



[Adani Green Energy Eighteen Limited.]

# Critical Habitat Assessment for Three Hybrid Project (Wind and Solar) in Jaisalmer Rajasthan

## Final Report

12 December 2020

Project No.: 0570606

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12 December 2020

# Critical Habitat Assessment for Three Hybrid Project (Wind and Solar) in Jaisalmer Rajasthan

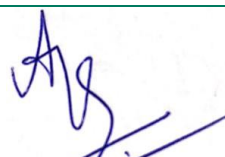
## Final Report

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## 1. INTRODUCTION AND BACKGROUND OF THE STUDY

Adani Green Energy Limited (hereinafter referred as 'AGEL' or 'Client'), a subsidiary of the Adani Group, an integrated business conglomerate in India is proposing hybrid (Wind and Solar) projects in Jaisalmer of capacity given as hereunder in **Table 1.1**;

**Table 1.1 Proposed capacity of Hybrid Projects of Adani**

Project Name	Solar Capacity	Wind Capacity
Proposed 390 MW Solar-Wind Hybrid Power Project	360 MW ac	101.2 MW
Proposed 600 MW Solar-Wind Hybrid Power Project	2*300 MW ac	151.2 MW
Proposed 700 MW Solar-Wind Hybrid Power Project	600 MW ac	510.4 MW

Source: DPR of respective projects

The project is being developed under the SPV M/s Adani Green Energy Eighteen Limited (AGE (18) L), a 100% subsidiary company of M/s Adani Green Energy Limited. ERM India undertook the ESIA stud for the three projects (390MW, 600 MW and 700 MW) and Critical Habitat Assessment study came out as a requirement for the three hybrid projects due to presence of IUCN listed Critically Endangered and Endangered species as mentioned in the ESIA study and detailed further in subsequent chapters. AGEL has entrusted ERM India to undertake a Critical Habitat Assessment study for the three Hybrid Project. The hybrid project location map is in **Figure 1.1**.

### 1.1 Project Brief

The project brief of the three-hybrid project of AGEL (Refer: **Figure 1.1**) is discussed as hereunder;

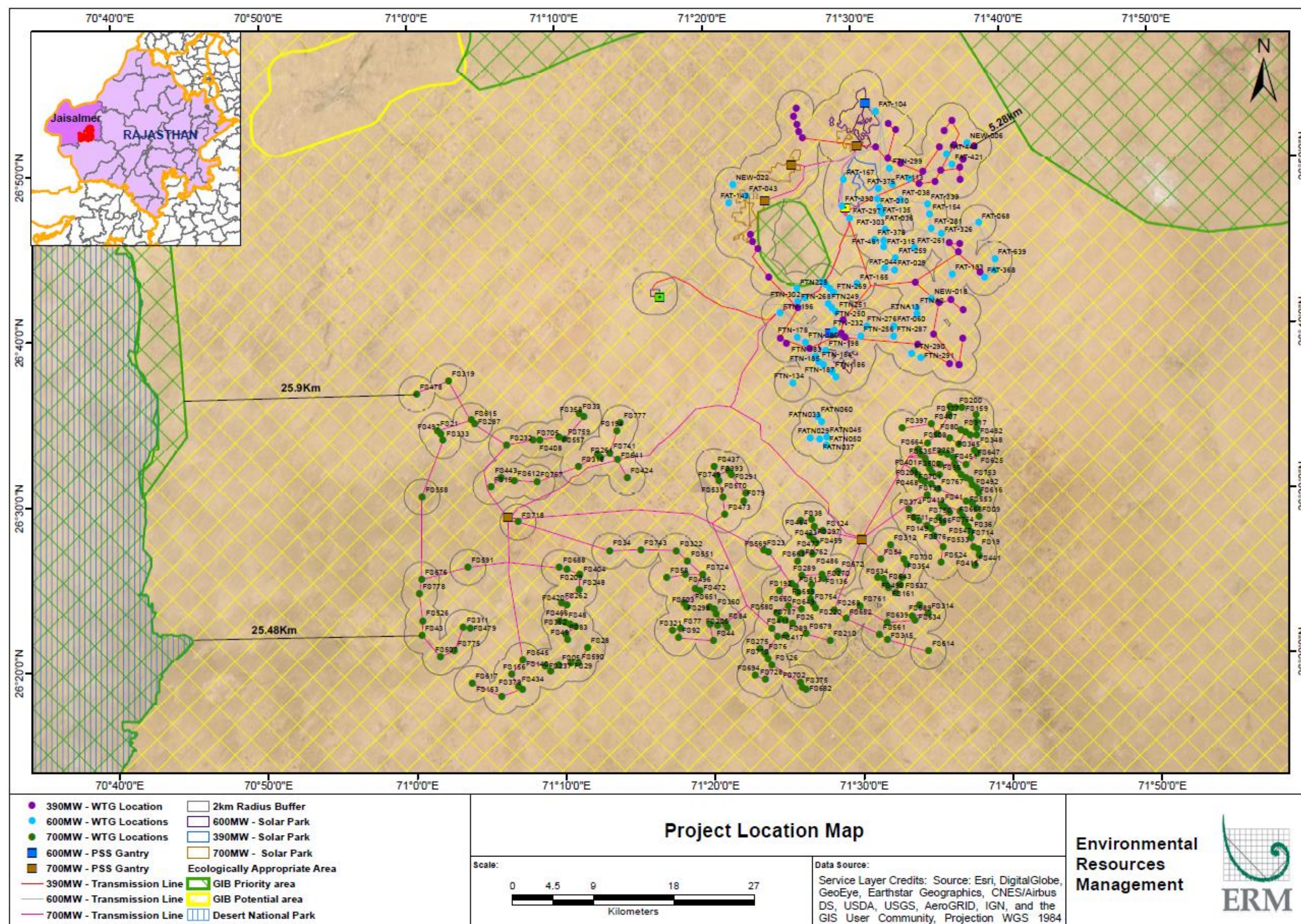
#### 1.1.1 390 MW Hybrid project

The proposed 390 MW hybrid power project in being set up in Jaisalmer district of Rajasthan, India; the same is scheduled for Commissioning in May 2021. The project is being developed under the SPV M/s Adani Green Energy Eighteen Limited (AGE (18) L), a 100% subsidiary company of M/s Adani Green Energy Limited

The power generated from the proposed Solar-Wind Hybrid project will be purchased by Solar Energy Corporation of Indian (SECI) awarded to the Project Company through Competitive bidding process on 'Build, Own, Operate' basis. The tenders were invited for 2500 MW ISTS Connected Wind-Solar Hybrid Power Project Capacity vide Request for Selection (RFS No: SECI/ C&P/ HPD/ 2500MW/ HYB/ T1/ RfS/ 062018) dated 22<sup>nd</sup> June 2018. Subsequent to the completion of successful bidding process and based on the provisions of RfS terms and conditions, the Project Company has entered into PPA with the Project Company for purchase of Wind -Solar Hybrid power for a period of 25 years. The project brief is provided in **Table 1.2**.



Figure 1.1 Location Map of Project Area





**Table 1.2: Project overview – 390 MW Hybrid Power Project, Rajasthan**

Particulars	Description
Project name	390 MW Solar-Wind Hybrid Power Project
Project Capacity	360.00 MW ac Solar, & 101.20 MW Wind, a total peak hybrid capacity of 390 MW
<b>LOCATION DETAILS</b>	
Location coordinates	26.821143 N, 71.492376 E
Location details	Pokhran tehsil, Jaisalmer district, Rajasthan state, India
Villages covered - Solar	Madhopura
Villages covered - Wind	Madhopura, Sanawara, Naya Sanawara, Chok, Khetasar, Madasar, Rasla, Achla, Bhainsara Motisar, Balasar and Uttam Nagar
<b>LAND RELATED, &amp; CONNECTIVITY DETAILS</b>	
Land type	Solar and Wind Project: Private Land
Land characteristic	Predominantly shrub land with few portion of agricultural land and gravel waste land
Total land required	2126 acres
Mode of land procurement	Lease for 30 years for both Solar and Wind locations
Nearest highway	National Highway NH-11, NH-68, NH-125
Nearest Major Town	Pokhran, Jaisalmer, Jodhpur, Phalodi, Bikaner
Nearest Railway Station	Jaisalmer, Jodhpur, Phalodi, Bikaner
Nearest Airport	Jaisalmer
Nearest Sea Port	Mundra 750 km and Kandla 700 km
<b>TECHNICAL SUMMARY – SOLAR</b>	
Solar Capacity	360.00 MW ac
Total blocks	58 blocks each of 6.25 MW
Total number of modules	1,216,180
<b>TECHNICAL SUMMARY – WIND</b>	
Wind Capacity	101.20 MW
WTG capacity	2.2 MW
# of WTGs	46 WTGs divided into four clusters (Cluster 1 – 11 WTGs, Cluster 2 – 12/13* WTGs, Cluster 3 – 12 WTGs, and Cluster 4 – 11/10* WTGs) <i>* please refer to project status for clarity</i>
<b>PLANT CONNECTIVITY</b>	
Internal pooling	33 kV for solar, and 33 kV for wind
Transmission Line – Solar and Wind Pooling Substation to ISTS / CTU Substation	Voltage level at 220 kV, double circuit, with TL length ~30 km and 120 towers
Connecting grid substation	Evacuation voltage level at 220 kV, and substation voltage level at 765/400/220 kV connected to 765/400/220 kV Fatehgarh-2, PGCIL Substation
<b>PPA &amp; POWER SALE</b>	



Particulars	Description
Letter of award	25 <sup>th</sup> June 2019
PPA date	28 <sup>th</sup> November 2019
PPA effective date	7 <sup>th</sup> November 2019 and valid through 18 months from PPA effective date
PPA COD timeline	May 2021
PPA execution partner	PPA executed with SECI, and the sale of power will be to SECI

#### PROJECT STATUS AS ON DATE OF ESIA SITE VISIT

Project Status	<p><b>Planning Phase.</b></p> <ul style="list-style-type: none"> <li>The Project will have 46 operating WTGs with a capacity of 2.2 MW each. Currently, 45 WTGs have been finalised i.e. land has been leased for 45 WTGs and one location from either of two WTGs-FAT-090 or FTN-156 will be finalised at a later stage;</li> </ul> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p><b>NOTE:</b> This report has undertaken assessment of 47 WTG locations identified by the project proponent as either of the two WTGs FAT-090 or FTN-156 will be finalised at a later stage.</p> </div> <ul style="list-style-type: none"> <li>For total 276 acres of land, the lease agreement has been executed. The total land procured for all the WTGs are private land.</li> <li>The land for the solar plant is in the process of finalisation. Out of 1500 acres, lease agreement for 1450 acres of land has been executed, and the remaining 50 acres of land is under process. The total land procured for the solar power plant is private land</li> <li>Internal Transmission Line: The internal transmission line has been divided into four clusters, and tentative route has been identified. However, land survey for the same is yet to be executed, and ROW is yet to be finalised</li> <li>External Transmission Line: Initial route survey of the external transmission line connecting pooling substation in Madhopura village to the Fatehgarh-2 PGCIL grid substation has been completed. However, ground survey for the same is yet to be conducted. As reported by the Project team and as per the initial survey of external transmission line (TL), the land requirement for the TL comprise of private land only.</li> </ul>
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Source: Detailed Project Report dated June 2020, ESIA 2020

### 1.1.2 600 MW Hybrid Project

The proposed 600 MW hybrid power project is being set up in Jaisalmer district of Rajasthan, India; the same is scheduled for Commissioning in July 2021. The project operates under two (02) SPV's M/s Adani Green Energy Seven Limited (AGE7L) & M/s Adani Green Energy Nine Limited (AGE9L), 100% subsidiaries company of M/s Adani Renewable Energy Park (Gujarat) Limited, which further is a subsidiary of AGEL.

The power generated from the proposed Solar-Wind Hybrid project will be purchased by Solar Energy Corporation of India (SECI) awarded to the Adani Renewable Energy Park (Gujarat) Limited through Competitive bidding process on 'Build, Own, Operate' basis. The tenders were invited for 1200 MW ISTS Connected Wind-Solar Hybrid Power Project Capacity vide Request for Selection RfS No. SECI/ C&P/ HPD/ 1200MW/ HYB/ T2/ RfS/ 032019 dated 8<sup>th</sup> March 2019 issued by SECI for selection of HPDs for development of cumulative capacity of 1200MW. Adani Renewable Energy Park (Gujarat) Limited (AREPGL) has been issued letter of award (LOA) for aggregate capacity of 600MW LOA No. SECI/ C&P/ HPD/ T2/ LOA/ AREPGL/ P1/ 31698 dated 18<sup>th</sup> June 2019 and LOA No. SECI/ C&P/

HPD/ T2/ LOA/ AREPGL/ P2/ 31699 dated 18<sup>th</sup> June 2019 for development of ISTS-connected Wind-Solar Hybrid Power Project(s), generation and sale of wind-solar hybrid power under the above Rfs.

Adani Renewable Energy Park (Gujarat) Limited has formed two (02) Project companies, Adani Green Energy Seven Limited (AGE7L) & Adani Green Energy Nine Limited (AGE9L), hereafter called as “HPD” to execute the projects through two projects of 300MW capacity each (P1&P2). Project ID HPD-ISTS-T2-AREPGL-P1-300RJ of capacity Hybrid: 300MW (Solar PV: 300MW & Wind: 75MW) has been allotted to Adani Green Energy Seven Limited (AGE7L) and Project ID HPD-ISTS-T2-AREPGL-P2-300RJ of capacity Hybrid: 300MW (Solar PV: 300MW & Wind: 75MW) has been allotted to Adani Green Energy Nine Limited (AGE9L)

Subsequent to the completion of successful bidding process and based on the provisions of RfS terms and conditions, the HPD (AGE(7)L & AGE(9)L) has entered into PPA with SECI for purchase of wind solar hybrid power for a period of 25 years. The project brief is provided in **Table 1.3**.

**Table 1.3: Project overview – 600 MW Hybrid Power Project, Rajasthan**

Particulars	Description
Project name	600 MW Solar-Wind Hybrid Power Project
Project Capacity	2*300.00 MW ac Solar, and 151.20 MW Wind
<b>LOCATION DETAILS</b>	
Location coordinates	2*300MW Solar - 26°52'42.24"N, 71°29'56.49"E
Location details	Fatehgarh & Pokhran Tehsils, Jaisalmer District
Villages covered - Solar	Sanawara (Pokhran Tehsil, Jaisalmer District) Both the 300 MW solar plants shall be located in Sanawara village
Villages covered - Wind	Sanawara, Naya Sanawara , Lakhasar, Dawara, Sadrasar, Madhopura, Bhesada, Motisar, Details provided in Section 5.18, below.
<b>LAND RELATED, &amp; CONNECTIVITY DETAILS</b>	
Land type	Solar and Wind Project: Private Land
Land characteristic	Predominantly barron and culturable waste land with few portion of agricultural land (net sown area)
Total land required	Solar: 3,750 acres approx. Wind: 175-180 acres approx. Approximately 4240 acres
Mode of land procurement	Lease for 29 Years, 11 Months for both Solar and Wind locations
Nearest highway	National Highway NH-11, NH-68, NH-125
Nearest Major Town	Pokhran, Jaisalmer, Jodhpur, Phalodi, Bikaner
Nearest Railway Station	Jaisalmer, Jodhpur, Phalodi, Bikaner
Nearest Airport	Jaisalmer, Jodhpur, Bikaner
Nearest Sea Port	Mundra 750 km and Kandla 700 km
<b>TECHNICAL SUMMARY – SOLAR</b>	
Solar Capacity	600.00 MW ac or 858MWp dc (2*429)
Total blocks	96 blocks (2*48 blocks)
Total number of modules	1,900,462
<b>TECHNICAL SUMMARY – WIND</b>	
Wind Capacity	151.20MW

Particulars	Description
WTG capacity	2.1MW
# of WTGs	72

#### PLANT CONNECTIVITY

Internal pooling	<p>Solar: 33 kV for solar, and 33 kV for wind</p> <ul style="list-style-type: none"> <li>Wind: 33 kV TL divided in 6 Clusters, approximate total length of 163.04 km</li> </ul>
Transmission Line – Solar and Wind Pooling Substation to ISTS / CTU Substation	Voltage level at 220 kV, double circuit, with TL length ~31 km connecting to Fatehgarh-2, PGCIL Substation
Connecting grid substation	Evacuation voltage level at 220 kV, and substation voltage level at 765/400/220 kV connected to 765/400/220 kV Fatehgarh-2, PGCIL Substation

#### PPA & POWER SALE

Letter of award	18 <sup>th</sup> June 2019
PPA date	21 <sup>st</sup> January 2020
PPA effective date	15 <sup>th</sup> January 2020 and valid through 18 months from PPA effective date
PPA COD timeline	15 <sup>th</sup> July 2021, extension of +30 days to be granted by SECI under Force Majeure due to COVID-19 Lockdown
PPA execution partner	PPA executed with SECI, and the sale of power will be to SECI

#### PROJECT STATUS AS ON DATE OF ESIA SITE VISIT

Project Status	<p><b>Planning Phase.</b></p> <ul style="list-style-type: none"> <li>72 WTGs of 2.1 MW each have been finalised for the wind power generation</li> <li>The land for all the 72 WTGs has been finalised. For total 540 acres of land, the lease agreement has been executed. The total land procured for all the WTGs are private land.</li> <li>The land for the solar plant is in the process of finalisation. The entire land parcel identified and finalized for both 300 MW solar sites is private land. as per information, a MoU has been signed between AGE(7), AGE(9)L &amp; identified land lessors;</li> <li><b>Internal Transmission Line:</b> During consultation with land team of AGEL it was informed that no internal line has envisaged for both solar sites; however, for wind project, 33 kV internal transmission line, divided into 6 clusters and having its total length of approx 163.04 km shall connect it to PSS.</li> <li>The given hybrid project shall have two PSSs; one in Sanawara village within solar site and the other one in Sadrasar village. As informed, the land for both PSSs have been identified and finalized;</li> <li><b>External Transmission Line:</b> The land for both PSSs have been finalized and the length of 220 kV external TL from proposed PSS to PGCIL GSS shall be ~31.1 Km; however, the total number of towers to be erected for external TL has not been finalized until date</li> </ul>
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Source: Detailed Project Report dated June 2020, ESIA September 2020



### 1.1.3 700 MW Hybrid project

The proposed 700 MW hybrid power project is being set up in Jaisalmer and Barmer district of Rajasthan, India; the scheduled commercial operation date is 10<sup>th</sup> August, 2021. The project operates under the SPV M/s RSEPL Hybrid One Limited (RHPOL or HPD<sup>1</sup>), a 100% subsidiary company of M/s Adani Green Energy Limited (AGEL).

Considering various aspects of land and connectivity for the implementation of the project capacity of 700MW, RSEPL preferred to implement the project in multiple locations. Accordingly, RHPOL intimated to AEML the configuration of the project, as per the terms of the Rfs. In pursuance of the same, 4Nos. PPAs dated 11<sup>th</sup> Feb 2020 were executed among RSEPL, 100% subsidiaries of RHPOL and AEML for the cumulative Wind-Solar Hybrid Capacity of 700MW as under:

1. 150MW PPA between Rosepetal Solar Energy Private Limited (RSEPL) and AEML
2. 150MW PPA between RSEPL Hybrid Power One Limited (RHOPL) and AEML
3. 250MW PPA between RSEPL Renewable Energy One Limited (RREOL) and AEML
4. 150MW PPA between Adani Green Energy Twenty Two Limited (AGE22L) and AEML

However, in view of the significant challenges faced by RSEPL and its subsidiaries (due to COVID-19), AEML had consented to allow M/s RHPOL to implement project through M/s RSEPL Hybrid Power One Limited (HPD) within the provisions of the Rfs vide its communication ref AEML/RE/HYBPP/FY21/ dated 23<sup>rd</sup> June 2020.

Adani Electricity Mumbai Limited (AEML), a 100% subsidiary of Adani Transmission Ltd., will purchase the power generated from the proposed Solar-Wind Hybrid project. The project was awarded to the Project Company through Competitive bidding process. AEML vide its RfS No.AEML/RE/HYB/PP/2019/001 dated 18th July 2019 floated tender to procure wind solar hybrid power up to capacity of 350 MW through Competitive Bidding Process and additional 350 MW of power under Greenshoe option. Subsequent to the completion of successful bidding process and based on the provisions of RfS terms and conditions, the RHPOL has entered into PPA with AEML for purchase of wind solar hybrid power for a period of 25 years. The project brief is provided in **Table 1.4**.

**Table 1.4: Project overview – 700 MW Hybrid Power Project, Rajasthan**

Particulars	Description
Project name	700 MW Solar-Wind Hybrid Power Project
Project Capacity	600.00 MW ac Solar (350 MW & 250MW), and 510.4 MW Wind, a total of 1110.4MW
<b>LOCATION DETAILS</b>	
Location coordinates	350MW Solar - 26°46'58.69"N, 71°22'53.42"E 250MW Solar- 26°49'38.55"N, 71°25'16.42"E
Location details	Fatehgarh, Pokhran tehsil, Jaisalmer district, and Sheo Tehsil, Barmer District, Rajasthan state, India
Villages covered - Solar	Rasla and Neran (Pokhran Taluka, Jaisalmer District) Both the solar plants are located in the Fatehgarh Solar Park
Villages covered - Wind	Loona Kalan, Pratappura, Devalpura, Chitrori, Lakhmana, Devalpura, Amarsar, Dholiya, Pancha, Kanasar and other nearby villages. Details provided in below.

<sup>1</sup> As mentioned in the PPA dated 7<sup>th</sup> July 2020 (

Particulars	Description
<b>LAND RELATED, &amp; CONNECTIVITY DETAILS</b>	
Land type	Government land for Solar and Private land for Wind project.
Land characteristic	Predominantly Fallow land and culturable waste land with few portion of agricultural land (net sown area)
Total land required	4437.5 acres
Mode of land procurement	Solar Projects: Lease for 25-30 years from AREPRL Fatehgarh Solar Park Land Wind Projects: Lease for 30 years for both Wind locations
Nearest highway	National Highway NH-15, SH-65
Nearest Major Town	Pokhran, Jaisalmer
Nearest Railway Station	Jaisalmer, Pokhran
Nearest Airport	Jaisalmer
Nearest Sea Port	Mundra 750 km and Kandla 700 km
<b>TECHNICAL SUMMARY – SOLAR</b>	
Solar Capacity	350.00 MW ac & 250MW ac, combined capacity of 600MW ac
Total blocks	96 blocks each of 6.25 MW
Total number of modules	1,891,290
<b>TECHNICAL SUMMARY – WIND</b>	
Wind Capacity	510.40 MW
WTG capacity	2.2 MW
# of WTGs	232 WTGs divided into two clusters (Cluster A & Cluster B)
<b>PLANT CONNECTIVITY</b>	
Internal pooling	33 kV for solar, and 33 kV for wind
External Transmission Line PSS to AREPRL Fatehgarh Solar Park substation	<ul style="list-style-type: none"> <li>■ AEML Wind 220KV SC-1 TL: A 220 kV, double circuit TL traversing a length of approximately 25-30 kms from AEML Wind PSS-1 and converging at a transmission tower (26°35'29.94"N, 71°21'28.78"E) which further connects to AREPRL Fatehgarh Solar Park substation via 220KV DC TL approximately 33-36 kms in length</li> <li>■ AEML Wind 250KV SC-2 TL: A 250 kV, double circuit TL traversing a length of approximately 18-22 kms from AEML Wind PSS-2 and converging at a transmission tower (26°35'29.94"N, 71°21'28.78"E) which further connects to AREPRL Fatehgarh Solar Park substation via 220KV DC TL approximately 33-36 kms in length</li> <li>■ AEML Solar 350 MW SC TL: A 220 kV, double circuit TL traversing a length of approximately 7 kms from Solar AEML PSS-2 and converging at a transmission tower (26°49'58.44"N, 71°26'45.73"E) which further connects to 220/400 kV AREPRL Fatehgarh Solar Park Substation via 220 kV DC TL approximately 6-8 kms in length</li> <li>■ AEML Solar 250 MW SC Line-1 TL: A 220 kV, double circuit TL traversing a length of approximately 7 kms from Solar AEML PSS-1 and converging at a transmission tower (26°49'58.44"N, 71°26'45.73"E) which further connects to 220/400 kV AREPRL Fatehgarh Solar Park Substation via 220 kV DC TL approximately 6-8 kms in length</li> </ul>

Particulars	Description
Transmission Line- AREPRL Fatehgarh Solar Park substation to ISTS Substation	Voltage level at 400 kV, double circuit/Multi Circuit TL, with TL length ~25 to 30 km, Details and route for which have not been shared with ERM
AREPRL Fatehgarh Solar Park Substation	Evacuation voltage level at 220 kV, and substation voltage level at 220/400kV connected to 220/400 kV AREPRL Fatehgarh, Solar Park Substation
FBTLL Connecting grid substation	Evacuation voltage level at 400 kV, and substation voltage level at 220/400kV connected to 765/400/220 kV Fatehgarh-2, FBTLL ISTS Substation

#### PPA & POWER SALE

Letter of award	25 <sup>th</sup> June 2019
PPA date	28 <sup>th</sup> November 2019
PPA effective date	7 <sup>th</sup> November 2019 and valid through 18 months from PPA effective date
PPA COD timeline	May 2021
PPA execution partner	PPA executed with Adani Electricity Mumbai Limited, and the sale of power will be to AEML

#### PROJECT STATUS AS ON DATE OF ESIA SITE VISIT

Project Status	<p><b>Planning Phase.</b></p> <ul style="list-style-type: none"> <li>232 WTGs of 2.2 MW each have been finalised for the wind power generation</li> <li>The land for all the ~232 WTGs is in identification stage. As informed by site team during ERM's site visit, the ground survey had not been carried out. For total ~526.5 acres of land, the lease agreement has not been executed. The total land to be taken on lease for all the WTGs, are private land.</li> <li>The land for the solar plant was in the process of finalisation at the time of ERM's visit. The land to be taken on lease for two solar sites is primarily a Govt. land. As per information, AREPRL (Adani Renewable Energy Park Rajasthan Ltd.) has a joint venture with Rajasthan Renewable Energy Corporation Ltd (RRECL); where AREPRL has been granted 2500 Ha. Of land on lease by Govt. of Rajasthan for 30 years to develop 1500 MW solar park. The 700 MW site is a part of this 1500 MW solar park. A separate lease agreement will be further carried out between AREPRL and AEML, where ~3911 Acres (i.e. ~2275 Acres of 350 MW solar site and ~1636 Acres for 250 MW solar site) of land will be given on lease</li> <li>Internal Transmission Line: As understood, Initial route survey for the Internal transmission line is complete, however ground survey for the same is yet to be undertaken.</li> <li>External Transmission Line: Initial route survey of the external transmission line connecting pooling substations (AEML Wind PSS-1&amp;2, Solar AEML PSS- 1&amp;2) to AREPRL Fatehgarh Solar Park PSS is complete. However, ground survey for the same is yet to be conducted. As reported by the Project team and as per the initial survey of external transmission line (TL), the land requirement for the TL comprise a mix of private and government land. The proposed TL route for AREPRL Fatehgarh Solar Park PSS to</li> </ul>
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Particulars	Description
	FBTLL Fatehgarh-2 grid substation is yet to finalised, no details has been shared with ERM for the same.

Source: Detailed Project Report dated July 2020, ESIA Report Sept 2020

## 1.2 Scope of Assessment

The scope of the assessment as proposed assessment is present hereunder;

### 1.2.1 Task 1: Desktop Review

- Review existing literature, such as: (i) ESIA, existing environmental studies, scientific literature or other types of biodiversity assessments available for the project area and/or adjacent areas; (ii) national or regional plans (e.g., Strategic Environmental Assessments, National Biodiversity Strategies and Action Plans, management plans, if any, for the protected area and the Key Biodiversity Area within the area of influence; (iii) existing conservation programs or initiatives.
- Identify an ecologically appropriate area(s) of analysis (EAAA) for the assessment, in accordance with the applicable PS6 Guidance Note (2019). The EAAA will include, but is not necessarily limited by, the project's area of influence, as well as the surrounding ecological boundary that considers the extent of biodiversity values and where such values may be negatively impacted by project activities within the broader landscape.
- Review outcomes of stakeholder engagement conducted to date and identify additional stakeholders associated with the area of interest and potential biodiversity values.
- Develop a list of candidate critical habitat values. In tabular form, present for each candidate biodiversity value details on:
  - Key information sources (e.g. IUCN Red List, expert sources);
  - Rationale for inclusion or exclusion from further assessment;
  - Rationale on potential to trigger critical habitat criteria, where rationale exists for inclusion in further assessment;
  - Key information needs for biodiversity values where rationale and potential to trigger critical habitat criteria exists but existing data is inadequate to confirm status.
- Protected and internationally recognized areas: Review management plans (if any)

### 1.2.2 Task 2: Stakeholder consultation

- Consult with experts with relevant experiences or knowledge of the region or its biodiversity values to fill information gaps and understand the area of interest in terms of potential occurrence of critical habitat values and other biodiversity values. Where possible, this should include consultation with foremost national academic experts for each species to help ensure that the results of unpublished data is accurately reflected and interpreted as appropriate.
- Consult with protected area sponsors, managers and other relevant government agencies and conservation organizations with responsibilities related to protected areas.

### 1.2.3 Task 3: Habitat characterization

- Using existing vegetation maps, land use maps, satellite imagery, aerial photography and other supporting information, map extent of PS6 defined modified and/or natural habitat in the EAAA.

### 1.2.4 Task 4: Data gap identification

- Determine the need for any additional field surveys using information obtained in Tasks 1 – 3. If additional field surveys are necessary, identify the priorities using a risk-based approach and make recommendations on timing, required expertise and design.

### 1.2.5 Task 5: Area of analysis mapping and critical habitat determination

- Map the EAAA(s) to determine the presence of critical habitat (both global and regional) *for each species* with regular occurrence in the project's area of influence, or ecosystem, covered by PS6 critical habitat Criteria 1-4. Define the boundaries of the EAAA(s) taking into account the area of distribution of species or ecosystems (within and often extending beyond the project's area of influence) and the ecological patterns, processes, features and functions that are necessary for maintaining them.
- Provide maps of the EAAA(s), including overlap with project boundaries.
- Screen candidate biodiversity values identified against critical habitat criteria to assess critical habitat status. Apply the critical habitat criteria and thresholds to determine if this area is critical habitat for the species or ecosystems concerned.<sup>2</sup> Refer to GN63 – GN80 in Guidance Note 6 for further guidance.
- Provide a final listing of biodiversity values, in table format, that trigger critical habitat criteria. Determination must be justified according to definitions and thresholds described in PS6 Guidance Note 6. This listing must include each biodiversity value with details on:
  - Information sources (e.g. IUCN Red List, expert sources)
  - Critical Habitat criteria triggered and rationale
  - Any remaining information needs required to confirm status as critical habitat-qualifying value if this is not possible using existing data.
- Depending on the outcomes of the CHA, a Biodiversity Action Plan may be required which demonstrates a concept of "net gain" for the biodiversity values/species identified.

## 1.3 Applicable References

The critical habitat assessment (CHA) was carried out with reference to IFC Performance Standard 6 (2012) and the associated Guidance Note (2019) on Biodiversity Conservation and Sustainable Management of Living Natural Resources.

## 1.4 Layout of the Report

The report layout is presented in the following **Table 1.5**.

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<sup>2</sup> For species with large geographic distributions, the ecologically appropriate area may be defined by geographic features such as watersheds that, at a minimum, encompass the area of influence of the project. For some wide-ranging species, it may not be appropriate to define an ecologically appropriate area based on area of occupancy, but rather areas of aggregation, recruitment, or other habitat features of importance to the species. In all cases, the area should consider the distribution and connectivity of such features in the landscape/seascape and the ecological processes that support them. Where it can be shown that multiple values have largely overlapping ecological requirements and distributions, a common or aggregated area may be appropriate. The final area of critical habitat against which project impacts will be assessed may be revised based on additional knowledge documented through fieldwork and other assessment after the initial critical habitat assessment has been conducted.

**Table 1.5      Layout of the Report**

Chapter	Details
Chapter 1	Introduction and Background of Study
Chapter 2	Approach and Methodology
Chapter 3	Critical Habitat Screening and Assessment
Chapter 4	Biodiversity Action Plan

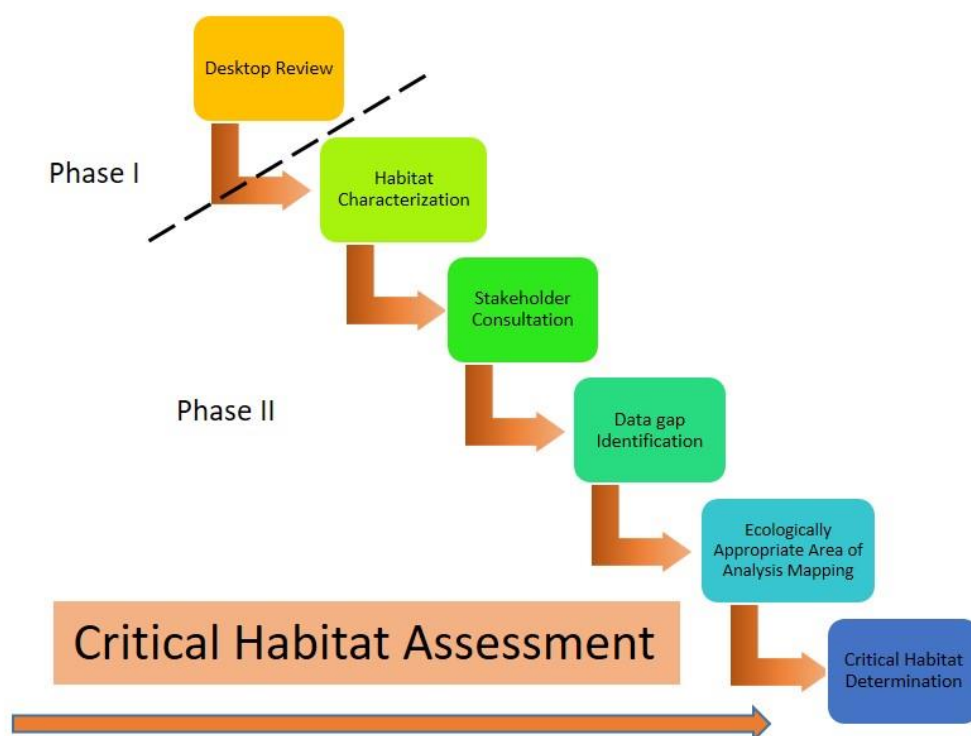


## 2. APPROACH AND METHODOLOGY

The critical habitat assessment comprised the following phases and stages (refer **Figure 2.1**):

- **Phase I:** Screening of the site to determine priority species that could potentially trigger the Critical Habitat assessment thresholds as per IFC PS 6; and
- **Phase II:** Site assessments and stakeholder consultation to guide the Critical habitat Assessment.

**Figure 2.1 Phases and Stages of Critical Habitat Assessment**



These steps are detailed further below.

### 2.1 Phase I:

#### 2.1.1 Desktop Review

In addition to primary surveys during the site visit for the ESIA, ERM also had the experience of similar nature projects done in past in similar landscape within a 20-30 km radius of the project site. Also, secondary data for the project site was collected from the Wildlife Management Plan of Desert National Park, working plan for Jaisalmer Territorial Forest Division, available published scientific literature.

The project site location and immediate surroundings was also run for IUCN listed threatened species (CR, EN, and VU Species). Databases such as iBAT (Integrated Biodiversity Assessment tools), and crowdsourcing platforms such as eBIRD, iNaturalist, GBIF (Global Biodiversity Information Facility—an international network and research infrastructure) to understand the presence and absence of the potential Critical Habitat (CH) trigger species and their habitat values. A list of references is presented in **Table 2.1**.

**Table 2.1 Secondary Sources used for Screening of Species for Critical Habitat**

S. N.	Source	Purpose
1.	IUCN Red List for Threatened Species Online Version [2018-1]	The IUCN Red List provides a list of threatened species by classifying them from Least Concern (LC) to Critically Endangered (CR) through an understanding of their global distribution, population numbers, and trends in population decline and stresses on the species. As part of the classification, the global distribution and habitat preference of the species is given.
2.	Bird Life Data Zone	BirdLife International maintains a database of Important Bird Areas (IBAs) that provides a list of species found in these designated areas, measure of sensitivity of these habitats and identifies migratory, congregatory and threatened species in the area.
3.	ebird.org	ebird.org provides a geo-referenced list of identified bird species in a given area.
4.	Management Plan for Desert National Park Sanctuary	Management Plan (2017-2027) of the Desert National Park Sanctuary suggest presence of IUCN listed Threatened Species within its management areas
5.	Working Plan of Territorial Division of Jaisalmer	Working Plan (2013-14 to 2022-23) to work around the forest land within the Jaisalmer Forest Division
6.	Other Primary surveys that ERM has undertaken in this landscape since 2012.	These surveys recorded some of the target species and provided additional data important for the assessment.
7.	Global Biodiversity Information Facility (GBIF)	It is an international network and data infrastructure funded by the world's governments and aimed at providing anyone, anywhere, open access to data about all types of life on Earth. This was run for EAAA.
8.	iBAT (Integrated Biodiversity Assessment Tool)	The Integrated Biodiversity Assessment Tool (IBAT) is a multi-institutional programme of work involving BirdLife International, Conservation International, IUCN, and UNEP-WCMC. iBAT reports were generated for the project Aol to understand the presence of IUCN listed Threatened species in the area. Areas of conservation significance such as Protected areas, IBAs and KBAs falling within the 50 km radius of Aol were also included in this assessment.
9.	iNaturalist	iNaturalist is an online social network of naturalists, citizen scientists, and biologists built on the concept of mapping and sharing observations of biodiversity across the globe. Areas falling within Aol were run through this database.

## 2.2 Phase II

### 2.2.1 Habitat Characterization

The potential Critical Habitat (CH) species were further screened to evaluate the possible presence or absence of the species and habitat values to assign them as potential critical habitat trigger species. The screening of the species was followed IFC PS6 Guidance notes GN6 2019 as detailed in the **Table 2.2** and **Table 2.3**.

**Table 2.2 Category and Criteria for delineating Critical Habitat**

Criteria	Category	Parameters
I.	Habitat of significant importance to Critically Endangered (CR) and/or Endangered (EN) species <sup>(3)</sup>	<ul style="list-style-type: none"> <li>Habitat of significant importance to Critically Endangered (CR) and/or Endangered Species (EN) as per the latest IUCN Red List;</li> <li>Areas required for the reintroduction of CR and EN species and refuge sites for these species ;</li> <li>Ecosystems of known special significance to EN or CR species for climate adaptation purposes; and</li> <li>Concentrations of Vulnerable (VU) species in cases where there is uncertainty regarding the listing and the actual status of the species may be EN or CR.</li> </ul>
II.	Habitat of significant importance to Restricted Range species	<ul style="list-style-type: none"> <li>Habitats supporting species where <math>\geq 95\%</math> of its global range is inside a country or region of analysis; and</li> <li>Terrestrial vertebrates have to fall within a 50,000 km<sup>2</sup> or less area to be classified as restricted range; and</li> <li>Freshwater species have to fall within a 20,000 km<sup>2</sup> or less area to be classified as a restricted range (fish, crab, and mollusks only).</li> </ul>
III.	Habitat supporting globally significant concentrations of migratory species and/or congregatory species.	<ul style="list-style-type: none"> <li>Habitats supporting species where a significant proportion of its members are cyclically and predictably moving from one geographical area to another;</li> <li>Habitats supporting congregatory species include species that form colonies and large gatherings for non-breeding purposes (e.g. foraging, roosting); and</li> <li>Habitats that are bottleneck sites for species movement, contain clumped distributions of species or hold populations of species that make an inordinate contribution to the recruitment of the species.</li> </ul>
IV.	Highly threatened and/or unique ecosystems	<ul style="list-style-type: none"> <li>Habitats that are at significant risk of decreasing in area/quality, have a small spatial extent or contain unique assemblages of species; and</li> <li>Habitats are determined to be irreplaceable or of high priority/significance based on systematic conservation planning techniques carried out in the area.</li> </ul>
V.	Areas associated with key	<ul style="list-style-type: none"> <li>Habitats where the physical feature of the landscape might be associated with particular evolutionary processes; and</li> </ul>

<sup>(3)</sup>Species are classified as Critically Endangered (CR), Endangered (EN) and Vulnerable (VU) as per the International Union for the Conservation of Nature (IUCN) Red List that classified flora and fauna globally based on their risk of extinction. The database provides information from governmental organizations, non-governmental organizations, scientific institutions, published journals and discussions with researchers to provide up-to-date information on the global distribution, abundance, behaviour and threats to extinction to classify species as Least Concern (LC) to Extinct (EX).



Criteria	Category	Parameters
	evolutionary processes,	<ul style="list-style-type: none"> <li>Habitats where subpopulations of species exist which are phylogenetically or morpho-genetically distinct.</li> </ul>

Ultimately critical habitat candidate species were assessed against the quantitative thresholds to assess whether they are critical habitat triggers.

**Table 2.3 Quantitative thresholds for Tiers 1 and 2 of Critical Habitat Criteria 1 through 3**

Criteria	Tier 1	Tier 2
1. Critically Endangered (CR)/ Endangered (EN) Species	<p>(a) Habitat is required to sustain <math>\geq 10</math> percent of the global population of a CR or EN species/subspecies where there are known, regular occurrences of the species and where that habitat could be considered a discrete management unit for that species.</p> <p>(b) Habitat with known, regular occurrences of CR or EN species where that habitat is one of 10 or fewer discrete management sites globally for that species.</p>	<p>(c) Habitat that supports the regular occurrence of a single individual of a CR species and/or habitat containing regionally- important concentrations of a Red-listed EN species where that habitat could be considered a discrete management unit for that species/ subspecies.</p> <p>(d) Habitat of significant importance to CR or EN species that are wide-ranging and/or whose population distribution is not well understood and where the loss of such a habitat could potentially impact the long-term survivability of the species.</p> <p>(e) As appropriate, habitat containing nationally/ regionally important concentrations of an EN, CR, or equivalent national/regional listing.</p>
2. Endemic/ Restricted Range Species	<p>(a) Habitat is known to sustain <math>\geq 95</math> percent of the global population of an endemic or restricted-range species where that habitat could be considered a discrete management unit for that species (e.g., a single-site endemic).</p>	<p>(b) Habitat known to sustain <math>\geq 1</math> percent but <math>&lt; 95</math> percent of the global population of an endemic or restricted-range species where that habitat could be considered a discrete management unit for that species, where data are available and/or based on expert judgment.</p>
3. Migratory/ Congregatory Species	<p>(a) Habitat known to sustain, on a cyclical or otherwise regular basis, <math>\geq 95</math> percent of the global population of a migratory or congregatory species at any point of the species' lifecycle where that habitat could be considered a discrete management unit for that species.</p>	<p>(b) Habitat known to sustain, on a cyclical or otherwise regular basis, <math>\geq 1</math> percent but <math>&lt; 95</math> percent of the global population of a migratory or congregatory species at any point of the species' lifecycle and where that habitat could be considered a discrete management unit for that species, where adequate data are available and/or based on expert judgment.</p> <p>(c) For birds, habitat that meets BirdLife International's Criterion A4 for congregations and/or Ramsar Criteria 5 or 6 for Identifying Wetlands of International Importance.</p>

Criteria	Tier 1	Tier 2
		<p>(d) For species with large but clumped distributions, a provisional threshold is set at ≥5 percent of the global population for both terrestrial and marine species.</p> <p>(e) Source sites that contribute ≥ 1 percent of the global population of recruits.</p>

## 2.3 Stakeholder Consultation

The project area is remote and limited secondary data is available. There are some national and state level organizations working in the landscape with more focus on the protected areas such as Desert National Park and Great Indian Bustard (GIB) Conservation Area. National Non-Governmental organizations (and NGOs) and local NGOs working in this landscape were consulted regarding the biodiversity of the area. Some individuals are locally active in this area for protection of local biodiversity and habitats. They belong to the Bishnoi Community and are actively working with the State forest department, and NGOs for protection of the IUCN listed Threatened species. Additionally one local Camel herder actively working in the area for rescue, protection of species and their habitat and an active wildlife activist was consulted. The discussions were undertaken both over a telephone call as well as face to face discussions.

**Table 2.4 Key Stakeholders Consulted**

Stake-Holder Consulted	Key Issues Discussed
<p><b>Wildlife Institute of India, Dehradun</b></p> <p>Dr.YV Jhala, Dr. Sutirtha Dutta, Bipin CM</p> <p><b>Mode:</b> Telephone Call with Bipin CM and email confirmation of the minutes of the call</p>	<ul style="list-style-type: none"> <li>Population status of GIB in the Thar Landscape</li> <li>Movement Pattern of GIB within Priority Area and Potential Areas and further towards the Project Area</li> <li>Species mortality with powerlines</li> <li>Mitigation of Powerline Mortality</li> <li>Studies on Vultures in Thar Landscape</li> <li>Captive Breeding programme and relocation/rehabilitation program of GIB</li> </ul>
<p><b>Bombay Natural History Society, Mumbai</b></p> <p>Sujit Narwade</p> <p><b>Mode: Telephone Call</b></p>	<ul style="list-style-type: none"> <li>BNHS is undertaking long term studies on the biodiversity of the Thar Landscape including community awareness</li> <li>BNHS is likely to publish its report in two months on the biodiversity of the landscape under study</li> <li>BNHS has also worked on the GIB landscape</li> </ul> <p><b>Note:</b> No data was shared by BNHS as the data collected was under analysis and cannot be shared in current form.</p>
<p><b>Deputy Conservator of Forest Office, Desert National Park (DNP)</b></p> <p>Kapil Chandrawal, DCF-DNP</p> <p>Mr.Vijay Borana, ACF-DNP</p>	<ul style="list-style-type: none"> <li>Status of GIB inside and outside DNP and the larger GIB Landscape</li> <li>Census undertaken for GIB population assessment</li> </ul>

Stake-Holder Consulted	Key Issues Discussed
<p><b>Mode:</b>F2F with Mr. Vijay and follow up Telephonic call with Mr. Kapil</p>	<ul style="list-style-type: none"> <li>■ Census undertaken to document general wildlife including Vultures</li> <li>■ GIB Mortality issues with respect to transmission lines</li> </ul> <p><i><b>Note:</b> No data was shared by Forest Department citing the information sensitive. Data can be shared only under Right to Information Act, which was not attempted due to limited available time.</i></p>
<p><b>Founder, Ecology, Rural Development &amp; Sustainability (ERDS) Foundation and Assistant Professor, Guru Gobind Singh Indraprastha University's School of Environment Management, New Delhi</b></p> <p>Dr. Sumit Dookia</p> <p><b>Mode:</b> Telephonic Conversation</p>	<ul style="list-style-type: none"> <li>■ Activities of ERDS in the Landscape</li> <li>■ Movement pattern of GIB and Vulture species in the landscape</li> <li>■ Community response on the GIB Conservation and Habitat Protection</li> <li>■ GIBs species ecology and preferred habitat conditions</li> </ul>
<p><b>Mr. Kamlesh Bishnoi</b>, Villager Khetolal</p> <p><b>Mode:</b>F2F</p>	<ul style="list-style-type: none"> <li>■ Status and Numbers of GIB in the landscape</li> <li>■ Movement of GIB in and around Raasla Enclosure and distributional range in the landscape</li> <li>■ Movement routes of GIB from Pokharan Field Firing range to Raasla Enclosures</li> <li>■ Patterns of Movement and seasonality of GIB</li> <li>■ Presence of Threats to GIB and other wildlife in the area</li> </ul>
<p><b>Mr. Sumersinghji Bhati</b>, Camel Rearer and Wildlife Activist Villager Sanwata</p> <p><b>Mode:</b>F2F</p>	<ul style="list-style-type: none"> <li>■ Presence and Movement Pattern of GIB in the Degrai Oran area</li> <li>■ Legal Status of Degrai Oran as deemed Forest</li> <li>■ GIB Mortality in the Area</li> <li>■ Mortality of other species from Transmission Line</li> <li>■ Biodiversity of Degrai Oran</li> <li>■ Community Awareness</li> </ul>
<p><b>Mr. Radheshyam Pemani Bishnoi</b>, Wildlife Activist, Villager Dholia</p> <p><b>Mode:</b>F2F</p>	<ul style="list-style-type: none"> <li>■ Presence and Movement Pattern of GIB within and outside Priority Area</li> <li>■ GIB Mortality in the Area</li> <li>■ Vulture activity in the landscape</li> <li>■ Threats to other wildlife in the landscape</li> </ul>

The consultation minutes are provided as part of Annex A

### **2.3.1 Data Gap Identification**

The data was so far collected on the potential Critical Habitat (CH) candidate species within the Ecologically Appropriate area for analysis (EAAA). ERM identifies the gaps in data for presence and absence data of the candidate species and the habitat they use. In an event of gaps in data is observed addition data collection through the primary survey is suggested along with the scope, timings, duration, and survey effort for data gap identification

### **2.3.2 Area of Analysis Mapping and Critical Habitat Determination**

Based on the Potential Critical Habitat (CH) species and habitat values ecologically appropriate area(s) of analysis (EAAA) was delineated. The boundaries of this area take into account the distribution of species or ecosystems (within and sometimes extending beyond the project's area of influence) and the ecological patterns, processes, features, and functions that are necessary for maintaining them. These boundaries may include landscape or geological features. This area of analysis was used to assess the applicability of the critical habitat criteria and thresholds

To determine critical habitat for the species and/or ecosystems concerned EAAA boundaries will be equivalent in scale to areas mapped for practical site-based conservation management activities. For some wide-ranging species, areas of aggregation, recruitment, or other specific habitat features of importance to the species will inform critical habitat. The critical habitat will consider the distribution and connectivity of such features in the landscape/seascape and the ecological processes that support them. Where it can be shown that multiple values have largely overlapping ecological requirements and distributions, a common or aggregated area of critical habitat may be appropriate.



### 3. CRITICAL HABITAT SCREENING AND ASSESSMENT

#### 3.1 Ecological Sensitive Areas (Protected Areas, Key Biodiversity Areas and Important Bird Areas)

There are no Protected Areas (PA) or Important Bird Area (IBA) within 5 km radius of the Project site. However, Desert National Park is situated at a distance of 69.7 km west of the Project site.

##### 3.1.1 Desert National Park

Desert National Park (DNP) is a Protected Area and an Important Bird Area situated in the western region of Rajasthan state. The area of DNP is 3162 km<sup>2</sup> and falls within Jaisalmer and Barmer districts. The PA was established to protect the flora and fauna of the Thar Desert and more specifically with the purpose of protecting Critically Endangered (IUCN CR v 2020-2) Great Indian Bustard (*Ardeotis nigriceps*). It is considered the most important site for long-term survival of this species.

In addition, the area is very important for Vultures as it harbours five Vulture species<sup>4</sup> including three Critically Endangered (IUCN CR v 2020-2) species viz. White-rumped Vulture (*Gyps bengalensis*), Long-billed Vulture (*Gyps indicus*) and Red-headed Vulture (*Aegypius calvus*) and Endangered (IUCN EN v 2020-2) Egyptian Vulture (*Neophron percnopterus*). Three Vulnerable (IUCN VU v 2020-2) bird species viz. Greater Spotted Eagle (*Aquila clanga*), Stoliczka's Bushchat (*Saxicola macrorhyncha*) and Macqueen's Bustard (*Chlamydotis macqueeni*) have been reported from this area.

##### 3.1.2 GIB Arc and GIB Landscape

As per the Management Plan of Desert National Park, majority of the records of the Great Indian Bustard (GIB) in the state of Rajasthan are spread over a landscape of largely unprotected land forming an arc extending from northern part of Desert National Park up to Ramdevra and Pokhran on the east of the Arc. GIB Arc covers an area of about 5000 km<sup>2</sup> and serves as a corridor for the movement of the GIB in the landscape. A total of 26 individuals of GIB were recorded<sup>5</sup> from the eastern region of the GIB Arc. During the GIB status assessment undertaken by Wildlife Institute of India in 2017, 65 individuals of GIB were observed in this Thar landscape<sup>7</sup>.

Based on the long-term surveys of GIB movement and presence in Rajasthan, the Wildlife Institute of India has categorised this landscape in GIB Conservation Priority Area and GIB Potential Area<sup>6</sup> to target high priority areas for immediate conservation actions<sup>7</sup>. As presented in the map below, the entire Project site falls within the GIB Potential Area. The GIB Priority Area is largely restricted to north of Project site, however, a small patch of this priority area falls within the Study area. This patch covers the GIB enclosures present inside the Study area. According to WII's report t, all the power lines have to be underground in GIB Priority area, while in the Potential area, it can be laid with appropriate mitigation measures<sup>6</sup>.

##### 3.1.3 GIB Enclosures

Forest Department has identified and fenced a few areas in this landscape such as at Rasla, Guddi, Akal Wood Fossil Park, Loharki, Dursar, Ramdevra, etc. which are potential habitats for GIB and are called as satellites of Desert National Park (DNP) Wildlife Sanctuary<sup>5</sup>. The consultation with ACF at

<sup>4</sup> Rahmani, A.R., Islam, M.Z. and Kasambe, R.M. (2016) Important Bird and Biodiversity Areas in India: Priority Sites for Conservation (Revised and updated). Bombay Natural History Society, Indian Bird Conservation Network, Royal Society for the Protection of Birds and BirdLife International (U.K.). Pp. 1992 + xii

<sup>5</sup> Management Plan of Desert National Park Wildlife Sanctuary 2017-2027

<sup>6</sup> Jhala, Y. V., Dutta, S., Karkarya, T., Awasthi, A. Bipin, C.M. et al. 2020. Habitat improvement and conservation breeding of the Great Indian bustard: and integrated approach. Progress Report April 2018-March 2020. Wildlife Institute of India, Dehradun 248001, India. | TR/2020/03

<sup>7</sup> Habitat improvement and conservation breeding of the Great Indian Bustard. Annual Progress Report II. Wildlife Institute of India.

Jaisalmer confirmed that these enclosures are treated and managed as a part of DNP and are crucial habitats for GIB. Majority of the enclosures are located inside the GIB Arc, however, a few of them such as at Raasla, Guddi, etc. are located near the Project site.

Raasla enclosures (1 and 2) are situated inside the Study area at approximately 2.7 km east of WTG FAT-195 and about 5.8 km southwest of the solar park boundary. During the ESIA primary survey, consultations with the local community were undertaken to confirm the movement and presence of GIB inside these enclosures. The locals residing in nearby locations of Raasla enclosure confirmed the presence of two pairs of GIB in the enclosure on annual basis. Since these habitats are situated on either sides of the Project site and serve as a corridor for GIB's movement, the likelihood of inter-enclosure movement of the species through the Project site cannot be ruled out.

### 3.2 Delineation of Ecologically Appropriate Area of Analysis (EAAA)

IFC PS6 GN59 states, "The project should identify an ecologically appropriate area of analysis to determine the presence of critical habitat for *each* species with regular occurrence in the project's area of influence, or *ecosystem*, covered by Criteria 1-4. The client should define the boundaries of this area taking into account the distribution of species or ecosystems (within and sometimes extending beyond the project's area of influence) and the ecological patterns, processes, features, and functions that are necessary for maintaining them. These boundaries may include catchments, large rivers, or geological features. The client will use this area of analysis to assess applicability of the critical habitat criteria and thresholds to determine critical habitat for the species and/or ecosystems concerned. Critical habitats boundaries should be equivalent in scale to areas mapped for practical site-based conservation management activities. For some wide-ranging species, critical habitat may be informed by areas of aggregation, recruitment, or other specific habitat features of importance to the species. In all cases, the critical habitat should consider the distribution and connectivity of such features in the landscape/seascape and the ecological processes that support them. Where it can be shown that multiple values have largely overlapping ecological requirements and distributions, a common or aggregated area of critical habitat may be appropriate. The final area(s) of critical habitat against which project impacts will be assessed should be revised based on additional knowledge documented through fieldwork and other assessment after the initial critical habitat assessment has been conducted.

Accordingly, considering the project area, protected areas, areas outside protected areas which is known to be habitat of IUCN listed Threatened (critically endangered CR, endangered EN and Vulnerable VU) species an ecologically appropriate area of analysis EAAA is therefore presented in **Figure 3.1**. This EAAA contains areas of ecological significance as presented in **Table 3.1**

**Table 3.1 Area of Ecological Significance**

Area Category	Details
Protected Area	Desert National Park and its extension area
Important Bird Area	Desert National Park and Khichan
Key Biodiversity Area	Desert National Park
IUCN Protected Area Cat. V Protected Landscape	GIB Priority and Potential Area

**Notes:**

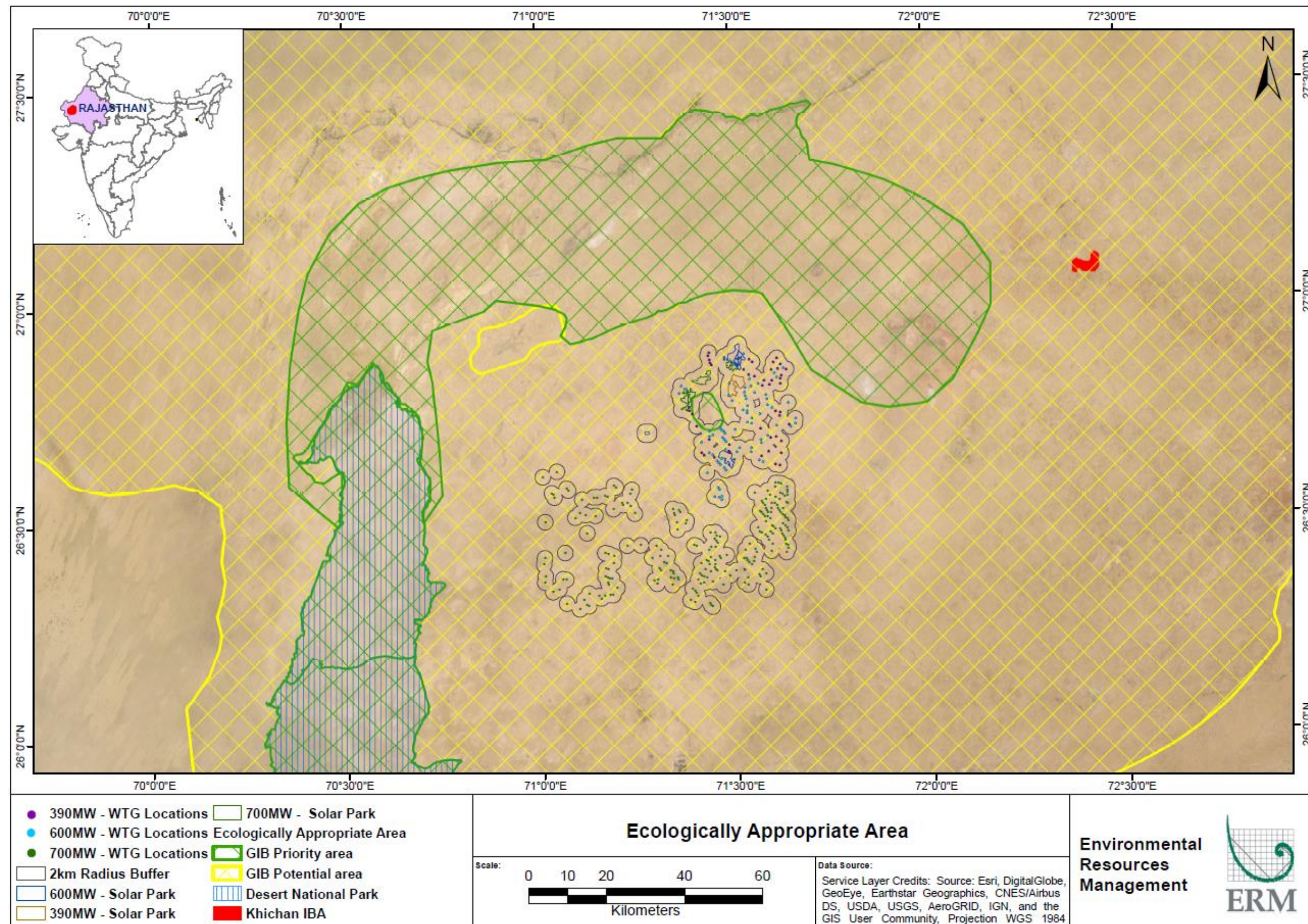
**Protected Area:** A protected area is a clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values.

**Important Bird Area:** An Important Bird and Biodiversity Area (IBA) is an area identified using an internationally agreed set of criteria as being globally important for the conservation of bird populations.

**Key Biodiversity Area:** Key Biodiversity Areas (KBA) are 'sites contributing significantly to the global persistence of biodiversity', in terrestrial, freshwater and marine ecosystems.



Figure 3.1 Ecologically Appropriate Area of Analysis

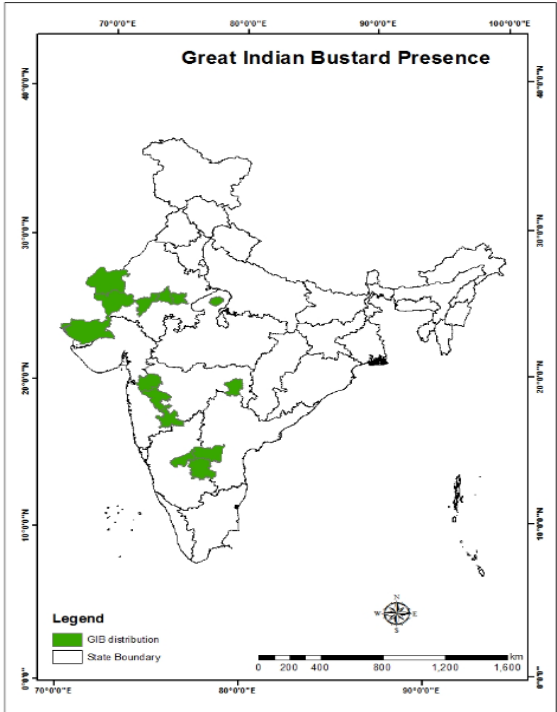
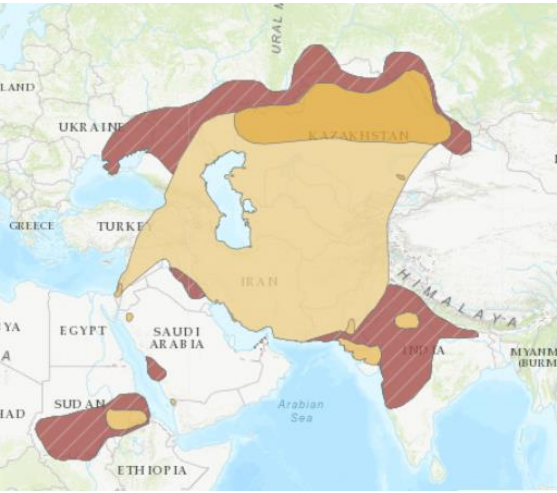




### 3.3 Qualitative assessment of the species of conservation importance

The Integrated Biodiversity Assessment Tool (IBAT) was used to identify threatened species likely to occur within or nearby the Project Area. Apart from IBAT, extensive publicly available documents and research materials were reviewed to identify additional sensitivities and finalize the checklist of species of conservation significance. An initial desk based screening of species likely to occur in and around the project location is presented in the **Table 3.2** below.

**Table 3.2. Qualitative assessment of the species of conservation importance**

S. N.	Common and Scientific Name	IUCN Status IWP Status Endemicity	Distribution Map <sup>8</sup>	CHA Criteria	Discussion	Scoped In or out
<b>Birds</b>						
1.	Great Indian Bustard ( <i>Ardeotis nigriceps</i> )	<ul style="list-style-type: none"> <li>■ IUCN: CR</li> <li>■ IWP: I</li> <li>■ Restricted Range: No</li> </ul>		1 a, c	<p>Great Indian Bustards (GIB) inhabit arid and semi-arid grasslands with scattered short scrub, bushes and low intensity cultivation in flat or gently undulating terrain. GIBs were historically distributed throughout the western half of India, however, currently they are restricted to five fragmented pockets in five Indian states including Rajasthan, Gujarat, Maharashtra, Karnataka and Andhra Pradesh. The population of the species has declined by 75% in last 30 years and is facing a risk of extinction. Presently, about 150 individuals of the species are left in the wild and the largest population of the species occurs in the state of Rajasthan<sup>2</sup>. The GIB population in Rajasthan is mostly restricted to the landscape of Thar Desert.</p> <p>The Project site is located within the same landscape. The Wildlife Institute of India has surveyed and identified areas which are intensively used by GIB. Based on these surveys, this landscape has been divided into GIB Priority and GIB Potential area. The Project site is situated with the GIB Potential area and in the immediate vicinity of GIB Priority area. Desert National Park located on the west of the Project site in the same landscape and was established with the purpose of protecting Critically Endangered GIB present in this area. It is considered to be the most important site for long-term survival of this species.</p>	The species has been screened in as a potential critical habitat assessment candidate
2.	Sociable Lapwing ( <i>Vanellus gregarius</i> )	<ul style="list-style-type: none"> <li>■ IUCN: CR</li> <li>■ IWP: IV</li> <li>■ Restricted Range: No</li> </ul>		1 a, c	<p>Sociable lapwing uses dry wastelands, cultivated, ploughed and stubble fields<sup>9</sup>. It winters in Sudan, Eritrea, Israel, Arabian Peninsula, Pakistan and India, possibly also in Iraq and Iran<sup>10</sup>.</p> <p>There are a few sporadic records of the species from 1998, 1999 and 2003 around Jaisalmer and Desert National Park area<sup>11</sup>. However, there are no recent records (past 10 years) of the species from Jaisalmer region available in public domain. Also, the distribution range of the species suggests that it is possibly extinct from this landscape.</p>	The species has been screened-out as a potential critical habitat assessment candidate

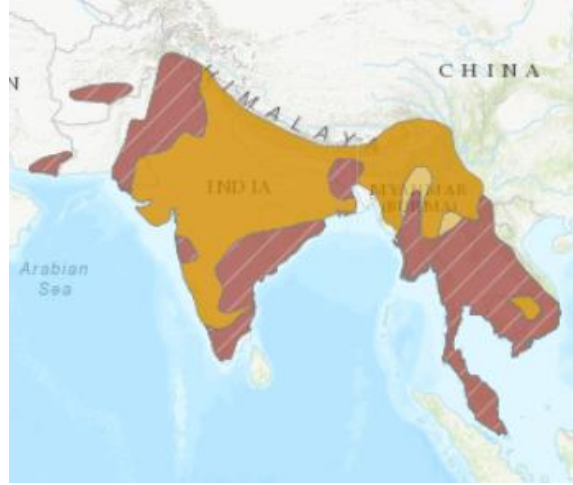
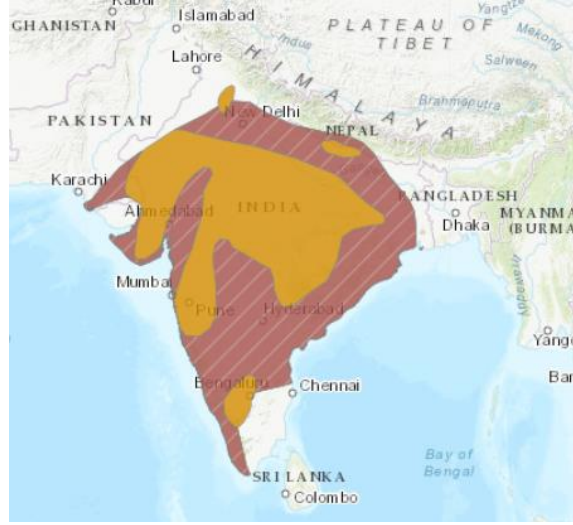
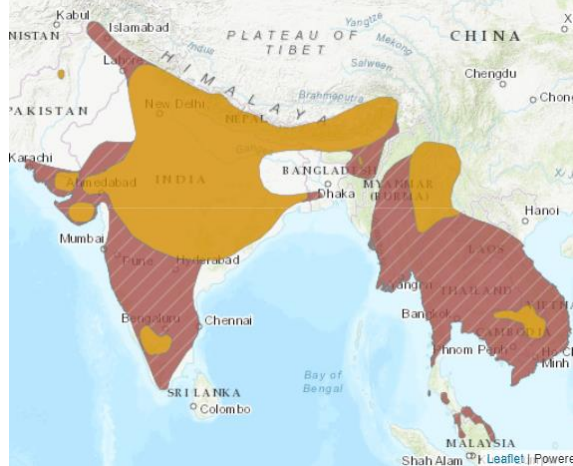
<sup>8</sup> [http://wiienvis.nic.in/Content/SpeciesRecoveryProgramme\\_8555.aspx?format=Print](http://wiienvis.nic.in/Content/SpeciesRecoveryProgramme_8555.aspx?format=Print) and IUCNredlist.org

<sup>9</sup> <https://www.iucnredlist.org/species/22694053/155545788#habitat-ecology>

<sup>10</sup> <https://birdsoftheworld.org/bow/species/soclap1/cur/introduction?login>

<sup>11</sup> Harkirat Singh Sangha. 2005. Sightings of Sociable Lapwing *Vanellus gregarius* in Rajasthan, excluding Bharatpur records. Indian Birds Vol. 1 No. 4 (July-August 2005)



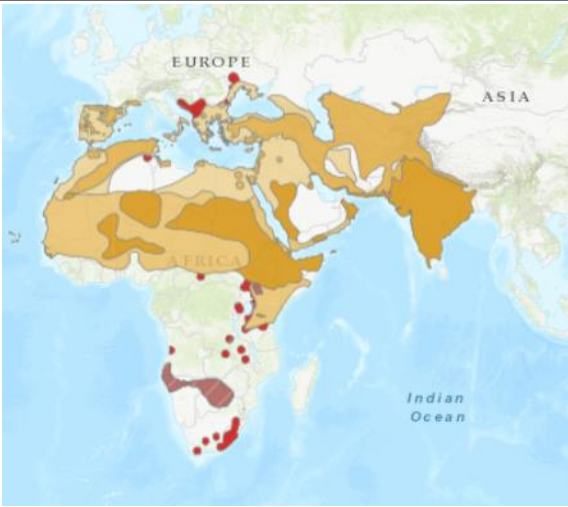
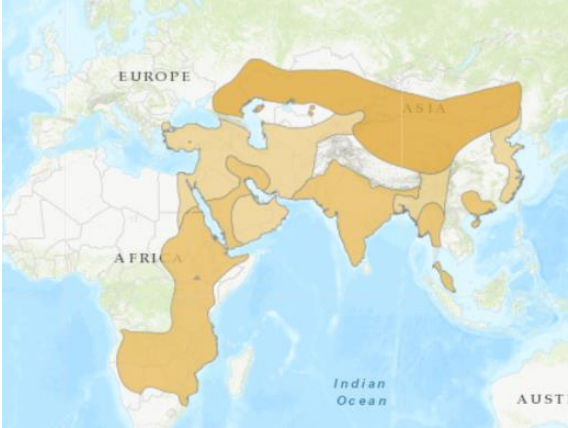
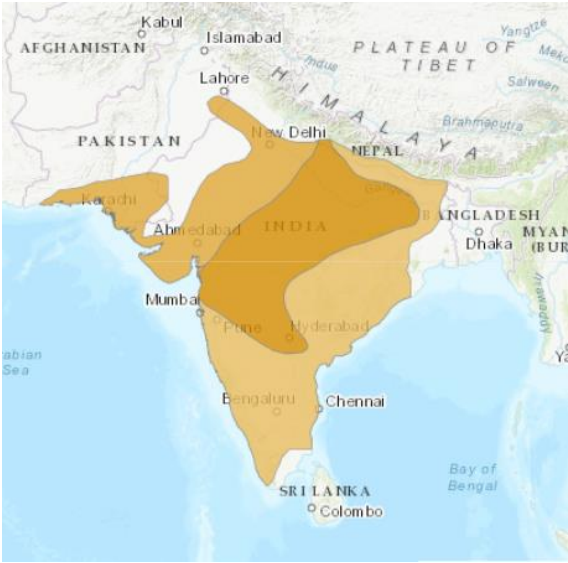
3.	White-rumped Vulture ( <i>Gyps bengalensis</i> )	<ul style="list-style-type: none"> <li>■ IUCN: CR</li> <li>■ IWP: I</li> <li>■ Restricted Range: No</li> </ul>		1 a, c	The White-rumped Vulture has a widespread but patchy distribution across India. The species occurs mostly in plains, light woodland, villages, cities, and open areas. Such habitats are present within the Project site. Also, the species has widely been reported from Desert National Park and entire Thar landscape <sup>12</sup> .	The species has been screened in as a potential critical habitat assessment candidate
4.	Indian Vulture ( <i>Gyps indicus</i> )	<ul style="list-style-type: none"> <li>■ IUCN: CR</li> <li>■ IWP: I</li> <li>■ Restricted Range: No</li> </ul>		1 a, c	<p>The Indian Vultures also have a widespread but patchy distribution across India. The species has faced a drastic population decline throughout the Indian subcontinent which probably began in the 1990s resulting in an overall population decline of greater than 97% over a 10-15 year period.</p> <p>The species has been widely reported from Desert and entire Thar landscape in which the Project site is situated<sup>13</sup>. There are multiple sighting records of the species from Bhadariya vulture feeding site located 15 km north of the Project site<sup>13</sup>.</p>	The species has been screened in as a potential critical habitat assessment candidate
5.	Red-headed Vulture ( <i>Sarcogyps calvus</i> )	<ul style="list-style-type: none"> <li>■ IUCN: CR</li> <li>■ IWP: IV</li> <li>■ Restricted Range: No</li> </ul>		1 a, c	<p>These vulture are widely distributed across India and Indian subcontinents. They prefer open country, semi-desert, cultivated areas, savannah and deciduous woodland<sup>14</sup> The population of the species has declined by 91% between the early 1990s and 2003 (Cuthbert et al. 2006).</p> <p>The species has been reported on multiple occasions from Thar landscape, Desert National Park and Bhadariya vulture feeding site<sup>15</sup>.</p>	The species has been screened in as a potential critical habitat assessment candidate

<sup>12</sup> <https://ebird.org/map/whrvul1?neg=true&env.minX=60.36021039818386&env.minY=17.98338831278408&env.maxX=82.86021039818385&env.maxY=28.095683899835826&zh=true&qp=false&ev=Z&mr=1-12&bmo=1&emo=12&yr=all&byr=1900&eyr=2020>

<sup>13</sup> <https://ebird.org/map/indvul1?neg=true&env.minX=70.41057548228194&env.minY=26.542060708488613&env.maxX=71.81682548228194&env.maxY=27.155906657691315&zh=true&qp=false&ev=Z&mr=1-12&bmo=1&emo=12&yr=all&byr=1900&eyr=2020>

<sup>14</sup> <https://birdsoftheworld.org/bow/species/revul1/cur/introduction?login>

<sup>15</sup> <https://ebird.org/map/revul1?neg=true&env.minX=70.53691825571944&env.minY=26.535917768209007&env.maxX=71.94316825571944&env.maxY=27.149796939429113&zh=true&qp=false&ev=Z&mr=1-12&bmo=1&emo=12&yr=all&byr=1900&eyr=2020>

6.	Egyptian Vulture ( <i>Neophron percnopterus</i> )	<ul style="list-style-type: none"> <li>■ IUCN: EN</li> <li>■ IWP: IV</li> <li>■ Restricted Range: No</li> </ul>		1 a, c	<p>The species prefers extensive open areas mainly in dry or arid regions, steppe, desert, scrub, pastures and agricultural fields<sup>16</sup>. They have a very widespread distribution across Asia, Europe and Africa.</p> <p>Egyptian Vultures have been extremely widely reported and recorded<sup>17</sup> from the landscape of the Project site, Desert National Park and Bhadariya vulture feeding site<sup>18</sup></p>	The species has been screened in as a potential critical habitat assessment candidate
7.	Steppe Eagle ( <i>Aquila nipalensis</i> )	<ul style="list-style-type: none"> <li>■ IUCN: EN</li> <li>■ IWP: I</li> <li>■ Restricted Range: No</li> </ul>		1 a, c	<p>The Steppe Eagle has extremely widespread distribution and it overlaps the Project site. It frequents wooded hills open country and large lakes and such habitat is present in and around the Project site.</p> <p>The species has been reported from Desert National Park and from multiple locations in and around the Project site<sup>19</sup>.</p>	The species has been screened in as a potential critical habitat assessment candidate
8.	Lesser Florican ( <i>Sypheotides indicus</i> )	<ul style="list-style-type: none"> <li>■ IUCN: EN</li> <li>■ IWP: I</li> <li>■ Restricted Range: No</li> </ul>		1 a, c	<p>Lesser Florican is a grassland species with relatively wide distribution across India. It is generally found in productive grasslands with scattered bushes and scrub. The species is restricted to the eastern and southern parts of the state of Rajasthan. The species has not been reported from Jaisalmer district<sup>20</sup>.</p>	The species has been screened-out as a potential critical habitat assessment candidate

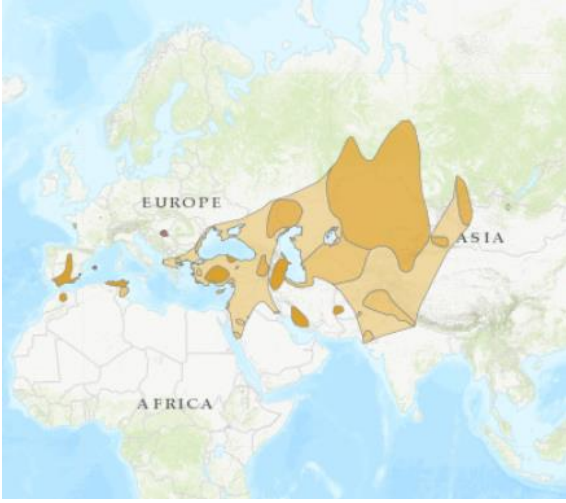
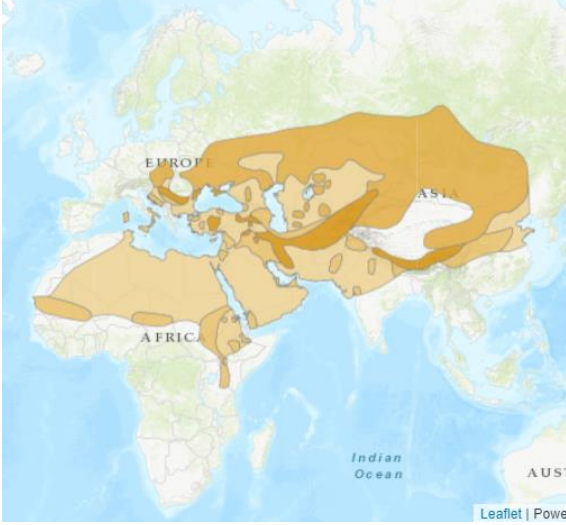

<sup>16</sup> <https://birdsoftheworld.org/bow/species/egyvl1/cur/introduction>

<sup>17</sup> ERM's previous experience of working in this landscape

<sup>18</sup> <https://ebird.org/map/egyvl1?neg=true&env.minX=70.35427055064132&env.minY=26.46857459594917&env.maxX=71.76052055064132&env.maxY=27.082817510917547&zh=true&qp=false&ev=Z&mr=1-12&bmo=1&emo=12&yr=all&byr=1900&eyr=2020>

<sup>19</sup> <https://ebird.org/map/steeag1?neg=true&env.minX=70.37349662486007&env.minY=26.47840890540145&env.maxX=71.77974662486007&env.maxY=27.09259875433713&zh=true&qp=false&ev=Z&mr=1-12&bmo=1&emo=12&yr=all&byr=1900&eyr=2020>

<sup>20</sup> Habitat improvement and conservation breeding of the Great Indian Bustard: An Integrated Approach, Annual Progress Report II, Wildlife Institute of India

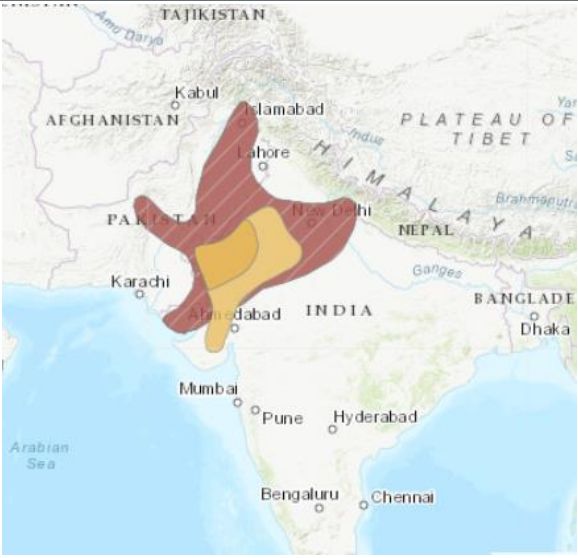
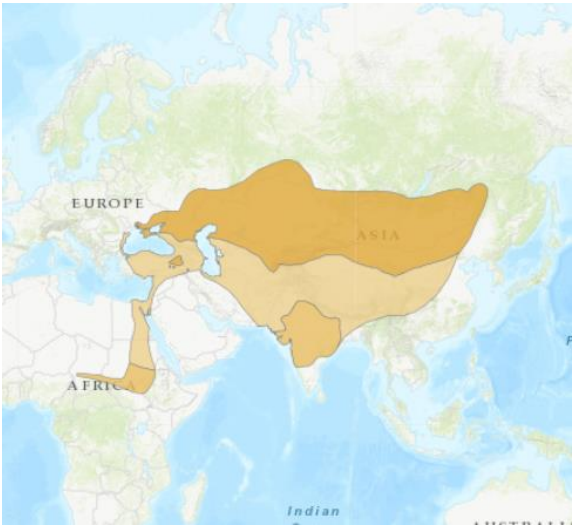
9.	White-headed Duck ( <i>Oxyura leucocephala</i> )	<ul style="list-style-type: none"> <li>■ IUCN: EN</li> <li>■ IWP: IV</li> <li>■ Restricted Range: No</li> </ul>		1 a, c	The species is passage migrant to north-western India. It is resident to Russia and some parts of Europe. These ducks have very rarely been recorded in India and most recent record of the species from country is from 1997 <sup>21</sup> . Also there are no sighting records of these ducks from the Thar landscape. It is, thus, unlikely to be found at the Project site.	The species has been screened-out as a potential critical habitat assessment candidate
10.	Saker Falcon ( <i>Falco cherrug</i> )	<ul style="list-style-type: none"> <li>■ IUCN: EN</li> <li>■ IWP: I</li> <li>■ Restricted Range: No</li> </ul>		1 a, c	<p>The species prefers hunting close to desert, steppes, agricultural and arid montane areas. Such habitats are present in the Aol of the Project site. Also, the distribution range of the species overlaps the Project site.</p> <p>The species has been reported from the Desert National Park and Jaisalmer area <sup>22</sup></p>	The species has been screened in as a potential critical habitat assessment candidate
11.	Greater Adjutant ( <i>Leptoptilos dubius</i> )	<ul style="list-style-type: none"> <li>■ IUCN: EN</li> <li>■ IWP: IV</li> <li>■ Restricted Range: No</li> </ul>		1 a, c	The species prefers habitats such as marshes, lakes, jheels, paddy fields, open deciduous and freshwater flooded forest, dry grassland, fallow fields, etc. <sup>23</sup> . The distribution of the species is mostly restricted to the north eastern parts of the country. The distribution maps indicates that the species is extinct from majority of its historical range including Rajasthan. In addition, there are no sighting records of the species from the landscape of the Project site.	The species has been screened-out as a potential critical habitat assessment candidate

<sup>21</sup> <https://www.wetlands.org/wp-content/uploads/2015/11/Conservation-of-the-White-headed-Duck-Oxyura-leucocephala-in-Central-Asia-Part-1.pdf>

<sup>22</sup> <https://ebird.org/map/sakfal1?neg=true&env.minX=59.7812643140227&env.minY=19.501138021784705&env.maxX=82.28126431402269&env.maxY=29.500195092916755&zh=true&gp=false&ev=Z&mr=1-12&bmo=1&emo=12&yr=all&byr=1900&eyr=2020>

<sup>23</sup> <https://birdsoftheworld.org/bow/species/greadj1/cur/introduction>



12.	White-browed Bushchat ( <i>Saxicola macrorhynchus</i> )	<div><div>IUCN: VU</div><div>IWP: IV</div><div>Restricted Range: No</div></div>		2 a	<p>White-browed or Stoliczka's Bushchat inhabits dry, sandy semi-deserts and desert plains with low herbs and scattered shrubs. It has a small, declining population which qualifies it as Vulnerable. The preferred habitats of the species are present in and around the Project site. Also, there are multiple and regular sighting records of the species from Desert National Park and Jaisalmer area<sup>24</sup>.</p> <p>The distribution range of the species is mostly restricted to Rajasthan and neighbouring states. However, the Extent of Occurrence (EOO) of the species is 97,400 km² which does not qualify it for a restricted range species<sup>25</sup>.</p>	The species has been screened-out as a potential critical habitat assessment candidate
13.	Demoiselle Crane ( <i>Anthropoides virgo</i> )	<div><div>IUCN: LC</div><div>IWP: IV</div><div>Restricted Range: No</div></div>		3 a	<p>Demoiselle Crane is a migratory and congregatory species and travels vast distances. This species shows a preference for grasslands and agricultural habitats in close proximity to shallow lakes and other wetlands, also frequenting desert areas where water is available<sup>26</sup>. The species regularly uses the Central and West Asian flyway and is an Annex II species within the Convention for the Conservation of Migratory Wild Animal Species (CMS).</p> <p>The species has its presence in the Thar landscape and Desert National Park and congregations of hundreds of birds have been reported from the areas such as Degrai water body and Sanwata, adjacent to the Project site<sup>27</sup>.</p>	The species has been screened in as a potential critical habitat assessment candidate

Mammal


<sup>24</sup> <https://ebird.org/map/whbbus4?neg=true&env.minX=70.16768474400362&env.minY=24.91621851985702&env.maxX=75.79268474400362&env.maxY=27.107923004705288&zh=true&gp=false&ev=Z&mr=1-12&bmo=1&emo=12&yr=all&byr=1900&eyr=2020>

<sup>25</sup> <https://www.iucnredlist.org/species/22710160/110578039#geographic-range>

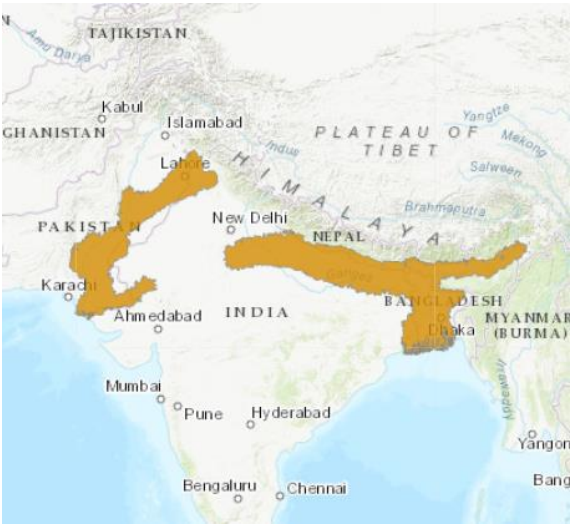
<sup>26</sup> <https://www.iucnredlist.org/species/22692081/131927771#habitat-ecology>

<sup>27</sup> <https://ebird.org/map/demcra1?neg=true&env.minX=70.19127655029294&env.minY=26.74204534935384&env.maxX=71.59752655029294&env.maxY=27.285259678539244&zh=true&gp=false&ev=Z&mr=1-12&bmo=1&emo=12&yr=all&byr=1900&eyr=2020>



14.	Indian Pangolin (Manis crassicaudata)	<div><div>IUCN: EN</div><div>IWP: I</div><div>Restricted Range: No</div></div>		<p>Indian Pangolin is a widespread species in India as shown in the distribution map. There species is reported to occur in various types of tropical forests as well as open land, grasslands and degraded habitat, including in close proximity to villages<sup>28</sup>.</p> <p>There are sporadic sighting records of the species from western Rajasthan<sup>29</sup>. And even if found around the Project site, the species has too wide a distribution to trigger the quantitative thresholds defined in IFC PS 6 for critical habitat.</p>	<p>The species has been screened-out as a potential critical habitat assessment candidate</p>
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Reptile

15.	Spotted Pond Turtle (Geoclemys hamiltonii)	<div><div>IUCN: EN</div><div>IWP: I</div><div>Restricted Range: No</div></div>		<p>The species prefers shallow, densely vegetated standing waterbodies, but may also occur in rivers, ponds and reservoirs and basks preferentially in reed beds<sup>30</sup>. A small portion of its distribution range overlaps the western tip of Rajasthan. The species however, has not been reported from Desert National Park and the landscape of the Project site. Also Aol of the Project site does not have any densely vegetated wetlands as preferred by these Turtles.</p>	<p>The species has been screened-out as a potential critical habitat assessment candidate</p>
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<sup>28</sup> <http://dx.doi.org/10.2305/IUCN.UK.2014-2.RLTS.T12761A45221874.en>  
<sup>29</sup> Management Plan Of Desert National Park Wildlife Sanctuary, Plan Period 2017-2027  
<sup>30</sup> <https://www.iucnredlist.org/species/9029/152050337#habitat-ecology>

The above species that have been screened-in as critical habitat candidates (shown green in **Table 3.2**). They needed further assessment against the quantitative thresholds as provided in the IFC PS 6 Critical Habitat Assessment criteria shown in **Table 2.3**. Species that have been screened-out of the critical habitat assessment (shown in red in Table 3.2) have not been taken forward for the quantitative assessment of the critical habitats in **Table 3.3** below.

**Table 3.3 List of species scoped into critical habitat assessment**

S.N.	Class of Flora/Fauna	Species	Common Name
1.	Birds	<i>Ardeotis nigriceps</i>	Great Indian Bustard
2.		<i>Gyps bengalensis</i>	White-rumped vulture
3.		<i>Gyps indicus</i>	Indian vulture
4.		<i>Sarcogyps calvus</i>	Red-headed vulture
5.		<i>Neophron percnopterus</i>	Egyptian vulture
6.		<i>Aquila nipalensis</i>	Steppe Eagle
7.		<i>Falco cherrug</i>	Saker Falcon
8.		<i>Anthropoides virgo</i>	Demoiselle Crane

Stakeholder consultations as well as focused literature review were undertaken with Protected area managers, experts working on the species and landscape level and Non-Governmental Organizations as well as locals involved at individual capacity were consulted for following species listed in **Table 3.4**.





**Table 3.4 Potential Critical Habitat Trigger species group**

Status	Species
Critically Endangered (CR) and Endangered (EN) Species	Great Indian Bustard, White-rumped Vulture, Indian Vulture, Steppe eagle,
Migratory/congregatory species	Steppe eagle, Demoiselle's crane, Saker Falcon

### 3.3.1 Habitat Characterization

The vegetation of major part of the arid region of the Thar falls under Thorn Forest type (Champion and Seth 1968). Most of the undisturbed areas are covered by sewan grass (*Lasiurus scindicus*) that has 8-10% protein content in the early leaves. It is considered to be one of the finest fodder grasses in India. The Khejri tree (*Prosopis cineraria*) is commonly found here and it is revered and protected by the local communities specially the 'Bishnois'. 245 plant species belonging to 51 families have been reported from this area. The biota of Thar has both mesic and desert elements owing to location of the Thar in the Saharo-Tharian Basin. The project AoI is largely open scrub to grassland with isolated and mosaic of agricultural lands with crop only during Monsoon-Post Monsoon period. Remaining part of the year the land is dry, exposed and devoid of any grasses. Grazing pressure is quite evident when compared with forest closure areas and outside areas. (Refer **Figure 3.2**)

**Figure 3.2 Habitats within EAAA**

	
Rich grassland with Great Indian Bustard (2 Nos.) north of Khetolai Village	Open Scrub and Grassland North of the proposed Solar Site
	
Open Scrub and Grassland North of the proposed Solar Site	Open Scrub and Grassland at Raasla Enclosure

There are two broader vegetation types in the Project Aol.

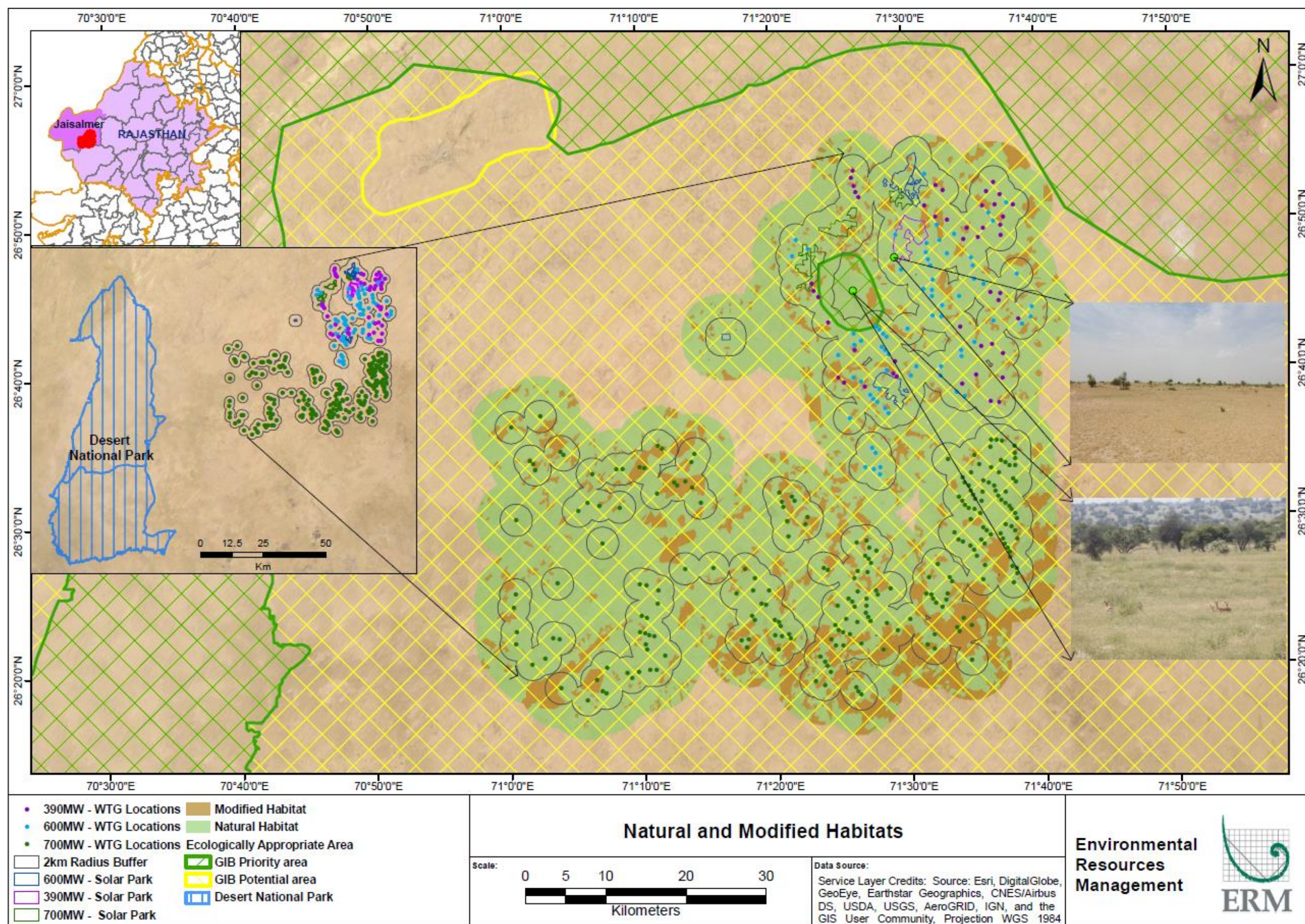
Open Scrub and Grasslands which can be delineated as Natural Habitats. Some part of the Aol are sand dunes. Most of the dunes get colonized by pioneer plants like *Aerva javanica*, *Aristida* sp. *Calligonum polygonoides*, *Cenchrus* sp. *Cyperus atkinsonii* etc. that results in stabilizing the dunes. Perennial herbaceous flora capable of drought resistance is very limited. Common species are *Acacia senegal*, *Prosopis cineraria*, *Capparis decidua* and *Salvadora persica*. Some other species which can be commonly seen of the sandy soil are *Calligonum polygonoides* and *Calotropis procera*.

The short lived herbaceous vegetation 'Ephemerals' come up during the rainy season and complete their life cycle before the advent of winters.

Agricultural Lands can be delineated as Modified Habitats.



Figure 3.3 Natural and Modified habitats within Aoi





### 3.4 Critical Habitat Quantitative Threshold Assessment

Potential Candidate species were identified through Critical Habitat Screening, provided in **Table 3.5** and based on consultation with experts and other stakeholders, assessment of critical habitat was done. The critical habitat candidates and assessment against thresholds are summarised in **Table 3.5**.

**Table 3.5 Critical Habitat Assessment**

Common Name	Scientific Name	Global IUCN (IUCN v 2020-2)	Criterion 1	Criterion 2	Criterion 3	Criterion 4	Criterion 5	Species information	CH rationale
Great Indian Bustard (GIB)	<i>Ardeotis nigriceps</i>	CR	✓					<p>The consultations with multiple stakeholders including Wildlife Institute of India (WII) and local experts, NGOs and community members revealed that the Thar landscape holds two subpopulations of the species, one residing the northern parts of Desert National Park and another cluster in Pokran Field Firing Range and neighbouring areas. The GIB Priority Area, as identified by WII, supports most of the breeding activities of the species. However, once the breeding season is over, the GIBs move out of the enclosures and habitats of Priority Area and roam the entire landscape, specifically the southern landscape to the Priority Area. The movement of GIBs around Rasla and Sanwata can be confirmed from the recent GIB mortality in Degrai Oran<sup>31</sup> (2020) near Rasla GIB enclosure and earlier mortality near Sanwata (2017)<sup>32</sup> due to collision with the transmission lines. Presence of three more birds have recently been reported from Degrai oran area post this incident of the mortality<sup>32 34</sup>. The Project site is situated in close proximity Rasla enclosure and Degrai Oran which supports at least 3 to 5 GIBs on annual basis<sup>32 34</sup>.</p> <p>Mr. Bipin CM of WII confirmed that eastern part of the Priority area including Pokran Firing Range, Ramdevra, etc. presently harbours approximately around 2/3<sup>rd</sup> of the GIB population present in the Thar landscape. While Desert National Park supports remaining 1/3<sup>rd</sup> of it. The movement of GIBs is very restricted during the summer to the areas with less disturbance and with the availability of water<sup>33 36</sup>. The eastern sub-population breeds in the Pokran Firing Range and in the grasslands around Ramdevra, Dhidhu, Ajasar, etc. and moves out of these areas to roam the wider landscape outside the Priority Area rest of the year<sup>33</sup>. A few of the probable reasons behind this movement, as understood from the consultations with Dr Dookia, Mr Bipin CM and Dr Joshua, are:</p> <ol style="list-style-type: none"> <li>The disturbance inside the Firing Range caused due to the testing practices generally occurring from October to March;</li> <li>An observation that the male birds leave more productive habitats for females and chicks and move towards other modified/degraded habitats such as agricultural land and open scrub;</li> <li>The genetics and biology of the bird make them move across the landscape and also to their historical range at times.</li> </ol> <p>Thus, it can safely be established that the GIBs are present and using the landscape outside the Priority Area and areas within the AoI of the Project site. Regular GIB activity has been reported from the Orans (Degrai, Delasar) and the habitats around Dawara, Neran, Achla, Sanawara, Jaskaranpur, Lakhmana, Bhopa. All these villages are located within and around the AoI of the Project site<sup>32 34</sup>.</p>	<p>The EAAA supports the largest portion of the global GIB population. According to WII's latest population assessment (Dutta et al. 2018) Thar landscape holds about 128 (±19) individuals of the species. As the global population of GIB is considered to be around 150, EAAA supports about 85% of this population and more than 5 breeding units of the species.</p> <p>Also, there is a regular movement of the species within the AoI of the Project and the entire landscape of the Project site is expected to hold more than 5 birds which is more than 3% of the global population.</p> <p><b>Great Indian Bustard has, thus, been considered as a Critical Habitat Candidate. (Criteria 1 a, c)</b></p>

<sup>31</sup> <https://timesofindia.indiatimes.com/city/jaipur/gib-dies-after-hitting-live-wires/articleshow/78155378.cms>

<sup>32</sup> Consultation with Mr. Sumersinghji Bhati, Sanwata on 7<sup>th</sup> October 2020

<sup>33</sup> Consultation with Dr. Sumit Dookia of ERDS Foundation on 17<sup>th</sup> October 2020

<sup>34</sup> Consultation with Mr. Kamlesh Bishnoi, Khetolai on 9<sup>th</sup> October 2020



Common Name	Scientific Name	Global IUCN (IUCN v 2020-2)	Criterion 1	Criterion 2	Criterion 3	Criterion 4	Criterion 5	Species information	CH rationale
White-rumped Vulture	<i>Gyps bengalensis</i>	CR	✓					<p>White-rumped Vulture occurs mostly in plains and less frequently in hilly regions where it utilises light woodland, villages, cities, and open areas<sup>35</sup>. It feeds on carrion, both putrid and fresh. It is social and usually found in flocks. It breeds in colonies in tall trees, often near human habitation.<sup>35</sup> The global population of White-rumped Vulture is estimated to be in range of 3,500 to 15,000 individuals.</p> <p>Consultations with Dr. Dhookia, Mr. Radheshyam Pemani and Sumersinghji Bhati confirmed that the Project Aol as well as EAAA hold a good population of Vultures. Among three Critically Endangered species of Vultures, White-rumped Vulture constitute the highest population in Thar landscape<sup>36</sup>. A study on the status of Vultures in Rajasthan published in 2009 also confirms that the Jaisalmer district holds the highest population of White-rumped Vultures with 89 individuals recorded during the survey<sup>37</sup>. Also, there are multiple sighting records of the species across the EAAA. The sighting of 60 individuals of the species has been reported from Jaisalmer area by Mr Stanton on ebird.org in 2012<sup>38</sup>.</p> <p>Livestock carcass dumping site at Bhadriya, which is a part of EAAA and located approximately 18 km north of the Project site, attracts large number of both resident as well as migratory Vultures every year. As understood from the consultations, this area supports a regular movement of more than 3000 Vultures every year. Dr. Dhookia was of an opinion that Bhadriya site supports higher Vulture activity than Jorbeer IBA (Vulture feeding site) situated in Bikaner district.</p>	<p>Despite the unavailability of recent data regarding the species population, there are many recent and regular sighting records of White-rumped Vulture from the area around Jaisalmer, Bhadriya, Degrai Oran and other parts of EAAA <sup>38 32</sup>. Considering facts discussed here about the species, EAAA is expected to hold more than 0.5% of the global population (18-75 individuals). And as informed by Dr Dhookia, the species also breeds in this GIB landscape. Around 7-8 nests have been reported by the birdwatchers in his network. Thus, the EAAA also supports more than 5 breeding units of White-rumped Vultures.</p> <p>In addition, considering the large scale vulture recovery after ban on NSAIDs, the population present in this landscape can be considered regionally important which meets the Criteria 1 c.</p> <p>White-rumped Vulture has thus been <b>considered</b> a Critical Habitat Candidate (Criteria 1, a, c).</p>
Indian Vulture	<i>Gyps indicus</i>	CR	✓					<p>Indian Vultures prefer similar habitats and are often associated with White-rumped Vultures<sup>39</sup>. Species presence in the landscape was confirmed through consultations with stakeholders and through actual site visit. Red-headed Vultures, on the other hand, are relatively rare with fewer sighting records. Two Indian Vultures and one Red-headed Vulture were sighted near Bhadriya and in Desert National Park during the site visit, respectively.</p> <p>A 2009 study undertaken about the status of Vultures in Rajasthan had recorded 40 individuals of Indian Vulture and 9 Red-headed Vultures in Jaisalmer district<sup>37</sup>.</p> <p>Both the species shows decreasing global population trend with the estimated global population of the Indian Vulture is 45000 individuals and around 3500 to 15000 individuals of Red-headed Vulture<sup>40</sup>.</p>	<p>The presence of both the species within the EAAA has been confirmed through site visit and consultations. However, due to unavailability of recent population estimates on both the species, it cannot be confirmed if the EAAA holds 0.5% of the global population of Indian Vulture (225 individuals) and Red-headed Vulture (18-75 individuals). Also, no data about the breeding of both these species in Thar landscape is available.</p> <p>Thus, Indian Vulture and Red-headed Vulture are <b>not considered</b> Critical Habitat candidates.</p>
Red-headed Vulture	<i>Sarcogyps calvus</i>	CR	✓						

<sup>35</sup> <https://www.iucnredlist.org/species/22695194/118307773#habitat-ecology>

<sup>36</sup> Consultation with Radheshyam Pemani on 7<sup>th</sup> October 2020

<sup>37</sup> Chhangani, A. (2009). Status of vulture population in Rajasthan, India. Indian For. 135. 239-251.

<sup>38</sup> <https://ebird.org/map/whrvul1?neg=true&env.minX=70.20765991075066&env.minY=26.73577158899958&env.maxX=71.61390991075066&env.maxY=27.348566330145577&zh=true&gp=false&ev=Z&mr=1-12&bmo=1&emo=12&yr=all>

<sup>39</sup> <https://www.iucnredlist.org/species/22729731/117875047#habitat-ecology>

<sup>40</sup> <https://www.iucnredlist.org/species/22729731/117875047#population>

Common Name	Scientific Name	Global IUCN (IUCN v 2020-2)	Criterion 1	Criterion 2	Criterion 3	Criterion 4	Criterion 5	Species information	CH rationale
Egyptian Vulture	<i>Neophron percnopterus</i>	EN	✓					<p>Egyptian Vultures are the most common and abundant species among the Vultures in Thar landscape. The species is widely distributed and can be very frequently sighted across the Project AoI of the entire EAAA. The highest concentration of the species can be seen around Bhadariya carcass dumping site. During the visit to this site, about 100 individuals of the species were recorded soaring around in this area. The consultations revealed that the number goes up during the winter and thousands of Vultures can be observed feeding on carcasses. A few birds were also observed around Degrai Oran, Rasla, Sanwata, Khetolai and Desert National Park during the primary survey.</p> <p>The global population trend of the species, however, is decreasing and the population is considered to be somewhere between 18000 and 57000 individuals<sup>41</sup>.</p>	<p>About 100 birds were sighted during the site visit and presence of the species inside EAAA in good numbers has been confirmed through the consultations. The numbers are expected to increase by manifolds during the winter and thus, it can be safely concluded that the EAA holds more than 0.5% (90 to 285 individuals) of global population and more than 5 reproductive units of the species. In addition, even Degrai Oran, which falls within the AoI of the Project, is expected to hold more than 150 individuals of the species<sup>32</sup>.</p> <p><b>Egyptian Vulture is thus considered a Critical Habitat candidate. (1 a)</b></p>
Steppe Eagle	<i>Aquila nipalensis</i>	EN	✓					<p>The global population of the Steppe Eagle is estimated to be about 94,116 individuals<sup>42</sup>. The population is declining owing to habitat destruction, especially conversion of steppe into agricultural land, persecution, and collisions with power lines.<sup>42</sup></p> <p>Consultations and the review of ebird.org data confirmed the presence of the species inside the AoI of the Project site<sup>43</sup>. However, no quantitative data about the population of the Steppe Eagle visiting this region is available.</p>	<p>There is a likelihood of EAAA supporting more than 0.5% (470 individuals) of the species during the migratory season. However, due to the lack of quantitative data about the species population in the Project AoI and EAAA, it has been excluded as a Critical Habitat candidate.</p> <p>Steppe Eagle is <b>not considered</b> a Critical Habitat candidate.</p>
Saker Falcon	<i>Falco cherrug</i>	EN	✓					<p>The species has witnessed a population decline of about 50% during the past 20 years due to various anthropogenic activities<sup>45</sup>. The global population of the Saker Falcon is estimated to be about 12,800 to 30800 mature individuals<sup>44</sup>. China, Mongolia, Kazakhstan and Russia hold about 90% of the global population of the species. It winters in some parts of north-western India including states of Gujarat, Rajasthan, Haryana and Punjab and is a passage migrant for other north-western states. However, no quantitative data about the population of Saker Falcon visiting the area of Project site is available.</p>	<p>As the distribution range of the species overlaps with the EAAA along the road stretch, it was scoped in. However, the species has been recorded from Rajasthan as a passage migrant or a rare winter visitor<sup>45</sup>. According to 2014 Global Action Plan prepared for the conservation of Saker Falcon, only 5 to 10 breeding pairs have been reported from India which are restricted to Ladakh. Also, there are just a few sporadic sighting records of the species from Thar landscape. The EAAA is unlikely to hold 5 reproductive units and cross the threshold of 0.5% (64 to 154 individuals) of the global population in the AoI of the Project site.</p> <p>Thus, Saker Falcon <b>cannot be considered</b> as a Critical Habitat Candidate.</p>

<sup>41</sup> <https://www.iucnredlist.org/species/22695180/154895845#population>

<sup>42</sup> <https://www.iucnredlist.org/species/22696038/118576408#population>

<sup>43</sup> <https://ebird.org/map/steeag1?neg=true&env.minX=70.75148010253908&env.minY=26.500061690461187&env.maxX=72.15773010253908&env.maxY=27.114134637489546&zh=true&gp=false&ev=Z&mr=1-12&bmo=1&emo=12&yr=all&byr=1900&eyr=2020>

<sup>44</sup> Kovács, A., Williams, N. P. and Galbraith, C. A. 2014. Saker Falcon *Falco cherrug* Global Action Plan (SakerGAP), including a management and monitoring system, to conserve the species. Raptors MOU Technical Publication No. 2. CMS Technical Series No. 31. Coordinating Unit - CMS Raptors MOU, Abu Dhabi, United Arab Emirates.

<sup>45</sup> Chandan, Pankaj & Mundkur, Taej & Takpa, Jigmet & Jamwal, Pushpinder & Suhail, Intesar & Rigzin, Tsewang & Rattan, Rohit. (2015). First Breeding Record of Saker Falcon *Falco cherrug milvipes* in India. Journal of the Bombay Natural History Society (JBNHS). 112. 93. 10.17087/jbnhs/2015/v112i2/104935.

Common Name	Scientific Name	Global IUCN (IUCN v 2020-2)	Criterion 1	Criterion 2	Criterion 3	Criterion 4	Criterion 5	Species information	CH rationale
Demoiselle Crane	<i>Anthropoides virgo</i>	LC			✓			<p>Every year, thousands of Demoiselle Cranes visit wintering grounds in India. The species starts arriving during late August and stays until March. It disperse in the landscapes of Rajasthan and Gujarat in large numbers and occupies the entire Thar landscape. Flocks of hundreds of bird have been reported in this area<sup>46</sup>.</p> <p>Khichan, which is a part of EAAA, is an Important Bird Area known for very high activity of wintering Demoiselle Cranes. It has been selected as an IBA because it holds more than around 4-10% of the wintering population of Demoiselle Cranes<sup>47</sup>. These birds have been traditionally visiting this site since last 150 years as they are fed by the local community at a feeding site.</p> <p>There are many recent (2019, 2020) sightings of the species ranging from 3000 to 8000 birds from Khichan IBA reported on ebird.org<sup>48</sup>. Congregations of around 800 birds have also been reported from and around the AoI of the Project site near Sanwata village<sup>49</sup>.</p> <p>The population trend of the species is increasing with about 230000 to 261000 individuals across the globe.</p>	<p>No quantitative data about the population of Demoiselle Cranes visiting the area of Project site is available. However, considering multiple sighting records available in the public domain, the AoI of the Project site is likely to support more than 0.5% (1150-1305 individuals) of the global population of the species during winter.</p> <p>In addition, Khichan IBA supports around 4000 to 10000 individuals of the species every winter. This crosses the threshold of 0.5% population (1150-1305 individuals). Thus, it can be safely concluded that the EAAA supports more than 0.5% of the global Demoiselle Crane population and more than 5 reproductive units.</p> <p><b>Demoiselle Crane is considered a Critical Habitat candidate. (Criteria 3 a)</b></p>

### 3.5 Conclusion

Several species of CR, EN, Endemic/Restricted Range and migratory/congregatory species were assessed against the critical habitat quantitative thresholds. Except four species namely Indian Vulture, Red-headed Vulture, Steppe Eagle, Saker Falcon, following species qualify as the critical habitat candidate species as provided in **Table 3.6**

**Table 3.6 Qualified Critical Habitat Candidate Species.**

Sn	Species Name	Critical Habitat triggered Criteria
1.	Great Indian Bustard (GIB) <i>Ardeotis nigriceps</i> IUCN CR	Criteria 1 a, c
2.	White-rumped Vulture <i>Gyps bengalensis</i> IUCN CR	Criteria 1, a, c
3.	Egyptian Vulture <i>Neophron percnopterus</i> IUCN EN	Criteria 1 a
4.	Demoiselle Crane <i>Anthropoides virgo</i> IUCN LC	Criteria 3a

<sup>46</sup> Ebird.org

<sup>47</sup> Rahmani, A.R., Islam, M.Z. and Kasambe, R.M. (2016) Important Bird and Biodiversity Areas in India: Priority Sites for Conservation (Revised and updated). Bombay Natural History Society, Indian Bird Conservation Network, Royal Society for the Protection of Birds and BirdLife International (U.K.). Pp. 1992 + xii

<sup>48</sup> <https://ebird.org/map/demcra1?neg=true&env.minX=71.22134045751146&env.minY=26.782069054444992&env.maxX=72.62759045751146&env.maxY=27.39461152467531&zh=true&gp=false&ev=Z&mr=1-12&bmo=1&emo=12&yr=all&byr=1900&eyr=2020>

<sup>49</sup> <https://ebird.org/checklist/S64812414>

## 4. BIODIVERSITY ACTION PLAN

A Biodiversity Action Plan (BAP) is required for projects located in critical habitat and is recommended for high-risk projects in natural habitats.

The BAP should described

1. the composite of actions and a rationale for how the project's mitigation strategy will achieve net gain (or no net loss),
2. the approach for how the mitigation hierarchy will be followed, and
3. the roles and responsibilities for internal staff and external partners.

The proposed three hybrid (Solar+Wind) projects (390 MW, 600 MW and 700MW) of the Adani Green Energy are located in Jaisalmer district of Rajasthan State. Based on the outcome of the Critical Habitat Assessment, a Biodiversity Action Plan (BAP) is being developed.

For a project in critical habitat, IFC Performance Standard 6 (PS6) requires that net gain is achieved for the biodiversity values for which critical habitat was designated. If the Project is found to be in critical habitat, the BAP must further demonstrate that:

- No other viable alternatives within the region exist for development of the Project on modified or natural habitats that are not critical;
- The Project does not lead to measurable adverse impacts on those biodiversity values for which the critical habitat was designated, and on the ecological processes supporting those biodiversity values;
- The Project does not lead to a net reduction in the global and/or national/regional population of any Critically Endangered or Endangered species over a reasonable period of time; and
- A robust, appropriately designed, and long-term biodiversity monitoring and evaluation program is integrated into the Project's management program

The purpose of this BAP is to set out the Project's mitigation and monitoring actions (through avoidance, minimization, restoration and – where necessary – offset of impacts) to achieve alignment with (PS6) and with other statutory or stakeholder requirements.

### 4.2 Priority Biodiversity Values

#### 4.2.1 Natural Habitat and Modified Habitat

The project is situated in a mosaic of natural and modified habitat. Two major habitat were identified in the area of influence (Aoi)

- Open scrub, grassland, sand dunes, rocky outcrops and inter-dunal planes: These habitats account for 3089.03 km<sup>2</sup> area, which comprises 82.3% of the Aoi. These habitats are delineated as Natural habitats as the native flora and fauna of the area are intact.
- Agricultural land: These habitat accounts for 665.60 km<sup>2</sup> area, which comprises 17.7% of Aoi. The agriculture in the majority of the Aoi is rainfed where single crop is grown. However, at some parcels irrigation is also being done using the underground water. These habitats are delineated as modified habitats as the native flora and fauna in the region are disturbed. The movement of fauna in these habitats are restricted due to the fencing.
- Some operational wind farms along with the associated infrastructures are present within the Aoi, though the area cannot be qualified as significant and merged within the agricultural land.

The map depicting the natural and modified habitats are presented in **Figure 3.3**.

### 4.2.2 Critical Habitats

The CHA determined that the Project is situated in Critical Habitat for the following priority biodiversity values as given in

**Table 4.1 Summary of Critical Habitat within the Project Area**

Feature	PS 6 Criteria	Rationale	Critical Habitat
Great Indian Bustard (GIB) <i>Ardeotis nigriceps</i> IUCN CR	Criterion 1	(a) Areas that support globally-important concentrations of an IUCN Red-listed EN or CR species ( $\geq$ 0.5% of the global population AND $\geq$ 5 reproductive units of a CR or EN species).	Yes
		(c) As appropriate, areas containing important concentrations of a nationally or regionally-listed EN or CR species.	Yes
White-rumped Vulture <i>Gyps bengalensis</i> IUCN CR	Criterion 1	(a) Areas that support globally-important concentrations of an IUCN Red-listed EN or CR species ( $\geq$ 0.5% of the global population AND $\geq$ 5 reproductive units of a CR or EN species).	Yes
		(c) As appropriate, areas containing important concentrations of a nationally or regionally-listed EN or CR species.	Yes
Egyptian Vulture <i>Neophron percnopterus</i> IUCN EN	Criteria 1	(a) Areas that support globally-important concentrations of an IUCN Red-listed EN or CR species ( $\geq$ 0.5% of the global population AND $\geq$ 5 reproductive units of a CR or EN species).	Yes
Demoiselle Crane <i>Anthropoides virgo</i> IUCN LC	Criterion 3	Area is known to sustain, on a cyclical or otherwise regular basis, $\geq$ 1 percent of the global population of the species at any point of the species' lifecycle.	Yes



## 4.3 Priority Biodiversity Values

### 4.3.1 Great Indian Bustard

The Great Indian Bustard (GIB) (*Ardeotis nigriceps*) is a Critically Endangered (CR IUCN v. 2020-2) with about 150 birds left in the world and no known breeding population outside India. The species is largely restricted to Jaisalmer/Thar landscape (Rajasthan) and very small populations in Kutch (Gujarat), Sholapur (Maharashtra), Ballari (Karnataka) and Kurnool (Andhra Pradesh).

It is accorded Schedule I protection in the Indian Wildlife (Protection) Act 1972 and is declared as the State Bird of Rajasthan. It is also listed in the CMS Convention, and CITES Appendix I, to both of which India is a signatory.

The GIBs are terrestrial birds with adult males as tall as 122 cm and 11-15 kg and adult females reach up to 92 cm and 4-7 kg. The plumage is predominantly brown and white, and adult males are characterised by thicker and whiter neck with black eyebrow.

#### 4.3.1.1 Distribution – Past and Present

Historically, Great Indian Bustard was distributed throughout the western half of India; from Punjab and Haryana in north to Tamil Nadu in south, and from Gujarat and Rajasthan in west to Orissa in east; spanning eleven states. The last three decades have seen a drastic reduction in the range occupancy of this species. In 1969, the population was roughly estimated at about 1,260 individuals<sup>50</sup> ranging over the western half of India, which sharply declined to 600 by 2000<sup>51</sup>. By 2010, the population had shrunk to 300, fragmented into eight small discontinuous groups<sup>52</sup>.

The current distribution is restricted to only five isolated pockets. According to the Wildlife Institute of India's (WII) Habitat improvement and Conservation Breeding of GIB Progress Report III (April 2018-March 2020), the largest population of 128 (19SE) birds occurs in Thar landscape of Rajasthan (Desert National Park in Jaisalmer alongside Jodhpur) with 50% of the population living in army-controlled grasslands near Pokhran that are relatively free of consumptive human uses but are used for artillery testing<sup>53</sup>.

The other populations are almost ecologically extinct with <10 birds each, occurring in Gujarat (Lala-Naliya Sanctuary and its neighbourhood in Kachchh), Maharashtra (GIB Sanctuary in Solapur, alongside Chandrapur and Nagpur), Andhra Pradesh (Rollapadu Wildlife Sanctuary and its neighbourhood in Kurnool) and Karnataka (Ballari)<sup>54</sup>.

#### 4.3.1.2 Habitat

GIB is a grassland bird and prefers semi-arid habitat flat open landscapes with minimum visual obstruction and fewer disturbances. The habitat studies have found that GIB typically uses arid-semiarid areas dominated by grasslands with 30–70 cm herbaceous height interspersed with short shrub and extensive agriculture. However, its habitat requirements may vary with season and behaviour<sup>55 56</sup>. In the non-breeding season, it vagrantly uses wide agro-grass-scrub landscapes.

<sup>50</sup> Dharmakumarsinhji RS (1971) Study of the great Indian bustard. Final report. WWF, Morges

<sup>51</sup> Rahmani 2012 - Rahmani, A. R. (2012) Threatened birds of India: their conservation requirements. Mumbai: Oxford University Press (for the Indian Bird Conservation Network).

<sup>52</sup> Dutta, S., Rahmani, A. R. & Jhala, Y. V. (2011) Running out of time? The great Indian bustard *Ardeotis nigriceps*—status, viability, and conservation strategies. *Eur. J. Wildl. Res.* 57: 615–625.

<sup>53</sup> Collar, Nigel & H.S. Baral, & Batbayar, Nyambayar & Bhardwaj, Gobind & Brahma, Namita & Burnside, Robert & CHOUDHURY, A. & Combreau, Olivier & Dolman, Paul & DONALD, P. & Dutta, Sutirtha & Gadhavi, Devesh & Gore, Kedar & Goroshko, Oleg & C, HONG & Jathar, Girish & Jha, Rohit & JHALA, Y. & Koshkin, Maxim & Kessler, Mimi. (2017). Averting the extinction of bustards in Asia. *Forktail*. 33. 1-26.

<sup>54</sup> Habitat improvement and conservation breeding of the Great Indian Bustard: An Integrated Approach, Annual Progress Report III, Wildlife Institute of India

Whereas, in the breeding season (summer and monsoon) it congregates in traditional undisturbed grassland patches which are characterized by a mosaic of less grazed relatively tall grass (less than 50 cm) preferred by nesting females for concealment, interspersed with well grazed short grass preferred by displaying males. It prefers sparse ground cover for roosting, moderately tall and dense vegetation for resting, and agro-grass mix with fruit resources for foraging<sup>55 56</sup>.

From the consultations, it has been learned that once the breeding season is over then birds migrate locally to the nearby areas to spend the winter. The birds make local and long distance nomadic movements in response to various factors, such as activity in firing range and abundant food resource in agricultural fields and community protected natural grassland/scrub habitat (Orans).

#### 4.3.1.3 Threats

As large birds of open grassland and dryland habitats, GIBs are attractive to hunters, both animals and humans. Research conducted by Dr. Rahmani (1989) and Dutta et al. (2010) show that GIB is a long-lived species with very slow reproductive rate – it lays one egg every 1-2 years, and the success rate of these eggs under ideal situation is around 60-70%. The nest predation by feral dogs and pigs has been suspected to be reducing productivity (Dutta et. al, 2013). Also, the lack of a hind toe (although an advantage for cursorial species) renders GIB incapable of perching on trees to escape ground predators.

Historically, GIB has been hunted as a game bird and its widespread hunting led to the decline in the number of individuals, which is later accelerated by current threats such as the habitat fragmentation, loss of grassland area, expansion of agriculture and infrastructure projects in bustard habitats and overhead power transmission lines.

#### Threat from Power Lines

Presently, the greatest threat faced by the species is fatal collision with overhead power transmission/distribution lines<sup>57</sup>. Altogether nine such fatalities have been recorded in the past decade, four in 2017, making power lines the single most serious threat to the survival of the species (Dutta 2018)<sup>57</sup>.

The bustards have eyes arranged for >300° vision to boost vigilance, which leads to reduced frontal vision that is necessary to see the power-lines ahead while flying between habitats (Martin & Shaw 2010)<sup>58</sup>. In addition to it, the heavy body of the bustard makes it difficult to maneuver wires when they are detected at the nick of the time. It has been noticed that most mortalities happen in low-light conditions such as twilight, when birds fly between foraging and roosting grounds<sup>58</sup>. The birds die after colliding with lines, mostly by the inconspicuous earth wire, or being electrocuted after bridging the two conducting phases. Furthermore, it has been observed that even well marked power lines cause fatalities, and effectively fragment habitat by causing birds to avoid their proximity (Silva et al. 2010)<sup>59</sup>. A GIB mortality map due to transmission line collision and electrocution is being presented in

**Figure 4.1.**

<sup>55</sup> Rahmani, A. R. 1989. The Great Indian Bustard. Final Report in the study of ecology of certain endangered species of wildlife and their habitats, Bombay Natural History Society, Mumbai, India.

<sup>56</sup> Dutta, Sutirtha & Rahmani, Asad & Jhala, Yadvendra. (2010). Running out of time? The great Indian bustard *Ardeotis nigriceps*—status, viability, and conservation strategies. *European Journal of Wildlife Research*. 57. 615-625. 10.1007/s10344-010-0472-z.

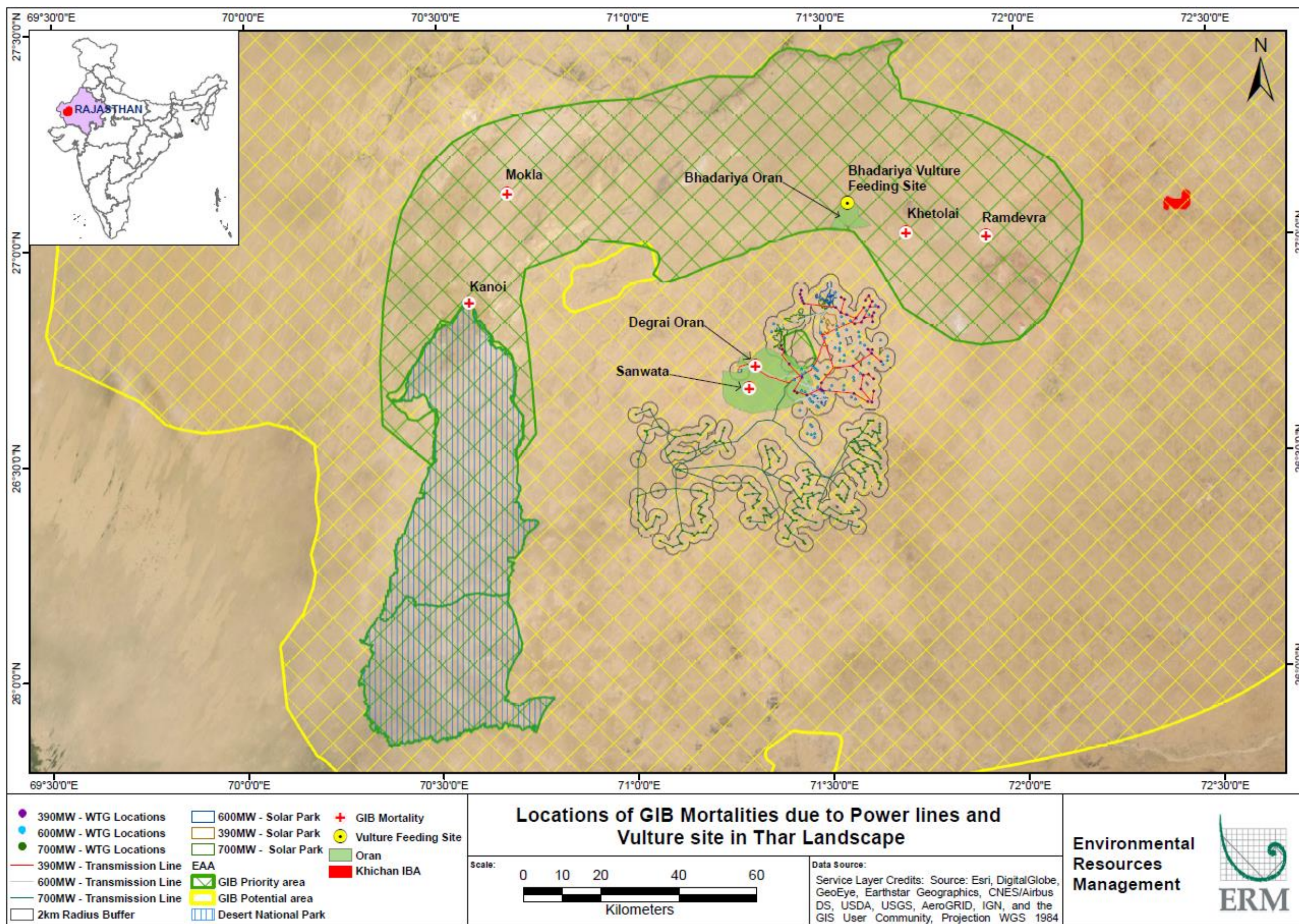
<sup>57</sup> Dutta, S. (2018) Bustard, wires, and the flight to extinction. [www.conservationindia.org/articles/bustard-wires-and-the-flight-to-extinction](http://www.conservationindia.org/articles/bustard-wires-and-the-flight-to-extinction)

<sup>58</sup> Martin, G. R. & Shaw, J. M. (2010) Bird collisions with power lines: failing to see the way ahead? *Biol. Conserv.* 143: 2695–2702.

<sup>59</sup> Silva, J. P., Santos, M., Queirós, L., Leitão, D., Moreira, F., Pinto, M., Leqoc, M. & Cabral, J. A. (2010b) Estimating the influence of overhead transmission power lines and landscape context on the density of little bustard *Tetrax tetrax* breeding populations. *Ecological Modelling* 221: 1954–1963.



Figure 4.1 Map showing Sacred Grooves (Oran), GIB Mortality locations and Vulture Roosting site





## Habitat loss

India's Revenue Department categorizes most bustard habitat under its jurisdiction as 'revenue wasteland'. A major threat today to bustard habitat is from its conversion to other land uses such as intensive agriculture and industry, along with their associated infrastructural developments. In the Thar Desert, Rajasthan, 75% of priority Great Indian Bustard conservation sites are outside protected areas, with most being 'threatened by hunting and unplanned land uses' (Dutta et al. 2014), whilst Mokla grassland (about 50 km<sup>2</sup>) in the 'GIB Arc' (Collar et al. 2015) has been converted to scrub by misguided planting of exotic *Acacia tortilis* (Collar et al. 2017).

In order to bring Thar landscape under the umbrella of Protected Area based conservation, a representative fraction (3162 km<sup>2</sup>) was notified as sanctuary (the Desert National Park or DNP) in early eighties. However, the park encompasses a mere proportion of the priority conservation areas and park authorities have control over only 4% of this area (in the form of enclosures), leaving the remaining habitat beyond the scope of management as this land is not owned by Forest Department<sup>60</sup>.

Furthermore, the agricultural expansion and intensification, involving mechanisation, year-round harvesting, reduced fallow periods, increasing use of pesticides, fertilisers and inappropriate crops, have depleted resources, destroyed habitat and increased disturbances with increased availability of water, agriculture has spread over vast arid-semiarid grasslands. For example, the Indira Gandhi Nahar Project has caused drastic changes and massive agricultural conversion in and around the Desert National Park. Moreover irrigation facilities and changing lifestyles have led to a shift in the crop pattern from bustard-friendly traditional monsoonal crops (Sorghum, millet etc.) to cash crops (sugarcane, grapes, cotton, horticulture etc.) which are not suitable for bustard. The invasion of grasslands by introduced mesquite *Prosopis juliflora* and conversion of grasslands to shrub/tree plantations have rendered former bustard habitats unsuitable (Dutta et. al, 2013)<sup>61</sup>.

### 4.3.1.4 Conservation Efforts

The conservation efforts for GIB has been going for long. In late 1980s the State Governments in India declared eight bustard Sanctuaries, with a belief that establishment of "Protected Areas" (PAs) might hold the best hope for saving the species. Most of these PAs were either too small, targeting traditional breeding patches following the preservationist approach or very large, covering entire agro-pastoral landscape inclusive even of large townships. Within these reserves, the recommendation was to maintain small, scattered (>100 to <500 ha) refuges with large buffers that should preferably be traditional breeding spots and protected during the breeding season to exclude cattle. Refuges were recommended to be managed so as to provide habitat requirements for crucial activities such as lekking, nesting, chick rearing, and foraging and could be rotated over the PA through ≥5-year periods (Dutta, 2010).

### Setting up of GIB Enclosures

Multiple enclosures have been developed by fencing certain areas with the aim of securing the breeding habitats of GIB. These enclosures are located within as well as outside the DNP Wildlife Sanctuary. The enclosures have been created over an area of 3527 Ha. in the periphery of Pokharan Field Firing Ranges (PFFR) at Ramdeora, Loharki, Guddi, Dudhsar and Rasla and Sudasiri near DNP. These areas are also called as satellite habitats of DNP Wildlife Sanctuary.

<sup>60</sup> WII and Rajasthan Forest Department Status Report of GIB in Thar, 2014

<sup>61</sup> Dutta, S., Rahmani, A., Gautam, P., Kasambe, R., Narwade, S., Narayan, G., and Jhala. Y. 2013. Guidelines for State Action Plan for Resident Bustards' Recovery Programme. The Ministry of Environment and Forests, Government of India. New Delhi.



### *Habitat Improvement and Conservation Breeding of Great Indian Bustard project*

The Ministry of Environment, Forest & Climate Change (MoEF&CC) formulated the National Bustard Recovery Plans in 2013 based on scientific consultation, and initiated the Project “Habitat Improvement and Conservation Breeding of Great Indian Bustard” in 2016 with the Wildlife Institute of India (WII) as the nodal agency along with State Forest Departments and partner NGOs as collaborators. This project aims at recovering the species from extinction through holistic approach of conservation breeding, applied research, outreach and pilot habitat management.

As per the report from WII for above-mentioned project, for Conservation breeding, two Breeding Center are established at Sorsan, Baran District and Ramdevra, Jaisalmer District. Since the Satellite Conservation Breeding facility at Ramdevra had to be built *de novo* and would not be completed before the GIB breeding season in 2019, a temporary breeding facility was developed from an existing building to utilize the breeding season of 2019 at Sam, Jaisalmer that currently houses ten GIB chicks reared from wild collected and artificially hatched eggs.

### *GIB Area Delineation and Power line mitigation*

Management Plan of Desert National Park confirms majority of the records of the Great Indian Bustard (GIB) in the state of Rajasthan are spread over a landscape of largely unprotected land forming an arc extending from northern part of Desert National Park towards Salkha and Mokla villages to the north and in the east to the extensive dry savannah controlled by Indian Armed Forces and used for artillery testing near Pokhran. Based on the long-term surveys of GIB movement and presence in Rajasthan, the Wildlife Institute of India has categorised this landscape into GIB Conservation Priority Area and GIB Potential Area<sup>62</sup> to target high priority areas for immediate conservation actions<sup>63</sup>. The priority area and potential area identified in Rajasthan spans ~13,100 km<sup>2</sup> and ~ 78,500 km<sup>2</sup>. As suggested by the WII, priority areas are intensively used by GIB and thus all power lines in this area have to be underground or disallowed. While the surrounding potential area require mitigation measures such as installation of bird diverters. Based on the findings of WII, the National Green Tribunal in order dated 11 July, 2019 has stayed installation of new wind turbines in GIB habitats in the arc and recommended laying down underground power lines in place of overhead transmission lines in and around GIB habitat. According to the order, the Power companies have been mandated to install bird diverters on power lines, samples of which have been supplied by the Wildlife Institute of India to power companies and are being tested on a pilot basis.

### **Bustard Movement in the Landscape**

Based on the consultations undertaken with multiple stakeholders in this area including Wildlife Institute of India, researchers, forest officials, local experts and wildlife enthusiasts and community members, the general pattern of GIB movement and the probable population of the species in Thar landscape was understood as following key points:

- Thar landscape harbours 128 (SE(19)) individuals of the species;
- There are two sub-populations of the species in this landscape, one restricted to the northern part of Desert National Park (DNP) and another to the eastern part of the Priority area in Pokhran Field Firing Range and Ramdevra;
- Eastern subpopulation constitutes roughly of about 2/3<sup>rd</sup> of the Thar population, while remaining 1/3<sup>rd</sup> resides inside DNP;

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<sup>62</sup> Jhala, Y. V., Dutta, S., Karkarya, T., Awasthi, A. Bipin, C.M. et al. 2020. Habitat improvement and conservation breeding of the Great Indian bustard: and integrated approach. Progress Report April 2018-March 2020. Wildlife Institute of India, Dehradun 248001, India. | TR/2020/03

<sup>63</sup> Habitat improvement and conservation breeding of the Great Indian Bustard. Annual Progress Report II. Wildlife Institute of India.

- During hot summer months, the GIBs prefer areas with less disturbance and with availability of water and thus stay inside the firing range and habitats in the priority area;
- While in winters, they move out of the firing range and priority area and disperse the entire landscape in the south;
- Around 15 birds are believed to be disperse in the landscape south to the priority area (Pokharan Field Firing Station);
- The birds are not restricted to the Priority area and move long distances specifically during winter months in search food, less disturbed habitats and following their instincts and traditional habitats/sites;
- The enclosures created by forest department are used by the bird mostly for breeding purpose and moves out to grassland/agricultural landscape post breeding;

### 4.3.2 White rumped Vulture (WRV)

White rumped Vulture (*Gyps bengalensis*) is an Old World vulture native to South and Southeast Asia. It has been listed as Critically Endangered on the IUCN Red List since 2000, as the population severely declined. White-rumped vultures die of kidney failure caused by diclofenac poisoning<sup>64</sup>. In 2016, based on the available recent estimates, the recent global population was estimated at less than 6000-8,600 mature individuals<sup>65</sup> which is declining. This species qualifies as Critically Endangered because it has suffered an extremely rapid population decline primarily because of feeding on carcasses of animals treated with the veterinary drug diclofenac.

The last estimates available from Jaisalmer district of 2005<sup>66</sup> suggest presence of 40 individuals of WRV.

#### 4.3.2.1 Distribution:

The species is distributed in the countries such as Pakistan, India, Bangladesh, Nepal, Bhutan, Myanmar, Thailand, Laos, Cambodia and southern Vietnam.

#### 4.3.2.2 Description

This vulture builds its nest on tall trees often near human habitations in northern and central India, Pakistan, Nepal, Bangladesh and southeast Asia, laying one egg. Birds form roost colonies. The population is mostly resident. Like other vultures it is a scavenger, feeding mostly on carcasses, which it finds by soaring high in thermals and spotting other scavengers. It often flies and sits in flocks. 15 years before, it was the most common vulture in India<sup>67</sup>.

During consultations with the experts and individuals involved in the conservation, it was informed to the ERM team that the species numbers have significantly gone down, but still can be seen on cattle carcasses.

#### 4.3.2.3 Threats

Apart from mortality due to drug, the species is under threat of collision with every increasing wind turbines as well as increasing associated infrastructures like transmission lines (internal as well as external) in the entire landscape.

<sup>64</sup> BirdLife International (2017). "Gyps bengalensis". IUCN Red List of Threatened Species. 2017: e.T22695194A118307773

<sup>65</sup> <https://save-vultures.org/wp-content/uploads/2020/02/Vulture-policy-brief-India-Feb-20-updated-3.pdf>

<sup>66</sup> Chhangani, A. (2009). Status of vulture population in Rajasthan, India. Indian For. 135. 239-251.

<sup>67</sup> Rasmussen, P. C.; Anderton, J. C. (2005). Birds of South Asia: The Ripley Guide. Volume 2. Smithsonian Institution and Lynx Edicions. pp. 89–90.

#### 4.3.2.4 Conservation Effort

Based on the discussion with the Forest Department, Wildlife Institute of India and the local organizations and individuals, though there is presence of the species in the landscape, the population is not monitored through census. Forest Department's annual census of the waterholes also, do not emphasize of the species counting. As no additional programme is currently active in the landscape for the conservation of species, a detail conservation plan is thus required.

#### 4.3.3 Egyptian Vulture (EV)

Egyptian Vulture (*Neophron percnopterus*) is a small Old World vulture and the only member of the genus *Neophron*. It is widely distributed from the Iberian Peninsula and North Africa to India. The contrasting underwing pattern and wedge-shaped tail make it distinctive in flight as it soars in thermals during the warmer parts of the day. Egyptian vultures feed mainly on carrion but are opportunistic and will prey on small mammals, birds, and reptiles. They also feed on the eggs of other birds, breaking larger ones by tossing a large pebble onto them.

No India level estimates are available however, the population has declined by > 90%. Global estimates according to the IUCN Red List Assessment, the population of this species is declining, with the current population size estimated at 12,000-38,000 individuals.

Local estimate of the Jaisalmer region is around 2000 mature individuals through unconfirmed sources. The CHA team have sighted more than 100 individuals from the EAAA.

The threat to its persistence comes from breeding habitat disturbance due to large-scale agriculture and other human encroachments such as hunting using ammunition and illegal poisoning. Adult mortality is also high due to the ingestion of highly toxic NSAID diclofenac when foraging on carcasses (BirdLife International, 2019).

The contrasting underwing pattern and wedge-shaped tail make it distinctive in flight as it soars in thermals during the warmer parts of the day. Egyptian vultures feed mainly on carrion but are opportunistic and will prey on small mammals, birds, and reptiles. They also feed on the eggs of other birds, breaking larger ones by tossing a large pebble onto them.

The threats and conservation efforts are similar to those of WRV.

#### 4.3.4 Demoiselle Cranes

Every year, thousands of Demoiselle Cranes visit wintering grounds in India. The species starts arriving during late August and stays until March. It disperses in the landscapes of Rajasthan and Gujarat in large numbers and occupies the entire Thar landscape. Flocks of hundreds of bird have been reported in this area.

Khichan, which is a part of EAAA, is an Important Bird Area known for very high activity of wintering Demoiselle Cranes. It has been selected as an IBA because it holds more than around 4-10% of the wintering population of Demoiselle Cranes. These birds have been traditionally visiting this site since last 150 years as they are fed by the local community at a feeding site.

There are many recent (2019, 2020) sightings of the species ranging from 3000 to 8000 birds from Khichan IBA reported on ebird.org. Congregations of approx. 800 birds have also been reported from and around the Aol of the Project site near waterbodies in Sanwata village. Other waterbodies in the area also

The population trend of the species is increasing with about 230000 to 261000 individuals across the globe. No quantitative data about the population of Demoiselle Cranes visiting the area of Project site is available. However, considering multiple sighting records available in the public domain, the Aol of the Project site is likely to support more than 0.5% (1150-1305 individuals) of the global population of the species during winter.

In addition, Khichan IBA supports around 4000 to 10000 individuals of the species every winter. This crosses the threshold of 0.5% population (1150-1305 individuals). Thus, it can be safely concluded that the EAAA supports more than 0.5% of the global Demoiselle Crane population and more than 5 reproductive units. No conservation efforts were visible in the project Aol.

#### 4.3.4.1 Threats

The project Aol is part of the foraging areas of Demoiselle Cranes. The project Aol has existing transmission line network, which is expected to increase post project. This will pose a risk of collision and electrocution to the species due to energized transmission lines.

### 4.4 Potential impacts on priority biodiversity values

The manner in which the Project could potentially impact on priority biodiversity values is explained in **Table 4.2**.

**Table 4.2 Potential Impacts**

Priority Biodiversity Values	Impacts	
Great Indian Bustard (GIB) <i>Ardeotis nigriceps</i> IUCN CR	<b>Habitat Loss:</b> GIB movement in the project Aol was confirmed in several stakeholder consultations. An unconfirmed estimate of 15 individuals of GIB is likely to be present within the Project Aol. Project is likely to impact the foraging areas of the GIB. The Aol in past was known to be nesting sites for GIB.	<b>Mortality due to collision:</b> A recent mortality of a female GIB on Sept. 16 <sup>th</sup> 2020 near the PGCIL Substation Fatehgarh-II confirms its presence in the landscape and the species use of the landscape. With the increased overhead transmission line infrastructure. Of the total population of GIB 15% annual death are accounted due to collision with the transmission line against natural death rate of 4-8%. The flight height of GIB also falls under the potential collision risk zone (Rotor swept area) of WTG. WII's research has shown that power lines, particularly high voltage (33-440 KV) transmission lines with vertical alignment are the biggest threat to GIB as of now. Since 2017, there are 6 known mortality of GIB due to collision
White-rumped Vulture <i>Gyps bengalensis</i> IUCN CR	<b>Mortality due to Electrocution:</b> The two Vulture species are under risk of electrocution from the transmission lines, when the species body parts such as wings etc. comes in direct contact of two phased wire. There are ample incidents shared by the locals	<b>Mortality due to Collision:</b> The two vulture species are also under risk of mortality due to collision with wind turbine as well as transmission line.
Egyptian Vulture <i>Neophron percnopterus</i> IUCN EN		
Demoiselle Crane <i>Anthropoides virgo</i> IUCN LC	<b>Mortality due to Electrocution and Collision:</b> Demoiselle Crane usually fly in small to large groups. With the increased	<b>Loss of Habitats:</b> Since the Demoiselle Crane usually roost around a waterbody. The unplanned



Priority Biodiversity Values	Impacts	
	obstrucles like transmission line and WTGs the risk of mortality due to collision and electrocution increases.	infrastructure around these waterbodies such as transmission line

## 4.5 Avoidance, minimisation and restoration

Mitigation measures to avoid and/or minimize impacts on the priority biodiversity values in Critical Habitat are listed and discussed in **Table 4.3-**

**Table 4.3 Avoidance, Minimization and Restoration**

Priority Biodiversity Values	Avoidance	Minimization	Restoration
Great Indian Bustard (GIB) <i>Ardeotis nigriceps</i> IUCN CR	<p>The Solar and Wind Project layout should avoid all areas of Priority GIB habitat identified by WII eg. Area surrounding Raasla GIB Enclosure). Any transmission lines passing through the priority GIB habitats such as open scrub, grassland and barren gravel patch which are nesting sites of GIB should be underground; and bird flight diverter (BFDs) should be installed in all areas of the project falling in GIB potential areas.</p> <p>In case any sensitive transmission line areas are later identified though monitoring where the BFDs are installed in the GIB Potential Area, those lines will be converted to underground TL Line</p>	<p>A site-specific Construction Environmental Management Programme (CEMP) to be prepared and implemented, which gives appropriate and detailed description of how construction activities must be conducted. All contractors have to adhere to the CEMP and apply good environmental practice during construction. This should include the following:</p> <ul style="list-style-type: none"> <li>Construction activity is restricted to the immediate footprint of the infrastructure, and in particular to the proposed road network;</li> <li>Construction of new roads is only considered if existing roads cannot be upgraded;</li> <li>Measures are implemented according to best practice to curb noise and dust.</li> </ul> <p>The Contractor HSE Officer oversees activities and ensure that the CEMP is implemented and enforced. All contractors have to apply good environmental practice during construction. This includes the following:</p> <ul style="list-style-type: none"> <li>The minimum footprint areas of infrastructure should be used wherever possible, including road widths and lengths;</li> <li>No off-road driving;</li> <li>Existing roads and farm tracks should be used where possible;</li> </ul>	<p>Following construction, restoration of all disturbed areas (e.g. temporary access tracks and laydown areas) must be undertaken to restore them to their pre-construction state.</p>
White-rumped Vulture <i>Gyps bengalensis</i> IUCN CR	<p>A detailed Carcass Management Plan should be prepared and implemented. If any Cattle Carcass is detected, it should be immediately relocated to an area away from the WTG and transmission line infrastructure. A network of livestock grazers should be identified which will inform the Carcass Disposal Unit about presence of a Carcass. Every carcass of the project area should be disposed within 2 days. The nearest Carcass disposal site is at Bhadariya Village.</p>	<p>Turbine management (shutdown on demand - SSoD) should be implemented to minimise the risk of Vultures colliding with a wind turbine through the feathering the blades or shutdown on demand. (i.e. stopping the rotors when a vulture moves through the site). Human observers of approx. 10-15 nos. will trigger the shutdown, with a supervisor, who will be responsible for the implementation of SSoD.</p> <p>Ten Vantage points (from watch towers) with a radius of 1-2 km radius will be identified from monitors, working in pairs and in shifts, will scan the landscape during daylight hours for approaching Vultures and other species of conservational significance eg. GIBs. The radius is based on the distance at which a large bird such as a raptor or vulture can be identified reliably, with enough time for a turbine to be stopped before the bird enters the danger zone. This needs to be more focused in the 390MW and 600 MW project sites</p>	<p>Large and old grown trees should be retained and restored which provide roosting as well as nesting sites to the vulture species. Only the essential un-avoidable trees should be felled with proper approvals in place. (Eg. Khejri (<i>Prosopis cineraria</i>) is a protected species in Rajasthan with a State Tree designation.)</p>
Egyptian Vulture <i>Neophron percnopterus</i> IUCN EN			
Demoiselle Crane <i>Anthropoides virgo</i> IUCN LC	<p>A setback of 2 km from the waterbodies should be maintained for any planned infrastructure such as Wind Turbine and Transmission line</p>	-	<p>All waterbodies, if affected during the construct should be restored before start of September months back to its natural</p>

## 4.6 Measures designed to achieve net gain for priority biodiversity values

The measures listed below are aimed at achieving biodiversity net gain as per the requirements of PS6 for the biodiversity values for which the Critical Habitat has been designated.

### 4.6.1 Habitat Improvement and Creation of New Habitat

Following activities should be implemented;

- GIB habitats equivalent of the solar project sites outside the project area in the available similar landscape should be undertaken in confidence with the forest and wildlife department and the landowners in the identified areas. This should be targeted to achieve in 3-5 years time.
- Strengthen the existing GIB Enclosures (Raasla, Guddi and Ramdevara) by providing financial assistance to State Forest and Wildlife Department
- Facilitate alien species clearing and management, watercourse restoration, erosion control (sheet and gully erosion), grazing management (through fencing) in the identified area through forest department;
- A survey of all the existing powerlines in the Aol to establish a baseline for current mortality, and to identify high-risk sections of power line. Similar exercise will be required in the operational phase for comparison of adequacy of suggested mitigation.
- High-risk sections will subsequently be marked with WII approved bird flight diverters (BFDs). This should be followed by regular inspections to assess the effectiveness of the BFDs. This action is expected to reduce mortality of GIB, Vultures and Demoiselle Cranes on power lines, and thus secure a net gain outcome for this species.
- Predator (Feral Dogs) control and management program should be financially assisted in confidence with the forest department and all the such predators should be relocated to areas far away from GIB habitat
- Vulture feeding sites away from the project area should be identified and further developed as Vulture restaurant.

### 4.6.2 Research Planning

A research workshop should be initiated in the GIB area answering Specific research questions

- Which agricultural practices are most beneficial to the species?
- What is the breeding success of the species through-out its range in different habitats?
- How effective are formally protected areas in conserving the species?
- What are the impacts of terrestrial predators on the breeding success in artificial pastures?

Based on the outcomes of the workshop, the Project intends to support a focused programme of agreed priority research. If this results in concrete recommendations for conservation measures, the Project will support a conservation management programme at an appropriate scale to achieve net gain for this species.

## 4.7 Monitoring and Evaluation

A Biodiversity Monitoring and Evaluation Plan (BMEP) is suggested below for construction and operation phase for monitoring and evaluation. (Refer **Table 4.4**)

**Table 4.4 Biodiversity Action Monitoring and Evaluation Plan Construction and Operation Phase**

S.N.	Required Mitigation	Responsible Person for Ensuring Action Implementation	Means of Verification That Commitment Has Been Met	Monitoring / Inspection / Spot Check Parameters				KPIs
				Timing and Frequency of Monitoring	Parameters	Location	Reporting Requirements	
A	GIB Habitat Loss							
1.	Habitat Improvement by identifying areas and developing them as GIB Enclosure area by fencing and controlled grazing	Corporate HSE with Assistance from Site HSE	Physical Verification supported by Satellite Imagery of regular intervals	Twice in a year Pre Monsoon and Post Monsoon	Visible Habitat Condition	Area identified by Forest Department between Project sites and Priority areas	Access records and incident reports maintained	Acceptance of the improved habitat
2.	Underground transmission conductor in Priority GIB Habitat	Corporate HSE with Assistance from Site HSE	Physical verification	One time	Not Applicable	Internal and External Transmission Route	Report completion	Undergrounding of transmission line in identified GIB Habitat
3.	Installation of Bird Diverters outside GIB Habitat	Corporate HSE with Assistance from Site HSE	Physical verification and inspection	Six Monthly	Physical Condition of Diverter, note of wear and tear	Internal and External Transmission Route	One time on completion of Task then six monthly inspection report	Marked reduction in Collision and Electrocution incidents
B	Electrocution and Collision of Vulture species							
1.	Habitat Restoration by retaining the mature old grown trees	Corporate HSE with Assistance from Site HSE	Physical Verification and Marking	One time	Not applicable	Location identified based on land inspection	Report of Trees with GPS location to be retained	Retained trees
2.	Cattle Carcass Management	Corporate HSE with Assistance from Site HSE	Implementation Report of Cattle Carcass Management Plan	Three Monthly	No. of Carcass disposed	Within Aol	Number of Cattle carcass disposed	Reduce mortality of Vultures
3.	Underground transmission conductor in GIB Habitat(Repeat from A-2)	Corporate HSE with Assistance from Site HSE	Physical verification	One time	Not Applicable	Internal and External Transmission Route		
4.	Installation of Bird Diverters outside GIB Habitat (Repeat from A-3)	Corporate HSE with Assistance from Site HSE	Physical verification and inspection	Six Monthly	Physical Condition of Diverter, note of wear and tear	Internal and External Transmission Route	One time on completion of Task then six monthly inspection report	Marked reduction in Collision and Electrocution incidents
C	Electrocution and Collision of Demoiselle Crane							
1.	Restoration of Waterbodies channelling of rainwater and maintenance	Corporate HSE with Assistance from Site HSE	Physical Verification	Six Monthly	Visible Condition, Photographic evidence	At suitable traditionally located locations	One time post completion	
2.	Underground transmission conductor in GIB Habitat(Repeat from A-2)	Corporate HSE with Assistance from Site HSE	Physical verification	One time	Not Applicable	Internal and External Transmission Route	One time	
3.	Installation of Bird Diverters outside GIB Habitat (Repeat from A-3)	Corporate HSE with Assistance from Site HSE	Physical verification and inspection	Six Monthly	Physical Condition of Diverter, note of wear and tear	Internal and External Transmission Route	One time on completion of Task then six monthly inspection report	Marked reduction in Collision and Electrocution incidents



## 4.8 Conservation Action Administration

Administration and management of the Conservation Action/Mitigation Action will require the establishment of an administrative framework with the key objectives of:

- Implementing conservation actions;
- Providing funding;
- Monitoring and evaluation;
- Ensuring that outcomes are assessed and success/failure reported upon; and
- Resolving disputes between stakeholders.

An outline of the administrative arrangements proposed are below.

### 4.8.1 Conservation Action Management Committee

AGEEL is to facilitate the creation of a management committee consisting of:

- AGEEL Staff (Chair)
- Forest Department Representative
- Community Representative
- External conservation expert and/ or NGO, for Example:
  - Wildlife Institute of India.
  - Bombay Natural History Society
  - Local NGOs and Individuals

The role of the management committee is to oversee the implementation of management actions in this Plan. The committee is to:

- Provide strategic advice on the conservation actions contained in this Plan;
- Provide recommendations on the monitoring and evaluation framework;
- Review reports on progress in implementing this Plan;
- Recommend and approve changes in management actions and expenditure;
- Prepare the 5 yearly review of the Plan; and
- Resolve any disputes with the community and other concerned parties.

### 4.8.2 Tenure of Members

The tenure of members of the management committee is to be reviewed at years 2.5 and 5 yearly thereafter to enable sufficient time for the committee to oversee implementation of one 5 yearly review. The review process can occur during the mid-point of two reviews, enabling efficient use of the committee's time and to manage workload during the member's tenure.

### 4.8.3 Meeting frequency

It is recommended that meetings be initially held on a bi-monthly basis for the first 8 months, followed by 6 monthly meetings thereafter. More frequent meetings may be employed during review and/or tendering processes. Meetings frequencies may vary over the 20 year implementation timeframe.

### 4.8.4 Cost of Action Plan

The proposed cost for implementation of Action Plan which are discussed above are presented in the **Table 4.5**

**Table 4.5 Cost of Implementation of the Action Plan**

S No.	Activities Recommended	Cost in INR for 5 Years
<b>1</b>	<b>Habitat Improvement</b>	
1a	Habitat Restoration and Creation of New Habitat of GIB in consultation and coordination of the Forest Department and Local Villagers Plantation of Native Grasses Boundary wall, Gates and Watch Tower	INR 25 Lakhs/100 Ha. INR 5 Lakhs
1b	Habitat Improvement for GIB and other species Cost of Watch Towers (10 Nos.) Cost of Bird Watchers (10 Nos.)	INR 4 Lakhs/Tower INR 90,000/Months (Sept-March)
1c	Restoration of Mature Old grown trees Survey of Old Grown Trees	INR 5 Lakhs/Project
1d	Restoration of water bodies for Demoiselle Cranes Cost per waterbodies (Target 10 Nos)	INR 5 Lakhs/Waterbodies
<b>2</b>	<b>Collision and Electrocution Reduction</b>	
2a	Undergrounding of Transmission Lines	Survey is undergoing Cost will be estimated by Company based on outcomes of Survey
2b	Installation of Bird Flight Diverters (BFDs) for 120 km Approx line Cost of 1Km (Local BFDs) Implementation of Carcass Management Plan (2 Sites)	INR 3 to 5 Lakhs/Km INR 10 Lakhs/Site
<b>3</b>	Cost of Monitoring and Evaluation (Pre-Construction & Post Operation)	INR 30 Lakhs for Five years

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## **APPENDIX A       MINUTES OF CONSULTATION**

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## **Consultation #1**

**Telephonic Consultation:** Assessment of GIB and Vulture movement in the landscape and Proposed Hybrid Power Project, Jaisalmer, Rajasthan as per IFC Performance Standard (PS) 6

Date: 8<sup>th</sup> October 2020 Time 03:35 pm

Attendees:

WII – Mr. Bipin C.M.

ERM – Dr. Rahul Srivastava, Suhas Fuladi and Kritika Gautam

### **Key Points:**

*Rahul: We are doing a Critical Habitat Assessment for a renewable power company, which is coming up with three hybrid (solar and wind) 1500 MW power projects in Jaisalmer area. Two of them are very close to Rasla enclosure and another one is located on further south. So we wanted to understand the movement of GIB as WII has been working since 2014 in this landscape. Can you explain from your experience how these GIBs move along this landscape?*

Bipin: Based on our work, we have developed maps of priority and potential areas of GIB in the Thar landscape. There are two clusters or sub-populations of GIBs that intensively use the priority area. However, birds also keep moving between the sub-populations and in the surrounding landscape through the delineated potential area. Bird occurrence and movement have been recorded in and around Rasla enclosure, as it falls between the two sub-populations in the southern side. Power projects and related infrastructure should be avoided in the priority area to minimize adverse impacts on GIB in their intensive usage. Infrastructure in the potential area should be carefully planned and effectively mitigated to reduce impacts during occasional bird movements.

*Rahul: Does all the movement that you have recorded fall within the potential area?*

Bipin: We have recorded more intensive movements within the priority area and some movements in the potential area. These zonations are to guide conservation planning, but are not hard boundaries for the birds. Birds move in and out between the priority and potential areas. They can also cross long distances covering over 1000 km and can even fly to Pakistan or other range states.

*Rahul: During WII's survey, was it observed that the eastern sub-population in the GIB arc further moves into Ramdevra, Rasla, or Guddi enclosures? Have you seen any pattern in the movement of the species in terms of numbers?*

Bipin: For your question regarding birds inside Pokhran field firing range, the reason why the birds are using the firing range is that it has minimum disturbance in there. The firing range is 3000 to 4000 km<sup>2</sup> area and the firing does not happen all over the place. There are limited areas wherein firing happens. And even though there is a presence of a lot of shepherds and livestock inside the firing range, there is no infrastructure development inside. So birds are using it as a refuge. And it is the last refuge that is left in this area because everything else around has changed. It is not that the birds are going inside as you mention. Birds have been and are using the range and more so recently since there is very less natural habitat left for them in the larger landscape without intensive agriculture, infrastructure development and other anthropogenic disturbances. So it is not the disturbance inside due to which birds come out of the range as you mentioned, it is the disturbances outside the firing range due to which birds keep moving inside the range.



Our research has found GIB usage in Ramdevra, Rasla and Guddi enclosures, and also movement of birds between the eastern subpopulation and Ramdevra enclosures. These are traditional areas of the bird and were developed as enclosures earlier based on regular bird sightings. But now there is a lot of infrastructure in between these enclosures that are hindering movements and even killing birds in the process. It is not that the birds are just moving through these enclosures, they use them regularly, as these are part of the GIB habitat. Habitat requirements of the species as well as the food availability in desert landscape change with season, requiring the birds to move locally as well as over long distances.

*Rahul: We have got a number of 128 ( $\pm$  19) birds from the forest department. Have you observed that the sub-population residing in the Pokhran firing range interacts with the sub-population in DNP?*

Bipin: The priority landscape was delineated based on the areas used by the birds and their movement in between those areas. Bird usage is concentrated in the two corners of the priority area (sub-populations or clusters) and bird movement and presence have been recorded in the intervening space. These birds fly/walk on average 20 km in a day and the distance between two sub-populations is only ~ 50 km. The priority area could be seen as two rich wildlife areas with a corridor which allows movement, mixing and to propagate in a GIB friendly habitat.

*Rahul: If we break down this figure of 120 birds, do you think that Rasla receives a good number of GIB? We talked to locals and came to know that 40-50 individuals are there in the firing range and Ramdevra area and during winter, they move further south. Do you agree with these numbers and their movement further south? If yes, how many birds do you think should be moving in the landscape of our proposed Project site?*

Bipin: Wildlife survey methods are based on sampling and statistical estimation that provide a likely estimate of numbers with a range of uncertainty, based on assessment using latest scientific methods and not on anecdotal information. Our latest estimate of GIB population size was 128 (SE 19) birds. Roughly speaking, 2/3<sup>rd</sup> of the estimated population is on the eastern side of the priority area and 1/3<sup>rd</sup> is on the western side with individual birds moving between them and beyond.

It is difficult to say how many birds from Pokhran Field Firing Range will move into Rasla as that would depend on the food resource availability and other biological requirements of the species that change between seasons and years. Even if 1 bird moves in, it will be nearly 1% of the global population and therefore qualify as a critical habitat as per global criteria.

The movement of birds depends on its biology and upon the availability of certain resources. In summer, we have observed sometimes that they move from the northern part of the firing range to the southern parts. So seasonal movement is there based on the availability of specific food resources. We also have got some reports of the bird sighted near Jodhpur and Ajmer area. So if resource depletion happens in this particular area, the birds can move that far as well. These are large-bodied birds and capable of flying long distances. They definitely move and at some time or the other one bird or the other will be moving back and forth and recent GIB mortality near Rasla area could have happened when the bird was moving locally. We are still trying to figure out how far they move on to the south of the priority area. We are getting information from the radio-tagged birds. But as of now, we have tagged only GIB females in Thar and earlier studies in Maharashtra have revealed that males move longer distances than females. So it will be premature to conclude based on the data collected from just female birds. But yes, tagged females are moving beyond the priority area and reside outside too.

*Rahul: Based on the conditions such as drought, resource depletion, or any other disturbance, can the species move any further south?*

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Bipin: In arid and desert conditions, the weather is not very predictable and the resource distribution is very patchy. So the birds have to move across the landscape in search of resources. They can easily move around 100 km and further south. Birds do not move just due to the disturbance or the factors mentioned by you, it also moves because of its biology and genetic wiring.

*Rahul: Are you also studying the locations of these power projects and their impacts on the species?*

Bipin: The mitigations coming from the ministry and identification of the GIB areas is based on our study itself. Around 90,000 birds of various species die due to power lines in 4000 km<sup>2</sup> area where we have conducted this study in this landscape. And for GIB, a mortality of 15% of the population has been estimated due to the power lines in western Thar. Two tagged birds have died from power line collisions. If this continues, GIB extinction is inevitable within next 20 years.

*Rahul: The common recommendations are the undergrounding of power lines for priority areas and installing bird diverters in the potential area. So we want to understand that, in the potential area, if the power lines are not being put underground, how effectively the bird diverter mitigation is working in your experience?*

Bipin: Although undergrounding is the ideal solution, due to the technological and financial reasons, installing bird diverters in potential areas was recommended. Diverters have been installed in many countries with bustards (related to GIB) that have reduced mortality. Literature on multiple bird species (not just bustards) show that diverters can reduce mortality by 50-70% but the exact effectiveness depends on the species, model and area in question. However, it would be ideal if power agencies can underground cables in the potential area too.

*Rahul: As GIBs have a poor frontal vision, how good this mitigation do you think is?*

Bipin: Multiple studies have revealed that bird mortality can be reduced by about 50-70% by installing bird diverters on the power lines. If we consider GIB, an estimated 18 birds annually die due to collision with power lines in Thar. If this global average fits GIBs, then 9-10 birds can be saved annually. However, exactly what proportion of GIB collisions can be avoided with diverters is difficult to conclude at this stage, and it is ideal to have all power lines undergrounded.

*Rahul: How frequently the GIB status survey is conducted?*

Bipin: These surveys were carried out every year from 2014 until 2018. We were planning to do a survey this year as well, but it got delayed due to the pandemic.

*Rahul: Can you please explain, why cannot every GIB in the landscape be tagged?*

Bipin: Tagging a reasonably large sample of birds is sufficient for understanding the species' ecology. Tagging all individuals may not be practical because: a) finding all individuals of a rare, critically endangered bird is nearly impossible, b) there are certain risks associated with capturing birds, c) the permitting authority limits the issues of permissions particularly for such critically endangered species, and c) the available funds are often not enough.

*Rahul: Is there any study about Vultures that WII has conducted or currently doing in this landscape?*

Bipin: There is no study going on about Vultures in this landscape as of now.

*Rahul: One last question, WII is involved in captive breeding of GIB, and as they need good habitats, what is the plan of releasing these birds?*

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Bipin: That is why the areas inside and beyond the priority areas need immediate mitigations starting now as recommended by us. The habitats have to be secured for GIBs and the entire policy and regulations whatever are coming is for this purpose.

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## **Consultation #2**

**Telephonic Consultation:** Assessment against International Finance Corporation (IFC) Performance Standard (PS) 6 of a Proposed Hybrid Power Project, Jaisalmer, Rajasthan

Date: 17<sup>th</sup> October 2020

Time 12:10 pm

Attendees:

ERDS Foundation –Dr. Sumit Dookia

ERM – Dr. Rahul Srivastava and Kritika Gautam

### **Key Points:**

*Rahul: We are doing a Critical Habitat Assessment of Adani's hybrid power project (solar and wind) of 1500 MW in Jaisalmer area, against International Finance Corporation (IFC) Performance Standard (PS) 6. We want to know what role your organization (ERDS Foundation) is playing in the landscape and what are its objectives?*

Sumit: It is a community owned organization, where I am involved as a Scientific Advisor. We are largely involved in community training, focusing on the desert bird tourism. We also promote GIB friendly farming that involves not using chemical pesticides and moving towards organic farming in areas where GIB movement is detected. We are working on an economic model to provide livelihood to the bird guides in the area. We have identified and provided training to the Bird Guides in the area. Through our network of trained bird guides, we got to know about the movement of GIB outside the Desert National Park (DNP) area. With time, we have observed that the movement of GIB is more outside the DNP, rather inside. The movement of GIB is very restricted inside and nearby DNP. WII has notified two areas, namely, priority area and potential area. The movement of GIB is quite evident in priority area. Based on my experience, there are two GIB populations in Jaisalmer. One is in DNP and other one lies in Ramdevra enclosure.

*Rahul: Do we call it as two populations or a population in two clusters?*

Sumit - To ascertain this, WII have radio collared GIBs but have not disclosed the results. We have a network of 500-700 locals, who inform about GIB sighting in their area. We know that GIB breeds in PFFR and few villages in northern side of GIB Arc. We have also observed GIB mating around Guddi and Sadasara but have not noticed in Ramdevra, as believed. However, the birds lay egg in Ramdevra. Both, forest department and researchers from WII have seen and recorded female GIB with chicks in the area. On an average, about 4-5 eggs are laid in Ramdevra. Any disturbance in this area causes bird to move towards south. The birds are routinely spotted in areas Samwata, Dengray oran and Rasla.

*Rahul – A recent mortality of female GIB is observed near Rasla. Was it a breeding GIB movement or regular bird movement?*

Sumit – The movement of GIB gets disturbed during winters. At the onset of winters, the GIB is sighted more in the outside areas, in villages and no bird is found in DNP enclosures. At the time of mortality, two more female birds were spotted around Rasla and Sanawada (with 1-2 km radius of mortality), indicating the movement on bird in these areas. The locals have known the bird movement in this area for long. Though, WII did not sighted/ detected the movement of the bird in this area, but they have mentioned in their report that locals have mentioned sighting birds around Rasla and Sanawada. As per my knowledge, there are 40-45 GIB individuals in Jaisalmer. Out of these, 20-22 GIBs are found in Pokhran range and 20-25 GIB are found in Sudansari area. In Sudansiri, Barna village and Khuri village marks the extent of range of GIB movement in north and south direction, respectively. Not GIB movement is detected beyond this area.



*Rahul – How true is the fact that once the breeding is done and chick has come out, the male GIB leaves good habitat for female and moves to a degraded habitat? We are also informed by locals that after the breeding season, the male GIB moves from Khetolai village towards Rasla and south.*

Sumit – The male GIB move from Khetolai towards Ralsa, Odhaniya, and Godhan to Sanawada. At Odhaniya, locals spotted 15-17 GIB. The GIB movement is very restricted during summers but during winters, they move out in search of food.

*Rahul: Earlier Supreme Court has also asked state government to notify Orans as deemed forest. Recently, the Degray oran is declared as deemed forest by the National Green Tribunal. What do you seek from this order?*

Sumit: We are in talks with forest department and locals on conservation and protection of oran areas for a long time. We are encouraging local people to put pressure on forest department to notify oran areas as deemed forest, in pursuance of Supreme Court order. Our main role is to create a ripple and produce waves of conservation among local people. The Supreme Court had ordered state government to notify orans as deemed forest. However, state government has not come out with notification yet. Now, NGT has given order and asked forest department to go do survey and check the areas. On ground, the non-forest activities happened in oran areas which are deemed forest areas. During lockdown period many trees were cut. A Jaisalmer moratorium was also imposed in the area, restricting setting up of windmills. Overall, many orders like underground laying of transmission wires were enforced but none has been complied with. The compliance to law and order is very poor in the area.

*Rahul: The success of captive breeding of GIB lies in protecting their habitat. What is your take on this?*

Sumit: We are also working in this direction and believe that habitat restoration is must.

*Rahul: Have you done any mapping in the project area to check/ identify the movement of GIB?*

Sumit: Yes, we have. We have submitted the details in the NGT and the matter is sub judice. The recent GIB mortality happened within 5 km radius of the project. According to my estimate, there are around 18+ GIB found in the project landscape. The enclosures made for GIB are not big enough. They are only used for breeding purposes, after that bird moves to the surrounding area.

*Rahul: Some time back a GIB mortality that happened near Ramdevra town. It was noticed that the local people were not aware about the bird and could not identify. How true does this information stand correct?*

Sumit: Yes, it is true. The local people could not recognize the bird. The people there do not take any interest in the bird and its conservation. We are creating awareness, educating them about the bird.

*Rahul: Sumer Singh, one of our local contacts and conservationist, informed us that mostly the kids in cities who do not get to see the bird, are taught about the GIB and its conservation importance rather than the kids in villages who usually encounter the bird in their neighborhood. What is your take on this?*

Sumit: We are working on this. We have a conservation and preservation program. We are creating research material on the bird, covering entire area in which it is found. It will include Ramdevra and DNP villages.

*Rahul: Do you also perform vulture population assessment or is aware about the vultures found in the area?*

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Sumit: In vultures, you can find White rumped vulture, Long billed vulture, Red necked vulture, Eurasian griffon vulture, Himalayan Griffon vulture, Egyptian vulture here.

In migratory bird, Common crane, Demoiselle crane and Cream coloured coursier are found here.

*Rahul: We are informed that about 2000-2500 Egyptian vultures are found in this landscape. It is correct?*

Sumit: Yes, that is true. In Bhadariya village, the goshala dumping ground attracts vultures in good numbers. One can find more Steppe eagle and tawny eagle than found in Joribeel, Bikaner. The Egyptian vultures are found in great numbers in the Bhadariya dumping ground, as well as in Degray oran.

*Rahul: Is there any vulture foraging or breeding or feeding site present in the project landscape?*

Sumit: Foraging site is there in Bhadariya dumping ground. Egyptian vulture can roosts anywhere. In GIB area, it is informed by our bird watchers that about 7-8 White rumped vultures breed there.

*Rahul: Do you know the specific location of their breeding?*

Sumit: No, we do not have the location. We are given this information by the birdwatchers.

*Rahul: What do think about Steppe Eagle? What population of Steppe eagle is found in the landscape?*

Sumit: Around eight to ten thousand. They are mostly found in Bhadariya goshala dumping ground.

*Rahul: Is there any landscape level survey on vultures done here in the landscape in recent times? We know about Prof A. K. Chhangani work on vultures in the landscape, of 2009. Are you aware of any recent work in the landscape on vultures?*

Sumit: No, none that I am aware of.

*Rahul: What is the status of the radio collared GIB in the landscape?*

Sumit: At present, only private data is collected on tagged GIB that is not shared with anyone. There are 3 confirmed GIBs that are tagged to understand their movement in the landscape. One is tagged in Ramdevra area and other two are tagged in Subansiri. Overall, the present status is unknown. GIB is long-lived mobile bird. It is important to keep 2 km buffer in areas where GIB movement is identified. In addition, it has good memory and remember movement routes and habitats. It is also known to claim their old habitat. For conservation of GIB, you have to protect and conserve its old habitat.

*Rahul: How effective do you think is the installation of bird diverters in case of GIB mortality?*

Sumit: So far, 20 bird diverters have been installed. It is a coincidence that there no mortality is observed in the place where it is installed. It could be possible that there is no movement of GIB in the area in the area of installation. According to a research, the diverters are maximum 70% effective.

*Rahul: Where are these bird diverters installed?*

Sumit: the bird diverters are installed between Khetolai and Dholia village. It is done under a WII pilot study.

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*Rahul: Effective mitigation for GIB lies in reducing the threats. How do you think that controlling the population of feral dogs will affect the GIB population?*

Sumit: It is possible that it will benefit the bird. WII did a study, where it relocated about 800 dogs but no details of study are available in the public domain for understanding and assessment.

*Rahul: As a mitigation measure, joining two adjacent grassland enclosure to make them one big enclosure will help or not?*

Sumit: Yes, habitat restoration is very important for conservation. In recent times, the number of enclosures have increased. Now you can see spot a GIB every enclosure. We have also witnessed breeding in enclosures in the subsequent year of its set up.

If you give a proper grassland to bird, it will definitely come. Habitat restoration is necessary. Moreover, the birds do not have problems with livestock such as cows buffalo sheep, desert fox, camel etc. The birds and livestock co-exist with each other. For e.g. the GIB feeds upon the beetles present in cow dung. In Khetolai, you can spot a livestock within 100 meters of GIB.

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### Consultation #3

**Consultation:** Assessment of GIB and Vulture movement in the landscape and Proposed Hybrid Power Project, Jaisalmer, Rajasthan

Date: 8<sup>th</sup> October 2020 Time 11:00 am

Attendees:

Mr. Kamlesh Bishnoi, Guard, Rajasthan Forest Department.

ERM – Suhas Fuladi and Kritika Gautam

#### Key Points:

*Suhas: Can you please explain how GIBs move across this landscape?*

Kamlesh: GIBs generally stay inside the Pokhran field firing range during the summer months and concentrated around the areas with availability of water. When the firing activities start within the firing range from October to March, birds move out due to disturbances and disperse in the entire landscape even outside Priority area identified by WII. I have recorded GIBs at multiple locations outside the Priority area. I have seen GIB near Raneri village on the north outside Priority area and further south of Rasla. These birds can easily move more than 15 km in a day.

*Suhas: What about the movement around Rasla enclosure and landscape of Project area?*

Kamlesh: 5-7 birds move regularly to Rasla and neighboring area during winter season from the Pokhran. The entire landscape around Rasla is GIB habitat and supports regular GIB activity. There are previous records of about 12 GIBs in the area between Ratan ki Basti and Sanawara. There is regular movement of GIBs in the habitats around Bhairwa, Delasar Oran, Neran, Rasla, Achla and Sanwata. They visit Degrai Temple Lake to drink water as well. As the winter is approaching, the birds have started moving southwards from Khetolai. I sighted a female bird near Chanani village on 7<sup>th</sup> October 2020.

*Suhas: When was the bird last sighted in Rasla area?*

Kamlesh: There is a latest GIB mortality in Degrai Oran in the month of September. After the mortality, around 3 more birds have been reported from that area.

*Suhas: Do you think, the activity of birds is concentrated around Oran?*

Kamlesh: There are 3-4 Oran in this landscape and these birds get food in these areas. So generally they prefer these Oran areas during winters.

*Suhas: How many GIBs could be there in this landscape?*

Kamlesh: There are around 40 birds in and around Pokhran and Khetolai area. They disperse in winter and occupy southern landscape.

*Suhas: How is the Vulture activity in this area?*

Kamlesh: Vultures are present all across this landscape. The activity increases manifolds during winters. We have seen more than 2500 Vultures at one place near Bhadariya and Khetolai. Griffon Vultures can be seen in highest number during winters followed by Egyptians.

*Suhas: Are you aware of any census/survey carried out of Vultures here?*

Kamlesh: No survey has been conducted for Vultures in this area.

*Suhas: Are there any Vulture roosting sites identified by you or forest department?*

Kamlesh: Vultures roost on Khejadi trees across this entire landscape. Around 40 Egyptian Vultures can be easily seen around Degrai Temple Lake.



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## **Consultation #4**

**Consultation:** Assessment of GIB and Vulture movement in the landscape and Proposed Hybrid Power Project, Jaisalmer, Rajasthan

Date: 7<sup>th</sup> October 2020

Attendees:

Mr. Sumersinghji Bhati, Sanwata.

ERM – Rahul Srivastava, Suhas Fuladi and Kritika Gautam

### **Key Points:**

*Rahul: There is a hybrid power project proposed in this area. What is the status of GIB in this landscape?*

Sumersinghji: GIBs are present in this area. I have seen 4 birds in last November-December and a bird died recently due to collision with the power line in Degrai Oran. Three more birds were observed in this area after this GIB mortality. These birds stay in here during the winter months from September to December or January. There are also earlier records of nesting of GIB in this landscape.

*Rahul: What is the frequency of bird mortalities due to collision with power lines?*

Sumersinghji: The birds dying almost every day due to collision and electrocution due to power lines. There are multiple cases of mortalities of Crows, Peafowls, Falcons in this area. The mortalities are mostly concentrated around the water bodies due to high bird activity.

*Suhas: Are there any GIB sightings from Rasla enclosure?*

Sumersinghji: There are multiple and frequent GIB sightings in and around Rasla enclosure.

*Suhas: Are there any earlier cases of GIB mortality in this area?*

Sumersinghji: There is a case of GIB mortality due to collision with power line from 2017. This was near Sanwata village in Degrai Oran.

*Rahul: How is Vulture activity in Degrai Oran?*

Sumersinghji: There is good Vulture activity across this area and can be easily sighted. There are certain sites in the Oran where these Vultures roost. More than 150 Egyptian Vultures are present in this area.

*Rahul: How many GIBs do you think are present or visit Rasla area?*

Sumersinghji: There are about 6 GIBs are present in Sanwata circle including Rasla, Lakhmana, Bhopa landscape.

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## **Consultation #5**

**Consultation:** Assessment of GIB and Vulture movement in the landscape and Proposed Hybrid Power Project, Jaisalmer, Rajasthan

Date: 9<sup>th</sup> October 2020

Attendees:

Mr. Radheshyam Pemani, Dholia, Jaisalmer.

ERM – Rahul Srivastava, Suhas Fuladi and Kritika Gautam

*Rahul: What is the current status and movement of GIBs in this landscape?*

Radheshyam: Once the agricultural activities slow down, the movement of GIBs increases in the agricultural areas. They spend most of the winter on the south of the Priority area and move up to Sanawara, Neran and Rasla. During the summer months, they stay inside the Pokhran firing range. There is less human activity and thus less disturbance inside the range which birds prefer.

*Rahul: We want to understand how many GIBs visit landscape of the Project area on annual basis.*

Radheshyam: The movement in this landscape is mostly restricted to winter season. There could be movement of around 15-20 GIBs in this entire landscape on the south of the Priority area. There are around 40-50 birds residing Pokhran firing arrange area, out of which 15-20 individuals move southward in this area.

*Suhas: How far do they go towards south?*

Radheshyam: They move up to Rasla and further south to Achla village. The movement is from the villages Dholia, Chanani, Sanawara, Neran, etc.

*Rahul: Are there any recent sightings in this landscape?*

Radheshyam: I sighted 4 male birds, four days ago, near Chanani village.

*Rahul: Which species of Vultures are present in this area?*

Radheshyam: There are 7 species of Vultures found in this area including Griffon, Himalayan Griffon, Egyptian, Cinereous, White-rumped, Indian and Red-headed Vultures.

*Rahul: What could be the population of the Vultures in this landscape?*

Radheshyam: It is difficult to say anything about exact population, but around 2000-2500 vultures can be seen during winter at Bhadariya dumping site. The activities of both resident and migratory vultures increase during the winter months. The movement of vultures is higher outside DNP.

*Suhas: Are there any roosting or nesting sites of these Vultures?*

Radheshyam: There are a few roosting sites of White-rumped Vultures in DNP and near Mokla. Also there is a roosting site of Red-headed Vultures near Bhadariya. There could be some nesting sites of Indian Vultures near Chaudhan village.

*Rahul: Do you have any information regarding GIB mortalities due to power lines in this area?*

Radheshyam: There are total 7 cases of GIB mortality in last 3 years. I have myself informed forest department about 4 of them, happened in Khetolai, Loharki, Ramdevra and Dholia.

*Rahul: What are the main threats for GIBs in this landscape?*

Radheshyam: Main threat is power lines. Some of the other threats are habitat destruction and stray dogs present in the villages within the GIB landscape.

Date

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