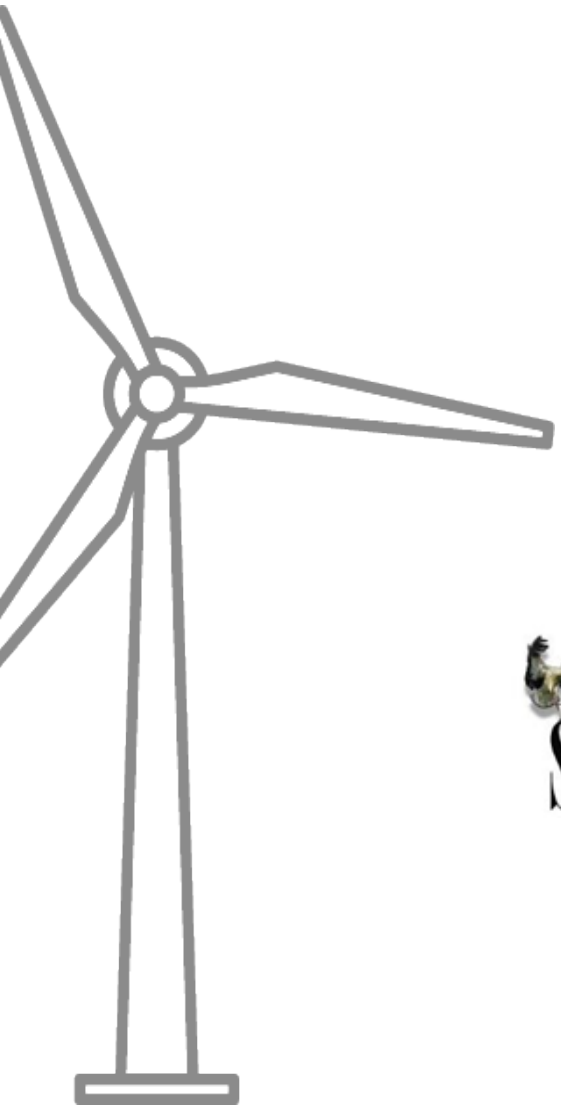
Environmental & Social Impact Assessment (ESIA)

Shadwan Wind Power 900 MW, Egypt

Scatec



RCREEE
Regional Center for Renewable Energy and Energy Efficiency
المركز الإقليمي للطاقة المتجددة وكفاءة الطاقة

Safe Soar

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TABLE OF CONTENTS

Table of Contents ii
List of Figures v
List of Tables viii
Abreviation and Acronyms x
1. Introduction 14
1.1 Background 14
1.2 The Environmental and Social Impact Assessment (ESIA) Report 15
1.3 Project Setup and Responsibilities 15
1.4 Document Structure 16
2. Project Description 18
2.1 Project Location 18
2.2 Local Communities 22
2.3 Project Components 23
2.4 Overview of Project Activities 29
2.5 Project Schedule 32
2.6 Workforce Requirements 32
2.7 Other Wind Farm Developments within Red Sea Governorate 33
3. ESIA Approach and Methodology 36
3.1 Analysis of Alternatives 36
3.2 Stakeholder Consultation and Engagement 36
3.3 Delineation of Study Boundaries and Scope of Assessment 36
3.4 Impact Assessment Methodology 39
3.5 Development of Environmental and Social Management Plan (ESMP) 43
4. Stakeholder Consultation and Engagement 44
4.1 Objectives 44
4.2 Stakeholder Identification and Analysis 44
4.3 Stakeholder Consultation and Engagement to Date 49
4.4 Future Stakeholder Engagement and Consultation 72
5. Regulatory and Policy Framework 74
5.1 Environmental Clearance Process in Egypt 74
5.2 Egypt E&S Regulatory Context 75
5.3 International Agreements 84
5.4 Requirements for Project Financing 85
6. Analysis of Alternatives 94

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6.1 Site Alternatives 94
6.2 Technology Alternatives 97
6.3 Design Alternatives 98
6.4 No-Project Alternative 98
7. Existing Physical, Biological and Social Environment 100
7.1 Landscape and Visual 100
7.2 Land Use 106
7.3 Geology, Hydrology and Hydrogeology 108
7.4 Climate and Meteorology 124
7.5 Biodiversity – Excluding Birds and Bats 129
7.6 Avifauna 143
7.7 Bats 166
7.8 Archaeology and Cultural Heritage 170
7.9 Air Quality and Noise 173
7.10 Infrastructure And Utilities 179
7.11 Socioeconomics 184
8. Environmental and Social Impact and risk Assessment 200
8.1 Overview of Strategic Environmental and Economic Impacts 200
8.2 Landscape and Visual 202
8.3 Land Use 204
8.4 Geology, Hydrology and Hydrogeology 205
8.5 Climate and Meteorology 230
8.6 Biodiversity 230
8.7 Avi Fauna 256
8.8 Bats 270
8.9 Archaeology and Cultural Heritage 272
8.10 Air Quality and Noise 273
8.11 Infrastructure and Utilities 276
8.12 Occupational Health and Safety and Worker Accommodation 285
8.13 Public Health and Safety 289
8.14 Socioeconomics 304
8.15 Summary of Anticipated Impacts and risks 306
9. Assessment of Cumulative Impacts 310
10. Environmental and Social Management Plan (ESMP) 313
10.1 Institutional Framework and Procedure Arrangements for ESMP Implementation 313
10.2 Environmental, Health, Safety and Social Management System (EHSS-MS) 316

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10.3 Compilation of Environmental and Social Management Plan (ESMP)..... 318

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LIST OF FIGURES

Figure 1: Administrative Division of Egypt 19
Figure 2: Red Sea Governorate 19
Figure 3: Administrative Division of Red Sea District 20
Figure 4: Project Distance from Cairo and Ras Gharib 20
Figure 5: Project Site within Land Allocated for Renewable Energy Developments 21
Figure 6: Project Site 21
Figure 7: Project Site and Closest Communities 22
Figure 8: Typical Structural Components of a Wind Turbine and Wind Farm 23
Figure 9: Final WTG Layout 25
Figure 10: Typical Substation 26
Figure 11: Typical Mobile Batching Plant 27
Figure 12: Typical Burrow Pit 28
Figure 13: Nearby Planned/Existing Wind Farms 33
Figure 14: Newspaper Announcement in El-Akhbar Published on 10/10/25 60
Figure 15: Selected Photos from the Public Session 62
Figure 16: FGD with Ebad El Rahman NGO 67
Figure 17: FGD with Youth Educated Females on Public Service 67
Figure 18: Newspaper Announcement in El-Akhbar Published on 25/11/25 68
Figure 19: Selected Photos from the Disclosure Session 70
Figure 20: Land Plots Provided by Government 95
Figure 21: KBAs, IBAs and Protected Areas around the Project Site 96
Figure 22: Egypt's Wind Atlas (Source: IRENA, 2018) 98
Figure 23: General Site Topography and Landscape 101
Figure 24: 3D DEM Modelling of the Project Site 102
Figure 25: Typical Views from the General GoS Area 103
Figure 26: Visual Receptors within 50km of the Project Site 104
Figure 27: Historical Satellite Image Review 108
Figure 28: Land Sat Image Showing the Location of the Project Site 109
Figure 29: Structure Domains of the Gulf of Suez (Bosworth and Durocher 2017) 110
Figure 30: Sample Photos of Precambrian Basement Rocks; (a) Older Granite; (b) Younger Granite; (c) Basic Dyke Swarms Intruding the Basement in Different Direction 111
Figure 31: Sample Images of Upper Cretaceous Sandstone Exposed in the Project Site 112
Figure 32: Sample Images of (a, b) Miocene Evaporite and (c) coral reefs in the Project Area 113
Figure 33: Sample Images of Quaternary Deposits Covering most of the Project Site 114
Figure 34: Plate tectonic setting of the Gulf of Suez (Bosworth & Durocher, 2017) 115
Figure 35: Minimum Horizontal Stress Orientations (Shmin) in the Gulf of Suez Sub-basins 116
Figure 36: Young Fault-line Scarps in Pliocene–Pleistocene Alluvium within the Gharib Plain 117
Figure 37: DEM Showing the Physiography and Drainage Basins around the Project Area 119
Figure 38: 3D DEM of the Project Area Constructed from SRTM Data 119
Figure 39: Hydrogeological Map of the Area around the Project Site 121
Figure 40: Hydrogeological Cross-Section along Wadi Dara Based on Drilled Wells (Nasr, 1990) 121
Figure 41: Location map of the drilled wells at Wadi Dara 122
Figure 42: Available Data in Wadi Dara in Relation to Project Site 123
Figure 43: Average Monthly Maximum and Minimum Temperatures for the Past 30 Years 125
Figure 44: Average Monthly Wind Speeds for the Past 30 Years 125
Figure 45: Wind Speed Patterns in Ras Gharib Over the Past 30 Years 126
Figure 46: Wind Rose of Ras Gharib 126

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Figure 47: Average Monthly Rainfall Distribution in Ras Gharib for the Past 30 Years 127
Figure 48: Temperature within Egypt 128
Figure 49: Number of Days in Egypt with Temperatures <0°C and >40°C 128
Figure 50: Floral Quadrat Survey Sampling Methodology 133
Figure 51: spatial distribution of presence marks of spiny-tailed lizard (Uromastyx aegyptia) on the site 136
Figure 52: Distribution of line transects over the study 137
Figure 53: Observed gazelle and Ibex records on the site and coordinates 139
Figure 54: Camera trap locations 140
Figure 55: Mount Gharib adjacent to the Project site 141
Figure 56: Live trapping locations 142
Figure 57 Map of the Rift Valley –Red Sea Flyway after Porter (2005) 144
Figure 58 Maps of the Rift Valley-Red Sea Flyway and the routes of the autumn (left) and spring (right) migratory routes, after Shirihai et al. (2001) 145
Figure 59: Location of VP for the spring and autumn seasons 2025 146
Figure 60: Data sheet example 149
Figure 61: Weekly and monthly cumulative percentage of birds crossing in the springs (above) and autumn (bottom) in 2025 156
Figure 62: White Stork: passing rates and contacts during the spring 2025 according to months and weeks (up) and daily hour interval (bottom) 157
Figure 63: White Stork: passing rates and contacts during the autumn 2025 according to months and weeks (up) and daily hour interval (bottom) 158
Figure 64: Steppe buzzard: passing rates and contacts during the spring 2025 according to months and weeks (up) and daily hour interval (bottom) 159
Figure 65: Honey buzzard: passing rates and contacts during the spring 2025 according to months and weeks (up) and daily hour interval (bottom) 160
Figure 66: Honey buzzard: passing rates and contacts during the autumn 2025 according to months and weeks (up) and daily hour interval (bottom) 160
Figure 67 Black Kite: Passing rates and contacts during the spring 2025 according to months and weeks (left) and daily hour interval (right) 161
Figure 68 Steppe eagle: passing rates and contacts during the spring 2025 according to months and weeks (up) and daily hour interval (bottom) 162
Figure 69: Areas where Golden eagles have been recorded in Egypt during appropriate breeding season. Data from Sullivan et al. (2017) 163
Figure 70: Distribution map of the Sooty falcon in Egypt. Dark color: breeding, light color: passage. 164
Figure 71: Location of the Bat Detectors 167
Figure 72: Sonograms of the species detected in the bat recording surveys at Scatec Shadwan 900MW 170
Figure 73: Project Site and Archaeological Sites 172
Figure 74: Project Site and UNESCO WHS 172
Figure 75: Satellite Map for Measurements Point Location 175
Figure 76: Highway 65 in Relation to the Project Site 180
Figure 77: Nearest Communication Towers to the Project Site 181
Figure 78: Project Site Relative to the Closest Wastewater Treatment Plant 182
Figure 79: Existing Transmission Lines and Substations in the Project Area 183
Figure 80: Existing OHTLs 184
Figure 81: Existing Substations 184
Figure 82: Project Site and Closest Communities 185
Figure 83: Distribution of Population Density According to Districts in the Red Sea Governorate 186

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Figure 84: Location of Wadi Dara Farms 195
Figure 85: Delineated Drainage Basins in the Wider Study Area Showing the Project's Location Within Wadi Dara (Modified after Youssef and Hegab, 2005) 206
Figure 86: Regional Flash-Flood Hazard and Vulnerability Classification for the Delineated Drainage Basins 207
Figure 87: Observed Flood Damage in Ras Gharib During the October 2016 Storm Event 209
Figure 88: Proposed Flash Flood Channel Location in the Study Area (After Elnazer et al., 2017) 210
Figure 89: Drainage Basins Intersecting the Project Area Derived From DEM-Based Watershed Analysis 211
Figure 90: 3D Terrain Model Illustrating the Course of Wadi Dara South of the Project Site 211
Figure 91: Topographic Profiles Along the Project Site 212
Figure 92: Topographic Profiles Along the Project Site 213
Figure 93: Grain Size Variation of the Surface Deposits in the Western and Central Parts of the Project Site 214
Figure 94: Grain Size Variation of Surface Deposits in the Eastern Side of the Project Site 215
Figure 95: Shallow, Wide Drainage Lines in the Western and Central Parts of the Site Where Surface Flow is Minimal 216
Figure 96: Main Streams of the Drainage Lines Crossing the Eastern Part of the Project Site 217
Figure 97: Sporadic and Weak Vegetation Along the Mainstream of the Drainage Lines 218
Figure 98: Locations of Flood Mitigation Structures Observed Near Existing Infrastructure Close to the Project Site 219
Figure 99: Culverts Installed Under the Main Road to Facilitate Safe Passage of Surface Runoff 219
Figure 100: Simple Fences Applied to Protect the Base of Towers from Surface Flow Erosion 220
Figure 101: Proposed Locations of Strong Surface Runoff Along Mainstream Drainage Lines Within the Project Site 221
Figure 102: Sound Power Levels for Envision EN 206-11.0 MW for W_{10} 292
Figure 103: Noise Sensitive Receptor Locations 293
Figure 104: Noise Contour Map for Shadwan Wind Farm Layout - W_{10}: 10 m/s (Isolated Assessment) 297
Figure 105: Noise Contour Map for Shadwan Wind Farm Layout - W_{10}: 10 m/s (Cumulative Assessment) 298

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LIST OF TABLES

Table 1: ESIA Document Structure 17
Table 2: Region Division of Egypt 18
Table 3: Project Site Coordinates 18
Table 4: Worst-Case WTG Specification 24
Table 5: Footprint of the Project Components 29
Table 6: Determination of Significance 41
Table 7: Identified Groups of Stakeholders 45
Table 8: List of Vulnerable Groups and Their Relevance 49
Table 9: Identified Groups of Stakeholders 50
Table 10: Key Outcomes and Reponses of the Public Scoping Session 62
Table 11: Key Outcomes of FGDs 65
Table 12: Key Outcomes and Reponses of the Public Disclosure Session 70
Table 13: National Legislation and Guidelines Governing the E&S Compliance for the Project 76
Table 14: Relevant International Conventions and Agreements 84
Table 15: IFC Performance Standard Requirements 85
Table 16: Overview of Key Points of EBRD Performance Requirements of Relevance to the Project 88
Table 17: Other International E&S Requirements and Standards 92
Table 18: Visual Receptors within 50km of the Project Site 104
Table 19: The available data in wadi Dara area (Bediar 2015) 123
Table 20: Average Humidity Levels 127
Table 21: Populations of IBA Trigger Species 130
Table 22: Populations of KBA Trigger Species 130
Table 23: Populations of IBA Trigger Species 131
Table 24: Bird Species that Trigger KBA Designation 131
Table 25: Results of April-May 2025 Survey 134
Table 26: Results of the Reptile Surveys 136
Table 27: Results of the Mammal Surveys 138
Table 28: Location of Observed gazelle and Ibex records 139
Table 29: Results of the Invertebrate Surveys 142
Table 30: Coordinates of the VPs (UTM 36R) 146
Table 31: Level of Effort from Project Site VP during spring 2025 149
Table 32: Level of Effort from Project Site VP during autumn 2025 150
Table 33: Species Recorded during Vantage Point Monitoring in the spring and autumn 2025 (number of records and individuals) 150
Table 34: Mean flock size per species, number of observations in spring and autumn 2025, and min and max flock sizes recorded. Those highlighted are considered solitary or migrating in small groups. 153
Table 35: Distribution of bird numbers according to wind direction in spring 2025 155
Table 36: Coordinates of location of the bat detectors 167
Table 37: Dates of recording in 2025 167
Table 38: List of Bat Species Recorded in Project Site and Vicinity Based on Literature Review 168
Table 39: Nearest Archaeological Sites 171
Table 40: Location for Noise and Air Quality Monitoring Points 174
Table 41:Applicable National Permissible Limits for Air Quality 175
Table 42: Applicable National Permissible Limits for Noise 176
Table 43: IFC EHS General EHS Guideline Noise and Air Quality Limits 176
Table 44: Air Quality Analysis Result 177
Table 45: 24-Hour Ambient Noise Level Measurements and Comparison with National Standards 179

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Table 46: Population (Red Sea Governorate Information Centre, 2022) 186
Table 47: Demographic Trends (Statistical Yearbook of Red Sea Governorate, 2019-2020)..... 187
Table 48: Workforce Research (CAPMAS, Workforce Research Results for the Second Quarter of 2018)188
Table 49: The Distribution of the Project Area's Population by Work Status & Sex - Red Sea Governorate (Directorate of Manpower in the Red Sea Governorate, 2018-2020) 188
Table 50: Labor Status of Ras Gharib & Zaafarana (CAPMAS Poverty Map, 2018) 188
Table 51: Education Mapping of Ras Gharib & Zaafarana (CAPMAS Poverty Map, 2018)..... 190
Table 52: Education Mapping of Ras Gharib City (The Statistical Yearbook, Ras Gharib City Information Centre, 2018) 190
Table 53: Ministry of Health Hospitals & Other Entities in the Red Sea Governorate (The Statistical Yearbook, Red Sea Governorate Information Centre, 2018) 191
Table 54: Number & Categories of Health Sector Workers in the Red Sea Governorate (CAPMAS, Census of Population Activities of the Governorates, Arab Republic of Egypt, 2016) 191
Table 55: Access to potable water and sanitation in the Red Sea Governorate 192
Table 56: Access to Electricity in Red Sea Governorate 192
Table 57: Fields of Investment in the Red Sea Governorate & Ras Gharib City (Red Sea Governorate Official Website, 2018) 193
Table 58: Coordinates of Wadi Dara Farms 195
Table 59: Wadi Dara Suvey Results 196
Table 60: Historical Records of Hazardous Flash Floods in Egypt 208
Table 61: Criteria and Conditions for Identifying Critical Habitats and Priority Biodiversity Features* ... 231
Table 62 Summary of Sensitive Receptors and Species 234
Table 63: Turbine specifications used for the CRM 259
Table 64: Physical characteristics of each bird species included within the CRM analysis. 260
Table 65: Observational data from the VP surveys used for the spring CRM analysis in Spring 2025..... 261
Table 66: Observational data from the VP surveys used for the spring CRM analysis in autumn 2025 ... 262
Table 67: Published Avoidance rates (AR) for several bird species 263
Table 68 Collision Risk estimates for a 240m risk height in spring 2025..... 263
Table 69: Collision Risk estimates for a 240m risk height in Autumn 2025 264
Table 70: Envision EN 206-11.0 MW Specifications 291
Table 71: EN 206-11.0 Modelling Scenario for Assessment..... 292
Table 72: Noise Sensitive Receptors..... 293
Table 72: Model Calculation and Parameter Settings 296
Table 74: Predicted contribution noise levels at NSRs from Shadwan Wind Farm (Isolation & Cumulative) (W_{10})..... 298
Table 75: Summary of Anticipated Impacts during Planning and Construction 307
Table 75: Summary of Anticipated Impacts during Operation..... 309
Table 77: Assessment of Cumulative Impacts..... 310
Table 78: Roles and Responsibilities of Entities Involved in ESMP..... 313
Table 79: Training Elements 314
Table 80: Inspection and Monitoring Elements 315
Table 81: Required Meetings 315
Table 82: Reports 316
Table 82: ESMP for the Planning Phase..... 319
Table 84: ESMP for the Construction Phase (to be reflected in the C-ESMP) 320
Table 85: ESMP for the Operation Phase 335

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ABREVIATION AND ACRONYMS

Acronym	Definition
AfDB	African Development Bank
AoI	Area of Influence
BOO	for the Build Own and Operate
CAAs	Competent Administrative Authorities
CBD	Convention on Biological Diversity
CCKP	Climate Change Knowledge Portal
CCRA	Climate Change Risk Assessment
CEA	Cumulative Effects Analysis
CITES	Convention on International Trade in Endangered Species
CMA	Competent Ministerial Authority
CRM	Collision Risk Model
CSOs	Civil Society Organizations
CSR	to Corporate Social Responsibility
DEM	Digital Elevation Model
DHA	of the Directorate of Health Affairs
E&S	Environmental and Social
EBRD	European Bank for Reconstruction and Development
EEAA	Egyptian Environmental Affairs Agency
EETC	Egyptian Electricity Transmission Company
EHS	Environment, Health and Safety
EIB	European Investment Bank
EMF	from Electric and Magnetic Fields
EMs	Environmental Management System
EPI	Environmental Performance Index
EPC	Engineering Procurement and Construction
EPs	Equator Principles
EPSRA	Egyptian Electricity Sector Regulatory Agency
ESAP	Environmental and Social Action Plan
ESF	Environmental and Social Framework
ESIA	Environmental and Social Impact Assessment
ESMF	Environmental and Social Management Framework
ESMP	Environmental and Social Management Plan
ESMS	Environmental and Social Management System
ESP	Environmental and Social Policy
EU	European Union
FCDO	Foreign Commonwealth and Development Office
FGD	Focus Group Discussions
FGD(s)	Focus Group Discussions
FGM	Female Genital Mutilation
GBV	Gender-Based Violence
GDP	Gross Domestic Product
GEF	Global Environment Facility

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GIIP	Good International Industry Practice
GoE	Government of Egypt
GoS	Gulf of Suez
GRC	Grievance Redress Committee
GRM	Grievance Redress Mechanism
GRS	Grievance Redress Service
HDI	Human Development Index
HFO	Heavy Fuel Oil
HRI	Human Rights Impact
HRIA	Human Rights Impact Assessment
IBAs	Important Birds Areas
IBA	Important Birds Area
ICMM	International Council on Mining and Metals
ICNIRP	International Commission on Non-Ionizing Radiation Protection
IDA	International Development Association
IDPs	Internally Displaced Persons
IEA	International Energy Agency
IFC	International Finance Corporation
IFIs	International Financing Institutions
IFRS	International Financial Reporting Standards
ILO	International Labor Organization
IMF	International Monetary Fund
IPCC	Intergovernmental Panel on Climate Change
IPM	Integrated Pest Management
IRENA	International Renewable Energy Agency
ISES	Integrated Sustainable Energy Strategy
ISS	Integrated Safeguards System
IUCN	International Union for Conservation of Nature
JICA	Japan International Cooperation Agency
KfW	Kreditanstalt für Wiederaufbau
LGU	Local Government Unit
LNG	Liquefied Natural Gas
LULUCF	Land-Use, Land-Use Change and Forestry
MDBs	Multilateral Development Banks
MENR	Ministry of Environment and Natural Resources
MoE	Ministry of Environment
MoHP	Ministry of Health and Population
MoHUUC	Ministry of Housing, Utilities and Urban Communities
MoLD	Ministry of Local Development
MoSS	Ministry of Social Solidarity
MoT	Ministry of Transport
MoU	Memorandum of Understanding
MSDS	Material Safety Data Sheet
MWRI	Ministry of Water Resources and Irrigation
NCCMDRR	National Council for Crisis Management and Disaster Risk Reduction

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NCCS	National Climate Change Strategy
NCE	National Council for Energy
NCW	National Council for Women
NDC	Nationally Determined Contribution
NGO	Non-Governmental Organizations
NGOs	Non-Governmental Organizations
NIEHS	National Institute of Environmental Health Sciences
NREA	New and Renewable Energy Authority
NTRA	National Telecom Regulatory Authority
NTS	Non-Technical Summary
O&M	Operation and Maintenance
OECD	Organization for Economic Co-operation and Development
OE	Owner's Engineer
OHS	Occupational Health and Safety
OS	Operational Safeguards
PAs	Protected Areas
PCM	Project Complaint Mechanism
PELs	Population Exposure Levels
PERSGA	Regional Organization for the Conservation of the Environment of the Red Sea and Gulf of Aden
PMU	Project Management Unit
PPA	Power Purchase Agreement
PPP	Public Private Partnership
PR	Performance Requirements
PS	Performance Standards
RCREEE	Regional Centre for Renewable Energy and Energy Efficiency
REDD+	Reducing Emissions from Deforestation and forest Degradation
SBSTA	Subsidiary Body for Scientific and Technological Advice
SCF	Standing Committee on Finance
SDG	Sustainable Development Goal
SDGs	Sustainable Development Goals
SEA	Strategic Environmental Assessment
SEP	Stakeholder Engagement Plan
SIDS	Small Island Developing States
SLR	Sea Level Rise
SPEI	Standardized Precipitation Evapotranspiration Index
SPV	Special Purpose Vehicle
SSA	Sub-Saharan Africa
SSN	Social Safety Nets
TS	Technical Summary
UN	United Nations
UNDP	United Nations Development Programme
UNESCO	United Nations Educational Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
UNICEF	United Nations Children's Fund
VPs	Vantage Points

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WHO	World Health Organization
WHS	World Heritage Site
WTG	Wind Turbine Generators

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1. INTRODUCTION

1.1 Background

The energy sector is a key driver for the socio-economic development of Egypt, representing around 13% of current Gross Domestic Product (GDP) and thus making economic growth in the country contingent upon the security and stability of energy supply.

Since 2007, Egypt has experienced an energy supply deficit due to the rapid increase in energy consumption and the depletion of domestic oil and gas resources, shifting its position as a net hydrocarbon exporter for the last three decades to that of a net importer. This has brought a set of challenges to the energy sector, including electricity shortages, caused in part by the decline of domestic gas production, as natural gas is the main source of electricity, accompanied by highly subsidized energy prices, with negative financial implications for already dwindling government revenues.[1]

Acknowledging the severity of the situation, the Government of Egypt (GoE) has taken ambitious measures to adopt an energy diversification strategy with increased development of renewable energy and implementation of energy efficiency, including assertive rehabilitation and maintenance programs in the power sector.[2]

To this extent, in 2013, the Arab Republic of Egypt (through the Ministry of Electricity and Renewable Energy) had developed and adopted the Integrated Sustainable Energy Strategy (ISES) 2015 – 2035, which provides an ambitious plan to increase the contribution of renewable energy to 42% of the electricity generated by the year 2035.[3] This target includes approximately 26% from solar energy, 14% from wind energy, and about 2% from hydropower.[4]

In that respect, the GoE issued the Renewable Energy Law (Decree Law 203/2014) to support the creation of a favorable economic environment for a significant increase in renewable energy investment in the country. The law sets the legal basis for the Build, Own and Operate (BOO) scheme to be implemented. Through the BOO mechanism, the Egyptian Electricity Transmission Company (EETC) invites private investors to submit their offers for solar and wind development projects, for specific capacities. In addition, the GoE (through the New and Renewable Energy Authority (NREA)) provides the land for the investors.

In accordance with the Law above, the GoE has made land available for investors in the Gulf of Suez (GoS) to install wind power plants. Therefore, Scatec ASA is proceeding with developing a new wind power plant project with a capacity of 900 MW under the BOO scheme (hereafter referred to as the 'Project') located in the Ras Gharib region within the Red Sea Governorate. Scatec ASA established a Special Purpose Vehicle (SPV), "Shadwan Wind Power SAE", that is wholly owned by Scatec ASA and that will be responsible for the development and implementation of the Project (hereafter referred to as the 'Developer'). Following this, a Power Purchase Agreement (PPA) for a 900 MW Wind Farm between the Developer and the Egyptian Electricity Transmission Company (EETC) has been signed.

[1] UNIDO – Low-Carbon Hydrogen Assessments in Egypt Highlights (PDF)
[2] Renewable Energy Outlook, Egypt (IRENA, 2018)
[3] Egypt - Countries & Regions - IEA
[4] Egyptian State Information Service. (2023). Egypt's efforts in renewable energy and transition to a sustainable energy mix.

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1.2 The Environmental and Social Impact Assessment (ESIA) Report

The Regional Centre for Renewable Energy and Energy Efficiency (RCREEE) is managing the Environmental and Social (E&S) process for the Project development on behalf of the Developer. RCREEE commissioned the consortium consisting of ECO Consult and Safe Soar (hereafter referred to as the 'E&S Team') to carry out an Environmental and Social Impact Assessment (ESIA) for the Project.

The environmental clearance for this Project is governed by the Egyptian Environmental Affairs Agency (EEAA) as stipulated by "Law No. 4 of 1994 – Law on Protection of the Environment". Executive Regulations 1995 (Prime Ministers Decree 338) issued in accordance with the Law, classifies wind farm developments of such nature and capacity (i.e. this Project) as "Category C", requiring a comprehensive Environmental and Social Impact Assessment (ESIA) in order to obtain the environmental clearance and permit, which is necessary prior to commencing construction and operation activities.

The Project is seeking financing from International Financing Institutions (IFIs) and therefore the Developer wishes to design and manage the Project in accordance with Good International Industry Practice (GIIP), which also includes the ESIA that will be developed. The ESIA will be developed based on the following requirements:

- European Bank for Reconstruction and Development (EBRD) Environmental and Social Policy (2024) and associated Performance Requirements (PR);
- International Finance Corporation (IFC) Policy on Environment and Social (E&S) Sustainability (2012), IFC Performance Standards (PS) (2012), and IFC Environment, Health and Safety (EHS) Guidelines including the IFC EHS Guidelines for the Wind Sector; and
- African Development Bank (AfDB) Integrated Safeguards System Integrated safeguards system (ISS 2023.

Therefore, the ESIA has been prepared to ensure that local EIA requirements in accordance with "Law No. 4 of 1994" are met as well as international E&S standards and requirements.

This report is the ESIA report to be submitted by the E&S Team to EEAA. This ESIA is undertaken in accordance with the "Law No. 4 of 1994", its Executive Regulations 338/1995 and their amendments as well as GIIP, EBRD, IFC and AfDB requirements specified above. There are other complementary studies such as standalone documents which include the following:

- Non-Technical Summary (NTS)
- Stakeholder Engagement Plan (SEP)
- Cumulative Effects Analysis (CEA)
- Critical Habitat Assessment (CHA)
- Health, Safety, Social and Environmental (HSSE) Management System (MS) Manual

1.3 Project Setup and Responsibilities

Different entities are involved in the planning and implementation of the Project. Responsibilities of each entity are listed in the text below along with a general description of their roles.

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- *Shadwan Wind Power SAE:* The owner and developer of the Project (hereafter referred to as 'the Developer'). Shadwan Wind Power SAE is an SPV wholly owned by Scatec ASA;
- *Egyptian Environmental Affairs Agency (EEAA):* the official governmental entity responsible for protection of the environment in Egypt. The EEAA is responsible for approval of the Environmental and Social Impact Assessment (ESIA) and making sure it complies with the "Environmental Protection Law No. 4 of 1994" and granting the environmental clearance for the Project;
- *International Financing Institutions (IFIs):* entities that will provide financing to the Developer for the development of the Project. Such IFIs will ensure that the Project is developed in accordance with international E&S standards and requirements. At this stage, the IFIs have not been selected or appointed yet but are likely to include International Finance Corporation (IFC), European Bank for Reconstruction and Development (EBRD) and African Development Bank (AfDB).
- *Engineering, Procurement, and Construction (EPC) Contractor:* will be responsible for preparing the detailed design and layout of the Project; supply of the material and equipment (e.g. wind turbines); construction of the Project and its various components (turbines, internal roads, building infrastructure, etc.). EPC Contractor will also be responsible for construction of the associated facilities of the Project to include the access road. The EPC Contractor for this Project has not been assigned yet;
- *Owner's Engineer (OE):* engineering company appointed by the Developer to ensure EPC Contractor develops the Project with the required technical specifications. Owner's Engineer is also responsible for supporting the Developer in ensuring EPC Contractor adherence to E&S requirements and obligations.
- *Lenders Environmental and Social Advisor (LESA) :* consultant that is engaged by and on behalf of the IFIs to ensure that the Project is being developed in accordance with their E&S requirements.
- *Project Operator:* responsible for Operation and Maintenance (O&M) of the Project. The Project Operator has not been assigned at this stage;
- *Egyptian Electricity Transmission Company (EETC):* will be the off taker of electricity and is the entity that signed the Power Purchase Agreement (PPA) with the Developer. In addition, they will also be responsible for designing, building and operating the associated interconnection facilities. This will include the OHTL that will connect from the Project site to the existing national grid.
- *National New and Renewable Energy Authority (NREA):* is entity responsible for allocation of the land for the development of the Project;
- *Consultant (ECO Consult and Safe Soar):* hereafter referred to as the 'E&S Team' who is the ESIA Practitioner and the consultant commissioned by RCREEE to prepare the ESIA for the Project in accordance with "Law No. 4 of 1994" as well as GIIP requirements.

1.4 Document Structure

The following table provides an overview of the Sections within this ESIA document. The ESIA includes a standalone Non-Technical Summary (NTS) and a Stakeholder Engagement Plan (SEP).

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Table 1: ESIA Document Structure

Section	Description of Content
Section 1 – Project Introduction	Introduction and background information on the Project
Section 2 – Project Description	Provides a detailed description of the Project in relation to its location, the key Project components and an overview of the proposed activities that are to take place during the various Project phases.
Section 3 – ESIA Approach and Methodology	Presents the methodology and approach that was adopted for the ESIA study.
Section 4 – Analysis of Alternatives	This Section investigates several alternatives to the Project development and the reasons for the preferred choice. This includes alternatives in relation to the Project site, selected technology, Project design, and finally investigates the 'no action alternative' – which assumes that the Project development does not take place.
Section 5 – Policy, Legal, and Administrative Framework	Provides an overview of the environmental and social regulatory and policy framework applicable to the Project.
Section 6 – Project Stakeholders and Consultations	Discusses in detail the stakeholder consultation and engagement plans which were undertaken as part of the ESIA process for the Project and provides an overview of the findings. In addition, this Section also discusses the future stakeholder engagement and consultation plans which are to take place at a later stage.
Section 7 – Existing Physical, Biological, and Social Environment	This Section presents the baseline conditions within the Project site and surroundings. This includes the following: Landscape and Visual (Section 7.1), Land Use (Section7.2), Geology/Hydrology/Hydrogeology (Section7.3), Climate and Meteorology (Section7.4) Biodiversity (Section7.5), Avifauna (Section 7.6), Bats (Section 7.7), Archaeology and Cultural Heritage (Section 7.8), Air Quality and Noise (Section 7.9), Infrastructure and Utilities (Section 7.10) and Socioeconomics (Section 7.11).
Section 8 – Impact Assessment	This Section assesses the anticipated impacts from the Project throughout its various phases on such a receptor. For each identified impact a set of mitigation and monitoring requirements have been identified which aim to eliminate the impact and/or reduce it to acceptable levels. This includes the following: Overview of Strategic Environmental and Economic Impacts (Section 8.1), Landscape and Visual (Section 8.2), Land Use (Section 8.3), Geology/Hydrology/Hydrogeology (Section 8.4), Climate and Meteorology (Section 8.5), Biodiversity (Section 8.6), Avi Fauna (Section 8.7), Bats (Section 8.8), Archaeology and Cultural Heritage (Section 8.9), Air Quality and Noise (Section 8.10), Infrastructure and Utilities (Section 8.11), Occupational Health and Safety (Section8.12), Public Health and Safety (Section 8.13), Socio-economics (Section8.14) and Summary of Anticipated Impacts (Section8.15).
Section 9 – Assessment of Cumulative Impacts	Investigates the cumulative impacts which could result from incremental impacts from other known existing and/or planned developments in the area based on currently available information.
Section 10 – Environmental and Social Management Plan (ESMP)	Presents the Environmental and Social Management Plan (ESMP) for the Project, which mainly summarizes the impacts identified as well as the mitigation measures and monitoring requirements to be implemented throughout the various Project phases. In addition, this Section describes the institutional framework and procedural arrangement for the ESMP implementation.
Threads to Human Safety and Security Rights and Gender Assessment	Presents a standalone thread to human safety and security rights and gender risk assessment for the Project.
Climate Change Risk Assessment (CCRA)	Provided as a standalone document

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2. PROJECT DESCRIPTION

This Section provides a detailed description of the Project in relation to its location, the key project components and an overview of the proposed activities that are to take place during the construction, operation, and decommissioning phase.

2.1 Project Location

Administratively, Egypt is divided into 27 Governorates. Governorates are then divided into Ahyaa (singular: Hay) [5]) or Marakez[6] (Districts) – (singular Markaz) which are then subdivided into local units, which are finally divided into cities, villages and hamlets.

The Project site is located within the Red Sea Governorate and is around 270 km to the southeast of the capital city of Cairo. The Red Sea Governorate is bordered by the Red Sea Cost to the east and Bani-Suef, Menia, Asyout, Suhag, Qena, Luxor and Aswan Governorates to the west, Suez Governorate to the North, and North Sudan to the south. Red Sea Governorate's total area is around 120,000 km^2, forming 11.9% of the country's total area.

Administratively, the Red Sea Governorate is divided into seven (7) Cities (also known as Districts), each headed by a Local City Council. The capital of the Governorate is Hurghada that is located around 115 km southeast of the Project site.

Table 2: Region Division of Egypt

Governorate	Legend	Governorate	Legend	Governorate	Legend
Cairo	11	Gharbia	3	Suhag	24
Alexandria	7	Menoufia	2	Qena	25
Port-Said	14	Behera	10	Aswan	27
Suez	12	Ismaiilia	6	Luxor	26
Damietta	13	Giza	19	Red Sea	22
Dakahlia	4	Bani-Suef	8	El Wadi El Gidid	21
Sharkia	5	Fayoum	18	Matrouh	20
Kalyoubia	1	Menia	17	North Sinai	15
Kafr-El-Sheikh	9	Asyout	23	South Sinai	16

Table 3: Project Site Coordinates

Point	Latitude	Longitude
1	28.085945	32.944679
2	28.096690	32.945182
3	28.132781	33.001798
4	28.062129	33.077327
5	28.016011	28.016011

[5] Hay: In the administrative division of Egypt, the Hay is an urban district made up of neighbourhoods and residential blocks (not villages). It usually has more commercial and government services than smaller neighbourhoods and functions as the main local administrative unit in urban governorates and large cities.

[6] Markaz. In the administrative division of Egypt, the Markaz is the main city or village followed by a group of villages in agricultural areas (not urban), and often the most important city is a Markaz for a total of villages. The Markaz has more commercial markets than villages, and there may also be branches of government service institutions and agencies serving villages. Each Governorate of the Delta and Upper Egypt includes a number of Markaz, Cities and villages.

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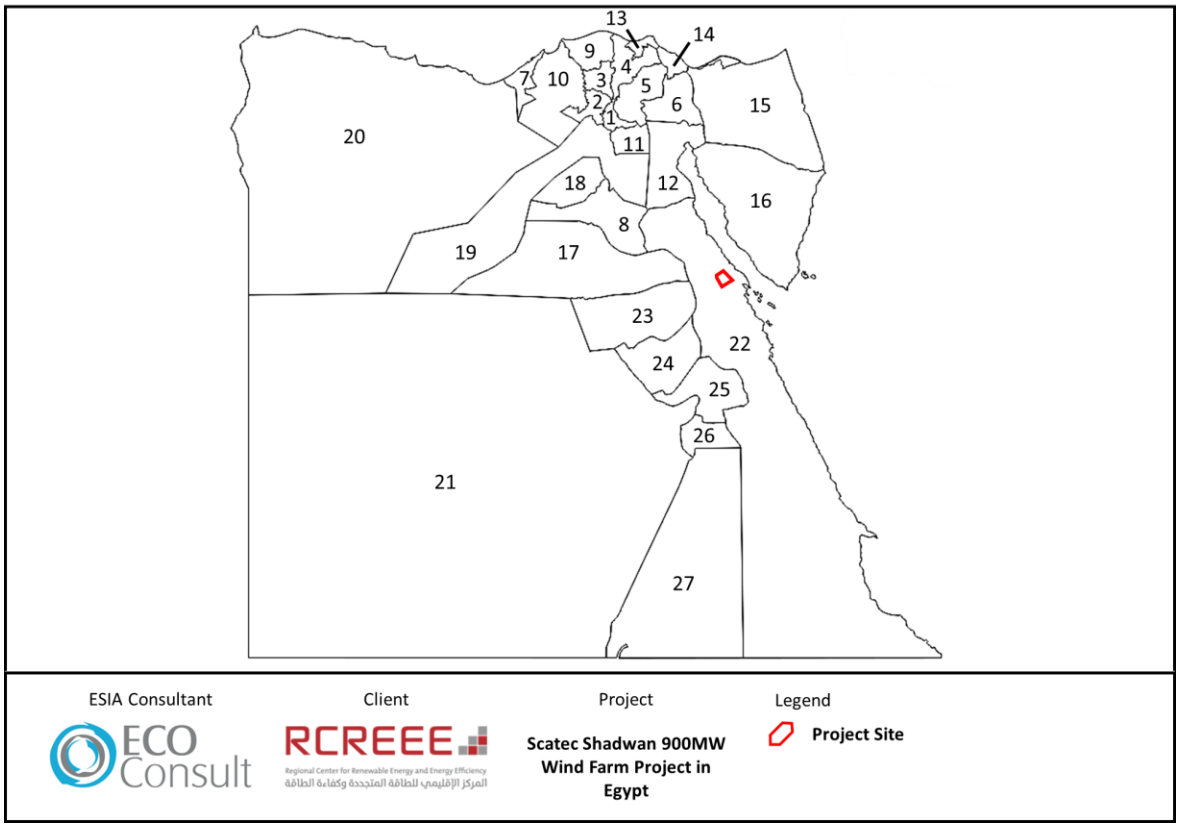


Figure 1: Administrative Division of Egypt

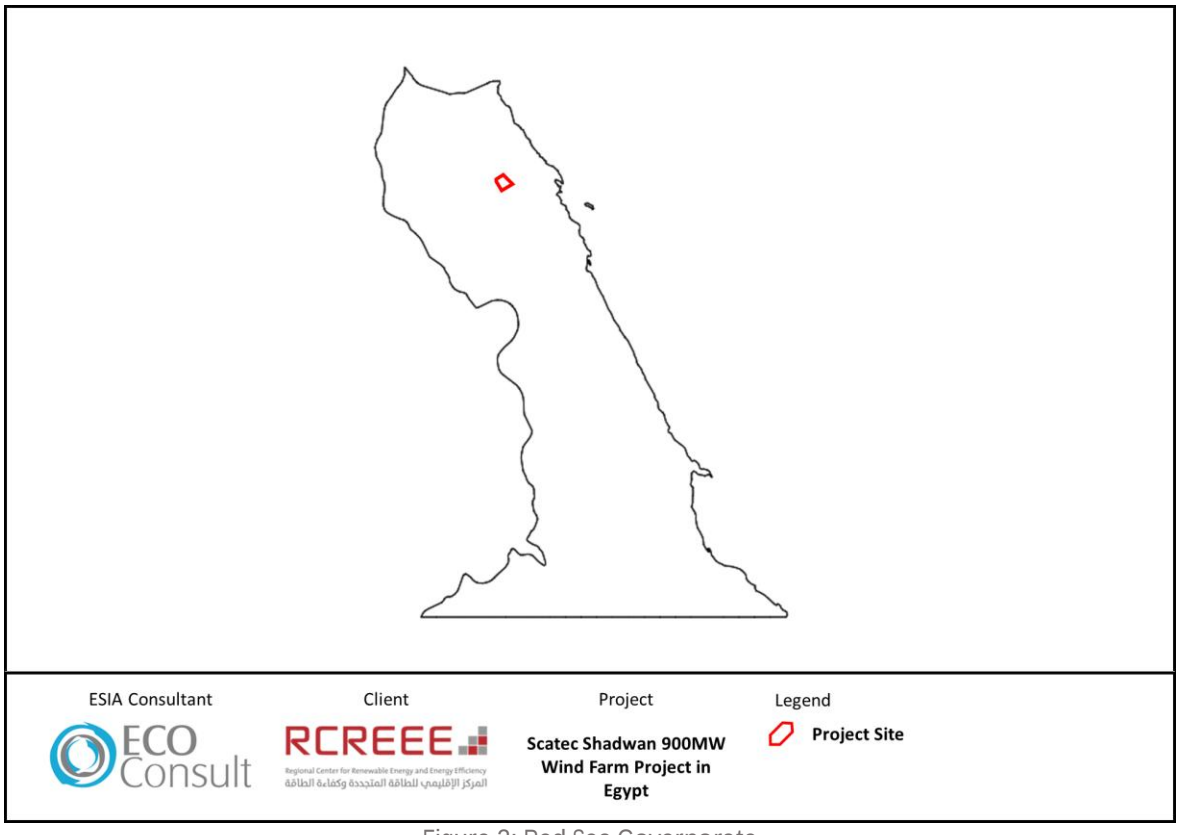


Figure 2: Red Sea Governorate

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The Project site is located within the Ras Gharib City (or District) and therefore administratively is under the Ras Gharib City Council. The Ras Gharib District is further divided into Ras Gharib town as well as two (2) rural (village) local units (Zaafarana and Wadi Dara). The closest community settlement to the Project site is Ras Gharib city that is located around 22km to the northeast. Ras Gharib City is the second-largest city in the Red Sea Governorate, and the most important Egyptian city in terms of oil production.

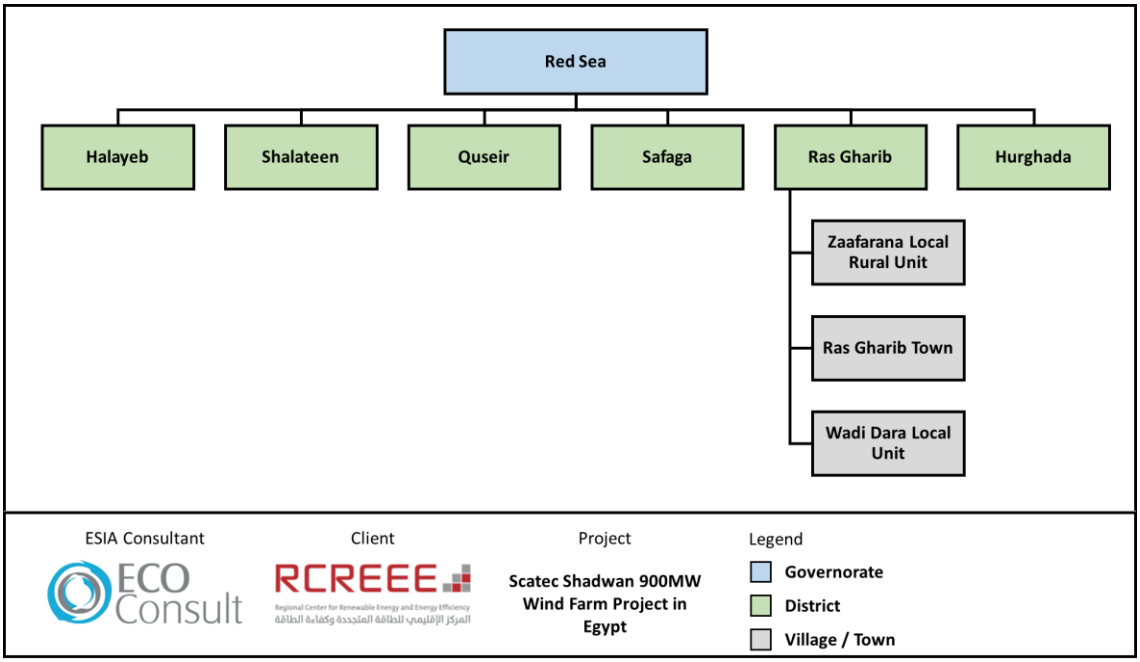


Figure 3: Administrative Division of Red Sea District

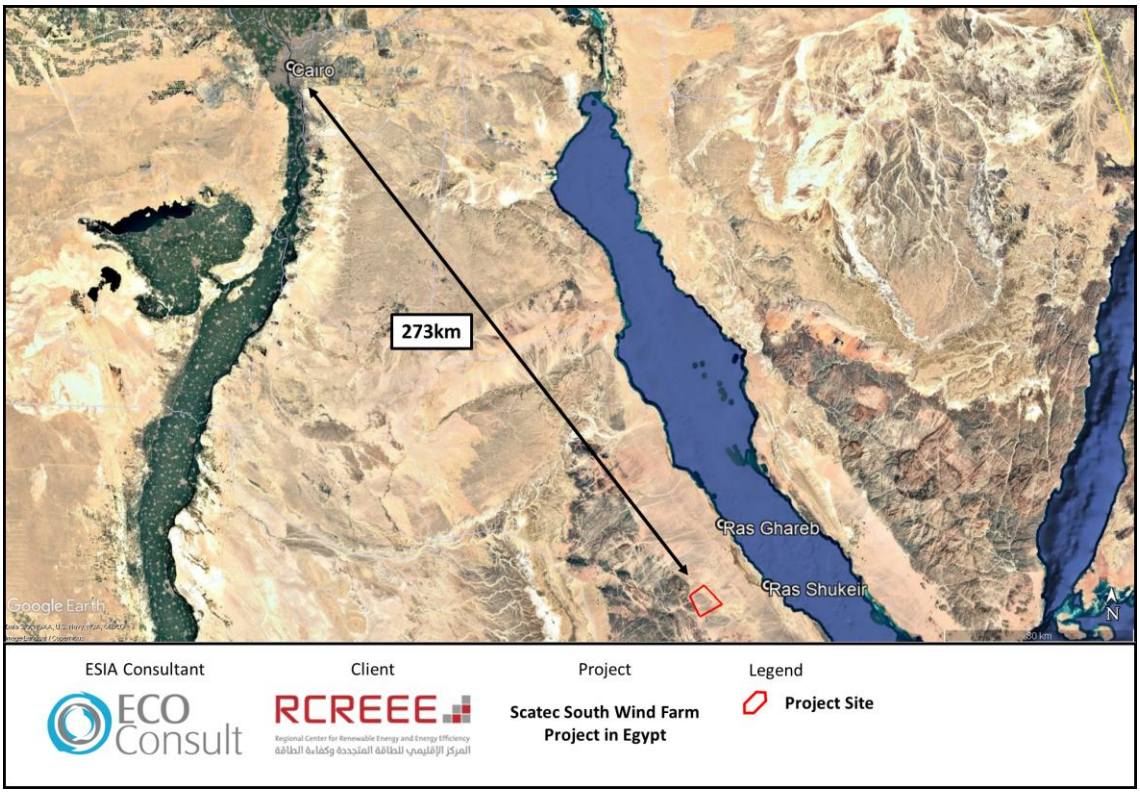


Figure 4: Project Distance from Cairo and Ras Gharib

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As discussed earlier, the Project is located within several areas in the GoS allocated by the GoE for renewable energy project developments. The Project site has an area of 90 km^2 and lies within a 350 km^2 land defined by Presidential Decree No. 628 of 2024 which allocates this state-owned land to the NREA as shown in the figure below.

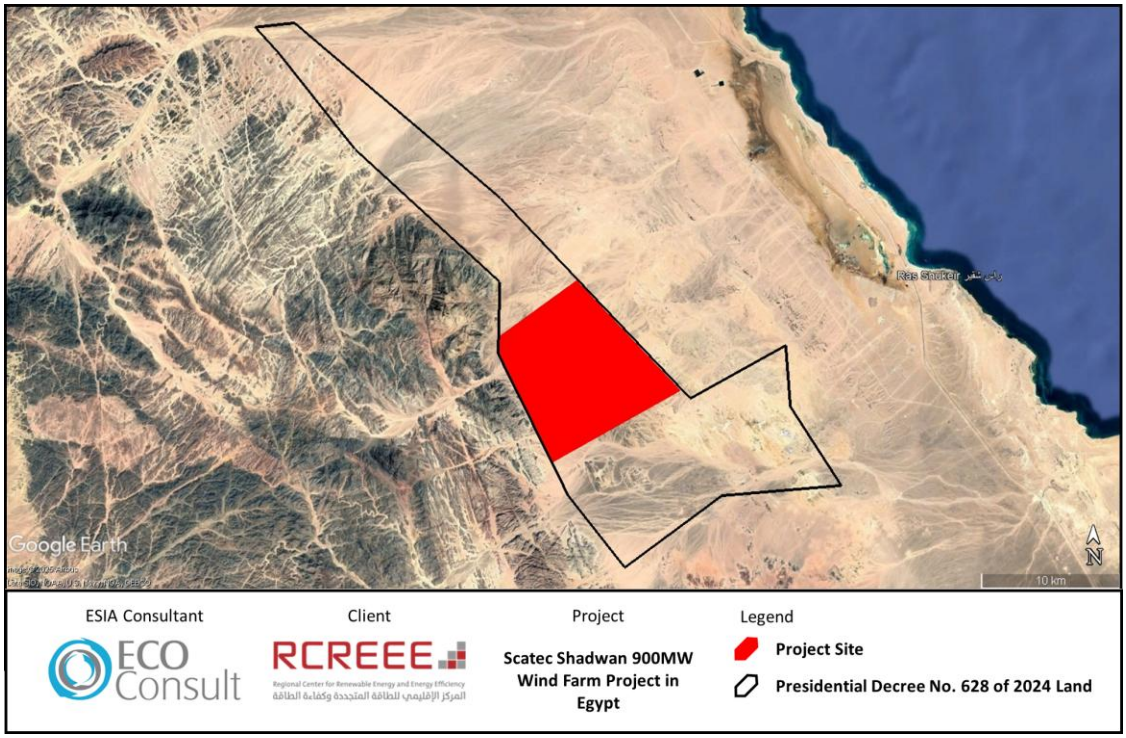


Figure 5: Project Site within Land Allocated for Renewable Energy Developments

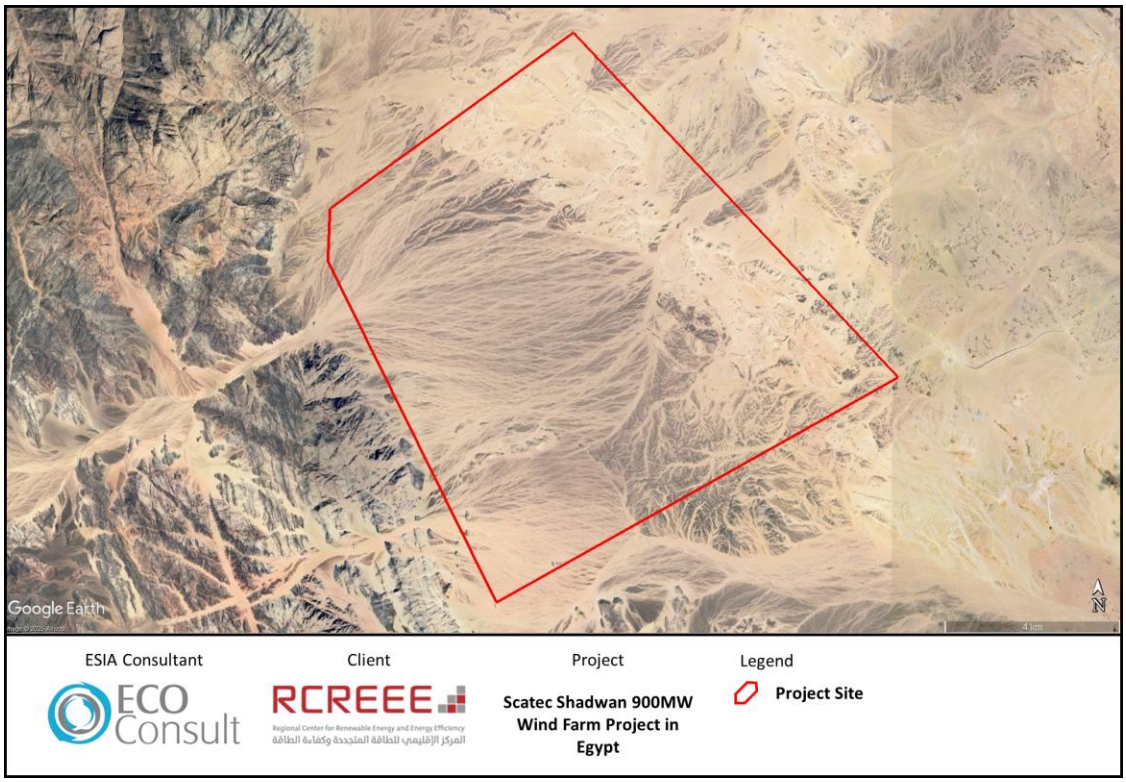


Figure 6: Project Site

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2.2 Local Communities

Throughout the ESIA, the term local communities will be used. This will refer to the following settlements in particular:

- Ras Gharib city is located around 22 km north-northeast of the Project site; and
- Wadi Dara village is located around 10 km southeast of the Project site. Although it is not considered a residential community area; however, it is an area where local communities engage in economic activities. Community members operate poultry and cattle farms within Wadi Dara, and the area plays a significant role in supporting their livelihoods.

The above communities have been selected as affected communities based on the following rationale:

- Administrative Setup: the Project site as explained earlier is located within Ras Gharib District.
- Proximity to Site: the closest settlements were considered as local communities, therefore are the communities that are most likely to be impacted (positivity or negatively) in some way by the Project.

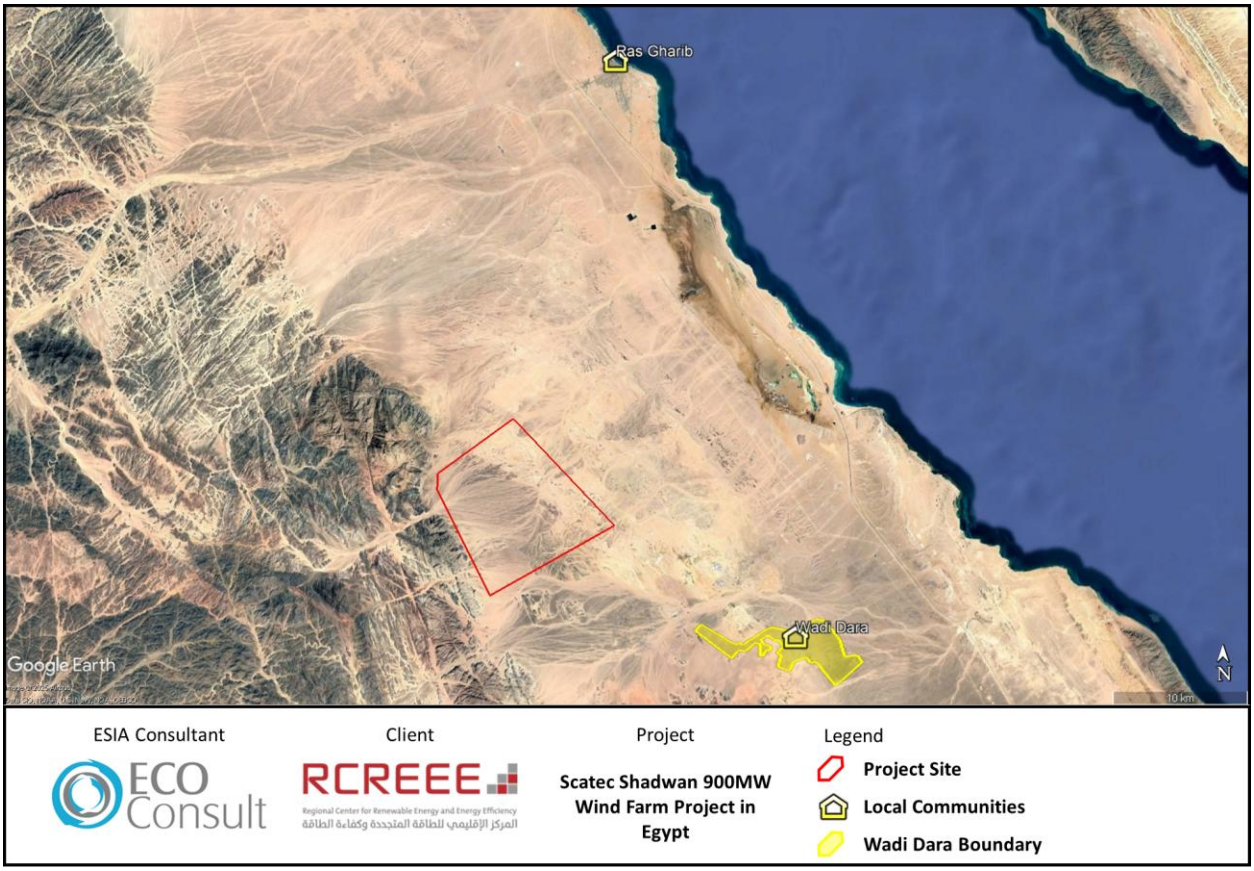


Figure 7: Project Site and Closest Communities

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2.3 Project Components

2.3.1 Outline of Wind Turbine Technology

Wind turbines convert kinetic energy from the wind that occurs naturally in the earth's atmosphere into electrical energy. Wind's kinetic energy is converted to rotational energy with the turbine's rotor. This rotational energy is then, inside the wind turbine, transferred to the gearbox to adjust its rotational speed, before it is transformed into electrical energy with the generator. After some rectifications through converters, transformers and substations the electricity is delivered to transmission and distribution systems and then to the end user.

The figure below presents the key components of a wind farm, each of which is discussed in further details throughout the subsequent sections.

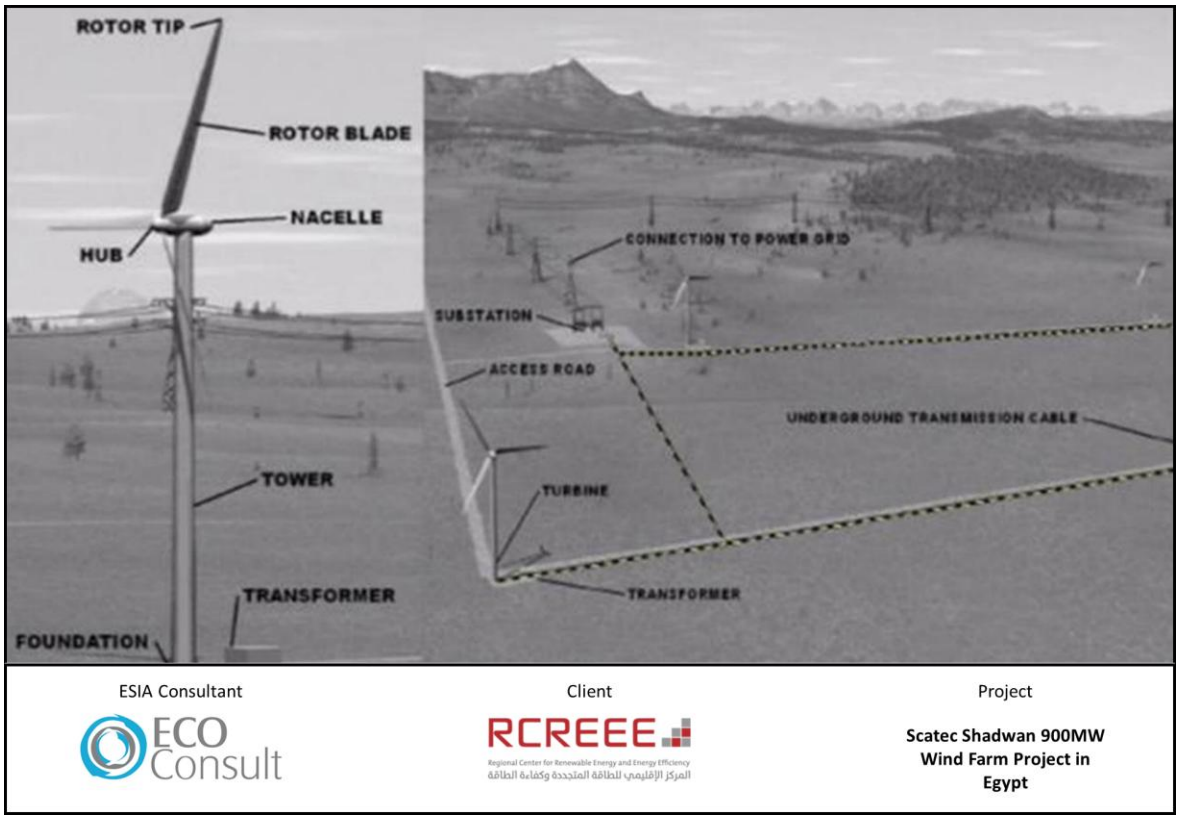


Figure 8: Typical Structural Components of a Wind Turbine and Wind Farm
(Source: EHS Guidelines for Wind Energy, IFC)

2.3.2 Wind Turbine Generators (WTG)

Generally, a WTG consists of a foundation, tower, nacelle, rotor blades, a rotor hub, and a transformer (refer to figure above).

Foundations will be constructed to bolt the tower of the WTG in place (one for each WTG); where in general each foundation consists of a circular footing of around 25m diameter, with a depth of 4m and an elevation of 1m. The foundation will be built with concrete reinforced with structural corrugated steel.

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The WTG contains the electrical conduits, supports the nacelle, and provides access to the nacelle for maintenance. Typically, three (3) blades are connected to the hub which then connects with the nacelle; the box-like component that sits atop the tower and which most importantly contains the gear box (which steps up the revolutions per minute to a speed suitable for the electrical generator) and the generator (which converts the kinetic energy into electricity).

In addition, each WTG is equipped with a transformer that converts/steps up the output from the turbine to a higher voltage (from 0.61kV to 22kV or 33kV) to meet a specific utility voltage distribution level that is appropriate for connection with a substation (explained in detail below).

Finally, next to each WTG will be a crane pad to accommodate cranes for the installation of the turbines and for maintenance activities during operation. The crane pads will be suitable to support loads required for the erection, assembly an operation and maintenance of the turbines. Generally, crane pads have an area of around 4,500 m^2.

The Developer is currently undergoing a selection process for the EPC Contractor who will be supplying the WTGs and preparing the detailed design of the Project. There is a WTG layout design that is being considered at this point. *Note: the design is based on a worst-case turbine layout as well as worst-case turbine specifications in order to present the worst-case assessment in relation to the ESIA report.*

The table below presents the WTG specifications and the figure that follows presents the WTG layout.

Table 4: Worst-Case WTG Specification

Item	Specification
Turbine Type	WTG – EN206 – 11MW
Rotor Diameter (m)	210
Hub Height (m)	115
Tip height (m)	220
Number of turbines	83
Capacity per turbine (MW)	11
Area Swept by rotors (m^2)	34,636

In addition, the figure below also presents the final layout for the turbine options discussed above as provided by the Developer.

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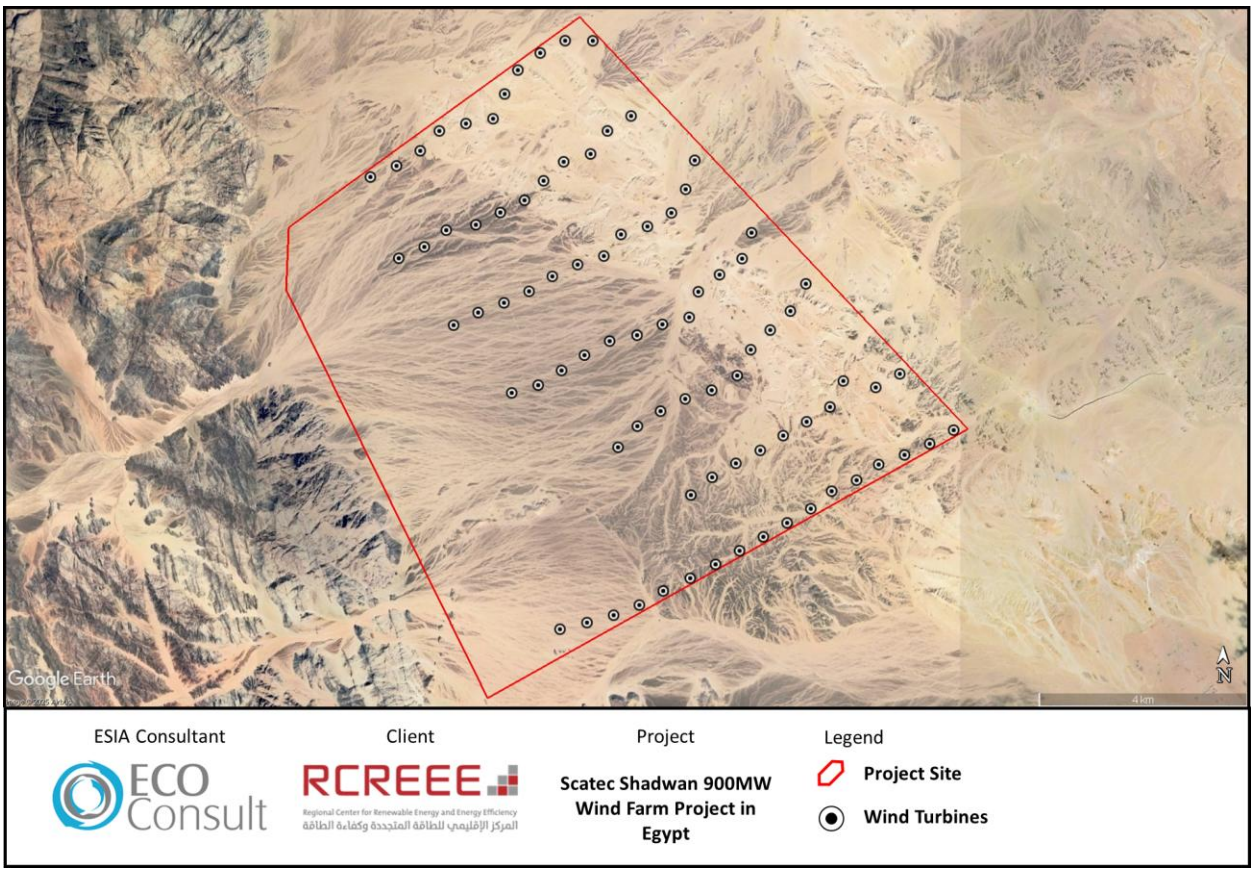


Figure 9: Final WTG Layout

2.3.3 *Infrastructure and Utilities*

The following highlights the key infrastructure and utility elements that will be required for the Project.

- Medium Voltage (MV) Cables: The wind turbines will be connected through medium voltage cables (33kV or 35kV) to an onsite substation (discussed below). The connection between the turbines and the substation will be made using underground transmission cables buried in ground by trenches.
- Communications Network: The Project will have a Supervisory Control and Data Acquisition (SCADA) system for the remote operation of the facilities. A communication network will be installed which will consist of fiber optic cables connecting the turbines together to the SCADA system at substation. The communication system will be installed in the same trenches as the MV cables discussed above.
- Substation: The substation is a high voltage transformer unit that collects and converts the output from the turbines to a higher voltage (from 33kV or 35kV to 500kV) that is appropriate for connection with the High Voltage National Grid (500kV).
- Building Infrastructure: Onsite building infrastructure will be required for the daily operation of the Project. Such buildings could include an administrative building (offices) used for normal daily operational related work, control room, workshop and a warehouse for storage of equipment and machinery such as spare parts, oil cartridges, fuel, lubricants, etc.;
- Road network: An internal road network will be required within the Project site for installation of the

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turbines during the construction process and for ease of access to the turbines for maintenance purposes during operation. It is important to note that the internal road will follow to the greatest extent possible the existing track and dirt roads within the Project site.

It is important to note that the ESIA consider the final Project. All baseline surveys and assessments have been conducted for the entire Project boundary, taking into account all supporting infrastructure and facilities within the site, including but not limited to the internal substation, internal roads, MV cable routes, buildings and other associated infrastructure.

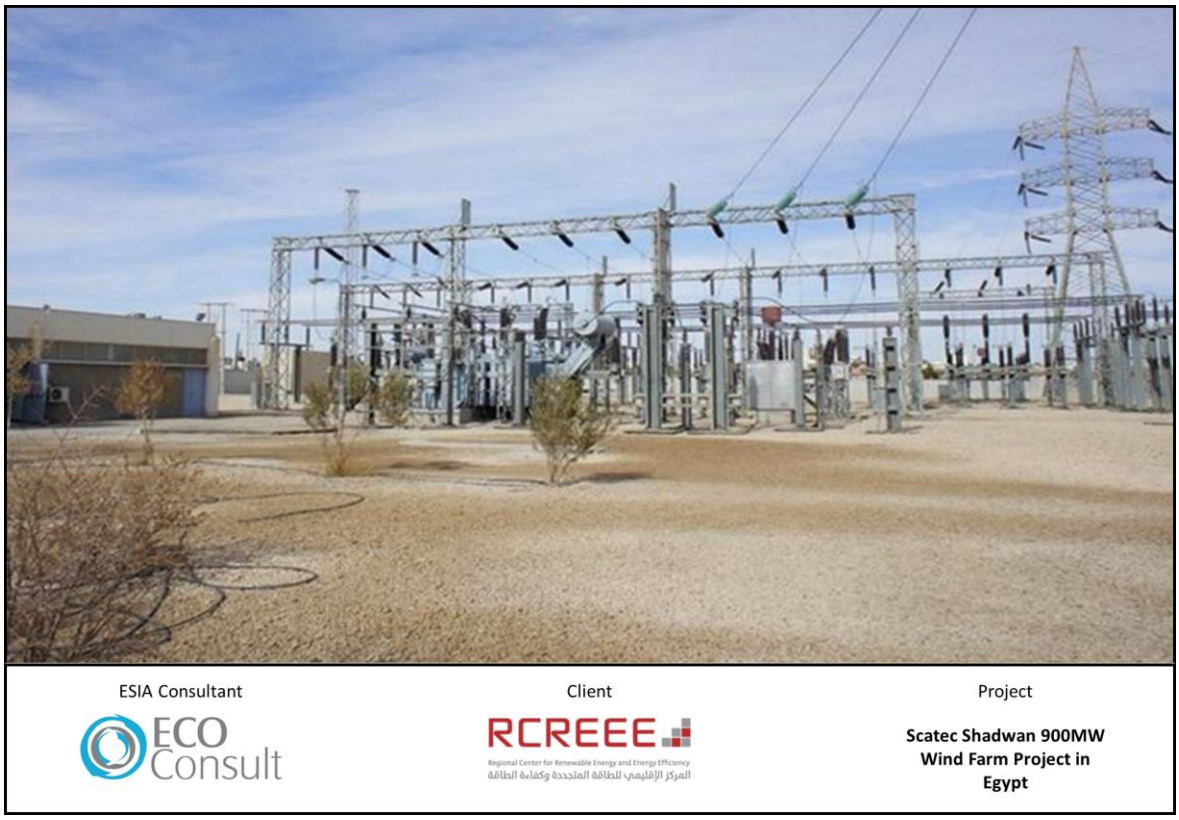


Figure 10: Typical Substation

2.3.4 Other Temporary Components

There are additional Project components that will be required on a temporary basis throughout the construction phase of the Project in particular. Those are identified below. The location of such components in particular will not be available at this point, nor is it expected to be available during the ESIA preparation phase. Those will be identified once the EPC Contractor is appointed and a detailed design is completed.

- Site Offices: temporary offices that will be used by Developer and EPC Contractor staff during the construction phase. It is expected that this will be within the Project footprint.
- Laydown areas: this is a temporary storage area where tools, materials, equipment and vehicles are stored when not in use. It is expected that this will be within the Project footprint.
- Batching Plant: a mobile concrete batching plant will be established within the Project footprint for preparation of the concrete to be used for foundation installation and other infrastructure

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requirements (e.g. substation, buildings, etc.). This will reduce transportation requirements compared to an off-site plant which is considered of significance given the remoteness of the site. A typical batching plant is provided in the figure below. It is expected that this will be within the Project footprint.

- Borrow Pits: borrow pits are used to provide filling materials such as gravel, sand, clay for various construction requirements such as base for road networks, foundations for WTGs, and other. A typical borrow pit is provided in the figure below. Those are expected to be from authorized / approved / licensed quarries that are offsite.
- Generators: generators will be used for supply of electricity throughout the construction phase of the Project for various power supply requirements. There will be no temporary power supply lines erected before or during the construction period.

As discussed in further details in "Section 10", requirements for temporary components will be included within the Environmental and Social Management Plan (ESMP) and Environmental and Social Management System (ESMS) to be considered by the EPC Contractor when planning for such components.

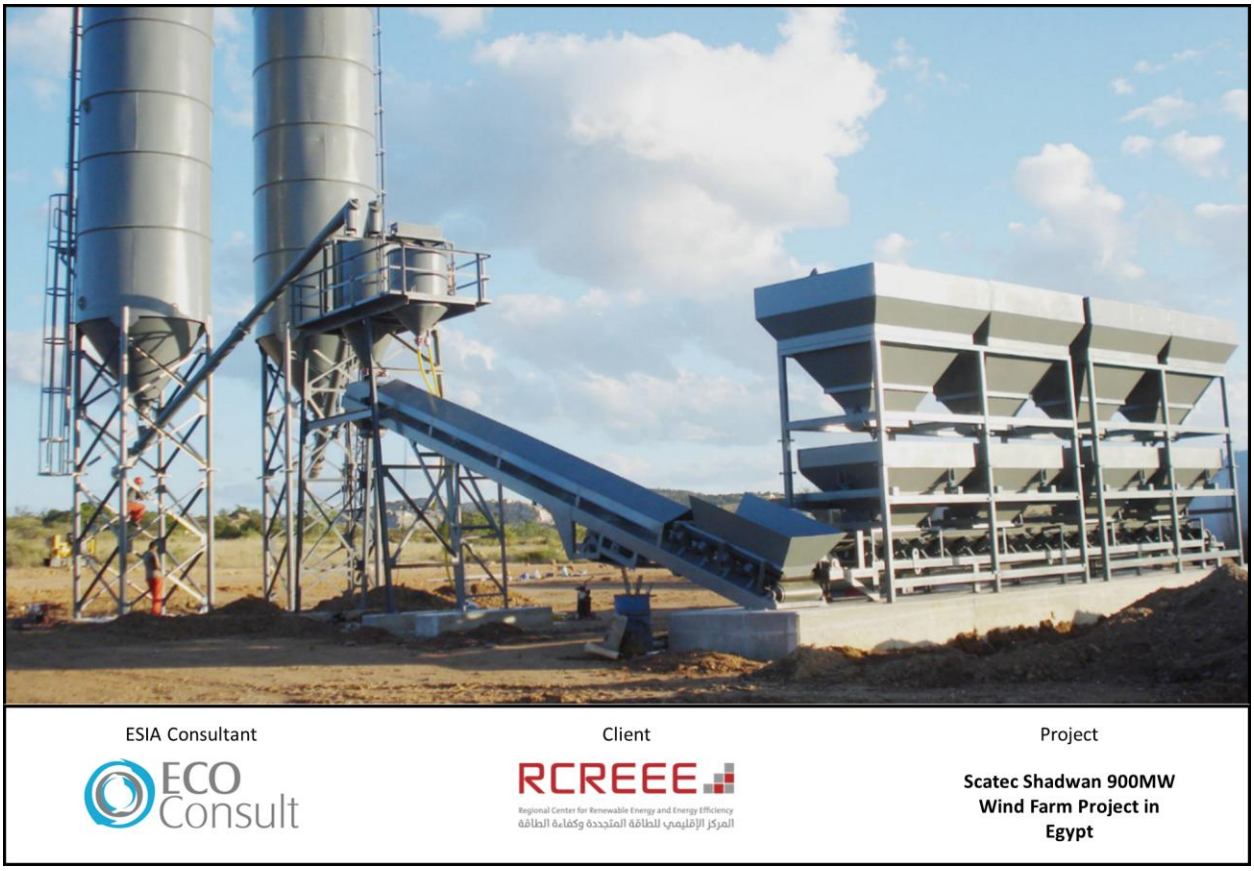


Figure 11: Typical Mobile Batching Plant

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Figure 12: Typical Burrow Pit

2.3.5 *Associated Facilities*

Associated facilities are facilities that would not have been constructed or expanded if the Project did not exist and without which the Project would not be viable. For this Project, the key associated facility is the Overhead Transmission Line (OHTL) that will connect from Project until the national grid in order to supply electricity to end users.

EETC is to be responsible for off-site connection works from the onsite substation to the National Grid. This will be through three 500kV Overhead Transmission Line (OHTL). EETC will be responsible for identification of the OHTL route, preparing the detailed design, undertaking construction activities, as well as operation and maintenance activities. The following preliminary information was provided by EETC as the available options for the Project's possible OHTL connection to the national grid:

- A 500 kV OHTL connecting October Substation to Shadwan Substation, with an approximate length of 350 km.
- A 500 kV OHTL connecting S4 Gharb Bakr Substation to Shadwan Substation, with an approximate length of 45 km.
- A 500 kV OHTL connecting Orascom GOS III Substation to Shadwan Substation, with an approximate length of 15 km.

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After the selection of the appropriate connection was undertaken, EETC chose the 500 kV OHTL connecting S4 Gharb Bakr Substation to Shadwan Substation, with an approximate length of 45 km as the connection method for the Project.

Please note that a standalone ESIA for the selected OHTL was undertaken.

EETC is responsible for transmission infrastructure, including the planning, design, permitting, construction, ownership, and operation of high-voltage transmission lines. As such, Scatec has no control or influence over the conception, routing, design, implementation, or operation of these OHTLs.

Furthermore, as per the Egyptian environmental regulations and environmental approval, transmission lines are subject to a standalone environmental approval requirement. EETC is responsible for preparing and submitting standalone ESIAs for each OHTL to the EEAA, obtaining the necessary environmental approvals prior to construction, and ensuring compliance with all applicable environmental laws and regulations.

2.3.6 Footprint of the Project Components

This section provides an estimate on the footprint of the Project considering the components discussed in the previous section, based on technical input provided by engineers that have prepared the final layout of the Project.

As noted in the table below, the total area of disturbance for the Project is significantly small, calculated at less than 2% of the total boundary of the Project area.

Table 5: Footprint of the Project Components

Component	Footprint	Description
Turbines	0.41 km^2	This includes the footprint for the foundation and the crane pad area for each of the 83 turbines. Typically, each crane pad is around 4,500 m^2 in area, whereas each foundation typically consists of a circular footing of 24m diameter
Substation and Warehouse and Storage Facilities	0.08 km^2	Footprint for each substation, warehouse, and building facilities. The Project has 1 internal substation.
Cables	0.10 km^2	This includes MV cables (total length of around 55 km and width of 0.7 m) and telecommunication cables (total length of around 55 km and width of 1.15 m)
Internal Road Networks	0.825 km2	This includes the road network with a total length of around 55 km and a width of 15 m.
Temporary facilities	0.145 km^2	This includes site offices, laydown areas and batching plant. Those will be located within the Project boundary.
Total Project Footprint	1.56 km^2	
Total Project Site Boundary Area	90 km^2	Project footprint is around 1.7% of the total boundary of the Project area.

2.4 Overview of Project Activities

This section presents the likely activities to take place during the Project development and which will include three distinct phases: (i) planning and construction, (ii) operation, and (iii) decommissioning. Each of which is summarized below.

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2.4.1 Planning and Construction Phase

The typical activities that will take place during the planning and construction phase for wind farms include the following:

- Preparation of the detailed design and layout of wind turbines within the Project site in addition to the various other infrastructure/utility elements (buildings, roads, substation, etc.);
- Preparation of the Contractor Environmental and Social Management Plan (C-ESMP) and approve it by the AfDB and the developer, prior to starting of mobilization works.
- Site mobilization and will involve transporting construction equipment, materials and personnel to the site. This includes setting up temporary facilities such as site offices and storage areas;
- Incorporation of findings from the comprehensive geotechnical study, which includes recommendations based on site investigations and subsequent laboratory testing and geotechnical analyzes carried out in June 2025 for the Project, to inform the optimal placement and foundation design of wind turbines and associated infrastructure;
- Transportation of wind turbine components to the Project site. The components are expected to be transported to the closest marine port and then transported by road to the Project site;
- Site preparation of the turbine foundation. Such activities are limited to relatively small individual footprints of the foundations and will include excavations and land clearing activities for building the foundations;
- Establishment of the Concrete Batch Plant at the project site.
- Installation of turbine components to include tower assembly, hub, rotor, and nacelle lift and rotor assembly which most likely will occur through onsite mobile cranes;
- In addition to the erection of each turbine, there is additional construction work (which could include excavations, land clearing activities, electrical work, etc.) that must be conducted to connect each turbine to the power grid, this could include the installation and laying of transmission and communication cables, installation of substations, and installation of project transmission line;
- Other construction works (which could include excavations, land clearing activities, etc.) for the potential access road construction or upgrade and for the building infrastructure (warehouse and offices); and
- Where possible, the EPC contractor will connect to existing utilities, including the power supply. Where this is not possible, power will be supplied by temporary diesel generators. At the time of writing this ESIA report, the precise number of generators needed has not yet been determined.
- Ensure a proper ESHS management system in place of implementing the project's ESMP.

2.4.2 Operation Phase

Wind farm projects generally require limited operational activities as this mainly includes the following:

- Commissioning tests of the wind farm which usually involves standard electrical tests for the electrical

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infrastructure as well as the turbine, and inspection of routine civil engineering quality records. Careful testing at this stage is vital if a good quality wind farm is to be delivered and maintained. Commissioning of an individual can take around two days with experienced staff;

- Normal daily operation of the wind farm. The long-term availability of a commercial wind turbine is usually in excess of 97 percent (i.e. 97% of the time, the turbine will be available to work); and
- Maintenance will also take place through a dedicated team. Typical routine maintenance time for a modern wind turbine is 40 hours per year. Non-routine maintenance may be of a similar order. Although minimal, maintenance activities may include turbine and rotor maintenance, lubrication of parts, washing of blades, maintenance of electrical components, full generator overhaul, etc.

On the other hand, the associated OHTL with the Project generally require extremely limited operational activities as this mainly includes the following:

- Routine maintenance and repair which would be based on a set schedule. This would include towers, conductors and accessories and would include activities such as insulators cleaning, joints tightening, checkup on foundations and its earthing, power conductor and earth wire conductor, etc.
- Non-routine maintenance which is undertaken in case of failure of any of the Project components and could include replacement of equipment such as broken insulators, worn-out cables, damaged cross-arms, etc.
- Ensure a proper ESHS management system in place of implementing the project's ESMP

2.4.3 Decommissioning Phase

According to the PPA agreement, the Project is expected to be operational for 25 years. Prior to the commencement of decommissioning activities, a disposal plan will be prepared and submitted to the relevant authorities for review and approval, as applicable. In the case of complete decommissioning of a wind turbine, the tower and blades of the removed wind turbine will be taken down by crane, disassembled into components, and then the turbine will be refurbished at source and used elsewhere for another Project, recycled/recovered where feasible, or sent for final disposal. The decommissioning process will include an evaluation of recycling and recovery options for wind turbine components, including the identification of licensed waste processing facilities within the country or internationally, where required. This will cover, at a minimum, turbine towers, nacelles, rotor blades, electrical cables and transformers, control and electronic components, substation equipment, hazardous and/or toxic liquids such as oils, lubricants and coolants, as well as hazardous and/or toxic solid materials. Cost estimation will also be undertaken for the collection, recycling, recovery and/or disposal of such components at the end of the Project lifetime.

Materials suitable for reuse or recycling, such as steel components, copper cabling and other recoverable materials, will be identified as part of the decommissioning planning process. Hazardous waste management, including any transboundary movement of waste, will be undertaken in accordance with the Basel Convention and applicable national regulations. Where materials are exported internationally for recycling or disposal, the entity responsible will specify the materials to be exported and the receiving licensed facility. Confirmation from the Original Equipment Manufacturer (OEM), where applicable, will also be obtained regarding the recommended procedures for dismantling, safe handling, packaging, transport, recycling and disposal of turbine components in line with industry best practice. Where recycling, recovery, reuse or international disposal options cannot be achieved, as a last option, the

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disposal plan will investigate the disposal of the relevant components at existing waste facilities in Egypt through coordination with EEAA.

The base will typically be left in place and covered by gravel and peat or loam. Internal road networks and access roads are typically kept in place. Tracks used for maintenance vehicles will be restored and can be kept as agricultural routes. Gates and fences, including those around the substation area and onsite offices, will be removed.

2.5 Project Schedule

Discussed below is the preliminary and tentative schedule for the overall Project development that is available at this point, as provided by the Developer.

- Planning and Design phase: This phase is ongoing and is expected to be completed by June 2026.
- Construction phase: this will involve undertaking of all construction activities as identified earlier for the Project development. This is expected to require around 31 months from June 2026 until December 2028.
- Operation phase: is expected to start in June 2028 for the duration of the PPA which is as discussed earlier set for 25 years.

2.6 Workforce Requirements

According to information provided by the Developer, the Project will require the following workforce throughout the construction and operation phase:

- Around 2000 job opportunities are at peak during the construction phase for a duration of approximately 31 months. This will mainly include 300 skilled job opportunities (to include engineers, technicians, consultants, surveyors, etc.) and 1,700 semi-skilled and unskilled job opportunities (such as laborers, security personnel, housekeeping, etc.).
- Around 100 job opportunities during the operation phase for a duration of 25 years. This will include 70 skilled job opportunities (such as engineers, technicians, administrative employees, etc.) and 30 unskilled job opportunities (such as security personnel, drivers, etc.).

The Developer is committed to implementing transparent and fair recruitment procedures that allow local community members to access employment opportunities associated with the Project. To the extent possible, the Developer will seek to recruit local community members during both the construction and operation phases for skilled and unskilled positions, provided that applicants meet the required qualifications, experience, skills and competencies for the relevant role.

Recruitment will be undertaken in accordance with applicable Egyptian labour laws and will be based on a fair assessment of each applicant's suitability for the position. All employees will be subject to the Developer's standard human resources policies and procedures and will be required to comply with the Developer's disciplinary code and workplace rules.

The recruitment process will be conducted without discrimination on the basis of ethnicity, gender, race, religion, disability, social background or any other demographic factor. Preference may be given to members of directly affected local communities, where appropriate, provided that they meet the minimum requirements for the relevant position.

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2.7 Other Wind Farm Developments within Red Sea Governorate

Within the Red Sea Governorate, there are several other wind farms that are both operational and under development. The New and Renewable Energy Authority (NREA) assigned plots in the GoS, east and west of the Nile, Benban and Kom Ombo regions for renewable energy. This includes a plot with an area of 350 km^2 in the GoS for wind power projects that the Project lies in. The boundaries for all NREA plots can be seen in black in the figure below. [7,8,9]

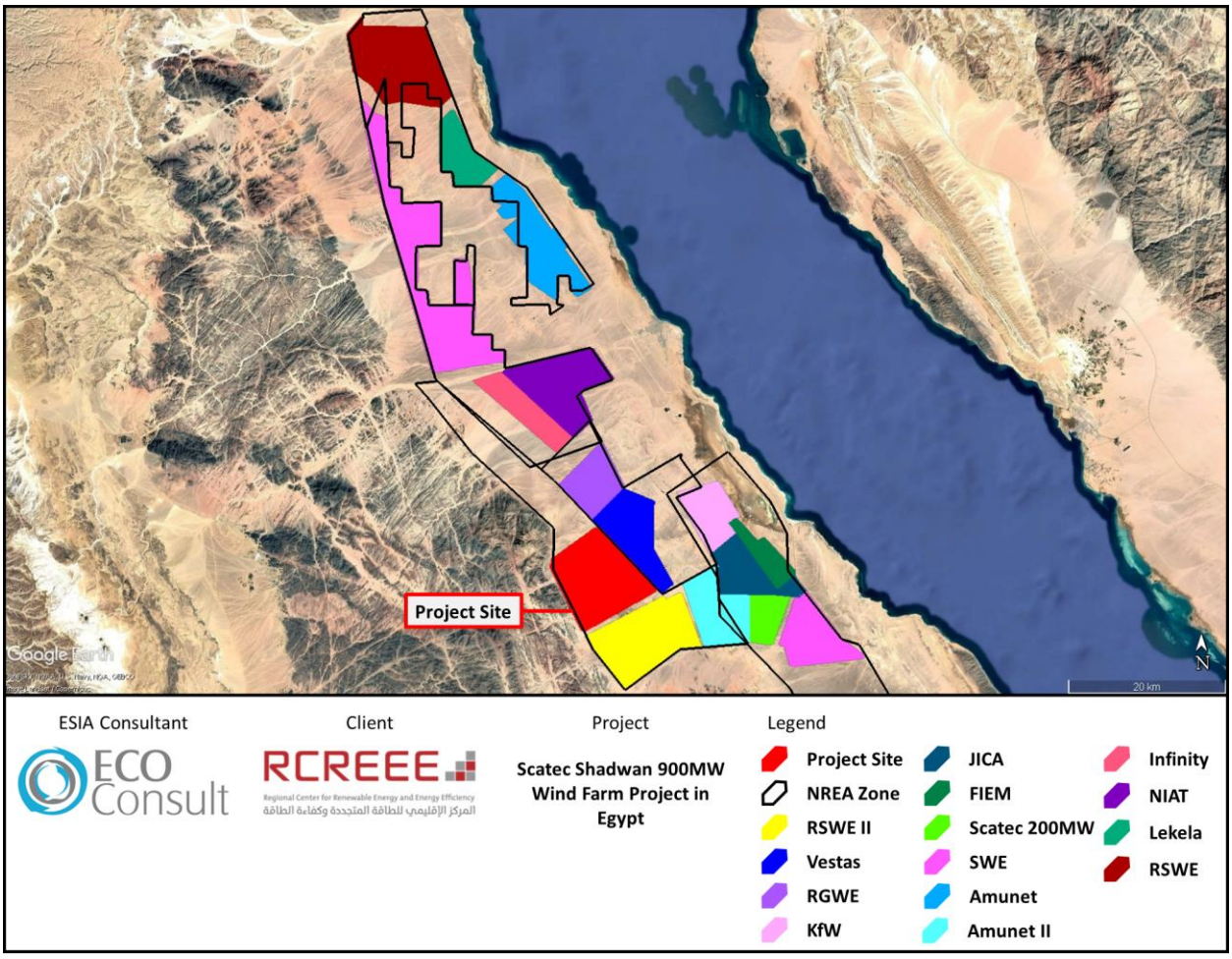


Figure 13: Nearby Planned/Existing Wind Farms

Red Sea Wind Energy (RSWE) Wind Farm – 650 MW (Partially Operational, Partially Planned)

The RSWE wind farm is located approximately 57km north-northwest of the Project site and is almost completely within the NREA wind energy development zone. It consists of an operational 500MW wind farm and a planned 150MW extension, developed under a BOO scheme by Red Sea Wind Energy S.A.E., for a total capacity of 650MW.

[7] Environmental and Social Impact Assessment Study 1,000 MW Wind Farms at the Gulf of Suez
[8] Environmental Impact Assessment for Wind Energy Power Plant, Gabal El Zeet, Suez Gulf, in Egypt
[9] Strategic and Cumulative Environmental and Social Assessment Active Turbine Management Program (ATMP) for Wind Power Projects in the Gulf of Suez

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The development covers an area of approximately 75.8km² and will comprise 104 turbines once complete – 84 operational and 20 planned. The ESIA was completed in 2024[10], and the extension is expected to be operational by August 2025.

GOS III (RSWE II) Wind Farm – 900MW (Planned)

Through a BOO mechanism, a direct proposal was submitted for the development of a 900MW wind farm in the Gulf of Suez. The site is expected to have around 90 turbines. It is located to the south of the Project site, covering a total area of 90km² within the NREA wind energy allocated development zone.

Ras Gharib Wind Energy (RGWE) Wind Farm – 262.5MW (Operational)

The RGWE wind farm is located approximately 3km north of the Project site and is within the NREA wind energy development zone. It covers a total area of approximately 41km² and comprises 125 turbines. The project is fully operational.

NREA – Governmental Wind Farms – 1332MW (Operational and Planned)

A cluster of five (5) wind farms developed under governmental agreements, located within the NREA wind energy development zone at various distances from the Project site.

- KfW Wind Farm – 240MW (Operational): located around 10km northwest of the Project site, with a total area of approximately 39km².
- JICA Wind Farm – 220MW (Operational): located around 11km east of the Project site, with a total area of approximately 44km².
- FIEM Wind Farm – 120MW (Operational): located around 16km east of the Project site, with a total area of approximately 22km².
- Vestas Wind Farm – 252MW (Operational): located around 114m northwest of the Project site, making it the nearest wind farm to the Project. It comprises 70 turbines and covers a total area of around 57km².
- NIAT Wind Farm – 500MW (Planned): located around 14km north of the Project site, with a total area of 73km² with 173 turbines planned.

Scatec Wind Farm – 200MW (Planned)

Through the BOO mechanism, a direct proposal was submitted by Egypt Green Hydrogen SAE for the development of a 200MW wind farm in the Gulf of Suez within the NREA wind energy development zone. The site is located approximately 13km southeast of the Project site covering an area of approximately 22km² to include 25 turbines. The PPA is signed, and the project is expected to be operational in 2027.

Suez Wind Energy (SWE) Wind Farm – 1.1GW (Under Construction)

Through the BOO mechanism, a direct proposal was submitted by ACWA Power to EETC for the development of a 1.1 GW wind farm in the Gulf of Suez. The project is within the NREA wind energy development zone that will be developed over two geographically separate plots:

- Plot 1 (550MW): located approximately 26km north-northwest of the Project site.

[10] BOO Wind Power Plant 500MW + 150MW Extension at the Gulf of Suez

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- Plot 2 (550MW): located approximately 18km southeast of the Project site.

The development covers a total area of around 145km² and include 138 turbines (69 per plot). Separate ESIAs were prepared in 2024 for each plot[11,12]. The PPA is signed, and the project is expected to be operational by 2027.

Amunet Wind Farm – 500 MW (Operational)[13]

Through the BOO mechanism, a direct proposal was submitted by Amunet Wind Power Company S.A.E. to EETC for the development of a 500MW wind farm in the Gulf of Suez. The site is almost fully within the NREA wind energy development zone and is located approximately 31km north of the Project site covering an area of 69.4km², with the plan to include up to 77 turbines. The PPA is signed, and the project is expected to be operational in Q3 2025[14].

Amunet II Wind Farm –500MW (Planned)

Through a BOO mechanism, a direct proposal was submitted for the development of a 500MW wind farm in the Gulf of Suez. The site is expected to have around 80 turbines. It is located to the south of the Project site, covering a total area of 54km² within the NREA wind energy allocated development zone.

Infinity Wind Farm – 200MW (Under Construction)

Through a BOO mechanism, a direct proposal was submitted by Infinity Power Holding (IPH) for the development of a 200MW wind farm in the Gulf of Suez. The site is expected to have 26-28 turbines. It is located around 13km north of the Project site, covering a total area of 27.5km² within the NREA wind energy development zone. The PPA has been signed, and according to the ESIA timeline[15], the project is expected to be operational in January 2026.

Lekela Wind Farm – 250MW (Operational)[16]

Through a BOO mechanism, a direct proposal was submitted by Lekela Power for the development of a 250MW wind farm in the Gulf of Suez within the NREA wind energy development zone, and the PPA was signed accordingly. The site is located around 47km north-northwest of the Project site and has 96 turbines covering a total area of 36km².

[11] SUEZ Wind Energy BOO Wind Power Plant 1.1 GW – SWE North (PLOT 1)
[12] SUEZ Wind Energy BOO Wind Power Plant 1.1. GW – SWE South (PLOT 2)
[13] Amunet Wind Farm 500 MW at Gulf of Suez
[14] https://www.ameapower.com/786-2/
[15] Masdar Infinity Power Holding 200MW Wind Power Project in Gulf of Suez
[16] ESIA for Lekela BOO Wind Power Plant at Gulf of Suez

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3. ESIA APPROACH AND METHODOLOGY

This section presents the overall approach and methodology that was followed throughout the ESIA process for the Project.

3.1 Analysis of Alternatives

The Egyptian Regulations to include the "Guidelines of Principles and Procedures for Environmental Impact Assessment" (EEAA, 2009) requires that the ESIA identify and analyze alternatives and present the main reason for the preferred choice. The examination of alternatives is also considered to be a key element of the ESIA process under good international practice, to include but not limited to the: (i) IFC Performance Standard 1 (IFC, 2012) and the associated "IFC Guidance Note 1" (IFC, 2012); (ii) EBRD Performance Requirement 1; and (iii) AfDB Environmental and Social Operational Safeguard 1 (OS1): Assessment and Management of Environmental and Social Risk

The analysis of alternatives is presented in "Section 4". The section discusses and compares several alternatives to the Project development in relation to: (i) the Project site, (ii) the Project design, and finally investigated the 'no action alternative' - which assumes that the Project development does not take place.

3.2 Stakeholder Consultation and Engagement

Stakeholder consultation and engagement is an essential part of the ESIA process and has been carried out in accordance with the regulatory requirements in Egypt and the international E&S standards and requirements. The previous and future stakeholder consultation and engagement for the Project are summarized below and discussed in detail in "Section 4".

The Project to date has included extensive stakeholder consultation and engagement with various stakeholder groups such as national governmental entities, regional and local governmental entities, Non-Governmental Organizations (NGOs), local communities, and other as appropriate. This has been undertaken through bi-lateral meetings, Focus Group Discussions (FGD), e-mail communication, phone communication, formal letters, and other.

"Section 4" also discusses future stakeholder engagement and consultations which are to take place at a later stage. This mainly includes: (i) disclosure of Project documentation on Developer's website; (ii) distribution of Project documentation at key local community platforms; and (iii) implementation of the Stakeholder Engagement Plan (SEP) by the Developer which describes the planned stakeholder consultation activities and engagement process' to take place after the ESIA approval.

The SEP is prepared in compliance to AfDB Environmental and Social Operational Safeguard 10 (OS10): Stakeholder Engagement and Information Disclosure as well as other project's funding institutions.

3.3 Delineation of Study Boundaries and Scope of Assessment

3.3.1 Definition of Spatial Study or Area of Influence (AoI)

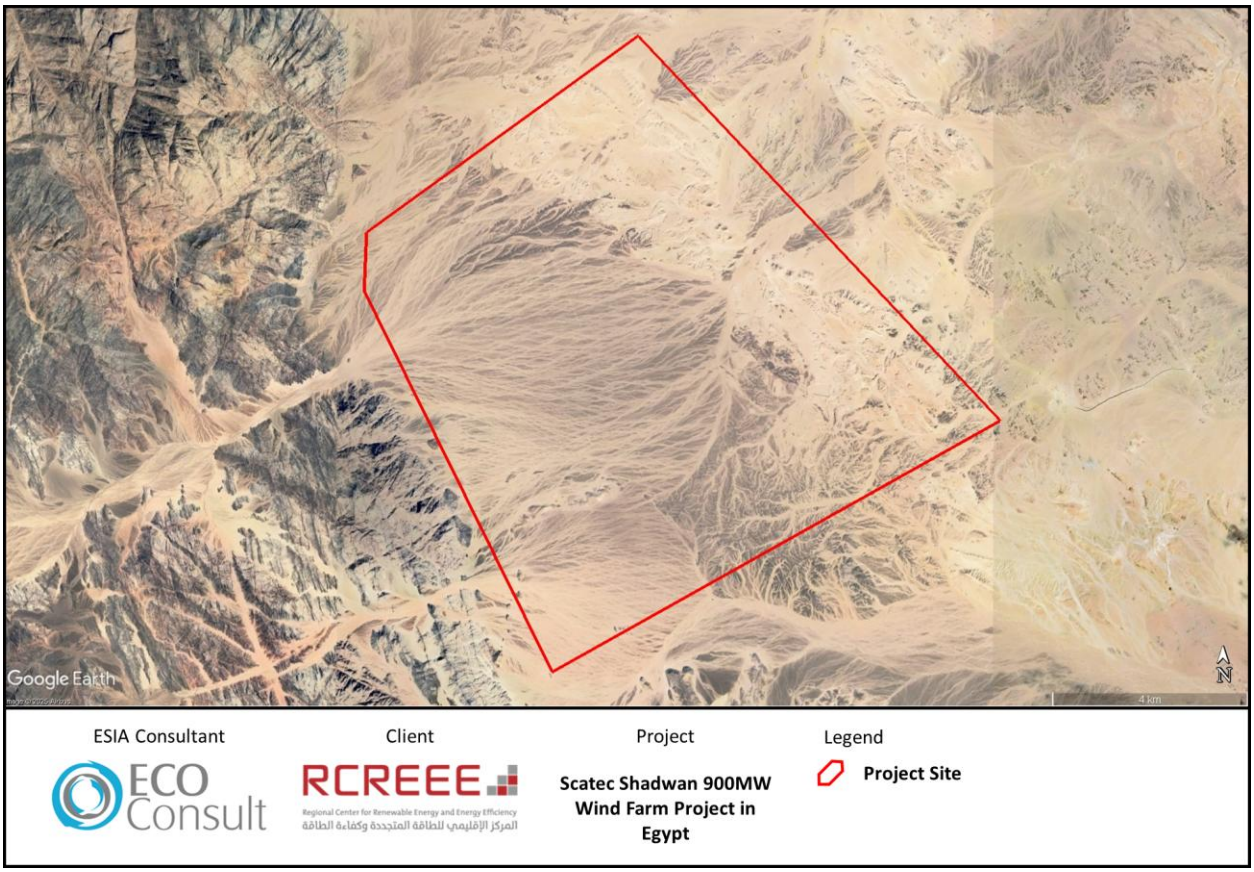
Before detailing the methodology of the assessment, it is important to delineate the study boundaries and the scope of the assessment that will be undertaken, both of which are discussed below.

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Definition of Spatial Study Area

The overall study area (or AoI) for the ESIA represents the potential Area of Influence (AoI) of the Project. This is 'the area over which significant effects of the Project could reasonably occur, either on their own, or in combination with those of other developments and projects.

In general terms, the study area for Project ESIA includes the footprint of Project disturbance as demarcated in red in the figure below. This includes the wind farm Project site with a total area of 90 km^2.



However, for certain E&S parameters (such as noise, landscape and visual, socioeconomics, etc.), the study area goes beyond the actual footprint of the Project site, and therefore an appropriate thematic study area is determined for each theme on a case-by-case basis. Such a thematic study area is clearly identified within the relevant section it relates to throughout this ESIA.

In identifying this thematic study area, the type and degree of the potential direct and indirect effects were taken into consideration. The core area where direct effects are likely to occur was determined, as well as the wider area of influence where indirect, combined and cumulative effects are likely to occur in the surrounding areas and communities

3.3.2 Temporal Scope of the Assessment

The Project will be developed in a three-phase sequence as follows. The potential impacts are assessed throughout the various Project phases.

- Planning and Construction Phase;

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- Operation Phase; and
- Decommissioning Phase.

(i) Planning and Construction Phase

This includes onsite construction activities which will be undertaken by the EPC Contractors under the guidance of the Developer. This mainly includes preparing the detailed design and layout of the turbines, transportation of Project components onsite, construction of the substation, as well as onsite site preparation and construction activities for installation of wind turbines.

(ii) Operation Phase

This includes activities to be undertaken by the Project Operator. Activities expected to take place mainly include the normal daily operation of the Project and the routine maintenance activities.

(iii) Decommissioning Phase

Generally, the anticipated impacts throughout the decommissioning phase are similar in nature to impacts assessed during the construction phase – and specifically in impacts related to soil and groundwater (from improper management of waste streams), air quality and noise, and occupational health and safety. Therefore, the assessment of impacts for those receptors and mitigation identified during the construction phase is assumed to apply to this phase in particular without the need to reiterate or emphasize this throughout subsequent chapters.

3.3.3 Environmental and Social Baseline Conditions

As part of the ESIA process, the baseline environmental and social conditions of the study area were established. Describing the baseline includes identifying and defining the importance and sensitivity of the various environmental and social resources and receptors likely to be impacted, i.e. within the study area. Understanding the value or sensitivity of the resources and receptors to impacts and changes is an important consideration when determining the significance of effects and allows for better identification of the most appropriate measures that could be employed to avoid impacts, and to mitigate any adverse impacts.

The description of environmental and social baseline conditions has considered a wide range of data and information gathered from various sources, including:

- Desk-based studies and literature reviews;
- Data from statutory and non-statutory stakeholders; and
- Field surveys and site investigations.

These studies have covered all the environmental and social aspects related to the Project. The baseline conditions are treated as those conditions which would prevail in the absence of the Project.

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Studies of the environment and social baseline are described in "Section 7" to include the following: landscape and visual; land use; geology/hydrology/hydrogeology; biodiversity, avifauna, bats; archaeology and cultural heritage; air quality and noise; infrastructure and utilities; and socioeconomic conditions. Within each section, the methodology which was undertaken throughout 2025 for assessment of each of those baseline conditions is described in detail. This also included accounting for seasonal factors for biodiversity, avifauna, and bats – refer to each section for additional details on timing of surveys undertaken.

3.4 Impact Assessment Methodology

Given the scale and type of the Project, the ESIA commences with an assessment of the positive environmental and economic impacts on the strategic and national level given the current challenges the energy sector in Egypt faces – as highlighted in "Section 8.1".

It then moves forward into the main body of the ESIA undertaking the assessment of impacts on environmental and social parameters for each receptor under the relevant chapter, from "Section 8.2" to "Section 8.15". The following section provides a description of the approach, methodology and process adopted for the impact assessment presented within this ESIA.

3.4.1 Approach to Assessment of Impacts

The adverse and beneficial environmental and social impacts of the Project have been identified and assessed against the established baseline. A consistent approach to the assessment of impacts was followed to enable environmental and social impacts to be broadly compared across ESIA. A set of generic criteria were used to determine significance (see below) which were applied across the various environmental social and environmental parameters.

As far as possible, environmental and social impacts were quantified. Where it was not possible to quantify impacts, a qualitative assessment was conducted using professional experience, judgment and available knowledge, and including the consideration of stakeholder views. Where there were limitations to the data, and/or uncertainties, these were recorded in the relevant chapters, along with any assumptions that were taken during the assessment.

In order to determine the significance of each impact, two overall factors are considered:

- The importance and/or sensitivity of the E&S receiving parameter, as determined during the assessment of baseline conditions; and
- Magnitude and Nature of the impact.

3.4.2 Sensitivity of the Receiving Parameter

Receiving parameter sensitivity was determined using information taken from the baseline description on the importance, significance or value of the social or environmental component under examination. It is important to understand the sensitivity of the receiving parameter, as this is a measure of the adaptability and resilience of an E&S parameter to an identified impact. The following categories of sensitivity were applied to the assessment:

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- High: The E&S parameter/receptor is fragile and an impact is likely to leave it in an altered state from which recovery would be difficult or impossible.
- Medium: The parameter/receptor has a degree of adaptability and resilience and is likely to cope with the changes caused by an impact, although there may be some residual modification as a result; and
- Low: The parameter/receptor is adaptable and is resilient to change.

3.4.3 Magnitude and Nature of the Impact

The magnitude of the impact is the scale of change which the impact may cause compared to the baseline and how this change relates to accepted thresholds and standards. The following categories were applied to the assessment:

- High: a large change compared to variations in the baseline. Potentially a clear breach of accepted limits;
- Medium: change which may be noticeable and may breach accepted limits; and
- Low: when compared with the baseline, change which may only just be noticeable. Existing thresholds would not be exceeded.

Furthermore, in determining the magnitude of the impact it is important to take into account and consider several other factors which define the nature of the impact. This includes the following:

Type of Impact

- Positive: applies to impacts that have a beneficial E&S result, such as enhancement of conditions; and
- Negative: applies to impacts that have a harmful aspect associated with them such as loss or degradation of environmental resources.

Type of Effect

- Direct: applies to impacts which can be clearly and directly attributed to a particular E&S parameter (e.g. generation of dust directly impacts air quality); and
- Indirect: applies to impacts which may be associated with or are subsequent to a particular impact on a certain E&S parameter (e.g. high levels of dust could affect occupational health and safety).

Duration (how long the stressor or its effect last)

- Short Term: applies to impacts whose effects on the environment will disappear within a 1-year period, or once construction activities are completed;
- Medium Term: applies to impacts whose effects on the environment will disappear within a 5-year period; and
- Long Term: applies to impacts whose effects on the environment will disappear in a period greater than 5 years.

Reversibility

- Reversible: applies to impacts whose significance will be reduced and disappeared over time (either

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naturally or artificially), once the impacting activity ceases; and

- Irreversible: applies to impacts whose significance will not be reduced nor disappeared over time (either naturally or artificially), once the impacting activity ceases.

3.4.4 Assessing the Significance of the Impacts

The concept of 'significance' is central to the ESIA process and aids the identification and categorization of E&S effects. As noted, in order to determine impact significance, the sensitivity of each E&S parameter/receptor is considered in combination with the magnitude of the impact. The table below demonstrates how these parameters are considered in the assessment of significance.

Table 6: Determination of Significance

Sensitivity of Receiving Parameter/Receptor \ Magnitude of Impact	Low	Medium	High
Low	Not significant	Minor	Minor
Medium	Minor	Moderate	Moderate
High	Minor	Moderate	Major

While the above matrix provides a framework for the determination of significance, and enables comparison across E&S parameters, a degree of professional judgement must be used and some parameter-specific factors to be considered in making the determination of significance. Below provides additional guidance to the degrees of significance used in this ESIA. Note that positive impacts are defined but are not rated for significance.

- *Major significance*: Based on the above methodology such impacts result in high magnitude and affect receptors that are highly sensitive. Those are impacts that are considered to have potentially significant and adverse risks and will be a key factor in the overall decision-making process of the Project. In addition, they will also require detailed considerations for mitigation and monitoring measures;

- *Moderate significance*: Based on the above methodology such impacts either (i) result in medium magnitude and affects receptors that are of medium or high sensitivity; or (ii) result in high magnitude and affect receptors that are of medium sensitivity. Those are impacts that are considered to have potentially limited adverse risks and are unlikely to have a significant effect on the overall decision-making process. In addition, mitigation and monitoring measures require some consideration;

- *Minor significance*: Based on the above methodology such impacts either: (i) result in low magnitude and affects receptors that are of medium or high sensitivity; or (ii) result in medium magnitude and affects receptors that are of low sensitivity; or (iii) result in high magnitude and affects receptors that are of low sensitivity. Those are impacts that are considered to have minimal risks and unlikely to be of importance for the overall decision-making process. In addition, mitigation and monitoring measures are readily available to address such risks; and

- *Not significant*: Based on the above methodology such impacts result in low magnitude and affect receptors that are of low sensitivity. Such impacts are beneath the level of perception and do not require any mitigation or monitoring measures.

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3.4.5 Management Measures

Based on the impact assessment undertaken a set of management measures are identified for each impact which aims to address it. Management measures include the following:

- *Additional Requirements*: those are generally regulatory requirements which have been identified and which must be taken into account at a later stage;
- *Additional Studies*: for certain E&S receptors additional studies must be undertaken at a later stage. Such studies and their scope, timing, etc. have been highlighted were relevant;
- *Mitigation Measures*: a vital step in the ESIA process is the identification of measures that can be taken to ensure that impacts are mitigated or reduced to acceptable levels. The ESIA will firstly consider the significance of any impacts caused by the Project and then assigned mitigation options through applying the following hierarchy:
  - Avoiding or 'designing out' impacts wherever possible;
  - Considering alternatives or modifications to the design to reduce the impacts wherever possible;
  - Applying measures to minimize and manage impacts on the receptor; then
  - As a last resort, identify fair compensation, remediation and offsetting measures to address any potentially significant residual effects.

  Some negative impacts can be easily mitigated, whilst others cannot or are too difficult and costly to mitigate. The various potential impacts are described in this ESIA, along with the provision of 'feasible mitigation measures' that can be implemented; and
- *Recommendations*: for positive impacts it is not possible to identify mitigation measures, but rather recommendations have been identified which aim to enhance the positive impact.

3.4.6 Assessment of Residual Significance

If there are mitigation measures it is then necessary to make an assessment of the 'residual significance' after mitigation has been taken into account. A re-assessment of Project impacts is then made, considering the effect of the proposed mitigation measures in order to determine the significance of the residual effects. Residual effects are discussed for each E&S theme in the ESIA chapters, and their significance determined and summarized in an Impact Assessment Table in "Section 8.15".

3.4.7 Assessment of Cumulative Impacts

For each of the impacts assessed, the ESIA investigates the cumulative impacts which could result from incremental impacts from other known existing and/or planned developments in the area and based on currently available information on such existing/planned developments. Assessment of cumulative impacts is presented in "Section 9".

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3.5 Development of Environmental and Social Management Plan (ESMP)

Based on the results of the impact assessment, development of management measures, and development of monitoring plan, a framework ESMP was compiled into a single table that details all of the above. The ESMP will be a key document and will list the E&S requirements and detail the procedures necessary for managing the significant E&S issues connected to proposed Project activities. The ESMP will be developed specifically to provide flexibility in the nature and exact location of operations, while ensuring all potential impacts are identified and properly mitigated and monitored throughout the later stages of the Project. This ESMP can be used as a stand-alone document during the different phases of the Project by Developer, EPC Contractor, Ministry of Ecology, Environmental Protection, and Climate Change, and other responsible parties. The ESMP complies with the directives of the AfDB Operational Safeguard 1 (OS1).

The ESMP aims to provide high level mitigations and requirements for managing the E&S risks anticipated from the Project.

Throughout the Project's construction and operation phase an Environmental and Social Management System (ESMS) must be implemented by all relevant parties (i.e. Developer, EPC Contractor and Project Operator). The ESMS must be Project and site specific and must build on and take into account the requirements of the ESMP presented throughout this document. The development and implementation of an ESMS is considered a key requirement under international E&S standards and requirements. The ESIA also identifies the overall framework, structure and key requirements for the ESMS for the key entities involved in the Project.

Note: as discussed previously under "Section 2.3", during the construction phase there will be temporary facilities which their location will not be known throughout the ESIA phase. This includes site offices, laydown areas, batching plants, borrow pits, and worker camp area. The ESMP will identify key requirements for such facilities in particular.

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4. STAKEHOLDER CONSULTATION AND ENGAGEMENT

This section discusses in detail the stakeholder consultation and engagement plans which were undertaken as part of the ESIA process for the Project and provides an overview of the findings. In addition, this section also discusses the future stakeholder consultation and engagement plans which are to take place at a later stage of the ESIA process as well as Project development. This chapter complies with the directives of the AfDB Operational Safeguard 1 and 10 (OS1, OS10).

4.1 Objectives

The Developer is committed to a technically and culturally appropriate approach to consultation and engagement with all stakeholders affected either directly or indirectly by the Project. The consultation program for the Project is based on informed consultation and participation in line with good international practice requirements with affected people and is designed to be both fair and inclusive. Consultation activities have been an ongoing process since the commencement of the Project development in June 2025.

Stakeholders are people or groups who are directly or indirectly affected by a project, as well as those who may have interest in a project and/or the ability to influence its outcome, either positively or negatively.

Stakeholders may include: (i) locally affected communities or individuals and their formal and informal representatives, (ii) national or local government authorities, politicians, religious leaders, civil society organizations and groups with special interests, (iii) the academic community, or other businesses.

The objective of stakeholder consultation is to ensure that a participatory approach takes place, which in turn documents concerns of all stakeholder groups and make sure that such concerns are considered, responded to, and incorporated into the decision-making process of the development. Stakeholder consultation needs to be a two-way communication process that imparts information to stakeholders but also obtains additional and on-the-ground information from them. Stakeholder consultation and engagement must take place at the inception phase of the ESIA process and be implemented all through the study period.

The specific objectives of this section are to:

- Describe and identify the stakeholders affected and/or with an interest in the Project;
- Summarize stakeholder engagement and consultation conducted to date. In addition, describe how the views and issues raised have informed and influenced the development of the Project; and
- Outline the future plans and approach to stakeholder engagement.

4.2 Stakeholder Identification and Analysis

The purpose of stakeholder identification is to identify and prioritize Project stakeholders for consultation. Stakeholder identification is an ongoing process, and thus key stakeholders will be identified during different stages of the Project. A systematic approach is used to map the stakeholders based on the Project zone of impacts. In this approach, by mapping the zone of social impacts, stakeholders are identified by the impact area.

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As a result of the stakeholder mapping, Project stakeholders are categorized into the following main categories:

1. People and groups who will be directly or indirectly affected by the project (such as local communities);
2. People and groups who may participate in the implementation of the project (such as investors and lenders);
3. People and groups who are not affected by the project development per se may but have a possibility to influence and make decisions on implementation of the Project (such as Ministries or regulatory agencies).

The main groups of stakeholders identified so far are listed in the table below. The list can be updated and modified in the course of the Project development and as a result of cooperation of the parties.

Table 7: Identified Groups of Stakeholders

Stakeholder Group	Description	Relevance
Stakeholders who may be directly or indirectly affected by the Project		
Local communities which as identified include: ▪ Ras Gharib city ▪ Wadi Dara village		This includes the following groups within the local communities specifically: ▪ Community Members: local community members have a vested interest in the Project due to mainly potential for job opportunities. In addition, local community members could be impacted by other potential negative impacts (e.g. worker influx, noise & shadow flicker, etc.). Such impacts are discussed and identified within this ESIA document. ▪ Community Leaders: They are socially active members and known figureheads for local community members, who may or may not hold government positions. ▪ Business Community (local subcontractors): such groups have a vested interest in the Project due to mainly potential for procurement opportunities such as subcontracting works (e.g. civil works, provision of food and amenities, etc.)
Stakeholders who may Participate in Implementation of the Project		
Investor / lender	Entities that will provide financing for the Project development.	They have interest in ensuring that the Project is developed and implemented in accordance with their E&S requirements and standards and will monitor the compliance of the Project with such requirements.
Stakeholders who may have a possibility to influence and make decisions on implementation of the project and/or may have an interest in the Project		
National Governmental Ministries		
The Egyptian Environmental Affairs Agency (EEAA)	Entity authorized to regulate environmental management issues.	For this Project it will be responsible for reviewing and approving the ESIA study, issuing the environmental permit for the Project, as well as monitoring the implementation of the ESMP and compliance with other conditions of approval as applicable.

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Stakeholder Group	Description	Relevance
Egyptian Electricity Transmission Company (EETC)	Entity that has signed the PPA with the Developer to be the off taker of electricity.	For this Project, they will also be responsible for designing, building and operating the associated interconnection facilities. This will include the Project's connection to the national grid which includes an Overhead Transmission Line (OHTL) or similar.
New & Renewable Energy Authority (NREA)	Entity that acts as the national focal point for expanding efforts to develop and introduce renewable energy technologies to Egypt.	For this Project, NREA was the entity responsible for allocation of the land for the development of the Project. Also, they are entrusted to plan and implement renewable energy programs in coordination with national and international institutions.
Ministry of Labor	Official governmental entity responsible for setting labor policies and legislations as well as ensuing protection of labor rights and working conditions.	They have a vested interest in ensuring that labor rights an proper working conditions are maintained for the Project in accordance with Egyptian laws and regulations.
Ministry of Tourism and Antiquities	Entity that is responsible for the preservation and protection of the heritage and ancient history of Egypt, under which operates all inspector offices in the governorates.	For this Project, they are the entity that ensure development activities do not negatively impact cultural heritage sites. In areas near archaeological or historically significant locations, the Ministry is responsible for assessing potential risks, granting necessary approvals, and overseeing measures to preserve and protect antiquities during project implementation.
Ministry of Civil Aviation	Official governmental entity responsible for civil aviation management in Egypt.	They are responsible for issuing permits for projects with specific height requirements and warning signs for turbines and overhead transmission line (s)(OHTLs) connection.
Ministry of Interior	Entity that is responsible for national and local security, as well as approving emergency response and firefighting plans for establishments/projects.	The entity ensures security and public safety throughout the project's lifecycle. This includes protecting the project site, safeguarding equipment, and maintaining order during construction and operation.
General Petroleum Company	National State-owned company engaged in exploration, production and development of hydrocarbons, is responsible for the management of oil and gas exploration and production activities on behalf of the State.	They are one of the subsidiary companies affiliated with the Ministry of Petroleum. They could have right of concession for petroleum exploration in some parts of the Project area and adjacent areas.
Armed Forces Operations Authority	Official governmental entity that is responsible for military aviation management in Egypt.	The entity is responsible for issuing permits for projects with specific height requirements (such as wind turbines).
National Telecom Regulatory Authority (NTRA)	Entity that is responsible for the overall regulation and administration of the telecommunication sector in Egypt including interface with telecommunication companies and their infrastructure elements.	The entity is required to provide and approval ensuring that the project does not impact infrastructure elements such as broadcasting towers.

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Stakeholder Group	Description	Relevance
Telecommunication Operators	Could own and operate telecommunication infrastructure within the area. This includes mainly Orange, Etisalat and Vodafone.	Approval is required for the project given that it could impact on such infrastructure elements.
Radio and Television Unit	Responsible for overall regulation and administration of the radio and television sector in Egypt including infrastructure elements	Approval is required for the project given that it could impact such infrastructure elements.
Local Government Ministries and District Authorities		
Red Sea Governorate	The Governorate's main role is supporting the Project in all aspects as required to include providing required permissions.	They key departments of the Governorate that are related to the Project include the following: ▪ Environmental Administration is responsible for monitoring compliance to environmental requirements along with EEAA; ▪ Labor Office that is responsible for overall management of the labor force in Red Sea Governorate, monitoring recruitment by development projects within the Governorate, monitor labor grievances and other; ▪ Roads Directorate: responsible for services and development of external roads in the governorate and issuing permits for any construction work on the external roads; ▪ Public Health Directorate: provide the health services and facilities to the local districts and ensure overall local community health and safety.
Ras Gharib Local City Council	The City Council's main role is supporting the Project in all aspects as required to include providing required permissions.	The Council is responsible for administrative oversight as well as supervision and follow-up for monitoring compliance to environmental requirements along with EEAA and Red Sea Governorate.
Wadi Dara Cooperative Association	Wadi Dara Cooperative Association was established in 1994/1995 through an official governmental decision, through which the government allocated land areas in Wadi Dara to the Association for agricultural reclamation.	The Association is the responsible entity that manages the overall agricultural development process within Wadi Dara, including dividing and allocates lands within these areas and selling them to private sector investors. The Association works closely with the Red Sea Governorate.
Directorate of Social Solidarity Ras Gharib	Official governmental entity that acts as the overall management, organization and registration of local community association, foundations and NGOs.	The entity could have a vested interest in obtaining updates on employment and procurement opportunities provided by the Developer as well as any social responsibility programs.
Red Sea Water and Wastewater Company (RSWWC) – Ras Gharib Sanitation Authority – Ras Gharib	Official entity responsible for water and wastewater management within the Governorate.	The entity that will be responsible for providing the Project's requirements of water as well as disposal of wastewater.

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Stakeholder Group	Description	Relevance
Hazardous Waste Management Unit – Red Sea Governorate	Entity responsible for hazardous waste management within the Governorate	The entity that will be responsible for the disposal of hazardous waste.
Solid Waste Management – Red Sea Governorate	Entity responsible for solid waste management within the Governorate	The entity that will be responsible for the disposal of solid waste.
NGOs		
Nature Conservation Egypt (NCE)	NCE is the Birdlife International partner in Egypt and is a member of the International Union for the Conservation of Nature (IUCN). Nature Conservation Egypt (NCE) is an Egyptian NGO working towards conserving Egypt's natural heritage and the promotion of its sustainable use, for the benefit of present and future generations.	Egypt's leading experts in the field of nature and biodiversity conservation, NCE is specialized scientific research, advocacy, education and outreach to support species, their habitats, and local communities. NCE works in partnership with local experts and governmental bodies, as well as international organizations and partnerships to ensure efficient collaboration for conservation within and across borders.
Regional Center for Renewable Energy and Energy Efficiency (RCREEE)	RCREEE is an intergovernmental organization serving 17 Arab countries, acting as the regional hub for advancing renewable energy and energy efficiency. RCREEE supports policy development, capacity building, and technical assistance to promote sustainable energy across the Arab region.	RCREEE is responsible for managing certain aspects of the overall development process on behalf of the Developer. This includes in specific the overall management of the ESIA process with the Consultant. In addition, during the operation phase, RCREEE will be responsible in particular for the implementation of the Active Turbine Management Plan (ATMP).

NGOs/ CBOs	Scope
Resala Association	Social and family services
El Fardos NGO for Patients' Care and Service	Social and family services
Ibad Al-Rahman Women's Association	Social and family services
Youth Educated Females on Public Service	Community Development

Other	
Media (Newspaper, Television, Internet)	Ensuring that Project activities do not impact on any of their infrastructure and utility elements within the area.
Academic and Research Institutions	
Educational Directorate Ras Gharib	Education providers (in particular technical / vocational training institutes): Provides knowledge and skills required for various occupations, including renewables and solar power in specific that is delivered through formal, non-formal and informal learning processes. The education curriculum in undergraduate, postgraduate, or Technical and Vocational Education and Training (TVET) could be reviewed and revised to match the market and workforce requirements.

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4.2.1 Vulnerable Groups

A key stakeholder group to which particular attention must be considered during identification are vulnerable groups. Those are groups that due to their socio-economic characteristics may experience impacts more severely and/or disproportionally compared to the rest of the community members.

Vulnerable groups are project specific and depend on a range of issues which must be understood such as project location, socio-economic and demographic context, as well as the nature of the development and type of impacts anticipated. Vulnerable groups may be severely affected by the Project by virtue of their physical disability, social or economic standing, and limited education, lack of employment or access to land.

The key vulnerable groups within the context of the Project and their relevance are summarized in the table below.

Table 8: List of Vulnerable Groups and Their Relevance

Group	Relevance
Women groups to include single mothers and widows	Could be considered vulnerable as cultural norms could limit their participation in the decision-making process in general that is related to the Project. Even though such cultural norms are considered applicable within local communities, however Bedouin women are considered much more vulnerable than mainstream women in Upper Egypt.
Disabled groups	Could be considered vulnerable groups mainly due to physical disability which could limit their access to information on the Project as well as participation in the decision-making process in general that is related to the Project.
Elderly Groups	Could be considered vulnerable by limitations of access to participate in the Project related community decision-making process.

4.2.2 Indigenous Peoples

A common consideration across the Project site is a consideration of potential impacts on Indigenous Peoples (IPs). It is noted however, that the Indigenous World 2025 Report[17] states that Egypt is not classified as a country with indigenous people. This was further confirmed based on previous experience on E&S assessments with IFIs in Egypt where such standard was not triggered.

4.3 Stakeholder Consultation and Engagement to Date

4.3.1 Targeted Consultations

Targeted consultations were undertaken with various stakeholder groups as highlighted below. During such targeted consultations, a handout was provided in advance in local language (mainly in Arabic language) which entailed information on Project, its location, components, overall ESIA process, key impacts anticipated during the various Project phases, contact details, and other.

- National governmental entities;
- Regional governmental entities;
- Non-Governmental Organizations (NGOs); and

[17] The Indigenous World 2025

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- Gas Exploration Entities.

The detailed minutes of meeting of such consultations along with name/position of person met for each entity is provided in Annex I.

Table 9: Identified Groups of Stakeholders

Entity	Date	Key Outcomes
National Governmental Entities in Egypt & Regional Governmental Entities in Red Sea Governorate		
Ras Gharib City Council	24 June 2025	▪ The Project is located within the administrative boundaries of Ras Gharib City Council (Red Sea Governorate), which includes Zaafarana Village to the north and Wadi Dara Village to the south. It is the second largest city in the Red Sea Governorate, covering an area of approximately 14,344 km^2. ▪ The land designated for the Project is State-owned land located several kilometers away from the Ras Gharib city center and falls fully under national jurisdiction for wind energy development as designated by the Egyptian Republic Presidency. ▪ The Project area does not conflict with local land use plans. However, the Ras Gharib City Council expressed the need to obtain a permit from the Armed Forces confirming the absence of oil exploration plans. Further engagement with other high-level authorities may be necessary for sensitive areas. ▪ Local infrastructure services (roads and traffic, cleanliness, water, sanitation and solid waste) are internally coordinated through the Ras Gharib city council. ▪ The Ras Gharib City Council coordinates with NREA to manage and dispose of hazardous waste in the Alexandria Dumpsite (Nahdet Masr Company in El Hamman City) with close coordination with local companies for transportation arrangements. ▪ The city council plays a central role in facilitating all procedures for wind farm investors, including coordination during construction and operation. It also serves as a direct liaison between project developers and the community. - Weekly public meetings are held every Wednesday at the city council premises, where residents can raise grievances or receive feedback. Requests can be submitted from Thursday to Monday for review. - Residents can also communicate through the Red Sea Governorate's official website[18] or the Government Unified Complaint System[19]. - All kinds of announcements for public events and local news are published on the city council website. Specific information on public consultation events or local projects news can also be disseminated through the public relation office, or by hanging a banner at the city council. Public consultation sessions are typically held at the Four Seasons Hall in Ras Gharib. Key stakeholders to involve include parliament members, Bedouin family heads, NGOs, CBOs, and relevant line ministries and directorates. ▪ Local employment opportunities can be advertised through the Ras Gharib City Council website and coordinated with the labor office. The Red Sea

[18] http://www.redsea.gov.eg/t/ras%20gharib/rasgharib.aspx; http://www.redsea.gov.eg/t/Contactus.aspx; http://www.redsea.gov.eg/t/Complaints.aspx

[19] https://www.shakwa.eg

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		governorate and NREA support local hiring. Use of local contractors is encouraged to boost the Ras Gharib's economy. ▪ No community concerns or grievances are currently anticipated due to the Ras Gharib community's long-standing familiarity with wind energy development. ▪ The Project must obtain relevant permits and approvals, including environmental approvals, planning permissions, grid connection agreements, land use permits, building permits and site visit permits. The Developer should also consider potential impacts on proximity to residential areas, potential impact on local wildlife and birdlife, potential noise and visual impacts on the local community, and workers on-site safety. ▪ Throughout the Project cycle, the Ras Gharib city council coordinates directly and closely with the Civil Defense, Domestic Intelligence, Police, Fire-fighting Service, and Armed Forces in case of any emergency. It also coordinates with various medical service providers inside and outside Ras Gharib, e.g., Ras Gharib General Hospital, Hurghada General Hospital, Menya General Hospital, and Electricity Hospital in Cairo for medical emergencies. ▪ The Ras Gharib city council highlighted a need to guide developers (in general) toward allocating 3-5% of the Project budget to Corporate Social Responsibility (CSR), in cooperation with the city council, focusing on: - Encouragement to establish on-site camps for workers to avoid pressure on local housing; - Improving local health and education services; - Upgrading roads and completing sanitation networks (especially in El Sakala); - Installing water recycling facilities for tree planting; and - Establishing Bedouin settlements in remote areas like Arab Ayesh and Wadi Araba.
Wadi Dara Local Unit	25 June 2025	▪ Wadi Dara village is accessed via one main paved road and a network of unpaved farm alleys. ▪ The unit mentioned that there are no infrastructure or social services that exist in the village beyond limited electricity (3 hours/day) and groundwater wells. ▪ The unit does not anticipate any disruption or impacts on local infrastructure from the construction or operation of the wind farm. ▪ Wadi Dara falls under the jurisdiction of Ras Gharib City Council and is represented by the Board of Directors of the Dara Agricultural Cooperative. ▪ The closest Bedouin settlement is Arab Ayesh. No contact or land/resource overlap exists between this community and Wadi Dara. ▪ Community engagement should be coordinated by the Wadi Dara Agricultural Cooperative and local investors. There are no active tribal, women, or youth groups in the area. ▪ Wadi Dara was established in 1995 as an agricultural production development initiative. 5000 feddans (≈ 21 km²) were allocated to the Cooperative – 50 feddans (≈ 0.21 km²) per investor (80 total) and 5 feddans (≈ 0.021 km²) per cooperative member (200 total). It was designated as a Local Unit in 2002. ▪ Residents are permanent agricultural laborers hired by investors. Families may visit during summer but do not reside year-round due to lack of basic services.

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		▪ Key community concerns include investor contributions to local infrastructure upgrades, particularly: - Extended access to electricity - Provision of potable water - Establishment of a basic healthcare unit
Egyptian Environmental Affairs Agency (EEAA) Office in Cairo	16 October 2025	▪ EEAA confirmed that relevant environmental and social data may be accessed through the New and Renewable Energy Authority (NREA) and the central EEAA offices. ▪ Survey methodologies were presented, and the entity advised incorporating recommendations received from the General Petroleum Authority, including potential site identification and the inclusion of a waste management plan within the ESIA. ▪ Planned biodiversity fieldwork was discussed, including bird and bat surveys and habitat assessments. EEAA advised that additional feedback would be provided by NCE and Biodiversity Department during a separate session on 22 October 2025. It was also advised to follow national wind farm siting guidelines. ▪ It was advised to consult the NCE for guidance on threatened species and potential sensitive habitats. *However, it is important to note that Consultation attempts with NCE between August and October 2025 sought feedback on the biodiversity baseline methodology and key ecological sensitivities. No response was received, and NCE also did not attend the public consultation session held in Ras Gharib as presented in Section 4.3.2below.* ▪ EEAA confirmed the absence of recent biodiversity data within the Project area or 10 km buffer but welcomed efforts to collect data within this range. Reference materials from previous studies will be gathered and shared where possible. ▪ The need to define buffer zones, exclusion areas, or setbacks will be determined in consultations with biodiversity specialists, guided by an ongoing national strategic study under EEAA supervision. Additional biodiversity features potentially impacted by the Project will be identified through field surveys and reference to the regional critical habitat assessment. ▪ Permitting requirements include use of an EEAA-accredited consultant, submission via NREA, and 30 working days for official review and issuance of environmental permit. ▪ Bird monitoring during construction and operation phases will be required as per the signed protocol. EEAA is responsible for reviewing and approving all monitoring methodologies and protocols. ▪ EEAA will issue an environmental opinion (approval, rejection, or request for revision) after reviewing the submitted ESIA. ▪ Any further requirements or issues of concern will be determined upon submission and review of the final documentation.
EEAA Red Sea Branch,	15 October 2025	▪ Project description and ESIA survey methodology were presented, and EEAA confirmed that the proposed survey methodology is sufficient.

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Regional Director		▪ EEAA confirmed no available secondary data or environmental studies for the Project area or 10km buffer. ▪ EEAA stated that issues related to protected species fall under the Protected Areas Department and are not within its own jurisdiction. ▪ Permitting must be coordinated through NREA and EEAA in Cairo. ▪ EEAA raised no objection to the Project but noted that its acceptance is conditional on final ESIA review. ▪ Monitoring expectations, additional issues of concern, and any required revisions will be confirmed after review of the environmental report.
EEAA Red Sea Branch, Director of Inspection and Legal Monitoring	15 October 2025	▪ Project description and ESIA survey methodology were presented, and EEAA confirmed that the proposed survey methodology is sufficient. ▪ EEAA clarified that issues related to threatened species and protected zones fall under the authority of the Protected Areas Department. ▪ Permitting must be processed via NREA and the Ministry of Environment in Cairo, with EEAA reviewing submitted environmental studies. ▪ The Project received conditional non-objection subject to full review of the ESIA. ▪ No additional concerns or requirements were raised during the consultation.
EEAA Red Sea Branch, Red Sea Protectorates	15 October 2025	▪ The Red Sea Protectorates team acknowledged the Project and noted that biodiversity-related publications relevant to the area are available through EEAA's Environmental Impact Assessment Department. ▪ No biodiversity studies or species of concern were identified within or near the Project area. ▪ It was recommended to establish safe bird corridors between adjacent wind projects. ▪ All environmental permits are to be obtained from EEAA headquarters in Cairo. ▪ No objection letter was available at the time of consultation. ▪ Additional recommendations included ensuring the review and publication of relevant environmental studies and reports.
New & Renewable Energy Authority (NREA)	10 October 2025	▪ The Project was presented including its location, boundaries, production capacity, and technology via a detailed presentation. ▪ NREA confirmed that the Project land is free from conflicting surface or subsurface activities and stated that official land allocation and handover documents had been provided to the Developer. They also committed to sharing formal land use plans for both the Project site and surrounding areas up to 30km. ▪ NREA emphasized adherence to internationally approved technical standards and confirmed that turbine layout plans must be submitted for review and approval prior to implementation. ▪ It was confirmed that NREA is coordinating with relevant government authorities including the Armed Forces Operations Authority, Red Sea Governorate, and the National Authority for Regulating State Land Use. Further coordination will continue with other entities.

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		▪ NREA requested submission of full turbine technical specifications and a Waste Management Plan.
Ministry of Labor, Ras Gharib	12 October 2025	▪ Project description and ESIA methodology was presented, including its components, location, and anticipated construction and operation activities. The ESIA methodology was outlined, with emphasis on labor-related risks such as occupational health and safety, labor abuses (e.g., discrimination, child labor, passport retention), and working/living conditions (e.g., leaves, compensation, sanitation, drinking water, accommodation). ▪ A request was made to prioritize hiring locally rather than bringing in labor from outside Ras Gharib. ▪ Recommendations included establishing an on-site employment center to facilitate the hiring of Ras Gharib residents and allocating a defined labor quota for locals.
Radio and Television Unit – Ras Gharib & Red Sea Governorate	12 October 2025	▪ Project description and potential turbine-related signal interference (e.g. reflection, attenuation) was presented. ▪ No major broadcasting towers or transmission infrastructure identified near the Project site. ▪ Coordination advised with Ras Gharib Radio and Television Unit during use of cranes, erection of turbines, or other activities involving tall structures. ▪ No requirement indicated for signal impact study. No additional concerns or recommendations were raised.
Red Sea Water and Wastewater Company (RSWWC) – Ras Gharib	14 October 2025	▪ The Project scope and ESIA methodology were discussed, with specific focus on potential impacts to local water supply and wastewater systems. ▪ It was confirmed that Ras Gharib is supplied via the Kureimat Line along the highway, which experiences service disruptions affecting local demand, especially during labor-intensive periods. ▪ No water supply facilities or pipelines were identified within the Project footprint. Direct connection to the main line or treatment plant is considered difficult. Instead, it is recommended to use water tankers during the construction period. ▪ For wastewater, the nearest treatment facility is located on Umm Al-Yeser Road. Coordination must be undertaken with Ras Gharib management, and regular drainage of septic tanks is required. ▪ Additional recommendations included proposing the Developer to construct a dual water supply line to alleviate pressure from increased population and labor demands.
Sanitation Authority – Ras Gharib	16 October 2025	▪ The Project overview and ESIA approach were discussed, focusing on construction-phase wastewater generation and management. ▪ No sanitation facilities are located on or near the Project site. The nearest treatment plant is situated on Umm Al-Yeser Road (Ras Gharib Treatment Plant). ▪ Due to infrastructure limitations, wastewater generated by the Project should be managed using septic tanks and drained regularly via septic trucks. ▪ Coordination with the Sanitation Department of Ras Gharib is required throughout construction phase.

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		▪ No additional concerns or requirements were raised.
Hazardous Waste Management Unit – Red Sea Governorate	15 October 2025	▪ The Project and ESIA scope were presented, including expected hazardous waste streams during construction (e.g., oils, lubricants, contaminated containers). ▪ There are no hazardous waste treatment or disposal facilities within the Red Sea Governorate. ▪ Hazardous waste must be collected, transported, and disposed of by a licensed company approved by the Waste Management Regulatory Authority (WMRA). Tracking forms are required. ▪ Coordination should be made with the Secretary General of the Governorate regarding permitting and oversight. ▪ No additional concerns or requirements were raised.
Solid Waste Management – Red Sea Governorate	15 October 2025	▪ The Project and ESIA scope were presented, including anticipated solid waste streams such as packaging, construction debris and municipal waste from workers. ▪ The nearest landfill is located in Ras Gharib next to Umm Al-Yeser, with a current capacity of 200,000 m³. It is operated in accordance with national standards. ▪ It was confirmed that the landfill is capable of handling the waste volumes expected from the Project. ▪ It is recommended to contract licensed companies for waste transport and disposal. ▪ Recycling and reuse of solid waste is encouraged. A committee may be formed by the Solid Waste Department to oversee recycling and related actions.
Ras Gharib National Council for Women (NCW)	24 June 2025	▪ To ensure continuous access to Project information and updates for women groups, the following platforms and entities were recommended: - Ras Gharib City Council - “Fanar Gharib” Facebook page - NGOs’ WhatsApp groups - Employment vacancy links on company websites ▪ Women and youth can be informed about consultation sessions through NGOs and CBOs operating in Ras Gharib. ▪ Job and procurement opportunities targeting women and youth should be advertised through active NGOs. Many youth in Ras Gharib require technical training as most are graduates of non-technical fields such as commerce, law, science and education. ▪ It was noted that wind farm projects have positively contributed to the community, unlike oil companies that have historically lacked engagement. As an example, one windfarm project has previously upgraded the facilities of a local NGO. ▪ Priority needs for Ras Gharib include: - Creating job opportunities for young men and women; - Delivering technical training programs to prepare youth for Project-related employment; and

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		- Supporting youth development through sports and talent-nurturing activities.
Ministry of Archaeology and Antiquities		▪ Pending
Ministry of Civil Aviation		▪ Pending
NGOs		
Ressala Charity Organization	24 June 2025	▪ Local active NGOs and CBOs maintain close connections with women in Ras Gharib, especially single breadwinners. Information on Project updates and disclosures can be disseminated through the City Council and active local NGOs. ▪ There is no single entity responsible for coordination, as NGOs operate under the Social Solidarity Department at Ras Gharib City Council but manage their own priorities and activities. ▪ To ensure women's participation in scoping and disclosure sessions, coordination should take place with the heads and directors of active local NGOs and CBOs in Ras Gharib and Zaafarana including: (i) Ebad El Rahman NGO; (ii) El Fardos NGO; and (iii) Ressala Charity Organization. ▪ Employment and procurement opportunities can be announced via local Facebook groups Ressala Gharib[20] and Fanar Gharib[21], as well as through the directors of active NGOs and CBOs (Ebad El Rahman NGO, El Fardos NGO, and Ressala Charity Organization). ▪ Bedouin family heads in Ras Gharib can also help communicate job opportunities to female members during their clan meetings, as there are no active parliament members in the area. ▪ Ras Gharib faces a lack of basic infrastructure and social services. Windfarm projects have provided valuable contributions in the past (e.g., support during orphans' day, Ramadan food supplies, and hospital equipment). ▪ Community priorities remain focused on: - Expanding educational services - Improving healthcare services - Organizing medical convoys
El Fardos NGO for Patients' Care and Service	24 June 2025	▪ To ensure continuous access to Project information for women in the local community, it was recommended to: - Assign a dedicated community liaison officer to coordinate between windfarm projects and Ras Gharib civil organizations (one officer may cover multiple projects, requiring coordination between project managers). - Post updates through the "Fanar Gharib" Facebook page and Ras Gharib Radio channel.

[20] Ressala Gharib Facebook page
[21] Fanar Gharib Facebook page

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		▪ Entities suggested for coordination include: - Active and established NGOs and CBOs - Bedouin family heads - Religious leaders in Ras Gharib (e.g., Al-Azhar, endowment, and Mary Gergis Church) ▪ To ensure women's participation in scoping and disclosure sessions, the following was proposed: - Mobilize participants through local NGOs and CBOs - Coordinate with the National Council for Women (NCW), Ras Gharib Branch ▪ Women can contribute to windfarm projects during construction by offering services to workers' camps such as food catering and tailoring of clothing and beddings, and during operation in roles such as HR officers, E&S officers, or engineers. Employment opportunities can be advertised through: - The Labor Office in Ras Gharib - The City Council's official website - The "Fanar Gharib" Facebook page ▪ Additional issues raised include lack of municipal services (transport, housing, subsidized bread), high unemployment, and vulnerability of female-headed households. Proposed interventions include: - Subsidize electricity and gas bills for Ras Gharib residents by at least 10% as a benefit-sharing mechanism - Enforce a minimum 10% quota for local hiring, prioritizing qualified residents with higher education - Establish community cultural projects for Ras Gharib families - Provide group loans for women to launch small enterprises - Contribute seasonal food assistance during Ramadan and religious feasts ▪ Offer scholarships for academically distinguished students from poor families
Hammadin Bedouins from Maaza Tribe	24 June 2025	▪ No Bedouin families currently use or have historically used the Project area for grazing, seasonal migration, water access, agriculture, or other livelihood activities. The area has been affected by prolonged drought, with no rainfall for nearly nine years, making it unsuitable for grazing. ▪ Bedouins typically migrate in search of water for grazing, staying in tents or huts during winter and relocating to the mountains in summer. However, the Project area has not been part of this movement due to lack of water and vegetation. ▪ There are no Bedouin structures (e.g., tents, shelters, wells) currently in use in the general Project area and vicinity. Only natural water wells and crushed rock wind barriers were previously present but are now abandoned due to drought. ▪ There are no cultural, spiritual, or historical sites of significance to Bedouin traditions (e.g., graveyards or shrines) located within or near the Project area. ▪ Preferred communication channels with Bedouin communities include:

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		- Tribal leaders from the Hammadin Tribe (4–5 Sheikhs in Ras Gharib) - Bedouin liaison officers working at windfarm project sites - Officers from the Social Solidarity Department at the City Council responsible for providing Bedouin support in Ras Gharib ▪ Consultations and meetings with Bedouin communities can be organized at any time and location, provided at least one week's advance notice is given. ▪ The Bedouin tribe expressed that their main interest lies in securing employment opportunities and receiving tangible services from the Project. They noted previous negative experiences with wind farm developers who consulted them but failed to deliver any benefits. ▪ Key contributions recommended include: - Engaging local subcontractors to provide equipment, vehicles, and support services - Prioritizing local hiring, especially for security and guard services, rather than outsourcing from outside Ras Gharib - Establishing a one-class school in remote Bedouin settlements - Organizing mobile medical convoys to remote areas - Providing an ambulance for remote Bedouin communities
Hammadin Bedouins	12 October 2025	▪ Bedouin representatives confirmed that the Project site and its vicinity are not used for grazing, seasonal migration, water access, or other livelihood activities. ▪ No seasonal structures, water wells, or spiritual/cultural heritage sites were identified within or near the Project footprint. ▪ Communication with Bedouin communities should occur through the tribal sheikh via phone with advance notice. ▪ No additional concerns were raised, but employment opportunities for local tribal youth were encouraged.
Ibad Al-Rahman Women's Association	13 October 2025	▪ The association acknowledged the temporary nature of construction-phase job opportunities and limited operational roles due to the Project type. ▪ Access to information should be facilitated via social media, local NGOs, and the local administrative unit. ▪ Invitations for scoping and disclosure sessions, as well as employment/procurement opportunities, should be channelled through local NGOs and announced via the same platforms. ▪ No additional concerns were raised, and the association recommended offering training courses for women in Ras Gharib.
Gas Exploration Entities		
General Petroleum Company		▪ The Project and its components were presented in detail, including turbine locations, total site area, and maps showing geographic boundaries and proximity to petroleum infrastructure. ▪ Existing infrastructure near the Project stie includes water wells, pumps, and low-voltage electricity towers affiliated with Gulf of Suez Petroleum Company (GUPCO)

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		▪ Correspondence has already taken place between the Developer and GPC's Planning Sector regarding ongoing and planned petroleum activities near the Project area. ▪ Setback distances from petroleum infrastructure were specified as 500 meters in urban areas and a minimum of 1 kilometer in road and desert areas. ▪ Coordination between the Project and petroleum operators was discussed, particularly regarding emergency preparedness and incident response. ▪ It was clarified that coordination is required with both GPC and GUPCO (coastal gas installations) for any construction works in proximity to their facilities. ▪ The Project must coordinate with GPC's Safety, Environment, and Survey Departments to ensure compliance with environmental, health, and safety requirements. ▪ Permits are issued through the Ministry, with follow-up and oversight conducted by the relevant sector. Intervention is carried out in case of any identified impacts. ▪ All necessary approvals have been secured, and updated site maps were shared with the Ministry and relevant entities. ▪ Additional comments and requests included: - Installation of road signage (including emergency contact points, lighting, and rest areas) to assist GPC field teams during site visits. - Provision of real employment opportunities for the local community in technical and specialized roles – not limited to unskilled labor or security. - Road improvements between the Project sites and Ras Gharib.
Academic and Research Institutions		
Educational Directorate – Ras Gharib	13 October 2025	▪ The Directorate acknowledged that employment and procurement opportunities will primarily arise during the construction phase and will be limited during operations. ▪ Project updates, disclosures, and data should be shared via targeted social media outreach (e.g., Fanar Gharib). ▪ Participation in scoping and disclosure sessions, and access to employment opportunities, should be coordinated through the Labor Office and announced via social media. ▪ No issues of concern were raised; recommendations included support for school maintenance, youth employment, and offering specialized training for local residents.

4.3.2 Focus Group Discussions (FGD)

Public Scoping Session

A public scoping session was held in Ras Gharib city, Red Sea Governorate at the Four Seasons Hall (venue) on the 22nd of October 2025. The objectives of the public scoping session included the following:

- Introduce the Project to stakeholders (location, components, activities, etc.);
- Present the methodology and study outlines of the Project;

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- Identify key anticipated impacts; and
- Allow interested stakeholders to comment on the scope of work undertaken, key issues identified and any other issues of concern they might have.

Announcement and Advertisement of the Session

The public scoping session was announced around 2-weeks in advance in one of the official daily newspapers as shown in the figure below (the advertisement was published in El-Akhbar newspaper on the 10th of October, 2025). The invitation was an open session for any interested stakeholder to attend.

In addition to the public announcement, invitations were sent to key stakeholders. The invitee list included EEAA Headquarter and regional branch, New and Renewable Energy Authority (NREA), Red Sea Governorate, other governmental entities, Ras Gharib City Council, the National Council for Women, local community representatives, NGOs and Developers of Wind Energy Projects in the Gulf of Suez and Gebel El Zeit. In coordination with the E&S Team, all invitees were notified of the date and location of the public consultation session. Invitations were extended through the following channels:

- Invitations and executive summary sent by the E&S team to stakeholders in the governorate, NGOs and local community representatives by hand mail, fax, email and WhatsApp;
- Invitations sent by the RCREEE;
- Telephone calls by the E&S team;



Figure 14: Newspaper Announcement in El-Akhbar Published on 10/10/25

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Participating Parties

The total number of participants was 83, in addition to the Developer's representative. The session was moderated by representatives of the E&S Team.

The attendees comprised representatives from various government agencies within Red Sea Governorate to include EEAA branch in Red Sea, NGOs, governmental agencies in Ras Gharib, academics, wind energy projects developers and local community representatives. A summary of the participating entities is provided in the table below. Additionally, a non-technical executive summary of the ESIA was prepared and distributed to all attendees (refer to Annex X).

Attendance	No.
Egyptian Environmental Affairs Agency EEAA	2
EEAA - Red Sea	1
SCATEC	1
Safe Soar	5
Ministry of Environment	1
Egyptian Electricity Transmission Company EETC	2
Regional Center for Renewable Energy and Energy Efficiency RCREEE	3
New and Renewable Energy Authority NREA	2
Ras Gharib City Council	9
Members of the local community in Ras Gharib	27
Heads of Bedouin families in Ras Gharib area	3
Clergy	1
Youths from city of Ras Gharib working in bird watching	2
NGOs	12
Academic	2
Wind energy projects	2
General Petroleum Company and other oil and Gas companies	2
Directorate of Social Solidarity Red Sea	3
National Council for Women in Ras Gharib	1
Labor office in Ras Gharib city	1
Total	83

The public scoping session commenced with opening remarks delivered by the key participating entities, including the representative from the Developer, the Ras Gharib City Council Chairman, and representatives from EEAA, NREA, and EETC, in addition to RCREEE and the E&S Team.

The speakers emphasized that the purpose of the session was to present the ESIA study methodology prepared for the Project, and to provide a constructive platform for community members and stakeholders to express their concerns and recommendations. They highlighted the importance of consultation sessions as an opportunity for community dialogue on the Project details, particularly energy projects and their potential impacts on the environment.

The E&S Team and RCREEE then delivered a detailed presentation on the ESIA scoping outlines, the methodology adopted for the study, and an overview of the Project, including its location, key components, and development phases. The presentation also addressed the anticipated E&S impacts of the Projects, with particular focus on biodiversity considerations in the Gulf of Suez and Gebel El Zeit regions.

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Following the above presentations, an open discussion was held, during which attendees were given the opportunity to comment and raise concerns. The table below provides a summary of the key issues raised and the corresponding responses.



Figure 15: Selected Photos from the Public Session

The table below summarized the key issues raised during the session along with the corresponding responses.

Table 10: Key Outcomes and Reponses of the Public Scoping Session

E&S Attribute	Comment	Response
Job Opportunities	Multiple attendees from Ras Gharib, including former and current directors of the Social Solidarity Department, representatives from the Educational Administration, local residents, and civil society organizations emphasized the critical importance of ensuring job opportunities for the local community. Key points raised included: ▪ Prioritizing Ras Gharib residents for both skilled and unskilled employment during construction and operation. ▪ Ensuring transparent and fair recruitment processes in coordination with the local labor office, which maintains an official database of workers and contractors. ▪ Providing long-term job opportunities rather than limiting	It was clarified that the Project is currently in the scoping stage; however, all concerns and recommendations raised regarding job opportunities are fully documented and will be incorporated into the ESIA. The Developer will prepare a comprehensive Recruitment Plan that identifies labor needs (skilled and unskilled) and prioritizes hiring from Ras Gharib. Recruitment will be coordinated through official channels, including the local labor office, to ensure transparency, fairness and compliance with national labor laws and international requirements. The Developer will also consider inclusion of persons with disabilities in accordance with the national 5% employment quota. Opportunities for local contractors and suppliers will be explored, and capacity-building initiatives such as training programs and youth-focused activities will be recommended as part of the Social Development Plan. Enhanced cooperation among energy projects in the area, as well as

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	employment to the construction phase. ▪ Ensuring inclusion of people with disabilities in future employment and CSR plans, in line with national requirements. ▪ Enhancing cooperation among energy projects in the area to collectively support local development. ▪ Offering procurement opportunities to local suppliers and contractors. ▪ Organizing capacity-building initiatives such as training sessions for local youth and contractors, and proposals such as a "Youth Day" to identify and develop local talents. ▪ Concerns from local residents (including youth and individuals affiliated with community associations) about previous negative experiences in other renewable energy projects where transparent access to job opportunities was limited.	coordination with the City Council and local stakeholders, will also be considered to maximize community benefits.
General Environmental Impacts and its effect on residents	Residents requested clarification on the potential environmental impacts of the Project on Ras Gharib, including impacts on air quality, community well-being and the surrounding environment. Concerns were also raised about ensuring long-term job opportunities for youth.	It was explained that all potential environmental and social impacts – including impacts on nearby communities – will be thoroughly assessed in accordance with EEAA requirements as well as IFI requirements. No environmental approvals are granted without confirming that the Project poses no harmful impacts on the environment or local community residents. A strategic area-wide assessment is conducted prior to issuing approvals. Regarding local job opportunities, the Developer confirmed that most of the general labor will be sourced from Ras Gharib, while specialized technical roles may be filled from outside the Governorate if skills are not available locally. The Developer is preparing community engagement and CSR plans that will be shared with the Ras Gharib City Council and local stakeholders once finalized.
Bedouin Tribe Engagement	A concern was raised by the tribal leader of the Tababna tribe regarding the perception that Bedouin tribes are marginalized in employment	It was clearly explained that Bedouin tribes are in fact among the first groups consulted during the study and are considered key partners in the Project, refer to "Section4".

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	opportunities.	Bedouin-owned security companies are already operating on site, demonstrating active engagement.
Community Engagement and Role of Local NGOs	Local NGOs requested opportunities to participate in Project related activities, highlighting that associations serve as effective channels to reach all community groups.	It was explained that community engagement and social investment activities will form part of the Developer's Social Development Plan. This plan will assess community needs and identify appropriate interventions. The recommendation to engage local NGOs from the early stages is considered valuable and will be reflected in the ESIA recommendations.
Written Comments and Recommendations	▪ Considering international standards in the construction and operation of the Project. ▪ Mitigating the environmental impacts of the Project to preserve the environment. ▪ Cooperation with the local community to raise the standard of living of citizens and pay attention to the quality of the environment. ▪ Setting procedures and conditions for the selection of subcontractors to reach the highest levels of safety, reduce rates of deaths and accidents, and create local opportunities. ▪ Youth engagement and youth representatives in such meetings and consultations. ▪ Cooperation with other existing projects and activating community CSR plans to improve community needs.	

NGOs and CBOs within the Local Communities

As part of the targeted interviews that were conducted on the 24th and 25th of June (refer to "Section 4.3.1"), two (2) focus group discussions were held in Ras Gharib city with the following entities:

- Ebad El Rahman NGO; and
- Youth Educated Females on Public Service

At the beginning of each session, a presentation on the Project was first provided along with a handout on the following key topics. These sessions were attended by all of the groups above.

- Description of the Project location along with maps;
- Description of key Project components along with figures and illustrations;
- Description of the key activities anticipated in each key phase of the Project (planning, construction and operation);
- Description of ESIA study and its key components and requirements;
- Explanation of key anticipated E&S impact under each phase of the Project; and
- Explanation of the methodology and scope of work that will be undertaken for the ESIA.

Upon completion of the above informative session, each group was separated for general discussions as well as discussion on any comments or key issues of concern on the overall Project and/or the ESIA process in particular. Key discussions were undertaken in relation to the following key aspects:

- Economic activities and livelihood strategies

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- Land use activities
- Community quality of life
- Perceptions towards the Project
- Community structure (ethnic and tribal groups, religion, ethnic minorities, etc.)
- Cultural and Heritage sites

The presentation and handouts were provided in the Arabic language, as well as the delivery of the presentation.

Annex I present the handout and presentation that was provided during each of these FGDs as well as the forms used throughout the FGD.

The table below presents an overall summary of the outcomes of these FGD for each community.

Table 11: Key Outcomes of FGDs

Ras Gharib Community	Date	Key Outcomes
Vulnerable Female Heads of Household – Ebad El Rahman NGO	25 June 2025	▪ Participants confirmed they have never received information about wind farm projects in Ras Gharib. To ensure continuous access to Project updates and documentation, they recommended that local NGOs: - Conduct awareness raising sessions in schools, universities, and among mothers to explain the benefits of renewable energy; and - Disseminate Project information through awareness sessions and distribute non-technical summary leaflets. ▪ To support women's participation in scoping and disclosure sessions, the following approaches were proposed: - NGOs should communicate the session date and time to their beneficiaries directly - Advertisements should be posted at the Social Solidarity Department in the City Council ▪ Participants raised several challenges in accessing employment or procurement opportunities, including: - Scarcity of job opportunities for women in Ras Gharib, especially for those with limited resources. - Lack of financial capacity to start small businesses, even for those who have received training. - Absence of group lending mechanisms to support women entrepreneurs. ▪ To ensure opportunities reach women, job vacancies should be announced through: - Local active NGOs - The Social Solidarity Department at the City Council ▪ Additional community concerns and proposed priorities included: - Rising cost of living (particularly food and rent)

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		- Limited employment opportunities for Ras Gharib youth ▪ Specific recommendations included: - Prioritize hiring sons of vulnerable women who receive government or NGO assistance. - Support the medical sector with equipment, medication, and services, especially for households with chronic illness.
Youth Educated Females on Public Service	24 June 2025	▪ Participants demonstrated fair awareness of wind farm projects in Ras Gharib, with at least one member employed as a social officer with a contractor. To ensure youth have continuous access to Project information, the following dissemination channels were recommended: - Social media platforms - LinkedIn - Facebook - City Council website - Dedicated project website links - Company outreach via local NGOs ▪ To encourage youth participation in scoping and disclosure sessions, participants referred to the same information channels listed above. ▪ To enhance youth participation in employment and procurement opportunities, participants emphasized the need for companies (investors and contractors) to provide subsidized access to capacity-building programs. Priority areas include: - English language courses - Computer skills - Soft skills and personality development - Job-oriented training through internships or trainee programs within the companies ▪ No major concerns were raised, but participants noted that companies often underestimate the presence and potential of well-educated young women in Ras Gharib. As a result, women are frequently excluded from employment or offered unequal salaries compared to other regions. ▪ Additional community development needs highlighted include: - Establishment of recreational spaces - Sports and professional athletic training programs - Education services tailored for people with special needs

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Figure 16: FGD with Ebad El Rahman NGO



Figure 17: FGD with Youth Educated Females on Public Service

Public Disclosure Session

A disclosure session was held in Ras Gharib city, Red Sea Governorate at the Four Seasons Hotel (venue) on the 8th of December 2025. The objectives of the disclosure session included the following:

- Introducing the Project to stakeholders;
- Present the results, outcomes and conclusions of the ESIA study
- Allow stakeholders to raise any comments or issues of concern in relation to ESIA study to include but not limited to the baseline results, impacts, mitigation, monitoring measures, etc.
- Discuss any questions, inquiries, or issues of concern raised by stakeholders

Announcement and Advertisement of the Session

The disclosure session was announced around 2-weeks in advance in one of the official daily newspapers as shown in the figure below (the advertisement was published in El-Akhbar newspaper on the 25th of November 2025). The invitation was an open session for any interested stakeholder to attend.

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In addition to the public announcement, invitations were sent to key stakeholders. The invitee list included EEAA Headquarter and regional branch, New and Renewable Energy Authority (NREA), Red Sea Governorate, other governmental entities, Ras Gharib City Council, the National Council for Women, local community representatives, NGOs and Developers of Wind Energy Projects in the Gulf of Suez and Gebel El Zeit. In coordination with the E&S Team, all invitees were notified of the date and location of the public consultation session. Invitations were extended through the following channels:

- Invitations and executive summary sent by the E&S team to stakeholders in the governorate, NGOs and local community representatives by hand mail, fax, email and WhatsApp;
- Invitations sent by the RCREEE;
- Telephone calls by the E&S Team;



Figure 18: Newspaper Announcement in El-Akhbar Published on 25/11/25

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Participating Parties

The total number of participants was 87, in addition to the Developer's representative. The session was moderated by representatives of the E&S Team.

The attendees comprised representatives from various government agencies within Red Sea Governorate to include EEAA branch in Red Sea, NGOs, governmental agencies in Ras Gharib, academics, wind energy projects developers and local community representatives. A summary of the participating entities is provided in the table below. Additionally, a non-technical executive summary of the ESIA was prepared and distributed to all attendees (refer to Annex X).

Attendance	No.
Egyptian Environmental Affairs Agency EEAA	1
EEAA - Red Sea	5
SCATEC	1
Safe Soar	4
Egyptian Electricity Transmission Company EETC	2
Regional Center for Renewable Energy and Energy Efficiency RCREEE	2
New and Renewable Energy Authority NREA	1
Ras Gharib City Council	8
Members of the local community in Ras Gharib	15
Heads of Bedouin families in Ras Gharib area	4
Clergy	2
Youths from city of Ras Gharib	10
NGOs	12
Wind energy projects	5
General Petroleum Company and other oil and Gas companies	5
Directorate of Social Solidarity Red Sea	7
National Council for Women in Ras Ghareb	2
Labor office in Ras Gharib city	1
Total	87

The public disclosure session commenced with opening remarks delivered by the key participating entities, including the representative from the Developer, the Ras Gharib City Council Chairman, and representatives from EEAA, NREA, and EETC, in addition to RCREEE and the E&S Team.

The speakers emphasized that the purpose of the session was to present the results of the ESIA study that was prepared for the Project, and to provide a constructive platform for community members and stakeholders to express their concerns and recommendations. They highlighted the importance of consultation sessions as an opportunity for community dialogue on the Project details, particularly energy projects and their potential impacts on the environment.

The E&S Team and RCREEE then delivered a detailed presentation on the ESIA scoping outlines, the methodology adopted for the study, and an overview of the Project, including its location, key components, and development phases. The presentation also addressed the anticipated E&S impacts of the Projects, with particular focus on biodiversity considerations in the Gulf of Suez and Gebel El Zeit regions.

Following the above presentations, an open discussion was held, during which attendees were given the opportunity to comment and raise concerns. The table below provides a summary of the key issues raised and the corresponding responses.

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Figure 19: Selected Photos from the Disclosure Session

The table below summarized the key issues raised during the session along with the corresponding responses.

Table 12: Key Outcomes and Reponses of the Public Disclosure Session

E&S Attribute	Comment	Response
Job Opportunities and Community Engagement	Attendees from Ras Gharib provided recommendations and observations regarding employment opportunities and community engagement, including: ▪ Providing job opportunities for residents at different employment levels, not limited to worker-level positions. ▪ Requests to reduce electricity invoice costs following the increase in renewable energy production. ▪ A proposal for the Developer to lead an initiative to establish a community Trust Fund, in cooperation with other wind energy companies, to support community infrastructure and healthcare services.	▪ It was clarified that the majority of the Project workforce will be sourced from Ras Gharib, while specialized technical labor may be recruited from outside the Governorate if such skills are not available locally. ▪ The Developer is currently preparing studies and plans to identify appropriate community engagement and CSR activities throughout the Project lifecycle, which will be shared with the Ras Gharib City Council and relevant stakeholders once finalized. ▪ The recommendation to strengthen cooperation among wind energy projects in the area to support community needs was acknowledged and will be considered as part of the ESIA and Social Development planning. ▪ It was also noted that employment-related topics represent a significant proportion of consultation discussions in Ras Gharib, and that contractors typically conduct labor needs assessments during construction, which prioritize local labor where feasible.
General Environmental Impacts and its	Attendees requested clarification on the potential environmental impacts of the Project on Ras Gharib, including	▪ It was explained that all potential environmental and social impacts will be assessed in accordance with EEAA

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effect on residents	impacts on water resources and whether desalination of seawater could be considered in light of water scarcity in the area.	requirements as well as applicable international standards. ▪ No environmental approvals are granted without confirming that the Project poses no harmful impacts on the environment or local community residents. ▪ A strategic area-wide assessment is conducted prior to issuing approvals, and mitigation measures will be implemented to minimize and avoid adverse impacts. ▪ The relevant environmental authority is responsible for monitoring and following up on the implementation of environmental management plans during the Project implementation phases.
Community Engagement and Social Infrastructure	Concerns and inquiries were raised regarding the role of wind projects in improving community infrastructure and services, including facilities for children and youth.	▪ It was explained that a Community Liaison Officer (CLO) from Ras Gharib will be appointed to support continuous engagement with the local community. ▪ Community needs will be identified through social assessments, and CSR activities will be prioritized based on available budgets and in coordination with relevant authorities and the Ras Gharib City Council.
Community CSR Practices and Infrastructure Improvements	Examples and recommendations were shared regarding ongoing CSR practices implemented by other wind energy projects in Ras Gharib, including school upgrades, preschool rehabilitation, youth centers, and other community facilities.	▪ It was noted that CSR activities are ongoing for several wind energy projects in Ras Gharib and are updated on a regular basis. ▪ The Project will consider existing best practices and lessons learned when developing its CSR and community engagement activities.
Employment Duration and Local Services	A request was raised to prioritize long-term employment opportunities for local residents. In addition, a recommendation was made to give attention to service and infrastructure projects along the main road between Zaafarana and Gebel El Zeit.	▪ These recommendations will be considered and evaluated through the ESMP and CSR planning for the Project, where applicable.
Youth Empowerment and Engagement	Attendees emphasized the importance of youth empowerment in Ras Gharib, including improving youth centers, supporting sports facilities, enhancing youth skills, and involving skilled local youth at different employment levels within the Project. Clarifications on the Project timeline were also requested.	▪ It was explained that youth empowerment initiatives will be addressed through the Project's CSR and community engagement activities, which will be based on a community needs assessment conducted by the CLO and the Developer. ▪ A transparent recruitment system will be applied, and all job opportunities throughout the Project lifecycle will be announced through recognized online and offline community channels. ▪ The construction phase is expected to last approximately 20 months, followed by an

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		operational phase of approximately 25 years.
Environmental Capacity Building	The importance of enhancing youth skills through environmental capacity-building training was highlighted, including training in workplace environmental practices. It was suggested that cooperation be established with wind energy projects to provide such training opportunities.	▪ This recommendation was acknowledged and will be considered as part of the Project's CSR and community engagement planning.
Bird Migration and Environmental Monitoring	Concerns were raised regarding the potential impacts of wind turbines on migratory birds in the Gulf of Suez region.	▪ It was explained that the Gulf of Suez is one of the world's major bird migration corridors. ▪ Comprehensive bird migration studies will be undertaken to assess flight paths and altitudes, and appropriate mitigation measures, including automatic turbine shutdown systems, will be implemented to minimize collision risks.
Written Comments and Recommendations	▪ Considering international standards in the construction and operation of the Project. ▪ Mitigating the environmental impacts of the Project to preserve the environment. ▪ Cooperation with the local community to raise the standard of living of citizens and pay attention to the quality of the environment. ▪ Setting procedures and conditions for the selection of subcontractors to reach the highest levels of safety, reduce rates of deaths and accidents, and create local opportunities. ▪ Youth engagement and representation in consultation meetings. ▪ Cooperation with other existing projects and activating community CSR plans to improve community needs.	

4.4 Future Stakeholder Engagement and Consultation

Future stakeholder engagement and consultations will mainly include the following, each of which is discussed in further detail.

4.4.1 Disclosure of Documentation

The documents below will be disclosed on the Developer's website to allow any stakeholder to review the studies and comment on the scope of work undertaken, key issues identified and any other issues of concern they might have. At the end of the disclosure period, all received comments will be addressed and taken into account and updated as appropriate.

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- Environmental and Social Impact Assessment (ESIA);
- Non-Technical Summary (NTS);
- Stakeholder Engagement Plan (SEP);
- Cumulative Effects Analysis (CEA)
- Critical Habitat Assessment (CHA)
- Health, Safety, Social and Environmental (HSSE) Management System (MS) Manuel

The above will be disclosed in two (2) main languages to include English and Arabic language.

All disclosed documentation will be available at the following locations:

- Wadi Dara Local Unit Office
- Ras Gharib District Office
- Red Sea Governorate office

4.4.2 Implementation of the Stakeholder Engagement Plan (SEP)

Stakeholder Engagement is an on-going process that involves stakeholder analysis & planning, disclosure & dissemination of information, consultation & participation, grievance mechanism, and on-going reporting to Affected Communities. A Stakeholder Engagement Plan (SEP) is developed and implemented that is scaled to the Project risks and impacts and development stage and tailored to the characteristics and interests of the Affected Communities and key stakeholders.

- The SEP for the Project describes the planned stakeholder consultation activities and engagement process and includes the following:
- Define the Project's approach to future stakeholder engagement;
- Identify stakeholders within the area influenced by the Project;
- Profile identified stakeholders to understand their priorities;
- Propose an action plan for future engagement with identified stakeholders; and
- Set out the grievance/project complaints mechanism.
- The SEP is prepared in compliance to AfDB Environmental and Social Operational Safeguard 10 (OS10): Stakeholder Engagement and Information Disclosure.

The Developer is committed to implementing the requirements of the SEP throughout the lifetime of the Project. The SEP is provided as a standalone document.

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5. REGULATORY AND POLICY FRAMEWORK

This section presents the environmental clearance process in Egypt, the key E&S legislations that are applicable for the Project, and the relevant international E&S standards and requirements.

5.1 Environmental Clearance Process in Egypt

The Egyptian Environmental Affairs Agency (EEAA) is the primary environmental regulator in Egypt. Operating under the Ministry of Environment, the EEAA is responsible for developing and enforcing national environmental and conservation policy, issuing environmental approvals, overseeing environmental compliance, and ensuring integration of environmental management across all development sectors. EEAA also oversees the implementation of environmental standards and the review of Environmental and Social Impact Assessment (ESIA) studies required for development projects.

The ESIA requirements and procedures are set forth in Law No. 4 of 1994 for the Protection of the Environment and its Executive Regulations, as amended by Law No. 9 of 2009 and Prime Ministerial Decree No. 338 of 1995. These laws outline the scope and responsibility of project developers and Competent Administrative Authorities (CAAs) in assessing and mitigating the potential impacts of development projects.

For electricity generation projects, including utility-scale wind farms, the New and Renewable Energy Authority (NREA) serves as the Competent Administrative Authority. NREA is mandated to receive ESIA submissions, assess site suitability, and forward the documentation to the EEAA for environmental clearance. For wind farm projects, the relevant ESIA is submitted to the Central Environmental Impact Assessment Department within EEAA headquarters in Cairo.

As per the EEAA's EIA Guidelines of 2009, utility-scale wind energy projects are classified as Category C—projects with potentially significant environmental and social impacts—which require a full ESIA to be conducted. The full ESIA must be completed and approved prior to obtaining an environmental permit for construction.

The key components of a full ESIA for Category C wind projects include the following:

- Public Consultation: Two rounds of consultation are required—first during the scoping phase and again after the draft ESIA is prepared. The public consultation must include disclosure of an Arabic-language technical summary and documentation of meetings with stakeholders, local authorities, and affected communities.
- Description of the Existing Environment: Including climatic conditions, geology and soils, water resources, biodiversity (flora and fauna), air quality, noise, land use, socio-economic context, and cultural heritage.
- Project Description: Including layout and location of wind turbines, associated infrastructure (e.g., substation, internal roads, transmission lines), and construction methods.
- Impact Assessment: Identification and analysis of potential environmental and social impacts, including avifauna interactions, noise, shadow flicker, land use changes, and community health and safety.
- Assessment of Alternatives: Including site alternatives, technology options, and "no project" scenario.

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- Emergency Preparedness and Response: Assessment of potential risks and outline of emergency response measures.
- Environmental and Social Management Plan (ESMP): Description of mitigation measures, institutional responsibilities, monitoring requirements, and compliance mechanisms.
- Forecast of Environmental Conditions: Estimation of environmental and social conditions following project implementation.

The ESIA is reviewed by the EEAA within a 30-day period. Based on the review, the EEAA may either approve the ESIA and issue the environmental clearance or request additional studies, surveys, or mitigation measures. The environmental approval granted will be valid for the construction phase of the project. Prior to the operation phase, the project developer must provide evidence of compliance with ESIA conditions and may be required to submit an operational phase environmental plan.

In addition, the Engineering, Procurement, and Construction (EPC) Contractor will be required to obtain separate environmental permits (in accordance with EEAA regulations) for any temporary or ancillary facilities that were not assessed under the main ESIA. These may include, but are not limited to, concrete batching plants, burrow pits, and worker camps.

5.2 Egypt E&S Regulatory Context

This section lists those legislations that are directly related to E&S compliance that must be adhered to by all parties involved in the Project throughout the planning and construction, operation, and decommissioning phase. These legislations include: (i) those issued by EEAA (laws, regulations and instruction), and (ii) the relevant national legislation issued by other line ministries (laws, regulations, instructions, standards).

The table below lists the key relevant legislation and regulator/entity relevant to each of the environmental and social parameters being studied and assessed within this ESIA. Throughout the following Sections, reference to the requirements set out within those legislations is provided under each relevant parameter.

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Table 13: National Legislation and Guidelines Governing the E&S Compliance for the Project

Legislation	Relevant Article	Requirements
Land Use		
Electricity Law No. 87/2015	Article 53	▪ Stipulates the right of proper compensation for the affected persons due to the establishment of Electricity projects
	Article 55	▪ Identifies the Right of Way that should be avoided for the OHTL and the underground cables: - 25 meters from the center for extremely high voltage OHTL - 13 meters from the center for the high voltages OHTL - 5 meters for the medium voltage OHTL - 5 meters for the high and extremely high voltage cables - 2 meters for low and medium voltage cables ▪ The Owner of the land should be compensated in case of land acquisition. The right of way stated in article 55 should be abided by
Law on Expropriation for Public Interest No. 10/1990	No relevant article as the project will not entail any expropriation or acquisition of private land	▪ The main site is located on a state-owned land which does not trigger any expropriation activities, according to law no. 10/1990.
Law on Expropriation of Real Estate Property for Public Interest 577/1954 later amended by Law 252/60 and Law 13/1962	No relevant article as the project will not entail any expropriation or acquisition of private land	▪ Establishes the provisions pertaining to the expropriation of real estate property for public benefit and improvement. ▪ The project will not entail any land acquisition of private land or expropriation of private property
Civil code 131/1948	Articles 802-805	▪ Recognizes private ownership right. - Article 802 states that the owner, pursuant to the Law, has the sole right of using and/or disposing their property. - Article 803 defines what is meant by land property - Article 805 states that no one may be deprived of their property except in cases prescribed by Law and would take place with an equitable compensation. ▪ Land for the Project was allocated by NREA and was not previously owned and thus no compensation would be needed
Unified Building Law No. 119/ 2008	Article 39	▪ Apply and a receive the construction permit before start of the implementation ▪ Ensure that all designs abide by the building codes of Egypt
Geology, hydrology, hydrogeology		
Law on Environmental Protection No. 4/1994	Article 33 of the Executive regulations of Law 4/1994	▪ The owner of the project is responsible to decontaminate the area/soil in case of relocation or decommissioning
Management of solid waste and hazardous waste generated from the facility during generation, handling, transportation and disposal		
Law No. 4/1994 amended by Law	Articles 28, 29, 33, 37, 39	▪ Identification: Using the hazardous waste (HW) lists issued by the competent authority. ▪ Minimization: strive to reduce quantitatively and qualitatively the generation of the HW

No. 9/2009 and ER 1095/2011 amended by Decree 710/2012)		▪ Segregation: HW is to be separated from other types of non-hazardous waste. In addition, the different types of HW must not be mixed together. ▪ On site Storage: HW is to be stored in a designated area, and containers must be made of suitable materials and be properly sealed to avoid any leakages or spills into the surroundings. ▪ Off-site transportation: HW handling and transportation to be undertaken by authorized HW contractors.
	Article 22 and Article 17 of the Executive Regulations	▪ The establishment should maintain an environmental register in accordance with Annex 3 of the Executive regulations
	Article 39 and Article 41 of the Executive Regulations	▪ Article 39: The establishment should maintain the cleanliness of garbage bins and vehicles. Garbage collection bins shall be tightly covered and waste shall be transported at suitable intervals. ▪ Article 41: The establishment shall undertake necessary precautions to secure the safe storage and transportation of waste. These precautions include the following: - Construction waste storage is to be carried out at site such that it does not obstruct movement of vehicles and personnel. - Waste that generates emissions should be covered to avoid air pollution - Waste is to be handled and transported by authorized waste contractors and disposed of in licensed facilities
	Articles 26, 28 and 29 of the Executive regulations	▪ The establishment should maintain a register for the hazardous waste, as well as record for the hazardous substances used
Law No. 202/2020 on waste management and its executive regulation 722/2022	Article 10	▪ The waste generators or holders shall safely dispose of the wastes of their establishment or their projects or entities after the delivery or initial operation of the new or renovated projects, or after the completion of the works from which wastes are generated, whatever their purpose, within a period not exceeding twenty days starting from the date of delivery or initial operation of the project or works, in the event that these wastes are located outside the boundaries of these establishments. or projects. The generators or possessors of the waste shall also abide by the measures and requirements set out in the appendices attached to this regulation.
	Article 36	▪ All entities and individuals, when carrying out demolition and construction works, are obligated to manage safe transportation, recycling and final disposal through entities licensed and authorized to do so.
	Article 50	▪ The owner of the facility or the person in charge of its management whose activity produces hazardous waste, in accordance with the provisions of the law, must keep a paper or electronic record, or both, of these wastes, and how to dispose of them, as well as the parties contracted for any management operations of these wastes, and in the event that the activity of the facility is transferred or suspended, the owner of the facility or the person responsible for its management must clean it and the soil in which this activity was carried out, in accordance with the requirements and standards set out in Appendix No. (8) attached to this regulation.
Control of the wastewater discharge into the sewage system and public network.		
Ministerial Decree 44/2000, Decree of Law 93/1962	Article 14	▪ The law prohibits the disposal of domestic, industrial and commercial wastewater, treated or untreated, in public drainage system without obtaining a prior approval. ▪ Article 14 of the executive regulations set the parameters required regarding the quality of the wastewater discharged to the public sewage network. ▪ The owner of the project should abide by the limits stated in article 14 of the Executive regulations of Law 93/1962
Biodiversity, Birds, and Bats		
Law 4 of 1994 amended by Law	Article 28, as amended by Law 9 of 2009. Annex 4 of the	▪ Defines fauna and flora which are prohibited to be hunted or disturbed. ▪ Concerned with ensuring that no species are being disturbed and implementing all mitigation measures needed to

9/2009	Executive Regulations of law 4/1994, amended by Prime Minister Decree 1095 of 2011	reduce the impact on any fauna and flora in the vicinity of the project
Environmental Impact Assessment Guidelines and Monitoring Protocols for Wind Energy Development Projects along the Rift Valley/Red Sea Flyway with a particular reference to wind energy in support of the conservation of Migratory Soaring Birds (MSB)	Section One Guidelines for Environmental Impact Assessment for Wind Energy Development in Egypt 1.5 Description of EIA Study Components for Wind Farm Projects – 0.7 Project Environmental Setting	▪ Defines the ecological components of plant, animals and their habitats, including threatened species and areas that have been identified as protected areas or IBAs and requests the review IUCN Red List of Threatened Species. ▪ Defines baseline information requirements for birds at Wind Farm Projects.
	Section Two Guidelines on Mitigation, Monitoring and Training 2.2 Monitoring Protocols	▪ Defines standard methods and models to predict risk related to migratory birds. ▪ Defines standard methods used in pre- and post-construction studies of Wind Energy Facilities focused on assessing impacts on birds. ▪ Defines standard shutdown protocol to be implemented building on results of species recorded and numbers of passage birds recorded during studies.
Archaeology and cultural heritage		
Law on Antiquities Protection No. 117/1983	Article 1	▪ Defines a monument as a building or movable property produced by different civilizations or by art, sciences, literature and religions from the prehistoric era or successive historical eras until a hundred years ago or historical buildings.
	Article 2	▪ States that any building or movable property that has a historical, scientific, religious, artistic or literary value could be considered as a monument whenever the national interest of the country imposes its conservation and maintenance without adherence to the time limit stipulated in the preceding Article no.1
	Article 5	▪ States that the Supreme Council of Antiquities (SCA) is the competent authority responsible for antiquities in Egypt.
	Article 20	▪ States that license of construction in archaeological sites or land is not permitted. It is prohibited to make any installation or landfill or digging channels, construct roads, agricultural land or for public benefits in archaeological sites or land within its approved border lines. ▪ The Article additionally, states that a buffer zone around the monument or the site is defined as three kilometres in the uninhabited areas or any distance determined by the SCA to achieve environmental protection of the other parts of the monument in the surroundings (article 20-Ch.1). ▪ The provisions of this article (20) apply on land which appears to the SCA - based on conducted studies – that there is a probable existence of monuments in the subsoil. ▪ The provisions of this article are also applied to desert and areas where quarrying work is licensed.
	Article 22	▪ States that license of construction in the immediate vicinity of archaeological sites within populated areas could be delivered by the competent authority, after the approval of SCA. ▪ The competent authority must state in the license the conditions which the SCA emphasizes to guarantee that the building does not have a negative visual impact on the monument and its direct buffer zone protecting the archaeological and historical surroundings.

		▪ The SCA has to pronounce its verdict on the license demand within 60 days of the date of submission. Otherwise, the elapsing of this period is regarded as a decision of refusal.
	Article 23	▪ States that the SCA should take the necessary steps to expropriate land that is found in archealogical sites and registered according to the rules of this Law. (Article 23- Ch.1). [These rules are defined in the second chapter of the Law 117 – articles 26-30]. ▪ The SCA must be notified in the event that an unrecorded ruin is found by any person (Article 23).
Air quality and noise		
Law 4/1994 amended by Law 9/2009 and ER 710/2012	Article 42 of Law 4/1994 amended by Law 9/2009	▪ Defines maximum allowable limits for ambient noise intensity and maximum exposure duration
	Article 44 of ER 710/2012	▪ Open burning of garbage and non-hazardous solid waste is strictly prohibited, and garbage and solid waste shall only be dumped or treated in designated areas away from residential, industrial, agricultural and waterways.
		▪ Dumping areas should be bound by a wall, away from obstruction, traffic and pedestrians and take into account the coverage of volatile soil so as not to cause air pollution. ▪ Transporting waste and dust resulting from excavation, demolition and construction in special containers or using transport vehicles prepared and licensed for this purpose. - The vehicle shall be equipped with a special box or a tight cover that prevents the spread of dust and debris to the air or falling on the road. - The vehicle shall be equipped with special equipment for loading and unloading. - The car should be in good condition according to the rules of safety, durability and lights and equipped with all safety devices.
ERs (amended by Decree 1095/2011 amended by Decree 710/2012)	Annex 5	▪ Defines maximum limits of ambient air pollutants
	Annex 6	▪ Defines permissible limits of air pollutants in emissions
	Annex 8 and Annex 9	▪ Defines maximum allowable limits for air emissions, heat stress, ventilation rates within the work environment
Modified ERs (710/2012) of Law 4/1994	Article 37	▪ Defines maximum allowable limits for exhaust gases from machines, engines and vehicles.
Law 4/1994	Article 36	▪ Stipulates that it is prohibited to use machines, engines or vehicles whose exhaust emissions exceed the limits set by the executive regulations of this Law.
Law 4/1994 and its modified ERs	Article 35 of Law 4/1994 and article 34 of its modified ERs	▪ Defines maximum allowable limits for ambient air pollutants, which should be met by the contractors and operator throughout the lifetime of the plant.
Infrastructure and utilities		
Petroleum pipelines Law No. 4/1988	Decree 292/1988	▪ The owner of a property should allow the passing of pipelines transporting liquid or gaseous hydrocarbons beneath the ground surface in accordance with the procedure mentioned in the executive regulations
	Article 2	▪ Specifies that no buildings or trees, other than agricultural land trees, should be constructed or planted at a distance less than 2 m on each side of the pipeline inside urban and 6 m on each side of the pipeline outside the urban areas. ▪ If it is necessary to place the pipelines at a closer distance than what is specified in the law, it is allowed through a decision from the chairman of Egyptian General Petroleum Corporation (EGPC); taking into consideration the necessary safety precautions.

		▪ also specifies that if the activities done in accordance to the law will result in damage to the property, the owner has the right to a fair compensation to be decided by a committee formed by a decision from the Minister of Petroleum, and the executive regulations include the guidelines for compensation estimation.
Occupational health and safety		
Law 4/1994	Articles 43 – 45 of Law 4/1994, which address air quality, noise, heat stress, and the provision of protective measures to workers.	▪ The owner of the project should abide by the limits stated in Annex 7 of the Executive regulations ▪ In case the limits are exceeded, special protective equipment should be made available (earmuffs, masks…) ▪ In case the limits are exceeded, the workers should have rests as specified by the limits (especially for noise and vibration from electric jack hammers or any other ramming equipment) ▪ Conduct regular medical check-ups for workers that are facing noise, vibration or heat stress exceeding the limits
Egyptian Labour Law No. 14 of 2025	Article 252, 254, 258	▪ Article 252 requires employers to take all necessary preventive measures to protect workers from hazards associated with working in confined or enclosed spaces, ensuring safe entry procedures and risk control measures. ▪ Article 254 newly introduces psychosocial safety obligations, requiring prevention of harassment, bullying, and workplace violence. ▪ According to article 258, Occupational health and safety inspectors have the authority to inspect workplaces and verify compliance with safety standards.
	Minister of Labour Decree 48/1967. Minister of Labour Decree 55/1983. Minister of Industry Decree 91/1985 Minister of Labour Decree 126/2003. Minister of Industry Decree 134/2003	▪ The owner of the project is bound with the provision of protective equipment to workers and fire-fighting/emergency response plans. Moreover, the following laws and decrees should be considered: ▪ The contractors should have appropriate number of first aid kits in relation to the size of the site and the number of workers on site ▪ Work-related accidents, injuries, fatalities and diseases should be notified and bi-annual OHS statistics reporting should be developed. ▪ Types of establishments needing to establish OHS services and committees.
	Article 211 and article 34 of the Decree of the Minister of Labour and Manpower no. 211/2003	▪ The establishment should prepare records/reports/register for chemical safety
Decree 458/2007		▪ Egyptian Drinking Water Quality Standards should be met for all water bought and stored on site for the workers' use.
Decree 162, 2019	Articles 5, 9, 11, 19.	▪ Without prejudice to the applicable provisions of the Egyptian Labour Law No. 14 of 2025, all parties, including Government entities and their affiliated bodies, public sector companies, the public business sector, the private sector, trade-union and professional associations and youth employment agencies are prohibited from employing workers subject to this regulation other than via the competent department in the Directorate of Manpower and within whose competence the activity falls. ▪ Labour, occupational safety and health inspectors are required in the course of conducting their inspections to monitor the informal workers in the establishments under inspection and to notify employers that they are required to proceed to the competent department of the Directorate to register these workers, regularize their status and take the requisite legal measures as per the provisions of the Labour Act and its implementing ministerial decisions.

Ministerial Decree No.162, 2019	Articles 5, 9, 11, 19.	▪ Without prejudice to the applicable provisions of the Egyptian Labour Law No. 14 of 2025, all parties, including Government entities and their affiliated bodies, public sector companies, the public business sector, the private sector, trade-union and professional associations and youth employment agencies are prohibited from employing workers subject to this regulation other than via the competent department in the Directorate of Manpower and within whose competence the activity falls. ▪ Labour, occupational safety and health inspectors are required in the course of conducting their inspections to monitor the informal workers in the establishments under inspection and to notify employers that they are required to proceed to the competent department of the Directorate to register these workers, regularize their status and take the requisite legal measures as per the provisions of the Labour Act and its implementing ministerial decisions. ▪ Without prejudice to the social insurance and pensions system in force, the employer shall at his own expense provide first aid to any worker subject to the provisions of this regulation who suffers injury during work and he shall transport him to the requisite provider treatment. ▪ Labour, occupational safety and health and employment inspectors shall monitor the employment of workers subject to the provisions of this regulation and the enforcement of the rules for employment set out in this regulation.
Worker Rights & general Working Conditions		
Labour Law No. 12 of 2003 and its amendments by Labour Law 2021	Working hours	▪ According to the new Labour Law 2021, which came into force by the end of 2025, The standard workweek remains 8 hours per day and 48 hours per week, as per Article 90. Employers must provide at least one rest day per week, preferably on Fridays. Breaks: Workers must receive a rest period after every five continuous hours of work (Article 92). Breaks must not be less than one hour per day and are not counted as part of the total working hours. ▪ According to the current Labour Law No. 12 of 2003 According to Article 80, the maximum working hours shall not exceed eight hours per day or 48 hours per week, excluding rest periods. ▪ Article 81-83 mandates a rest break of at least one hour per working day., and 21 days of annual leave after completing one year of service, increasing to 30 days after ten years or upon reaching the age of fifty (Article 47).
	Worker Protection and Employment Rights	▪ According to the new Labour Law 2021, which came into force by the end of 2025, ▪ The new labour law explicitly prohibits harassment, bullying, or any form of verbal, physical, or psychological violence against workers, aligning with international agreements and ensuring a safe working environment that meets decent work conditions. ▪ Article (4) of the proposed law states that it is prohibited to employ a worker under coercion or forced labour. Additionally, harassment, bullying, or any form of verbal, physical, or psychological violence against workers is strictly forbidden. The internal work regulations and disciplinary sanctions within the establishment shall specify the penalties for such violations. ▪ Furthermore, Article (281) stipulates that any violation of Articles (4) and (5) of this law shall be punishable by a fine of no less than 5,000 EGP and no more than 50,000 EGP. The fine shall be multiplied based on the number of workers affected by the offense, and in cases of repeated violations, the fine shall be doubled. ▪ As a result, workplace bullying and harassment in the private sector and establishments subject to labour law shall be penalized with fines ranging from 5,000 EGP to 50,000 EGP. ▪ According to the current Labour Law No. 12 of 2003

		▪ Article 92 prohibits discrimination in wages based on gender, ensuring fair treatment. ▪ Article 120 establishes strict rules regarding contract termination, requiring justified reasons and severance compensation when applicable.
	Overtime Pay	▪ According to the new Labour Law 2021, which came into force by the end of 2025, ▪ Employees required to work overtime must be compensated at a rate of at least 35% higher than their normal wage for daytime overtime and 70% higher for night shifts (Article 95). ▪ Work performed on public holidays entitles employees to double their normal wage, plus an additional day off in lieu (Article 98). ▪ According to the current Labour Law No. 12 of 2003 ▪ Overtime Pay: Articles 85 and 88 specify that any overtime work must be compensated at 35% above normal pay for daytime overtime and 70% for nighttime overtime.
	Other Working Conditions	▪ The law prohibits discrimination in employment and wages based on gender, disability, or social status (Article 3) and prohibits discrimination on the basis of sex in hiring, wages, promotions, and termination of employment (Article 35). ▪ Maternity leave has been extended to four months instead of three, with full salary benefits (Article 108). ▪ Flexible working arrangements are introduced to support women in the workforce.
	Occupational Health & Safety (OHS) Regulations	▪ OHS regulations remain governed under the existing Labour Law No. 12 of 2003 until the new law takes effect. Employers must provide a safe working environment, conduct regular risk assessments, and ensure employee health protection measures are in place. ▪ The Egyptian Environmental Law (Law No. 4 of 1994, amended in 2009) also imposes safety and environmental protection obligations in industrial and construction activities.
Law on Social Protection and Benefits Egyptian Social Insurance No. 148/ 2019, which came into force on January 1, 2020	Social Protection and Benefits Egyptian Social Insurance	▪ The Egyptian Social Insurance Law No. 148 of 2019, which came into force on January 1, 2020, continues to regulate job protections, benefits, and social security matters.
Law on Establishing the National Council for Human Rights No. 94/2003		▪ The Law on Establishing the National Council for Human Rights (NCHR) aims to ensure respect, set values, raise awareness and grant observance of human rights. ▪ At the forefront of these rights and freedoms are the right to life and security of individuals, freedom of belief and expression, the right to private property, the right to resort to courts of law, and the right to fair investigation and trial when charged with an offence. ▪ This Constitution came into force after a public referendum on 11th September 1971 and was amended on 22nd May 1980 to introduce the Shoura Council and the press.
EEAA EIA guidelines	Paragraph 6.4.3.1 Scope of Public Consultation Paragraph 6.4.3.2 Methodology of Public Consultation	▪ Conduct a public consultation as part of the ESIA study according to the EEAA guidelines methodology. The involvement of the public and concerned entities in the EIA planning and implementation phases is mandatory for Category C projects through the public consultation process with concerned parties. ▪ Preparation of the Public Consultation Plan before starting the consultation activities in the EIA scoping phase, the project proponent prepares a plan indicating the methodology of the public consultation to be adopted in the two

	Paragraph 6.4.3.3 Documentation of the Consultation Results Paragraph 7 Requirement and Scope of the Public Disclosure	public consultation phases (EIA scoping phase and consultation on the draft EIA). The plan should indicate the concerned parties that will be consulted, method of consultation and other points. ▪ An individual section in the EIA will be prepared for public consultation ▪ Disclosure of relevant material is an important process and should be undertaken in a timely manner for all Category C projects. This process permits meaningful consultations between the project proponent and project-affected groups and local NGOs is required to take place. Before the public consultation on the draft EIA, the draft technical summary in Arabic should be disclosed to all concerned parties. ▪ workers in the establishments under inspection and to notify employers that they are required to proceed to the competent department of the Directorate to register these workers, regularize their status and take the requisite legal measures as per the provisions of the Labour Act and its implementing ministerial decisions.
Socio-economics		
Law No. 94/2003 and EEAA EIA guidelines	Paragraph 6.4.3.1 Scope of Public Consultation Paragraph 6.4.3.2 Methodology of Public Consultation Paragraph 6.4.3.3 Documentation of the Consultation Results Paragraph 7 Requirement and Scope of the Public Disclosure	▪ At the forefront of these rights and freedoms are the right to life and security of individuals, freedom of belief and expression, the right to private property, the right to resort to courts of law, and the right to fair investigation and trial when charged with an offence. ▪ This Constitution came into force after a public referendum on 11th September 1971 and was amended on 22nd May 1980 to introduce the Shoura Council and the press. ▪ Conduct a public consultation as part of the ESIA study according to the EEAA guidelines methodology. The involvement of the public and concerned entities in the EIA planning and implementation phases is mandatory for Category C projects through the public consultation process with concerned parties. ▪ Preparation of the Public Consultation Plan before starting the consultation activities in the EIA scoping phase, the project proponent prepares a plan indicating the methodology of the public consultation to be adopted in the two public consultation phases (EIA scoping phase and consultation on the draft EIA). The plan should indicate the concerned parties that will be consulted individual section in the EIA will be prepared for public consultation ▪ Disclosure of relevant material is an important process and should be undertaken in a timely manner for all Category C projects. This process permits meaningful consultations between the project proponent and project-affected groups and local NGOs is required to take place. Before the public consultation on the draft EIA, the draft technical summary in Arabic should be disclosed to all concerned parties., method of consultation and other points.

5.3 International Agreements

Egypt has signed and ratified a number of international conventions committing the country to the conservation of E&S resources and protection of workers' health & safety and labor rights. The following table lists the key conventions:

Table 14: Relevant International Conventions and Agreements

Name of Multilateral E&S Agreement	Year
Biodiversity and Natural Resources	
International Plant Protection Convention	1951
Agreement for the Establishment of a Commission for Controlling the Desert Locust in the Near East	1965
Convention on Wetlands of International Importance Especially as Water Fowl Habitat (RAMSAR)	1971
Convention Concerning the Protection of the World Cultural and Natural Heritage	1972
Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES)	1973
Convention on the Conservation of Migratory Species of Wild Animals	1979
Protocol to Amend the Convention on Wetlands of International Importance Especially as Water Fowl Habitat	1982
Convention on Biological Diversity (CBD)	1992
Agreement for the Establishment of the Near East Plant Protection Organization	1993
United Nations Convention to Combat Desertification in those Countries Experiencing Serious Drought and/or Desertification, particularly in Africa	1994
Protocol Concerning Specially Protected Areas and Biological Diversity in the Mediterranean	1995
African Convention on the Conservation of Nature and Natural Resources (revised)	2003
International Tropical Timber Agreement	2006
Hazardous Materials and Chemicals	
Convention Concerning Prevention and Control of Occupational Hazards Caused by Carcinogenic Substances and Agents	1974
Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons, and on their Destruction	1972
Protocol on the Prevention of Pollution of the Mediterranean Sea by Transboundary Movements of Hazardous Wastes and their Disposal	1976
Convention on the Prohibition of Military or any other Hostile Use of Environmental Modification Techniques	1976
Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal	1989
Bamako Convention on the Ban of the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes within Africa	1991
Amendment to the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal	1995
Stockholm Convention on Persistent Organic Pollutants (POPs)	2002
Atmosphere, Air Pollution and Climate Change	
Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space Including the Moon and Other Celestial Bodies	1967
Vienna Convention for the Protection of the Ozone Layer	1985
Montreal Protocol on Substances that Deplete the Ozone Layer	1987
(London) Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer	1990
United Nations Framework Convention on Climate Change	1992
(Copenhagen) Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer	1992
Name of Multilateral Environmental Agreement	
Kyoto Protocol	1997
Paris Agreement under the United Nations Framework Convention on Climate Change	2015
Health and Worker Safety	
International Labor Organization Core Labor Standards	1936

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Convention Concerning the Protection of Workers Against Ionizing Radiation	1960
Convention Concerning the Protection of Workers Against Occupational Hazards in the Working Environment due to Air Pollution, Noise and Vibration	1977
Occupational Safety and Health Convention	1979
Human Rights	
UN Convention on the Elimination of All forms of Discrimination against Women	1981
UN International Covenant on Economic, Social and Cultural Rights	1982
UN Convention on the Rights of a Child	1990
UN Convention on the Rights of Persons with Disabilities	2008
UN International Covenant on Civil and Political Rights	1982

5.4 Requirements for Project Financing

The Project will be seeking financing from International Financing Institutions (IFIs). Therefore, the Developer wishes to design and manage the project in accordance with international E&S standards and requirements. For the ESIA, it will be based on the requirements of the following entities, each of which is discussed in further details below:

- International Finance Corporation (IFC);
- European Bank for Reconstruction and Development (EBRD); and
- African Development Bank (AfDB).

5.4.1 International Finance Corporation (IFC)

The IFC of the World Bank provides a range of guidance documents related to the assessment and management of E&S issues in project development. Not only does IFC guidance provide a generally accepted basis for good practice, but it also provides the technical cornerstone for the Equator Principles which set out the E&S requirements of banks for project finance. The IFC requirements have become the *de facto* international E&S performance benchmark for project financing.

The IFC policy on E&S Sustainability puts into practice IFC's overall commitments to E&S sustainability. The policy seeks to: (i) enhance the predictability, transparency, and accountability of IFC's actions and decision making; (ii) help clients manage their environmental and social risks and impacts and improve their performance; and (iii) enhance positive development outcomes on the ground. In addition, the Policy identifies IFC's commitments, its roles and responsibilities and others as applicable.

The IFC Performance Standards (PS) on Social and Environmental Sustainability set out a framework for managing and improving project performance from planning and assessment, through construction and operations to closure. The Performance Standards requirements are summarized in the table below.

Table 15: IFC Performance Standard Requirements

IFC PS	Key Points	Applicability for ESIA
PS 1: Assessment and Management of	PS1 underscores the importance of managing social and environmental performance throughout the life of a project by using a dynamic social and environmental management system. Specific objectives of this Performance Standard are: ▪ To identify and assess social and environmental impacts, both adverse and	Applicable and considered for this ESIA

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Environmental and Social Risks and Impacts	beneficial, in the project's area of influence; ▪ To avoid, or where avoidance is not possible, minimize, mitigate, or compensate for adverse impacts on workers, affected communities, and the environment; ▪ To ensure that affected communities are appropriately engaged on issues that could potentially affect them; and ▪ To promote improved social and environmental performance of companies through the effective use of management systems.	
PS 2: Labor and Working Conditions	The requirements set out in the PS have been in part guided by a number of international conventions negotiated through the International Labor Organization (ILO) and the United Nations (UN). Specific objectives of this Performance Standard are: ▪ To establish, maintain and improve the worker-management relationship; ▪ To promote fair treatment, non-discrimination and equal opportunity of workers and compliance with national labor and employment laws; ▪ To promote the workforce by addressing child labor and forced labor; and ▪ To promote safe and healthy working conditions, and to protect and promote the health of workers.	Applicable and considered for this ESIA
PS 3: Resource Efficiency and Pollution Prevention	This Performance Standard outlines a project approach to pollution prevention and abatement in line with international available technologies and practices. It promotes the private sector's ability to integrate such technologies and practices as far as their use is technically and financially feasible and cost-effective in the context of a project that relies on commercially available skills and resources. Specific objectives of this Performance Standard are: ▪ To avoid or minimize adverse impacts on human health and the environment by avoiding or minimizing pollution from project activities; and ▪ To promote the reduction of emissions that contribute to climate change.	Applicable and considered for this ESIA
PS 4: Community Health, Safety and Security	This PS recognizes that project activities, equipment, and infrastructure often bring benefits to communities including employment, services, and opportunities for economic development. However, projects can also increase risks arising from accidents, releases of hazardous materials, exposure to diseases, and the use of security personnel. While acknowledging the public authorities' role in promoting the health, safety and security of the public, this PS addresses the project sponsor's responsibility in respect of community health, safety and security.	Applicable and considered for this ESIA
PS 5: Land Acquisition and Involuntary Resettlement	Involuntary resettlement refers both to physical and economic displacement as a result of project-related land acquisition. Where involuntary resettlement is unavoidable, appropriate measures to mitigate adverse impacts on displaced persons and host communities should be carefully planned and implemented.	Not applicable, Refer to "Section 7.2.2 "
PS 6: Biodiversity Conservation and Sustainable Management Of Living Natural Resources	This Performance Standard reflects the objectives of the Convention on Biological Diversity to conserve biological diversity and promote the use of renewable natural resources in a sustainable manner. This Performance Standard addresses how project sponsors can avoid or mitigate threats to biodiversity arising from their operations as well as sustainably manage renewable natural resources. Specific objectives of this Performance Standard are: ▪ To protect and conserve biodiversity; and ▪ To promote sustainable management and use of natural resources through the adoption of practices that integrate conservation needs and development priorities.	Applicable and considered for this ESIA

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PS 7: Indigenous Peoples	Indigenous peoples may be particularly vulnerable to the adverse impacts associated with project development, including risk of impoverishment and loss of identity, culture, and natural resource-based livelihoods. PS7 seeks to ensure that business activities minimize negative impacts, foster respect for human rights, dignity and culture of indigenous populations, and promote development benefits in culturally appropriate ways. PS 7 (Indigenous Peoples) is not considered to be applicable to this Project. The Indigenous World 2018 Report (IWGIA, 2018) states that Egypt is not classified as a country with indigenous people.	Not applicable, Refer to "Section 7.11"
PS 8: Cultural Heritage	Consistent with the Convention Concerning the Protection of the World Cultural and Natural Heritage, this Performance Standard aims to protect irreplaceable cultural heritage and to guide project sponsors on protecting cultural heritage in the course of their business operations.	Applicable and considered for this ESIA

In addition, to the Performance Standards, the IFC have sector-specific EHS guideline documents. With regards to the ESIA the following are applicable:

- IFC General EHS Guidelines (2007): identifies detailed EHS management and technical recommendations which are applicable for all development projects; and
- EHS Guidelines for Wind Energy (IFC, 2015*):* Provide guidance and information to users on EHS issues related to onshore and offshore wind energy facilities. The Guideline provides a summary of EHS impacts associated with wind energy facilities along with recommendations for their management as well as performance indicators and monitoring programs for environmental, occupational health and safety and community health and safety. Where relevant, the requirements of this guideline are reiterated clearly in subsequent sections that discuss the environmental attributes they relate to where national legislation is not available.
- EHS Guidelines for Electric Power Transmission and Distribution (IFC, 2007): Provide guidance and information to users on EHS issues related to transmission and distribution lines. The Guideline provides a summary of EHS impacts associated with transmission and distribution lines along with recommendations for their management as well as performance indicators and monitoring programs for environmental, occupational health and safety and community health and safety. Where relevant, the requirements of this guideline are reiterated clearly in subsequent sections that discuss the environmental attributes they relate to where national legislation is not available.

5.4.2 European Bank for Reconstruction and Development

EBRD's 2024 Environmental and Social Policy seeks to ensure, through its E&S appraisal and monitoring processes, that the projects it finances:

- Are socially and environmentally sustainable;
- Respect the rights of affected workers and communities; and
- Are designed and operated in compliance with applicable regulatory requirements and good international practice.

Under EBRD's Environmental and Social Policy Annex B identifies large scale wind power projects are classified as "Category A" and which therefore have significant risks and require an ESIA.

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To translate this objective into successful practical outcomes, EBRD has adopted a comprehensive set of E&S Requirements (ESR) covering key areas of environmental and social impacts and issues. EBRD expects clients to assess and manage the environmental and social issues associated with their projects so that projects meet their E&S Requirements. The E&S Requirements applicable are summarized in the table below.

Table 16: Overview of Key Points of EBRD Performance Requirements of Relevance to the Project

EBRD PR	Key Points Relevant to the Project	Applicability
ESR 1: Assessment and Management of E&S Risks and Impacts	This requirement outlines the process of appraising, managing and monitoring environmental and social issues associated with a project to include E&S management systems, E&S assessments, ESMP, organizational capacity, monitoring and reporting, etc.	Applicable and considered for this ESIA
ESR 2: Labor and Working Conditions	This requirement assures that human resources policies, procedures and standards will meet the following minimum requirements during the life of the Project with regards to labor and working conditions. This includes issues related to management of worker relationships including HR policies and procedures, conditions of work, migrant workers, workers' organization, forced labor, child labor, non-discrimination and equal opportunity, grievance mechanism, contracted and supply chain workers, etc.	Applicable and considered for this ESIA
ESR 3: Resource Efficiency and Pollution Prevention and Control	This requirement ensures that resources are utilized efficiently and impacts associated with polluting activities are controlled. This includes issues related to resource efficiency and circular economy, water, waste, pollution prevention and control, greenhouse gas emissions, safe use and management of hazardous substances and materials, pest management, and noise and vibration.	Applicable and considered for this ESIA
ESR 4: Health. Safety and Security	While bringing many positive benefits to local communities, projects can also increase the potential for community exposure to risks and impacts arising from temporary or permanent changes in population; transport of raw and finished materials; construction, operations and decommissioning; accidents, structural failures, and releases of hazardous materials. This performance requirement addresses the project proponent's responsibility to identify and to avoid or minimize the risks and adverse impacts to community health, safety and security as well as occupational health and safety.	Applicable and considered for this ESIA
ESR 5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement	Involuntary resettlement refers both to physical and economic displacement as a result of project-related land acquisition. Where involuntary resettlement is unavoidable, appropriate measures to mitigate adverse impacts on displaced people and host communities should be carefully planned and implemented. The requirement includes issues related to avoidance or minimization of displacement, forced eviction, negotiated settlements, socioeconomic surveys, inventory assessments and cut-off dates, valuations, eligibility and compensation, temporary land use restrictions, stakeholder engagement, grievance mechanism and other.	Not applicable

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EBRD PR	Key Points Relevant to the Project	Applicability
ESR 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	EBRD recognizes the need for the protection and conservation of biodiversity in the context of projects in which it invests. In pursuing these aims, this includes requirements related to assessment of risks and impacts, protection and conservation of biodiversity/Priority Biodiversity Features (PBF)/Critical Habitats (CH), legally protected areas, invasive alien species, sustainable management of natural resource, and supply chains.	Applicable and considered for this ESIA
ESR 7: Indigenous Peoples	Indigenous peoples may be particularly vulnerable to the adverse impacts associated with project development, including risk of impoverishment and loss of identity, culture, and natural resource-based livelihoods. The requirement seeks to ensure that business activities minimize negative impacts, foster respect for human rights, dignity and culture of indigenous populations, and promote development benefits in culturally appropriate ways.	Not applicable
ESR 8: Cultural Heritage	Cultural heritage is important as a source of valuable historical and scientific information, as an asset for economic and social development, and as an integral part of a people's cultural identity, practices, and continuity. EBRD requires the protection of cultural heritage from project activities to include archeological sites, built heritage, cultural landscape with natural features, movable cultural heritage, etc.	Applicable and considered for this ESIA
ESR 9: Financial Intermediaries	This Requirement applies exclusively to projects where the EBRD provides funding through financial intermediaries (FIs) such as commercial banks, private equity funds, or microfinance institutions. In this case, the EBRD is providing direct financing to the project developer for the implementation of the Project. Since no financial intermediary is involved in the structure or disbursement of funds, the provisions of PR 9 are not applicable to this project.	Not applicable
ESR 10: Stakeholder Engagement	EBRD considers stakeholder engagement as an essential part of good business practice and corporate citizenship. In particular, effective community engagement is central to the successful management of risks and impacts on communities, as well as central to achieving enhanced community benefits. The requirement entailed identifying people or communities that are or could be affected by the Project, as well as other interested parties; ensure that such stakeholders are appropriately engaged on environmental and social issues that could potentially affect them through a process of information disclosure and meaningful consultation; and maintain a constructive relationship with stake holders on an ongoing basis through meaningful engagement during project implementation.	Applicable and considered for this ESIA

5.4.3 AfDB Requirements

The AfDB's had an Integrated Safeguards System (2015) to manage environmental and social risks, this ISS was updated by the ISS 2023. The Integrated Safeguards System (ISS) is a cornerstone of its strategy to promote growth that is socially inclusive and environmentally sustainable. The ISS is a powerful tool for identifying risks, reducing development costs and improving project sustainability, thus benefiting affected communities and helping to preserve the environment.

The Integrated Safeguards System not only promotes best practices in these areas but also encourages greater transparency and accountability. It upholds the voices of people who are affected by Bank-funded

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operations, especially the most vulnerable communities, by providing, for example, project-level grievance and redress mechanisms—a structured, systematic and managed way of allowing the voices and concerns of affected people to be heard and addressed during project planning and implementation.

The AfDB ISS 2023 includes the following Operational safeguards:

- E&S OS 1 (OS1): Assessment and Management of Environmental and Social Risks and Impacts

It addresses how the borrower will address the environmental and social risks and impacts of the project throughout the project life cycle to meet the requirements of the Environmental and Social Safeguards (ESSs) in a manner and within a time frame acceptable to the Bank.

This safeguard is applicable to most projects and applies to the current one.

- E&S OS 2 (OS2): Labor and Working Conditions

It recognizes the importance of employment creation and income generation in the pursuit of poverty reduction and inclusive economic growth. Also, the importance of treating workers in the project fairly and providing safe and healthy working conditions and respect of workers 'rights to promote sound worker-management relationships and enhance the development benefits of a project.

This safeguard is applicable to the proposed project during the construction and operation phases.

- E&S OS 3 (OS3): Resource Efficiency and Pollution Prevention and Control

It recognizes that economic activities often cause air, water, and land pollution and consume finite resources that may threaten people, ecosystem services, and the environment at the local, regional, and global levels. It sets out the requirements to address resource efficiency and pollution prevention and management throughout the project life cycle in a manner consistent with GIIP.

This safeguard is applicable on the construction and operation phases of the project.

- E&S OS 4 (OS4): Community Health, Safety and Security

It recognizes that projects, activities, equipment, and infrastructure can increase community exposure to risks and impacts. In addition, communities that are already subjected to impacts from climate change may also experience an acceleration or intensification of impacts due to a project or activities. It addresses the health, safety, and security risks to and impacts on project affected communities and the corresponding responsibility of the Borrower to avoid or minimize them.

This safeguard is applicable on the construction and operation phases of the project.

- E&S OS 5 (OS5): Land Acquisition, Restrictions on Access to Land and Land Use, and Involuntary Resettlement

It recognizes that involuntary resettlement should be avoided, and where involuntary resettlement is unavoidable, it will be minimized, and appropriate measures to mitigate adverse impacts on displaced persons (and on host communities receiving displaced persons) will be carefully planned and implemented.

This safeguard does not apply to the proposed project since the activities will not involve any involuntary resettlement or change in the land use.

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- E&S OS 6 (OS6): Habitat and Biodiversity Conservation and Sustainable Management of Living Natural Resources

It recognizes that protecting and conserving biodiversity and sustainably managing living natural resources are fundamental to sustainable development. Also, recognizes the importance of maintaining core ecological functions of habitats, including forests, and the biodiversity they support in a changing climate, and the need to consider the livelihoods of project-affected parties. Also, addresses the sustainable management of primary production and harvesting.

This safeguard is applicable to the construction of most project components as they are located within a natural desert environment.

- E&S OS 7 (OS7): Vulnerable Groups

OS7 requires assessment and mitigation of impacts on vulnerable groups, including women, children, the elderly, and indigenous peoples. It contributes to poverty reduction and sustainable development by ensuring that projects supported by the Bank enhance opportunities for vulnerable groups to participate in, and benefit from, the development process in ways that do not threaten their unique cultural identities and well-being.

This safeguard is applicable on the construction and operation phases of the project.

- E&S OS 8 (OS8): Cultural Heritage

It sets out measures designed to protect cultural heritage throughout the project life cycle.

In case of chance finds, the procedures outlined in the Egyptian Antiquities Law No. 117 of 1983 will be followed.

Although no cultural heritage components are anticipated within the project site, the archaeological sites near the proposed project location will be addressed in the ESIA.

- E&S OS 9 (OS9): Financial Intermediaries

It recognizes that strong domestic capital and financial markets, and access to finance are important for economic development, growth, and poverty reduction. Also, it addresses the environmental and social (E&S) requirements associated with intermediated financing through financial and nonfinancial institutions.

This safeguard is not applicable to the present project.

- E&S OS 10 (OS10): Stakeholder Engagement and Information Disclosure

It recognizes the importance of open and transparent engagement between the Borrower and project stakeholders as an essential element of good international practice.

This safeguard is applicable on the construction and operation phases of the project.

In specific, the following AfDB policies and standards have been adopted:

- The Gender Policy (2001) and Bank Group Gender Strategy (2013)
- AfDB Civil Society Engagement Framework (2012)

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- Disclosure and Access to Information Policy (2012)
- Policy on Poverty Reduction (2001)
- Policy for Integrated Water Resources Management (2000)
- Environmental and Social Assessment Procedures (ESAP)
- AfDB ISS Guidance Materials
- AfDB ISS Sector Key sheets
- The Presidential Directive on Exploitation, Abuse and Sexual Harassment (PD. 2021.02)

5.4.4 Other

There are additional international E&S standards and requirements that were considered throughout the ESIA study. Those are identified in the table below along with their applicability.

Table 17: Other International E&S Requirements and Standards

Requirement	Applicability for ESIA
IFC Good Practice Note – Addressing Grievances from Project-Affected Communities & IFC Good Practice Manual – Doing Better Business Through Effective Public Consultation and Disclosure	Those identify additional requirements that should be considered and taken into account as part of the planned stakeholder engagement activities as well as the SEP that is provided as a standalone document.
IFC Good Practice Note: A Good Practice Handbook for Companies Doing Business in Emerging Markets	The note identifies key concepts and principles of stakeholder engagement and how to integrate stakeholder engagement with the project cycle. This has been considered for the SEP that is provided as a standalone document.
EBRD and IFC Guidance Note on Worker's accommodation	Identify key issues of concern that should be addressed as well as best practice requirements to be taken into account in relation to worker accommodation
IFC Good Practice Note on Non- Discrimination and Equal Opportunity IFC Good Practice Note – Managing Retrenchment IFC Handbook for Labor and Working Conditions - Measure & Improve Your Labor Standards Performance Good Practice Note: Managing Risks Associated with Modern Slavery International Labor Organization (ILO) Conventions. This will include all ILO conventions signed and ratified by the Government of Egypt and at a minimum all ILO conventions covering core labor standards and all ILO conventions covering the basic terms and conditions of employment	Those are related to workforce management as applicable within the ESIA and associated management plans.
Good Practice Note (GPN) IFC's Use of Security Forces: Assessing and Managing Risks and Impacts	The handbook provides practical, project-level guidance for companies to better understand and implement the requirements outlined in PS 4. Sections focus on risk assessment, managing private security, managing the relationship with public security, preparing a security management plan, and assessing allegations or incidents

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	related to security personnel.
UN Voluntary Principles on Security and Human Rights	Promotes implementation of a set of principles on providing security for their operations in a manner that respects human rights
Addressing Gender-Based Violence and Harassment (GBVH): Emerging Good Practice for the Private Sector	The note prevents the physical, sexual, emotional and financial harm GBVH causes to individuals, as well as the financial, reputational and legal risks it poses to businesses and investors
UNESCO Guidance and Toolkit for Impact Assessments in a World Heritage Context (2022)	Outstanding Universal Values (OUVs) (receptors of biological significance) identified in UNESCO nomination text and associated documents. Baseline surveys to identify the presence of OUVs and subsequent assessment of likely ecological impact of the project (construction and operation) on OUVs. Assessment should include a 'futures' assessment should the baseline ecological value of the WHS (and surrounding area) improve with wider conservation efforts.

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6. ANALYSIS OF ALTERNATIVES

This section presents the alternatives that were considered for the Project development to date. This includes site alternatives as well as design alternatives, both of which are discussed in further details below.

6.1 Site Alternatives

The GoE has allocated to the NREA through Prime Ministerial Decree No. (37/4/15/14) of 2015 land for the development of renewable energy projects through usufruct rights. The area was proposed by the National Centre for Land-use Planning and was approved by the Council of Ministers. In line with the decree, the government assigned about 7,600 km² in the GoS, east and west of the Nile, Benban, and Kom Ombo regions, of which about 5,700 km² (75% share) were designated for wind projects and 1,900 km² (25%) for solar energy projects (25% share). These projects are being developed through usufruct rights, which grant the government the right to use the land while retaining ownership.[22]

As discussed earlier under "Section 1.1", the Developer signed a MoU with the Government of Egypt. The Project is located inside an area of land allocated to NREA by virtue of Presidential Decree No. 628 of 2024 for the development of renewable energy development projects, as shown in the figure below.

In general, the key factors considered by the GoE and NREA for selection of such areas included the following:

- Areas to be under governmental ownership and therefore do not require any land acquisition measure;
- Areas to be mostly free from competing uses such as agricultural or housing developments to avoid resettlement and livelihood restoration requirements;
- Areas to be located with the highest wind and solar power potential;
- The geomorphology of the areas to be favorable for renewable energy development and requiring limited construction and landscape modification measures; and
- The access to the areas should be easy requiring only limited road construction measures.

Based on the above, NREA granted the Developer full access rights to the specific Project for the development of a 900MW wind farm Project. Therefore, taking the above into account, there are no site alternatives that were considered by the Developer in this case.

It is important to note that the Developer had no authority, influence or decision in the site selection process as land allocation was handled by the Ministry of Electricity for the Project. In addition, the entire Gulf of Suez area is now planned for new and additional wind farm and/or green hydrogen developments further restricting availability of any alternative lands within the area. The above information has been included within the section as well.

[22] Renewable Energy Incentives (IRENA, 2018)

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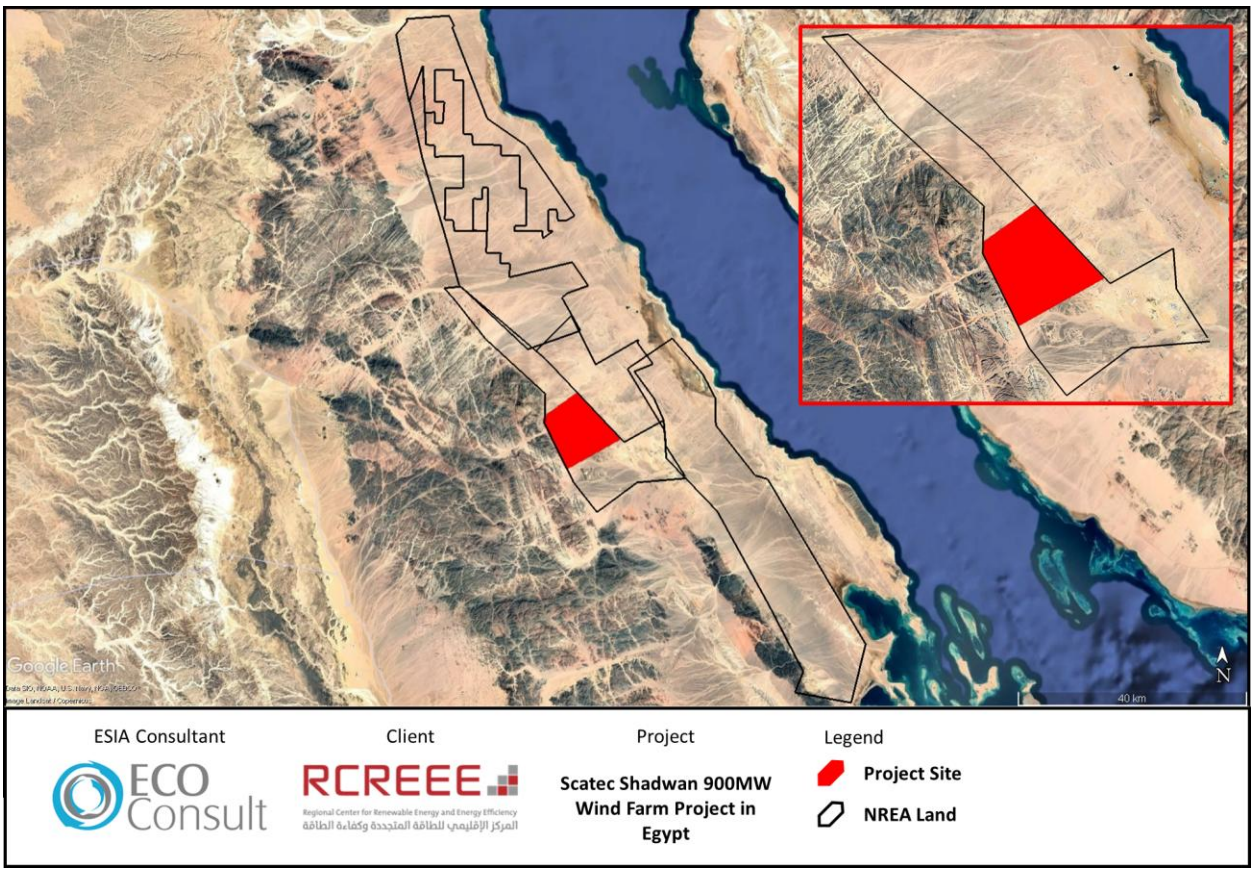


Figure 20: Land Plots Provided by Government

6.1.1 Biodiversity

Initial analysis was undertaken by the "E&S Team" and based on desktop research it was indicated that the Project site does not intersect or overlap with any Key Biodiversity Areas (KBAs), Important Birds Area (IBA) and Protected Areas. The closest KBAs and IBAs to the Project site is Gebel El Zeit KBA IBA that is located around 7km east of the Project, and Hurghada KBA IBA that is located around 59km south of the Project site. The closest Protected Area is Red Sea Islands that is located 48km southeast of the Project site. In addition, there are there are four (4) Proposed Protected Areas near the Project that are El-Galala El-Qebalya, Shaieb El-Banat, Malahet Ras Shukeir and Wadi Qena – all of which are located 63km northwest, 54km south, 13km east and 31km west of the Project site, respectively.

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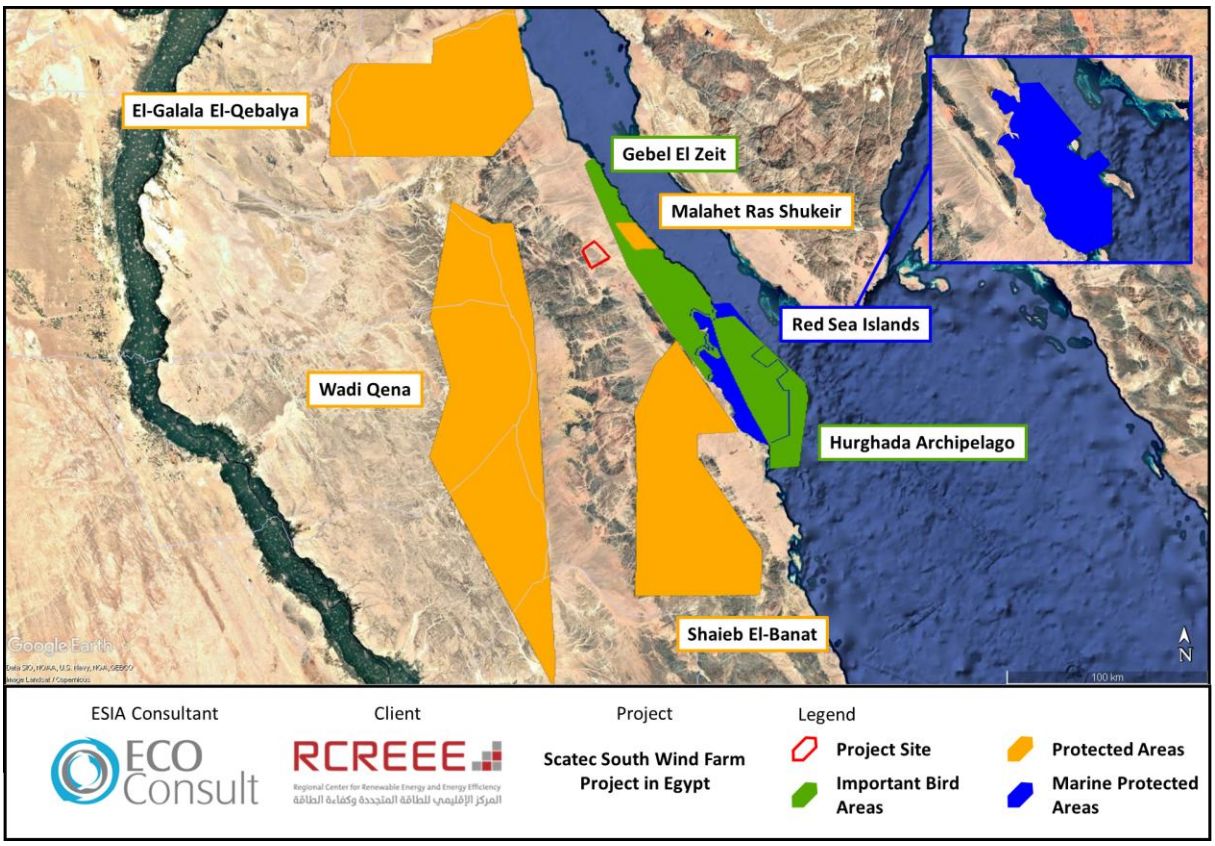


Figure 21: KBAs, IBAs and Protected Areas around the Project Site

Consultations were sought with Nature Conservation Egypt (NCE)[23] in August 2025 to review the proposed biodiversity baseline methodology and to gather input on key issues, including proximity to Important Bird Areas (IBAs), Key Biodiversity Areas (KBAs), and other sensitive habitats. A follow-up consultation attempt was undertaken in September and October 2025 to re-engage NCE and obtain technical feedback on the proposed approach and survey coverage. Despite the outreach and multiple follow-ups, no feedback was received from NCE, and therefore no input could be integrated from their side into the assessment.

6.1.2 Land Use

Consultations were undertaken on the 10th of October with NREA in order to identify land tenure of the Project site and therefore avoid to the extent possible any acquisition process as well as physical and/or economical displacement impacts. Additional details on the outcomes of consultation are provided in "Section 4.3.1".

The entity confirmed that the Project site lies within lands under the jurisdiction of the NREA, designating NREA as the competent administrative entity and land-owning authority responsible for land allocation, facilitating project development, and reviewing associated environmental studies. In parallel, a desktop assessment, satellite imagery review, and site visit were undertaken to verify the presence of any existing and ongoing land use activities within the Project area to ensure that such uses are duly considered in the

[23] NCE is the Birdlife International partner in Egypt and is a member of the International Union for the Conservation of Nature (IUCN).

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assessment. None were recorded. Accordingly, no restrictions or conflicts related to land use were identified at this stage of the assessment.

6.1.1 Community Settlements

Data was obtained on all potential community settlements within the area to ensure that the Project site is located away from such areas to the extent possible. The closest settlements are Wadi Dara town located 10km southeast of the Project and Ras Gharib town located 22km north-northeast of the Project site. Therefore, based on this, no restrictions on community settlements were considered for the Project boundary.

6.2 Technology Alternatives

This section discusses several alternatives besides the development of a wind farm project. This mainly includes other renewable energy alternatives suitable for Egypt, as well as other technological alternatives for power generation such conventional thermal power plants.

6.2.1 Renewable Energy Development Projects

As discussed earlier, the GoE has taken bold steps to adopt an energy diversification strategy with increased development of renewable energy and implementation of energy efficiency, including assertive rehabilitation and maintenance programs in the power sector (IRENA, 2018).

To this extent, in 2013, the Arab Republic of Egypt (through the Ministry of Electricity and Renewable Energy) had developed and adopted the ISES 2015 – 2035, which provided an ambitious plan to increase the contribution of renewable energy to 20% of the electricity generated by the year 2022, through hydro, wind, and solar and its efforts are ongoing.

Egypt enjoys favorable solar radiation intensity, and it is considered one of the most appropriate regions for exploiting solar energy both for electricity generation and thermal heating applications. Similar to the wind power development process, the GoE is developing many solar development projects (to include solar Photovoltaic (PV) and concentrated solar power) through the BOO mechanism and other (such as the Feed-In Tariff mechanism). Such development projects have been identified within key areas that provide the most favorable potential and conditions for solar development – this includes but not limited to Kom Ombo, West Nile, Hurghada, Zaafarana, Benban and other.

With regards to hydropower, the main hydro resource in Egypt is the Nile River, with the highest potential in Aswan where a series of power stations are located. Within this context, several projects have been realized, and several other hydroelectric plants are being developed.

Taking the above into account, with regards to the Project site in specific it is best utilized for wind power projects. According to Egypt's Wind Atlas (Wind Atlas for Egypt Measurement and Modelling 1991-2005), the country is endowed with abundant wind energy resources, particularly in the GoS area. This is one of the best locations in the world for harnessing wind energy due to its high stable wind speeds that reach on average between 8 and 10 m/s at a height of 100m, along with the availability of large uninhabited desert areas.

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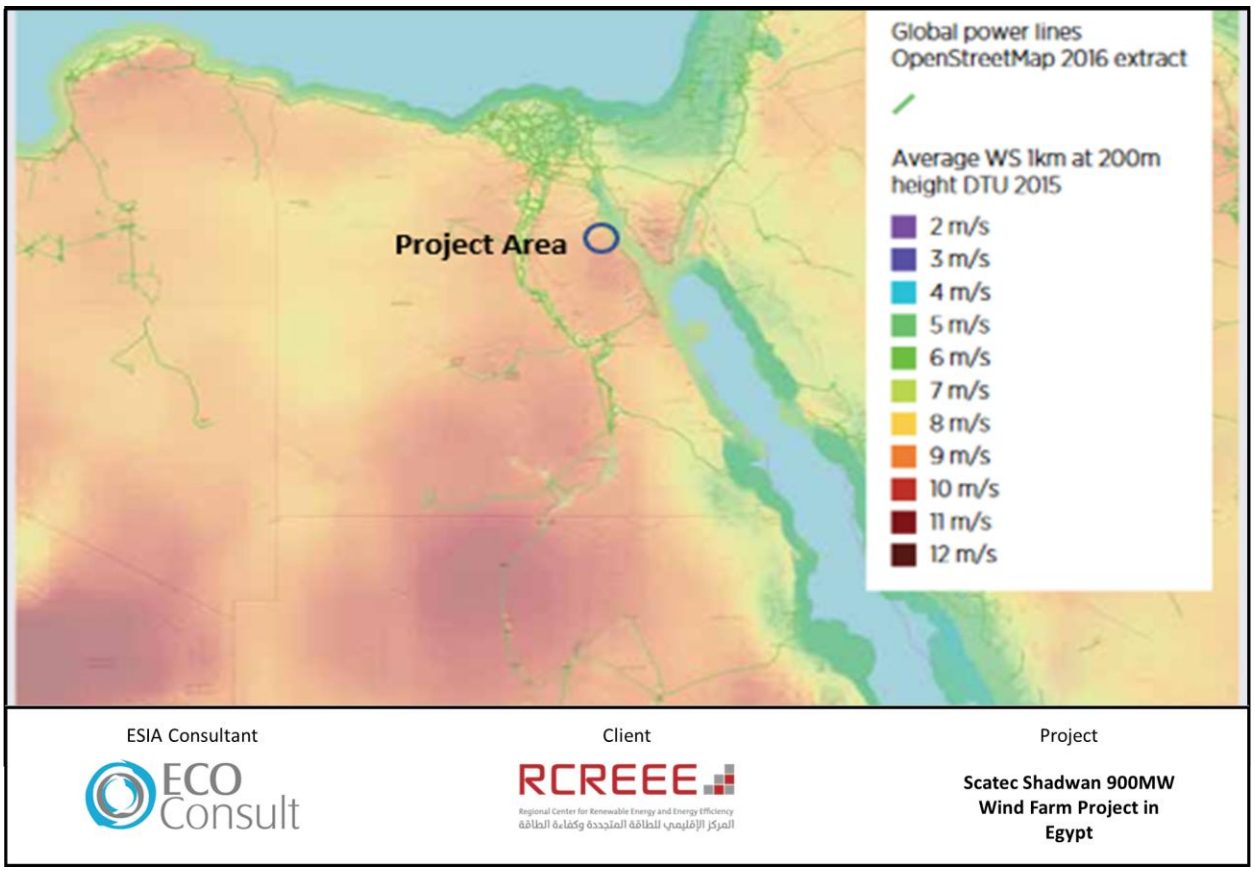


Figure 22: Egypt's Wind Atlas (Source: IRENA, 2018)

6.3 Design Alternatives

As noted in "Section 2.3.2" earlier, the Developer has prepared an initial layout for the Project that is being updated on a continuous basis at this point.

The Developer is committed to ensuring that all identified E&S constraints identified throughout the ESIA process are considered fully throughout the Project design, specifications and layout. Currently, no constraints have been identified to date. However, as part of the ESIA it is expected that E&S constraints will be identified which will need to be considered as part of the detailed design. This could include, for example, archaeological sites, nests for key bird species, burrows for critical species (e.g. Egyptian spiny-tailed lizard), as well as other.

During the ESIA process, site-specific E&S constraints in relation to the Project site will be identified based on the methodology and scope of work identified within "Section 7".

6.4 No-Project Alternative

The 'no Project' alternative assumes that the 900MW Project will not be developed. Should this be the case, then the Project site area would remain the same. The land area would remain with its current characteristics – vast barren desert grounds with very limited vegetation with no particular land use.

Should the Project not move forward, then the Project-related negative E&S impacts discussed throughout

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this ESIA would be averted. However, as noted throughout the ESIA, generally such impacts do not pose any key issues of concern and can be adequately controlled and mitigated through the implementation of the ESMP discussed in "Section 10". Nevertheless, should the Project not move forward; the significant and crucial positive economic and E&S benefits would not be realized. Such benefits include the following:

- This development allows for more sustainable development and shows the commitment of the Government of Egypt to realizing the energy strategy;
- Contribute to increasing energy security through development of local energy resources and reducing dependency on external energy sources;
- The clean energy produced from renewable energy resources is expected to reduce consumption of alternative fuels for electricity generation, and will thus help in reducing greenhouse gas emissions, as well as air pollutant emissions; and
- Project is expected during the construction and operation phase to generate local employment and commit to other social responsibilities. As such, this is expected, to a certain extent, to subsequently enhance the socio-economic conditions and standards of living of the local communities.

In conclusion, an ESIA must investigate all potential positive and negative impacts from project development. In the case of this Project, it is important to weigh the significant positive economic and E&S impacts incurred from the Project development, against the negative E&S impacts anticipated at the site-specific level – in which generally the ESIA concludes that they can be mitigated, managed and controlled to acceptable levels. The comparison in this Section clearly concludes that the 'no Project' alternative is not a preferable option.

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7. EXISTING PHYSICAL, BIOLOGICAL AND SOCIAL ENVIRONMENT

7.1 Landscape and Visual

This section provides an assessment of baseline conditions within the Project site and surroundings in relation to landscape and visual.

7.1.1 Methodology for Assessment

A. Secondary Data Review

Prior to the undertaking of any site-related surveys, a full and detailed review of up-to-date high-quality satellite images for the Project area was undertaken. The objective was to aim to understand site topography and landscape character, and more importantly identify any potential visual receptors within the entire Project footprint and boundary so that it can be inspected during the site survey.

The definition of key critical visual receptor was based on the "Guidelines for Landscape and Visual Impact Assessment (GLVIA)" (Landscape Institute, 2013) as defined below.

Critical Receptors definition per GLVIA
Residents at home.
People engaged in outdoor recreation, whose attention/interest is likely to be focused on the landscape or particular views, including from public rights of way.
Communities where views contribute to landscape setting enjoyed by residents.
Visitors to heritage assets or other attractions, where views of the surroundings are an important contributor to the experience.
Travelers on scenic routes

B. Site Survey

A detailed site survey for the Project area was undertaken in July 2025 to characterize the general topography and landscape of the Project area as well as any potential visual receptors onsite.

7.1.2 Results and Outcomes

A. Landscape and Topography

Based on as site visit, the Project site is generally characterized as an open area with minimal changes in topography across the entire site. The ground surface of the Project site is covered by Quaternary deposits in the form of alluvial fanes and terraces. This includes clastic sediments of gravels, pebbles and sometimes boulders of different rock fragments impeded in fine sand and silt.

Typical views of the Project site are limited to the open landscape with elevated mountains along the western border of the Project site, with topography of a desert-like habitat as noted within the figure below.

The figure below presents the general landscape of the Project site while the figure that follows presents the topography variations onsite based on a 3-D Digital Elevation Model (DEM).

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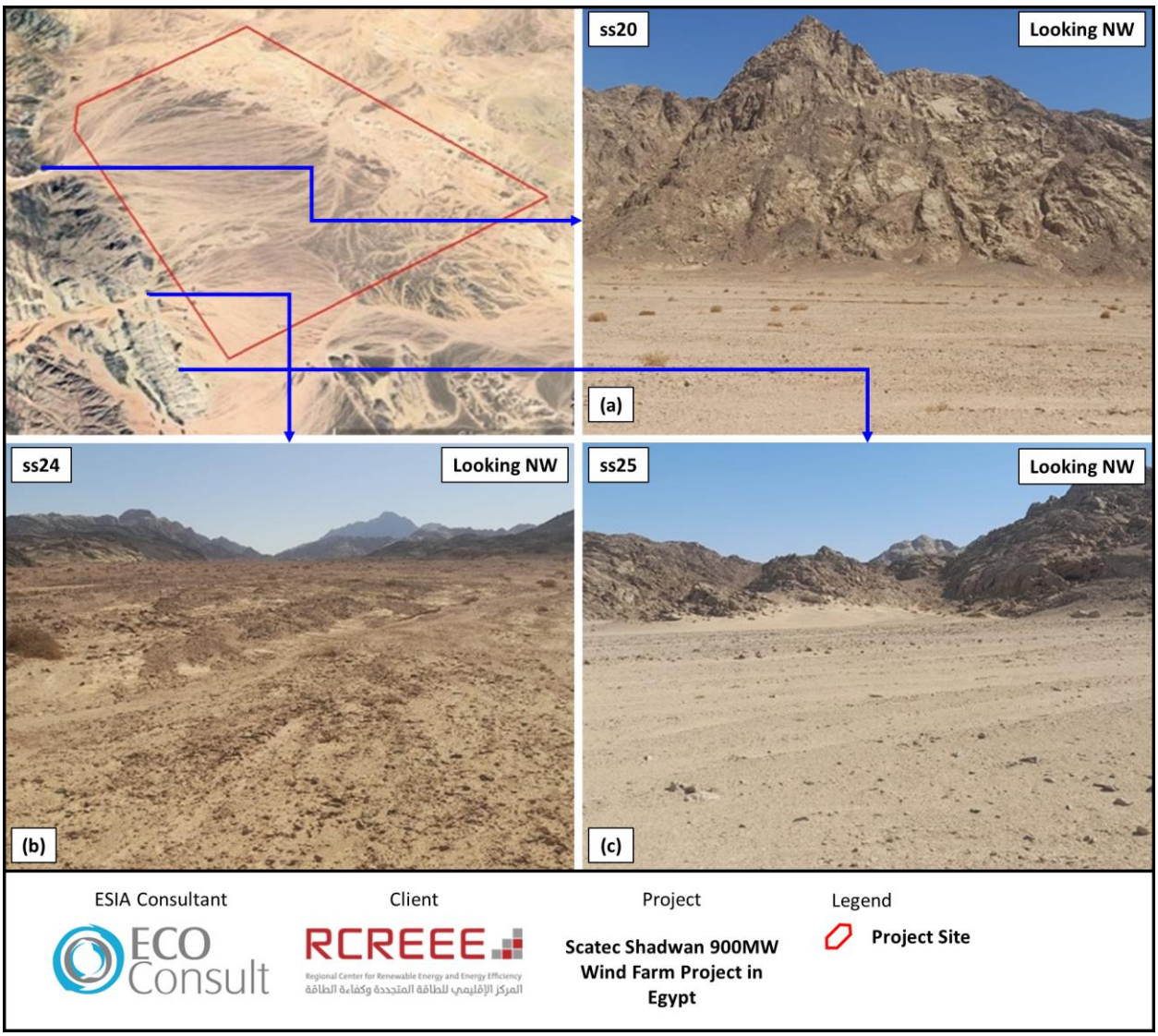


Figure 23: General Site Topography and Landscape

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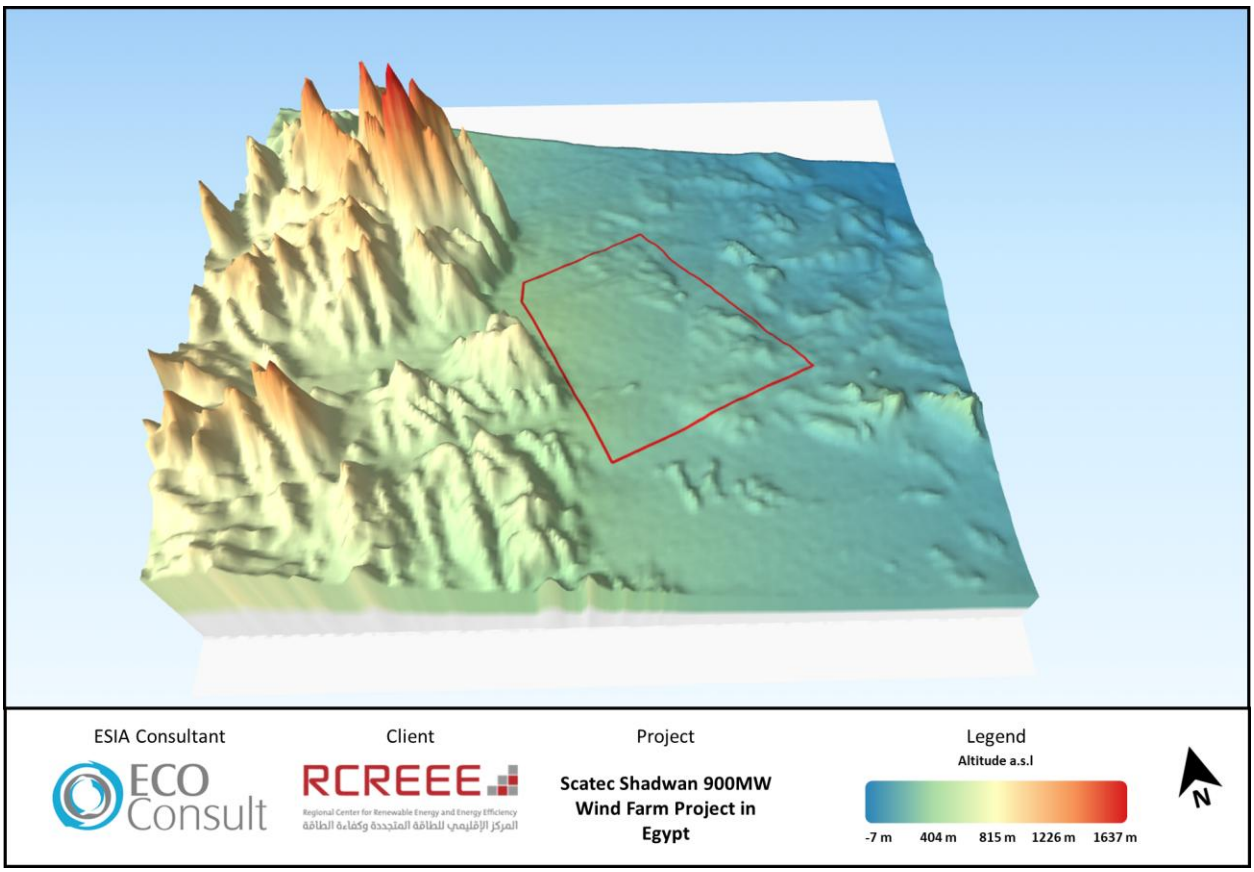


Figure 24: 3D DEM Modelling of the Project Site

B. *Visual Receptors*

Typical views within a 2km buffer of the Project site include an existing windfarm and a substation east of the Project site as shown in the figure below, refer to "Section 2.7." Other than the aforementioned, the Project site is mainly limited to a landscape and topography can be described as a desert-like habitat that is barren. Such views are noted within the figure above earlier.

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Figure 25: Typical Views from the General GoS Area

Based on the site visit and desktop review undertaken, no key visual receptors were identified within the Project site, surrounding areas, or within a 2km radius. The nearest potential visual receptors are Wadi Dara village and Ras Gharib city which are located 10km southeast and 22km north-northeast, respectively.

In addition, based on the desktop review undertaken for a 50km radius, however, no visual receptors were noted as shown in the figure and table below – all are not defined as key critical visual receptors based on the "Guidelines for Landscape and Visual Impact Assessment (GLVIA)" (Landscape Institute, 2013) as defined above.

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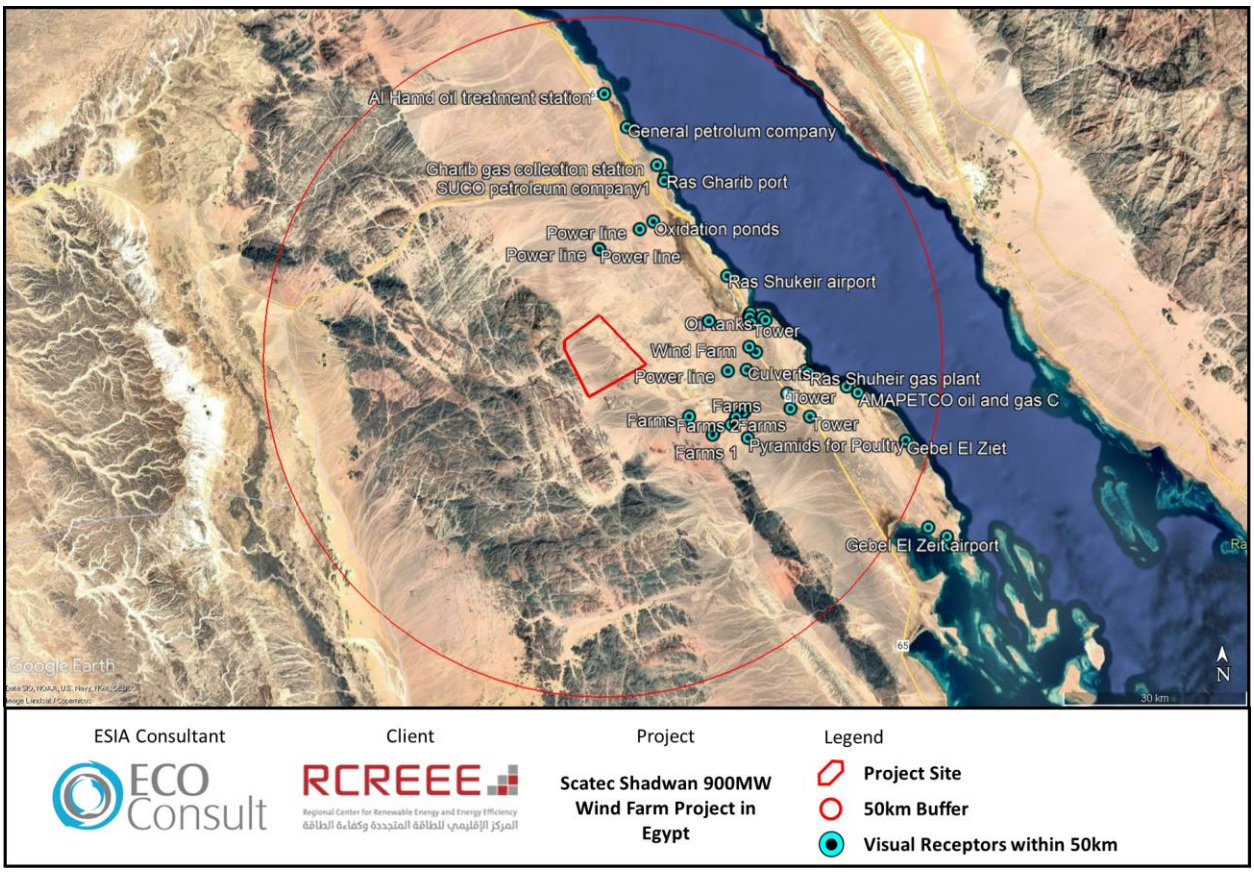


Figure 26: Visual Receptors within 50km of the Project Site

Table 18: Visual Receptors within 50km of the Project Site

Receptor ID	Type	Coordinates	Area (m²)	Description
Gebel El Zeit	Topographical landmark	27.951809°N, 33.497824°E	≈26,000,000	An ancient mining area in Egypt. It is a bottle neck for migratory birds in both spring and autumn seasons
Ras Gharib	Residential area	28.343927°N, 33.110482°E	≈28,000,000	One of the major oil-producing regions on the Gulf of Suez
Ras Shukheir	Residential area	28.129873°N, 33.267633°E	≈11,000,000	It is a key transit hub for crude oil exports and domestic energy infrastructure on the Gulf of Suez
Wadi Dara village	Residential area	27.995772°N, 33.237264°E	≈21,000,000	The most important agricultural project in the Red Sea
Al Hamd oil treatment station	Industry	28.450022°N, 33.012978° E	≈184,500	treat oils, and optimize production of GPC and other companies operating in the Ras Gharib
General Petroleum company	Industry	28.402197°N, 33.049159°E	≈468,000	is the national arm of the Egyptian petroleum sector
Gharib gas collection station	Industry, infrastructure	28.347579°N, 33.098277°E	≈184,000	Collect gas and piped to a treatment system to remove moisture and other contaminants
Ras Gharib	Industry,	28.331644°N,	≈15,000	It serves as a pivotal maritime facility,

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port	infrastructure	33.111392°E		particularly for oil and gas.
SUCO petroleum company	Industry	28.325291°N, 33.109204°E	≈ 45,000	Producers of crude oil and gas in Egypt
		27.801517°N, 33.568003°E	≈230,000	
AMAL Petroleum Co	Industry	28.029749°N, 33.403058°E	≈80,000	
AMAPETCO oil and gas C	Industry	28.020962°N, 33.421375°E	≈100,000	
PetroGulf Petroleum Co.	Industry	27.814157°N, 33.563792°E	≈150,000	
Ras Shukheir airport	Infrastructure	28.189001°N, 33.210691°E	≈450,000	Is Small airports serving the city of Ras Gharib
Gebel El Zeit airport	Infrastructure	27.827433°N, 33.533652°E	≈900,000	
Gas plant	Industry	28.052956°N, 33.336625°E	≈140,000	Process natural gas to make it suitable for use in various applications
Ras Shukheir gas plant	Industry	28.049569°N, 33.341940°	≈300,000	
Pyramids for Poultry	Poultry Farms	27.957525°N, 33.242339°E	≈50,000	Grandparent farms, hatcheries and a feed mill
Farms	Agricultural farms	27.962490°N, 33.185435°E	≈200,000	Palm
		27.966122°N, 33.187222°E	≈70,000	
		27.976700°N, 33.215792°E	≈200,000	
WWTP	Infrastructure	28.135661°N, 33.247981°E	35,000	2nd., treatment plant
Gas station	Industry	28.131661°N, 33.245547°E	10,000	Compression station
Oil tanks	Industry	28.129333°N, 33.246517°E	8,000	General petroleum Company tanks
Tower	Infrastructure	28.121103°N, 33.249242°E	10,000	Communication tower
Oil tanks	Industry	28.125508°N, 33.272486°E	500,000	GUPCO tanks
Wind fam	Industry	28.087489°N, 33.245672°E	110 x 106	Gebel Zeit wind farm
Desalination plant	Infrastructure	28.080108°N, 33.256719° E	27,000	Reverse osmoses desalination
Power line	Infrastructure	28.053372°N, 33.210750°E	-	High voltage power line
Culverts	Infrastructure	28.054706°N, 33.241292°E	-	Set of culverts to save the road against surface runoff
Farms	Agricultural	27.993934°N, 33.234090°E	-	Livestock, poultry, Palms
Power line	Infrastructure	28.227908°N, 33.003617°E	-	High voltage power line
Power line	Infrastructure	28.256325°N, 33.069342°E	-	High voltage power line
Power line	Infrastructure	28.227908°N, 33.003617°E	-	High voltage power line

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Oxidation ponds	Infrastructure	28.267128°N, 33.091442° E	400,000	Wastewater treatment
Farms	Agricultural	27.986550°N, 33.223511°E	60,000	Livestock, poultry, Palms
Farms	Agricultural	27.986550°N, 33.223511°E	60,000	Livestock, poultry, Palms
Farms	Agricultural	27.988714°N, 33.147483°E	60,000	Livestock, poultry, Palms
Tower	Infrastructure	28.020576°N, 33.306734°E	-	Communication tower
Power line	Infrastructure	27.999139°N, 33.311794°E	-	High voltage power line
Tower	Infrastructure	27.987197°N, 33.343181° E	-	Communication tower

7.2 Land Use

This section provides an assessment of baseline conditions within the Project site and surroundings in relation to land use.

7.2.1 Methodology for Assessment

Assessment of baseline conditions was based on a site visit by the 'E&S Team' to the Project site and surrounding areas in July 2025. The site visit aimed to understand in detail any land use activities undertaken onsite. In addition, consultations were undertaken with key stakeholders to better understand and characterize the land use activities onsite as discussed further throughout this section.

7.2.2 Land Ownership

The Government of Egypt has allocated to NREA by virtue of the Presidential Decree No. 628 of 2024 for the development of wind power projects. The Developer had no authority, influence or decision in the site selection process as the site was handed over by the Government to the Developer for development of the Project. In addition, the entire Gulf of Suez area is now planned for new and additional wind farms and/or green hydrogen developments. In general, key factors considered for selection of such areas required that areas had to be under governmental ownership in order not to require any land acquisition measures.

During consultations with NREA and Ras Gharib City Council, the Project site is located within a designated renewable energy development zone by NREA and is therefore under governmental ownership. NREA has a dedicated department responsible for land allocation for energy investments, which coordinates with several government entities, including the Ministry of Antiquities, Urban Planning, and the military authorities, among others.

NREA also confirmed that the land allocated for the proposed Project is not designated for any other development purposes, such as housing, industrial activities, or agricultural reclamation. The Project site lies within an NREA designated renewable energy development zone next to an existing windfarm, therefore there are no land acquisition measures considered for the Project development.

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7.2.3 Results and Outcomes

Based on the site survey undertaken, no key land uses were identified to include: (i) physical structures (e.g. houses, tents, structures, etc.) and/or (ii) economic activities (e.g. grazing, agriculture, etc.). The Project site is located in a non-residential zone and does not overlap with any current residential, agricultural, or environmentally sensitive land uses. The nearest land use is mainly poultry and livestock farms within Wadi Dara village, which is located more than 10km away from the Project site. In particular, the following was noted:

- No physical structures were noted onsite (such as human settlements of structures). In addition, no man-made features appearing above ground were noted such as roads, electricity lines, pipelines, transmission lines, etc.
- There is no evidence of any economic activities to include in particular agriculture activities or grazing activities which are common practices undertaken by local communities. In particular, no ploughing marks were noted within the Project area (which would be indicative of agricultural activities) nor any livestock fecal remains (which could be indicative of grazing activities).
- No nomadic or Bedouin activity was noted within the Project site or evidence of such activities.
- Consultations undertaken with multiple Bedouin tribes indicated that the Project area has historically not been used by Bedouins for grazing, seasonal migration, water access, agriculture or other livelihood activities because the Project area has been affected by prolonged drought for nearly nine (9) years.

Finally, a historical satellite image review was also undertaken which also did not reveal any particular land uses within the Project site as shown in the figure below.

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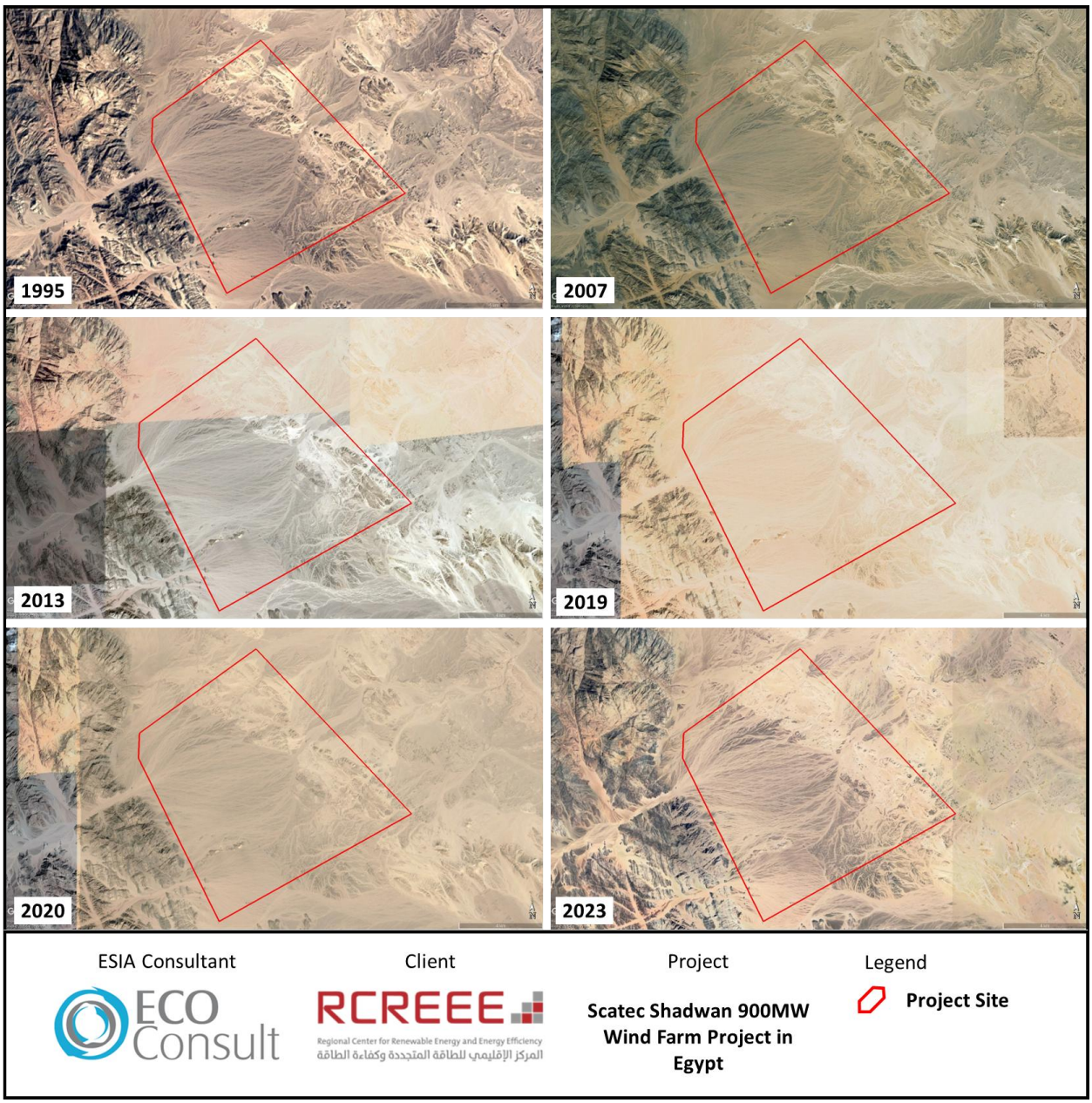


Figure 27: Historical Satellite Image Review

7.3 Geology, Hydrology and Hydrogeology

This section provides an assessment of baseline conditions within the Project site and surrounds in relation to geology, hydrology, and hydrogeology.

7.3.1 Assessment of Baseline Conditions

Baseline assessment was based on secondary data as available from desktop review as well as a standalone assessment undertaken by the Developer (through technical consultant) to include a geotechnical and

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hydrology assessment. In addition, a site assessment was undertaken to confirm and verify the outcomes of the literature review and document conditions on the ground.

The above entailed collecting information on the following:

- Geological conditions within the Project site include formations, soil types, and geomorphology along with illustrative maps;
- Hydrology conditions of the Project site include catchment within which the Project is located along with maps as appropriate. This includes drainage patterns, runoff volumes and surface water resources; and
- Hydrogeology conditions of the Project site along with maps as appropriate. This includes groundwater resources, groundwater quality, etc.

7.3.2 Geology

The geological formations within the Project site and surrounding areas are presented in the figure below, which include various lithologic units ranging in age from Precambrian to Quaternary. As illustrated below, the Project site lies on the Gharib Plain along the western margin of the Gulf of Suez, where Quaternary alluvial deposits dominate the surface while Upper Cretaceous–Miocene units are exposed to the east, and Precambrian basement rocks form the elevated ranges to the west.

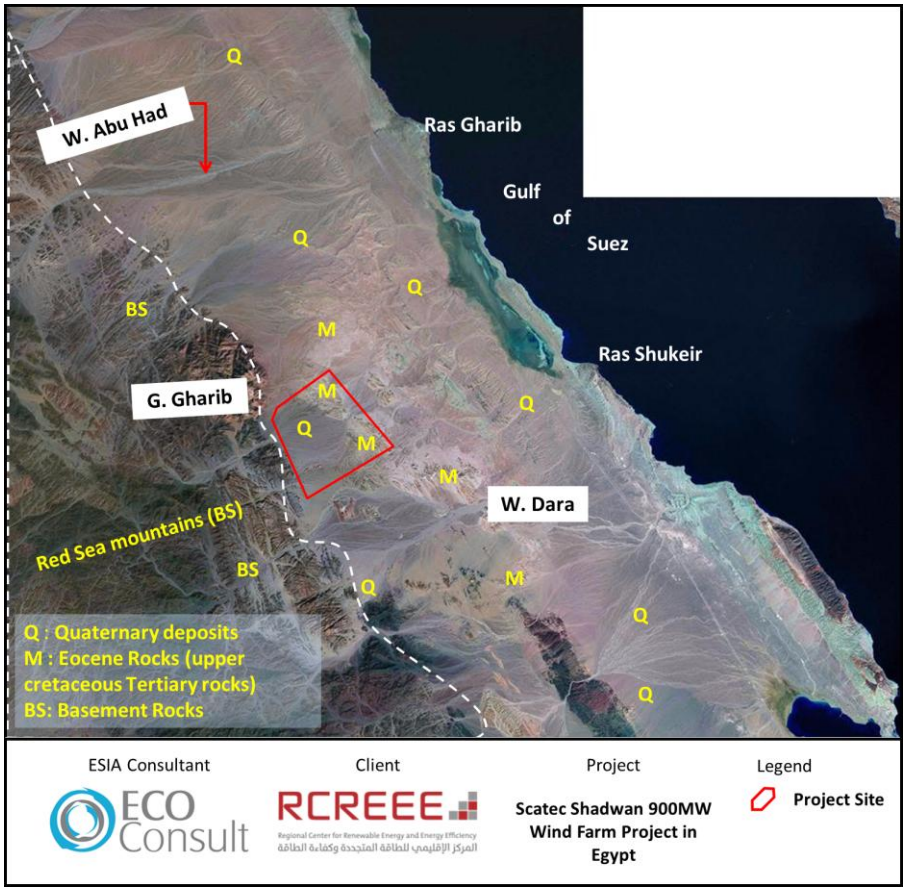


Figure 28: Land Sat Image Showing the Location of the Project Site

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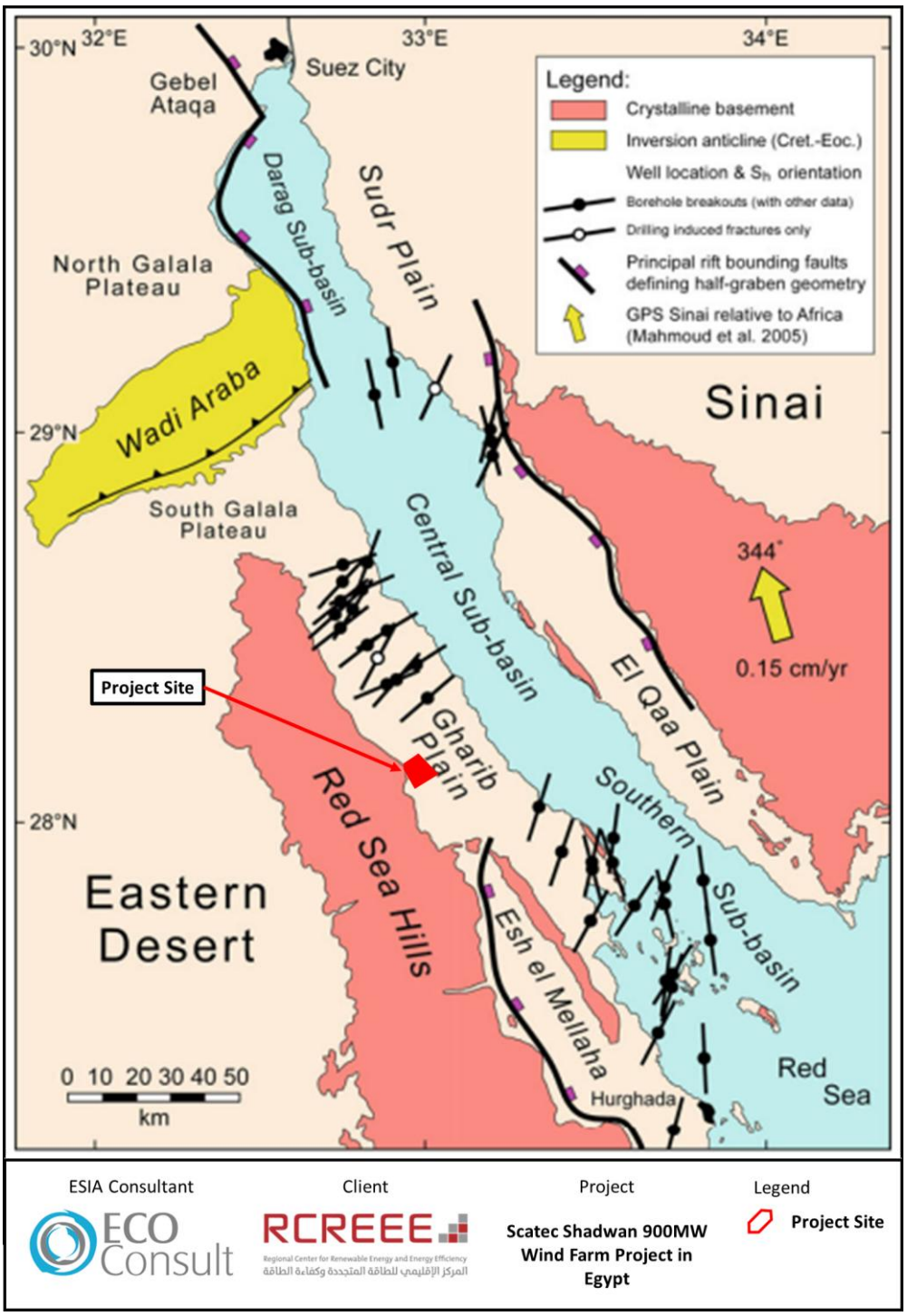


Figure 29: Structure Domains of the Gulf of Suez (Bosworth and Durocher 2017)

Precambrian Basement Rocks

The foundational units forming the western highlands adjacent to the Project site consist of Precambrian igneous and metamorphic rocks belonging to the Red Sea Mountain range. These basement rocks form the Gebel Gharib watershed system, draining toward the Project area via major wadis such as Wadi Dara.

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Two principal granite suites are exposed, representing the dominant lithologies in the region as shown in the figure below.

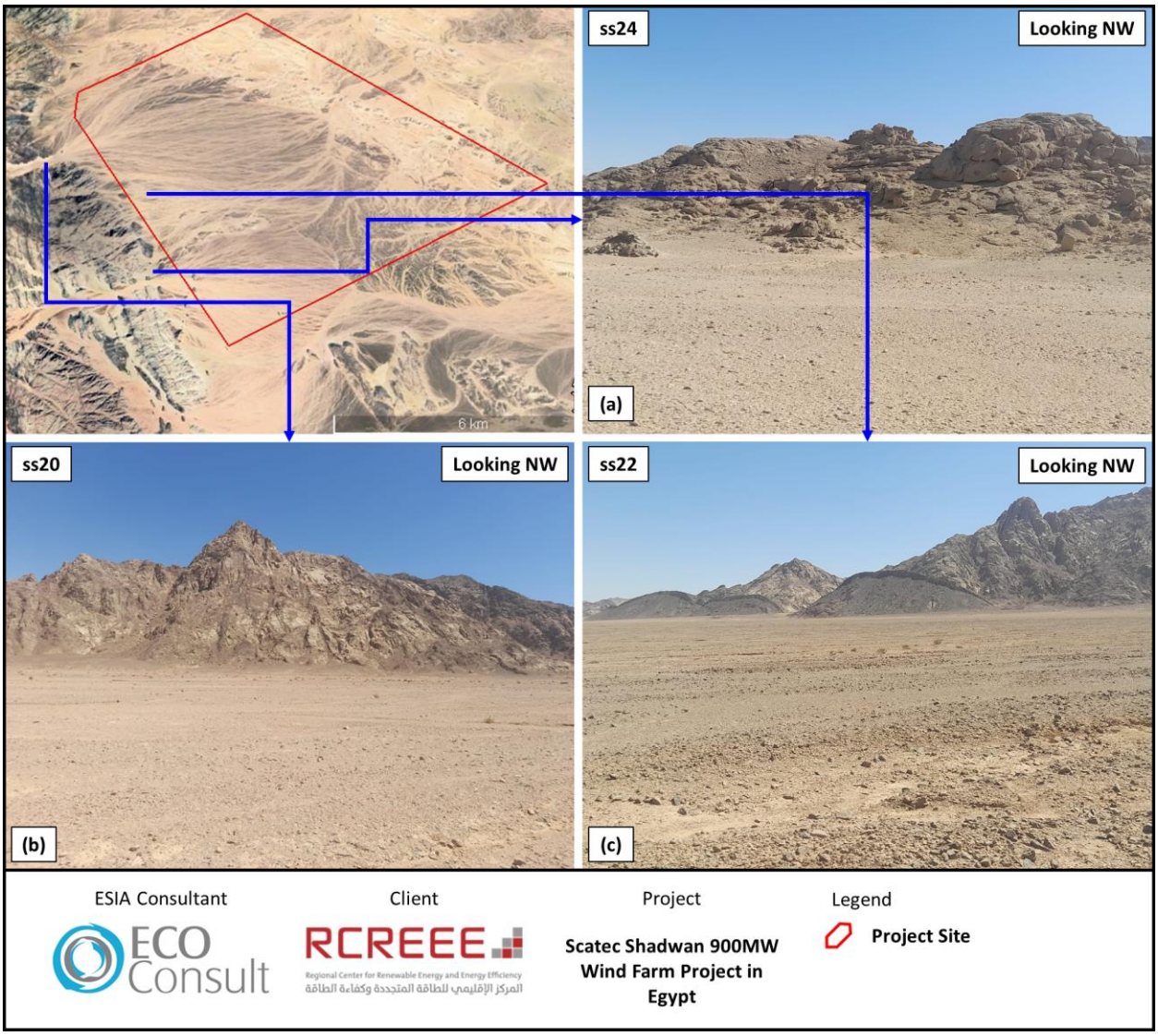


Figure 30: Sample Photos of Precambrian Basement Rocks; (a) Older Granite; (b) Younger Granite; (c) Basic Dyke Swarms Intruding the Basement in Different Direction

Older Granite (Gray Granite)

The older granite forms low-relief bodies characterized by grey to whitish-grey coloration, medium- to coarse-grained equigranular textures, and the presence of xenoliths of varying sizes. These units consist mainly of diorite, quartz diorite, tonalite, and granodiorite. The older granite is highly weathered and easily eroded, contributing abundant cobbles and boulders to the surface alluvial deposits that blanket the Project site.

Younger Granite (Red Granite)

The younger granite forms highly elevated, conspicuous peaks with sharp intrusive contacts against surrounding rock units. It is primarily composed of oligoclase feldspar, quartz, K-feldspar, and mafic

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minerals such as biotite. Weathered fragments of this red granite are widely distributed across the surface deposits within the Project area.

Dyke Swarms

Younger basic and acidic dykes intrude the basement rocks in multiple orientations. These dykes occur as narrow, sub-vertical bodies exhibiting variable compositions and represent the youngest intrusive phase within the basement terrane.

Upper Cretaceous Deposits

The Upper Cretaceous deposits occur in the eastern part of the Project site as weathered sandstone and carbonate units. These rocks form small, elevated exposures that appear light-colored in satellite imagery due to their high weathering degree, as shown in the figure below. Field observations confirm the presence of Upper Cretaceous sandstone exhibiting typical continental to marginal-marine lithologies.

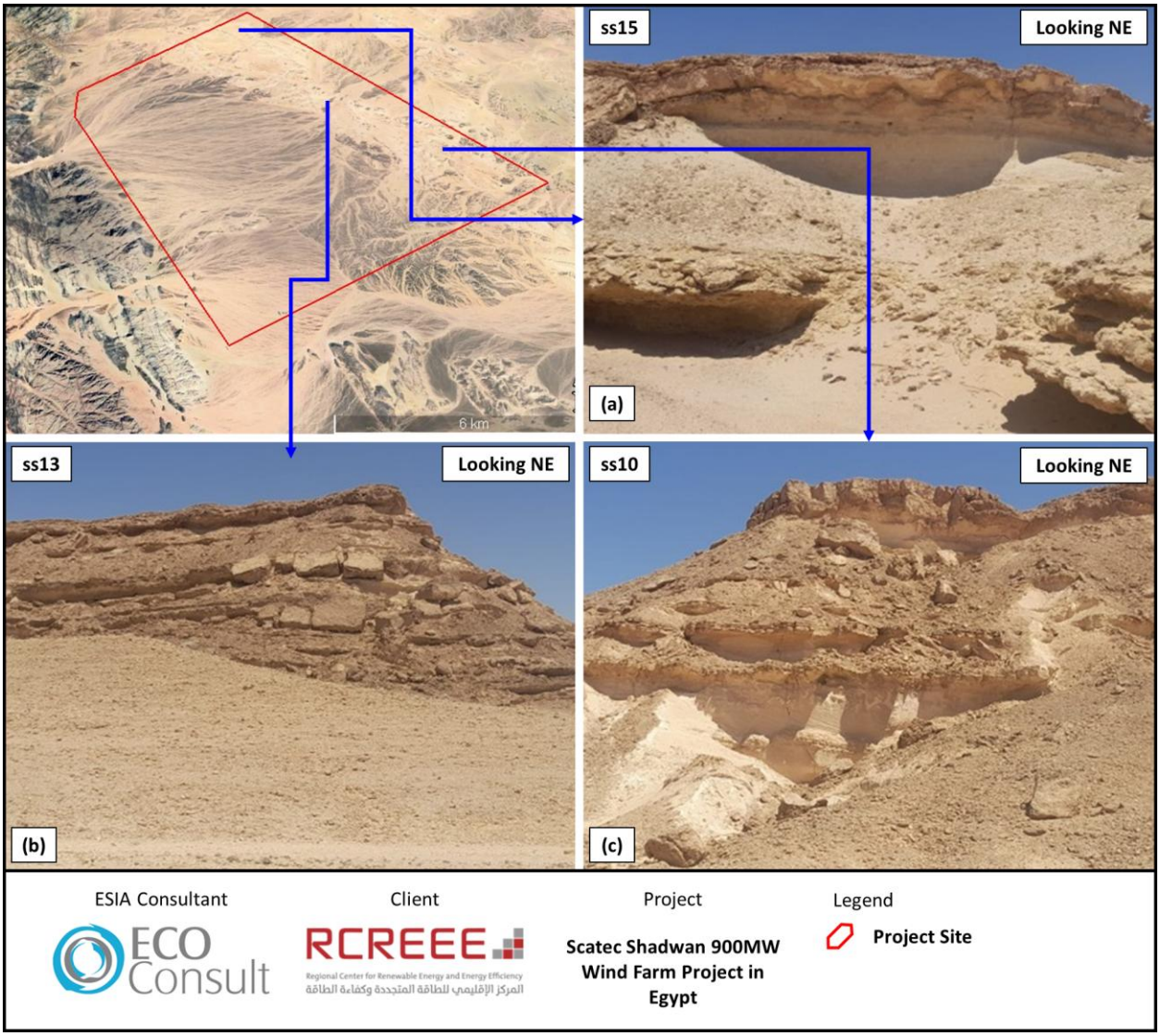


Figure 31: Sample Images of Upper Cretaceous Sandstone Exposed in the Project Site

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Miocene Deposits

This unit is exposed within the eastern extent of the Project site and surrounding areas, forming isolated low-elevation hills and remnants of paleo-coral reef structures.

- The Miocene deposits consist predominantly of evaporites that appear as dark-brown, highly weathered layers overlying the underlying Cretaceous sandstone and carbonates.
- In some locations, fossilized coral reef structures of Miocene age form small mounded features, indicating former shallow-marine depositional environments during the Gulf of Suez rift development.

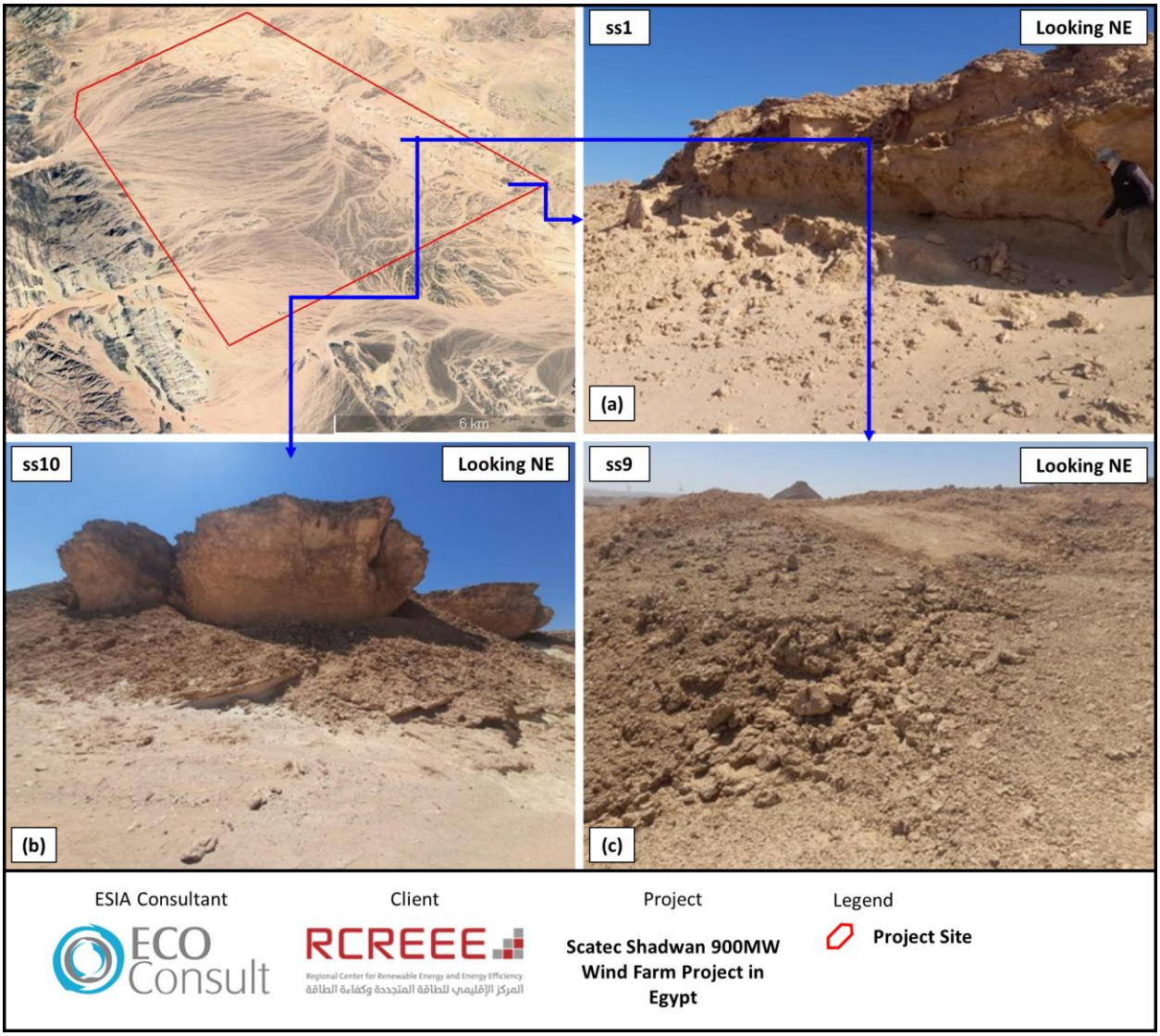


Figure 32: Sample Images of (a, b) Miocene Evaporite and (c) coral reefs in the Project Area

Quaternary Deposits

Quaternary sediments cover most of the Project site, forming extensive alluvial fan systems derived from the erosion of the surrounding basement and sedimentary units.

- The deposits consist of gravel, sand, clay, aeolian sand sheets, and mixed sand accumulations with textures ranging from silt to coarse gravel.

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- The composition of these sediments reflects the lithologies of the Red Sea Mountain range to the west, especially the feldspar-rich red granites. As a result, the alluvial fan deposits across the site exhibit distinct darker colors due to the abundance of weathered granitic material.

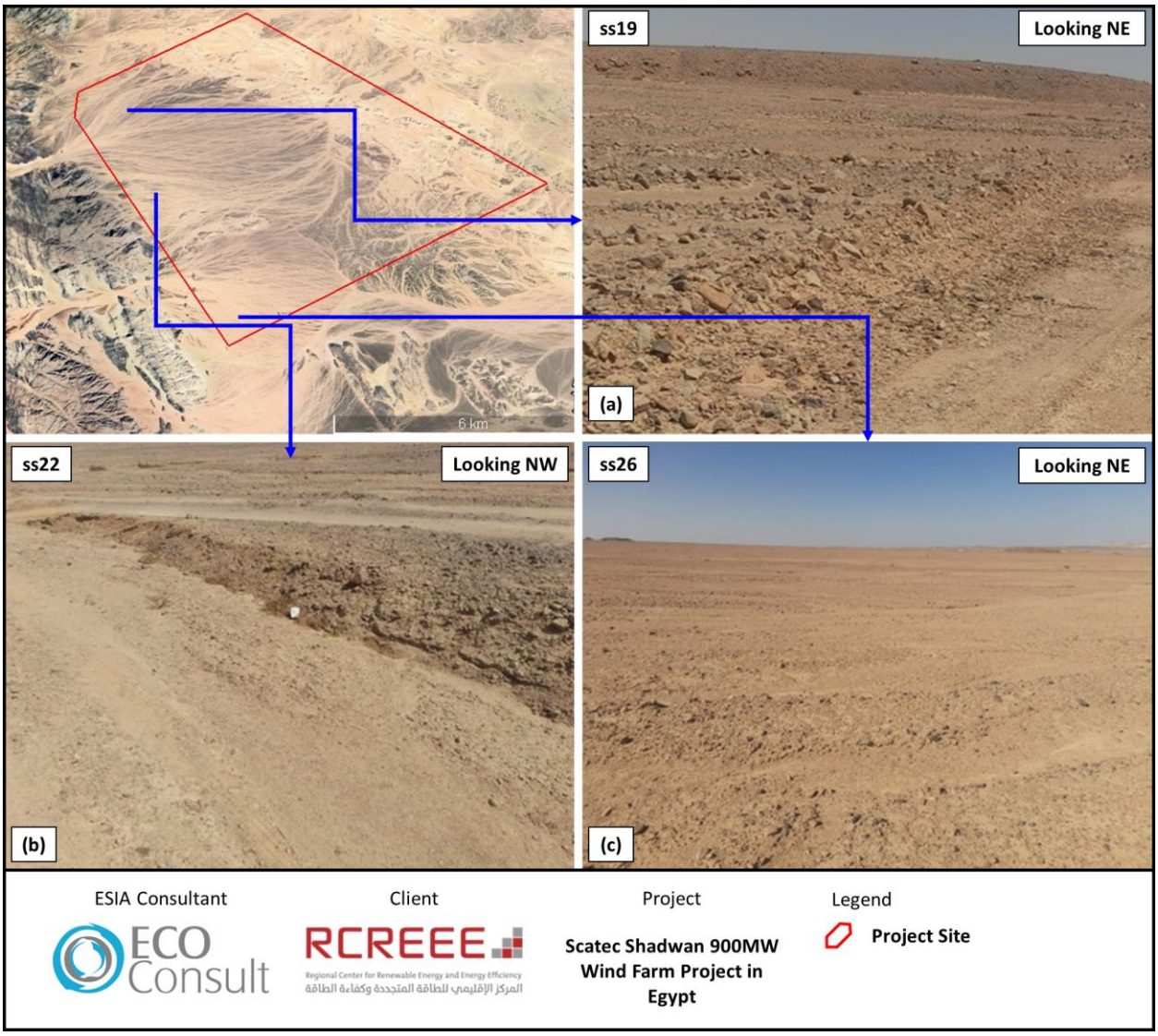


Figure 33: Sample Images of Quaternary Deposits Covering most of the Project Site

Subsurface Geology

The Project site is located within the structurally active Gulf of Suez rift system, which is characterized by repeated subsidence and the accumulation of thick sedimentary successions. The regional basin architecture comprises three major half-graben systems, separated by structurally complex accommodation zones (Bosworth, 1985 Rosendahl, 1987) or transfer zones (Morley et al., 1990; Patton et al., 1994).

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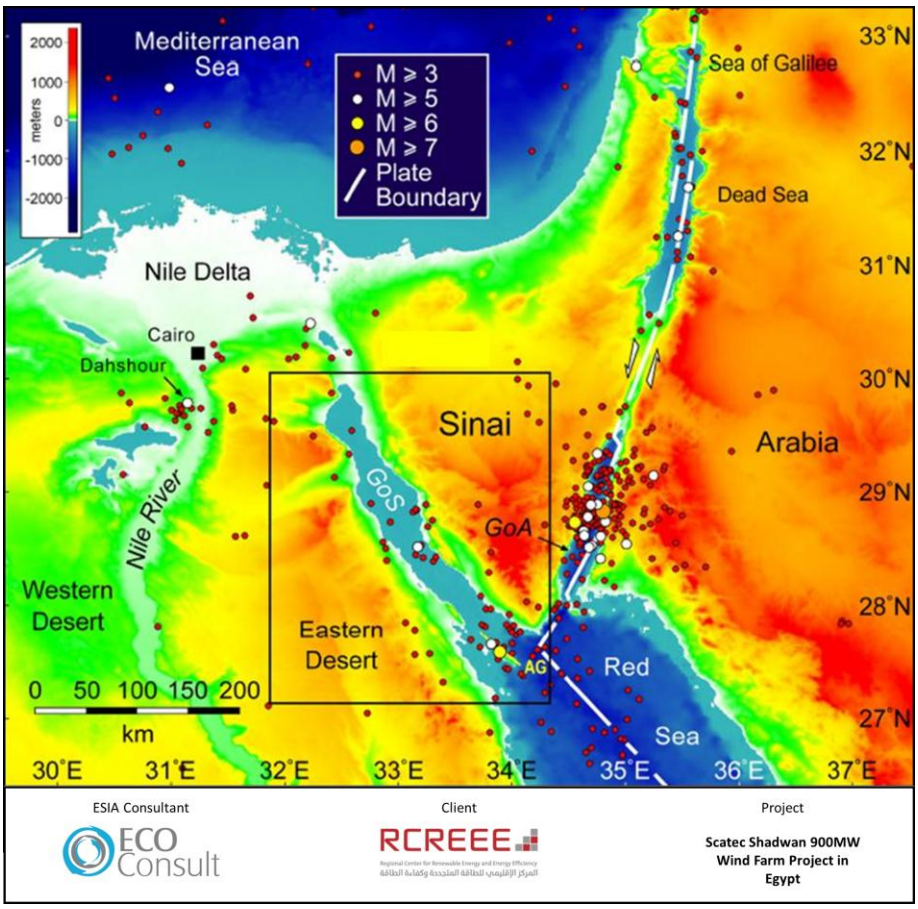


Figure 34: Plate tectonic setting of the Gulf of Suez (Bosworth & Durocher, 2017)

The Gharib Plain, where the Project is located, lies within the Central Sub-basin of the Gulf of Suez, which is characterized by south-westward-dipping strata and NE–SW oriented extensional stresses.

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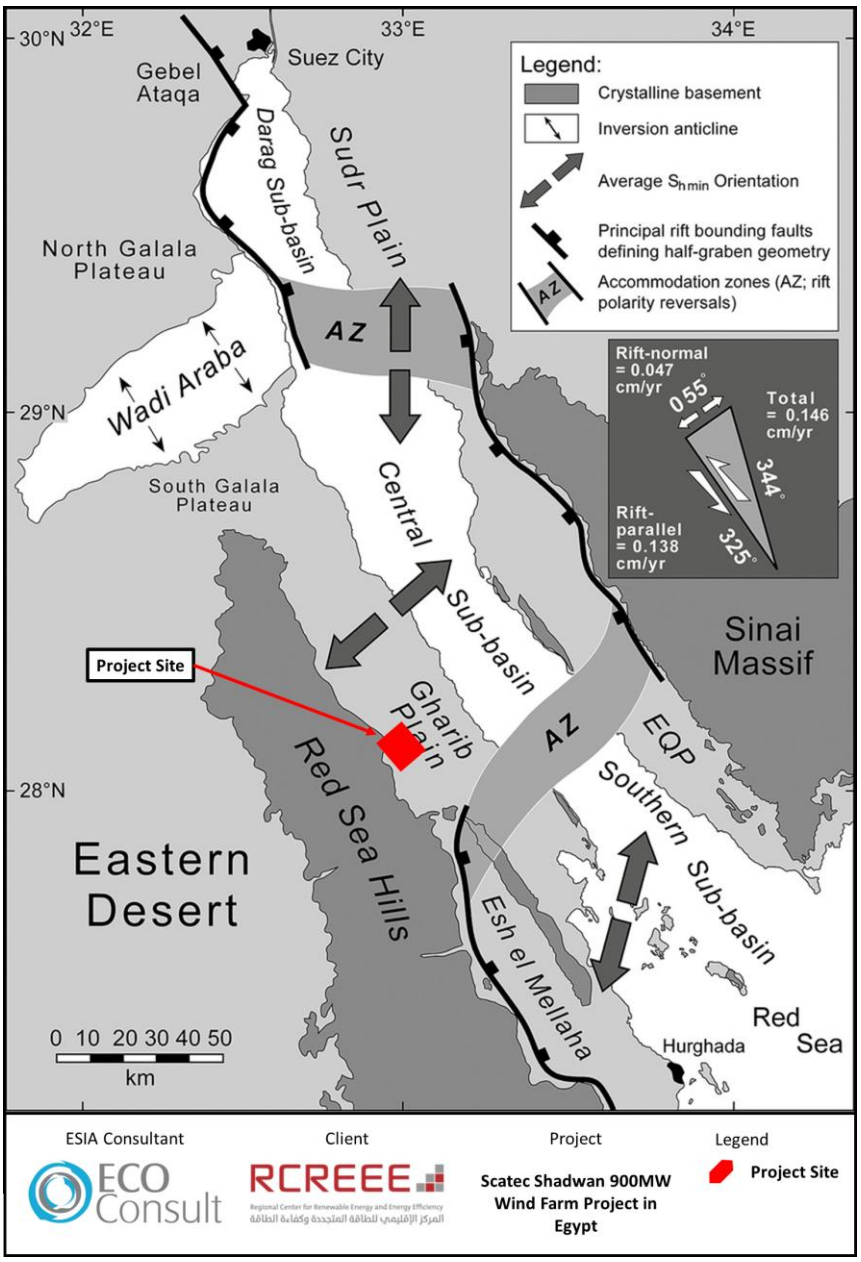


Figure 35: Minimum Horizontal Stress Orientations (Shmin) in the Gulf of Suez Sub-basins

Surface expressions of faulting include young fault-line scarps developed within partially lithified Pliocene–Pleistocene sands and gravels. These scarps are generally straight, display predominantly dip-slip displacement, and are down-thrown toward the northeast.

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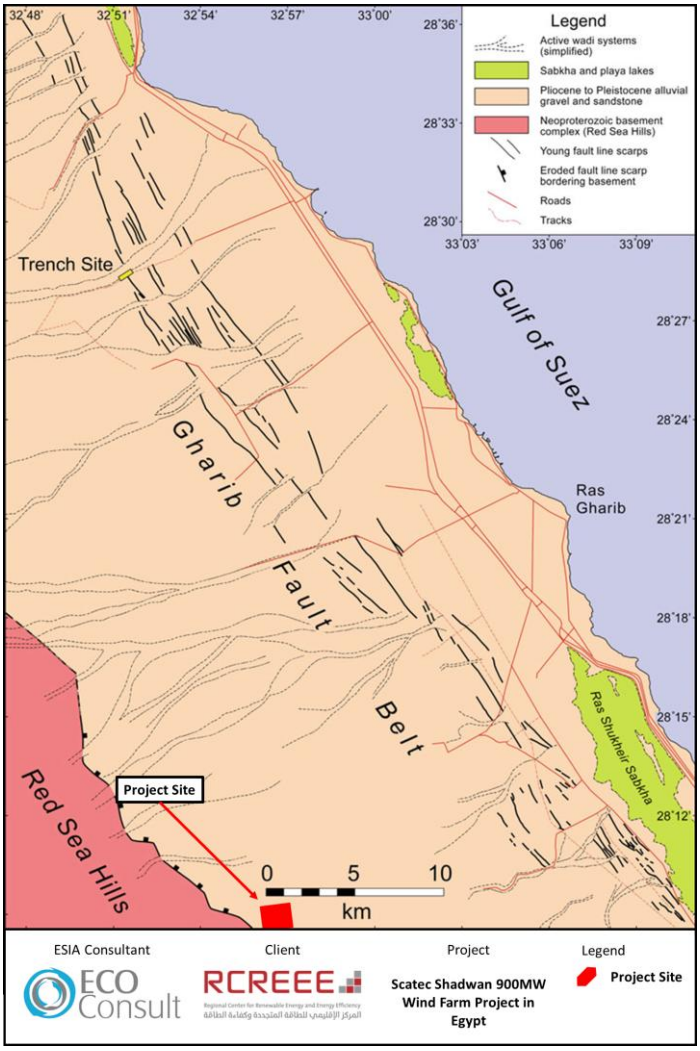


Figure 36: Young Fault-line Scarps in Pliocene–Pleistocene Alluvium within the Gharib Plain (Basworth etal., in Rasul and Stewart, 2019)

The deformed sediments overlie Late Miocene evaporite beds and are themselves overlain by Quaternary terraces, indicating that faulting occurred during the post-Miocene to early Pleistocene interval. Despite the presence of Late Miocene evaporites, the straight geometry of the scarps suggests that the faults are not related to salt tectonics but rather to regional rift-normal extension.

7.3.3 Hydrology

A topographic and drainage analysis has been prepared for the Project site and surrounding areas using topographic maps, Landsat imagery, and DEMs generated from SRTM data and GIS software. As noted in the figure below, the Project site is situated within a gently sloping plain that trends generally toward the Gulf of Suez. The ground surface is characterized by low-relief alluvial fans and shallow drainage lines, with isolated low sandstone and evaporite hills in the central and eastern parts of the site. The regional slope of the area is very gentle, with average gradients on the order of 0.025 toward the northeast and local cross-slopes of approximately 0.005–0.006.

The Project site lies at the downstream part of the watershed areas of Wadi Dara to the south and Wadi Kharm Elein to the north, as shown in the figure below. The drainage network crossing the Project area

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consists of shallow, wide, and weakly incised tributaries that coalesce into main streams outside or at the margins of the site. Although these wadis can convey flash flood runoff during intense rainfall events, the drainage lines intersecting the Project footprint itself are characterized by low sinuosity, very gentle gradients, and limited capacity for deep erosion. The main course of Wadi Dara runs through the southern part of the wider site, while lower order tributaries of Wadi Kharm Elein drain the northern part; both are considered medium-hazard to low-hazard basins in terms of flash flood potential within the Project area.

Taking the above into account, the physiographic features of the area can be differentiated into two relief units as follows:

- High Relief Unit: Located mainly to the west and southwest of the Project site, this unit is associated with elevated basement exposures and dissected hills of sandstone and evaporite. Short and long tributaries drain these higher areas and feed two wide alluvial fans that extend across much of the western and central parts of the Project site. Local relief within this unit is modest, with sandstone and evaporite hills rising up to about 10 m above the surrounding surface, and the drainage lines are shallow and wide.
- Low Relief Unit: This unit extends across the central and eastern portions of the Project site and toward the Gulf of Suez, where the ground surface is nearly flat to very gently undulating. It is formed predominantly of Quaternary alluvial fan deposits and terraces, intersected by straight, shallow tributaries with very low incision. Surface slopes are weak, and the drainage tracks are broad and diffuse, indicating low-intensity runoff and limited capacity for channel development.

Therefore, based on topographic maps, DEM models, and site investigations, the Project area's topographic relief is generally gentle rather than rugged. It features wide, flat alluvial fans and shallow, weakly developed drainage lines, with small sandstone and evaporite hills dissected by minor tributaries. The drainage channels that cross the Project area show no evidence of strong incision or significant sediment scour; instead, they are filled with fine sand, gravel, and small rock fragments that reflect low-energy flow conditions. The Project site and its surroundings lack any permanent fresh surface water bodies or streams (such as rivers, lakes, or irrigation/drainage canals).

In addition, based on the site visit undertaken, it was indicated that the site is characterized by a complete absence of deeply incised, high-energy drainage lines or strong surface flow paths. The Quaternary sediments that blanket the site are composed of alluvial fan and terrace deposits with variable grain size, ranging from boulders and gravel embedded in fine sand and clay in the upstream western parts to coarser sands and gravels in the central sector and sandy loam toward the eastern sandstone-evaporite hills. These deposits are highly porous and permeable, granting them a high infiltration capacity and enabling them to absorb significant volumes of surface runoff during rainfall events. The thickness of recent terrace deposits along the main drainage lines generally does not exceed a few centimeters, indicating thin surface flows and weak erosive power even during storm events.

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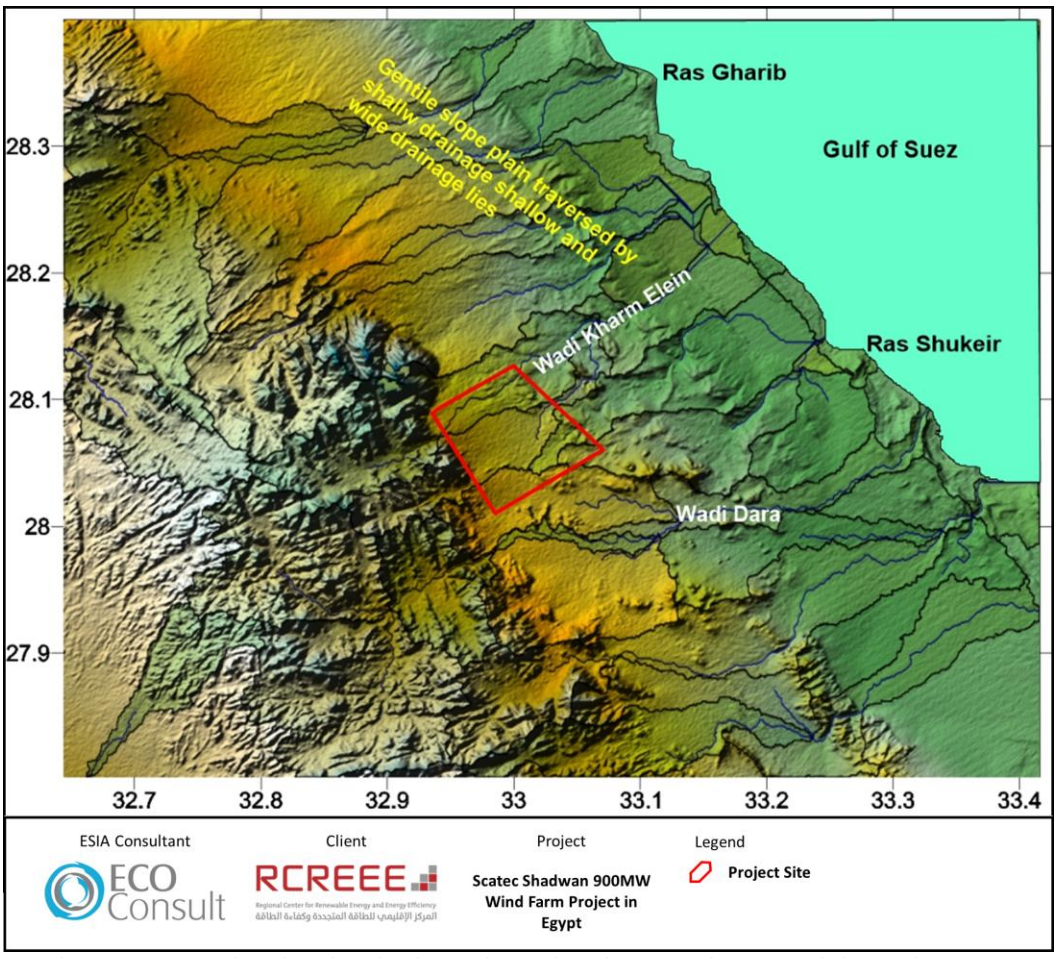


Figure 37: DEM Showing the Physiography and Drainage Basins around the Project Area

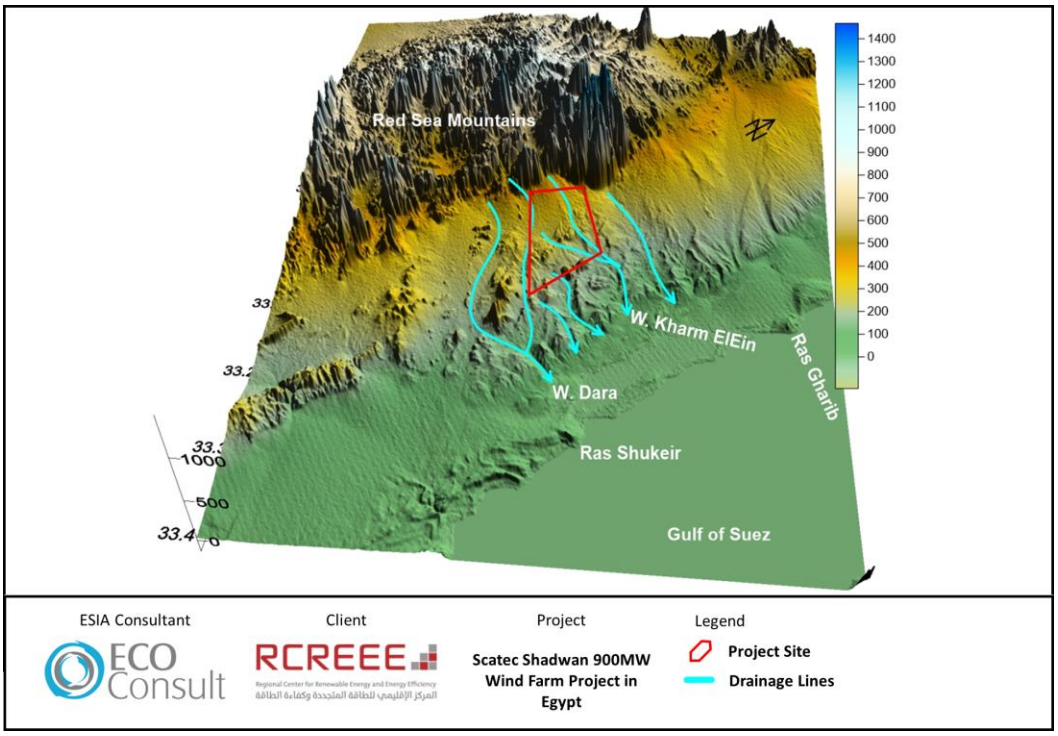


Figure 38: 3D DEM of the Project Area Constructed from SRTM Data

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7.3.4 Hydrogeology

Egypt's landscape is predominantly arid, with more than 95% of the country classified as desert. Groundwater therefore represents a critical resource, particularly within regions where aquifer systems form the primary water supply for development. The Project site is located within the middle western part of the Gulf of Suez, an area that has been extensively examined in previous geological, hydrological, hydrogeological, and geophysical studies. As in much of the Gulf region, groundwater availability is strongly controlled by lithology, tectonics, and the configuration of deeper aquifer systems.

According to regional assessments, groundwater accumulations within the Gulf of Suez area occur within several lithological units, including weathered hard rock zones, Paleozoic to Lower Cretaceous sandstones, paleo-karstified Upper Cretaceous–Eocene carbonates, and unconsolidated alluvial deposits. The distribution and productivity of these aquifers are largely governed by the presence and thickness of underlying clay layers, which influence storage capacity and restrict vertical hydraulic connectivity. In addition, faulting in the region may have juxtaposed impervious formations against pervious aquifer units, thereby hindering eastward groundwater discharge and modifying local flow paths.

Groundwater in the Gulf of Suez is primarily exploited for tourism- and industry-related developments. Groundwater withdrawal accounts for approximately 10 – 40% of total water use across the Gulf province, with daily abstraction rates ranging from 260 m^3/day in Wadi Araba to nearly 3000 m^3/day in the El Sukhna – Zaffarana area. Continuous extraction from these aquifers' places increasing stress on both groundwater quantity and quality, underscoring the need for sustainable management in line with regional development pressures.

Based on the hydrogeological map of Egypt, a low to moderate productivity aquifer is expected beneath the Project site, as shown in the figure below. Within Wadi Dara, located to the southeast, groundwater has historically been utilized for land-reclamation projects; however, the high total dissolved solids (TDS) concentrations render the water unsuitable for domestic use. Recent investigations conducted by the Desert Institute indicate that the Pre-Cenomanian sandstone aquifer, part of the regional Nubian Sandstone Aquifer System, underlies the Wadi Dara area. This aquifer consists of alternating sandstone and shale layers resting directly on basement rocks, with an overall thickness ranging from 100 m to 300 m, thinning westward. Groundwater levels vary considerably, with depths to water ranging from 9 m to 120 m. Water quality within this aquifer is generally brackish, further limiting its suitability for potable supply.

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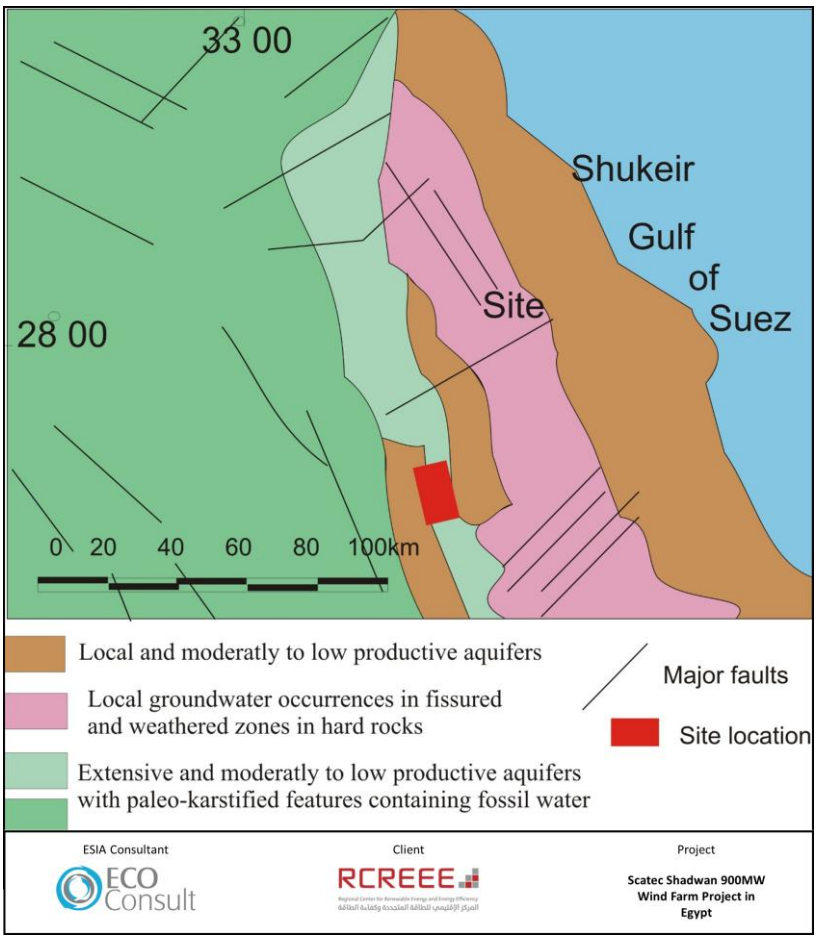


Figure 39: Hydrogeological Map of the Area around the Project Site

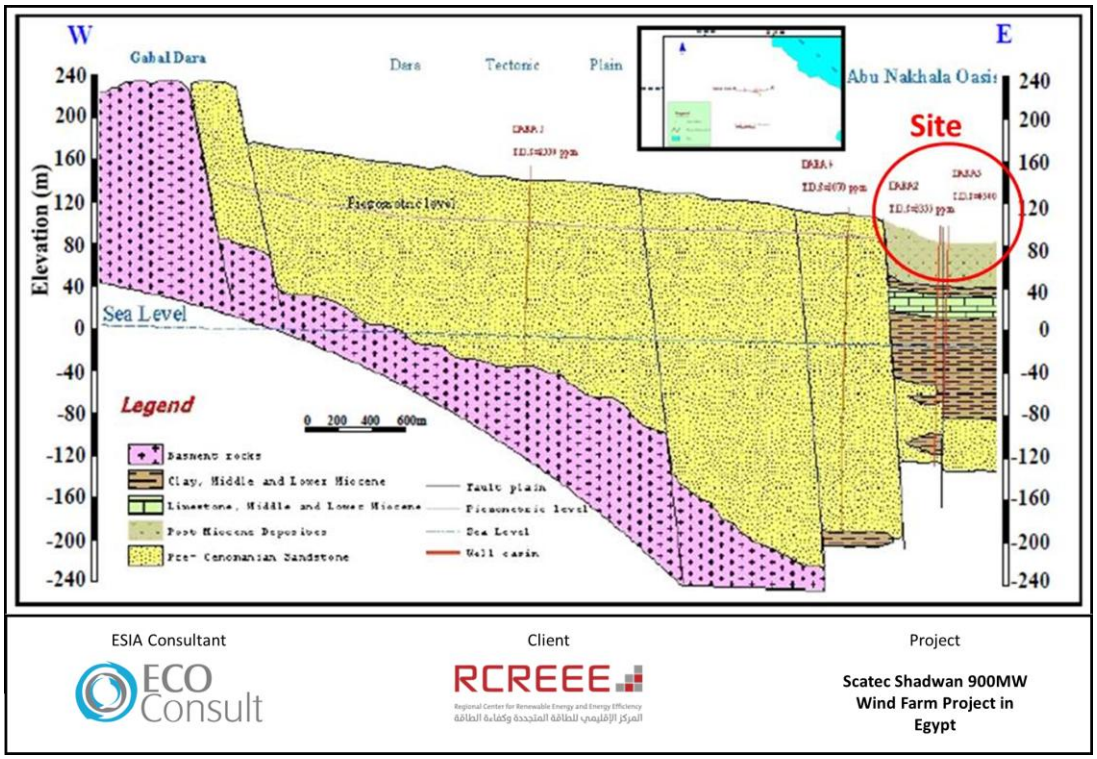


Figure 40: Hydrogeological Cross-Section along Wadi Dara Based on Drilled Wells (Nasr, 1990)

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Three sets of production and observation wells drilled by the Desert Research Institute and additional wells installed by RIGW (2005) represent the main sources of hydrogeological data for the Wadi Dara area. These wells provide essential information on groundwater levels, salinity, aquifer thickness, and lithological variability. As shown in the table below, data compiled from these wells indicate significant variability in TDS values, ranging from 2550 mg/L to over 8200 mg/L, confirming the limited presence of freshwater in the region.

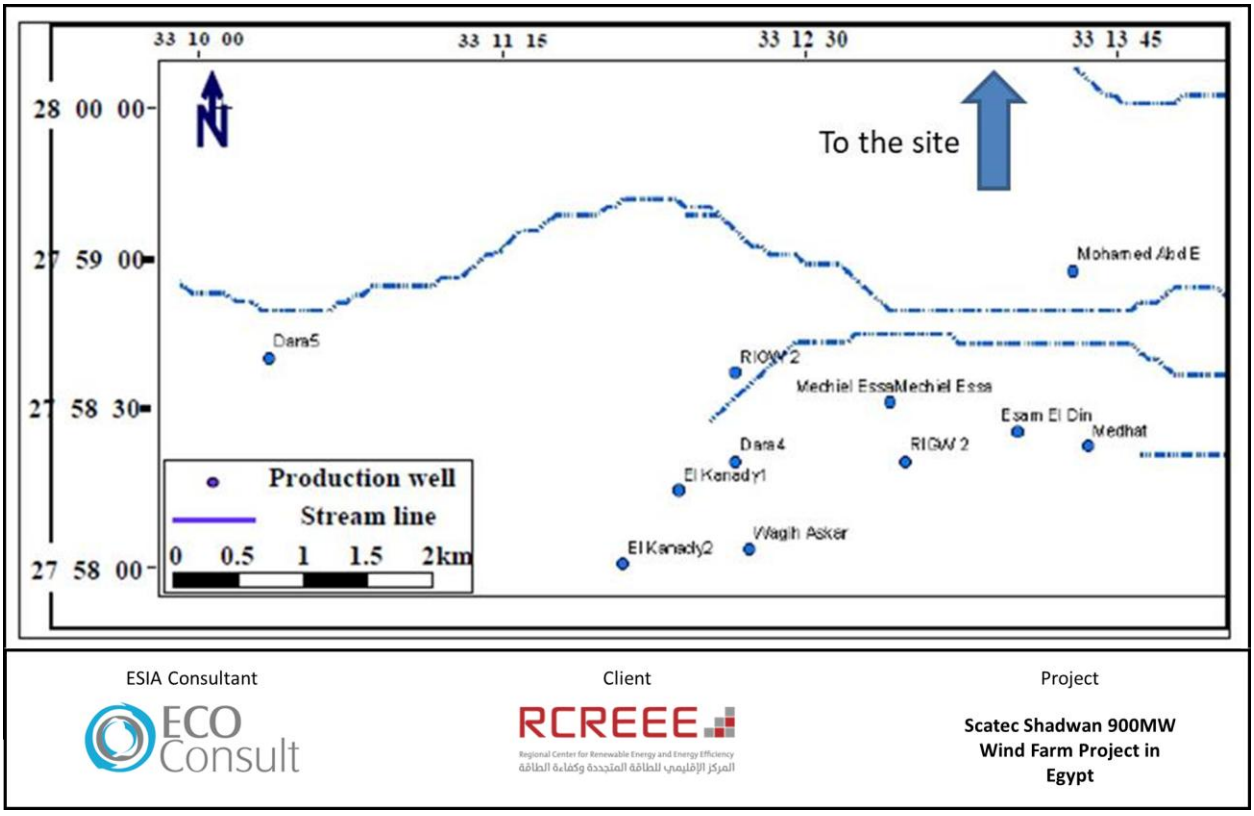


Figure 41: Location map of the drilled wells at Wadi Dara

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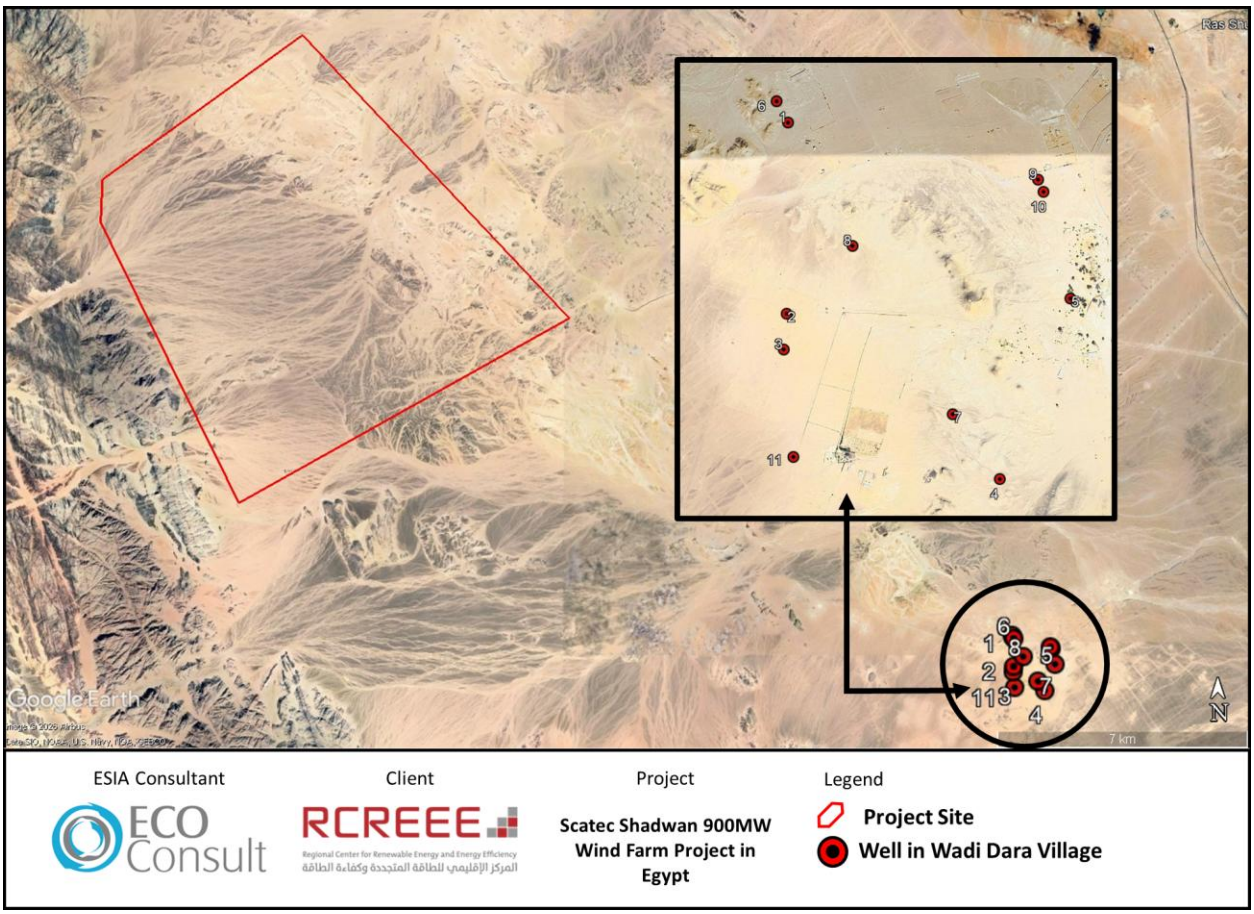


Figure 42: Available Data in Wadi Dara in Relation to Project Site

Table 19: The available data in wadi Dara area (Bediar 2015)

No	Lat. N	Long. E	Gl m amsl	DW m	TDS gm/l	WL m
1	27°58′56.9″	33°12′12.2″	121.9	11.34	3400	110.5
2	27°58′31.8″	33°12′12″	128	16	3650	112
3	27°58′27.1″	33°12′11.57″	135	26.6	2720	108.3
4	27°5810.1″	33°12′43.7″	151	39.2	2675	111.8
5	27°58′33.8″	33°12′54.2″	109	Flowing	6750	105
6	27°58′59.7″	33°12′10.5″	154	44.4	2550	109.5
7	27°58′18.6″	33°12′36.7″	120	93	3250	27
8	27°58′40.7″	33°12′21.8″	97.2	94.9	7630	2.32
9	27°58′49.4″	33°12′49.4″	150.6	9	3400	141.6
10	27°58′47.8″	33°12′50.2″	121.9	7.78	8200	114
11	27°58′13″	33°12′13″	134.5	24	2800	110.5

Based on these findings, freshwater groundwater resources are not considered significant within the Project site, except for localized areas in the southern part of Wadi Dara where limited rainfall infiltration may temporarily recharge shallow sediments during storm events. This assessment is supported by the following observations:

- There is no shallow aquifer at the Project site with a reliable or continuous source of freshwater recharge. Annual rainfall is insufficient to replenish wadi-fill deposits or sustain shallow groundwater storage.

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- Despite the unconfined nature of the wadi deposits and their high porosity and permeability, the regional dip toward the east and the absence of subsurface hydraulic barriers prevent meaningful accumulation of groundwater, even during heavy rainfall events.
- No specific hydrogeological investigations or groundwater wells exist at the exact Project site, and therefore direct information on aquifer characteristics beneath the footprint is limited.

These findings collectively indicate that the Project area is underlain by low-productivity, brackish aquifers with limited capacity for sustainable groundwater extraction. As such, groundwater is not expected to form a viable water supply source for Project development.

7.4 Climate and Meteorology

This section provides an assessment of baseline conditions within the Project site and its surroundings in relation to climate and meteorology.

7.4.1 Assessment of Baseline Conditions

(i) Methodology of Assessment

The methodology was based on secondary data available through online resources on key climate and meteorological conditions. This includes temperature, wind speeds, humidity, rainfall, sand/snowstorms and other things as applicable. The assessment provided below is for Ras Gharib, which is considered representative of the Project site and the local communities.

(ii) Results

Temperature

The figure below presents the annual temperature variations in Ras Gharib based on historical information throughout the past 30 years. The average daily maximum temperature presents the peak temperature on an average day each month, while the average daily minimum temperature presents the average minimum temperature.

As shown in the figure below, the hottest months are typically June – August, with averages reaching a maximum of 34°c. The coldest months are typically December – February with averages reaching a minimum of 10°C.

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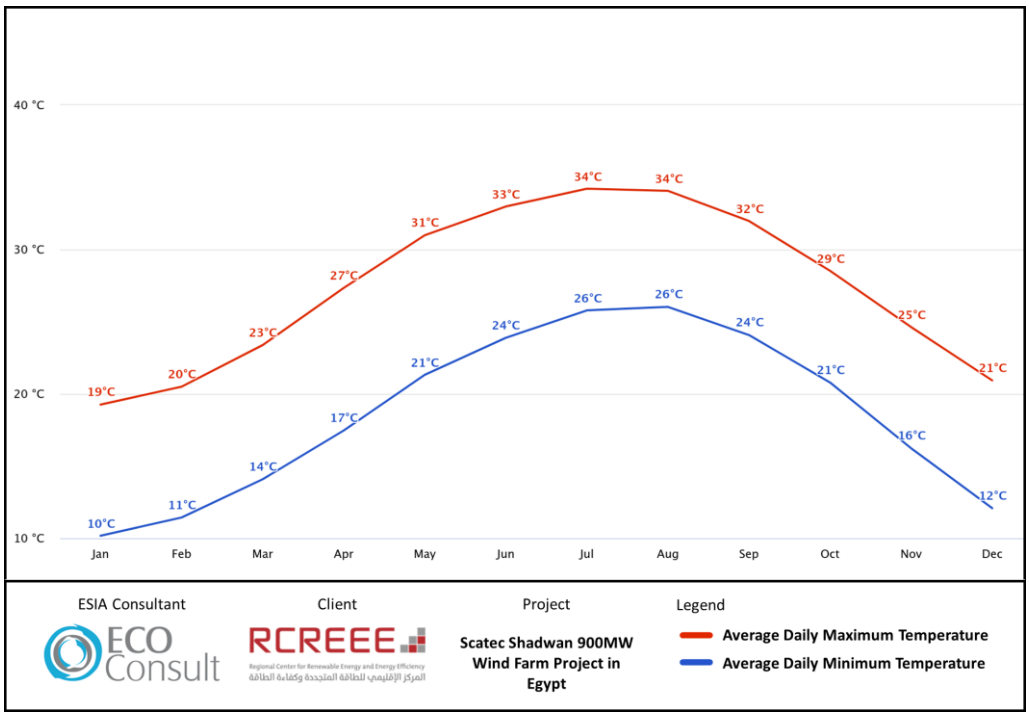


Figure 43: Average Monthly Maximum and Minimum Temperatures for the Past 30 Years

Wind Speed and Direction

The figure below presents the windspeed patterns across Ras Gharib. As noted below, there is a distinct seasonal variation, with higher wind speeds prevalent during the warmer months. June is the month with the highest wind speeds, ranging from a minimum of 18 km/h to a maximum of 30 km/h, with an average speed of 24 km/h. The lowest wind speeds occur during January, ranging from a minimum of 10 km/h to a maximum of 22 km/h, with an average wind speed of 16 km/h.

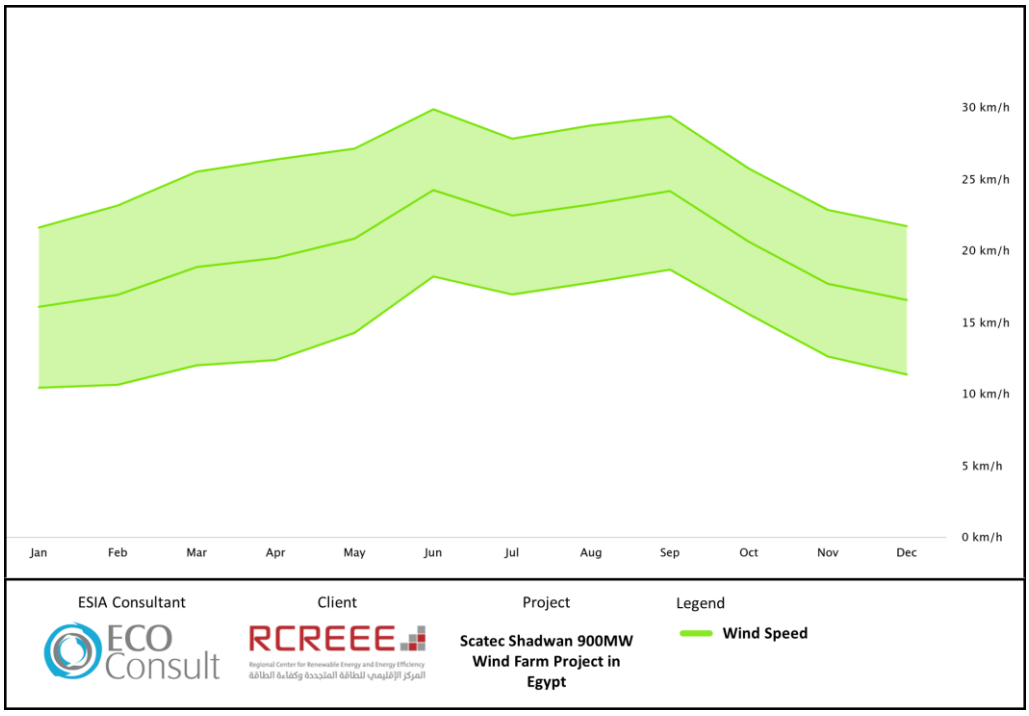


Figure 44: Average Monthly Wind Speeds for the Past 30 Years

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The figure below categorizes the months based on the frequency of different wind speeds, whereas noted the months March until September witnessed the highest speeds exceeding 40 km/h. Generally, wind speeds in Ras Gharib predominantly fall within the range of 20 km/h to 30 km/h.

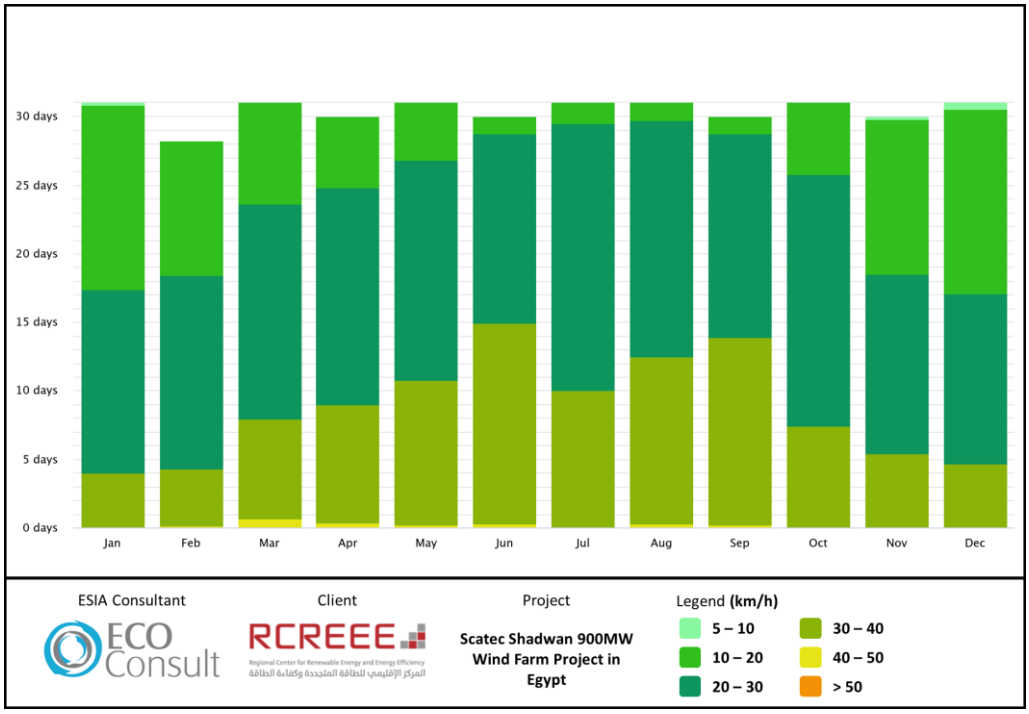


Figure 45: Wind Speed Patterns in Ras Gharib Over the Past 30 Years

The figure below presents a wind rose with distinctive patterns in wind direction. The prevailing wind direction is predominantly from the northwest (NW) to the north-northwest (NNW). Conversely, the sector with the least occurrence of wind direction spans from the northeast (NE) to the southwest (SW).

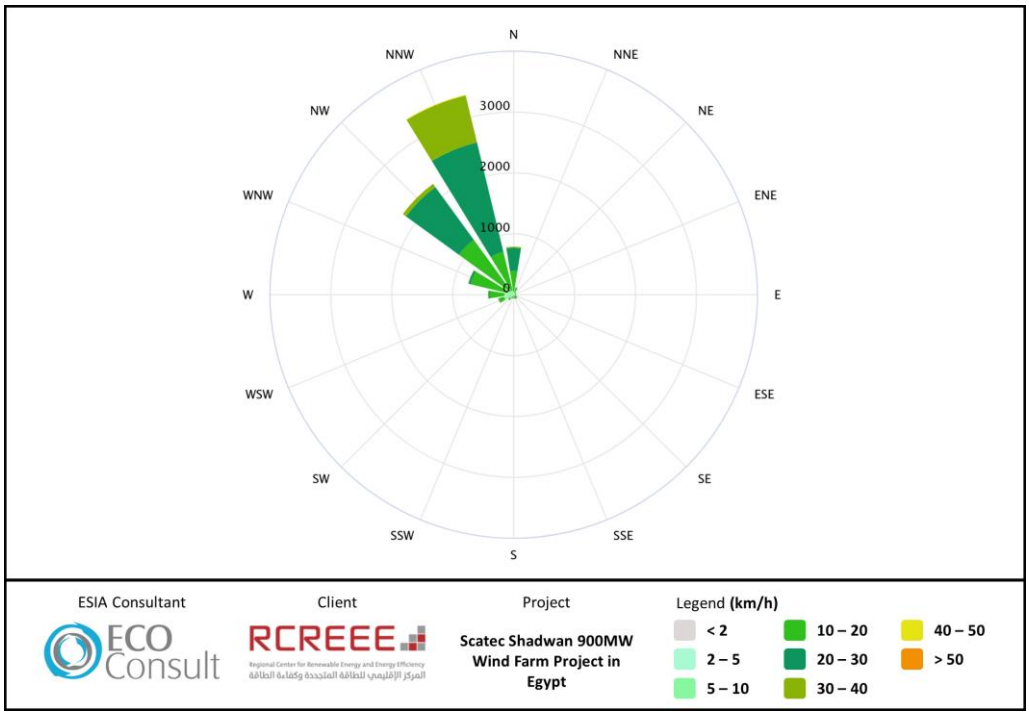


Figure 46: Wind Rose of Ras Gharib

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Rainfall

The figure below presents the amount of rainfall and number of rainy days across the year in Ras Gharib. As noted, January has the highest number of rainy days (at around 1.1 days). June, July and August have zero rainy days.

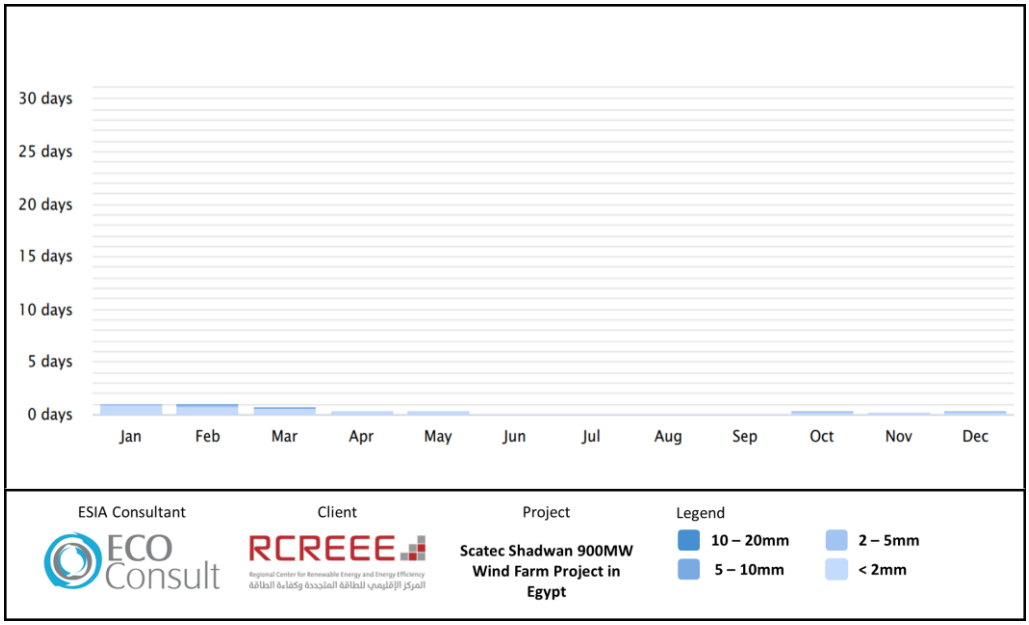


Figure 47: Average Monthly Rainfall Distribution in Ras Gharib for the Past 30 Years

Humidity

In Ras Gharib, there is a seasonal fluctuation in average humidity levels. October registers the highest average relative humidity at 62.0%, highlighting a relatively more humid condition during autumn. The lowest average humidity levels in Ras Gharib are during the months of late spring and early summer, ranging between 44.2% and 43.8% in May and June. The data suggests a gradual rise in humidity from August onward, reaching its peak in October, after which it starts to decline. This pattern reflects the distinct humidity variations between the drier summer months and the more humid autumn and winter seasons.

Table 20: Average Humidity Levels

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average Humidity (%)	57.7	54.4	50.5	47.1	44.2	43.8	45.7	47.5	52.5	62.0	59.1	60.2

Heat/ Cold Waves

The frequency of heat waves in Egypt varies across its territories, with the desert areas experiencing the highest risk due to maximum air temperature norms nearing 40°C. In these regions, the occurrence of heat waves poses a significant threat to human health. The number of days with high air temperatures serves as an index for assessing the likelihood of dangerous heat waves. In accordance with the criteria established by economic entities and design institutes, any instance where the air temperature exceeds or equals 40°C, irrespective of its duration, is considered a hazardous phenomenon in Egypt.

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Specifically, within the Project site, the frequency of air temperatures equal to or exceeding 40°C is considered rare, as shown in the figure below. The temperature generally falls between 30-35°C.

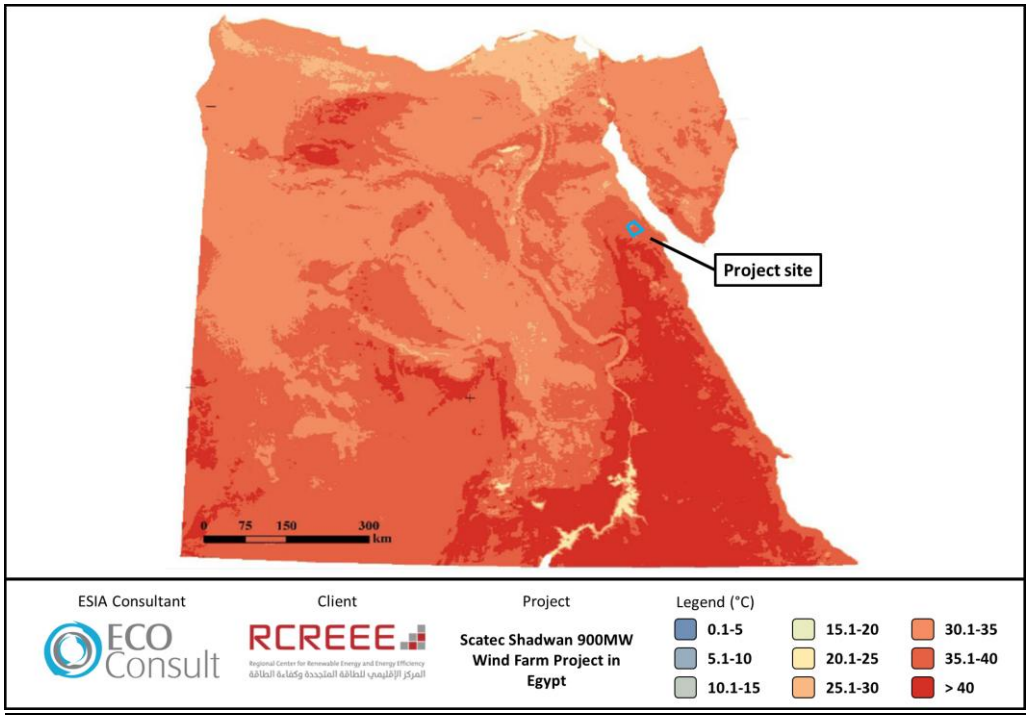


Figure 48: Temperature within Egypt

The figure below illustrates that the months characterized by temperatures surpassing 40°C are primarily from May through July. This suggests anticipation of increased heatwave occurrences during these months, with particular emphasis on the month of June. The data indicates a heightened likelihood of extreme heat events, emphasizing the need for attention and preparedness during this period to mitigate potential adverse effects. Contrarily, there are no days where temperature falls below 0°C.

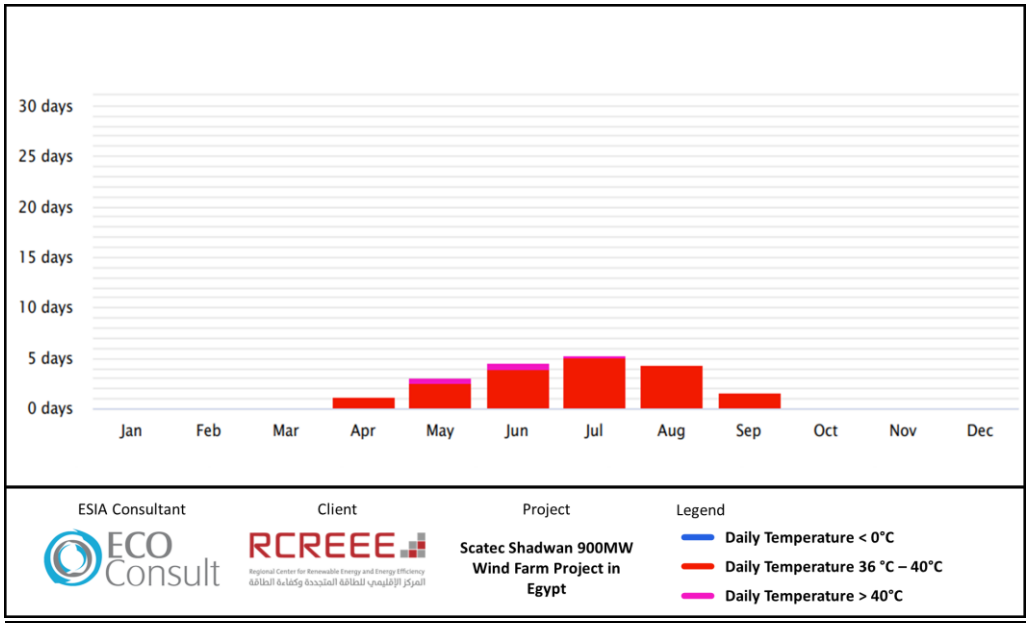


Figure 49: Number of Days in Egypt with Temperatures <0°C and >40°C

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7.5 Biodiversity – Excluding Birds and Bats

This section provides an assessment of baseline conditions within the Project site and surrounds in relation to biodiversity.

7.5.1 Desktop Review

Protected Areas

The location of Protected Areas within 50 km of the site boundary were taken from a range of sources including, but not limited to, Protected Planet[24], IUCN[25], Birdlife Datazone IBA[26]and Key Biodiversity Areas[27] The results of the search are as follows:

- Protected Areas
  - Gebel El Zeit KBA IBA
  - El Qa Plain KBA IBA
  - Red Sea Islands
- Potential Protected Areas
  - Wadi Qena
  - Malahet Ras Shukeir
  - Shaieb El-Banat

Gebel EL Zeit IBA and KBA

Gebel El Zeit is designated as both an IBA and a KBA (with concurrent boundaries) and the Project lies 5 km to the south-west of the protected site. The site consists of a narrow, 100km long strip extending along the Gulf of Suez and Red Sea coast. Gebel El Zeit is a mountain reaching 457m while the IBA/KBA itself extends from Ras Gharib to the bay of Gubbet El Gemsa. Habitats include mountains, coastal plain, saline bays, intertidal mud, saltmarsh and small vegetated wadis.

IBA Designation

The Gebel El Zeit area is a very important migration corridor for soaring migrants, particularly birds of prey and storks. Because of the geography of the Gulf of Suez as a whole and the micro-geographic configuration of the Gebel El Zeit area, which is the narrowest point in the southern part of the Gulf of Suez, over 250,000 White Stork (Ciconia ciconia) and many other migrant soaring birds are funneled through this stretch of coast on both spring and autumn migrations. Birds of prey, storks and pelicans migrate through and usually land, rest or roost near the coastline and on the surrounding desert plains

[24] https://www.protectedplanet.net
[25] https://www.iucnredlist.org
[26] https://datazone.birdlife.org
[27] https://www.keybiodiversityareas.org

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and hills. Resting and roosting storks especially, utilize the two bays of Ghubbet El Zeit and Ghubbet El Gemsa and the saltmarsh at Sabkhet Ras Shukheir.

Information on bird species which trigger the IBA Criteria is shown in the table below.

Table 21: Populations of IBA Trigger Species

Species		IUCN Category	Season	Year(s) of Estimate	Population at Site	IBA Criteria Triggered
Common Name	Scientific Name					
White-Eyed Gull	*Larus leucophthalmus*	LC	Non-breeding	1998	common	A1
Eastern Imperial Eagle	*Aquila heliaca*	VU	Passage	1992-1994	19 Individuals	A1
Pallid Harrier	*Circus macrourus*	NT	Passage	1992-1994	4 individuals	A1
Lesser Kestrel	*Falco naumanni*	LC	Passage	1998	Uncommon	A1
A4iv Species Group – Soaring birds/cranes	*n/a*	n/a	Passage	1989-1998	250,000 individuals	A4iv

In terms of other fauna there are seven species of sea grass in the bay of Ghubbet El Zeit forming one of the most diverse and extensive sea-grass beds in the northern Red Sea. These beds are potential feeding grounds for Dugong (Dugong dugon), an IUCN VU species, and endangered marine turtles.

KBA Designation

This site qualifies as a Key Biodiversity Area of international significance because it meets one or more previously established criteria and thresholds for identifying sites of biodiversity importance (including Important Bird and Biodiversity Areas, Alliance for Zero Extinction sites, and Key Biodiversity Areas).

Oil pollution from onshore and offshore oil facilities, as well as passing vessels is the most immediate threat to birds. It is recommended in the KBA citation that development in this area is carried out with careful consideration of migratory birds. Information on bird species which trigger the KBA Criteria is shown in the table below.

Table 22: Populations of KBA Trigger Species

Taxonomic Group	Scientific name	Common name	IUCN Red List Category	KBA Criteria	Legacy Criteria
Birds	*Aquila heliaca*	Eastern Imperial Eagle	VU		Y
Birds	*Circus macrourus*	Pallid Harrier	NT		Y
Birds	*Falco naumanni*	Lesser Kestrel	LC		Y
Birds	*Larus leucophthalmus*	White-eyed Gull	VU		Y

El Qa Plain IBA and KBA

El Qa Plain lies approximately 48 km east from the Project site and is both designated as an IBA and KBA.

IBA Designation

El Qa Plain lies across the Gulf of Suez and consists of a wide plain that flanks the South Sinai Mountain massif on the west and separates it from the Gulf of Suez. The IBA is mostly concerned with the coastal portion of the plain and extends from Wadi Feiran in the north to Ras Mohammed in the south, where

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migratory birds tend to concentrate and often land in vast numbers. The plain is dissected by many wadis that flow from the mountains of Sinai into the Gulf of Suez. To the north of El Tor a narrow mountain range separates the plain from the Gulf of Suez. This mountain, immediately overlooking the Gulf, is thought to be a very important departure point for many of the soaring birds that attempt to cross the Gulf of Suez in autumn. Sparse scrub vegetation and scattered Acacia trees cover sizeable sections of the plain. The town of El Tor is located within the area of concern and is the only major human settlement in the region.

Information on bird species which trigger the IBA Criteria is shown in the table below.

Table 23: Populations of IBA Trigger Species

Species		IUCN Category	Season	Year(s) of Estimate	Population at Site	IBA Criteria Triggered
Common Name	Scientific Name					
Eastern Imperial Eagle	*Aquila heliaca*	VU	Passage	1998	Present	A1
Pallid Harrier	*Circus macrourus*	NT	Passage	1998	Uncommon	A1
Lesser Kestrel	*Falco naumanni*	LC	Passage	1998	Uncommon	A1
A4iv Species Group – Soaring birds/cranes	*n/a*	n/a	Passage	1998	200,000 individuals	A4iv

The mammal fauna of note present within the IBA is limited to Dorcas Gazelle (Gazella dorcus) which is categorized as IUCN Vulnerable and is thought to be the largest remaining population of this species in Sinai.

KBA Designation

This site qualifies as a Key Biodiversity Area of international significance because it meets one or more previously established criteria and thresholds for identifying sites of biodiversity importance (including Important Bird and Biodiversity Areas, Alliance for Zero Extinction sites, and Key Biodiversity Areas).

Threat from tourism and development is the most immediate threat for this KBA, particularly for migratory birds in the Spring. Details on bird species which trigger the KBA are shown in the table below.

Table 24: Bird Species that Trigger KBA Designation

Taxonomic Group	Scientific name	Common name	IUCN Red List Category	KBA Criteria	Legacy Criteria
Birds	*Aquila heliaca*	Eastern Imperial Eagle	VU		Y
Birds	*Circus macrourus*	Pallid Harrier	NT		Y
Birds	*Falco naumanni*	Lesser Kestrel	LC		Y

Red Sea Islands

The Red Sea Islands has been a Marine Protected Area and Developing Resources Protection Area since 2006. It lies 47 km south-east of Scatec South (Shadwan) and is designated on a national level. Its reported area is 1800.00 km². The reason for designation is not clear. The IUCN category of this site is not reported and accordingly it is assumed to be of lower importance than sites meeting criteria within lenders environmental standards.

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Proposed Protected Areas

Shaieb El-Banat

Shaieb El-Banat has been a proposed Terrestrial and Inland Waters Protected Area since 1999. It lies 50 km south-east of Scatec South (Shadwan) and is designated on a national level. Its reported area is 4,855.85 km². The reason for designation is not clear from available literature. The IUCN category of this site is not reported and accordingly it is assumed to be of lower importance than sites meeting criteria within lenders environmental standards.

Malahet Ras Shukeir

Malahet Ras Shukeir has been a proposed Terrestrial and Inland Waters Protected Area since 1999. It lies 10 km north-east of Scatec South (Shadwan) and is designated on a national level. Its reported area is 107.19 km². The reason for designation is not clear from available literature. The IUCN category of this site is not reported and accordingly it is assumed to be of lower importance than sites meeting criteria within lenders environmental standards.

Wadi Qena

Wadi Qena has been a proposed Terrestrial and Inland Waters Protected Area since 1999. It is 40 km west of Scatec South (Shadwan) and is designated on a national level. Its reported area is 8006.56 km². The reason for designation is not clear from available literature. The IUCN category of this site is not reported and accordingly it is assumed to be of lower importance than sites meeting criteria within lenders environmental standards.

7.5.2 Habitats and Flora

A. Methods: Habitats and Flora

A standard Sampling method is applied uniformly across the entire study region, using a random influence balanced strategy. The sampling design allocates 30 sampling points across the study region, maintaining a minimum distance of at least 1.0 km between samples to achieve comprehensive site coverage and prevent double sampling in the vicinity of each site, thereby ensuring sample independence.

For the floral survey, a protocol was devised and surveys consisted of five 10 x 10m sample plots (quadrats) in a radius of 50m from each sampling point as shown in the figure below. All plant species present within each quadrat were recorded (including their abundance and % of cover), in particular, threatened species, weeds and invasive species. For each sample plot, photographs of the landscape and plants were taken using a digital camera.

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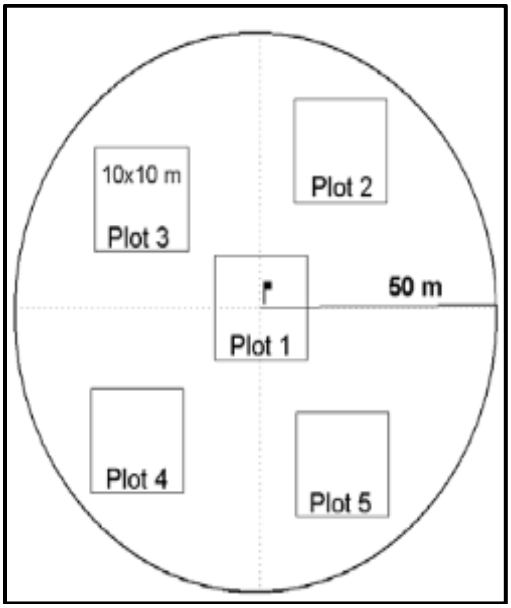


Figure 50: Floral Quadrat Survey Sampling Methodology

Following field sampling, calculations to account for the Shannon-Wiener Biodiversity Index and Importance Value Index (IVI) of the flora of species per site were undertaken and pooled for the entire AoI. Refraction curves were created to ensure adequate coverage of the AoI.

A trial TWINSPAN analysis was then undertaken to identify and map the floral community of the site which aims to provide diagnostic species of each identified community to give better assessment of the flora and biodiversity of the site. The analysis was conducted on a plant abundance matrix containing 30 sampling sites and 19 plant species.

TWINSPAN Analysis Protocol

TWINSPAN (Two-Way Indicator Species Analysis) is a divisive hierarchical clustering method specifically designed for ecological community data analysis. Originally developed by (Hill, 1979), TWINSPAN has become one of the most widely used classification techniques in vegetation science and community ecology. The method simultaneously classifies both sites and species, creating a two-way ordered table that reveals the underlying structure of ecological communities.

The primary objectives of this analysis were to:

- Identify distinct plant community groups within the dataset
- Determine diagnostic species for each identified group
- Visualize community relationships through ordination
- Provide ecological interpretation of the results

The TWINSPAN analysis was implemented using a hierarchical clustering approach with Ward's linkage method and Euclidean distance to capture abundance patterns. The analysis was configured to identify four distinct groups based on the dendrogram structure and ecological interpretability.

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NMDS Ordination

Non-metric Multidimensional Scaling (NMDS) was performed to provide an independent validation of the clustering results and to visualize the relationships between sampling sites in reduced dimensional space using a two-dimensional solution.

Mapping Communities

To transfer the results of the TWINSPAN analysis to a spatial representation of the results an approach previously described by alqamy 2004 that uses Thiessen polygons to identify an area of influence of each sampling site relatively to the distance of the neighboring sites and its position in relation to the extent of the study region. Thiessen polygons were created by Thiessen polygons tool in ArcPro 3.2.

B. *Results: Habitat and Flora*

During the 2025 surveys a total of 19 plant species were recorded across the Project AoI as shown in the table below. The majority of these species were in the herb and shrub communities with Vachellia tortilis representing the tree community in low numbers.

Table 25: Results of April-May 2025 Survey

Species Scientific Name	Total Abundance	IUCN Status
Anabasis setifera Moq.	1	LC
Anastatica hierochuntica L.	6	LC
Caroxylon imbricatum (Forssk.) Moq.	1	LC
Cometes abyssinica R.Br. ex Wall.	2	LC
Haloxylon salicornicum (Moq.) Bunge ex Boiss.	1	LC
Heliotropium bacciferum Forssk.	1	LC
Launaea spinosa (Forssk.) Sch.Bip. ex Kuntze	1	LC
Morettia philaeana (Delile) DC.	101	LC
Ochradenus baccatus Delile.	14	LC
Pulicaria undulata (L.) C.A.Mey.	1	
Reseda pruinosa Delile	1	
Salvadora persica L.	2	
Stipagrostis ciliata (Desf.) De Winter	39	
Tetraena coccinea (L.) Beier & Thulin	278	
Vachellia tortilis subsp. raddiana (Savi) Kyal. & Boatwr.	3	
Zilla spinosa (L.) PrrantI in Engl. & PrantI.	87	
Zygophyllum arabicum (L.) Christenh. & Byng	90	
Zygophyllum indicum (Burm.f.) Christenh. & Byng	3	
Zygophyllum molle (Delile) Christenh. & Byng	2	

No species that are listed on the IUCN Red List as Critically Endangered, Endangered, Vulnerable or Near Threatened or endemic species were recorded during the survey. Species such as *Calligonum polygonoises* and *Zilla spinosa* were noted as having heigh value for local livestock.

The collective Shannon-Wiener Biodiversity Index for the AoI was 1.680, while the same calculated for each sampling site ranged from 0.00 to 1.550. The species count for the AoI was 19 species, which ranged

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from 0 species to 13 species between sampling sites with the species richness across the AoI being 4.9. This shows the site is moderate to high in both flora diversity and floral richness.

The floral diversity and species richness across the AoI was highest in the western northern and western-southern corners of the site.

The habitats present on the site do not meet any of the criteria for Annex I or Priority Habitats and are assessed as being of Low to Medium Sensitivity.

7.5.3 Reptiles and Amphibians

A. Methods: Reptiles and Amphibians

Field studies were carried out according to generally accepted zoological methods for identifying species composition. No amphibian species are known to be present within the AoI. Three survey methods were undertaken for reptiles and these included:

- Diurnal Active Searching – thorough searches of suitable basking spots and resting places such as rocks, logs, within soil and leaf litter, soil cracks and holes. Areas surrounding trees and large shrubs, primarily Acacia, were checked for snakes.
- Nocturnal Searching – torchlight surveys for primarily nocturnal species such as geckos and snakes.
- Pitfall Trapping – traps made out of plastic buckets placed into pre-dug holes in the ground which are used to catch terrestrial reptiles and amphibians as they travel. No chemical substances are used within the buckets and individuals are captured, identified and released. The pitfall traps remain open for seven consecutive nights at each sampling location. Data recorded within the pitfall trapping was recorded to calculate local occupancy of each species.

All reptile species were identified to species level according to the national reptiles and amphibians guidebooks.

Spiny-tailed Lizard (Dhabb Lizard) *Euromastix aygeptia*

Spiny-tailed Lizard *(Euromastix aygeptia)* are recognized as an IUCN Vulnerable species and therefore dedicated surveys were undertaken for this species along with general reptile surveys. These were designed to not just be representative but to cover all individuals and burrows in the AoI.

B. Results: Reptiles and Amphibians

The results of the reptile surveys completed are shown in the table below and are summarized below.

In general, the composition of the herpetofauna within the Project AoI is characterized as low densities of common and widespread species, with the exception of *Uromastyx aegypita* which are discussed below. At least four species of reptile were recorded throughout the survey effort.

No amphibians were recorded and as such amphibians are therefore not discussed further in this report.

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Table 26: Results of the Reptile Surveys

Common Name	*Scientific Name*	Red List Status	Number
Spiny-tailed Lizard	*Uromastyx aegyptia*	Vulnerable VU	89
Red-spotted Lizard	*Mesalina rubropunctata*	Least concern LC	1
Bosc's Fringe-toed	*Acanthodactylus boskianus*	Least concern LC	1
Sahara sand viper	*Cerastes vipera*	Least concern LC	1
Lizard sp.	-	-	7

Spiny-tailed Lizard (Dhabb Lizard) *Uromastyx aegyptia*

Surveyors recorded 97 observations of 89 live individuals and both active and inactive burrows of Spiny-tailed Lizard. Observations were at a density of 1.077 per km². The spatial distribution of these observations in the project site shows a noticeable concentration of the species on the western side of the study site and towards the higher grounds, as shown in the figure below.

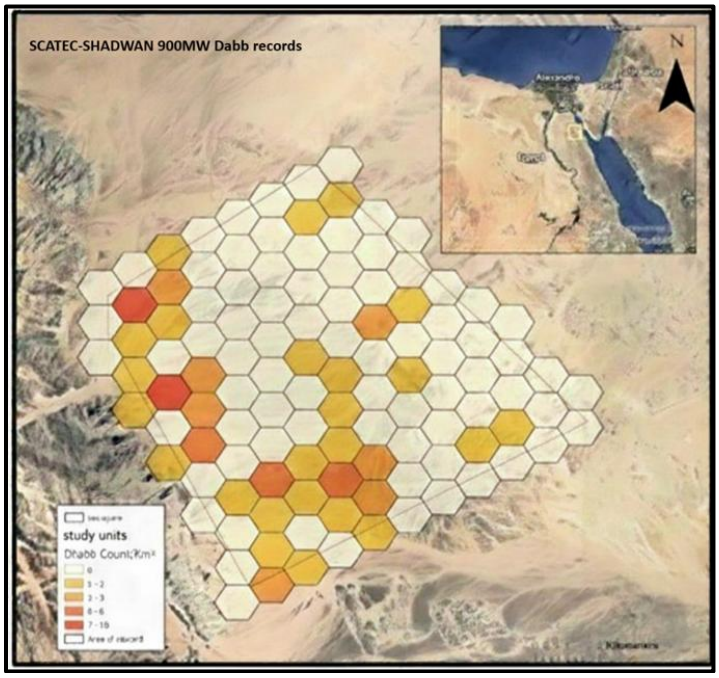


Figure 51: spatial distribution of presence marks of spiny-tailed lizard (Uromastyx aegyptia) on the site

The Egyptian Spiny–tailed Lizard has a patchy distribution from Egypt (east of the Nile), eastwards into Israel, Jordan, southern Syria, Iraq and Iran and southwards into the Arabian Peninsula. It occurs in open, flat, gravelly, stony and rocky areas, and it is infrequently seen in sandy areas. Animals forage on low vegetation close to their burrows, where they live in loose colonies.

There is no published information about the global population, but the species is generally uncommon and declining throughout its range in Egypt. The species is threatened by habitat loss due to over-grazing, quarries and agricultural expansion, and pet and medicinal trade (some of them being illegal). The species is protected by Egyptian legislation (Wilms et al. 2012), implying that it cannot be killed or captured in any protected area.

During the ecological field assessments that were carried out at the project site a number of Egyptian Spiny-tailed Lizards and burrows were identified. Despite its broad distribution, the Egyptian Spiny-tailed

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Lizard is assessed globally as IUCN Vulnerable, declining throughout its range, and poorly known, and thus considered a Priority Biodiversity Feature.

7.5.4 Mammals (excluding bats)

A. Methods: Mammals

The terrestrial mammal survey included a full walkover/drive of the Project AoI. Any signs of mammals including scat, footprints, direct observations, burrows, or other signs were recorded. Where mammals of international or national conservation concern were recorded, they were mapped and their location recorded on to a GPS device. In addition, specific surveys were conducted for large and small mammal species.

Large Mammals

Three survey methods were used for specifically surveying large mammals:

- Camera Trapping – camera traps were deployed in five sampling site for 29 days (from 26 April to 24 May) in order to photograph any medium or large mammals passing through these areas. Camera trap footage was reviewed, and species identified.
- Track Stations – in areas of the AoI where large mammal foraging was expected, track stations were prepared by smoothing a 3m^2 area of sand and baiting the area (with canned salmon or any bait with a strong odor). The track stations were prepared before dusk each night and fresh tracks were recorded each morning. Track stations were deployed in five sites and monitored for six days.
- Line Transects and Active Search – observers walked 500m transect lines from 30 different locations within the AoI in each direction (N, S, E and W). Observed species were recorded and where possible, photographed. The midpoint of each transect is shown in the figure below.

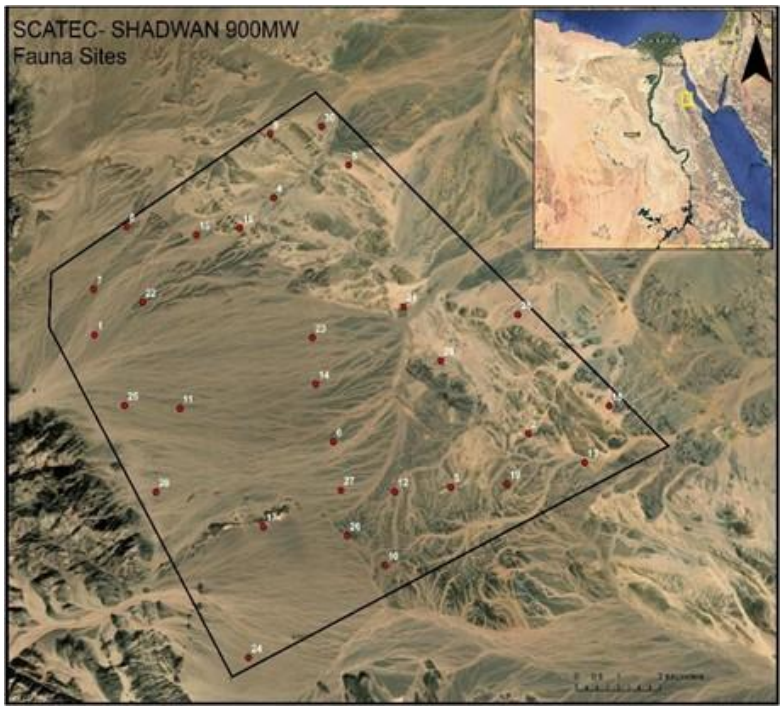


Figure 52: Distribution of line transects over the study

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Small Mammals

In order to survey small terrestrial mammals, live trapping methods were used. Baited Sherman traps of differing sizes were installed randomly at 16 locations across the Project AoI to cover all relevant habitat types, with a higher density of traps allocated to areas where small mammal activity has been previously recorded. Each of the traps elapsed 7 days in the field in continuous sampling. This equates a total sampling effort of 112 trap-days. Traps were regularly checked to ensure the safety and well-being of each animal. Captured individuals were identified to species level and relevant morphometric measurements were recorded. Individuals were then released into the site they were trapped.

B. *Results: Mammals*

Large Mammals

Four (4) large mammal species were recorded using the three survey methods detailed above and are shown below in the table below. Of these two – Nubian Ibex (*Capra nubiana*) and Dorcas Gazelle (*Gazella Dorcus*) are classified as Vulnerable by the IUCN. Only Red Fox (*Vulpes vulpes*) was recorded in all three surveying methods and is an IUCN Least Concern Species.

Line Transects

Four mammal species were recorded during the line transect surveys, as can be seen in the table below.

Table 27: Results of the Mammal Surveys

Common Name	*Scientific Name*	IUCN Status	Peak Number
Camel	*Camelus dromedarius*	Not evaluated	1
Nubian Ibex	*Capra nubiana*	Vulnerable VU	1
Red Fox	*Vulpes vulpes*	Least Concern LC	8
Dorcas Gazelle	*Gazella dorcus*	Vulnerable VU	1

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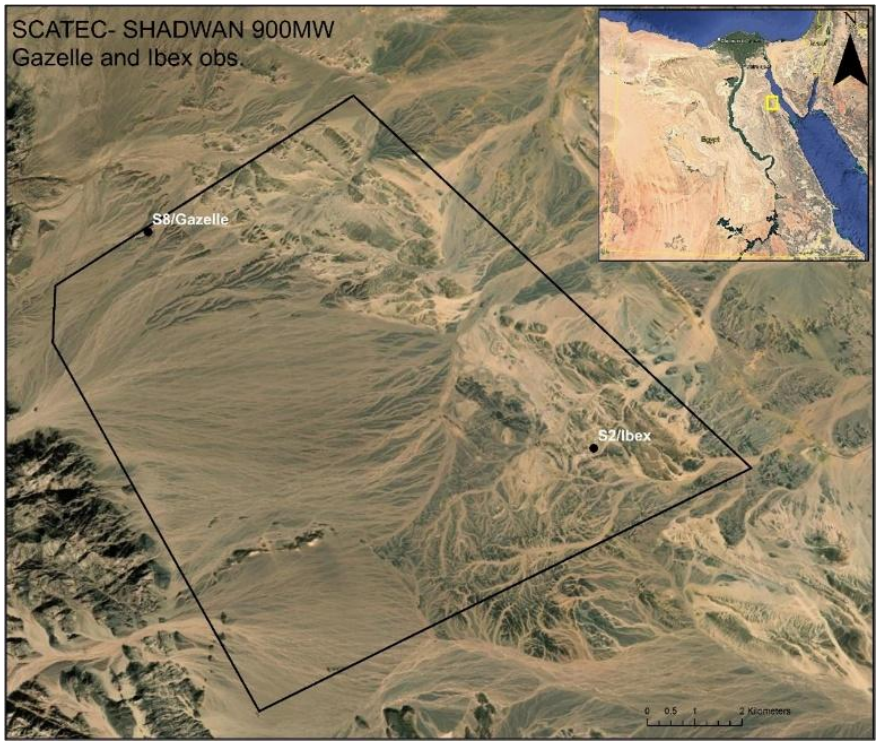


Figure 53: Observed gazelle and Ibex records on the site and coordinates

Table 28: Location of Observed gazelle and Ibex records

Date	Stand ID	Latitude	Longitude	Spieces
24-5-2025	2	28.065875	33.047423	*Capra nubiana* (Ibex)
24-5-2025	8	28.106885	32.962807	*Gazella dorcas* (Gazelle)

Nubian Ibex was recorded on transect 2 and Dorcas Gazelle was recorded on transect 8, both as individual encounters only. The site does not contain significant grazing grounds for these species and there are no water sources. Only a very few acacia trees were recorded on the site. There must be water in the wider area – although not on site, as Nubian Ibex have to drink regularly. Nubian Ibex is known as a species of higher altitude mountains.

Camera Trapping

Camera Traps were deployed at five sites for 29 days each, resulting in a total of 145 days of trapping. Two species were recorded using this method: Red Fox and Nubian Ibex. Red Fox was recorded a total of nine times, while Nubian Ibex was recorded twice at camera site 6.

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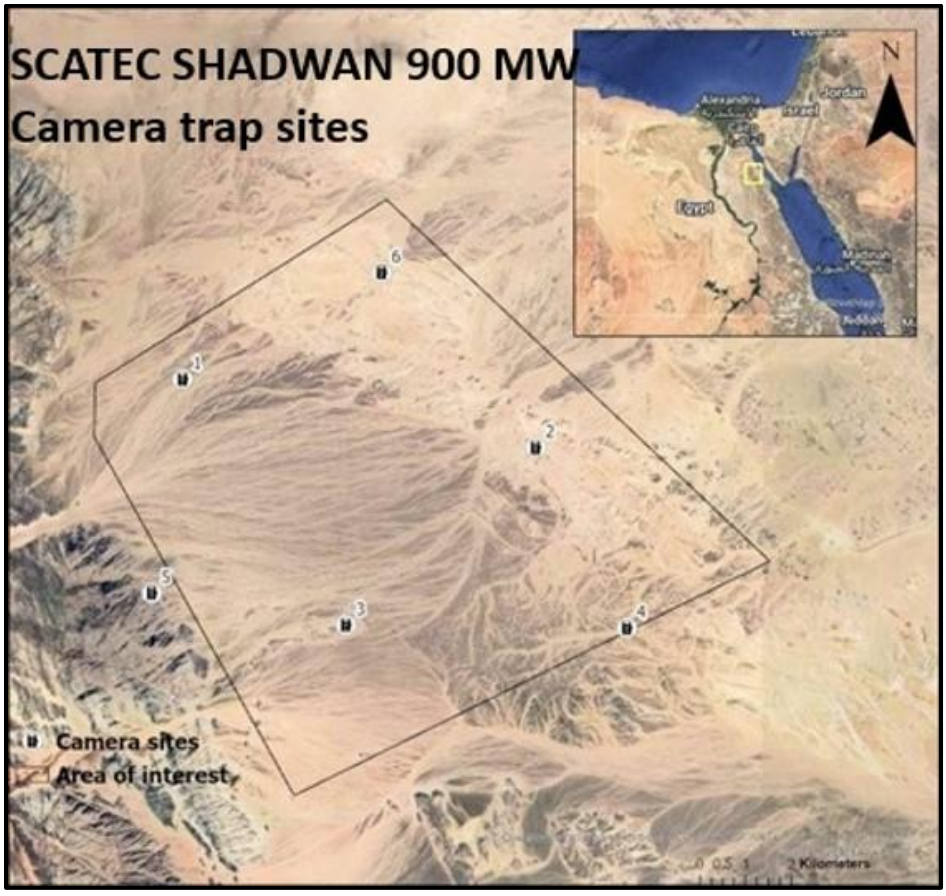


Figure 54: Camera trap locations

Dorcas Gazelle

Dorcas Gazelle is listed as IUCN Vulnerable, primarily due to the loss of 86% of its global historical range. Numbers of Dorcas Gazelle has been in decline for some time mainly due to hunting, and these declines have worsened with more intensive motorized hunting. Habitat degradation resulting from overgrazing by livestock and drought have also had negative impacts. A population of 1,000-2,000 is in rapid decline in Egypt, mostly outside protected areas (Saleh 2001). Egypt's largest Dorcas Gazelle populations occur in the southern Eastern desert (El Alqamy and Baha El Din, 2006). This gazelle inhabits a wide range of arid and semi-arid habitats, but avoids extensive areas of dunes and hyper arid areas (Cuzin 2003, Lafontaine et al. 2005) and it preferentially inhabits sparsely vegetated rocky plains. They occasionally inhabit canyons and hilly country, but avoid steep terrain. Dorcas Gazelle are nomadic and exhibit relatively small-scale seasonal movements in response to the availability of pasture (Heim de Balsac, 1936; Newby, 1974). The species has the ability to make seasonal shifts that allow it to exploit localised areas with high-quality and moisture-rich forage (Dragesco-Joffé 1993, East 1999).

Abundance is more often shaped by anthropogenic activities than ecological factors, and they have been studied to avoid areas of human disturbance and will choose less suitable habitats (Nagy et al, 2022). A study in Tunisia (Chammen 2008) found Dorcas Gazelles tended to avoid areas where agricultural development has occurred but did not seem to be disturbed by livestock. Results suggested that the occurrence probability of Dorcas Gazelle in southern Tunisia was mainly dependent on human presence and land use, rather than habitat characteristics. Studies from Tunisia show that they prefer clear, open

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and accessible areas which make it more suitable for predator detection (Louhichi et al, 2025). In Egypt in the Eastern Desert, Dorcas Gazelles browse upon Acacia raddiana, Acacia ehrenbergiana, Nitraria retusa, Psoralea plicata, Astragulus vogelii, and several other desert plants (Osborn and Helmy 1980).

Nubian Ibex

Nubian Ibex occur in Egypt east of the Nile and exist as small, isolated, populations in the Eastern Desert / Red Sea Mountains (and in the South Sinai in the mountains of the Sinai Peninsula (Attum et al. 2008, ElAlqamy et al. 2010)). The Eastern Desert population includes two protected areas including Elba Protectorate (36,000 km²) and Wadi Gemal Protected Area (7,000 km²). It is estimated that there are up to 400-1,000 Ibex in this region (ElAlqamy). Nubian Ibex occur in rocky, desert mountains with steep slopes and hills (which provide vital escape routes), and associated plateaus, canyons and wadis. They consume a wide array of herbaceous and woody plants (Alkon et al. 2008) and access to water is critical.

Nubian Ibex populations have declined in Egypt due to hunting pressure and competition with livestock. Habitat degradation and direct competition for resources with livestock is an issue particularly in Egypt. Disturbance of water resources by livestock and their herders, and depletion of water resources due to lowering water tables in the arid areas Nubian Ibex inhabit is a huge impact.

Both species are understudied and lack detailed distribution and population data for Egypt. Dorcas Gazelle is likely to be limited to very low numbers in the area, considering the existing amount of disturbance and lack of good quality habitat and food plants. They have also not been recorded in the wider area previously during any of the other surveys for the numerous wind farms in the area, but this could also be due to lack of survey effort rather than lack of presence. Nubian Ibex is not largely known to be in the area, with the area of the wind farm within the part of the range indicated as 'possibly extinct' by IUCN. Although, based on them being present at the wind farm site, it is very likely that there are animals still in the northern part of the Red Sea Hills, such as around Mount Gharib which is just to the north-west of the Project site a shown in the figure below. Although it is unclear why up to three individuals would be utilising the site and at this time of year (April-May) as there is a lack of good quality habitat, food plants and water.

Dorcas Gazelle and Nubian Ibex are both assessed globally as IUCN Vulnerable and thus considered as Priority Biodiversity Features.

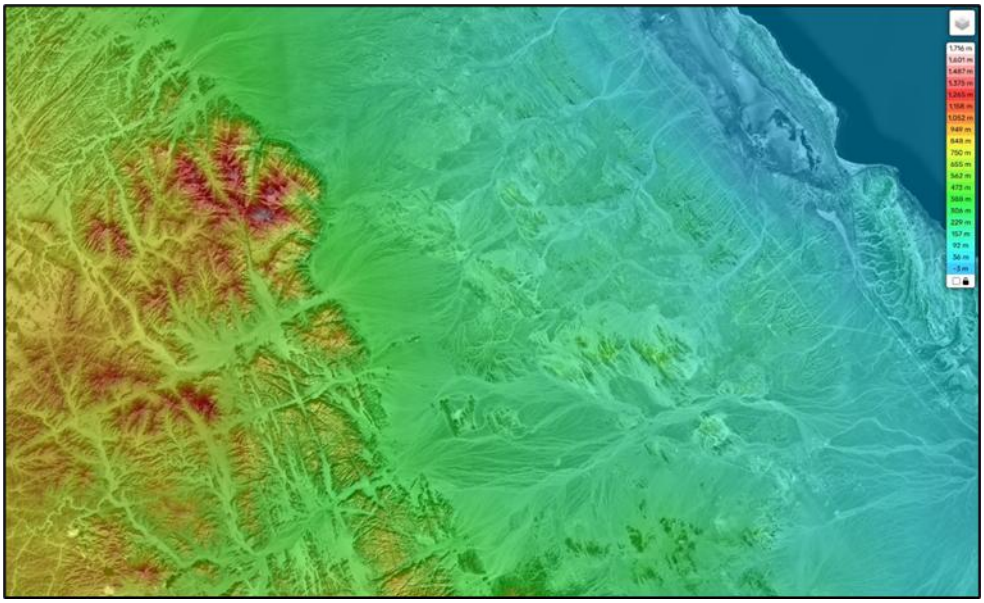


Figure 55: Mount Gharib adjacent to the Project site

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Track Stations Survey

Six track stations were set up and one wild mammal was recorded: Red Fox which was detected once on Station 1.

Small Mammals

Of the sixteen sampling sites, three returned positive records. Three species of small mammal were recorded during the live trapping surveys: Lesser Egyptian Gerbil (*Gerbillus gerbillus*), Fat Sand Rat (*Psmmomys obesus*) and a Jerboa species. All these species are listed as IUCN Least Concern.

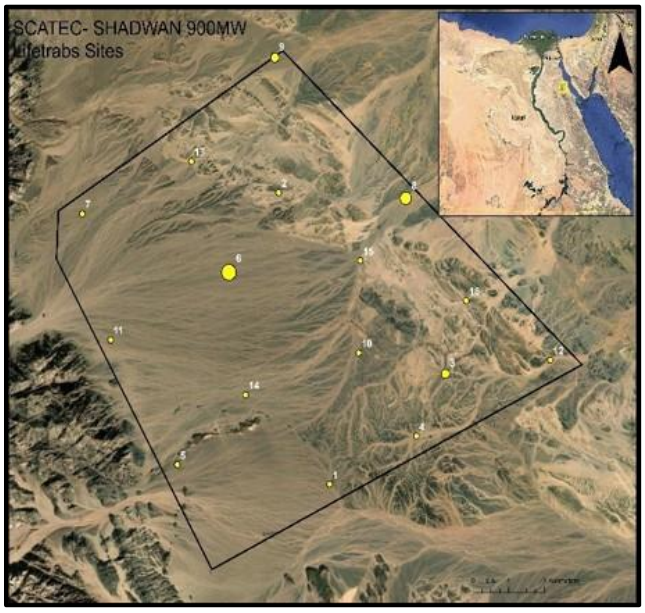


Figure 56: Live trapping locations

7.5.5 *Invertebrates*

A. *Methods: Invertebrates*

Invertebrate methodologies included pitfall trapping, with 16 sites within the AoI. Surveyors identified the species using key books, relevant scientific articles as well as consultation with external experts as appropriate.

B. *Results: Invertebrates*

No species of national or international conservation concern were recorded within the Project AoI and no species considered to be range-restricted, endemic or near-endemic were recorded. The invertebrate assemblage is considered typical for the area and the habitats present within the AoI and are of negligible sensitivity.

Table 29: Results of the Invertebrate Surveys

Common Name	*Scientific Name*	Red List Status	Number
Darkling Beetle	*Cerenopus concolor*	Least concern	57

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Darkling Beetle	*Trachyderma hispidum*	Least concern	62
Ant Species	-	-	14
Big Black Ant	*Cataglyphis niger*	Least concern	494
Camel Spider	*Paragaleodes ssp*	-	2
Deathstalker Scorpion	*Leiurus quinquestriatus*	Least concern	1
Desert Silver Ant	*Cataglyphis bombycina*	Least concern	1
Medium Dark Beetle	-	-	2
Medium Desert Ant	-	-	1
Praying Mantis	*Mantis ssp*	-	1
Small Desert Ants	*Cataglyphis spp.*	-	56

7.6 Avifauna

7.6.1 Baseline Assessment Methodology

A. General Introduction

There are two words that need to be clear when dealing with migratory studies and wind energy developments, one is "Flyway" and the second one is "bottleneck". A bottleneck is a must to pass the site, while the flyway is the wide-area throughout the migratory route where flights take place regularly.

Examples of bottlenecks are the Strait of Gibraltar between Spain and Africa, the Bosphorus between Europe and Asia in Turkey, or Bab al Mandab between Yemen and Djibouti; all these are narrow sea passes. An example of a bottleneck over mountains is Batumi in Georgia. A Flyway, as the RVRSF comprises several countries from Lebanon to Ethiopia and even further south. A flyway might include one or several bottlenecks; see Zalles and Bildstein (2000) for a complete review of these sites worldwide. In addition, Porter (2005) explains that birds concentrate in the Middle East at two main points, where the sea is at its narrowest: the GoS in Egypt and the Straits of Bab al-Mandab at the southern end of the Red Sea, the only two points according to Porter, where counts of > 100,000 soaring birds have been recorded. There are other sites in Gebel El Zeit and Ras Mohammed National Park although. Because of all the above, the location of the wind energy projects fall within the Flyway but does not form or belong to a bottleneck itself. In other words, birds do not need to pass through the area on all their migratory routes every season and year. The Flyway is wide enough; even hundreds of km over which birds move freely and this is the reason for the different numbers recorded at a specific site. This is the baseline hypothesis of this research, and if any kind of flight pattern exists, it would help to integrate into the mitigation strategy of these developments.

In order to balance wind industry and biodiversity conservation we require a proper analysis of the data collected at all kind of wind energy studies to 1) Understand the migratory bird behaviour and 2) Establish appropriate mitigation and monitoring measures balancing efforts and costs of wind energy operations and safeguard of migratory species.

Wind energy developments affect birds in different ways, being those always mentioned in the literature the collision with blades, the barrier effect, and the displacement. The collision is normally well assessed because it is easier just to find fatalities under the turbines, whilst the other two need further design, data collection and analyses. The analysis here only considers the collision risk. As we will see later, a percentage of all the Flyway populations cross twice every year through the RVRSF.

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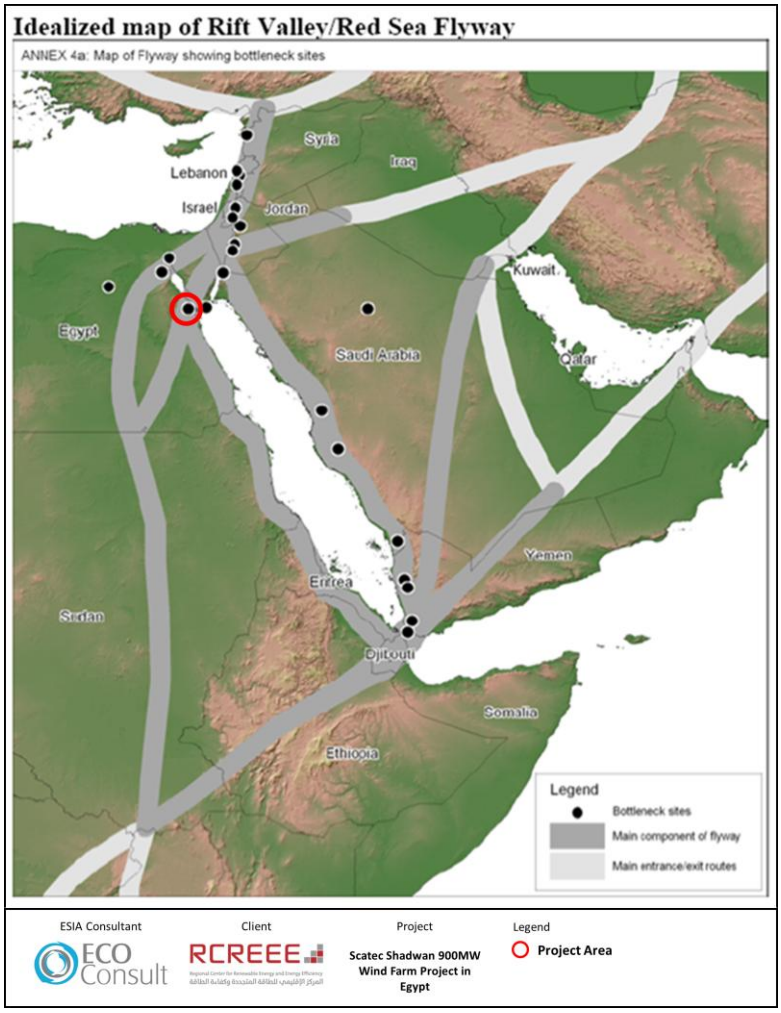


Figure 57 Map of the Rift Valley –Red Sea Flyway after Porter (2005)

The above map does not detail the two migration seasons but depicts all the routes. Thus, we have used the work by Shirihai et al. (2001) who depict better the autumn and spring migration routes and major watchpoints/ bottlenecks in the Middle East. The numbers refer to the watchpoints, being of our interest the numbers in the Red Sea area: 7 (Suez), 8 (Eilat), 11 (north Yemen), and 12 (Bab el Mandab). The arrows reflect the magnitudes of the migration routes. We can see how different the authors express the avian flux, which suggests a difference in bird intensity.

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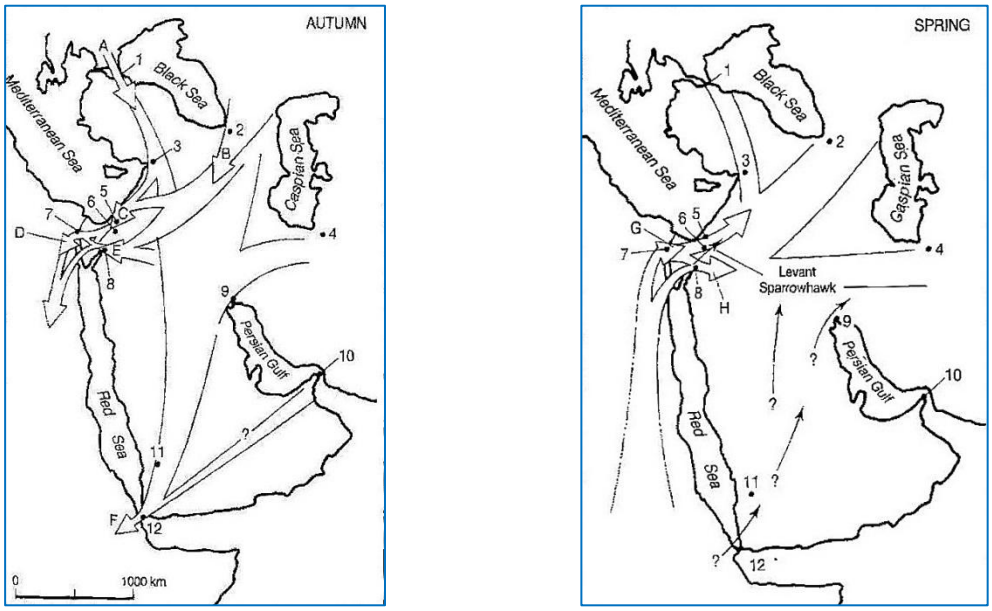


Figure 58 Maps of the Rift Valley-Red Sea Flyway and the routes of the autumn (left) and spring (right) migratory routes, after Shirihai et al. (2001)

According to the methodology outlined in the "Environmental Impact Assessment (EIA) Guidelines and Monitoring Protocols for Wind Energy Development Projects along the Rift Valley / Res Sea Flyway (RVRSF) with a particular reference to wind energy in support of the conservation of Migratory Soaring Birds (MSBs)" (2013), the "Strategic Environmental and Social Impact Assessment for an Area of 300 km² of potential wind farms at the Gulf of Suez (2013)", and the methodology applied in the "Strategic and Cumulative Environmental and Social Assessment Active Turbine Management Program for Wind Power Projects in the Gulf of Suez (2019)", the assessment used specific pre-assigned Observation Points (OPs) [also known as Vantage Points (VPs)] for the spring and autumn 2025 migration periods.

The objective of the survey was to provide an assessment of the presence and activities of the migratory and resident birds within the Project site and provide a detailed analysis indicating species' duration of activity and the elevations at which they are present. Meeting these objectives will provide an in-depth understanding of the predicted impacts of the Project on bird species.

Eight (8) Vantage points (VPs) were designated to cover the Project area. Due to the large-scale nature of the Project site and longer period of monitoring hours undertaken every day the rotational system was as follows: a) The monitoring was divided into a morning and evening shifts (5-6 hours each), b) The selection of the VPs during any monitoring event entailed rotational work to avoid for overlaps among contiguous VPs. For example, the VPs selected on Day 1 included VP1, VP3, VP5 and VP8, whilst the remaining was monitored on the following day. This approach ensures avoidance of overlap between the monitoring teams, so as to minimize the chances of double-counting as much as possible., and 3) Each VP was covered by two observers (i.e. for a total of 8 observers per day) that are qualified with adequate previous experience in avifaunal assessments for wind farms.

In the figure below, the locations and orientation of the VPs are indicated at the site where they were attended on alternating days. In other words, two VPs located adjacent to one another were not operated

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in the same day in order to avoid duplication and double-counted sightings. For example, Group A's VP1 and VP3 and Group B's VP2 and VP4 would be active on alternating days.

Other measures to avoid double-counting included: (i) continuous communication between team members onsite at VPs to report key flocks passing through the site; (ii) daily revision of daily sheets of observers by Team Leader to check for any potential double counting data, which if identified were removed for the data set accordingly – this included records that have same or similar number of birds, trajectories and timings.

Unlike previous methodologies that undertook eight (8) hours of observations, the Project's methodology has been updated to ensure monitoring is undertaken to start no later than 1-hour after sunrise until 1-hour before sunset.

Note: Although a 1-hour break is provided between each two-observation periods, the approach ensured that this does not affect the quality of recordings by alternating break periods among observes (i.e. one observer takes a break, for example, from 1pm-2pm while the second observer remains on shift and vice-versa). The approach enabled the continuous observation of avian sighting throughout daylight hours.

The start and end of observation periods varied depending on the following conditions:

- The season and, therefore, the duration of daylight hours
- Weather conditions, including visibility
- Observers were equipped with binoculars and cameras.

The field team was instructed to commence the monitoring program at the Scatec plot on February 2025, in accordance with the methodology identified above. The spring monitoring season in Egypt begins 20 February. The monitoring period was spread over the entire migratory period employed in the wider region of the Eastern Desert in Egypt (mid or late February to mid-May).



Figure 59: Location of VP for the spring and autumn seasons 2025

Table 30: Coordinates of the VPs (UTM 36R)

VP	Coordinates	
	N	E

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VP1	500247	3109684
VP2	496811	3107119
VP3	500595	3105506
VP4	502606	3107518
VP5	506522	3104355
VP6	503057	3102497
VP7	497131	3103548
VP8	499454	3100567

B. Data Collection

Data was recorded on spreadsheets (figure below) that were completed on a daily basis by the field team of Safe Soar. During data collection, observers accounted for days of zero bird counts (days with no records of migrating birds) to better understand birds' response to changes in weather conditions, limiting factors of crossing the Gulf of Suez, as well as determine favourable and unfavourable weather conditions of migration generally or specifically for a certain species.

Information on bird flight activity was collected from the VPs. The recording of observations followed the methods described by Band et al. (2007) and SNH (2017), which are summarized below, in addition to some site-specific adaptations to the migratory context in Egypt (also indicated below). This has been taken into account given that SNH includes method developed for Scotland, where migration patterns are different when compared to Egypt.

If a target species is detected, it was followed until it ceased flying or was lost from view. For each observation of a target species, the following data were collected:

- The time the target species was detected
- The flight duration of the target species to the nearest 15-second interval
- Flight elevation in the analyses was classified based on turbine specifications and divided into two classes: at collision risk and above collision risk.

At the time of the spring 2025 season, neither the Project layout nor the specifications of turbines were available. Therefore, the collision risk height was set at 240m, the general turbine tip height planned for the wind developments in the region. This height was also the same for the autumn.

As guidance to observers to define their area of survey before starting the observation, determining the cardinal directions (North, South, East, and West) and pre-defining several landmarks of reference in the field, if feasible, were outlined. Observers constantly scanned with and without binoculars within a circumference of 360 degrees around each VP until a target species is detected.

Weather conditions (wind intensity and direction, visibility, cloud cover and precipitation) were recorded at start of monitoring activities, then at every subsequent hour and at the end time of monitoring activities. Ideally, observations should have been made in a range of wind conditions. This is particularly important in the case of soaring birds when wind direction and strength is likely to affect migration behaviour and flight routes.

(i) BASIC DATA METRICS

- Date (year/month/day)

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- Vantage point (or Observation Point)
- Observer name (initials)
- Time at the start of the observation period
- Time at the end of the observation period
- Observation time in hours and minutes format (00: 00)
- Species with their English names. For unidentified birds it will be referred to the nearest identifiable systematic Genus, e. g. two close species *Circus macrorus/pygargus*, or to Genus level, e.g., *Aquila sp*., if not possible to the closest group e. g. Unidentified Raptor (UR).
- Number – number of birds of the same species (mixed species flocks should have one line and one key number for each species)
- Sex and Age - Sex: M/F; Age: Juvenile (J), Immature (I), Adult (A).
- Flying Height considering the following classes: 1-50, 50-120, 120-180, 180- 240, 240-300, 300-500, and above 500 m.
- Origin – cardinal/inter cardinal direction of the point where the bird was first detected in relation to the observer.
- Direction – cardinal/inter cardinal main direction of the bird(s)'s trajectory
- Relevant behaviour of flying – Soaring, Gliding, Active flying
- Observation numbers
- Observation Distance
- Recorded Inside or Outside the project site
- Any other noteworthy remarks were noted.

(ii) *Weather Data*

- This sheet will only be filled by one of the senior observers assigned by the Team Leader.
- The following weather variables will be recorded hourly.
- Cloud cover (%)
- Visibility (km)- following predefined categories: 1 = 2.5 km, 2 = 5 km 3 = 7.5 km, 4 = 10 km
- Temperature (ºC)
- Wind direction (cardinal/inter cardinal points)
- Wind speed (Beaufort)
- Precipitation: Yes/No. Heavy (H)/Moderate (M)/Light (L)

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A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
FID	Date	week	mon	VP	Start	End	montime	hr	min	Totmontin	Rec	Species	No.	Withou	birds/hr	Obs. Time
7	20-feb-25	8	2	4	8:20	16:15	7:55	7	55	475	7	STE	15	15	1.8947	9:51
8	20-feb-25	8	2	4	8:20	16:15	7:55	7	55	475	8	SBU	1	1	0.1263	9:51
9	20-feb-25	8	2	4	8:20	16:15	7:55	7	55	475	9	STE	8	8	1.0105	9:59
10	20-feb-25	8	2	4	8:20	16:15	7:55	7	55	475	10	BOE	1	1	0.1263	10:11
11	20-feb-25	8	2	4	8:20	16:15	7:55	7	55	475	11	STE	6	6	0.7579	10:15
12	20-feb-25	8	2	4	8:20	16:15	7:55	7	55	475	12	STE	5	5	0.6316	10:19
13	20-feb-25	8	2	4	8:20	16:15	7:55	7	55	475	13	STE	12	12	1.5158	10:25
14	20-feb-25	8	2	4	8:20	16:15	7:55	7	55	475	14	STE	1	1	0.1263	10:48
15	20-feb-25	8	2	4	8:20	16:15	7:55	7	55	475	15	STE	10	10	1.2632	13:26
16	20-feb-25	8	2	4	8:20	16:15	7:55	7	55	475	16	AQS	3	3	0.3789	13:30
17	20-feb-25	8	2	4	8:20	16:15	7:55	7	55	475	17	STE	2	2	0.2526	13:37
18	21-feb-25	8	2	1	10:25	14:00	3:35	3	35	215	1	SHE	1	1	0.2791	10:35
19	21-feb-25	8	2	1	10:25	14:00	3:35	3	35	215	2	SHE	1	1	0.2791	11:30
20	21-feb-25	8	2	1	10:25	14:00	3:35	3	35	215	3	AQS	1	1	0.2791	12:10
21	21-feb-25	8	2	1	10:25	14:00	3:35	3	35	215	4	STE	6	6	1.6744	13:15
22	21-feb-25	8	2	3	9:10	15:10	6:00	6	0	360	1	STE	7	7	1.1667	9:40
23	21-feb-25	8	2	3	9:10	15:10	6:00	6	0	360	2	IME	1	1	0.1667	9:40
24	21-feb-25	8	2	3	9:10	15:10	6:00	6	0	360	3	STE	69	69	11.5000	9:48
25	21-feb-25	8	2	3	9:10	15:10	6:00	6	0	360	4	STE	2	2	0.3333	11:14
26	21-feb-25	8	2	3	9:10	15:10	6:00	6	0	360	5	STE	1	1	0.1667	11:17
27	21-feb-25	8	2	3	9:10	15:10	6:00	6	0	360	6	STE	1	1	0.1667	11:25
28	21-feb-25	8	2	3	9:10	15:10	6:00	6	0	360	7	STE	2	2	0.3333	11:46
29	21-feb-25	8	2	3	9:10	15:10	6:00	6	0	360	8	STE	1	1	0.1667	12:18
30	21-feb-25	8	2	3	9:10	15:10	6:00	6	0	360	9	RSP	3	3	0.5000	13:13
31	21-feb-25	8	2	3	9:10	15:10	6:00	6	0	360	10	STE	1	1	0.1667	13:42
32	21-feb-25	8	2	5	8:25	15:30	7:05	7	5	425	1	STE	2	2	0.2824	12:02
33	21-feb-25	8	2	8	9:10	14:50	5:40	5	40	340	1	SHE	1	1	0.1765	14:02
34	22-feb-25	8	2	2	9:00	15:50	6:50	6	50	410	1	STE	2	2	0.2927	9:05
35	22-feb-25	8	2	2	9:00	15:50	6:50	6	50	410	2	STE	1	1	0.1463	13:38
36	22-feb-25	8	2	4	8:20	16:20	8:00	8	0	480	1	STE	4	4	0.5000	11:20
37	22-feb-25	8	2	4	8:20	16:20	8:00	8	0	480	2	STE	6	6	0.7500	11:28
38	22-feb-25	8	2	4	8:20	16:20	8:00	8	0	480	3	STE	2	2	0.2500	11:35
39	22-feb-25	8	2	4	8:20	16:20	8:00	8	0	480	4	STE	1	1	0.1250	11:43
40	22-feb-25	8	2	4	8:20	16:20	8:00	8	0	480	5	STE	1	1	0.1250	12:46

Figure 60: Data sheet example

The field team was in contact during the reporting period via mobile phones and a "WhatsApp Group". This would ensure immediate communication to follow up on the migrating flocks and individuals over the Project area, avoiding double counts of same flocks/individuals, while also ensuring full and accurate perception about the record spatial and temporal aspects.

Maintaining consistent and rapid communication was crucial to avoid double counting of observed species.

The data analysis and this section have been developed by ACRENASL. The results are based in the standalone Bird Migration studies for the spring and autumn seasons:

- Camina, A., Vicente, N., Martín, J., Garrido, J.R. 2025a. Bird Migration Study for the SCATEC Power BOO Wind Power Plant GW during autumn season 2025.
- Camina, A., Vicente, N., Martín, J., Garrido, J.R. 2025b. Bird Migration Study for the SCATEC Power BOO Wind Power Plant GW during autumn season 2025.

7.6.2 Monitoring times

As shown in the tables below, monitoring times per VP differed in spring and autumn, because there was fewer number of observation days (e.g. VPs 2 and 3 were not monitored in February and VP7 was not monitored in April and May due to the reasons explained earlier). The alternating monitoring time per VP resulted in non-comparable bird raw numbers, as a longer monitoring time might result in more birds recorded. Therefore, a standardized value for such comparisons was calculated as noted throughout this section. This variable, which measures such variations, is the *passing rate (#birds/hour of observation*), see Bibby et al. 1992, Caughley 1977.

Table 31: Level of Effort from Project Site VP during spring 2025

	VP1	VP2	VP3	VP4	VP5	VP6	VP7	VP8	Total

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Feb	27:35	30:51	30:00	45:00	31:20	33:13	32:05	27:05	257:09
Mar	126:07	120:12	128:24	106:21	128:40	120:30	112:03	114:00	956:17
Apr	118:23	120:18	120:18	120:59	112:47	120:06	120:20	117:47	950:58
May	88:40	75:55	88:08	76:03	89:10	73:00	73:09	88:05	652:10
Total	360:45	347:16	366:50	348:23	361:57	346:49	337:37	346:57	2861:34

Table 32: Level of Effort from Project Site VP during autumn 2025

	VP1	VP2	VP3	VP4	VP5	VP6	VP7	VP8	Total
Aug	87:02	88:22	87:29	87:32	89:04	88:34	88:17	88:15	704:35
Sep	120:56	120:25	120:20	119:45	121:02	120:06	120:31	120:20	964:17
Oct	128:31	119:49	128:28	119:50	128:26	112:23	120:29	128:24	986:20
Nov	40:04	40:02	40:15	40:11	39:22	40:08	40:10	40:09	320:22
Total	376:33	368:38	376:32	367:18	377:54	361:11	369:27	377:08	2975:34

The relief of the landscape at the project site is quite homogeneous. There is bare ground with almost no vegetation cover, except a few shrubs. This suggests there are few and rare features that would affect the birds' behaviour making them to prefer certain areas within the footprint (e.g. use of slope soaring flight because the presence of mountains or deep cliffs).

A. Bird Numbers

There were between 24 (autumn) and 31 (spring) species recorded in 2025. Following the common rule among projects in the GoS, there were more birds and contacts in spring (121,372 birds and 6,025 records) compared to autumn (58,713 birds and 605 records), as shown in the table below). In addition, observers were not able to identify a variable number of birds – those were classified as raptors, falcons, eagles or unidentified raptor. It is noteworthy that despite the increase of 10% in the monitoring time in autumn, spring doubles the number of birds.

In spring, 72.93% of the birds involved only three (3) species; the White Stork *Ciconia ciconia*, Steppe Buzzard *Buteo buteo vulpinus*, and the Honey Buzzard *Pernis apivorus*. Another four (4) accounted for more than 1,000 individuals (White pelican, Levant Sparrowhawk, Steppe eagle, and Black kite). All of these species represent more than 97.09% of the total birds seen. In autumn occurred the same, with 99.01% of the birds recorded involving the White Stork, Honey Buzzard, and the Great White Pelican. Among the most abundant species only the Steppe buzzard and Steppe eagle change between spring and autumn two species.

The fraction of unidentified birds e.g. "eagle", "harrier", and "raptor" are negligible in terms of importance for future analyses, as we present passing rates instead of raw numbers. The numbers in the Table are not the real ones crossing the Project's footprint. The observers miss birds too far from their sight; or they migrate at times the observers are not at the site, during the night, like the Common crane and the Lesser kestrel. Thus, we must work with median passing rates (birds/hour) and their associate confidence intervals. This median has a range, percentiles 5 and 95% where the real median falls. For understanding purposes, there is a maximum and a minimum passing rate, and the real value falls in between. This range already includes such missing information because of imperfect detection.

Table 33: Species Recorded during Vantage Point Monitoring in the spring and autumn 2025 (number of records and individuals)

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			spring		autumn	
SPECIES	IUCN Red List (2021)	National Status	#records	Individuals	#records	Individuals
Black Kite *Milvus migrans*	LC	Passage migrant	1,044	10,149	65	201
Bonelli's Eagle *Aquila fasciata*	LC	Passage migrant	1	1	-	-
Booted Eagle *Hieraaetus pennatus*	LC	Passage migrant	280	359	7	7
Black Stork *Ciconia nigra*	LC	Passage migrant	79	636	2	2
Chrested H Buzzard *Pernis ptilorhynchus*	LC	Passage migrant	1	1	1	1
Common Crane *Grus grus*	LC	Passage migrant	2	207	-	-
Eleonora's falcon *Falco eleonorae*	LC	Passage migrant	4	4	2	2
Egyptian Vulture *Neophron percnopterus*	EN	Passage migrant	121	147	6	7
Golden eagle *Aquila chrysaetos*	LC	Resident breeder	6	6	6	6
Glossy Ibis *Plegadis falcinellus*	LC	Passage migrant	3	4	-	-
Griffon Vulture *Gyps fulvus*	LC	Wintering Resident/passage migrant	12	12	-	-
European Honey-buzzard *Pernis apivorus*	LC	Passage migrant	315	15,253	194	8,132
Eastern Imperial Eagle *Aquila heliaca*	VU	Passage migrant	22	22	-	-
Common Kestrel *Falco tinnunculus*	LC	Passage migrant	25	27	21	22
Long-legged Buzzard *Buteo rufinus*	LC	Passage migrant	131	141	27	43
Lanner Falcon *Falco biarmicus*	LC	Passage migrant	1	1	6	8
Lesser Kestrel *Falco naumanni*	LC	Passage migrant	3	3	-	-
Lesser Spotted Eagle *Clanga pomarina*	LC	Passage migrant	340	949	1	1
Levant Sparrowhawk *Accipiter brevipes*	LC	Passage migrant	15	3,731	-	-
Marsh Harrier *Circus aeruginosus*	LC	Passage migrant	51	56	61	66
Montagu's Harrier *Circus pygargus*	LC	Passage migrant	7	7	5	5
Osprey *Pandion haliaetus*	LC	Passage migrant	25	25	3	3
Pallid Harrier *Circus macrourus*	NT	Passage migrant / winter visitor	4	4	4	5
Steppe Buzzard *Buteo buteo vulpinus*	LC	Passage migrant	1,331	23,506	60	139
Short-toed Snake-eagle *Circaetus gallicus*	LC	Passage migrant / summer breeder	573	832	1	1
Sooty Falcon *Falco concolor*	VU	Passage migrant/Resident	2	2	8	10

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			spring		autumn	
SPECIES	IUCN Red List (2021)	National Status	#records	Individuals	#records	Individuals
Greater Spotted Eagle *Clanga clanga*	VU	Passage migrant	11	11	-	-
Eurasian Sparrowhawk *Accipiter nisus*	LC	Passage migrant	68	79	2	2
Steppe Eagle *Aquila nipalensis*	EN	Passage migrant	1,392	6,584	13	14
White Pelican *Pelecanus onocrotalus*	LC	Passage migrant	41	8,855	74	23,109
White Stork *Ciconia ciconia*	LC	Passage migrant	115	49,758	28	26,888
Subtotal			6,025	121,372	605	58,713

Unidentified buzzard	N.A.	N.A.	95	2,215	32	301
Aquila sp.	N.A.	N.A.	259	1,429	12	13
Raptor sp.	N.A.	N.A.	147	14,477	22	65
Falcon sp.	N.A.	N.A.	20	24	33	34
Harrier sp.	N.A.	N.A.	-	-	19	22
Total			521	18,145	118	435

B. *Conservation Status*

As a whole, and according to IUCN Red List of Threatened Species (IUCN, 2021), six (6) are globally threatened – these include two (2) Endangered-EN, the Steppe Eagle and the Egyptian Vulture, and three (3) Vulnerable-VU, the Eastern Imperial Eagle, Greater Spotted Eagle, and Sooty Falcon. In addition, one (1) species is Near Threatened-NT, the Pallid Harrier. All the remaining species have been evaluated as Least Concern.

However, there is one species which is resident, the Golden eagle, that despite classifies as Least Concern, constitutes an important biodiversity value. The presence of the species in Egypt is in the southernmost point of its distribution range worldwide. An individual loss has the implication of reducing the distribution map but also to extinct the Golden Eagle in the country.

It is worth to mention that the Lesser kestrel is underrepresented. Despite being a species triggering Important Bird Areas (see precious section about protected areas), the species migrates also at night. The species is also of a very small size, being the observers able of counting from the Vantage points properly (detectability quickly decrease as distance increases from observers). Because of these two reasons, counts in the project area should not be considered useful and representative.

C. *Spatial Passage per VP*

Each species has a different passing rate and timing for migration, which varies depending on the month and season. This has been studied in the scientific literature, e.g. (Shirihai et al. 2000). For the comparison among VPs, the median passing rate (birds per hour of observation) was utilized. There were no differences when comparing the passing rates per species, neither spring nor autumn (Camiña et al. 2025a and 2025b). The lack of a preference is an expected result because of two main reasons: 1) the uniform

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landscape of the project site which does not have special characteristics forcing or influencing the birds to behave differently and 2) the, similarly, absence of geographic features which could influence the bird´s flight. Reasons for potential differences in 2025 could be related with the congregators behaviour of the different species: there are species migrating solitary or small groups, opposite to others like the White stork or the Honey Buzzard. None of the analysis performed showed significant differences in the passing rates among VPs in spring or autumn. In other words, the passage was random and only influenced by the flocking behaviour. The presence of some large flocks for the most congregator species may influence the appearance that birds tend to pass preferring certain areas, which is not really true. The mean flock sizes for every species each year appear in the table below.

Table 34: Mean flock size per species, number of observations in spring and autumn 2025, and min and max flock sizes recorded. Those highlighted are considered solitary or migrating in small groups.

SPECIES	Spring 2025		Autumn 2025		Minimum and Maximum Flock Sizes	
	Mean Flock Size	# records	Mean Flock Size	# records	Min	Max 21-23
Black Kite	9.72	1,044	3.09±4.27	65	1	30-180
Black Stork	8.05 ±11.60	79	1.00	2	1	49
Common Crane	196.6 ±136.47	2	-	-	1	195
Bonelli's eagle	1.00	1	-	-	-	-
Booted Eagle	1.00 ± 0.61	7	1.00	7	1	1
Common Kestrel	1.00±0.27	22	1.05±0.22	20	1	2
Eastern Imperial Eagle	1.00	22	-	-	1	1
Egyptian Vulture	1.00 ±0.58	121	1.16±0.40	6	1	5
Eleanora´s falcon	1.00	4	1.00	2	1	1
Griffon vulture	1.00	12	-	-	1	1
Eurasian Sparrowhawk	1.16±0.37	68	1.00	3	1	2
E. Honey Buzzard	48.42±166.29	315	41.91 ± 110.61	194	1	800-2,100
Great White Pelican	215.98±395.04	41	312.28 ± 660.30	74	7	200-5,000
Golden eagle	1.00	6	1.83 ±0.71	12	1	3
Greater Spotted Eagle	1.00	11	-	-	1	1
Lanner Falcon	1.00	1	1.33±0.51	6	1	2
Lesser Kestrel	1.00	3	-	-	1	1
Lesser Spotted Eagle	2.79 ±0.29	340	1.00	1	1	65
Levant Sparrowhawk	248.73±548.90	15	-	-	1	2,000
Long-legged Buzzard	1.08 ± 0.29	131	1.59±0.79	27	1	3
Montagu´s Harrier	1.00	5	1.00	19	1	2

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SPECIES	Spring 2025		Autumn 2025		Minimum and Maximum Flock Sizes	
	Mean Flock Size	# records	Mean Flock Size	# records	Min	Max 21-23
Marsh harrier	1.10±0.30	51	1.08±0.27	61	1	2
Osprey	1.00	25	1.00	3	1	1
Pallid Harrier	1.00	6	1.25±0.50	4	1	1-2
Short-toed Snake Eagle	1.00 ± 0.95	573	1.00	1	1	9
Sooty Falcon	1.00	3	1.25±0.46	8	1	2
Steppe Buzzard	17.66± 40.53	1,331	2.31±2.77	60	1	19-450
Steppe Eagle	4.73 ± 9.43	1,392	1.07±0.27	13	1	2-120
White Stork	432.68± 945.23	115	960.28±1438.94	28	1	5,000-6,000

The table above indicates the results of observations for the various species sighted including: the White stork, Great White Pelican, and Levant Sparrowhawk have the largest mean flock sizes (>2,000 individuals per flock) in 2025. Others like the Eurasian Honey and Steppe buzzards have smaller mean flock size. On the contrary, eighteen (18) out of thirty-one (31) species, are considered solitary birds (as highlighted in the table).

The hypothesis before performing the 2025 monitoring sessions and based on the experience of the Consultant in analyzing similar data for other wind farm projects in the region for multiple migratory seasons, was for those species that tend to pass in greater numbers through specific VPs one year, they are not likely to repeat their routes in the same way the following season – demonstrating variability at the scale of the project site.

D. Birds at risk, influence of weather conditions

. As noted in the table earlier, it is evident that there are differences in the resulting number of unidentified birds. In this case, there is the effect of human error (including varying perceptions in estimation of flight altitude and avifauna identification) as there were different teams available between the two years.

The exploration analysis indicated that the number of birds at risk was significant but negative related to the increasing observation time ($p = 0.001$) based on Pearson r-coefficient. The earlier the time of observation in the day, the higher the number of birds at risk. This relationship suggests that any analysis on the passing rates or bird numbers should include as much variables as possible that could influence the behaviors including a) the time of day, b) weather conditions (indicating wind speed and direction), c) temperature, d) location (VP), and e) observers.

For example, at the site, wind direction was influential in indicating the number of birds at risk – indicated as ("yes") or ("no"). Western, southwestern and southern wind directions indicated that species were less likely or had not traversed the project footprint. The table below presents the distribution of bird numbers according to wind direction during the spring 2025 survey as an illustrative example. A similar analysis is not conducted for the autumn season, as such analysis require a minimum volume of data to provide useful outcomes, which is not available for Autumn season.

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Table 35: Distribution of bird numbers according to wind direction in spring 2025

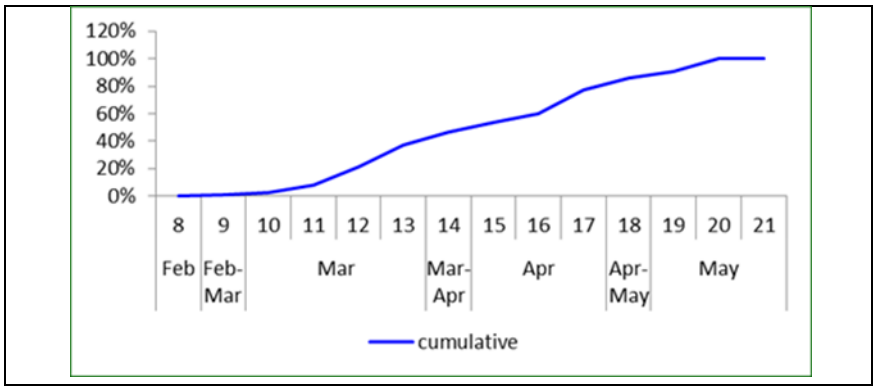
Wind Direction	Total	Yes	No
NW	39787	10087	29700
N	33400	3479	29921
NE	3847	1660	2187
E	5084	1047	4037
SE	3959	983	2976
SW	195	156	39
S	91	16	75
W	711	601	110

This analysis provides an added perspective for understanding as well as predicting avifaunal patterns at the project site.

E. Temporal Patterns: Monthly and Daily Passes

The Figures below show the cumulative percentage of migratory soaring birds crossing per week and month in spring (above) and autumn (below). There are two types of patterns. The one in spring is steadier, with birds crossing at a "constant" rate at all times, especially from mid-March till the end of the season in May. On the contrary, in autumn the patterns show like "jumps". A first occurs in the mid and late August weeks. Then, most of the White storks and Honey buzzards pass. The second one is by the end of September and first days of October. By the mid-October, nearly 80% of the birds have crossed already.

From the data in the tables, the Consultant was able to represent temporal patterns to understand the migration through the project site we first present the cumulative counts throughout the season, followed by the most abundant species and those with the highest risk based on the CRM model. For each species in spring and autumn, we present the data and graphs in two ways i) per #week and month and ii) time of the day, from 7:00am to 18:00pm.



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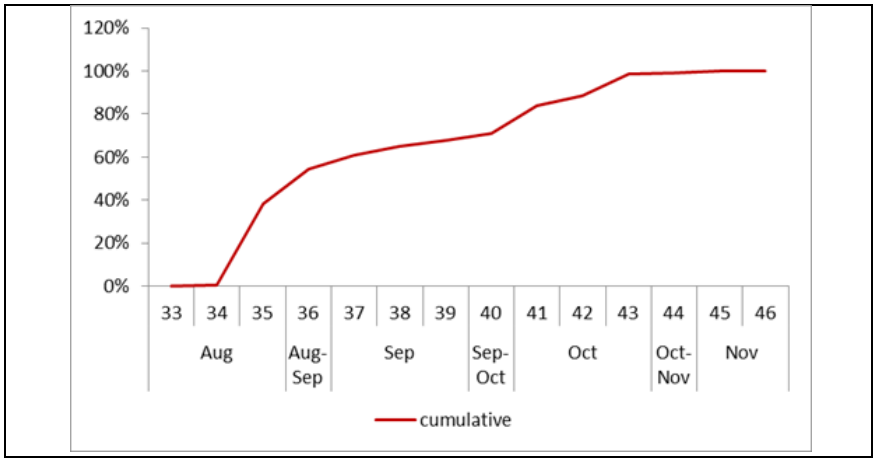


Figure 61: Weekly and monthly cumulative percentage of birds crossing in the springs (above) and autumn (bottom) in 2025

The most comprehensive monitoring of bird migration in the Middle East comes from the work by Shirihai et al. (2000) "*Raptor Migration in the Middle East. A summary of 30 years of field research*". As the title says, it includes more than thirty years of established monitoring. The authors explain that counts at the Gulf of Suez of migratory birds in both autumn and spring were observed and recorded already in the 80´s and 90`s with specific references there such as Biljsma (1982, 1983), Wimpfheimer et al. (1983), Meininger & Atta (1994), or other counts in the Southern Red Sea Area (Sorensen 1982, Grieve 1996). The authors also provide details on and how migration occurs both in spring and winter along the entire Middle East, from Djibouti to Jordan and Lebanon, from Egypt to Yemen, providing also data from latitudes further north like Bosphorus. The assessment below compared the results with the Shirihai et al. (2000) study in order to understand and compare the raptor migratory patterns recorded within the Project site since it is more focused in the Middle East. For the non-raptor species, other scientific sources have been considered.

It must be kept in mind that despite wind energy is a new field; the migratory counts existed many decades before the first turbines started spinning. The VP counts do not differ from those counts being done exclusively to study the migration.

(i) The White Stork

This species has been recorded from early March to May, with peaks in the second half of March in 2025. For the study and comparison of the passage of the White Stork the work by Van den Bossche (2002) was relied on, who uses data from the 90's for his analyses. This study refers to smaller flocks in April and May. The site results show a different pattern as large flocks were recorded consistently: March, April, and May with flocks larger than 1,000 birds but a small number of contacts (records). However, the pattern of migration has greatly changed over the entire Palearctic, with a proportion of the population becoming sedentary due to feeding from dumpsites along the way. The hourly interval is the same as the overall pattern observed before with two migration peaks – one in the mid-morning and another in the early afternoon.

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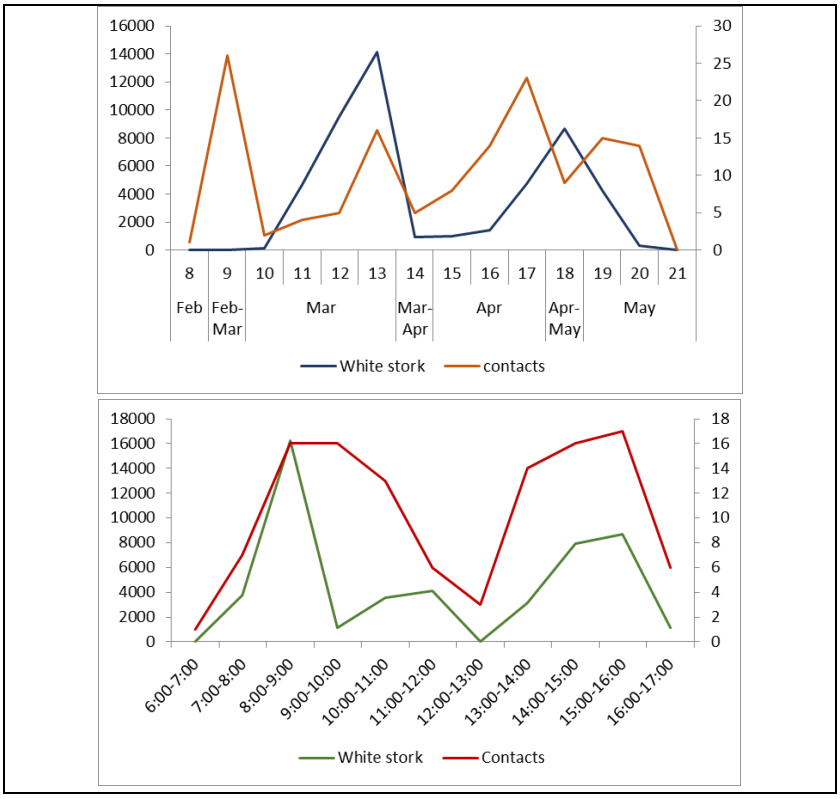
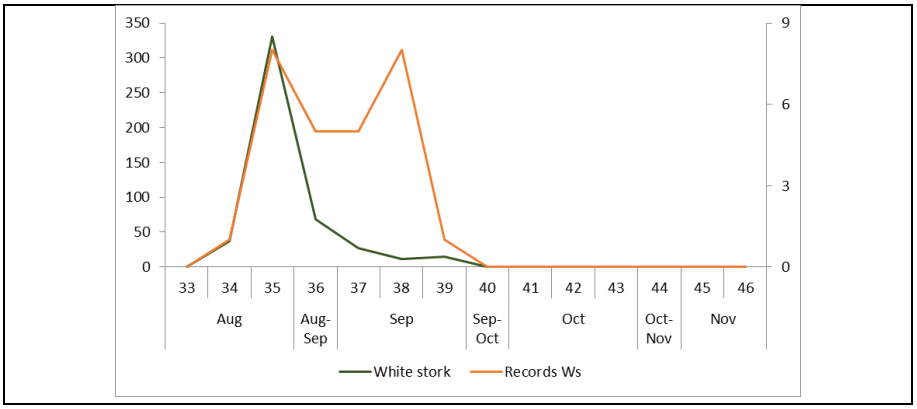


Figure 62: White Stork: passing rates and contacts during the spring 2025 according to months and weeks (up) and daily hour interval (bottom)

In autumn, the White Stork migrates early, as expected when comparing with other areas (Shirihai et al., 2000) or regions (Western Palearctic). However, the daily pattern differs with the spring. Most, if not all birds, crosses in the afternoon. There is a coincidence although, in the late afternoon, with a peak before sunset.



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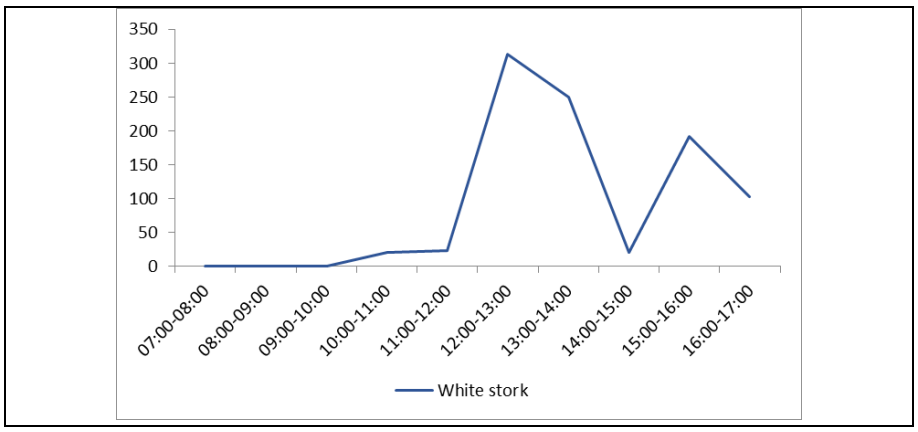
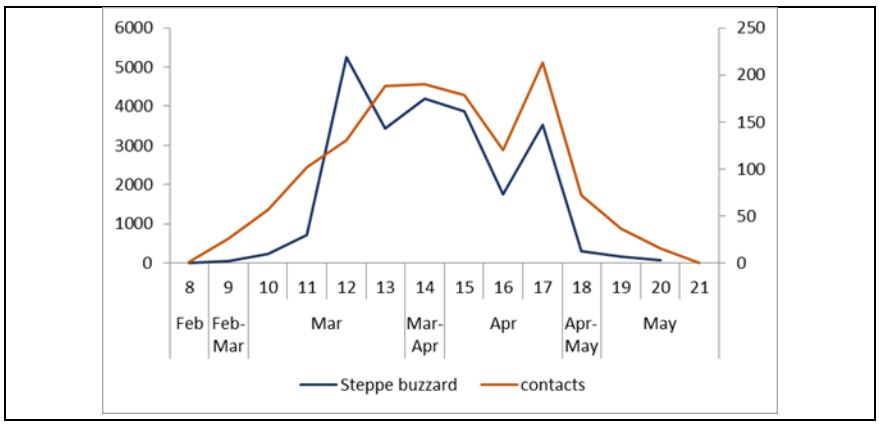


Figure 63: White Stork: passing rates and contacts during the autumn 2025 according to months and weeks (up) and daily hour interval (bottom)

(ii) *The Steppe Buzzard*

The next figure below presents the migration pattern for the Steppe Buzzard which extends from mid-March to May. The large pass start in mid-March to April-May, reaching the highest counts in late March. Shirihai et al. (2000) mentions that 90% of the total numbers passes between 22 March and 15 April. Results almost perfectly match this pattern, but in 2025 the passing time frame extends beyond mid-April. All the times the passing rates matches with the records, showing the consistency on group migration.



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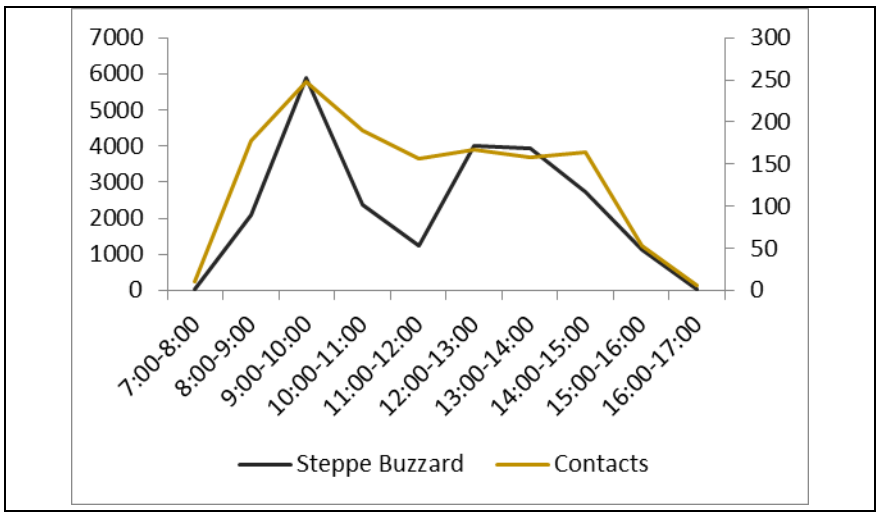
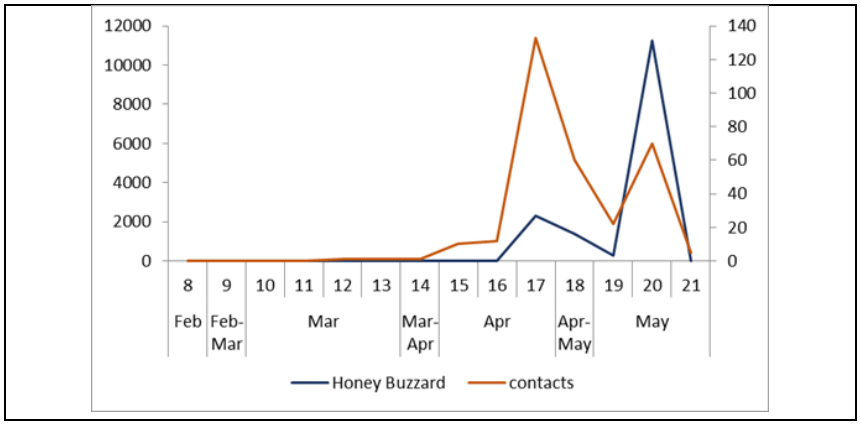


Figure 64: Steppe buzzard: passing rates and contacts during the spring 2025 according to months and weeks (up) and daily hour interval (bottom)

On the contrary, there were only 139 birds recorded and 60 records, which are clearly not enough for any trend assessment. Thus, we cannot present graphs for this season.

(iii) The European Honey Buzzard

The figure below presents the migration pattern for the European Honey Buzzard. As expected, according to the well-known migratory patterns in the region, the European Honey Buzzard peaks in May, despite an incipient migration in the last week of April, this is formed by scattered contacts. Shirihai et al. (2000) refers to the European Honey Buzzard with a migration period which extends from mid-March to mid-June and recorded the peak between late April and late May – which corresponds well with the data noted for the project site. Information about the migration in June is not available, as all the migratory counts ends by May 20th.



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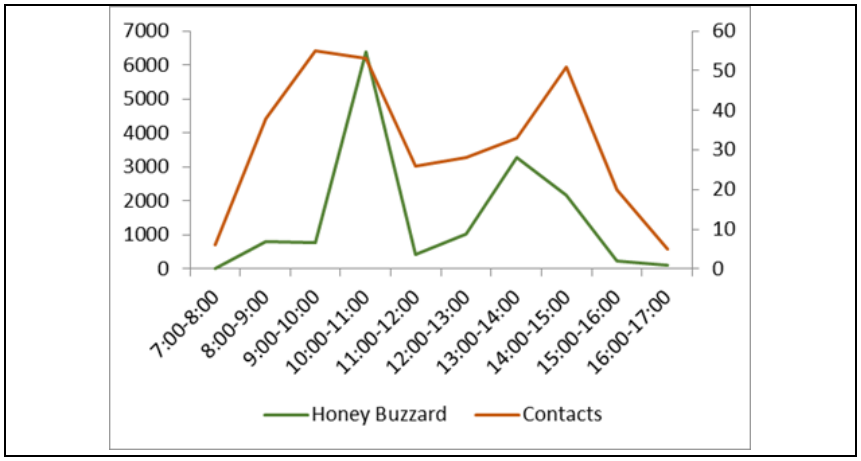


Figure 65: Honey buzzard: passing rates and contacts during the spring 2025 according to months and weeks (up) and daily hour interval (bottom)

The Honey Buzzard has a quite concentrated patter in autumn in terms of weeks, passing early in the season, figure below (up). Both contacts and passing rates are highly synchronized, many birds cross in large groups involving similar numbers of birds.

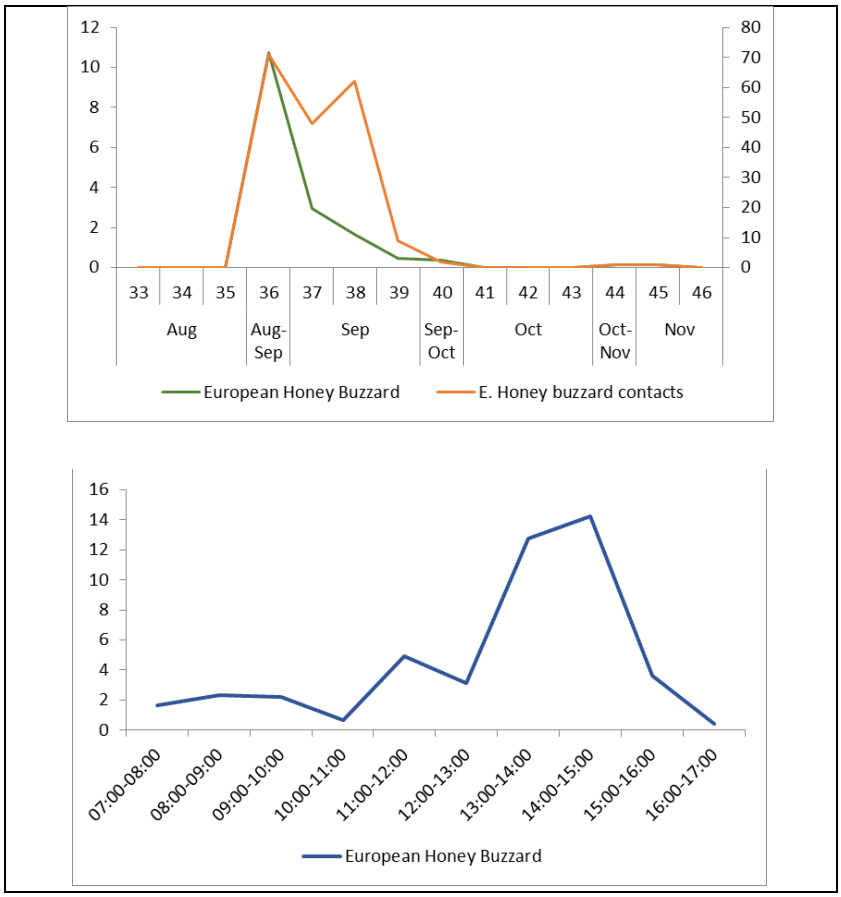


Figure 66: Honey buzzard: passing rates and contacts during the autumn 2025 according to months and weeks (up) and daily hour interval (bottom)

When referring to time of the day, in autumn Honey buzzards also crossed in the late afternoon. This pattern, if repeating in future autumn seasons, may have implications for the mitigation strategy on site

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and the Shut-down on demand (SDOD), suggesting hours where migration could be higher (more observers should be aware for detection). The passing rates for all of them increased in the afternoon, after 11:00-12:00pm, to descend by the end of the day. This has been the case not only for this species but many others in 2025.

(iv) The Black Kite

The figure below presents the migration pattern for the Black Kite. This species appeared from March to May (a total of 11 weeks) with the highest numbers occurring between mid-March and end of April. This pattern is similar to what is referenced by Shirihai et al. (2000). Some slight differences appear with other projects in the region –a week later in 2021- but this could be due to normal issues in the migration (delays because of unknown reasons, detours, etc.) given the scale of this process.

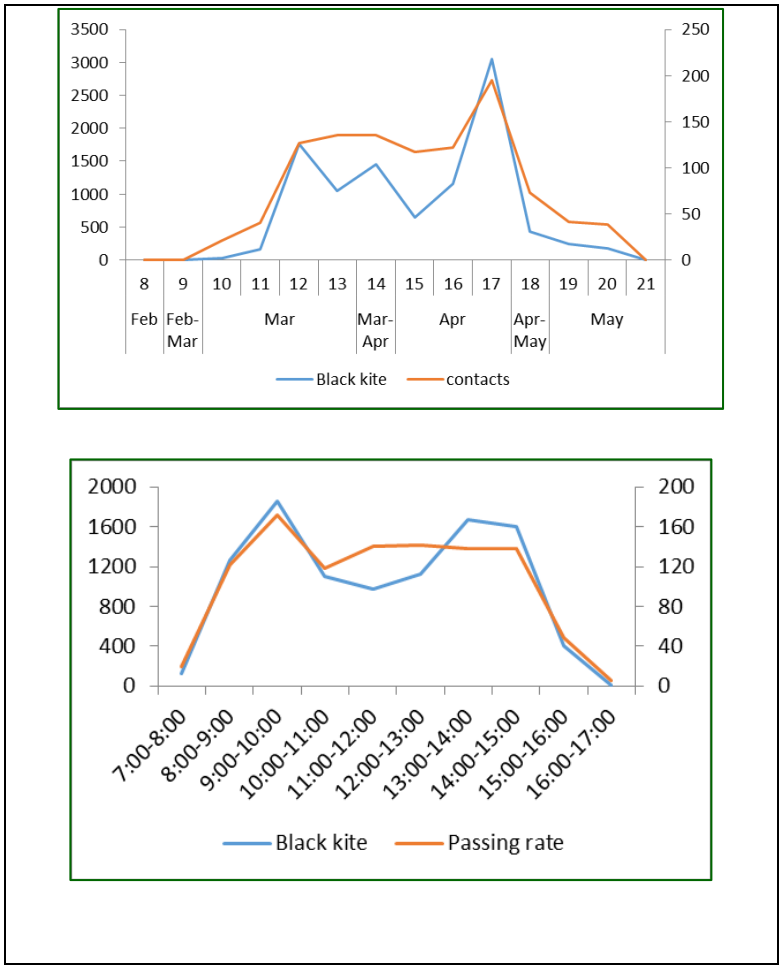


Figure 67 Black Kite: Passing rates and contacts during the spring 2025 according to months and weeks (left) and daily hour interval (right)

(v) The Steppe Eagle

The figure below presents the migration pattern for the Steppe Eagle. This species migrates between mid-February and May (a total of 12 weeks), showing its peak in early March in 2025, and a smaller one in early April. In general, the pattern here is similar to Shirihai et al. (2000). The daily passage is also

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concentrated with most of the birds passing since the morning window at 8:00 am till 15:00 pm. The birds start the migration early in the day, with a higher passing rate which then descends and remains similar for the rest of the day. However, most of the contacts reach it by the mid-day. It is one the Priority species for this and other projects in the GoS, classified as Endangered by the UICN.



Figure 68 Steppe eagle: passing rates and contacts during the spring 2025 according to months and weeks (up) and daily hour interval (bottom)

The hourly passage rate for the Steppe Eagle is similar to that for the Steppe Buzzard, with a nearly similar passing rate throughout the day. Also, the patterns of the number of records keep the same trend of the previous raptor species; the records reach the peak by 9:00-10:00am, then decreasing till the end of the day.

On the contrary, in autumn the Steppe eagle is really scarce, with only fourteen birds (14) for thirteen records in the entire season, and an additional 10% monitoring time compared to spring.

7.6.3 Breeding Birds

The close proximity to the mountain range favors the appearance of cliff nesting birds of importance. Unless specific targeted studies were being done, concern exists for two raptor species, one resident the entire year, the Golden eagle (*Aquila chrysaetos*) and the Sooty Falcon (*Falcon concolor*).

A. The golden eagle

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It is important to highlight the ten recordings from March (2), April (5), and May (3). All involved either one (1) or two (2) birds, as shown in the figure below, a photo of one adult one by the field team. Observations took place at two VPs, #2 (five (5) sightings) and #7 (two (2) sightings). The remaining three (3) occurred at VPs 1 and 4, both joining. In addition, the golden eagle has been cited in Egypt in the GoS in such exact area in august 2024. During the autumn monitoring, there were ten records from august (1), September (2), October (5) and November (4). They involve from one (1), four records, to three (3) birds, two occasions. Observations took place at all vantage points except number seven (vp07).

The species is categorized as least concern (LC) according to the IUCN (WESTRIP, J.R.S. et al. 2022. *Aquila chrysaetos*. The IUCN red list of threatened species 2022: e.t22696060a210501592. https://dx.doi.org/10.2305/iucn.uk.2022-1.rIts.t22696060a210501592.en). This finding opens the chance that more pairs could exist in the mountains of the red sea in Egypt, which have been probably not properly monitored because of the harsh climate by ornithologists or scientists.

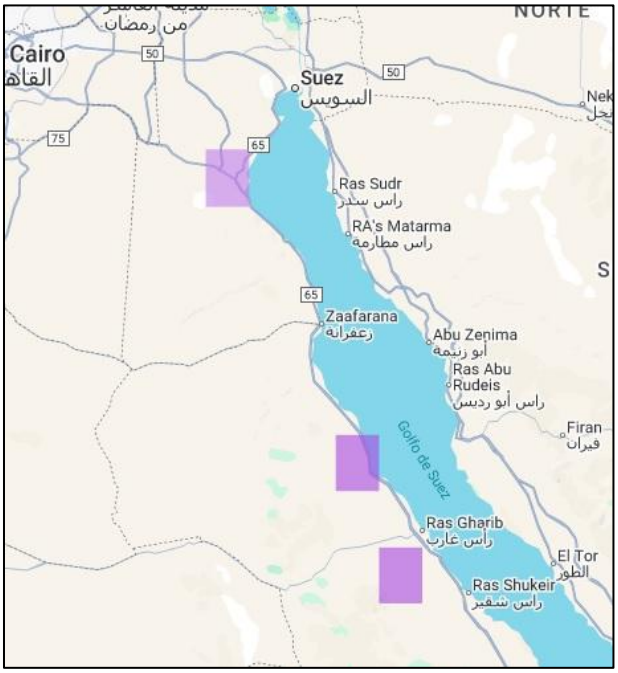


Figure 69: Areas where Golden eagles have been recorded in Egypt during appropriate breeding season. Data from Sullivan et al. (2017)

From an ecological perspective, this observation would extend the breeding range to the south, and to the east in northern Africa, where it would be really very scarce. In the Golden eagle, population growth rates are particularly sensitive to adult mortality rates and only a 4% reduction in adult survival is enough to trigger population decline, which cannot be offset by increased productivity (Tack, J.D., Noon, B.R., Bowen, Z.H., Strybos, L. & Fedy, B.C. (2017). No substitute for survival: Perturbation analyses using a Golden eagle population model reveal limits to managing for take. *J. Raptor Res*. 51, 258–272.

Thus, appropriate mitigation measures should apply, despite the LC category but because of the biodiversity value of being the current southernmost region in the Mediterranean where the species do breed. Despite globally, the loss of one individual is minimal for the entire world population; it is not at regional level due to its small population.

A detailed breeding survey on this species would be necessary to assess the real population size in this area, unique for the world in the edge of its distribution range. The finding on this wind farm pre-

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construction monitoring is highly relevant due to the protected species list in Egypt (BirdLife International (2025) available at https://datazone.birdlife.org/country/factsheet/egypt

A complete survey comprising the entire breeding cycle of the species would be necessary to properly assess the potential impact of this and other similar projects planned near the mountains and suitable cliffs. This monitoring should be developed with experts on the species, and GPS tagging highly recommended to save time and improve budgets. This monitoring could be shared by other developers in a similar situation.

- References:

1. Sullivan et al. (2017) Using open access observational data for conservation action: A case study for birds. Biological Conservation. http://dx.doi.org/10.1016/j.biocon.2016.04.031

2. The Cornell Lab of Ornithology. Birds of the World. https://birdsoftheworld.org/bow/species/goleag/cur/introduction?lang=es

B. *The Sooty Falcon*[28]

Following Garrido et al. (2021), the sooty falcon breeds colonially in hot, arid deserts and coastal habitats without vegetation, and on coral islands, where its breeding coincides with the autumn migration of the small birds on which it feeds (Clark and Davies, 2018). It nests in a hole or on a cliff ledge. It is classified as Vulnerable (VU) in the IUCN Red List 2021. It is a migratory species; birds arrive in their breeding grounds in April and return to their wintering sites in OCtober (del Hoyo et al., 1994).

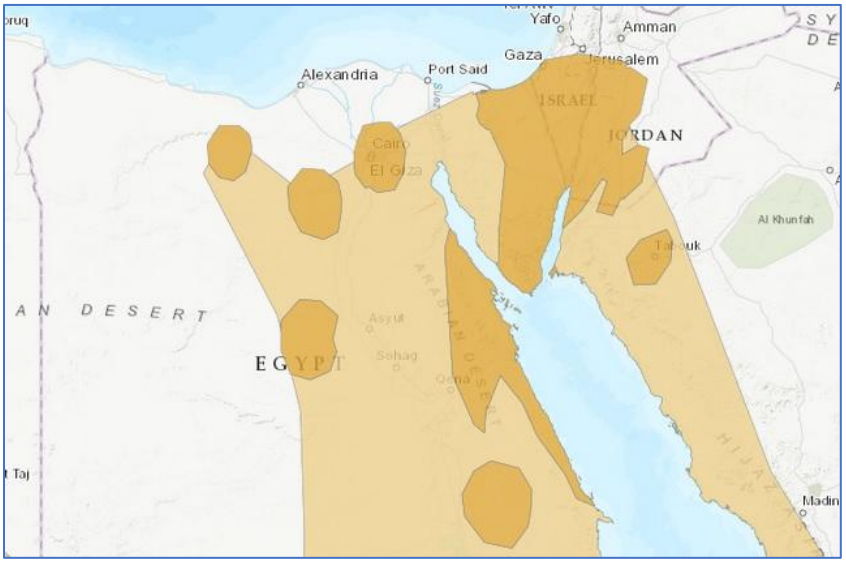


Figure 70: Distribution map of the Sooty falcon in Egypt. Dark color: breeding, light color: passage.

Despite only two individuals have been recorded in the spring migration, up to ten individuals were recorded between August and October. This is a species, for which observers are not able of proper

[28] BirdLife International. 2021. Falco concolor. The IUCN Red List of Threatened Species 2021: e.T22696446A180387681. https://dx.doi.org/10.2305/IUCN.UK.2021-3.RLTS.T22696446A180387681.en. Accessed on 22 December 2025.

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monitoring from the Vantage Points due to its small size (e.g., observers lost their capabilities for detecting and recording the birds at very short distances, much shorter than the 1.8- 2 km radius. In other words the species is UNDERESTIMATED.

The Sooty falcon has been recorded already colliding with wind farms in the Gulf of Suez, close to the proposed project. A recent paper on the Lesser Kestrel *Falco naumanni* quantified the potential long- term demographic impact of collisions to anthropogenic structures like windfarms in a relatively short-lived bird species. Additional mortalities induced by collisions with turbines may also have a strong impact on their population dynamics.

Due to the habitat characteristics, close to the cliffs and mountain ridge, we consider the potential breeding population has not been properly assessed in this and other surrounding projects with similar characteristics. The current monitoring is limited to migratory seasons, without non species specific breeding monitoring. This should be done.

Following Garrido et al. 2022: The species is included in the CMS Appendix II. There is a draft International Single Species Action Plan (Gallo-Orsi et al., 2014, unpublished). The main conservation and research actions needed: Awareness of the species should be raised. Research should be conducted to inventory, survey and monitor the population to determine, protect and manage potential breeding sites and key dispersal areas, including migration corridors. Research on the ecology of breeding, non-breeding and migrating birds is needed, involving GPS tagging and on-the-ground investigations, to assess potential threats to the species.

- A species specific study with experts (apart from the normal migration monitoring) on the potential breeding of the species in the mountainous areas, and others in the vicinity, as shown in the figure above, should be completed. Additional References:

1. Garrido, J.R., Numa, C., Barrios, V., Qninba, A., Riad, A., Haitham, O., Hasnaoui, H., Buirzayqah, S., Onrubia, A., Fellous-Djardini, A., Saheb, M., Rousselon, K., Cherkaoui, S.I., Essetti, I., Noaman, M., Radi, M., Cuzin, F., Irizi, A., Monchaux, G., Hamdi, N., Monti, F., Bergier, P., Ouni, R., Etayeb, K., Chokri, M.A., Azafzaf, H., Gyenge, P., Si Bachir A. and Bakass, B. 2021. The Conservation Status and Distribution of the Breeding Birds of Prey of North Africa. IUCN, Gland, Switzerland.

2. Duriez, O. P. Pilard, N. Saulnier, P. Boudarel, and A. Besnard. 2023. Windfarm collisions in medium-sized raptors: even increasing populations can suffer strong demographic impacts. Animal Conservation 26 (2023) 264–275

7.6.4 Conclusions

- Related with the migration period of each of the species, the White Stork, Steppe Buzzard, European Honey Buzzard, Black Kite, and the Steppe Eagle follow the known pattern through the Middle East, as described by Shirihai et al. (2000), despite some delays recorded. An exhaustive recording of the ages of the birds passing was not conducted which may assist us to better understand which fractions of the populations are migrating.

- The results are consistent with other projects in the region. A very detailed information of the monitoring and migration is available in the Bird Monitoring reports (Camiña et al. 2025a and 2025b), where all species are described in detail.

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- There are TWO SPECIES, the Golden eagle and Sooty Falcon, which could be breeding in the area of influence of the project. Further assessment should be done before operational phase across their respective breeding seasons. These studies should involve experts on these species and GPS tagging. These species suggest evidence of being resident and breeding, and conservation efforts must be made in the edge of its world distribution. Thus, mitigation measures must apply to preserve the species in Egypt and confirm their statuses and potential impact of wind farms in the GoS.
- The breeding assessment will be joint activity between several wind developer in the area and it will be conducted during 2027 during the construction phase and before installing the WTG, by international/national experts under supervision of EEAA
- The survey did not identify any key, important or significant habitats for roosting or breed sites within the Project area. This is mainly attributed to the desert and barren nature of the area and lack of trees.
- The survey did not identify any specific or preferred routes for birds within the Project site. The entire project area also shows consistency in this respect due to the landscape.
- The survey did not identify any site-specific constraints or area of concern that should be avoided.
- As expected, numbers of birds passing through change between seasons. The CRM cannot be considered to establish thresholds for collision estimations, other than considering higher or lower risk. In any case, the species of major and lower concern are the same as in other project within the Red Sea region wherever the project is, e.g., north or south to Ras Gharib.

7.7 Bats

7.7.1 Baseline Assessment Methodology

The baseline assessment of the Project site was based on a literature review and site surveys both of which are discussed in further details below.

C. Literature Review

This was based on previous studies, data, surveys, and records available in published scientific papers, books, and journals on bats of Egypt and the Gulf of Suez. The conservation status of the bat species listed from the literature review is based on IUCN's Red List of Threatened Species (IUCN, 2021).

D. Site Surveys

The site survey was performed using of a bat detector; there were deployed two Song Meter SM4 Acoustic Recorder from Wildlife Acoustics Inc. The survey was based on automatic recordings from May through November continuously, according to the schedule in the Table. In general, from December to March in the northern hemisphere bat activity is reduced because of the hibernation. Nevertheless, Minimum temperatures below 15°C in Ras Gharib are uncommon. As happens in other countries or even Southern Spain, this mild weather makes the bats to be active almost all the time.

The bat detectors were programmed to record from 30 minutes before sunset till 30 minutes after sunrise, including the change between summer and winter time in the last Friday of April and the last Thursday of October.

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Table 36: Coordinates of location of the bat detectors

Location	Latitude	Longitude	Metmast	Rationale
1	28.0646	33.0547	No	Coverage within the study area
2	28.0643	33.0146	Yes	Coverage within the study area - Mountain

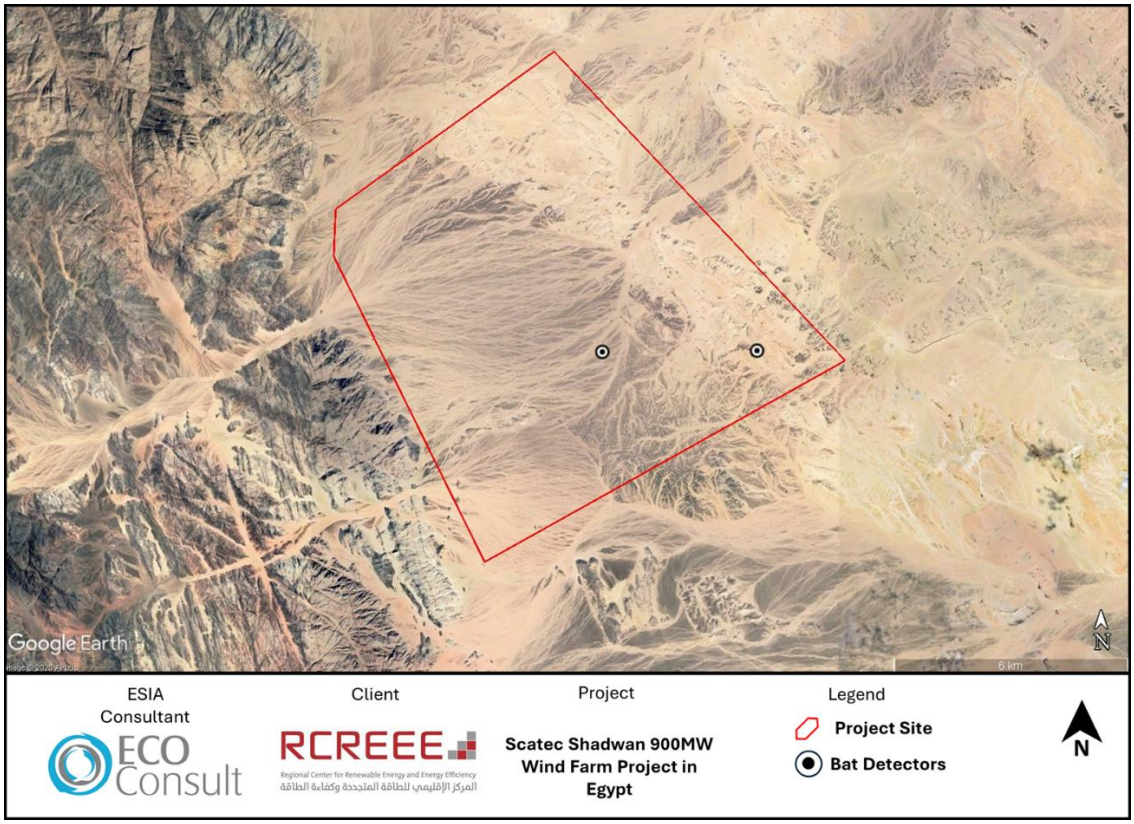


Figure 71: Location of the Bat Detectors

Table 37: Dates of recording in 2025

From	To	#Bat detector	Detector code	# nights	Files
03rd May	15th May	9	S4U23543	13	504
03rd May	15th May	10	S4U23512	13	362
15th May	26th May	9	S4U23543	12	362
26th May	04th June	9	S4U23543	10	909
04th June	13th June	10	S4U23512	10	error
13th June	22nd June	10	S4U23512	10	733
22th June	01st July	9	S4U23543	10	706
01st July	11th July	9	S4U23543	11	251
11th July	20th July	10	S4U23512	10	372
20th July	30th July	10	S4U23512	11	1405
30th July	08th Aug	9	S4U23543	10	735
08th Aug	18th Aug	9	S4U23543	11	1983
18th Aug	28th Aug	10	S4U23512	11	275
28th Aug	07th Sept	10	S4U23512	11	1418
07th Sept	23rd Sept	9	S4U23543	17	1444
23rd Sept	06th Oct	9	S4U23543	14	1080
06th Oct	20th Oct	10	S4U23512	15	994
20th Oct	01st Nov	10	S4U23512	13	309

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Total				212	13,842

Two locations and three detectors were used for the bat monitoring from May through November Weather data were taken from two met-masts installed in the project area. The Bat detector was the Song Meter SM4BAT from Wildlife Acoustics.

Met mast data were processed as follows:

- Meteo data recording at wind farms takes place on a 10 minutes basis at different heights.
- Sunrise and sunset times were filtered from www.dayandnight.com
- Files with recordings were filtered selecting only those for which the wind speed was equal or lower to 8 m/s. Those above such threshold were discarded, as the bat activity even above 6 m/s is quite scarce.
- Extracted files were then analysed with "Anabat Insight" using Auto ID. Anabat Insights may apply filters during file conversion (e.g., .wav to .zc) or analysis to separate structured bat calls from unstructured noise. Filters can be used in a number of ways to streamline the analysis.

7.7.2 Results

E. Literature Review

Little is known about the distribution of the bats of Egypt. Qumsiyeh (1985), Osborn (1988), and Hoath (2003) reported around 20 species. As for the study area, Osborn (1988) reported only two species from the Red Sea Mountains of Egypt; namely Nyctinomus aegyptiaca and Plecotus christiei. Both species are resident within the area, and no large-scale migration was reported in Egypt. Qumsiyeh (1985) reported four bats from the Red Sea Mountains including Taphozous nudiventris from Quseir, Pipistrellus kuhlii, Taphozous perforatus and Asellia tridens. Most recently, Benda & Ševčík (2020) updated the distribution of the Egyptian bats with additional locality records with a total of 20 species.

Table 38: List of Bat Species Recorded in Project Site and Vicinity Based on Literature Review

Family	Species
Pteropodidae	*Rousettus aegyptiacus* (E. Geoffroy St.-Hilaire, 1810)
Rhinopomatidae	*Rhinopoma microphyllum* (Brunnich, 1782).
	Rhinopoma cystops Thomas, 1903
Emballonuridae	*Taphozous perforatus* Geoffroy, 1818
	Taphozous nudiventris Cretzchmar, 1830
Nycteridae	*Nycteris thebaica* (Geoffroy, 1813)
Rhinolophidae	*Rhinolophus clivosus* Cretzschmar, 1828
	Rhinolophus hipposideros (Borkhausen, 1797)
	Rhinolophus mehelyi Matschie, 1901
Hipposideridae	*Asellia tridens* (Geoffory, 1813)
Vespertilionidae	*Pipistrellus kuhlii* (Kuhl, 1817)
	Vansonia rueppellii (Fischer, 1829)
	Hypsugo ariel (Thomas, 1904)
	Cnephaeus bottae (Peters, 1869)
	Otonycteris hemprichii Peters, 1859
	Nycticeius schlieffenii Peters, 1859
	Barbastella leucomelas (Cretzschmar, 1826)

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	Plecotus christii Gray, 1838
Molossidae	*Tadarida teniotis* (Rafinesque,1814)
	Nyctinomus aegyptiacus Geoffroy, 1818

All species are not threatened and listed under Least Concern category according to the IUCN Redlists. However, three species; Pipistrellus rueppellii, Taphozous nudiventris and Cnephaeus bottae are listed as VU in the Egyptian Mammal Red List (Basuony et al., 2010).

- Basuony, M.I., Gilbert, F. & Zalat, S. 2010. Mammals of Egypt: Atlas, Red Data Listing & Conservation. Ministry of State for Environmental Affairs. 274 pp+VIII.
- Benda, P. & Ševčík, M. 2020. Bats (Mammalia: Chiroptera) of the Eastern Mediterranean and Middle East. Part 16. Review of the distribution and taxonomy of bats in Egypt. Acta Soc. Zool. Bohem. 84: 115–279.
- Dietz, C. 2005. Illustrated identification key to the bats of Egypt. Electronic Publication, Version 1.0, released 21.12.2005 Tuebingen (Germany).
- Hoath, R. 2003. A Field Guide to the Mammals of Egypt. The American University in Cairo Press. 320 pp.
- Osborn, D.J. 1988. New bat records from the Red Sea Mountains of Egypt. Mammalia 52 (4): 596-598.
- Qumsiyeh, M.B. 1985. The Bats of Egypt. Special Publication of the Museum, Texas Tech University No. 23. Texas Tech Press, Lubbock, Texas. 102 pp.

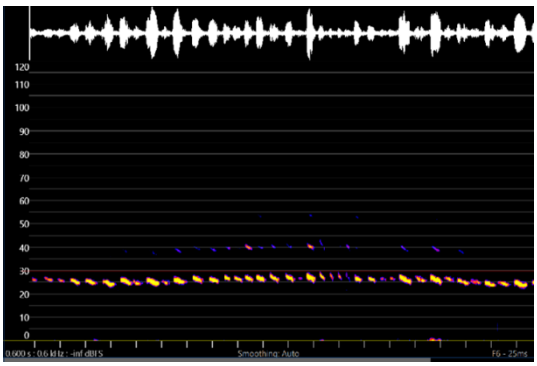
F. Outcomes of the surveys

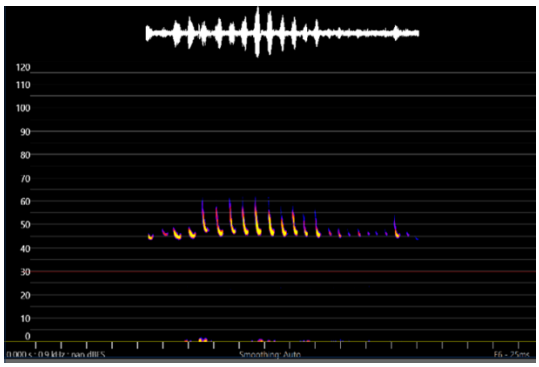
Out of the 13,842 files recorded, days per month retrieving wind speeds lower than 8 m/s at some 10 min interval were the following: nineteen (19) in July, fifteen (15) in August, ten (10) in September, and another fifteen (15) in October.

Bat calls were only recorded at one of the two detectors, being scarce despite using the Auto ID.

File name	Passes	*T. perforatus*	*P. kuhlii*	Total
S4U23512_20251008_033558.wav	24	0	24	24
S4U23512_20251022_005923.wav	0	51	0	51

The Figure below shows the calls of these two species.





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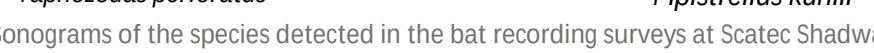


Figure 72: Sonograms of the species detected in the bat recording surveys at Scatec Shadwan 900MW

7.8 Archaeology and Cultural Heritage

This section provides an assessment of baseline conditions within the Project site and its surroundings in relation to archaeology and cultural heritage.

7.8.1 Methodology for Assessment

The baseline assessment of the Project site was based on a literature review, secondary data review and a field survey, each of which is discussed in further details below.

A. Literature Review

Literature review included a comprehensive review of archives, publications, and studies on previous archaeological and cultural heritage work and surveys undertaken in the area, and which are available through desktop review as well as through the Red Sea Antiquities Inspection Office and Suez Antiquities Inspection Office. Such literature review included information available through the French Institute for Oriental Archaeology, French Institute in Cairo, and data published by the French mission working at in Sukhna city.

B. Stakeholder Consultation and Engagement

Stakeholder consultation and engagement activities will be undertaken with the Ministry of Tourism and Antiquities which is the key entity involved in archaeology and cultural management as it is currently pending. Refer to “Section 4.3.1” earlier for addition details.

In addition, as part of the consultations and FGD undertaken with the local communities, and more specifically Bedouin tribes, specific discussions were undertaken in relation to cultural heritage sites within the Project area. Refer to “Section 4.3.2”.

C. Site Survey

A field survey was undertaken by an archaeology and cultural heritage expert in June 2025 to verify the presence/absence of any surface archaeological or cultural heritage remains within the Project site. The survey covered the entire Project boundary. The monitoring equipment used were GPS devices, digital cameras and data loggers The surface area was walked by the expert in order to inspect the entire ground surface. Based on the survey, should any sites of interest be discovered, the following actions are to be undertaken:

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- Sketch plans and /or a photograph as appropriate
- GPS coordinates for the area
- Undertake an analysis to categorize the sites and archaeological features and making an assessment of their significance.

7.8.2 Results and Outcomes

A. Literature Review

This section presents the results in accordance with the methodology discussed above. Based on the literature review, it is concluded that there are no registered archaeological sites within the Project area itself and the area adjacent to the Project area. The closest sites that are considered of great archaeological, historical and cultural heritage value are described in the table below and presented in the figure that follows.

Table 39: Nearest Archaeological Sites

Site	Description	Distance to Project
Wadi Jarf / Red Sea coast	A harbour complex which was used regularly during the second half of the Old Kingdom and the Middle Kingdom (from 2550 to 1700 b.c.e.). It was used by the expeditions seeking turquoise and other products from south Sinai. Moreover, it's also known for its very famous wadi jarf papyrus which dates to the reign of king khufu and which describes the organization of labor under the supervision of their leader Merer who recorded the diary of the mission on a long papyrus sheet.	91km to the north
Saint Anthony Monastery (Deir erl Qidis Antun)	Saint Anthony's disciples founded the monastery between 361 and 36 (Starkey.2012:205)	109km to the north
Saint Paul Monastery (Deir el Qidis Nulus):	The monastery is located in front of Mount el Galala. The caves in this area were used by Christian monks who used the limited resources available in the harsh desert for living, while the cave and chapel of Saint Paul in particular were considered the base for the current monastery (Starkey.2012: 207).	91km to the north
Gebel El Zeit	The mountain itself is located within an Important Bird Area of the same name and located within the internationally recognized important corridor for soaring birds.	47km to the southeast

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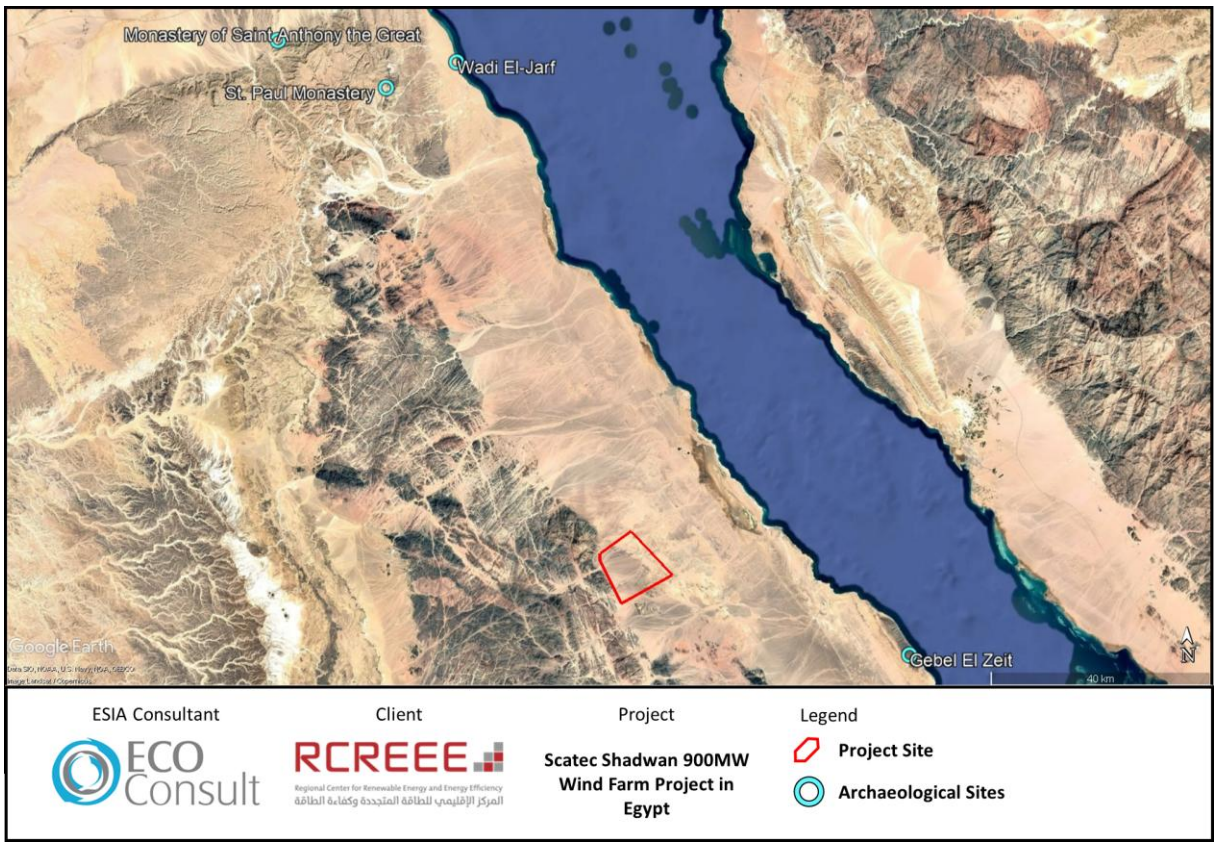


Figure 73: Project Site and Archaeological Sites

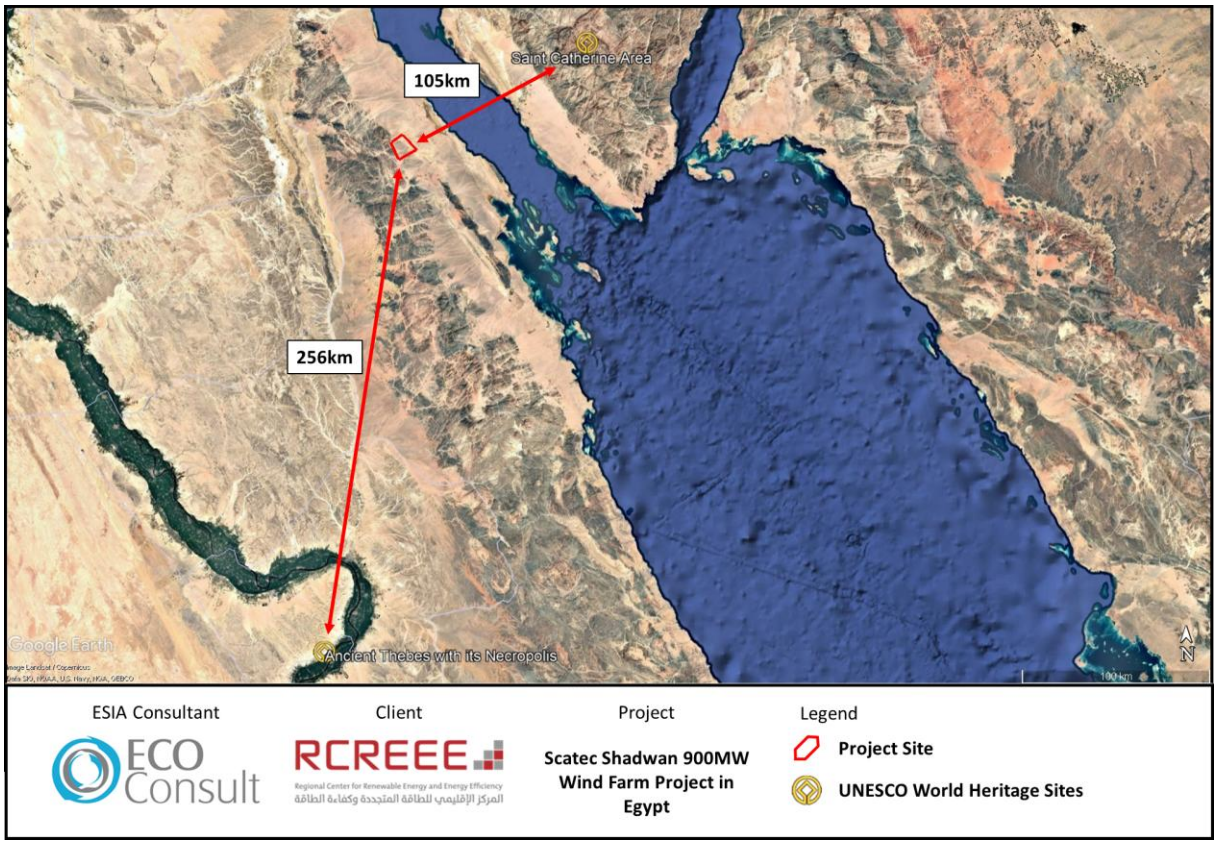


Figure 74: Project Site and UNESCO WHS

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B. Stakeholder Consultation and Engagement

Additionally, the discussions with local communities indicated that there are no cultural, spiritual or historical sites of significance to Bedouin tradition such as graveyards or shrines located within or near the Project site.

C. Site Survey

During the survey across the entire Project site and surrounding areas, fragments of ancient pottery were discovered scattered on the surface. These shreds exhibit smooth, well-fired surfaces with colours ranging from light brown to reddish hues, indicative of early traditional manufacturing techniques. Based on an initial assessment of the form, fabric, and temper, the pottery is likely to date back to the Old Kingdom period (circa 2686–2181 BCE), however, they do not hold any archaeological or cultural significance and are therefore not considered relevant artifacts.

Based on the findings, the site is considered free of any archaeological remains, and construction of the wind energy project can proceed. However, the presence of an archaeological observer on site during the initial excavation phases is recommended as a precaution in case any unexpected archaeological evidence is discovered

However, upon completion of the detailed archaeological survey across the Project site, the following was concluded:

- No surface archaeological remains or indications of subsurface archaeological deposits were observed.
- The natural surface consists of gravelly/sandy/rocky soil (as appropriate), with no clear evidence of ancient human activity.
- The area is not listed as an official archaeological site according to the records of the Ministry of Tourism and Antiquities.

7.9 Air Quality and Noise

This section provides an assessment of baseline conditions within the Project site and its surroundings in relation to air quality and noise.

7.9.1 Methodology for Assessment

A. Selection of Parameters

Monitoring was undertaken for the following parameters: (i) gases to include Carbon monoxide (CO), Sulphur Dioxide (SO_2) and Nitrogen Oxides (NO_x), (ii) Suspended Particulate Matter to include Particulate Matter smaller than 10.0 (PM_{10}) and 2.5 microns ($PM_{2.5}$) in diameter, TSP (total suspended particle) and (iii) Noise Pressure Levels (NPL). These parameters were selected based on the following rationale:

- Such parameters are likely to be present within the Project site given its characteristics and attributes. Suspended particulate matter is expected given the desert nature of the site. On the other hand, pollutants (such SO_2, NO_2,) are expected onsite but rather at minimal concentrations as the site is in a

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remote area; nevertheless, motor emissions particularly from vehicles passing casually through the site (or from the main road) could be a source of such pollutants. Finally, noise levels are expected from the windy nature of the site and possibly casual vehicular movement.

- Such parameters are likely to be affected mainly during the Project's construction activities. All air pollutant parameters selected are expected to be slightly impacted and increase specifically during the Project's construction activities. Emissions from vehicles and machinery used onsite and their movement onsite will increase gaseous emissions, suspended particulate matter, as well as noise pressure levels.

Based on a site visit undertaken by the 'E&S Team' and a review of satellite imagery, no significant point sources of anthropogenic air pollutant emissions were observed within the immediate vicinity of the Project site. Previous air quality and noise monitoring programs undertaken in the area[29] further confirms the above as they have indicated that outcomes of the monitoring results were all significantly less than the maximum permissible limits to include both Egyptian limits as well as international limits. The Project site is also expected to have similar air quality and noise characteristics.

B. Selection of Location

To assess the air quality baseline conditions within the Project area, three (3) monitoring points were selected as shown in the figure below. Monitoring was undertaken for 24 hours at each point respectively. The coordinates for the monitoring points and location are presented in the table and figure that follows.

Table 40: Location for Noise and Air Quality Monitoring Points

Station Name	Coordinates	
	Latitude	Longitude
Monitoring Point 1	28° 7' 18.10"N	32° 58' 45.40"E
Monitoring Point 2	28°3' 7.00"N	32° 59' 42.80"E
Monitoring Point 3	28°4' 32.10"N	33°2' 24.50"E

[29] SUEZ Wind Energy BOO Wind Power Plant 1.1. GW – SWE South (PLOT 2)

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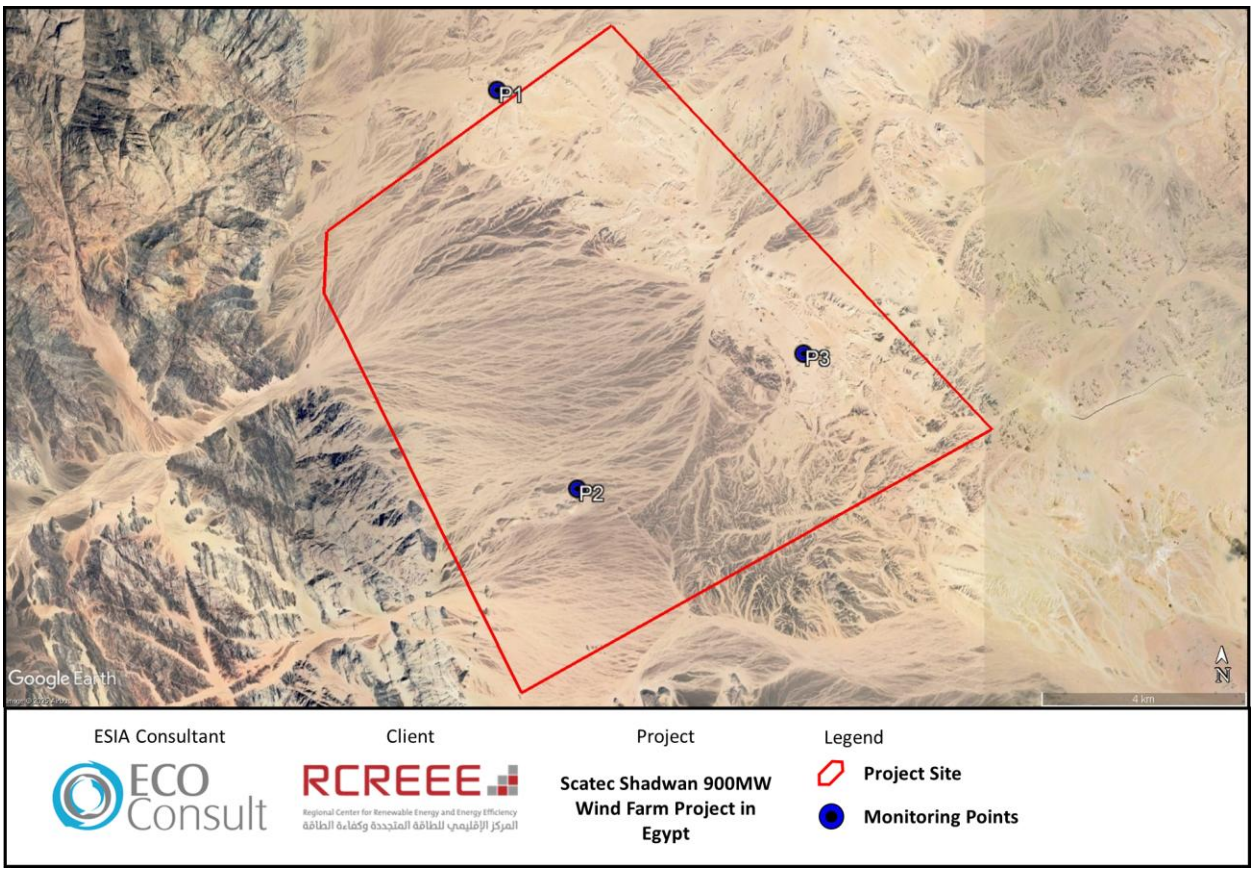


Figure 75: Satellite Map for Measurements Point Location

C. *Legislative Requirements*

With regards to air quality, the results of the measurements were compared to the national limits as set within Annex 5 of the Executive Regulation (D1095/2011) for ambient air quality. The table below identifies the corresponding applicable national ambient air quality permissible limits. The limits included for 'urban' areas were used for comparison given the nature of the site that does not include any industrial activities and therefore cannot be classified as such.

Table 41:Applicable National Permissible Limits for Air Quality

Pollutant	Location	Maximum Limit (µg/m^3)			
		1 Hour	8 Hours	24 Hours	1 Year
Sulfur Dioxide (SO_2)	Urban Industrial	300 350	--- ---	125 150	50 60
Carbon Monoxide (CO)	Urban Industrial	30 mg/m^3	10 mg/m^3	--- ---	--- ---
Nitrogen Dioxide (NO_2)	Urban Industrial	300 300	--- ---	150 150	60 80
Total Suspended Particles (TSP)	Urban Industrial	--- ---	--- ---	230 230	125 125
Respirable Particulates (PM_{10})	Urban Industrial	--- ---	--- ---	150 150	70 70

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Solid Particulates < 2.5 µm	Urban Industrial	--- ---	--- ---	80 80	50 50

With regards to noise, the results were compared to the national limits set in Annex 7 of the Executive Regulation (D710/2012) for the 'Day' and 'Night' intervals. The table below lists the different area classifications and their corresponding applicable permissible limits for noise. Out of the areas below, it is believed that the following classification best describes the Project site "Residential suburb with low traffic activity and limited activities service". In such area limits are set at 55 dB(A) and 45 dB(A) for both day and night respectively.

Table 42: Applicable National Permissible Limits for Noise

Type of Area	Permissible Limit for Noise Intensity [dB (A)]	
	Day (7 am to 10 pm)	Night (10 pm to 7 am)
Sensitive areas to noise	50	40
Residential suburbs with low traffic and limited activities service	55	45
Residential areas in the city and have commercial activities	60	50
Residential areas are located on roads less than 12 m and have some workshops or commercial activities or administrative activities or recreational activities … etc.	65	55
Residential areas located on roads equal or more than 12 m, or industrial zones with light industry and some other activities	70	60
Industrial areas (heavy industries)	70	70

Results were also compared with the IFC General EHS Guidelines for air quality and noise as presented in the table below.

Table 43: IFC EHS General EHS Guideline Noise and Air Quality Limits

Parameter	Limit
Sulfur Dioxide (µg/m^3)	125 (Interim target-1) 24-hour
Nitrogen Dioxide (µg/m^3)	200 1-hour
Particulate Matter PM10 (µg/m^3)	150 (Interim target-1)24-hour
Noise one-hour LAeq (dB(A)	Daytime 07:00 - 22:00 = 55; Nighttime 22:00 – 07:00 = 45

7.9.2 Results

Air quality

The table below presents the analysis results of ambient (24-hour) air quality levels for this point, compared with the limits specified in national and international standards.

The initial air quality and noise monitoring programme was undertaken for the Project at monitoring location P1 on 2 July, P2 on 3 July, and P3 on 4 July. Following review of the hourly monitoring data provided, it was identified that the monitoring undertaken at P2 and P3 covered only 12 hours due to technical issues with the monitoring equipment. Accordingly, to ensure that the baseline dataset is complete and representative, an additional air quality and noise monitoring programme was conducted in November for 24 hours.

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Table 44: Air Quality Analysis Result

Air Quality Monitoring Results							
Date	Time	NO_2	SO_2	CO	PM2.5	PM-10	TSP
2/7/2025 Monitoring Point 1	9:00AM	17.45	20.57	2.12	38.6	53.8	70.4
	10:00	13.76	13.14	1.875			
	11:00	12.11	11.71	1.75			
	12:00PM	16.84	11.14	1.62			
	1:00	8.42	9.99	1.5			
	2:00	8.01	25.71	2.37			
	3:00	6.57	14.28	1.87			
	4:00	18.69	11.99	1.75			
	5:00	11.09	8.85	1.62			
	6:00	12.52	7.99	1.5			
	7:00	11.91	7.99	1.5			
	8:00	14.17	7.71	1.37			
	9:00	8.42	7.42	1.5			
	10:00	8.21	8.85	1.62			
	11:00	6.98	7.71	1.5			
	12:00AM	13.35	7.42	1.5			
	1:00	20.95	8.85	1.62			
	2:00	14.78	7.71	1.5			
	3:00	17.66	7.14	1.37			
	4:00	10.06	6.85	1.25			
	5:00	19.10	7.42	1.5			
	6:00	14.99	8.28	1.62			
	7:00	16.84	13.71	1.87			
	8:00	11.50	9.14	1.62			
	Average	13.1	10.48	1.64			
13/11/2025 Monitoring Point 2	9:00AM	10.88	11.14	1.62	37.3	52.6	73.1
	10:00	11.91	11.99	1.75			
	11:00	13.55	14.57	1.87			
	12:00PM	12.52	12.28	1.62			
	1:00	11.91	12.57	1.75			
	2:00	13.55	14.85	1.87			
	3:00	14.58	16.57	2			
	4:00	16.63	17.71	2.12			
	5:00	15.19	14.28	1.87			
	6:00	12.52	13.14	1.87			
	7:00	13.35	11.99	1.75			
	8:00	14.99	14.57	1.87			
	9:00	19.51	19.42	2.12			
	10:00	19.10	17.42	2			
	11:00	23.62	20.28	2.12			
	12:00AM	18.07	21.42	2.25			
	1:00	19.30	18.57	2			

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Air Quality Monitoring Results							
Date	Time	NO_2	SO_2	CO	PM2.5	PM-10	TSP
	2:00	18.28	15.14	1.87			
	3:00	21.15	21.42	2.12			
	4:00	17.04	15.42	1.87			
	5:00	14.17	10.85	1.75			
	6:00	14.78	12.28	1.75			
	7:00	17.86	13.42	2			
	8:00	18.89	14.00	1.87			
	Average	15.97	15.22	1.90			
14/11/2025 Monitoring Point 3	9:00AM	20.74	18.00	2	47.8	57.6	78.3
	10:00	16.84	15.71	1.875			
	11:00	14.78	11.71	1.75			
	12:00PM	13.14	9.71	1.62			
	1:00	20.33	13.14	1.75			
	2:00	11.29	11.14	1.62			
	3:00	15.61	15.42	2			
	4:00	15.00	14.57	1.87			
	5:00	13.35	13.71	1.75			
	6:00	14.37	14.00	1.87			
	7:00	18.28	17.42	2			
	8:00	16.22	13.71	1.87			
	9:00	13.14	11.14	1.75			
	10:00	14.78	9.42	1.62			
	11:00	15.81	10.85	1.75			
	12:00AM	13.76	13.99	1.87			
	1:00	13.55	10.28	1.62			
	2:00	12.73	11.71	1.75			
	3:00	16.63	14.57	1.87			
	4:00	11.09	8.85	1.62			
	5:00	12.11	13.71	1.87			
	6:00	11.70	12.57	1.75			
	7:00	15.00	16.85	2			
	8:00	13.14	10.57	1.75			
	Average	14.72	13.03	1.80			
IFC limits		125	125	-	-	150(24hr)	-
Egyptian limit		150	125	30	100	-	230

As noted in the table above, all measured parameters comply with both Egyptian legislative requirements as set within Annex 5 of the Executive Regulation (D1095/2011) for ambient air quality as well as IFC limits.

Noise

The table below presents the analysis results of ambient (24-hour) noise levels for the measurement point, compared with the maximum permissible limits specified in Egyptian law standards.

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Table 45: 24-Hour Ambient Noise Level Measurements and Comparison with National Standards

Noise Monitoring (24-hours) Results			
Time	Monitoring Points		
	1	2	3
	2/7/2025	13/11/2025	14/11/2025
9:00AM	42.3	48.2	52.3
10:00	35.6	50.3	54.6
11:00	33.6	48.9	53.4
12:00PM	41.8	51.3	55.2
1:00	39.5	53.2	56.4
2:00	37.8	47.9	55.6
3:00	35.9	53.5	49.7
4:00	40.8	52.4	48.9
5:00	38.7	51.8	52.3
6:00	36.5	56.3	54.3
7:00	34.9	53.4	47.9
8:00	40.9	55.4	49.8
9:00	36.2	54.6	58.6
10:00	33.9	56.2	54.2
11:00	37.5	55.1	57.3
12:00AM	38.1	48.7	51.1
1:00	39.7	45.1	48.6
2:00	32.6	49.6	44.8
3:00	31.7	47.3	46.5
4:00	37.5	46.3	50.1
5:00	33.2	42.2	52.6
6:00	35.4	49.2	56.4
7:00	40.1	47.8	51.5
8:00	38.5	44.5	48.6
Average	37.19	50.38	52.11
Daytime Average	38.20	51.3	52.6
Nighttime Average	35.51	48.9	51.3
National Standards	Daytime Limit: 55dB, Nighttime Limit: 45dB		
IFC Limits	Daytime Limit: 55dB, Nighttime Limit: 45dB		

The above indicates that the site maintains good air quality and generally low noise levels in line with both national standards and the IFC guidelines. All air quality parameters measured during both daytime and nighttime were within the permissible limits. Concentrations of key pollutants, including NO_2, SO_2, CO, $PM_2.5$, PM_{10}, and total suspended particulates, were significantly below their respective thresholds, demonstrating a low risk of air pollution related impacts.

Noise levels were within the allowable limits during the daytime. While the nighttime results exceeded allowable limits, this is attributed to natural reasons, mainly wind, since no anthropogenic noise sources were identified during the monitoring period.

7.10 Infrastructure And Utilities

This section first provides an assessment of baseline conditions within the Project site and its surroundings in relation to infrastructure and utilities.

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7.10.1 Assessment of Baseline Conditions

Assessment of baseline conditions was based on a site visit by the 'E&S Team' to the Project site and surrounding area in July 2025. The site visit aimed to identify any key visible infrastructure and utility elements within the Project site or surrounding areas (e.g., electricity infrastructure lines, water infrastructure lines, etc.).

Desktop review as well as consultations were undertaken with key governmental entities to better understand and characterize infrastructure and utility element services required for the Project development as discussed further throughout this section. This includes water supply, waste management services, traffic and transport, etc. The consultation activities were previously discussed in "Section4" and are discussed again in the sections below as applicable and relevant.

7.10.2 Existing Roads and Networks

The Cairo-Hurghada (Highway 65) runs around 19 km east of the Project site, as shown in the figure below. There is also a road network for the adjacent wind farms.

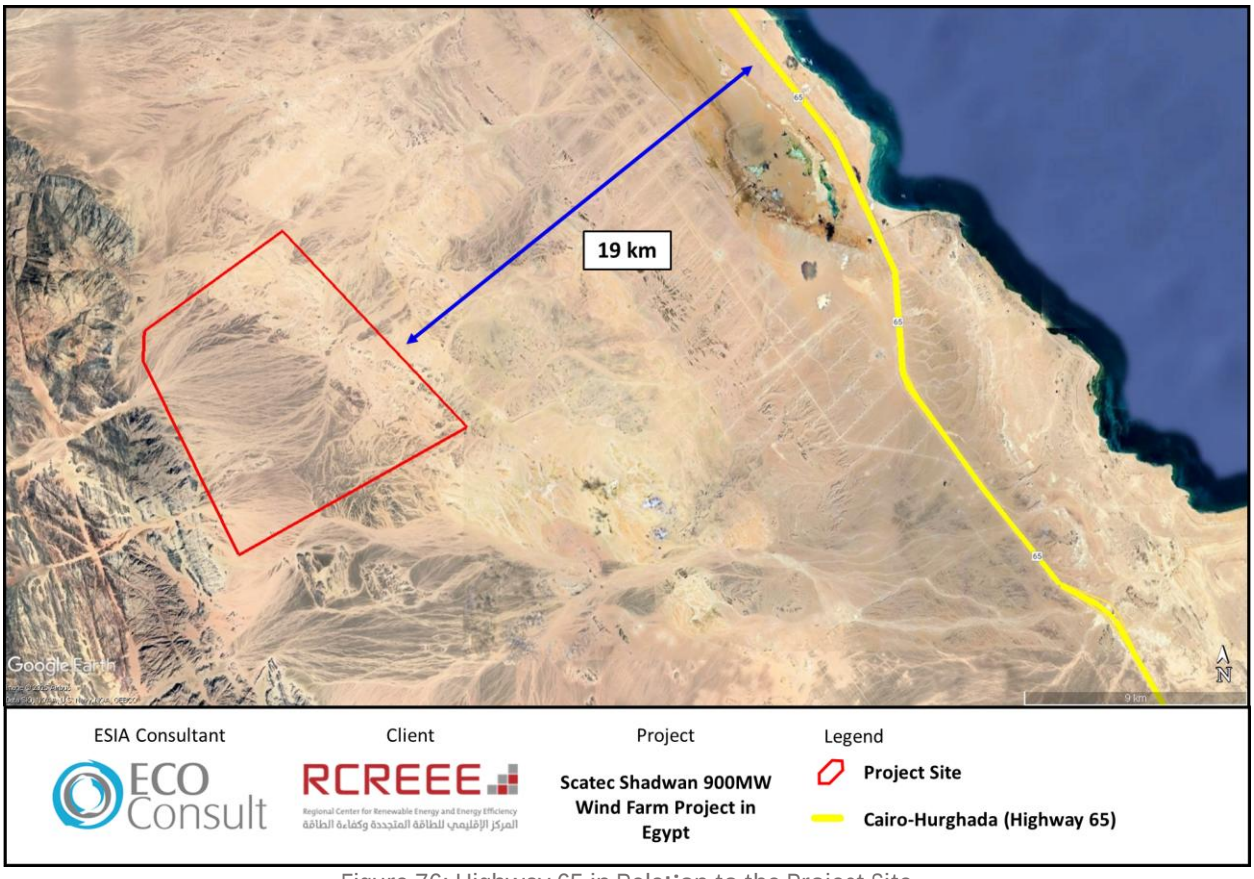


Figure 76: Highway 65 in Relation to the Project Site

7.10.3 Telecommunication, Radio and TV

As part of the site survey undertaken, no infrastructure elements in relation to telecommunications, radio or TV were noted within the Project site (e.g. broadcasting towers). A total of three (3) communication

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towers were noted near the Project; however, the nearest one is located more than 18km east of the Project site as shown in the figure below.

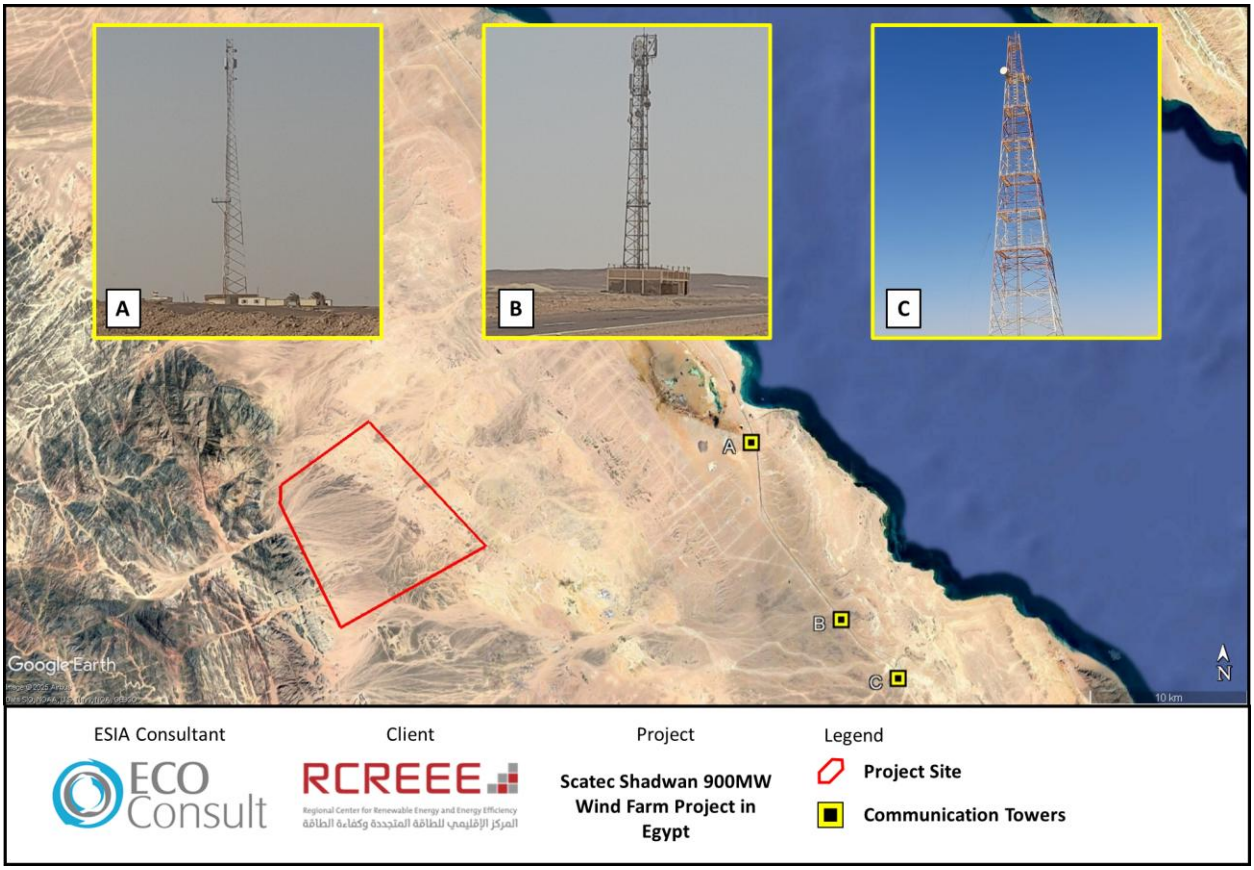


Figure 77: Nearest Communication Towers to the Project Site

7.10.4 Waste Management (Solid Waste, Wastewater and Hazardous Waste)

As discussed earlier in "Section 4" consultations were undertaken to obtain information on municipal and construction waste disposal facilities, Wastewater Treatment Plants (WWTPs), and hazardous waste landfills with the following entities:

- Solid Waste Management Branch of Red Sea Governorate which is the relevant entity that is responsible for handling solid waste in Red Sea Governorate;
- Hazardous Waste Management Unit in Red Sea Governorate, which is the relevant entity that is responsible for handling hazardous waste in Red Sea Governorate; and
- Red Sea Water and Wastewater Company (RSWWC) and the Sanitation Authority in Ras Gharib which are the relevant entities responsible for handling wastewater in Ras Gharib District.

According to consultations undertaken with the Solid Waste Management Branch, the nearest landfill in Ras Gharib is located next to Um-Al-Yeser with a current capacity of 200,000m^3, and the entity confirmed that it can handle waste expected from the Project.

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Wastewater Treatment Plants

According to consultations with RSWWC and the Sanitation Authority in Ras Gharib, the nearest wastewater treatment plant is the Ras Gharib Treatment Plant located around 20km east of the Project site, as shown in the figure below. It was also indicated that wastewater generated by the Project should be managed using septic tanks and drained regularly via septic trucks.

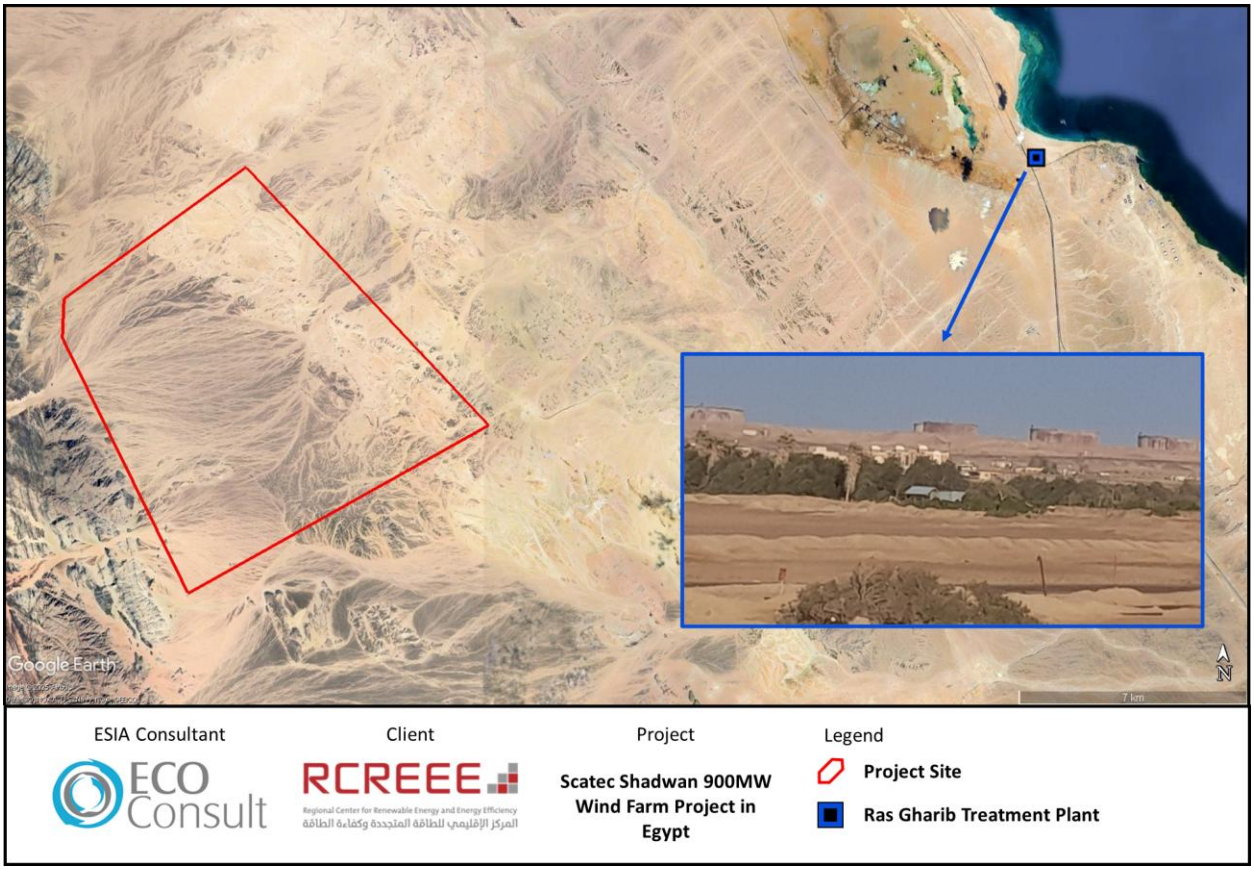


Figure 78: Project Site Relative to the Closest Wastewater Treatment Plant

Hazardous Waste Landfill

According to consultations with Hazardous Waste Management Unit in Red Sea Governorate, there are no hazardous waste treatment or disposal facilities within the Red Sea Governorate. Instead, the hazardous waste must be collected, transported and disposed of by a licensed company approved by the Waste Management Regulatory Authority (WMRA).

7.10.5 Water Resources

Consultations with RSWWC indicated that the main source of water supply in Ras Gharib is by the Kureimat pipeline along the highway, which experiences service disruptions affecting local demand. Due to this, direct connection to the main line is considered difficult and therefore it is recommended to use water tankers during the construction period.

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7.10.6 Electricity Networks

Based on desktop review as well as a site visit, the Project area contains existing electrical infrastructure, including substations and several overhead transmission and distribution lines in the vicinity of the Project. As such, the area is already subject to routine electromagnetic field (EMF) exposure associated with standard power infrastructure.

Substations and Overhead Transmission Lines

As previously mentioned in "Section 2.7", there are multiple windfarms developments surrounding the Project site, and therefore within a 20km buffer there are three (3) existing substations, as shown in the figure below.

In addition, there are multiple 220kV OHTLs surrounding the Project site which are under the responsibility of the Egyptian Electricity Transmission Company (EETC). As such, the area is already subject to routine electromagnetic field (EMF) exposure associated with standard power infrastructure.

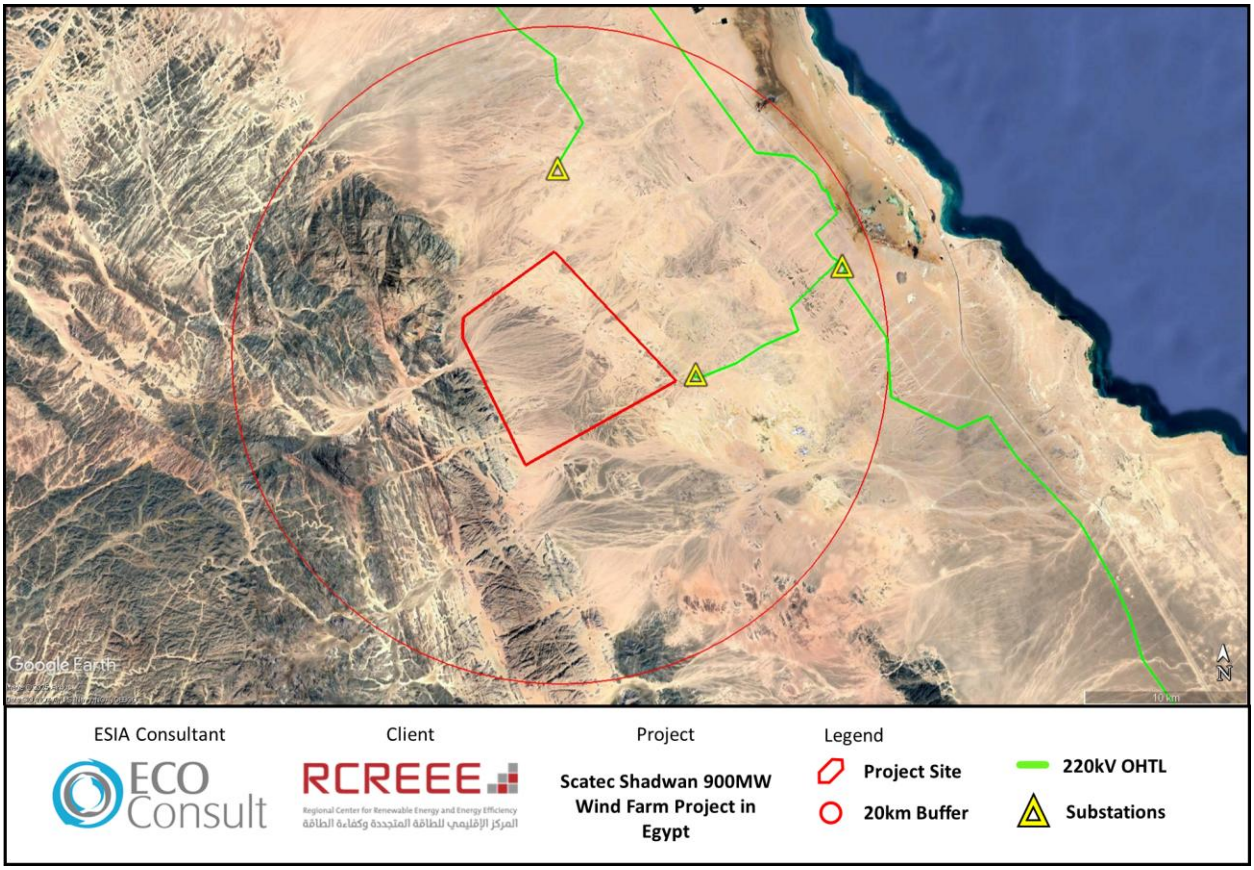


Figure 79: Existing Transmission Lines and Substations in the Project Area

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Figure 80: Existing OHTLs



Figure 81: Existing Substations

7.11 Socioeconomics

This section provides an assessment of baseline conditions within the Project site and surrounds in relation to socioeconomics.

7.11.1 Methodology for Assessment

Assessment of baseline conditions was based on a desktop review of official and published secondary data and statistics from governmental agencies (such as the Central Agency for Public Mobilization and Statistics – CAPMAS) in addition to the data and information mentioned during the meetings with the various stakeholders and local communities). Such secondary data was collected and is presented in relation to

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key socio-economic indicators to include but not limited to demographic dynamics, population characteristics, employment status, community structure, livelihoods, and other data sets.

In addition, a detailed assessment was done for a total of 14 farms in Wadi Dara Village to assess the type of structure, type of occupancy, number of occupants (if any), and

The Project site is located within the Red Sea Governorate that is bordered by the Red Sea Cost to the east and Bani-Suef, Menia, Asyout, Suhag, Qena, Luxor and Aswan Governorates to the west, Suez Governorate to the North, and North Sudan to the south. Red Sea Governorate's total area is around 120,000 km^2, forming 11.9% of the country's total area.

Administratively, the Red Sea Governorate is divided into seven (7) Cities (also known as Districts), each headed by a Local City Council. The capital of the Governorate is Hurghada that is located around 115km southeast of the Project site.

The Project site is located within the Ras Gharib City (or District) and therefore administratively is under the Ras Gharib City Council. The Ras Gharib District is further divided into Ras Gharib town as well as two (2) rural (village) local units (Zaafarana and Wadi Dara). Therefore, the affected communities include in particular Ras Gharib City and Wadi Dara village, both of which are located 22km north-northeast and 10km southeast of the Project site.

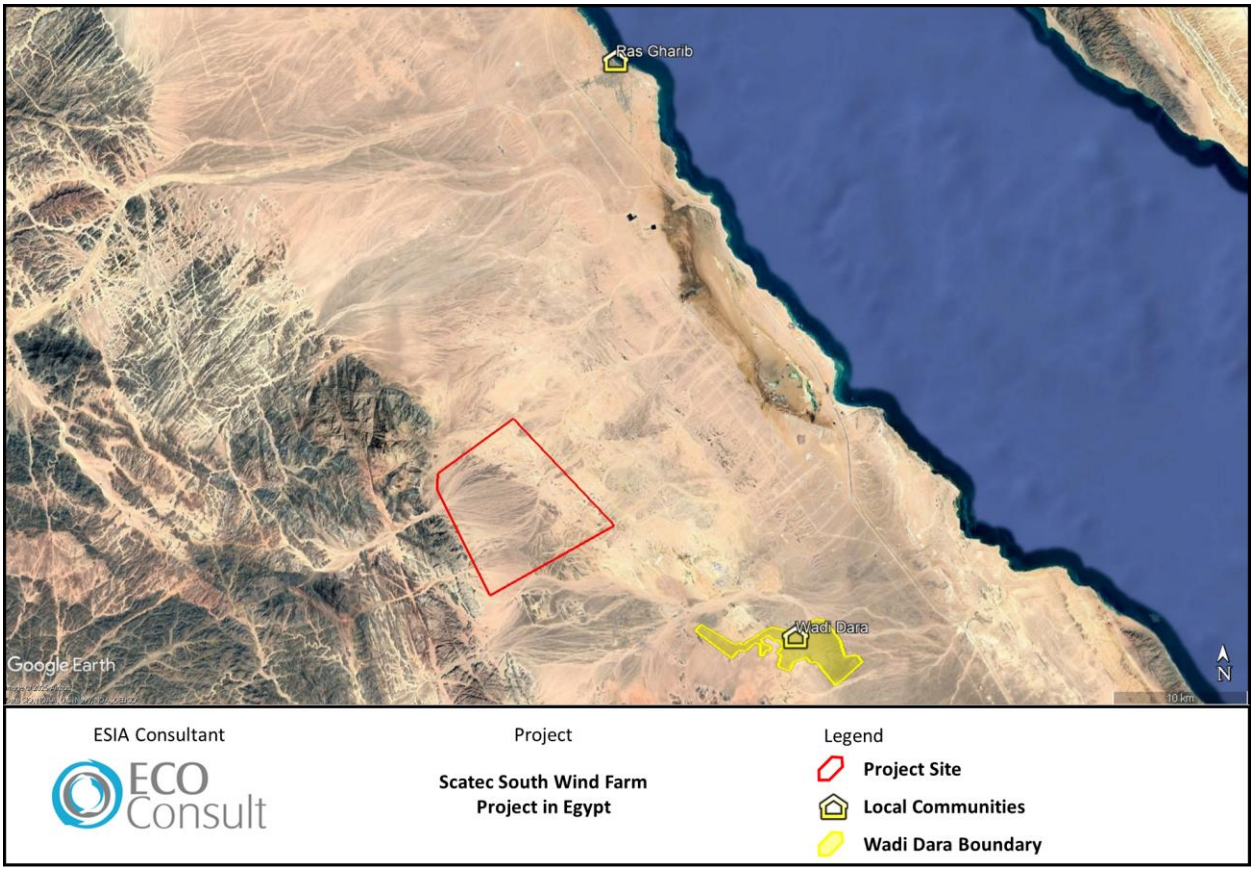


Figure 82: Project Site and Closest Communities

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7.11.2 Results and Outcomes

A. Ras Gharib City

Population and Demographic Profiles

Based on information from the Statistical Yearbook2022, the total population of the Red Sea Governorate was 396,000, which represents around 0.4% of the total national population. Further information about the population in the Project area is presented in the following table. As noted, the population of Ras Gharib in particular was estimated at around 68,020.

Table 46: Population (Red Sea Governorate Information Centre, 2022)

Area	Households	Population		Total Population
		Male	Female	
Red Sea Governorate	100,500	205,583	190,417	396,000
Ras Gharib	16,125	35,987	32,033	68,020
Hurghada	25,930	52,138	49,875	102,013
Safaga	18,500	37,444	36,136	73,580
Quseir	18,644	72,806	36,541	74,579
Marsa Alam	5,500	11,509	9,294	20,903
Shalateen	7,777	15,700	13,656	29,556
Halayeb	7,196	14,465	12,683	27,348

Ras Gharib represents 17% of the total population of the Red Sea Governorate, where the majority of population is located in Hurghada, due to the large-scale touristic activities in the city. However, services and population activities are concentrated in Ras Gharib City. The following figure shows the distribution of the population in the Red Sea Governorate according to each city.

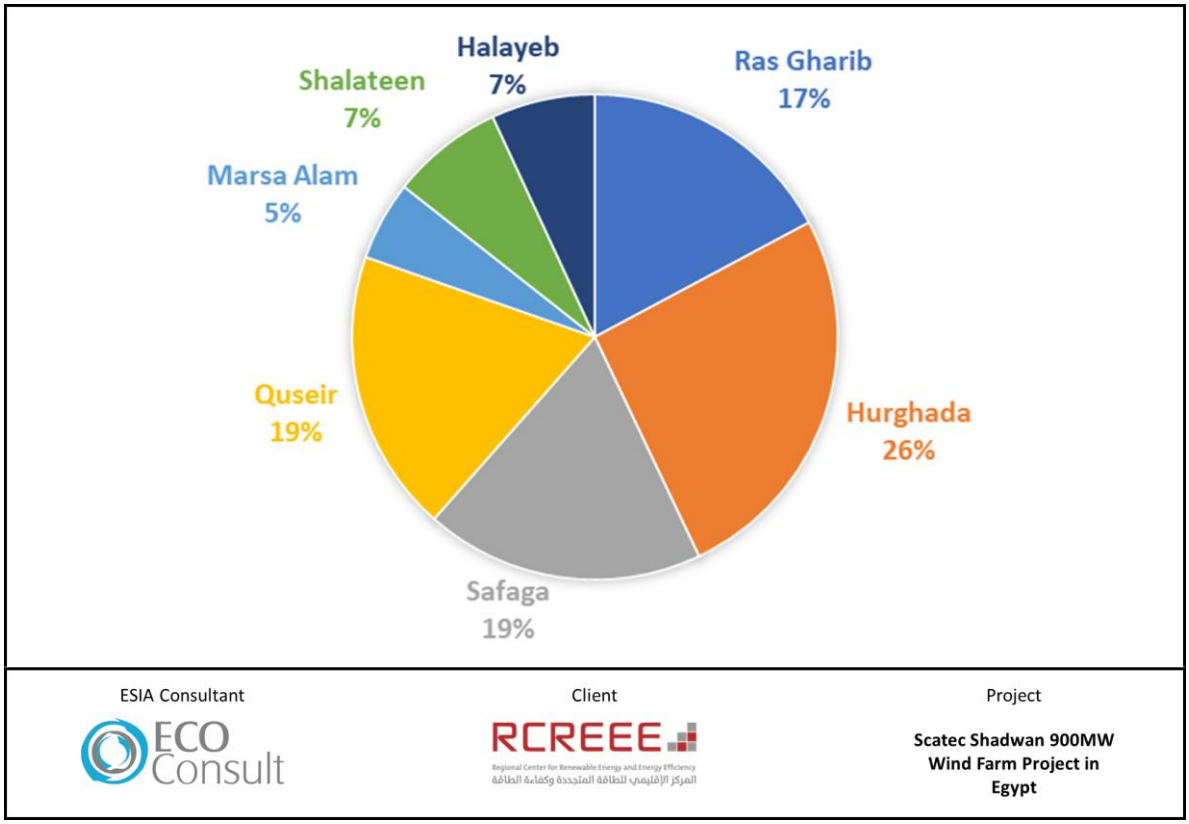


Figure 83: Distribution of Population Density According to Districts in the Red Sea Governorate

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Bedouin communities in Ras Gharib are mostly unsettled, and live deep in the desert, away from the city and the villages. They currently settle permanently in Ras Gharib city, Zaafarana and Wadi Dara. Such Bedouin groups generally engage in traditional economical activities such as agriculture and animal husbandry and in addition, they are also employed in the development projects in the area (mainly the petroleum companies) either as guides, security guards, or contractors (more details in are provided throughout this section).

The demographic trend also includes migrant workers from neighboring governorates. The predominant majority of these migrant workers work for oil companies located in the area, and a very small number work in farms in Wadi Dara village.

Age and Gender Distribution

Data from CAPMAS Statistical Yearbook 2020 indicates that the population in the Red Sea Governorate is predominantly young. Based on the outcomes of the 2020 population consensus, up to 79 % of the population of the Red Sea Governorate are under the age of 45. With respect to gender, statistical data indicates a male/ female ratio in the Governorate (205,583: 190,417).

Rate of Natural Increase

The total population in the Red Sea Governorate has grown by 21.00/1000 (*Red Sea Governorate Information Centre, Statistical Yearbook of Red Sea Governorate, 2020-2022*). The growth rate in the governorate decreased from the previous rate in 2020, but despite this, the current growth rate is considered one of the highest rates during the past five years in terms of the rate of natural increase. However, it is considered one of the 10 lowest governorates in terms of birth rate.

The following table illustrates demographic trends in the Red Sea Governorate:

Table 47: Demographic Trends (Statistical Yearbook of Red Sea Governorate, 2019-2020)

Demographic Trends	Value
Average Household Size (persons)	3.8
Natural Growth Rate (per 1,000 persons)	25.30
Urban Population (% of total Egyptian population)	0.39
Birth Rate (Births per 1,000 persons)	28.70
Mortality Rate (Deaths per 1,000 persons)	4.10

Labor Profile

- CAPMAS statistical data indicates that the official unemployment rate decreased to 9.9% in the second quarter of 2018, marking the lowest rate in the past eight years. The job outlook has improved due to steadily accelerating economic growth, with Gross Domestic Product (GDP) growing by 5.4% year-on-year in the third quarter of the year 2017/2018 (January-March), according to data issued by the Ministry of Planning, Monitoring and Administrative Reform.
- This followed a growth of 5.2% and 5.3%, respectively, in the first and second quarters, and despite low household incomes and high inflation rates, more of the country's unemployed youth are being absorbed by the labor market, despite the low wages. Workforce research results for the second quarter (April - June) of 2018 in Egypt are provided in the table below.

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Table 48: Workforce Research (CAPMAS, Workforce Research Results for the Second Quarter of 2018)

Workforce	Total No. of Employed Persons 26.161 Million		Total No. of Unemployed Persons 2.875 Million		Unemployment Rate 9.9%		Labor Force (by Occupation)		
	Males 80.8%	Females 19.2%	Males 53.1%	Females 46.9%	Males30	Females31	Agriculture	Industry	Service
29.036 Million	21.138 Million	5.023 Million	1.527 Million	1.348 Million	6.7%	21.2%	28.2%	24.7%	47.1%

- The table above shows that the service sector forms the biggest part of the employment sector in the Governorate which accounts for around 47% of the workforce. The agriculture sector constitutes around 28% of the total workforce, while the industry sector constitutes the lowest percentage of the working population, accounting for around 25%. In addition, the data shows that the rate of unemployment is higher amongst females compared to males.
- The following table shows data from the Directorate of Manpower in the Red Sea Governorate, excluding the informal sector. The Governorate's workforce – as a percentage of the local population is estimated at 34.61%.

Table 49: The Distribution of the Project Area's Population by Work Status & Sex - Red Sea Governorate (Directorate of Manpower in the Red Sea Governorate, 2018-2020)

Workforce	Total No. of Employed Persons 89.20 thousand		Total No. of Unemployed Persons 25.7 thousand		Unemployment Rate 21.7%	
	Males	Females	Males	Females	Males	Females
116.60 Thousand	77.5%	22.5%	59.8%	40.2%	17.6%	27.3%

- According to the Statistical Yearbook 2018 of the Red Sea Governorate, the service sector constitutes 60.3% of the Governorate's workforce. Hurghada City represents the largest proportion of employment, due to the presence of coastal touristic areas, followed by Safaga City.
- According to Ras Gharib City Council officials, most of the workforce can be divided into three main categories: Government/Public Sector, Oil and Gas (O&G) Petroleum Sector, and Fishing.
- There is also a percentage of wage workers. Agricultural activities are relatively minor, compared to petroleum-related activities. In addition, tourism-related activities are limited in Ras Gharib, even though some residents work in the tourism sector in other cities in the Governorate, such as Hurghada and Safaga.
- Based on discussions with City Council officials, it was indicated that there is a rise in the unemployment rate in Ras Gharib City due to the limited tourism in the Governorate during recent years, which increased the lack of employment opportunities.

Table 50: Labor Status of Ras Gharib & Zaafarana (CAPMAS Poverty Map, 2018)

Employment Information	Ras Gharib City	Zaafarana Village
Male Workforce (aged 15+) from Total Population	46%	57%
Female Workforce (aged 15+) from Total Population	25%	12%
% of Employed Adults (aged 24+) from the Total Workforce	57%	58%
Distribution of Workforce by Sector		

30 Out of the total number of males (15 years of age and above) nationwide.
31 Out of the total number of females (15 years of age and above) nationwide.

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Employment Information	Ras Gharib City	Zaafarana Village
Self-Employed Males	49%	19%
Self-Employed Females	24%	33%
Male Workers in the Agricultural Sector	1.6%	37.2%
Female Workers in the Agricultural Sector	0.05%	84.2%
Workers in the Public Sector	57%	19%

Ras Gharib City attracts many migrant workers from neighboring governorates, such as Beni Suef, Minya, Assyut, Sohag, Qena and Luxor. Workers also come from the Delta Governorates and Sinai, and the majority of them work for oil companies, while few of them work on poultry farms, as construction workers, and in agriculture in Wadi Dara village.

Economic Activities and Well Being

Economic activities in the city of Ras Gharib and its affiliated villages include oil and gas production, in addition to agricultural reclamation activities, poultry and livestock farms in the Wadi Dara region. According to a Ras Gharib City Council representative, tourism is not a major economic activity in the city compared to other areas in the Red Sea Governorate.

Cultivated Lands: The area of cultivated lands in the Red Sea Governorate in 2012/2013 is almost 0.02% of the total nationwide cultivated lands. The Red Sea Governorate relies on rain and underground water in agriculture, which causes fluctuations in cultivated areas.

The division of land in Wadi Dar village (the village closest to the project site) includes lands allocated for agricultural reclamation projects. The number of existing farms at the time is approximately (50) farms. The status of these farms varies in terms of agricultural production and continuity in agriculture because the majority of them are still trying but facing obstacles with arable water due to the high salinity in groundwater in the area.

Fisheries: The Red Sea Governorate contributes to supplying fish, since the Governorate's coastline extends across 1,080 km and 240 km wide. The southern part of the Governorate is rich in fish resources.

The coastal area in Ras Gharib is not designated for fishing. There is no fishing port in Ras Gharib because the area is designated for oil exploration, therefore there is no scope for the fishing activates on the coast near the project site.

Livestock: 78.74% of the total number of livestock is butchered in state-owned slaughterhouses. The Red Sea Governorate has no livestock feed or poultry feed plants. Heifers account for 35% of cattle butchered in state-owned slaughterhouses.

According to the site visits and consultation activities that took place in the Wadi Dara area, there are some livestock and poultry breeding farms in Wadi Dara, some of which have begun production and others are still in the construction stage. In addition to 3 factories under construction to produce feed.

Industrial Activity: The total number of registered industrial firms is 53, operating in four industrial zones. The total number of workers in registered industrial firms is 4,340 workers (*Source: Red Sea Governorate Official Website, 2018).*

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Social Services Profiles

Education

Education is one of the most important criteria for measuring the progress of people and their ability to advance and improve their standard of living. According to CAPMAS, September 2018 announced that Egypt's illiteracy rate dropped from 39.4% in 1996 to 29.7% in 2006, and then to 25.8% in 2017.

Ras Gharib City contains 18 schools covering the three basic stages of education (primary, preparatory and secondary), which include two experimental schools. Additionally, there are two secondary vocational training schools. According to Ras Gharib City Council officials, the main objective of the two secondary vocational training schools is to provide their students with the necessary basic skills that enable them to work in oil companies.

CAPMAS Poverty Map 2018 shows that 20.23% of males and 21.14% of females of Ras Gharib City received basic education. Likewise, the percentage of males and females who finalized their basic education in Zaafarana is approximately 19% and 15% respectively. The following table details the educational status of inhabitants of Ras Gharib and Zaafarana.

Table 51: Education Mapping of Ras Gharib & Zaafarana (CAPMAS Poverty Map, 2018)

Education Information	Ras Gharib City	Zaafarana Village
University Degree Holders/Males	19%	9%
University Degree Holders/Females	15%	0%
Male School Enrolment/Males (age: 6-18)	99.28%	72.2%
School Enrolment/Females (age: 6-18)	99.45%	74.3%
School Drop-outs/Males	0.21%	0%
School Drop-outs/Females	0.23%	0%

According to CAPMAS Poverty Map 2018, the illiteracy rate in Ras Gharib City is estimated at 20.4% for males and 16.1% for females, while the illiteracy rate in Zaafarana was 37.15% among males and 45% among females.

Table 52: Education Mapping of Ras Gharib City (The Statistical Yearbook, Ras Gharib City Information Centre, 2018)

Area	University Degrees		Above Intermediate Education		Intermediate Education		Less than Intermediate Education		Workers	
	Males	Females	Males	Females	Males	Females	Males	Females	Males	Females
Ras Gharib	133	31	112	39	281	199	301	70	232	68

Health

Data from the Health Affairs Directorate in the Red Sea Governorate showed that the Governorate is free of the following diseases:

- Endemic diseases
- Infectious diseases
- Diseases related to water and air quality

The data indicated that non-communicable diseases include diabetes, and hypertension. Other common diseases include digestive system and cardiovascular diseases. Cancer is also increasing, and the most

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common cancers include breast, liver, bladder and lymph nodes. In addition, there are other communicable diseases to include diarrheal diseases (especially in children), cold and flu, fever and inflammations or infections of the ear, nose or throat, as well as skin rashes and infections.

The Red Sea Governorate suffers from a lack of specialized health services which are suitable for the middle class. Furthermore, these services are concentrated in Hurghada City, and are absent in some other cities, such as Shalateen and Halayeb. The following tables show the health services available in the Governorate.

According to the statistics of the Directorate of Health Affairs (DHA) in Red Sea Governorate, there are 7 hospitals in Governorate with approximately 330 beds, they are government hospitals; one of them is a public and central hospital, in addition to 13 Private hospitals with 399 beds.

Table 53: Ministry of Health Hospitals & Other Entities in the Red Sea Governorate (The Statistical Yearbook, Red Sea Governorate Information Centre, 2018)

Item	Value
Hospitals Affiliated with the Ministry of Health	7
Hospitals of the General Authority for Health Insurance	0
Medical Treatment Institutions	0
Educational Hospitals	0
No. of Public & Central Hospitals	1
No. of Specialized Hospitals	1
Public Sector Hospitals (Including Military Hospitals)	4
Private Sector Hospitals	13
No. of Haemodialysis Centres Affiliated with the General Authority for Health Insurance	0
No. of Ambulance Vehicles	48

Ras Gharib City contains one central hospital, one ambulance station, and one civil defense unit, in addition to a limited number of private clinics and health centers. All health services are concentrated in Ras Gharib City. The central hospital serves all the areas and villages administratively affiliated with Ras Gharib Local Government Unit (LGU). The hospital is equipped with an Emergency room section and has outpatient clinics.

Human resources is one of the main factors for the success and continuity of health services, and the absence of qualified medical staff affects the quality of services provided. The following table illustrates available human resources in the health sector in the Red Sea Governorate.

Table 54: Number & Categories of Health Sector Workers in the Red Sea Governorate (CAPMAS, Census of Population Activities of the Governorates, Arab Republic of Egypt, 2016)

Area	No. of Doctors		No. of Pharmacists		No. of Dentists		No. of Nursing Staff		No. of Assistants	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Red Sea Governorate	255	137	60	170	49	29	79	412	102	0

Infrastructure and Services

According to the data available in the statistical yearbook, Red Sea Governorate, a brief summary of the extent to which access of basic infrastructure services available in the Red Sea Governorate and to the project's area is given in the following tables.

Potable Water & Sanitation

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Table 55: Access to potable water and sanitation in the Red Sea Governorate

Item	Unit	Value
Production of potable water	Thousand m^3 /Day	107.57
Consumption of potable water	Thousand m^3 /Day	81.96
Per capita water consumption	Liter. Day/ Person	249.24
Capacity of sanitation	Thousand m^3 /Day	16.57
Per capita sanitation capacity	Liter. Day/ Person	50.39

Source: Red Sea Governorate- Egypt Description by Information, 2020

- 18.00 thousand m^3/ day is the total capacity of sanitary drainage treatment plants in the Red Sea Governorate in 2018/2020.
- 92.06 % is the actual capacity of total capacities of sanitary drainage treatment plants in Red Sea Governorate in 2018/2020.
- 76.19 % is the amount of potable water consumption to average produced water in the Red Sea Governorate in 2018/2020.

All houses and facilities in Ras Gharib are connected to water and sanitation services from the local network. There is a limited number of houses (10%) in the city are not connected to the sewage network. They rely on septic tanks that are drained periodically.

Electricity

Access to electricity in Upper Egypt Governorates is 99.0% (Egyptian Human Development Report 2020). Even squatter areas have access to electricity regardless of their legality.

The East Delta Company for Electricity serves governorates of (Damietta- Ismailia- Port Said – Suez- North Sinai- South Sinai- the Red Sea).

Table 56: Access to Electricity in Red Sea Governorate

Item	Unit	Value
Total electricity production	Million k.w.h yearly	730.00
Total electricity consumption	Million k.w.h yearly	621.90
Electricity consumption for lighting	Million k.w.h yearly	424.27
Electricity consumption for industrial utilization	Million k.w.h yearly	197.63
No. of subscribers in the electrical grid	Thousand subscribers	157.05
Per capita share of electricity used for lighting	k.w.h yearly/ Person	1290.21

Source: Red Sea Governorate- Egypt Description by Information, 2020

All houses and facilities in Ras Gharib are connected to electricity services from the local network.

Investment and Development

- There is large focus on investment in the Red Sea Governorate, and many fields of investment are available (touristic, industrial, services), which positively impact comprehensive development in the Governorate.
- The following table shows the fields of investment in the Red Sea Governorate and Ras Gharib City

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Table 57: Fields of Investment in the Red Sea Governorate & Ras Gharib City (Red Sea Governorate Official Website, 2018)

Item	Red Sea Governorate	Ras Gharib
Mineral Production	The Red Sea is one of the important Egyptian governorates in the field of mineral production, as it contains deposits of most of metallic and non-metallic minerals, decoration stones and construction materials. The Red Sea Governorate stretches across the larger part of Eastern Desert, which forms one-fourth of Egypt's total area (about 250,000 km^2), and contains huge mineral resources.	There are several metal productions sites in Ras Gharib, including: - Gold in Abu-Marwat - Iron in Abu-Marwat - White sands in Dakhl Valley - Gypsum in the northwest of El-Dob Valley - Marble in Al-Shaikh Fadl Road and El-Dob Valley - Granite in Al-Shaikh Fadl Road
Fish Production	The Red Sea Governorate is an important region that can be utilized to increase fish production, as it has a 1,080 km-long coastline, with an average width of 240 km. There are various coral reef sites, with 3-5 square mile-area each. Different kinds of fish pass by these sites in certain seasons. Fish food is four times more abundant in the southern part of the Red Sea coast compared to the northern part.	There are several fish production sites in Ras Gharib: - Al-Mallaha fish farm which is located between Ras Gharib and Shoqair, with an area of 15,000 acres and a total annual production of more than 250 tons. - Suez Gulf fish farm with an area of 12,000 acres, and a total annual production of more than 400 tons. - Gamsha Gulf fish farm with an area of 9000 acres and total annual production of more than 350 tons.
Agricultural & Livestock Projects	Agriculture is a basic element in the regional comprehensive and integrated development in the Red Sea Governorate either through providing the food supply required for the development in the region or taking part in the attraction of new population from the crowded places over the Nile banks and confronting the expected increase in population and consumption. The southern triangle (Shalateen, Halayeb, Abu-Ramad) is one of the most important places for the agricultural investment in addition to other cities in the Governorate.	Suggested areas for agricultural investment in Ras Gharib include: - Cultivation of 500,000 acres in Wadi Araba (to the south of Zaafarana), which can be irrigated by groundwater from El-Bowerat well. - Cultivation of Gharib basin using groundwater in the area, as it is possible to extract 4,000 m3 of medium-salinity water per day, which can be used in irrigating citrus fruits and barley. - Cultivation of Wadi Dara village.
Touristic Investment	The General Tourist Planning of the Red Sea Governorate Red Sea Governorate contains a number of planned touristic zones.	- Zaafarana Sector - Gamsha Sector
	Available Elements for Supporting the Establishment of Touristic Projects in the Red Sea Governorate: ▪ A colourful, rocky mountain range extends along the Red Sea coast, providing a wonderful backdrop to the beach. The area is teeming with mines that had been exploited during ancient ages; mines that once rendered Egypt as one of the richest nations in ancient times, which were used to excavate gold, diamonds and valuable stones like Schist, white granite, etc. ▪ The beaches of the Red Sea coast are renowned for their clear blue waters, calm waves, and a paradise of colourful underwater coral reefs, which contains a multitude of rare and colourful fish.	

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Item	Red Sea Governorate	Ras Gharib
	▪ The yearlong moderate climates attract tourists both in summer and in winter to Red Sea Governorate resorts. ▪ The Governorate hosts various national parks, which contain a multitude of biological diversity. ▪ The Governorate contains valleys and archaeological, religious and curative sites. ▪ The Red Sea is also renowned for its black sands, which are used to cure rheumatoid and psoriasis.	
	▪ Touristic Projects Proposed for Implementation in the Governorate: ▪ Touristic villages, hotels, motels and camps in Safaga, Qoseir and Marsa Alam, the southern triangle (Shalateen, Abu-Ramad & Halayeb), as well as Zaafarana. Project land is allocated according to vacant areas. ▪ Cinemas, amusement parks and malls proposed to be established in Hurghada, Safaga, Qoseir & Marsa Alam. ▪ Fairs, aquariums, sports centres, golf courses, billiard halls and bowling alleys proposed to be implemented in Hurghada, Safaga, Qoseir, Marsa Alam & Zaafarana. ▪ Centers for providing diving equipment in Hurghada, Safaga, Qoseir & Marsa Alam. ▪ Tourist companies that provide safari trips in Hurghada, Safaga, Qoseir & Marsa Alam. ▪ Shipyards in Hurghada, Safaga, Qoseir & Marsa Alam. ▪ Internal shipping lines connecting the ports of Hurghada, Safaga & Marsa Alam with the ports of Al-Tour, Nuweiba, Taba & Sharm El-Sheikh, as well as Port Tawfik in Suez. Additionally, an international shipping line is proposed to connect the Governorate's ports with the ports the Red Sea and the Arabian Gulf. ▪ Establishing integrated projects for underwater imaging in Hurghada and Marsa Alam. ▪ An international conference centre in Hurghada. ▪ A hotel school in both Hurghada and Qoseir. ▪ Schools for teaching diving and swimming, drawing on graduate divers and specialized trainers in Hurghada, Safaga & Marsa Alam. ▪ Utilizing the islands in the construction of suitable projects in accordance with environmental laws. ▪ Small and medium industries provide hotel equipment.	

B. Wadi Dara Village

As previously mentioned, a survey was conducted for a total of 14 farms within the Wadi Dara Village as shown in the figure below. The results of the questionnaire undertaken during the site visit will be attached as a separate Annex.

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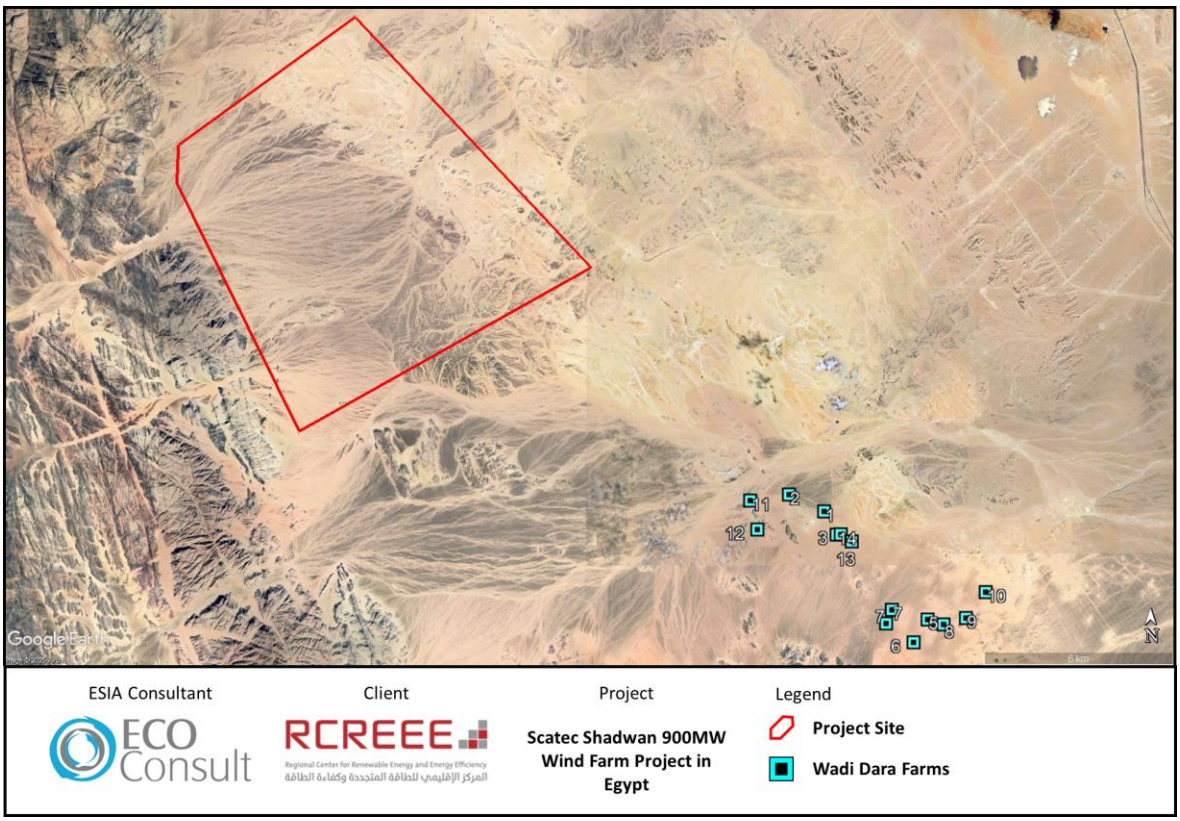


Figure 84: Location of Wadi Dara Farms

Table 58: Coordinates of Wadi Dara Farms

Reference Number	Coordinates	
	Latitude	Longitude
1	27.993177	33.144932
2	27.996715	33.140141
3	27.985851	33.156395
4	27.965673	33.173728
5	27.96975	33.185152
6	27.656525	33.180657
7	27.961881	33.171871
8	27.961570	33.190260
9	27.963370	33.197439
10	27.970648	33.203787
11	27.994384	33.128483
12	27.987960	33.130393
13	27.993177	33.144932
14	27.986974	33.156088

The following table presents the results of the survey undertaken.

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Table 59: Wadi Dara Suvey Results

Reference Number	Type of Structure	Occupancy / Quantity	Presence of windows facing the Project	Picture
1	Poultry farm Residents/ Accommodation	Workers accommodated at this location operate on a rotational basis, with each worker residing on-site for up to 30 days, followed by a 30-day off-site period before returning for the next rotation.	Yes	
2	Poultry farm under construction	No residents at this point	Yes	
3	Isolated biosafe area for poultry farm Accommodation for workers	Workers are accommodated on a shift-based rotational basis, with 20 workers present per shift and replaced by another group after one month. 20 people per month per shift.	Yes	
4	Poultry farm Residents/ accommodation	Workers accommodated at this location follow a rotational schedule, whereby each worker remains on site for a maximum of 30 days, followed by a 30-day off-site period before returning for the next rotation. 17 workers per	Yes	N/A

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Reference Number	Type of Structure	Occupancy / Quantity	Presence of windows facing the Project	Picture
		shift, with two shifts per day. The farm relies on a generator as the primary source of power.		
5	Agricultural farm (palm tree farm)	No workers were present on site during the visit. It is assumed that workers accommodated at this location follow a rotational schedule, whereby each worker remains on site for a maximum of 30 days, followed by a 30-day off-site period before returning for the next rotation. The farm uses solar power as the primary source of electricity.	Yes	
6	Poultry farm	At the time of the visit, only one community guard was present on site. It is assumed that workers accommodated at this location will follow a rotational schedule, whereby each worker remains on site for a maximum of 30 days, followed by a 30-day off-site period before returning for the next rotation.	Yes	

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Reference Number	Type of Structure	Occupancy / Quantity	Presence of windows facing the Project	Picture
7	Active poultry farm Residence/ accommodation	Workers are accommodated on site on a part-time basis. A total of 17 workers are present per shift, with two shifts per day. Workers remain on site for periods exceeding 30 days. The farm relies on a generator as the primary source of power.		
8	Poultry and agricultural farms Residents/ accommodation	The site is occupied by full-time residents. A total of seven permanent workers reside on site throughout the year. Power supply is provided by an on-site generator.		
9	Livestock farm (Arabian horses) and agricultural farm (palm trees) with on-site accommodation.		Yes	
10	Agricultural farm (palm tree farm) under construction.	No residents or workers were present on site during the site visit.	Yes	

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Reference Number	Type of Structure	Occupancy / Quantity	Presence of windows facing the Project	Picture
11	Poultry farms are under construction. related to Ministry of Defense	Approximately nine daily workers are present on site, in addition to two drivers.	Yes	
12	No structure was present			
13	Egg-hatchery farm related to the Ministry of Defense	Workers are accommodated at this location on a rotational basis. Each worker remains on site for a maximum of 30 days, followed by a 30-day off-site period, before returning for the next rotation.	Yes	
14	Water desalination source for nearby poultry farms	The facility is under the control of the Ministry of Defense. Workers are present on a shift basis, with approximately 10 persons per month assigned for one shift.	Yes	

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8. ENVIRONMENTAL AND SOCIAL IMPACT AND RISK ASSESSMENT

This Section provides an overview of the strategic environmental and economic impacts and risks related to the Project development followed by an assessment of anticipated impacts resulting and or influenced by the Project throughout its phases (construction, operation and decommission) on Environmental and Social receptors and attributes.

8.1 Overview of Strategic Environmental and Economic Impacts

8.1.1 Government Vision for the Energy Sector

The GoE has taken steps to adopt an energy diversification strategy underscored by increased development of renewable energy and the implementation of energy efficiency, including assertive rehabilitation and maintenance programs in the power sector (IRENA, 2018).

To this extent, in 2013, the Arab Republic of Egypt (through the Supreme Council of Energy) had developed and adopted the Integrated Sustainable Energy Strategy (ISES) 2015 – 2035, which outlines the nation's roadmap to increase the contribution of renewable energy to 42% of the country's electricity mix by 2030.

To promote renewable energy sources and in order to open the way for the private sector to effectively participate in the implementation of renewable energy project, the Renewable Energy Law (Decree Law 203/2014) was issued. The law facilitates investors in developing renewable grid-connected electricity production through the BOO scheme as discussed earlier in "Section 1.1".

8.1.2 Energy Security

The topic of energy security Recently, most policy makers around the world are grappling with issues related to energy security, energy poverty, and an expected increase in future demand for all energy sources – and Egypt is no exception. Almost certainly, the most spoken words by policy makers and government bodies in Egypt in the last couple of years revolved around 'energy security'.

Through various strategies and visions, Egypt has emphasized on the importance of energy security. This includes for example the Egypt Sustainable Development Strategy, Egypt Vision 2030, in which the sustainable development targets include energy and in which Goal I specifically address security of supply to ensure the availability of reliable energy supplies to satisfy the future development needs of the country through adoption of a more diverse energy mix. Similarly, the ISES 2015 – 2035 addresses energy import dependence and diversification of electricity generation.

In line with the above, the Project in specific will contribute to increasing energy security by way of increasing the availability of a national and mostly import-independent energy resource. The estimated electricity generation from the Project is estimated at around 2,450 Gigawatt hours (GWh) per year on average; which will serve the annual electricity needs of around 900,000 local households.

The above has been calculated based on statistics obtained from Egyptian Central Agency for Public Mobilization and Statistics (CAPMAS). The total household electricity consumption in Egypt for 2016 – 2017 (latest statistics available online) was 64,100 GWh (CAPMAS, 2018). In addition, in 2016 – 2017 the total number of household beneficiaries from the public electricity network was 23,383,521 Households

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(CAPMAS, 2017). Therefore, average electricity consumption per household per year can be assumed to be around 2,700 (kWh/household).

8.1.3 Environmental Benefits

The negative environmental impacts from generating electricity through conventional fossil fuel burning at thermal power plants are very well known. This most importantly includes air pollutant emissions such as ozone, Sulphur Dioxide (SO2), Nitrogen Dioxide (NO2), Particulate Matter (PM), and other gases which are the cause of some serious environmental concerns such as smog, acid rain, health effects, and many others.

In addition, the burning of fossil fuels results in carbon dioxide emissions; a primary greenhouse gas emitted through human activities which contributes to global warming. The main human activity that emits CO_2 is the combustion of fossil fuels for electricity production and transportation. Concurrently, global climate change has become an issue of concern and so reducing greenhouse gas emissions have also emerged as primary issues to be addressed as the world searches for a sustainable energy future.

Generating electricity through wind power is rather pollution-free during operation. Compared with the current conventional way of producing electricity in Egypt through thermal power, the clean energy produced from renewable energy resources is expected to reduce consumption of fossil fuels, and is to aid in reducing GHG emissions, as well as air pollutant emissions.

The Project is expected to generate approximately 2,450 GWh/year. Based on CAPMAS statistics for 2016–2017, total national CO_2 emissions were reported as approximately 210 million tonnes CO_2, of which the electricity sector accounted for 43.3%, equivalent to approximately 91 million tonnes CO_2. Total electricity generation for the same period was approximately 190,000 GWh. On this basis, the implied grid emission factor is calculated as follows:

91,000,000 tCO_2 ÷ 190,000 GWh = 479 tCO_2/GWh

This is equivalent to approximately 0.479 tCO_2/MWh or 479 gCO_2/kWh.

Applying this emission factor to the Project's expected annual electricity generation gives:

2,450 GWh/year × 479 tCO_2/GWh = approximately 1,174,000 tCO_2/year

Therefore, the Project is estimated to avoid approximately 1.17 million tCO_2/year, rounded to approximately 1.2 million tCO_2/year.

It is noted that this calculation is based on CAPMAS electricity generation and emissions statistics available at the time of preparation of this ESIA. The estimate should therefore be understood as an indicative calculation of avoided emissions. In addition, there is an important benefit in relation to wind farm developments related to water conservation because unlike certain power generation methods, wind projects do not require significant amounts of water for cooling or steam generation. Conservation of water is particularly important in arid regions like Egypt, where water scarcity is a significant challenge.

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8.2 Landscape and Visual

This section identifies the anticipated impacts on landscape and visual from the Project throughout its various phases. For each impact, a set of management measures (which could include mitigation measures, additional requirements, etc.) and monitoring measures have been identified to eliminate or reduce the impact to acceptable levels.

8.2.1 Potential Impacts During the Construction Phase

Site preparation activities which are to take place onsite by the EPC Contractor for installation of the wind turbines and the various Project components to include substation, transmission cables, access roads and internal road network, buildings, etc. are expected to include land clearing activities, levelling, excavation, grading, etc.

Construction activities would create a temporary negative effect on the visual quality of the site and its surroundings and may disturb the natural appearance of the desert terrain. The visual environment during the construction phase would include the presence of elements typical of a construction site such as equipment and machinery to include excavators, trucks, front end loaders, compactors and others.

The table below provides an overall summary of the impact on landscape and visual during the construction phase. The overall impact is considered to be of minor significance.

Construction Phase		
Type	Negative	N/A
Duration	Short-term	Limited to construction phase which is 31 months
Magnitude	Medium	Given that construction activities will not be noticeable
Reversibility	Reversible	With completion of construction activities
Sensitivity	Low	Given the number of existing wind power plants and substations surrounding the Project
Likelihood	High	Given nature of activities expected
Frequency	Frequent	Will occur for 31 months during construction period
Timing	N/A	Not applicable
Extent	Low	Impacts will occur within the actual footprint of Project. Under worst-case scenario and for tall construction elements this is expected to be within 5km radius.
Significance	Minor	

Mitigation Measures

The following identifies the mitigation measures to be applied by the EPC Contractor during the construction phase and which include:

- Ensure proper general housekeeping and personnel management measures are implemented which could include:
  - Ensure the construction site is left in an orderly state at the end of each workday.
  - To the greatest extent possible construction machinery, equipment, and vehicles that are not in use should be removed in a timely manner and kept in locations to reduce visual impacts to the area.
- Ensure proper storage, collection, and disposal of waste streams generated

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- Implement restoration and rehabilitation measures to restore the site's visual quality through for example re-contouring the land and removing temporary structures (e.g. batching plant).
- Ensure full application of the C-ESMP obligations and so fulfilling EEAA conditions stated in the ESIA approval letter, during the construction phase.

Following the implementation of these mitigation measures, the significance of the residual impact is categorized as not significant.

Monitoring and Reporting Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by EPC Contractor during the construction phase:

- Inspections of the work should be carried out at all times to ensure the above measures are implemented.

8.2.2 Potential Impacts During the Operation Phase

Visual impacts associated with wind energy projects typically concern the turbines themselves (e.g. color, height, and number of turbines) and impacts relating to their interaction with the character of the surrounding landscape and the visual receptor which might be present.

Turbines are tall structures (220m for this Project) that can be seen from several kilometers away and impose a change on the landscape of the area where they are installed. However, visual impacts depend on several factors such as distance, size, visibility, landscape and geography, and the presence of potential sensitive visual receptors.

Nevertheless, visual impacts created from the development of the Project are not considered an issue of concern due to the following:

- The only potential sensitive receptors would be Wadi Dara village and Ras Gharib city which are located 10km southeast and 22km north-northeast of the Project site, respectively.
- Project area is considered a barren and desert area and in general is located within an industrial area with multiple wind farm developments for which its aesthetical value loses some importance.
- There are several existing and under construction wind farm developments in the area as well as several electricity distribution and transmission lines so the addition of this Project will not be a significant impact on the visual and landscape characteristics of the area.
- Being visible is not necessarily the same as being intrusive. Aesthetic issues are by their nature highly subjective. For some viewers, a Wind Farm could be regarded as manmade structures with visual burdens while to others it represents a positive impact in the sense that they introduce a break in the otherwise dull and monotonous view.

In addition to the above, the rotating blades will most likely be visible from vehicles passing across the Hurghada - Cairo Highway as well as the main road leading into Wadi Dara Village which also intersects the Project Site. The turbines can attract visual attention and potentially distract drivers passing along the highway.

In accordance with the above, the table below provides an overall impact assessment for the windfarm on landscape and visual receptors during the operation phase.

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Operation Phase		
Type	Negative	N/A
Duration	Long-term	Throughout the operation phase
Magnitude	Low	Given that visual impacts are not very noticeable in general
Reversibility	Reversible	With decommissioning of WTGs
Sensitivity	Medium	Given that there are no sensitive receptors in the area.
Likelihood	Medium	Given nature of activities expected
Frequency	Frequent	Expected throughout entire operational phase
Timing	Not relevant	Applicable throughout entire operational phase
Extent	High	Turbines can be visible for distances greater than 10 km
Significance	Minor	

Mitigation Measures

The following identifies the mitigation measures to be applied by the Project Operator during the operation phase and which include:

- In coordination with the Traffic and Transport Authority, install clear and informative signage in Arabic and English language at Hurghada – Cairo Highway and on the road leaving the highway and into Wadi Dara Village to alert drivers of the wind farm ahead and provide guidance on safe driving practices.
- Ensure full application of the approved ESMP obligations and so fulfilling EEAA conditions stated in the ESIA approval letter, during the operation phase.
-

Following the implementation of these mitigation measures, the significance of the residual impact is categorized as not significant.

Monitoring and Reporting Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by Project Operator during the operation phase:

- Inspections on highway to ensure signage is installed.

8.3 Land Use

This section identifies the anticipated impacts on land use from the Project throughout its various phases. For each impact, a set of management measures (which could include mitigation measures, additional requirements, etc.) and monitoring measures have been identified to eliminate or reduce the impact to acceptable levels.

Based on the results and outcomes of the desktop and site survey presented in “Section 7.2”, as well as the consultations undertaken with relevant authorities, no land acquisition requirements have been identified for the Project. As confirmed during consultations with NREA and the Ras Gharib City Council, the Project site lies within a designated renewable energy development zone under governmental ownership, which has been allocated by the Government of Egypt to NREA for wind power development in accordance with Presidential Decree No. 628 of 2024. Hence, there are no anticipated land acquisition impacts and there are no further requirements to be considered for the ESIA study. Therefore, there are no impacts anticipated in terms of landownership.

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Consultations conducted with NREA additionally confirmed that the land allocated for the Project is not designated for any other development purposes, such as housing, industrial activities, or agricultural reclamation.

Accordingly, there are no physical or economical activities undertaken on the Project site. Therefore, there are no anticipated impacts on land use in relation to physical and/or economical displacement from the Project footprint.

Based on the above, there are no anticipated impacts on land use and there are no further requirements to be considered for the ESIA study.

8.4 Geology, Hydrology and Hydrogeology

This section identifies the anticipated impacts on hydrology and hydrogeology from the Project throughout its various phases. For each impact, a set of management measures (which could include mitigation measures, additional requirements, etc.) and monitoring measures have been identified to eliminate or reduce the impact to acceptable levels.

8.4.1 Potential Impacts from Flood Risks on the Project Site

It is important to investigate potential risks of local flood hazards from drainage systems, particularly during the rainy season and during flash flood events, as these could affect the Project components. The Project site and its surroundings lack permanent fresh surface water bodies or streams; instead, the area is traversed by shallow, dry drainage lines that occasionally convey runoff from the Red Sea Mountains toward the Gulf of Suez. As discussed earlier, the Project is located within a plain intersected by wide, shallow drainage lines with a simple topography and gentle slope toward the northeast, and the ground floor of the site is covered by Quaternary alluvial deposits in the form of alluvial fans and terraces.

The Project lies within the drainage basin of Wadi Dara, which is one of the main wadis in the area, and in the downstream part of the watershed shared between Wadi Dara and Wadi Kharm Elein. Regional studies have identified several drainage basins in the Ras Gharib area that contribute to flash flood hazards along the Red Sea coast, including Wadi Abu Had, Wadi El Darb, Wadi Malaha, Wadi Garf and Wadi Dara.

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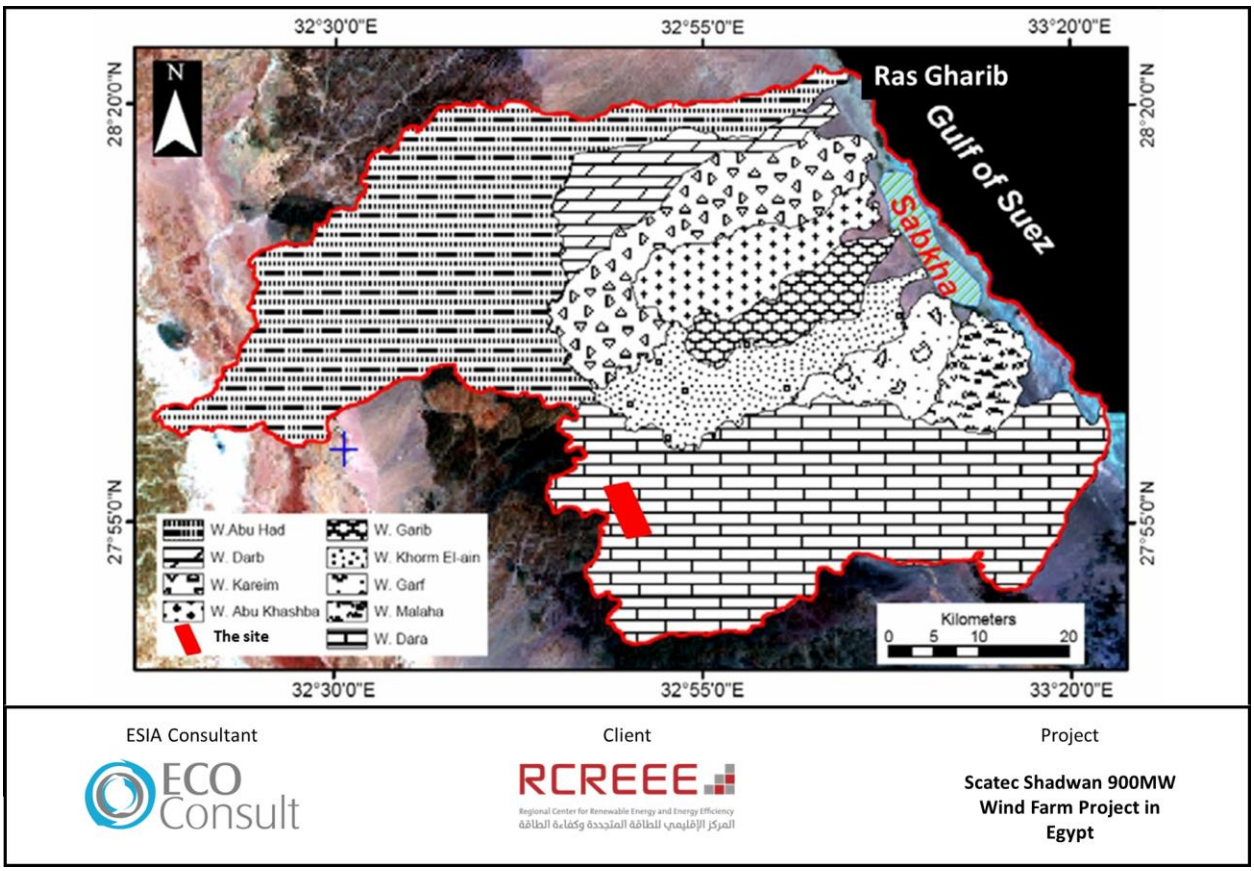


Figure 85: Delineated Drainage Basins in the Wider Study Area Showing the Project's Location Within Wadi Dara (Modified after Youssef and Hegab, 2005)

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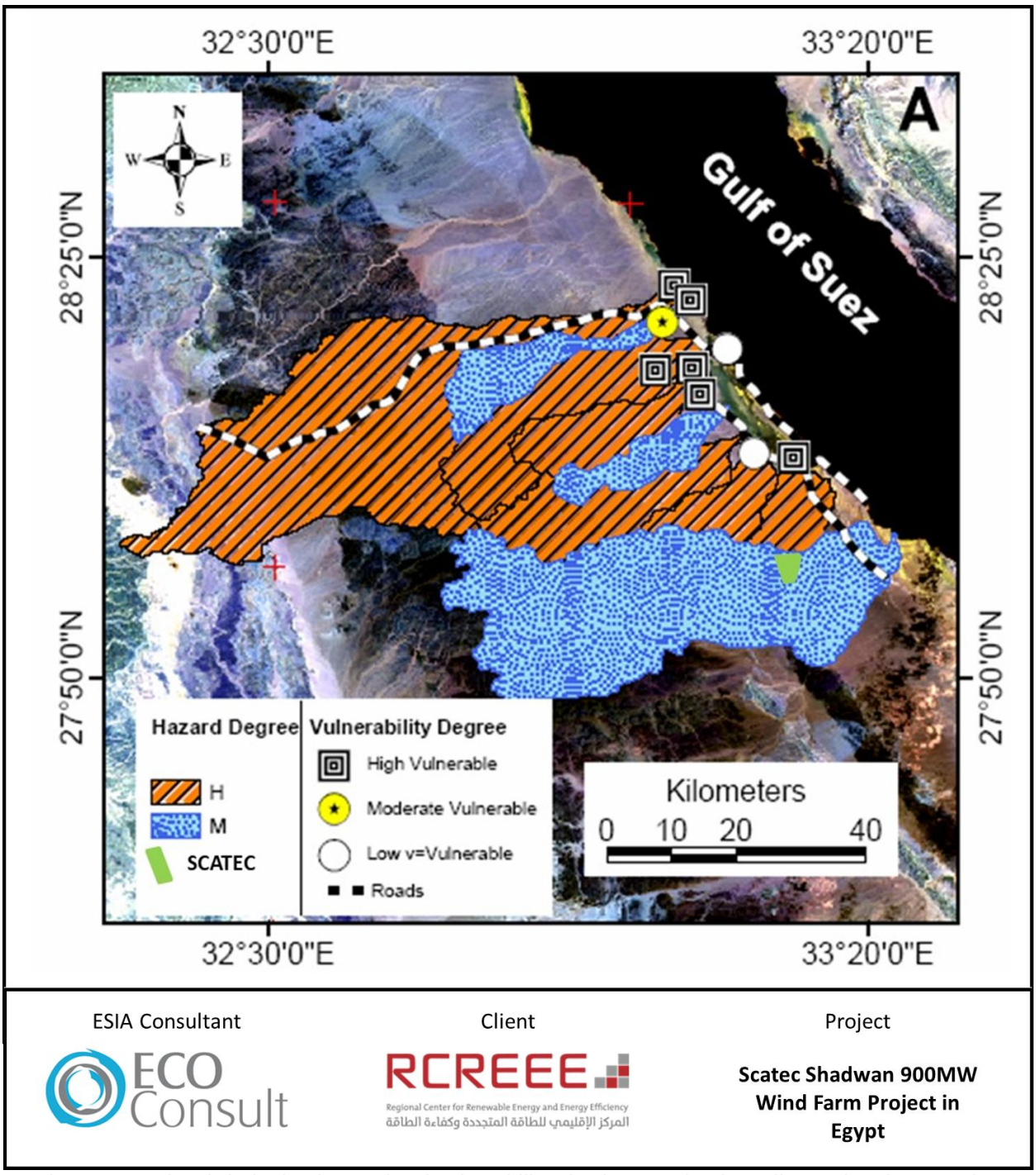


Figure 86: Regional Flash-Flood Hazard and Vulnerability Classification for the Delineated Drainage Basins (After Youssef and Hegab, 2005)

A literature review and historical record of flash floods along the Red Sea and Gulf of Suez indicate that destructive flash floods have occurred repeatedly between 1972 and 2016 in locations such as Ras Gharib, Safaga, El Quseir, Marsa Alam and other coastal and Upper Egypt towns. These events have caused road damage, dam failures, demolished houses and loss of life. However, during the major storm of October 26–27, 2016, the watershed of Wadi Dara did not receive any heavy rainfall, whereas the city of Ras Gharib was severely damaged by flash flooding.

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Table 60: Historical Records of Hazardous Flash Floods in Egypt

Date	Area	Recorded damages & References
October 2019	Cairo, Alexandria, meet Ghamr and new Cairo	12 Deaths, road damages
April 2018	Al ain Alshokhna, Fifth settlement "New Cairo"	Road damage, damaged vehicles, 10 million EGP loss
October 2016	Ras sedr, Sharm Elshekh, Hurghada, and Qena	Road damage, water pipe damage
2015	Assuit, Sohag, Qena, Luxor, and Aswan	Destroyed houses
2015	Alexandria, Al-bhera, and Matrouh Governorates	35 Deaths, 180 destroyed houses, dozens injured thousands of acres drowned
February, October 2015	North and south of Sinai, Red Sea region	Road damage, loading and unloading area of Hurghada International Airport drowned
March, May 2014	Taba, Sohag, Aswan, Kom Ombo	Dam failure at Sohag, road damages
2013	South Sanai & Sohag, and Assuit	Deaths, road damage, 750 million EGP loss
2012	W. Dahab, Catherine area	Dam failure, destroyed houses
January 2010	Aswan, Sinai, and Al Arish	8 Deaths, 1381 damaged houses, roads and infrastructure
2009	Along the Red Sea coast, Aswan, Sinai	12 Deaths, damaged houses and roads and 37 injuries
October 2004	W. Watier, Safaga, El-Qusier	Road damage
May 1997	Hurghada, Marsa Alam	200 Deaths, destroy roads, demolished houses damaged vehicles
November 1996	Dhab, Sohage, Qena, Safaga, El-Qusier, Marsa Alam,W. Aawag	3200 Destroyed houses
September, November 1994	W. El-Gemal, Marsa Alam, W. Sudr	1 Death, roads damage, 27 injuries
March, August 1991	South Sanai	32 Deaths, dam failure
October 1990	Qena Governorate	Demolished 180 houses
January 1988	South Giza	Roads damaged and demolished houses
October 1987	Aswan Governorate	Roads damage, demolished houses and farms
1985	Aswan Governorate, W. Elarish, Qena and Sohag	5619 Deaths, demolished houses
February 1982	Aswan, Kom Ombo, Idfu, Assiut, Marsa Alam, El-Qusier	Drowning of 10 villages, 180 houses were destroyed, and 1500 citizens displaced.
April 1981	Minia, Assuit, and Sohag	17 Deaths, road problems, and 200 houses destroyed
February, November, and December 1980	W. El-Arish	Destroyed houses, roads, and farms
May, October 1979	Giza	500 Houses destroyed
1975	Qena Governorate	Demolished houses, destroyed roods, and dam failure
February 1975	W. Al Arish	Demolished houses, destroyed roods, and dam failure

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Figure 87: Observed Flood Damage in Ras Gharib During the October 2016 Storm Event

Further regional assessments (e.g. Elnazer et al., 2017) indicate that, while some basins such as Wadi Abu Had and Wadi Al Darb pose high risks to urban areas (e.g. Ras Gharib), the Wadi Dara basin is characterised by a medium flash flood hazard level but without associated vulnerability, due to the absence of major settlements along its course. A flood mitigation channel of approximately 38 km has been proposed and partially implemented around Ras Gharib to divert floodwaters north of the city and reduce future flood risk.

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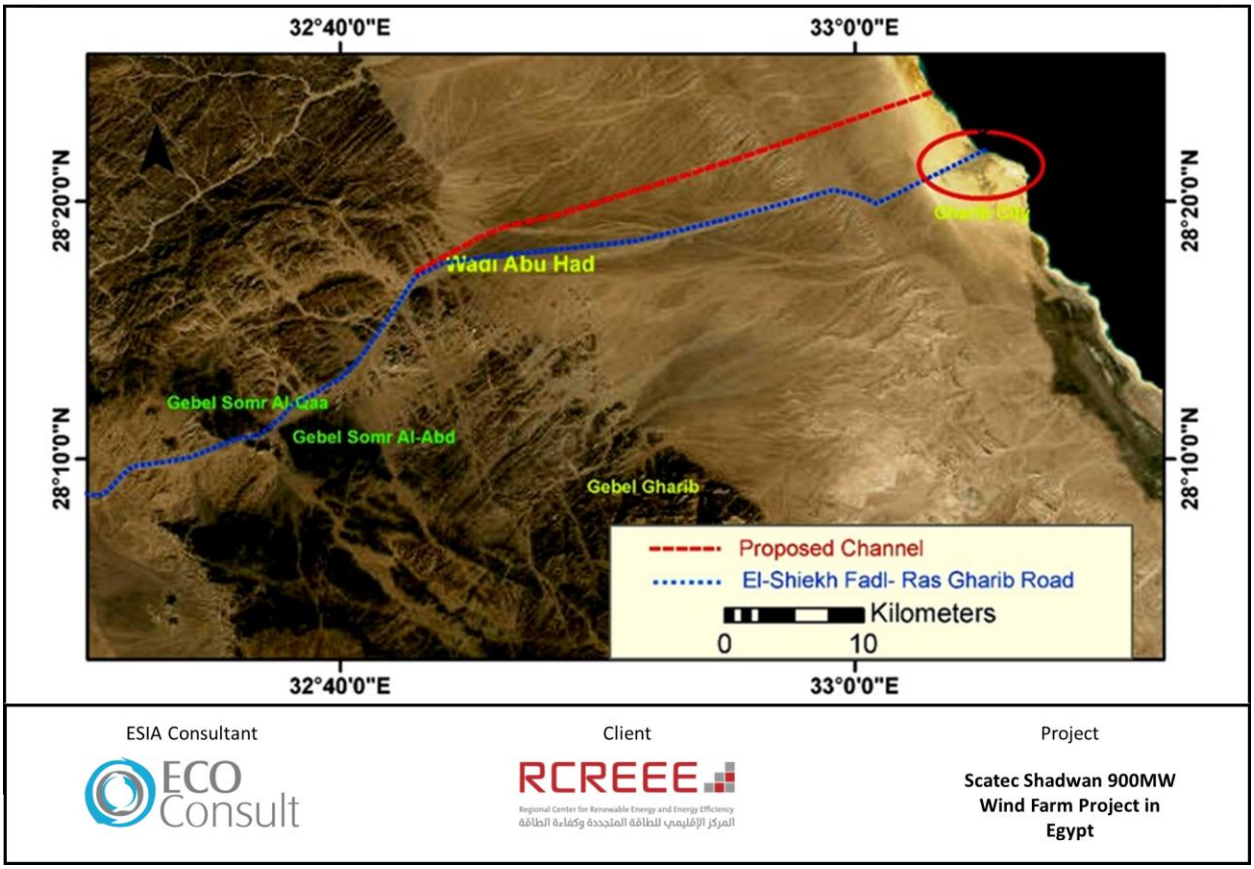


Figure 88: Proposed Flash Flood Channel Location in the Study Area (After Elnazer et al., 2017)

At the Project scale, surface water conditions and the drainage network have been analyzed using topographic maps, Landsat images and DEMs generated from SRTM data. These show that the Project site is located within a gently sloping plain intersected by shallow and wide drainage lines, with a regional slope on the order of 0.025 toward the northeast, and slopes across the site of approximately 0.005–0.006. The drainage lines are weakly incised and separated by shallow alluvial terraces, indicating low-intensity surface flow and limited ability to erode or transport large sediment loads.

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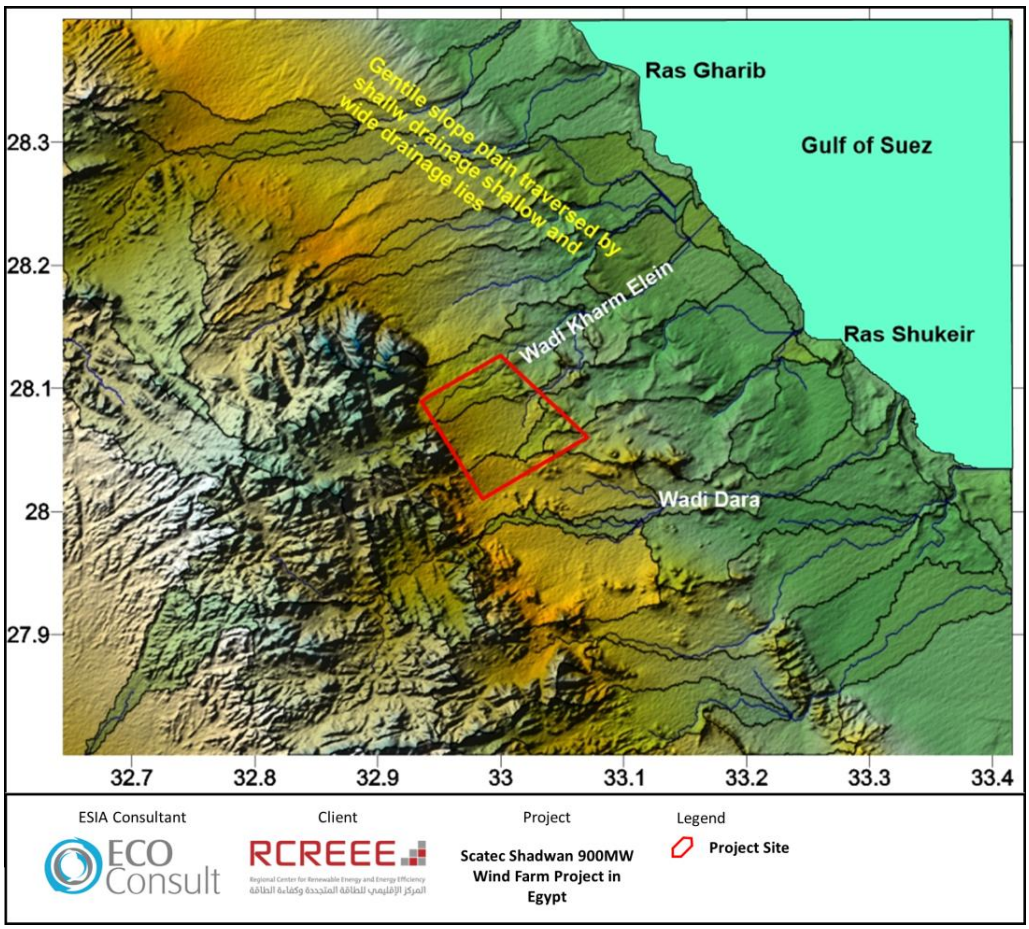


Figure 89: Drainage Basins Intersecting the Project Area Derived From DEM-Based Watershed Analysis

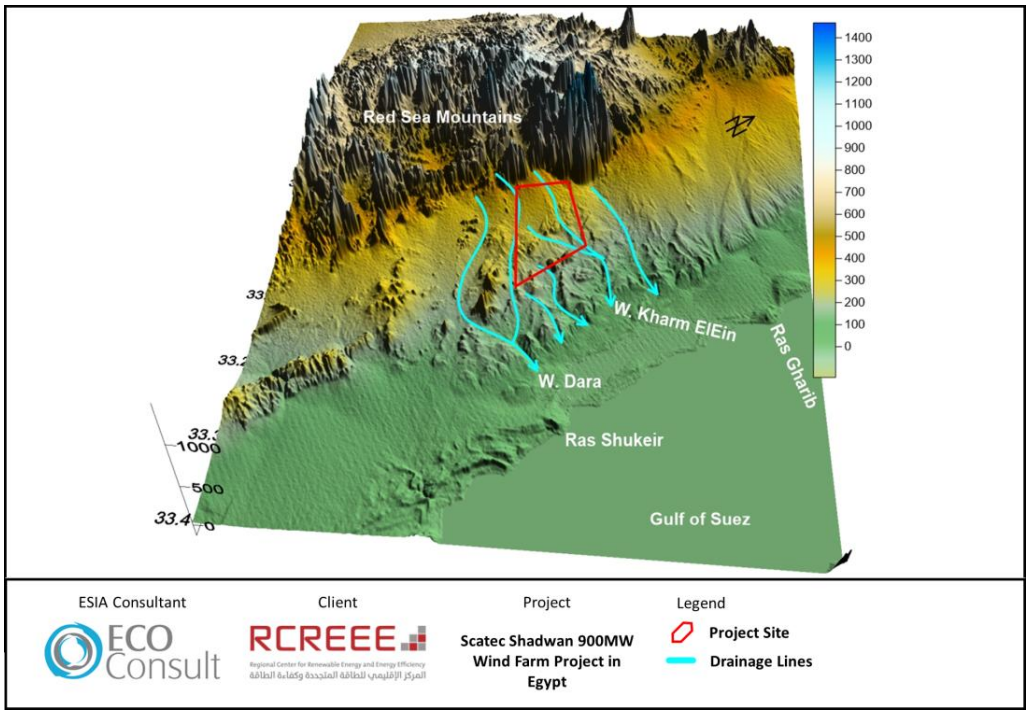


Figure 90: 3D Terrain Model Illustrating the Course of Wadi Dara South of the Project Site

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The field-based topographic profiles (P1–P6) confirm that the surface water flow paths across the site are very shallow and that the overall slope is low, both along and across the drainage lines. Refer to figures below.

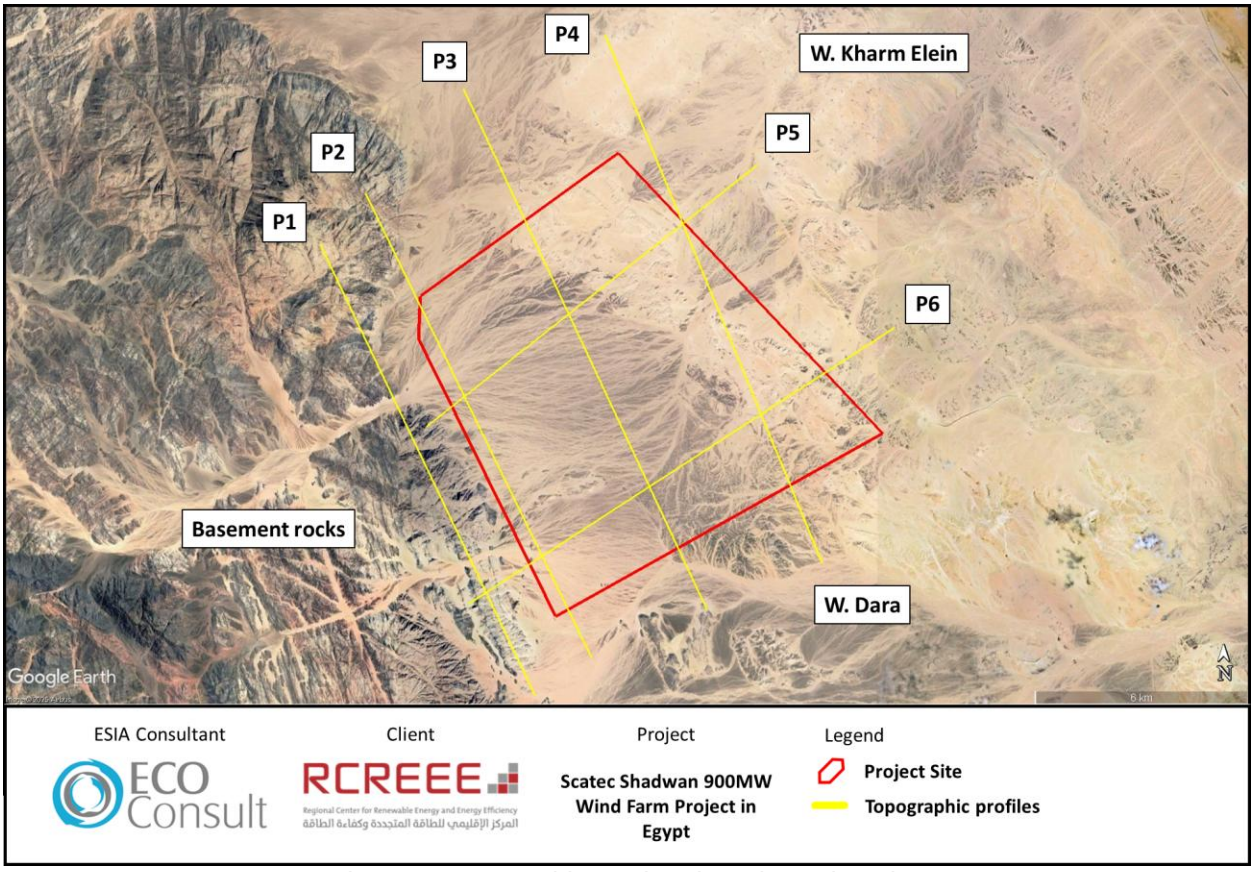


Figure 91: Topographic Profiles Along the Project Site

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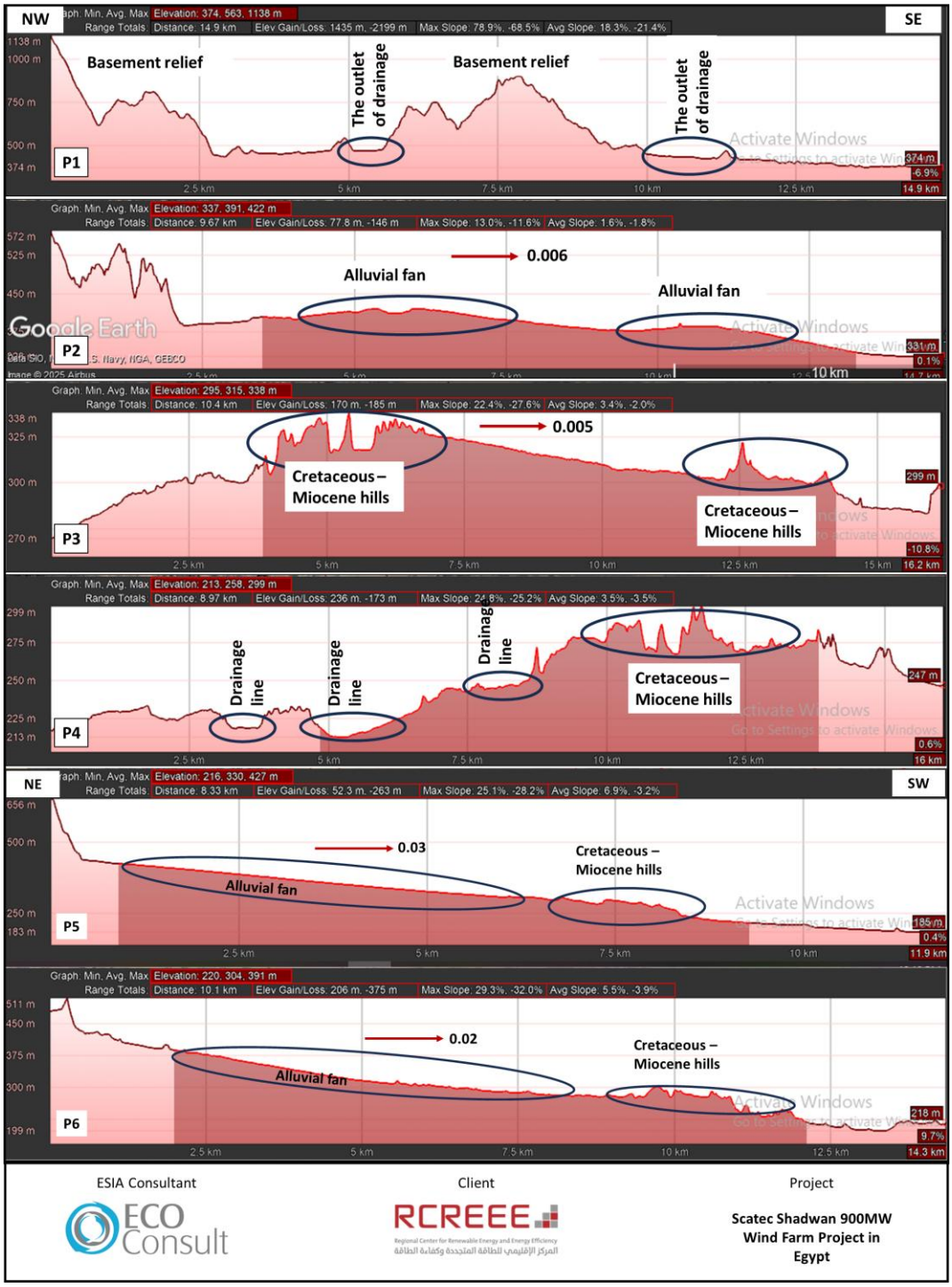


Figure 92: Topographic Profiles Along the Project Site

In addition, field observations confirm that the entire Project area is wide and nearly flat, with numerous straight, shallow and short tributaries. The main trunk streams are shallow and wide, covered with fine sand and coarse gravel, reflecting weak flow intensity. Small, elevated hills of Upper Cretaceous and Miocene sediments, mainly evaporite, are exposed in the eastern part of the site, but these are dissected by shallow tributaries and surrounded by gently sloping alluvial surfaces that remain accessible via existing tracks or roads.

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The soil cover consists of Quaternary alluvial deposits (alluvial fans and terraces) with varying grain sizes, from gravely sand in the western part near the basement rocks to sandy loam in the eastern part where sandstone and evaporite prevail. The upper layer of these deposits contains coarse gravel and rock fragments to a depth of less than 1 m, underlain by finer materials. The soil is characterized by high porosity and permeability, granting it a high infiltration capacity that allows a significant proportion of rainfall and surface runoff to infiltrate and recharge groundwater during storm events. The surface flow appears too weak to effectively sort the surface deposits, even in the upstream areas just below the basement exposures.

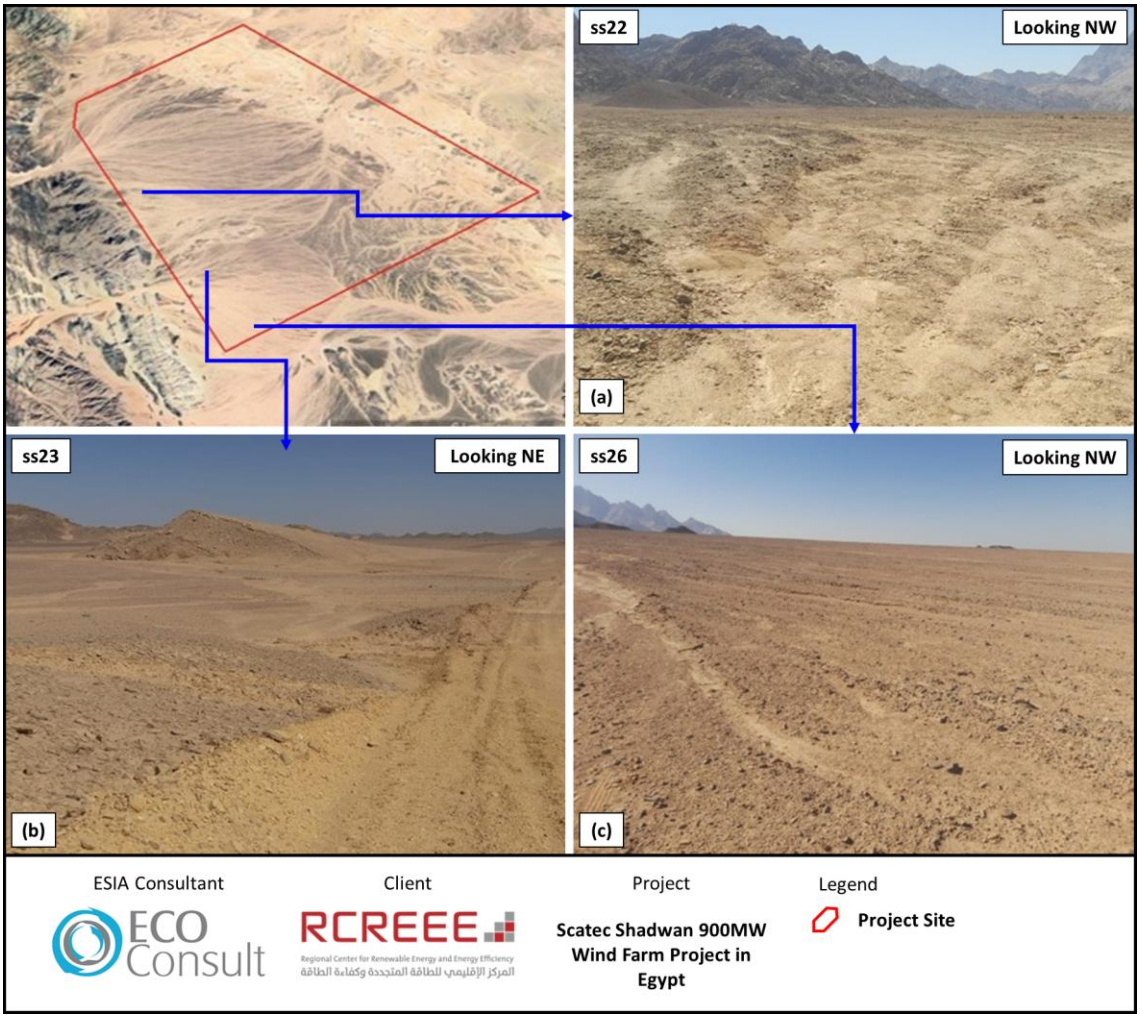


Figure 93: Grain Size Variation of the Surface Deposits in the Western and Central Parts of the Project Site

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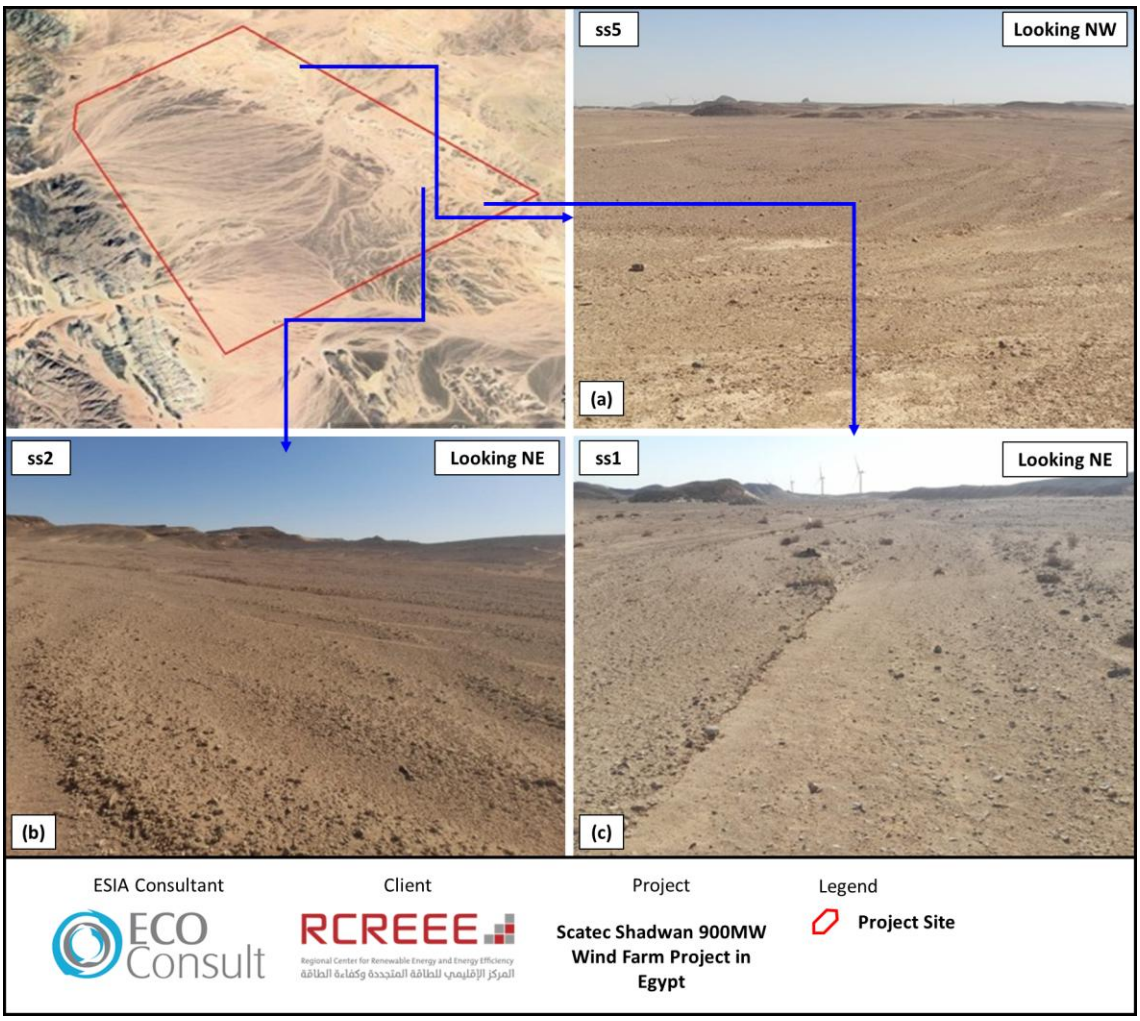


Figure 94: Grain Size Variation of Surface Deposits in the Eastern Side of the Project Site

Furthermore, measurements of terrace thickness and channel morphology indicate that the average thickness of surface flow along the main drainage lines is limited to a few centimeters in the western and middle parts of the Project site and increases only slightly in the eastern part where tributaries merge into mainstream channels. This indicates that surface water flow in the alluvial fans is very slow and thin compared to flow in the more confined channels in the eastern portion, and that the likelihood of floods or severe surface runoff posing a threat to site infrastructure is minimal over most of the site area and only slightly higher in the low-elevation sandstone and evaporite zones in the east.

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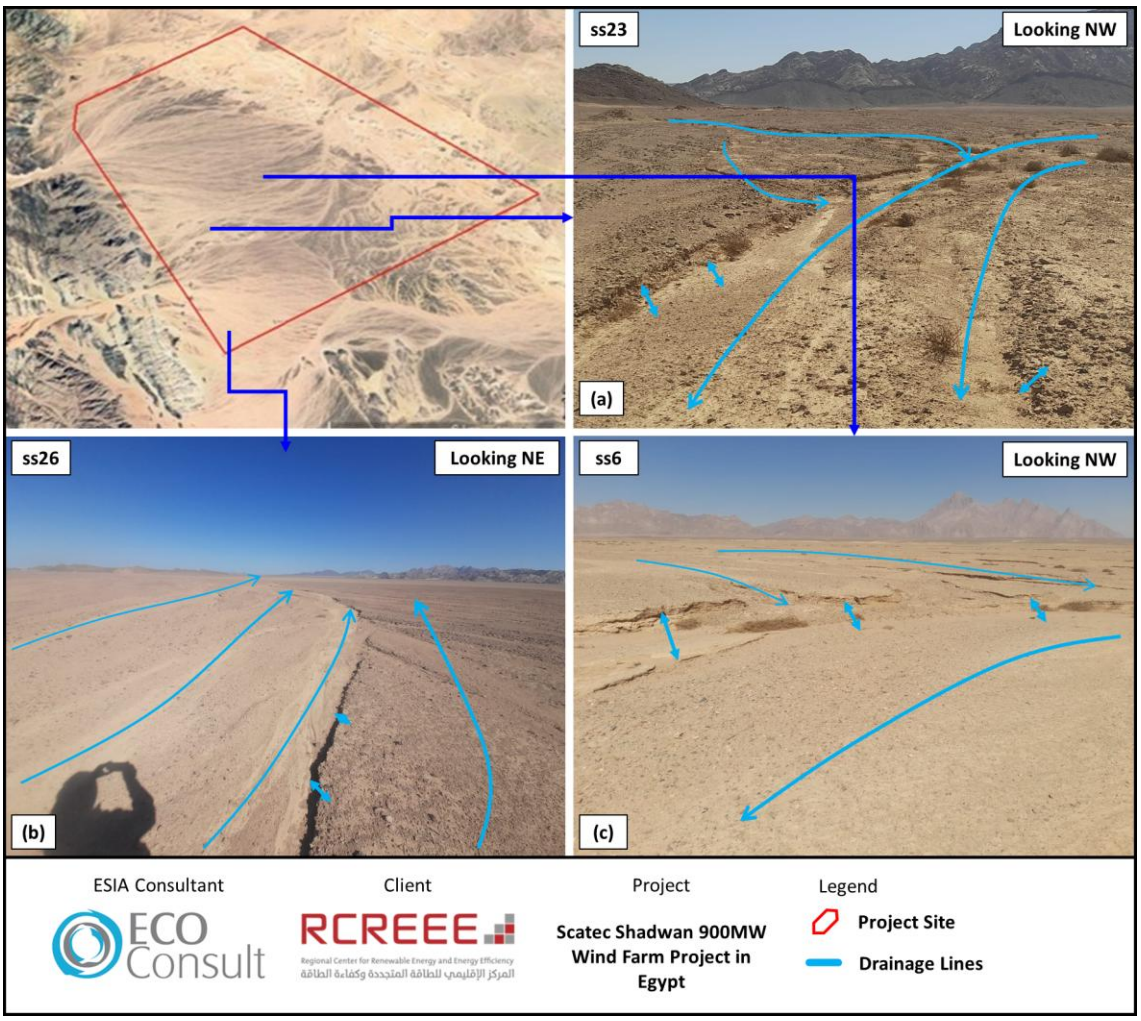


Figure 95: Shallow, Wide Drainage Lines in the Western and Central Parts of the Site Where Surface Flow is Minimal

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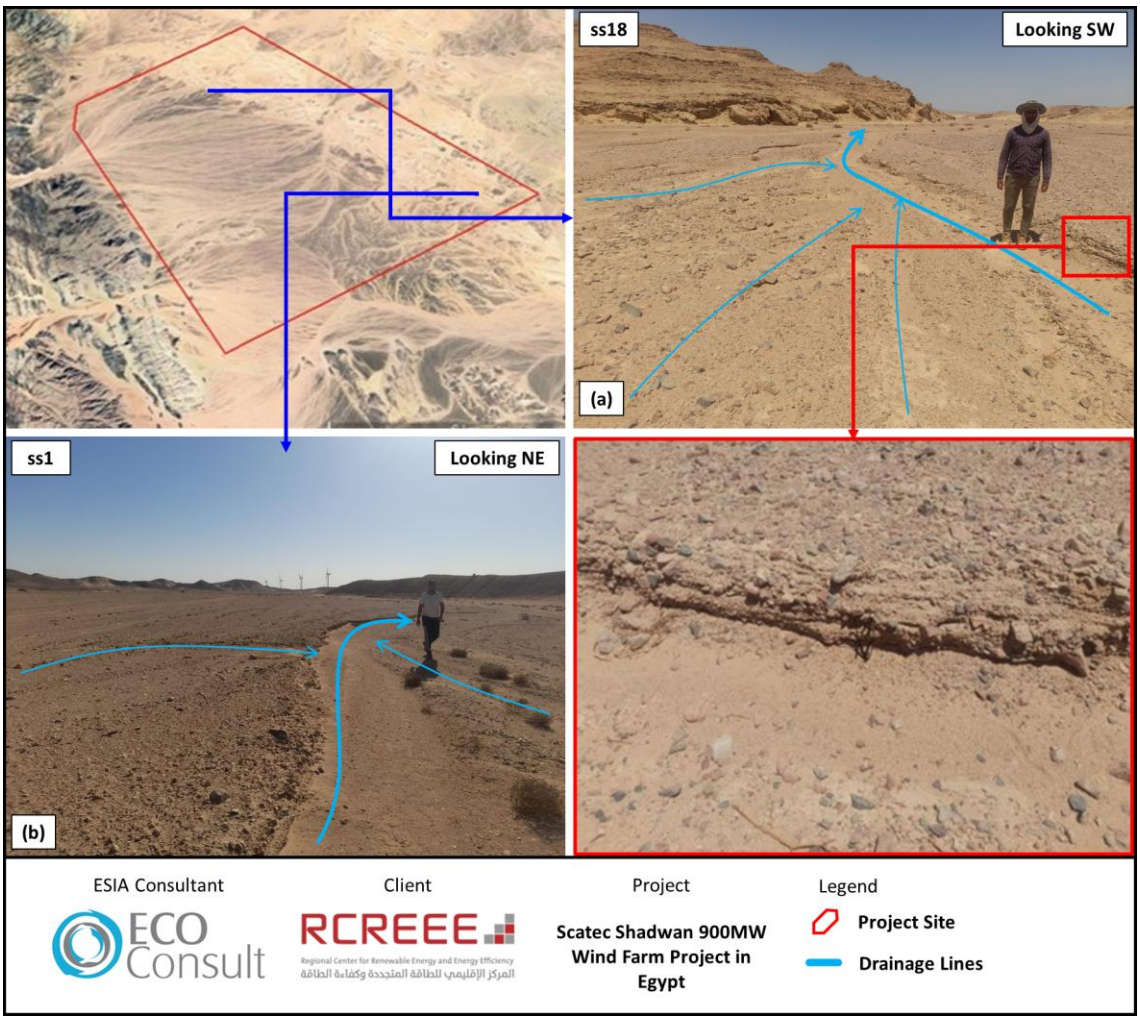


Figure 96: Main Streams of the Drainage Lines Crossing the Eastern Part of the Project Site

In addition, vegetation density within the Project site is very low and largely restricted to the floors of drainage lines, which suggests either low rainfall intensity or high infiltration capacity that limits surface water residence time. Erosion is confined mainly to the sides of drainage lines, with thin sediment layers accumulating on channel floors. Annual sediment deposit is estimated to be only a few millimetres, confirming that erosion processes are currently very weak. No field indications of water accumulation areas, such as depressions capable of storing surface runoff, were observed within the site.

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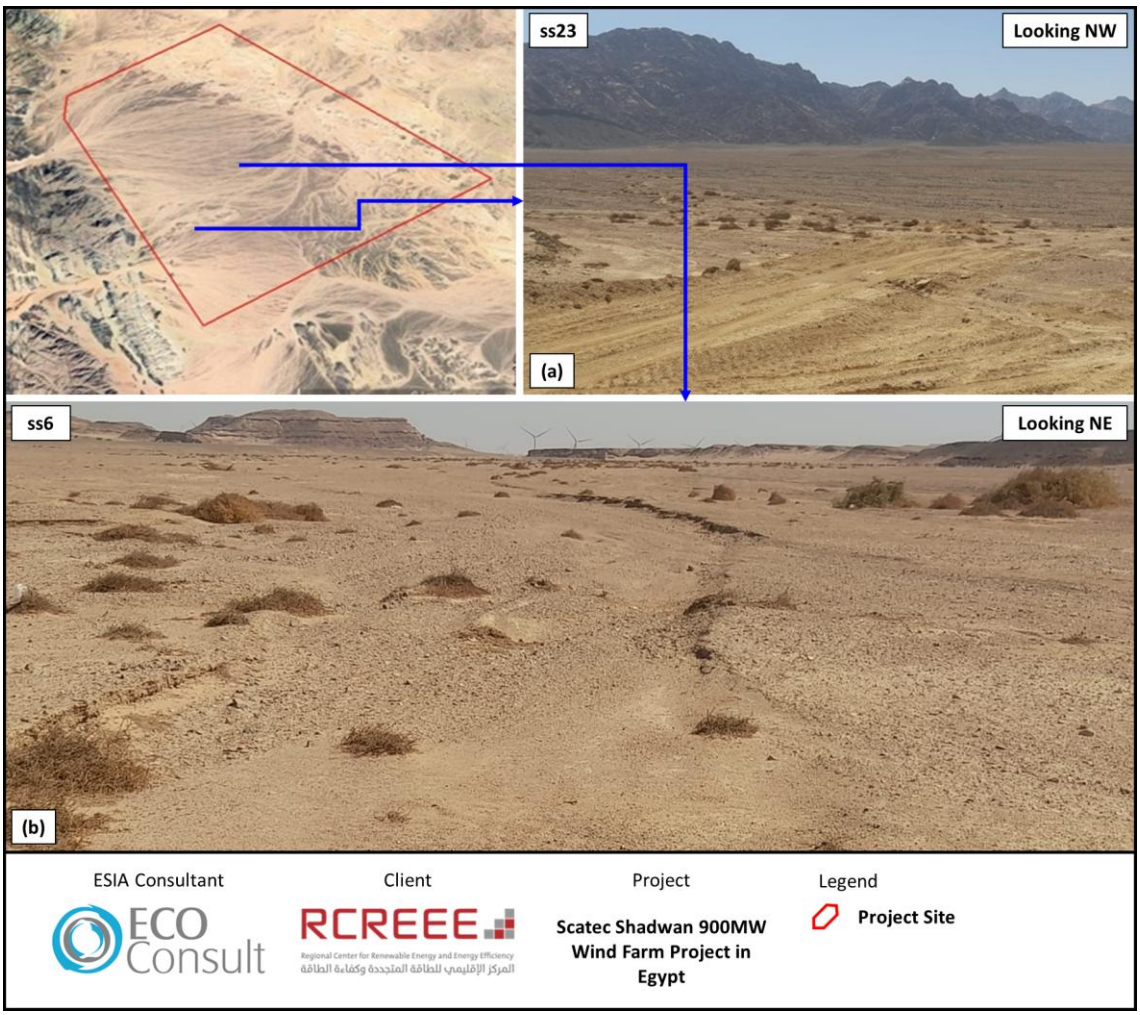


Figure 97: Sporadic and Weak Vegetation Along the Mainstream of the Drainage Lines

From a receptor and vulnerability perspective, there are no important land uses or water-sensitive areas within the Project site that could be significantly affected by flash floods. The main receptors in the wider area are engineering facilities such as main roads and associated services (checkpoints, ambulances, fuel stations, etc.), power lines, communication and weather towers, substations, some household and farming activities in Wadi Dara, military units and crude oil and gas facilities. The only large, populated areas near the site are Ras Gharib and Ras Shukeir, which lie outside the immediate drainage pathways crossing the Project footprint. As such, there are no important flood receptors on the Project site or in the close area, and the exposure and vulnerability of the Project to flash flood impacts are low.

Existing Mitigation Measures

Several flood mitigation measures have already been applied in the area around the Project site to protect existing infrastructure located along drainage lines, including culverts installed beneath paved roads where they cross mainstream wadis and concrete or stone fences constructed around the bases of transmission towers. These measures demonstrate that weak to moderate surface runoff in drainage lines can be effectively managed using straightforward engineering solutions.

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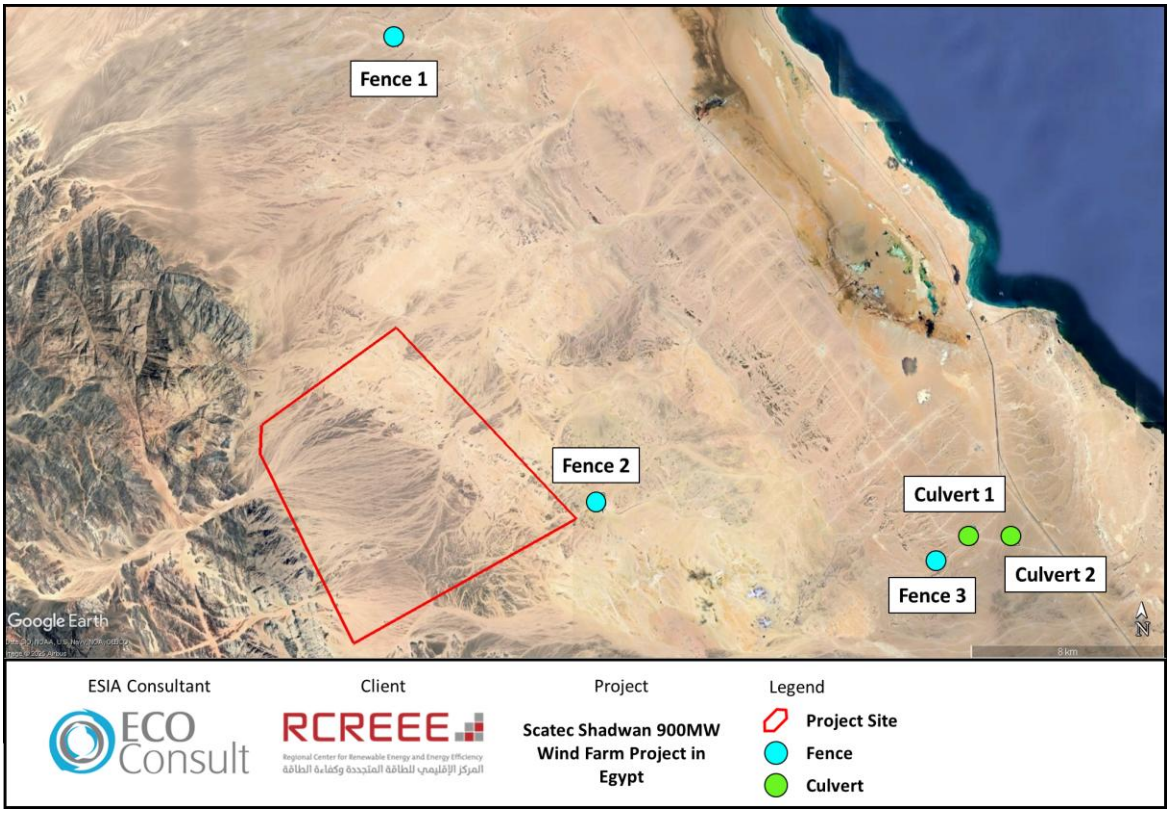


Figure 98: Locations of Flood Mitigation Structures Observed Near Existing Infrastructure Close to the Project Site

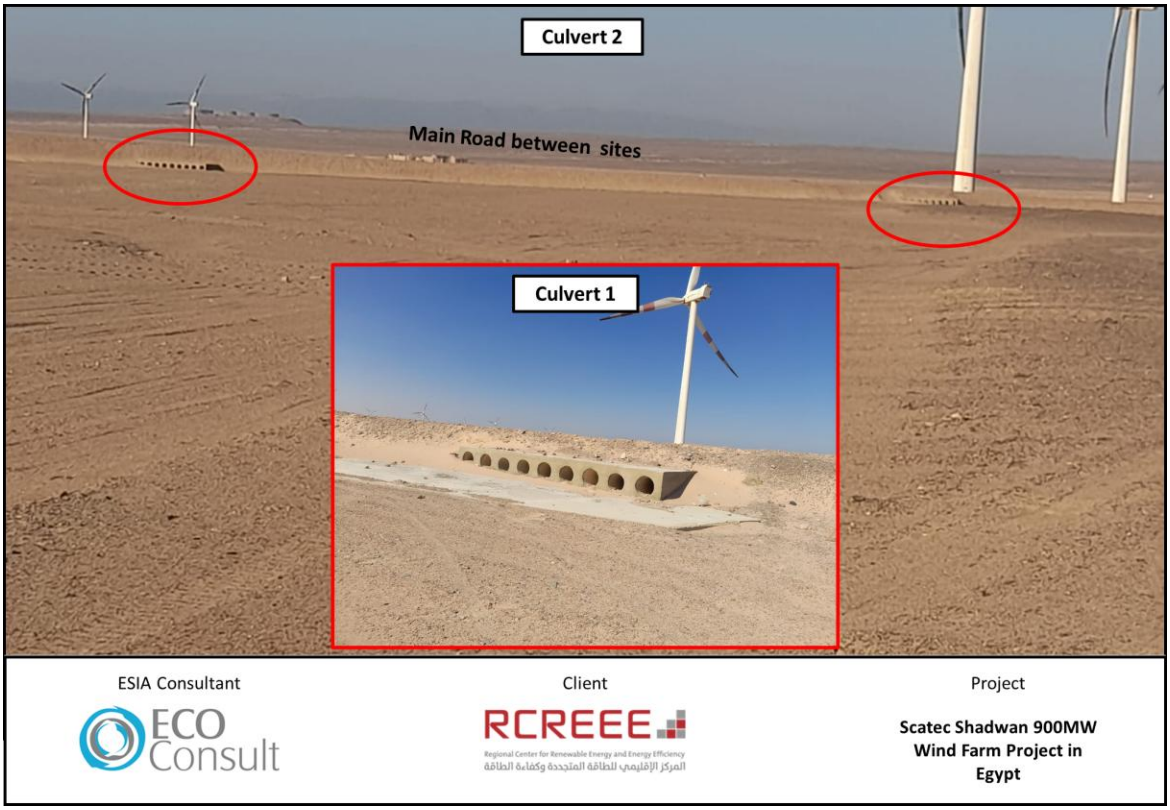


Figure 99: Culverts Installed Under the Main Road to Facilitate Safe Passage of Surface Runoff

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Figure 100: Simple Fences Applied to Protect the Base of Towers from Surface Flow Erosion

In conclusion, the flood vulnerability assessment carried out for the Project area indicates that the drainage lines crossing the site accumulate only limited rainfall due to their small watershed areas and that the drainage basins crossing the site are expected to have low flood risk possibilities. The figure below indicates that the area's most susceptible to potential surface runoff are the floors of the mainstream drainage lines that cross the site.

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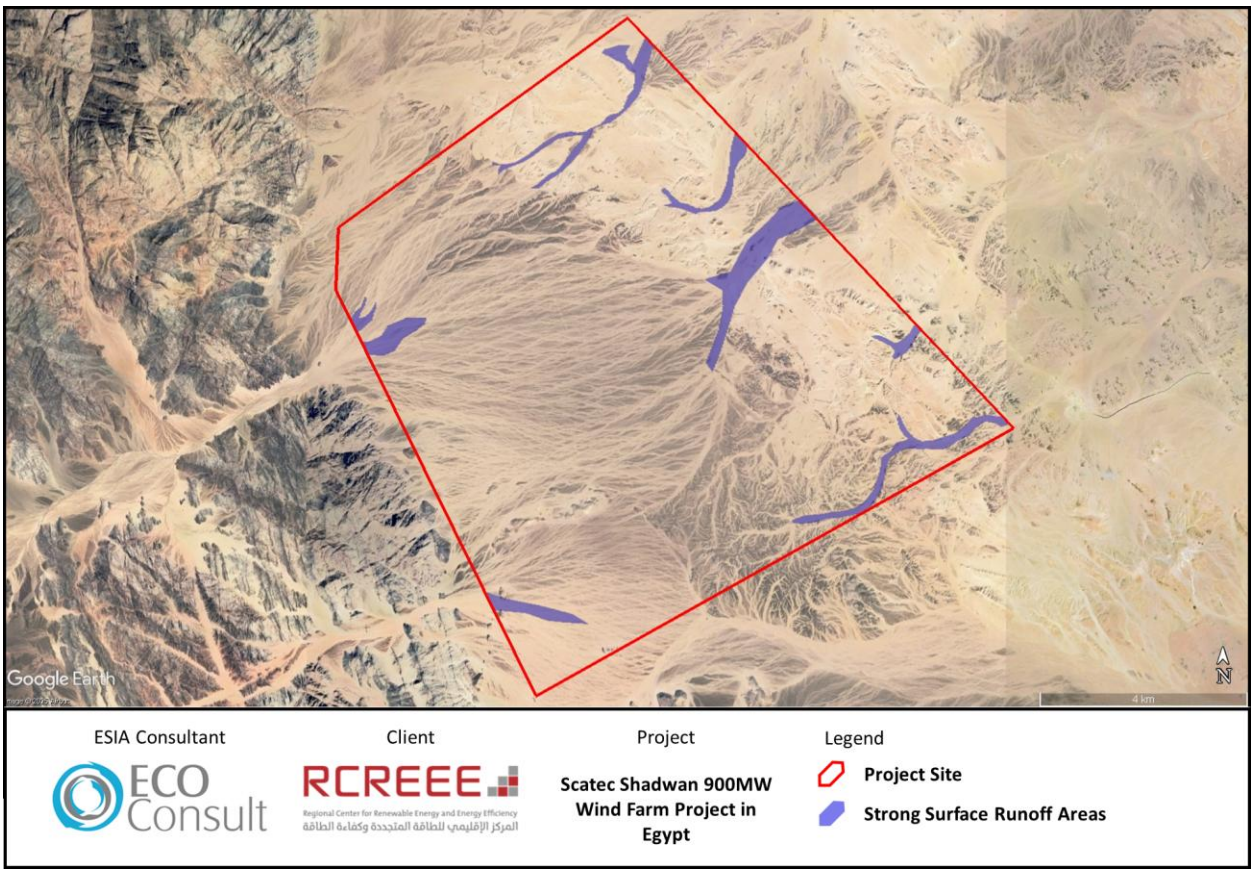


Figure 101: Proposed Locations of Strong Surface Runoff Along Mainstream Drainage Lines Within the Project Site

If infrastructure is to be established directly within these mainstream drainage courses, it will be essential to provide adequate protection measures during construction and operation, taking into account the nature and size of each facility and the local ground relief.

However, given the simple physiography of the site, the gentle slopes, shallow and wide drainage lines, high soil permeability, low intensity of surface flow and absence of sensitive receptors, the overall potential impacts from flood risk on the Project site are considered low.

- Given the possibility of extreme rainstorms exceeding the maximum calculated estimates, it is recommended to construct a one-meter-high concrete fence around critical facilities, especially WTGs or any infrastructure located within the mainstream of drainage lines. These areas are more susceptible to surface runoff, and this fence would provide an additional layer of protection against unexpected floods.
- To mitigate flood risks, turbines should preferably be installed on elevated terrain away from drainage mainstreams. These locations are less susceptible to the accumulation of surface runoff, reducing the potential for flood-related damage. However, if avoidance is not possible, additional mitigation measures should be implemented to enhance resilience. These may include reinforcing turbine foundations to improve stability, elevating turbine bases above the projected flood level, or constructing reinforced concrete fences around turbine bases. The recommended minimum height for these fences is 1.5 meters, ensuring protection against potential surface runoff impacts. Proper site

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selection and structural reinforcement will significantly reduce the risk of turbine failure due to flooding.

- The site's access roads, whether paved or asphalt, crossing the wide and shallow drainage lines. These areas exhibit weak to moderate surface runoff that does not concentrate on narrow, specific paths, meaning the impact on the roads is not significant. However, to minimize any potential disruptions, it is recommended to install simple cement culverts (with a maximum diameter of one meter) beneath roads that cross these drainage lines at identified points. This will allow surface water to flow through without blocking or damaging the road infrastructure.
- As for the electricity cables, they must be buried under the ground at a depth of about a meter, while taking all measures for insulation and protection against subsurface infiltrated water.
- While establishing an early warning system for floods is the responsibility of local authorities in the Ras Gharb and Ras Shukeir area, it is even more critical for the project team to develop an internal flood management plan. This plan should outline clear response protocols for handling flood emergencies, ensuring that all personnel are well-prepared to take appropriate actions. Key components of the plan should include monitoring rainfall data, identifying evacuation procedures, securing critical infrastructure, and implementing contingency measures in the event of severe flooding. By proactively preparing flood events, the project can mitigate potential damage, reduce downtime, and ensure the safety of personnel and infrastructure.

Following the implementation of these mitigation measures, the significance of the residual impact is categorized as not significant.

8.4.2 *Potential Impacts from Improper Management of Waste Streams during Construction and Operation*

Given the generic nature of the impacts on soil and groundwater for both phases of the Project (construction and operation) those have been identified collectively throughout this section. Generally, this includes potential impacts from improper housekeeping practices (e.g. improper management of waste streams, improper storage of construction material and of hazardous material, etc.).

Improper housekeeping practices during construction and operation (such as illegal disposal of waste to land) could contaminate and pollute soil which in turn could pollute groundwater resources. This could also indirectly affect flora/fauna and the general health and safety of workers (from being exposed to such waste streams). Generally, such impacts can be adequately controlled through the implementation of general best practice housekeeping measures as highlighted throughout this section, and which are expected to be implemented by the EPC Contractor throughout construction phase and Project Operator during the operation phase.

Construction Phase			Operation Phase		
Type	Negative	Such impacts are controlled through implementation of general best practice.	Type	Negative	Such impacts are controlled through implementation of general best practice.
Duration	Short-term		Duration	Long -term	
Magnitude	Medium		Magnitude	Medium	
Reversibility	Reversible		Reversibility	Reversible	
Sensitivity	Low		Sensitivity	Low	
Likelihood	Medium		Likelihood	Medium	
Frequency	Frequent		Frequency	Frequent	
Timing	Not relevant		Timing	Not relevant	

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Extent	Medium		Extent	Medium	
Significance	Minor		Significance	Minor	

Following the implementation of the mitigation measures highlighted throughout this section, the residual significance can be reduced to not significant.

(i) Solid Waste Generation

Solid waste is expected to be generated from construction and operational activities. Solid waste generated will likely include construction waste (such as debris) and municipal solid waste (during construction and operation such as cardboard, plastic, food waste, etc.).

Municipal solid waste and construction waste generated will likely be collected and stored onsite and then disposed to the closest approved dumpsite (Ras Gharib Public Dumpsite) or, if possible, reused in the construction activities.

Note: expected waste quantities, the landfill that will be used for the Project and impacts on landfills is discussed separately under "Section 8.11.3".

Mitigation Measures

The following identifies the mitigation measures to be applied by all involved entities to include the EPC Contractor during the construction phase and the Project Operator during the operational phase unless stated otherwise:

- Coordinate with Ras Gharib City Council for the collection of solid waste from the site to the municipal approved dumpsite (the closest dumpsite being Ras Gharib Public Dumpsite) or for recycling (as discussed in further details below);
- Prohibit fly-dumping of any solid waste to the land;
- Distribute appropriate number of properly contained litter bins and containers properly marked as "Municipal Waste";
- Adhere to waste hierarchy principles with associated mitigation measures to include prevent, minimize, reuse, recycle, recover and dispose.
- EPC Contractor only - during construction, distribute a sufficient number of properly contained containers clearly marked as "Construction Waste" for the dumping and disposal of construction waste.
- EPC Contractor only – during construction, it is recommended that recycling measures are implanted. It is recommended that recycling is undertaken in the following approach: (i) separation and disposal of recyclables in a separate container (cardboard, paper, glass, metal, etc.); and (ii) separation and disposal of non-recyclable materials in a separate container (e.g. food waste). Each container must be clearly marked. In addition, EPC Contractor must seek ways to reduce construction waste by reusing materials (for example through recycling of concrete for road base coarse);
- Implement proper housekeeping practices on the construction site at all times; and

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- Maintain records and manifests that indicate volume of waste generated onsite, collected by contractor, and disposed of at the landfill. The numbers within the records are to be consistent to ensure no illegal dumping at the site or other areas.
- Ensure full application of the approved C-ESMP during the construction phase and so the approved ESMP obligations during the operation phase. In addition to fulfilling EEAA conditions stated in the ESIA approval letter.
-

Monitoring and Reporting Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by all involved entities to include the rm EPC Contractor during the construction phase and the Project Operator during the operational phase unless stated otherwise:

- Inspection of waste management practices onsite;
- Review of records and manifests for volume of waste generated to ensure consistency; and
- Regular environmental reporting on implementation of the waste management practices onsite.

(ii) Wastewater Generation

Wastewater is mainly expected to include black water (sewage water from toilets and sanitation facilities), as well as grey water (from sinks, showers, etc.) generated from workers during the construction and operation phase. Wastewater quantities are expected to be minimal. It is expected that wastewater will be collected and stored in fully contained septic tanks and then collected and transported by transportation tankers to be disposed of at the closest Wastewater Treatment Plant (WWTP) (being Ras Gharib WWTP). However, if inadequate disposal of wastewater occurs and is allowed to drain on land, this might contaminate the soil and possibly infiltrate to groundwater.

Note: expected wastewater quantities, the WWTP that will be used for the Project and impacts on WWTP is discussed separately under "Section 8.4.2".

Mitigation Measures

The following identifies the mitigation measures to be applied by all involved entities to include the EPC Contractor during the construction phase and the Project Operator during the operational phase unless stated otherwise:

- Coordinate with Ras Gharib Water Company to hire a private contractor for the collection of wastewaters from the site to the closest WWTP (being Ras Gharib WWTP);
- Prohibit illegal disposal of wastewater to the land;
- Maintain records and manifests that indicate volume of wastewater generated onsite, collected by contractor, and disposed of at the WWTP. The numbers within the records are to be consistent to ensure no illegal discharge at the site or other areas;
- EPC Contractor only - ensure that constructed septic tanks during construction and those to be used during operation are well contained and impermeable to prevent leakage of wastewater into soil; and

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- Ensure that septic tanks are emptied and collected by wastewater contractor at appropriate intervals to avoid overflowing.
- Ensure full application of the approved C-ESMP during the construction phase and so the approved ESMP obligations during the operation phase. In addition to fulfilling EEAA conditions stated in the ESIA approval letter.
-

Monitoring and Reporting Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by all involved entities to include the EPC Contractor during the construction phase and the Project Operator during the operational phase unless stated otherwise:

- Inspection of wastewater management practices onsite;
- Review of records and manifests for volume of wastewater generated to ensure consistency; and
- Regular environmental reporting on implementation of the wastewater management practices discussed above.

(iii) Hazardous Waste Generation

Hazardous waste is expected to be generated throughout both the construction and operation phase and this could include consumed oil, chemicals, paint cans, etc. Hazardous waste generated will likely be collected and stored onsite and then disposed of at the approved hazardous waste disposal facilities managed by the Hazardous Waste Management Project and supervised by the governorate and the EEAA.

Note: expected hazardous waste quantities, the hazardous waste landfill that will be used for the Project and impacts on the landfill is discussed separately under "Section 8.11.3".

Mitigation Measures

The following identifies the mitigation measures to be applied by all involved entities to include the EPC Contractor during the construction phase and the Project Operator during the operational phase unless stated otherwise:

- Coordinate and hire a private contractor for the collection of hazardous waste from the site to the approved hazardous waste disposal facilities;
- Ensure that hazardous waste is disposed in a dedicated area that is enclosed; of hard surface; with proper signage and suitable containers as per hazardous waste classifications and that they are labelled for each type of hazardous waste.
- Ensure hazardous waste storage area is equipped with spill kit, fire extinguisher and anti-spillage trays and a hazardous waste inventory is available.
- Prepare and implement a Spill Prevention and Response Procedure as part of the approved C-ESMP during construction and the approved ESMP during operation. The procedure shall define spill prevention measures, immediate spill response actions, notification and reporting requirements, roles

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and responsibilities, required spill response materials, waste handling requirements and corrective actions;

- In the event of any spill or leakage of fuel, oil, lubricant, chemicals, wastewater, hazardous material or hazardous waste, the spill shall be immediately stopped at source where safe to do so, contained using appropriate spill kits, absorbents, bunding or sand, and cleaned up without delay. Contaminated absorbents, soil, sand, containers, rags, PPE or other clean-up materials shall be collected, labelled, temporarily stored in the designated hazardous waste storage area, and disposed of through a licensed hazardous waste contractor;
- Where a spill may have resulted in soil contamination, the affected area shall be inspected and, where required, contaminated soil shall be excavated and managed as hazardous waste.
- Relevant workers and contractors involved in fuel handling, chemical storage, hazardous waste management, maintenance, refuelling and emergency response shall receive training on spill prevention and response. Spill kits shall be regularly inspected and replenished following use;
- Prohibit illegal disposal of hazardous waste to the land;
- Possibly contaminated water (e.g. runoff from paved areas) must be drained into appropriate facilities (such as sumps and pits). Contaminated drainage must be orderly disposed of as hazardous waste;
- Ensure that containers are emptied and collected by the contractor at appropriate intervals to prevent overflowing; and
- Maintain records and manifests that indicate volume of hazardous waste generated onsite, collected by contractor, and disposed of at the hazardous waste disposal facilities. The numbers within the records are to be consistent to ensure no illegal discharge at the site or other areas.
- Ensure full application of the approved C-ESMP during the construction phase and so the approved ESMP obligations during the operation phase. In addition to fulfilling EEAA conditions stated in the ESIA approval letter.

Monitoring and Reporting Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by all involved entities to include the EPC Contractor during the construction phase and the Project Operator during the operational phase unless stated otherwise:

- Inspection of hazardous waste management practices onsite;
- Inspection of spill prevention and response arrangements, including availability, accessibility and condition of spill kits, absorbents, anti-spillage trays, secondary containment and hazardous waste storage areas;
- Review of records and manifests for volume of hazardous waste generated to ensure consistency;
- Maintain a spill/incident register documenting the date, location, material spilled, estimated quantity, cause of spill, response and clean-up actions undertaken, contaminated waste generated, disposal route, corrective actions and close-out status; and

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- Regular environmental reporting on implementation of hazardous waste management practices onsite.

(iv) Hazardous Material

The nature of construction and operational activities entail the use of various hazardous materials such as oil, chemicals, and fuel for the various equipment and machinery. Improper management of hazardous material entails a risk of leakage into the surrounding environment either from storage areas or throughout the use of equipment and machinery.

Mitigation Measures

The following identifies the mitigation measures to be applied by all involved entities to include the EPC Contractor during the construction phase and the Project Operator during the operational phase unless stated otherwise:

- Ensure that hazardous materials are stored in proper areas and in a location where they cannot reach the land in case of accidental spillage. This includes storage facilities that are of hard impermeable surface, flame-proof, accessible to authorized personnel only, locked when not in use, and prevents incompatible materials from coming in contact with one another;
- Maintain a register of all hazardous materials used and accompanying Material Safety Data Sheet (MSDS) must always present. Spilled material should be tracked and accounted for;
- Incorporate dripping pans at machinery, equipment, and areas that are prone to contamination by leakage of hazardous materials (such as oil, fuel, etc.);
- Regular maintenance of all equipment and machinery used onsite. Maintenance activities and other activities that pose a risk for hazardous material spillage (such as refueling) must take place at a suitable location (hard surface) with appropriate measures for trapping spilled material;
- Ensure that a minimum of 1,000 liters of general-purpose spill absorbent is available at hazardous material storage facility. Appropriate absorbents include zeolite, clay, peat and other products manufactured for this purpose; and
- If spillage on soil occurs, spills must be immediately contained, cleaned-up, and contaminated soil disposed as hazardous waste.
- In the event of any spill or leakage of hazardous materials, including fuel, oil, lubricants, chemicals or paints, the spill shall be immediately stopped at source where safe to do so, contained using appropriate spill kits, absorbents, drip trays, bunding or sand, and cleaned up without delay, irrespective of whether the spill occurs on hardstanding, paved surfaces, compacted ground or soil. Spill residues, used absorbents, contaminated sand, rags, PPE and other clean-up materials shall be collected, labelled, temporarily stored in the designated hazardous waste storage area and disposed of through a licensed hazardous waste contractor. Where the spill has affected soil, the contaminated soil shall be excavated, where required, and managed as hazardous waste. Spills shall not be washed down to land, drainage channels or any uncontained area.
- Ensure full application of the approved C-ESMP during the construction phase and so the approved ESMP obligations during the operation phase. In addition to fulfilling EEAA conditions stated in the

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Monitoring and Reporting Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by all involved entities to include the EPC Contractor during the construction phase and the Project Operator during the operational phase unless stated otherwise:

- Inspection for storage of hazardous materials to include inspections for potential spillages or leakages; and
- Report any spills and the measures taken to minimize the impact and prevent from occurring again.

8.4.3 Potential Impacts from Erosion and Runoff during the Construction Phase

Site preparation activities which are to take place onsite by the EPC Contractor for installation of the various Project components to include wind turbines, substation, cables, etc. are expected to include land clearing activities, excavation, grading, etc.

The nature of construction activities discussed above could disturb soil, exposing it to increased erosion during rainfall events. If onsite erosion and runoff are not controlled, they can result in siltation of surface water. Generally, such impacts can be adequately controlled through the implementation of general best practice housekeeping measures as highlighted throughout this section, and which are expected to be implemented throughout construction phase.

Construction Phase		
Nature	Negative	Such impacts are controlled through implementation of general best practice.
Duration	Short-term	
Magnitude	Medium	
Reversibility	Irreversible	
Sensitivity	Low	
Likelihood	Medium	
Frequency	Periodic	
Timing	During rain events	
Extent	Low	
Significance	Minor	

Mitigation Measures

The following identifies the mitigation measures to be applied by all involved entities to include the EPC Contractor during the construction phase:

- Existing natural flows will be maintained where possible as part of the drainage system design and any change to the natural/pre-development surface water conditions within the site to be minimized to the extent possible.

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- Scheduling to avoid construction activities during heavy rainfall periods (i.e., during the wet season) to the extent practical. In addition, this will include modifying or suspending activities during extreme rainfall and high winds to the extent practical.
- Salvage and store topsoil and subsoil before are excavated, with topsoil stripped and stockpiled separately.
- Place clear markers indicate stockpiling area of excavated materials to restrict equipment and personnel movement, thus limiting the physical disturbance to land and soil in adjacent areas.
- Erect erosion control barriers around work sites during site preparation and construction to prevent silt runoff where applicable. This could include but not limited to silt fences, gravel bag berms, fiber rolls, or other similar applications.
- Return surfaces disturbed during construction to their original (or better) condition to the greatest extent possible.
- Specifically in terms of road design the following shall be considered:
  - All roads shall be graded and shaped appropriately;
  - Provision of limiting access road gradients to reduce runoff-induced erosion;
  - Provision of effective short-term measures for slope stabilization, sediment control and subsidence control;
  - On steep sections of access road, transverse drains ('grips') will be constructed where appropriate in the surface layer of the road to divert any runoff off the road into swales/roadside drains; and
  - To reduce damage to soil and risks of soil erosion, the length and width of the on-site and off-site roads should be with the route optimized to reduce the need for cut-and-fill material. Run-off and erosion control features should be included in designs.
  - Ensure full application of the approved C-ESMP during the construction phase, an so fulfilling EEAA conditions stated in the ESIA approval letter.
  -

Following the implementation of the mitigation measures highlighted throughout this section, the residual significance can be reduced to not significant.

Monitoring and Reporting Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by all involved entities to include the EPC Contractor during the construction phase:

- Inspection for erosion and runoff control to include inspections for implementation of mitigation measures.

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8.5 Climate and Meteorology

This section discusses the potential impacts anticipated from the various Project phases to include the planning, construction and operation phases. For each identified impact, a set of mitigation measures and monitoring requirements have been identified to eliminate the impact or reduce it to acceptable levels.

The key risks of climate and meteorology are related to the following:

- Impacts on occupational health and safety from onsite construction and operational works related to extreme climate conditions such as sandstorms, extreme heat, periods of high wind speeds, which may affect onsite activities including turbine installation and lifting operations, etc. Such risks have been assessed under "Section 8.12" and applicable mitigation and monitoring measures have been identified.
- Impacts on ensuring appropriate worker accommodation considering climatic conditions such as extreme heat, extreme cold, etc. Such risks have been assessed under "Section 8.12" and applicable mitigation and monitoring measures have been identified.
- Impacts on worker health and safety from transportation activities during construction and operation (e.g. worker transportation to/from local community areas, component transportation, etc.) related to extreme climate conditions such as sandstorms, etc. Such risks have been assessed under "Section 8.11.1" and applicable mitigation and monitoring measures have been identified.

Taking the above into account, there are no further requirements to be considered.

8.6 Biodiversity

This section identifies and assesses the anticipated impacts from Project activities on identified ecological receptors during the construction and operation phases. For each impact, a set of management measures (which could include mitigation measures, additional requirements, etc.) and monitoring measures have been identified to eliminate or reduce the impact to acceptable levels.

All mitigation measures contained in this section will be included in a Project specific Biodiversity Management Plan which will also include details of pre-clearance, pre-construction, and during-construction monitoring.

Definition of EBRD Critical Habitat and Priority Biodiversity Features

ESR6 defines critical habitat and priority biodiversity features as:

Critical Habitat:

The most sensitive biodiversity features; which comprise one of the following:

- Highly threatened or unique ecosystems;
- Habitats of significant importance to endangered or critically endangered species;
- Habitats of significant importance to endemic or geographically restricted species;
- Habitats supporting globally significant migratory or congregatory species;

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- Areas associated with key evolutionary processes; or
- Ecological functions that are vital to maintaining the viability of biodiversity features described in this paragraph.

Priority Biodiversity Features (PBF):

This concept replaces the previous definition of natural habitat and encompasses a sub-set of biodiversity that is particularly irreplaceable or vulnerable, but at a lower priority level than critical habitats; which include:

- Threatened habitats;
- Vulnerable species;
- Significant biodiversity features identified by a broad set of stakeholders or governments (such as Key Biodiversity Areas or Important Bird Areas); and
- Ecological structure and functions needed to maintain the viability of priority biodiversity features.

The criteria for the determination of Critical Habitat Features and those defined as Priority Biodiversity Features are shown in the table below.

Table 61: Criteria and Conditions for Identifying Critical Habitats and Priority Biodiversity Features*

Criterion	Priority Biodiversity Feature	Critical Habitat
1. Priority ecosystems		
Threatened ecosystems (a) Habitats listed in Annex 1 of EU Habitats Directive (EU members only) or Resolution 4 of Bern Convention (signatory nations only) (b) IUCN Red-List EN or CR ecosystems	(ESR6 para. 12-i) (a) EAAA is habitat type listed in Annex 1 of EU Habitats Directive or Resolution 4 of Bern Convention (b) EAAA** < 5% of the global extent of an *ecosystem* type with IUCN status of CR or EN	▪ (ESR6 para. 14-i) (a) EAAA is habitat type listed in Annex 1 of EU Habitats Directive marked as "priority habitat type" (b) EAAA ≥5% of global extent of an ecosystem type with IUCN status of CR or EN (c) EAAA is ecosystem determined to be of high priority for conservation by national systematic conservation planning
2. Priority Species and their Habitats		
Threatened species (a) Species and their habitats listed in EU Habitats Directive and Birds Directive (EU members only) or Bern Convention (signatory nations only) (b) IUCN Red List EN and CR species (c) IUCN Red List VU species (d) Nationally or regionally (e.g., Europe) listed EN or CR species	(ESR6 para. 12-ii) (a) EAAA for species and their habitats listed in Annex II of Habitats Directive, Annex I of Birds Directive, or Resolution 6 of the Bern Convention (b) EAAA supports < 0.5% of global population OR < 5 reproductive units of a CR or EN species. (c) EAAA supports VU species (d) EAAA for regularly occurring nationally or regionally listed EN or CR species	(ESR6 para. 14-ii) (a) EAAA for species and their habitats listed in Annex IV of the Habitats Directive (See EU restrictions) (b) EAAA supports ≥ 0.5% of the global population AND ≥ 5 reproductive units of a CR or EN species (c) EAAA supports globally significant population of VU species necessary to prevent a change of IUCN Red List status to EN or CR, and satisfies threshold (b)

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Criterion	Priority Biodiversity Feature	Critical Habitat
		(d) EAAA for important concentrations of a nationally or regionally listed EN or CR species
Range-restricted species	(ESR6 para 12-ii) (a) EAAA for regularly occurring range-restricted species	(ESR6 para. 14-iii) (a) EAAA regularly holds ≥ 10% of global population AND ≥ 10 reproductive units of the species***
Migratory and congregatory species	(ESR6 para 12-ii) (a) EAAA identified per Birds Directive or recognized national or international process as important for migratory birds (esp. wetlands)	▪ (ESR6 para. 14-iv) (a) EAAA sustains, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population at any point of the species' lifecycle (b) EAAA predictably supports ≥10 percent of global population during periods of environmental stress

*Quantitative thresholds derived from IUCN Key Biodiversity Area Standard and aligned with International Finance Corporation's (IFC) Guidance Note 6 (rev. 2019)

**EAAA = *ecologically appropriate area of analysis*, as defined above

***The IUCN Key Biodiversity Areas standard cites the following definition for reproductive unit: "the minimum number and combination of mature individuals necessary to trigger a successful reproductive event at a site. Examples of five reproductive units include five pairs, five reproducing females in one harem, and five reproductive individuals of a plant species."

International Finance Corporation (IFC)

The biodiversity section of this ESIA also follows the IFC PS6 (2012) and associated Guidance Note (GN6 published on January 1, 2012 and last updated June 14, 2021) on biodiversity conservation and sustainable management of living natural resources.

The IFC PS6 main objectives are:

- To protect and conserve biodiversity
- To maintain the benefits from ecosystem services
- To promote the sustainable management of living natural resources through the adoption of practices that integrates conservation needs and development priorities

IFC PS6 requires that a conservation value is allocated to the ecological features (protected areas, habitats and species) which are likely to be directly or indirectly impacted in the Project Area of Influence (AoI). Under the IFC guidance, the requirements of PS6 apply to projects in all habitats, whether or not those habitats have been previously disturbed and whether or not they are legally protected. Specifically, a project is required to:

- Assess significance of project impacts on all levels of biodiversity as an integral part of the social and environmental assessment process
- Take into account differing values attached to biodiversity by specific stakeholders

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- Assess major threats to biodiversity, especially habitat destruction and invasive alien species

In accordance with IFC PS6, habitats are divided into modified, natural and critical habitats. Critical habitats can be either modified or natural habitats supporting high biodiversity value, including:

- Habitat of significant importance to critically endangered and/or endangered species (International Union for Conservation of Nature and Natural Resources (IUCN) Red List)
- Habitat of significant importance to endemic and/or restricted-range species
- Habitat supporting globally significant concentrations of migratory species and/or congregatory species
- Highly threatened and/or unique ecosystems
- Areas associated with key evolutionary processes

Since habitat destruction is recognized as a major threat to the maintenance of biodiversity and to assess likely significance of impacts, IFC PS6 requires the following depending on habitat status:

Modified Habitat: exercise care to minimize any conversion or degradation of such habitat, depending on scale of project, identify opportunities to enhance habitat and protect and conserve biodiversity as part of operations.

Natural Habitat: developer will not significantly convert or degrade such habitat unless no financial/technical feasible alternatives exist, or overall benefits outweigh cost (including those to biodiversity), and conversion or degradation is suitably mitigated. Mitigation must achieve no net loss of biodiversity where feasible; offset losses through creation of ecologically comparable area that is managed for biodiversity, compensation of direct users of biodiversity.

Critical Habitat: in areas of critical habitat the developer will not implement project activities unless there are no measurable adverse impacts on the ability of the critical habitat to support established populations of species described or on the functions of the critical habitat; no reduction in population of a recognized critically endangered or endangered species and lesser impacts mitigated as per natural habitats.

IUCN Red List of Threatened Species[32]

The IUCN Red List of Threatened Species is the world's most comprehensive information source on the extinction risk of animals, fungi and plants. Assessors place species into one of the IUCN Red List Categories, based on a series of assessment criteria. For each species, The IUCN Red List provides information about its range, population size, habitat and ecology, use and/or trade, threats and conservation actions. The IUCN Red List Categories indicate how close a species is to becoming extinct.

Species are assessed against five criteria based on geographic range, population size and population decline/increase, in addition to extinction probability analyses. These criteria determine which category is most appropriate for the species.

Species in the Vulnerable, Endangered and Critically Endangered categories are collectively described as 'threatened'. The IUCN Red List does not include Not Evaluated species. Critically Endangered species may also be tagged as Possibly Extinct or Possibly Extinct in the Wild.

[32] https://www.iucnredlist.org/

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Sensitive Receptors

A Critical Habitat assessment has been conducted by The Biodiversity Consultancy (TBC) using the best recent and available information at the time of its production and the full results of the Critical Habitat Assessment are included as a standalone document – *TBC (2026). Critical Habitat Assessment for the Shadwan 900 MW Wind Farm Project, Egypt. January 2026, The Biodiversity Consultancy Ltd, Cambridge.*

Critical Habitat has been identified for two migratory soaring birds species and numerous other species are defined as PBFs mainly due to the strong association with the Gebel-El Zeit Important Bird Area (IBA)-EG031. Additionally, one Mammal and one Reptile have been defined as PBFs.

Species for which Critical Habitat has been determined require Net Gain, which may require offsetting to achieve. PBFs will need to be safeguarded during the construction and operational phase to ensure no net loss of these features.

Mitigation and monitoring for these species will be included in a Biodiversity Management Plan. Offetting and Net Gain requirements will need to be included in a project BAP.

Pre-clearance and pre-construction surveys, at appropriate times of the year, will need to be completed to establish presence/absence in proposed works areas and if mammals and reptiles are found to be present in these areas or considered likely to occur in these areas during construction, additional mitigation (e.g. limited translocation to a suitable receptor site) will be required. This will be identified further within the Biodiversity Management Plan (BMP) and Biodiversity Action Plan (BAP) that will address translocation decision criteria, receptor-site selection requirements, success criteria, etc. .

Monitoring will need to be completed to ensure no net loss of PBFs during the operational phase.

Based on the findings of the biodiversity baseline surveys, Critical Habitat Assessment and proposed mitigation hierarchy measures, the Project is expected to meet the requirements of IFC PS6 Paragraph 17, subject to implementation of the Biodiversity Action Plan and Biodiversity Management Plan. These documents will also set out measures designed to achieve No Net Loss for those species defined as PBFs.

Table 62 Summary of Sensitive Receptors and Species

Receptor	Conservation Status IUCN	Justification	CH or PBF	Sensitivity
Habitat	-	Site habitats are common for the wider region in Egypt, and is considered to have no specific importance, vulnerability or potential for consideration as a critical habitat.	No – but no net loss is required for natural habitat	Low-Medium
Flora	-	Flora is moderately diverse, however no IUCN CR, EN, VU species and no endemic or near-endemic species were noted within the AoI.	No	Low

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Small Mammals	-	Three species of small mammal were noted during live trapping, all of which were IUCN least concern.	No	Low
Egyptian Spiny-tailed Lizard	VU	89 Spiny-tailed Lizard were recorded during line transects and further inactive burrows/field signs. This is a high population of a IUCN Vulnerable species.	PBF	High
Other Reptile Species	-	Three additional species of reptile were noted during line transects in very low numbers. Both species were IUCN Least Concern.	No	Low
Dorcas Gazelle	VU	One Dorcas Gazelle was recorded during line transects. This is an IUCN Vulnerable species and is rarely recorded.	PBF	High
Nubian Ibex	VU	Two Nubian Ibex were recorded, one during line transect and one via camera trap. This is an IUCN Vulnerable species and is rarely recorded. Considered to be a vagrant and therefore not a PBF.	No	High
Mammal Species	LC	Red Fox was recorded regularly but is an IUCN LC species, along with a single feral Camel.	No	Low
Invertebrate species	LC	All species recorded are IUCN LC	No	Low
Steppe Eagle	EN	Surveys within the Project area recorded a maximum number of 1,465 individuals flying within the AoA. This constitutes 1.9% of the global population, therefore exceeding the threshold for qualification under Criteria PS6 3a/ESR6 4a/ESS4 2a.	CH	High
White Stork	LC	The number of White Storks that were recorded flying within the AoA (14,357) constitutes 1.8% of the global population. This exceeds the threshold for qualification under Criteria PS6 3a/ESR6 4a/ESS4 2a.	CH	High
Egyptian Vulture	EN	Surveys within the Project area recorded a seasonal maximum number of individuals flying through the AoA at low height of 45 individuals. This represents 0.2 % of the species' minimum global population. Therefore, the area does not qualify as CH for this species under Criteria PS6 3a/ESR6 2c, 4a/ESS4 2a, 4a.	PBF	High
Saker Falcon	EN	The species has not been recorded during spring and autumn surveys within the Project area. It is generally rare in the region, and it is not detected every year. it is unlikely that the species occurs in sufficient numbers to qualify the Migratory Bird EAAA as CH.	PBF	High
Greater Spotted Eagle	VU	Although the Greater Spotted Eagle was recorded during the surveys (11 individuals), no individuals were detected within the AoA airspace.	PBF	High
Eastern Imperial Eagle	VU	The percentage of the global population of the Easten Imperial Eagle that was recorded within the AoA was only 0.025% of the global population (six individuals).	PBF	High

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Red-footed Falcon	VU	The Red-footed Falcon is an uncommon migrant in the region. Despite the fact that it is usually detected during baseline or monitoring surveys (in low numbers) it was not detected in the AoA.	PBF	High
Sooty Falcon	VU	Only nine Sooty Falcons were recorded within the AoA. This represents 0.2% of the global population.	PBF	High
Turtle Dove	VU	Regularly occurring IUCN VU species	PBF	High
Golden Eagle	LC	Considered a PBF on the basis of stakeholder concern. The species is very rare in Egypt and the wider region, and survey evidence suggests the presence of a breeding pair in the vicinity of the Project, in an area where the species had not previously been known to occur.	PBF	High
Other migratory birds	Various (below VU)	See below*	PBF	High

* All migratory species regularly occurring in the Project area of impact that are not CH-qualifying or globally Endangered or Vulnerable should be considered as PBFs under EBRD ESR6 Criterion 4a. These include migratory soaring birds such as the European Honey Buzzard (*Pernis apivorus*), Black Stork (*Ciconia nigra*), Great White Pelican (*Pelecanus onocrotalus*), Pallid Harrier (*Circus macrourus*), Black Kite (*Milvus migrans*), Eurasian Sparrowhawk (*Accipiter nisus*), Long-legged Buzzard (*Buteo rufinus*), Short-toed Eagle (*Circaetus gallicus*), Western Marsh Harrier (*Circus aeruginosus*), Montagu's Harrier (*Circus pygargus*), Lanner Falcon (*Falco biarmicus*), Eleonora's Falcon (*Falco eleonorae*) Lesser Kestrel (*Falco naumanni*), Peregrine Falcon (*Falco peregrinus*), Eurasian Hobby (*Falco subbuteo*), Common Kestrel (*Falco tinnunculus*) Griffon Vulture (*Gyps fulvus*), Booted Eagle (*Hieraaetus pennatus*), Osprey (*Pandion haliaetus*), Common Crane (*Grus grus*), Eurasian (Steppe) Buzzard (*Buteo buteo vulpinus*), Lesser Spotted Eagle (*Clanga pomarina*), Levant Sparrowhawk (*Accipiter brevipes*), and Oriental Honey Buzzard (*Pernis ptilorhynchus*).

8.6.1 Potential Impacts during the Construction Phase

Habitat Loss, Fragmentation and Degradation

Site clearance and subsequent construction activities will result in the direct loss of areas of highly disturbed and degraded natural habitats over the full construction footprint of the Project including internal site roads, turbine bases, crane pads, substations, and permanent site structures (e.g. offices). Habitats are valued as beings of Low Sensitivity as they do not meet any of the criteria for Annex I or Priority Habitats and are already degraded, e.g. there are tracks and quarries throughout the area. The habitat does support sensitive species, such as Egyptian Spiny-tailed Lizard at a high population level which increases it's importance. It is also used transiently by Dorcas Gazelle and migratory birds but is not part of their core habitat meaning impact to the habitat would not impact those PBFs viability significantly. There is also likely to be temporary habitat loss and degradation of habitats as a result of temporary lay-down areas and other temporary facilities (e.g. worker accommodation) as well as cabling and communication routes.

Habitat loss has been discussed with respect to habitat and flora itself but not in regard to fauna. The list of terrestrial fauna present on site from surveys is presented below. Most species are IUCN Least Concern; however three species are categorized as IUCN Vulnerable (VU): Spiny-tailed Lizard, Dorcas Gazelle and

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Nubian Ibex. Each of these species has specific individual mitigation measures in place to ensure no harm comes to the species during works – these are detailed further below.

Habitat loss of terrestrial species can lead to a negative impact on overall population viability. In the situation here the impact is reduced due to the nature of the development meaning that habitat loss is spread in small areas over a wider project site. This means that connectivity is maintained through the area and no physical barriers to movement put in place or wide areas of specific interest will be lost. Given habitats are found through the area the small loss of habitat, it is considered that there will be no impact on conservation status of these species.

Despite this there will be mitigation for all these species in the form of provision of alternate habitat with the enhancement of around 1.56 km² (this is preliminary) using appropriate, native planting in suitable parts of the Project Area. This will ensure no loss of the area available to use for these widespread species. Planting within these areas is being monitored and accordingly the success of habitat provision will be ensured. Details of habitat loss associated with infrastructure other than WTG bases cannot be fully assessed at this stage due to no confirmed infrastructure layout. It is assumed that habitat loss associated with access from the main road will be minimized by following existing vehicle access routes. Assumed areas for infrastructure are provided at this stage in order to best assess the project impact.

Any species that was recorded during surveys, but which are not listed in the sensitive receptor table are considered to be of Low/lower value.

- Impacts on Low/Lower value species are expected to be of low to moderate magnitude. In accordance with Table 6, Low sensitivity receptors with Medium or High magnitude of impact will therefore result in Minor significance;
- Impacts on Medum sensitivity receptors with Medium or High magnitude of impact will therefore result in Moderate significance; and
- Mitigation for higher value receptors will also alleviate impacts on these lower value receptors.

Therefore, these Low/lower value species have not been listed out in detail and the impact assessment section will not include assessments on these receptors.

Construction Phase - Direct Impacts on Sensitive Receptors (Natural Habitats and Flora)		
Type	Negative	Removal of 1.56 km^2 of low sensitivity – natural habitat
Duration	Long term	Permanent loss
Magnitude	Medium	Loss of natural habitat
Reversibility	Irreversible	Permanent habitat loss is irreversible
Sensitivity	Low-Medium	Areas of low sensitivity
Likelihood	High	Habitat loss is certain
Frequency	Rare	Habitat/Flora loss will occur once. Once lost/impacted areas can't be impacted again
Timing		At start of construction
Extent	Low	Impact will occur in Project footprint only
Significance	Minor to Moderate	

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Mitigation Measures

The following mitigation measures will be employed to reduce the significance of habitat loss, fragmentation, and degradation during the construction period. Mitigation measures are largely based on avoidance of impact through selection of the working areas to favor areas of degraded natural habitat or those areas where habitats have been modified. Where impacts cannot be avoided the following will be completed

- All site workers will undertake a Project induction before working on site. The induction will include a comprehensive biodiversity element where the baseline ecological value and sensitivity of the site will be discussed and relevant receptors highlighted to the site staff.
- Prior to construction works, working areas will be clearly demarked (using appropriate temporary fencing (e.g. orange netting attached to wooden posts)) so that site workers fully understand the working area. Encroachment into areas outside of agreed working areas will be prohibited and working areas will be subject to regular check by the EPC Ecologist to check enforcement of working areas.
- On completion of phased construction works the EPC Contractor will be responsible for habitat rehabilitation works in all areas that have been subject to temporary disturbance.
- Following construction an area of around 1.56 km² as a preliminary footprint will be enhanced using appropriate, native planting in suitable parts of the Project Area, this will ensure that no net loss of habitat as a result of the works. The area of habitat required to be enhanced will be calculated through detailed pre-clearance habitat surveys and assessment of the condition of the habitats that will be lost which will then be compared to restoration phase monitoring results to ensure there is no net loss of the natural habitat on site. This planting enhancement will be in the western part of the project area, away from the main construction works, to benefit PBF species as much as possible, particularly aimed at providing additional habitat close to the more typical mountain habitats of the PBF mammals. Any areas of additional planting will be monitored as part of the biodiversity monitoring program and any species which do not establish will be replaced.
- Ensure full application of the approved C-ESMP during the construction phase and so fulfilling EEAA conditions stated in the ESIA approval letter.

Direct Impacts on Sensitive Receptors (Habitats and Flora) – Non-native Species and Introduced Flora

It is possible that non-native or introduced flora could be imported into the AoI on vehicles or with any imported soil material. The impacts of non-native and introduced flora could be moderately significant in absence of any mitigation as these species could become established and outcompete native flora.

Construction Phase – Direct Impacts on Sensitive Receptors (Natural Habitats and Flora) – Non-native Species and Introduced Flora		
Type	Negative	
Duration	Short to Long Term	If non-native species become established impacts could be longer term
Magnitude	Medium	Potential change to natural habitat and species composition in areas surrounding the Project area
Reversibility	Reversible	Invasive species can be controlled, if identified

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Sensitivity	Low	Areas of natural habitat are of low sensitivity
Likelihood	Low to Medium	Introduction of invasive non-native species is possible, but not certain
Frequency	Periodic	During Construction
Timing	Not Relevant	For the duration of construction phase
Extent	Medium	If established within the Project footprint it is possible that invasive species could spread to wider areas
Significance	Minor	

Mitigation Measures

- Prior to construction works, working areas will be subject to a botanical walkover survey to identify areas of non-native or invasive species. Any specimens will be clearly marked, and the area avoided and if this is not possible the specimen will be removed and disposed of.
- Areas of soil removed from proximity of these species will be stored separately and not used further on the site. It will be collected from the site and disposed of or used as deep sub-soil fill (to reduce the chance of seed germinating.
- Areas of non-native or invasive species will be mapped and a programme of mechanical control will be completed over the construction period in order to remove these species from the AoI. Chemical control will be avoided as far as possible, however if necessary, it will be used in accordance with national and international guidelines as well as those applied by the Lenders (e.g. specific risk assessment and Lender agreement prior to use).
- Soil imports to be taken from local quarries or borrow pits to avoid importing non-native and invasive species from further afield.
- Adequate wheel-washing facilities are to be constructed at the entrance to the site (e.g. at the eastern end of the access road) and any wastewater will be disposed of correctly to prevent spread of undesirable species.
- Regular site walkover surveys throughout the construction period by a suitably qualified botanist to check to the presence and abundance of non-native or invasive species.
- Ensure full application of the approved C-ESMP during the construction phase and so fulfilling EEAA conditions stated in the ESIA approval letter.

Impacts on Sensitive Receptors (Nubian Ibex and Dorcas Gazelle)

Species such as Nubian Ibex and Dorcas Gazelle are threatened by habitat loss and both species are likely to avoid areas of human disturbance and instead choose to use less suitable but undisturbed habitats.

The main cause of barrier impacts in large mammals, especially in ungulates, is the presence of linear features within the landscape and this is more apparent in open landscapes. Of all the linear infrastructure types, roads are among the more common and most problematic for large ungulates (CMS Guidelines), especially where there are fences or roadside ditches/banks/bunds. In the absence of these features, disturbance impacts of roads including people and vehicles can limit or even prevent movements of

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animals across the road. Fences are also problematic as they create physical barriers to movement and are likely to result in significantly lower movements of ungulates.

Studies in North America have shown that traffic volumes of > 2,000 vehicles/ day can have a barrier effect on wildlife, becoming "strong to complete barriers" at volumes of >4,000 vehicles/day. A "functional" barrier to wild ungulates (meaning, some individuals cross but not enough to prevent loss of functional ecological and genetic connectivity), is likely to be reached at much lower traffic volumes for species in Egypt, where wild animals have a much clearer view of long stretches of road and are very wary of vehicles due to hunting pressure and harassment. Predictions of expected traffic flow along the access road are not available but it is expected that traffic volumes will be significantly less than 2,000 vehicles per day during construction and far less during operation.

In construction zones traffic volumes are again expected to be small however continuous construction activity will likely cause small zones of increased disturbance however these impacts will be localized, and any animals will be able to avoid these areas without significant impacts.

Surveys completed to inform the ESIA did not record significant numbers of large mammals (ungulates) within Project AoI. Additional information regarding the impacts of the operational wind farm on ungulates is presented in a separate section.

The Project AoI will not be widely fenced (fences around sub-stations, working areas, offices etc. and these areas are likely to be avoided by sensitive receptors due to increased human activity) and no fences are planned to run adjacent to the access roads. In addition, the access roads will not be 'banked' and are therefore unlikely to act as barriers to movement. Vehicle numbers (e.g. vehicles per hour) will be low and again traffic volumes are not considered to be potentially significant. Therefore, it is considered that there will be no barriers to free movement of mammals across the AoI during construction or operation.

Construction Phase – Direct Mortality sensitive mammals		
Type	Negative	
Duration	Short Term	Impacts in construction areas would be short term
Magnitude	Medium	Potential mortality could reduce population size and viability within the Project footprint
Reversibility	Irreversible	Mortality will be permanent
Sensitivity	High	IUCN VU
Likelihood	Low	Mortality is very unlikely
Frequency	Periodic	During Construction
Timing	Not Relevant	For the duration of construction phase and in all seasons
Extent	Low	Impact will occur in the Project footprint only
Significance	Moderate	

Mitigation Measures

A summary of mitigation measures to avoid and mitigate for direct impacts on sensitive vertebrate receptors is included below. These measures will be included in a Biodiversity Management Plan.

Timing construction works to avoid the most sensitive areas for birthing Dorcas Gazelle and Nubian Ibex will take place, where practicable. The most sensitive period of the year for both species is spring and birthing is typically in March and April therefore works taking place outside these dates are unlikely to impact on breeding individuals of this species. If future works take place between these dates the Project Ecologist will check suitable habitat to look for female Gazelle and Ibex with young calves and will report the location to the EPC contractor so an appropriate working buffer can be established.

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Survey methods should be appropriate to locate the species if it is present and therefore designed by qualified and experienced ecologist with experience of large terrestrial mammal surveys. All survey methods and results should be reported to management/lenders.

If females are recorded with calves that are less than one week old or if pregnant females are observed there will be no works within 1km of the area until cessation of breeding activity is confirmed by the Project Ecologist / Vertebrate Ecologist.

Surveys in areas of suitable habitat within 1km of working areas will be completed in April and May in each year throughout the construction period and if females are recorded the areas will be avoided until birthing has been completed in order to prevent disturbance. Construction activities will be allowed to proceed once all pregnant females present have given birth and all calves are at least one week old. All animals must be allowed to move freely away from construction areas to more suitable habitat (the hills to the west) and construction will only proceed when all animals have left the area naturally.

The Project Ecologist should check with the ecologists completing other surveys for information relating to the presence of Dorcas Gazelle within the project area. Pre-construction surveys should target any areas where this species has been previously recorded, especially in areas suitable for birthing.

Data relating to mammal fatalities found on Project roads will also be collected and included in the fatality database, with results included as supplementary data within the 6 monthly PCFM reporting.

Direct Impacts on Sensitive Receptors (Vertebrates) - Site Clearance and Earthworks

As well as impacts on habitats it is near-certain that site preparation works and construction activities have the potential to negatively impact sensitive ecological receptors (e.g. reptiles, mammals) as a result of direct mortality.

Animals that are on site, such as the Egyptian Spiny Tailed Lizard (IUCN VU), are likely to be exposed to impacts during construction as they are a diurnal species meaning they will be mobile while site works are active. The site also offers suitable burrowing habitat, which could be damaged during construction. Unmitigated, impacts on Egyptian Spiny-tailed Lizard could potentially be medium-term and irreversible (e.g. loss of breeding habitat and mortality) and of high significance. Direct mortality of Dorcas Gazelle and Nubian Ibex is highly unlikely.

Construction Phase – Direct Mortality Egyptian Spiny-tailed Lizard		
Type	Negative	
Duration	Short Term	Impacts in construction areas would be short term
Magnitude	Medium	Potential mortality could reduce population size and viability within the Project footprint
Reversibility	Irreversible	Mortality of Spiny-tailed Lizards will be permanent
Sensitivity	High	IUCN VU
Likelihood	High	Mortality is certain without mitigation
Frequency	Periodic	During Construction
Timing	Not Relevant	For the duration of construction phase and in all seasons
Extent	Low	Impact will occur in the Project footprint only
Significance	Moderate	

Mitigation Measures

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A summary of mitigation measures to avoid and mitigate for direct impacts on sensitive vertebrate receptors is included below. These measures will be included in a Biodiversity Management Plan. Pre-clearance assessment and mitigation measures for Egyptian Spiny-tailed lizard should be detailed in a dedicated reptile relocation plan, follow GIIP developed in Egypt at other sites and be overseen by suitably qualified herpetological expert with experience in the translocation process.

- All site workers will undertake a Project induction before working on site. The induction will include a comprehensive biodiversity element where the baseline ecological value and sensitivity of the receptors within the AoI will be discussed and relevant receptors highlighted to the site staff.
- Prior to construction works, working areas will be clearly demarked (using appropriate temporary fencing (e.g. orange netting attached to wooden posts) so that site workers fully understand the working area. Encroachment into areas outside of agreed working areas will be prohibited and working areas will be subject to regular check by the EPC Ecologist to check enforcement of working areas.
- Working areas should avoid trees / shrubs as these are likely, due to their sporadic distribution across the AoI to be of importance.
- Pre-construction surveys of sensitive species (i.e. those qualifying Priority Biodiversity Features) of herpetofauna will take place. The locations of known/active burrows used by Egyptian Spiny-tailed Lizard will be marked throughout the Project Area and appropriate buffers around each burrow established.
- Prior to the start of construction suitable sites for the release of relocated Egyptian Spiny-tailed Lizards will be identified and mapped. A suitable translocation receptor site must;
  - Preferably within the project wide boundary but certainly within 10 km of the Project site.
  - Contain appropriate vegetation (both for food and cover).
  - Have suitable soil types to allow animals to dig and create new burrows.
  - Not already close to carrying capacity for this species.
  - Not within another existing or proposed development site (or where there is likely to be a proposed site).
- Capture and movement of Spiny-tailed Lizards will only be completed as a last resort. All works will aim to be completed at least 100m from active burrows. Locations where burrows are present up to 200m of construction will be monitored throughout the construction period and if significant negative impacts (i.e., abandonment of burrows or increased mortality) are observed the remaining burrows in closest proximity will be excavated and the animals captured and translocated to holding areas in accordance with the below protocols for the duration of the construction window in that location.
- Detailed design for the final infrastructure layout will take into account the results of the pre-construction surveys and Project infrastructure will be sited to avoid the identified burrows. Where this is not possible, or where fresh burrows are identified at the commencement of clearance works, these burrows will be excavated by hand and the animals captured and translocated, details of this are provided below.

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- Prior to working in an area containing Spiny-tailed Lizard burrows any remaining burrows within 100m of proposed works will be re-checked by the Ecologist using an endoscope and if empty dug out and destroyed. If any animal is found back in the working areas the burrow will be dug out carefully by hand and the animal captured and placed in a secure box before taking it to a cool location ready for translocation to the receptor site. Once the lizard is removed from the burrow the hole will collapse and be made unsuitable for future use.
- If areas suitable for translocation exist within the Project Area these will be prioritized as this minimizes the impact of transporting animals away from the Project site.
- Where possible animals will be moved to existing, but inactive, burrow sites – as long as the site is still suitable for use, with nearby food and cover plants etc.
- Studies have shown that soft releasing Spiny-tailed Lizards leads to a better survival rate than simply releasing the animals into a new site so any animal which is translocated will be soft-released into an individual mesh enclosure within a suitable area of habitat. The pen will measure at least 2m x 2m and be covered to provide shade and prevent attack from above. A "starter hole" will be dug using a 20cm auger to a depth of approximately 30cm to provide some initial shelter. Supplementary feeding will also be undertaken and after a period of seven days the enclosure will be removed to allow the lizards to move and forage naturally.
- After the relocation period, a report will be prepared which will include the following information:
  - Survey dates and timing of capture and release
  - Weather conditions during survey and relocation effort
  - Location of captured individuals
  - Number of captured individuals during each relocation effort
  - Number of juveniles, mature males and mature females
  - Release sites used for relocation of each effort
  - Number of males and females released at each site
  - Number of mortalities during relocation effort
- Ensure full application of the approved C-ESMP during the construction phase and so fulfilling EEAA conditions stated in the ESIA approval letter.

Direct Impacts on Sensitive Receptors (Vertebrates) – Vehicle Collisions

Vehicle related collision is possible for all vertebrate species present within the Project's AoI and this will result in direct mortality on receptors of low to high sensitivity. Any such impact would be negative, long-term and irreversible and would be of medium to high magnitude and therefore of minor to major significance (depending on the receptor killed).

Both small and large vertebrate species are at risk of vehicle collisions throughout construction. Species such as Egyptian Spiny-tailed Lizard are at higher risk of collision with vehicles and machinery as they are active in the day.

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It is possible that carcasses on the road could attract scavenging animals, including birds of prey which in turn would increase their risk of collision with vehicles and machinery.

Construction Phase – Direct Impacts on Sensitive Receptors (Vertebrates) – Vehicle Collisions		
Type	Negative	
Duration	Medium-Term	Throughout construction period
Magnitude	High	Potential mortality could reduce population size and viability within the Project footprint
Reversibility	Irreversible	Mortality of individuals would be permanent loss
Sensitivity	Low to High	Dependent on receptor impacted
Likelihood	Medium	Direct mortality of sensitive receptors is possible
Frequency	Periodic	During Construction
Timing	N/A	Impacts possible in all months
Extent	Low	Impact will occur in the Project footprint only
Significance	Minor to Major	Dependent on receptor affected

Mitigation Measures

- Speed limits of 20 kph will be enforced by the EPC Contractor on all site roads
- Regular signage will be installed along the site access roads and internal roads informing all drivers of the speed limit
- The site entrance will be staffed and any visitors or locals using the site roads will be informed of the speed limits and that there are regular checks of vehicle speeds
- A ban of driving at night will be enforced and if necessary the speed limit will be reduced to 15kph
- Ban against off-road driving at all times of the day
- Regular checks of the road for carcasses and if found these will be moved to at last 50m from the road to reduce the likelihood of hitting scavengers, including birds of prey.
- A chance find procedure will be developed by the EPC Contractors so that all workers report any road collisions so that any such incident can be investigated in full.
- Ensure full application of the approved C-ESMP during the construction phase and so fulfilling EEAA conditions stated in the ESIA approval letter.
-

Direct Impacts on Sensitive Receptors (Habitats, Vertebrates) – Poaching, Collection etc.

It is possible that site workers may poach or take plants and animals from the site, either for firewood or in the case of the Spiny-tailed Lizard or large mammals for food, trophy or to be sold. Species such as Red Fox could also face persecution.

Construction Phase – Direct Impacts on Sensitive Receptors (Habitats, Vertebrates) – Poaching, Collection etc.		
Type	Negative	
Duration	Medium Term	Throughout construction period
Magnitude	Low to High	Dependent on receptor affected

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Reversibility	Irreversible	Mortality of individuals would be permanent loss
Sensitivity	Low to High	Dependent on receptor impacted
Likelihood	Low to Medium	Unlikely to occur
Frequency	Periodic	During Construction
Timing	N/A	Impacts possible in all months
Extent	Medium to High	Possible for site workers or poachers could access a wider area around the wind farm due to increased accessibility as a result of the access road
Significance	Not significant to Major	Dependent on receptor affected

Mitigation Measures

- The Project will enforce strict controls on hunting, gathering, poaching and otherwise disturbing flora and fauna within Project AoI. Any breaches of this ban will be strictly enforced, and any workers found in breach of this control measure will be subject to disciplinary procedures.
- The ban on hunting etc. will be included in the site induction along with discussions about the sanctions for breaches of this control measure.
- A chance find procedure will be implemented should any site worker find a wild animal, especially one that has become a nuisance (e.g. scavenger in the works camp, presence of small mammals in worker accommodation, presence of snake or scorpion on the works site) and the EPC Ecologist will arrange for an appropriately qualified person to capture and relocate. Where scavengers have been identified within the works site additional housekeeping measures may be required.

Direct and Indirect Impacts on Sensitive Receptors (Vertebrates) – Disturbance

The presence of site workers and machinery can result in disturbance related impacts to all terrestrial ecological receptors present within the AoI. These impacts are not certain, and the magnitude of such impacts will vary depending on the sensitivity of each receptor to disturbance. The significance of any such disturbance impacts is likely to range from Minor to Moderate / Major, depending on the sensitivity of the affected receptor. The duration of impact will also likely vary from very short-term (e.g. running away from a vehicle using the access road) to short to medium term in areas adjacent to construction areas or worker accommodation where receptors may temporarily abandon the area during the construction period. It is likely that any disturbance impacts, irrespective of duration, will be reversible once the disturbance event has passed.

Construction Phase – Direct and Indirect Impacts on Sensitive Receptors (Vertebrates) – Disturbance		
Type	Negative	
Duration	Short to Medium Term	Throughout construction period which is likely to be approximately 4 years however disturbance could also be very short-term (e.g. move away from a vehicle)
Magnitude	Low to High	Dependent on receptor affected
Reversibility	Reversible	Impact likely to be reversible once disturbance event has passed and disturbance events likely to be localized and will cease on completion of construction activities.

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Sensitivity	Low to High	Dependent on receptor impacted
Likelihood	Low to Medium	Impacts are not certain to occur or be significant.
Frequency	Periodic	During Construction
Timing	N/A	Impacts possible in all months
Extent	Low	Likely to occur within the Project AoI or only in immediately adjacent habitats.
Significance	Not significant to Major	Dependent on receptor affected

Mitigation Measures

- Site wide induction to include information regarding disturbance of ecological receptors.
- Chance find procedure to report sightings of potentially sensitive receptor and investigation of any such sightings by the EPC Contractor in order that additional buffer areas can be agreed, where necessary.
- Ensure full application of the approved C-ESMP during the construction phase and so fulfilling EEAA conditions stated in the ESIA approval letter.
-

Direct and Indirect Impacts on Sensitive Receptors (Vertebrates) – Reduced Air Quality / Dust

The habitat across the AoI is very sandy. It is likely that construction related ground disturbance will increase the amount of dust in the air which in turn could result in negative impacts on plants and vertebrate receptors. In addition, air pollution from site vehicles from the concrete batching plant could also result in negative impacts on valued receptors.

Construction Phase – Direct and Indirect Impacts on Sensitive Receptors (Vertebrates) – Reduced Air Quality / Dust		
Type	Negative	
Duration	Medium-term	Limited to construction. Construction phased over four years so impacts assessed as short-term. Construction is also phased so direct impacts in limited working areas during the construction phase.
Magnitude	Low to Medium	Dependent on receptor affected
Reversibility	Reversible	Impact likely to be reversible once construction activities have finished.
Sensitivity	Low to High	Dependent on receptor impacted
Likelihood	Low to Medium	Impacts are not certain to occur or be significant.
Frequency	Periodic	During Construction
Timing	N/A	Impacts possible in all months
Extent	Medium	Impacts within Project AoI but dust and pollution could affect areas within 2 km of Project activities.
Significance	Not significant to Moderate	Dependent on receptor affected

Mitigation Measures

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- Where necessary tracks will be damped down to reduce the risk of dust. Damping down will also include areas adjacent to roads. These measures will be implemented where necessary.
- Vehicles will be properly maintained to reduce emissions.
- Emissions from the batching plant will be monitored in line with control plans to minimize air pollution.
- Ensure full application of the approved C-ESMP during the construction phase and so fulfilling EEAA conditions stated in the ESIA approval letter.
-

Direct Impacts on Sensitive Receptors (Vertebrates) – Noise

Noise as a result of construction can result in direct impacts on vertebrates due to acoustic masking, disturbance and displacement thereby reducing survivorship and reproductive success.

Any impacts are likely to be short- to medium term (for the duration of construction) and reversible. The magnitude of impact ranges from low to medium and is likely to be of low to moderate significance.

Construction Phase – Direct Impacts on Sensitive Receptors (Vertebrates) – Noise and Vibration		
Type	Negative	
Duration	Short-term to Medium Term	Limited to construction. Construction phased over four years so impacts assessed as short-term. Construction is also phased so direct impacts in limited working areas during the construction phase.
Magnitude	Low to Medium	Dependent on receptor affected
Reversibility	Reversible	Impact likely to be reversible once construction activities have finished.
Sensitivity	Low to High	Dependent on receptor impacted
Likelihood	Low to Medium	Impacts are not certain to occur
Frequency	Periodic	During Construction
Timing	N/A	Impacts possible in all months
Extent	Medium	Impacts within Project AoI but noise and vibration could affect areas within 2 km of Project activities.
Significance	Not significant to Moderate	Dependent on receptor affected

Mitigation Measures

- Vehicles will be properly maintained to minimize noise emissions.
- Use of available technology and management practices within construction methodologies to reduce noise.
- Regular monitoring of noise levels within works compounds and works areas as far as possible and apply corrective measures as necessary.
- Ensure full application of the approved C-ESMP during the construction phase and so fulfilling EEAA conditions stated in the ESIA approval letter.

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Direct Impacts on Sensitive Receptors (Vertebrates) – Lighting

Lighting could impact foraging and commuting routes for mammal species. Any impacts are likely to be short- to medium term (for the duration of construction) and reversible. The magnitude of impact is low and is likely to be of no/minor significance given the small number of mammals present. Mitigation measures will help all nocturnal sites use by other animals.

Construction Phase – Direct Impacts on Sensitive Receptors (Vertebrates) – Lighting		
Type	Negative	
Duration	Short-to Medium-term	Limited to construction. Construction phased over four years so impacts assessed as short-term. Construction is also phased so direct impacts in limited working areas during the construction phase. Impacts associated with the worker compounds and offices could occur throughout the construction phase and are considered medium-term.
Magnitude	Low to Medium	Dependent on receptor affected
Reversibility	Reversible	Impact likely to be reversible once construction activities have finished.
Sensitivity	Low to High	Dependent on receptor impacted
Likelihood	Low to Medium	Impacts are not certain to occur
Frequency	Periodic	During Construction
Timing	N/A	Impacts possible at night and in months, although more likely in spring, autumn and winter (i.e. shorter day lengths)
Extent	Low	Lighting will not be extensively used (if at all) and as such any impact would be very localized and within the Project AoI only.
Significance	Not significant to Moderate	Dependent on receptor affected

Mitigation Measures

- Limit the amount of lighting, especially within the wider AoI (e.g. at turbine construction sites). Night-time work is not anticipated and will certainly not be a regular occurrence. This will be achieved by ensuring that night-time work is only undertaken with appropriate justification, e.g. emergency work.
- Where lighting is required within worker compounds, site offices etc. ensure that any lighting is shielded and protected to reduce light-spill and glare. Low intensity lighting should also be used, where possible, to further reduce light spills.
- For external security lights PIR trigger units should be used and these should be timed to automatically switch off after five minutes.
- No lighting will be installed along the access roads.
- Ensure full application of the approved C-ESMP during the construction phase and so fulfilling EEAA conditions stated in the ESIA approval letter.

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Direct and Indirect Impacts on Sensitive Receptors (Vertebrates) – Littering, Waste Management

Unmitigated, it is possible that poor waste management could result in the proliferation of litter across Project AoI including plastic containers, plastic bags and glass. This waste could result in negative impacts to sensitive receptors through ingestion or entanglement. Any such impact could be long-term and irreversible, and the significance of this impact would be minor to high depending on the receptor effected.

In addition, poor management of other solid wastes, including food waste, could result in the presence of pest species such as rats and mice, which could outcompete wild rodents and attract feral cats and dogs which could increase the risk of predation of wild rodents and other prey species.

Construction Phase – Direct and Indirect Impacts on Sensitive Receptors (Vertebrates) – Littering, Waste Management		
Type	Negative	
Duration	Short-to Medium-term	Limited to construction. Construction phased over four years so impacts assessed as short-term. Construction is also phased so direct impacts in limited working areas during the construction phase. Impacts associated with the worker compounds and offices could occur throughout the construction phase and are considered medium-term.
Magnitude	Low to Medium	Dependent on receptor affected
Reversibility	Reversible	Impact likely to be reversible once construction activities have finished.
Sensitivity	Low to High	Dependent on receptor impacted
Likelihood	Low to Medium	Impacts are not certain to occur
Frequency	Periodic	During Construction
Timing	N/A	Impacts possible in all months during construction activities.
Extent	Medium	Impacts within Project AoI but possible wind-blown litter / waste could affect areas within 2 km of Project activities.
Significance	Not significant to Moderate	Dependent on receptor affected

Mitigation Measures

- A Waste Management Plan will be prepared by the EPC Contractor
- Waste Management will be included in the Site Induction so that all site workers understand their responsibilities to maintaining a clean and tidy site. Where possible all materials that can be recycled will be.
- Zero tolerance to littering on the works site and within the worker compound. This zero-tolerance approach should also be applied to smoking and workers must use appropriate smoking areas (supplied with 'butt bins') at all times, even when on construction sites. Litter must not be thrown out of vehicle windows when driving to and from or around the site.

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- Daily inspections of working areas and worker compound should be completed, and corrective actions applied, where necessary.
- Additional mitigation measures for pest species, including feral cats and dogs are included below.
- Ensure full application of the approved C-ESMP during the construction phase and so fulfilling EEAA conditions stated in the ESIA approval letter.
-

Direct and Indirect Impacts on Sensitive Receptors (Vertebrates) – Pest Species

As discussed above it is possible that pest species become established within the Project as a result of increased littering or poor waste management as well as the propensity of certain species (e.g. rats, cats and dogs) to associate with human habitation.

An increase in pest species could result in long-term negative impacts on wild animals through direct and indirect competition for food resources, direct mortality through predation, and direct impacts as result of disturbance impacts. Such impacts could be reversible or irreversible, will be between low to high magnitude and as such significance will vary from minor to major depending on the receptor being affected.

Construction Phase – Direct and Indirect Impacts on Sensitive Receptors (Vertebrates) – Pest Species		
Type	Negative	
Duration	Short-to Medium-term	Limited to construction. Construction phased over four years so impacts assessed as short-term. Construction is also phased so direct impacts in limited working areas during the construction phase. Impacts associated with the worker compounds and offices could occur throughout the construction phase and are considered medium-term.
Magnitude	Low to High	Dependent on receptor affected
Reversibility	Reversible or irreversible	During construction period only however pest species could persist within the Project AoI after construction.
Sensitivity	Low to High	Dependent on receptor impacted
Likelihood	Low to Medium	Impacts are not certain to occur
Frequency	Periodic	During Construction and possibly post-construction if pest species become established.
Timing	N/A	Impacts possible in all months during construction activities.
Extent	Low to Medium	Dependent on pest species
Significance	Not significant to Major	Dependent on receptor affected

Mitigation Measures

- Where pest species are identified the EPC Contractor / Ecologist will be notified and an appropriate course of action taken. For small mammal pests live traps will be used, in order to reduce the risk of by-catch. Poison bait should be avoided, unless it can be certain that non-target species will be affected, and any such use should be in accordance with national and international best practice. If

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poison bait is to be used it must be certain that any poisoned animal cannot move out on to the wider AoI to reduce the risk of natural predators eating poisoned animals. Any chemical control of pests must only be undertaken in accordance with national and international guidelines as well as following Lender guidelines including risk assessment and prior agreement with the Lender.

8.6.2 Potential Impacts during the Operation Phase

Direct and Indirect Impacts on Sensitive Receptors (Mammals) – Habitat Fragmentation and Barrier Impact

Operational Wind turbines could also act as a potential barrier to movement of ungulates through the landscape, although this is not widely studied in Dorcas Gazelle or Nubian Ibex and information regarding potential barrier impacts and successful mitigation options have been sourced from similar species (e.g. Tibetan antelope (*Pantholops hodgsonii*)) or species which inhabit similar open habitats (e.g. Pronghorn (*Antilocapra americana*)). Studies in North America (Milligan 2021, Milligan 2023) have shown that whilst Pronghorn migration persists through wind farm areas in the short term, multiple aspects of behavior and migration are affected (e.g. increased transit speed through wind farms, avoidance of some areas during spring / autumn), which leads to concern that long-term viability of migration routes through wind farms may be impacted. Other projects (e.g. gas and oil exploration) have been shown to have more significant operational disturbance impacts as a result of increased regular human activity.

The actual impacts of operational wind farms on ungulates have not been subject to exhaustive study and there are no definitive or accepted displacement / disturbance distances for operational wind farms. It is possible that the wind farm will result in significant and persistent barrier/displacement impact to ungulates however the actual severity of this impact is questionable given the relatively low populations of Gazelle and Ibex within the Project site and wider area. The turbine layout is most likely to be arranged in lines generally east west, however there will be a corridor of at least 2 km between the western end of the lines of turbines and the adjacent hills. This provides a buffer to the most suitable habitat and allows movement of animals around the western edge of the wind farm area.

The critical factor in determining the severity of likely impacts is habitat suitability and avoidance of key habitat areas (e.g. for calving or high-quality foraging habitats). The wind farm area is not sited in core areas of high-quality habitat. Therefore, it is considered that there will be no permanent barriers to free movement of mammals across the AoI.

Operation Phase – Direct Impacts on Sensitive Receptors (Vertebrates and Birds) – Habitat Fragmentation and Barrier Impact		
Type	Negative	
Duration	Long-Term	Potential impact throughout the operation of the wind farm
Magnitude	Low to High	Dependent on receptor affected
Reversibility	Both	Barrier impact could persist throughout operation, although a degree of habituation is also possible.
Sensitivity	Low to High	Dependent on receptor impacted
Likelihood	Low	Impacts are not certain to occur and project design to limit barrier impacts
Frequency	Periodic	During operation, especially during periods of migratory behavior

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Timing	N/A	Impacts possible in all months but more significant during migration periods
Extent	High	Potential for impacts over a wide area if barrier impact exists
Significance	Not significant to Major	Dependent on receptor affected

Indirect Impacts on Sensitive Receptors (Vertebrates) – Disturbance

During the operation of the wind farm disturbance impacts are likely to be very minor as the site will not be subject to regular activity other than occasional vehicle movements and maintenance operations around the site, including turbine locations.

Egyptian Spiny-tailed Lizard, Dorcas Gazelle and Nubian Ibex may suffer some minor impact to their daily foraging activities. Any such impact will have be very short-term (for the duration of the disturbance impact) and reversible and is likely to only result in impacts of low magnitude. The significance of operational disturbance is therefore considered to be minor, at worst.

Operation Phase – Indirect Impacts on Sensitive Receptors (terrestrial mammals and breeding / resident birds) – Disturbance		
Type	Negative	
Duration	Short-term but throughout operation	Impacts are short-term (i.e. disturbance event) but could occur over a long period of time (i.e. 25 years of operation)
Magnitude	Low to Medium	Dependent on receptor affected
Reversibility	Reversible	During operation. Disturbance events are reversible
Sensitivity	Low to High	Dependent on receptor affected
Likelihood	Low	Impacts are not certain to occur
Frequency	Periodic	During operation,
Timing	N/A	Impacts possible in all months
Extent	Low	Impacts limited in extent to areas where maintenance is being undertaken etc.
Significance	Not significant to Moderate	

Mitigation Measures

- Speed limits are to be enforced.
- Sensitive species are to be included in the site induction for all operational staff where additional control measures will be discussed including allowing animals to move around the site, not chasing after them in vehicles or approaching them on foot.
- Ensure full application of the approved ESMP obligations during the operation phase. In addition to fulfilling EEAA conditions stated in the ESIA approval letter.
-

Direct Impacts on Sensitive Receptors (Vertebrates) – Vehicle Collisions

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Vehicle related collision is possible for all vertebrate species present within the Project's AoI and this will result in direct mortality on receptors of low to high sensitivity. Any such impact would be negative, long-term and irreversible and would be of medium to high magnitude and therefore of minor to major significance (depending on the receptor killed).

Species such as Egyptian Spiny-tailed Lizard have a high risk of collision with vehicles due to their diurnal nature.

It is possible that carcasses on the road could attract scavenging animals, including birds of prey which in turn would increase their risk of collision with vehicles and machinery.

Operation Phase – Direct Impacts on Sensitive Receptors (Vertebrates) – Vehicle Collisions		
Type	Negative	
Duration	Long-term	During operation
Magnitude	Low to High	Dependent on receptor affected
Reversibility	Irreversible	Impact could result in death or injury to sensitive receptors
Sensitivity	Low to High	Dependent on receptor affected
Likelihood	Medium	Direct mortality of sensitive receptors is possible
Frequency	Rare	During operation,
Timing	N/A	Impacts possible in all months
Extent	Low	Impacts limited to Project AoI including access road
Significance	Not significant to Major	

Mitigation Measures

- Speed limits of 20 kph will be enforced by the O&M Contractor
- Regular signage will be installed along the site, access roads and internal roads informing all drivers of the speed limit.
- The site entrance will be staffed and any visitors or locals using the site roads will be informed of the speed limits and that there are regular checks of vehicle speeds.
- A ban on driving at night will be enforced and if necessary the speed limit will be reduced to 15kph
- Ban against off-road driving at all times of the day, and if necessary, the works area will be subject to a walkover by the Project Ecologist.
- Regular checks of the road for carcasses and if found these will be moved to at last 50m from the road to reduce the likelihood of hitting scavengers, including birds of prey.
- A chance find procedure will be developed by the O&M Contractors so that all workers report any road collisions so that any such incident can be investigated in full and included in ongoing mortality monitoring at the site.
- Ensure full application of the approved ESMP obligations during the operation phase. In addition to fulfilling EEAA conditions stated in the ESIA approval letter.
-

Direct Impacts on Sensitive Receptors (Vertebrates) – Lighting

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Lighting could potentially result in negative impacts of a range of ecological receptors including those of high sensitivity such as Nubian Ibex and Dorcas Gazelle.

Any impacts are likely to be short- to medium term and reversible. The magnitude of impact ranges from low to medium and is likely to be of minor to moderate significance.

Operation Phase – Direct Impacts on Sensitive Receptors (Vertebrates) – Lighting		
Type	Negative	
Duration	Variable	Impacts are short- to medium-term (i.e. lighting event) but could occur over a long period of time (i.e. 25 years of operation). Longer term impacts at operations base however other lighting events likely to be shorter to medium term (e.g. on site if required)
Magnitude	Low to Medium	Dependent on receptor affected
Reversibility	Reversible	During operation. Lighting events are reversible although lighting at site offices / compound would be permanent and irreversible during the operation phase
Sensitivity	Low to High	Dependent on receptor affected
Likelihood	Low to Medium	Impacts are not certain to occur
Frequency	Rare	During operation,
Timing	N/A	Impacts possible in all months
Extent	Low	Impacts limited to Project AoI
Significance	Not significant to Moderate	

Mitigation Measures

- Site-wide lighting is not being implemented so any lighting impacts during operation will be very limited. Night-time work is not anticipated and will certainly not be a regular occurrence.
- Where lighting is required within worker compounds, site offices etc. ensure that any lighting is shielded and protected to reduce light-spill and glare. Low intensity lighting should also be used, where possible, to further reduce light spills.
- For external security lights PIR trigger units should be used and these should be timed to automatically switch off after five minutes.
- No lighting will be installed along access road
- Ensure full application of the approved ESMP obligations during the operation phase. In addition to fulfilling EEAA conditions stated in the ESIA approval letter.
-

Direct Impacts on Sensitive Receptors (Habitats and Flora) – Non-native Species and Introduced Flora

It is possible that non-native or introduced flora could be imported into the AoI on vehicles or with any imported soil material. The impacts of non-native and introduced flora could potentially be significant in absence of any mitigation as these species could become established and out-compete native flora.

Impacts associated with non-native, invasive or introduced flora could result in long-term negative impacts, irreversible (if allowed to become established) and potentially significant.

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Operation Phase – Direct Impacts on Sensitive Receptors (Habitats and Flora) – Non-native Species and Introduced Flora		
Type	Negative	
Duration	Long Term	During operational phases of the project
Magnitude	Low to Medium	Potential change to natural habitat and species composition across the Project AoI.
Reversibility	Reversible	Invasive species can be controlled, if identified
Sensitivity	Low to Medium	Habitats are assessed as being of low to medium sensitivity
Likelihood	Low to Medium	Introduction of invasive non-native species is possible
Frequency	Rare	During operation,
Timing	N/A	Impacts possible in all months
Extent	Medium	Impacts limited to Project AoI
Significance	Not significant to Moderate	

Mitigation Measures

- Post-construction monitoring will be completed across the AoI to record the presence and distribution of non-native and invasive plant species and a programme of mechanical control will be completed over the operational period to remove these species from the AoI. Chemical control will be avoided however, if necessary, will be used in accordance with national and international guidelines and will also be subject to risk assessment and approval from the Lenders. The programme of control will continue until the species are absent from Project AoI.
- A programme of regular monitoring will be completed with surveys completed in Years 1, 2, 5, 10, 15 to survey for the presence of non-native and / or invasive species and relevant control of these species will be completed, where necessary.

Direct and Indirect Impacts on Sensitive Receptors (Vertebrates) – Pest Species

It is possible that pest species become established within the Project as a result of increased littering or poor waste management as well as the propensity of certain species (e.g. rats, cats and dogs) to associate with human habitation.

An increase in pest species could result in long-term negative impacts on wild animals through direct and indirect competition for food resources, direct mortality through predation, and direct impacts as result of disturbance impacts. Such impacts could be reversible or irreversible, will be between low to high magnitude and as such significance will vary from minor to major depending on the receptor being affected.

Operation Phase – Direct and Indirect Impacts on Sensitive Receptors (Vertebrates) – Pest Species		
Type	Negative	
Duration	Long Term	During operational phases of the project
Magnitude	Low to Medium	Potential change to natural habitat and species composition across the Project AoI.
Reversibility	Reversible	Invasive species can be controlled, if identified
Sensitivity	Low to High	Dependent on receptor
Likelihood	Low to Medium	Introduction of invasive non-native species is possible

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Frequency	Rare	During operation
Timing	N/A	Impacts possible in all months
Extent	Medium	Impacts limited to Project AoI but could also encroach into adjacent areas
Significance	Not significant to Moderate	

Mitigation Measures

- Where pest species are identified, the O&M Contractor / Ecologist will be notified, and an appropriate course of action taken. For small mammal pests' live traps will be used, to reduce the risk of by-catch. Poison baits should be avoided, unless it can be certain that non-target species will be affected, and any such use should be in accordance with national and international best practice and will also be subject to risk assessment and approval from the Lenders. If poison bait is to be used it must be certain that any poisoned animal cannot move out on to the wider AoI to reduce the risk of natural predators eating poisoned animals.

Monitoring

Long term monitoring of Project AoI will be completed as set out above and will include:

- Habitat and Flora monitoring within the AoI to measure the success of habitat rehabilitation work to reasonably demonstrate no net loss of natural habitat as well as to record the presence of invasive / non-native flora. Monitoring will be completed in Years 1, 2, 5, 10 and 15. Full site walkover surveys as well as quadrat surveys will be completed.
- Monitoring of mammal and herpetofauna assemblages across the AoI. Repeat of baseline surveys will be completed in Years 1, 2, 5, 10 and 15. Population densities recorded in Year 5 will be compared to baseline levels and if required additional work will be completed.
- All of the above monitoring requirements will be included within a Biodiversity Management Plan which will include Key Performance Indicators (KPIs) against which the results of the monitoring will be assessed.

8.7 Avi Fauna

This section identifies the anticipated impacts on birds (avifauna) from the Project throughout its various phases. For each impact, a set of management measures, including mitigation and monitoring measures, and additional requirements, which have been identified to reduce, or eliminate, the impact to acceptable levels.

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8.7.1 Potential Impacts during the Construction Phase

Site preparation activities by the EPC Contractor for installation of the WTGs and associated components, like the substation, transmission cables, access roads and internal road network, or buildings, are expected to include land clearing activities, levelling, excavation, grading.

Such activities can impact the avifauna which potentially uses the site for resting – it does not matter if being soaring or non-soaring resident and migratory species. Generally, such construction activities do not result in any major alteration of the site's habitats given that they are limited to a small individual footprint, and the area of disturbance is quite reduced.

Construction Phase		
Type	Negative	
Duration	Long-term	
Magnitude	Low	
Reversibility	Irreversible	
Sensitivity	Medium	
Likelihood	Medium	
Frequency	Frequent	
Timing	Not relevant	
Extent	Medium	
Significance	Minor	

Mitigation Measures

- A species specific study with experts (apart of the normal migration monitoring) on the potential breeding of the species in the mountainous areas, and others in the vicinity, as shown in the figure above, should be completed.
- Implementation of proper housekeeping measures to reduce impacts including:
  - A complete additional survey comprising the entire breeding cycle of the Golden Eagle species would be necessary to properly assess the potential impact of this and other similar projects planned near the mountains and suitable cliffs. This monitoring should be developed with experts on the species, and GPS tagging highly recommended to save time and improve budgets. This monitoring could be shared by other developers in a similar situation.
  - A species-specific additional study with experts for the observed Sooty Falcon (apart of the normal migration monitoring) on the potential breeding of the species in the Project area, and others in the vicinity should be completed PRIOR TO COMENCEMENT OF CONSTRUCTION.
  - Should the additional assessments indicate highly sensitive areas for resident species, then additional mitigation and monitoring measures will be required. This could include the use of Automatic Detection Cameras (ADC) or additional resources. The most feasible option considering biodiversity and commercial criteria should be determined based on the outcomes of the additional assessment in compliance with the experts' opinion of the two affected species.
  - IF CONFIRMED, and depending on the distance of the works to potential breeding sites, works will be restricted to be performed out of the breeding seasons. A buffer of 2 km will apply to any nest

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(occupied or not by the eagles /colony for the falcons. Restrictions to apply after detailed study for both species, at least for one complete breeding season.

- Restrict activities exclusively to the allocated construction areas, including movement of workers and vehicles to allocated roads within the site, prohibiting off-roading to minimize disturbances.
- Ban hunting of birds on site at any time and under any condition to anyone, especially workers.
- Implement measures, preventing bird attraction to the site. This includes measures such as prohibiting dumping, and ensuring waste streams are disposed appropriately in accordance with the measures identified in "Section 8.4.2".
- Avoid unnecessary elevated noise levels at all times. In addition, apply adequate noise abatement measures. This could include the use of well-maintained mufflers and suppressants for high noise generating equipment and machinery. Develop a regular maintenance schedule of vehicles, machinery, and equipment for early detection of issues to avoid unnecessary elevated noise level, etc.

- Reduced speed limits inside the footprint to avoid road kills and dust.
- Report any incidental finding and killing of wildlife. Develop a protocol to report dispose of any deaths and injured wildlife or animals recorded onsite.
- Ensure full application of the approved C-ESMP during the construction phase and so fulfilling EEAA conditions stated in the ESIA approval letter.

Following the implementation of these mitigation measures, the significance of the residual impact can be reduced to not significant.

Monitoring and Reporting Requirement

The following summarizes the monitoring requirements for the projects which must be undertaken, and which include:

- EPC Contractors to submit the construction schedule and plan and demonstrate that construction is planned to avoid areas of concern during breeding season.
- Submission of an animal handling protocol, either dead or alive.

8.7.2 Potential Impacts during the Operation Phase

Wind turbines have the associated collision impact on birds from risks of collision and electrocution for any kind of bird.

For the Golden eagle and Sooty falcon, mitigation will be decided once the full assessment of these two species has been done, together with stakeholders (experts on these species working closing together with the consultant).

Related to migration: Egypt is one of the main Flyways for migratory soaring birds (MSBs) crossing from breeding grounds in Europe and Asia to their wintering areas in Africa (Rift Valley-Red Sea Flyway-RVRSF). The high wind energy potential in the Gulf of Suez (GoS) speeded up the development of wind energy facilities, which. The principal risks to migratory and resident bird species are the fatal collisions with turbines and overhead powerlines and disturbance/barrier effects.

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Given the importance of the area for bird migration, and the implementation of related international commitments, the Regional Centre for Renewable Energy and Energy Efficiency (RCREEE) initiated the "Active Turbine Management Program" (ATMP) aiming to safeguard Migratory Soaring Birds from collisions with turbines using bird flight migration survey data and developing an adaptively managed turbine shutdown program. This is done through a Bird Migration Protocol (BMP) called the "*Executive Framework for Strategic Cumulative, Environmental & Social Assessment & Program of Ornithological monitoring and Active Turbine Management for Wind Energy Developments in Gulf of Suez*".

Objective

The objective of this section is to assess impacts on birds during the operation phase of the project. This will be undertaken through the following approach:

- Identify the flying bird numbers at risk height for wind turbines; and
- Evaluate the Collision Risk of the different species according to Collision Risk Modelling (CRM).

Collision Risk Modelling and Flying at Risk

General introduction to CRM

The Collision Risk Model (CRM) is a simplified model developed to predict the potential impact of wind turbines on birds. There exist several CRM models developed / improved around the world, being one of the most used that is known as the Band model (SNH 2012). It must be clear that the CRM was not developed to provide a threshold of collisions, but an order of magnitude which would help the authorities –when it was designed- as a way to decide on project permitting purposes. A full and detailed development of the model can be read in Band, Madders, and Whitfield (2007) Developing field and analytical methods to assess avian collision risk at wind farms. In: De Lucas, Janss, and Ferrer (Eds). Birds and wind farms: Risk assessment and mitigations.

The CRM is performed only considering the physical bird characteristics, but does not consider e. g. behavior (migratory, hunting), or does not include topographical and weather variables into the modeling. As a result, CRM outcomes in the GoS have resulted quite different for the same species, at the same site and season, in two consecutive years, as demonstrated in other wind projects. These changes between years within the same season suggest that the data are not comparable between them and reinforces the idea of the low value to make any concrete or informed predictions. Other variations for the remaining species should not be considered as indicative, because of the low numbers of birds observed (usually < 5 individuals each), and some of the species which were not detected in one year would have passed through the site despite not being recorded by the observers. In other words, the numbers of birds at risk height differ between seasons, and data should not be used to estimate collision for one year as it could differ significantly during the second year.

The model for the two types of turbines selected appears in the table below.

Table 63: Turbine specifications used for the CRM

Model	EN206 – 11MW
Rated Capacity	11MW
Rotor Diameter	206m

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Hub-Height	117m
Maximum speed of the blade tips	Not provided
Blade Chord Length	No provided
Number of WTGs	83

Data inputs for the CRM analysis were derived from the results of the VP surveys, as well as the above-mentioned turbine specifications and the following assumptions:

Rotation speed (rpm)	7.5	Average value calculated from manufacturer's Specifications for similarly-sized turbine.
Percent of time Operational	Monthly values ranging from 64% to 85%	Project specific data not available, representative values taken from SOSS example
Maximum blade width (m)	4.5	Not provided
Pitch (degrees)	47.5	Not provided

In addition to bird densities derived from VP survey data, CRM makes use of physical and observational characteristics of avifauna species. Input values used in the CRM analysis are presented in the table below. Data on physical dimensions of birds were derived from Cornell Lab of Ornithology's Birds of the World (https://birdsoftheworld.org), while information specific to the VP survey observations, such as typical flight speeds derived from Alerstam et. Al. (2007), flight styles, and maximum effective radius of observation/identification were generated using input from the databases.

Table 64: Physical characteristics of each bird species included within the CRM analysis.

Scientific name	English Common Name	Length (m)	Wingspan (m)	Flight type	Flight speed
Milvus migrans	Black Kite	0.55	1.37	gliding	11.7
Ciconia nigra	Black Stork	1	1.55	gliding	16
Aquila pennata	Booted eagle	0.51	1.38	gliding	11.3
Grus grus	Common Crane	1.08	1.9	flapping	16.67
Falco tinnunculus	Common Kestrel	0.31	0.68	flapping	13.9
Aquila heliaca	Eastern Imperial Eagle	0.71	1.9	gliding	18.06
Neophron percnopterus	Egyptian Vulture	0.62	1.6	gliding	13.9
Gyps fulvus	Eurasian Griffon	1.01	2.52	gliding	19.4
Falco tinnunculus	Eurasian Kestrel	0.31	0.68	flapping	13.9
Accipiter nisus	Eurasian Sparrowhawk	0.34	0.67	flapping	19.4
Pelecanus onocrotalus	Great White Pelican	1.56	2.93	flapping	15.6
Clanga clanga	Greater Spotted eagle	0.71	1.8	gliding	11.7
Pernis apivorus	Honey Buzzard	0.6	1.5	flapping	18.06
Falco naumanni	Lesser Kestrel	0.31	0.66	flapping	13.9
Clanga pomarina	Lesser spotted eagle	0.67	1.68	gliding	11.7
Accipiter brevipes	Levant Sparrowhawk	0.37	0.74	flapping	11.1
Buteo rufinus	Long-legged Buzzard	0.53	1.3	gliding	16.67
Circus pygargus	Montagu's Harrier	0.49	1.23	gliding	8.4
Pandion haliaetus	Osprey	0.66	1.59	gliding	11.4
Circus macrorus	Pallid Harrier	0.46	1.1	gliding	11.1

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Falco vespertinus	Red-footed falcon	0.32	0.75	flapping	12.8
Falco cherrug	Saker Falcon	0.51	1.12	flapping	22.2
Circaetus gallicus	Short-toed Snake-Eagle	0.66	1.77	gliding	11.3
Falcon concolor	Sooty falcon	0.36	0.88	flapping	11.3
Buteo buteo	Steppe Buzzard	0.46	1.23	gliding	16.67
Aquila nipalensis	Steppe Eagle	0.7	1.9	gliding	18.06
Circus aeruginosus	Western Marsh-Harrier	0.48	1.3	gliding	11.1
Ciconia ciconia	White Stork	1.02	1.65	gliding	16

The table below shows the number of birds at a collision height of 120 m, according to the wind turbine plans in the Table above. The turbine tip height (hub plus blade) is 218.5 m and the clearance height is 13.5 m. On the other hand, the bird observational data has been collected into the following height intervals: 1 to 50m, 50-120, 120-180, 180-240, 240-300, 300-500, and above 500 m.

The lack of field references for the observers, but also trials to test their accuracies when estimating flying height, makes us consider a precautionary principle with the following conditions:

- Any MSB bird flying at the clearance height is considered risk
- The maximum risk of collision height has been set at 240 m, as it is the closer bird recording height compared to the rotor swept maximum height, which is 218.5 (~220 m).

Published and validated avoidance rates (AR) were not available for several of the species, yet the AR parameter is well-known to be a very important parameter in Band CRM analysis, with outcomes very sensitive to slight variations (Cook et. al, 2012). For each species included within the CRM analysis, a "most realistic" AR parameter value, bounded by a "conservative" low parameter estimate (95%), and a high estimate (99.9%) was developed, reflecting an upper bound, based on a comprehensive review of available literature. Considering these two boundaries, the extent of avoidance rates considered in the literature were incorporated.

The flight duration of the target species was recorded at minute intervals, as per data recorded and included in the database.

Table 65: Observational data from the VP surveys used for the spring CRM analysis in Spring 2025

Species	No risk	Risk 240	Total	% Risk
Black kite	7833	2317	10,150	22.83%
Black stork	468	233	701	33.24%
Booted eagle	248	111	359	30.92%
Crested Honey Buzzard	0	1	1	100%
Egyptian vulture	104	45	149	30.20%
Common crane	200	7	207	3.38%
Elenora's Falcon	1	3	4	75.00%
Eurasian sparrowhawk	61	18	79	22.78%
European Honey Buzzard	15,891	823	16,714	4.92%
Golden Eagle	4	3	7	42.86%
Great White pelican	8,191	2,316	10,607	22.78%
Lanner Falcon	0	1	1	100.00%

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Eastern Imperial eagle	16	6	22	27.27%
Lesser spotted eagle	760	189	949	19.92%
Long-legged Buzzard	81	60	141	42.55%
Marsh harrier	29	27	56	48.21%
Levant Sparrowhawk	3,724	7	3,731	0.10%
Montagu's harrier	0	7	7	100%
Osprey	18	8	25	32.00%
Pallid harrier	2	2	4	50.00%
Short-toed eagle	621	211	832	25.36%
Sooty falcon	0	2	2	100.00%
Steppe buzzard	19,035	4,471	23,506	19.02%
Steppe eagle	5,119	1,465	2,215	4.79%
White stork	49,051	14,357	63,408	22.64%

Table 66: Observational data from the VP surveys used for the spring CRM analysis in autumn 2025

Species	No risk	Risk 240	Total	% Risk
Black kite	168	33	201	23.08%
Black stork	1	1	2	50.00%
Booted eagle	5	2	7	28.57%
Crested Honey Buzzard	0	1	1	100.00%
Egyptian vulture	6	1	7	14.29%
Elenora's Falcon	1	1	2	50.00%
Eurasian sparrowhawk	3		3	0.00%
European Honey Buzzard	7667	465	8132	5.72%
Golden Eagle	14	8	22	36.36%
Great White pelican	20827	2282	23109	9.87%
Lanner Falcon	4	4	8	50.00%
Lesser spotted eagle	0	1	1	100.00%
Long-legged Buzzard	39	4	43	9.30%
Marsh harrier	20	46	66	69.70%
Montagu's harrier	0	5	5	100.00%
Osprey	0	3	3	100.00%
Pallid harrier	2	3	5	60.00%
Short-toed eagle	0	1	1	100.00%
Sooty falcon	1	9	10	90.00%
Steppe buzzard	126	13	139	9.35%
Steppe eagle	11	3	14	21.43%
White stork	26825	63	26888	0.23%

Published and validated avoidance rates (AR) were not available for several of the species, yet the AR parameter is well-known to be a very important parameter in Band CRM analysis, with outcomes very sensitive to slight variations (Cook et. al, 2012). For each species included within the CRM analysis, a “most realistic” AR parameter value, bounded by a “conservative” low parameter estimate (95%), and a high estimate (99.9%) was developed, reflecting an upper bound, based on a comprehensive review of available literature. Considering these two boundaries, the extent of avoidance rates considered in the literature were incorporated.

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Table 67: Published Avoidance rates (AR) for several bird species

Species	Low	Mid	High
Golden Eagle[33] *Aquila chrysaetos*	98.1	99.58	99.9
Imperial Eagle *Aquila heliaca*	98.1	99.58	99.9
Steppe Eagle[1] *Aquila nipalensis*	98.1	99.58	99.9
Honey Buzzard[2] *Pernis apivorus*	95	99	99.5
Saker Falcon[1] *Falco cherrug*	99.5	99.8	99.9
Eurasian Griffon[3] *Gyps fulvus*	98	99	99.5
Egyptian Vulture[4] *Neophron percnopterus*	99	99.58	99.9
Great White Pelican *Pelecanus onocrotalus*	95	99	99.5
Eurasian Sparrowhawk[1] *Accipiter nisus*	99	99.5	99.9
Common Buzzard[1] *Buteo buteo*	97.8	99.5	99.9
Long-legged Buzzard[1] *Buteo rufinus*	97.8	99.5	99.9
Short-toed Snake-Eagle[5] *Circaetus gallicus*	98.1	99.58	99.9
Eurasian Marsh-Harrier[5] *Circus aeruginosus*	95	99	99.9
Pallid Harrier[5] *Circus macrourus*	95	99	99.9
Lesser Kestrel[1] *Falco naumanni*	87.3	96.9	99.9
Eurasian Kestrel[1]*Falco tinnunculus*	87.3	96.9	99.9
Common Crane[2] *Grus grus*	95	99	99.5
Black Kite[6] *Milvus migrans*	98	99.2	99.85
Black Stork[2] *Ciconia nigra*	95	99	99.5
Booted Eagle[2] *Aquila pennata*	95	99	99.5
Greater spotted Eagle[2] *Clanga clanga*	95	99	99.5
Lesser spotted eagle *Clanga pomarina*	95	98	99
Levant Sparrowhawk *Accipiter brevipes*	95	98	99
Montagu´s Harrier *Circus aeruginosus*	95	98	99
Osprey *Pandion haliaetus*	98	99.2	99.5
White Stork[2] *Ciconia ciconia*	95	99	99.5

(i) Spring 2025

The output of the CRM should be interpreted as a magnitude of the impact rather than a true value of the number of fatalities. The tables below show the estimated fatalities according to three avoidance rates. A rank of high (red), medium (yellow), low (green), and negligible collision risk was established based on the outputs of the CRM after scaling the fatalities to make them comparable among species.

Table 68 Collision Risk estimates for a 240m risk height in spring 2025

Species	Avoidance 99.5%	Avoidance 98%	Avoidance 95%
Black kite	7	29	71
Black stork	4	18	44

[33] Whitfield and Madders (2006a), [2]Cook et al.(2012), Vasilakis et al. (2012), [4] Whitfield and Madders(2009), [5]Whitfield and Madders (2009), SNH (2010),

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Booted eagle	0	1	3
Crested Honey Buzzard	0	0	0
Egyptian vulture	0	0	1
Common crane	0	0	0
Eleonora's Falcon	0	0	0
Eurasian Sparrowhawk	0	0	0
European Honey Buzzard	2	8	20
Great White pelican	10	42	106
Lanner Falcon	0	0	0
Eastern Imperial eagle	0	0	0
Lesser spotted eagle	0	3	6
Long-legged Buzzard	0	1	2
Marsh harrier	0	0	1
Levant Sparrowhawk	0	0	0
Montagu's harrier	0	0	0
Osprey	0	0	1
Pallid harrier	0	0	0
Short-toed eagle	1	3	7
Sooty falcon	0	0	0
Steppe buzzard	10	41	103
Steppe eagle	0	1	3
White stork	323	1,290	3,207

The highest value is for the White stork (maximum risk of collision), followed by the steppe buzzard, a group of three species including the European Honey Buzzard, Great White Pelican, and the Black kite.

(ii) Autumn 2025

Table 69: Collision Risk estimates for a 240m risk height in Autumn 2025

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Species	Avoidance 99.5%	Avoidance 98%	Avoidance 95%
Black Kite	0	1	1
Black Stork	0	0	0
Booted Eagle	0	0	0
Common Kestrel	0	0	0
Egyptian Vulture	0	0	0
Eurasian Sparrowhawk	0	0	0
European Honey Buzzard	1	5	12
Great White Pelican	10	40	100
Lanner Falcon	0	0	0
Lesser Spotted Eagle	0	0	0
Long-legged Buzzard	0	0	0
Osprey	0	0	0
Pallid Harrier	0	0	0
Short-toed Snake Eagle	0	0	0
Sooty Falcon	0	0	0
Steppe Buzzard	0	0	0
Steppe Eagle	0	0	0
Western Marsh Harrier	0	0	1
White Stork	2	6	14

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The table above shows the collision risk is the highest for the Great White pelican, followed by the White stork and Honey buzzard, and a series of species with zero predictions. Among these, there is the Egyptian vulture and the Sooty falcon, the first classified under the Endangered (EN) category and the second as Vulnerable (VU) by the IUCN.

Knowledge about Existing Fatalities and Current Operational Wind Farms

The CRM makes several assumptions when data were not available including the monthly proportion of time operational (proportion of time when a turbine is rotating). It excludes occurrences when the wind is below the cut-in speed wind speed, when the rotors may be stationary or idling; occurrences when the rotors are stopped and feathered for protection in very high wind speeds; and down-time for operations and maintenance (O&M). These proportions vary over the year, reflecting different wind conditions in different seasons, and the increased opportunities for maintenance access in summer. The frequency distribution of winds nor the tested effect that weather conditions (wind speed and direction, temperature) and their influence on flight altitudes, direction and bird sightings over the site were not available. These weather variables have been demonstrated to affect bird's occupancy and flight.

Because of the above, also represented is the proportion of risk flights according to time of the day, to inform how the risk varies and how the situations could require more or less active mitigation attention.

Some non-systematic processed information comes from the existing wind farms in the region, within the NREA area or current operational monitoring, e.g., Lekela West Bakr. A peer-review of the existing reports showed (pers. obs.) that there is still required a process on collecting and analysing the post-construction fatality data. Thus, only qualitative information was used about fatalities in the region. One of the representative papers is that from Riad (2022) which collated data from March 2019 to May 2022 form wind farms in the NREA area, recording 59 fatalities with wind turbines. The most affected species in order of importance were the White stork, followed by a second group formed by the Black kite, Steppe Buzzard and Honey Buzzard, and all the remaining species: Lesser Spotted and Steppe eagles, Eurasian Sparrowhawk, Montagu´s and Marsh harriers, and Common Kestrel.

Sensitivity of the Project Site

The baseline assessments have recorded high numbers of migratory soaring birds over the Project site and its vicinity. Some of those recorded species have an important status on the international or national levels. The baseline assessment concludes that the site is considered within a highly sensitive area in terms of avifauna. Additionally, the Project site is considered to be located along an intensive migration route. Taking all of the above into account, the receiving environment is considered of high sensitivity.

Magnitude of the Impact

The collision risk model (CRM) assessment data in the tables above are helpful for assessing impacts. The results suggest:

- In general, collision risk to all species is significantly lower in the autumn compared with the spring migration period.

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- For the majority of MSBs passing through the Project site airspace during spring and autumn migration, the risk of collision is low or zero.
- Most species had low or zero predicted collision rates when assessed either seasonally or annually. Six species had higher CRM estimates (Steppe Buzzard, European Honey-buzzard, Black Kite, Greater White Pelican, and Steppe Eagle).
- Based on the predicted seasonal and annual collision rate estimates, two species have the potential to be substantially impacted by the project: the White stork and the Steppe Buzzard. The impacts for both species are likely to be greatest during spring migration without mitigation. In the autumn season, impacts are of lower risk.
- Six globally threatened MSBs pass through the project airspace. These are Steppe Eagle and Egyptian Vulture, (IUCN – Endangered), Eastern Imperial Eagle, Sooty Falcon, Greater Spotted Eagle (IUCN – Vulnerable) and Pallid Harrier (IUCN-Near Threatened). All these species had a very low predicted collision rate (around 1) with the lowest avoidance rates (95%) with the exception of the Steppe Eagle.

The CRM estimates indicate that the impacts for most MSB species including those globally threatened or near-threatened the impacts are likely to be low, however uncertainty relating to migration activity between years may mean that impacts could be higher and, in some cases, reach or exceed acceptable thresholds. Overall, there is potential for a noticeable change to occur and acceptable limits are likely to be breached for non-threatened species but not for the majority of MSBs, therefore the assessment concludes major magnitude of impact

Operation Phase		
Type	Negative	
Duration	Long-term	
Magnitude	High	
Reversibility	Irreversible	
Sensitivity	High	
Likelihood	High	
Timing	Not relevant	
Extent	Medium	
Significance	Major	

For the Golden eagle and Sooty falcon – until full assessments being done- the magnitude of the impact may be High, and the impact assessed as High as a precautionary principle in ESIA.

Residual Impacts

The outcomes of the PCFM data for the GoS indicate that raw fatality numbers per species is low. Comparing these numbers with CRM data for the GoS also identified that the actual numbers are even lower (species and numbers).

The following identifies the mitigation and monitoring measures to be applied during operation phase. Following the implementation of these mitigation measures, the significance of the residual impact can be reduced to moderate.

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Mitigation and Monitoring Measures

(i) Site Specific Design Requirements

As discussed within "Section 7.6.1" earlier the Strategic Environmental and Social Impact Assessment was undertaken for the 300 km^2 area identified specific requirements for site constraints related to avifauna. These included requirements such as the below:

- Avoid continuous lighting of turbines. Use minimum number of intermittent flashing lights in accordance with civil aviation authority requirements.
- After preliminary studies and permission, Assisted Automatic Shut-down on Demand Devices (ADS) may be tested to reduce fatalities. It will need permission and robust analyses of its effectiveness. This could be important for the resident Golden Eagle.
- Given the very high levels of migration activity and based on the outputs of the CRM as well as the results of the surveys completed to date upfront mitigation including lead Shut Down on Demand is considered necessary as predicted mortality for all species is likely to result in moderate or major negative impacts.
- Minimum distances between wind turbines to be not less than 3 x 12 rotor-diameters to provide corridors for bird migration;
- The mitigation will be developed by an international expert on bat monitoring and interactions with wind energy facilities.

EEAA has approved the installation of 200m or even bigger turbines in the GoS. Such conditions are now typically included within the environmental permit issued for each Project. Therefore, for this project such site-specific requirements are expected to be identified once the ESIA is submitted to EEAA and the environmental permit is issued. Based on the Project's Environmental Permit that was issued by EEAA on January 28th, 2026, it includes the following which the current layout already meets:

- Minimum distances between wind turbines should not be shorter than 2.5 × rotor-diameter;
- Adhere to a buffer area of 7 × rotor-diameter between turbine rows;

(ii) SESA-CIA

EBRD, in coordination with EEAA, RCREEE and other stakeholders, are currently undertaken a Strategic Environmental and Social Assessment – Cumulative Impact Assessment (SESA CIA) that is assessing avifauna risks in particular within the entire GoS. Amongst other outputs, the study will identify 'no-go zones' for developments, assess potential impacts of wind farms as disruptive barriers to the migration route at the cumulative level within the GoS region, and identify any additional mitigation measures to be considered. Study is expected to be available around Q4 2026.

The Developer is committed to implementing and adhering to any requirements within the SESA-CIA as applicable for this Project.

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(iii) Avi-Fauna Monitoring and On-Demand Turbine Shutdown

Good International Industry Practice implements the standard shutdown on demand with filed observers (SDOD) and a bird monitoring study protocol. It will be designed and implemented by the Project informed by baseline bird data and the results of similar monitoring at GoS wind projects.

Monitoring during the operation of the wind farm must be completed in order to inform the actual impact caused by the wind farm on resident and migratory birds – known as Active Turbine Management Plan (ATMP). The monitoring has the primary objective of collision avoidance but also secondary for migration monitoring behavior.

Monitoring will take place during the migration seasons. The start and end of the monitoring period will be agreed with the ATMP Technical Committee prior to commencement of each migration season. Based on current information, monitoring must take place during the spring migration season, from 20th February until 15th May, and autumn migration season from 10th August till 15th November). Throughout these periods, monitoring must take place continuously on a daily basis.

RCREEE developed an ATMP protocol that describes the shutdown criteria and communications protocol, timing of operation (seasonally and daily), number of vantage points, equipment used (optical and communications), and others as applicable.

As said before, there is a resident Golden eagle which raises conservation concern. The following measures should apply in addition to the shutdown on demand and bird monitoring:

- Specific cliff nesting raptor monitoring in the breeding seasons controlling for nest locations: Effort should be made for the Golden Eagle, even outside the project boundaries to the north and south. Period: Early February till the end of the breeding season (chicks fledge).
- Depending on nest location, monitoring of the breeding success and fledgling success. The schedule and methods have to be developed by international consultants with experience on the species in arid environments.
- Recommended: Satellite tracking of the breeding pair (both individuals) as soon as possible to get as much information as possible related to 2) above. This requires specific consultant team for the capturing, managing, and monitoring of the tracked birds. This will allow confirming the foraging areas of the species on site and overlapping with the project footprint. This will assist in establishing mitigation throughout the year in addition to the SDOD for migratory birds.

Specific Measures for Further Post-Construction Studies:

- Potentially shutdown on demand during the whole year, to achieve no net loss of the breeding pair. Depending on the outcome of the pre-construction studies mentioned above.

(iv) Post Construction Fatality Monitoring (PCFM)

A Good International Industry Practice standard Post-Construction Fatality Monitoring program (PCFM) program has to be designed and implemented. This will follow IFC, EBRD & KfW (2023) "*Post-construction bird and bat fatality monitoring for onshore wind energy facilities in emerging market countries. Good Practice Handbook and Decision Support Tool. International Finance Corporation (IFC). European Bank for Reconstruction and Development (EBRD). Kreditanstalt für Wiederaufbau (KfW).*"

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The PCFM program will assess the effectiveness of shutdown mitigation measures and allow a precise and accurate fatality estimation of vertebrate's mortality estimates.

PCFM reporting, including fatality rate estimates has to be reported every six months, better separately for each migratory season. In addition, it is recommended that a comparative assessment of the fatality monitoring results and the outcomes of the pre-construction ESIA.

An adaptive management strategy will be developed, and additional mitigation will be undertaken if the results of the post-construction fatality monitoring indicate higher than predicted mortality, especially in relation to species of elevated conservation concern.

A chance finding procedure will be implemented and any carcasses seen by site workers will be reported to the Project Ecologist so that they can investigate. In addition any prey species carcasses found on-site (e.g. on roads) will be removed to reduce the likelihood of scavenging birds landing within the Project site.

8.8 Bats

This section identifies the anticipated impacts on bats from the Project throughout its various phases. For each impact, a set of management measures (which could include mitigation measures, additional requirements, etc.) and monitoring measures have been identified to eliminate or reduce the impact to acceptable levels.

8.8.1 Potential Impacts during the Construction Phase

Site preparation activities will be developed by the EPC Contractor for installation of the wind turbines and the associated infrastructure which include substation, transmission cables, access roads and internal road network, buildings. These require land clearing activities, levelling, excavation, and grading among others.

Such facilities are limited to small individual footprints, and the actual area of disturbance is relatively minimal. Nevertheless, they result in the alteration of the site's habitat and thus potentially impacts bats; particularly through loss of hunting habitat as well as roosting sites.

Construction Phase		
Type	Negative	
Duration	Long-term	
Magnitude	Low	
Reversibility	Reversible	
Sensitivity	Low	
Likelihood	Medium	
Timing	Not relevant	
Extent	Medium	
Significance	Minor	

- Based on literature review all bat species that are expected within the Project area are considered of Least Concern according to IUCN Red List of Threatened Species.
- The Project site being a feeding ground for bats is expected to be minimal and non-significant given the expected low nocturnal insect activity due to the arid nature of the Project site and vegetation coverage.

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- Based on preliminary visits of the Project area it does not seem to support roosting sites for bats.

Taking the above into account, no mitigation measures are expected to be required.

8.8.2 *Potential Impacts during the Operation Phase*

The potential impacts from the Project during operation are related to risk of bat collision with the blades of the operating wind turbines.

Many reports demonstrated bat collisions with wind turbines; this includes reports in Germany (Dürr 2001; Trapp et al. 2002; Dürr & Bach 2004), Sweden (Ahlén, 2002) and Spain (Alcalde, 2003; Camiña et al. 2022). Evidence that turbines do not only kill bats from local populations but also from populations at far distance were established (Voigt et al., 2012).

In addition, in reference to EUROBATS Guidelines for Considerations on Bats in Wind Farm Projects (Rodrigues et al, 2014), some of the species that are listed to have their distribution range in the Project area and its vicinity are documented to be vulnerable to collisions with wind turbines. For instance, Pipistrellus spp. are known to be at high risk of collision from wind turbines. The literature shows that two species of the genus have their distribution range in the area; Pipistrellus kuhlii and P. rueppellii.

Operation Phase		
Type	Negative	
Duration	Long-term	
Magnitude	Medium	
Reversibility	Reversible	
Sensitivity	Low	
Likelihood	Medium	
Timing	Not relevant	
Extent	Medium	
Significance	Minor	

- Risk of collision of bats could potentially entail impacts on population on the species during specific periods of the year, like the migration period. Based on literature review all bat species that are expected within the Project area are considered of Least Concern according to IUCN Red List of Threatened Species.
- The Project site being a feeding ground for bats is expected to be minimal and non-significant given that the expected low nocturnal insect activity and vegetation coverage due to the arid nature of the Project site.
- Based on visits of the Project area it does not seem to support any roosting sites for bats.

Mitigation and Monitoring Measures

- Developer will be required to undertake at height bat acoustic surveys for one (1) year during first or second year of operations to verify outcomes above. Such acoustic surveys will be done at the met masts and should be undertaken by a third-party entity with experience in bat assessments and studies.

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- To verify the outcomes above, as part of the PCFM Program to be developed for birds, it should cover bats as well. Based on the outcomes of the PCFM, additional management measures should apply such as curtailment of turbines and increase cut-in speed to 6 m/s.
- The mitigation will be developed by an international expert on bat monitoring and interactions with wind energy facilities.

8.9 Archaeology and Cultural Heritage

This section identifies the anticipated impacts on archaeology and cultural heritage from the Project throughout its various phases. For each impact, a set of management measures (which could include mitigation measures, additional requirements, etc.) and monitoring measures have been identified to eliminate or reduce the impact to acceptable levels.

8.9.1 Potential Impact during the Construction Phase

Site preparation activities which are to take place onsite by the EPC Contractor for installation of the wind turbines and the various Project components to include substation, transmission cables, access roads and internal road network, buildings, etc. are expected to include land clearing activities, levelling, excavation, grading, etc.

Although such activities are limited to the relatively small individual footprints of these facilities and the actual area of disturbance is relatively minimal, if such activities are improperly managed, they could damage or disturb archaeological remains present on the surface of the Project site. However, the archaeological baseline assessment discussed earlier concludes that there are no archaeological sites or remains within the Project site. Therefore, there are no anticipated impacts from the Project on surface archaeological remains within the Project site.

In addition, there is a chance that throughout such construction activities, archaeological remains buried in the ground are discovered. Improper management (if such sites are discovered) could potentially disturb or damage such sites which could potentially be of importance.

The table below provides an overall summary of the impact on archaeology and cultural heritage during the construction phase. The overall impact assessment will be of minor significance.

Construction Phase		
Type	Negative	Impact is negative in nature as it could damage sites
Duration	Short-term	Limited to construction phase which is 31 months
Magnitude	Medium	Given that there are no sites within the area and it is unlikely that there will be underground discoveries, but if so such activities could damage these sites if inappropriately managed.
Reversibility	Irreversible	
Sensitivity	Low	
Likelihood	Low	In general such impacts are considered unlikely
Frequency	Rare	Expected to occur on minimal occasions during construction phase
Timing	Not relevant	N/A
Extent	Low	Limited to actual footprint of activities or recorded sites only

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Significance	Minor

Mitigation Measures

The following identifies the mitigation measures to be applied by the EPC Contractor during the construction phase and which include:

- As required by the Archaeology and Cultural Heritage expert, during excavation activities, the Ministry of Tourism and Antiquities must be notified to check if they will provide any observers to oversee the process and ensure that no underground archaeological remains of importance are unearthed and/or disturbed.
- Throughout the construction phase, and as the case with any Project development that entails such construction activities, there is a chance that potential archaeological remains in the ground might be discovered. It is expected that appropriate measures for such chance finding procedures are implemented. Those mainly require that construction activities be halted and the area fenced along with proper signage, while immediately notifying the Ministry of Tourism and Antiquities/Red Sea and Suez Antiquities Inspection Office. No additional work will be allowed before the Ministry/Inspection Office assesses the found potential archaeological site and grants a clearance to resume the work. Construction activities can continue at other parts of the site if no potential archaeological remains are found. If found, same procedures above apply.

Following the implementation of these mitigation measures, the significance of the residual impact can be reduced to not significant.

Additional Recommendations:

It is recommended that additional archaeological investigations be undertaken to confirm the extent and significance of the identified heritage features during the pre-construction phase. Precautionary measures should be applied to protect the area until the detailed assessment is completed.

Monitoring Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by the Wind Farm EPC Contractors during the construction phase and which include:

- Submission of formal letter of communication with Ministry of Tourism and Antiquities; and
- For chance find procedure, inspection of actions taken in case of new discoveries, including fencing, limiting access to site, and contacting the Ministry of Tourism and Antiquities/ Red Sea and Suez Antiquities Inspection Office. Report should be prepared and submitted to the Ministry in such a case which details the above.

8.10 Air Quality and Noise

This section identifies the anticipated impacts on air quality and noise from the Project throughout its various phases. For each impact, a set of management measures (which could include mitigation measures, additional requirements, etc.) and monitoring measures have been identified to eliminate or reduce the impact to acceptable levels.

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8.10.1 Potential Impacts during the Construction Phase on Air Quality and Noise

Site preparation activities which are to take place onsite by the EPC Contractor for installation of the wind turbines and the various Project components to include substation, transmission cables, access roads and internal road network, buildings, etc. are expected to include land clearing activities, levelling, excavation, grading, etc.

Although such activities are limited to the relatively small individual footprints of these facilities and the actual area of disturbance is relatively minimal. Nevertheless, such activities will likely result in an increased level of dust and particulate matter emissions, which in turn will directly and temporarily impact ambient air quality. If improperly managed, there is a risk of nuisance and health effects to construction workers onsite and to a lesser extent to the nearby surrounding receptors from windblown dust (such as nearby petroleum activities). In addition, construction activities will likely entail the use of vehicles, machinery and equipment (such as generators, compressors, etc.) which are expected to be a source of other pollutant emissions (such as SO_2, NO_2, etc.) which would also have minimal direct impacts on ambient air quality.

In addition, all the above activities will likely include the use of machinery and equipment such as generators, hammers, compressors, etc. and which are expected to be a source of noise and vibration generation within the Project site and its surroundings. If improperly managed, there is risk of nuisance and health effects to construction workers onsite and to a lesser extent to the nearby surrounding receptors (such as nearby petroleum activities).

However, it is important to note that there are no key receptors that are anticipated to be impacted from dust, noise and emission given that the closest receptor / community settlement to the Project site is Ras Gharib and Wadi Dara Village.

The table below provides an overall summary of the impact on air quality during the construction phase.

Construction Phase		
Type	Negative	Generation of dust
Duration	Short-term	Limited to construction period only and specifically activities such as the limited excavation which will be for a couple of weeks
Magnitude	Medium	Dust could be noticeable but dispersed
Reversibility	Reversible	Baseline restored after completion of construction works
Sensitivity	Low	Given that there are no key sensitive receptors within the area
Likelihood	Medium	Given that it is likely limited to activities such as the limited excavation which will be for a couple of weeks
Frequency	Periodic	Expected particularly during excavation and land clearing activities
Extent	Medium	Around 2km from active areas due to wind influence
Significance	Minor	

Mitigation Measures

The following identifies the mitigation measures to be applied by the EPC Contractor during the construction phase:

- If dust or pollutant emissions were found to be excessive due to construction activities, the source of such emissions should be identified and adequate control measures must be implemented;
- Comply with the Occupational Safety and Health Administration (OSHA) requirements and the Egyptian Codes to ensure that for activities associated with high dust and noise levels, workers are

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equipped with proper Personal Protective Equipment (e.g. masks, eye goggles, breathing masks, ear muffs, etc.);

- Apply basic dust control and suppression measures which could include:
  - Regular watering of roads for dust suppression;
  - Proper planning of dust causing activities to take place simultaneously in order to reduce the dust incidents over the construction period.
  - Proper management of stockpiles and excavated material (e.g. watering, containment, covering, bundling).
  - Proper covering of trucks transporting aggregates and fine materials (e.g. through the use of tarpaulin).
  - Adhering to a speed limit of 15km/h for trucks on the construction site.
- Develop a regular inspection and scheduled maintenance program for vehicles, machinery, and equipment to be used throughout the construction phase for early detection of issue to avoid unnecessary pollutants and noise emissions.
- Based on inspections and visual monitoring undertaken, if noise levels were found to be excessive from construction activities, the source of such excessive noise levels should be identified and adequate control measures must be implemented; and
- Apply adequate general noise suppressing measures. This could include the use of well-maintained mufflers and noise suppressants for high noise generating equipment and machinery, developing a regular maintenance schedule of all vehicles, machinery, and equipment for early detection of issues to avoid unnecessary elevated noise level, etc.
- Ensure full application of the approved C-ESMP during the construction phase and so fulfilling EEAA conditions stated in the ESIA approval letter.

Following the implementation of these mitigation measures, the significance of the residual impact is categorized as not significant.

Monitoring and Reporting Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by the EPC Contractor during the construction phase and which include:

- Dust and noise monitoring should be undertaken on a quarterly basis during the construction phase at key points where active construction activities are undertaken. The monitoring should include TSP, PM_{10} and $PM_{2.5}$ and noise levels.
- Periodic inspections should be conducted at nearby sites (e.g. such as nearby petroleum activities) to determine whether harmful levels of dust and noise from construction activities exist; and
- Reporting of any excessive levels of pollutants/dust or noise and the measures taken to minimize the impact and prevent it from occurring again.

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8.10.2 Potential Impacts during the Operation Phase

The main impacts foreseen during the operation phase are that related to the noise generated from the operating wind turbines and its potential impact on the health and safety of the nearby surrounding receptors. Given that such impacts are directly related to public health and safety, such impacts have been discussed in details in "Section 8.13.1 Public Health and Safety" along with other relevant impacts such as shadow flicker.

8.11 Infrastructure and Utilities

This section identifies the anticipated impacts on infrastructure and utilities from the Project throughout its various phases. For each impact, a set of management measures (which could include mitigation measures, additional requirements, etc.) and monitoring measures have been identified to eliminate or reduce the impact to acceptable levels.

8.11.1 Potential Impacts on Traffic and Transportation During Construction Phase

The construction phase of the Project will involve the transportation of personnel, equipment, and materials to and from the Project site. This includes light vehicles for workforce transport, heavy trucks for material delivery (e.g. concrete, gravel, and equipment), as well as oversized loads associated with wind turbine components and construction machinery.

The Project is located approximately 35 km from Ras Ghareb city, accessed via the Hurghada-Cairo Highway, followed by an internal desert access road extending approximately 20 km west of the highway. Average travel time between Ras Ghareb and the project site is approximately one hour, subject to traffic conditions and weather. The project is also located approximately 150 km from Hurghada International Airport, with access primarily via the same national highway corridor. This route forms the principal logistics and personnel transport artery for the project. The Hurghada–Cairo Highway is a divided, two-way national road carrying moderate traffic volumes and supporting a mix of private vehicles, tourist transport, and heavy commercial traffic linked to industrial and energy operations along the Red Sea coast.

The use of these roads during construction is expected to result in a temporary increase in traffic volumes, particularly due to delivery trucks and workforce transportation vehicles. However, such increases will be intermittent and limited to the construction period.

Potential impacts associated with traffic and transportation during the construction phase include increased traffic flow, potential congestion at access points, increased risk of road accidents, and potential disturbance to other road users and nearby communities. In addition, the transportation of oversized equipment may require temporary traffic control measures, including short-term traffic stoppages to facilitate safe entry and exit to the Project site.

To minimize such impacts, traffic movements will be optimized to reduce the number of daily trips, and transportation activities will generally be limited to daytime hours, with night-time movements restricted unless necessary. Furthermore, designated access routes will be used, and coordination with relevant authorities will be undertaken where required, particularly for oversized loads and temporary road disruptions.

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Given that the increase in traffic is temporary, localized, and managed through the implementation of traffic management measures, the impact on traffic and transportation during the construction phase is considered to be of low magnitude and not significant.

The table below provides an overall summary of the impact on traffic and transportation during the construction and operation phases:

Construction Phase			Operation Phase		
Type	Negative		Type	Negative	
Duration	Short-term	Relevant for construction period which is 31 months	Duration	Long-term	Relevant for operation period
Magnitude	Low	Temporary increase in traffic volumes and controlled movements	Magnitude	Low	Limited traffic associated with operation and maintenance activities
Reversibility	Reversible	N/A	Reversibility	Reversible	N/A
Sensitivity	Low	Existing road network capable of accommodating additional traffic	Sensitivity	Low	Minimal interaction with existing road users
Likelihood	High		Likelihood	High	
Extent	Low	Limited to access roads and nearby routes	Extent	Low	Limited to site access routes
Significance	Not Significant		Significance	Not Significant	

Additional Requirements

The following additional requirements shall be implemented by the EPC Contractor during the construction phase and the Project Operator during the operation phase:

- Implement a Traffic and Transportation Management Plan to regulate vehicle movements and ensure road safety.
- Ensure all drivers comply with applicable traffic regulations, speed limits, and safety requirements.
- Restrict vehicle movements to designated routes and approved access points.
- Schedule and coordinate delivery of materials and oversized loads to minimize traffic disruptions.
- Install appropriate signage, barriers, and traffic control measures along access roads and within the Project site.
- Maintain access roads and implement dust control measures where required.
- Coordinate with relevant authorities regarding any temporary road closures or traffic management requirements.

With the implementation of the above requirements, the significance of the impact remains unchanged and is expected to be not significant.

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8.11.2 Potential Impact on Water Resources during Construction and Operation

It is expected that the Project throughout the construction and operation phase will require water for potable usage (drinking, showering, etc.) and non-potable usage (e.g. cleaning of machinery and vehicles).

The potable water requirements for a maximum of 5,000 workers onsite are not expected to exceed 50 liters per capita per day for a duration of 31 months. Thus, the daily water consumption at peak is likely to be around 250,000 liters per day – or 250 m^3 per day. As a worst-case scenario, taking into account the full construction period (31 months), this is equivalent to an estimated total of 233,500 m^3.

In addition, water for non-potable purposes, primarily used for dust suppression, and cleaning of machinery and vehicles, will depend on site conditions, weather, and activity intensity. Water for dust control is estimated at 25 m^3/day, sanitary use at 50 m^3/day and construction related needs at 150 m^3/day, resulting in a total non-potable water demand of 225 m^3/day.

Thus, total water requirements during the construction phase are likely to be around 475 m^3/day. The water requirements throughout the construction phase will be required temporarily (for construction period only) and are considered minimal and not significant.

In addition, water will be required during the operation phase, primarily for drinking and personal use by the onsite staff, estimated at a maximum of 100 personnel. Similar to the construction phase, the potable water demand is not expected to exceed 50 liters per capita per day, resulting in a daily consumption of approximately 5,000 liters, or 5 m^3/ day.

Therefore, the total maximum water consumption during the operation phase is expected to be approximately 5 m^3/day, equivalent to about 1,825 m^3/year. This volume is considered minimal and will not pose any significant pressure on local water resources.

As discussed earlier, based on consultations with RSWWC there are no existing or planned water connections to the Project area. Water will be supplied through water trucks and tankers from Ras Gharib and stored onsite through water tanks.

Based on the above it is clear that the water requirements for the Project during construction and operation are unlikely to entail any constraints on the existing users. However, the involved entities are required to coordinate with RSWWC to secure water requirements for the Project, most likely through tankers.

The table below provides an overall summary of the impact on water resources during the construction phase and operation phase. The overall impact is considered to be not significant during the construction and the operation phase.

Construction Phase			Operation Phase		
Type	Negative		Type	Negative	
Duration	Short-term	Relevant for construction period which is 31 months	Duration	Long-term	Relevant for operation period
Magnitude	Low	Amounts of water required is considered low level	Magnitude	Low	Amounts of water required is considered low level
Reversibility	Reversible	N/A	Reversibility	Reversible	N/A
Sensitivity	Low	Given that the amounts can be	Sensitivity	Low	Given that the amounts can be supplied without

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		supplied without straining any existing resources			straining any existing resources
Likelihood	High		Likelihood	High	
Extent	Low	Given that the amounts can be supplied without straining any existing resources	Extent	Low	Given that the amounts can be supplied without straining any existing resources
Significance	Not Significant		Significance	Not Significant	

Additional Requirements

The following identify additional requirements to be applied by the EPC Contractor during the construction phase and Project Operator during the operation phase respectively and which include:

- Coordinate with the Ras Gharib Water Company to sector the water requirements of the Project.
- Ensure full application of the approved C-ESMP during the construction phase and so the approved ESMP obligations during the operation phase. In addition to fulfilling EEAA conditions stated in the ESIA approval letter.

With the implementation of the additional requirement, the significance of the impact remains unchanged and is expected to be not significant.

8.11.3 Potential Impacts on Waste Utilities during Construction and Operation

The Project is expected to generate the following waste streams during the construction and operation phases:

- Wastewater during construction and operation to include black water (sewage water from toilets and sanitation facilities) and grey water (from sinks, showers, etc.) and industrial effluents (e.g. batching plants onsite). Wastewater during the construction phase from the Project can be assumed by taking into account an 80% wastewater generation factor for potable water requirements which will amount to around 93,000m^3 throughout the construction phase. Wastewater generated from the wind farm during operation is expected to be minimal and insignificant. Wastewater will be stored onsite though enclosed septic tanks and collected by tankers from the Project to the closest WWTP.
- Solid waste during construction and operation from the wind farm will include construction waste (mainly during construction to include dirt, rocks, debris, etc.) as well as general municipal waste (such as food, paper, glass, bottles, plastic, etc.). Solid waste quantities generated are not expected to be significant and are likely to be easily handled by closest landfill facility.
- Solid waste quantities expected are around 1.25-2.5 tons daily for construction waste on average, while municipal waste is expected to be around 2,500 kg per day at peak taking into account the daily per capita waste generation factor in Egypt (*1.25kg/capita/day*[34]) and number of 2,000 workers.

[34] A smart framework for municipal solid waste collection management: A case study in Greater Cairo Region - ScienceDirect

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During operation, this is only likely to include municipal waste at around 125kg per day for 100 workers.

- Hazardous waste during construction and operation from the wind farm will include routine waste generated from such activities to include spent oil, lubricants, paint cans, solvents, etc. Hazardous waste quantities generated are not expected to be significant and are likely to be easily handled by closest authorized facility.
- Hazardous waste quantities are expected to be around 16.4 kg per day only.

Construction Phase			Operation Phase		
Type	Negative	N/A	Type	Negative	N/A
Duration	Short-term	Limited to construction phase which is 31 months	Duration	Long-Term	Throughout entire operational period
Magnitude	Medium	Given waste quantities above	Magnitude	Low	Given waste quantities during operation are minimal
Reversibility	Reversible	N/A	Reversibility	Reversible	N/A
Sensitivity	Low	Given waste quantities above	Sensitivity	Medium	Given waste quantities during operation are minimal
Likelihood	High	Given nature of activities expected	Likelihood	High	Given nature of activities expected
Extent	Medium	Could impact all resources / users relying on such waste utilities which could be more than 5 km away	Extent	Medium	Could impact all resources / users relying on such waste utilities which could be more than 5 km away
Significance	Minor		Significance	Minor	

Additional Requirements

The following identifies the additional requirements to be applied by the EPC Contractor during the construction phase and Project Operator during the operation phase respectively and which include:

- Coordinate with the RSWWC and Sanitation Authority in Ras Gharib and obtain list of authorized contractors for collection of wastewaters from the site to the Ras Gharib WWTP.
- Coordinate with the RSWWC and Sanitation Authority in Ras Gharib to hire a competent private contractor for the collection of solid waste from the site to the Ras Gharib Public Dumpsite.
- Coordinate with Environmental Management at RSWWC and Sanitation Authority in Ras Gharib to obtain list of authorized contractors for collection of hazardous waste from the site to the closest approved facility for final disposal.
- Ensure full application of the approved C-ESMP during the construction phase and so the approved ESMP obligations during the operation phase. In addition to fulfilling EEAA conditions stated in the ESIA approval letter.

8.11.4 Potential Impacts on Waste Disposal Utilities during Decommissioning Phase

Of particular importance during the decommissioning phase is the management and disposal of hazardous and non-hazardous waste generated from wind turbines and associated electrical infrastructure. This may

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include transformer oils, hydraulic fluids, lubricants, electrical components, cables, and other materials classified as hazardous waste under applicable national legislation.

As a worst-case scenario, certain components may be disposed of at licensed landfill facilities where recycling options are not technically or economically feasible. However, the prospects for recycling and recovery of turbine components may evolve over the Project lifetime of 25 years, particularly in relation to composite turbine blades and electrical equipment.

The table below provides an overall summary of the impact on waste disposal utilities during the decommissioning phase. The overall impact is considered to be not significant.

Decommissioning Phase		
Type	Negative	Prospects of Wind Farm component disposal and management is not clear at this stage, taking into account the Project timeline of 25 years.
Duration	Short-term	
Magnitude	Low	
Reversibility	Reversible	
Sensitivity	Low	
Likelihood	High	
Extent	Low	
Significance	Not Significant	

Additional Requirements

Given that at this stage there is a great deal of uncertainty at the decommissioning phase of the Project (with regards as to whom is the responsible party, prospects on waste disposal facilities in Egypt, etc.), it is recommended that before any decommissioning activities take place a Disposal Plan for the Wind Farm components is prepared by the responsible entity undertaking decommissioning activities. The plan should consider the following options and compare the costs/benefits of each:

- Evaluation of recycling and recovery options for wind turbine components, including identification of licensed waste processing facilities within the country or internationally, where required.
- Cost estimation for recycling and collecting at the end of lifetime at least but not limited the following components:
- Turbine towers
- Nacelles
- Rotor blades
- Electrical cables and transformers
- Control and electronic components
- Substation equipment
- Hazardous and/or toxic liquids (e.g., oils, lubricants, coolants)
- Hazardous and/or toxic solid materials
- Identification of materials suitable for reuse or recycling (e.g., steel components, copper cabling).

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- Confirmation that hazardous waste management and any transboundary movement of waste complies with the Basel Convention and applicable national regulations. If materials are exported internationally for recycling or disposal, the responsible entity shall specify the materials to be exported and the receiving facility.
- Provision of confirmation from the Original Equipment Manufacturer (OEM), where applicable, regarding recommended procedures for dismantling, safe handling, packaging, transport, recycling, and disposal of turbine components in accordance with industry best practice.
- If the above could not be achieved, as a last option the plan must investigate the disposal of the components at existing waste facilities in Egypt through coordination with EEAA.

Monitoring Measures

- Submission of Disposal Plan along with proof of coordination with the authorities discussed above for works required as part of the Study.

8.11.5 Potential Impacts on Civil and Military Aviation during the Planning and Construction Phase

Any tall structure could impact aircraft safety if located near airports or known flight paths. In addition, such structures could potentially interfere with certain electromagnetic transmissions associated with air transport, for example primary radar and secondary surveillance radar. Wind turbines have the potential to impact the surveillance systems used to detect and identify aircraft approaching, overlying or leaving Egyptian airspace and for which a Recognized Air Picture (RAP) is produced.

Inappropriate management of planning activities and site locations (e.g. siting of turbines) and construction activities (e.g. excavations) could disturb such aviation practices.

Such issues are generally managed through appropriate setback distances (if applicable) and in addition, regulatory authorities generally include requirements for wind farm developments related to visibility of turbines to include navigational lights and blade paintings

Planning and Construction Phase		
Type	Negative	
Duration	Long-term	Limited to construction period only which is 31 months
Magnitude	Low	Given the nature of construction activities
Reversibility	Reversible	Baseline restored after completion of construction works
Sensitivity	High	Given the nature of construction activities
Likelihood	Low	Limited to construction period only
Extent	Medium	Impacts could have an affect up to 5 km radius
Significance	Minor	

Mitigation Measures

The following identifies the mitigation measures to be applied by the Developer during the planning phase and which include:

- Establish coordination with NREA to ensure that the clearance that has been provided by the Ministry of Defense for the area includes in approvals from civil and military aviation entities. In addition, based on that they adhere to any specific navigational safety requirements (e.g. navigational lights, blade paintings, etc.)

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Following the implementation of these mitigation measures, the significance of the residual impact can be reduced to not significant.

Monitoring and Reporting Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by the Developer during the construction phase and which include:

- Submission of formal non-objection letters from relevant entities

8.11.6 *Potential Impacts on Electricity, Radio and Telecom Infrastructure during the Planning and Construction Phase*

Inappropriate management of the various construction activities (to include but limit to transportation and traffic of vehicles in/out of the site, worker code of conduct, etc.) could damage or disturb the various nearby infrastructure and utility elements. This includes but is not limited to the electricity overhead transmission lines, radio and telecommunication tower.

In addition, wind turbines during the construction and operation phase could impact telecommunication, TV and Radio infrastructure. For example, construction activities could damage/disturb underground communication cables (if present within the area), while rotating turbines during operation could disrupt Line of Sight (LoS) connections between telecommunication transmission towers.

The table below provides an overall summary of the impact on electricity, radio and telecom infrastructure during the construction phase. The overall impact is considered to be of minor significance.

Construction Phase		
Type	Negative	
Duration	Short-term	Limited to construction period only which is 31 months
Magnitude	Low	Given the nature of construction activities
Reversibility	Reversible	Baseline restored after completion of construction works
Sensitivity	Medium	Given the nature of construction activities
Likelihood	Low	Limited to construction period only
Extent	Medium	Impacts could have an effect up to 5 km radius
Significance	Minor	

Mitigation Measures

The following identifies the mitigation measures to be applied by the Developer during the planning phase and which include:

- Establish coordination via NREA with NTRC to provide information on the at least six (6) months prior to the commencement of construction (to include location and specifications of turbines in specific) and include any specific requirements to be considered as part of the detailed design to include setback distances if required for telecommunication, infrastructure (e.g. from LoS connections)

Following the implementation of these mitigation measures, the significance of the residual impact is categorized as not significant.

Monitoring and Reporting Requirements

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The following identifies the monitoring and reporting requirements that must be adhered to by the Developer during the planning phase and which include:

- Submission of formal non-objection letter from NTRC.

8.11.7 Potential Impacts on Nearby Wind Farms during Operation

As noted earlier within "Section 2.7", there are several operating and planned wind farms within the GoS area.

Inappropriate management of planning activities (e.g. siting of turbines and proper buffer distance) could affect such nearby wind farms.

Operation Phase		
Type	Negative	N/A
Duration	Long-term	Throughout the operation phase
Magnitude	Low	Given the general project area
Reversibility	Reversible	With decommissioning of WTGs
Sensitivity	Medium	Given that there are no sensitive receptors in the area.
Likelihood	High	Given nature of activities expected
Frequency	Frequent	Expected throughout entire operational phase
Timing	Not relevant	Applicable throughout entire operational phase
Extent	High	Cumulative turbines can be visible for distances greater than 10 km
Significance	Minor	

Taking all of the above into account, the anticipated impacts are considered of long-term duration during the operation phase. Such impacts are of a negative nature, and if such impacts are improperly managed, then they are expected to be of medium magnitude and medium sensitivity due to their distance from the Project site. Given the above impact is considered of minor significance.

Mitigation Measures

The following identifies the mitigation measures to be applied by the Developer / EPC Contractor during the planning phase:

- Further follow/communication with NREA to ensure if buffer distance of the Project from other nearby wind farm projects is considered sufficient and appropriate from a technical perspective

Following the implementation of these mitigation measures, the significance of the residual impact can be reduced to not significant.

Monitoring and Reporting Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by the Developer / EPC Contractor during the planning phase and which include:

- Submission of proof of coordination with relevant entities.

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8.12 Occupational Health and Safety and Worker Accommodation

This section identifies the anticipated impacts from the Project throughout its various phases on occupational health and safety. For each impact, a set of management measures (which could include mitigation measures, additional requirements, etc.) and monitoring measures have been identified to eliminate or reduce the impact to acceptable levels.

This section presents the assessment of potential impacts on occupational health and safety collectively during the construction and operation phase for the wind farm, given that they are similar in nature during both phases.

Throughout the construction and operation phase there will be generic occupational health and safety risks to workers, as working onsite increases the risk of injury or death due to accidents. The following risks are generally associated with wind farm development projects:

- Slips and falls;
- Working at heights;
- Working with powered and hand-held tools;
- Struck-by objects;
- Periods of high wind speeds;
- Moving machineries;
- Working in confined spaces and excavations;
- Exposure to chemicals, hazardous or flammable materials;
- Working in sunny conditions and high temperatures;
- Exposure to electric shocks and burns when touching live components;
- OHS risks from work with nearby operations to include in specific the oil rigs and petroleum storage facilities

The table below provides an overall summary of the impact on occupational health and safety during the construction and operation phases. The overall impact is considered to be of moderate significance.

Construction Phase			Operation Phase		
Type	Negative	In extreme cases could entail permanent impacts (e.g. permanent disability) however such impacts are controlled through implementation of general best practice.	Type	Negative	In extreme cases could entail permanent impacts (e.g. permanent disability) however such impacts are controlled through implementation of general best practice.
Duration	Short-term		Duration	Long-term	
Magnitude	Medium		Magnitude	Medium	
Reversibility	Irreversible		Reversibility	Irreversible	
Sensitivity	High		Sensitivity	High	
Likelihood	Medium		Likelihood	Medium	
Extent	Low		Extent	Low	
Significance	Moderate		Significance	Moderate	

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Mitigation Measures

Occupational Health and Safety

It is expected that the EPC Contractor will prepare an Occupational Health and Safety Plan (OHSP) regarding the Project's construction, installation and commissioning works as well as the general construction site operations among the C-ESMP that will be prepared and approved prior to starting the construction phase. In addition, the Project Operator is expected to develop an OHSP tailored to the Project's operation phase, among the project ESMP.

The objective of the OHSP is to ensure the health and safety of all personnel in order to concur with and maintain smooth and proper progress of work at the site and prevent accident which may injure personnel or damage property of the EPC Contractor and all involved sub-contractors, as well as the Project Operator.

The OHSP for the construction and operation phase should be Project and site specific and must take into account the national requirements mainly the Law 4/1994 and Law 12/2003 on Labor and Workforce Safety and Book V on Occupational Safety and Health (OSH) and Ministerial Decree 211/2003. In addition, it must also be compliant with the IFC PS2, EBRD PR 2,World Bank's ESS 2 (Labor and Working Conditions) and the AfDB ISS 2023 which recognize the importance of avoiding or mitigating adverse health and safety impacts on workers and require the development of a project-specific health and safety plan that is in accordance with Good International Industry Practice (GIIP).

In general, the OHSP should address the following components:

- Identify roles and responsibilities of the personnel involved within the Project to include the EHS manager, construction manager, supervisor, and other subcontractors' responsibilities;
- Identify in details information in relation to formulation of safety committees, communication protocols, first aid personnel and facilities, first aid training programs, occupational health and safety culture, quality system, reporting requirements, competence and job safety training, safety inspections, recruitment procedures, safety audits, risk assessment, etc.;
- Risk assessment, method statement, and job safety analysis procedure;
- permit to work procedure;
- Lock Out Tag Out Procedure;
- Identification of measures to be implemented onsite that ensure hazard elimination or substitution, followed by engineering control requirements.
- Identify in detail the hazards which may be associated with various activities to take place and the various measures to be implemented to reduce such risks including the requirements for Personal Protective Equipment (PPE). This includes for example hand tools, access equipment, lifting equipment, mobile working equipment, etc.; and
- Establish training requirements for workers to comply with health and safety procedures and protective equipment.
- Include specific procedures and protocols related to COVID-19 risk to include but not limited to: (i) complying with the World Health Organization (WHO) requirements as well as local Ministry of Health requirements at that time; (ii) identification of requirements for daily temperature checks, provision of relevant PPE equipment (sanitizers, facemask, etc.) and undertaking COVID-19 testing at accredited

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institutions; (iii) undertake regular sanitization and disinfection arrangements of shared facilities; (iv) identification of requirements for self-isolation in case of suspected COVID-19 symptoms or direct contact with a person with a confirmed COVID-19 infection; (v) continues training and education on COVID-19 issues such as symptoms, procedures to be implemented, etc.

- Include specific procedures and protocols related to venomous species onsite to include but not limited to undertaking awareness sessions on potential presence of key species, measures to be undertaken in case they are found, ensuring medical resources are available to handle incident.
- Incident and investigation procedure.
- Ensure full application of the approved C-ESMP during the construction phase and so the approved ESMP obligations during the operation phase. In addition to fulfilling EEAA conditions stated in the ESIA approval letter.
-

The EPC Contractor and Project Operator are expected to adopt and implement the provisions of the OHSP throughout the Project construction and operation phase.

Emergency Preparedness and Response

The EPC Contract and Project Operator are also expected to prepare and implement an Emergency Preparedness and Response Plan for the Project construction and operation phase.

The objective is to establish a series of organizational, operational and preventive measures in the event of an emergency that are adapted to the circumstance of such situations, which in turn will ensure the safety of workers and property within the specific Project site. The plan should take into account the following:

- Inclusion of requirements for an emergency responder team that includes at a minimum first aiders and firefighters that receive appropriate and certified training
- Inclusion of requirements to undertake emergency drills in coordination with external emergency response services if required (e.g. civil defense, nearest hospital, etc.)
- Identify in detail of emergency procedures to be implemented to include first actions, alerting emergency contacts, site evacuation, communicating with external emergency services
- Identification in details of emergency control measures to include but not limited to: (i) fire (including fit for purpose firefighting equipment and PPE given potential electrical fires), (ii) personnel accidents, (iii) spillage, (iv) sandstorms, (iv) heats strokes, (v) war conflicts/security deterioration and other.
- Consider real time emergency communication using radios
- Identification of location of assembly points onsite
- Identification of emergency signs to be implemented onsite
- Identify roles and responsibilities for implementation of plan to include establishment of an emergency committee and assigning roles to an emergency manager

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- Ensure full application of the approved C-ESMP during the construction phase and so the approved ESMP obligations during the operation phase. In addition to fulfilling EEAA conditions stated in the ESIA approval letter.

Worker Grievance Mechanism

The EPC Contract and Project Operator are also expected to prepare and implement a worker grievance mechanism for the Project construction and operation phase. The objective is to ensure a robust and comprehensive procedure to capture, document, resolve and close out any worker complaint, whether classified as grievances or not. The plan should take into account the following:

- Identification of a step-by-step process and guideline to ensure that every complaint/grievance made by workers is registered, documented and fully addressed
- The overall outline/structure of the grievance mechanism will be as follows:
  - Workers will be allowed to lodge grievances through various platforms and channels to include grievance boxes distributed onsite, telephone, face to face meetings with responsible personnel, workers representatives and unions. Contact details for all such channels will be identified and provided in detail.
  - Anonymous lodging of grievances will be allowed.
  - All grievances will be recorded and a case handler will be assigned and who will be determined at a later stage.
  - All grievances will be handled in the shortest possible period. The first approach will be to inform the worker within the first 24 hours after receiving grievance. The worker will be informed within 7 working days on whether the grievance proceeds and what the next steps will be.
  - Once a resolution has been agreed or a decision made, the case handler will monitor the implementation of the response.
  - After the implementation of an agreed resolution has been verified the grievance close-out will take place. It will entail reaching a unanimous agreement, clearly communicated to avoid misunderstandings.
  - Grievance mechanisms should be designed in full compliance with AfDB Operational Safeguards: OS2, OS7 and OS10.
  - A close-out report will be prepared with evidence to support closure (e.g. photos).

Worker Accommodation

It is not clear at this point whether there will be any onsite accommodation for workers. Nevertheless, should the EPC Contractor opt for onsite accommodation unit for workers, it must conform to the national requirements. In addition, it should also confirm to international best practice requirements – this includes mainly the "Workers' accommodation: process and standards" (EBRD/IFC Guidance Note, 2009).

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The document provides guidance notes on general living facilities, room facilities, medical facilities, management of accommodation units, etc.

Following the implementation of these mitigation measures, the significance of the residual impact can be reduced to minor. This has been based on a precautionary residual significance rating pending confirmation of workforce sourcing, accommodation arrangements and implementation of the Worker Influx Plan.

Monitoring and Reporting Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by the EPC Contractor and Project Operator during the construction and operation phase:

- Inspection to ensure the implementation of the provisions of the Occupational Health and Safety Plan and assess compliance with its requirements;
- Regular Reporting on the health and safety performance onsite in addition to reporting of any accidents, incidents and/or emergencies and the measures undertaken in such cases to control the situation and prevent it from occurring again; and
- If applicable, inspection on workers accommodation to ensure its compliance with the requirements of "Instructions for Prevention of Health Nuisances from Workers Accommodation No. (1) For the year 2013" and "Workers' accommodation: process and standards" (EBRD/IFC Guidance Note, 2009).
- Submission of an Emergency Preparedness and Response plan
- Submission of a Worker Grievance Mechanism.

8.13 Public Health and Safety

This section identifies and assesses the anticipated impacts from the Project activities on public health and safety during the various phases to include planning and construction phase and operation phase. For each impact, a set of management measures (which could include mitigation measures, additional requirements, etc.) and monitoring measures have been identified to eliminate or reduce the impact to acceptable levels.

8.13.1 Potential Impacts from Noise during Operation

Wind turbines produce noise during operation from mechanical and aerodynamic sources. Mechanical noises are mainly limited from the machinery in the nacelle of the turbine (gearbox, generator, auxiliary equipment, etc.) while aerodynamic noise is generated from the movement of air around the turbine blades and tower.

Propagation of the sound from a turbine is primarily a function of distance, but it can also be affected by the placement of the turbine, surrounding terrain, and atmospheric conditions. In addition, noise levels depend greatly on the level of operation of the turbines (percentage of rated power). Nevertheless, in some cases, background/ambient sound already exceeds the sound produced by any wind turbine (e.g.

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high wind speeds, surrounding activities, etc.). In this case, the sound from the wind turbine blends into the background sound, simply becoming part of the present soundscape without the notice of residences.

As required by the IFC EHS Guideline for Wind Energy, the following is noted in relation to noise assessment for wind farms:

- Receptors should be chosen according to their environmental sensitivity (human, livestock, or wildlife).
- Preliminary modelling should be carried out to determine whether more detailed investigation is warranted. The preliminary modelling can be as simple as assuming hemispherical propagation (i.e., the radiation of sound, in all directions, from a source point). Preliminary modelling should focus on sensitive receptors within 2,000 m of any of the turbines in a wind energy facility.
- If the preliminary model suggests that turbine noise at all sensitive receptors is likely to be below an LA90 of 35 decibels (dB) (A) at a wind speed of 10 meters/second (m/s) at 10 m height during day and night times, then this preliminary modelling is likely to be sufficient to assess noise impact; otherwise, it is recommended that more detailed modelling be carried out, which may include background ambient noise measurements.
- All modelling should take account of the cumulative noise from all wind energy facilities in the vicinity having the potential to increase noise levels.

The IFC EHS Guideline for Wind Energy is based on the on "the Assessment and Rating of Noise from Wind Farms" (ETSU-R-97). ETSU can be regarded as relevant guidance on good practice, it contains a methodology for generating noise limits for a wind turbine and wind farms. ETSU-R-97 is referenced by the United Kingdom (UK) Government as a best practice guide for UK Legislation. The assessment procedure of ETSU-R-97 consists of the following steps for the screening assessment:

- Determine a study area;
- Identify potentially affected properties;
- Predict noise levels from all turbines (existing and proposed) and determine a noise contour boundary of 35dB(A); and
- Identify if any noise sensitive receptors are within this boundary.

Taking the above requirements into account, a preliminary noise assessment was undertaken for the Project as described below within this section.

As part of this preliminary noise study, the following main objectives have been identified and therefore proposed as outcomes for the assessment:

- Noise prediction calculations using SoundPLAN 9.1 for a reasonable worst-case noise scenario (W10 = 10 m/s).
- Determine the extent of the 35 dB(A) contour boundary emitted from the WTGs (from both proposed and existing wind farms).
- Determine if there are any noise sensitive receptors within the calculated contour boundary.

The assessment is based on the following information:

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- General arrangement and layout drawings of the wind farm, including topography.
- Wind Turbine supplier data (vendor noise data).
- Noise sensitive receiver (NSR) locations.

A. WTG Specifications

As previously discussed in 'Section 2.3' above, the Project consists of 83 WTGs. These will consist of new types of wind turbine specifications, which are highlighted in the table below.

Table 70: Envision EN 206-11.0 MW Specifications[35]

General Details	
Rated Power	11,000 kW
Wind Class	N/A
Rotor Diameter	206 m
Swept Area	33,329 m2
Power Density	330 W/m2
Gearbox	3 stage (2 planetary + 1 parallel)
Generator	Synchronous permanent
Frequency	50 Hz
Physical Dimensions	
Hub Height	116 m
Tower Type	Tubular steel / Hybrid

EN 206-11.0 Noise Source Data

Noise source emission data, sound level performance specifications, noise emission analysis and sound warranties for the proposed EN 206-11.0 MW turbines are described below.

Sound power levels are derived from acoustics test measurements in accordance with IEC 61400-11 ed. 3 Wind Turbine Generator Systems – Part 11: Acoustic noise measurement techniques[36].

The sound power levels during standard operation mode ranges from 105.1 dB(A) at low revolutions per minute (rpm) to 114.6 dB(A) at full rated power output (high rpm). The figure below shows sound power levels per wind speed at 10 m height (W_{10} in m/s).

[35] "Technical Specification for the Sound Power Level of Envision 206-11.0 Wind Turbine Generator," 2025.
[36] IEC, Wind Turbine Generator Systems - Part 11: Acoustic noise measurement techniques, 2012.

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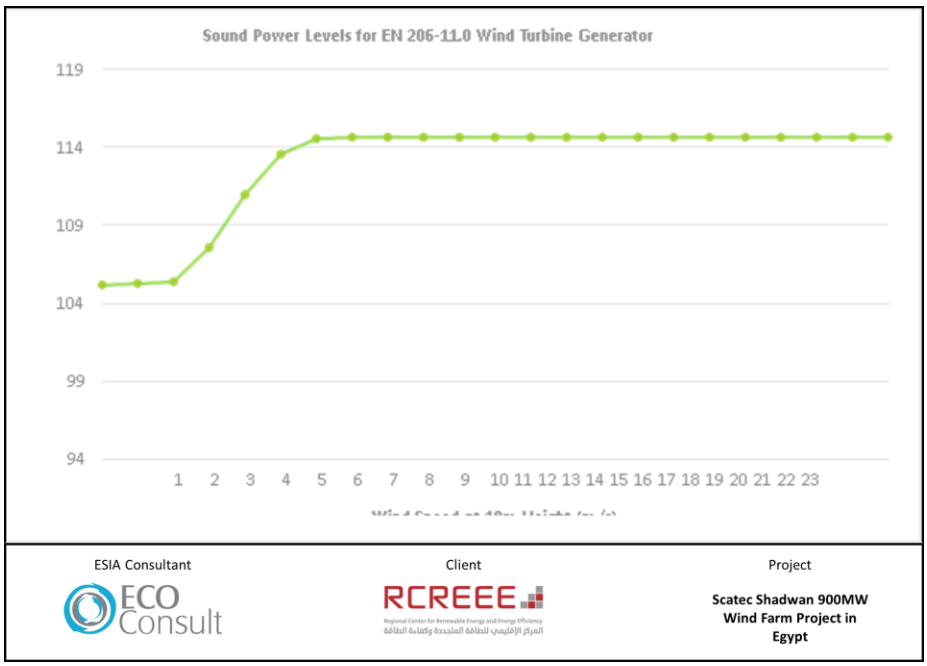


Figure 102: Sound Power Levels for Envision EN 206-11.0 MW for W_{10}

This modelling scenario presents the worst-case scenario which includes wind speeds exceeding 10 m/s, therefore, worst cases would be defined as operation within wind speeds which exceed 10 m/s (Table 4-2).

A 2 dB correction has been applied to account for uncertainty.

Table 71: EN 206-11.0 Modelling Scenario for Assessment

Scenario Description	Wind Speed (at 10 m)	Sound Power Level dB(A)	Correction for Uncertainty
Worst-Case	> 10 m/s	116.6	+ 2 dB

Description of Wind Turbine Noise

Wind turbine noise is mainly generated from two sources: aerodynamic noise and mechanical noise. Aerodynamic noise is produced by airflow interacting with the rotating blades and is the dominant source during operation. It is typically broadband in nature and commonly perceived as a “wooshing” sound, resulting from blade interaction with atmospheric turbulence, trailing edge effects, blade tip turbulence, and flow separation along the blade surface.

Mechanical noise originates from the mechanical and electrical components within the turbine nacelle. In modern wind turbines, this noise is largely minimized through improved design and insulation and is generally less significant than aerodynamic noise during normal operation.

B. Noise Sensitive Receptors

As discussed previously in ‘Section 7.1’ above, number of receptors have been identified; however, not all of these are considered noise sensitive. Most of the potential NSRs and are clustered in close proximity to one another. For the purposes of this assessment, four receptors closest to the proposed wind farm location have been selected as representative assessment NSRs. The figure below displays the location of the selected representative NSRs and the table below displays the coordinates of the NSRs.

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Table 72: Noise Sensitive Receptors

NSR	Classification	NSR UTM Coordinates	
		Longitude (UTM Easting) mE	Latitude (UTM Northing) mN
NSR1	New Wadi Dara Farm	512643	3096600
NSR2	New Wadi Dara Farm	513887	3097048
NSR3	Residential	523436	3096786
NSR4	Livestock Farm	524285	3095499

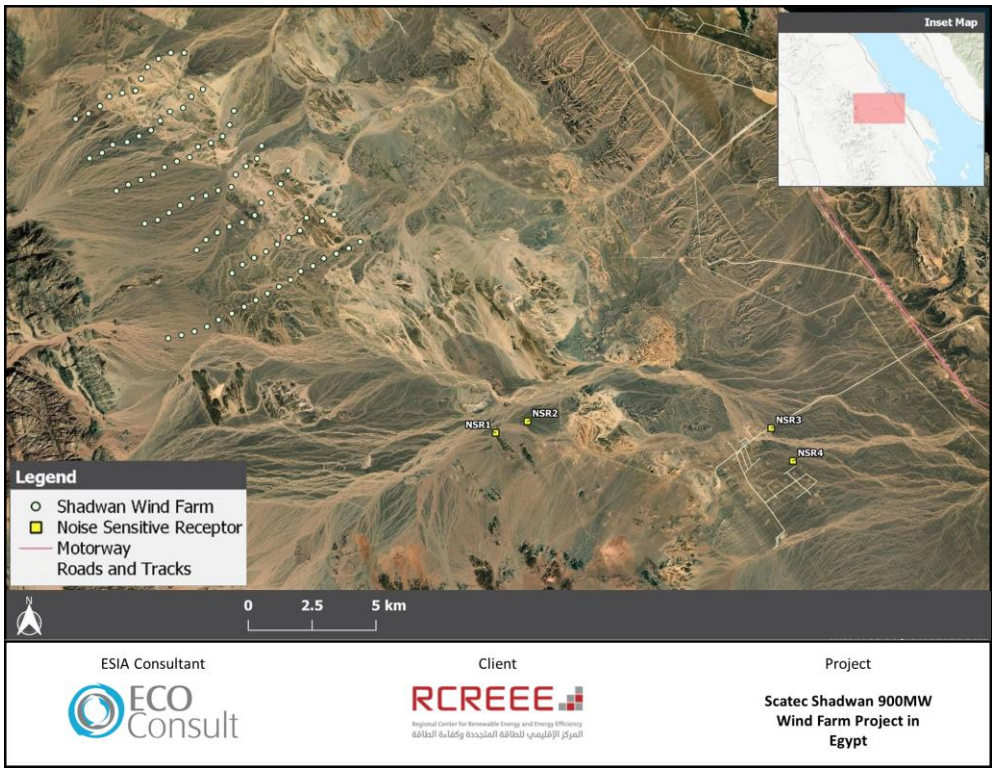


Figure 103: Noise Sensitive Receptor Locations

C. *Existing Wind Farms in Surrounding Area*

As mentioned earlier in 'Section 2.7' above, there are existing wind farms present in the surrounding area of the proposed Project that have the potential to increase the cumulative noise level at the identified NSRs. Therefore, even during the screening, the assessment should consider all wind turbine noise emissions that have the potential to increase noise levels at noise sensitive receptors.

D. *Noise Model Methodology*

(i) Propagation of Sound Outdoors

Sound is a sequence of pressure waves which propagate through fluid medium. In the case of all outdoor propagation of sound in air the following factors affect the propagation and resultant sound levels from the source.

- Type of source (point, line, or area)
- Distance from the source

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- Atmospheric absorption
- Wind
- Temperature and temperature gradient
- Obstacles such as barriers and buildings (Barrier effects)
- Ground Absorption
- Reflections
- Humidity and Precipitation

A brief description of the above is given as follows:

Types of Sources

Point sources are considered where the dimensions of a source are small compared to the distance of the receiver. An example of point sources are stacks and fans. Sound energy spreads spherically and the sound pressure level is the same for all points at the same distance from the source.

If the source is narrow and long in one direction perpendicular to the distance of the receiver, it is called a line source. The sound level propagates cylindrically such that the sound pressure level is equal at all points at the same distance from the line.

Berries

Noise reduction caused by barriers is dependent on two main factors:

- Path difference of the sound wave as it travels over the barrier compared with the direct transmission to the receiver.
- The sound frequency of the noise in question.

Atmospheric Attenuation

Atmospheric attenuation is complex and therefore will be summarized in short. Atmospheric attenuation depends on the following main factors:

- Distance from source
- Frequency content of the noise
- Ambient temperature
- Relative Humidity
- Ambient Pressure

Distance from source and frequency content are the most influential to the atmospheric attenuation with source distance being the most influential to atmospheric absorption.

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Wind and Temperature

For noise propagation over short distances, climatic conditions do not have a significant effect; however, for distances over 50 m, wind becomes more influential. Downwind, the level may increase by a few dB, depending on wind speed whereas on the upwind or side-wind, the level can drop by 10 dB.

Temperature gradients create effects similar to those of wind gradients, except that they are uniform in all directions from the source. On a sunny day with no wind, temperature decreases with altitude. On a clear night, temperature may increase with altitude (temperature inversion) focusing sound on the ground surface.

Ground Effects

Reflections by the ground interact (interfere) with directly propagated sound and therefore affect the receiver level depending on the ground covering and surface. The ground effect varies according to the ground type. Generally, hard ground (e.g., water or concrete) is reflective and adds an additional 3 dB whereas soft ground (e.g., grass and vegetation) decreases the sound at the receiver (varies with frequency).

Therefore, to effectively predict noise levels for the project the above would need to be considered and effectively modelled with the chosen software package for noise propagation prediction modelling.

(ii) Modelling the Propagation of Sound

The propagation methodology adopted within the SoundPLAN model was the International Organization for Standardization (ISO) 9613 'Acoustics – Attenuation of Sound During Propagation Outdoors' (ISO, 2024-01)[37]. This document can be referred to for an in-depth description of the methodology SoundPLAN utilizes for attenuation of sound and propagation outdoors.

ISO 9613 specifies an engineering method for calculating the attenuation of sound during propagation outdoors in order to predict the levels of environmental noise at a distance from a variety of sources. The method predicts the equivalent continuous A-weighted sound pressure level (LAeq) under meteorological conditions favorable to propagation from sources of known sound emission. The source (or sources) may be moving or stationary and takes account of the following physical effects:

- Geometrical divergence;
- Atmospheric absorption;
- Ground effect;
- Reflection from surfaces; and,
- Screening by obstacles.

[37] "ISO9613-2 'Acoustics - Attenuation of Sound During Propagation Outdoors'," 2024

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Noise from WTGs is reduced by distance, atmospheric losses, screening effects and other 'miscellaneous' losses. ISO 9613-2 empirical formula calculates the predicted sound pressure level at a specified distance by taking into account the sound power level in octave frequency bands and subtracting a number of attenuating factors as described generally above.

A summary of the calculation settings and standards are detailed in the table below.

Table 73: Model Calculation and Parameter Settings

Model Parameter	Parameter Setting / Standard							
Calculation Standard	(ISO) 9613 'Acoustics – Attenuation of Sound during Propagation Outdoors – Part 2: General Calculation Method' (ISO, 2024-01) Application as per IOA GPG[38]							
Wind Speed	10 m/s							
Ground Absorption Coefficient	0.5							
Receiver Height	1.5 m							
Meteorological Data	Humidity 70% Air Pressure 1013.3 mbar T = 25ºC							
Atmospheric Attenuation Coefficients (dB / km)	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
	0.1	0.3	1.1	2.8	5	9	22.9	76.6

(iii) Modelling Assumptions and Limitations

The following assumptions have been made for the modelling assessment, and wherever possible, a conservative approach has been taken:

- ISO 9613-2 calculates predicted noise levels with the assumption of moderate downwind conditions of propagation, therefore, attenuation due to metrological factors such as wind speed and wind direction are not taken into account.
- Due to the surrounding area being a mix of hard and soft ground surfaces, an absorption coefficient of 0.5 has been assumed.

E. Predicted Noise Levels

(i) Noise Screening Assessment

The noise screening assessment was carried out for the new Scatec Shadwan 83 WTG layout in an isolated and cumulative scenario. Under the cumulative scenario, full operation of proposed and existing nearby wind farms that have the potential to increase noise levels at the NSRs were included in the model. This was to determine whether noise levels at the identified NSRs detailed previously exceed the 35 dB(A) prescribed limit.

[38] IOA, "A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise,"2013

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(ii) Noise Contour Maps

Noise contour maps for the worst-case noise scenario have been calculated for both isolated and cumulative assessments and are presented in the figures below. The maps show noise contour lines as well as the noise contour limit line of 35 dB(A). The significance of the noise contour maps is to allow for an overview of noise levels over a geographic area and therefore allows a quick basic analysis of the noise propagation for identification of the specific NSRs.

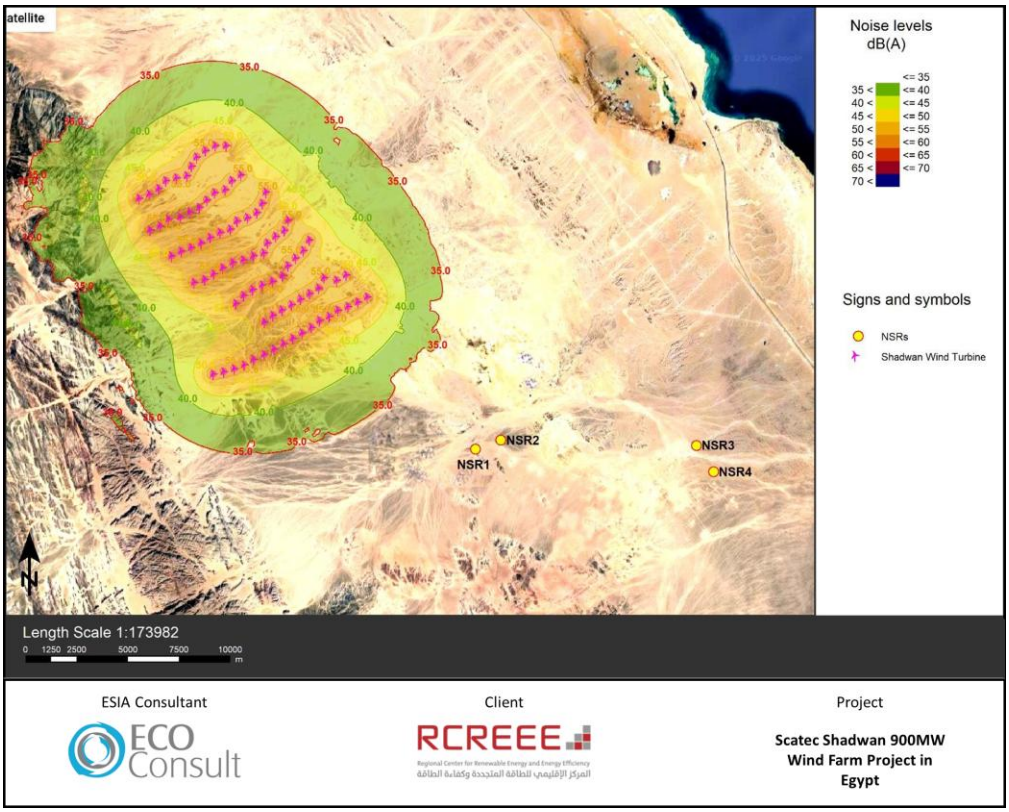


Figure 104: Noise Contour Map for Shadwan Wind Farm Layout - W_{10}: 10 m/s (Isolated Assessment)

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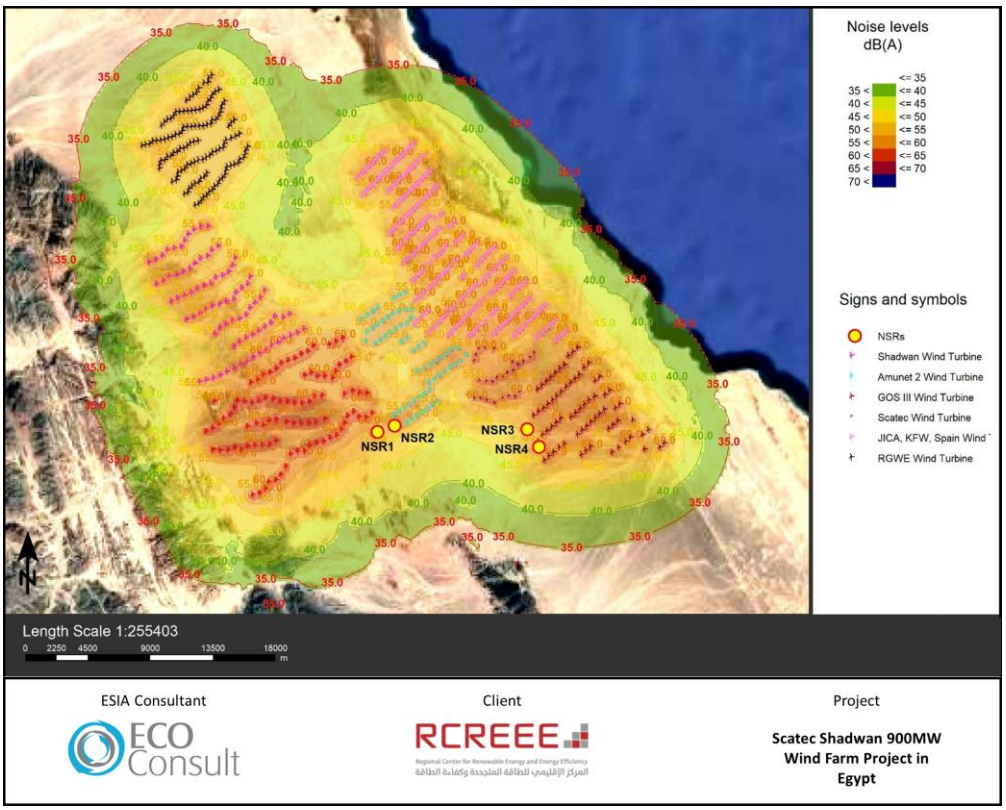


Figure 105: Noise Contour Map for Shadwan Wind Farm Layout - W_{10}: 10 m/s (Cumulative Assessment)

(iii) Predicted Noise Result at NSRs

Results Table

Based on the results of the noise contour map and the identification of the NSR, the table below displays the predicted noise level results at the NSR for both the isolated and cumulative WTG assessments.

Table 74: Predicted contribution noise levels at NSRs from Shadwan Wind Farm (Isolation & Cumulative) (W_{10})

NSR	Classification	Predicted Contribution Noise Level at 10 m/s Wind Speed (W10) – dB(A)	
		Project site (Isolation)	Project site (Cumulative)
NSR1	New Wadi Dara Farm	28.1	52.3
NSR2	New Wadi Dara Farm	27.4	62.7
NSR3	Residential	19.5	52.1
NSR4	Livestock Farm	18.9	55.1

Isolation Wind Farm Results

The results show that under these conditions, the 35 dB(A) noise limit at the representative NSRs is not predicted to be exceeded in the isolation assessment.

Cumulative Wind Farm Results

All NSRs are predicted to exceed the 35 dB(A) noise limit when assessed cumulatively. Given that the Project contributes more than 10 dB(A) below the cumulative noise level at all NSRs and is located more than 10 km away from the nearest NSR, the cumulative exceedances are not due to the Project.

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F. Conclusions and Recommendations

The noise emissions from the Project at the identified NSRs are not predicted to exceed the 35 dB(A) noise limit in isolation. Exceedances are predicted for the cumulative assessment; however, the dominant noise sources are the wind farm layouts located closer to the NSRs, and not due to the operations of the Project.

The results of this preliminary noise assessment satisfy the condition that a detailed wind farm noise study is not required.

8.13.2 Potential Impacts from Shadow Flicker from Wind Turbines during Operation

Shadow flicker occurs when the sun passes behind the wind turbine and casts a shadow several hundred meters away from the turbine's location. As the rotor blades rotate, shadows pass over the same point causing an effect known as 'shadow flicker'. Shadow flickers only occur under specific environmental conditions which must also align for flicker to occur which include position and height of the sun, wind speed, direction, cloudiness, and position of the turbine to a sensitive receptor.

Excessive shadow flicker can be a source of nuisance and could create a disturbing indoor environment to the occupants of those buildings especially when cast through windows of buildings that directly face the turbine with no obstructions in sight (trees, hills, etc.).

A companion guide to Planning Policy Statement 22 (PPS22) (2004) and BERR (2007) indicates that shadow flicker is typically limited to occurring within approximately 10 rotor diameters of a wind turbine; at distances beyond 10 rotor diameters shadow flicker effects are essentially undetectable. Beyond this distance, the shadow is diffused such that the variation in light levels is not likely to be sufficient to cause annoyance. This is also acknowledged in the Queensland Wind Farm Planning Guidelines, which state that the first step in performing a shadow flicker assessment is to determine the extent of shadows from turbines and suggest a distance equivalent to 265 maximum blade chords (the thickest part of the blade) as an appropriate limit. This limit corresponds to around 800 m to 1,325 m for modern wind turbines, which typically have maximum blade chord lengths of 3 m to 5 m (AECOM, 2016). The maximum shadow flicker expected is likely to occur within 2,100m radius.

The IFC EHS Guideline for Wind Energy states that where there are nearby receptors, commercially available software can be used to model shadow flicker to identify the distance to which potential shadow flicker effects may extend.

Based on the above, and since there are no nearby receptors within 2,100m of the Project site, this impact is scoped out and there are no further requirements to be considered for the ESIA study.

8.13.3 Potential Impacts from Trespassing of Unauthorized Personnel during Construction and Operation

Such impact is mainly related to public access of unauthorized personnel to the various Project components. Such access could result in safety issues such as unauthorized climbing of the turbine, safety hazards from substations (electric shock, thermal burn hazards, exposure to chemicals and hazardous materials, etc.), unauthorized climbing of the transmission tower and others.

Construction Phase	Operation Phase

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Type	Negative		Type	Negative	
Duration	Short-term	Limited to construction which is 31 months	Duration	Long-term	During entire operation period of 25 years
Magnitude	Medium	Extreme cases they could entail permanent impacts	Magnitude	Medium	Extreme cases they could entail permanent impacts
Reversibility	Irreversible		Reversibility	Irreversible	
Sensitivity	Medium		Sensitivity	Medium	
Likelihood	Low	No local community activity in the area	Likelihood	Low	No local community activity in the area
Extent	Low	Will have an effect on impacted area only	Extent	Low	Will have an effect on impacted area only
Significance	Moderate		Significance	Moderate	

Mitigation Measures

The following presents the mitigation measures that are to be implemented by the Project Operator during the operation phase of the Project and which include:

- A Security Risk Assessment should be developed for the wind farm Project and which considers the following:
  - Each turbine to be fitted with locked doors to prevent unauthorized access to the turbines;
  - Substation area to be completely fenced with concrete walls to prevent unauthorized access;
  - Onsite guards within the entire Project site always to ensure the safety and security of the Project as well as preventing unauthorized access to any of the Project components. However, it must be ensured that all onsite guards are adequately trained to deal with unauthorized trespassing incidents.
  - Post informative signs on the turbines and substation about public safety hazards and emergency contact information. Signs, especially warnings need to be pictorial as well as written to ensure they are understood by those unable to read

Following the implementation of these mitigation measures, the significance of the residual impact can be reduced to not significant.

Monitoring and Reporting Requirements

The following presents the mitigation measures that are to be implemented by the Project Operator during the operation phase of the Project and which include:

- Submission of Security Risk Assessment

8.13.4 Potential risks from Worker Influx during Construction

During construction the Project a relatively significant number of workers will be expected onsite (around 2,000 workers) for duration of approximately 31 months. However, as discussed earlier, at this point it is still unclear how many of these workers will be expatriates, Egyptians and/or from local communities and it is still unclear where accommodation of these works will take place.

Nevertheless, the influx of workforce to the area could result in certain community health, safety and security impacts which are discussed below.

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Risk of Diseases

Influx of workers may introduce new reservoirs of diseases such as vector-related diseases, water-borne diseases, etc. In addition, there is also a risk of spreading communicable diseases, including sexually transmitted ones. The risk of catching or exchanging communicable diseases (e.g., Virus B, Virus C, and HIV/AIDS) and the lack of awareness on transmission disease can represent a high risk to workers and community health and safety.

Inappropriate Code of Conduct

Other risks from worker influx include inappropriate code of conduct by workers towards local communities which might result in hostility and resentment. Such inappropriate conduct could include also disrespecting the traditional culture and social norms of the area and local communities.

Increase in Social Vices

Population influx could result in an increase of social vices including alcoholism, drug abuse, and other.

Increase in Competition for Public Services

The sudden increase in population due to the influx of workers and their families can put substantial pressure on existing local infrastructure, particularly water, electricity, and transportation systems. These services might not have been designed to handle such an increase in use, leading to overloads and service disruptions.

Local Inflation of Prices

The arrival of a large labor force can drive up the demand for goods and services, potentially leading to higher local prices and displacing regular consumers in the local community.

Increased Risk of Crime

The influx of workers in communities could lead to a rise in criminal activities or create a feeling of insecurity among local residents. Potential issues may include theft, physical assaults, substance abuse, prostitution and human trafficking. The local police force might be unprepared to handle the surge in population and associated challenges.

Construction Phase		
Type	Negative	N/A
Duration	Short-term	Limited to construction which is 31 months
Magnitude	Medium	Medium magnitude and sensitivity given that it could entail some impacts on local resources, spread of serious diseases which could impact community H&S, and other.
Reversibility	Reversible	
Sensitivity	Low	
Likelihood	Medium	Due to presence of nearby communities
Frequency	Frequent	Throughout entire construction phase
Timing	Not relevant	
Extent	Medium	Effects expected within 5 km radius from impact
Significance	Minor	

Mitigation Measures

The EPC Contractor is expected to prepare a worker influx plan to be implemented for the construction phase of the Project. The plan must take into account the following:

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- Medical examination program. All workers must be subject to a preliminary medical examination before commencement of any job tasks in accordance with local applicable requirements. In addition, routine medical examination for workers (bi-annually) must be undertaken. Such medical examinations must be undertaken at certified centers. Copies of medical examination results of all workers must be retained onsite.
- Details and procedures for ensuring and maintaining hygienic conditions onsite at all times specifically related to toilet and washing facilities, eating areas, etc.
- Development of a code of conduct for workers which takes into account appropriate behavior by workers at all times, religious customs, traditional cultures and social norms in the area. In addition, it must include specifically requirements for social vices including gender-based violence, sexual harassment, alcoholism, drug abuse, etc.
- Induction training and awareness raising sessions on risks associated to the most common contagious diseases (e.g. influenza virus), communicable diseases, general measures for hygiene, code of conduct expected to be implemented and others as appropriate.
- Ensure full application of the approved C-ESMP during the construction phase, in addition to fulfilling EEAA conditions stated in the ESIA approval letter.

Following the implementation of these mitigation measures, the significance of the residual impact is still minor until further information is provided regarding worker influx.

Monitoring and Reporting Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by the EPC Contractor:

- Submission of the Worker Influx Plan

8.13.5 Potential risks from Security Personnel during Construction and Operation

There could be interactions between security guards and personnel of the Project with local communities and nearby receptors. Inappropriate management of security issues and incidents by security personnel towards local communities (e.g. overreaction, mistreatment, use of excessive force) could result in potential for conflict, resentment, distrust and escalation of events.

Construction Phase			Operation Phase		
Type	Negative		Type	Negative	
Duration	Short-term	Limited to construction which is 31 months	Duration	Long-term	During entire operation period of 25 years
Magnitude	Medium	Extreme cases could entail permanent impacts	Magnitude	Medium	Extreme cases could entail permanent impacts
Reversibility	Irreversible		Reversibility	Irreversible	
Sensitivity	Medium		Sensitivity	Medium	
Likelihood	Low	No local community activity in the area	Likelihood	Low	No local community activity in the area
Extent	Low	Will have an effect on impacted area only	Extent	Low	Will have an effect on impacted area only
Significance	Minor		Significance	Minor	

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Mitigation Measures

The EPC Contractor and Project Operator are expected to prepare a Security Management Plan to be implemented for the construction and operation phase of the Project.

The plan must identify appropriate measures for hiring, rules of conduct, training, equipping, and monitoring of security personnel to control and manage such issues. The plan must adhere to: (i) IFC PS 4 (Community Health, Safety and Security); and (ii) EBRD PR 2 (Labor and Working Conditions), all of which identify requirements for security personnel. This includes specific requirements to ensure security personnel are guided by the Voluntary Principles on Security and Human Rights in terms of hiring, rules of conduct, training, equipping and monitoring of such personnel. They also require reasonable inquiries that those providing security measures are not implicated in past abuses, will ensure they are trained adequately in the use of force (and firearms if applicable) and appropriate conduct towards the workers and the local community. Force should only be used when strictly necessary, and to an extent proportional to the threat.

- The plan should ensure full application of the approved C-ESMP during the construction phase and so the approved ESMP obligations during the operation phase. In addition to fulfilling EEAA conditions stated in the ESIA approval letter.

Following the implementation of these mitigation measures, the significance of the residual impact can be reduced to not significant.

Monitoring and Reporting Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by the EPC Contractor and Project Operator:

- Submission of the Security Management Plan

8.13.6 Potential Impacts from Blade and Tower Glint of Wind Turbines during Operation

Blade or tower glint occurs when the sun strikes a rotor blade or the tower at a particular orientation. This can impact a community, as the reflection of sunlight off the rotor blade may be angled toward nearby residences.

However, as discussed previously, there are no key sensitive receptors located within the surrounding area of the wind farm which could potentially be impacted by blade and tower glint. In addition, according to the IFC EHS Guidelines on Wind Energy (IFC, 2007), blade glint is a temporary phenomenon for new turbines only and typically disappears when blades have been soiled after a few months of operation.

Based on the above, and since there are no nearby receptors, this impact is scoped out and there are no further requirements to be considered for the ESIA study.

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8.13.7 Potential Impacts from Blade and Ice Throws from Turbines during Operation

Failure in rotor blade can result in the 'throwing' of the blade. In addition, snow idling on a blade can also result in ice throwing when operated. Blade and ice throw impacts from operating turbines entail public health and safety concerns on receptors.

As noted within "Section 7.2" there are no receptors within the Project site and surrounding areas that would classify as blade and ice throws sensitive receptors.

For clarity, the definition of receptor was followed as that defined within the "World Bank Group / IFC EHS Guidelines for Wind Energy" (IFC, 2015) which is defined as "populated locations". In addition, IFC EHS Guidelines on Wind Energy (IFC, 2015) state that a setback distance should be applied between turbines and populated locations. The minimum setback distance is 1.5 x turbine height (which is equivalent to around 300m), although modelling suggests that the theoretical blade throw distance can vary with the size, shape, weight, and speed of the blades, and the height of the turbine.

The closest populated location would be the closest community located 10 km from the Project site.

Based on the above, this impact is scoped out and there are no further requirements to be considered for the ESIA study.

8.14 Socioeconomics

This Section identifies the potential impacts in relation to socio-economic during the various Project phases. For each impact, a set of mitigation measures and monitoring requirements are identified.

Given the generic nature of the impacts on socio-economic development for both phases of the Wind Farm Project (construction and operation) those have been identified collectively throughout this section.

During the construction and operation phases of the Wind Farm, the Project is expected to create the following job opportunities:

- Around 2,000 job opportunities at peak during the construction phase for a duration of approximately 31 months. This will mainly include 300 skilled job opportunities (to include engineers, technicians, consultants, surveyors, etc.) and 1,700 unskilled job opportunities (mainly laborers but will also include a number of security personnel).
- Around 100 job opportunities during the operation phase for a duration of 25 years. This will include skilled job opportunities (such as engineers, technicians, administrative employees, etc.) and unskilled job opportunities (such as security personnel, drivers, etc.).

However, the contractors and operators have not been selected at this stage, and therefore there are no details available on the number of job opportunities targeted to local communities, type of jobs, duration, etc. In addition to the above, the local communities could also be engaged in procurement opportunities along different segments of the value chain such as local contractors, local supply of equipment and machinery, cleaning services, etc.

Taking the above into account, the Developer is committed to ensuring that priority for job opportunities and procurement activities where relevant are targeted to the local communities. The above could also entail other indirect positive benefits to the local community from increase in demand for local services, supplies, and businesses. This could include for example possible engagements for supplies and service

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providers (accommodation services, food, etc.). Such demands could improve the existing local economic activities and impact certain sectors, such as wholesale/retail trade.

Taking all of the above into account, this to some extent could contribute to enhancing the living environment for its inhabitants. The creation of job and procurement opportunities in specific is of crucial importance. However, it is understood that the socio-economic development of the area is not hinged on a single project but rather on implementing collective and coordinated actions, including other development projects and investment within the area.

Nevertheless, proper planning and local community engagement from the start is crucial to understand issues and opportunities which in turn would enable the Project to build true sustainable links which will bring maximum benefits to the local communities. Given the above, such impacts are anticipated to be *positive*.

Recommendations and Required Action

As the impacts discussed are mainly positive, no mitigation measures have been identified. This section provides recommendations which aim to enhance such positive impacts anticipated from the Project throughout the construction and operation phases to the greatest extent possible.

- Local Recruitment Procedure: the EPC Contractor under supervision from the Developer should develop a Local Recruitment Procedure that must identify the number of job opportunities targeted for local communities to include skilled and unskilled workers, including Bedouin groups. Such job opportunities should also take into account employment of local communities in the area around the project to include fresh graduate engineers, technicians, laborers, etc. In addition, the procedure must include details on how job opportunities will be announced as well as a selection process that is fair and transparent and provides equal opportunities for all including females. The Procedure should investigate the potential for implementation through a joint collaboration between the Developer/EPC Contractors and the other wind farm developers in the area. Prioritizing employment from the community is considered a key issue and this should be reflected in the EPC Contract and subsequent subcontracts. The terms and conditions of the new labor law of Egypt No. 14/2025 and its Executive Regulations should be strictly considered in addition to the AfDB ISS 2023 and other relevant lenders E&S safeguards as well.

- ~~Local Procurement Procedure: the EPC Contractor under supervision from the Developer should develop a Local Procurement Procedure that must identify the procurement opportunities targeted for local communities (including Bedouin groups) to include for example local subcontractors, local supplies and services, cleaning services, etc. In addition, the procedure must include details on how procurement opportunities will be announced as well as a selection process that is fair and transparent and provides equal opportunities for all. The Procedure should investigate the potential for implementation through a joint collaboration between the Developer/EPC Contractors and the other wind farm developers in the area. Prioritizing procurement opportunities from the community is considered a key issue and this should be reflected in the EPC Contract and subsequent subcontracts.~~

- Social Responsibility Program: it is recommended that the Developer implement a social responsibility program which aims to benefit the local communities to the greatest extent possible. In this case, a structured approach must be developed which must identify priority development projects which could benefit local communities (e.g. based on a needs assessment if available). Based on that the social responsibility program can prioritize projects for local communities based on available budget, vision, timeline for implementation and other factors.

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8.15 Summary of Anticipated Impacts and risks

The tables below present a summary of the anticipated impacts during the planning and construction and operation phase of the Project. The information in the tables includes:

- Key and generic environmental attributes (e.g. air quality, noise);
- Impact and risk (textual description);
- Nature of impact (negative or positive);
- Duration (long-term or short-term);
- Reversibility (reversible or irreversible);
- Magnitude (high, medium, or low);
- Sensitivity (high, medium, or low);
- Significance (major, moderate, minor, or not significant);
- Management action – generally management actions describe whether an impact can be mitigated or not. Management actions include: (i) mitigation measures; (ii) compensation measures; (iii) additional requirements which must be implemented at a later stage and which could be required by a governmental entity; (iv) for positive impacts recommendations have been provided which aim to enhance the impact; and
- Residual significance after management actions is implemented (major, moderate, minor, or not significant

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Table 75: Summary of Anticipated Impacts during Planning and Construction

Attribute / Issue	Likely Impact – Planning and Construction Phase	Impact Assessment									
		Nature	Duration	Reversibility	Magnitude	Sensitivity	Likelihood	Extent	Significance	Management Action	Residual Significance
Landscape and Visual	Visual and landscape impacts due to presence of elements typical of a construction site such as equipment and machinery from the angle of Wadi Dara Village and Highway 65 (running along the Project site's eastern border).	Negative	Short-term	Reversible	Medium	Low	High	Low	Minor	Mitigation Available	Not Significant
Geology, Hydrology and hydrogeology	Risk of soil and groundwater contamination during the various construction activities from improper housekeeping activities, spillage of hazardous material, random discharge of waste and wastewater.	Negative	Short-term	Reversible	Medium	Low	Medium	Medium	Minor	Mitigation available	Not Significant
	Potential Impacts from erosion and runoff	Negative	Short-term	Irreversible	Medium	Low	Medium	Low	Minor	Mitigation available	Not Significant
Biodiversity	Habitat loss, fragmentation and degradation	Negative	Short-term	Irreversible	Medium	Medium	High	Low	Minor	Mitigation available	Not Significant
	Direct Impacts on Sensitive Receptors (Habitats and Flora) – Non-native Species and Introduced Flora	Negative	Long-term	Irreversible	Medium	Medium	Low to Medium	Medium	Moderate	Mitigation available	Not Significant
	Impacts on Sensitive Receptors (Nubian Ibex and Dorcas Gazelle)	Negative	Medium-term	Irreversible	High	High	Medium	Low	Major	Mitigation available	Not Significant
	Direct Impacts on Sensitive Receptors (Vertebrates) - Site Clearance and Earthworks	Negative	Medium-term	Irreversible	High	High	Medium	Low	Major	Mitigation available	Not Significant
	Direct Impacts on Sensitive Receptors (Vertebrates) – Vehicle Collisions	Negative	Long-term	Irreversible	Medium to High	High	Medium	Low	Moderate	Mitigation available	Not Significant
	Direct Impacts on Sensitive Receptors (Habitats, Vertebrates) – Poaching, Collection etc.	Negative	Long-term	Irreversible	Low to High	Low	Low	Low	Minor	Mitigation available	Not Significant
	Direct and indirect impacts on sensitive receptors (vertebrates) – Disturbance	Negative	Short-term	Reversible	Medium	Medium	Medium	Low	Moderate	Mitigation available	Not Significant
	Direct and Indirect Impacts on Sensitive Receptors (Vertebrates) – Reduced Air Quality / Dust	Negative	Short-term	Reversible	Medium	High	Medium	Medium	Moderate	Mitigation available	Not Significant
	Direct Impacts on Sensitive Receptors (Vertebrates) – Noise	Negative	Short to Medium-term	Reversible	Low to Medium	High	Medium	Medium	Moderate	Mitigation available	Not Significant
	Direct Impacts on Sensitive Receptors (Vertebrates) – Lighting	Negative	Short to Medium-term	Reversible	Low	Medium	Medium	Medium	Minor	Mitigation available	Not Significant
	Direct and Indirect Impacts on Sensitive Receptors (Vertebrates) – Littering, Waste Management	Negative	Long-term	Irreversible	Medium	High	Medium	Low	Moderate	Mitigation available	Not Significant
	Direct and Indirect Impacts on Sensitive Receptors (Vertebrates) – Pest Species	Negative	Long-term	Reversible or Irreversible	Low to high	High	Medium	Medium	Moderate	Mitigation available	Not Significant
Avi-Fauna	Improper management of construction activities could disturb breeding birds and damage relevant habitats	Negative	Long-term	Could be irreversible	Low	Medium	Medium	Medium	Minor	Mitigation Available	Not Significant
Bats	Potential impacts on Bats during Construction	Negative	Long-term	Reversible	Low	Low	Medium	Medium	Minor	Mitigation Available	Not Significant
Archaeology	Improper management of construction activities could disturb/damage archaeological remains which could be buried in the ground (if any).	Negative	Short-term	Irreversible	Medium	Low	Low	Rare	Minor	Mitigation Available / Additional Recommendations	Not Significant
Air Quality and Noise	Construction activities will likely result in an increased level of dust, particulate matter and pollutant emissions which in turn will directly impact ambient air quality.	Negative	Short-term	Reversible	Medium	Low	Medium	Medium	Minor	Mitigation Available	Not Significant
	Possible noise emissions to the environment from the construction activities which will likely include the use of machinery and equipment such as generators, hammers, and compressors and other activities	Negative	Short-term	Reversible	Medium	Low	Medium	Medium	Minor	Mitigation Available	Not Significant
Infrastructure and	Water Resources – water requirements of the Project could	Negative	Short-term	Reversible	Low	Low	High	Low	Not significant	Additional	Not

Attribute / Issue	Likely Impact – Planning and Construction Phase	Impact Assessment									
		Nature	Duration	Reversibility	Magnitude	Sensitivity	Likelihood	Extent	Significance	Management Action	Residual Significance
Utilities	entail constraints on the existing resources and users.									Requirements	Significant
	Waste Utilities – it is important to ensure that existing utilities would be able to handle the amount of waste, wastewater and hazardous generated from the Project during the construction phase.	Negative	Short-term	Reversible	Medium	Low	High	Medium	Minor	Additional Requirements	Not Significant
	Civil and Military Aviation – Improper planning and site selection of the Project could impact aircraft safety and/or could potentially interfere with certain electromagnetic transmissions associated with air transport	Negative	Long-term	Reversible	Low	High	Low	Medium	Minor	Mitigation Available	Not Significant
	Telecommunication, and TV & Radio Links – Improper planning and site selection of the Project could potentially interfere with certain electromagnetic transmissions associated with telecommunications, and radio/television systems in the area.	Negative	Short-term	Reversible	Low	Medium	Low	Medium	Minor	Additional Requirements	Not Significant
	Potential impact on nearby wind farms: Inappropriate management of planning activities (e.g. siting of turbines and proper buffer distance) could affect such nearby wind farms	Negative	Long-term	Reversible	Low	Medium	High	High	Minor	Mitigation Available	Not Significant
Occupational Health and Safety	There will be some generic risks to workers health and safety from working on construction sites, as it increases the risk of injury or death due to accidents.	Negative	Short-term	Irreversible	Medium	High	Medium	Low	Moderate	Mitigation Available	Not Significant
Public Health and Safety	Public access of unauthorized personnel to the various Project components (turbines, substation) could result in various public safety hazards.	Negative	Short-term	Irreversible	Medium	Medium	Low	Low	Moderate	Mitigation Available	Not Significant
	Worker influx could result in certain community health, safety and security impacts to include risk of diseases, inappropriate code of conduct by workers towards locals, increase in social vices, etc.	Negative	Short-term	Reversible	Medium	Low	Medium	Medium	Minor	Mitigation Available	Not Significant
	Inappropriate conduct of security personnel towards local communities could result in resentment, distrust and escalation of events	Negative	Short-term	Irreversible	Medium	Medium	Low	Low	Minor	Mitigation Available	Not Significant
Socio-economic	The Project is expected at a minimum to provide job opportunities for local communities. This, to some extent, could contribute to enhancing the living environment for its inhabitants, elevate their standards of living, and bring social and economic prosperity to local communities.	Positive	Not applicable.								

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Table 76: Summary of Anticipated Impacts during Operation

Attribute / Issue	Likely Impact – Operation Phase	Impact Assessment									
		Nature	Duration	Reversibility	Magnitude	Sensitivity	Likelihood	Extent	Significance	Management Action	Residual Significance
Landscape and Visual	Visual impacts concern the turbines themselves (e.g. colour, height, and number of turbines) relating to their interaction with the character of the surrounding landscape.	Could be both Negative or Positive	Long-term	Reversible	Medium	Medium	Medium	High	Minor	Mitigation available	Not Significant
Geology, Hydrology and Hydrogeology	Risk of soil and groundwater contamination during the various operational activities from improper housekeeping activities, spillage of hazardous material, random discharge of waste and wastewater.	Negative	Long-term	Reversible	Medium	Low	Medium	High	Minor	Mitigation available	Not significant
Biodiversity	Indirect Impacts on Sensitive Receptors (Vertebrates) – Disturbance	Negative	Short-term	Reversible	Low	Medium	Medium	Medium	Minor	Mitigation available	Not significant
	Direct Impacts on Sensitive Receptors (Vertebrates) – Vehicle Collisions	Negative	Long-term	Irreversible	Medium to high	Low to High	Medium	Low	Major	Mitigation available	Not significant
	Direct Impacts on Sensitive Receptors (Vertebrates) – Lighting	Negative	Variable	Reversible	Low to Medium	High	Medium	Low	Moderate	Mitigation available	Not significant
	Direct Impacts on Sensitive Receptors (Habitats and Flora) – Non-native Species and Introduced Flora	Negative	Long-term	Irreversible	Low	Medium	Medium	Medium	Minor	Mitigation available	Not significant
	Direct and Indirect Impacts on Sensitive Receptors (Vertebrates) – Pest Species	Negative	Long-term	Reversible or Irreversible	Low to High	High	Medium	Low	Minor to Major	Mitigation Available / Monitoring	Not significant
Avi-Fauna (Birds)	Wind turbines are associated with impacts on birds from risks of strikes and collision on both migratory and resident soaring birds. Such impacts depend on several factors but could affect the population levels of certain species especially those with international/national critical conservation status.	Negative	Long-term	Reversible or Irreversible	High	High	High	Medium	Major	Mitigation available	Moderate
Bats	Potential impacts on Bats during Operation	Negative	Lomng-term	Reversible	Medium	Low	Medium	Medium	Minor	Mitigation available	Not significant
Infrastructure and Utilities	Water Resources – water requirements of the Project could entail constraints on the existing resources and users.	Negative	Long-term	Reversible	Low	Low	High	Low	Not significant	Additional Requirements	Not Significant
	Waste Utilities – it is important to ensure that existing utilities would be able to handle the amount of waste, wastewater and hazardous generated from the Project during the construction phase.	Negative	Long-term	Reversible	Low	Medium	High	Medium	Minor	Additional Requirements	Not Significant
Occupational Health and Safety	There will be some risks to workers health and safety during the operation and maintenance activities of the Project.	Negative	Long-term	Irreversible	Medium	High	Medium	Low	Moderate	Mitigation Available	Minor
Public Health and Safety	Public access of unauthorized personnel to the various Project components (turbines, substation) could result in various public safety hazards.	Negative	Long-term	Irreversible	Medium	Medium	Low	Low	Moderate	Mitigation Available	Minor
	Inappropriate conduct of security personnel towards local communities could result in resentment, distrust and escalation of events	Negative	Long-term	Irreversible	Medium	Medium	Low	Low	Minor	Mitigation Available	Minor

9. ASSESSMENT OF CUMULATIVE IMPACTS

A standalone Cumulative Effects Assessment (CEA) covering biodiversity has been prepared for this Project in accordance with lender requirements. As such, detailed assessment of cumulative impacts is not repeated within this section.

In addition, a Strategic Environmental and Social Assessment – Cumulative Impact Assessment (SESA-CIA) for the Gulf of Suez renewable energy sector is currently under development, with completion expected by the end of 2026. This study is intended to assess cumulative environmental and social sensitivities at a regional level, including large-scale renewable energy development and associated pressures, particularly in relation to biodiversity receptors such as migratory bird species. This study will provide additional regional context to cumulative impact considerations relevant to the Project.

This section provides an assessment of cumulative impacts covering other aspects, mainly based on the outcomes of the 2013 Strategic ESIA. The table below provides the key outcomes of the Strategic ESIA for each attribute, key outcomes of the project-specific ESIA and key additional requirements to be considered.

Table 77: Assessment of Cumulative Impacts

E&S Attributes	Outcomes of Strategic ESIA	Additional Requirements in Strategic ESIA
Landscape and Visual	No concerns reported as the landscape is sparce (desert plains) of sensitive receptors as well as ecological elements.	No additional requirements to be considered
Landscape and Visual	Area is mostly desert landscape (compacted gravel or rocky) and not ecologically sensitive. Very little deterioration expected.	Site-specific mitigation and housekeeping procedures.
Geology, Hydrology, Hydrogeology	▪ Negligible impacts on groundwater and surface water. ▪ Within the NREA Concession area, there are plans to construct service buildings, such as store, control and apartment buildings, of which will be connected to the existing water pipeline and equipped with an appropriate wastewater treatment system (e.g. septic tank with underground seepage and regular sludge collection).	Site-specific mitigation and monitoring requirement.
Biodiversity	▪ No serious impacts on biodiversity anticipated. The landscape is sparce in vegetation.	Site-specific mitigation and monitoring requirement.
Birds (avi-fauna)	▪ As the NREA area is located next to a registered Important Bird Area (IBA), the Gabal el Zeit IBA area, and near or partially in a major flyway area of migrating birds, impacts of wind power utilization on migrating birds were likely to be significant. ▪ The disturbance on the flyway against the heavy wind during spring was determined to be critical.	Site-specific mitigation and monitoring requirement. Cumulative Effects Assessment (CEA) for biodiversity ad birds has been undertaken and is provided in a sperate document. Please refer to CEA for additional details.

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E&S Attributes	Outcomes of Strategic ESIA	Additional Requirements in Strategic ESIA
Archaeology and Cultural Heritage	None reported	Precautionary Principle to be applied and coordination with the Ministry of Antiquities
Air Quality and Noise	▪ Some additional dust will occur locally during construction works; however, it is not anticipated to be critical due to the absence of population or wildlife, that would otherwise be affected. ▪ Similarly for noise, the closest sensitive receptors reported are in Wadi Dara. ▪ Based on the preliminary noise assessment carried out for the Project, no cumulative noise exceedances of the ETSU-R-97 derived limit were predicted during daytime or night-time at any of the NSRs.	Site-specific mitigation and monitoring requirement.
Infrastructure and Utilities	▪ Water supply: Wind farms' water requirement not to affect the overall water supply in the region ▪ Transport: Wind power development is not anticipated to cause traffic bottlenecks in the greater area	▪ Domestic wastewater originating from the construction yard facilities or permanently constructed service buildings shall undergo simplified treatment (septic tank) and be infiltrated to the sandy underground for further natural treatment. ▪ Site-specific mitigation (waste gathering and proper disposal) and monitoring requirement. A co-operation with the Rhas Gharib waste collection system is recommended. ▪ The wind park internal grid shall be made by underground cables. Any wind park, which would be erected on the NREA area, shall be connected to a substation to be built by EEHC/ETC. The interconnections shall be either by underground cable or built according to accepted bird protection guidelines
Occupational Health and Safety	General risks associated to people involved in construction, operation and decommissioning of wind farms.	Adhering to international standards of health and safety guidelines.
Socioeconomics	Few people reside in the immediate surroundings of the NREA area, who may be affected by wind power development. Wind farm construction will create employment.	No additional requirements to be considered

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10. ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

10.1 Institutional Framework and Procedure Arrangements for ESMP Implementation

Generally, two main pillars govern the successful implementation of any Environmental and Social Management Plan (ESMP) as well as the Environmental, Social, Health and Safety Management System (ESHS-MS) for the project that will be developed at a later stage (as discussed in further details in below). These pillars include:

- Proper identification of roles and responsibilities for the entities involved; and
- Effective control of the process.

All management practices are interlinked, and this section describes how these two pillar criteria could be fulfilled, which in turn helps ensure that the overall objectives are met.

Staffing Requirements

Defining roles and responsibilities of the involved entities identifies where and when each entity should be engaged, their degree of involvement, and the tasks expected of the entity. This in turn eliminates any overlap of jurisdiction or authority and ensures proper communication and effective management of ESMP and ESHS-MS components.

The table below identifies the staffing requirements that are expected for the Project. This should be expanded further in the Environment, Health, and safety (EHS) Manual that is required as part of the ESHS-MS (as discussed in further details below). This should include an organisational structure that identifies the lines of authority and roles and responsibilities of all involved entities.

Table 78: Roles and Responsibilities of Entities Involved in ESMP

Project Role	Entity	Responsibilities	Staffing Requirements
Project Owner and Developer	shadwan	▪ Selection of EPC Contractor and Project Operator; ▪ Implement mitigation and monitoring requirements as applicable for such entity as detailed in the ESMP; and ▪ Ensure overall compliance of EPC Contractor and Project Operator with the requirements of the ESMP and ESHS MS.	-Appoint competent HSSE Manager or as part of Third-Party Employer representative (e.g. Owner's Engineer) -Appoint one environmental specialist and one social specialist -Appoint a Community Liaison Officer (CLO)
EPC Contractor	sshadwan	▪ Appoint a competent HSE team. ▪ Implement mitigation and monitoring requirements as detailed in the ESMP and ESHS MS requirements;	For Project nature and duration, this is expected to include at a minimum full-time and onsite HSE Manager and one HSE officer is to be deployed for 50 workers. In addition to recruiting environmental and social specialists among its staff.
Project Operator	TBA	▪ Appoint a competent HSE team. ▪ Implement mitigation and monitoring requirements as detailed in the ESMP and ESHS MS requirements;	For Project nature and duration, this is expected to include HSE Manager (which is required to always be full-time onsite). In addition to recruiting

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			environmental and social specialists among its staff.
EEAA	Granting environmental clearance to the Project	▪ Undertake compliance monitoring	N/A
IESC	TBD	▪ Monitoring on Developer and EPC Contractor to ensure compliance with IFI E&S requirements.	N/A
OE	TBD	▪ Support Developer in implantation of mitigation and monitoring requirements and compliance of EPC Contractor with E&S requirements	Appoint competent HSSE Manager

Training and Awareness

An EHS training plan must be developed and maintained onsite which identifies the type of training that is required for each worker onsite. The plan will ensure that each worker is competent in relation to the tasks to be performed. In addition, signed attendance sheets and training material must be always maintained onsite. This should be completed by the EPC Contractor and Project Operator as applicable.

Training should include the following as applicable and as highlighted in the table that follows.

- Basic visitor HSE induction training
- Worker HSE induction training for all workers onsite to include for example EPC Contractor and subcontractor crew
- Emergency response training for all workers onsite to include for example EPC Contractor and subcontractor crew
- Specialized training: there are other specific training requirements that must be adhered to and which are related to specific topics as applicable. This includes for example specific training for Occupational Health and Safety (OHS) issues such as working at height, electrical works, etc.
- Toolbox Talks (TBT): regular TBT meetings must be undertaken with for example EPC Contractors respective crews and subcontractor crews. Topics and frequency are developed and distributed regularly.

Table 79: Training Elements

Training	EPC Contractor	Project Operator
Basic visitor HSE induction training	✓	✓
Worker HSE induction training	✓	✓
Emergency response training	✓	✓
Specialized training	✓	✓
Tool Box Talks (TBT)	✓	✓

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Inspection and Monitoring

EHS inspection and monitoring must be undertaken to ensure compliance of involved entities with the mitigation and monitoring requirements as detailed in the ESMP and ESHS-MS requirements. This should be completed by the Developer, EPC Contractor, and Project Operator as applicable.

Inspection and monitoring should include the following as applicable and as highlighted in the table that follows.

- Daily HSE inspection and monitoring at the site and preparation of a daily observation report stating therein the corrective measures on observed safety deficiencies, unsafe acts and conditions.
- Weekly site inspections to be carried out using the weekly site inspection checklists template based on requirements of the ESMP and EHSS-MS
- HSE Audits to be undertaken by Developer on EPC Contractor to ensure compliance with ESMP requirement and EHSS-MS. HSE audits should be undertaken monthly during the construction phase and quarterly during the operation phase

Table 80: Inspection and Monitoring Elements

Inspection and Monitoring	Developer	EPC Contractor	Project Operator
Daily HSE Inspection and Monitoring		✓	
Weekly Site Inspections		✓	✓
HSE Audits	✓		

Meetings

Regular EHS meeting must be undertaken to discuss EHS performance onsite, outstanding issues, key issues of concern and other as applicable. Signed attendance sheets and Minutes of Meeting (MoM) must be maintained onsite at all times. This should be completed by the Developer, EPC Contractor, and Project Operator as applicable.

Meetings should include the following as applicable and as highlighted in the table that follows.

- Weekly HSE meetings
- Monthly HSE meeting
- Quarterly management HSE reviews

Table 81: Required Meetings

Meetings	Developer	EPC Contractor	Project Operator
Weekly HSE and E&S staff Meetings		✓	✓
Monthly HSE and E&S staff Meeting	✓	✓	✓
Quarterly Management HSE and C-ESMP reviews	✓	✓	✓

Reporting

HSE reporting will be required to summarize the following:

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- Progress in implementing the ESMP and EHSS MS plans as required
- Findings of the monitoring programs, with emphasis on any breaches of the control standards, action levels or standards of general site management
- Outstanding incident report forms
- Relevant changes or possible changes in legislation, regulations and international practices
- Reporting on Key Performance Indicators (KPI).
- Grievances
- Security incidents

Reporting should be submitted to the Developer as applicable by the relevant entities as identified below.

Table 82: Reports

Reporting	EPC Contractor	Project Operator
Reporting	Monthly	Monthly

10.2 Environmental, Health, Safety and Social Management System (EHSS-MS)

The ESIA is considered a key document in assessing and managing environmental and social risks related to the Project. The key output of the ESIA is the ESMP which aims to provide high level mitigations and requirements for managing the environmental and social risks anticipated from the Project.

Throughout the Project's construction and operation phase an Environmental, Health, Safety and Social Management System (EHSS-MS) must be implemented by all relevant parties (i.e. Developer, EPC Contractor and Project Operator). The EHSS-MS must be project and site specific and must build on and take into account the requirements of the ESMP. The development and implementation of an EHSS-MS is considered a key requirement under IFC PS1, in addition the EHSS-MS must also be in line with the IFC PSs.

Summarised below is the overall framework, structure and key requirements for the EHSS-MS for the key entities involved in the Project.

Developer

- HSE Manual that should include: (i) HSE Policy; (ii) Human Resources Policy and Procedures; (iii) HSE Organisational Structure and Responsibilities; and (iv) HSE Training, Monitoring and Reporting Plan
- Stakeholder Engagement Plan;
- Community Grievance Mechanism
- Active Turbine Management Plan (ATMP)

EPC Contractor

- HSE Manual (in line with Developer) that should include: (i) HSE Policy; (ii) Human Resources Policy and Procedures; (iii) HSE Organizational Structure and Responsibilities; (iv) HSE Training, Monitoring

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and Reporting Plan

- Water Management Plan
- Waste Management Plan
- Air Quality and Noise Management Plan
- Traffic and Transport Management Plan
- Occupational Health and Safety Plan
- Emergency Preparedness and Response Plan
- Security Management Plan
- Chance Find Procedures
- Worker Grievance Mechanism
- Employment and Procurement Management Plan
- Worker Influx and Accommodation Plan
- Labour and Working Conditions Management Plan
- Biodiversity management plan for construction phase

All of these plans will be prepared among the C-ESMP which will be submitted to AfDB to approve prior to starting of mobilization/construction phases.

Project Operator

- HSE Manual (in line with Developer) that should include: (i) HSE Policy; (ii) Human Resources Policy and Procedures; (iii) HSE Organizational Structure and Responsibilities; (iv) HSE Training, Monitoring and Reporting Plan
- Biodiversity management plan for operational phase
- Water Management Plan
- Waste Management Plan
- Occupational Health and Safety Plan
- Emergency Preparedness and Response Plan
- Security Management Plan
- Employment and Procurement Management Plan
- Labour and Working Conditions Management Plan

All of these plans are considered part of the project ESMS during both construction and operation phases

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10.3 Compilation of Environmental and Social Management Plan (ESMP)

All the ESMPs during planning, construction and operation phases (Tables 79, 80, and 81) are designed and will be implemented in full compliance to AfDB ISS 2023 terms and conditions, EEAA prevailing laws and decrees, new labour law of Egypt 14/2025 and relevant local laws and regulations.

The tables below present the ESMP for the: (i) planning and construction, and (ii) operation phase respectively and which include the following:

- The E&S attribute (e.g. air quality) that is likely to be impacted;
- A summary of the potential E&S impact and/or likely issue;
- The identified management measures that aim to eliminate and/or reduce the potential impact to acceptable levels. Management measures include mitigation actions, further requirements, additional studies, etc.;
- Monitoring actions to ensure that the identified mitigation measures are implemented. Monitoring actions include inspections, review of reports/plans, reporting, etc.;
- The frequency for implementing the monitoring actions, which include once, continuously throughout the construction/operation period (depending on the mitigation measure identified this could include daily, weekly, or monthly), or upon occurrence of a certain issue;
- Parameters and location of monitoring actions as identified and applicable; and
- Responsible entity for implementing the mitigation measures and monitoring actions identified.
- The identified costs during construction are approximately EUR 290,000, mainly related to biodiversity actions. Other minor costs include EGP 35,000–40,000 for one-time office/miscellaneous requirements, EGP 20,000–40,000/month for wastewater and hazardous waste contractors, and EGP 50,000–60,000 per monitoring round for air quality and noise monitoring. Other costs are not yet identified and include items marked as “Contractor’s cost,” including housekeeping, site restoration, erosion controls, OHS plans, security measures, etc. Costs for operation will be included in the operator budget.

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Table 83: ESMP for the Planning Phase

Environmental Attribute	Potential Impact	Management Action (mitigations, additional requirements, additional studies, compensation measures, etc.)	Type of Action	Monitoring & Reporting Action	Parameters to be monitored / location	Frequency	Responsible Entity	Estimated cost
Infrastructure and Utilities	Inappropriate management of planning activities and site locations (e.g. siting of turbines) and construction activities (e.g. excavations) could disturb such aviation practices.	Establish coordination with NREA to ensure that the clearance that has been provided by the Ministry of Defence for the area includes in particular approvals from civil and military aviation entities. In addition, based on the that adhere to any specific navigational safety requirements (e.g. navigational lights, blade paintings, etc.)	Mitigation	Submit formal communication letters from the relevant entities.	Not applicable	Once before commencement of construction	E&S staff of the EPC Contractor under the supervision of the developer's PIU/E&S staff	Contractor's cost
	Construction activities could damage/disturb underground communication cables (if present within the area), while rotating turbines during operation could disrupt Line of Sight (LoS) connections between telecommunication transmission towers.	Establish coordination via NREA with NTRC to provide information on the at least six (6) months prior to the commencement of construction (to include location and specifications of turbines in specific) and include any specific requirements to be considered as part of the detailed design to include setback distances if required for telecommunication, infrastructure (e.g. from LoS connections)	Mitigation	Submit formal communication letters from the relevant entities.	Not applicable	Once before commencement of construction	E&S staff of the EPC Contractor under the supervision of the developer's PIU/E&S staff	Contractor's cost

Table 84: ESMP for the Construction Phase (to be reflected in the C-ESMP)

Environmental Attribute	Potential Impact	Management Action (mitigations, additional requirements, additional studies, compensation measures, etc.)	Type of Action	Monitoring & Reporting Action	Parameters to be monitored / location	Frequency	Responsible Entity	Estimated cost
Landscape and Visual	Visual and landscape impact due to presence of typical elements of a construction site such as equipment and machinery (e.g. cranes, excavators, etc.).	Ensure proper general housekeeping and personnel management measures are implemented which could include: (i) ensure the construction site is left in an orderly state at the end of each work day; (ii) to the greatest extent possible construction machinery, equipment, and vehicles that are not in use should be removed in a timely manner and kept in locations to reduce visual impacts to the area; (iii) to ensure proper storage, collection, and disposal of waste streams generated.	Mitigation	Visual inspections	At construction active areas relevant for period of construction	Daily HSE monitoring Weekly site inspections Monthly ESHS reporting	E&S staff of the EPC Contractor under the supervision of the developer's PIU/E&S staff	Contractor's cost
		Implementation of restoration and rehabilitation measures to restore the site's visual quality through, for example, re-contouring the land and removing temporary structures (e.g. batching plant).	Mitigation	Visual Inspections				Contractor's cost
Geology, Hydrology and Hydrogeology	Impacts from Flood Risks on the Project Site	(i) Construct a 1.0 m high concrete fence around critical facilities, particularly wind turbine generators and other infrastructure located within drainage mainstreams, to protect against surface runoff and unexpected flood events during extreme rainfall. (ii) Install wind turbines on elevated terrain away from drainage mainstreams where practicable to reduce flood risk; where avoidance is not possible, implement additional flood resilience measures including reinforcement of turbine foundations, elevation of turbine bases above projected flood levels, and construction of reinforced concrete fencing around turbine bases with a minimum height of 1.5 m. (iii) Design access roads crossing wide and shallow drainage lines to allow surface water flow, including installation of simple cement culverts with a maximum diameter of 1.0 m at identified crossing points to prevent obstruction and damage to road infrastructure. (iv) Bury electricity cables underground at a depth of approximately 1.0 m and provide adequate insulation and protection against subsurface water infiltration. (v) Develop and implement a Project specific Flood Management Plan, in addition to local authority early warning systems, defining rainfall monitoring, emergency response procedures, evacuation arrangements, protection of critical infrastructure, and contingency measures during flood events.	Mitigation	Visual inspections	Not applicable	Once before commencement of construction	E&S staff of the EPC Contractor under the supervision of the developer's PIU/E&S staff	Contractor's cost
	Risk of soil and groundwater contamination during the various construction activities from improper housekeeping activities (e.g. spillage of hazardous material, random discharge of waste and wastewater to surrounding environment, etc.). Solid waste management	Coordinate with Ras Gharib City Council for the collection of solid waste from the site to the municipal approved dumpsite (the closest dumpsite being Ras Gharib Public Dumpsite) or for recycling (as discussed in further details below);	Mitigation	Submit Contract	Not applicable	Once before commencement of construction	EPC Contractor	5,000-10,000 EGP
		Prohibit fly-dumping of any solid waste to the land	Mitigation	Visual Inspections	At construction active areas relevant for period of construction	Daily HSE monitoring Weekly site inspections Monthly ESHS reporting		Contractor's cost
		Distribute appropriate number of properly contained litter bins and containers properly marked as "Municipal Waste."						15,000 EGP (cost of the bins)
		Adhere to waste hierarchy principles with associated mitigation measures to include prevent, minimize, reuse, recycle, recover and dispose.						Contractor's cost
		Distribute a sufficient number of properly contained containers clearly marked as "Construction Waste" for the dumping and disposal of construction waste.						15,000 EGP (cost of the bins)
		Recycling measures must be implemented as follows: (i) separation and disposal of recyclables in a separate container						Contractor's cost

Environmental Attribute	Potential Impact	Management Action (mitigations, additional requirements, additional studies, compensation measures, etc.)	Type of Action	Monitoring & Reporting Action	Parameters to be monitored / location	Frequency	Responsible Entity	Estimated cost
		(cardboard, paper, glass, metal, etc.); and (ii) separation and disposal of non-recyclable materials in a separate container (e.g. food waste). Each container must be clearly marked. In addition, ways to reduce construction waste must be undertaken by reusing materials (for example through recycling of concrete for road base coarse). This is a key requirement given that with the Project's workforce there could be huge amounts of waste that could be recycled.						
		Always implement proper housekeeping practices on the construction site.						Contractor's cost
		Maintain records and manifests that indicate volume of waste generated onsite, collected by contractor, and disposed of at the landfill. The numbers within the records are to be consistent to ensure no illegal dumping at the site or other areas.	Mitigation	Submit manifests	Not applicable	Throughout entire construction period		Contractor's cost
	Risk of soil and groundwater contamination during the various construction activities from improper housekeeping activities (e.g. spillage of hazardous material, random discharge of waste and wastewater to surrounding environment, etc.). Wastewater management	Coordinate with Ras Gharib Water Company to hire a private contractor for the collection of wastewaters from the site to the closest WWTP (being Ras Gharib WWTP);	Mitigation	Submit contract	Not applicable	Once before commencement of construction	E&S staff of the EPC Contractor under the supervision of the developer's PIU/E&S staff	10,000-20,000 EGP monthly for private contractor
		Ensure that constructed septic tanks during construction are well contained and impermeable to prevent leakage of wastewater into soil.	Mitigation	Submit detailed design				Contractor's cost
		Prohibit illegal disposal of wastewater to the land.	Mitigation	Visual Inspections	At construction active areas relevant for period of construction	Daily HSE monitoring Weekly site inspections Monthly ESHS reporting		Contractor's cost
		Ensure that septic tanks are emptied and collected by wastewater contractor at appropriate intervals to avoid overflowing.						Contractor's cost
		Maintain records and manifests that indicate volume of wastewater generated onsite, collected by contractor, and disposed of at the WWTP. The numbers within the records are to be consistent to ensure no illegal discharge at the site or other areas.	Mitigation	Submit manifests	Not applicable	Throughout construction period		Contractor's cost
	Risk of soil and groundwater contamination during the various construction activities from improper housekeeping activities (e.g. spillage of hazardous material, random discharge of waste and wastewater to surrounding environment, etc.). Hazardous waste management	Hire approved private contractor for the collection of hazardous waste from the site to the approved hazardous waste disposal facilities.	Mitigation	Submit contract	Not applicable	Once before commencement of construction	E&S staff of the EPC Contractor under the supervision of the developer's PIU/E&S staff	10,000-20,000 EGP monthly for private contractor
		Ensure that hazardous waste is disposed in a dedicated area that is enclosed, of hard surface, with proper signage and suitable containers as per hazardous waste classifications and that they are labelled for each type of hazardous waste.	Mitigation	Visual Inspections Maintain a spill/incident register documenting the date, location, material spilled, estimated quantity, cause of spill, response and clean-up actions undertaken, contaminated waste generated, disposal route, corrective actions and close-out status	At construction active areas relevant for period of construction Not applicable	Daily HSE monitoring Weekly site inspections Monthly ESHS reporting Throughout construction period		Contractor's cost
		Ensure hazardous waste storage area is equipped with spill kit, fire extinguisher and anti-spillage trays and a hazardous waste inventory is available.						Contractor's cost
		Prohibit illegal disposal of hazardous waste to the land.						Contractor's cost
		Possibly contaminated water (e.g., runoff from paved areas) must be drained into appropriate facilities (such as sumps and pits). Contaminated drainage must be orderly disposed of as hazardous waste.						Contractor's cost
		Ensure that containers are emptied and collected by the contractor at appropriate intervals to prevent overflowing.						Contractor's cost

Environmental Attribute	Potential Impact	Management Action (mitigations, additional requirements, additional studies, compensation measures, etc.)	Type of Action	Monitoring & Reporting Action	Parameters to be monitored / location	Frequency	Responsible Entity	Estimated cost
		Prepare and implement a Spill Prevention and Response Procedure. The procedure shall define spill prevention measures, immediate spill response actions, notification and reporting requirements, roles and responsibilities, required spill response materials, waste handling requirements and corrective actions		Submit manifests				Contractor's cost
		In the event of any spill or leakage of fuel, oil, lubricant, chemicals, wastewater, hazardous material or hazardous waste, the spill shall be immediately stopped at source where safe to do so, contained using appropriate spill kits, absorbents, bunding or sand, and cleaned up without delay. Contaminated absorbents, soil, sand, containers, rags, PPE or other clean-up materials shall be collected, labelled, temporarily stored in the designated hazardous waste storage area, and disposed of through a licensed hazardous waste contractor;						
		Where a spill may have resulted in soil contamination, the affected area shall be inspected and, where required, contaminated soil shall be excavated and managed as hazardous waste.						
		Relevant workers and contractors involved in fuel handling, chemical storage, hazardous waste management, maintenance, refuelling and emergency response shall receive training on spill prevention and response. Spill kits shall be regularly inspected and replenished following use						
		Maintain records and manifests that indicate volume of hazardous waste generated onsite, collected by contractor, and disposed of at the hazardous waste disposal facilities.						Contractor's cost
	Risk of soil and groundwater contamination during the various construction activities from improper housekeeping activities (e.g. spillage of hazardous material, random discharge of waste and wastewater to surrounding environment, etc.). Hazardous material management	Ensure that hazardous materials are stored in an area that is of hard impermeable surface, flame-proof, accessible to authorized personnel only, locked when not in use, and prevents incompatible materials from coming in contact with one another.	Mitigation	Visual Inspections	At construction active areas relevant for period of construction	Daily HSE monitoring Weekly site inspections Monthly ESHS reporting	E&S staff of the EPC Contractor under the supervision of the developer's PIU/E&S staff	Contractor's cost: 400-600 EGP/drum
		Maintain a register of all hazardous materials used and accompanying MSDS must present at all times. Spilled material should be tracked and accounted for.						Contractor's cost
		Incorporate dripping pans at machinery, equipment, and areas that are prone to contamination by leakage of hazardous materials (such as oil, fuel, etc.)						300-500 EGP / dripping pan depending on the material and size
		Maintenance activities and other activities that pose a risk for hazardous material spillage (such as refuelling) must take place at a suitable location (hard surface) with appropriate measures for trapping spilled material						Contractor's cost
		Ensure that a minimum of 1,000 liters of general-purpose spill absorbent is available at hazardous material storage facility. Appropriate absorbents include zeolite, clay, peat and other products manufactured for this purpose.						Contractor's cost
		In the event of any spill or leakage of hazardous materials, including fuel, oil, lubricants, chemicals or paints, the spill shall be immediately stopped at source where safe to do so, contained using appropriate spill kits, absorbents, drip trays, bunding or sand, and cleaned up without delay, irrespective of whether the spill occurs on hardstanding, paved surfaces, compacted ground or soil. Spill residues, used absorbents, contaminated sand, rags,						Contractor's cost

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Environmental Attribute	Potential Impact	Management Action (mitigations, additional requirements, additional studies, compensation measures, etc.)	Type of Action	Monitoring & Reporting Action	Parameters to be monitored / location	Frequency	Responsible Entity	Estimated cost
		PPE and other clean-up materials shall be collected, labelled, temporarily stored in the designated hazardous waste storage area and disposed of through a licensed hazardous waste contractor. Where the spill has affected soil, the contaminated soil shall be excavated, where required, and managed as hazardous waste. Spills shall not be washed down to land, drainage channels or any uncontained area.						
	Construction activities could disturb soil, and result in erosion and runoff could result in siltation of surface water (during rain events)	Existing natural flows will be maintained where possible as part of the drainage system design and any change to the natural/pre-development surface water conditions within the site to be minimized to the extent possible.	Mitigation	Visual Inspections	At construction active areas relevant for period of construction	Daily HSE monitoring Weekly site inspections Monthly ESHS reporting	E&S staff of the EPC Contractor under the supervision of the developer's PIU/E&S staff	Contractor's cost
		Scheduling to avoid construction activities during heavy rainfall periods (i.e., during the wet season) to the extent practical. In addition, this will include modifying or suspending activities during extreme rainfall and high winds to the extent practical.						Contractor's cost
		Salvage and store topsoil and subsoil before areas are excavated, with topsoil stripped and stockpiled separately.						Contractor's cost
		Place clear markers indicating stockpiling area of excavated materials to restrict equipment and personnel movement, thus limiting the physical disturbance to land and soils in adjacent areas.						Contractor's cost
		Erect erosion control barriers around work sites during site preparation and construction to prevent silt runoff where applicable. This could include but not limited to silt fences, gravel bag berms, fiber rolls, or other similar applications.						Around 50 EGP/m² for basic materials (textiles); 200 EGP/m² or more for specialized barriers such as gabions or riprap
		Return surfaces disturbed during construction to their original (or better) condition to the greatest extent possible.						Contractor's cost
		In terms of road design, all Project roads shall be appropriately graded and shaped, with access road gradients limited to reduce runoff-induced erosion. Effective short-term measures for slope stabilization, sediment control, and subsidence control shall be implemented, particularly during construction. On steep road sections, transverse drains (grips) shall be constructed, where appropriate, to divert surface runoff from the road surface into swales or roadside drains. In addition, the alignment, length, and width of both on-site and off-site roads shall be optimized to minimize soil disturbance and reduce the need for cut-and-fill activities, with suitable runoff and erosion control features incorporated into the road design.						Contractor's cost
Biodiversity	Potential impacts of Habitat Loss, Fragmentation and Degradation	All site workers will undertake a Project induction before working on site. The induction will include a comprehensive biodiversity element where the baseline ecological value and sensitivity of the site will be discussed and relevant receptors highlighted to the site staff.	Mitigation	Submit Induction Training Records Submit TBT records	At construction active areas	Throughout construction period	Developer/EPC Contractor	1000 EUR
		Prior to construction works (habitat clearance, levelling or any other works), working areas will be clearly demarked so that site workers fully understand the working area. Encroachment into	Mitigation	Visual Inspections	At construction active areas relevant for period of construction	Daily HSE monitoring		500 EUR

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Environmental Attribute	Potential Impact	Management Action (mitigations, additional requirements, additional studies, compensation measures, etc.)	Type of Action	Monitoring & Reporting Action	Parameters to be monitored / location	Frequency	Responsible Entity	Estimated cost
		areas outside of agreed working areas will be prohibited and working areas will be subject to regular check by the EPC Contractor to check enforcement of working areas.				Weekly site inspections Monthly ESHS reporting		
		On completion of phased construction works the EPC Contractor will be responsible for habitat rehabilitation works in all areas that have been subject to temporary disturbance.	Mitigation	Visual Inspections	At construction active areas	Once after completing construction		Contractor's cost
		An area will be enhanced using appropriate, native planting in suitable parts of the Project Area, this will ensure that no net loss of habitat as a result of the works. Any areas of additional planting will be monitored as part of the biodiversity monitoring program and any species which do not establish will be replaced.	Mitigation	Visual Inspections	At construction active areas	Once after completing construction		Contractor's cost
	Direct Impacts on sensitive receptors (Habitats and Flora) - Non-native Species and Introduced Flora	Prior to construction works, working areas will be subject to a botanical walkover survey to identify areas of non-native or invasive species. Any specimens will be clearly marked, and the area avoided and if this is not possible the specimen will be removed and disposed of. Survey needs to be systematic with the method and results submitted to management/lenders.	Mitigation	Visual Inspections / site walkovers	Once before commencement of construction	Daily HSE monitoring Weekly site inspections Monthly ESHS reporting		5000 EUR
		Areas of soil removed from proximity of these species will be stored separately and not used further on the site. It will be collected from the site and disposed of or used as deep sub-soil fill to reduce the chance of seed germinating.			At construction active areas relevant for period of construction			Contractor's cost
		Areas of non-native or invasive species will be mapped and a programme of mechanical control will be completed over the construction period in order to remove these species from the AoI. Chemical control will be avoided as far as possible however, if necessary, will be used but in accordance with national and international guidelines as well as those applied by the Lenders (e.g. specific risk assessment and Lender agreement prior to use).						2500 EUR
		Regular site walkover surveys throughout the construction period by a suitably qualified botanist to check to the presence and abundance of non-native or invasive species.	Mitigation	Visual Inspections	At construction active areas relevant for period of construction	Throughout construction period		5000 EUR
		Adequate wheel-washing facilities to be constructed at the entrance to the site and any wastewater will be disposed of correctly to prevent spread of undesirable species.	Mitigation	Visual Inspections	Once before commencement of construction	Once before commencement of construction		Contractor's cost
		Soil imports to be taken from local quarries or borrow pits to avoid importing non-native and invasive species from further afield.	Mitigation	Submission of pre-construction survey report	At construction active areas relevant for period of construction	Throughout construction period		Contractor's cost
		On the above measures, botanist needed to oversee/provide training to EPC for this.	Mitigation	Appointemnet contract	Once before commencement of construction	Throughout construction period		Contractor's cost
	Direct impacts on Sensitive Receptors (Nubian Ibex and Dorcas Gazelle)	(ii) Where construction activities are required during the birthing period, the Project Ecologist shall undertake pre works checks in suitable habitats to identify the presence of females with calves or pregnant females and communicate locations to the EPC Contractor to establish appropriate working buffers noting that this should be based on recommended buffer distances provided by qualified ecologist with experience of the species. (iii) Survey	Mitigation	Submission of Biodiversity Management Plan	At construction active areas relevant for period of construction	Throughout construction period		10,000 EUR

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Environmental Attribute	Potential Impact	Management Action (mitigations, additional requirements, additional studies, compensation measures, etc.)	Type of Action	Monitoring & Reporting Action	Parameters to be monitored / location	Frequency	Responsible Entity	Estimated cost
		methods should be appropriate to locate the species if it is present and therefore designed by qualified and experienced ecologist with experience of large terrestrial mammal surveys. All survey methods and results should be reported to management/lenders. . (iv) If females with calves less than one week old or pregnant females are recorded, no construction activities shall occur within appropriate area of the identified area until cessation of breeding activity is confirmed by the Project Ecologist or Vertebrate Ecologist. (v) Surveys of suitable habitat within aappropraite areas of active work areas shall be undertaken in April and May during each construction year, and areas where females are recorded shall be avoided until birthing is completed and calves are at least one week old. (vi) Construction activities shall only resume once all animals have naturally moved away from the construction area to suitable habitat, and no active displacement or herding of animals shall be permitted. (vii) The Project Ecologist shall coordinate with other ecological survey teams to confirm records of Dorcas Gazelle and Nubian Ibex presence and ensure that pre-construction surveys target areas where these species have been previously recorded. (viii) Records of mammal fatalities on Project roads shall be collected and entered into the Project fatality database, with results reported as supplementary information within the six monthly PCFM monitoring reports.						
	Direct Impacts on Sensitive Receptors (Vertebrates) – Site Clearance and Earthworks	All site workers will undertake a Project induction before working on site. The induction will include a comprehensive biodiversity element where the baseline ecological value and sensitivity of the receptors within the AoI will be discussed and relevant receptors highlighted to the site staff.	Mitigation	Submit Induction Training Records Submit TBT records	At construction active areas	Throughout construction period		1000 EUR
		Prior to construction works, working areas will be clearly demarked (using appropriate temporary fencing (e.g. orange netting attached to wooden posts)) so that site workers fully understand the working area. Encroachment into areas outside of agreed working areas will be prohibited and working areas will be subject to regular check by the EPC Ecologist to check enforcement of working areas.	Mitigation	Visual Inspections Submission of pre-clearance and translocation report Visual Inspections on exclusion zones	At construction active areas relevant for period of construction	Once before commencement of construction		1000 EUR
		Pre-construction surveys for sensitive species (i.e. those qualifying Priority Biodiversity Features) of herpetofauna will take place. The locations of known/active burrows used by Egyptian Spiny-tailed Lizard will be marked throughout the Project Area and appropriate buffers around each burrow established. This will require an Egyptian Spiny-tailed Lizard relocation plan that covers pre-clearance surveys, relocation procedure and post relocation monitoring. This will be conducted and aligned with GIIP established for this species in GoS and managed on site by a qualified reptile specialist and vet.	Mitigation					82000 EUR
		Prior to the start of construction suitable sites for the release of relocated Egyptian Spiny-tailed Lizards will be identified and mapped. A suitable translocation receptor site must; (i) Preferably be within the project wide boundary but certainly be within 10 km of the Project site. (ii) Contain appropriate vegetation (both for food and cover). (iii) Have suitable soil types to allow animals to dig and create new burrows. (iv) Not already be close to carrying capacity for this species. (v) Not within	Mitigation					25000 EUR

Environmental Attribute	Potential Impact	Management Action (mitigations, additional requirements, additional studies, compensation measures, etc.)	Type of Action	Monitoring & Reporting Action	Parameters to be monitored / location	Frequency	Responsible Entity	Estimated cost
		another existing or proposed development site (or where there is likely to be a proposed site).						
		Capture and movement of Spiny-tailed Lizards will only be completed as a last resort. All works will aim to be completed at least 100m from active burrows. Locations where burrows are present up to 200m of construction will be monitored throughout the construction period and if significant negative impacts (i.e., abandonment of burrows or increased mortality) are observed the remaining burrows in closest proximity will be excavated and the animals captured and translocated to holding areas in accordance with the below protocols for the duration of the construction window in that location.	Mitigation					90000 EUR
		Detailed design for the final infrastructure layout will take into account the results of the pre-construction surveys and Project infrastructure will be sited to avoid the identified burrows. Where this is not possible, or where fresh burrows are identified at the commencement of clearance works, these burrows will be excavated by hand and the animals captured and translocated, details of this are provided below.	Mitigation					Included above
		If areas suitable for translocation exist within the Project Area these will be prioritized as this minimizes the impacts of transporting animals away from the Project site.	Mitigation					Included above
		Prior to work in an area containing Spiny-tailed Lizard burrows any remaining burrows within 100m of proposed works will be re-checked by the Ecologist using an endoscope and if empty dug out and destroyed. If any animal is found back in the working areas the burrow will be dug out carefully by hand and the animal captured and placed in a secure box before taking to a cool location ready for translocation to the receptor site. Once the lizard is removed from the burrow the hole will be collapsed and made unsuitable for future use.	Mitigation	Daily HSE monitoring Weekly site inspections Monthly ESHS reporting				Included above
		Where possible animals will be moved to existing, but inactive, burrow sites – as long as the site is still suitable for use, with nearby food and cover plants etc.	Mitigation		At construction active areas relevant for period of construction	Upon occurrence		Included above
		All translocated Egyptian Spiny-tailed Lizards shall be soft-released to enhance post-release survival. Each individual shall be placed within a dedicated mesh enclosure located in suitable habitat, with a minimum size of 2 m × 2 m and covered to provide shade and protection from aerial predators. A starter burrow shall be created within each enclosure using an auger of approximately 20 cm diameter to a depth of around 30 cm to provide initial shelter. Supplementary feeding shall be provided during the acclimation period, and the enclosure shall be removed after approximately seven days to allow the lizards to disperse and forage naturally.						15000 EUR
		Working areas should avoid trees / shrubs as these are likely, due to their sporadic distribution across the AoI to be of importance to breeding birds (e.g. passerines, raptors).	Mitigation	Daily HSE monitoring Weekly site inspections Monthly ESHS reporting	At construction active areas relevant for period of construction	Throughout the construction period		2000 EUR
		Capture and movement of Egyptian Spiny-tailed Lizards will only be completed as a last resort. All works will aim to be completed at least 100m from active burrows. Locations where burrows are	Mitigation	Daily HSE monitoring Weekly site inspections	At construction active areas relevant for period of construction	Upon occurrence		Included above

Environmental Attribute	Potential Impact	Management Action (mitigations, additional requirements, additional studies, compensation measures, etc.)	Type of Action	Monitoring & Reporting Action	Parameters to be monitored / location	Frequency	Responsible Entity	Estimated cost
		present up to 200m of construction will be monitored throughout the construction period and if significant negative impacts (i.e., abandonment of burrows or increased mortality) are observed the remaining burrows in closest proximity will be excavated and the animals captured and translocated to holding areas in accordance with the below protocols for the duration of the construction window in that location.		Monthly ESHS reporting				
		A post-relocation report shall be prepared following completion of the relocation activities. The report shall document the survey dates and timing of capture and release, prevailing weather conditions during the survey and relocation efforts, locations of captured individuals, and the number of individuals captured during each relocation event. It shall also include a breakdown of individuals by age class and sex (juveniles, mature males, and mature females), details of the release sites used for each relocation effort, the number of males and females released at each site, and records of any mortalities occurring during the relocation process.	Mitigation	Submission of post-relocation report	At construction active areas relevant for period of construction	Post-relocation period		Included above
	Direct Impacts on Sensitive Receptors (Vertebrates) – Vehicle Collisions	Appropriate speed limits will be enforced on internal road network and working areas (20 km/h).	Mitigation	Visual Inspections	At construction active areas relevant for period of construction	Daily HSE monitoring Weekly site inspections Monthly ESHS reporting		Contractor's cost
		Regular signage will be installed along the site access roads and internal roads informing all drivers of the speed limit						Contractor's cost
		A ban of driving at night will be enforced and if absolutely necessary the speed limit will be reduced to 15kph	Mitigation	Visual Inspections	At construction active areas relevant for period of construction	Daily HSE monitoring Weekly site inspections Monthly ESHS reporting	E&S staff of the EPC Contractor under the supervision of the developer's PIU/E&S staff	Contractor's cost
		Ban against off-road driving at all times of the day						Contractor's cost
		Regular checks of the road for carcasses and if found these will be moved to at last 50m from the road to reduce the likelihood of hitting scavengers, including birds of prey.						Contractor's cost
		A chance find procedure will be developed by the EPC Contractors so that all workers report any road collisions so that any such incident can be investigated in full.	Mitigation	Submission of chance find procedure	At construction active areas relevant for period of construction	Once prior commencement of construction		Contractor's cost
	Direct Impacts on Sensitive Receptors (Habitats, Vertebrates) – Poaching, Collection etc.	The Project will enforce strict controls on hunting, gathering, poaching and otherwise disturbing flora and fauna within the Project AoI. Any breaches of this ban will be strictly enforced, and any workers found in breach of this control measure will be subject to disciplinary procedures.	Mitigation	Visual Inspections	At construction active areas relevant for period of construction	Daily HSE monitoring Weekly site inspections Monthly ESHS reporting		Contractor's cost
		The ban on hunting etc. will be included in the site induction along with discussions about the sanctions for breaches of this control measure.	Mitigation	Submit Induction Training Records Submit TBT records	At construction active areas	Throughout construction period		Contractor's cost
		A chance find procedure will be implemented should any site worker find a wild animal, especially one that has become a nuisance (e.g. scavenger in the works camp, presence of small mammals in worker accommodation, presence of snake or	Mitigation	Submission of report	Not applicable	Throughout construction period	E&S staff of the EPC Contractor under the	Contractor's cost

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Environmental Attribute	Potential Impact	Management Action (mitigations, additional requirements, additional studies, compensation measures, etc.)	Type of Action	Monitoring & Reporting Action	Parameters to be monitored / location	Frequency	Responsible Entity	Estimated cost
		scorpion on the works site) and the EPC Ecologist will arrange for an appropriately qualified person to capture and relocate. Where scavengers have been identified within the works site additional housekeeping measures may be required.					supervision of the developer's PIU/E&S staff	
	Direct and Indirect Impacts on Sensitive Receptors (Vertebrates) – Disturbance	Site wide induction to include information regarding disturbance of ecological receptors.	Mitigation	Submit Induction Training Records Submit TBT records	At construction active areas	Throughout construction period		Contractor's cost
		Chance find procedure to report sightings of potentially sensitive receptor and investigation of any such sightings by the EPC Contractor in order that additional buffer areas can be agreed, where necessary.	Mitigation	Submission of report	Not applicable	Throughout construction period		Contractor's cost
	Direct and Indirect Impacts on Sensitive Receptors – Reduced Air Quality / Dust	Where necessary tracks will be damped down to reduce the risk of dust. Damping down will also include areas adjacent to roads. These measures will be implemented where necessary.	Mitigation	Visual Inspections	At construction active areas relevant for period of construction	Daily HSE monitoring Weekly site inspections Monthly ESHS reporting		Contractor's cost
		Vehicles will be properly maintained to reduce emissions.						Contractor's cost
		Emissions from the batching plant will be monitored in line with control plans to minimize air pollution.						Contractor's cost
	Direct Impacts on Sensitive Receptors (Vertebrates) – Noise	Vehicles will be properly maintained to reduce noise emissions.	Mitigation	Visual Inspections	At construction active areas relevant for period of construction	Daily HSE monitoring Weekly site inspections Monthly ESHS reporting		Contractor's cost
		Use of available technology and management practices with construction methodologies to reduce noise and vibration.						Contractor's cost
		Regular monitoring of noise and vibration levels within works compounds and works areas and applying corrective measures as necessary. Quarterly noise monitoring will be undertaken.	Mitigation	Noise Monitoring Program & Submission of report	At applicable areas	Quarterly		Contractor's cost
	Direct Impacts on Sensitive Receptors (Vertebrates) – Lighting	Limit the amount of lighting, especially within the wider AoI (e.g. at turbine construction sites). Night-time working is not anticipated and will certainly not be a regular occurrence. This will be achieved by ensuring that night-time working is only undertaken with appropriate justification, e.g. emergency works	Mitigation	Visual Inspections	At construction active areas relevant for period of construction	Daily HSE monitoring Weekly site inspections Monthly ESHS reporting		Contractor's cost
		Where lighting is required within worker compounds, site offices, etc. Ensure that any lighting is shielded and protected to reduce light-spill and glare. Low intensity lighting should also be used, where possible, to further reduce light spill.						Contractor's cost
		For external security lights PIR trigger units will be used and these should be timed to automatically switch off after five minutes.						Contractor's cost
		No lighting will be installed along the access roads.						Contractor's cost
	Direct and Indirect Impacts on Sensitive Receptors (Vertebrates) – Littering, Waste Management	Waste Management will be included in the Site Induction so that all site workers understand their responsibilities of maintaining a clean and tidy site. Where possible all materials than can be recycled will be.	Mitigation	Submit Induction Training Records Submit TBT records	At construction active areas	Throughout construction period		Contractor's cost
		Zero tolerance to littering on the works site and within the worker compound. This zero-tolerance approach should also be applied to smoking and workers must use appropriate smoking areas (supplied with 'butt bins') at all times, even when on construction sites. Litter must not be thrown out of vehicle windows when	Mitigation	Visual Inspections	At construction active areas relevant for period of construction	Daily HSE monitoring Weekly site inspections		Contractor's cost

Environmental Attribute	Potential Impact	Management Action (mitigations, additional requirements, additional studies, compensation measures, etc.)	Type of Action	Monitoring & Reporting Action	Parameters to be monitored / location	Frequency	Responsible Entity	Estimated cost
		driving to and from or around the site.						
		Daily inspections of working areas and worker compound should be completed, and corrective actions applied, where necessary.				Monthly ESHS reporting		Contractor's cost
	Direct and Indirect Impacts on Sensitive Receptors (Vertebrates) – Pest Species	Where pest species are identified the EPC Contractor / Ecologist will be notified and an appropriate course of action taken. For small mammal pest's live traps will be used, in order to reduce the risk of by-catch. Poison baits should be avoided, unless it can be certain that non-target species will be affected, and any such use should be in accordance with national and international best practice. If poison baits are to be used it must be certain that any poisoned animal cannot move out on to the wider AoI to reduce the risk of natural predators eating poisoned animals.	Mitigation	Visual Inspections	At construction active areas relevant for period of construction	Daily HSE Monitoring Weekly site inspections Monthly ESHS reporting		Contractor's cost
Avifauna	Direct and indirect impacts during site preparation activities	Implementation of proper housekeeping measures to reduce impacts including: - Restrict activities exclusively to the allocated construction areas, including movement of workers and vehicles to allocated roads within the site, prohibiting off-roading to minimize disturbances. - Ban hunting of birds on site at any time and under any condition to anyone, especially workers. - Implement measures, preventing bird attraction to the site. This includes measures such as prohibiting littering, dumping, and ensuring waste streams are disposed appropriately. - Avoid unnecessary elevated noise levels at all times. In addition, apply adequate noise abatement measures. This could include the use of well-maintained mufflers and suppressants for high noise generating equipment and machinery. Develop a regular maintenance schedule of vehicles, machinery, and equipment for early detection of issues to avoid unnecessary elevated noise level, etc.	Mitigation	Construction Schedule Plan Submission of an animal handling protocol, either dead or alive	At construction active areas relevant for period of construction	At commencement of construction activities Continuous	EPC Contractor / Developer	Contractor's cost
		Reduced speed limits inside the footprint to avoid road kills and dust.						Contractor's cost
		Report any incidental finding and killing of wildlife. Develop a protocol to report dispose of any deaths and injured wildlife or animals recorded onsite.						Contractor's cost
	Direct and indirect impact on resident and breeding birds from risks of collision and electrocution.	▪ A complete additional survey comprising the entire breeding cycle of the Golden Eagle species would be necessary to properly assess the potential impact of this and other similar projects planned near the mountains and suitable cliffs. This monitoring should be developed with experts on the species, and GPS tagging highly recommended to save time and improve budgets. This monitoring could be shared by other developers in a similar situation. ▪ A species-specific additional study with experts for the observed Scooty Eagles (apart of the normal migration monitoring) on the potential breeding of the species in the Project area, and others in the vicinity should be completed PRIOR TO COMENCEMENT OF CONSTRUCTION. ▪ Should the additional assessments indicate highly sensitive areas for resident species, then additional mitigation and monitoring measures will be required. This could include the use of Automatic Detection Cameras (ADC) or additional resources. The most feasible option considering biodiversity and commercial criteria should be determined based on the	Additional Study	Submission of survey reports	Entire project footprint	Before commencement of operation and after agreeing with other developers for collective monitoring campaign		50,000 EUR

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Environmental Attribute	Potential Impact	Management Action (mitigations, additional requirements, additional studies, compensation measures, etc.)	Type of Action	Monitoring & Reporting Action	Parameters to be monitored / location	Frequency	Responsible Entity	Estimated cost
		outcomes of the additional assessment in compliance with the experts' opinion of the two affected species. ▪ IF CONFIRMED, and depending on the distance of the works to potential breeding sites, works will be restricted to be performed out of the breeding seasons. A buffer of 2 km will apply to any nest (occupied or not by the eagles /colony for the falcons. Restrictions to apply after detailed study for both species, at least for one complete breeding season						
Archaeology and Cultural Heritage	Improper management could potentially disturb or damage potential archaeological remains on the surface as well as some of which could be buried in the ground (if any).	During excavation activities, the Ministry of Tourism and Antiquities must be notified to check if they will provide any observers to oversee the process and ensure that no underground archaeological remains of importance are unearthed and/or disturbed.	Mitigation	Visual Inspections	At construction active areas relevant for period of construction	Daily HSE monitoring Weekly site inspections Monthly ESHS reporting		Contractor's cost
		There is a chance that potential archaeological remains in the ground might be discovered. It is expected that appropriate measures for such chance find procedures are implemented. Those mainly require that construction activities be halted and the area fenced along with proper signage, while immediately notifying the Ministry of Tourism and Antiquities/Red Sea and Suez Antiquities Inspection Office. No additional work will be allowed before the Ministry/Inspection Office assesses the found potential archaeological site and grants a clearance to resume the work. Construction activities can continue at other parts of the site if no potential archaeological remains were found. If found, same procedures above apply.	Mitigation	Submission of chance-find procedure				Contractor's cost
Air Quality and Noise	Construction activities will likely result in an increased level of dust and particulate matter emissions as well as noise emission to surrounding environment which in turn will directly impact ambient air quality. This could entail indirect impacts on workers' health and safety.	If dust or pollutant emissions were found to be excessive due to construction activities, the source of such emissions should be identified and adequate control measures must be implemented;	Mitigation	Dust and Noise monitoring program	This will include at least one (1) monitoring point which represents activities undertaken. The monitoring should include TSP, PM10 and PM2.5 and noise levels. Results should be compared with national limits or IFC standards as included within the General EHS Guidelines or EU limits, whichever is more stringent	Quarterly	E&S staff of the EPC Contractor under the supervision of the developer's PIU/E&S staff	50,000 – 60,000 LE/ monitoring round
		Comply with the Occupational Safety and Health Administration (OSHA) requirements and the Egyptian Codes	Mitigation	Dust and Noise monitoring report				Contractor's cost
		Basic dust control and suppression measures will be applied throughout the construction period to minimize dust generation and dispersion. These measures will include regular watering of access roads and active work areas, careful planning and scheduling of dust-generating activities to avoid their simultaneous occurrence where possible, and proper management of stockpiles and excavated materials through practices such as watering, containment, covering, or bundling. In addition, all trucks transporting aggregates and fine materials will be adequately covered, for example using tarpaulins, and a maximum speed limit of 15 km/h will be strictly enforced for construction vehicles within the site.	Mitigation	Visual Inspections				Contractor's cost
		Develop a regular inspection and scheduled maintenance program for vehicles, machinery, and equipment to be used throughout the construction phase for early detection of issue to avoid unnecessary pollutant and noise emissions.	Mitigation	Visual Inspections	At construction active areas relevant for period of construction	Daily HSE monitoring Weekly site inspections Monthly ESHS reporting		Contractor's cost
		Based on inspections and visual monitoring undertaken, if noise levels were found to be excessive from construction activities, the source of such excessive noise levels should be identified and adequate control measures must be implemented;						Contractor's cost
		Apply adequate general noise suppressing measures. This could include the use of well-maintained mufflers and noise						Contractor's cost

Environmental Attribute	Potential Impact	Management Action (mitigations, additional requirements, additional studies, compensation measures, etc.)	Type of Action	Monitoring & Reporting Action	Parameters to be monitored / location	Frequency	Responsible Entity	Estimated cost
		suppressants for high noise generating equipment and machinery, developing a regular maintenance schedule of all vehicles, machinery, and equipment for early detection of issues to avoid unnecessary elevated noise level, etc.						
Infrastructure and Utilities	Waste handling requirements generated from the Project could entail constraints on existing users	Coordinate with the RSWWC and Sanitation Authority in Ras Gharib and obtain list of authorized contractors for collection of wastewaters from the site to the Ras Gharib WWTP.	Additional Requirement	Submit formal communication letters from the relevant entities.	Not applicable	Once before commencement of construction	E&S staff of the EPC Contractor under the supervision of the developer's PIU/E&S staff	Contractor's cost
		Coordinate with the RSWWC and Sanitation Authority in Ras Gharib to hire a competent private contractor for the collection of solid waste from the site to the Ras Gharib Public Dumpsite.						Contractor's cost
		Coordinate with Environmental Management at RSWWC and Sanitation Authority in Ras Gharib to obtain list of authorized contractors for collection of hazardous waste from the site to the closest approved facility for final disposal.						Contractor's cost
	Water requirements of the Project could entail constraints on existing users such as local communities or industrial establishments.	Coordinate with the Ras Gharib Water Company to sector the water requirements of the Project.	Additional Requirement	Submit formal communication letters from the relevant entities.	Not applicable	Once before commencement of construction		Contractor's cost
	Inappropriate management of planning activities and site locations (e.g. siting of turbines) and construction activities (e.g. excavations) could disturb such aviation practices.	Establish coordination with NREA to ensure that the clearance that has been provided by the Ministry of Defence for the area includes in particular approvals from civil and military aviation entities. In addition, based on the that adhere to any specific navigational safety requirements (e.g. navigational lights, blade paintings, etc.	Mitigation	Submit formal communication letters from the relevant entities.	Not applicable	Once before commencement of construction		Contractor's cost
	Construction activities could damage/disturb underground communication cables (if present within the area), while rotating turbines during operation could disrupt Line of Sight (LoS) connections between telecommunication transmission towers.	Establish coordination via NREA with NTRC to provide information on the at least six (6) months prior to the commencement of construction (to include location and specifications of turbines in specific) and include any specific requirements to be considered as part of the detailed design to include setback distances if required for telecommunication, infrastructure (e.g. from LoS connections)	Mitigation	Submit formal communication letters from the relevant entities.	Not applicable	Once before commencement of construction	E&S staff of the EPC Contractor under the supervision of the developer's PIU/E&S staff	Contractor's cost
Occupational Health and Safety and Worker Accommodation	Generic occupational health and safety risks to workers, as working onsite increases the risk of injury or death due to accidents	Prepare an Occupational Health and Safety Plan (OHSP). Adopt and implement the recommendations/provisions of the OHSP which includes: (i) Risk assessment and job safety planning procedure, (ii) PTW system procedure, (iii) LOTO procedure, (iv) Site control occupational health and safety procedure to include requirements for personal Protective Equipment (PPE), requirements for site risks (fall protection, powered and hand tools, compressed air / gas cylinders, fire prevention, hot works, electrical works, material handling, machinery use and safety, excavation/concrete works/civil works, confined space activity, storage, medical requirements, and communicable disease management),., (v) Occupational health and safety signage requirements, (vii) Identification of OHS training requirements, (viii) Identification of monitoring and reporting requirements, (ix) Identification of roles and responsibilities, and (x) Identification of measures to reduce the risk of COVID-19 exposure and transmission.	Mitigation	Submit OHSP	Not applicable	Once before commencement of construction	E&S staff of the EPC Contractor under the supervision of the developer's PIU/E&S staff	Contractor's cost

Environmental Attribute	Potential Impact	Management Action (mitigations, additional requirements, additional studies, compensation measures, etc.)	Type of Action	Monitoring & Reporting Action	Parameters to be monitored / location	Frequency	Responsible Entity	Estimated cost
		Prepare an Emergency Preparedness and Response Plan (EPRP) which should include: (i) communication and management process, (ii) emergency procedure and an onsite notification process (iii) emergency response procedure, (iv) emergency control measures to include but not limited to fire, accidents, spillage, traffic accidents, natural disasters and other. In addition, of particular importance within the Project area are also risks related to remoteness of the Project site (e.g. in case of a medical emergency), risks from sand and salt storms including windy conditions, risks from extreme hot and cold weather and conditions and low/high temperatures, (v) requirements for emergency kits, (vi) onsite assembly points, (vii) emergency signs, (viii) training requirements, (ix) monitoring and reporting requirements, and (x) roles and responsibilities of the personnel involved in implementation of the plan		Submit EPRP				Contractor's cost
		Prepare and establish and implement a worker grievance mechanism to ensure that all worker complaints are properly received, documented, addressed, and closed out in a timely and transparent manner. The mechanism will provide multiple channels for submitting grievances, including anonymous options, ensure formal registration and assignment of a case handler, define clear timelines for acknowledgement, response, resolution, and monitoring, and require documented verification and reporting upon grievance close-out.		Submit Worker grievance mechanism				Contractor's cost
		Follow the Workers' accommodation: process and standards" (EBRD/IFC Guidance Note, 2009). In case there is an accommodation onsite. The document provides guidance notes on general living facilities, room facilities, medical facilities, management of accommodation units, etc.		Submit Worker Accommodation document				Contractor's cost
Public Health and Safety	Trespassing of unauthorized personnel into construction active areas could result in health and safety impacts	Develop a Security Risk Assessment to identify and manage potential security risks. The assessment will ensure that each turbine is fitted with locked doors to prevent unauthorized access, that the substation area is fully enclosed with concrete fencing to restrict entry, and that trained onsite security guards are present across the Project site at all times to safeguard assets and prevent trespassing. In addition, clear and visible safety signage will be installed on turbines and at the substation, providing warnings on public safety hazards and emergency contact information, with signs presented in both pictorial and written formats to ensure they are understood by all individuals, including those who are unable to read.	Mitigation	Submit Security Risk Assessment	Not applicable	Once before commencement of construction	E&S staff of the EPC Contractor under the supervision of the developer's PIU/E&S staff	Contractor's cost
	Influx of workers to the area could result in community impacts such as pressure on infrastructure elements, increase in social vices, risk of spread of disease, and other.	All workers must be subject to a preliminary medical examination before commencement of any job tasks in accordance with local applicable requirements. In addition, routine medical examination for workers (bi-annually) must be undertaken. Such medical examinations must be undertaken at certified centres. Copies of medical examination results of all workers must be retained onsite.	Mitigation	Submission of medical examination records	Not applicable	Once before commencement of construction	E&S staff of the EPC Contractor under the supervision of the developer's PIU/E&S staff	Contractor's cost
		Ensureand maintain hygienic conditions onsite at all times specifically related to toilet and washing facilities, eating areas, etc.		Visual Inspections				Contractor's cost
		Develop a code of conduct for workers which takes into account appropriate behaviour by workers at all times, religious customs, traditional cultures and social norms in the area. In addition, it		Submission of signed code of conduct and associated disciplinary				Contractor's cost

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Environmental Attribute	Potential Impact	Management Action (mitigations, additional requirements, additional studies, compensation measures, etc.)	Type of Action	Monitoring & Reporting Action	Parameters to be monitored / location	Frequency	Responsible Entity	Estimated cost
		must include specifically requirements for social vices including gender-based violence, sexual harassment, alcoholism, drug abuse, etc.		measures				
		Induction training and awareness raising sessions on risks associated to the most common contagious diseases (e.g. influenza virus), communicable diseases, general measures for hygiene, code of conduct expected to be implemented and other as appropriate		Submit induction training modules and Toolbox Talks on hygiene and code of conduct.				Contractor's cost
	Inappropriate management of security issues and incidents by security personnel towards local communities (e.g. overreaction, mistreatment, use of excessive force) could result in potential for conflict, resentment, distrust and escalation of events.	Develop a Security Management Plan (SMP) plan to identify appropriate measures for hiring, rules of conduct, training, equipping, and monitoring of security personnel to control and manage such issues. The plan must adhere to: (i) IFC PS 4 (Community Health, Safety and Security); and (ii) EBRD PR 2 (Labour and Working Conditions), all of which identify requirements for security personnel. This includes in specific requirements to ensure security personnel are guided by the Voluntary Principles on Security and Human Rights in terms of hiring, rules of conduct, training, equipping and monitoring of such personnel. They also require reasonable inquiries that those providing security measures are not implicated in past abuses, will ensure they are trained adequately in the use of force (and firearms if applicable) and appropriate conduct towards the workers and the local community. Force should only be used when strictly necessary, and to an extent proportional to the threat.	Mitigation	Submit SMP	Not applicable	Once before commencement of construction	EPC Contractor	Contractor's cost
Socioeconomics	It is expected to have positive impacts through direct and indirect employment and local economic stimulation. Additional indirect benefits are expected through local procurement and increased demand for local services and businesses. Although detailed employment figures are not yet available, the Developer is committed to prioritising local communities where feasible.	Develop a Local Recruitment Procedure to prioritize employment opportunities for local communities, including Bedouin groups, by identifying targeted numbers of skilled and unskilled positions such as fresh graduate engineers, technicians, and labourers from the surrounding area. The Procedure will define clear and transparent mechanisms for announcing vacancies and implementing a fair, non-discriminatory selection process that ensures equal opportunities, including for females. It will also assess the potential for joint implementation with other wind farm developers in the area to maximize local employment benefits, with local hiring priorities formally reflected in the EPC Contract and all subsequent subcontracts.	Additional Requirement	Submit Local Recruitment Procedure	Not applicable	Once before commencement of construction	Developer / EPC Contractor Developer	Contractor's cost
		Develop a Local Procurement Procedure to prioritize procurement opportunities for local communities, including Bedouin groups, by identifying eligible local subcontractors and locally sourced goods and services such as supplies, equipment, cleaning, and support services. The Procedure will define clear and transparent mechanisms for announcing procurement opportunities and establish a fair, competitive, and non-discriminatory selection process that ensures equal opportunities for all qualified local suppliers. It will also assess the potential for joint implementation with other wind farm developers in the area to enhance local participation and efficiency, with local procurement priorities formally embedded in the EPC Contract and all subsequent		Submit Local Procurement Procedure				Contractor's cost
		Implement a social responsibility program which aims to benefit the local communities to the greatest extent possible. In this case, a structured approach must be developed which must identify priority development projects which could benefit local		Submit Social Responsibility Program				Contractor's cost

Environmental Attribute	Potential Impact	Management Action (mitigations, additional requirements, additional studies, compensation measures, etc.)	Type of Action	Monitoring & Reporting Action	Parameters to be monitored / location	Frequency	Responsible Entity	Estimated cost
		communities (e.g. based on a needs assessment if available). Based on that the social responsibility program can prioritize projects for local communities based on available budget, vision, timeline for implementation and other factors.						

Table 85: ESMP for the Operation Phase

Environmental Attribute	Potential Impact	Management Action (mitigations, additional requirements, additional studies, compensation measures, etc.)	Type of Action	Monitoring & Reporting Action	Parameters to be monitored / location	Frequency	Responsible Entity	Estimated cost
Landscape and Visual	Impacts related to interaction of wind turbines within the overall landscape and visual character of the area including any potential sensitive visual receptors.	Coordinate with the Traffic and Transport Authority, install clear and informative signage in Arabic and English language at Hurghada – Cairo Highway and on the road leaving the highway and into Wadi Dara Village to alert drivers of the wind farm ahead and provide guidance on safe driving practices.	Mitigation	Visual Inspections	Not applicable	Throughout entire operational period	E&S staff of the Project Operator	To be included in operator budget
Geology, Hydrology, and Hydrogeology	Risk of soil and groundwater contamination during the various construction activities from improper housekeeping activities (e.g. spillage of hazardous material, random discharge of waste and wastewater to surrounding environment, etc.). Solid waste management	Coordinate with Ras Gharib City Council for the collection of solid waste from the site to the municipal approved dumpsite (the closest dumpsite being Ras Gharib Public Dumpsite) or for recycling (as discussed in further details below);	Mitigation	Submit contract	Not applicable	Once before commencement of operation	Project Operator	To be included in operator budget
		Prohibit fly-dumping of any solid waste to the land	Mitigation	Visual Inspections	Entire project footprint	Daily HSE monitoring Weekly site inspections Monthly ESHS reporting		To be included in operator budget
		Distribute appropriate number of properly contained litter bins and containers properly marked as "Municipal Waste"						To be included in operator budget
		Adhere to waste hierarchy principles with associated mitigation measures to include prevent, minimize, reuse, recycle, recover and dispose						To be included in operator budget
		Implement proper housekeeping practices onsite at all times						To be included in operator budget
		Maintain records and manifests that indicate volume of waste generated onsite, collected by contractor, and disposed of at the landfill. The numbers within the records are to be consistent to ensure no illegal dumping at the site or other areas	Mitigation	Submit manifests	Not applicable	Throughout operational period		To be included in operator budget
	Risk of soil and groundwater contamination during the various construction activities from improper housekeeping activities (e.g. spillage of hazardous material, random discharge of waste and wastewater to surrounding environment, etc.). Wastewater management	Coordinate with Ras Gharib Water Company to hire a private contractor for the collection of wastewater from the site to the closest WWTP (being Ras Gharib WWTP);	Mitigation	Submit contract	Not applicable	Once before commencement of operation		To be included in operator budget
		Maintain records and manifests that indicate volume of wastewater generated onsite, collected by contractor, and disposed of at the WWTP. The numbers within the records are to be consistent to ensure no illegal discharge at the site or other areas	Mitigation	Submit manifests	Not applicable	Throughout operational period		To be included in operator budget
		Prohibit illegal disposal of wastewater to the land	Mitigation	Visual Inspections	Entire project footprint	Daily HSE monitoring Weekly site inspections Monthly ESHS reporting		To be included in operator budget
		Ensure that septic tanks are emptied and collected by wastewater contractor at appropriate intervals to avoid overflowing.						To be included in operator budget
	Risk of soil and groundwater contamination during the various construction activities from improper housekeeping activities (e.g. spillage	Coordinate and hire a private contractor for the collection of hazardous waste from the site to the approved hazardous waste disposal facilities	Mitigation	Submit contract	Not applicable	Once before commencement of operation		To be included in operator budget
		Ensure that hazardous waste is disposed in a dedicated area that is enclosed; roofed and of hard surface; with proper signage and suitable containers as per hazardous waste classifications and that they are labelled for each type of hazardous waste	Mitigation	Visual Inspections	Entire project footprint	Daily HSE monitoring Weekly site inspections		To be included in operator budget
		Ensure hazardous waste storage area is equipped with spill kit, fire						To be included

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Environmental Attribute	Potential Impact	Management Action (mitigations, additional requirements, additional studies, compensation measures, etc.)	Type of Action	Monitoring & Reporting Action	Parameters to be monitored / location	Frequency	Responsible Entity	Estimated cost
	of hazardous material, random discharge of waste and wastewater to surrounding environment, etc.). Hazardous waste management	extinguisher and anti-spillage trays and a hazardous waste inventory is available				Monthly ESHS reporting		in operator budget
		Prohibit illegal disposal of hazardous waste to the land						To be included in operator budget
		Possibly contaminated water (e.g. runoff from paved areas) must be drained into appropriate facilities (such as sumps and pits). Contaminated drainage must be orderly disposed of as hazardous waste						To be included in operator budget
		Ensure that containers are emptied and collected by the contractor at appropriate intervals to prevent overflowing						To be included in operator budget
		Prepare and implement a Spill Prevention and Response Procedure. The procedure shall define spill prevention measures, immediate spill response actions, notification and reporting requirements, roles and responsibilities, required spill response materials, waste handling requirements and corrective actions						
		In the event of any spill or leakage of fuel, oil, lubricant, chemicals, wastewater, hazardous material or hazardous waste, the spill shall be immediately stopped at source where safe to do so, contained using appropriate spill kits, absorbents, bunding or sand, and cleaned up without delay. Contaminated absorbents, soil, sand, containers, rags, PPE or other clean-up materials shall be collected, labelled, temporarily stored in the designated hazardous waste storage area, and disposed of through a licensed hazardous waste contractor;						
		Where a spill may have resulted in soil contamination, the affected area shall be inspected and, where required, contaminated soil shall be excavated and managed as hazardous waste.						
		Maintain records and manifests that indicate volume of hazardous waste generated onsite, collected by contractor, and disposed of at the hazardous waste disposal facilities. The numbers within the records are to be consistent to ensure no illegal discharge at the site or other areas						To be included in operator budget
	Risk of soil and groundwater contamination during the various construction activities from improper housekeeping activities (e.g. spillage of hazardous material, random discharge of waste and wastewater to surrounding environment, etc.). Hazardous Material Management	Ensure that hazardous materials are stored in proper areas and in a location where they cannot reach the land in case of accidental spillage. This includes storage facilities that are of hard impermeable surface, with a hard roof, flame-proof, accessible to authorized personnel only, locked when not in use, and prevents incompatible materials from coming in contact with one another.	Mitigation	Visual Inspections	Entire project footprint	Daily HSE monitoring Weekly site inspections Monthly ESHS reporting		To be included in operator budget
		Maintain a register of all hazardous materials used and accompanying Material Safety Data Sheet (MSDS) must present at all times. Spilled material should be tracked and accounted for						To be included in operator budget
		Incorporate dripping pans at machinery, equipment, and areas that are prone to contamination by leakage of hazardous materials (such as oil, fuel, etc.)						To be included in operator budget
		Maintenance of all equipment and machinery used onsite. Maintenance activities and other activities that pose a risk for hazardous material spillage (such as refueling) must take place at a suitable location (hard surface) with appropriate measures for trapping spilled material						To be included in operator budget

Environmental Attribute	Potential Impact	Management Action (mitigations, additional requirements, additional studies, compensation measures, etc.)	Type of Action	Monitoring & Reporting Action	Parameters to be monitored / location	Frequency	Responsible Entity	Estimated cost
		Ensure that a minimum of 1,000 liters of general-purpose spill absorbent is available at hazardous material storage facility. Appropriate absorbents include zeolite, clay, peat and other products manufactured for this purpose						To be included in operator budget
		In the event of any spill or leakage of hazardous materials, including fuel, oil, lubricants, chemicals or paints, the spill shall be immediately stopped at source where safe to do so, contained using appropriate spill kits, absorbents, drip trays, bunding or sand, and cleaned up without delay, irrespective of whether the spill occurs on hardstanding, paved surfaces, compacted ground or soil. Spill residues, used absorbents, contaminated sand, rags, PPE and other clean-up materials shall be collected, labelled, temporarily stored in the designated hazardous waste storage area and disposed of through a licensed hazardous waste contractor. Where the spill has affected soil, the contaminated soil shall be excavated, where required, and managed as hazardous waste. Spills shall not be washed down to land, drainage channels or any uncontained area.						To be included in operator budget
Biodiversity	Indirect Impacts on Sensitive Receptors (Vertebrates) – Disturbance	Speed limits of 20 kph will be enforced	Mitigation	Visual Inspections	Entire project footprint	Daily HSE monitoring Weekly site inspections Monthly ESHS reporting	Project Operator	To be included in operator budget
		Sensitive species are to be included in the site induction for all operational staff where additional control measures will be discussed including allowing animals to move around the site, not chasing after them in vehicles or approaching them on foot	Mitigation	Submit Induction training record				To be included in operator budget
	Direct Impacts on Sensitive Receptors (Vertebrates) – Vehicle Collisions	Speed limits of 20 kph will be enforced by the O&M Contractor	Mitigation	Visual Inspections	Entire project footprint	Daily HSE monitoring Weekly site inspections Monthly ESHS reporting		To be included in operator budget
		Regular signage will be installed along the site access roads and internal roads informing all drivers of the speed limit.						To be included in operator budget
		The site entrance will be staffed and any visitors or locals using the site roads will be informed of the speed limits and that there are regular checks of vehicle speeds.						To be included in operator budget
		A ban on driving at night will be enforced and if absolutely necessary the speed limit will be reduced to 15kph						To be included in operator budget
		Ban against off-road driving at all times of the day, and if necessary, the works area will be subject to a walkover by the Project Ecologist.						To be included in operator budget
		Regular checks of the road for carcasses and if found these will be moved to at last 50m from the road to reduce the likelihood of hitting scavengers, including birds of prey.						To be included in operator budget
		A chance find procedure will be developed by the O&M Contractors so that all workers report any road collisions so that any such incident can be investigated in full and included in ongoing mortality monitoring at the site.						To be included in operator budget
	Direct Impacts on Sensitive Receptors (Vertebrates) – Lighting	Site-wide lighting is not being implemented so any lighting impacts during operation will be very limited. Night-time working is not anticipated and will certainly not be a regular occurrence.	Mitigation	Visual Inspections	Entire project footprint	Daily HSE monitoring Weekly site inspections		To be included in operator budget
		Where lighting is required within worker compounds, site offices etc. ensure that any lighting is shielded and protected to reduce light-spill and glare. Low intensity lighting should also be used, where possible,						To be included in operator budget

Environmental Attribute	Potential Impact	Management Action (mitigations, additional requirements, additional studies, compensation measures, etc.)	Type of Action	Monitoring & Reporting Action	Parameters to be monitored / location	Frequency	Responsible Entity	Estimated cost
		to further reduce light spill.				Monthly ESHS reporting		
		For external security lights PIR trigger units should be used and these should be timed to automatically switch off after five minutes.						To be included in operator budget
		No lighting will be installed along access road						To be included in operator budget
	Direct Impacts on Sensitive Receptors (Habitats and Flora) – Non-native Species and Introduced Flora	Post-construction monitoring will be completed across the AoI to record the presence and distribution of non-native and invasive plant species and a programme of mechanical control will be completed over the operational period to remove these species from the AoI. Chemical control will be avoided however, if necessary, will be used but in accordance with national and international guidelines and will also be subject to risk assessment and approval from the Lenders. The programme of control will continue until the species are absent from the Project AoI.	Mitigation	Visual Inspections	Entire project footprint	Daily HSE monitoring Weekly site inspections Monthly ESHS reporting		To be included in operator budget
		A programme of regular monitoring will be completed with surveys completed in Years 1, 2, 5, 10, 15 to survey for the presence of non-native and / or invasive species and relevant control of these species will be completed, where necessary	Mitigation	Submission of survey report	Entire project footprint	Years 1, 2, 5, 10, 15		To be included in operator budget
	Direct and Indirect Impacts on Sensitive Receptors (Vertebrates) – Pest Species	Where pest species are identified, the O&M Contractor / Ecologist will be notified, and an appropriate course of action taken. For small mammal pest's live traps will be used, to reduce the risk of by-catch. Poison baits should be avoided, unless it can be certain that non-target species will be affected, and any such use should be in accordance with national and international best practice. If poison baits are to be used it must be certain that any poisoned animal cannot move out on to the wider AoI to reduce the risk of natural predators eating poisoned animals.	Mitigation	Visual Inspections	Entire project footprint	Daily HSE monitoring Weekly site inspections Monthly ESHS reporting		To be included in operator budget
Avifauna	Direct and indirect collision impact on birds from risks of collision and electrocution for any kind of bird.	(i) Apply site specific turbine design and layout requirements to reduce avifauna collision risk, including avoidance of continuous turbine lighting, use of the minimum number of intermittent flashing lights in accordance with civil aviation requirements, compliance with minimum turbine spacing of 2.5 times rotor diameter and 7 times rotor diameter between turbine rows, and implementation of upfront mitigation measures including observer led Shut Down on Demand based on migration intensity and CRM results, subject to regulatory approval. (iii) Design and implement an Active Turbine Management Plan during operation in line with Good International Industry Practice, including bird monitoring and observer led shutdown on demand during migration seasons, with continuous daily monitoring during spring migration from 20 February to 15 May and autumn migration from 10 August to 15 November, in accordance with the RCREEE ATMP protocol and Technical Committee guidance. This should ensure continuous observer coverage of turbines and buffer areas, adequate buffer distances to allow timely turbine shutdown, deployment of trained observers working in pairs and shifts, effective communication between observers and shutdown operators, and periodic review of shutdown protocols in coordination with regional projects and best practice. (iv) Undertake targeted monitoring and mitigation measures for	Mitigation	(i) Conduct regular visual inspections and design compliance checks to confirm implementation of approved turbine lighting, layout, and spacing requirements, with records maintained by the Project Environmental Team. (ii) Maintain logs of Shut Down on Demand events and bird observations, and include summaries within periodic avifauna monitoring and environmental compliance reports. (iii) Implement visual bird monitoring during	Entire project footprint	Daily HSE monitoring and visual inspections; weekly site inspections; monthly ESHS reporting; daily avifauna monitoring during migration seasons; six monthly and annual biodiversity monitoring reporting.	Project Operator	To be included in operator budget

Environmental Attribute	Potential Impact	Management Action (mitigations, additional requirements, additional studies, compensation measures, etc.)	Type of Action	Monitoring & Reporting Action	Parameters to be monitored / location	Frequency	Responsible Entity	Estimated cost
		resident Golden Eagle, including cliff nesting raptor monitoring during the breeding season, assessment of breeding and fledgling success, and implementation of additional studies such as satellite tracking where required to identify foraging areas and inform year round mitigation, with the potential for year round shutdown on demand if necessary to achieve no net loss of the breeding pair. (v) Design and implement a Post Construction Fatality Monitoring program during operation to assess vertebrate mortality and the effectiveness of mitigation measures, with fatality rate estimates reported every six months by migration season, annual CRM updates, comparison against ESIA predictions, and application of adaptive management measures where higher than predicted mortality is recorded. (vi) Implement a chance find procedure for vertebrate carcasses during operation, requiring site personnel to report findings to the Project Ecologist, and remove prey species carcasses from roads and on site areas to reduce the attraction of scavenging birds.		migration seasons in accordance with the approved Active Turbine Management Plan, with monitoring results summarized in seasonal monitoring reports. (iv) Undertake targeted visual monitoring of resident raptor activity during the breeding season, and document observations and findings in dedicated raptor monitoring reports. (v) Conduct Post Construction Fatality Monitoring surveys during operation, record carcass findings, and report results within six monthly and annual environmental monitoring reports. (vi) Record all chance finds of vertebrate carcasses by site personnel and report findings to the Project Ecologist, with outcomes documented in monitoring records and included in periodic reporting.				
Infrastructure and Utilities	Waste handling requirements generated from the Project could entail constraints on existing users	Coordinate with the RSWWC and Sanitation Authority in Ras Gharib and obtain list of authorized contractors for collection of wastewaters from the site to the Ras Gharib WWTP.	Additional Requirement	Submit formal communication letters from the relevant entities.	Not applicable	Once before commencement of operation	Project Operator	To be included in operator budget
		Coordinate with the RSWWC and Sanitation Authority in Ras Gharib to hire a competent private contractor for the collection of solid waste from the site to the Ras Gharib Public Dumpsite.						To be included in operator budget
		Coordinate with Environmental Management at RSWWC and Sanitation Authority in Ras Gharib to obtain list of authorized contractors for collection of hazardous waste from the site to the closest approved facility for final disposal.						To be included in operator budget

Environmental Attribute	Potential Impact	Management Action (mitigations, additional requirements, additional studies, compensation measures, etc.)	Type of Action	Monitoring & Reporting Action	Parameters to be monitored / location	Frequency	Responsible Entity	Estimated cost
	Water requirements of the Project could entail constraints on existing users such as local communities or industrial establishments.	Coordinate with the Ras Gharib Water Company to sector the water requirements of the Project.	Additional Requirement	Submit formal communication letters from the relevant entities.	Not applicable	Once before commencement of operation		To be included in operator budget
	Inappropriate management of planning activities (e.g. siting of turbines and proper buffer distance) could affect such nearby wind farms.	Further follow up/communication with NREA to ensure if buffer distance of the Project from other nearby wind farm projects is considered sufficient and appropriate from a technical perspective	Mitigation	Submit formal communication letters from the relevant entities.	Not applicable	Once before commencement of operation		To be included in operator budget
Occupational Health and Safety and Worker Accommodation	Generic occupational health and safety risks to workers, as working onsite increases the risk of injury or death due to accidents	Prepare an Occupational Health and Safety Plan (OHSP). Adopt and implement the recommendations/provisions of the OHSP which includes: (i) Risk assessment and job safety planning procedure, (ii) PTW system procedure, (iii) LOTO procedure, (iv) Site control occupational health and safety procedure to include requirements for personal Protective Equipment (PPE), requirements for site risks (fall protection, powered and hand tools, compressed air / gas cylinders, fire prevention, hot works, electrical works, material handling, machinery use and safety, excavation/concrete works/civil works, confined space activity, storage, medical requirements, and communicable disease management),., (v) Occupational health and safety signage requirements, (vii) Identification of OHS training requirements, (viii) Identification of monitoring and reporting requirements, (ix) Identification of roles and responsibilities, and (x) Identification of measures to reduce the risk of COVID-19 exposure and transmission.	Mitigation	Submit OHSP	Not applicable	Once before commencement of operation	Project Operator	To be included in operator budget
		Prepare an Emergency Preparedness and Response Plan (EPRP) which should include: (i) communication and management process, (ii) emergency procedure and an onsite notification process (iii) emergency response procedure, (iv) emergency control measures to include but not limited to fire, accidents, spillage, traffic accidents, natural disasters and other. In addition, of particular importance within the Project area are also risks related to remoteness of the Project site (e.g. in case of a medical emergency), risks from sand and salt storms including windy conditions, risks from extreme hot and cold weather and conditions and low/high temperatures, (v) requirements for emergency kits, (vi) onsite assembly points, (vii) emergency signs, (viii) training requirements, (ix) monitoring and reporting requirements, and (x) roles and responsibilities of the personnel involved in implementation of the plan		Submit EPRP				To be included in operator budget
		Prepare and establish and implement a worker grievance mechanism to ensure that all worker complaints are properly received, documented, addressed, and closed out in a timely and transparent manner. The mechanism will provide multiple channels for submitting grievances, including anonymous options, ensure formal registration and assignment of a case handler, define clear timelines for acknowledgement, response, resolution, and monitoring, and require		Submit Worker grievance mechanism				To be included in operator budget

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Environmental Attribute	Potential Impact	Management Action (mitigations, additional requirements, additional studies, compensation measures, etc.)	Type of Action	Monitoring & Reporting Action	Parameters to be monitored / location	Frequency	Responsible Entity	Estimated cost
		documented verification and reporting upon grievance close-out.						
		Follow the Workers' accommodation: process and standards" (EBRD/IFC Guidance Note, 2009). In case there is an accommodation onsite. The document provides guidance notes on general living facilities, room facilities, medical facilities, management of accommodation units, etc.		Submit Worker Accommodation document				To be included in operator budget
Public Health and Safety	Trespassing of unauthorized personnel into construction active areas could result in health and safety impacts	Develop a Security Risk Assessment to identify and manage potential security risks. The assessment will ensure that each turbine is fitted with locked doors to prevent unauthorized access, that the substation area is fully enclosed with concrete fencing to restrict entry, and that trained onsite security guards are present across the Project site at all times to safeguard assets and prevent trespassing. In addition, clear and visible safety signage will be installed on turbines and at the substation, providing warnings on public safety hazards and emergency contact information, with signs presented in both pictorial and written formats to ensure they are understood by all individuals, including those who are unable to read.	Mitigation	Submit Security Risk Assessment	Not applicable	Once before commencement of operation	Project Operator	To be included in operator budget
	Inappropriate management of security issues and incidents by security personnel towards local communities (e.g. overreaction, mistreatment, use of excessive force) could result in potential for conflict, resentment, distrust and escalation of events.	Develop a Security Management Plan (SMP) plan to identify appropriate measures for hiring, rules of conduct, training, equipping, and monitoring of security personnel to control and manage such issues. The plan must adhere to: (i) IFC PS 4 (Community Health, Safety and Security); and (ii) EBRD PR 2 (Labour and Working Conditions), all of which identify requirements for security personnel. This includes in specific requirements to ensure security personnel are guided by the Voluntary Principles on Security and Human Rights in terms of hiring, rules of conduct, training, equipping and monitoring of such personnel. They also require reasonable inquiries that those providing security measures are not implicated in past abuses, will ensure they are trained adequately in the use of force (and firearms if applicable) and appropriate conduct towards the workers and the local community. Force should only be used when strictly necessary, and to an extent proportional to the threat.	Mitigation	Submit SMP	Not applicable	Once before commencement of operation	Project Operator	To be included in operator budget
Socioeconomics	It is expected to have positive impacts through direct and indirect employment and local economic stimulation. Additional indirect benefits are expected through local procurement and	Develop a Local Recruitment Procedure to prioritize employment opportunities for local communities, including Bedouin groups, by identifying targeted numbers of skilled and unskilled positions such as fresh graduate engineers, technicians, and labourers from the surrounding area. The Procedure will define clear and transparent mechanisms for announcing vacancies and implementing a fair, non-discriminatory selection process that ensures equal opportunities, including for females. It will also assess the potential for joint implementation with other wind farm developers in the area to	Additional Requirement	Submit Local Recruitment Procedure	Not applicable	Once before commencement of operation	Project Operator	To be included in operator budget

Environmental Attribute	Potential Impact	Management Action (mitigations, additional requirements, additional studies, compensation measures, etc.)	Type of Action	Monitoring & Reporting Action	Parameters to be monitored / location	Frequency	Responsible Entity	Estimated cost
	increased demand for local services and businesses. Although detailed employment figures are not yet available, the Developer is committed to prioritising local communities where feasible.	maximize local employment benefits, with local hiring priorities formally reflected in the EPC Contract and all subsequent subcontracts.						
		Develop a Local Procurement Procedure to prioritize procurement opportunities for local communities, including Bedouin groups, by identifying eligible local subcontractors and locally sourced goods and services such as supplies, equipment, cleaning, and support services. The Procedure will define clear and transparent mechanisms for announcing procurement opportunities and establish a fair, competitive, and non-discriminatory selection process that ensures equal opportunities for all qualified local suppliers. It will also assess the potential for joint implementation with other wind farm developers in the area to enhance local participation and efficiency, with local procurement priorities formally embedded in the EPC Contract and all subsequent		Submit Local Procurement Procedure		Once before commencement of operation	Project Operator	To be included in operator budget
		Implement a social responsibility program which aims to benefit the local communities to the greatest extent possible. In this case, a structured approach must be developed which must identify priority development projects which could benefit local communities (e.g. based on a needs assessment if available). Based on that the social responsibility program can prioritize projects for local communities based on available budget, vision, timeline for implementation and other factors.		Submit Social Responsibility Program		Once before commencement of operation	Project Operator	To be included in operator budget

1. ANNEX1: Assessment Of Associated Facilities for Shadwan 900 Project

This section presents an overall description of the associated facilities for the Project along with a biodiversity assessment. As discussed previously, the only associated facility of the Project is the OHTL.

1.1 Project Description

The OHTL is considered a key element as the Project will rely on it to evacuate electricity to the national grid. As stated earlier, EETC (i.e. the off-taker) will be fully responsible for planning, developing, constructing, commissioning and operating the OHTL. This assessment is based on preliminary design information for the associated facilities. The OHTL includes one (1) line as noted in the Figure below:

- Northwestern, northeastern and northern OHTL Shadwan (Scatec – S4) 500kV (shown in bright green in the Figure below): this OHTL will connect the Shadwan Wind Power substation with the existing S4 substation also traverses an area characterized by a high concentration of operational and planned wind power plants. This line has a length of 45km;

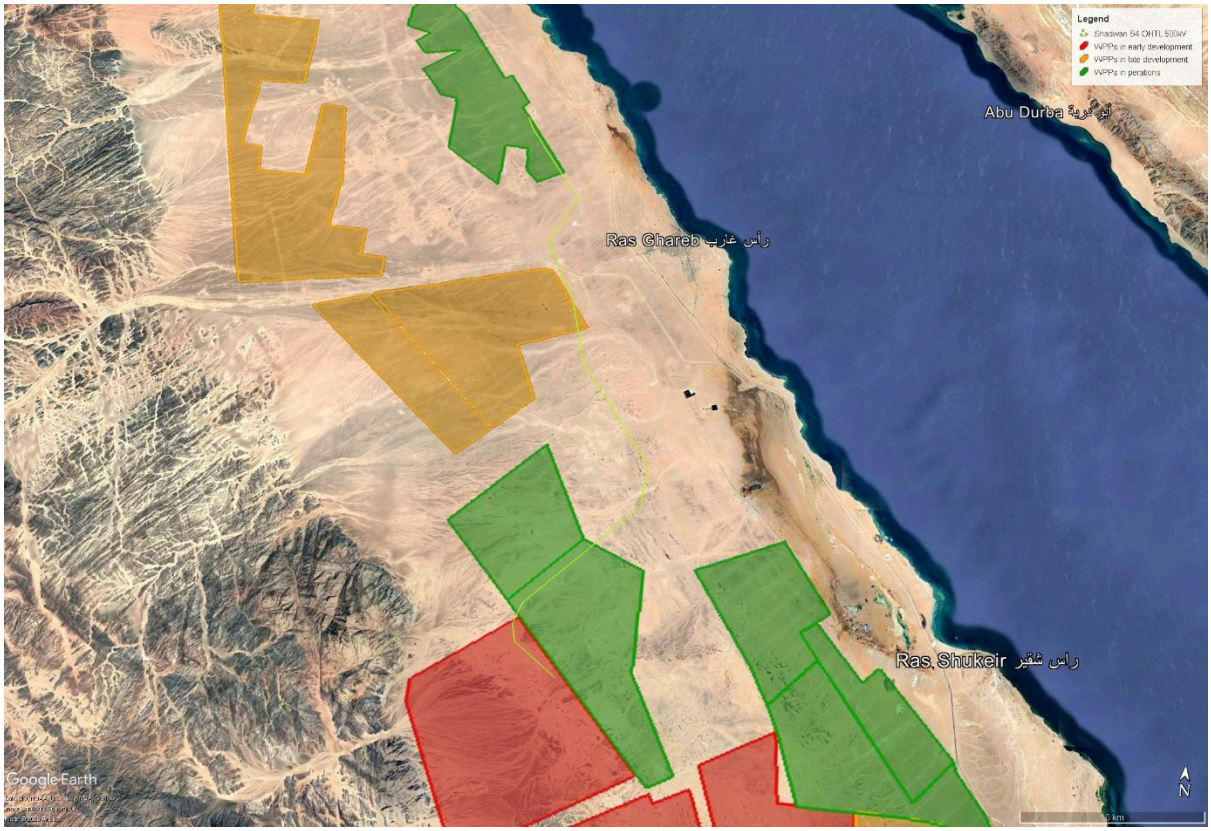


Figure 1: Location of OHTL Route

1.1.1 OHTL Components

The following describes the main OHTL components. This has been based on currently available information provided by EETC.

(i) Transmission Towers

The main component of the OHTL is the transmission towers. The transmission tower will be a three (3) phase steel beam Double-Circuit Transmission Towers (DCT), which will transport the electricity from the substation located within the windfarm to the High Voltage National Grid. The typical structure of the DCT tower is presented in the Figure below. To the left of the figure is the actual tower that EETC will utilize for the project, while to the right is a schematic to explain the key components.

Each transmission tower will consist of the following:

- Foundations: each tower will be fixed and bolted to the ground through reinforced concrete foundations. The exact area for each foundation is expected to be around 15m×15m and will be confirmed as part of the detailed design;
- Steel structure: the foundations will support the steel structure that will carry the conductors, cross-arms and shield wire;
- Cross-Arms: each tower will have six (6) steel beam cross arms (three (3) on each side) which connect the conductors (discussed below) with the towers (refer to the Figure below).
- Conductors: the conductor is the line used to carry electrical energy from one tower to the next until its connection with the High Voltage National Grid. There will be six (6) conductors, three (3) on each side of the tower that will connect through the cross-arms (refer to Figure below). The conductor will be a 220 kV line; and
- Shield Wire (also known as earth wire): positioned above the phase conductors, the shield wire is grounded at each tower to facilitate the safe and rapid dissipation of voltage surges caused by technical issues or external factors (e.g. lightning).

The tower is likely to have a height of around 65m. In addition, there will be one (1) tower approximately every 350m. Therefore, a total of 130 towers is expected OHTL presented in the Figure 1 above.

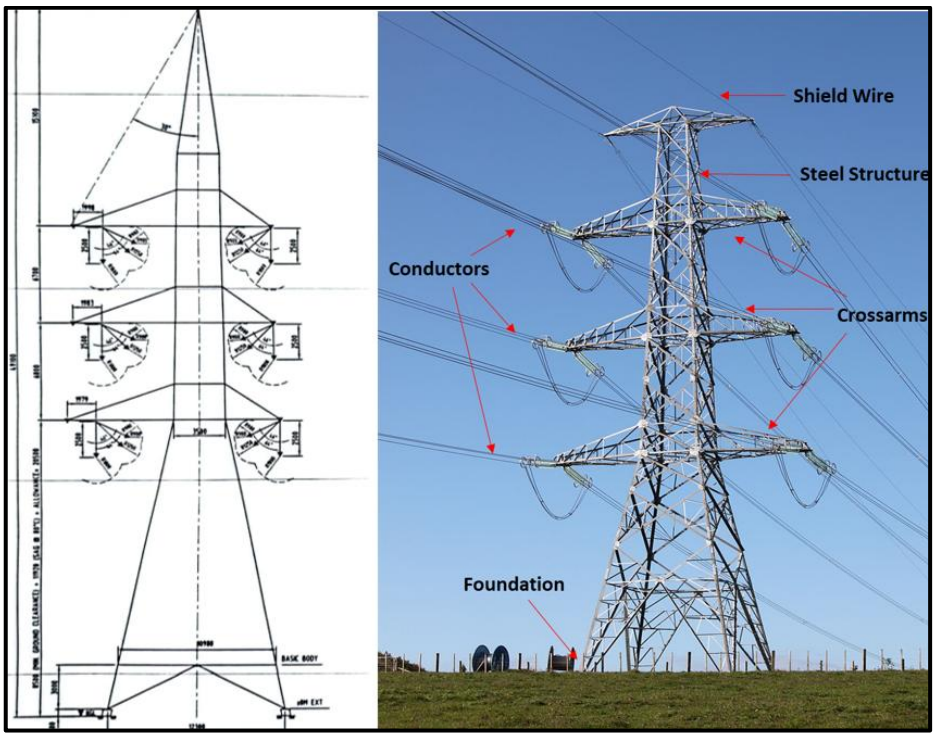


Figure 2: Typical Structural Components of DCT Towers

(ii) Infrastructure Elements

The only infrastructure requirements for the OHTL will be access roads, which may be required in areas where the towers are inaccessible based on existing site conditions. Such access roads are required for access of construction vehicles and machinery during construction and for maintenance activities during operation. The layout of the access roads will be determined at a later stage as part of the detailed design to be prepared by EETC's OHTL Contractor and once areas with no access are identified.

1.1.2 Right of Way for the OHTL

Electricity transmission and distribution projects require Rights-of-Way (RoW) to protect the system from windfall, contact with trees, branches, utilities, buildings, and other potential hazards that may result in damage to the system, or power failures, as well as public health and safety concerns. RoW are also utilized to access, service, and inspect transmission and distribution systems.

The IFC EHS Guidelines for Electric Power Transmission and Distribution (2007), states that the RoW width for transmission lines ranges from 15 to 100m depending on voltage and proximity to other RoW, but typical range is between 15 and 30m.

Within the local requirements, EETC will take into account the requirements of the Electricity Law 87/2015, which provides requirements for safe distance between the conductors and the neighbouring lands and buildings and other receptors. Based on the law, the requirements of the RoW distances applicable for the 220kV OHTL is 25m horizontal distance from each side and for the 500kV OHTL is 50m horizontal distance from each side. Any successive buildings, structures or other receptors to be built shall take into account this safety distance/ RoW.

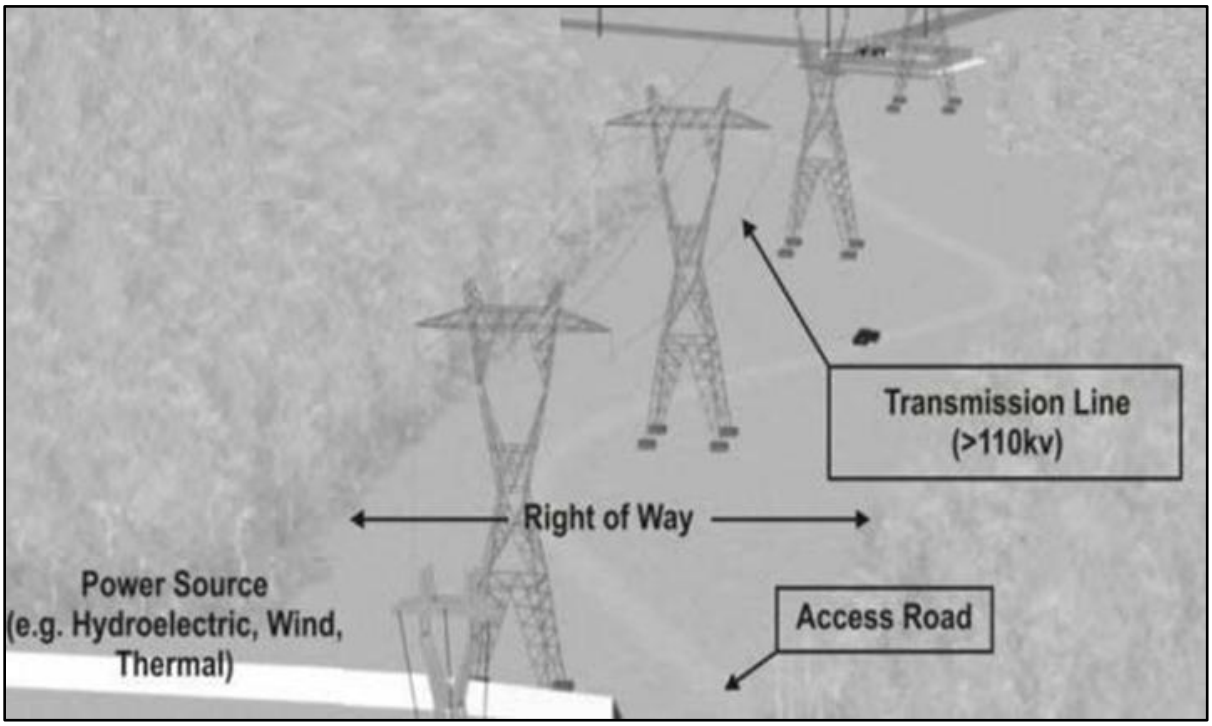


Figure 3: Right of Way and Access Road for OHTL (IFC, 2007)

1.1.3 Overview of Project Phases

This section presents the likely activities to take place during the Project development, which will include three (3) distinct phases: (i) construction, (ii) operation and (iii) decommissioning each of which is summarised below.

Planning & Construction Phase

Typical activities during the construction phase for the OHTL include the following:

- Transportation of various Project components to the Project site. The components are expected to be transported by road to the Project area;
- Site preparation activities for the tower foundations. Such activities are limited to the individual footprint of the towers and therefore the actual area of disturbance is small. Nevertheless, such activities could include land clearing activities, excavations, and levelling;
- Installation of components such as the DCT towers, cross-arms, conductors.
- Bird Flight Diverters (BFDs) will be installed along the entire OHTL shield wire as part of the initial construction phase in accordance with the mitigation commitments presented in this assessment.
- Stringing to install the conductor wires and the ground wire which is typically undertaken through using sufficient pulling force on one end and tension capabilities on the other;
- In addition to the erection of each DCT, there is additional construction work (which could include excavations, land clearing activities, etc.) for the road network if required to provide access to equipment and machinery onsite.

Throughout the construction phase, the Project will require skilled labour (such as engineers, technicians, surveyors, etc.) and unskilled labour, to be hired through EETC's construction contractor.

Operation Phase

The OHTL is expected to remain operational at least throughout the operation period of the windfarm – which is set for 25 years. The operational phase will be mainly limited to maintenance and repair activities for the OHTL when needed. These could also include some routine preventive maintenance activities (based on a set schedule) as well as corrective maintenance in case of failure of any of the Project components. Maintenance activities are generally undertaken by a dedicated team of technicians from EETC and do not normally require any permanent staff to be onsite. The EETC Team would undertake the required technical activities during any given day and leave the site.

Decommissioning Phase

As discussed earlier, the windfarm is expected to remain operational for 25 years, after which the OHTL could be decommissioned or possibly used to connect another energy facility which would replace this wind farm. Decommissioning activities will include disassembly of the towers for final disposal. However, most of these materials are salvageable (i.e. recyclable).

1.2 Avifauna Assessment

Avifauna

Ecological Context

Powerlines pose potential risks to birds through collisions during flight and from electrocution. In the study region extending north to south along the western coast of the Gulf of Suez, the main risks are from collision with powerlines and wind turbines. Birds are at risk of colliding with power lines during flights, especially when lines are not clearly visible or intersect with important bird flight paths. Factors influencing collision risk include line visibility, bird species behavior, and the proximity of power lines to critical habitats.

According to the Guidelines for Addressing Risks to Soaring Birds from Overhead Transmission Lines in Egypt (Baha El Din, 2022), as shown in the Figure 4 below, the proposed Shadwan OHTL (Scatec- S4) alignment traverses the western sector of the Gebel El-Zeit Important Bird Area (IBA). The route directly intersects the IBA boundary and remains within the designated bird area for part of its length. Consequently, the minimum distance between the OHTL route and the IBA is zero metres at the point of intersection. Given the international importance of the Gebel El-Zeit IBA for migratory soaring birds and other avifauna, the crossing represents a key environmental sensitivity requiring detailed assessment of collision risk, disturbance effects, and cumulative impacts in combination with existing and planned wind energy developments within the Gulf of Suez region. The Guidelines recommend conducting high-intensity pre-construction monitoring of migratory soaring birds for all new OHTLs proposed in High-Risk zones.

Assessment Methodology

To ensure that conclusions are representative of the proposed Shadwan OHTL, the assessment is based on three complementary lines of evidence. Firstly, site-specific observations collected along the proposed 45 km OHTL alignment and associated flight corridor during the Spring and Autumn 2025

migration seasons were used to characterize bird movements directly within the Project area. Secondly, project-specific datasets collected for the Shadwan Wind Farm ESIA and associated biodiversity studies were used to assess bird activity within the wider Project footprint and adjacent habitats. Thirdly, regional ornithological datasets from existing and proposed renewable energy developments and OHTLs within the Gulf of Suez were used to provide contextual information, calibration of collision-risk estimates, and cumulative impact assessment. Site-specific data were used as the primary basis for impact assessment, while regional datasets were used only to supplement the assessment where direct long-term monitoring data for the proposed OHTL were not yet available. Therefore, the avifaunal assessment does not rely solely on the pre-construction surveys conducted during spring 2025 (20 February – 20 May) and autumn 2025 (10 August – 10 November) Approximately 35% of the OHTL alignment lies within the WPPs boundaries, and therefore benefits from extensive ornithological monitoring for ESIA, ATMP, SESA-CIA Projects in GoS. Field surveys were conducted during daylight hours (from one hour after sunrise until one hour before sunset) on a daily basis throughout the spring and autumn 2025 seasons. A total of fourteen field teams carried out observations across the OHTL routes and within a 5 km buffer extending along the length of the on either side of proposed OHTL alignment. The buffer was adopted to ensure that bird movements approaching, crossing, or diverging from the proposed OHTL corridor were adequately represented. These teams monitored the MSBs from fixed vantage points (VPs [Shadwan {1,4}, RGWE {S,M,E}, SESA CIA {17,22}, Alcazar NIAT {3,6}, AMUNET 6,7,8,9,10}], Figure 8), ensuring that each location is surveyed approximately most monitoring days in spring and autumn seasons, thereby providing robust spatial and temporal coverage of bird movements. Monitoring locations were selected specifically to provide coverage of the proposed Shadwan OHTL alignment and the surrounding collision-risk airspace. All observations used in the site-specific assessment represent bird movements either directly above, adjacent to, or immediately approaching the proposed OHTL corridor. The observation points used in the assessment, the Shadwan {1,4}, RGWE S, NIAT 6, AMUNET {8,10} Vantage Points (VPs) are located directly adjacent to the proposed OHTL alignment and provide site-specific data. The remaining observation points RGWE {E,M}, SESA CIA {17,22}, NIAT Alcazar 3 and AMUNET {6,7,9} locations are external reference VPs used to characterise wider spatial patterns of migration within the Gulf of Suez and support cumulative assessment.

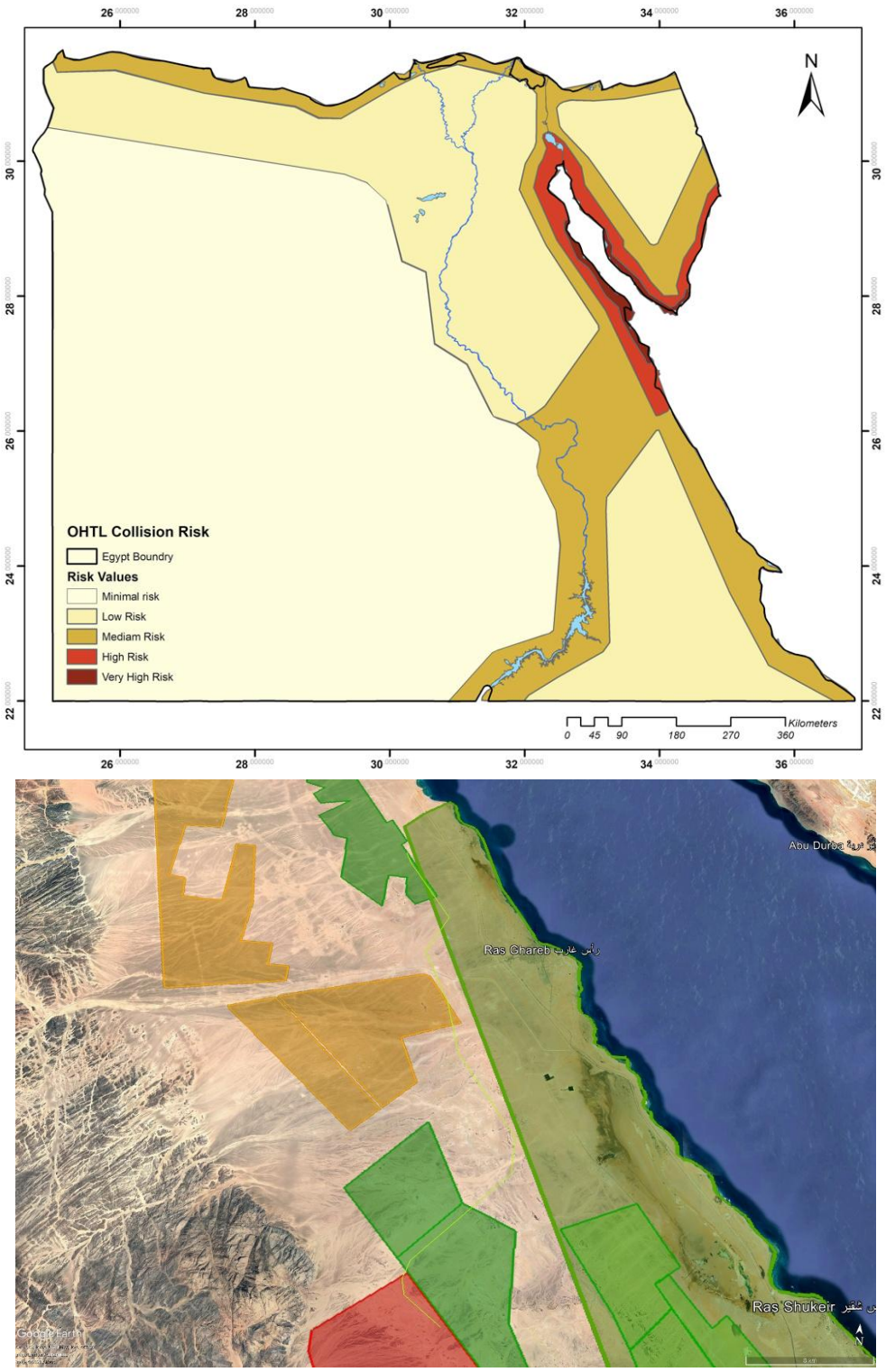


Figure 4: Preliminary OHTL Collision Risk Map for Egypt (Up) – Proposed OHTLs and Gebel El Zeit IBA (Down)

Assessing risks of avian mortality from power line collisions is dependent on identifying the factors and circumstances under which birds fly at collision risk altitudes. These conditions could be the basis for the identification and development of appropriate risk management strategies to reduce the potential of collision risk. Flight altitudes and consequently bird collision risk are influenced by both extrinsic

(site-specific and OHTL-specific) and intrinsic (species-specific) factors[1]. Topographic variations, habitat features, weather and light conditions, as well as anthropogenic disturbance levels are considered site-specific factors; while line configuration, wire diameter and height are OHTL-specific factors of collision risk.

Geography, topography and the distribution of water bodies define migratory flyways and thermal uplift zones, with mountains and depressions providing different flyways for soaring birds and consequently, different flight altitudes. In the current study area, the Gulf of Suez provides a "thermal barrier" for certain passive species, which strongly prefer to fly over landmasses, while some active fliers brave the crossing (at a cost). Understanding the soaring bird migration phenology in the region is critical for the assessment of risks from various infrastructure in this region.

While Intrinsic (species-specific) factors play a critical role in determining collision risk, including flight behavior, body size, maneuverability, and visual perception. Soaring species such as White Stork and European Honey Buzzard, which dominate movements along the RSRV Flyway, are generally considered susceptible due to their reliance on thermals, variability in flight altitude, and tendency to pass through the OHTL height range. However, recorded field data indicate that this susceptibility varies significantly depending on behavior and spatial context.

The Post-Construction Fatality Monitoring (PCFM) dataset referenced in this assessment comprises surveys undertaken along existing overhead transmission lines associated with the RGWE, RSWE, WBWF, AMUNET, Zaafarana and NREA developments. The combined monitored network exceeds several hundred kilometres of OHTLs and provides the largest available evidence base for evaluating collision mortality associated with transmission infrastructure in the Gulf of Suez region. The PCFM results demonstrate clear seasonal and spatial differences in collision patterns along the OHTLs. During the spring seasons (2021 – 2025), collisions were recorded mainly for 8 European Honey Buzzard, 2 Steppe Buzzard, and 1 Sparrowhawk, while no collisions of White Stork were observed, likely due to its strong coastal tracking behavior, which reduces interaction with inland infrastructure. In contrast, the PCFM in autumn seasons (2023–2025) within the coastal area recorded collisions involving multiple species, including 16 White Storks, 3 White Pelicans, 5 European Honey Buzzards, 1 Steppe Buzzard, 1 Sparrowhawk, 1 Marsh Harrier, and 1 Short-toed Eagle, while no carcasses were recorded during spring in the same coastal zone. So, the fatalities recorded in the central inland (between the mountains and the coastal plain) during the past five years (2021 – 2025) reflecting a different collision risk profile with OHTLs compared to the coastal corridor.

Overall, the available monitoring data indicate that collision risk varies among species and between seasons, and may also be influenced by local landscape characteristics and migration patterns. These factors have therefore been considered in the collision-risk assessment of the proposed Shadwan OHTL. ~~White Storks experienced relatively low levels of recorded collision mortality within inland portions of the monitored OHTL network. This finding appears to reflect lower exposure within those specific alignments rather than active avoidance behaviour.~~ White Storks experienced relatively low levels of recorded collision mortality within some inland segments of the monitored OHTLs. However, this finding reflects observed mortality patterns on those specific reference OHTLs and should not be interpreted as indicating low collision susceptibility throughout the Gulf of Suez region. White Storks remain one of the most abundant migratory species using the flyway and, where migration movements

[1] Intrinsic risk depends on: flight behaviour, body size, altitude variability, visual limitation, experience, age, migration ecology and strategy.

overlap with overhead transmission powerlines infrastructure, can be exposed to elevated collision risk. Conversely, mortality records from coastal OHTLs demonstrate that White Storks remain susceptible to collisions where migration routes overlap with transmission infrastructure. s

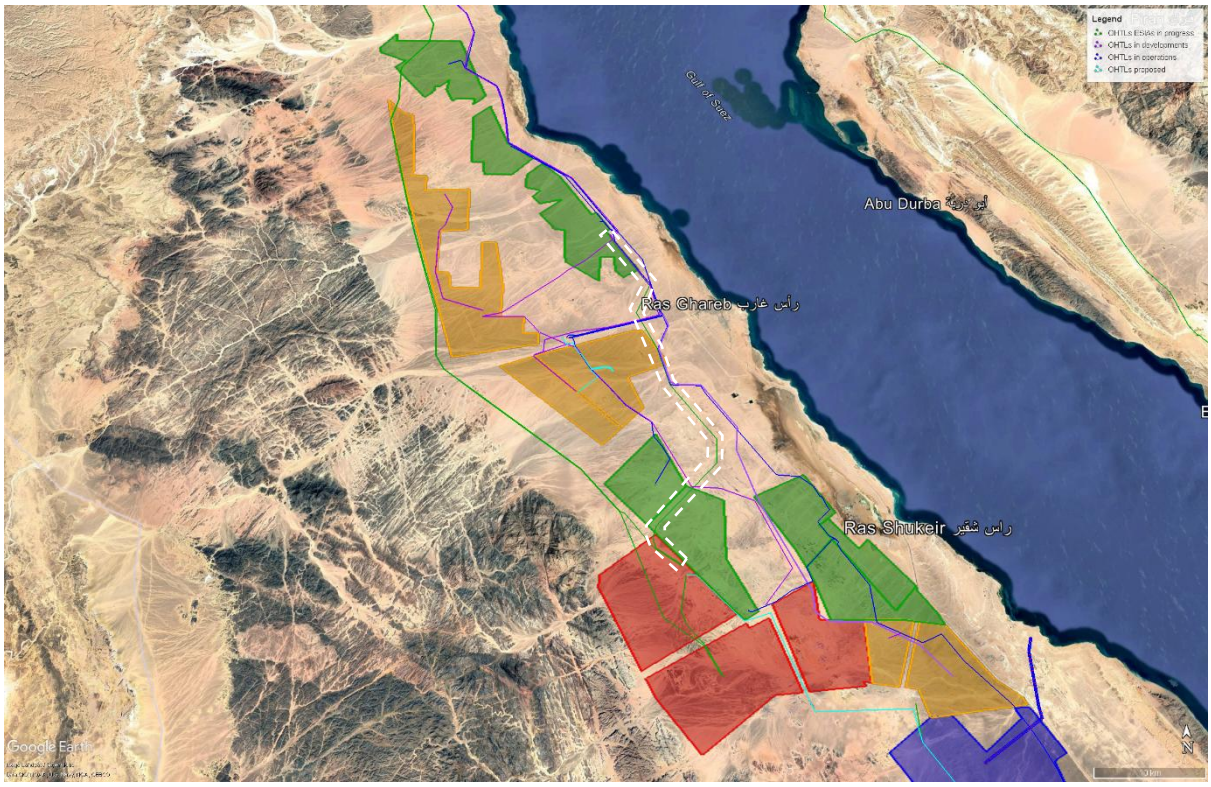


Figure 5: General location of the project region and the distribution of windfarms, operational OHTLs (blue), in development OHTLs (purple), OHTLs ESIAs in progress (green), proposed OHTLs (turquoise), and study area (dashed white).

Avifaunal Assessment Approach and Methodology

The avifauna assessment initiation (bird migration and fatalities) used a pragmatic approach taking into consideration the limited time that was available for its preparation and capitalizing on available data from the wind energy developments in the region during the previous years to optimize the outcome of the study. This was formulated by combining all available information from large parts of the study area. In this respect, the study depended on two basic data sources:

- Bird monitoring data

Bird monitoring data from 17 locations for renewable energy projects (wind farms and solar photovoltaic plants PV) located within the Gulf of Suez. The bird data was collected from 176 observation points (vantage points) scattered through the 17 RE projects along the study area through the last year (2025) from both the spring and autumn seasons. The Figure 6 shows the location of the VPs during spring and autumn 2025, while the Figures 9 and 10 below identifies the MSB sensitivity (bird/hour) that flew in 120m. The data collection included the date, location, number, species, direction and altitude data for each observation, amongst other parameters. Most relevant to this assessment were data on the number of birds and flight altitude, location and seasonality.



Figure 6: VPs locations in the west side of GoS during spring and autumn 2025

- Overhead Powerlines fatality surveys

There is now a common protocol for fatality monitoring at wind farms of the region. While project-specific carcass searches are localized and only cover relatively short lengths of overhead powerlines directly associated with individual wind farms, data was also gathered from other lengths of the overhead powerlines for the purposes of the SESA CIA in 2024-25 in the western side of GoS, see Figure 7 below. This data provides important evidence of the existence of high levels of mortality in some aforementioned localities along the existing overhead powerlines.

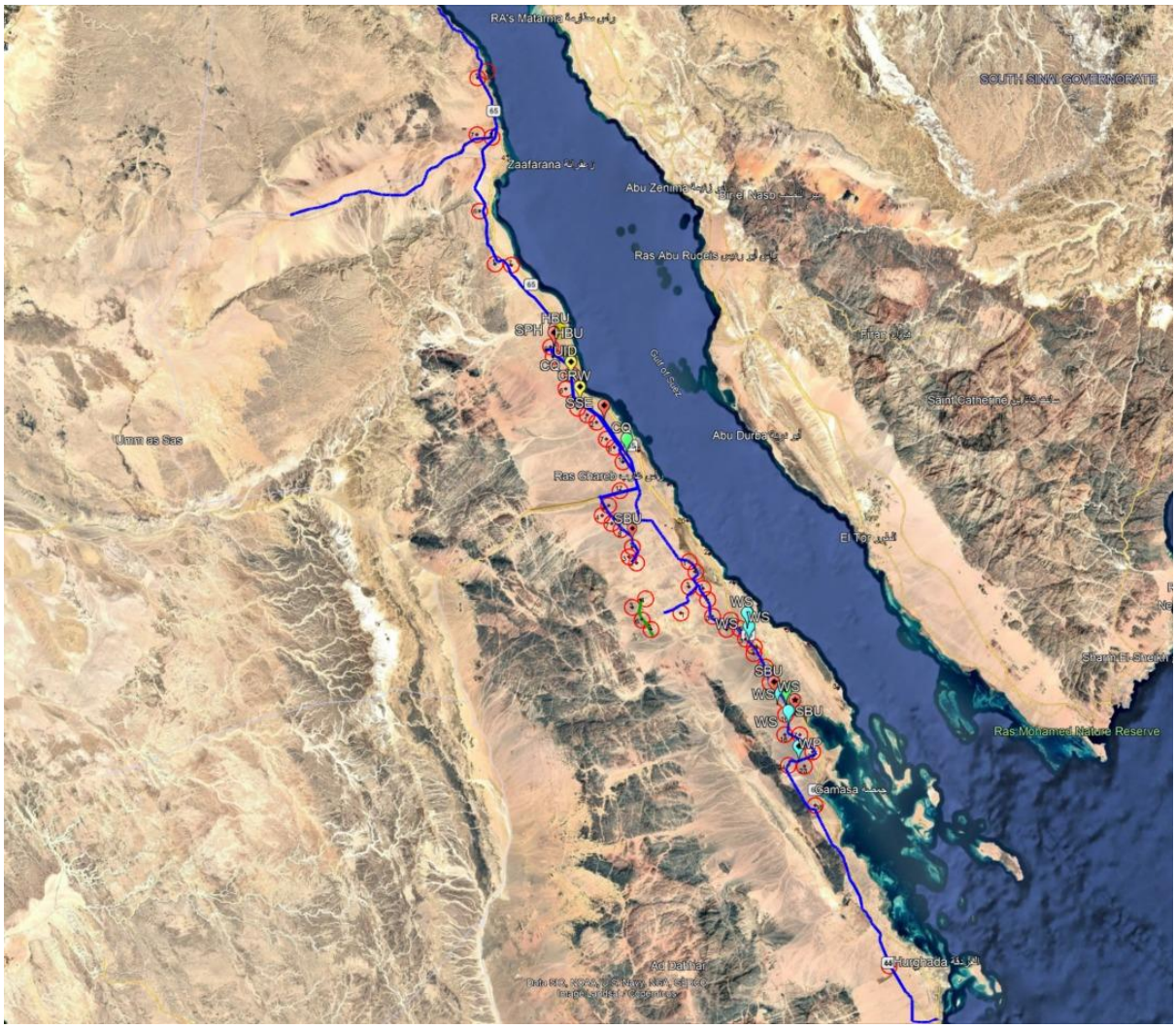


Figure 7: Fatalities recorded on overhead power transmission lines and the observation points intersecting with them during 2025

Systematic fatality surveys of sample lengths of existing overhead powerlines in the vicinity of wind farms and other power stations in the study region near the proposed OHTL route provided some empirical data on the potential mortality from power transmission infrastructure in the region, which could be applied to the proposed Shadwan OHTL. However, the data collected is not equally distributed along existing overhead powerlines during 2021-22-23-24-25 and thus can only serve to indicate potential relative mortality from powerlines in general rather than provide spatially differentiated mortality levels along different lengths of the powerline.

This available data on actual bird deaths along existing OHTLs is more valuable than surveys within the area that MSBs pass through as it provides real data from similar and close by projects and will provide a more accurate result to determine predicted numbers of MSB collisions per year / over the lifetime of the Project. Three assessments have been undertaken:

- Number of fatalities per year: Two collision-risk scenarios were developed for the assessment. The Realistic Case Scenario is based primarily on inland OHTLs that exhibit similar topographic setting, route orientation, migration characteristics and infrastructure design to the proposed Shadwan OHTL. The Worst-Case Scenario is based on coastal OHTLs where bird densities, migration concentrations and observed collision rates are demonstrably higher. Together these scenarios

provide a reasonable range within which actual Project mortality is expected to occur. So, bird collision data from OHTLs monitoring fatalities in the immediate vicinity of the proposed project (such as RGWE and VESTAS OHTLs that considered as a Realistic Case Scenario "High Risk Zone") and the coastal existing OHTLs (Such as RSWE, WBWF, AMUNET, Zaafarana, NREA (KFW, FIEM, JICA), and Gabel Elzeit Hurghada OHTLs that considered as Worst Case Scenario "Very High Risk Zone") was used to extrapolate how many individual birds are predicted to collide with the Shadwan OHTL each year. This was done by taking the average number of fatalities for each species per km over several seasons (with data surveyed a length of 30km from 2021-2025 for the Realistic Case Scenario, while other data surveys lengths of 38km, 61.4km, and 198.3km during 2023, 2024, and 2025 respectively for the Worst Case Scenario). Data from these projects has been extrapolated to predict how many birds may potentially collide with the proposed Shadwan OHTL per km of overhead powerlines, per year. The prediction of annual collision mortality for the proposed Shadwan OHTL was based on empirically derived fatality rates from existing OHTLs within the Gulf of Suez region. Four independent datasets were used:

- Realistic Case Scenario (Observed Fatalities): based on the actual number of bird fatalities recorded during PCFM surveys along representative inland OHTLs. Annual species-specific fatality rates were calculated by dividing the observed number of fatalities by the monitored OHTL length (21 km).

Year	Covered OHTL length in Km	No of Fatality	Species	Species Fatality/Km
2021	21	2	HBU	0.10
		1	SBU	0.05
		1	SPH	0.05
2022	21	3	SBU	0.14
		2	HBU	0.10
2023	21	2	LBU	0.10
		2	SBU	0.10
		1	SPH	0.05
2024	21	4	HBU	0.19
2025	21	1	SBU	0.05

- Realistic Case Scenario (GenEst-Corrected Fatalities): based on estimated mortality derived using GenEst correction factors for carcass persistence, searcher efficiency and survey coverage. Species-specific fatality rates were calculated by dividing the estimated annual fatalities by the monitored OHTL length (21 km).

Year	Covered OHTL length in Km	No of Estimated Fatality	Species	Species Fatality/Km
2021	21	2.86	HBU	0.14
		1.43	SBU	0.07
		1.43	SPH	0.07
2022	21	4.29	SBU	0.20
		2.86	HBU	0.14
2023	21	2.468	LBU	0.12
		2.468	SBU	0.12
		1.234	SPH	0.06
2024	21	5.78	HBU	0.28
2025	21	1.6	SBU	0.08

- Worst Case Scenario (Observed Fatalities): based on actual mortality recorded along coastal OHTLs located within higher bird-density migration corridors. Species-specific fatalities were divided by the monitored OHTL length in each year (62.6 km in 2021–2023, 199.73 km in 2024 and 372.7 km in 2025) to derive annual fatalities per kilometre.

Year	Covered OHTL length in Km	No of Fatality	Species	Species Fatality/Km
2021	62.6	31	WS	0.50
		6	HBU	0.10
		1	MAHA	0.02
2022	62.6	4	SBU	0.06
		2	BK	0.03
		2	HBU	0.03
		10	WS	0.16
2023	62.6	25	WS	0.40
		2	LBU	0.03
		2	SBU	0.03
		2	HBU	0.03
2024	199.73	9	HBU	0.05
		5	WS	0.03
		2	WP	0.01
		1	MAHA	0.01
2025	372.7	3	SBU	0.01
		6	WS	0.02
		3	WP	0.01
		7	HBU	0.02
		2	SHE	0.01
		1	MAHA	0.003
		1	SPH	0.003

- Worst Case Scenario (GenEst-Corrected Fatalities): based on corrected mortality estimates from coastal OHTLs. Mean annual fatality rates were calculated for RSWE, AMUNET, WBWF and NREA OHTLs using GenEst-adjusted mortality estimates. Average mortality rates ranged from 0.206 fatalities/km/year at WBWF to 0.325 fatalities/km/year at NREA, producing an overall mean fatality rate of approximately 0.24 fatalities/km/year, which was adopted as the representative coastal worst-case mortality rate.

Year	Spring	Autumn	Avg
2025	71	71	km
RSWE	0.243	0.176	0.210
AMUNET	0.243	0.200	0.222
WBWF	0.211	0.200	0.206
NREA	0.350	0.300	0.325

The Realistic Case Scenario produced an average GenEst-corrected collision rate of approximately 0.14 fatalities/km/year (range 0.08–0.28 fatalities/km/year). The Worst Case Scenario produced an average GenEst-corrected collision rate of approximately 0.24 fatalities/km/year based on coastal OHTLs (RSWE, AMUNET, WBWF and NREA). These rates were adopted as the primary mortality coefficients used to estimate annual collision mortality for the 45 km proposed Shadwan OHTL.

The selected reference OHTLs were chosen because they share key characteristics with the proposed Shadwan OHTL, including tower design, route orientation, topographic setting, proximity to migratory bird movement corridors and location within the Gulf of Suez migration system. Accordingly, they provide representative analogue datasets for estimating potential collision risk associated with the proposed Project. As part of the extrapolation, it has been assumed that no bird diverters are currently in place (it is known to be the case that at least 5 of the powerlines have no diverters and the exact use of diverters along the full length of the other lines is unknown). s. . Based on the RGWE PCFM monitoring reports (2021–2025), the estimated average collision fatality rate in the inland section of the OHTL, where bird flight diverters (BFDs) are installed (assumed 50% efficiency), is estimated at approximately 0.14 fatalities per km per year. In

comparison, data from RSWE, AMUNET, WBWF[2], and NREA (2025) indicate a higher estimated fatality rate of approximately 0.24 fatalities per km per year in the coastal area, reflecting increased collision risk associated with higher bird densities and more concentrated migration pathways along the coast.

- Number of fatalities with and without diverters: data has been used from background data studies is based on findings reported by Bernardino et al. (2019), Barrientos et al. (2011), and regional monitoring programmes undertaken within the Gulf of Suez, which collectively indicate that appropriately selected wire-marking devices can reduce collisions by approximately 50% or more.
- Compounded and cumulative risk assessment: using bird collision data from local wind farms with OHTLs associated with OHTLs exhibiting comparable route orientation, topographic setting, migration intensity, habitat characteristics and engineering specifications to assess which areas of the OHTL are at the highest risk of MSB collisions, a cumulative risk assessment was undertaken by RCREEE and Safe Soar.
- To distinguish project-specific risks from cumulative risks, the assessment was undertaken in two stages. Firstly, the proposed Shadwan OHTL was assessed using site-specific bird monitoring data collected along the proposed alignment during the Spring and Autumn 2025 migration seasons. These data were used to evaluate bird migration intensity, flight altitude distributions, species composition and route-specific collision exposure within the proposed OHTL corridor. Secondly, a compounded and cumulative risk assessment was undertaken using additional regional datasets from existing and planned OHTLs and renewable energy developments within the Gulf of Suez. This supplementary assessment was undertaken to identify whether external landscape factors and the presence of other infrastructure could increase or decrease collision risk along different sections of the proposed Shadwan OHTL. Accordingly, the five indicators presented below should be considered cumulative risk modifiers applied to the site-specific assessment rather than primary indicators of collision risk. The resulting assessment therefore identifies those sections of the proposed Shadwan OHTL where cumulative conditions may elevate collision risk above that indicated by site-specific bird observations alone.
- The compounded and cumulative assessment of the proposed Shadwan OHTL takes into account five indicators (parameters) that may influence collision risk at a landscape scale:

  Topography (route-specific input)

Points	Criteria
1	Flat surface
2	Area with small elevations
3	Area with higher elevations and hills
4	Area with hills and different successive elevations

The cumulative effect resulting from the convergence of other OHTLs (cumulative input)

Points	Criteria
1	Distance between different OHTLs > 1000 m
2	Distance between different OHTLs 500-1000 m

[2] BFDs are installed (assumed 50% efficiency) at associated WBWF OHTL.

3	Distance between different OHTLs 250-500 m
4	Distance between different OHTLs 50-250 m

When calculating the risk level for the cumulative effect of converging OHTLs, the differences in the pylon elevations are taken into account. If two converging lines have different elevations, this increases the risk level by one point.

The cumulative effect resulting from the convergence of OHTLs with Wind Turbines (cumulative input)

Points	Criteria
1	Distance between OHTL and Wind Turbines > 2000 m
2	Distance between OHTL and Wind Turbines 1000-2000 m
3	Distance between OHTL and Wind Turbines 500-1000 m
4	Distance between OHTL and Wind Turbines 100-500 m

Distance from any attraction (Sea –Sabkha - Hills or Mountainous areas) (route-specific input)

Points	Criteria
1	Distance from attraction site >10 km
2	Distance from attraction site 6-10 km
3	Distance from attraction site 3-6 km
4	Distance from attraction site 0-3 km

Bird Density at risky height (<120m) (This indicator is assessed in segments of 2.5 km) (project-specific input)

Points	Criteria
1	0-1000 Bird / 2.5 km
2	1001-5000 Bird / 2.5 km
3	5001-10000 Bird / 2.5 km
4	≥10000 Bird / 2.5 km

Each indicator was assessed in segments of around 2.5 km

A. Results

Avifauna

The abundant available data from wind energy developments throughout the region provided by RCREEE was composed of bird records of pre and post construction monitoring at active, under construction and planned wind farms in the Gulf of Suez region, coinciding with the proposed lengths of powerlines.

This data was collected in roughly the same manner and provides similar information on bird movements through the target region. Some modest treatment of the data was required to align all data sets to provide a common plateau for analysis, most importantly unifying altitudinal bands used amongst various wind farm monitoring teams and to categorize these data into two altitudinal bands below 50 m above ground and below 120 m above ground. These height bands were selected in order

to provide the best evaluation of risk from OHTLs in the region, without the loss of too many observations that would not conform with these bands otherwise.

Because bird monitoring data was not equally distributed across the study area spatial interpolation techniques were used for predicting the values of bird migration intensity at unsampled sites in order to generate spatially continuous data (Li and Heap, 2011). Among the interpolation methods, the most commonly used are Interpolates an Inverse Distance Weighted (IDW) technique (Mirzaei and Sakizadeh, 2016).

The output value for a cell using inverse distance weighting (IDW) is limited to the range of the values used to interpolate. Because IDW is a weighted distance average, the average cannot be greater than the highest or less than the lowest input. The best results from IDW are obtained when sampling is sufficiently dense regarding the local variation to be simulated. If the sampling of input points is sparse or uneven, the results may not sufficiently represent the desired surface (Watson and Philip 1985).

This technique was used to generate the bird migration intensity maps and identify potential risk hotspots along the proposed powerlines.

Bird monitoring data used in this assessment were collected from fourteen VPs located along the proposed OHTL route during the spring and autumn seasons of 2025. The dataset includes key observation parameters such as date, location, species, number of individuals, flight direction, and flight altitude.

In addition, carcass data from existing OHTLs along the western coast of the Gulf of Suez were incorporated to provide context on historical bird mortality and potential collision risk associated with transmission infrastructure in the region.

To support a broader spatial understanding of bird movement and sensitivity, seasonal sensitivity maps (spring and autumn) were developed using data from all wind energy projects within the GoS. These maps provide a regional perspective on migration patterns and high-use areas, complementing the site-specific observations collected along the proposed OHTL route.

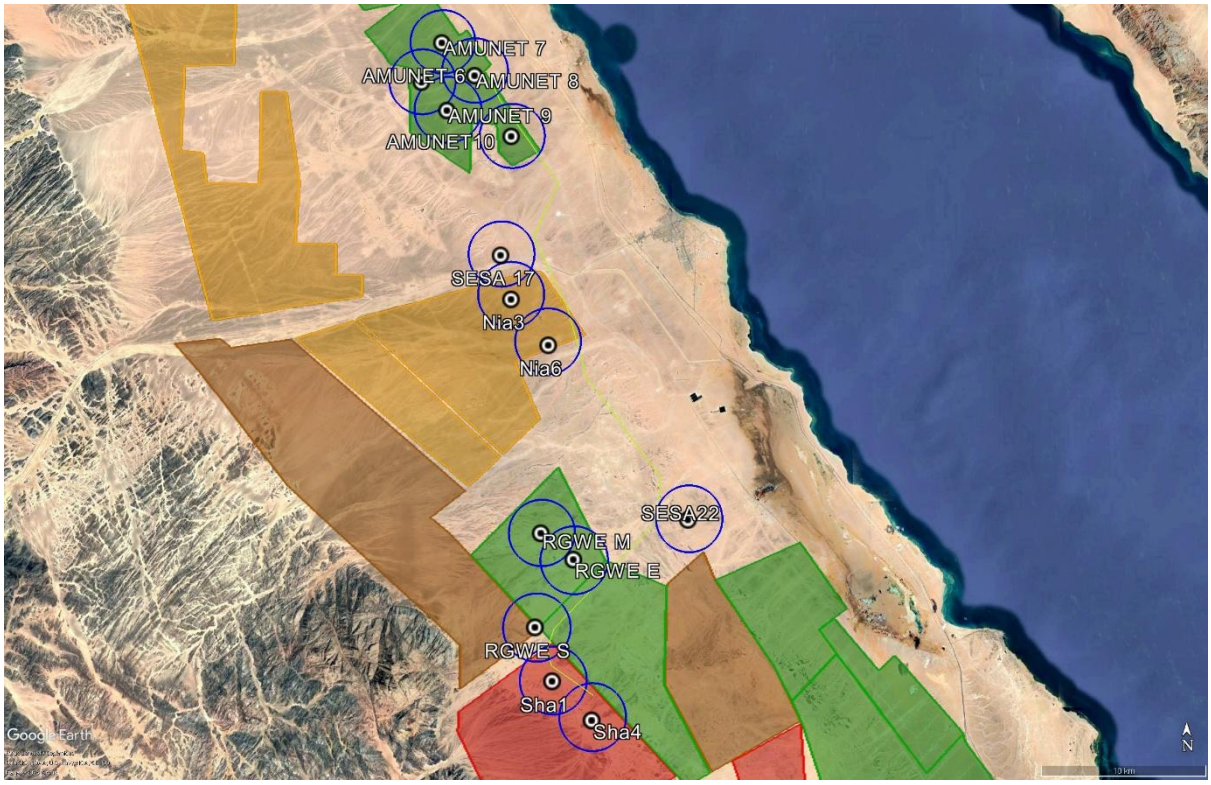


Figure 8: Observation Points Located Along the Proposed OHTL Route During Spring and Autumn Seasons 2025

Spatial Distribution of Migration Intensity Along the Western Coast of the GoS Spring and Autumn 2025

The first map presents a sensitivity assessment of wind farm areas in the Gulf of Suez (GoS) based on soaring bird migration activity during spring and autumn 2025. It highlights how bird passage rates vary spatially along the coastal corridor, which is a well-known migration route. The color-coded zones represent bird activity intensity, ranging from very low (0-29 birds/hour) (light yellow) to very high (360-730 birds/hour) (dark red) in spring, while very low levels (0–17 birds/hour in light yellow) to very high levels (192–319 birds/hour in dark red) in autumn 2025, indicating areas of increasing ecological sensitivity and potential collision risk.

The central part of the study area shows the highest bird passage rates, particularly in locations where darker orange and red colors appear. These zones represent migration hotspots where large numbers of birds concentrate, increasing the likelihood of interaction with man-made structures. In contrast, the northern and southern sections generally show lower to moderate activity levels. The map emphasizes that bird migration is not uniform but rather concentrated in specific segments along the coast.

In addition to bird sensitivity, the map overlays existing and planned wind farms, as well as overhead transmission lines (OHTLs) and vantage points (VPs). This allows for identifying areas where infrastructure overlaps with high bird activity, highlighting potential collision risks. The map is therefore an important tool for environmental assessment and planning, supporting decisions on turbine

placement, transmission routing, and the implementation of mitigation measures to reduce impacts on migratory birds.

The second map provides a detailed sensitivity assessment of soaring bird migration at low altitude (<120 m) within the wind farm area and its associated 500 kV overhead transmission line in the Gulf of Suez during spring and autumn 2025. It shows that most of the project footprint lies within low to moderate bird passage zones (approximately 0.1–200 birds/hour in spring, while 0.01-20 bird/hour in autumn), while higher activity areas (up to 500–800 birds/hour in spring) are mainly located toward the southeast of the OHTL route. The map also overlays key infrastructure, including nearby wind farms, transmission lines, and observation points used to derive the data. Overall, it indicates that although some moderate-risk zones exist—particularly along certain transmission line segments — the project area is relatively well positioned outside the highest bird migration hotspots, suggesting manageable collision risks with appropriate mitigation measures.

The southwestern section of the Shadwan OHTL predominantly traverses areas classified as low to moderate migration sensitivity. Sensitivity increases progressively towards the northeastern section where bird passage rates are higher and where the alignment approaches areas identified as migration concentration zones. Consequently, the northeastern segments contribute disproportionately to the overall collision risk associated with the OHTL.

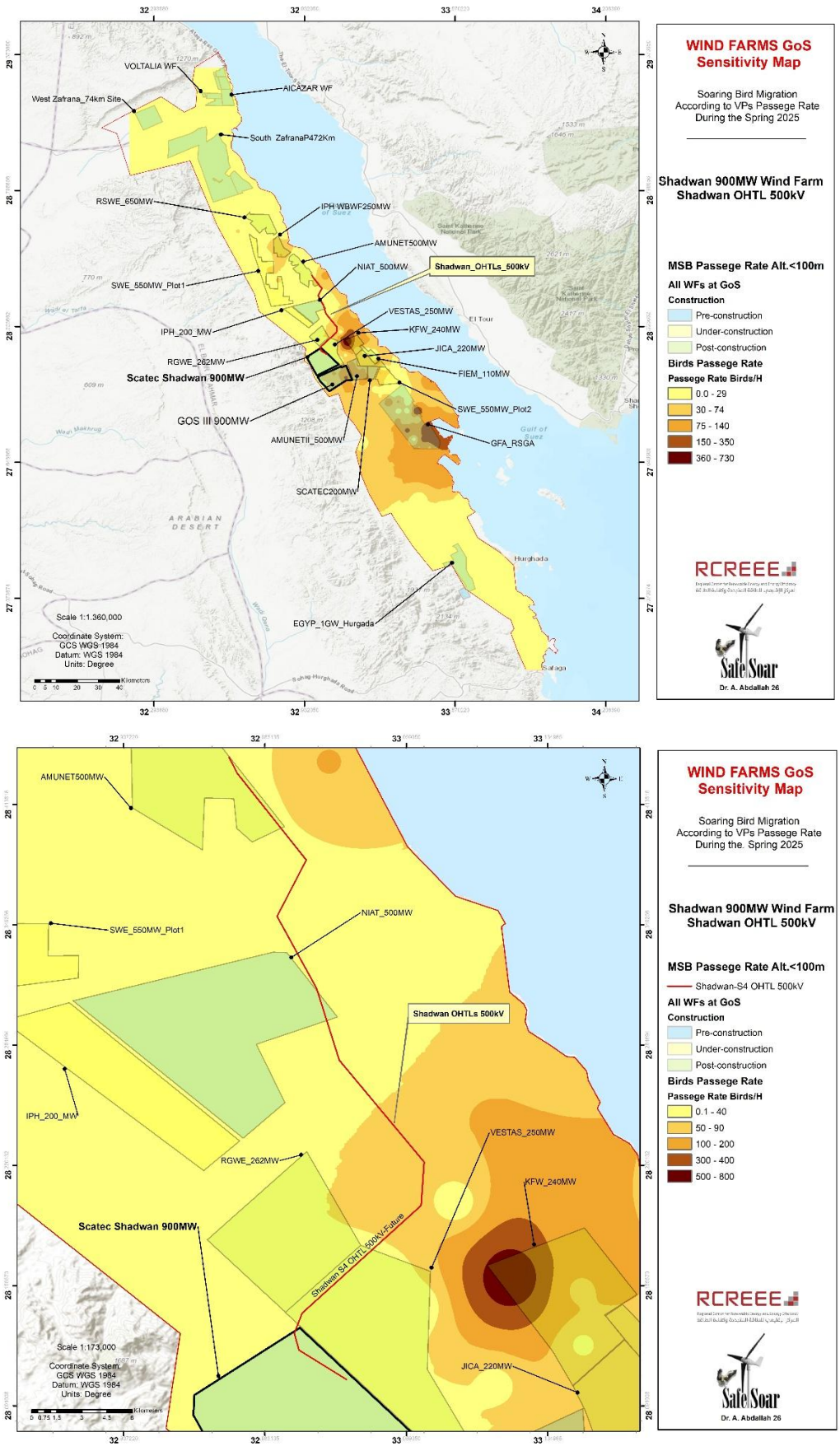


Figure 9: Intensity of MSB migration in spring 2025 season below 120 m.

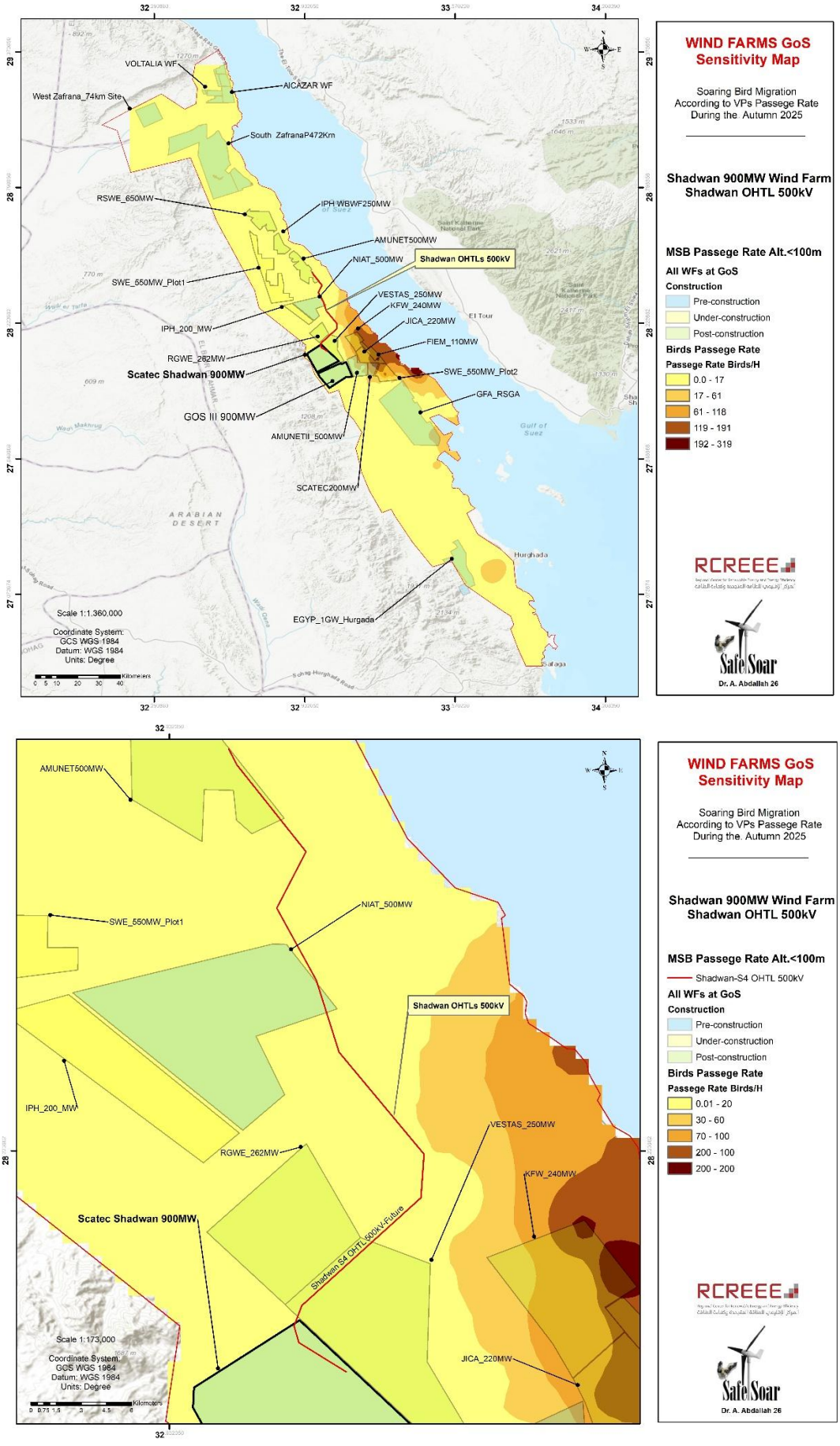


Figure 10: Intensity of MSB migration in autumn 2025 season below 120 m.

MSBs Species Sensitivity to Collision Risk in Spring 2025 , Autumn 2025, and Spring 2026.

The migration data presented below relates to observations collected from vantage points associated with the proposed Shadwan OHTL corridor shown in Figure 8 and are therefore considered representative of bird activity within the Project area. The spring migration monitoring period (20 February–20 May 2025) recorded 243,709 migratory soaring birds from a diverse assemblage of species. The migration was strongly dominated by White Stork (102,870 individuals), followed by Steppe Buzzard (49,400 individuals), Black Kite (25,427 individuals), and European Honey Buzzard (24,352 individuals), with Steppe Eagle (16,287 individuals) also representing a major component of the migration. These species collectively accounted for the vast majority of all recorded movements and are characteristic of the major migratory flyways crossing the region.

Flight activity analysis indicates that only about 16.1% of all recorded birds flew within the 0–120 m altitude band, which corresponds to the collision-risk zone for overhead transmission lines (OHTLs). Consequently, approximately 83.9% of all birds were recorded above the collision-risk height, reducing their potential exposure to OHTL-related collisions.

Collision risk was assessed based on bird abundance, frequency of occurrence within the Shadwan OHTL corridor, cumulative time spent within the risk zone, and the proportion of movements recorded between 0–120 m altitude. The analysis demonstrates that:

- White Stork exhibits the highest collision exposure, with 23,063 individuals recorded within the 0–120 m risk zone, representing approximately 22% of all White Storks observed. Owing to its exceptionally high abundance, the species contributes the largest number of potentially exposed birds.
- Black Kite shows substantial exposure, with 5,151 individuals (20%) recorded within the risk zone and the longest cumulative time spent at risky altitudes (1,126 minutes), indicating prolonged use of low-altitude flight paths.
- Steppe Buzzard, despite a relatively low proportional exposure (10%), contributes significantly to overall collision risk because of its very high abundance, resulting in 4,777 individuals recorded within the risk zone and 1,660 cumulative minutes spent at risky altitudes.
- European Honey Buzzard also exhibits notable exposure, with 3,848 individuals (16%) recorded within the risk zone and a cumulative risk time of 528 minutes.
- Steppe Eagle shows comparatively low proportional exposure (4%), with 662 individuals recorded within the risk zone. However, its conservation importance and large body size make it a species of concern despite the lower risk percentage.
- Lesser Spotted Eagle, Short-toed Eagle, and Black Stork exhibited moderate exposure levels, with 88, 75, and 179 individuals, respectively, recorded within the risk zone. These species remain important from a conservation perspective and therefore warrant consideration in impact assessments.
- Several species, including Common Kestrel (60%), Montagu's Harrier (56%), Marsh Harrier (39%), Pallid Harrier (70%), and Golden Eagle (40%), showed relatively high proportions of

low-altitude flight. This indicates a behavioural susceptibility to collision risk; however, their overall contribution to cumulative impacts is limited due to their low abundance.

- Species such as Bonelli's Eagle, Crested Honey Buzzard, and Lesser Kestrel showed no recorded use of the 0–120 m risk band, indicating negligible collision exposure during the survey period.
- Although White Pelican was observed in relatively high numbers (8,392 individuals), only 13% of individuals were recorded within the risk zone, suggesting a generally lower collision exposure compared with the dominant soaring migrants.

Overall, the collision risk assessment indicates that White Stork, Steppe Buzzard, Black Kite, and European Honey Buzzard contribute most significantly to potential collision impacts due to their combination of high abundance and frequent use of the OHTL risk zone, while Steppe Eagle and other large raptors remain key species of concern because of their conservation significance despite lower exposure rates.

Table 1 Summary of Bird Migration Intensity and Collision Risk by Species – Spring 2025/26

Species/Spring 2025-26 (20 Feb – 20 May)	Accumulated Number of Birds	Accumulated Number of Records	Bird/h	Accumulated Time Spent (minutes)	Accumulated Number of Birds at Risky Altitudes (0-120 m)	Accumulated Number of Records at Risky Altitudes	Bird/h at Risky Altitudes (0-120 m)	Accumulated Time Spent at risky Altitudes (minutes)	Risk Bird Counts %	Risk Bird Time %
Black Kite	25427	1774	3.08	5559	5151	325	0.62	1126	20%	20%
Black Stork	1118	124	0.14	685	179	14	0.02	135	16%	20%
Booted Eagle	382	323	0.05	669	54	47	0.01	160	14%	24%
Common Kestrel	84	80	0.01	156	50	47	0.01	91	60%	58%
Egyptian Vulture	164	127	0.02	400	16	12	0.00	81	10%	20%
European Honey Buzzard	24352	686	2.95	2058	3848	179	0.47	528	16%	26%
Imperial Eagle	55	54	0.01	137	6	6	0.00	15	11%	11%
Lesser Spotted Eagle	1632	495	0.20	1341	88	48	0.01	132	5%	10%
Long-legged Buzzard	141	135	0.02	369	39	37	0.00	105	28%	28%
Marsh Harrier	138	110	0.02	248	54	48	0.01	101	39%	41%
Montagu's Harrier	9	9	0.00	18	5	5	0.00	10	56%	56%
Osprey	40	40	0.00	185	8	8	0.00	65	20%	35%
Pallid Harrier	10	9	0.00	24	7	6	0.00	16	70%	69%
Short-toed Eagle	778	537	0.09	1300	75	61	0.01	165	10%	13%
Sooty Falcon	1	1	0.00	1	1	1	0.00	1	100%	100%
Sparrowhawk	120	99	0.01	152	34	29	0.00	42	28%	28%
Greater Spotted Eagle	22	21	0.00	53	4	3	0.00	6	18%	11%
Steppe Buzzard	49400	2573	5.99	8511	4777	514	0.58	1660	10%	20%
Steppe Eagle	16287	2156	1.98	6687	662	242	0.08	745	4%	11%
White Pelican	8392	50	1.02	570	1102	14	0.13	197	13%	35%
White Stork	102870	282	12.47	3161	23063	39	2.80	488	22%	15%
Bonelli's Eagle	3	3	0.00	5	0	0	0.00	0	0%	0%
Crested Honey Buzzard	7	6	0.00	14	0	0	0.00	0	0%	0%
Eurasian Crane	71	4	0.01	12	3	1	0.00	2	4%	17%
Eleonora's Falcon	6	6	0.00	8	4	4	0.00	6	67%	75%
Golden Eagle	5	4	0.00	17	2	2	0.00	4	40%	24%
Eurasian Griffon	9	9	0.00	20	2	2	0.00	6	22%	30%
Peregrine Falcon	2	2	0.00	4	2	2	0.00	4	100%	100%
Eurasian Hobby	1	1	0.00	2	1	1	0.00	2	100%	100%
Lanner Falcon	1	1	0.00	2	1	1	0.00	2	100%	100%
Lesser Kestrel	1	1	0.00	2	0	0	0.00	0	0%	0%
Levant Sparrowhawk	12181	26	1.48	94	10	3	0.00	4	0.1%	4%

The autumn migration survey recorded 55,153 birds from the target soaring bird species, distributed across 1,530 observation records. Overall, the migration season was dominated by European Honey Buzzards, White Storks, and White Pelicans, which together accounted for more than 97% of all recorded individuals.

The European Honey Buzzard was by far the most abundant species, with 28,453 individuals (51.6% of all birds recorded). This was followed by the White Stork with 16,119 individuals (29.2%) and the White Pelican with 9,105 individuals (16.5%). All other species were recorded in substantially lower numbers, including Black Kite (790 individuals), Marsh Harrier (362 individuals), and Steppe Buzzard (157 individuals).

The high abundance of European Honey Buzzards is consistent with the importance of the Gulf of Suez region as a major autumn migration corridor for this species. White Storks and White Pelicans also showed strong migratory passages, typically occurring in large flocks during favorable weather conditions.

Collision risk was evaluated based on the proportion of birds recorded within the rotor-swept risk zone (0–120 m).

European Honey Buzzards: represented the greatest potential collision risk due to both its abundance and its flight altitude distribution:

- 21,800 birds (77%) were recorded within the risk altitude zone.
- 517 records occurred at risky altitudes.
- 1,431 minutes (60%) of the total observation time were spent within the risk zone.

This species therefore constitutes the principal contributor to seasonal collision risk and should be considered the key species of concern during autumn migration.

White Pelicans: were the second most important risk species in absolute terms:

- 2,755 birds (30%) flew within the risk zone.
- 42% of total flight time occurred at risky altitudes.

Although the percentage of birds within the risk zone was lower than for European Honey Buzzards, the large overall population size resulted in a substantial number of individuals potentially exposed to collision risk.

White Storks: were recorded in large numbers; however, their risk exposure was comparatively limited:

- Only 1,625 birds (10%) were recorded within the risk altitude band.
- 38% of flight time occurred in the risk zone.

The majority of migrating White Storks therefore flew at higher altitudes above the OHTLs area.

Raptors and Other Soaring Birds: Among raptors, several species showed relatively high proportions of flights within the risk zone despite their lower abundance:

MSB Species	Risk Bird Counts	Risk Bird Time
Sooty Falcon	86%	86%
Pallid Harrier	67%	61%
Marsh Harrier	60%	64%
Montagu's Harrier	57%	54%
Black Kite	49%	52%
Common Kestrel	45%	39%

The Marsh Harrier was particularly notable among raptors due to its relatively high abundance (362 individuals) and substantial proportion of flights within the risk zone (60% of birds and 64% of flight time). Consequently, Marsh Harriers may represent an important secondary risk species despite their much lower numbers compared with the dominant migratory species.

The Black Kite, although recorded in moderate numbers (790 individuals), also spent more than half of its flight time within the OHTL risk zone, indicating a moderate collision sensitivity during autumn migration.

Species with Negligible Risk: Several species were recorded in very low numbers and showed little or no exposure to collision risk such as Lesser Spotted Eagle, Steppe Eagle, Golden Eagle, and Lanner Falcon. These species either flew entirely above the risk zone or were observed too infrequently to contribute meaningfully to overall collision risk.

So, the overall autumn season conclusion was characterized by:

1. Very high passage rates of European Honey Buzzards, White Storks and White Pelicans, which together dominated seasonal migration.
2. European Honey Buzzard being the primary species of concern, owing to both its exceptional abundance and high proportion of flights within the OHTL risk zone.
3. White Pelicans representing a secondary collision-risk species because of the large numbers migrating through the area.
4. Marsh Harriers and Black Kites constituting the most relevant raptor risk species, given their relatively frequent use of risky flight altitudes.
5. Most other recorded species occurring in low numbers and contributing only marginally to overall collision risk.

Table 2 Summary of Bird Migration Intensity and Collision Risk by Species – Autumn 2025

Species/Autumn 2025 (10 Aug – 10 Nov)	Accumulated Number of Birds	Accumulated Number of Records	Bird/h	Accumulated Time Spent (minutes)	Accumulated Number of Birds at Risky Altitudes (0-120 m)	Accumulated Number of Records at Risky Altitudes	Bird/h at Risky Altitudes (0-120 m)	Accumulated Time Spent at risky Altitudes (minutes)	Risk Bird Counts %	Risk Bird Time %
Black Kite	790	150	0.10	526	391	79	0.05	273	49%	52%
Black Stork	1	1	0.00	3	1	1	0.00	3	100%	100%
Booted Eagle	9	9	0.00	33	3	3	0.00	7	33%	21%
Common Kestrel	51	49	0.01	98	23	22	0.00	38	45%	39%
Egyptian Vulture	11	5	0.00	10	1	1	0.00	2	9%	20%
European Honey Buzzard	28453	854	3.49	2396	21800	517	2.68	1431	77%	60%
Lesser Spotted Eagle	2	2	0.00	4	0	0	0.00	0	0%	0%
Long-legged Buzzard	12	11	0.00	26	4	3	0.00	8	33%	30%
Marsh Harrier	362	249	0.04	548	219	161	0.03	352	60%	64%
Montagu's Harrier	23	23	0.00	46	13	13	0.00	25	57%	54%
Pallid Harrier	18	17	0.00	43	12	10	0.00	26	67%	61%
Sooty Falcon	7	6	0.00	16	6	5	0.00	13	86%	81%
Sparrowhawk	9	8	0.00	12	3	3	0.00	5	33%	38%
Steppe Buzzard	157	59	0.02	420	44	21	0.01	212	28%	50%
Steppe Eagle	9	9	0.00	19	0	0	0.00	0	0%	0%
White Pelican	9105	46	1.12	181	2755	17	0.34	76	30%	42%
White Stork	16119	20	1.98	42	1625	7	0.20	16	10%	38%
Crested Honey Buzzard	1	1	0.00	2	1	1	0.00	2	100%	100%
Eleonora's Falcon	4	4	0.00	6	2	2	0.00	2	50%	33%
Golden Eagle	4	2	0.00	6	0	0	0.00	0	0%	0%
Eurasian Hobby	2	2	0.00	3	1	1	0.00	1	50%	33%
Lanner Falcon	4	3	0.00	6	0	0	0.00	0	0%	0%

Resting and Roosting Birds in the Vicinity of the Proposed OHTL Route

During the spring season, a total of 10,800 birds belonging to 21 soaring bird species were recorded resting or roosting in the vicinity of the proposed OHTL route. White Stork was by far the most abundant species, with 9,530 individuals recorded in 13 resting/roosting events, followed by White Pelican (391 individuals), Steppe Buzzard (264 individuals), Black Kite (255 individuals), and European Honey Buzzard (231 individuals). Other species, including Steppe Eagle (49 individuals), Black Stork (46 individuals), and several eagle, falcon, harrier, and raptor species, were recorded in relatively low numbers. Resting and roosting durations varied among species, with the longest cumulative times recorded for Black Stork (75 minutes), White Pelican (71 minutes), Steppe Buzzard (46 minutes), Egyptian Vulture (36 minutes), and Black Kite (34 minutes). Overall, the observations indicate that the vicinity of the proposed OHTL route was used as a temporary resting or roosting area by a diversity of migrating soaring birds, with White Stork being the dominant species.

The table below shows the resting and roosting birds in the vicinity of the proposed OHTL routes in spring 2026.

Table 3 Resting and Roosting (Re/Ro) bird activity recorded along the proposed OHTL Route in spring 2025

Species	Number of Birds	Number of Records	Total Time of Re/Ro in minutes
Unidentified Eagle	2	2	4
Black Kite	255	44	34
Booted Eagle	3	3	
Black Stork	46	3	75
Eleonora's Falcon	1	1	
Egyptian Vulture	2	1	36

Species	Number of Birds	Number of Records	Total Time of Re/Ro in minutes
European Honey Buzzard	231	14	1
Imperial Eagle	1	1	
Common Kestrel	2	2	
Long-legged Buzzard	6	4	5
Lesser Spotted Eagle	3	3	
Marsh Harrier	6	5	5
Osprey	1	1	35
Pallid harrier	1	1	2
Peregrine Falcon	1	1	
Steppe Buzzard	264	32	46
Short-toed Eagle	2	2	3
Sparrowhawk	3	3	3
Steppe Eagle	49	17	10
White Pelican	391	5	71
White Stork	9530	13	13

During the autumn season, a total of 656 soaring birds belonging to 11 species were recorded resting or roosting in the vicinity of the proposed OHTL route. White Pelican was the most abundant species, with 451 individuals recorded in three resting/roosting events, followed by European Honey Buzzard (182 individuals in 22 events). The remaining species were represented by relatively few individuals, including Marsh Harrier (10 individuals), Black Kite (6 individuals), Steppe Buzzard (2 individuals), and single individuals of Hobby, Montagu's Harrier, Unidentified Harrier, Osprey, Short-toed Eagle, and Sooty Falcon. Where recorded, the longest cumulative resting/roosting duration was for Steppe Buzzard (90 minutes), followed by Marsh Harrier (5 minutes) and Sooty Falcon (2 minutes). Overall, the vicinity of the proposed OHTL route was used as a temporary resting or roosting area by a limited number of soaring bird species during the autumn migration season, with White Pelican and European Honey Buzzard accounting for the majority of observations.

Table 4: Resting and Roosting (Re/Ro) bird activity recorded along the proposed OHTL Route in autumn 2025

Species	Number of Birds	Number of Records	Total Time of Re/Ro in minutes
Black Kite	6	3	
European Honey Bizzard	182	22	
Hobby	1	1	
Marsh Harrier	10	5	5
Montagu's Harrier	1	1	
Unidentified Harrier	1	1	
Osprey	1	1	
Steppe Buzzard	2	2	90
Short-toed Eagle	1	1	
Sooty Falcon	1	1	2
White Pelican	451	3	

Non-soaring Birds

During the spring season, a total of 3,808 birds belonging to 32 non-soaring species were recorded flying in the vicinity of the proposed OHTL route. European Bee-eater was the most abundant species, with 1,983 individuals, followed by Barn Swallow (841 individuals), Great Cormorant (378 individuals), House Martin (126 individuals), Sandgrouse (118 individuals), Short-toed Lark (101 individuals), Red-rumped Swallow (96 individuals), and Swift (83 individuals). The remaining species were represented by fewer than 50 individuals each. Most non-soaring birds were observed flying at low altitudes, predominantly within the 1–50 m and 1–120 m flight height bands. Only a few species exhibited higher dominant flight heights, including Great Cormorant (>300 m), Cattle Egret (200–300 m), and unidentified waders (120–180 m).

Table 5 Non-Soaring bird species and their dominant flight height in spring 2025

Row Labels	Total Number of Birds Recorded on the Proposed OHTL Route	Dominant Flight Height
Alpine swift	2	1-50
Barn Swallow	841	1-50
Bar-tailed lark	2	1-50
Blue-cheeked Bee-eater	32	1-50
Brown-necked Raven	26	1-50
Cattel Egret	3	200-300
Common Swift	2	1-50
Cream-colored Courser	9	1-50
Crowned Sandgrouse	24	1-120

Row Labels	Total Number of Birds Recorded on the Proposed OHTL Route	Dominant Flight Height
Desert Lark	3	1-50
European Bee-eater	1983	1-120
Great Cormorant	378	>300
Hooded Crow	1	1-50
Hoopoe Lark	2	1-50
House Martin	126	1-50
Lark Species	1	1-50
Lesser whitethroat	2	1-50
Masked Shrike	1	1-50
Mourning Wheatear	1	1-50
Red-rumped Swallow	96	1-50
Rock Dove	6	1-50
Rock Pigeon	13	1-50
Roller	1	1-50
Sand Martin	2	1-50
Sandgrouse	118	1-120
Short-toed Lark	101	1-50
Spotted Sandgrouse	15	1-50
Swift	83	1-50
Turtle Dove	1	1-50
Wader Sp	9	120-180
white Wagtail	3	1-50
Yellow Wagtail	1	1-50

During the autumn season, a total of 1,041 non-soaring birds belonging to 27 species were recorded flying in the vicinity of the proposed OHTL route. Great Cormorant was the most abundant species, with 494 individuals, followed by European Bee-eater (163 individuals), Sandgrouse (103 individuals), Purple Heron (96 individuals), Brown-necked Raven (29 individuals), Heron (28 individuals), and Short-toed Lark (26 individuals). The remaining species were represented by fewer than 25 individuals each. Most non-soaring birds were observed flying at low to moderate altitudes, predominantly within the 1–50 m, 50–120 m, and 120–180 m flight height bands. However, several species exhibited higher dominant flight heights, including Great Cormorant and Brown-necked Raven (180–300 m), European Bee-eater (240–300 m), and Purple Heron, which was predominantly recorded flying at altitudes exceeding 500 m.

Table 6 Non-Soaring bird species and their dominant flight height in autumn 2025

Row Labels	Total Number of Birds Recorded on the Proposed OHTL Route	Dominant Flight Height
Barn Swallow	24	50-120
Bar-tailed Lark	6	1-50
Brown-necked Raven	29	180-300
Cattle egret	2	180-300
Common Quail	1	1-50
Desert Lark	7	1-50
European Bee-eater	163	240-300
Great Cormorant	494	180-300
Grey Heron	1	9-180
Heron	28	1-50
Hoopoe lark	4	1-50
Isabelline wheatear	1	1-50
Namaqua Dove	1	1-50
Purple Heron	96	>500
Redstart	1	1-50
Reed Warbler	1	1-50
Rock Pigeon	6	1-50
Rüppell's Warbler	2	1-50
Sand Martin	6	1-50
Sandgrouse	103	120-180
Short-toed Lark	26	1-50
Spanish sparrow	16	1-50
Spotted Flycatcher	1	1-50
Wheatear	1	1-50
White Wagtail	19	1-50
Willow Warbler	1	1-50
Yellow wagtail	1	1-50

B. Impact Assessment

General

This assessment looks at the Shadwan OHTL, as there will be cumulative impacts across the Project area.

Impacts During Operational Phase

Direct and Indirect Impacts on Sensitive Receptors (Birds) – Collision with OHTL

e, i. The proposed OHTL route crosses part of the Rift Valley/Red Sea Flyway and extends for approximately 45 km through an area known to support substantial movements of migratory soaring birds. Site-specific monitoring undertaken during the Spring and Autumn 2025 migration seasons

recorded bird movements across the full length of the route; however, the monitoring data did not identify a discrete or geographically confined migration bottleneck within the proposed OHTL corridor. Instead, bird movements were observed across a relatively broad front, with migration intensity varying between different sections of the route. Consequently, migratory birds may approach, follow, or cross the proposed OHTL at multiple locations along the alignment.

The route partially traverses approximately 4 km of the Gebel El-Zeit Important Bird Area (IBA) and lies within the wider Rift Valley/Red Sea Flyway, which represents one of the principal migration routes used by soaring birds moving between Eurasia and Africa. This means that the proposed OHTL is located within a landscape that is regularly used by migratory birds during both spring and autumn migration periods, increasing the potential for interactions between birds and transmission infrastructure. Site-specific monitoring results and regional ornithological studies indicate that bird migration activity is generally higher within the northeastern sections of the route and in areas associated with important landscape features and existing migration pathways. As a result, these sections of the OHTL are considered to have a comparatively higher potential collision risk than other parts of the alignment.

In addition, the proposed OHTL will operate within a landscape that already contains existing and planned wind farms and transmission lines. Consequently, cumulative impacts have been considered to account for the potential interaction of multiple infrastructure developments with the same migratory bird populations.

The operation of OHTLs is likely to have an impact on birds as they are proven to have a mortality factor for migratory and soaring birds. In most cases, impacts from overhead powerlines lead to severe injuries or immediate death. In case of collision accidents, birds crash at high flight speed into cables or wires. The resulting injuries vary widely and are comparable to trauma caused by collisions with cars. Electrocution harms mostly birds sitting on the live components or having ground contact, but this is less of an issue with high power OHTL such as the one proposed here, that should be addressed and mitigated.

Table 7: MSBs likely to utilize OHTL area, their conservation status and notes on likelihood of site utilization

Common Name	Conservation Status	Notes
	IUCN	
Egyptian Vulture	EN	Recorded across the existing OHTLs corridor (occurred in spring and autumn seasons)
Steppe Eagle	EN	High numbers of birds recorded migrating across the proposed OHTL corridor (Mostly occurred in spring seasons). Migration through the AoI is likely
Sooty Falcon	VU	A minor bird registered on survey per season. Migration through AoI possible.
Pallid Harrier	NT	Recorded in low numbers during surveys. Migration through the AoI is likely.
Imperial Eagle	VU	Recorded in low numbers during surveys. Migration through the AoI is likely.
Greater Spotted Eagle	VU	Recorded in low numbers during surveys. Migration through the AoI is likely.

White Stork	LC	Very high numbers of birds recorded migrating across the proposed OHTLs corridor (mostly recorded in spring season) Migration through the AoI is likely.
Black Kite	LC	Very high numbers of birds recorded migrating across the proposed OHTLs corridor (mostly recorded in spring season). Migratory species through the flyway. Migration through the AoI is likely.
Steppe Buzzard	LC	Very high numbers of birds recorded across the proposed OHTLs corridor (mostly occurred in spring season). Migratory species through the flyway. Migration through the AoI is likely.
European Honey Buzzard	LC	Recorded across the proposed OHTLs corridor (mostly occurred in spring and autumn seasons). Migration through the AoI is likely.
White Pelican	LC	Recorded across the proposed OHTLs corridor (mostly occurred in spring and autumn seasons). Migratory species through the flyway. Migration through the AoI is likely.

Generally, any large soaring or fast flying species is at risk of collision with OHTLs. The size and flight behavior (and sometimes other biological characteristics) of these species results in a low level of detection and being able to avoid collision with such structures.

T.

Available evidence from both the Gulf of Suez OHTL post-construction fatality monitoring (PCFM) datasets (2021-2025) and the Spring and Autumn 2025 vantage point (VP) surveys indicate that collision exposure varies considerably among migratory soaring bird species. The VP surveys showed that several large soaring species, including Steppe Eagle, Egyptian Vulture and other eagle species, were predominantly recorded above the OHTL collision-risk height band (<120 m), resulting in relatively low exposure to transmission lines. Similarly, smaller and more maneuverable species such as falcons and harriers were generally recorded in lower numbers and are considered to have a greater ability to avoid transmission infrastructure during flight. Consistent with these observations, the PCFM datasets from existing regional OHTLs recorded relatively few collision fatalities for these species. In contrast, Black Kite, Steppe Buzzard, European Honey Buzzard, White Stork and White Pelican demonstrated either higher levels of activity within the collision-risk height band or higher recorded collision rates on existing OHTLs and are therefore considered more susceptible to collision impacts. These findings are supported by both the site-specific VP monitoring undertaken for the proposed Shadwan OHTL and the regional OHTL fatality monitoring datasets used in this assessment. However, factors such as adverse weather conditions, reduced visibility, and resting or roosting behavior may increase collision exposure for all migratory species during certain periods.

As noted within “Assessment of Baseline Conditions” a compounded and cumulative risk assessment was undertaken by RCREEE and Safe Soar, which is presented in the Figure below. The results of this assessment show a range of high and very high collision risk areas within the proposed OHTL line. The expected risk of MSB collision is higher in the Northeastern OHTL segments compared with the Southwestern OHTL segments. However there are areas of medium risk throughout the powerlines, and although the risk maybe be moderate in sections, collisions are still possible except for a small section where it meets the project the results of this analysis categorize the OHTL as very high risk .

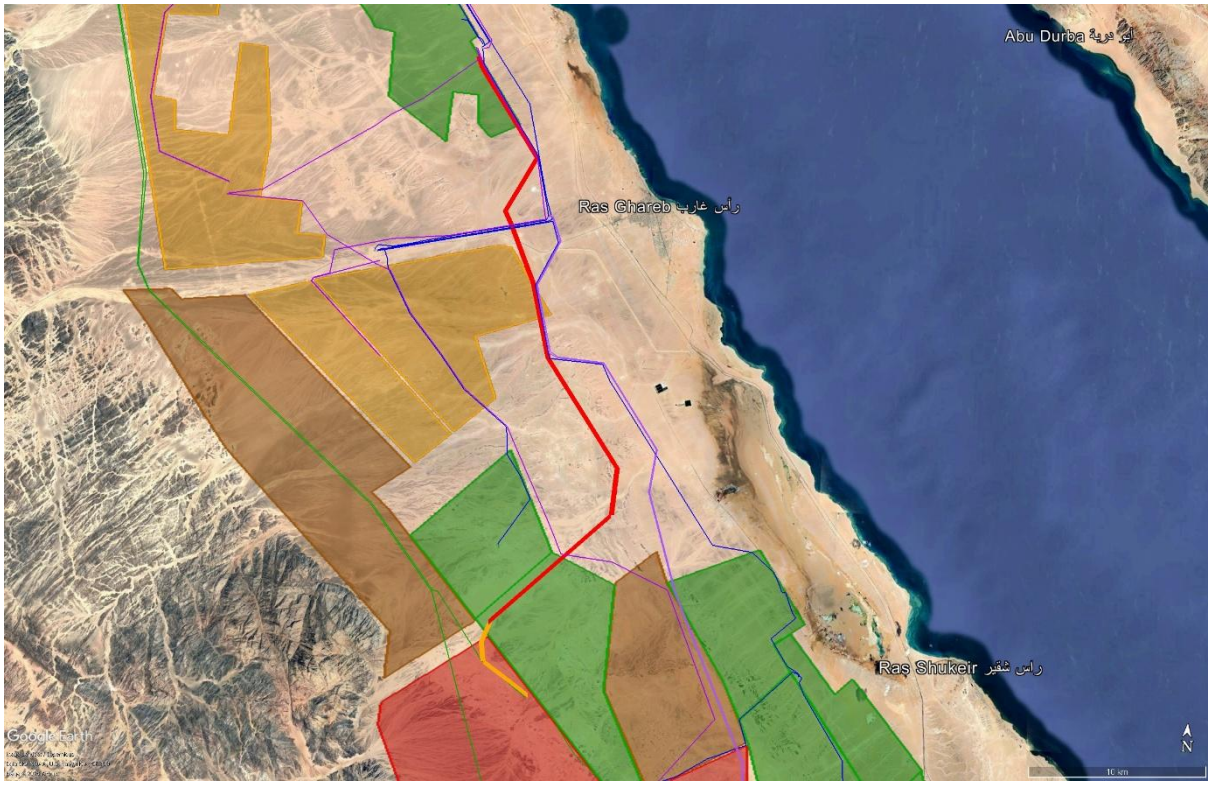


Figure 11: Compounded and cumulative risk assessment for predicted bird collisions along the proposed Shadwan OHTL for spring and autumn seasons (orange color for High Risk, red color for Very High Risk).

Using available data from the monitoring of confirmed bird casualties along existing OHTLs (RGWE, RSWE, WBWF, AMUNET, Zaafarana, NREA (KFW, FIEM, JICA) in the vicinity of the wind farm and proposed routes of the OHTL, an assessment has been undertaken to show predicted collision of MSBs for NIAT & RASGHA OHTLS for both worst case scenario and realistic case scenario as presented in the table below.

Following fatality monitoring at other wind farms locally, it has been predicted that, without the use of diverters, some MSBs will have a high number of collisions per year across the proposed OHTL lines as presented in the table below. White Storks are predicted to have over 27 collisions per year for Shadwan OHTL (45km) without mitigation. Without mitigation this will have a significant impact, however mitigation is discussed in further details below.

Collision Exposure and Fatality Estimation Methodology

Annual collision mortality estimates were derived using a two-step approach. First, a Collision Exposure Index (CEI) was calculated for each species using site-specific monitoring data collected along the proposed Shadwan OHTL corridor during the Spring and Autumn 2025 migration seasons. Secondly, the CEI was converted into annual fatality estimates using species-specific collision probabilities derived from observed mortality records on existing OHTLs in the Gulf of Suez and expert judgement regarding relative species vulnerability.

The Collision Exposure Index was calculated as follows: CEI = Total Number of Birds Recorded × (% of Individuals Flying within the OHTL Risk Height Band) × (% of Total Flight Time Spent within the OHTL Risk Height Band), where:

- Total Number of Birds Recorded = total number of individuals observed during migration surveys;
- % within Risk Height Band = proportion of birds flying within the collision-risk height (<120 m above ground level);
- % Flight Time within Risk Height Band = proportion of total observed flight time recorded within the collision-risk height.

The resulting CEI represents the relative exposure of each species to potential collision with the proposed Shadwan OHTL.

We assume species vulnerability classification and collision probabilities for worst/realistic case scenarios based on our expertise and judgment based on known species susceptibility as follows:

Species	Vulnerability Class	Assumed Collision Probabilities for Worst Case Scenario	Assumed Collision Probabilities for Realistic Case Scenario
Large soaring birds (White Pelican, White Stork)	Very High	0.010	0.0065
Large eagles (Steppe Eagle, Imperial Eagle, Egyptian Vulture)	High	0.006	0.004
Large non-raptors (Eurasian Crane)		0.005	0.0035
Medium raptors (Black Kite, Steppe Buzzard, Honey Buzzard)	Moderate	0.003	0.002
Harriers (Montagu's, Marsh, Pallid Harrier) (low flight but agile)	Low to Moderate	0.002	0.00125
Falcons, Kestrels (fast, maneuverable)	Low	0.001	0.00065

The CEI values were converted into annual fatality estimates using species-specific collision probability factors. These factors were derived from observed collision patterns on existing OHTLs within the Gulf of Suez region and account for differences in body size, maneuverability, flocking behavior and known collision susceptibility.

The calculation applied was: Predicted Annual Fatalities = Collision Exposure Index × Collision Probability. Two sets of collision probabilities were applied:

- Worst-Case Scenario: based on collision rates observed on coastal OHTLs with higher bird densities and mortality rates.
- Realistic Case Scenario: based on collision rates observed on inland OHTLs considered most representative of the proposed Shadwan OHTL alignment.

The annual species-specific fatalities presented in Table 8 therefore represent the application of these probability coefficients to the CEI values calculated from site-specific monitoring data.

Table 8: Predicted Fatalities per Year for Proposed Shadwan OHTL

MSB Species	Collision Exposure Index Spring[3]	Collision Exposure Index Autumn	Collision Exposure Index per year	Worst Case Scenario based on Site-Specific Prediction	[4]Realistic Case Scenario
Black Kite	1043.4	202.8	1246.1	3.7	2.5
Black Stork	35.3	1.0	36.3	0.4	0.2
Booted Eagle	12.9	0.6	13.6	0.1	0.1
Common Kestrel	29.2	8.9	38.1	0.04	0.0
Egyptian Vulture	3.2	0.2	3.4	0.0	0.0
European Honey Buzzard	987.2	13020.7	14007.9	28.0	21.0
Imperial Eagle	0.7	0.0	0.7	0.0	0.0
Lesser Spotted Eagle	8.6	0.0	8.6	0.1	0.0
Long-legged Buzzard	11.1	1.2	12.3	0.0	0.0
Marsh Harrier	22.1	140.7	162.8	0.3	0.2
Montagu's Harrier	2.8	7.1	9.8	0.0	0.0
Osprey	2.8	0.0	2.8	0.0	0.0
Pallid Harrier	4.9	7.3	12.2	0.0	0.0
Short-toed Eagle	9.5	0.0	9.5	0.1	0.0
Sooty Falcon	1.0	4.9	5.9	0.0	0.0
Sparrowhawk	9.4	1.1	10.6	0.0	0.0
Greater Spotted Eagle	0.5	0.0	0.5	0.0	0.0
Steppe Buzzard	931.7	22.2	953.9	2.9	1.9
Steppe Eagle	73.7	0.0	73.7	0.4	0.3
White Pelican	381.5	1156.8	1538.3	15.4	10.0
White Stork	3561.7	619.0	4180.8	41.8	27.2
Bonelli's Eagle	0.0	0.0	0.0	0.0	0.0
Crested Honey Buzzard	0.0	1.0	1.0	0.0	0.0
Eurasian Crane	0.5	0.0	0.5	0.0	0.0
Eleonora's Falcon	3.0	0.7	3.7	0.0	0.0
Golden Eagle	0.5	0.0	0.5	0.0	0.0
Eurasian Griffon	0.6	0.0	0.6	0.0	0.0
Peregrine Falcon	2.0	0.0	2.0	0.0	0.0
Eurasian Hobby	1.0	0.3	1.3	0.0	0.0
Lanner Falcon	1.0	0.0	1.0	0.0	0.0
Lesser Kestrel	0.0	0.0	0.0	0.0	0.0
Levant Sparrowhawk	0.4	0.0	0.4	0.0	0.0

It should be noted that the species-specific annual fatality estimates presented in Table 8 are derived from the Collision Exposure Index methodology and therefore do not represent a direct extrapolation of the average fatalities-per-kilometre values recorded on reference OHTLs. The reference OHTL

[3] Collision Exposure Index (CEI) = Total Birds × (% at risky altitude) × (% of time at risky altitude) mentioned in Table 1. CEI for White Stork in Spring 2025 is 102870*22.42%*15.44% =3561.7

[4] Assumed collision probability for large soaring birds under the Realistic Case Scenario: 0.0065. So, Predicted Annual Fatalities in Spring 2025: 3,561.7 × 0.0065 = 23.15. Considering Autumn 2025, the final annual fatality estimate presented in Table 8 is 27.2 White Storks per year under the Realistic Case Scenario.

datasets were used to calibrate species-specific collision probabilities, while the final mortality predictions are driven primarily by site-specific exposure data collected along the proposed Shadwan OHTL corridor.

C

Impact Evaluation

The significance of bird collision impacts associated with operation of the proposed Shadwan OHTL has been assessed in accordance with the methodology presented in Section 3.4 of the Main ESIA.

Migratory soaring birds (MSBs) are considered receptors of High Sensitivity due to the international importance of the Gulf of Suez migration corridor, the presence of the Gebel El-Zeit Important Bird Area (IBA), and the occurrence of species of conservation concern including Egyptian Vulture (Endangered), Steppe Eagle (Endangered), Eastern Imperial Eagle (Vulnerable), Greater Spotted Eagle (Vulnerable) and Sooty Falcon (Vulnerable).

Without mitigation, collision impacts would occur throughout the operational life of the Shadwan OHTL and would represent direct mortality of individual birds. The impact would be long-term in duration and irreversible at the individual level. Based on the realistic-case fatality predictions presented in Table 8, collision mortality is expected to occur annually, particularly for White Stork, European Honey Buzzard, White Pelican, Black Kite and Steppe Buzzard. However, predicted mortality levels are low relative to the regional populations migrating through the Gulf of Suez flyway each year.

The impact extent is considered regional because the affected bird populations migrate through a wider flyway extending beyond the Project area. The likelihood of occurrence is considered likely because bird collisions with OHTLs are a well-documented phenomenon and have been recorded on existing overhead transmission lines within the Gulf of Suez.

Considering the predicted mortality rates, affected population size, conservation status of the species concerned, duration, reversibility and extent of the impact, the pre-mitigation magnitude is assessed as Medium. Applying the ESIA significance matrix and considering the High Sensitivity of the receptor, the pre-mitigation impact significance is assessed as Moderate to Major.

Mandatory mitigation measures have been incorporated into the Project design, including installation of Bird Flight Diverters (BFDs) along the entire OHTL shield wire. Based on published literature and regional monitoring data from comparable OHTLs, BFDs are expected to reduce collision mortality by approximately 50%. In addition, the Project will implement long-term post-construction fatality monitoring and an adaptive management program to identify collision hotspots and implement additional mitigation measures if required.

Following implementation of these mitigation and monitoring measures, the residual collision mortality is expected to reduce substantially. Consequently, the residual impact magnitude is assessed as Low to Medium. Applying the significance matrix, the residual impact significance is assessed as Moderate and acceptable with mitigation, monitoring and adaptive management measures in place.

Table 9: Impact Significance Assessment for Bird Collisions with the Proposed Shadwan OHTL

Assessment Criterion	Evaluation

Impact Type	Direct mortality due to collision with OHTL
Receptor	Migratory Soaring Birds (MSBs)
Receptor Sensitivity	High
Extent	Regional
Duration	Long-term (Operation Phase)
Reversibility	Irreversible at individual level
Likelihood	Likely
Magnitude (Without Mitigation)	Medium
Significance (Without Mitigation)	Moderate to Major
Key Mitigation Measures	BFD installation along entire shield wire, PCFM, Adaptive Management
Magnitude (Residual)	Low to Medium
Residual Significance	Moderate

The collision mortality estimates presented in Table 8 are based on species-specific Collision Exposure Indices (CEIs) derived from site-specific bird migration monitoring undertaken along the proposed Shadwan OHTL corridor during the Spring and Autumn 2025 migration seasons. Under the Realistic Case Scenario, the highest predicted annual collision mortality is associated with White Stork (27.2 birds/year), European Honey Buzzard (21.0 birds/year) and White Pelican (10.0 birds/year), reflecting their relatively high exposure within the OHTL collision-risk zone and their known susceptibility to collisions with overhead transmission lines. The high predicted collision mortality for White Stork is primarily driven by the exceptionally high number of individuals recorded during site-specific monitoring along the proposed Shadwan OHTL corridor and the resulting high Collision Exposure Index. This prediction is based on project-specific exposure data and therefore differs from the lower mortality levels recorded on some inland reference OHTLs, which reflect local conditions within those monitored alignments rather than overall exposure within the wider migration corridor.

Bird Flight Diverters (BFDs) will be installed along the entire shield wire of the proposed OHTL as a mandatory mitigation measure. Based on published literature and regional monitoring data from comparable OHTLs within the Gulf of Suez, BFD installation is expected to reduce collision mortality by approximately 50%. Following implementation of BFDs, annual collision mortality is predicted to decrease to approximately 13.6 White Storks/year, 10.5 European Honey Buzzards/year and 5.0 White Pelicans/year, with corresponding reductions expected for other species.

These residual mortality estimates form the basis of the impact significance assessment and will be verified through the Post-Construction Fatality Monitoring (PCFM) program implemented throughout the operational life of the Project. Monitoring results will be reviewed through the adaptive management framework, and additional mitigation measures will be implemented by EETC where monitoring indicates mortality levels higher than those predicted by this assessment.

~~Magnitude was evaluated using predicted mortality levels, conservation status of affected species, affected population size, duration, reversibility and spatial extent. The highest predicted impacts relate to abundant migratory species, including White Stork, European Honey Buzzard and White Pelican. However, implementation of mandatory mitigation measures, including installation of Bird Flight Diverters, is expected to substantially reduce mortality levels. Following mitigation, residual impacts are considered moderate for priority migratory species and minor for all remaining species, subject to verification through post-construction monitoring.~~

C. Mitigation

Operational Phase

Direct and Indirect Impacts on Sensitive Receptors (Birds) – Collision with OHTL

Due to the requirements and length of the OHTL, routing options will never be able to completely avoid the risk to migratory birds or the risk of collision impacts. However, as discussed earlier within "Section Error! Reference source not found." one factor considered with siting by EETC was to align the route with existing OHTL route. Studies by Pallet et al. (2022) have shown that aligning and staggering the towers could reduce collisions of collision prone MSBs by 67%.

The proposed design of the towers and lines are possibly the least impactful possible as the towers are free standing with no support wires.

An extensive literature review and meta-analysis was performed (Bernardion et al. 2019) to evaluate the overall effectiveness of wire-marking in reducing bird collisions with powerlines, including the possible influencing factors of powerline voltage, habitat and type of device. Data was gathered from 35 field studies across the world (which included 66 trials) assessing the effectiveness of wire-marking based on regular carcass searches beneath power lines. Overall, wire-marking reduced bird collisions with power lines by 50.4%.

Mitigation is being installed to reduce the operational impact of the OHTL on migrating birds including birds of prey, waterbirds and other large soaring birds. The below table shows the difference in collision predictions with and without diverter mitigation. The results, based on local OHTL data, show that there is a reduction in collisions through the use of diverters and therefore this has been recommended for this project.

While high-voltage OHTLs present relatively low electrocution risk, this risk is not negligible, particularly at jumper connections and substation interfaces where conductor spacing is reduced. Appropriate mitigation measures, such as insulation of critical components and bird-safe substation design, will be implemented to minimize any residual risk.

Table 10 Comparison of Annual Bird Collisions per Species Before and After Diverter Installation

MSB Species	Collisions per year without diverters	Collisions per year with diverters
Black Kite	2.5	1.2
Black Stork	0.2	0.1
Booted Eagle	0.1	0.0
Common Kestrel	0.0	0.0
Egyptian Vulture	0.0	0.0
European Honey Buzzard	21.0	10.5
Imperial Eagle	0.0	0.0
Lesser Spotted Eagle	0.0	0.0
Long-legged Buzzard	0.0	0.0
Marsh Harrier	0.2	0.1
Montagu's Harrier	0.0	0.0
Osprey	0.0	0.0
Pallid Harrier	0.0	0.0
Short-toed Eagle	0.0	0.0
Sooty Falcon	0.0	0.0
Sparrowhawk	0.0	0.0
Greater Spotted Eagle	0.0	0.0
Steppe Buzzard	1.9	1.0
Steppe Eagle	0.3	0.1
White Pelican	10.0	5.0
White Stork	27.2	13.6
Bonelli's Eagle	0.0	0.0
Crested Honey Buzzard	0.0	0.0
Eurasian Crane	0.0	0.0
Eleonora's Falcon	0.0	0.0
Golden Eagle	0.0	0.0
Eurasian Griffon	0.0	0.0
Peregrine Falcon	0.0	0.0
Eurasian Hobby	0.0	0.0
Lanner Falcon	0.0	0.0
Lesser Kestrel	0.0	0.0
Levant Sparrowhawk	0.0	0.0

Based on the results of the PCFM Program conducted along the OHTLs crossing the GoS region, the estimated annual bird collision fatality rate is consistent with the findings of the present assessment. The values derived from the initial analysis fall within the same range as those reported by the PCFM Program, indicating that the predicted collision risk is comparable and aligns with regional benchmarks for overhead transmission lines within this high-use migratory corridor.

Bird Flight Diverters (BFDs) are to be installed every 10 m along the entire length of the OHTL on the shield wire. All BFDs installed will be dynamic (*e.g.* move in the wind) to increase visibility. However, A hybrid approach combining dynamic and static bird diverters will be adopted to ensure both high visibility and durability under desert conditions, supported by regular maintenance to ensure continued effectiveness. The BFDs installed within 4km of the dam will include models that glow or

light up at night (e.g. FireFly diverters) to increase visibility for birds staging in the area and arriving late or leaving early.

The Project Developer is committed to procuring diverters that meet the required long-term guarantee and specifications and take part in their installation. Installation of shield/earthing wire and attached BFDs will be completed by EETC around the same time (as practicably possible). BFDs will be installed by EETC to the manufacturer's guidance and assessment of the OHTL, taking into consideration number and spacing, at a minimum of 1 every 10m. Although EETC will be responsible for the construction, operation and maintenance of the OHTL, implementation of the proposed bird collision mitigation measures will be secured through regulatory requirements and existing institutional arrangements applicable to the Project. Specifically, the environmental permit issued by the Egyptian Environmental Affairs Agency (EEAA) is expected to include a condition requiring the installation and maintenance of BFDs along the OHTL. Compliance with this requirement will therefore form part of EETC's environmental obligations during project implementation. In addition, in accordance with the cooperation protocol established between EEAA, EETC, NREA and RCREEE, post-construction fatality monitoring (PCFM) for the Shadwan OHTL will be implemented by RCREEE following the approved monitoring methodology and reporting requirements. The results of the PCFM program will be reviewed by the relevant authorities and stakeholders to assess the effectiveness of the mitigation measures and identify any emerging collision hotspots. Where the monitoring results indicate that additional mitigation measures are required, adaptive management actions will be implemented by EETC in accordance with the conditions of the EEAA permit and the recommendations arising from the PCFM program. Compliance with mitigation, monitoring and adaptive management commitments will be documented through periodic reporting and review by the competent authorities and relevant stakeholders.

The installation of BFDs will need to be recorded by Project Ecologist and these checks need to be included in the annual reports. BFDs should be checked every 6 months before the spring and autumn migration seasons so that they are in place and operational for higher risk periods. Any damaged or defective BFDs will need to be replaced within 2 months of being reported as faulty.

However, the need for and extent of replacing damaged / defective BFDs will be undertaken following a review of the outcomes of the PCFM studies (discussed in further details below). This issue will be discussed in agreement with lenders and other relevant stakeholders.

Indirect Impacts on Sensitive Receptors

- Ban on off-road driving, especially during sensitive periods of the year (e.g. breeding bird season) and if off-road driving is required a check of the working area should be completed by the Project's Ecologist.
- Speed limits to be enforced.
- Sensitive species are to be included in the site induction for all operational staff where additional control measures will be discussed including allowing animals to move around the site, not chasing after them in vehicles or approaching them on foot and what to do if they observe breeding birds within their works areas.

In addition, if any significant maintenance work is required (e.g. replacement of any transmission towers or wires etc.) all impacts related to construction will be relevant and all mitigation outlined in previous sections will be followed.

Also, the EETC construction team of the OHTL will work in full harmonization and compliance with Health, Safety, and Environment (HSE) local standards and regulations and so related developer's regulations and procedures during both OHTL's construction and operation phases.

D. Monitoring

Long-term monitoring of Project AoI will be completed as set out above and will include:

- Post-construction fatality monitoring to be completed in the first three years of operation to record the actual impact of collisions with the OHTL. Additional surveys and/or mitigation measures to be implemented as part of an Adaptive Management Strategy if no sufficient decrease in fatalities has been recorded.
- All of the above monitoring requirements will be included within Construction and Operational Biodiversity Management Plans which will include KPIs and a Biodiversity Monitoring and Evaluation Plan (BEMP) against which the results of the monitoring will be assessed.

Avifauna

- Operational monitoring will be completed in line with best international practice presented in Post-Construction Bird and Bat Fatality Monitoring for Onshore Wind Energy Facilities In Emerging Market Countries (EBRD, IFC, KfW 2023) to monitor actual levels of mortality. Post construction fatality monitoring will be completed along the whole OHTL and the program of post construction monitoring will include carcass searching, searcher efficiency trials and carcass persistence trials. The results of the post-construction fatality monitoring will be used to inform a GenEst Analysis. Post-construction monitoring will follow the latest international best practice including the recently published PCFM Handbook (EBRD, IFC, KFW 2023). Full details of the PCFM Protocol will be included in an Operational BMP/BAP document.
- An adaptive management strategy will be developed (in line with the PCFM Handbook), and additional mitigation will be undertaken if the results of the post-construction fatality monitoring indicate higher than predicted mortality, especially in relation to species of elevated conservation concern. Adaptive management could include retrofitting of BFDs (or different types of BFD) on unmarked lines where PCFM surveys indicate areas of elevated mortality or provision of additional BFDs on marked lines if the installed BFDs are not preventing (or reducing) mortality. This could include installation of additional BFDs or those that are shown to increase avoidance / reduce collision in species susceptible to OHTL impacts. Installation of BFDs can be undertaken using a drone and would not require powerlines to be disconnected. Installed mitigation (if deemed necessary and useful) could also be changed if additional research into the effectiveness of BFDs comes to light during the construction period which would be agreed with lenders.
- . Post-construction fatality monitoring will be undertaken during the spring and autumn migration seasons throughout the operational life of the Project. The PCFM program will follow internationally recognized methodologies and will include carcass searches, carcass persistence trials, searcher-efficiency trials and statistical correction of observed mortality estimates. This will be undertaken with the Lenders.

- A chance finds procedure will be implemented and any carcasses seen by site workers will be reported to the Project Ecologist so that they can investigate.

E. Cumulative Impacts

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Cumulative Impacts with the other wind farms and other OHTLs schemes

The cumulative impacts between the turbines and the OHTL have been considered. Without mitigation it is likely there would be a significant impact on MSBs. .Shutdown-on-demand measures reduce collision mortality associated with wind turbines and therefore contribute to reducing overall cumulative impacts on migratory bird populations at the landscape scale. However, such measures do not directly reduce collision risk associated with overhead transmission lines. Accordingly, OHTL collision risk has been assessed independently and mitigated through installation of Bird Flight Diverters and implementation of long-term monitoring and adaptive management measures. An adaptive management scheme is proposed which will monitor higher than predicted mortality and further mitigation undertaken.

There are several wind farms in operation within the same area with associated OHTLs, and therefore the addition of new OHTL lines may have a cumulative impact on species within the area (see Figure below).

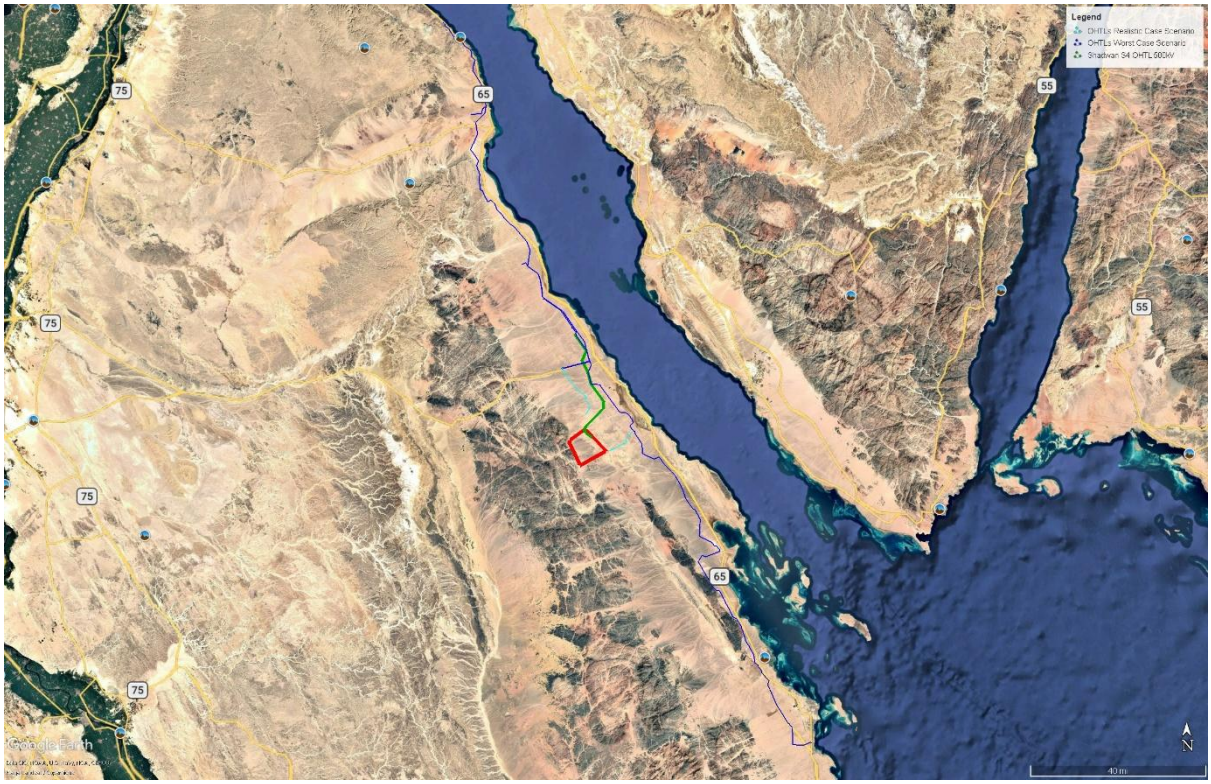


Figure 12: Reference (Analogue) OHTLs Used for Collision Mortality Estimation Showing OHTLs Applied in the Realistic-Case (Turquoise color) and Worst-Case (Blue color) Scenarios and the Location of the Proposed Shadwan OHTL (Green Color)

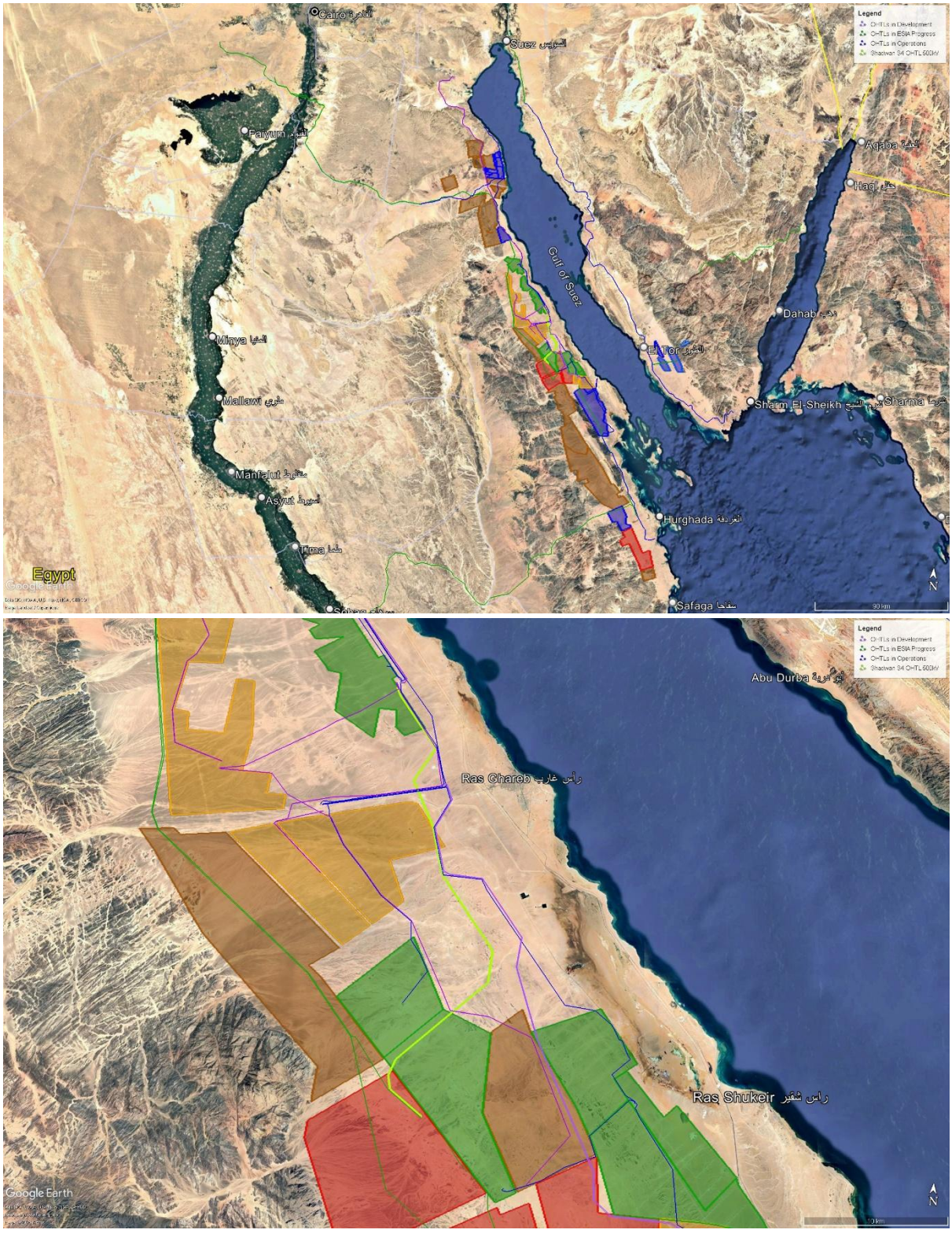


Figure 13: Wind and OHTL schemes within the Gulf of Suez (UP focus GOS region) (Down focus on Shadwan OHTL route)

Because of this the aforementioned projects have been considered within this assessment as each project could potentially affect the same populations of migratory birds. For example birds migrating through Masdar IPH, RGWE, NREA Vesta, and AMUNET are likely to move across the NIAT & RASGHA wind farm and could also possibly migrate through its associated OHTLs.

For those projects already constructed or for those with impact assessments no significant residual impact are predicted after the application of impact avoidance through project design or additional mitigation has been applied such that residual impacts were considered to be minor / not significant.

Where residual negative impacts are possible and cannot be effectively mitigated, off-setting[5] will be applied to ensure no net loss to these VECs. Collision risk and electrocution residual impacts for other species (e.g. raptors) is not significant for any of these projects. The Shadwan OHTLs consists of one large 500KV transmission lines which will be constructed with BFDs. Collision risk of other species will therefore be minimal as BFDs are known to be effective at significantly reducing collision in other species and electrocution risk for raptors is minimal on HV lines due to their size (and visibility), insulation, distance between any live parts and size of pylons providing ample safe perching opportunities well away from any dangerous components.

Adaptive Management for Avifauna

Adaptive management is triggered when target thresholds in Section 4.5 Table 14 of the Shadwan CEA are exceeded and when new evidence acquired over time shows an increased or decreased risk to a priority bird VEC or an increased risk to a non-priority population. Increased risk to priority birds requires that mitigation and management measures be revised to uphold thresholds and promote the long-term viability of the population. For priority bird VECs that exhibit a decreased risk over time, their primary threshold target may be reassessed and revised or reassigned to reflect the reduced risk to their long-term population viability. Non-priority populations that exhibit evidence of increased risk may be assigned as priority bird VECs, may have an appropriate threshold determined and may be subject to associated adaptive management response strategies. Threshold setting is a key component of adaptive management within the CEA as it provides a mechanism for dealing with the uncertainty associated with determining priority bird populations and with predicting thresholds for priority bird VECs.

[5] The need for biodiversity offsets will be determined through the residual impact assessment following mitigation and will be triggered where significant residual impacts remain on VECs. This process will be aligned with IFC PS6/EBRD PR6 and formalized within the Biodiversity Action Plan.