

49.5 MW Wind Power Project Gharo, Sindh

FAUNAL BASELINE ENVIRONMENTAL STUDY Report



Prepared for:

TEKCELLENT
(P V T) L I M I T E D
TECHNOLOGY ENGINEERING KNOWLEDGE MANAGEMENT

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By:

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List of Team Members

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Term of References (ToRs)

- ❖ **Survey of the Tenaga Generasi Project site and surroundings**
- ❖ **Demarcation and establishment of coordinates of all sensitive areas within 5 km of boundaries of the Tenaga Generasi Project site**

Executive Summary

M/s. Tenaga Generasi Limited (TGL) a part of Dawood Group of Companies are planning to develop, own and operate a 49.5 MW wind power plant near Gharo, about 54 km south-east of Karachi. In line with the prevailing legislation in the country and IFC performance standards, an initial environmental examination (IEE) of the project has been carried out. The IEE report was submitted to the Sindh Environmental Protection Agency and this has been approved by the Sindh Environmental Protection Agency. This report has now been forwarded to Sindh Wildlife Department for review.

Legislative Framework

The Pakistan Environmental Protection Act, 1997 (PEPA 1997) requires the proponents of every development project in the country to conduct an environmental assessment and submit its report to the relevant environmental protection agency.

The IFC's Performance Standards also call for an environmental and social assessment for projects such as the TGL wind power plant. The present IEE has been carried out in accordance with the above-mentioned Act and IFC Performance Standards.

Background

Tekcellent Private Limited has been engaged by the Tenaga Generasi Limited as Consultants for 49.5 MW wind power plant Project near Gharo in Sindh, Pakistan.

Administratively, project area lies within the district of Thatta. The project area is shown in Annexure-1.

Project Overview

TGL plans to develop, own and operate a 49.5 MW wind farm IPP project in Sindh, Pakistan. The purchaser of the project's power will be the National Transmission and Distribution Company (NTDC). TGL has acquired 4,881 acres (about 1,975

hectares) of land from the Alternative Energy Development Board (AEDB), who have leased the land from the Government of Sindh. A detailed wind resource study has been conducted, and the micro siting study is in hand. The wind resource study is based on the three year (January, 2006 to December, 2008) site specific wind data obtained from a 80m meteorological mast that was set up by Green Power Limited and the data from December, 2008 to May, 2009 from the meteorological mast of 85m height set up by TGL at the site. The project will consist of 33 GE 1.5xl, 1.5MW turbines with a hub height of 80m and a rotor diameter of 82m.

Description of the Environment

The proposed power plant site is located in Thatta District, about 17 km southwest of Gharo town, which is located on the National Highway between Karachi and Thatta. The power plant site is located on inter-tidal mud flats, surrounded on its three sides by the creek channels. The proposed site and its immediate surroundings are lying completely vacant, with no habitation, cultivation or grazing activity. However, two other wind farms are likely to be developed in the vicinity.

Administratively, the area is located in Haji Girano, which is one of the union councils of the Mirpur Sakro Taluka, District Thatta. However the proposed site is outside the settled area of the union council. The nearby population is mostly rural, and depends upon cultivation, fishing and associated activities for livelihood.

The climate in the project area can be characterized by dry, hot and humid conditions, typical of sub-tropical coastal zones lying in monsoon region. There is a minor seasonal intervention of a mild winter from mid-December to mid-February and then a long hot and humid summer extending from April to October.

The project site is located in the area which is classified as Indus Delta. However, primarily as a result of the decreasing river water flows, the area is no longer included in the active delta, which is now restricted between Shah Bunder and Keti Bunder. The project site comprises of inter-tidal mudflats with marshes along the creeks. The area is mostly plain having alluvial silt above the high tide mark. In the low-lying area, numerous marshes have been formed. A sparse growth of

mangroves was found in and around the project site area. However, no mangroves were found on the Site.

Project Location

The proposed power plant site is located in Thatta District, about 17 km southwest of Gharo town, which is located on the National Highway between Karachi and Thatta. The site can be approached by using the Gharo – Ketī Bundar Highway for about 12 km up to Leete village, and then following the local road along the Jam Sakro Canal for about 9.5 km. An alternative route is by using the newly constructed Ketī Bundar Coastal Highway, which passes at a distance of 800m from the boundary of the site. Beyond this point, about 10 km long dirt track leads to the proposed site. The power plant site is located on inter-tidal mud flats, surrounded on its three sides by the creeks. This land forms a part of the Khattī Kun un-surveyed government land which has been designated by Alternative Energy Development Board (AEDB) for setting up of wind power projects.

Major towns in the area include Gharo and Mirpur Sakro. Small villages are scattered throughout the area, but lie predominantly to the east of the site.

Site Layout

The project area is generally very flat, and the most prominent natural feature is the creeks that surround the project area.

Need of the Study

The Pakistan Environmental Protection Act, 1997 (PEPA 1997) requires the proponents of every development project in the country to submit either an Initial Environmental Examination (IEE) or “where the project is likely to cause an adverse environmental effect,” an Environmental Impact Assessment (EIA) to the concerned environmental protection agency (EPA). The IEE/EIA Regulations 2000 issued under the PEPA 1997 provide separate lists for the projects requiring IEE and EIA. The

AEDB, in close collaboration with the UNDP/GEF Wind Energy Project (WEP) have recently developed a set of guidelines to document an Environmental Assessment. These guidelines are based on the PEPA 1997, IEE/EIA Regulations 2000 and the Pakistan Environmental Assessment Procedures 1997 (PEAP 1997), are not legally binding but provide in one place main factors to be incorporated in any EA of Wind Power projects. Based on these guidelines SEPA has determined that an IEE is required for the projects in the Gharo area.

The study also evaluates the requirements of the IFC Performance Standards in addition to the national legal requirements mentioned above. The IFC Performance Standards call for environmental and social assessment of projects such as the proposed power plant Study Objectives.

Ecological Baseline Data Collection:

The conduct of Environmental Assessment is a pre-requisite for all development projects in Pakistan. An Environmental Assessment and Management Plan (EAMP) was prepared and presented for the project area by Tekcellent Pvt. Limited.

There is a requirement to update the baseline ecological survey included in the IEE and also to establish whether any part of the Site is included in any Wildlife Sanctuary, Game Reserve or any Important Bird Area (IBA). This will determine whether the Site, or any part, lies within any Protected Area. The review will also assess the possible impact of project work on adjacent areas of ecological significance.

As the recent data on species and habitats in the area is not available, Faunal Baseline Data is required to assess the impact of project activities.

Tekcellent Private Limited (The Client) has contracted Adnan Hamid Khan, Consultant to conduct the Faunal Baseline studies in the Project Area to further fortify the EAMP in a bid to support the environmental assessment and management plan. The faunal baseline studies were therefore conducted starting from February

03rd, 2012 to February 05th, 2012. The report on the faunal baseline studies is presented here.

The components of the survey as required by the Client, outlined in the Terms of Reference (Annex 1), include the following.

Survey Areas

- ✓ Mirpur Sakro Game Reserve
- ✓ Deh Khalifa Game Reserve
- ✓ Deh Jaangisar Game Reserve
- ✓ Marho Kotri Wildlife Sanctuary
- ✓ Gullel Kohri Wildlife Sanctuary

Conduct of Surveys

Survey Activities

Survey schedule is given in the Standard Operating Procedure (SOP---Appendix-3)

Surveys were conducted as per ToRs (Annex 1) as follows:

Protected Area	Survey Length (km)	Detailed Animal Survey	Overview Birds Survey	Overview Animal Survey
Project Area	12	-	✓	✓
Mirpur Sakro GR	9	-	✓	✓
Deh Khalifa GR	3	-	✓	✓
Deh Jangisar GR	3	-	✓	✓
Gulel Khorl WLS	5	-	✓	✓
Marho Kotri WLS	5	-	✓	✓

Methodology

Surveys were conducted at different times of the day employing different methods for each group of animals. It was not possible to physically observe all the animals hence presence of animals was confirmed on the basis of signs and through interviews of the local residents. Birds were watched early in the morning and in the evening. Some local residents in the study area were also interviewed in order to have their views about the past and existing situation of wildlife in the area and the impacts of the project activities upon key wildlife species.

Sindh Wildlife Protection Act, 1972

This law is to protect the province's wildlife resources directly and other natural resources indirectly. It classifies wildlife by degree of protection, ie, animals that may be hunted on a permit or special license, and species that are protected and cannot be hunted under any circumstances. The Act specifies restrictions on hunting and trade in animals, trophies, or meat. The Act also defines various categories of wildlife protected areas, i.e, National Parks, Wildlife Sanctuaries and Game Reserve. This Act will be applicable to the construction as well as operation and maintenance (O&M) activities of the proposed project.

Obligations under International Treaties

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

- Basel Convention on the Control of Trans-boundary Movements of Hazardous Wastes and their Disposal,
- Convention on Biological Diversity (CBD),
- Convention on Wetlands (Ramsar),
- Convention on International Trade in Endangered Species (CITES),
- UN Framework Convention on Climate Change (UNFCCC),
- Kyoto Protocol,
- Montreal Protocol on substances that deplete the ozone layer,
- UN Convention to Combat Desertification,

- Convention for the Prevention of Pollution from Ships (MARPOL),
- UN Convention on the Law of Seas (LOS),
- Stockholm Convention on Persistent Organic Pollutants (POPs),
- Cortina Protocol.

Biological Environment

Indus Delta

The Indus Delta covers about 85 percent of the coastal belt of Sindh and is the most prominent ecological feature of the area. The coastal morphology is characterized by a network of tidal creeks and several small islands with scattered mangrove vegetation which constitute the largest arid land mangroves in the world and the thirteenth largest mangrove forests in terms of coverage. The habitats include marshes, fallow land and mudflats and support rich avian and marine fauna. It stretches from Korangi Creek in the northwest to Sir Creek near Indian border. It is a critically threatened ecosystem due to reduced freshwater flow from diversions upstream, cutting of mangroves for fuel wood and drainage of coastal wetlands. The Patiani Creek, which is situated west of the proposed site at a distance of approx. 8 to 10 km, forms a part of the Indus Delta.

Lakes

Several fresh and brackish water lakes exist in Thatta district. These include the Keenjher, Haleji, Hudero lakes and Jhuddo lagoon. Haleji Lake is an artificial freshwater lake with marshes and a brackish seepage lagoon. Considered a game reserve in 1971, this lake was declared a wildlife sanctuary and in 1976, the lake proceeded to become a Ramsar site. Jubho Lagoon is a shallow, small brackish water lagoon with mudflats and marshes that support a large concentration of migratory birds including flamingos and endangered Dalmation pelicans, a rare species in the world. This was declared a Ramsar site in 2001 because of the efforts made by IUCN Pakistan. None of the above water bodies are in the immediate vicinity of the proposed project site.

Forests

A large numbers of protected forests exist in Thatta district. Some of these are declared as Wildlife Sanctuaries and Game Reserves as well under Sindh Wildlife Protection Ordinance 1972. The closest Game Reserve to the project area is Mirpur Sakro Game Reserve, Taluka Mirpur Sakro, District Thatta. which was initially declared vide Notification No. VII/45-SO(FG)65, dated on 25th May 1965 and reproduced as Game Reserve vide Notification No. WL&FT(DEC-GEN-77)/1981, dated 15th July 1981. Whereas two other Game Reserves are Deh Khalifa and Deh Jangiser. Both were initially notified as Game Reserves vide Notification No. 7(98)SO(Forest and Game)/65, dated 25th September 1965 and the same will reproduced as Game Reserve vide Notification No. WL&FT(DEC-GEN-76)/1981, dated 15th July 1981. Both the Game Reserves were Protected Forests and were at the Southern part of Protection Bund. At the time of declaration as Game Reserve, Deh Khalifa was in the Administratively in Ghorabari Taluka and Deh Jangiser was in Mahal Ketu Bander but presently, both Game Reserves are in Taluka Ghorabari. All the three Game Reserves no longer harbor the Key Wildlife Species as the whole area was distributed for agriculture in 1996 by the then Political Government. The local Haris (poor farmers) now own this land.

Now all the land of the Game Reserves has been converted in agriculture land. Similarly, two protected Forests were declared as Wildlife Sanctuaries in the Southern Part of the Protection bund of Indus River (Kacha Area). And the same were also distributed in the poor farmers (Haris) of the area for agriculture and the Wildlife Sanctuaries are now become converted into agriculture land. None of the above Protected Areas are in the immediate vicinity of the proposed project site (Annexure-2).

Mammals

The areas were searched while travelling in a 4 x 4 vehicle along the project area and protected areas including 1000 feet wide belt from the toe of the paths to record the existing small, medium sized and large mammals. Direct observation and indirect observations (including footprints, trails, faecal pellets/deposits) were

recorded; interviews with the locals residents were also made to record their view point on the occurrence of mammals showing them the pictures of animals.

Small Mammals were actively searched during the daytime through potential and suitable microhabitats. During the nights open areas of the habitat were also visited to record the presence of small mammals.

Wild Boar, Indian Crested Porcupine, Jungle Cat, Fishing Cat and Roof Rat were recorded on the basis of indirect evidences like footprints, tracks, body parts, faecal materials, territory marking signs and interviews with local residents and wildlife watchers from Sindh Wildlife Department.

Reptiles

Six species of reptiles have been recorded from the area as listed in **Exhibit 5.10**.

Among terrestrial snakes, the Saw-scaled Viper is reported to be common, while in the Sea Snakes, the Beaked Sea Snake, Annulated Sea Snake, Pelagic Sea Snake, Yellow Sea Snake and the Small-headed Sea Snake are the common species.

Birds

The bird species were recorded along the project area 1000 feet wide strip from the toe of the paths mainly in the morning from dawn for a period of 3-4 hours. The areas were walked, observations were also recorded while travelling in a 4 x 4 vehicle, occasionally stopping, and moving at a slow pace. The agricultural areas were also visited to record the bird species. The wetlands/creeks in close vicinity of the project area were also visited. Binoculars 10 x 50 mm were used to observe the birds. Spotting scope 15 x 15-60 mm was also utilized to confirm the identification of birds. Interviews with the locals residents were also made to record their view point on the occurrence of birds showing them the pictures of birds.

Explanatory Note

For this survey the emphasis was on the confirmation of the occurrence or presence of the faunal species and their relative abundance based also on the available secondary information; and relate it to their conservation status. Estimation the population or the population structure was not the objective of the survey. Therefore

the presence or absence of the faunal species was confirmed and their status according to IUCN Red List has been reported here

Survey Results

The faunal surveys in the Project Area were conducted from February 03rd, 2011 to February 05th, 2012 according to the survey requirements indicated by the Client. The results are reported as follows;

Mammals

Sr. No.	Common Name	Zoological Name	Order	Status
1	Indian Gerbil	<i>Tatera indica</i>	Rodentia	LC
2	Indian crested porcupine	<i>Hystrix indica</i>	Rodentia	LC
3	House shrew	<i>Suncus murinus</i>	Rodentia	LC
4	Kohl's bat	<i>Pipistrellus kuhlii</i>	Chiroptera	LC
5	Northern Palm Squirrel	<i>Funambulus pennantii</i>	Insectivora	LC
6	Small Indian Mongoose	<i>Herpestes javanicus</i>	Carnivora	LC
7	Grey Mongoose	<i>Herpestes edwardsii</i>	Carnivora	LC
8	Jungle cat	<i>Felis chaus</i>	Carnivora	LC
9	Fishing cat	<i>Prionailurus viverrinus</i>	Carnivora	VU, P
10	Common Red Fox	<i>Vulpes vulpes</i>	Carnivora	LC
11	Asiatic Jackal	<i>Canis aureus</i>	Carnivora	LC
12	Wild Boar	<i>Sus scrofa</i>	Artiodactyla	LC

Legend: E = Endangered, VU = Vulnerable, LC = Least Concern, P = Protected

of the 12 species recorded one species viz... Fishing cat is vulnerable; all the other species have the "Least Concern" status.

Bird Species

One Hundred Three(103) bird species were observed in the Project Area as given in the following Table:

S. No.	English name	Scientific name	Status	Occurrence
1	Little Grebe	<i>Tachybaptus ruficollis</i>	Common	R
2	Black-necked Grebe	<i>Podiceps nigricollis</i>	Rare	WV
3	Little Cormorant	<i>Phalacrocorax niger</i>	Common	R
4	Grey Heron	<i>Ardea cinerea</i>	Scarce	WV
5	Purple Heron	<i>Ardea purpurea</i>	Rare	R
6	Indian Pond Heron	<i>Ardeola grayii</i>	Common	R

7	Cattle Egret	<i>Bubulcus ibis</i>	Common	R
8	Large Egret	<i>Egretta alba</i>	Common	WV
9	Intermediate Egret	<i>Egretta intermedia</i>	Common	R
10	Little Egret	<i>Egretta garzetta</i>	Common	R
11	Common Teal	<i>Anas crecca</i>	Common	R
12	Black-shouldered Kite	<i>Elanus caeruleus</i>	Scarce	R
13	Common Kite	<i>Milvus migrans</i>	Common	R
14	Brahminy Kite	<i>Haliastur Indus</i>	Rare	R
15	Sparrow hawk	<i>Accipiter nisus</i>	Common	R
16	Long legged buzzard	<i>Buteo rufinus</i>	Common	R
17	Common buzzard	<i>Buteo buteo</i>	Common	R
18	Marsh Harrier	<i>Circus aeruginosus</i>	Common	WV
19	Hen Harrier	<i>Circus cyaneus</i>	Common	WV
20	Osprey	<i>Pandion haliaetus</i>	Rare	WV
21	Grey Partridge	<i>Francolinus pondicerianus</i>	Common	R
22	Black Partridge	<i>Francolinus francolinus</i>	Scarce	R
23	White-breasted Water hen	<i>Amaurornis phoenicurus</i>	Scarce	R
24	Indian Moorhen	<i>Gallinula chloropus</i>	Common	R
25	Purple Moorhen	<i>Porphyrio porphyrio</i>	Common	R
26	Red wattled Lapwing	<i>Vanellus indicus</i>	Common	R
27	Little Ringed Plover	<i>Charadrius dubius</i>	Scarce	WV
28	Kentish Plover	<i>Charadrius alexandrines</i>	Scarce	WV
29	Little Ringed Plover	<i>Charadrius dubius</i>	Scarce	WV
30	Common Sandpiper	<i>Tringa hypoleucos</i>	Common	WV
31	Common Snipe	<i>Gallinago gallinago</i>	Scarce	WV
32	Black-winged Stilt	<i>Himantopus himantopus</i>	Common	R
33	Common gull	<i>Lanus canus</i>	Common	R
34	Indian River Tern	<i>Sterna aurantia</i>	Scarce	R
35	Little Tern	<i>Sterna albifrons</i>	Common	R
36	Blue Rock Pigeon	<i>Columba livia</i>	Common	R
37	Ring Dove	<i>Streptopelia decaocto</i>	Common	R
38	Little Brown Dove	<i>Streptopelia senegalensis</i>	Common	R
39	Rose-ring Parakeet	<i>Psittacula Krameri</i>	Common	R
40	Common Koel	<i>Eudynamys scolopaceus</i>	Common	Summer breeding
41	Crow Pheasant	<i>Centropus sinensis</i>	Common	R
42	Spotted Owlet	<i>Athene brama</i>	Rare	R
43	European Nightjar	<i>Caprimulgus europaeus</i>	Rare	Occasional WV
44	Pied Kingfisher	<i>Ceryle rudis</i>	Common	R
45	Common Kingfisher	<i>Alcedo atthis</i>	Rare	R
46	White-breasted Kigfisher	<i>Halcyon smyrnensis</i>	Common	R
47	Green Bee-eater	<i>Merops orientalis</i>	Common	R
48	Indian Roller	<i>Coracias benghalensis</i>	Common	R

49	Common Hoopoe	<i>Upupa epops</i>	Rare	WV
50	Golden backed woodpecker	<i>Dinopium benghalense</i>	Common	R
51	Crested Lark	<i>Galerida cristata</i>	Common	R
52	Pale Sand Martin	<i>Riparia diluta</i>	Common	WV
53	Barn or Common Swallow	<i>Hirundo rustica</i>	Common	WV
54	Rufous tailed or Isabelline Shrike	<i>Lanius isabellinus</i>	Scarce	R
55	Southern Grey Shrike	<i>Lanius meridionalis</i>	Common	R
56	Bay backed Shrike	<i>Lanius vittatus</i>	Scarce	R
57	Black Drongo	<i>Dicrurus adsimilis</i>	Common	R
58	Indian Myna	<i>Acridotheres adsimilis</i>	Common	R
59	Bank myna	<i>Acridotheris ginginianus</i>	Common	R
60	Common Starling	<i>Sturnus vulgaris</i>	Scarce	WV/R
61	Rosy Pastor	<i>Sturnus roseus</i>	Scarce	Double passage migrant
62	Black Redstart	<i>Phoenicurus ochruros</i>	Rare	WV
63	Hume's Wheatear	<i>Oenanthe albonigra</i>	Common	R
64	Indian Robin	<i>Saxicoloides fulicata</i>	Common	R
65	Pied Bush Chat	<i>Saxicola caprata</i>	Common	R
66	Stone Chat	<i>Saxicola torquata</i>	Common	Double passage migrant
67	House Crow	<i>Corvus splendens</i>	Common	R
68	Tree Pie	<i>Dendrocitta vagabunda</i>	Scarce	R
69	Yellow bellied Prinia	<i>Prinia flaviventris</i>	Common	R
70	Rufous vented Prinia	<i>Prinia burnesii</i>	Common	R
71	Plain Coloured Prinia	<i>Prinia inornata</i>	Common	R
72	Tailor Bird	<i>Orthotomus sutorius</i>	Common	R
73	White-cheeked Bulbul	<i>Pycnonotus leucogenys</i>	Common	R
74	Red vented Bulbul	<i>Pycnonotus cafer</i>		
75	Common Babbler	<i>Turdoides caudatus</i>	Common	R
76	Striated Babbler	<i>Turdoides earlie</i>	Rare	R
77	Jungle Babbler	<i>Turdoides striata</i>	Common	R
78	Common Chiffchaff	<i>Phylloscopus collybita</i>	Common	WV
79	Lesser Whitethroat	<i>Sylvia curruca</i>	Common	WV
80	Greenish Warbler	<i>Phylloscopus trochiloides</i>	Rare	WV
81	White Wagtail	<i>Motacilla alba</i>	Common	WV
82	Yellow Wagtail	<i>Motacilla Flava</i>	Common	PM
83	Tawny Pipit	<i>Anthus campestris</i>	Common	WV
84	Purple Sunbird	<i>Nectarinia asiatica</i>	Common	R
85	House Sparrow	<i>Passer domesticus</i>	Common	R
86	Sind Jungle Sparrow	<i>Passer pyrrhonotus</i>	Common	R
87	Whimbrel	<i>Numenius phaeopus</i>	Common	WV
88	Eurasian Curlew	<i>Numenius arquata</i>	Common	WV
89	Common Redshank	<i>Tringa erythropus</i>	Common	WV

90	March Sandpiper	<i>Tringa tetanus</i>	Common	WV
91	Common Greenshank	<i>Tringa nebularia</i>	Common	WV
92	Green Sandpiper	<i>Tringa ocropus</i>	Common	WV
93	Sanderling	<i>Calidris alba</i>	Common	WV
94	Little Stint	<i>Calidris minuta</i>	Common	WV
95	Dunlin	<i>Calidris alpina</i>	Common	WV
96	Ruff	<i>Philomachus pugnax</i>	Common	WV
97	Red-Necked Phalarope	<i>Phalaropes lobatus</i>	Common	WV
98	Black Tailed Godwit	<i>Limosa limosa</i>	Common	WV
99	Bar Tailed Godwit	<i>Limosa lapponica</i>	Common	WV
100	Pintail Snipe	<i>Gallinago solitaria</i>	Common	WV
101	Common Snipe	<i>Gallinago gallinago</i>	Common	WV
102	Striated Babbler	<i>Turdoidus earlei</i>	Common	WV
103	Green Bee Eater	<i>(Merops orientalis)</i>	Common	WV
TOTAL				

Legend: R=Resident, WV = Winter visitor, PM = Passage Migrant

All the recorded bird species during the survey are common, rare or scarce. Their Status is mainly “Least Concern” according to IUCN 2011. No Bird species is endemic to the area.

Conclusion

General

Tekcellent Private Limited has been engaged by the Tenaga Generasi Limited as Consultants for 49.5 MW wind power plant Project near Gharo in Sindh, Pakistan. The main purpose of the study was to explore the detail faunal species as well as regarding the Protected Wildlife Areas within or nearby the project area.

An initial Faunal/Vegetation/Land use survey was carried out in 2009 and this is mapped in Volume II of this Environmental Assessment. A full Faunal baseline survey was carried out in February 2012. This baseline can be compared with the engineering proposals also shown in Volume II. The survey has confirmed presence of Wild Boar, Jungle Cat, Fishing Cat, Asiatic Jackal and other species.

Impacts

The main environmental impacts will be construction disturbance over a two year period.

Significant construction impacts include potential water pollution within the project area. These should be managed out through the Environmental Management Plan (EMP) but could be **moderate adverse** impacts during the life of the contract. A burial site has been identified at the southern extent of the project area.

The overall impact on habitat and vegetation will be **moderate adverse** initially due to the construction and installation of the wind turbines. However, it is anticipated that this impact will reduce to **slight adverse** as both the human and wildlife of the area become accustomed to the new construction.

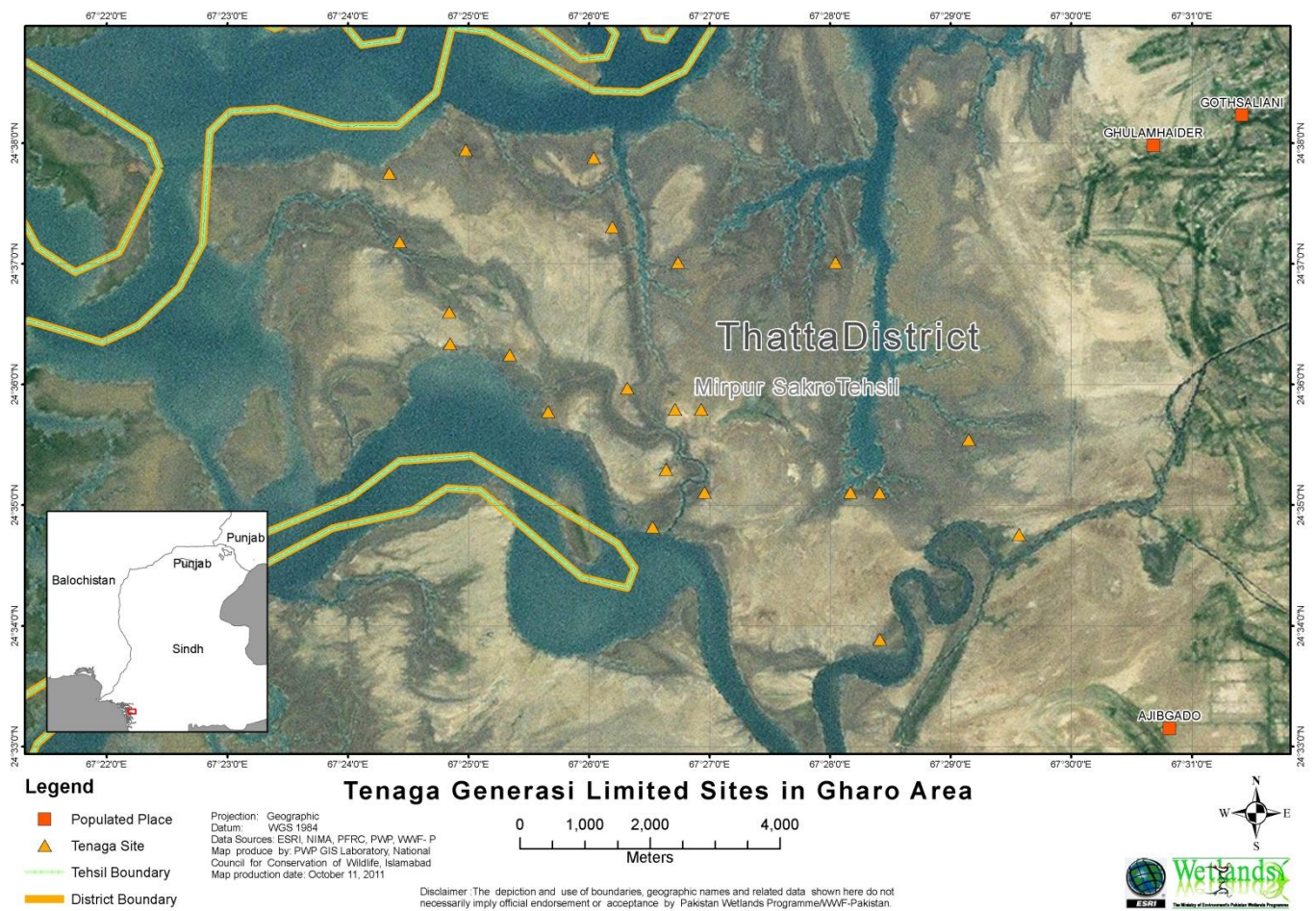
No Protected Area is in the vicinity of the Tenaga Wind Farm. The nearest Protected Area is the Mirpur Sakro Game Reserve which is located in Taluka Mirpur Sakro, District Thatta. The boundary of this reserve is more than 5 km from the Site boundary.

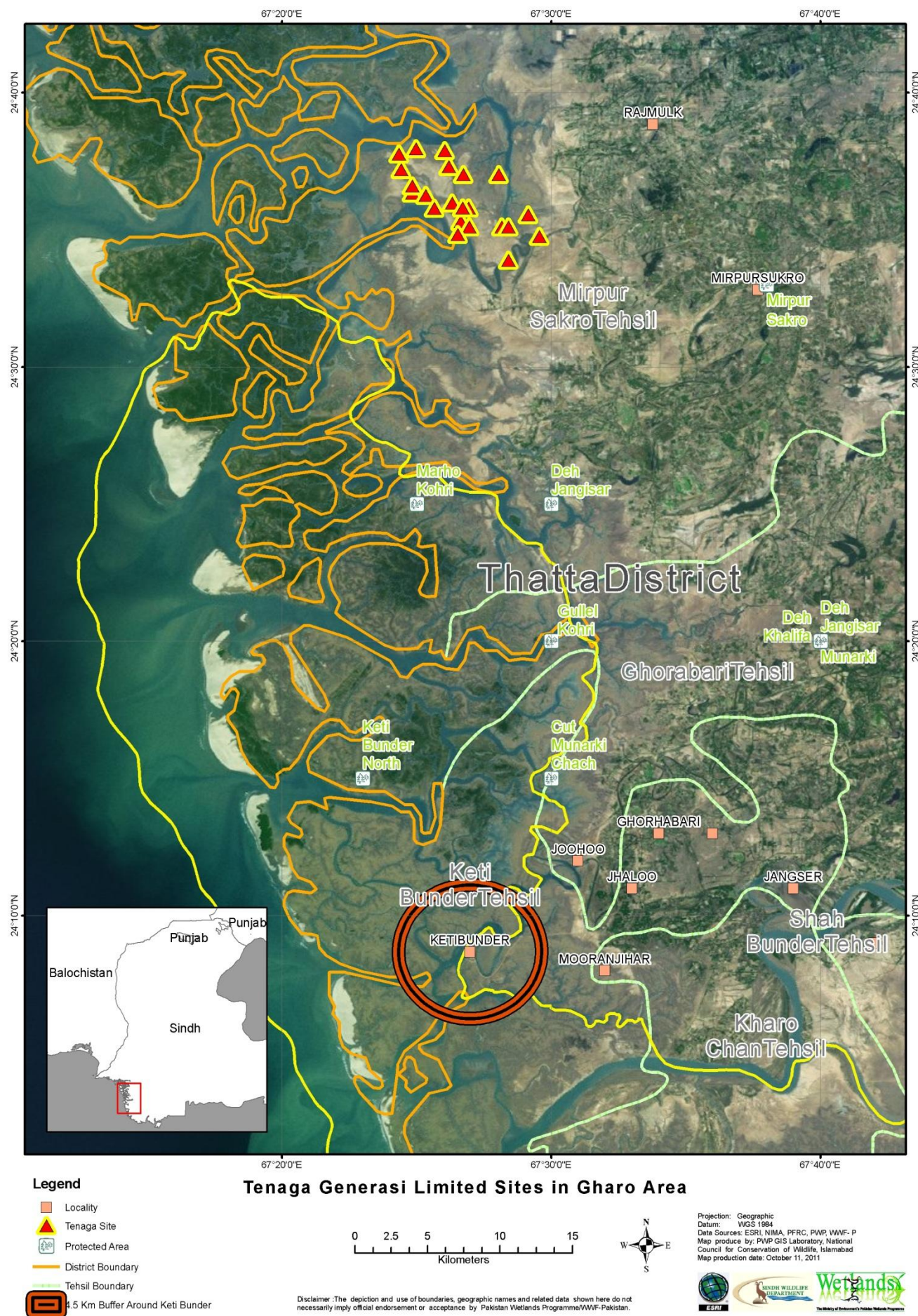
Monitoring

Birds or mammals were not located on project land during the recent survey. However, periodic monitoring of biological resources or habitats on the project land will be routinely carried out as part of the Environmental Management Plan (EMP) for the project.

Nesting areas, if any are found during the construction activities will not be disturbed if at all possible. Sightings of any fauna will be recorded and reported.

Annexures





**Photographs
By
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A View of proposed project site for 49.5 MW Wind Power Project



A view of Tanaga wind power project site



Black-wing stilts near project area



A View of Birds found near the Project Area



Ruff (*Philomachus pugnax*) near project area



Striated Babbler (*Turdoides earlei*) near project area



Indian Pond Heron (*Aredeola grayii*) in project area



Green Bee Eater (*Merops orientalis*) near project area



A view of Deh Khalifa Game Reserve at the distance of 40 Kilometers from Proposed TGL Site



A view of Coconut Plantation at Garkho Forest at the distance of 45 kilometers from Proposed TGL Site



A view of Deh Jangiser Game Reserve at the distance of 43 kilometers from Proposed TGL Site



A view of Gulel Khor Wildlife Sanctuary at the distance of 44.7 kilometers from Proposed TGL Site