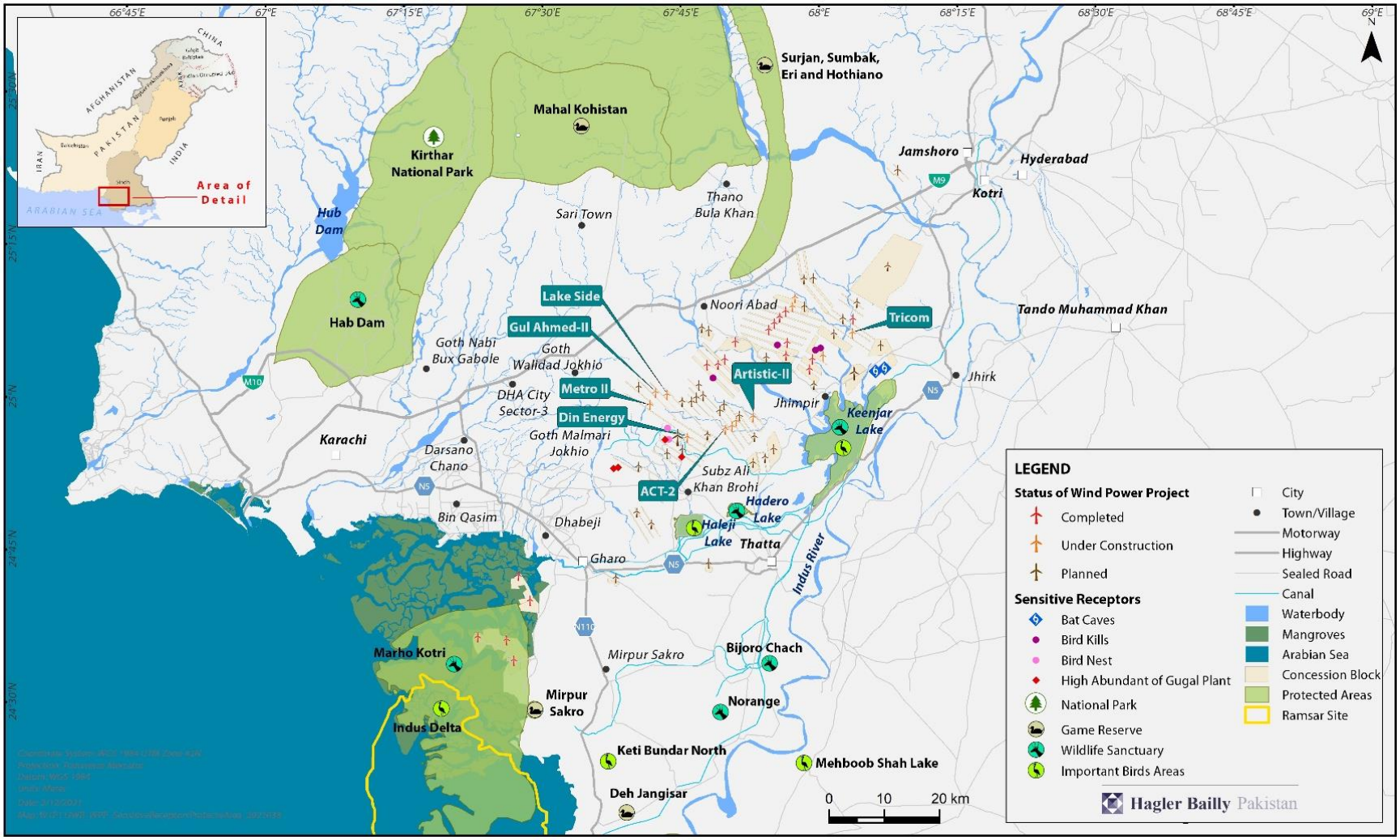
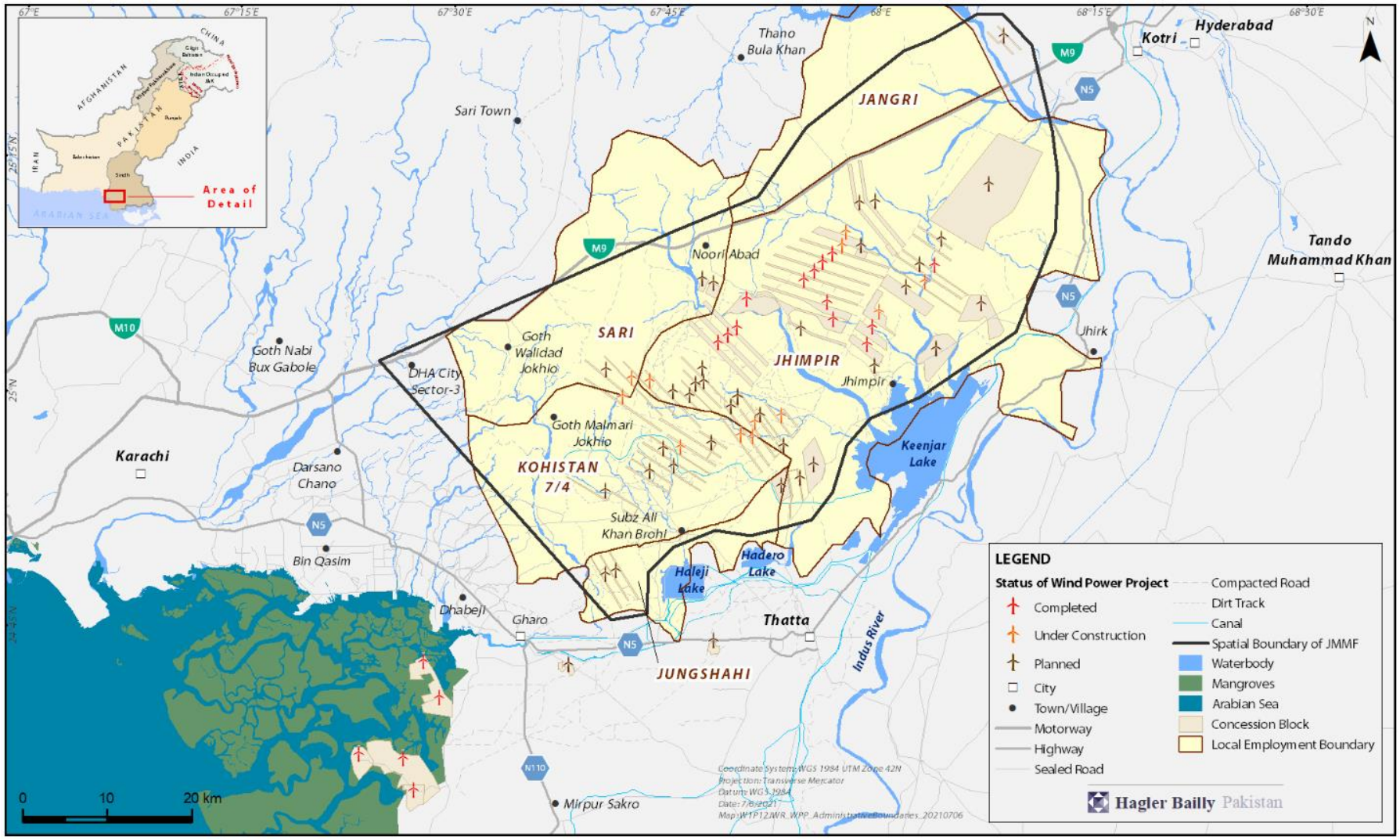


**Exhibit 11.8:** Sensitive Biodiversity Receptors




Note: Location of bird nests, bird kills, bat caves and Guggul Plant based on monitoring data collected by Arch Associates from December 2019 to December 2020

**Exhibit 11.9:** Local Employment Boundary



# 12. Adaptive Management

This section outlines the framework for adaptive management for the Joint Management and Monitoring Framework (JMMF) outlined in the previous sections.

## 12.1 Adaptive Management Framework

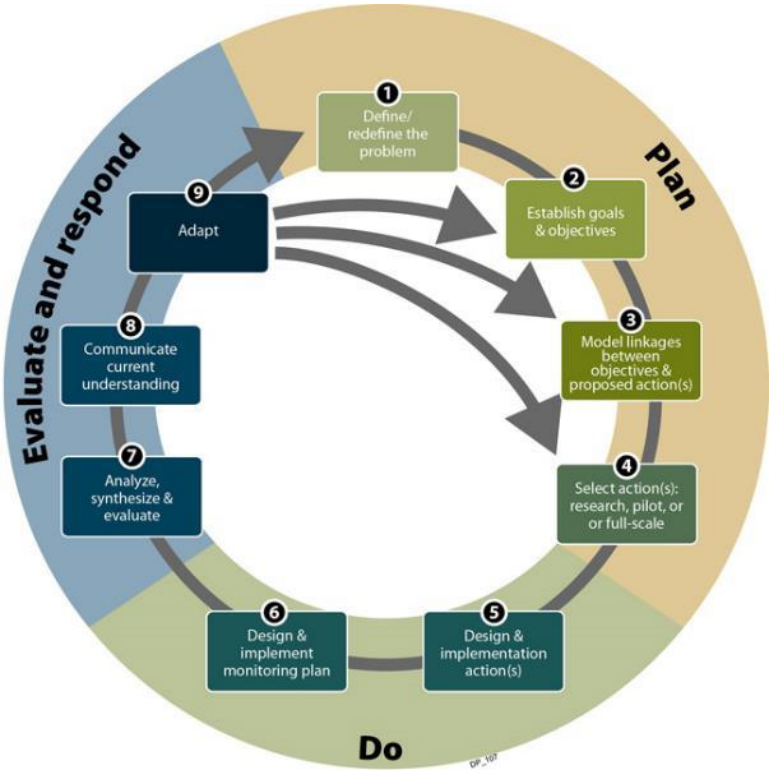
Adaptive management is defined as "a framework and flexible decision-making process for ongoing knowledge acquisition, monitoring, and evaluation leading to continuous improvements in management planning and implementation of a project to achieve specified objectives."53 An adaptive management approach provides a structured process that allows for taking action under uncertain conditions based on the best available science, closely monitoring and evaluating outcomes, and re-evaluating and adjusting decisions as more information is learned. The adaptive management framework encompasses three broad phases: Plan, Do, and Evaluate and Respond (**Exhibit 12.1**).

The 'Plan' phase of the JMMF has been completed. Steps 1 – 4 listed in **Exhibit 12.1** were completed during the development of the Draft JMMF. The proposed measures in JMMF have been defined to meet the objective of minimizing the negative cumulative impacts of WPP development in the JWR.

The Steps 5 and 6 listed in **Exhibit 12.1** will be put in practice once the JMMF goes into implementation.

[53] California Department of Fish and Wildlife. Official website. Available at: http://www.dfg.ca.gov/erp/adaptive_management.asp

**Exhibit 12.1:** Framework for Adaptive Management




## 12.2 Analysis and Assessment of JMMF

As stated in Step 7 of **Exhibit 12.1**, the success of the JMMF will be assessed and analyzed once implementation begins. This will be done using the monitoring and evaluation framework described in **Section 7, Monitoring and Reporting**. The objective is to evaluate the extent to which the management measures have contributed to protecting the VECs in JWR.

Conceptually, assessment of the extent to which the VECs have been protected can be a challenging task as a number of variables not in control of the participating WPP developers may contribute to decline in the VEC condition. These may include drought events, climate change, storms, epidemics or change in socio-economic conditions of the local communities.

The following approach will be used to evaluate the effectiveness of JMMF once a year by reviewing, assessing, and evaluating the

- Management measures outlined in **Exhibit 6.1**.
- Monitoring framework outlined in **Section 7**.
- Institutional arrangements outlined in **Section 9** including a review of whether any additional stakeholders should be added to the Advisory Committee
- individual and collective approach to CSR outlined in **Section 8**.

- factors that may have contributed to not meeting the proposed thresholds and recommendations listed in **Exhibit 6.1.**

## 12.3 Actions to Adapt

**Adaptation (Step 8** of the **Exhibit 12.1**) is about taking actions based on the results of monitoring to improve any intervention. If the intervention did not achieve the expected results, it is because either the assumptions were wrong, the actions were poorly executed, the conditions at the site have changed, the monitoring was faulty or some combination of these problems. Adaptation involves changing assumptions and interventions to respond to the new information obtained through monitoring efforts.

If an assessment of the JMMF reveals that the proposed objectives and targets are not being met, the following actions may be implemented:

- Training and capacity building of the staff of the participating WPP developers in implementing the JMMF measures
- Stringent monitoring to ensure implementation of management measures
- Allocation of additional finances towards JMMF implementation
- Political pressure that impedes successful implementation of the JMMF may be managed by approaching the government of Sindh through the members of the Advisory Committe
- To minimize opposition from the local communities, the communities may be engaged with support from a local NGO
- Targets may need to be revised if there is an unexpected large change in climate or such as unexpected floods or drought. Any changes to the targets will need to be justified and will have to be in line with the JMMF's objective of minimizing the negative impacts on the VECs

This is only an indicative list. Strategies for adaptive management will be based on analysis of problems and issues as they arise.

## 12.1 Responsibility

The Advisory Committee will be responsible for making adaptive management decisions after consultation with relevant parties and stakeholders, including the project lenders of individual participating WPP developers.

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# Appendix A: Priority Birds Species and Thresholds

This Appendix describes the methods used to identify priority bird VECs in the JMMF and determine the thresholds for these bird species

## A.1 Determining Priority Bird Species

Priority birds are those species assessed as at highest risk from the cumulative effects of wind projects in the JMMF Study Area.

JMMF priority birds are identified using a 3 step process:

- **Step 1** – Develop a 'Species Population List' of all bird species potentially at risk from WPP related activities in the JMMF study area.
- **Step 2a** – Assess sensitivity for each species (based on IUCN extinction risk category and a measure of susceptibility to wind energy effects).
- **Step 2b -** Determine priority birds based on the vulnerability rating applied in Step 2.

### A.1.1.1 Methodology

**Step 1 – Develop the Species Population List**

The purpose of step 1 is to identify all bird populations that could potentially be at risk from the cumulative effects of wind energy within the study area. For all species on the list the status relevant to Pakistan is determined (resident/breeding or non-breeding). This is then used to determine the most appropriate population scale at which to assess the risk to each species. This is referred to as the Unit of Analysis.

**Methods**

- A preliminary list of bird species potentially at risk[54] from WPP activities in the JMMF study area was developed informed by information in relevant peer-reviewed literature, wind power project environmental assessment reports and bird monitoring data as well as expert review of species known or likely to be present. The list was principally informed by information in the following documents:
  - Jhimpir Wind Farm Region. Cumulative Impact Assessment (ERM 2015)

[54] In this assessment collision mortality associated with turbine blades and associated powerlines is assumed to be the principal risk relating to WPPs in the JMMF study area, with other known effects (e.g. direct habitat loss, displacement, disturbance) regarded as having a lower impact on populations due to their non-lethal impacts and the availability of large expanses of alternative similar habitat adjacent to the WPP sites. Based on this, only species groups likely to be impacted by collision were included on the preliminary list. This included birds of prey (raptors), large terrestrial species (e.g. storks, cranes, pelicans). Not included were small ground dwelling, perching birds e.g. lark, doves, bulbuls, sparrows etc.)

- IFC Environmental and Social Review Summaries for Jhimpir Pakistan Wind Projects (IFC 2020)
- IFC review of bird data for Wind Power Projects in Jhimpir (Ghalib et al. 2019)

Additionally, the following individuals and organizations were consulted:

- N.J. Durranee (Arch Associates)

- The completed preliminary list was reviewed by N.J. Durranee, an ecological expert with extensive experience in the JMMF study area, and species removed if they concluded that the information used referred to historical records, the species was no longer present and had a low likelihood of occurring in the near future. After removal of these species those remaining comprised the 'Species Population List' used in the assessment.
- Each species on the species population list was assigned to one of two status categories relevant to Pakistan;
  - resident/breeding (including migratory species breeding in Pakistan)
  - non-breeding (including migratory and wintering species that do not breed in Pakistan).

Informed by its status, each species was then assigned a Unit of Analysis to provide a scale against which to measure risk. For resident/breeding species national population was regarded as an appropriate scale. Non-breeding species were assessed at the global scale. The Unit of Analysis is typically used in Step 2 of the prioritizing process and in the method for determining thresholds for priority birds (See Section A.2, Fatality Thresholds Birds).

**Results**

The preliminary list comprised 44 species, two of which (Red Kite and Saker Falcon) were removed based on expert review indicating that both species were no longer recorded in the Study Area, had been absent for at least 15 years and were considered to have a low likelihood of occurring in the near future. Of the 42 species on the Species Population List, 21 were resident and/or breeding in Pakistan, and the remaining 21 were non-breeding species that either transited through the country on migration or were present for part of the year but did not breed. The 'Species Population List' of 42 species is provided in **Exhibit A.3** and **Exhibit A.4** as part of the Step 2 vulnerability assessment.

**Step 2a – Assess Sensitivity**

The purpose of this step is to determine the likely sensitivity to the effects of wind energy to each species on the Species Population List. Ideally this is based on the *relative importance* of the study area to the population and its *vulnerability* at a national, regional, or international scale, depending on the UoA (For an example of this approach see IFC 2017). However, due to a lack of information on the distribution of species at the national scale it was not feasible to use *relative importance* as a measure of sensitivity and step 2 was based on an assessment of vulnerability only.

## Methods

- Vulnerability was assessed for each species based on values for two parameters; 1) the IUCN extinction risk (conservation status) categories; Least Concern (LC), Near Threatened (NT), Vulnerable (VU), Endangered (EN) and, Critically Endangered (CR), and 2) a species Vulnerability Index (SVI) which provides a relative assessment of the likely effects of wind energy projects for each species (see **Exhibit A.1**). For species where the Unit of Analysis was the national population, national IUCN ratings would be ideally used but as national IUCN red list for birds has not been developed for Pakistan, global red list categories were used instead.

### Species Vulnerability Index (SVI)

The Birdlife 'Species Vulnerability Index', originally developed for Migratory Soaring Birds (Allinson 2017), scores wind turbine and power line collision susceptibility for a suite of migratory species, principally raptors but also some large water birds, based on an assessment of their body mass, flight style, behaviour and documented incidents of collision. The index uses a 10-point scale with species with the highest vulnerability scoring 10.

**Exhibit A.1:** Species Vulnerability Index Scores (Allinson 2017)

| Species | SVI |
|---|---|
| Cranes, storks, vultures, pelicans, Secretarybird and *Haliaeetus* spp. sea eagles | 10 |
| Large eagles | 9 |
| Harriers, *Milvus spp.* kites, Scissor-tailed Kite, Eurasian Spoonbill and Northern Bald Ibis | 8 |
| Osprey, buzzards, honey-buzzards, snake-eagles, harrier-hawks and Bat Hawk | 7 |
| Accipiters, falcons, cuckoo-hawks and Black-winged Kite | 6 |

SVI scoring for all raptors and large waterbirds occurring on the Species Population List was aligned with scores from Allinson 2017. Additionally, Asian Houbara was scored 10 based on their large size, low level flight, poor manoeuvrability and evidence of bustard fatalities at power lines and wind turbines (Jenkins, Smallie & Diamond 2010; Dürr 2020; Perold, Ralston-Paton & Ryan 2020; Shaw *et al.* 2021).

For species with no Birdlife SVI score, a broadly comparable scoring system developed by IFC to fulfil the same purpose was used to assign a score between 1 and 10 based on evidence of species specific risks from wind energy projects in peer-reviewed literature, fatality databases and regional studies in Europe (IFC 2019). To utilize this scoring system for species with no Birdlife SVI score on the JMMF Species Population List, a suitable surrogate was used from the IFC study. For example, Sociable Lapwing was scored the same as Northern Lapwing from the IFC study (see IFC 2019 for scoring species with no Birdlife SVI rating).

- To obtain a relative vulnerability score for each species on the Species Population List the global IUCN extinction risk category and the SVI value for each species

was combined to provide a vulnerability rating score - negligible, low, moderate and high (**Exhibit A.2**).

**Exhibit A.2:** Vulnerability Scoring

| Vulnerability Scoring | Vulnerability Criteria |
|---|---|
| Negligible | Species that are unlisted (LC) on IUCN Global Red List **&** SVI of 6 or below |
| Low | Species are VU or NT on IUCN Global Red List **&** SVI of 6 or below; or |
| | Species that are unlisted (LC) on IUCN Global Red List **&** SVI of 7 or 8 |
| Moderate | Species that are VU or NT on IUCN Global Red List **&** SVI of 7 or 8, or |
| | Species that are unlisted (LC) on IUCN Global Red List & SVI of 9 or 10 |
| High | Species that are CR or EN on IUCN Global Red List, or |
| | Species that are VU or NT on IUCN Global Red List **&** SVI of 9 or 10 |

### A.1.1.2 Results

Of the 42 species on the Species Population List ,13 were rated as high, 5 moderate, 13 low and 11 negligible sensitivity to the effects of wind energy developments.

**Exhibit A.3** and **Exhibit A.4** shows the IUCN extinction risk categories, SVI scores and the overall vulnerability rating for resident/breeding and non breeding species respectively.

**Exhibit A.3:** Vulnerability rating for resident/breeding species on the Species Population List

| *Common Name as given on the IUCN Red List www.redlist.org* | *IUCN Red List Status* | *Species Vulnerability Index* | *Vulnerability Rating* |
|---|---|---|---|
| Lesser Whistling-duck | LC | 5 | N |
| Cotton Pygmy-goose | LC | 5 | N |
| Greater Flamingo | LC | 10 | M |
| Black-bellied Tern | EN | 8 | H |
| Black-winged Kite | LC | 8 | L |
| Oriental Honey-buzzard | LC | 7 | L |
| Egyptian Vulture | EN | 10 | H |
| Short-toed Snake-eagle | LC | 7 | L |
| Red-headed Vulture | CR | 10 | H |
| White-rumped Vulture | CR | 10 | H |

| *Common Name as given on the IUCN Red List www.redlist.org* | *IUCN Red List Status* | *Species Vulnerability Index* | *Vulnerability Rating* |
|---|---|---|---|
| Griffon Vulture | LC | 10 | M |
| Cinereous Vulture | NT | 10 | H |
| Tawny Eagle | VU | 9 | H |
| Bonelli's Eagle | LC | 6 | N |
| Booted Eagle | LC | 6 | N |
| Shikra | LC | 6 | N |
| Eurasian Sparrowhawk | LC | 6 | N |
| Pallas's Fish-eagle | EN | 9 | H |
| Brahminy Kite | LC | 8 | L |
| White-eyed Buzzard | LC | 7 | L |
| Common Kestrel | LC | 6 | N |

**Exhibit A.4:** Vulnerability rating for non-breeding species on the Species Population List

| *Common Name as given on the IUCN Red List www.redlist.org* | *IUCN Red List Status* | *Species Vulnerability Index* | *Vulnerability Rating* |
|---|---|---|---|
| Common Pochard | VU | 2 | L |
| Ferruginous Duck | NT | 2 | L |
| Gadwall | LC | 4 | N |
| Eurasian Wigeon | LC | 4 | N |
| Common Crane | LC | 10 | M |
| Asian Houbara | VU | 10 | H |
| Painted Stork | NT | 10 | H |
| Eurasian Spoonbill | LC | 8 | L |
| Glossy Ibis | LC | 8 | L |
| Great White Pelican | LC | 9 | M |
| Sociable Lapwing | CR | 8 | H |
| Osprey | LC | 7 | L |
| Greater Spotted Eagle | VU | 9 | H |
| Steppe Eagle | EN | 9 | H |
| Eastern Imperial Eagle | VU | 9 | H |
| Western Marsh-harrier | LC | 6 | N |
| Pallid Harrier | NT | 8 | M |
| Montagu's Harrier | LC | 8 | L |

| *Common Name as given on the IUCN Red List www.redlist.org* | *IUCN Red List Status* | *Species Vulnerability Index* | *Vulnerability Rating* |
|---|---|---|---|
| Eurasian Buzzard | LC | 7 | L |
| Long-legged Buzzard | LC | 7 | L |
| Peregrine Falcon | LC | 6 | N |

### Step 2b - Identifying priority species

Priority bird VECs were those species populations that were assigned high or moderate vulnerability rating in step 2. Species populations with either a negligible or low vulnerability rating were not considered priority bird VECs. **Exhibit A.5** provides the final list of 18 priority bird species for which annual fatality thresholds are developed (See **Section A.2**, *Fatality Thresholds-Birds*)

**Exhibit A.5:** JMMF Priority Birds

| *Status* | *Common Name* | *Vulnerability Rating* |
|---|---|---|
| Resident/Breeding | Greater Flamingo | M |
| | Black-bellied Tern | H |
| | Egyptian Vulture | H |
| | Red-headed Vulture | H |
| | White-rumped Vulture | H |
| | Griffon Vulture | M |
| | Cinereous Vulture | H |
| | Tawny Eagle | H |
| | Pallas's Fish-eagle | H |
| Non-breeding | Common Crane | M |
| | Asian Houbara | H |
| | Painted Stork | H |
| | Great White Pelican | M |
| | Sociable Lapwing | H |
| | Greater Spotted Eagle | H |
| | Steppe Eagle | H |
| | Eastern Imperial Eagle | H |
| | Pallid Harrier | M |

## *A.2* Fatality Thresholds – Birds

For each of the 18 priority bird species, a fatality threshold has been determined, which if exceeded triggers an adaptive management response (**Exhibit A.7** and **Exhibit A.8**). Threshold setting is informed by comparing; a) a theoretical annual fatality rate, which if exceeded would likely compromise the long term viability of the relevant reference population[55] with b) an estimate of annual human derived fatalities, additional to those from wind farm related activities in the CMMF study area. The theoretical annual fatality rate is derived using Potential Biological Removal (PBR) calculation (Wade 1998; Dillingham & Fletcher 2008; Dillingham & Fletcher 2011). The additional human derived fatalities are derived from expert opinion and/or published literature.

**Potential Biological Removal (PBR)**

The PBR approach is considered an appropriate approach when limited information on species population biology is available. The PBR is calculated using the annual recruitment rate which is calculated from the maximum annual population growth rate, based on mean annual adult survival and age of first breeding. A conservative estimate of population size is used and recovery factors are assigned to species based on a sliding scale developed by Dillingham and Fletcher (2008) where by 'Critically Endangered' and 'Endangered' species receive a factor of 0.1 whilst 'Vulnerable' species receive a factor of 0.3, and 0.5 for other species.

Calculating the Potential Biological Removal rate requires three pieces of biological information: 1) an estimate of population size for the relevant 'reference' population; 2) age at first breeding; and 3) adult survival rate.

National population size for the eight breeding/resident priority species was based on expert judgement (assessment by N J. Durranee), and for the nine non-breeding priority species based on global population estimates (IUCN 2021).

Age of first breeding for each species was obtained from available literature (referenced for each species in (**Exhibit A.7** and **Exhibit A.8**).

Adult survival rate was obtained from available literature where possible. For some species it was not possible to obtain a species specific survival rate and so estimated this based on similar sized species (for reasoning see Newton, McGrady & Oli 2016).

**Fatalities from human derived sources**

To arrive at useful species-specific thresholds for priority birds it is necessary to estimate how many annual fatalities are likely to result from human derived effects additional to those from wind farm related activities in the JMMF study area, compare this with the PBR annual fatality value and then arrive at an threshold that will provide appropriate species specific safeguarding and be acceptable to key stakeholders. For the eight

[55] The reference population for the eight resident/breeding priority species is the national population and for the nine non-breeding species the global population. Applying this to PBR, the PBR value of 85 for the breeding population of Greater Flamingo means that if human derived fatalities within the national population exceed 85 birds annually it is likely that this will have a long term impact on the viability of the national population

breeding/resident priority species the annual number of fatalities likely to relate to human related effects nationally was based on expert judgement (assessment by N J. Durranee) (**Exhibit A.7**) For non-breeding priority species information in published literature was used (**Exhibit A.8**).

#### A.2.1.1 Threshold setting

**Zero fatality thresholds**

The PBR value indicates a crisis point for the population and therefore if additional mortality due to human derived effects is close to or exceeds the PBR then it is likely that the population cannot sustain further fatalities. In this case a zero-fatality threshold is assigned.

**Annual fatality thresholds**

Where additional mortality does not approach the PBR value then some additional mortality may be possible without impacting on long-term viability. Situation criteria in **Exhibit A.6** was applied to arrive at an annual fatality threshold.

**Exhibit A.6:** Annual Fatality Threshold Setting Criteria

| *Estimated difference between annual fatalities calculated using PBR and human derived effects additional to those from wind farm related activities in the JMMF study area* | *Corrected[56] annual fatality threshold (number of birds)* |
|---|---|
| <10 | 0 |
| <100 | 2 |
| <1000 | 5 |
| <10000 | 10 |

Thresholds derived in this way are intended to provide annual fatality limits for each JMMF wind farm that ensure safeguarding of the species population and are also acceptable to conservation stakeholders.

**Extreme event fatality thresholds**

In addition to thresholds set for priority birds, a threshold is set to manage the risk of multiple-fatalities occurring as a single fatality event[57] e.g. resulting from migratory activity, extreme weather or increased foraging opportunities. This type of event may be particularly relevant to species that occur in flocks. For practical reasons, such as the need for a quick decision in the field to minimize the scale of this type of extreme event the threshold is set to **a single fatality event that exceeds 10 individuals of one or more species**.

[56] Corrected fatality estimates account for fatalities that were not found during systematic fatality search surveys.

[57] A single fatality event is defined as fatalities occurring at the same time (e.g. a flock of birds colliding with a turbine) or over a period of < 1week.

**Exhibit A.7:** Thresholds for Priority Birds -Resident/Breeding Populations

| *Common Name* | *Taxonomic name* | *Reference population* | *Global IUCN status* | *Potential Biological Removal inputs* | | | *Potential Biological Removal rate* | *PBR References (Where no survival rate/ age at first breeding was known for a priority species, a surrogate information for an appropriate species was used – given in italics)* | *Estimate of annual fatalities due to non-wind farm human effects** | *Fatality Threshold* |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | *Population estimate* | *[1] Mean adult survival rate* | *[2] Mean age at first breeding* | | | | |
| Greater Flamingo | *Phoenicopterus roseus* | National Population | LC | 1425 | 0.93 | 3 | 85 | (Cezilly *et al.* 1996) | 10 | 2 |
| Black-bellied Tern | *Sterna acuticauda* | | EN | 410 | 0.90 | 3 | 2 | *(Robinson 2005) Common Tern* | 2 | 0 |
| Egyptian Vulture | *Neophron percnopterus* | | EN | 180 | 0.93 | 5 | 1 | (Sanz-Aguilar *et al.* 2015) | 2 | 0 |
| Red-headed Vulture | *Sarcogyps calvus* | | CR | 140 | 0.967 | 4 | 1 | (Gouar *et al.* 2008) *Griffon Vulture* | 2 | 0 |
| White-rumped Vulture | *Gyps bengalensis* | | CR | 192 | 0.967 | 4 | 1 | (Gouar *et al.* 2008) *Griffon Vulture* | 2 | 0 |
| Griffon Vulture | *Gyps fulvus* | | LC | | 0.967 | 4 | 4 | (Gouar *et al.* 2008) | 2 | 0 |
| Cinereous Vulture | *Aegypius monachus* | | NT | 220 | 0.967 | 4 | 2 | (Gouar *et al.* 2008) *Griffon Vulture* | 2 | 0 |
| Tawny Eagle | *Aquila rapax* | | VU | 252 | 0.92 | 5 | 3 | (Newton, McGrady & Oli 2016) - [1] = *median value for Golden Eagle* | 5 | 0 |
| Pallas's Fish-eagle | *Haliaeetus leucoryphus* | | EN | 30 | 0.94 | 5 | 0 | (Newton, McGrady & Oli 2016) - [1] = *median value for White-tailed Eagle* | 1 | 0 |

* Estimates of annual fatalities due to human derived effects other than WPPs in the study area were based on an assessment process using expert judgement (see 'Fatalities derived from human sources' section for more details)

**Exhibit A.8:** Thresholds for Priority Birds – Non-Breeding Populations

| *Common Name* | *Taxonomic name* | *Reference population* | *Global IUCN status* | *Potential Biological Removal inputs* | | | *Potential Biological Removal rate* | *PBR references* *(Where no survival rate/ age at first breeding was known for a priority species, surrogate information for an appropriate species was used – given in italics)* | *Fatality Threshold* |
|---|---|---|---|---|---|---|---|---|---|
| | | | | *Population estimate* | *[1] Mean adult survival rate* | *[2] Mean age at first breeding* | | | |
| Common Crane | *Grus grus* | Global Population | LC | 491000 | 0.90 | 4 | 28209 | (Mathews & Macdonald 2001) | 5 |
| Asian Houbara | *Chlamydotis macqueenii* | | VU | 50000 | 0.895 | 3 | 1071 | (Dutta, Rahmani & Jhala 2010) *Great Indian Bustard* | 0 |
| Painted Stork | *Mycteria leucocephala* | | NT | 25000 | 0.78 | 3 | 714 | (Barbraud, Barbraud & Barbraud 1999) *White Stork* | 2 |
| Great White Pelican | *Pelecanus onocrotalus* | | LC | 265000 | 0.78 | 3 | 12620 | (Walter *et al.* 2013) *Brown Pelican* | 5 |
| Sociable Lapwing | *Vanellus gregarius* | | CR | 13700 | 0.413 | 2 | 261 | [1] (Watson *et al.* 2006), [2] (Robinson 2005) | 0 |
| Greater Spotted Eagle | *Clanga clanga* | | VU | 5000 | 0.95 | 4 | 65 | (Katzner, Bragin & Milner-Gulland 2006) *Eastern Imperial Eagle* | 0 |
| Steppe Eagle | *Aquila nipalensis* | | EN | 78042 | 0.924 | 4 | 403 | (Katzner, Bragin & Milner-Gulland 2006) *Eastern Imperial Eagle* | 0 |
| Eastern Imperial Eagle | *Aquila heliaca* | | VU | 3500 | 0.924 | 4 | 54 | (Katzner, Bragin & Milner-Gulland 2006) | 0 |
| Pallid Harrier | *Circus macrourus* | | NT | 18000 | 0.72 | 3 | 561 | (Robinson 2005) *Montagu's Harrier* | 2 |

**Exhibit A.9:** Threshold Justification for Non-Breeding Priority Bird Populations

| *Common Name* | *Taxonomic name* | *Potential Biological Removal rate* | *Fatality Threshold* | *Threshold justification (comparing the PBR with human derived sources of mortality additional to those from wind farm related activities in the JMMF study area)* |
|---|---|---|---|---|
| Common Crane | *Grus grus* | 28209 | 5 | Principal threats relating to direct mortality of Cranes are from collisions with powerlines and hunting (Birdlife International 2016a). One study of Common Crane powerline fatalities reported fatality rates of between 1.5 - 6.0% of the population (Janss & Ferrer 2000). Similar studies of other crane species report mortality rates lower than this (Morkill & Anderson 1991; Alonso, Alonso & Muñoz-Pulido 1994) and in some substantially cases higher than the figures reported in Janss & Ferrer 2000. e.g. 12% for Blue Crane in South Africa (Shaw *et al.* 2010). Assuming the values in Janss & Ferrer 2000 provide a reasonable estimate of powerline collisions and taking the median value of 3.8% gives an annual global powerline fatality rate of approximately 19000 birds. Fatality rates resulting from hunting are scarce but hunting of Cranes in Afghanistan and Pakistan is a known threat to this species with one estimate indicating that 10-15% (see references in Meine & Archibald 1996) of the total migrating populations of three species of crane were shot in one migration season. Given that hunting does not occur to this extent over the whole range of the species it might be reasonable to assume that annual fatalities due to hunting may be unlikely to exceed 1% of the population or approximately 5000 birds. Using these estimated figures for powerline fatalities and hunting as a rough guide the annual fatality rate due to external human derived effects would be around 4000 birds below the PBR value of just over 28000. On this basis an annual fatality threshold of 5 Common Cranes is considered an appropriate threshold to trigger an assessment of available mitigation options and if appropriate the implementing of additional mitigation actions. |
| Asian Houbara | *Chlamydotis macqueenii* | 1071 | 0 | Principal threats relating to direct mortality of Asian Houbara are from hunting related activities and collision with powerlines(Birdlife International 2019b). For powerlines alone it is likely that annual fatalities exceed the PBR value of 1071 birds. For example studies for other bustard species report annual powerline fatality rates of between 0.9 and 3.6% of a Great Bustard population - Spain (Janss & Ferrer 2000), and minimum value of 7% of a Ludwig's Bustard population in South Africa (Jenkins *et al.* 2011). If the annual powerline fatality rate is midway between these two values (i.e. 4% of the population) then 1975 Asian Houbara's powerline fatalities would occur annually, exceeding the PBR value by nearly 1000 birds. Even if this were an overestimate of powerline fatalities, hunting is regarded as a greater impact on mortality than powerlines and the combine effects would |

| *Common Name* | *Taxonomic name* | *Potential Biological Removal rate* | *Fatality Threshold* | *Threshold justification* *(comparing the PBR with human derived sources of mortality additional to those from wind farm related activities in the JMMF study area)* |
|---|---|---|---|---|
| | | | | undoubtedly exceed the annual fatality rate calculated by PBR. Based on this, a zero-fatality threshold for Asian Houbara is considered necessary to contribute to the safeguarding of the global population. |
| Painted Stork | *Mycteria leucocephala* | 714 | 2 | The principal threat relating to direct mortality of Painted Stork is from hunting (Birdlife International 2016b). Stork species are also susceptible to collisions with powerlines, and it is likely that although undocumented for Painted Stork some impact is likely. Assuming an annual powerline collision fatality rate of 1% of the population (aligned with an estimate for White Stork (Garrido & Fernandez-Cruz 2003)) 250 Painted Stork fatalities would occur annually at powerlines. Accounting for an additional number of fatalities due to hunting it is possible that the number of human derived fatalities is reasonably close to the PBR value of 714 fatalities annually. On this basis an annual fatality threshold of 2 Painted Storks is considered necessary to adequately contribute to the safeguarding of the global population. |
| Great White Pelican | *Pelecanus onocrotalus* | 12620 | 5 | Principal threats relating to direct mortality of Great White Pelican are hunting for food and sport and for use in traditional medicine. Collisions with powerlines are also a known cause of mortality (Birdlife International 2018b). The scale of mortality from these sources is poorly understood. Powerline fatalities are not thought to have a significant impact on this species in the African-Eurasian region (Prinsen *et al.* 2011). Taking account of the species' Least Concern IUCN extinction risk category plus no clear evidence to suggest and overall decline in the global population it is considered that annual mortality from human derived sources could be several thousand birds below the PBR fatality rate of 12620 birds. On this basis an annual fatality threshold of 5 Great White Pelicans is considered an appropriate threshold to trigger an assessment of available mitigation options and if appropriate implementing of additional mitigation actions. |
| Sociable Lapwing | *Vanellus gregarius* | 261 | 0 | Illegal hunting in wintering areas is possibly the principal threat to Sociable Lapwing (Birdlife International 2019c) Recent estimates of birds illegally killed in countries along the Mediterranean the Caucasus and the Arabian Peninsula, Iran and Iraq, suggested that at least 76-630 Sociable Lapwings are killed annually (Donald *et al.* 2021). Based on this information a zero-fatality threshold for Sociable Lapwing is considered necessary to contribute to the safeguarding of the Critically Endangered global population. |

| *Common Name* | *Taxonomic name* | *Potential Biological Removal rate* | *Fatality Threshold* | *Threshold justification*<br>*(comparing the PBR with human derived sources of mortality additional to those from wind farm related activities in the JMMF study area)* |
|---|---|---|---|---|
| Greater Spotted Eagle | *Clanga clanga* | 65 | 0 | Principal threats relating to direct mortality of Greater Spotted Eagle are shooting, poisoning, electrocution at powerlines. Given that shooting and poisoning are considered to occur across much of its global range it is highly probable that the annual global PBR fatality rate of 65 will be exceeded by these impacts. (Birdlife International 2017). Based on this information a zero fatality threshold for Greater Spotted Eagle is considered necessary to contribute to the safeguarding of the global population. |
| Steppe Eagle | *Aquila nipalensis* | 403 | 0 | Principal threats relating to direct mortality of Steppe Eagle are collision and electrocution at powerlines, turbine collision at wind power projects and poisoning (Birdlife International 2020). Mortality along powerlines alone exceeds the calculated PBR level for the global population and is recognized as a likely principal reason for declines of this species . For example, Moseikin (2003) recorded 932 Steppe Eagle fatalities along 1500 km of powerline in Kazakhstan. Based on this information a zero fatality threshold for Steppe Eagle is considered necessary to contribute to the safeguarding of the global population. |
| Eastern Imperial Eagle | *Aquila heliaca* | 54 | 0 | Principal threats relating to direct mortality of Eastern Imperial Eagle are illegal killing, poisoning and mortality relating to powerlines (Birdlife International 2019a). Mortality along powerlines alone exceeds the calculated PBR level for the global population of Eastern Imperial Eagle. For example, one study in the Altai region of Russia concluded that approximately 450 individuals were killed during an single breeding season (Karyakin *et al.* 2009). Based on this information a zero-fatality threshold for Eastern Imperial Eagle is considered necessary to contribute to the safeguarding of the global population. |
| Pallid Harrier | *Circus macrourus* | 561 | 2 | The principal threat relating to direct mortality of Pallid Harrier appears to be poisoning relating to pesticide use (Galushin, Clarke & Davygora 2003; Birdlife International 2018a). The scale of this threat is unknown although a mass fatality incident at a Pallid Harrier roost in India provides evidence of the potential scale of risk. This is especially relevant as some traditional Pallid Harrier roost sites hold large numbers of birds. For example, a roost in Velavadar, Gujarat, India has been recorded as holding about 1% of the global population. Taking account of the potential risk from this aspect of species' ecology, its Near Threatened IUCN extinction risk category and a decreasing population trend (Birdlife International 2018a) a precautionary annual fatality threshold of 2 Pallid Harriers is considered an appropriate threshold to trigger an assessment of available mitigation options and, if appropriate, implementing of additional mitigation actions. |

## A.3 References

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# Appendix B: Priority Bat Species and Thresholds

This appendix describes the methods used to identify priority bat VECs in the Jhimpir Wind Region as well as the thresholds for these species.

## B.1 Determining Priority Bat Species

Priority bats are those species assessed as at highest risk from the cumulative effects of wind projects in the JMMF study area.

JMMF priority bats were identified using a 3-step process:

- **Step 1** – Develop a 'Species Population List' of all bat species potentially at risk from WPP related activities in the JMMF study area.
- **Step 2a** – Assess sensitivity for each species (based on IUCN global conservation status and a measure of susceptibility to wind energy effects).
- **Step 2b** - Determine priority bats based on the vulnerability rating applied in Step 2.

### B.1.1.1 Step 1 – Develop the Species Population List

The purpose of step 1 was to identify bat populations that could potentially be at risk from the cumulative effects of wind projects within the JMMF study area.

**Methods**

First a preliminary list of all bat species known to occur in Pakistan was compiled based on information available on the IUCN Red List website (IUCN 2021). All species on this preliminary list whose mapped distribution range did not overlap with the JMMF study area were screened out of the process. Species remaining were regarded as those species potentially at risk from the cumulative effects of wind energy projects in the JMMF Study Area and were scoped in step 2.

**Results**

IUCN (2021) reports 48 bat species occurring in Pakistan (**Exhibit B.1**). Of these, 18 have distribution ranges that overlapped with the JMMF study area and were scoped into Step 2. Additionally, Serotine *Eptesicus serotinus* is not recorded with a distribution range within Pakistan but is one of the four species recorded within JMMF study area and was therefore scoped into Step 2.

**Exhibit B.1:** Preliminary list of bat species occurring in Pakistan
(Species in bold are those species with distribution ranges overlapping the JMMF study area and were scoped into step 2)

| *Common Name* | *Scientific Name* |
|---|---|
| Lesser Horseshoe Bat | *Rhinolophus hipposideros* |
| Lesser Noctule Bat | *Nyctalus leisleri* |
| Noctule | *Nyctalus noctula* |
| Egyptian Fruit Bat | *Rousettus aegyptiacus* |
| Lesser Mouse-eared Myotis | *Myotis blythii* |
| Greater Horseshoe Bat | *Rhinolophus ferrumequinum* |
| **Leschenault's Rousette** | ***Rousettus leschenaultii*** |
| **Greater Asiatic Yellow House Bat** | ***Scotophilus heathii*** |
| **Geoffroy's Trident Leaf-nosed Bat** | ***Asellia tridens*** |
| **Greater Mouse-tailed Bat** | ***Rhinopoma microphyllum*** |
| **Turkestani Long-eared Bat** | ***Otonycteris leucophaea*** |
| Desert Yellow Lesser House Bat | *Scotoecus pallidus* |
| Hodgson's Long-eared Bat | *Plecotus homochrous* |
| | ***Eptesicus pachyomus*** |
| | *Pipistrellus coromandra* |
| | *Scotozous dormeri* |
| | *Rhinolophus bocharicus* |
| Big-eared Horseshoe Bat | *Rhinolophus macrotis* |
| **Egyptian Free-tailed Bat** | ***Tadarida aegyptiaca*** |
| Sind Serotine Bat | *Rhyneptesicus nasutus* |
| Desert Long-eared Bat | *Otonycteris hemprichii* |
| Eastern Barbastelle | *Barbastella leucomelas* |
| **Fulvus Leaf-nosed Bat** | ***Hipposideros fulvus*** |
| Scully's Tube-nosed Bat | *Murina tubinaris* |
| | *Plecotus wardi* |
| Common Pipistrelle | *Pipistrellus pipistrellus* |
| **Least Pipistrelle** | ***Pipistrellus tenuis*** |
| **Lesser Asiatic Yellow House Bat** | ***Scotophilus kuhlii*** |
| **Greater Short-nosed Fruit Bat** | ***Cynopterus sphinx*** |
| Javan Pipistrelle | *Pipistrellus javanicus* |
| Kuhl's Pipistrelle | *Pipistrellus kuhlii* |

| *Common Name* | *Scientific Name* |
|---|---|
| **Kelaart's Pipistrelle** | ***Pipistrellus ceylonicus*** |
| Ognev's Serotine | *Eptesicus ognevi* |
| Hodgson's Bat | *Myotis formosus* |
| Nepal Myotis | *Myotis nipalensis* |
| **Lesser Mouse-tailed Bat** | ***Rhinopoma hardwickii*** |
| | *Eptesicus gobiensis* |
| **Greater False Vampire** | ***Lyroderma lyra*** |
| **Persian Trident Bat** | ***Triaenops persicus*** |
| Least Leaf-nosed Bat | *Hipposideros cineraceus* |
| Blasius's Horseshoe Bat | *Rhinolophus blasii* |
| Blyth's Horseshoe Bat | *Rhinolophus lepidus* |
| Small Mouse-tailed Bat | *Rhinopoma muscatellum* |
| Naked-rumped Tomb Bat | *Taphozous nudiventris* |
| **Indian Flying Fox** | ***Pteropus giganteus*** |
| **Egyptian Tomb Bat** | ***Taphozous perforatus*** |
| **Serotine** | ***Eptesicus serotinue*** |

### Step 2a – Assess Sensitivity

The purpose of step 2 was to determine the species sensitivity based on its vulnerability rating at the international scale, and the likely effects of wind energy based on the ecological and behavioral characteristics of each species where these were known.

Vulnerability was assessed using two parameters; 1) the IUCN extinction risk categories – Least Concern (LC), Data Deficient (DD) Near-Threatened (NT), Vulnerable (VU), Endangered (EN), Critically Endangered (CR), and 2) a published wind energy risk rating (high, medium, low and unknown) which provides a relative assessment of turbine collision susceptibility for several bat families based on their ecology and behaviour (Table on p19 of Rodrigues *et al.* 2015). Each of these two parameters were scored **(Exhibit B.2** and **Exhibit B.3)**. The sum of their scores was assigned to one of four vulnerability ratings - negligible, low, moderate and high (**Exhibit B.4**). Species with a rating of 'moderate or high' are identified as 'priority bats'

**Exhibit B.2:** Scoring for IUCN red list categories

| *Global IUCN red list category* | *Score* |
|---|---|
| LC | 0 |
| DD/NT | 1 |
| VU | 2 |
| EN/CR | 3 |

**Exhibit B.3:** Scoring for Collision Risk Level (Rodrigues et al. 2015)

| *Collision risk level rating* | *Score* |
|---|---|
| Low | 0 |
| Medium/Unknown | 1 |
| High | 2 |

**Exhibit B.4:** Scoring for Final Vulnerability Rating (IUCN Red List Score + Collision Risk Level Score)

| *Final vulnerability score* | *Final Vulnerability rating* |
|---|---|
| 0-1 | Negligible |
| 2-3 | Low |
| 4 | Moderate |
| 5 | High |

## Results

Of the 18 species on the Species Population List scoped into step 2, none were rated as high or moderate sensitivity, 5 as Low and 13 negligible sensitivity to the effects of wind energy developments.

**Exhibit B.5** shows the IUCN extinction risk categories, collision risk level rating and the overall vulnerability rating for bats scoped into step 2.

**Exhibit B.5:** Step 2. Vulnerability Rating Assessment Results

| *Common Name* | *Scientific Name* | *Global IUCN Red List Category* | *Score* | *Collision Risk Level Rating* | *Collision Risk Level Score* | *Final Vulnerability Rating* |
|---|---|---|---|---|---|---|
| Leschenault's Rousette | *Rousettus leschenaultii* | LC | 0 | Unknown | 1 | Negligible |
| Greater Asiatic Yellow House Bat | *Scotophilus heathii* | LC | 0 | Unknown | 1 | Negligible |
| Geoffroy's Trident Leaf-nosed Bat | *Asellia tridens* | LC | 0 | Unknown | 1 | Negligible |
| Greater Mouse-tailed Bat | *Rhinopoma microphyllum* | LC | 0 | Unknown | 1 | Negligible |
| Turkestani Long-eared Bat | *Otonycteris leucophaea* | DD | 1 | Unknown | 1 | Low |
| | *Eptesicus pachyomus* | LC | 0 | Low | 1 | Negligible |
| Egyptian Free-tailed Bat | *Tadarida aegyptiaca* | LC | 0 | High | 2 | Low |
| Fulvus Leaf-nosed Bat | *Hipposideros fulvus* | LC | 0 | Unknown | 1 | Negligible |
| Least Pipistrelle | *Pipistrellus tenuis* | LC | 0 | High | 2 | Low |

| *Common Name* | *Scientific Name* | *Global IUCN Red List Category* | *Score* | *Collision Risk Level Rating* | *Collision Risk Level Score* | *Final Vulnerability Rating* |
|---|---|---|---|---|---|---|
| Lesser Asiatic Yellow House Bat | *Scotophilus kuhlii* | LC | 0 | Unknown | 1 | Negligible |
| Greater Short-nosed Fruit Bat | *Cynopterus sphinx* | LC | 0 | Unknown | 1 | Negligible |
| Kelaart's Pipistrelle | *Pipistrellus ceylonicus* | LC | 0 | High | 2 | Low |
| Lesser Mouse-tailed Bat | *Rhinopoma hardwickii* | LC | 0 | Unknown | 1 | Negligible |
| Greater False Vampire | *Lyroderma lyra* | LC | 0 | Unknown | 1 | Negligible |
| Persian Trident Bat | *Triaenops persicus* | LC | 0 | Unknown | 1 | Negligible |
| Indian Flying Fox | *Pteropus giganteus* | LC | 0 | High | 2 | Low |
| Egyptian Tomb Bat | *Taphozous perforatus* | LC | 0 | Unknown | 1 | Negligible |
| Serotine | *Eptesicus serotinus* | LC | 0 | Medium | 1 | Negligible |

### B.1.1.2 Step 2b - Identifying priority species

Priority bat VECs are those species populations that were assigned high or moderate vulnerability rating in step 2. All species were rated with low or negligible sensitivity and therefore ***no priority bats are currently identified for the JMMF Study Area.***

## B.2 JMMF Fatality Thresholds – Bats

Distribution, population size, and collision risk at wind energy projects is poorly understood for bat species in Pakistan. These data gaps mean that although no priority bats were identified during the JMMF assessment for bats, there is potential for species that were not part of the prioritization process to occur within the JMMF Study Area (and be recorded as fatalities). This is demonstrated by recent observations of Serotine *Eptesicus serotinus* within the study area (records from Arch Associates 2020), a species which was not identified as occurring within Pakistan based on information in the IUCN Red List. Additionally, recent studies from elsewhere have demonstrated the potential for population level effects from wind energy on commonly occurring, IUCN Least Concern, species (see for e.g. Frick *et al.* 2017). Recognizing these data gaps two thresholds have been developed.

- **an annual fatality threshold for IUCN Least Concern or Data Deficient species** intended to signal that fatalities are likely reaching a level where long term viability needs to be evaluated and;
- **an annual fatality threshold for IUCN globally threatened species** intended to trigger an assessment of the emerging risk level to the species. Currently no globally threatened species are recorded as occurring in Pakistan (IUCN 2021) therefore the presence of a globally threatened species should trigger an assessment of risk.

### B.2.1.1 1. Threshold for IUCN Least Concern or Data Deficient Species.

The bat threshold for Least Concern and Data Deficient species is calculated as the *annual fatality rate per Megawatt (Mw)* based on:

- a theoretical estimate of the population size of a Least Concern species within the land area likely to be developed for wind energy in Pakistan.
- an estimate of the annual % reduction in the population, that if exceeded could result in adverse impacts on the long term viability of a bat population.
- the predicted forecast of total installed wind capacity to 2030.

The final annual threshold was calculated as follows:

$$Bat\ threshold\ per\ Mw\ = \frac{a\ \times\ b}{c}$$

$$Bat\ threshold\ per\ Mw\ = \frac{1{,}746{,}188 \times\ 0.02}{3795}$$

$$Bat\ threshold\ per\ Mw\ = 9.2$$

Based on the above ***the annual fatality threshold for IUCN Least Concern/Data Deficient bat species is set to***

9 bats per Mw[58].

**Important**

The threshold is a corrected figure that accounts for bat fatalities not found during systematic fatality monitoring. The actual bats found will likely be substantially lower than the corrected threshold.

**Exhibit B.6:** Information used to Calculate Threshold for IUCN Least Concern or Data Deficient Species

| *No* | *Parameter* | *Details* | *Value* | *Unit* | *Letter in equation 1 above* |
|---|---|---|---|---|---|
| 1 | Land area in Pakistan | Taken from publicly available information | 88,191,300 | hectares | |
| 2 | Proportion of land area in Pakistan with high wind potential | Taken from (Mengal *et al.* 2014) giving % of land area within Pakistan with high wind potential | 3 | percent | |
| 3 | Land area with high wind potential | [1] x [2] = (i.e. 3% of total Pakistan land area) | 2,645,739 | hectares | |

[58] For a 50 Mw wind power project this will approximate to an annual fatality rate of 460 bats

| *No* | *Parameter* | *Details* | *Value* | *Unit* | *Letter in equation 1 above* |
|---|---|---|---|---|---|
| 4 | Estimate of bat occupancy of a LC species (per hectare) | No value for bat occupancy in Pakistan. A median value for 12 habitats within South Africa used as a surrogate (MacEwan *et al.* 2020). These values were compared with values in other countries where this information was available for IUCN Least Concern Species to ensure the value was broadly within the range of known occupancy for bats. | 0.66 | bats per hectare | |
| 5 | Estimate of number of bats from a LC species within land area with high wind potential | [3] x [4] | 1,746,188 | individual bats | *a* |
| 6 | Estimate of the annual % reduction in individuals of a LC species that if exceeded could result in adverse impacts on the population | Based on the results of an analysis of bat population parameters (reported in MacEwan *et al.* 2020 p 6-7) | 2 | percent per year | *b* |
| 7 | Estimate reduction in number of individuals of an LC bat species within the area good for wind | [5] x [6] | 34,924 | individual bats | |
| 8 | Predicted forecast of total installed wind capacity to 2030 | Based on forecast given in (National Transmission and Despatch Company 2021) | 3795 | Mw | *c* |
| 9 | Estimate of annual bat fatality thresholds per Mw | [5] x [6]/8 | 9.2 | bats per Mw/year | |

The threshold of 9 bats per Mw has many underlying assumptions that have the potential to affect the accuracy of the threshold. Recognizing this, the objective was to incorporate population dynamics, measures of the spatial scale and magnitude of collision risk to arrive at a reasoned threshold value that can be refined when new information becomes available.

To provide some context relative to other bat fatalities elsewhere, the JMMF threshold is at the higher end of bat fatality rates recorded at wind energy projects in the United States, where the median annual fatality rate for all wind projects is 3 bats per Mw and only 25% of studies report an annual fatality rate of greater than 7.7 bats per MW (American Wind Wildlife Institute 2020)

#### B.2.1.2 2. Threshold for IUCN Globally Threatened Species

**The annual fatality threshold for an IUCN globally threatened species is set to zero.** This means that if one fatality from a globally threatened species is found the incident should be reported, the likely risk to the species should be evaluated, and its likely status

as a JMMF priority bat evaluated. Any species determined as a priority species will require a species-specific threshold.

## B.3 References

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# Appendix C: Reporting Formats

## C.1 Monitoring Framework for Individual WPP Reporting

This section presents the monitoring framework and reporting template for each participating WPP to report on status of indicator and thresholds as well as the implementation of management measures for each VEC.

***Monitoring of Birds***

**Exhibit C.1:** Status of Birds Indicator

| *Indicator* | *Threshold* | *Monitored Value* |
|---|---|---|
| 1st quarter and 3rd quarter of year<br>• records of fatalities of priority birds with zero fatality thresholds,<br>• records of priority birds exceeding extreme event thresholds<br>• records of fatalities of non-zero fatality priority birds where the actual number of fatalities has exceeded the threshold<br>2nd and 4th quarter (after 6-month and 12-months)<br>• all types of records detailed above, plus<br>• corrected fatality rate estimates for non-zero fatality priority birds (except in situations where the actual number of fatalities has exceeded the threshold) | See **Appendix A** | |

**Exhibit C.2** Implementation Status of Management Actions for Birds

| *Management Action* | *Implementation Status* |
|---|---|
| ***Good Management Practice*** | |
| Development of protocols to standardize practice | |
| Establishment of data sharing mechanism | |
| Bird Migration Tracking | |
| Micro-siting and alignment of wind turbines | |
| Joint Trainings | |
| Coordination between observers' network | |
| ***Recommended Management Options if Thresholds Exceeded*** | |
| Installation of Bird Flight Diverters | |

| | |
|---|---|
| Removal of livestock carcass | |
| On-demand micro shut-down | |
| Other actions (please specify): *[insert additional rows if required]* | |

### *Monitoring of Bats*

**Exhibit C.3:** Status of Bat Indicator

| ***Indicator*** | ***Threshold*** | ***Monitored Value*** |
|---|---|---|
| 1st quarter and 3rd quarter of year<br>• bat fatality rates<br>2nd and 4th quarter (after 6-month and 12-months)<br>• corrected fatality rate | See **Appendix B** | |

**Exhibit C.4:** Implementation Status of Management Actions for Bats

| ***Management Action*** | ***Implementation Status*** |
|---|---|
| ***Good Management Practice*** | |
| Development of protocols to standardize practice | |
| Establishment of data sharing mechanism | |
| Joint Trainings | |
| Coordination between observers' network | |
| ***Recommended Management Action*** | |
| Selective 'curtailment' of turbines with high bat fatality rates | |
| Other Actions (please specify): *[insert additional rows if required]* | |
| | |

### *Monitoring of Habitats and Vegetation*

**Exhibit C.5:** Status of Habitat and Vegetation Indicators

| ***Indicator*** | ***Threshold*** | ***Monitored Value*** |
|---|---|---|
| Percentage decline compared to baseline (2022) in Guggul cover, in WPP leased land and buffer zone of 500 m | More than 20% decline in Guggul cover compared to the baseline will cause the threshold to be exceeded. | |
| Percentage decline compared to baseline (2022), in indigenous vegetation cover, in | More than 20% decline in indigenous vegetation cover from | |

| *Indicator* | *Threshold* | *Monitored Value* |
|---|---|---|
| WPP leased land and buffer zone of 500 m (2022). | the baseline will cause the threshold to be exceeded. | |
| Percentage increase in AIS compared to baseline (2022) in WPP leased land and buffer zone of 500 m (2022). | More than 20% increase in AIS cover from the baseline will cause the threshold to be exceeded. | |

**Exhibit C.6:** Implementation Status of Management Actions for Habitats and Vegetation

| *Recommended Management Action* | *Implementation Status* |
|---|---|
| Improving cover area of Guggul in WPP leased land and buffer zone of 500m | |
| Revegetation of cleared land area | |
| Erosion management to protect topsoil and plant roots | |
| Improving vegetation covered area with plantation drives | |
| Harvesting of mesquite | |
| Awareness campaign on AIS | |
| Other actions (please specify): [insert additional rows if required] | |
| | |

### *Monitoring of Employment*

**Exhibit C.7:** Status of Employment Indicators

| *Indicator* | *Proposed Target* | *Achievement to date* |
|---|---|---|
| ***Local Employment*** | | |
| (i) % of local people in each WPPs full-time staff (skilled) | 15% | |
| ***Skill Development and Livelihood Promotion*** | | |
| No of local people provided on-or-off-job skill development training(s) | As actual | |
| No of locals with access to alternative livelihoods | As actual | |

**Exhibit C.8:** Implementation Status of Management Actions for Employment

| ***Recommended Management Action*** | ***Implementation Status*** |
|---|---|
| ***Local Employment*** | |
| Incorporate local[59] employment requirements (targets) in corporate policies and manuals for achieving the local employment threshold | |
| Communicate employment opportunities and criteria regularly through use of appropriate means including staff, media, and other partners | |
| Undertake staff (HR Manager, CLOs) checks to identify issues in adjustment and retention of locally employed staff | |
| Review and assess achievements and limitations in local employment and identify issues for addressing limitations | |
| ***Skill Development*** | |
| Identify skills requirements and plan skill development programmes for employees or community members | |
| Undertake refresher trainings to enhance and upgrade skills | |
| Livelihoods programmes organized for beneficiaries | |
| TVET opportunities organized for locals | |
| Locals engaged on petty contracts and/or other service provision (sub-contracts) | |
| Other Actions (please specify): *[insert additional rows if required]* | |

### *Monitoring Status for Gender*

**Exhibit C.9:** Status of Gender Indicators

| ***Indicator*** | ***Proposed Target*** | ***Achievement To-date*** |
|---|---|---|
| ***Engagement*** | | |
| No. of WPP staff trained in gender-sensitive community engagement | At least one gender focal person working with each WPP | |
| No. of meetings conducted with community women | One women focused meeting as part of the induction training for new staff | |

[59] The term local employment shall refer to all those men and women living as permanent residents (bearing National Identity Cards) within, around or in the immediate catchment of one or more WPPs in (i) UC Jhimpir (ii) UC Jungshahi and (iii) UC Mahal Kohistan in district Thatta and UC Moondar Khan in district Jamshoro. The term local can also extend to men and women living in UCs Jangri and Oonghar of district Thatta, followed by the entire tehsil Thatta and finally the entire tehsil Thano Bula Khan. See **Exhibit 11.9**

| ***Indicator*** | ***Proposed Target*** | ***Achievement To-date*** |
|---|---|---|
| No. of women provided information/basic orientation on WPPs with a focus on promoting empowerment | Quarterly meeting with community women | |
| **Women employment and alternative livelihoods support** | | |
| % of women employed by the WPPs in all categories in head-office | 15% | |
| Salary paid to employed men and women in the same position | NA | |
| No. of women supported for alternative livelihoods development | NA | |
| **Grievance redressal for women** | | |
| Establishment of GRM | Establish a user-friendly GRM) | |
| No. of complaints filed by women related to WPPs are received/documented | N/A | |
| No. of complaints addressed by the WPPs and the complainant notified | N/A | |

**Exhibit C.10:** Implementation Status of Management Actions for Gender

| ***Recommended Management Action*** | ***Implementation Status*** |
|---|---|
| **Engagement** | |
| Allocate a gender specialist to develop a gender plan and facilitate implementation | |
| Engage and train staff on gender issues | |
| Develop initiatives to foster more participation of women in the women focused meetings | |
| Develop and disseminate appropriate messages on promoting empowerment for local women | |
| Institute feedback mechanism on how information disseminated has been received, understood and (where applicable) acted upon | |
| **Women Employment and Alternative Livelihood Support** | |
| Develop and institutionalize gender action plans (with targets) | |
| Integrate more gender inclusive employment strategies | |
| Facilitate conducive working conditions and environment for women workers | |
| Establish company policy that men and women in the same positions will be paid same salary | |
| Review/revise, formulate women training needs | |

| ***Recommended Management Action*** | ***Implementation Status*** |
|---|---|
| Plan and implement women focused livelihood development programmes | |
| Identify and prioritize women for training | |
| **Grievance Redressal Mechanism** | |
| Prepare SOPs and protocols for GRM in documented form | |
| Ensure awareness raising and accessibility of GRM for women which is visible, safe and secure, easily accessible and easy to use for all women | |
| Review, filter, and direct complaints received through the GRM | |
| Address complaints received from women and ensure that necessary actions are taken | |
| Other Actions (please specify): *[insert additional rows if required]* | |

## C.2 Monitoring Framework for Collective Reporting

This section presents the monitoring framework and reporting template for the combined report which will be prepared by the Advisory Committee.

**Exhibit C.11:** Monitoring Framework for Environment VECs

| *Aspect* | *Monitoring Indicator* | *Threshold* | *Monitoring Value* | *Monitoring Frequency* | *Monitoring Method* | *Overall Assessment* |
|---|---|---|---|---|---|---|
| **Birds** | | | | | | |
| Bird fatality rates derived from systematic post-construction fatality monitoring programs | 1st quarter and 3rd quarter of year<br>♦ records of fatalities of priority birds with zero fatality thresholds,<br>♦ records of priority birds exceeding extreme event thresholds<br>♦ records of fatalities of non-zero fatality priority birds where the actual number of fatalities has exceeded the threshold<br>2nd and 4th quarter (after 6-month and 12-months)<br>♦ all types of records detailed above, plus corrected fatality rate estimates for non-zero fatality priority birds and bats (except in situations where the actual number of fatalities has exceeded the threshold) | See **Appendix A** | | Will be outlined in the operational phase Biodiversity Management Plan currently being developed for the IFC's Super 6 WPPs. Other participating WPPs can follow the monitoring protocols and frequency outlined in this Management Plan. | Ground Search | |

| *Aspect* | *Monitoring Indicator* | *Threshold* | *Monitoring Value* | *Monitoring Frequency* | *Monitoring Method* | *Overall Assessment* |
|---|---|---|---|---|---|---|
| **Bats** | | | | | | |
| Bat fatality rates derived from systematic post-construction fatality monitoring programs | 1st quarter and 3rd quarter of year<br>• bat fatality rates<br>2nd and 4th quarter (after 6-month and 12-months)<br>• corrected fatality rate | See **Appendix B** | | If fatality monitoring shows thresholds are being exceeded, the monitoring protocols and frequency will be outlined in the operational phase Biodiversity Management Plan currently being developed for the IFC's Super 6 WPPs. Other participating WPPs can follow the monitoring protocols and frequency outlined in this Management Plan. | Ground Search | |
| **Habitats and Vegetation** | | | | | | |
| Guggul | Percentage decline compared to baseline (2022) in Guggul cover, in WPP leased land and buffer zone of 500 m | More than 20% decline in Guggul cover compared to the baseline will cause the threshold to be exceeded. | | 5-Year | Change detection using multi temporal high-resolution satellite imagery, or field surveys using the quadrat method | |
| Loss of Indigenous Vegetation Cover | Percentage decline compared to baseline (2022), in indigenous vegetation cover, in WPP | More than 20% decline in indigenous vegetation cover from the baseline | | 5-Year | Change detection using multi temporal high-resolution satellite imagery, or | |

| *Aspect* | *Monitoring Indicator* | *Threshold* | *Monitoring Value* | *Monitoring Frequency* | *Monitoring Method* | *Overall Assessment* |
|---|---|---|---|---|---|---|
| | leased land and buffer zone of 500 m (2022). | will cause the threshold to be exceeded. | | | field surveys using the quadrat method | |
| Spread of Alien Invasive Species | Percentage increase in AIS compared to baseline (2022) in WPP leased land and buffer zone of 500 m (2022). | More than 20% increase in AIS cover from the baseline will cause the threshold to be exceeded. | | 5-Year | Change detection using multi temporal high-resolution satellite imagery, or field surveys using the quadrat method | |

**Exhibit C.12:** Monitoring Framework for Social VECs

| *Aspect* | *Monitoring Indicator* | *Target* | *Progress to-date* | *Overall Assessment* |
|---|---|---|---|---|
| ***Employment*** | | | | |
| Local Employment | % of local people in each WPPs full-time staff | 15% | | |
| Skill Development and Livelihood Promotion | No of local people provided on-or-off-job skill development training(s) | As actual | | |
| | No of locals with access to alternative livelihoods | As actual | | |
| **Gender** | | | | |
| Engagement | No. of WPP staff trained in gender-sensitive community engagement | At least one gender focal person working with each WPP | | |
| | No. of meetings conducted with community women | One women focused meeting as part of the induction training for new staff | | |
| | No. of women provided information/basic orientation on WPPs with a focus on promoting empowerment | Quarterly meeting with community women | | |
| Women Employment | % of women employed by the WPPs in all categories at head-office | 15%[60] | | |
| | Salary paid to employed men and women in the same position | NA | | |
| | No. of women supported for alternative livelihoods development | NA | | |

[60] This target is aspirational (to be achieved in 5-10 years), and it should be revised annually in order to ensure a sustained increase over time. This target does not preclude individual WPP to go beyond the common target and/or to employ women at operational sites.

| *Aspect* | *Monitoring Indicator* | *Target* | *Progress to-date* | *Overall Assessment* |
|---|---|---|---|---|
| Grievance Redressal for Women | Establishment of GRM | 01 (Establish a user-friendly GRM) | | |
| | No. of complaints filed by women related to WPPs are received/documented | NA | | |
| | No. of complaints addressed by the WPPs, and the complainant notified | NA | | |

# Appendix D: Implementation Schedule

## D.1 Key Actions, Responsibilities, and Implementation Schedule

A list of action items for implementation of the JMMF along with responsibilities, requirements and completion deadlines are provided in **Exhibit D.1**.

**Exhibit 13.1:** Key Actions, Responsibilities, and Timelines for JMMF Implementation

| | *Action* | *Responsibility* | *Requirement* | *Completion Deadline* |
|---|---|---|---|---|
| | **MoU between JMMF Participating Developers** | | | |
| 1. | Draft a MoU document for participating WPP developers for JMMF implementation | Leader of Advisory Committee (AC) | The MoU should include roles and responsibilities of participating WPP projects for JMMF implementation. | December 2021 |
| 2. | Organize MoU signing | Leader of Advisory Committee (AC) | The MoU should be shared with representatives of all participating WPP developers for signature | December 2021 |
| 3. | Share signed MoU with participating WPP developers | Leader of Advisory Committee (AC) | The final signed MoU should be shared with all participating WPP developers for their records | January 2022 |
| | **Meetings** | | | |
| 4. | Organize first meeting of the Advisory Committee | Leader of Advisory Committee (AC) | Send out invitations to participating WPP developers and lenders; provide venue for meeting; take meeting minutes | January 2022 |
| 5. | Organize quarterly meetings of the Advisory Committee | Leader of Advisory Committee (AC) | Send out invitations to participating WPP developers and lenders; provide venue for meeting; compile JMMF implementation reports from participating WPPs to discuss in meeting; take meeting minutes. | March 2022 onwards (recurring quarterly) |
| 6. | Organize meeting for selection of new annual leader of the Advisory Committee | Leader of Advisory Committee (AC) | Send out invitations to all participating WPP developers and lenders; provide venue for meeting; take meeting minutes. | January 2023 onwards (recurring annually) |
| 7. | First Meeting with external stakeholders | Leader of Advisory Committee (AC) | Organize a meeting with external stakeholders including relevant government departments and NGOs to provide an | June 2022 |

| | *Action* | *Responsibility* | *Requirement* | *Completion Deadline* |
|---|---|---|---|---|
| | | | overview of the JMMF; send out invitation letters; arrange venue; take meeting minutes | |
| 8. | Meeting with relevant stakeholder/s to discuss/resolve specific issue | WPPs individually or collectively | A meeting can be organized with relevant government department as required. For instance, Forest Department, to discuss plantations in JWR, or with relevant government department for vocational training of local communities. | As and when considered appropriate, at least one a year would be appropriate |
| | **Protocols, Data Sharing Forum and Baselines for Environment VECs** | | | |
| 9. | Prepare protocols for bird and bat monitoring | IFC's Super 6 WPPs with support from IFC's biodiversity specialist | The protocols will provide details of methodology for field data collection, data analysis, assessment to see if thresholds exceeded, selection of appropriate management measures | January 2022 |
| 10. | Share bird and bat protocols with other participating WPPs | Leader of Advisory Committee (AC) | The bird and bat monitoring protocols should be shared with Lakeside WPP and other participating WPPs which adopt the JMMF in the future | On completion of protocols |
| 11. | Implement the protocols for bird and bat monitoring | All participating WPPs | The participating WPP developers will implement the developed bird and bat monitoring protocols once WPP operations begin | At start of WPP operations |
| 12. | Develop a data sharing mechanism for sharing data obtained from monitoring of environment VECs (birds, bats, habitat and vegetation) | Leader of Advisory Committee (AC) | A forum to be developed to share data and information among the participating WPP developers | June 2022 |
| 13. | Prepare a habitat and vegetation baseline in WPP leased land and buffer zone of 500 m (2022). | Each participating WPP | Each WPP will develop a vegetation baseline in its leased land and buffer zone of 500 m, using multi temporal high-resolution satellite | June 2022 |

| | *Action* | *Responsibility* | *Requirement* | *Completion Deadline* |
|---|---|---|---|---|
| | | | imagery or field surveys using the quadrat method | |
| | **Company Policies for Social VECs (Employment and Gender)** | | | |
| 14. | Revise company (participating WPPs) policies and procedures to include local Employment targets[61] as well as other proposed management measures (Exhibit 6.1, Employment). | Each participating WPP | Company HR (Human Resource) policies should be revised to include the proposed targets and management measures outlined in Exhibit 6.1, Employment. | June 2022 |
| 15. | Revise company (participating WPPs) policies and procedures to include Gender targets as well as other proposed management measures (Exhibit 6.1, Gender). | Each participating WPP | Company HR (Human Resource) policies should be revised to include the proposed targets and management measures outlined in Exhibit 6.1, Gender. | June 2022 |

[61] The proposed targets may be reviewed by the Advisory Committee (**Section 9)** and revised as necessary, in line with the principles of a continuous improvement. This is to be achieved in a medium/long term (5-10 years), with the aim of having at least one skilled local staff member in the workforce.