DJIBOUTI PORTS & FREE ZONES AUTHORITY
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AFC
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CLIMATE FUND MANAGERS

Ghoubet 60MW Onshore Windfarm

Environmental and Social Impact Assessment

Volume II : ESIA Report

Final

Ghoubet 60MW Onshore Windfarm ESIA

Client: DJIBOUTI CONSORTIUM

- Africa Finance Corporation
- Great Horn Investment Holding SAS (GHIH)
- Nederlandse Financierings-Maatschappij coor Ontwikkelingslanden N.V (FMO)
- Climate Investor One (CIO)

Ghoubet 60MW Onshore Windfarm ESIA: 0438399-R02

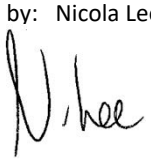
Status and Revision: Rev C

Date: July 2018

Prepared by:

For and on behalf of
Environmental Resources Management

Approved by: Nicola Lee

Signed: 

Position: Partner

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This page is a record of all revisions in this document. All previous issues are hereby superseded.

Client	Djibouti Consortium	**Number**	0438399-R02
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Summary

Revision	Date	Description	Prepared	Reviewed	Approved
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VOLUME II – ESIA REPORT

TABLES

FIGURES

VOLUME III – ANNEXES

ABBREVIATIONS & ACRONYMS

AFC	Africa Finance Corporation
AoI	Area of Influence
AoO	Area of Occupancy
CBD	United Nations Convention on Biological Diversity
CBE	Complementary Basic Education
CBO	Community Based Organisations
CE	Critically Endangered
CHPS	Community Based Health Planning and Service
CIO	Climate Investor One
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CLTS	Community Led Sanitation
CP	Completely Protected
CR	Critically Endangered
CSP	Close Season Protected
DD	Data Deficient
DMU	Discrete Management Unit
EDD	Eléctricité de Djibouti
EHS	Environmental, Social, Health and Safety
EIA	Environmental Impact Assessment
EMI	Electromagnetic Interference
EN	Endangered
EPs	Equator Principles
EPRP	Emergency Preparedness Response Plan
ERM	Environmental Resources Management
ESIA	Environmental and Social Impact Assessment
ESMMF	Environmental and Social Management and Monitoring Framework
ESMMP	Environmental and Social Management and Monitoring Plan
FGD	Focus Group Discussion
FMO	Nederlandse Financierings-Maatschappij coor Ontwikkelingslanden N.V.
GHIH	Great Horn Investment Holding SAS
GII	Gender Inequality Index
GIIP	Good International Industry Practices
GM	Grievance Mechanism
GNI	Gross National Income
GRI	Global Reporting Initiative
HDI	Human Development Index
HH	Household
IBA	Important Bird and Biodiversity Area
ICT	Information Communication Technology
IEMA	Institute of Environmental Management and Assessment
IFC	International Finance Corporation
IFI	International Finance Institution
IGF	Internally Generated Fund
ILO	International Labour Organisation
IRENA	International Renewable Energy Agency
IUCN	International Union for Conservation of Nature and Natural Resources
KII	Key Informant Interviews
LACP	Land Acquisition and Compensation Plan
LARP	Land Acquisition and Resettlement Plan
LC	Least Concern
LRF	Livelihood Restoration Framework

MRI	Magnetic Resonance Imagining
MW	Megawatt
NGO	Non-Governmental Organisations
NITS	National Interconnected Transmission System
NT	Near Threatened
ONEAD	Office National de l'Eau et de l'Assainissement de Djibouti
PM	Project Manager
POL	Petroleum, Oils and Lubricants
PP	Partly Protected
ProNet	Professional Network
PS	Performance Standards
QA	Quality Assurance
RN	Route Nationale
SAoI	Social Area of Influence
SEP	Stakeholder Engagement Plan
STI	Sexually Transmitted Infection
UNDP	United Nations Development Program
USAID	United States Agency for International Development
VP	Vantage Point
VU	Vulnerable
WATSAN	Water and Sanitation
WCR	Wildlife Conservation Regulation
WHO	World Health Organisation

1 INTRODUCTION

1.1 PURPOSE OF REPORT

This report is the Environmental and Social Impact Assessment (ESIA) for a proposed 60 MW (megawatt) windfarm located between Lake Assal and Lake Ghoubet in the Arta Region of the Republic of Djibouti (the Project). The location of the Project is shown in Figure 1.1.

The Project comprises of wind turbines with a capacity of up to 4.8 MW, an aerial cable network, up to 10 km of new access roads, an on-site substation, a grid connection, a permanent meteorological mast and associated construction and operation facilities. A detailed description of the Project is provided in Section 3.

The report has been prepared for Africa Finance Corporation (AFC), Great Horn Investment Holding SAS (GHIH), Nederlandse Financierings-Maatschappij coor Ontwikkelingslanden N.V. (FMO) and Climate Investor One (CIO) as part of a development consortium (the Consortium) by Environmental Resources Management (ERM), INSUCO and Combined Ecology.

The ESIA is required to meet local permitting requirements to gain permission for construction and operation. In addition, to ensure the Project's equity partner policies, standards and requirements are adhered to and met, the ESIA will also be completed to meet the International Finance Corporation (IFC) Performance Standards (PS), Equator Principles, World Bank Group's (WBG) Environmental and Social guidelines, including the Environmental, Health and Safety (EHS) General Guidelines and EHS Guidelines for Wind Energy.

1.2 PROJECT BACKGROUND

Djibouti's electricity is primarily generated by conventional thermal power stations in the country. However, with no proven reserves of oil or natural gas and no known coal reserves, electricity being produced is dependent on imported oil and therefore susceptible to price fluctuations. Djibouti also imports hydroelectric energy from Ethiopia via a high-voltage interconnection that has been in operation since 2012. The interconnection provides a cost effective supply of electricity throughout the year. However, power imports are not guaranteed because Ethiopia regularly curtails supply, particularly during its dry season (September to February). During the rainy season (June to August), failures of the Ethiopian transport network often lead to unplanned interruptions.[1] With national energy demand increasing between 3-5% annually[2], the country needs to develop new, more sustainable methods of energy production.

According to the *Djibouti Renewables Readiness Assessment* produced by the International Renewable Energy Agency (IRENA)[3], the Government of Djibouti has identified the renewable energy sector as a national priority and it is playing an

[1] International Development Association Project Appraisal Document on a Proposed Credit to the Republic of Djibouti for a Sustainable Electrification Program, The World Bank (2017) http://documents.worldbank.org/curated/en/778201496628036819/Djibouti-Sustainable-Electrification-Program-Project [*accessed May 2018*]
[2] "Power Africa" & Partner Country Energy in the News (2015) www.usaid.gov [*accessed March 2018*]
[3] Djibouti Renewables Readiness Assessment, May 2015, International Renewable Energy Agency (IRENA) http://www.irena.org/documentdownloads/publications/irena_rra_djibout_2015_en.pdf [*accessed May 2018*]

important role in the country's strategy for economic development. In this report the Minister of Energy in charge of Natural Resources states that the country's "energy policy aims primarily to diversify and reduce dependence on imported oil products, increasing the share of renewable energy and biofuels to make Djibouti the first African nation using 100% green energy".

The government has explored wind energy since 2000, including site selection studies and pre-feasibility studies. The studies identified the Gulf of Ghoubet as one of the most suitable areas in Djibouti for a windfarm due to its consistent high wind speeds throughout the year. The development of this Project is a direct response to these opportunities to improve the diversity and security of Djibouti's electricity supply. Further detail on the justification for the Project is provided in Section 3.2.

The Consortium is working with Djibouti's National Electricity Utility (Electricité de Djibouti - EDD), the state-owned utility which operates under the oversight of the Ministry of Energy and Natural Resources (MENR), to realise the wind energy potential of the Project site. EDD is responsible for the generation, transmission and distribution of electricity throughout the country. Since 2015, independent electricity producers are allowed to participate in the production of energy via negotiated purchase contracts with EDD[(1)].

EDD are also in the process of expanding the electricity distribution network throughout Djibouti, with current plans to install a high-voltage (230 kV) transmission corridor in parallel to the RN9 road, within proximity of the Project site (shown in Figure 3.2). The Project will connect into this new transformer ('EDD Ghoubet transformer') via a short (3.5 km) overhead transmission line.

[1] As per Act No. 88/AN/15/7th L promulgated on 03 March 2015

Figure 1.1
Project Location

PROJECTION: WGS 1984 UTM Zone 38N

SOURCE: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap

Path: P:\Projects\0438399 AFC Ghoubet Wind Farm.BP\02 Working Files\GIS\MAPS\ESIA Report\0438399_ProjectLocation_A02.mxd

1.3 ESIA TEAM

The core team members involved in undertaking this ESIA are listed in Table 1-1.

Table 1-1 The ESIA Team

Name	Role	Qualifications, Experience
Ms Nicola Lee	Project Director (ERM)	BSc, MSc, 19 years
Mr Ben Pizii	Project Manager (ERM)	BSc, MSc, 12 years
Ms Josie Preece	Project Coordinator (ERM)	BSc, MSc, 6 years
Mr Peter Wright	Environmental lead (ERM)	BSc, MSc, 13 years
Ms Tracey Draper	Socio-economic lead (ERM)	BSc, MSc, 17 years
Mr Houssein Rayaleh	Environmental lead (Combined Ecology)	20 years
Dr Pascal Rey	Socio-economic lead (INSUCO)	PhD, 15 years

1.4 PURPOSE OF ESIA

The purpose of the ESIA process is to identify and manage non-technical risks and opportunities of a project that emerge from interactions with the physical, biological or socioeconomic environments and stakeholders (such as regulatory authorities or local communities)[(1)].

The Djiboutian environmental impact assessment procedure (Décret n°2011-029/PR/MHUEAT) requires that any power installation of more than 2 megawatts (MW) be subject to detailed environmental impact study (refer to Section 2.3 for further detail on relevant environmental legislation). The Consortium have therefore commissioned an ESIA to be undertaken for the Project to comply with this requirement. The ESIA will be submitted to the Ministry of Housing, Urban Planning, Environment and Town Planning (MHUE); the competent authority and responsible for overseeing the ESIA process in Djibouti.

In addition, as previously mentioned, the ESIA will also be completed to meet the International Finance Corporation (IFC) Performance Standards (PS); standards used to manage environmental, social, and health and safety impacts, risks and opportunities (refer to Section 2.5 and 2.6 for further detail on the applicable standards and associated guidelines, such as the World Bank Group EHS Guidelines).

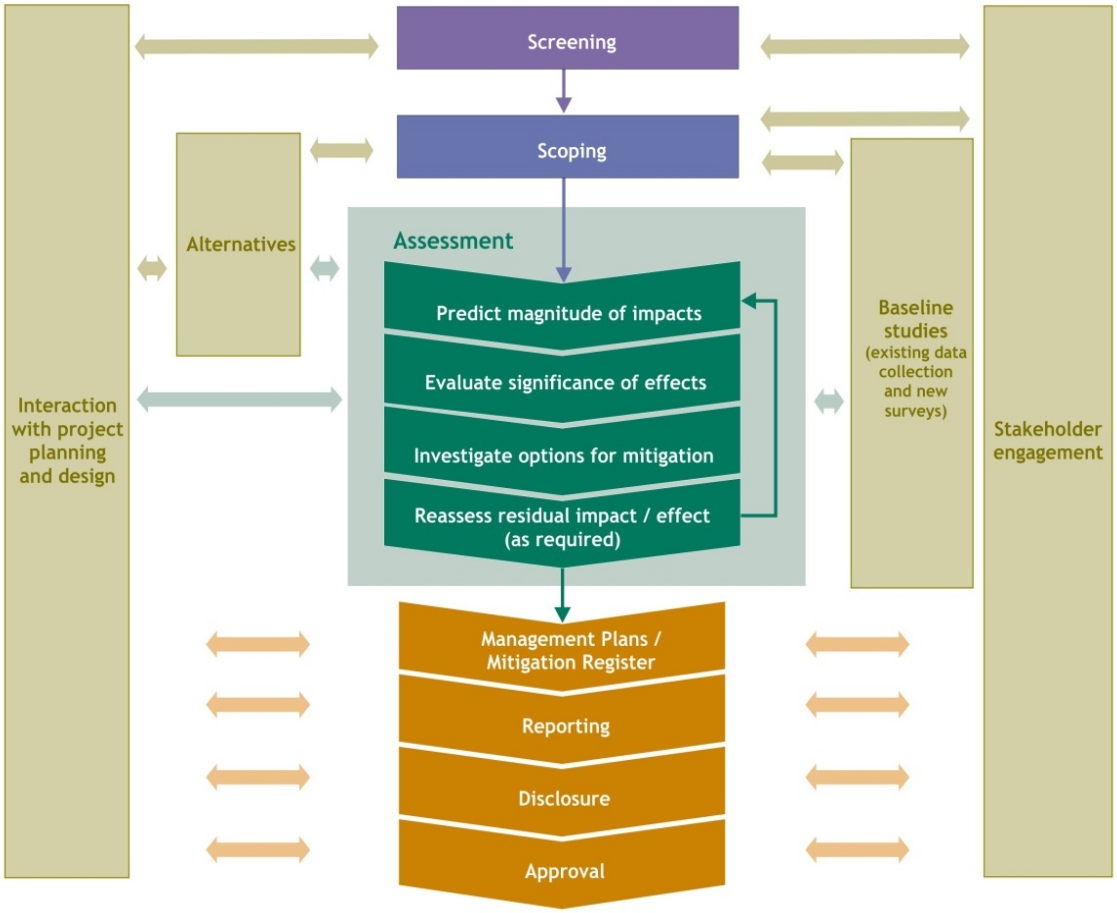
1.5 ESIA PROCESS

The ESIA process predicts and evaluates any likely significant effects of a project on the receiving environment and identifies measures to avoid, reduce, remedy, offset or compensate for adverse impacts, and also to provide benefits, to the extent these are reasonably practicable.

[1] The elegibility criteria for being a Project stakeholder, as well as a list of identified stakeholders, are presented in the Stakeholder Engagement Plan (SEP) in Section 5 of *Annex G*.

The ESIA process undertaken for the Project is shown in Figure 1.2.

Figure 1.2 ESIA Process



Source: ERM (2015)

The initial screening of the Project against applicable local laws and regulations and the IFC PS indicated that the Project may pose environmental or social risks that need to be further assessed through the additional steps of the ESIA process, as per IFC guidance(1).

Subsequently, scoping was completed for the Project. Scoping has an important role to play in achieving proportionate and effective ESIA by focusing subsequent work on the significant issues. A Scoping Report was prepared for the Project in February 2018 and submitted to the Consortium(2). The Scoping Report presented the results of the baseline desk studies and used the evidence base to justify proposed approaches to the ESIA, the levels of detail for different topics and clear arguments for scoping certain matters out, if they reasonably can be. A summary of the potential key environmental and social issues/impacts associated with the construction, operation and decommissioning of the Project to be assessed in the ESIA, as detailed in the Scoping Report, are set out in Table 1-2(3)

[1] IFC Guidance Note 1 Assessment and Management of Environmental and Social Risks and Impacts, January 1, 2012 https://www.ifc.org/wps/wcm/connect/b29a4600498009cfa7fcf7336b93d75f/Updated_GN1-2012.pdf?MOD=AJPERES [*accessed May 2018*]

[2] Refer to the Scoping Report in *Annex A* for further information on the scoping process of the ESIA.

[3] With regard to Indigenous Peoples, the Afar people, who inhabit the region that the Project site is located within, are not considered to be an indigenous people according to IFC PS7 or United Nations definitions and no futher assessment will be conducted under IFC PS7 in the ESIA. Refer to the Scoping Report in *Annex A* for further detail.

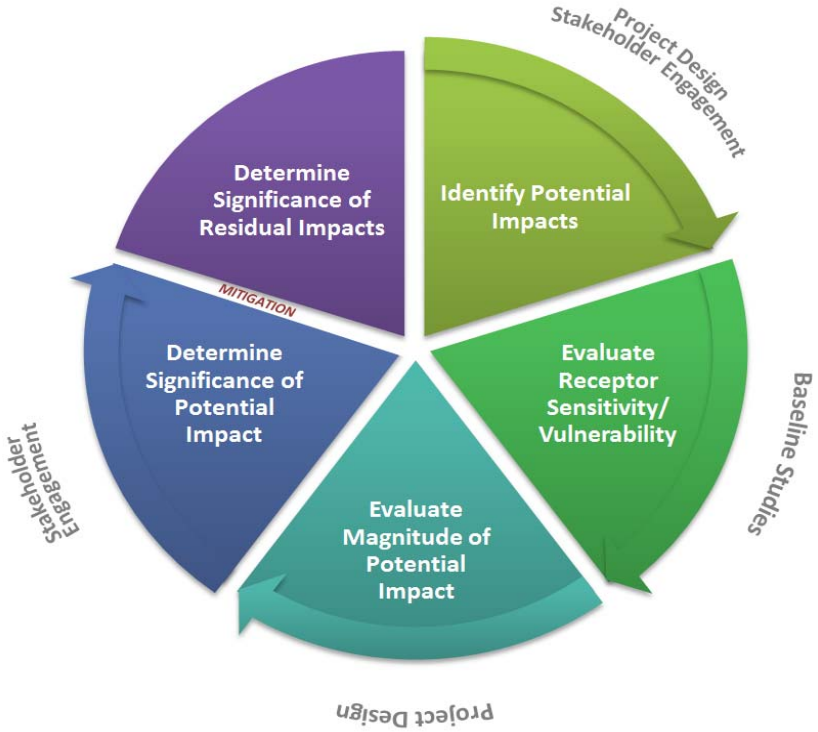
Table 1-2 Potential Key Environmental and Social Issues/Impacts

E&S Topic	Potential Issue / Impact
Land and soils	- Groundworks and construction activity resulting in soil compaction and loss of soil stabilising vegetation.
Noise & vibration	- Noise of construction activities (including blasting). - Noise from wind turbine operation.
Biodiversity	- Disturbance of wildlife due to vehicles, machinery and workforce on-site during construction and operation. - Collision risk for birds and bats during turbine operation.
Cultural heritage	- Groundworks and construction activity resulting in impacts on features of cultural heritage through ground disturbance.
Landscape & visual	- Changes to the landscape character of the area. - Visual impact on the area from viewpoints in nearby communities.
Air quality	- Limited, temporary and localised increase in emissions and dust generation from construction activities.
Surface water and groundwater	- Groundworks, creation of access roads and earthworks resulting in changes to surface water flows.
Community health, safety and security	- Noise disturbance during construction and operation. - Potential for transmission of communicable and non-communicable diseases. - Health impact from shadow flicker on local residents. - Restricted access during construction may comprise safety through trespassing into hazardous areas on the site. - Risk to safety arising from increased traffic and oversized vehicles. Presence of the workforce and worker-community interactions.
Community cohesion	- Community related tensions within and between communities resulting from land take, presence of the workforce and stakeholder's perceptions related to project benefits (e.g. employment and community investment). - Influx of jobseekers and workforce.
Pressure on public services and infrastructure	- Recruitment and expectations from job seekers resulting in an influx of job seekers into the area putting pressure on public services (i.e. health) and infrastructure. - Pressure on water resources.
Employment, procurement and the economy	- Direct employment opportunities through project recruitment. - Indirect employment opportunities arising from procurement, presence of the workforce and job seekers. - Taxes and royalties made by the project.
Traffic	- Transport of Project components and construction materials. - Movement of workers to and from Project site during construction and operation.
Tourism	- Construction traffic and construction activity resulting in impacts on access to tourist attractions.
Climate change	- Increased greenhouse gas (GHG) emissions from construction activities. - Clean, renewable energy will be produced during operation of the windfarm avoiding consumption of higher GHG emitting alternatives.
Unplanned events	- Spills of fuels and oils during construction activities and incidents involving construction traffic. - Failure of equipment or turbine damage during operation.
Cumulative impacts	- Impacts of the Project acting cumulatively with those of other planned or proposed projects.

The Scoping Report was presented to MHUE in February 2018 and the Consortium was advised to proceed with undertaking the impact assessment, and prepare and submit the Draft ESIA.

The impact assessment is an iterative process in which findings provide feedback through a number of stages as illustrated in Figure 1.3.

Figure 1.3 Impact Assessment Process



Source: ERM (2017)

1.6 ESIA STRUCTURE

The remainder of this report is structured as follows:

Section 2	Legislation and Standards
Section 3	Project Description
Section 4	Assessment of Alternatives
Section 5	Stakeholder Engagement
Section 6	Baseline Conditions
Section 7	Impact Assessment
Section 8	Unplanned Events
Section 9	Environmental & Social Management and Monitoring

The report is supported by the following annexes and technical reports:

Annex A	Scoping Report
Annex B	Biodiversity Studies
Annex C	Noise Survey and Modelling Report
Annex D	Landscape and Visual Assessment
Annex E	Shadow Flicker Assessment
Annex F	Social Field Survey Report
Annex G	Stakeholder Engagement Plan
Annex H	Livelihood Restoration Framework
Annex I	Impact Assessment Topic-Specific Methodologies

2 LEGISLATION AND STANDARDS

2.1 INTRODUCTION

This section sets out the administrative framework for the Project. It describes the Djiboutian laws and regulations that are relevant to the development of the Project. It also describes the industry standards and EHS policies and standards that the Project has adopted.

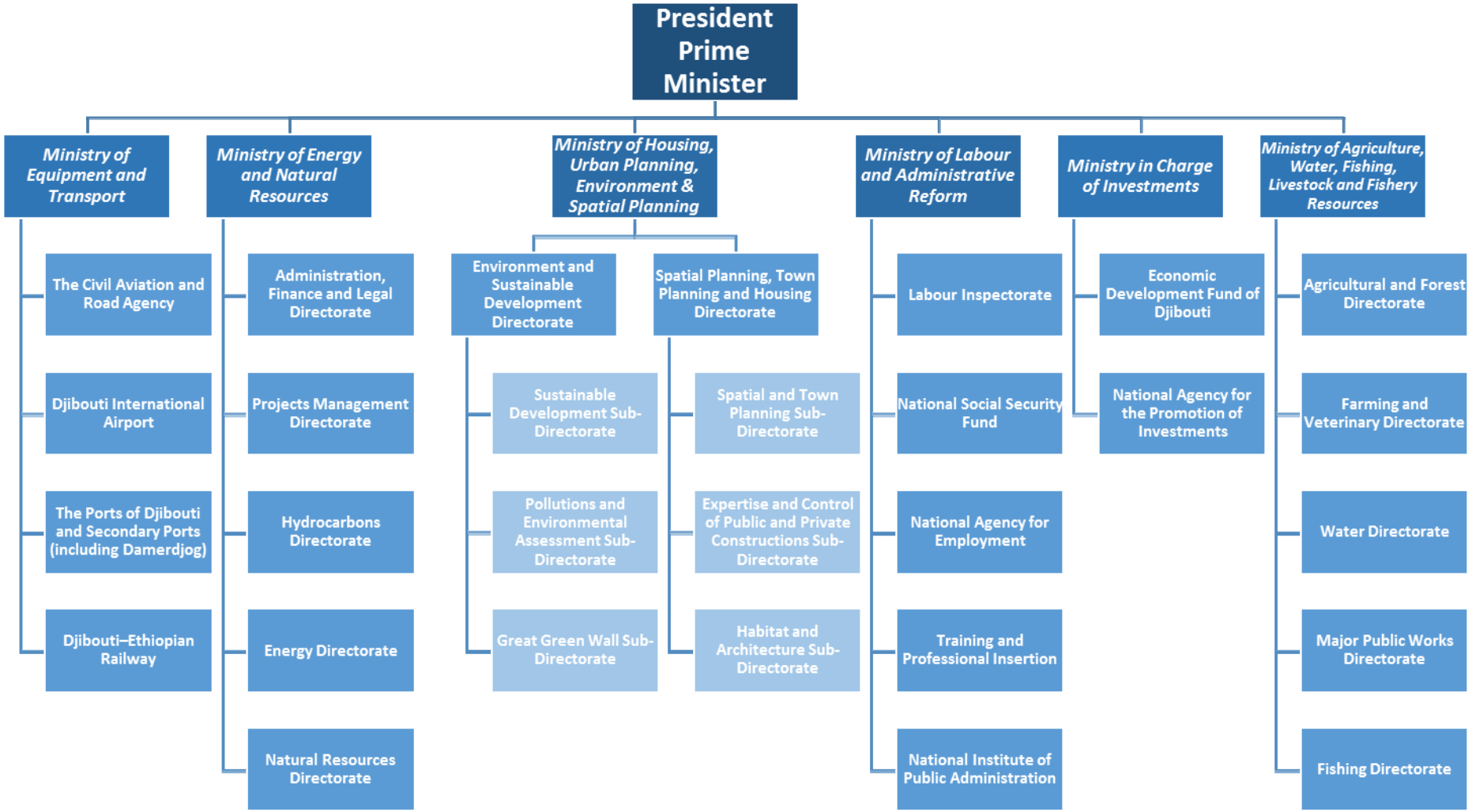
2.2 GOVERNMENT ADMINISTRATION

An overview of Djiboutian government ministries and the key administrative bodies (i.e. authorities, agencies and commissions) with responsibilities related to the project is given below and illustrated in Figure 2.1.

- Ministry in charge of Investments under the Presidence;
- Ministry of Labour and Administrative Reform;
- Ministry of Housing, Urban Planning, Environment, & Town Planning;
  - Spatial Planning, Town Planning and Housing Directorate;
  - Environment and Sustainable Development Directorate;
- Ministry of Energy and Natural Resources;
- Ministry of Equipment and Transport; and
- Ministry of Agriculture, Water, Fishing, Livestock and Fishery Resources.

The duties and authorities of the relevant administrative bodies within these key Ministries are discussed further below.

Figure 2.1 Relevant Djibouti Ministries and Directorates



Source: ERM (2018)

2.2.1 Ministry in Charge of Investments under the Presidence

The Ministry oversees the administrative aspects of public and private investments, links the government strategies with the Ministries and coordinates the Ministries to facilitate investments in the country. The Ministry also engages with private investors to enable government programmes and public-private partnerships.

2.2.2 Ministry of Labour and Administrative Reform

The Ministry is responsible for implementing government policy in the areas of labour, employment, employability, social relations, management of agents of the State and social protection. The Ministry drafts and implements the rules on working conditions, collective agreements and rights of employees. It also drafts and implements the administrative reform.

The Ministry has authority over the Labour Inspectorate. A number of public institutions fall under the supervision of the Ministry, including: the National Agency for Employment, Training and Professional Insertion (ANEFIP), the National Institute of Public Administration (INAP), the National Social Security Fund (CNSS).

2.2.3 Ministry of Housing, Urban Planning, Environment, & Town Planning (MHUE)

The Ministry is responsible for drafting and implementing policies related to the habitat, urban development, environment and spatial planning in order to promote a balanced and harmonious development of the territories. In addition, MHUE is tasked with drafting and implementing the urban and regional development policy. It is responsible for urban and regional planning between districts and between regions, including in terms of urban development, infrastructure and urban equipment, with the view to fight insecurity and social inequality.

The Ministry also develops legislative and regulatory instruments, monitors environmental standards in the areas of infrastructure, housing, equipment, transport and energy in partnership with the other relevant ministries. It is in charge of enforcing and overseeing environmental impact studies.

Spatial Planning, Town Planning and Housing Directorate

The Directorate is tasked with drafting, implementing and controlling, over the territory, the ministerial policies in relation to territory development and spatial planning, town planning, habitat as well as public and private constructions.

The functions of the Directorate are outlined below:

- design and implement public policies in relation to spatial planning;
- assess needs, design and implement programs for all urban areas including habitat and urban planning, as well as public and private constructions; and
- draft regulations in relation with the Directorate's role.

The Directorate is comprised of three sub-directorates, namely:

- Spatial and Town Planning Sub-Directorate – responsible for formulating a sectoral strategy for urban management and development, for drawing up regulations and monitoring their application.
- Housing and Architecture Sub-Directorate – responsible for formulating a sectoral housing development strategy and implementing it at national, regional and local levels.
- Expertise and Control of Public and Private Constructions Sub-Directorate – responsible for checking construction plans and design from the building permit

phase to construction completion and monitors the compliance of construction works with the authorities.

Environment and Sustainable Development Directorate[1]

The Directorate is tasked with drafting, implementing and controlling the ministerial policies in relation to the environment and sustainable development over the territory.

The functions of the Directorate are outline below:

- strengthen the institutional and judicial framework in terms of environmental matters;
- contribute to natural resources protection;
- implement relevant instruments to monitor and control the state of the environment;
- implement impact studies and provide opinions on development projects that may impact the environment;
- prevent and mitigate all form of pollutions and nuisances that may adversely impact human health and the environment;
- implement relevant controls and assist legal entities in terms of environmental matters;
- along with other relevant Ministries, integrate the "environmental" dimension within development programs such as in education, training, research and information;
- implement environmental projects; and
- promote cooperation with international non-governmental organisations, national associations and local communities in the environmental arena.

The Directorate is comprised of three sub-directorates, namely:

- Sustainable Development Sub-Directorate ;
- Pollutions and Environmental Assessment Sub-Directorate ; and
- Great Green Wall Sub-Directorate.

2.2.4 Ministry of Energy and Natural Resources

The Ministry is responsible for the implementation of the sectoral policies relating to energy and natural resources, including renewable energy, and to the promotion and development of oil and mining resources, both onshore and offshore. The Ministry is also tasked with implementing policies relating to access to and supply of electricity across the territory.

The Ministry comprises the following five Directorates:

1. Administration, Finance and Legal Directorate;
2. Projects Management Directorate ;
3. Hydrocarbons Directorate;
4. Energy Directorate; and
5. Natural Resources Directorate.

[1] Engagement with the relevant Ministries is done through the Director of the Environment and Sustainble Development, as the single point of contact, who will disseminate relevant information to other Ministires

2.2.5 *Ministry of Equipment and Transport*

The Ministry is responsible for the implementation and coordination of road, rail, sea and air transport policies as well as of the national meteorological services. It is also responsible for the management, operation, maintenance and renovation of public facilities. In addition, the Ministry is responsible for designing and implementing the government's policy on road, ports and airport infrastructure.

The following entities fall under the umbrella of the Ministry: Djibouti–Ethiopian Railway; The Ports of Djibouti and Secondary Ports (including Damerdjog); Djibouti International Airport and The Civil Aviation and Road Agency.

2.2.6 *Ministry of Agriculture, Water, Fishing, Livestock and Fishery Resources*

The Ministry is responsible for the implementation of sectoral policies in the areas of food security, rural development and water. It is also responsible for promoting and developing animal and plant production, improving plant cover, studying and exploiting water resources, as well as fish production. It is in charge of preparing, coordinating and implementing the Government's food security policy and rural development policy. It is responsible for the preparation and implementation of the government's water policy in both urban and rural areas. In the field of sanitation, and jointly with the relevant ministries, the Ministry is responsible for coordinating and implementing the government's sanitation policy through the design and implementation of the master plan and sanitation infrastructure.

The Ministry comprises the following five Directorates:

1. Agriculture and Forest Directorate;
2. Farming and Veterinary Vervices Directorate;
3. Water Directorate;
4. Major Public Works Directorate; and
5. Fishing Directorate.

2.3 RELEVANT NATIONAL LEGISLATION

Table 2-1 outlines the Djiboutian legislation relevant to this Project and Figure 2.2 outlines the national Djibouti EIA Process as governed by this legislation.

Table 2-1 Djiboutian Legislation Applicable to the Project

Name of Law	*Description*
General	
Loi n°171/AN/91 establishing and organizing the public domain	Establishes the basic regime of the natural and artificial public domain of the State and the relative easements to which land and buildings of private property are subject. The minister in charge of the domain grants by decree the authorizations to occupy the public domain and to build there.
Loi n° **172** / AN / **91** / 2e L Regulating compulsory purchase order for public use	This law regulates the expropriation for public utility, which is carried out by authority of justice and whose procedure comprises 4 phases: the declaration of public utility; the cessation order, the essential purpose of which is to determine the properties to be expropriated and to give interested persons the opportunity to assert their rights and produce their titles; the pronouncement of expropriation by authority of justice; fixing the expropriation indemnity by a clerk.

Name of Law	*Description*
Loi n° 177 / AN / 91 / 2eL organization of land ownership	Establishes a land conservation service, which is responsible for guaranteeing property owners the roles they have in these buildings by registering all the buildings with the land books and publishing them. Registration is mandatory and final.
Environmental Management	
Loi n°51/AN/09/6ème L bearing the code of the environment	Environmental Code establishes the basic rules and fundamental principles of national policy in the field of environmental protection and management.
Décret n°2011-029/PR/MHUEAT Revision of the environmental impact assessment procedure	Defines the scope of application and execution methods of environmental impact assessments. Any activity likely to induce negative impacts on the environment must be subject to a preliminary impact assessment.
Loi n° 121 / AN / 01 / 4th L approving the National Action Plan for the Environment (PANE) 2001-2010	This law is the approval of the National Action Plan for the Environment 2001-2010.
Décret n°2004-0065/PR/MHUEAT Biodiversity Protection	Applies the Convention of Biological Diversity to regulate or manage biological resources of importance for the conservation of biological diversity within and outside protected areas within Djibouti.
Loi n° 45 / AN / 04 / 5th L on the Establishment of Protected Terrestrial and Marine Areas	Applies the special provisions of the Convention on Biological Diversity, in particular in its paragraph 8a which states that each Contracting Party "shall establish a system of protected areas or areas where special measures shall be taken to conserve biological diversity"
Décret nº 80-62/PR/MCTT of 25 May 1980 on the protection of fauna and the seabed	Outlines measures to protect and conserve terrestrial and marine wildlife and the seabed focusing on islands. Including restriction of spearfishing, the maintenance of Musha Territorial Park and the creation of a protected area at Maskali.
Décret nº 83-021/PR/S.A.M. Recasting of the Commission for the protection of wildlife and underwater	Establishes the Commission for the protection of fauna and the seabed. The Commission is to study the issues of protection and enrichment of fauna and the seabed.
Décret n°2001-0108/PR/MAEM Approving the National Action Plan for the fight against desertification	The National Action Plan to Combat Desertification (NAP) is adopted as an instrument for the implementation of the National Action Plan for the Environment (PANE).
Loi n°10/AN/03/5ème L and Loi n°9/AN/03/5ème L Ratification of the Agreement on the Conservation of African-Eurasian Migratory Water birds	Provides for the protection of migratory birds (Africa-Eurasia) and ratification of the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention).
Loi n°133/AN/11/6ème L Ratification of the Great Green Wall Convention	Provides for the establishment of the Pan-African Agency for the Great Green Wall (Ratification of the Convention). The Great Green Wall is an African-led initiative to grow an 8000km 'wall' of vegetation across the width of Africa to combat desertification and impacts from climate change.
Décret n°2009-062/PR/MHUE establishes an inter-ministerial steering committee of the national component of the Great Green Wall	Provides for the establishment of the inter-ministerial committee for the Great Green Wall (with a Bureau dedicated to the related projects under Décret n°2011-036/PR/MHUEAT).
Loi No.38/AN/99/4emeL, Arrêté No.2003-0767/PR/MHUEAT and Décret No.2004-0066/PR/MHUEAT	Establishes a dedicated committee to fulfil the Vienna Convention for the Protection of the Ozone Layer (1985) and adopt a national plan to phase-out ozone-depleting substances, to regulate the import of substances that deplete the ozone layer with an annual quota.
Loi n°133/AN/05/5ème du 26 janvier 2006 The Labour Code	The Code regulates all activities involving the use of labour and imposes obligations on employees.
Loi n°28/AN/13/7 ème L Law on migrant workers	Establishes the level of fees applicable for work permits awarded to foreign workers.
Land and Building Laws	
Décret n°2004-0092/PR/MHUEAT Creation of a national commission for sustainable development	Responsible for drawing up a National Action Plan for Sustainable Development and a Strategic Framework.
Act No.178/AN/91/2nd L Property law	Regulates property law throughout the country.

Name of Law	*Description*
Arrêté n°2000-0555/PR/MHUEAT Establishing a National Housing Committee	The National Habitat II Committee, formed on the basis of the Urban Planning Advisory Committee (CCU) during the preparation of the United Nations Conference on Human Settlements, Habitat II, in June 1996, is reorganized to integrate the new composition of Ministries and public services.
Décret n°2004-0230/PR/MHUEAT establishing a national council of regional planning (CNAT)	Creation of the National Council of Regional Planning for the development and monitoring of the land planning policy.
Act No.102/AN/05/5th L The Land Domain and Conservation Directorate	Set up under the Ministry of Economy, Finance and Land Planning (art.4), is in charge of managing public and private domain of the State (art.7).
Arrêté n°2006-0515/PR/MHUEAT Obligation for the Ministerial Departments, the Public Establishments and the Project Units to resort to the assistance of the State Technical Services during the realization of works of urban development and construction and during building permit applications	Carries requirements for Ministerial Departments, Public Institutions and Project Units to seek the assistance of state technical services during implementation of urban development and construction and when requesting permission to build.
Arrêté n°2007-0645/PR/MHUEAT amending and supplementing Order No. 73-1580 / SG / CG of 31 October 1973 on the organization of the procedure for examining and issuing the building permit	No building can be built without an Ordinary Building Permit issued under the conditions indicated by this decree. These provisions apply to all constructions built with permanent materials on public land registered in the territory's land register. The building permit is required for work performed on existing constructions if the work will change their external appearance.
Arrêté n°2010-0061/PR/MHUEAT Supplementing Order No. 2007-0645 / PR / MHUEAT amending and supplementing Decree No. 73-1580 / SG / CG of 31 October 1973 on the organization of the investigation procedure and issuance of the Building Permit	Regulates the procedure for the issuance of building permits.
Arrêté n°2007-0646/PR/MHUEAT Fees for building permits and earthquake control	Rules regarding tax on building permits and earthquake standards of control fee of 28 July 2007.
Arrêté n°2010-0409/PR/MHUEAT Obligation of design of construction projects by architectural and accredited studies offices	All construction projects requiring a regular building permit must be prepared by an architectural or design office that has the necessary authorizations to carry out this activity.
Energy	
Décret n°2009-0218/PR/MERN Establishing the National Energy Commission	This decree establishes the National Energy Commission, whose mission is to ensure the coordination of energy projects, and more generally to undertake studies of all the measures contributing to a better coordination of the country's energy development. This Commission is responsible for intervening in the strategic areas of energy development in the Republic of Djibouti including studies, prospecting, research, exploration, exploitation and commercial.

2.4 INTERNATIONAL AGREEMENTS AND CONVENTIONS

Djibouti is signatory to a number of international conventions and agreements relating to industry, development and environmental management. In certain cases, conventions and agreements have influenced policy, guidelines and regulations and therefore are relevant to planning, construction and operation of the Project.

Table 2-2 lists the relevant international conventions and protocols to which Djibouti is signatory. Many of these are incorporated into the various World Bank Operational Procedures and the IFC PS. By conforming to these two sets of standards, the Project will comply with the requirements of the relevant international conventions.

Table 2-2 International Treaties Applicable to the Project

Name	Date Ratified by Djibouti	Objective	How it Relates to the Project
International Labour Organization Convention 182, Geneva, 1999	28 Feb 2005	Prohibition and Immediate Action for the Elimination of the Worst Forms of Child Labour	Working conditions and regulation on site during construction and operation of the Project.
International Labour Organization Convention 138, Geneva, 1973	14 Jun 2005	Minimum Age for Admission to Employment	Working conditions and regulation on site during construction and operation of the Project.
United Nations Convention on Biological Diversity (CBD), Rio, June 1992	1 Sep 1994	The objective of this Convention is to develop national strategies for the conservation and sustainable use of biological diversity and a fair and equitable sharing of benefits arising from genetic resources	Protection of the biodiversity in the surrounding area of the Project.
Basel Convention on the control of transboundary movements of hazardous wastes and their disposal, March 22, 1989	31 May 2002	International treaty that was designed to reduce the movements of hazardous waste between nations, and specifically to prevent transfer of hazardous waste from developed to less developed countries	Waste management during the construction and operation of the Project
Bamako Convention on the Ban of the import into Africa and the control of transboundary movement and management of hazardous wastes within Africa, January 31, 1991	20 Dec 1991*	This Convention defines strict rules concerning waste imports and movements, which have to be authorised by the authorities of each country and prohibiting the import of any hazardous (including radioactive) waste.	Waste management during the construction and operation of the Project
Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), also known as the Washington Convention, March 3, 1973	7 May 1992	Treaty developed to ensure that international trade in specimens of wild animals and plants does not threaten the survival of the species.	Protection of the biodiversity in the surrounding area of the Project.
International Union for Conservation of Nature and Natural Resources (IUCN) / African Convention on the Conservation of Nature and Natural Resources (known also as Algiers Convention)	18 Dec 2012*	Founded in 1948, the International Union for Conservation of Nature and Natural Resources (IUCN) is an international organisation working on natural resources protection and sustainable use. The IUCN is the world's main authority on the conservation status of species. IUCN established a red list set upon precise criteria to evaluate the extinction risk of thousands of species and subspecies. The Algiers Convention is a continent-wide agreement that supersedes the Convention Relative to the Preservation of Fauna and Flora in their Natural State.	Protection of the biodiversity in the surrounding area of the Project.

**Convention signed but not ratified*

2.5 INTERNATIONAL BEST PRACTICE STANDARDS AND GUIDELINES

This section outlines the most important environmental performance standards required by financial institutions and which the Consortium will take into consideration for the development of the Project.

These include the requirements of the Equator Principles and the International Finance Corporation (IFC) Performance Standards (PS)which are described further in the following Section.

2.5.1 The Equator Principles

The Equator Principles (EPs) are a set of agreed principles by financial institutions to determine, assess and manage environmental and social risk in project financing. The EPs emphasise that lenders will seek to ensure that the Project is developed in a manner that is socially responsible and reflects sound environmental management practices.

These principles have been adopted by a wide range of banks and lenders all over the world in order to manage the social and environmental risks associated with their potential investments. The Equator Principles III were adopted in June 2013 and are listed below:

- Principle 1: Review and Categorisation;
- Principle 2: Environmental and Social Assessment;
- Principle 3: Applicable Social and Environmental Standards;
- Principle 4: Environmental and Social Management System and Equator Principles Action Plan;
- Principle 5: Stakeholder Engagement;
- Principle 6: Grievance Mechanism;
- Principle 7: Independent Review;
- Principle 8: Covenants;
- Principle 9: Independent Monitoring and Reporting; and
- Principle 10: Reporting and Transparency.

The EPs apply in emerging markets.

2.5.2 International Finance Corporation Performance Standards

The IFC applies PSs to manage social and environmental risks and impacts and to enhance development opportunities in the private sector. The IFC PS may be applied by other financial institutions electing to apply them to projects in emerging markets. The latest version of the IFC PSs is the 2012 edition. The applicability of the IFC PSs in included in Annex A.

2.5.3 IFC Environmental, Health and Safety Guidelines

The Environmental, Health and Safety (EHS) Guidelines are technical reference documents that address IFC's expectations regarding the industrial pollution management performance of projects. This information supports actions aimed at avoiding, minimising, and controlling EHS impacts during the construction, operation, and decommissioning phase of a project or facility.

In the context of the proposed Project, the most relevant EHS Guidelines to be considered are:

- World Bank Group General EHS Guidelines (2007); and
- World Bank Group EHS Guidelines for Wind Energy (2015).

2.6 ESIA PROJECT STANDARDS

Figure 2.2 sets out the key standards, guidance and requirements which will form the ESIA Project standards.

Where no national Djiboutian standards for environmental or social assessments are available, IFC standards have been followed wherever possible.

ESIA Project Standards

IFC Performance Standards

The Performance Standards specify the IFC's conditions for environmental and social performance for projects seeking external financing. The IFC Performance Standards are divided into eight categories to identify and evaluate the potential environmental and social impacts which may occur as a result of project activities. A summary of the scope of the IFC Performance Standards and the applicability to the Project is provided below.

N°	Title	Scope	Applicable to the Project
1	Assessment and Management of Social and Environmental Risks and Impacts	Defines requirements for ensuring appropriate environmental and social management policy implementation and accountability, including Environmental and Social Impact Assessment requirements	✓
2	Labour and Working Conditions	Defines requirements for ensuring definition and implementation of fair recruitment and workforce management policies	✓
3	Resource Efficiency and Pollution Prevention	Defines requirements for ensuring an appropriate level of pollution prevention and abatement	✓
4	Community Health, Safety and Security	Defines requirements for ensuring that adverse impacts from the Project on the receiving community are managed and controlled	✓
5	Land Acquisition and Involuntary Resettlement	Defines requirements for land tenure management and community resettlement as part of Project development	✗ No involuntary resettlement
6	Biodiversity Conservation and Sustainable Management of Living Natural Resource	Defines requirements for ensuring that the Project's impacts on nature, ecosystems, habitats and biodiversity are appropriately managed	✓
7	Indigenous Peoples	Defines requirements for ensuring that the rights of autochthonous minorities are respected and that indigenous people may beneficiate from the Project	✗ No indigenous peoples are present in the
8	Cultural Heritage	Defines requirements for managing the Project's impacts on material and immaterial cultural heritage	✓

IFC EHS Guidelines

The IFC EHS Guidelines are technical reference documents, providing general and industry-specific examples of good practice. They are used by the IFC as part of the appraisal of projects under the IFC's project evaluation mandate as described in the IFC's Environmental and Social Review Procedures Manual. The IFC EHS Guidelines represent the Performance Standards normally considered acceptable by the IFC, and generally considered to be achievable in new facilities at reasonable cost by existing technology. When host country regulations differ from the levels and measures presented in the EHS Guidelines, the IFC recommends that projects should achieve whichever is more stringent. The IFC EHS Guidelines include general overarching guidelines as well as industry specific guidelines.

The IFC EHS Guidelines considered relevant to the Project are:

- Environmental, Health & Safety General Guidelines (2007)
- Guidelines for Wind Energy (2015)

Djibouti EIA Process

The EIA Laws and Regulations that govern the EIA process are as follows:

- Environmental Code (Law n°51/AN/09/6 L)
- Revision of the Environmental Impact Assessment (EIA) Procedure (Decree n°2011-029/PR/MHUEAT)
- The Ministry of Housing, Urban Planning, Environment, & Town Planning (MHUE) is responsible for overseeing the EIA

General Process	
Screening:	The regulations identify certain types of activities that require the project proponent to submit an EIA. EIA Procedure 2011: Article 4; categories of project requiring summary or detailed EIA are outlined in the Annex
Who Prepares EIA:	Project Proponent (with or without contractor approved by MHUE)
EIA Contractor Qualifications:	"The proponent may entrust the carrying out of the environmental impact study to consulting firms approved by the Minister in charge of the Environment or to consultants whose expertise in the field is proven. Foreign consulting firms or international consultants must be associated with approved consultancy firms or national consultants qualified in this field" EIA Procedure 2011: Article 9
Review Period:	40 days
Decision:	"After the period of [ ] forty days for the detailed study, and in case of silence of the Ministry of the Environment, the study is considered admissible". Decision will be favourable, conditional or unfavourable. EIA Procedure 2011: Article 12(2)
Authority to Impose Conditions:	Yes, a Technical Evaluation Committee, established to review the EIA, has 20 days to decide the "conditions for granting environmental authorisation" EIA Procedure 2011: Article 28(2)
EIA Content	
Alternatives:	Terms of reference for preparing an EIA requires that a detailed EIA study contains an "exploration and analysis of alternatives" EIA Procedure 2011: Article 11(4)
Type(s) of Impact Analysis:	Direct, indirect, permanent, temporary and cumulative environmental impacts on the physical and natural environment. Social, cultural, economic and public health impacts on citizens EIA 2011 Article 11(4)e.
Mitigation:	EIA shall include "the measures of suppression, mitigation, correction or compensation of the harmful consequences on the environment that the promoter proposes to put in place with a presentation of the corresponding financial means" EIA Procedure 2011: Article 11(4)h
Monitoring Plans:	EIA shall include "an Environmental and Social Management Plan (ESMP) including a detailed budget" EIA Procedure 2011: Article 11(4) k
Public Disclosure	
Disclosure of EIA:	Scoping - No; Draft EIA - No; Final EIA -Yes
Public Notice of Final EIA Detail:	If MHUE accepts the EIA, a public hearing should be conducted to "enable the public [ ] to participate in the evaluation of the report and to express an opinion on the conclusions of the study" EIA 2011:Article 17(1) For 30 days, the final EIA "shall be made available to the public in one designated place. An officer of the borough will be assigned and a special register will be used to record the grievances of the affected population" EIA Procedure 2011: Article 20
Public Notice of Final Decision:	Yes, as per EIA Procedure 2011: Article 29
Public Participation	
Public Participation Opportunities:	The EIA "shall be carried out with the participation of the populations and the public concerned through consultations and public hearings, in order to collect and take into account the opinions populations on the project" EIA Procedure 2011: Article 15(1)
Response to Public Comments:	MHUE draws up a memorandum in which will be transcribed all the opinions and concerns of the populations [on the final EIA] and made public. EIA Procedure 2011: Article 21

Figure 2.2 Project Standards: IFC Performance Standards, IFC EHS & Djibouti EIA Process

2.7 TOPIC-SPECIFIC REGULATIONS AND STANDARDS USED IN ASSESSMENT

2.7.1 Air Quality

The Djibouti Environmental Code[(1)] states that any emissions of substances beyond the standards is prohibited and that all land installations (air, sea or ground) that could modify the characteristics of the air are to be subject to prior environmental impact study. However, there are no specific national standards for air quality beyond this. The IFC has produced detailed guidance for the assessment and management of air emissions and ambient air quality[(2)].

In accordance with IFC General EHS Guidance, when host country regulations differ from the levels and measures presented in the EHS Guidelines, projects are expected to achieve whichever is more stringent. Therefore, the IFC standards for air quality will be used in this assessment.

2.7.2 Noise

The Djibouti Environmental Code states that noise, radiation or vibration, likely to harm human health or cause undue nuisance to neighbours, or harms the environment or public and private property, are prohibited[(3)]. However, no specific standards are provided. The IFC has produced detailed guidance for the assessment and management of noise[4] as shown in Table 2-3. This applies to stationary noise sources and not transport or mobile noise sources.

Table 2-3 IFC Guidelines for Ambient Noise Levels

Receptor	Noise Limit [$Leq_{(1\text{-hour})}$, dB(A)]	
	Daytime [07-22]	Night time [22-07]
Residential, Institutional, Educational	55	45
Industrial, Commercial	70	70

Source: IFC General EHS Guidelines: Noise (IFC, 2012)

In accordance with IFC General EHS Guidance, when host country regulations differ from the levels and measures presented in the EHS Guidelines, projects are expected to achieve whichever is more stringent. Therefore, the IFC standards for noise will be used in this assessment.

Construction

There are no IFC noise level guidelines specific to construction activities. However, it is considered best practice for construction periods lasting more than two years to meet IFC guideline levels of 55 dB(A) for the daytime.

Operation

The IFC General EHS guidelines state in environments where ambient noise levels already exceed a level of 55 dB(A) daytime and/or 45 dB(A) night-time noise emissions should not cause the ambient noise level in a residential area to rise by 3 dB(A) or more, determined during the noisiest hour of a 24-hour period.

[1] Loi n°51/AN/09/6ème. Code of the Environment. Title I. Chapter III : Protection and Preservation of the Air and Atmosphere. Articles 33 – 38.

[2] IFC, General EHS Guidelines: Environmental, Air emissions and ambient air quality, April 2007.

IFC General EHS Guidelines : 1.7 - Environmental Noise Management, IFC, (2007).

[3] Loi n°51/AN/09/6ème. Code of the Environment. Title III. Chapter III : Physical Factors. Article 74.

[4] IFC, General EHS Guidelines: 1.7 - Environmental Noise Management, IFC, (2007).

3 PROJECT DESCRIPTION

3.1 INTRODUCTION

This section provides a description of the Project and presents an overview of the key elements and activities involved in the planned construction, operation and maintenance, and decommissioning phases. The Project description provided here is an update to the design information that was included in the Scoping Report in February 2018.

The Project will provide a total of 60 MW generating capacity. Although the specific model, number and layout of turbines has not yet been finalised, this assessment is based on a realistic 'worst-case' scenario and considers that the production of 60 MW will be met through 13 wind turbines, each with a capacity of 4.8 MW.

Generated electricity will be fed via aerial collector lines (i.e. cables) to a substation on the Project site. An overhead transmission line will connect the Project substation (located adjacent to the RN9 at approximately lat: 11.531628 long: 42.496840) to the 230 kV circuits located in the proposed EDD Ghoubet transformer/ substation, adjacent to the RN9 national road (at approximately lat: 11.505262 long: 42.515229), 3.5 km from the Project site.

3.2 PROJECT JUSTIFICATION

According to Power Africa, an initiative run by the U.S. Agency for International Development, Djibouti has an access rate to electricity as low as 42%, with 110,000 households without power. At present, the country has the capacity to generate just over 100 MW of electrical power, however only 57 MW(1) of this is dependable to supply the country's population of close to 1 million people. With demand for electricity reportedly increasing between 3-5% annually(3), Djibouti needs to source new methods of supplying electricity if it is to meet the targets set out in 'Vision 2035' - Djibouti's master development plan.

In attempt to meet rising energy demands, Djibouti relies heavily on imported fossil fuels and electricity. Due to this, the country often suffers economic loss due to constant fluctuations in fuel prices, particularly oil, and as a result, Djibouti has an unreliable supply of electricity. Subsequently, power cuts are frequent and often occur in peak usage times(2).

'Vision 2035' sets the ambitious objective to supply 100% of domestic energy demand through renewable energy by 2020. Djibouti has significant renewable energy resources including geothermal, wind and solar. With the inclusion of renewable energies, Djibouti has the potential to produce more than 300 MW of electricity[3]. Wind, geothermal and solar energies are three natural resources abundantly available in Djibouti that may be harnessed to alleviate the economic and social pressures faced from high import prices and increasing electrical demand(4).

[1] Power Africa (2018) – www.usaid.gov/powerafrica/djibouti [*accessed May 2018*]
[2] Association of African Entrepreneurs - www.aaeafrica.org [*accessed May 2018*]
[3] "Power Africa" & Partner Country Energy in the News (2015) - www.usaid.gov [*accessed May 2018*]
[4] The Report: Djibouti 2016: Energy – www.oxfordbusinessgroup.com *[accessed May 2018]*

The Government of Djibouti has explored wind energy since 2000, including site selection studies and pre-feasibility studies. The studies identified the Gulf of Ghoubet as one of the most suitable areas in Djibouti for a windfarm due to its consistent high wind speeds throughout the year. The development of the Ghoubet windfarm is a direct response to these opportunities to improve the diversity and security of Djibouti's electricity supply.

The Project site was chosen as an area with good accessibility for development due to its proximity to existing road infrastructure and planned grid connections. This was further supported by the wind data collected by a met mast deployed at the Project site Q4 2012 to Q1 2015. The data collected has been analysed in an interim feasibility study by Tractebel Engineering[1] and concludes that the Project site has a reliable wind resource that is highly suitable for a windfarm development.

3.3 PROJECT AREA OF INFLUENCE

IFC Performance Standard (IFC PS) 1 defines the Area of Influence (AoI) as follows:

- *'The area likely to be affected by: (i) the project and the client's activities and facilities that are directly owned, operated or managed (including by contractors) and that are a component of the project; (ii) impacts from unplanned but predictable developments caused by the project that may occur later or at a different location; or (iii) indirect project impacts on biodiversity or on ecosystem services upon which Affected Communities' livelihoods are dependent.*

- *Associated facilities are facilities that will not have been constructed or expanded if the project did not exist and without which the project will not be viable.*

- *Cumulative impacts that result from the incremental impact, on areas or resources used or directly impacted by the project, from other existing, planned or reasonably defined developments at the time the risks and impacts identification process is conducted* [(2)].

The appropriate level of assessment and management of risks and impacts is determined by the degree of control that a project is able to exercise over its facilities or activities, and by the importance of the facilities or activities to a project's successful operation. The facilities and activities ('the project components') that make up the windfarm Project are therefore classified in determining the AoI, as illustrated in Figure 3.1.

Based on Figure 3.1 and the definitions of the IFC categories, the components that make up the windfarm Project are set out in Table 3-1.

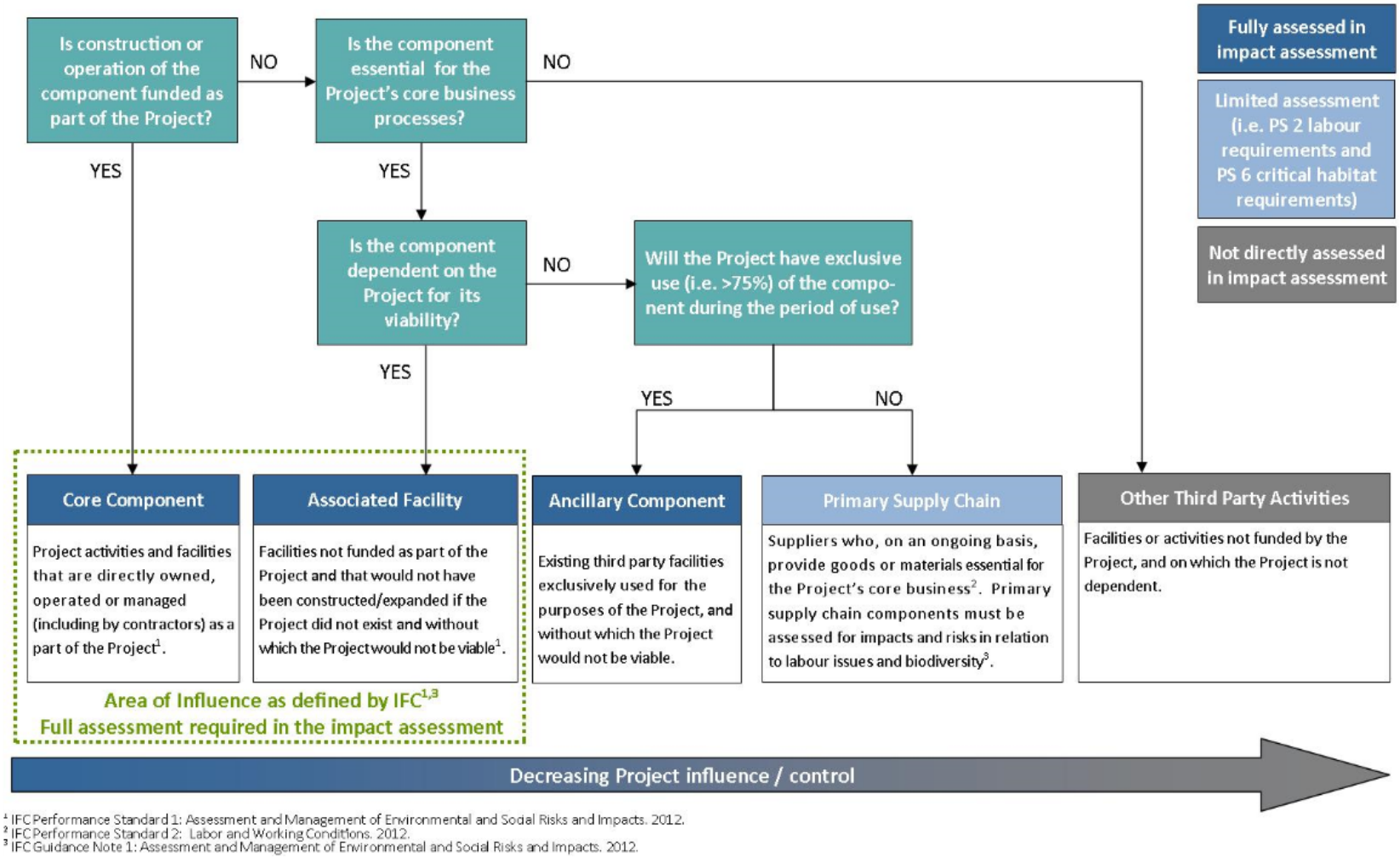
[1] Ghoubet 60 MW Update FS: Global Feasibility Study: FINAL Report [15/02/2018]
[2] IFC Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts, January 1, 2012.

Table 3-1 Area of Influence: Classifying Project Components

IFC Category	Project Component
Core component	• On-site access roads, foundations, crane pads, turbines, overhead cabling, temporary laydown areas, temporary camps, transformer, substation and meteorological mast
	• 3.5 km Project transmission line connecting windfarm to Ghoubet substation and national distribution network
Associated facilities	• Borrow pits used to supply aggregate to make cement for turbine foundations and on-site access road construction
	• Cement batching plant
	• Upgrades to public road network to allow transportation of construction materials and equipment
Third party activities	• Waste disposal sites
	• Water provision and transport
	• Port and public road network for delivery of Project materials and workforce

For the Project, the direct AoI is defined by the spatial extent of the footprint created by the core Project components and associated facilities, and their associated effects on the physical, biological and socioeconomic environments. Details of the AoI for both the environmental (physical and biological) and socioeconomic assessments are described in Section 6.2.1 and Section 6.8.1, respectively. If a specific assessment requires a different AoI, this is stated in the individual baseline.

Figure 3.1 Area of Influence (AoI): Classifying Project Components



Source: ERM (2016)

3.4 SITE LOCATION

The Project site, as shown in Figure 3.2, is located approximately one kilometre west of Lake Ghoubet, where the RN9 and RN10 roads intersect, in the Arta Region of Djibouti. The nearest settlements are listed in Table 3-2 and identified in Figure 3.2.

Table 3-2 Settlements Neighbouring the Project Site

Settlement	*Approx. distance from the site boundary*	*Orientation*
Lac Assal	500 m	North
Cité Moumina	600 m	West
Layta	1.5 km	West

3.5 SITE TENURE

Land legislation in Djibouti is governed by the principle of state-ownership: any non-registered plot belongs to the State (Art. 1 of Law n° 171 from 1991 concerning the organisation of the public domain[1]). Law n°173 from 1991 on the organisation of the State's private domain[2] fixes the conditions for access to land ownership. The conditions for access to rural land are stated in Articles 22 and 45. Rural land, such as that in the Project site, can be awarded as a concession to the local community who are settled in an area or have historically been using the land.

The local communities have not taken any steps to obtain a temporary concession for the land within the Project site. Land rights and obligations concerning use of land and natural resources are ruled by customary law and principles in the local area. A detailed description of land tenure of the Project site is included in *Annex F* (Social Field Survey Report).

The Consortium are in the process of negotiating the form of land tenure the Project will be subject to with the appropriate parties. The process of transferring any land tenure from current ownership and use to the Consortium will be a transparent process that will be fully documented, as required by IFC standards.

3.6 PROJECT COMPONENTS

3.6.1 Overview

The Project will comprise the following core components[3] within the site boundary:

- a temporary construction compound (including worker facilities);
- aggregate borrow pits;
- 13 turbines each with a capacity of 4.8 MW[4];
- aerial cable network;
- up to 10 km of new access roads;
- substation compound containing transformers; and
- a permanent meteorological mast.

The following facilities, located outside of the site boundary, are required for the construction and operation of the Project and are therefore included within the

[1] Loi N° 171/AN/91/2e L of October 10th 1991concerning setting up and organisation of the public domain
[2] Loi n°173/AN/91/2ème L of October 10th 1991concerning organisation of the State's private domain
[3] As classified using the decision tree presented in Figure 3.1, per IFC standards and guidelines.
[4] The candidate turbine assessed in the ESIA is the Nordex N133/4.8 MW turbine as this is the largest of the three models considered in the Tractebel feasibility study (2018). However, alternatives may be considered later in the final design stages for installation. This may also change the number of turbines required to meet the 60 MW output required.

broader footprint:

- a concrete batching plant; and
- 3.5 km overhead 230 kV transmission lines and associated pylons.

As previously mentioned, the Project site is located northwest of a proposed, new transmission corridor. It is the intention to connect the windfarm into a 230 kV circuit located along this transmission corridor (via the proposed EDD Ghoubet transformer/ substation) to feed generated electricity into the national distribution network. The proposed transmission corridor has been planned to extend the national distribution network and is not dependent on the Project for its viability, therefore it will not be considered in this ESIA. It is understood that an ESIA has been undertaken for this development and it has been permitted.

3.6.2 Site Access

Access to Project Site

Turbine components and construction materials (with the exception of locally sourced aggregate) will be transported to the Project site from Doraleh MultiPurpose Port near Djibouti City (approx. 90 km by road). From the port, trucks will travel on the RN3, then on a local arterial road, and the RN1, before joining the RN9. The RN9 crosses the Project site from north to south, and provides access to the mineral port on Lake Ghoubet, to the east of the Project site.

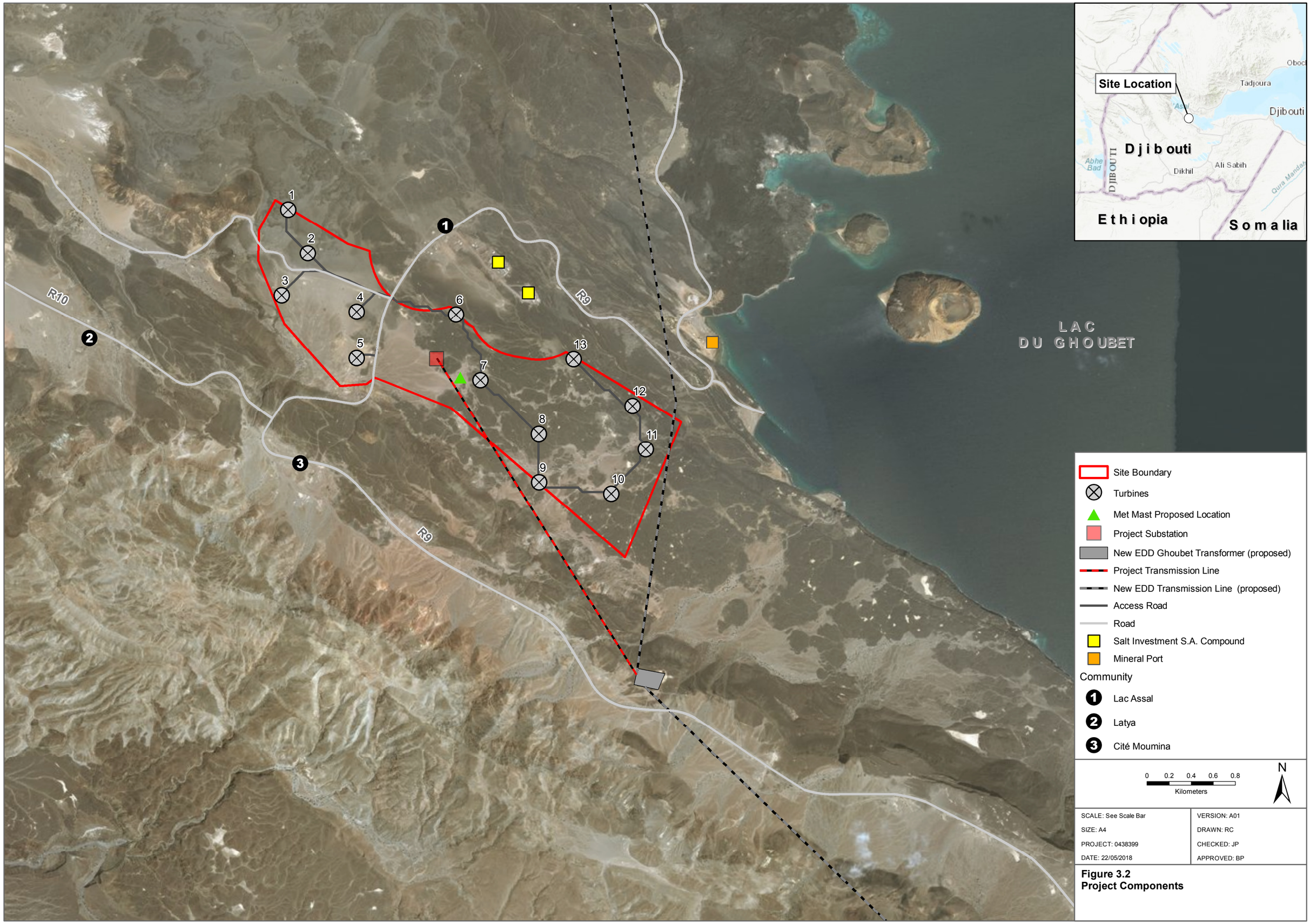
The nearest key logistics bases to the Project site are shown in Table 3-3.

Table 3-3 Nearest Key Logistics bases

Key logistics base	Detail	Approx. distance by road and direction to Project site
Village	Lac Assal	600 m (north)
Town	We'a	70 km (east)
Road	RN9 national road	Runs across Project site
Airport	Djibouti-Ambouli International Airport	110 km (east)
Port	Doraleh MultiPurpose Port	90 km (east)

On-Site Access Roads

It is anticipated that 10 km of new approximately 5 m wide gravel access roads will be constructed across the site to link the turbine sites to the existing road network. The proposed access road network is shown in Figure 3.2. The current alignments cross a number of the main wadi channels in the south eastern half of the site to allow access to the turbine sites. These crossings will be designed to incorporate appropriate drainage without affecting the natural drainage. The on-site roads will be available for use by the local communities during the operation of the Project.


Site Location
Djibouti
Tadjoura
Obock
Dikhil
Ali Sabih
Abhe Bad
DJIBOUTI
Ethiopia
Somalia
LAC
DU GHOUBET
R10
R9
R9
1
2
3
4
5
6
7
8
9
10
11
12
13
1
2
3
Site Boundary
Turbines
Met Mast Proposed Location
Project Substation
New EDD Ghoubet Transformer (proposed)
Project Transmission Line
New EDD Transmission Line (proposed)
Access Road
Road
Salt Investment S.A. Compound
Mineral Port
Community
1 Lac Assal
2 Latya
3 Cité Moumina
0 0.2 0.4 0.6 0.8
Kilometers
N
SCALE: See Scale Bar
SIZE: A4
PROJECT: 0438399
DATE: 22/05/2018
VERSION: A01
DRAWN: RC
CHECKED: JP
APPROVED: BP
Figure 3.2
Project Components
PROJECTION: WGS 1984 UTM Zone 38N
SOURCE: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap
Path: P:\Projects\0438399 AFC Ghoubet Wind Farm.BP\02 Working Files\GIS\MAPS\ESIA Report\0438399_ProjectComponents_A02.mxd

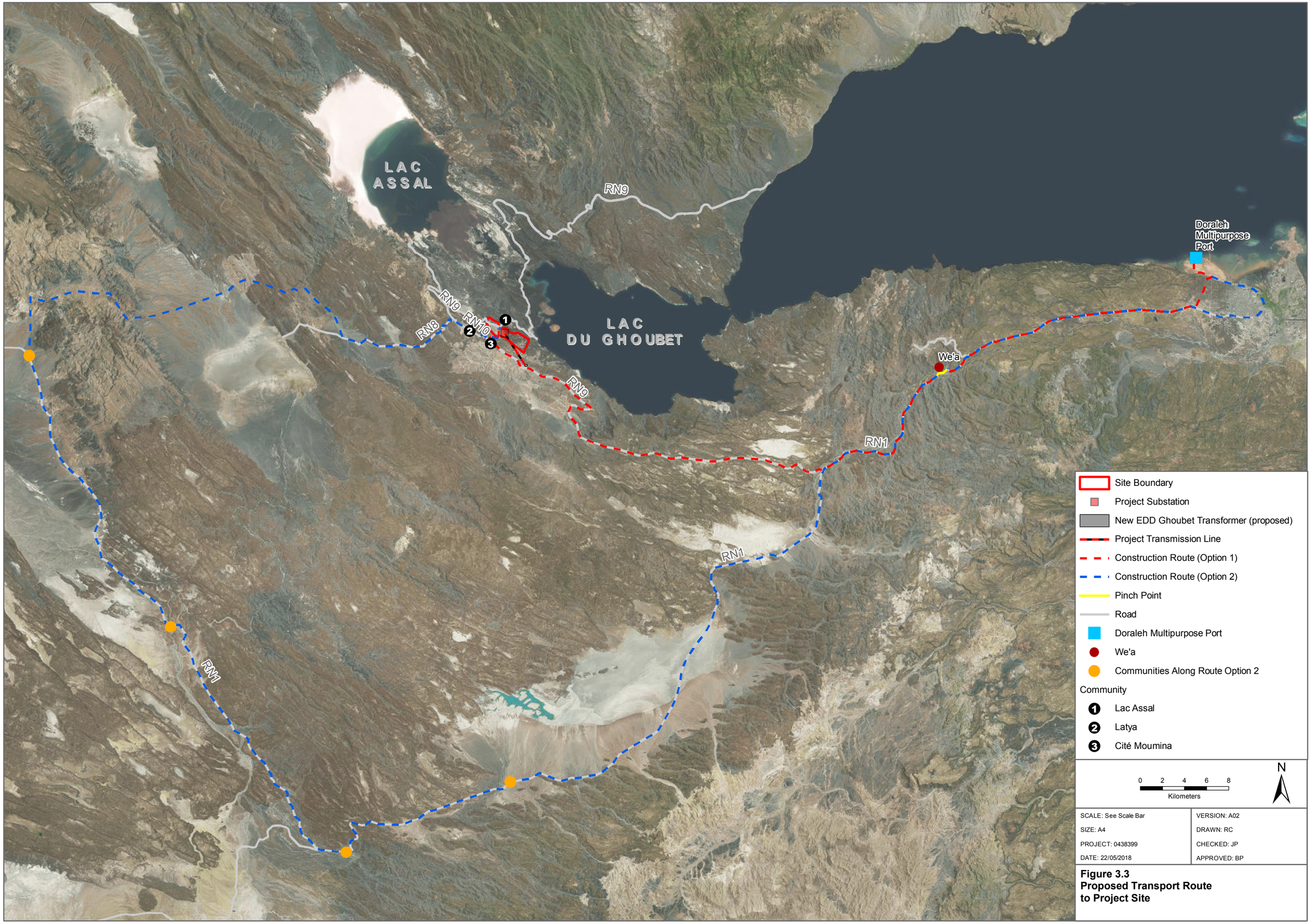


Figure 3.3
Proposed Transport Route to Project Site

PROJECTION: WGS 1984 UTM Zone 38N

SOURCE: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Path: P:\Projects\0438399 AFC Ghoubet Wind Farm.BP\02 Working Files\GIS\MAPS\ESIA Report\0438399_RoadNetworkImpactedbyProjectConstruction_A02.mxd

Turbine Layout

The proposed turbine layout is shown in Figure 3.2. The coordinates of the turbines are presented in Table 3-4, including the approximate distance from each turbine to the nearest building (whether residential or other). It should be noted that all turbines are sited a minimum distance of 500 m from residential properties.

Table 3-4 Turbine Coordinates

Turbine	Latitude (38N coordinate system)	Longitude (38N coordinate system)	Approx. distance to nearest building (m)*
1	11.54372	42.48476	950
2	11.54018	42.48641	620
3	11.53671	42.48429	180
4	11.53543	42.49051	610
5	11.53164	42.49055	350
6	11.53525	42.49876	480
7	11.52990	42.50082	670
8	11.52557	42.50571	1,190
9	11.52159	42.50577	1,640
10	11.52072	42.51174	1,360
11	11.52437	42.51457	910
12	11.52791	42.51345	1,000
13	11.53170	42.50853	630

** All turbines are sited >500 m from residential properties. These distances are subject to change during the detailed Project design and through the micrositing of turbines.*

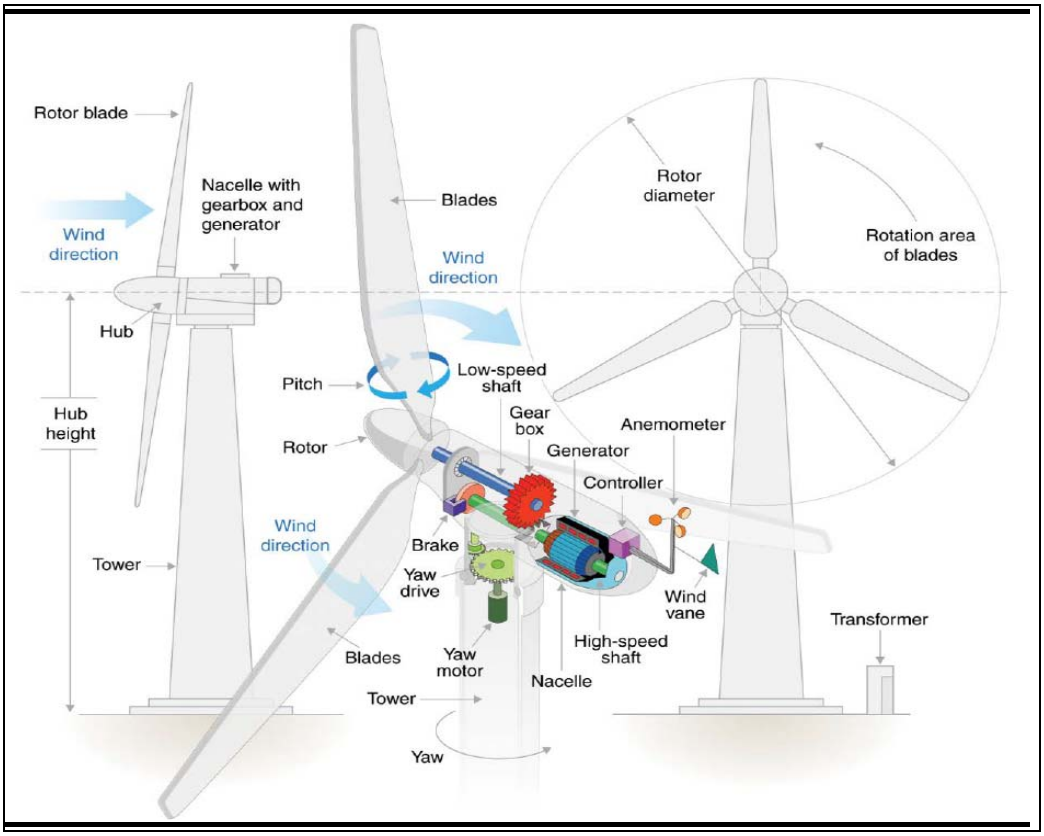
3.6.3 Turbine Generators

Turbine Make and Model

Wind turbines are made up of three main parts: a tower, a nacelle, and the rotary blades. The turbines consist of a hollow steel tower with a nacelle to which the rotor with three blades are attached. The nacelle houses wind turbine generators, gearbox, and control systems. A transformer is located in the base of each wind turbine generator tower. The components and features of a typical wind turbine are shown in Figure 3.4.

The model of wind turbine used for this assessment is the Nordex N133/4.8 MW turbine as this is the largest turbine (both height and rotor diameter) considered in the Project Feasibility Studies conducted to date (see Table 3-5 for specifications). A photo of Nordex turbines in operation is presented in Figure 3.5.

Figure 3.4 Typical Wind Turbine Components and Features



Source: US Department of Energy, Argonne National Laboratory, 2010

Figure 3.5 Turbines in Operation

Source: Mulilo website http://mulilo.com/Projects/ [accessed May 2018]

Table 3-5 summarises the main technical characteristics of the turbines considered in this assessment.

Table 3-5 Nordex N133/4.8 MW Turbine Technical Characteristics

Item	Specification
GENERATOR	
No. of wind turbine generators	13
Grid Connection	230 kv
Model / Type	Doubly-fed asynchronous generator
Frequency	50/60 Hz
POWER	
Wind Class	IEC S
Cut-in Speed	3 m/s
Re-cut-in Speed	21.5 m/s
Cut-out Speed	22 m/s
Nominal Power	4.8 MW
ROTOR	
Diameter	133 m
BLADES	
No. of blades	3
Length	64.4 m
TOWER	
Hub height	83 m
Tip height	150 m
NACELLE	
Height for transport	4.00 m
Height installed (inl. CoolerTop®)	4.39 m
Length	12.8 m
Width	4.30 m

Source: Nordex (2018) & Tractebel Feasibility Report (2018)

The turbines will be sited at least 400 m from one another and at least 500 m from any community receptors (i.e. residential buildings). The land between the turbines will continue to be accessible to local communities.

Turbine Foundations & Crane Hardstandings

Each turbine will have a concrete foundation. The installation of each turbine also requires the creation of a hardstanding area to provide a solid standing for a crane to erect the components. The exact location and orientation of these will be determined during detailed design but will be adjacent to each turbine foundation. The hardstandings will be constructed in conjunction with access roads at each turbine location. Further information on the turbine foundations and hardstandings is provided in Section 3.8.2.

Cabling

The turbines will be connected to the on-site substation using an aerial and underground 20 kV cable network approximately 10 km in length. The cables will be buried for approximately 30 m from where they exit each turbine underneath the tower. They will then emerge and be supported on poles (10-15 m in height). These will then connect to two main feeders which will likely be formed of 110 kV lattice towers. Typical pole pylons used for the 20 kV aerial network are shown in Figure 3.6. and typical 110 kV main feeder lattice towers are shown in Figure 3.7.

Figure 3.6 Typical Wooden Pole Mast for Turbine Cabling Aerial Network

Source: Tractebel 2018

Figure 3.7 Typical Lattice for Turbine Cabling Aerial Network Feeders

Source: Tractebel 2018

Transformers and Substation

The indicative location of the Project substation is shown in Figure 3.2. The substation compound will consist of a control building and communications room, a 20 kV air insulated metal-enclosed switchgear, transformers, circuit breakers and security fencing.

The substation will have an expected footprint (i.e. land take requirement) of 4,104 m^2. The final detailed design of the substation will be carried out in the latter stages of grid connection application.

3.6.4 Meteorological Mast

A meteorological (met) mast was deployed at the Project site from Q4 2012 to Q4 2015 to record 29 months of wind data. The data collected are used to inform which turbine models and layout may be best suited to the metereological conditions of the site and to calculate expected energy production. The mast was 60 m tall, with six anemometers spread across three heights, two wind vanes, temperature, humidity and pressure sensors and a data logger. The temporary mast will be replaced by at least one permanent mast that will be operated for the duration of the Project. The location of the permanent mast will be determined during the final detailed design.

3.6.5 Project Transmission Line

The Project site is located northwest of a proposed transmission corridor[1] that will run along the RN9 and RN4 roads towards Djibouti City. It is the intention to connect the windfarm into a 230 kV circuit located along this transmission corridor (via the proposed EDD Ghoubet transformer/substation). The new transmission line from the windfarm into the EDD Ghoubet transformer will be approximately 3.5 km in length (distance from centre of Project site; likely location for the on-site substation). The transmission line will be built and operated by EDD. Figure 3.2 shows the indicative route of the transmission line to connect the windfarm to the grid.

Figure 3.8 illustrates typical pylons (up to 35 m in height) to be used for the connection. Each pylon will have a footprint of approximately 50 m^2. This is assuming a steel lattice is used, if a pole line is used, the footprint of each pylon will be smaller and is therefore the preferred option. There will be pylons every 200 m along the transmission line, therefore there will be approximately 18 pylons along the 3.5 km length.

The exact route and design of the Project grid connection will be determined during the detailed design phase following further assessment of the local topography and conditions.

Figure 3.8 Typical Transmission Line Pylons

Source: Tractebel 2018

[1] EDD are responsible for constructing a 63 kV / 230 kV transformer and 38 km transmission line to facilitate evacuation of electricity from the Ghoubet windfarm.

3.6.6 Additional Project Infrastructure

The following associated facilities and utilities will also be required:

- For construction:
  - concrete batching plant
  - on-site aggregate borrow pits
  - a temporary construction compound (including worker facilities)
- For operation:
  - metering point for measuring production from each wind turbine generator
  - material storage yards
  - central monitoring station building and facilities

As this point in the Project development process, locations and specifications of the above facilities have not yet been determined. These will be established/completed after completion of further site invstigations and during the subsequent detailed design stage.

3.7 CONTRACTORS

The Djibouti Consortium will appoint an engineering, procurement and construction (EPC) contractor who will be the main contractor and will be responsible for planning, construction and maintenance of the Project.

3.8 PROJECT PHASES AND ACTIVITIES

The Project will be implemented over six main phases as follows:

- planning and pre-construction;
- procurement;
- design review;
- construction;
- operation and maintenance (including repair); and
- decommissioning.

3.8.1 Planning Phase

The Project is currently in the planning and development phase, which includes the following activities, some of which have been completed (highlighted in *italics*):

- *identification of land area and site;*
- *assessment of wind resources and feasibility study;*
- *community consultation;*
- environmental surveys, e.g. bird surveys in support of the ESIA*;*
- technical surveys, e.g. topographical and geotechnical investigations, micro-siting studies, electrical grid studies;
- permitting including ESIA;
- an electromagnetic, telecommunication and aviation (military and civil) assessment;
- negotiations with the eventual off-taker;
- procurement of turbines; and
- finalisation of contractors.

3.8.2 Construction Phase

Construction activities will include:

- deployment of labour;

- establishment of construction compound and worker facilities;
- site preparation, including installation of fencing or suitable barriers, construction of site;
- compounds and lay down areas;
- fill importing / exporting and site levelling;
- construction/establishment of the cement batching plant;
- on-site sourcing of aggregate;
- construction, widening, and strengthening of access roads;
- laying of turbine foundations;
- turbine delivery and installation;
- installation of on-site aerial cable network;
- testing of turbines to verify proper operation;
- installation of overhead transmission lines/grid connection; and
- commissioning of the windfarm.

Access, Transport, and Logistics

As mentioned in Section 3.6.2, turbine components and construction materials (with the exception of locally-sourced aggregate) will be delivered to Doraleh Multipurpose Port, 90 km east of the Project site, near Djibouti City. A logistics survey (separate to the ESIA process) will be undertaken to ensure that Project equipment can be safely stored at the chosen port. During construction all components will be transported to the Project site via national roads, RN3, RN1 and RN9. National roads are generally in good condition and will be capable of handling up to 180 t loads. Figure 3.3 shows the proposed transport route from Doraleh Multipurpose Port to the Project site, including any modifications required to the existing road network as identified through the feasibility study. The EPC contractor will be required to implement a Traffic Management Plan in line with IFC.

At each turbine location, gravel surfaced access roads will be constructed to support heavy equipment and vehicles used for the transportation, construction and erection of the wind turbines. Where required, excavation will be undertaken to construct the roads (likely to require blasting of the surface geology). On-site access roads will be a maximum width of 6 m, including the road shoulders. All access roads will be complaint with national and local Djibouti regulations, and built to support the weight of the equipment and heavy machinery required to carry out the construction activities at each turbine location. Localised land drainage requirements will be accommodated into the design of the roads where required.

The intersection of access roads and public roads will be modified to accommodate long loads. These modifications will include constructing temporary access with a minimum 55 m outside turning radius and a maximum inside turning radius of 50 m with suitable culverts. Temporary access will be removed and restored following construction.

Access roads, crane hardstandings, and laydown drainage systems will be designed to control and dissipate the flow of surface water along the roads so as to self-drain.

The Project workforce (up to 300 workers during peak construction) will be accommodated on site in a staff compound. Due to the health and safety risks associated with regularly transporting large numbers of workers between Djibouti City and the Project site (~95 km / 90 minute journey by car/minibus/coach). Accommodating workers onsite in a camp is the preferred option. As such, this is the scenario considered in this assessment.

The Project is expected to generate the following one-way heavy load traffic movements during construction:

- 135 loads of turbine components over a 3 month period (calculations provided in Table 3-6);
- around 350 water deliveries over the 12 month construction period (calculations provided in Section 3.9.3);
- around 550 concrete deliveries from the concrete batching plan (location to be determined) over the 12 month construction period (based on 13 turbines requiring 350 m^3 of concrete per foundation and 8 m^3 truck capacity); and
- numerous loads of components for the overhead transmission lines (both on and off site) to be brought from the port to the Project site.

It is assumed for the purpose of this Impact Assessment that aggregate will be sourced from within the Project site (if a suitable grade of stone is identified) therefore heavy load movements on public roads will be limited. If the Project requires to source aggregate from another location, an environmental and social assessment of the suitability of the selected source will be conducted and submitted as an addendum to this ESIA.

Table 3-6 Turbine Components Heavy Load Vehicle Movements

Wind turbine component	Number of heavy haul vehicle movements (one-way)
Turbine blade	3
Nacelle	1[(1)]
Hub	1
Controllers and converters	1
Tower sections	3
Total per turbine	10
Container for tools and kit	5
PROJECT TOTAL (13 turbines)	135

Installation of the turbines will be a sequential process as shown in Figure 3.9. Each turbine site and associated access track will be fenced off during construction for up to 3 months on average. This will avoid the requirement to fence off the entire Project site for the full construction period and thus allow continued access to the site for the local community.

Also, as is typical of this type of process, there will be a significant movement of materials in and around the Project site. Typically, surface material will be used as backfill where suitable or used for on-site landscaping. Any spoil will be disposed of as close to the site as possible; it can be used for infilling other excavations, or used as fill material for building embankments, berms etc. Surface material and spoil will not be mixed and will be stored separately.

[1] Including drive train.

Figure 3.9 Typical Phasing of Windfarm Construction Activities

Site Preparation and Access Roads



1

Electrical Connections


5

Construction of Foundations


Excavation


Steel reinforcement


Construction of concrete foundation


Replacing the topsoil

2

Turbine Delivery


3

Erection of Wind Turbines


Erecting the tower


Tower secured to the foundation

Assembling the rotary blade

Lifting the rotary blade

4

1-2 weeks | 4 weeks | 1 week | 4-6 weeks

Turbine Foundations

During construction an area of approximately 3 m deep by 20 m in diameter will be excavated for each foundation (up to 900 m^3 of material). The most efficient method of excavation will be blasting because of the surface geology; use of mechanical excavators will be limited. Rock hammering may also be used at specific locations depending on the properties of the geology.

Each turbine foundation is likely to require 350 m^3 concrete, however, the final design (i.e. exact dimensions, depths and reinforcement requirements) will be conducted after the completion of geotechnical surveys (post ESIA approval). Foundations will be constructed of poured concrete and reinforcing rebar steel using wooden forms to contain the structure. Each foundation will be left to cure for one month before the tower erection. Foundation construction will take approximately 6 weeks at each turbine location.

Figure 3.10 illustrates the typical construction of a turbine foundation.

Figure 3.10 A Typical Turbine Foundation being Constructed

Source: Vestas

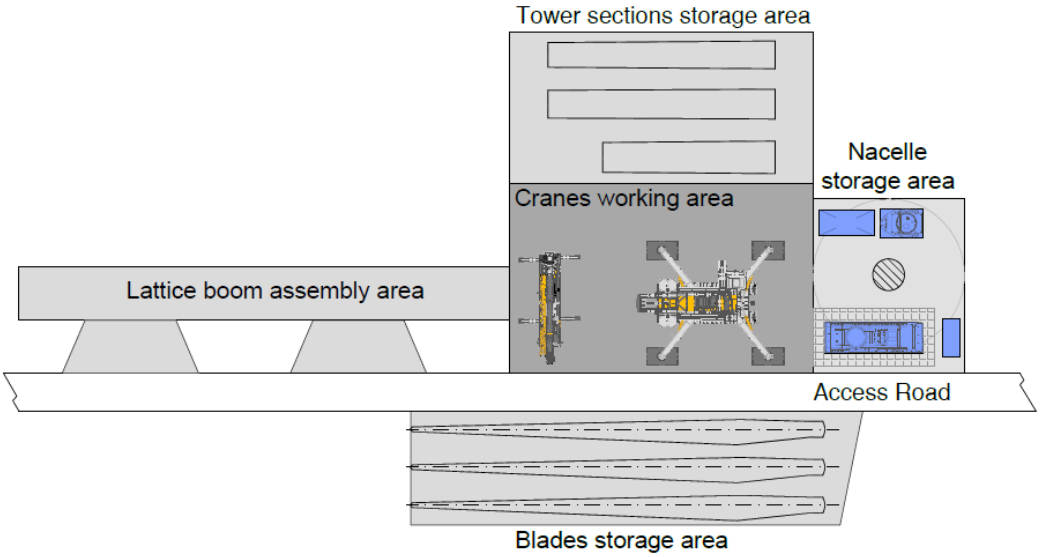
Crane Hardstandings

The installation of the wind turbine generators requires the creation of a crane hardstanding. These will be constructed in conjunction with access roads at each turbine location. Each hardstanding is approximately 50 m by 70 m (3,500 m^2 in area). The surface material will be removed, potentially requiring blasting, and 600 mm of crushed gravel laid and compacted to provide the hardstanding surface. A crane hardstanding comprises the following zones, which are illustrated on Figure 3.11.

- nacelle storage area;
- cranes working area;
- tower sections storage area;
- blades storage area; and
- main crane lattice boom assembly area.

Where any traces of archaeological remains are found during construction, all works will immediately be suspended, the affected area cordoned off, and the relevant authorities informed. If archaeological remains are found, then the turbine may be relocated, in coordination with the appropriate authorities and stakeholders.

Figure 3.11 Illustration of a Typical Crane Hardstanding



Source: Vestas (2017) Crane Pad Requirements DMS no: 0050-8073

The information provided in this section is for illustration only to explain the requirements for the crane hardstandings used for the wind turbines to provide safe assembly and erection of the components. It may be necessary to alter the illustrated layout, for technical or economic reasons, once the local site conditions are properly understood. In these circumstances a similar but alternative layout will be identified to facilitate the safe installation of the wind turbine generators.

Cabling

The aerial cable network will be installed on electrical masts to connect the turbines to the on-site substation. Up to 50 poles and up to 10 lattice masts will be installed in parallel to the on-site road network.

Transformers and Substation

A 20 kV to 230 kV substation compound with an approximate footprint of 76 m by 54 m will be constructed within the central area of the site. Substation equipment will be grounded to a grounding grid installed in the gravel substrate. Substation equipment will be mounted on the concrete foundation and connected to the adjacent outgoing distribution line.

Project Transmission Line

The Project transmission line for electricity evacuation will be constructed before or at the same time as the windfarm. The transmission line will run from the Project site for 3.5 km to the EDD Ghoubet transformer/substation adjacent to the RN9.

Turbine Assembly and Installation

The turbines will be erected using two large cranes supported on the crane platform area adjacent to each turbine site. The wind turbine (including the tower, blades, and nacelle) will be assembled using the crane. It will take approximately 4 days to fully assemble each turbine.

As part of the assembly and installation process provision will be made for safe and proper lay-down, off-loading and storage of the components of the wind turbines either on or near to the crane pad within the operating radius of the cranes used for assembly. Off-loading areas will be correct for the size of the specific parts of the turbines. All areas must be level and free draining with a bearing capacity and proof testing as specified by the manufacturer.

Workforce
During the busiest period of construction, it is expected there will be approximately 300 staff directly employed by the Project, comprising:

- 70% civil jobs (groundwork / general labour)
- 30% specialised jobs (electrical / mechanical / machine operators / surveyors etc.)

It is expected that there will be a temporary worker facilities compound established on site during construction.

Temporary Construction Compound
During construction a temporary construction compound will be required and will contain:

- site office and welfare facilities for a maximum of 300 workers (during peak construction);
- portable toilets with septic tank incorporated, which will be emptied as required;
- vehicle parking;
- temporary storage for turbine components;
- crane assembly platforms and temporary storage platform (each crane platform will be approximately 30 m by 35 m in area); and
- water and electricity supplies.

It is likely that this will be located within the Project site near to the N9 public road crossing the site for ease of access[1]. The location and specifications of this compound will be established during the detailed Project design.

Borrow Pits
Borrow pits are currently proposed to be installed on site[2]. The Consortium will undertake geotechnical investigations to review ground conditions to establish if the rock can be used during Project construction for access tracks and crane hardstanding. Should investigations reveal that the rock is of poor quality, the Consortium will then investigate the feasibility of using existing quarries within close proximity to the site or source material from new quarries, the latter being the least preferred option. However, it is likely rock sourced from on site will be suitable.

Construction Timetable
Construction will be completed over a 12 month period. It is expected that construction activities for the Project will begin during Q4 of 2018 following receipt of the required permits. Construction activities will be initiated and completed at each individual turbine in a phased approach. Figure 3.10 presents an indication of the typical construction activities and phasing for the Project.

[1] Where practicable, this temporary construction compound should be located within the Project site as a first preference
[2] Where feasible, borrow pits should be installed on site as a first preference, use existing quarries as a second option and finally new quarries out with the Project site.

The general timescales for the main construction activities are shown in Table 3-7.

Table 3-7 Outline Construction Schedule

Activity	*Expected Date*	*Expected Duration*
Surveying and geotechnical work	Mar 18 – Feb 19	12 months
Building permit	Sep 18	-
Access road construction and modification	Dec 18 – May 19	6 months
Electrical tapline construction	Feb 19 – Oct 19	5 months
Substation construction	May 19 – Aug 19	4 months
Delivery of equipment	Jan 19 & Jun – Jul 19	3 months
Foundation construction	Feb 19 – Jun 19	5 months
Installation of interconnection cabling from turbines to switching station (construction of aerial collector system)	May 19 – Aug 19	5 months
Tower and turbine assembly and installation	Jul 19 – Sep 19	3 months
Testing and commissioning of switching station and collection system	Sep 19	1 month
Turbine testing and commissioning	Oct 19 – Dec 19	3 months
Site clean-up and restoration	Jan 20	TBC

Source: Tractebel (2018)

EDD will design and construct the grid connection. The timescale for construction of the overhead transmission line is currently unknown but it is assumed that it will be completed by Q4 2018.

3.8.3 Operation and Maintenance Phase

Overview

The operation phase includes:

- regular remote monitoring of wind turbine generator operations;
- scheduled and unscheduled maintenance of wind turbine generator components; and
- scheduled and unscheduled maintenance of access roads, hardstandings, buildings and electrical equipment (e.g. cabling, on-site substation).

The design life of the Project is expected to be 25 years from the date of commissioning. Regular maintenance will be required to ensure that the turbines are kept in optimal working order. Most day-to-day facility operations will be conducted remotely through the use of computer networks and a small team. Some limited maintenance and repair activities may need to be undertaken occasionally on site.

Meteorological Mast

An on-site maintenance inspection will be carried out on the met mast in accordance with manufacturer requirements and local law, as a minimum every year. Statutory inspections will be performed in accordance with local laws on fall arrest systems and structural integrity. Wind data may be collected remotely; however, if this is not possible data may be collected on site.

Project Transmission Line

EDD will maintain the transmission line during operation. Once the transmission line has been installed only intermittent maintenance will be required.

Transport

Traffic during operation will be limited to maintenance vehicles and movement of employees around site.

Workforce
During operation it is expected there will be five full time employees working on the site in security, operation and civils/caretaker roles.

3.8.4 Decommissioning Phase

Overview
After a period of 25 years of operation, once the windfarm has reached the end of its economic life span, and unless otherwise agreed by the Djibouti authorities and the windfarm operator, the windfarm will be decommissioned. Decommissioning refers to the planned shut down or removal of a facility, buildings and/or equipment from operation or use.

A detailed decommissioning plan will be prepared and submitted to the Djibouti authorities (in accordance with Djibouti requirements) prior to commencing any decommissioning works. The plan will include measures to recycle materials whereever possible. The decommissioning of the windfarm will start as soon as the activities of the windfarm operations cease and approval from the Djibouti authorities has been obtained. The decommissioning and restoration process will take an estimated 3 months and will include the following main activities:

- removal of above-ground structures;
- removal of below-ground structures to a depth in accordance with planning permission;
- restoration of topsoil, re-vegetation and seeding in accordance with planning permission; and
- a 2-year monitoring and remediation period in accordance with planning permission.

Access roads and fencing will only be removed if required by either planning permission or by the landowner.

The decommissioning of a windfarm largely comprises the dismantling of the turbines and site clearance. Windfarm operation does not typically involve the use of large volumes of hazardous materials, which may result in releases of particularly harmful materials into the ground. Therefore, with appropriate management during operation, it should not be necessary to conduct post operational clean up. Basic measures will be included in the design to ensure ease of decommissioning, such as incorporating construction and fabrication techniques that facilitate ease of dismantling and recycling, where appropriate. Key difficulties associated with the decommissioning of a windfarm are the removal of foundations, if considered necessary, and the disposal of turbine blades, if their design does not facilitate ease of recycling. Another solution that should be considered is to sell and/or re-use parts of the turbines for other projects.

Decommissioning activities will be conducted under safe conditions and in consideration of environmental protection, within the legislative framework in force at the time of decommissioning.

Removal of Structures
Above-ground structures include the turbines, transformers, over-head collection lines, windfarm-owned portions of the substation, maintenance buildings, and access gates. Below-ground structures include turbine foundations, collection system conduits, and drainage structures.

The process of removing structures involves evaluating and categorizing all

components and materials into categories of recondition and reuse, salvage, recycling, and disposal. In the interest of increased efficiency and minimal transportation impacts, components and material may be stored on-site in a pre-approved location until the bulk of similar components or materials are ready for transport. The components and material will be transported to the appropriate facilities for reconditioning, salvage, recycling, or disposal.

Environmental Restoration
To the extent necessary, any quality surface material will be removed prior to removal of structures from all work areas and stockpiled, clearly designated, and separate from other excavated material. The surface material will be replaced to original depth, and original surface contours re-established where possible.

3.9 *RESOURCE* REQUIREMENTS

3.9.1 Temporary Land Take

During site preparation and construction approximately 6% of the Project site (59.92 acres / 0.29 km^2 of the total site area of 974 acres / 3.94 km^2) will be required for a temporary period. This is summarised in Table 3-8.

Table 3-8 Summary of Expected Temporary Project Land Take

Project component	*Dimensions*	*Area (km^2)*	*Area (acres)*	*Landtake duration*
Wind turbine construction area (including foundations and crane hardstanding)	*Foundations* Up to 20 m diameter + *Hardstandings* Length: 70 m Width: 50 m	*Foundations* 0.0041 *Hardstandings* 0.0035 x13 turbines = 0.0445	10.99	3 months*
Transmission line RoW	Length: 3.5km Width: 10-15 m	0.0525 (max)	12.97	6 months
On-site aerial cable network RoW**	Length: 10 km Width: 5 m	0.05	12.36	12 month
Compound / material laydown areas	Length: 150 m Width: 100 m	0.015	3.71	12 months
Substation compound	Length: 100 m Width: 75 m	0.0075	1.85	12 months
New on site access roads	Length: 10 km Width: 6 m	0.06	14.83	12 months
Worker facility compound (established prior to construction)	Length: 130 m Width: 100 m	0.013	3.21	12 months
TOTAL		**0.29**	**59.92**	

* The construction team will undertake a phased approach, therefore construction areas will be fenced off (i.e. made inaccessible to land users) for only up to 3 months at any one time. Turbines components will be stored at Doraleh port and only transported to site when required. Each wind turbine will take 3 days to erect.
** Assumed RoW will be in parallel to access road network (i.e. no overlap).

3.9.2 Permanent Land Take

Some land will be used permanently by the Project and hence will not be accessible for other uses. Table 3-9 summarises the expected permanent land take requirements.

Table 3-9 Summary of Expected Permanent Project Land Take

Project component	*Area (km^2)*	*Area (acres)*
Wind turbines operational area (assumed 50% of construction hardstanding will be reinstated)	0.0223	5.50
Substation	0.004	1.01
Access roads	0.06	14.83
TOTAL	**0.0863**	**21.34**

3.9.3 Water Requirement

Construction Phase

During construction, water will be required for construction activities (e.g. producing concrete for foundations), domestic purposes and drinking water for the construction teams.

For construction, it is anticipated that between 90 and 110 m^3 (max. 110,000 litres) of water will be required to produce the concrete for each turbine foundation. For the construction of 13 turbines, the total water requirement will be approximately 1.43 million litres. However there can be losses during construction and also the need to use additional water for closed loop cooling of the foundations when laid due to the hot climate. Therefore, up to 2 million litres of water could be required.

The following estimates have been made for other water use during construction:

- ~25 litres/worker/day for domestic use and sanitation (in construction camp/welfare facilities)
- ~5 litres/worker/day for potable, drinking water (based on high temperatures on site)

Therefore, during the busiest period of the construction phase with a workforce of 300, a volume of 9,000 litres/per day is expected. This volume will fluctuate depending on the number of workers on site over the 12 month construction period. Based on a crude assumption of 300 workers on site for a 6 month "peak" construction period and an average of 50 workers on site for a 6 month period (i.e. 3 months for site preparation/infrastructure construction and 3 months for turbine erection and commissioning either side of the peak period) a total volume of 1,916,250 litres will be required for worker use during Project construction. This assumes an average 30 days/month.

A summary of the water requirement for the construction phase is given in Table 3-10.

Table 3-10 Approximate Water Requirements during Construction Phase

Area	*Approximate Quantity (litres)*	*Water Source*
Construction activities	2 million	Piped from Ethiopia and then tankered
Domestic & potable water requirement	2 million	Piped from Ethiopia and then tankered
TOTAL	4 million	*[Note: 15,000 litres per truck, therefore total one-way water truck movements for the Project = 350]*

The Office National de l'Eau et de l'Assainissement de Djibouti (ONEAD) has exclusivity to supply water in Djibouti.[1] ONEAD has a 30-year concession with Ethiopia to build and operate 28 wells in Ethiopia which will supply up to 100,000 cubic meters per day of water to Djibouti and small communities in Ethiopia, known as the Transboundary Ethiopia-Djibouti Drinking Water Supply Project.[2] Currently 8 wells have been completed, supplying 10,000 to 12,000 cubic meters (10-12 million litres) per day. The Ministry of Agriculture is responsible for supplying this water to rural communities.

The Project will not utilise water supplied through The Ministry of Agriculture therefore preventing any interference with the current supply from ONEAD to communities in Djibouti. The Project will procure water directly from ONEAD. ONEAD have confirmed that they are able to supply the water required for the Project[3].

However, as the water required for the Project is proposed to be extracted from the same source as water delivered to Djibouti's rural communities, a separate water resources study should be undertaken for the boreholes in Ethiopia to confirm the Project will not affect the current supply in Djibouti or Ethiopia[4].

Water delivered by tankers to the two communities in vicinity of the Project site is supplied from a borehole situated adjacent to the RN1 national road (Lat: 11.438578, Long: 42.791305) in Djibouti, therefore water supply to the surrounding communities will be unaffected.

Operational Phase

The operation and maintenance team of the Project is anticipated to be five people for the entire windfarm. 20 litre mineral water bottles will be purchased and regularly restocked on site for the operation and maintenance team when required.

In addition, sanitation/non-potable water will be required during the operation phase for site security, maintenance staff etc. for the operational lifetime of the project. However, the number of staff on site will be minimal and therefore water requirements low.

3.9.4 Raw Materials

Construction Phase

Raw material in the form of sand, stone, fine aggregate will be extracted from borrow pits installed on site – see Section 3.8.2 for further details[5]. Cement will be purchased for the construction of the foundation and the various Project components. The source of cement will be decided by the EPC contractor upon appointment. It should be sourced locally where possible and its transport be kept to as short a distance as practicable.

Operation Phase

No significant volmes of raw materials will be required during the operation of the windfarm.

[1] ONEAD is also in charge of waste management and built its first sewage treatment plant in 2014. Power remains a big challenge and the highest cost for water production and treatment in Djibouti.

[2] The Shinile area of Ethiopia has high groundwater potential with borehole yield ranging from 5-20 l/s, as stated in Ketema, Abebe & Lemecha, Gezahegn & Schucknecht, Anne & Kayitakire, Francois. (2016) *Hydrogeological study in drought affected areas of Afar, Somali, Oromia and SNNP regions in Ethiopia. Part 1: Remote sensing and overlay analysis.* 10.2788/050278.

[3] Water supply by ONEAD was confirmed at a meeting between the Consortium and ONEAD on 27.02.2018

[4] Transboundary impacts could potentially occur depending on the outcome of the study.

[5] Where feasible, borrow pits should be installed on site as a first preference, use existing quarries as a second option and finally new quarries out with the Project site as the least preferred option.

3.9.5 Fuel Requirement and Storage

Construction Phase

The onsite fuel requirement during construction phase will be procured from local suppliers in Djibouti City and tankered to site.

Operation Phase

Approximately 500 litres of oil will be required per wind turbine over a five year period for gearbox maintenance activities. Oil should be stored at designated areas with secondary containment. This equates to approximately 32,500 litres of oil being required for the operation of a 13[1] turbine windfarm over a 25 year period.

3.9.6 Explosives

Construction Phase

Explosives will be required during the construction of the windfarm in some areas of the site to remove surface geology and install access roads, turbine foundations, hardstandings and lay down areas. Explosives will be transported to site from Djibouti City and safely stored on site in a purpose built facility.

Operation Phase

No explosives will be required during the operation of the windfarm.

3.9.7 Power Requirement

Construction Phase

The power requirement during the construction phase will be met through onsite diesel generators of various sizes dependent on usage.

Operation Phase

The power requirement during the operation phase for the site office will be provided by the Project. An emergency backup set 10 kVA DG set will be located at the site office.

3.9.8 Imported Materials

Construction Phase

Construction materials and turbine components will be procued by the EPC Contractor and delivered to Doraleh Multipurpose Port – see Section 3.8.2.

Operation Phase

Operational materials, such as spare wind turbine generator parts, will be procured as required by the operations team and delivered to Doraleh Multipurpose Port.

3.10 POLLUTION CONTROL MEASURES

3.10.1 Air Emissions

Construction Phase

The Project will cause localised, temporary impacts on air quality due to on-site construction activities. The likely emissions from construction activities will include the following:

- fugitive emissions from site clearing, digging, filling, material handling, transportation, use of construction machinery, etc.;
- fugitive dust emissions from vehinclar access along unpaved roads;
- dust emissions from batching plant;

[1] Up to 45,000 litres of oil may be required if up to 18 turbines are installed on site

- dust emissions from rock blasting;
- vehicular emissions from increased traffic volume from vehicles used for transport of construction material; transportation of wind turbine generators and accessories; and
- emissions from the operation of diesel generators.

Fugitive dust emissions arising from various activities such as excavation, transportation of material (loading and unloading), and vehicular movement (on unpaved roads) will be minimized through construction site good practice.

Operation Phase
Under normal operations there will be no gaseous emissions from the operating areas.

There will be gaseous and fugitive dust emissions owing to movement of maintenance vehicles, which will be minimized through onsite speed limits of 10-15 kph. Vehicular emission will be controlled through proper vehicle maintenance.

3.10.2 Waste Management

A high-level review of waste management facilities (solid and liquid waste) currently available in Djibouti was undertaken during the ESIA process. The following was established through discussions with representatives of the Environment and Sustainable Development Directorate and the *sous-préfet* (subprefecture) of Tadjoura:

- Project proponents are responsible for the appropriate management of generated waste streams.
- Official, solid waste management facilities (landfills) are located in Djibouti City (Douda) and Tadjoura.
- No household waste collection services currently exist in the locality of the Project.

Due to the limited waste management facilities in Djibouti, a detailed assessment to identify suitable waste management facilities or contractors suitably qualified to process waste should be undertaken by the EPC contractors once commissioned.

Solid waste will be generated during the construction phase and will likely consist of biodegradable waste such as cleared vegetation (limited); general waste such as paper, packaging, plastics, food waste; and construction related waste such as rubble, metal off cuts, etc. There are plans to temporarily store general waste on the site in skips. The skips will be emptied and the waste will be taken to the nearest suitable landfill site (to be identified during detailed Project design).

Wastewater will be generated from human activities such as hand washing on-site and from water used for construction purposes such as washing tools covered in excess cement. Sewage will also be generated on site and thus self-contained portable toilets will be installed in a designated space. A Waste Management Plan will be developed during the detailed design phase and implemented as soon as site preparation works commence.

An approved contractor will be employed to regularly empty and maintain the portable toilet facilities if implemented on site. A sewage removal contractor will uplift and transport the sewage to a licensed sewage treatment facility.

If grey water is to be discharged to soakaways, any areas set aside for washing of

hands or tools must be located in excess of 100 m from any water resource or area prone to flooding.

3.10.3 Solid and Hazardous Waste Management

Construction Phase

The solid waste generated by the Project will consist of waste, garbage waste, metal scrap and excess construction materials. Table 3-11 shows the main types of waste that will be generated and their sources.

Table 3-11 Waste Generated, Sources and Disposal Method

Waste Type	*Source*	*Estimated quantity*	*Method of disposal*
NON-HAZARDOUS WASTE			
Domestic solid waste	Labour activities	3-4 kg per day	Reuse and recycling if possible. Otherwise these will be transported to the nearest waste disposal site as required.
Construction debris (excavated material)	Construction of turbine foundations, access road, storage yard, etc.	0.5-1.0 tonnes per day	Excess construction materials will be reused where possible otherwise transported to a waste disposal site.
Packaging waste containing wood, cardboard and other recyclables	Packaging material for wind turbine generators	10 kg per wind turbine generator	Reuse and recycling if possible. Otherwise these will be transported to the nearest waste disposal site as required.
Sludge from welfare facilities	Construction facilities	4-5 kg per month	Disposal and clean-up of any liquid waste will be in accordance with procedures to be established by the EPC contractor for the Project.
All non-recyclables waste	Construction activities	5-10 kg per day	Transported to the nearest waste disposal site as required.
HAZARDOUS WASTE			
Used oil / waste oil	Construction machinery	5-10 litres per month	Disposal and clean-up of any liquid waste will be in accordance to the procedures established by the EPC contractor for the Project.
Oil contaminated rags	Cleaning activities	1-2 kg per month	Disposal and clean-up of any liquid waste will be in accordance to the procedures established by the EPC contractor for the Project.

Operation Phase

During operation phase, the waste generated from the Project will include:

- domestic waste from the site office;
- scrap materials (e.g. scrap tools, damaged PPEs); and,
- hazardous waste (e.g. waste oil, lubricants, oil contaminated rags, damaged batteries, waste oil filter).

The operational waste streams will be disposed of by a licenced contractor.

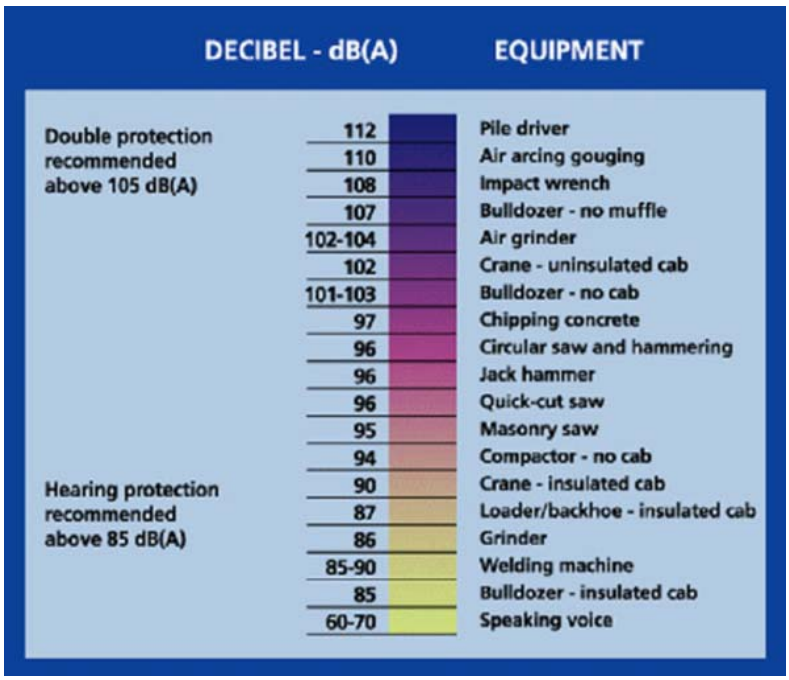
3.10.4 Noise Control

Construction Phase

All construction noise will be temporary in nature. The contractor will minimise noise disturbance impacts by restricting the use of noise emitting equipment to normal

daytime hours where construction methods feasibly allow for this. Figure 3.12 provides some typical noise levels that could be expected during construction.

Figure 3.12 Typical Construction Noise Levels



Source: Occupational Safety and Health Administration (OSHA), 2003

As mentioned in Section 3.8.2, localised blasting and rock hammering will be required to excavate the turbine foundations and possibly for the construction of the on-site access roads, crane pads and laydown areas. All necessary precautions (e.g. warning of the local community of blasting programme) and good practice will be used to reduce any unnecessary damage or nuisance. When blasting is required, access to site will be carefully controlled and areas where explosives are being used will be cordoned off (to be determined by EPC contractor).

Noise levels of blasting depends on several complex factors, such as maximum instantaneous charg (MIC) used, topography, meterological conditions and distance between blast site and receptor. The noise from blasting is typically of a very short duration and between 95dB(a) to 120 dB(a). However, this noise level will only be expected within close proximity to the blast site.

Operation Phase

Wind turbines produce noise when operating. The noise is generated primarily from mechanical and aerodynamic sources. Mechanical noise may be generated by machinery in the nacelle of the wind turbines. Aerodynamic noise emanates from the movement of air around the turbine blades, therefore turbine designs which allow lower rotational speeds in higher winds will limit the amount of noise generated.

3.10.5 Fire Safety and Security

Construction Phase

Appropriate firefighting system and equipment shall be provided throughout the construction period. The fire extinguishers will be placed at all strategic locations such as camp site, batching plant, site office, storage yard, heavy construction machinery etc. Besides this, emergency contact numbers will also be displayed onsite.

The construction phase will likely require the use of explosives to excavate materials for foundations. A secure and suitable facility will be provided for the safe storage of explosives managed by appropriately trained staff[1]. When blasting is required, access to site will be carefully controlled and areas where explosives are being used will be cordoned off (to be determined by EPC contractor).

Operation Phase

Structural fire protection

Wind turbines comprise predominantly non-flammable materials. Most components of the wind turbine generators are predominantly metal. The only inflammable components are rotor blades and the panelling of the machine house, which are made from fibre glass, electric cables and electrical components, gear box, transformer and hydraulic oils, hoses and other plastic components. It is difficult for a fire to spread from the transformer station to the wind turbine or vice versa.

The turbines will be installed with a braking system that automatically switches on in wind speeds in excess of 18m/s, to prevent failures and accidental damage.

Fire prevention

Due to the lack of local emergency services, the Project will need to have appropriate measures in place for both the construction and operation phases of the Project to tend with any emergency situations on site. Project personnel will take all appropriate measures to prevent fires.

Fire extinguishers

One portable dry chemical powder fire extinguisher (Category C) at 50 kg in weight will be maintained at each wind turbine. These extinguishers are meant for immediate fighting of fire in early stages.

3.10.6 Imported Materials

Construction Phase

Construction materials and turbine components will be procued by the EPC Contractor and delivered to Doraleh Multipurpose Port – see Section 3.8.2.

Operation Phase

Operational materials, such as spare wind turbine generator parts, will be procured as required by the operations team and delivered to Doraleh Multipurpose Port.

[1] Due to the specialist nature of training and experience required to safely manage explosives, it is unlikely that these particular roles would be available to people from the local communities for overriding reasons of health and safety.

3.11 PROJECT PERMITTING REQUIREMENTS

A summary of permits required for the construction and operation of the Project is presented in Table 3-12, identifying the type of permit required, the issuing authority, the party responsible for obtaining the permit and when the permit will be required.

Table 3-12 Project Permitting Summary

Permit	*Authority*	*Responsible Party*		*Timing*	
		Employer	*Contractor*	*Pre-NTP*	*Post-NTP*
Construction Permit	Housing, Urbanism and Environment		x	x	
Fencing permit	Department of Housing and Urban Development		x		x
Environmental Impact Assessment Approval	Minister of Housing, Urbanism and Environment	x		x	
Certificate of environmental conformity	Minister of Housing, Urbanism and Environment	x		x	
Certificate of registration with land coordinates, ground plan, cadastral plan	Djibouti Land Department	x		x	
Final ground plans	Sous-Direction de Conservation Foncière	x		x	
Authorisation to start trenching works	Major of Ali Sabieh		x	x	
Authorisation to synchronise trenching works	Djibouti Telecom, Electricite De Djibouti (EDD) and ONEAD (national office of water)		x	x	
Electrical certification of compliance	TBD		x		x
Alignment certificate	Djibouti Land Department	x		x	
Waste permit	TBD		x	x	
Sanitary certificate	National institute of public charge		x	x	
Hazardous materials permit and hazardous materials transportation permit	TBD		x	x	
Water permit	ONEAD		x	x	
Water and Sewage Connection permit	ONEAD		x	x	
Work permits for foreign employees	*Agence Nationale de l'Emploi de la Formation et de l'Insertion Professionnelle* (ANEFIP)	x	x	x	
Residence permits for foreign employees	*Agence Nationale de l'Emploi de la Formation et de l'Insertion Professionnelle* (ANEFIP)	x	x	x	
Registration with Social Security Administration	*Caisse Nationale de la Securité Sociale*	x	x	x	
Numéro d'Identification Fiscale	Office Djiboutien de la Propriété Industrielle et Commerciale (ODPIC)	x		x	
Fire Permit	National Fire Service		x	x	
Registration of the EPC Contractor as an external company	Office Djiboutien de la Propriété Industrielle et Commerciale (ODPIC)		x	x	

Source: Djibouti Consortium 2018

4 ASSESSMENT OF ALTERNATIVES

4.1 NO DEVELOPMENT OPTION

The diversity and security of Djibouti's electricity supply, as well as access to electricity, are key challenges faced by Djibouti (approximately 55% of the population does not have access to electricity)[(1)]. The continued dependence on imported fuel for generating electricity is also taking its toll on the wider economy causing Djibouti to use up precious financial resources importing electricity that could otherwise be spent on addressing urgent social development challenges.

Proceeding with the Project will produce clean renewable energy and will avoid using energy that will otherwise be generated wholly or partly from more carbon-intensive sources. It will also contribute towards the government's plans to meet 100% of domestic energy demand through renewable energy by 2020.

The option of not proceeding with the development was therefore discarded when considered against the benefits of establishing a renewable energy source, as outlined above.

4.2 ASSESSMENT OF DEVELOPMENT OPTIONS

4.2.1 Overview

A site selection exercise was carried out to identify sites suitable to locate the windfarm and associated substation and transmission line.

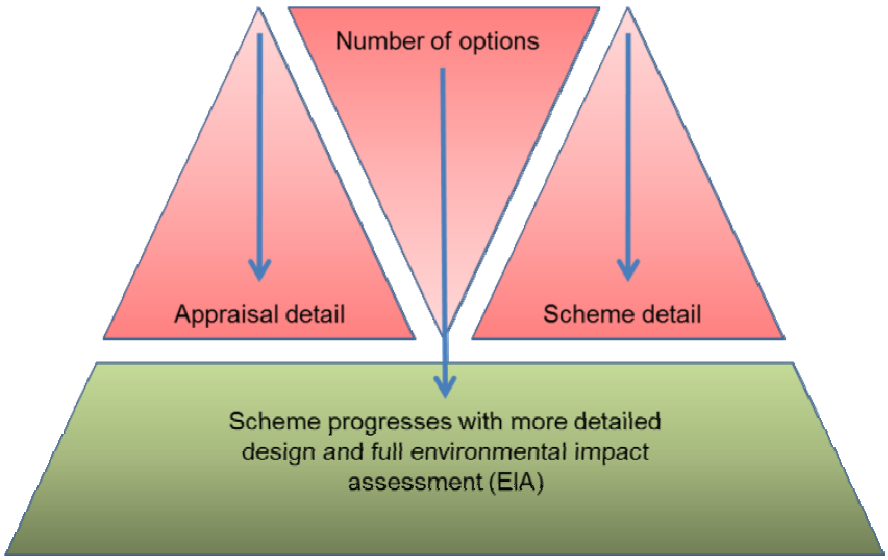
The aim of the site selection exercise was to ensure that site options were identified, appraised and compared, as far as possible, in a robust, clear and consistent manner to find, on balance, the best site for the windfarm. The site selection methodology developed to achieve this had the following main phases:

- Definition of the study area and site selection objectives and appraisal criteria.
- Identification of potential sites.
- Appraisal and comparison of the identified sites.
- Selection of shortlisted options.
- Detailed appraisal and comparison of shortlisted options to finalise choice of exploration sites that will be taken forward for development and subjected to the ESIA process.

The site selection and appraisal was an iterative process that initially identified a number of sites. The initial number of sites was refined to a preferred site as the level of appraisal detail and project definition increased. Ultimately this process has identified the site to be taken forward for IA. This process is summarised in Figure 4.1.

[1] International Reneweable Energy Agency (IRENA) Djibouti – Renewables Readiness Assessment. May 2015

Figure 4.1 Site Selection and Appraisal Process



Source: ERM (2017)

An 'objectives-led' approach was adopted for the site identification and appraisal exercise. This approach enabled sites to be identified that performed best against the desired objectives.

4.2.2 Site Location

There were five main objectives identified to enable the identification of potential sites for the location of the windfarm, as follows:

- suitable wind resource;
- environmental suitability;
- good site access;
- good grid access; and
- optimal terrain.

The Ghoubet site performed best against the site five appraisal criteria for the following reasons:

- **Suitable wind resource:** The average wind speed is above 9 metres per second at 84 m, with several months with a wind speed of above 10 metres per second. This makes the site suitable for several IEC class I wind turbine models including Nordex N133/4.8 MW, Siemens SWT-DD-120 4.3 MW and Vestas V117-4.0 MW.

- **Environmental suitability:** No significant environmental issues were identified at the site during the appraisal process. The land is occasionally used as a thorough-fare by surrounding communities to travel to grazing sites for livestock outside of the Project site.

- **Good site access:** The RN9 runs through the north of the Project site before joining the RN1. The RN1 runs to the coast at Djibouti city. The RN3 is connected to the RN1. The RN3 runs through Doraleh Port which is capable of receiving and transporting turbine components. These national roads are generally in good condition and could accommodate large construction traffic. Only on-site access roads to turbine locations will be required.

- **Good grid access:** EDD are going to construct the Ghoubet substation approximately 3.5 km from the Project site adjacent to the RN9. From this substation, EDD will construct a transmission line to evacuate electricity from the Project site. The Ghoubet site is strategically located to link into this new infrastructure.

- **Optimal terrain:** The Project site is a wide expanse of unpopulated land. It is relatively flat and consists predominantly of desert, surrounded by steep slopes.

4.2.3 Turbine Model

A number of turbine models have been considered for the Project through the feasibility studies, which were modelled on the basis of measured windspeeds from the onsite meteorological mast. Turbine types considered included:

- Nordex N133/4.8 (64.4 m blade and 4.8 MW nominal power)
- Siemens SWT-DD-120 (58.6 m blade and 4.3 MW nominal power)
- Vestas V117-4.0 (57.15 m blade and 4.0 MW nominal power)

A feasibility study conducted by Tractebel[(1)] considered these turbine models based on operational wind data recorded from the temporary meteorological mast and created models based on the three turbine on energy production estimate scenarios for the site. The N133 turbine was selected as the favourable option because of the higher MW production per turbine meaning fewer turbines are required to complete the 60 MW capacity.

The feasibility report produced by Tractebel also conducted a cost estimate on the three turbine model scenarios. Capital expenditure (CAPEX) was lowest for the Nordex N133 turbine model whilst producing the most power. Additionally, the operational expenditure (OPEX) were lowest for the Nordex N133.

Therefore, the Nordex N133 was recommended as the overall favourable option and is what the assessment is based on. However, the final turbine model may differ depending on which EPC contractor is appointed.

4.2.4 Turbine Layout Design

Having selected the Ghoubet site as the preferred location for the windfarm and the Nordex N133 as a potential preferred turbine model, the layout was then refined as more baseline data on wind resource and environmental and social receptors was gathered. Figure 4.2 presents three layouts showing the evolution of the design from 2012 to 2018.

These changes have been made in response to the findings of the assessment process, which has increased knowledge of noise, impact on people in dwellings/buildings and negative effects on wildlife on the area. As a result of listening to consultation feedback the following alterations were made to the site layout:

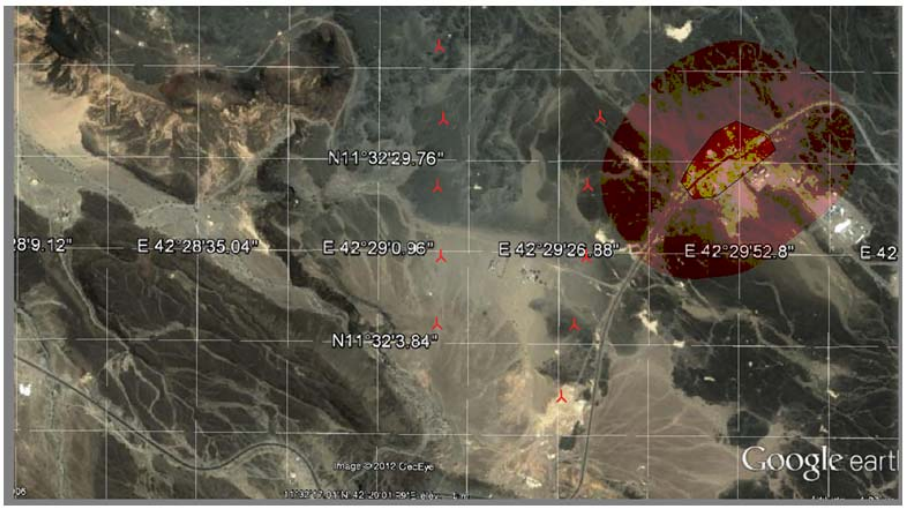
- **Moving the turbines a safe distance from any dwellings/houses:** A 500 m exclusion zone was placed around each of the residential locations, to minimise the potential health and safety impact of turbine failure.
- **Shadow flicker on dwellings/houses:** Wind turbine locations were moved to minimise the potential for impacts arising from 'shadow flicker'.
- **Noise impacts on people:** A 500 m exclusion zone was placed around each of the residential locations.
- **Proximity to wadi channels:** Turbines were designed to not be located within main wadi channels.
- **Avoidance of existing roads and site access:** Turbines were located to avoid existing

[1] Tractebel 2018 Global Feasibility Study: FINAL Report GHOUBET 60 mW UPDATE FS

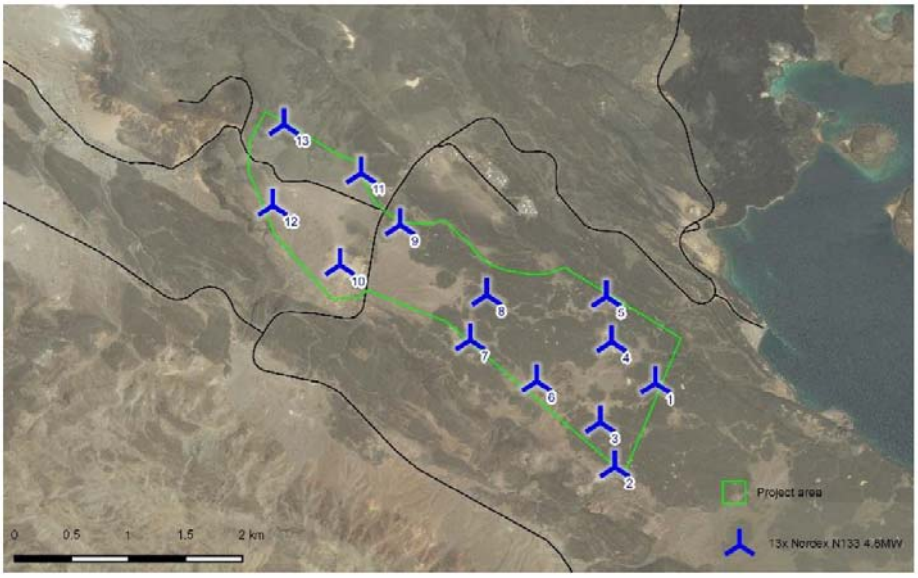
roads.

- **Site designed to ensure livestock can still pass through the land:** Sited away from key wadi channels used as footpath network by herders.

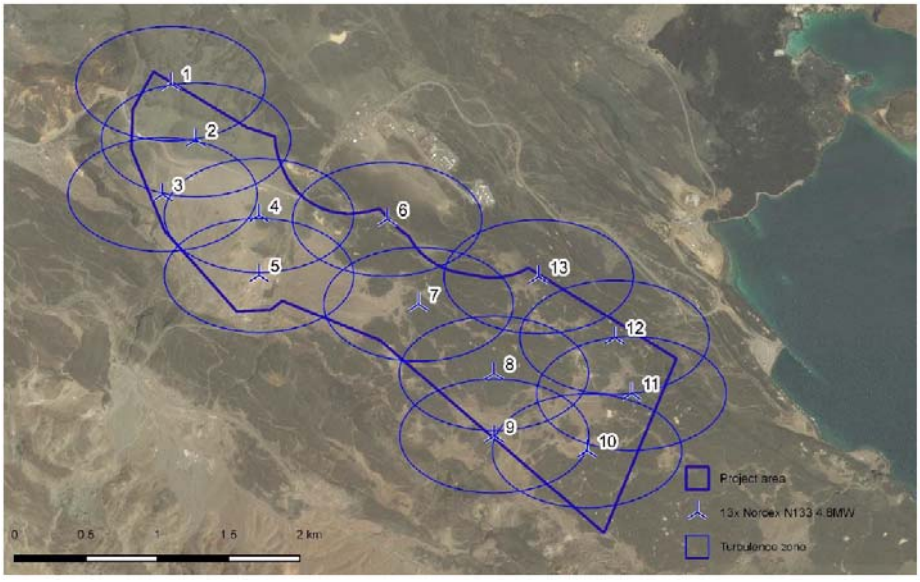
Figure 4.2 Evolution of Turbine Layout Design



Feasibility Study 2012



Feasibility Study 2014



Feasibility Study 2018

4.2.5 Transmission Corridor

The Ghoubet site is located approximately 3.5 km north of the EDD Ghoubet transformer and transmission corridor due to be constructed in 2018, so it will be necessary to install a new transmission line from the windfarm to the EDD Ghoubet transformer to export electrical power from the Project site to the national electricity grid.

The route of the Project transmission line has not been decided. For this assessment, it is assumed to be the shortest route between the Project substation and the EDD Ghoubet transformer.

To avoid/minimise potential impacts on environmental and social resources, the following preferences should be considered for the pathway of the Project transmission line:

- located >200 m from the escarpment to minise interaction with avifauna;
- run parallel to and not perpendicular to the escarpment to minise interaction with avifauna; and
- avoid poles/lattices in wadi channels to maintain the integrity of the local drainage system and habitat.

4.2.6 Construction Materials Transport Route – Port

The Project site is located approximately 70 km west (~95 km road journey) from the Doraleh MultiPurpose Port, accessed via the RN3, RN1 and RN9. This is an existing port with the capacity and security to handle the delivery and storage of the construction machinery and materials required to construct and operate the Project. The Project also considered the use of the Mineral Port approximately 1 km east of the Project site, accessed via the RN9 road (~4.5 km road journey) and Tadjourah Port 50 km north of the Project site, accessed via the RN9 (~80 km road journey).

Although the reduction in distance the materials and machinery will travel will be reduced by utilising either the Mineral Port or Tadjourah Port compared with Doraleh MultiPurpose Port, the RN9 between the Project site and these other two ports has several tight hair pin bends that would not allow delivery of turbine components. Additionally, the topography of the land as it undulates around the west bank of Lake Ghoubet would likely not allow safe movement of large plant and turbine components. Furthermore, the Mineral Port would likely require modification (in the form of dredging / channel deepening) in order to facilitate the delivery of the materials and machinery required to construct and operate the Project which could cause impacts to the marine environment of Lake Ghoubet. Therefore, from an environmental and social perspective, Doraleh MultiPurpose Port is considered the viable and preferred option.

4.2.7 Construction Materials Transport Route – Road

The transport routes shown in Figure 4.3 were considered for Project construction traffic from the Djibouti City area to the Project site, based on the assumption that Doraleh MultiPurpose Port is the viable and preferred option for receiving and storing Project construction materials.

Option 1 passes through, or adjacent to, approximately three communities including We'a and Cité Moumina. Option 2 passes through or adjacent to approximately seven communities, including We'a, Dikhil, Layta and Cité Moumina. Furthermore, Option 1 is a significantly shorter route. In consideration of the health and safety risk for communities and other road users associated with road transport, the preferred option is the shortest route with fewer communities and therefore the safest route: Option 1. Option 1 is also better in terms of minising vehicle air emissions.

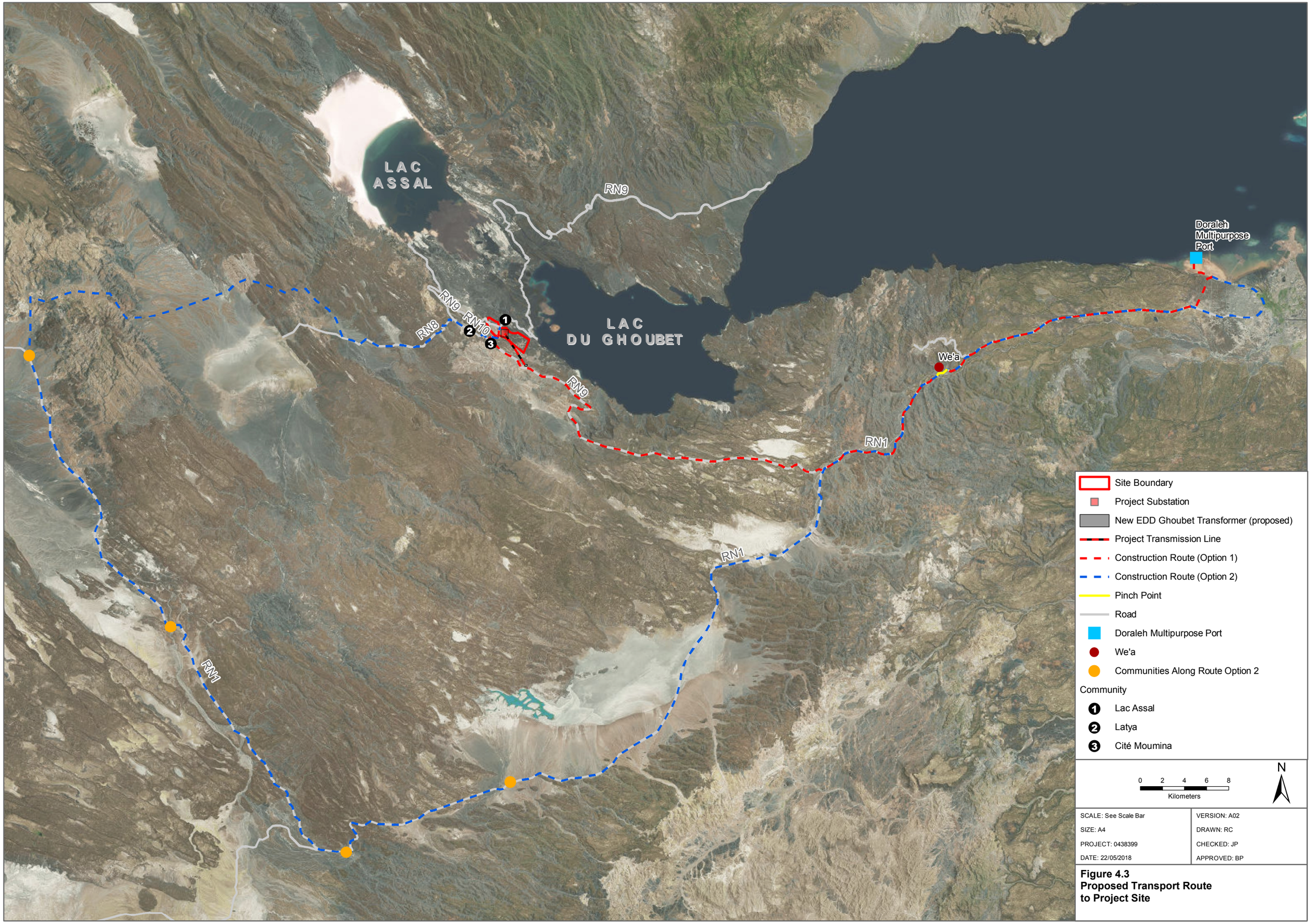


Figure 4.3
Proposed Transport Route to Project Site

PROJECTION: WGS 1984 UTM Zone 38N

SOURCE: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Path: P:\Projects\0438399 AFC Ghoubet Wind Farm.BP\02 Working Files\GIS\MAPS\ESIA Report\0438399_RoadNetworkImpactedbyProjectConstruction_A02.mxd

5 STAKEHOLDER ENGAGEMENT

5.1 INTRODUCTION

Stakeholder engagement is a key aspect of the ESIA process. The purpose of stakeholder engagement is to facilitate participation in the project decision-making process and to provide a platform for views to be expressed which inform the identification of impacts and associated mitigation measures. The process involves sharing information and knowledge, understanding the concerns of others and relationship building, thereby allowing stakeholders to understand the risks, impacts and opportunities of the project to achieve positive outcomes.

Stakeholder engagement is an ongoing 'two way' process of information sharing between companies and those that may influence or be affected by the project from the early stages. Engaging with stakeholders is essential for effective risk management and project delivery.

The key objectives of stakeholder engagement are summarised in Box 5.1.

Box 5.1 Objectives of Stakeholder Engagement

- **Ensuring Understanding:** An open, inclusive and transparent process of culturally appropriate engagement and communication to ensure that stakeholders are well informed about the Project. Information should be disclosed as early and as comprehensively as possible.
- **Involving Stakeholders in the Assessment:** Stakeholder views and concerns are considered in the scoping of issues, the assessment of impacts and the generation of mitigation and management measures. Information obtained from stakeholders may also play an important role in providing local knowledge and information in support of the baseline, which will inform the impact assessment.
- **Building Relationships:** Through supporting open dialogue, engagement will help establish and maintain a productive relationship between the Project and stakeholders.
- **Engaging Vulnerable Peoples:** An open and inclusive approach to consultation increases the opportunity for stakeholders to provide comments on the Project and to voice their concerns. Some stakeholders, however, need special attention in such a process due to their vulnerability. Special measures, such as focus group meetings, are undertaken to ensure that the perspectives of vulnerable stakeholders are heard.
- **Managing Expectations:** The engagement process will serve as a mechanism for understanding and managing stakeholder and community expectations regarding the Project.
- **Ensuring Compliance:** The process is designed to ensure compliance with both local regulatory requirements and international good practice.

This section presents a summary of the stakeholder engagement activities that have been undertaken to date in support of the Project (including as part of this ESIA). The Stakeholder Engagement Plan (SEP) provided in *Annex G* provides detail of the overarching engagement framework throughout the Project lifecycle, which is guided by the Djiboutian requirements and the International Finance Corporation (IFC) standards.

5.1.1 Engagement Background

A variety of communication methods have been used during engagement on the draft Scoping report and social baseline data collection. They were determined based

on the level and objective of engagement, as well as the target group. Communication methods have included:

- presentations outlining the Project and ESIA process;
- meetings with key interest groups and potentially impacted and/or interested stakeholders.

Communication will continue between the Consortium and stakeholders throughout the ESIA process, with the next step being the final ESIA report disclosure and submission to the regulators ESIA in late May 2018. This will involve presenting the findings of the ESIA and submitting the final ESIA to the regulators.

5.1.2 Stages of Engagement and Progress to Date

The stages of engagement and the status of each in relation to the ESIA is provided in Table 5-1

Table 5-1 Progress of ESIA Stakeholder Engagement to Date

Stage	Description	Status/Indicative Timing
Stage 1: Scoping	National level engagement meetings to gain a preliminary understanding of the Project and its likely impacts, and to commence the identification of relevant stakeholders.	*Completed December 2017 – January 2018*
Stage 2: Scoping Report Engagement	Consultation with key stakeholders in order to generate feedback on the Draft Scoping Report, including the scope, approach and key issues to be investigated further for the ESIA.	*Completed February – March 2018*
Stage 3: Social baseline data gathering and engagement	Baseline data collection to understand the socio-economic context of potentially affected communities as well as to provide an update on the Project, and gather topic and gender-related feedback from specific groups through focus group discussions, key informant interviews and community profiling.	*Completed February – March 2018*
Stage 4: Draft ESIA engagement	Following baseline data analysis and drafting of the impact assessment and mitigation measures, a series of national, district and local level engagement meetings were held to update stakeholders on the Project. This was done through the disclosure of the Draft ESIA findings, with the objective to obtain stakeholder feedback. The details related to the Project grievance mechanism and company contacts were also shared.	*Completed May 2018*
Stage 5: ESIA disclosure	The Final ESIA report will incorporate the comments and feedback received from stakeholders throughout the different rounds of engagement and the overall ESIA process. All identified stakeholders will be informed of the submission of the final report to the regulators.	*To be completed*

5.2 ESIA STAKEHOLDER ENGAGEMENT ACTIVITIES TO DATE AND KEY OUTCOMES

This section describes the ESIA activities that have been undertaken to date, the issues raised and how these issues have been addressed in the ESIA.

5.2.1 ESIA Stage 1: Scoping Engagement

Approach

Stakeholder engagement commenced during the Scoping site visit in December 2017. Meetings were held with the Electricté de Djibouti (EDD). These meetings aimed to:

- introduce the Project and gain feedback regarding the nature, scale and purpose of the Project;
- introduce the ESIA and stakeholder engagement processes;
- introduce the ESIA team;
- gather any existing reports, plans and data to support the impact assessment; and
- gain an initial understanding of the stakeholder's perceptions and any concerns about the Project.

5.2.2 ESIA Stage 2 & 3: Scoping Report engagement and Social Baseline data gathering and engagement

Approach

Further stakeholder engagement meetings were held in February 2018 to:

- introduce the Project to stakeholders and inform them of the ESIA process;
- present the findings of the Scoping Report;
- discuss potential environmental and social impacts associated with the Project and potential options for their mitigation and management;
- identify and discuss any issues of concern; and
- provide stakeholders with an opportunity to ask questions.

As part of this process, meetings were held with the regional administrative authorities from the Arta and Tadjourah prefectures. In addition, public consultation meetings were held with local administrative and customary authorities, community representatives and members of different local associations from the Lac Assal and Cité Moumina communities.

Focus group discussions were arranged, in addition to key informant interviews to gain a thorough understanding of the Project site and surroundings, and to ensure that all stakeholders had an opportunity to send a representative. At all of the meetings, details of the Project were presented and stakeholders were invited to ask questions and comment on potential impacts and mitigation measures.

5.2.3 ESIA Stage 4: Draft ESIA Engagement

Following baseline data analysis and drafting of the impact assessment and mitigation measures, an engagement meeting was held to:

- update stakeholders regarding the Project;
- disclose ESIA findings, including identification of impacts and proposed mitigation measures; and
- provide details of the grievance mechanism and company contact details.

For this stage of engagement stakeholders were re-visited to provide an update of the project and present the contents of the draft ESIA, including detail on the impacts and proposed mitigation measures. This included formal meetings and meetings in communities. This stage was held in early May 2018.

A list of meetings held is provided in Table 5-2.

Table 5-2 Stakeholder Engagement Meetings Held

Date	*Stakeholder*	*Participants*		
		Male	*Female*	*Total*
Government meetings				
12 Dec 2018 17-19 Feb 2018 3 May 2018	Electricté de Djibouti (EDD)	1		1
11 Feb 2018	Ministry of Agriculture	1		1
26 Feb 2018	Ministry of Habitat, Urban Planning, Environment and Town Planning (MHUE)	1		1
2 May 2018	Environment and Sustainable Development Directorate (part of MHUE)	2		2
	Total	*5*		*5*
Local level meetings				
8 Feb 2018	Arta Prefecture, meeting with Prefect	1		1
10 Feb 2018	Cité Moumina, Focus Group discussion with customary authorities	2		2
10 Feb 2018	Karta authority	1		1
11 Feb 2018	Tadjourah Prefecture, meeting with Prefect	1		1
14 Feb 2018	Public consultation in Lac Assal village. Attendees included: Sub-prefect and Village Chief of Lac Assal, members of local associations (including the Women's and Youth associations)	11	2	13
17 Feb 2018	Meeting with Okal, customary authority	1		1
17 Feb 2018	Public consultation in Cité Moumina community. Attendees included customary authorities and village elders.	6		6
19 Feb 2018	Focus Group discussion, Cité Moumina / Lac Assal Women's Assocation		2	2
18-19 Feb 2018	Individual interviews with Key informants (such as livestock breeders, fishermen, manager of the tourist resort) during the social baseline engagement.	7		7
15-19 Feb 2018	Household surveys were completed with 40 households in the Project area during the social baseline engagement.			40
3 May 2018	Public consultation in Lac Assal's Community Building. Attendees included: Sub-prefect and Chief of Lac Assal, Lac Assal Women's Assocation, Okal General, Imam of Cité Moumina Mosque, Makaban (customary authorities representing the Debné tribes) and community members.	14	2	
	Total	*30*	*6*	*74*
	Grand Total	***35***	***6***	***79***

Figure 5.1 shows photographs taken during some of the meetings.

Figure 5.1 Photos from Meetings with Communities

Participants of the Draft ESIA disclosure May 2018

Outcomes

During the public consultation meetings discussions with stakeholders included:

- presentations of the Project; and
- discussions on the potential impacts of the Project, on the proposed solutions to minimise negative impacts and maximise positive benefits, and on the overall expectations regarding the Project.

Table 5-3 provides a summary of issues raised and how they have been addressed in the ESIA. Further details of specific issues raised and discussed during meetings held with particular stakeholders can be found in the meeting minutes presented in *Annex F* (Social Field Survey Report), and *Annex G* (Stakeholder Engagement Plan).

Table 5-3 Stage 2, 3 & 4: Scoping Disclosure, Social Baseline & draft ESIA Engagement Outcomes and Project Responses

Subject	Issue	Project Response	ESIA Reference
Land Use and Land Take	• The Project footprint does not constitute a major issue for the community. The affected land is unsuitable for any productive activity, and the Project is thus not expected to hinder any agricultural or pastoral projects of the residents. • Some concerns were raised about the project actually materialising: reportedly projects have been planned in the past with no follow through.	• Access will be temporarily restricted in small areas of the site during construction. The Project will engage with communities beforehand to minimise the impact and agree on alternative accessible routes. • The Project will employ a Community Liaison Officer who will communicate all Project developments to the communities so that they are informed of Project development progress.	*Section 7.12 (Land Use and Livelihoods)*
Employment and the Economy	• Community members have high expectations in terms of access to jobs, both during the construction phase of the project and as a result of the electrification of the area. • Some members expressed concerns that outsiders will take the jobs, due to the lack of schooling and professional training of the local population – and this will reportedly be unacceptable for them.	• The Project will implement a Human Resources Policy and Management Plan setting out recruitment procedures, training requirements and targets around the hiring of local workers. • Local procurement will be prioritised where possible. • The Project will provide information on the specific jobs available and specific skills required, at least two months prior to the hiring period. This is to ensure opportunities are known in advance for unskilled and semi-skilled positions, which are more likely to be filled by local residents.	*Section 7.11 (Employment, Procument and Economy)*
Demography and in-migration	• In Lac Assal, potential demographic increase as a result of the project is seen as an opportunity. Some concerns were raised related to unplanned or chaotic urbanisation, and waste management. • In Cité Moumina, the community members maintained that the presence of workers or jobseekers from other areas will be a concern for them, and thus the village elders should be updated continuously to manage any potential influx of people.	• The Project will aim to detract work-seeking in-migration to the Project area through the clear communication of Project labour needs and clear Project policies and procedures for recruitment. • The Project will implement an Influx Monitoring Programme and an Influx Management Plan (if influx is identified as a growing concern during monitoring programme) • The Project will implement a Grievance Mechanims that is easily accessible to local communities	*Section 7.13.7 (Community Health, Safety and Security)*

Environment	• The community members were given the opportunity to ask questions regarding windfarms - noise pollution was the theme that raised most concerns.	• Noise emissions from construction will be temporary and limited to the duration of the equipment operations at the work sites. • It is planned that turbines will be sited at least 500 m from any dwellings to mitigate noise impacts. • The Project will commit to the IFC EHS General Guidelines on noise impacts: 45 dB(A) limit during operation at residential receptors.	*Section 7.10 (Noise)*
Health and wellbeing	• No particular concerns related to health and safety during the construction phase, especially if local people were to be in charge of site safety. • Questions related to the safety of the area once the turbines have been installed (lightening and fears that the rotor blades may detach and fall).	• The Project will engage with the local community through the Community Liaison Officer about the risks and safety features of the wind turbines; turbine failure resulting in 'turbine throw' is considered unlikely. • Set-back distances (≥500 m) between turbines and residential areas will be incorporated into the design. • The Project will engage with the local community on what to do in the event of an emergency scenario such as turbine failure.	*Section 7.13 (Community Health, Safety & Security)* *Section 8 (Unplanned Events)*
Cultural heritage	• There were concerns that the cemeteries located just outside the project perimeter will be damaged by the Project.	• The cemeteries are located outwith the Project site therefore direct impacts to them will be avoided. A suitable buffer has also been included in the turbine layout design.	*Section 6.10 (Cultural Heritage)*
Engagement during the Project	• Recommended means to set up a good communication and information sharing system between the project and the local communities.	• During the public consultation meetings, the EDD representative noted that there are plans for weekly meetings with the community. This plan was welcomed by the community. • The Project will employ a Community Liaison Officer who will communicate all Project developments to the communities. • A community grievance mechanism has been communicated and participants welcomed this.	*Annex G Stakeholder Engagement Plan*

5.2.4 ESIA Stage 5: ESIA Disclosure

Following the outcomes of engagement during Stages 3 and 4, the ESIA has been updated and re-issued for approval. It is anticipated that the Final ESIA Report will be disclosed in late May 2018.

5.2.5 Post ESIA Engagement

Stakeholder engagement will continue following completion of the ESIA process. A project SEP will be developed and will include the following key elements:

- Pre-Construction Engagement: The project will ensure that there are sufficient community relations resources on the ground to manage grievances and undertake engagement regarding timeframes for construction activities. A series of meetings will be held in impacted areas, including along the transportation route with affected people.

- Construction Engagement: During this phase, the community relations team will respond to grievances and continue to hold meetings with stakeholders as required to address issues of concern. In addition, the team will monitor the implementation of the mitigation measures. The number of grievances and meetings is likely to be greatest during the construction period due to the nature and extent of predicted impacts.

- Operations Engagement: Ongoing engagement will be undertaken as required to manage community concerns and issues as well as to address grievances. Meeting frequency and grievances are expected to reduce over time as stakeholders adapt to the presence of the windfarm.

5.3 GRIEVANCE MECHANISM

An effective grievance mechanism allows stakeholders to lodge complaints and/or concerns at no cost, without retribution and with the assurance of a timely response. The process will include the following steps:

- identification;
- review and record the grievance;
- acknowledgement;
- develop a response;
- communicate response and establish agreement; and
- close-out process.

A detailed description of the grievance mechanism required for the Project is provided in the SEP.

Stakeholders can submit grievances or comments regarding the Project to the Community Liaison Officer or through local community leaders. Prior to construction, an office will be established at the site in order to improve accessibility of the grievance process.

The grievance mechanism will be widely advertised to affected stakeholders so that they are aware of the process, know they have the right to submit a grievance, and understand how the mechanism will work and how their grievance will be addressed. This process shall be carried out through community visits, distributing flyers and emails.

5.4 MONITORING AND REPORTING

In order to assess the effectiveness of the SEP and associated engagement activities, the Consortium will implement a data management and monitoring process as part of the overall monitoring of ESIA commitments and performance.

All engagement activities, throughout the ESIA process and the life of the Project, will be documented and filed in order to track and refer to records when required and ensure delivery of commitments made to stakeholders. The strategies for documenting and recording ongoing stakeholder engagement are detailed in the SEP.

6 BASELINE CONDITIONS

This section establishes the existing conditions (i.e. baseline) of the Project Area of Influence (AoI) to enable the assessment of potential Project-related impacts on the physical, biological and socioeconomic receiving environment to be undertaken. Baseline data has been collected through both desktop assessments and, where necessary, in-country field surveys.

6.1 ENVIRONMENTAL BASELINE

6.1.1 Environmental Area of Influence

The environmental Area of Influence (AoI) includes the core components on the Project site (wind turbines and associated facilities), a buffer zone along the transmission line right of way (RoW) and up to 2 km around the Project site. The 2 km buffer has been adopted specifically as a worst case range of effects for mobile avian receptors (birds and bats) that fly through the site and further afield. If a specific environmental assessment requires a different AoI, this is stated in the individual baseline.

6.2 METEOROLOGICAL CONDITIONS

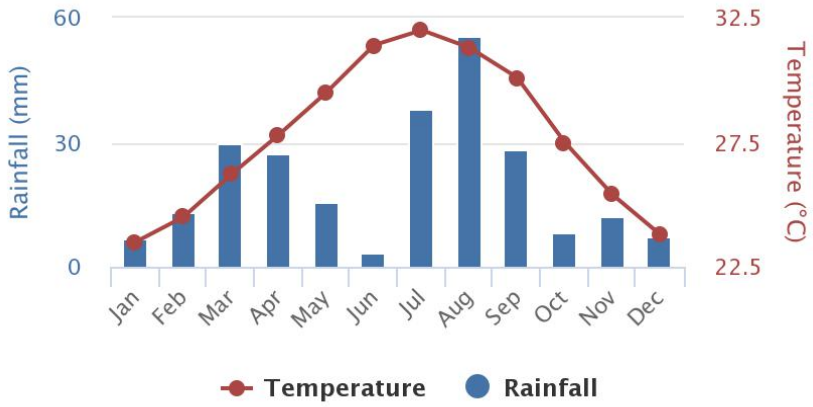
Djibouti's climate is semi-arid to arid. It is arid in the north-eastern coastal regions and semi-arid in the central, northern, western and southern parts of the country. Mean daily maximum temperatures range from 32 °C to 41 °C.

There are two distinct seasons in Djibouti: between October and April it is relatively cool (average temperature 23-27°C) and between June and September it is hot (average temperature 27-32°C). Rainfall is concentrated in two seasons, with the peak around July-September and a secondary season March-April[1]. Most precipitation falls in August; however, it is still only a monthly average of 55mm (Figure 6.1). Rainfall is less than 400 m^3/yr/per capita, therefore Djibouti is classified as water scarce[(2)].

[1] World Bank Group. Climate Change Knowledge Portal based on mean historical temperature and precipitation between 1901 and 2015.

[2] Wilby et al. (2010) Confronting climate variability and change in Djibouti through risk management. Geologically Active – Williams et al. (eds) ISBN 978-0-415-60034-7

Figure 6.1 Average Monthly Temperature and Rainfall for Djibouti (1905-2015)



Source: World Bank Group

The prevailing winds in Djibouti are generally from the east. The prevailing wind in the Project area is from the east-south east direction. The average wind speed in the Project area is 9.85 ms^{-1}, measured at a height of 59 m.

6.3 GEOLOGY AND SOILS

The geology of the Project region is very complex due to the high seismic and volcanic activities in the area. The geology on the Project site is dominated by jointed, vesicular, weathered basalt (formed from erupted fissures) and scoria. Figure 6.2 shows the typical geology and soil of the Project site.

Lava flows are expected to have created a sub-horizontal stratification. The thickness of these lava flows is very heterogeneous. One single lava flow can range from 1m to 25m thick. Due to the volcanic processes, the basalt can be embedded between scoriaceous layers that followed each lava flow; these have a characteristic vesicular texture.

Figure 6.2 Typical Geology and Soil of the Project Site

Source: ERM 2017

The basalt outcrops that dominate the majority of the local area are covered by a compact and cemented layer of silt and gravel or volcanic ashes. The thickness of this layer is unknown, but is likely to be ≥ 3 m in the north west part of the site.

The soil within the Project site comprises of rock and salt flats[1] as is typical for the region. The topography of the Project site is flat with a mix of flat desert terrain and steep slopes in the immediate surrounding area.

6.4 SURFACE AND GROUNDWATER

6.4.1 Drainage

There is a network of ephemeral water channels on the Project site known as a wadi network. This wadi network channel conveys water south east off the steep slopes towards Lake Ghoubet. However, for the vast majority of each year they are dry as rainfall is scarce in the arid climate. A typical wadi channel is shown in Figure 6.3 and the indicative location of the main wadi channels is shown in Figure 6.4.

Figure 6.3 Typical Wadi Channel within the Project Site

Source: ERM 2017

6.4.2 Surface Water Bodies

There are no permanent surface water bodies within the Project site due to the arid climate.

6.4.3 Hydrogeology

The hydrogeology of the site has not been investigated to date. Geophysical surveys will be undertaken as part of the detailed Project design which will include an assessment of the ground water of the Project site.

6.5 AIR QUALITY

There is no air quality data for the Project site. There is limited traffic and few industrial processes in the area therefore overall air quality is expected to be good. However, due to the dry climate/soil type and the windy conditions on site, levels of air-borne dust can become elevated.

[1] Food and Agriculture Organization of the United Nations. FAO GEONETWORK. FAO Classification dominant soil in Djibouti (GeoLayer). (Latest update: 04 Jun 2015) - http://data.fao.org/ref/ca493630-88fd-11da-a88f-000d939bc5d8.html?version=1.0 [*accessed March 2018*]

6.6 AMBIENT NOISE

An important part of the noise assessment is the quantification and understanding of the existing acoustic environment including the identification of baseline noise levels at potentially sensitive receptors. The baseline environment can be defined as the conditions that will prevail in the absence of the Project.

6.6.1 Monitoring Methodology

For the scope of the ESIA, continuous 48-hour noise measurements were carried out at two monitoring sites located in the proximity of the proposed windfarm:

- Moumina village (NML1), located approximately 600 m south of the project boundary;
- Lac Assal village (NML2), located less than 500 m north of the project boundary;

Additional measurements (for a period of 2h during day and night time) were performed at the Salt investment Compound (NML3), located 400 m east of the project boundary.

Monitoring sites locations are shown in Table 6-1 and Table 6.2.

Table 6-1 Noise Monitoring Locations

Monitoring Site	X coordinate [m]	Y coordinate [m]	Start Date	End Date
NML1 - Moumina village	42°29'04"E	11°31'31"N	08/03/18, 16:07	10/03/18, 16:04
NML2 - Lac Assal village	42°29'41"E	11°32'17"N	10/03/18, 16:23	12/03/18, 16:41
NML3 - Salt investment Compound	42°30'09"E	11°32'09"N	12/03/18, 20:20	12/03/18, 22:22
			13/03/18, 08:04	13/03/18, 10:04

6.6.2 Monitoring Results

Table 6-2 summarises the background noise levels at each monitoring location. Daytime and night-time noise levels were compared with the noise limits set by international standards. Detailed monitored results are reported in *Annex C*.

Table 6-2 Noise Monitoring Results

Monitoring Site	Period	Monitored Background Noise Level, dB(A)		Noise Limit, dB(A)		Main observed Noise Sources
		Daytime	Night-time	Daytime	Night-time	
NML1 - Moumina village	48h	56		55	45	Wind
NML2 - Lac Assal village	48h	58				Wind
NML3 - Salt investment Compound	2h	35 to 63	45 to 75			Wind

Based on the field survey conducted in the Project area, the acoustic climate of the Project site is already affected by existing noise sources (e.g., village activity, animals and wind), that generated very high background noise levels.

An average background noise level of 56 dB(A) and 58 dB(A) was recorded at Moumina village and Lac Assal village respectively over a 48h period. The noise levels were generally consistent throughout the day and night-time. The main noise source

was the wind blowing from the north-east. At the Salt investment compound, background noise levels ranged between 35 dB(A) and 63 dB(A) during the daytime, and 45 and 75 dB(A) during the night time generated through activity from the salt investment compound and also the wind.

The monitored background noise levels generally exceed the limits set by IFC for residential areas, both during the daytime and the night-time (limit of 55 dB(A) and 45 dB(A) respectively).

The main source of noise was the wind, that at the time of the monitoring, was blowing from north-east. It should be noted that background noise is expected to increase as wind speed increases.

6.7 WIND DATA ANALYSIS

Based on an analysis of available wind speed data collected by a metereological mast on the Project site between October 2012 and November 2015, the Project area is characterized by high average wind speed values (Table 6.3), reaching average maximum values up to 25 m/s:

- wind speed values higher than 5 m/s occurred for more than 80% of the 3-year period;
- wind speed values higher than 9 m/s occurred approximately for 50% of the 3-year period; and
- only 0.2% of the monitored data showed absence of wind or calm conditions (wind speed < 0.5 m/s).

Table 6-3 Wind Speed Data Monitored Between 2012 and 2015

Wind speed m/s	Freq. Average
< 0.5 m/s (calm)	0.2
0.5 – 1 m/s	0.6
1-3 m/s	4.8
3-5 m/s	11.4
5-7 m/s	15.6
7-9 m/s	19.2
9-11 m/s	15.9
11-13 m/s	11.8
13-15 m/s	8.3
15-17 m/s	6.2
17-19 m/s	3.8
> 19 m/s	2.1

6.8 BIODIVERSITY

6.8.1 Overview

The Project site lies in central Djibouti, approximately 1 km west of Lake Ghoubet. The site lies in the Ethiopian xeric grasslands and shrublands global ecoregion, as defined by Olson *et al* (2001). The Project site is dominated by undulating basalt outcrops with small rocky (dusty) plateaus surrounded by mainly southeast oriented rainwater drainage channels (dry wadis). There are no settlements in the project site but two villages are located within approximately 500 m from the southern boundary at the top of the escarpment and, again approximately 500 m from the northern boundary. Vegetation within the project site and surroundings is very low in density and diversity and is mostly aggregated in the dry wadis. It predominantly comprised of a few native drought resistant trees.

The site's southern boundary is bordered by an escarpment (c.100 m higher than the Project site) and the terrain rises slightly along its northern limit before descending to Ghoubbet El Kharab where the mineral port is located. The eastern half of the site is characterized by undulating basalt outcrops interspersed with finer material deposits through the rainwater drainage channels (dry wadi beds), which carry water during the very infrequent rainstorms experienced in this part of Djibouti. The western half of the site forms a plateau covered with compacted, dusty, gravel and rock, falling towards the networks of the rainwater drainage channels along the southern edge of the project site at the foot of the southern escarpment.

Baseline Data Gathering

Baseline data gathering included a desk based study and field surveys. Djibouti has not developed a national red list or red data book, and the conservation status of species presented here is based on IUCN Red List status.

Desk Based Review of Existing Information

A desk based assessment of the baseline biodiversity of the Study Area, defined as a 10 km buffer around the Project site, was undertaken using publically available data and satellite imagery. As the mammals and reptiles of the area are poorly known, a dedicated desk based review of these animal classes was commissioned from Dr Alain Laurent (author of: Laurent, A & D. (2002) *Djibouti au rythme du vivant : les mammifères d'hier à aujourd'hui pour demain*. Toulouse, Edition Beira).

The aim of the desk study was to compile a list of the mammals reptiles and amphibians of Djibouti, based on the above publication, also taking into account the main publications and recent observations since 2000 and internet databases.

A simple five point scale was used to describe the likelihood of a species being present, ranging from proven present to absent (see *Annex B*) based on the known distribution and ecological preferences of mammals and herpetofauna, the author's expert opinion.

Vantage Point Surveys

Vantage Point (VP) watches were undertaken to estimate the time target bird species spent flying over the defined survey area, the relative use of different parts of the defined survey area and the proportion of flying time spent within the upper and lower height limits as determined by the rotor diameter, rotor hub height and rotor height.

Two VPs were chosen (see Figure 6.20) to fully cover the proposed study area, which encompassed a 360 degree radius out to 2 km from each VP, using two observers. Visibility of the whole Project site as well as the proposed transmission line route from the chosen VPs was good, with 100% visibility at collision risk height. The survey area encompassed the full extent of the potential turbine locations plus a 500 m buffer. Survey standards and guidance followed recommended bird survey methods to inform impact assessment of onshore windfarms (Jenkins et al (2015)[(1)]; SNH (2014)[(2)].

Surveys of the Project site were undertaken on the following dates:

[1] Jenkins, A.R., Rooyen, C.S., Smallie, J.J., Harrison, J.A., Diamond, M., Smit-Robinson, H.A. and Ralston, S. (2015) Birds and Wind Energy Best Practice Guidelines. Birdlife South Africa, Endangered Wildlife Trust

[2] SNH (2014) Recommended bird survey methods to inform impact assessment of onshore wind farms. Guidance Note Series. SNH, Battleby

- 26th – 27th January 2018;
- 18th – 19th and 26th – 27th February 2018 and;
- 2nd – 3rd, 10th-11th and 14th – 15th March 2018.

A total of 36 hours of survey from each VP were undertaken through individual 3 hours watches, including watches during both the morning and evening.

During the VP surveys, flight activities by target species were recorded. Target species comprised:

- all raptors;
- all waterfowl;
- all sandgrouse and francolins;
- all waders; and
- all soaring birds (storks, pelicans, cranes *etc*).

During each watch, the area in view was scanned until a target species was detected at which point it was followed until it ceased flying or was lost from view. The time the target bird was detected and the flight duration were recorded. The bird's flight height above ground level was estimated at the point of detection and then at 15 second intervals thereafter, using, for example, a count-down timer. Flight heights were be classified according to the following four height bands: 0-25m (band 1), 25-80 m (band 2), 80-150 m (band 3, and, >150 m (band 4), with bands 3 and 4 largely corresponding to potential collision risk height (16 - 150 m). The route taken by focal bird(s) was mapped by plotting the path onto a visit map and cross referencing it with the same focal observation as the recording form, using a unique identification label for both.

The VP surveys covered the late winter and early spring migration period, and provide representative coverage of the use of the Project site and transmission line by birds during this period. The ESIA timescales did not allow for survey data to be gathered during other seasons, particularly during the northern hemisphere summer and autumn seasons. The need for further baseline surveys to determine the use of the Project site during other seasons is set out in the Project ESMM framework. A precautionary approach to mitigation and management of Project impacts on birds has been adopted in light of the limited availability of seasonal baseline data.

Terrestrial Ecology and Habitat Survey

An initial ecological scoping survey was carried out on the 25th January to undertake a preliminary assessment of habitats present on the Project site. Three separate transect surveys were then undertaken across the Project site and 500 m buffer zone during March 2018 to map the different habitat types present and to record encountered fauna and flora. Representative samples of each of the habitat type were identified and surveyed to assess potential ecological sensitivities (constraints) and conservation concerns.

During the walkover surveys, the Project site habitat types, associated mammals, birds, reptiles and amphibians and flora species encountered were identified and recorded. The surveys were carried out during dry weather conditions with mostly hazy days with a minimum temperature of 30° Celsius. Full and easy access to the different habitat types was possible and it was possible to thoroughly assess the presence of mammals, including searching for evidence of bat roosts, reptiles and birds. Areas where there could be potential ecological sensitivities were visited and assessed.

The warehouses of the Lac Assal Salt mining company at the southeast of the secondary Lac Assal village to the north boundary of the Project site, as well as the mosque and other significant buildings of the villages including the base of the "Gendarmerie Nationale" at Lac Assal areas, were assessed for the presence of bats.

An Audio Moth static acoustic detector was deployed for two nights from the 25th – 27th January at the closest secure location to the Project site, approximately 400 m north at the Gendarmerie Nationale station. No other surveys for bats were undertaken. Many species of bats are migratory or nomadic and this snapshot does not give a definitive answer as the survey was carried out outside of the migratory periods. The need for further baseline surveys to determine the use of the Project site during other seasons is set out in the Project ESMM framework. A precautionary approach to mitigation and management of Project impacts on bats has been adopted in light of the limited availability of seasonal baseline data.

6.8.2 Protected Areas

There are no nationally protected or internationally recognised areas, within 10 km of the Project site. The closest protected area is the Arta Beach proposed Marine Protected Area, located approximately 18 km northeast of the Project site along the southern coast of the Gulf of Tadjoura.

6.8.3 Habitats and Flora

Three main habitat types were identified in the project site:

- scattered acacia;
- herbaceous steppe in undulating basalt outcrops; and
- ephemeral dry wadis.

In addition to these habitats, the Project site also supports a range of man made features including roads, a graveyard, and a former borrow pit from which R9 construction materials were extracted. The remainder of the Project site comprises bare, un-vegetated rock.

The distribution of habitats is shown on Figure 6.4.

Table 6-4 Summary of Habitat Types

Habitat Types	Description
Scattered Acacia	Sparse acacia trees and sparse grass islet stand. *Acacia tortilis, Acacia asak*,
Herbaceous steppe	Scattered stands of *Cymbopogon schoenantus* interspersed with bare earth
Ephemeral dry wadis	Bare rock and earth, often dusty, interspersed with acacia trees and sparse grass islet stand. *Acacia tortilis*, *Acacia asak* are the dominant tree species

Vegetation within the project site and surroundings was very low in density and diversity and was mostly aggregated in the dry wadis. It predominantly comprised few native drought resistant trees *Acacia tortilis* (umbrella thorn), *Acacia asak*, stands of the perennial grass *Cymbopogon schoenantus* (camel grass). After rains, the creeping succulent plant *Trianthema crystallina* is expected to be very common, as it is found in similar habitats elsewhere in Djibouti. Other species of flora recorded included isolated individuals of *Senna alexandrina* (Alexandrian senna), *Maerua decumbens* at the borrow-pit, and *Balanites aegyptiaca* (desert date) and *Cadaba rutondifolia* located around some cliffs and wadis in the 500 m buffer zone surrounding the Project site. None of the plant species recorded on site have been assessed by IUCN, but all are considered to be common and widespread (*pers com*

Houssein Rayaleh). No species of conservation concern were recorded from this habitat type, and it offers negligible potential to support any.

Scattered Acacias

Acacia tortilis was the dominant plant species in the undulating basalt outcrops, rocky (dusty) plateaus and rainwater drainage channels (see *Figure 6.5).* Other species recorded included *Acacia asak*, *Trianthema crystallina*, *Cymbopogon schoenantus*, isolated individuals of *Senna alexandrina*, *Balanites aegyptiaca*, and *Cadaba rutondifolia* (see Figure 6.6).

Site Boundary

Indicitave Ephermeral Wadi System

Habitat Type

Herbaceous steppe

Scattered

0 0.1 0.2 0.3 0.4

Kilometers

N

SCALE: See Scale Bar	VERSION: A01
SIZE: A4	DRAWN: RC
PROJECT: 0438399	CHECKED: PW
DATE: 22/05/2018	APPROVED: BP

Figure 6.4
Habitats Recorded on the Project Site

PROJECTION: WGS 1984 UTM Zone 38N

SOURCE: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Path: P:\Projects\0438399 AFC Ghoubet Wind Farm.BP\02 Working Files\GIS\MAPS\ESIA Report\0438399_HabitatRecordedonProjectSite_A01.mxd

Figure 6.5 Scattered Acacia Habitat

Source: ERM 2017

Figure 6.6 Flora Species Recorded on Site

Clockwise from top left *Acacia tortilis, Trianthema crystalline, Cymbopogon schoenantus, Balanites aegyptiaca*
Source: ERM 2017

Scatted Herbaceous Steppe

Grass stands comprised of *Cymbopogon schoenantus* were scattered across the rocky (dusty) plateaus and rainwater drainage channels within the survey area. This habitat type, interspersed by roads, covered approximately half of the Project site. It held low densities of *Acacia sp*. trees and included a disused borrow pit that had been created to extract construction materials for the road R9 (see Figure 6.7).

Figure 6.7 Former Borrow Pit in Herbaceous Steppe Habitat

Source: ERM 2017

Ephemeral Dry Wadis

Ephemeral dry wadis supported a sparse flora, dominated where present by *Acacia tortilis* and *Acacia asak* with isolated drought resistant trees like *Balanites aegyptiaca* and shrubs such as *Senna alexandrina* (see Figure 6.8).

Figure 6.8 Ephemeral Dry Wadis

Source: ERM 2017

Graveyard

A small active graveyard was recorded close to the northern boundary of the Project site but accessed across the site. The graveyard is very small (around 1,000 sq. meters) and it is distinctly different from other habitats on the Project site as a result of the regular disturbance for burials. The area is sparsely vegetated however and does not support any flora of note (see Figure 6.9).

Figure 6.9 Graveyard Approximately 50 m South of the Project Site

Source: ERM 2017

Threatened and Protected Flora

None of plant species recorded have been evaluated by IUCN, but are considered to be common and widespread species (*pers com* Houssein Rayaleh). Djibouti supports a number of endemic plant species, the majority of which are restricted to high altitude areas including the Goda Mountains, approximately 30 km north of the Project site. Two lowland endemic species have been identified in Djibouti, but

neither were recorded during baseline surveys. *Aloe ericahenriettae* is a species of Aloe that has been recorded from a single location on lava flows north of Lake Ghoubet, approximately 15 km north of the Project site[1][2]. *Caudanthera mireillae* is a species of succulent plant which has been recorded from a single location south west of the Barra Yare, approximately 35 km east of the Project site.[3]

Invasive Species

No invasive flora species were recorded during the baseline surveys. A single invasive plant species is listed as occurring in Djibouti in the Global Invasive Species Database. *Leucaena leucocephala* is a fast growing legume shrub native to Mexico and Central America. It is now globally widespread in tropical and subtropical countries, growing in a wide range of open areas[4].

6.8.4 Mammals (Excluding Bats)

Mammals are an important part of the Djibouti desert ecosystem. Some species are resident but many are migratory, or nomadic, due to the sparse and seasonal rainfall in Djibouti.

During baseline surveys signs, or sightings, of four mammal species were recorded within the Study Area (see Table 6-5). The assemblage of mammals observed at the Project site is typical of the habitat, comprising species associated with arid and semi-arid areas.

Table 6-5 Mammals Recorded within Survey Area during the Baseline Surveys

Species	IUCN Red List Status
Dorcas gazelle (*Gazella dorcas)*	VU
Unstriped ground squirrel (*Xerus rutilus)*	LC
Speke's pectinator (*Pectinator spekei)*	LC
Golden Jackal (*Canis aureus)*	LC

One species of conservation concern (Dorcas gazelle *Gazella dorcas* – IUCN Vulnerable (VU) was recorded (see Figure 6.10). Only two sightings were recorded during the period of study from January to March 2018.

[1] http://www.iucnredlist.org/details/201344/0

[2] McCoy (2007) Aloe djiboutiensis and Aloe ericahenriettae two new species from Djibouti. Cactus and Succulent Journal, 79 (6): 269-273, Cactus and Succulent Society of America

[3] Meve, U. and Liede-Schumann, S. (2002) A molecular phylogeny and generic rearrangement of the stapeloid Ceropegieae (Apocynaceae-Ascelepiadoideae). Plant Systematics and Evolution. 234: 171-209.

[4] Global Invasive Species Database [*accessed March 2018*]http://issg.org/database/species/search.asp?st=sss&sn=&rn=Djibouti&ri=19162&hci=-1&ei=-1&fr=1&sts=&lang=EN

Figure 6.10 Dorcas Gazelle Recorded During the Baseline Survey

Source: ERM 2017

The desk study assessed the presence of the different mammal species occurring in Djibouti based on actual records and expert opinion and assigned them to one of five categories of likelihoods of presence. Five species are considered to be very likely to occur on site, with a further six species likely to occur on site (see Table 6-6 and Table 6-7). A further species of conservation concern, striped hyena (IUCN Near Threatened (NT)) is likely to occur on site, associated with scavenging from waste discarded from nearby settlements. The full results of the desk based review are presented in *Annex B.*

Table 6-6 Mammal Species Recorded during Baseline Surveys or Very Likely to be Present on, or Within 10km of the Project Site

Species	IUCN Red List Status	Distribution/Description
Unstriped ground squirrel (*Xerus rutilus)*	LC	Widespread species frequenting many types of habitats and common. Regularly and easily observed.
Speke's pectinator (*Pectinator spekei)*	LC	Common species in rocky environments at all altitudes
Golden jackal (*Canis aureus)*	LC	Opportunist species, quasi-commensal with man and common in Djibouti.
Hamadryas baboon (*Papio hamadryas)*	LC	A highly adaptable, opportunistic, quasi-commensal species of man. Its presence in the area depends on daily food prospecting circuits, which are themselves conditioned by the opportunities (water, grain, landfills) linked to road transport and to the human habitation in the area.
Dorcas gazelle (*Gazella Dorcas)*	VU	Recorded on the Project site during baseline surveys. Habitual species, rather territorial.

Table 6-7 Mammal Species Likely to Occur on, or Within 10km of the Project Site

Species	IUCN Red List Status	Distribution/Description
Cape hare (*Lepus (capensis) habessenicus)*	LC	Dependent on the state of the habitat and amount of vegetation
Caracal (*Caracal caracal)*	LC	Discreet, adaptable, opportunistic, under-recorded species.
White-tailed mongoose (*Ichneumia albicauda)*	LC	Quasi-commensal, opportunistic species.
Striped hyaena (*Hyaena hyaena)*	NT	Usual species, nocturnal. Its maintenance in the zone will depend on the presence of domestic waste.
Salt's dik-dik (*Madoqua saltiana swainei)*	LC	Widespread species, locally common, territorial, whose presence is dependent on the state of the vegetation and the abundance of predators and domestic competitors (goats). This species was observed in the area while travelling to and from the site from Djibouti city but was not actually observed in the site.
Rock hyrax (*Procavia capensis)*	LC	Common and widespread species of rocky escarpments.

6.8.5 Bats

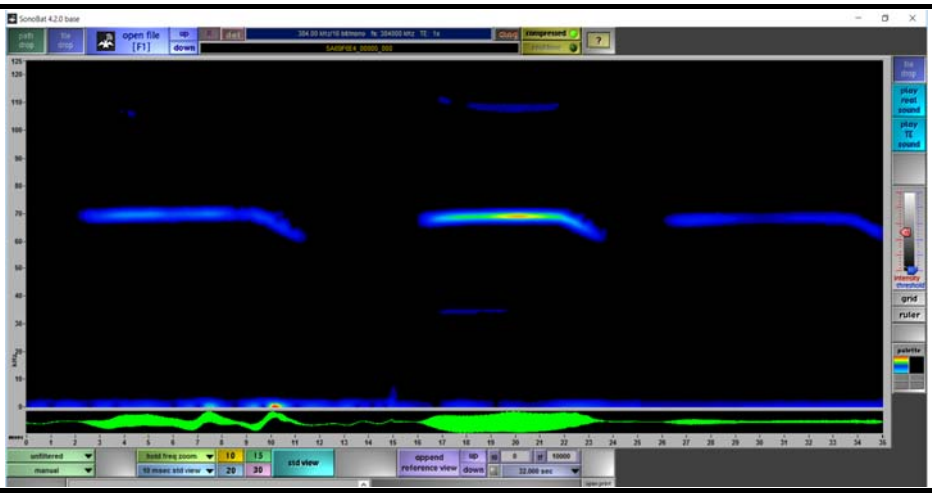
During the walk over baseline survey, no signs or sightings of any bat species were recorded within the Study Area. The habitat on the Project site, provides limited foraging opportunities for bats, with no permanent water features, and sparse vegetation which provides limited invertebrate prey for foraging bats.

No caves or trees suitable for roosting bats were observed during the surveys. Searches were made in all the buildings of the Lac Assal village, the closest settlement to the Project site. No evidence of bat roosting or feeding was found.

The warehouses and other buildings to the north of the Project site with false ceilings have potential to act as bat roosts, but they are relatively small and constantly used by the workers in the activities of the neighbouring mining port, which do not favour the formation of day roosts for bats.

During two night's recording (25/26 and 26/27 January 2018) one bat recording was obtained (see Figure 6.11). The calls of bats are poorly known in this part of Africa, but discussion among African bat experts identified it as most likely being the African trident bat (*Triaenops afer)* (IUCN LC).

Figure 6.11 Sonagram of Suspected African Trident Bat Recorded on the Night of 26/27 January 2018 in the Project Site.



Source: ERM 2018

The desk-based review of available data highlighted the lack of information about the occurrence of bats in Djibouti. Many species are known from one or two records only, and so the distribution of bats in the country is poorly understood. Based on habitat preferences, it was possible to determine that a portion of Djibouti's bat fauna will be absent from the site. The desk based assessment identified twelve IUCN LC species which may occur seasonally, or sporadically on site (see Table 6-8). One IUCN Data Deficient (DD) species (Samburu pipistrelle (*Neoromicia helios*)) may occur on site, although it's core range is northern Kenya and southern Somalia (IUCN, 2018)[1].

None of the species listed are globally-threatened and no large bat roosts or diurnal/nocturnal movements were observed. During the two nights of bat recording, only one call was recorded indicating that bat activity in the area was low.

Table 6-8 Bat Species Identified During the Desk Based Assessment which May Occur on the Project Site.

Species	IUCN Status	Habitat Preference	Behavioural Ecology	Likely Risk of Impact From Wind Turbine Blades
African Sheath-tailed Bat *Coleura afra afra*	LC	Found in illuminated caves, rocky crevices and cellars of houses.	Roosts in large colonies up to thousands of bats.	High
Egyptian Tomb Bat *Taphozous perforatus*	LC	Open woodland, requires the shelter of rocks or buildings to roost.	Occurs in small colonies.	High
Naked-rumped Tomb Bat *Taphozous nudiventris*	LC	The colonies in northern Africa are found in Sudanian and Sahelian savanna zones with inselbergs.	It is gregarious, roosting in cliff fissures, rock crevices, caves, tombs, temples, barns, houses, and underground tunnels.	High

[1] http://maps.iucnredlist.org/map.html?id=44921

Species	IUCN Status	Habitat Preference	Behavioural Ecology	Likely Risk of Impact From Wind Turbine Blades
Ethiopian Large-eared Roundleaf Bat *Hipposideros megalotis*	LC	This species has typically been recorded in dry savanna, coastal shrub and desert, or semi-desert habitats.	It is possibly a cave roosting species, however, a number of animals were found in a house at Nakuru, Kenya,	Low
Geoffroy's Trident Leaf-nosed Bat *Asellia tridens*	LC	A gregarious and colonial species which occurs in arid and semi-desert habitats Forages over desert and semi-desert vegetation zones, mainly in oases.	It roosts in temples, caves, mines, open-wells, underground irrigation tunnels and old tombs and buildings.	Low
Persian Trident Bat *Triaenops persicus*	LC	Generally inhabits riparian habitats in low-lying woodlands and savanna.	Characterised as a tree-roosting bat preferring small trees and shrubs but has been. recorded roosting in caves and mines.	Low
Cape Long-eared Bat *Nycteris thebaica*	LC	A savanna species with wide habitat tolerance. Occurs in moist and dry savanna, also ranging into desert, arid rocky areas, and riparian strips	A cave-roosting species but also roosts during the day in mine adits, aardvark holes, rock crevices, culverts under roads, roofs and hollow trees, typically in open savanna woodland.	Low
Lesser Mouse-tailed Bat *Rhinopoma hardwickii*	LC	Inhabits arid and semi-desert vegetation zones where suitable roosts and food are available.	Roosts in dry caves, ruins, underground tunnels (including catacombs), mosques and old buildings. In summer sometimes roosts in fissures, small crevices and among boulders.	Low
Greater Mouse-tailled Bat *Rhinopoma microphyllum*	LC	A desert species which inhabits arid areas with rainfall usually less than 300 mm and with sparse vegetation.	Roosts in crevices, small caves, mines, underground tunnels, wells, old monuments and buildings. T	Low
Schlieffen's Bat *Nycticeinops schlieffeni*	LC	Wide habitat tolerance.	Roosts in small groups under the roofs of huts or in crevices in trees.	Medium
Banana Bat *Neoromicia nana*	LC	Recorded from a wide variety of habitats including lowland and montane tropical moist forest and fry and moist savanna.	Roosts singly or as small colonies of two to six individuals, often in the terminal leaves of banana plants.	Medium-High
Samburu Pipistrelle Bat *Neoromicia helios*	DD	There is little information about the natural history of this species, in part because it has often been confused with other bat species.	There is little known about the roosting habits of this species.	Medium - High
African Yellow Bat *Scotophilus dinganii*	LC	Recorded from dry and moist savanna. Little data is available on this species.	Roosts in hollow trees, and houses. Roots singly or in groups of 20 to 30 bats.	Medium - High

Source: IUCN Red List of Species [1], Sowler & Stoffberg, 2012 [2].

6.8.6 Reptiles and Amphibians

During baseline surveys, two lizards and one skink species were observed (see Table 6-9). It was not possible to identify the skink to species level as it was observed briefly, however the desk study identified two skinks as being present in Djibouti which could occur on the Project site; African five-lined skink (*Trachylepis (Mabuya) quinquetaeniata)* (IUCN LC) and African striped skink (*Trachylepis (Mabuya) striata)* (IUCN Not Evaluated). No amphibians were recorded during baseline surveys and given the arid climate none are expected to occur.

Table 6-9 Reptiles Recorded within Survey Area

Species	IUCN Red List Status
Spiny agama (*Agama spinose)*	LC
Ocellated spinytail (*Uromastyx ocellata)*	LC
Skink sp. *Trachylepis* (*Mabuya)* sp.	-

The desk based review highlighted the lack of knowledge about reptiles in Djibouti. The habitats used by most species are poorly known and the threat status of many have not been assessed by IUCN. Of the terrestrial species identified in Djibouti, none have been assessed to be threatened, although this is partly a reflection of the lack of knowledge around this group of species.

Of the species identified by the desk based review, in addition to the species recorded on site, four species were considered likely to occur. These were:

- North-east African carpet viper (*Echis pyramidum)* (IUCN LC)
- Djibouti whip snake (*Platyceps afarensis)* (IUCN Not Evaluated)
- Egyptian cobra (*Naja haje)* (IUCN LC)
- White-throated monitor (*Varanus albigularis)* (IUCN Not Evaluated)

The Djibouti whip snake (*Platyceps afarensis)* is known from only one site in Djibouti and is currently the only reptile classed as endemic to Djibouti. Two specimens were collected at a military installation near Arta (approximately 11°31'N 42°51'E). This is approximately 35-40 km away from the Project site. The location where the snakes were collected supports three main habitats, two of which are present at the Project site (dry wadi beds and herbacaous steppe). The additional habitat was arbustive steppe which is covered by 2 m high scrub (Shatti & Ineich, 2004) [3].

Despite a complete lack of knowledge about the ecology of this species, given the similarity of habitats, it is very possible that it may be present on the Project site, or along the route of the transmission line.

The full results of the desk based review are presented in *Annex B*.

[1] http://www.iucnredlist.org/

[2] Sowler, S., & Stoffberg, S. (2014) South African Good Practice Guidelines for Surveying Bats at Wind Energy Facility Developments - Pre-construction. South African Bat Assessment Advisory Panel.

[3] Schatti, B. & Ineich, I. (2004) A new racer of the genus Platyceps Blyth from Djibouti. Revue suisse de Zoologie 111 (4): 685-690; decembre 2004

6.8.7 Birds

During baseline surveys, signs or sightings of eleven birds were observed within the Project site, including three raptor species recorded during the Vantage Point surveys (see Table 6-10). The species diversity was extremely low, as a result of the year round harsh arid conditions present in the area.

Table 6-10 Birds Recorded During Baseline Surveys

Species	IUCN Red List Status
Egyptian vulture (*Neophron percnopterus)*	EN
Osprey (*Pandion haliaetus)*	LC
Common kestrel (*Falco tinnunculus)*	LC
Black-crowned sparrow-lark (*Eremopterix nigriceps)*	LC
White-crowned black wheatear (*Oenanthe leucopyga)*	LC
Nile valley sunbird (*Hedydipna metallica)*	LC
Arabian warbler (*Sylvia leucomelaena)*	LC
Isabelline wheatear (*Oenanthe isabellina)*	LC
Desert lark (*Ammomanes deserti)*	LC
Speckled pigeon (*Columba guinea)*	LC
Striolated bunting (*Emberiza striolata)*	LC

Raptors

Three raptors were recorded during baseline surveys. Flight lines are shown in Figure 6.12. A single osprey (*Pandion haliaetus)* (IUCN LC) was recorded on the 2nd March south of the Project site, flying below 25 m. The bird recorded is likely to have been a migrant, with early March considered a typical date for this early-returning migrant.

Three flights of kestrel (two common kestrel (*Falco tinnunculus*) (IUCN LC) and one unidentified kestrel species) were recorded in January 2018. Two of these flights were south of the Project site, with the single flight across the centre of the Project site at between 25-80 m. The birds observed may have been resident individuals or overwintering migrants.

One globally threatened species, the Egyptian Vulture (IUCN Endangered (EN)), was recorded. During the VP surveys, three observations were recorded of birds outside the Project site flying to the south of the Project site (with one landing on the escarpment):

- 19/02/2018 at VP2 flying in the height band 0-25m,
- 11/03/2018 at VP1 (2 individuals) flying in the 0-25m height band and landing, and
- 15/03/2018 at VP2 flying in the 75-150 m height band.

The nearest sighting of an Egyptian vulture to the project site was <200 m from the southern boundary. The birds were observed flying along the escarpment ridge, undertaking both circling and linear flight. Soaring birds will often fly linearly along the length of ridges, taking advantage of the lift provided by ridges and this is most likely why these records came from this area.

Djibouti supports a resident population of Egyptian vulture, and is also an important wintering area for birds breeding in Europe and the Middle East. It is unknown whether the birds recorded during the survey were resident birds, or migrants spending the winter in the area. However, inhabitants of Lac Assal reported that

Egyptian vultures are present there year round, hence it is likely that they are resident birds (*pers com* Houssein Rayaleh).

Recent satellite tagging studies have identified Yemen, Djibouti, Eritrea and northern Ethiopia as important wintering areas for Egyptian vultures. The tagging data was used to model habitat use and to develop a utilization distribution for wintering Egyptian vultures. Modelling of habitat use predicts the Project site is of medium importance for wintering Egyptian vultures. The utilization distribution indicates which areas tagged birds use and can provide information on important habitats and core areas for a species (defined as areas with utilization of at least 50%). The Project site falls outside of the core areas identified for Egyptian vulture, with utilization of no more than 5% (Buechley *et al* 2018)[1].

No other raptors were recorded during the vantage point or walk over surveys.

Other Migratory Soaring Birds

Despite the very few birds observed, the desk based review identified a number of other migratory soaring birds pass which are known to pass through Djibouti, following the Red Sea/Rift Valley Migratory flyway. The Migratory Soaring Birds Sensitivity Map shows that a number of species that have been fitted with satellite trackers have passed over the region. These include glossy ibis *Pelagdis falcinella*, Egyptian vulture and Northern bald ibis *Geronticus eremita.* The eastern population of Northern bald ibis is Regionally Extinct. The population in Syria, from which this track originates, is now extinct.

Migration data from other locations along the Red Sea/Rift Valley flyway indicate that migratory soaring birds were recorded moving north into Europe and the Middle East from mid-February [2] [3]. This data suggests that the baseline surveys undertaken in February and March coincided with the spring migration season, and will have recorded migrants passing through the survey area at that time if present.

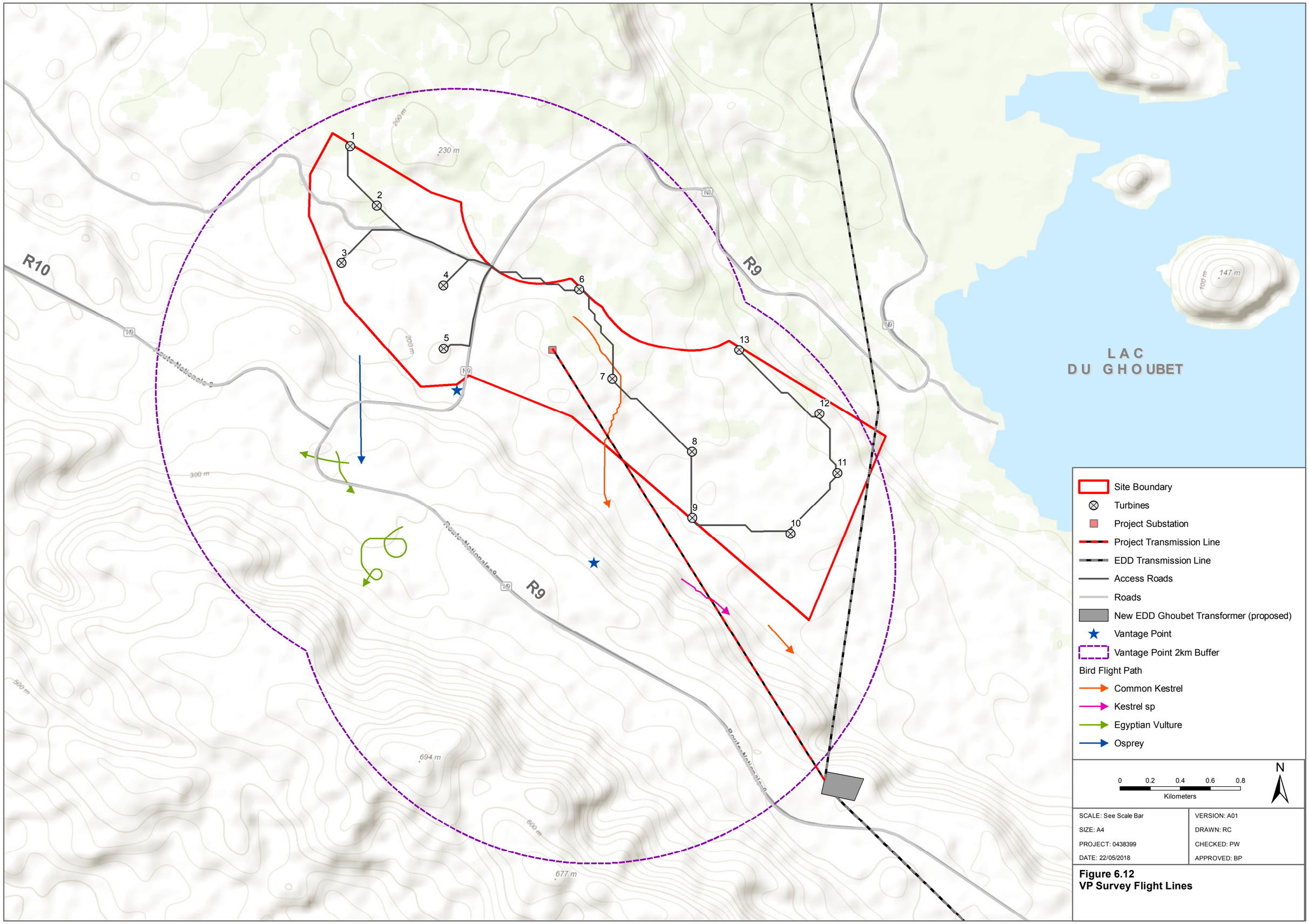
Passerines

Eight common and widespread passerine species were recorded during walkover and VP surveys of the Project site. The scattered grass plateaus on the Project site provide suitable breeding habitat for black-crowned sparrow-lark (*Eremopterix nigriceps)* and white-crowned black wheatear (*Oenanthe leucopyga*), with a few black-crowned sparrow larks recorded displaying during walk over surveys.

[1] Buechley, E.R., McGrady, M.J., Coban, E. and Sekercioglu, C.H. (2018) Satellite tracking a wide ranging endangered vulture species to target conservation actions in the Middle East and East Africa. Biodiversity and Conservation. Online Paper 19/03/2018

[2] http://www.birds.org.il/en/trektellen-data.aspx?ttId=11

[3] https://steppeeaglesoman.blogspot.co.uk/2018/03/steppe-eagle-migration-has-started.html



SCALE: See Scale Bar	VERSION: A01
SIZE: A4	DRAWN: RC
PROJECT: 0438399	CHECKED: PW
DATE: 22/05/2018	APPROVED: BP

Figure 6.12
VP Survey Flight Lines

PROJECTION: WGS 1984 UTM Zone 38N

SOURCE: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap

Path: P:\Projects\0438399 AFC Ghoubet Wind Farm.BP\02 Working Files\GIS\MAPS\ESIA Report\0438399_VPSurveyFlightLines_A01.mxd

6.8.8 Modified, Natural and Critical Habitat

Natural and Modified Habitat Determination

In relation to IFC PS6[(1)], modified habitat is defined as "*areas that may contain a large proportion of plant and/or animal species of non-native origin, and/or where human activity has substantially modified an area's primary ecological functions and species composition*" (IFS PS6 paragraph 12).

Natural habitat is defined as *"areas composed of viable assemblages of plant and/or animal species of largely native origin, and/or where human activity has not essentially modified an area's primary ecological functions and species composition" (*IFC PS6 paragraph 13*).*

The underlying habitats on the Project site comprise rocky outcrops and sand and gravel fields, which are largely resilient to human induced change. However the Project site was used for grazing livestock by local herdsmen up until the end of the 1980s, and is still crossed by grazing herds moving between pastures. The Project site also suffers a degree of disturbance from two main roads which cross the site and a number of small buildings and developments. The abundance and diversity of fauna and flora species are therefore reduced compared to areas of more pristine natural habitat away from coastal concentrations of inhabited areas. Therefore although the majority of the site is considered to comprise natural habitats, they are considered to be disturbed and relatively species poor.

Critical Habitat Determination

Critical Habitat identification is required by PS6 to manage risks and avoid, mitigate, and offset impacts to areas with high biodiversity value including:

1) habitat of significant importance to Critically Endangered (CR) and/or Endangered (EN) species;
2) habitat of significant importance to endemic and/or restricted-range species;
3) habitat supporting significant global concentrations of migratory species and/or congregatory species;
4) highly threatened and/or unique ecosystems; and/or
5) areas associated with key evolutionary processes.

A critical habitat determination has been undertaken for the biodiversity Study Area. The criteria and thresholds used in the determination are set out in IFC Guidance Note 6[(2)]. An Area of Influence (AoI) of 2 km around the Project site has been adopted for a worst case range of effects, noting that mobile avian receptors (birds and bats) from much further afield may also fly through the site on occasion.

The Study Area or 'area of analysis' for identifying Critical Habitat was defined based on a broad landscape unit. The Project site sits within the Ethiopian Xeric grasslands and shrublands defined by Olson *et al* 2001, which covers almost the whole of Djibouti. A desk based study was undertaken and the results of the Project baseline surveys were reviewed to identify potential critical habitat triggers present within this area of analysis.

[1] IFC 2012. Performance Standards on Environmental and Social Sustainability, published January 2012. Available in English at: http://www.ifc.org/wps/wcm/connect/115482804a0255db96fbffd1a5d13d27/PS_English_2012_Full-Document.pdf?MOD=AJPERES.
[2] https://www.ifc.org/wps/wcm/connect/a359a380498007e9a1b7f3336b93d75f/Updated_GN6-2012.pdf?MOD=AJPERES

For Critical Habitat Critieria 1-3, using an iterative process, a 'Discrete Management Unit' (DMU) was developed incorporating similar habitat to those found on the Project site under similar management regimes, following the definition presented in IFC GN6:

'the project should determine a sensible boundary (ecological or political) which defines the area of habitat to be considered for the Critical Habitat Assessment. This is called the "discrete management unit," an area with a definable boundary within which the biological communities and/or management issues have more in common with each other than they do with those in adjacent areas... A discrete management unit may or may not have an actual management boundary (eg, legally protected areas, World Heritage sites, Key Biodiversity Areas, IBAs, community reserves) but could also be defined by some other sensitive ecologically definable boundary (eg, watershed, interfluvial zone, intact forest patch within patchy modified habitat, seagrass habitat, coral reef, concentrated upwelling area, etc). The delineation of the management unit will depend on the species (and, at times, subspecies) of concern'.

In the south and west the DMU extends to the edge of the Arta district, which forms an administrative boundary in otherwise similar habitats which stretch to the Ethiopian border and beyond. In the east the DMU extends to the RN 1 main road to Djibouti City, which follows the main drainage channel between the relatively low relief coastal region and more mountainous interior of Djibouti. The DMU boundary then runs along the boundary of Djibouti City district to the coast. To the north, the DMU follows the coastline from the east and west and then follows the land below the 950 m contour around the southern side of the Goda Mountains. The DMU excludes the upper elvations of the Goda Mountains, including the Day Mountains National Park and Important Bird and Biodiversity Area (IBA) on the basis that these areas are characterised by high altitude wooded habitats, included juniper woodlands over 950 m which support a unique set of flora and fauna which are absent from the rest of the DMU. Given the terrestrial nature of the Project, marine habitats and species have been excluded from the critical habitat assessment. The boundaries of the DMU are shown in Figure 6.13.

For Critical Habitat Criteria 1 and 2 a review as undertaken of all IUCN CR and EN, species and endemic and restricted range species occurring in Djibouti to determine which, based on published distributions, occur in the DMU. For Criterion 3, literature was reviewed to identify the presence of any designated site or habitat which supported internationally important concentrations of migratory or congregatory species (as defined by IFC GN6).

For Criterion 4 and 5, literature was reviewed to identify whether the habitats present within the DMU were considered to be a highly threatened or unique ecosystem or a likely hotspot of evolutionary processes. The results of the Critical Habitat Determination are presented in Table 6-11.

Five wide ranging globally Endangered or Critically Endangered vulture and a single eagle species have been identified as occurring or potentially occurring in the DMU. However the DMU is not considered to meet the criteria for critical habitat for any of these species. The Critically Endangered and endemic Djibouti francolin (*Pternistis ochropectus*) is restricted to high altitude closed canopy forest in the Goda and Mabla Mountains to the north of the DMU.

A single reptile species which has so far only been recorded from Djibouti, the Djibouti whip snake (*Platyceps afarensis*) is believed to be the only other endemic animal species which occurs in the DMU, and is considered to meet the threshold for Tier 2 Critical Habitat. The Project site supports habitats that are relatively similar to

those present in the area south of Arta where the species has been recorded from. It is possible therefore that the species occurs on the Project site.

A single endemic plant species has been recorded from the DMU. *Aloe ericahenriettae* is a species of aloe that has been recorded from a single location on lava flows north of Lake Ghoubet, approximately 15 km north of the Project site[1]. Baseline survey did not record any aloes on the Project site or buffer zone. The author of the species description reports having travelled extensively through Djibouti, but has only recorded *Aloe ericahenriettae* from the type location. Its range is therefore considered to be restricted to north of Lake Ghoubet.

Table 6-11 Critical Habitat Assessment Screening

Species/Feature	Description/Distribution	Qualifies as Critical Habitat (Y/N)	Tier 1 or Tier 2 (for Criteria 1-3)
Criterion 1 – Critically Endangered and Endangered Species			
White headed vulture (*Trigonoceps occipitalis*) IUCN CR	Published distributions show white-headed vulture as a native resident in northeast Djibouti. Now considered possibly extinct from all other areas of Djibouti, and listed in the vulture multi-species action plan (MSAP) as possibly extinct in Djibouti. The DMU is considered to be unlikely to support the regular occurrence of any individuals.	N	N/A
Hooded vulture (*Necrosyrtes monachus*) IUCN CR	Published distributions show hooded vulture as a native resident across Djibouti. However the recent vulture MSAP lists the species as possibly extinct in Djibouti. Not recorded during baseline surveys. The DMU is considered to be unlikely to support the regular occurrence of any individuals.	N	N/A
Rüppell's vulture (*Gyps rueppelli*) IUCN CR	Published distributions show Rüppell's vulture as a native resident in southwest Djibouti and extinct from the easter coastal areas of Djibouti. The recent vulture MSAP list the species as possibly extinct in Djibouti. The DMU is considered to be unlikely to support the regular occurrence of any individuals.	N	N/A
Lappet-faced vulture (*Torgos tracheliotos*) IUCN EN	Published distributions show lappet faced vulture as a native resident across Djibouti. However the recent vulture MSAP lists the species as possibly extinct in Djibouti. Not recorded during baseline surveys. The DMU is considered to be unlikely to support the regular occurrence of any individuals.	N	N/A

[1] http://www.iucnredlist.org/details/201344/0 [*accessed May 2018*]

Species/Feature	Description/Distribution	Qualifies as Critical Habitat (Y/N)	Tier 1 or Tier 2 (for Criteria 1-3)
Egyptian vulture (*Neophron percnopterus*) IUCN EN	Published distributions show Egyptian vulture as a native resident across Djibouti. The recent vulture MSAP lists the species as a native resident in the country. Three individual flights were recorded during baseline surveys, indicating that the species is present, at least over winter and early spring. The global population is estimated at 218,000–57,000 (12,000–38,000 mature individuals) with Ethiopia holding the largest African breeding population. North east Africa is also an important wintering area for birds breeding in south eastern Europe and the Middle East. Recent satellite tracking data has been used to identify core areas for Egyptian vultures in their wintering areas. The core areas identified are out with the DMU. Although present in the DMU, the DMU is not believed to support regionally important populations of Egyptian vulture	N	N/A
Steppe eagle (*Aquila nipalensis*) IUCN EN	Published distributions show steppe eagle as a native non-breeding species in Djibouti. Birds from breeding populations in Eastern Europe and Central Asia winter or migrate through Djibouti. Individuals migrate to Djibouti across the Bab-el-Mandeb Strait, with IBAs for the species identified in northern Djibouti. No IBAs for wintering and migrating birds have been identified within the DMU. No individuals were recorded during baseline surveys. The DMU is not believed to support regionally important populations of steppe eagle.	N	N/A
Djibouti Francolin (*Pternistis ochropectus*) IUCN CR	Djibouti francolin occurs in closed canopy, high altitude forest in the Goda Mountains to the north of the DMU. The species does not occur within the DMU.	N	N/A
Criterion 2 – Endemic/Restricted Range Species			
Djibouti Francolin (*Pternistis ochropectus*) Djibouti Endemic	The endemic Djibouti Francolin occurs in closed canopy, high altitude forest in the Goda Mountains to the north of the DMU.	N	N/A
Djibouti whip snake (*Platyceps afarensis*) Djibouti Endemic	To date known from two specimens recorded from Arta, west of Djibouti City. The species was found in herbaceous steppe habitats similar to the more vegetated areas which occur on the Project site. To date all known records are located within the DMU. No other reptile species are known to be endemic to Djibouti, however and the species is likely to be under-recorded. As such is it considered likely that more than 1% of the population occurs outside of the DMU.	Y	Tier 2
Aloe ericahenriettae Djibouti Endemic	A species of Aloe that has been recorded from a single location on lava flows north of Lake Ghoubet, approximately 15 km north of the Project site. The species' distribution is restricted to the north side of Lake Ghoubet.	Y	Tier 1

Species/Feature	Description/Distribution	Qualifies as Critical Habitat (Y/N)	Tier 1 or Tier 2 (for Criteria 1-3)
Criteria 3 - Migratory /Congregatory Species			
None present.	Djibouti lies on the eastern arm of the Red Sea/Rift Valley migratory flyway, and migratory birds are known to cross from Africa to the Arabian Peninsula at the Bab-el-Mandeb Strait north of Djibouti. However, no areas which support internationally important concentrations of migratory or congregatory species are known within the DMU.	N	N/A
Criteria 4 – Highly Threatened or Unique Ecosystems			
Arta Beach Marine Protected Area	Arta Beach Marine Protected Area is situated approximately 18 km northeast of the Project site, within the DMU. The terrestrial (beach) habitats within the MPA are common and widespread habitats along the coastline of Djibouti. The MPA is principally designated for its marine habitats, which are not considered as part of the assessment for this terrestrial project.	N	N/A
Criteria 5 – Key Evolutionary Processes			
None present.	No areas which support key evolutionary processes are present in the Project AoI.	N	N/A

LAC ASSAL

Tadjourah Region

LAC DU GHOUBET

Arta Region

Site Boundary

Discrete Management Unit

Ali Sabieh-Assamo

Arta Plage - Proposed Protected

Important Bird and Biodiversity

0 2 4 6 8

Kilometers

N

SCALE: See Scale Bar	VERSION: A01
SIZE: A4	DRAWN: RC
PROJECT: 0438399	CHECKED: PW
DATE: 22/05/2018	APPROVED: BP

Figure 6.13
Critical Habitat Assessment Study Area and Discrete Management Unit

PROJECTION: WGS 1984 UTM Zone 38N

SOURCE: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Path: P:\Projects\0438399 AFC Ghoubet Wind Farm.BP\02 Working Files\GIS\MAPS\ESIA Report\0438399_CriticalHabitatAssessment_DiscreteManagementUnit_A01.mxd

6.9 SOCIAL BASELINE

This section summarises the social baseline. The detailed social baseline is presented in *Annex F*. The study describes the context of the socioeconomic environment potentially affected by the Project. The baseline has been established using primary and secondary data collected during both the initial Project scoping phase in 2017 and the social study performed in February 2018.

Primary data was collected through a sampling of Project-affected communities using the following methods:

- population census;
- household socio-economic survey;
- thematic focus groups;
- individual interviews;
- public consultations;
- individual consultations; and
- direct observation.

6.9.1 Social Area of Influence

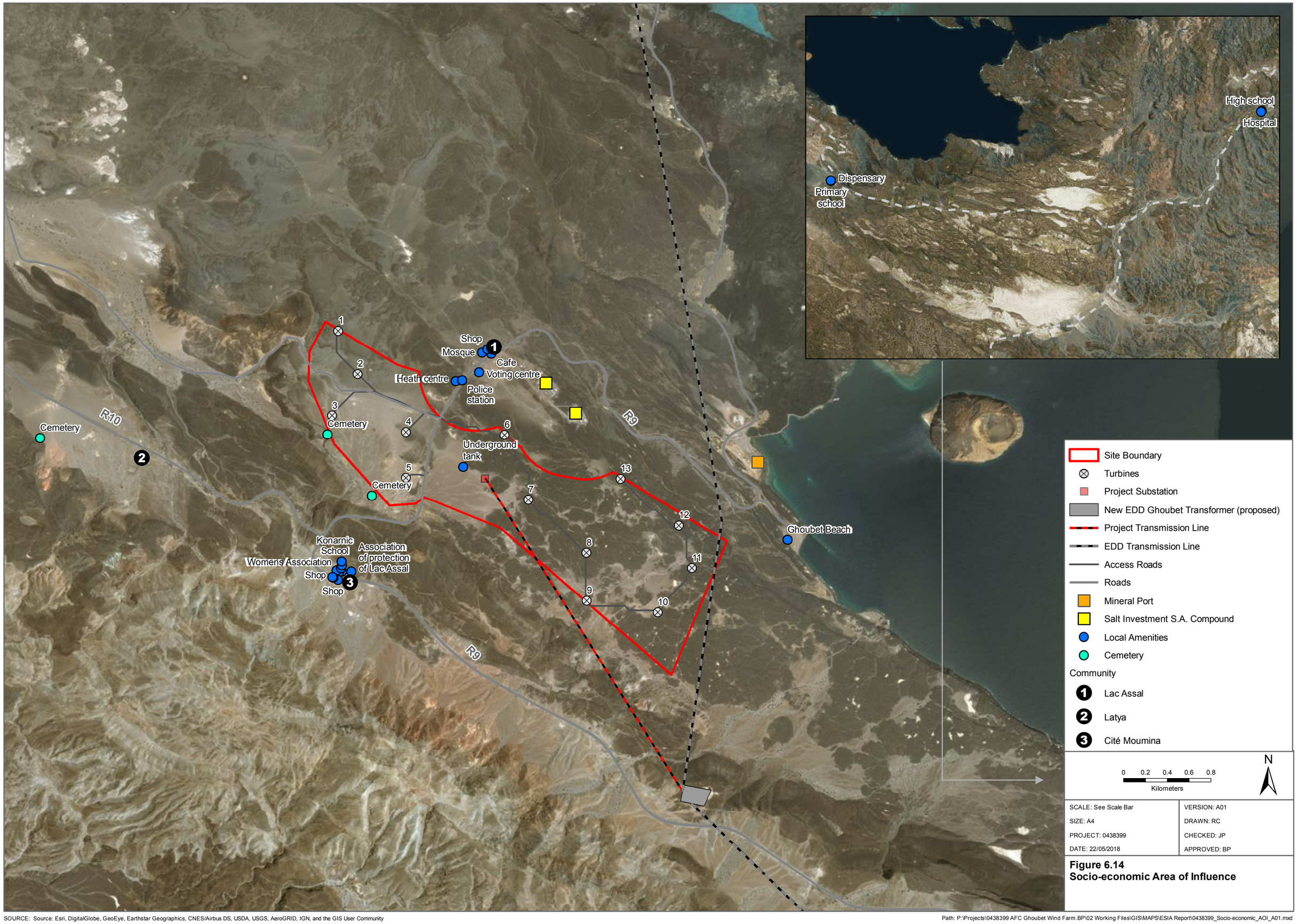
The Project's socioeconomic Area of Influence (AoI) spreads throughout the zone situated between Lac Assal and the Gulf of Ghoubet. The AoI includes the core components on the Project site (wind turbines and associated facilities), a buffer zone along the transmission line right of way (RoW), the N9 road crossing the Project site and the road linking Lac Assal and the Salt Investment facilities, and the zone bordering the site, where three villages are located.

As shown in Figure 6.14, the following villages border the Project site:

- Cité Moumina, situated just over 600 m south of the Project perimeter (105 households and a population of 641 inhabitants);
- Lac Assal village, the seat of a sub-prefecture, situated approximately 500 m north of the perimeter (24 households and population of 139 inhabitants); and
- Layta village, situated 1 km from the western limit of the perimeter (most of the inhabitants moved to the recently built Cité Moumina in 2016).

Although traces of old settlements and cemeteries close to the Project site indicate that the zone was an area of pastoral activity in the past, no nomadic herder camps, nor any evidence of seasonal migration, were recorded during the surveys. The deterioration of climatic and agro-ecological conditions since the 1980's most likely drove herders towards other areas of pasture or other activities. Currently, the Project's direct footprint and the adjacent areas are only sporadically crossed by pastoralists with their herds.

The Project's socioeconomic AoI for this assessment is illustrated in Figure 6.14.



SCALE: See Scale Bar	VERSION: A01
SIZE: A4	DRAWN: RC
PROJECT: 0438399	CHECKED: JP
DATE: 22/05/2018	APPROVED: BP

Figure 6.14
Socio-economic Area of Influence

PROJECTION: WGS 1984 UTM Zone 38N

SOURCE: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Path: P:\Projects\0438399 AFC Ghoubet Wind Farm.BP\02 Working Files\GIS\MAPS\ESIA Report\0438399_Socio-economic_AOI_A01.mxd

6.9.2 Development Context

The extraction and commercialisation of Lake Assal salt reserves dominates the overall history of the AoI. Throughout the centuries, caravan routes supplied salt from Lake Assal to the great political structures of the Horn of Africa. The absence of water and the aridity of the area means that, despite the attraction of the resources of Lake Assal, the area was never systematically settled in a permanent manner. It remained an area of passage, rather than an area of residence.

Between 1998 and 1999, the village of Layta became a major centre of salt production and its population grew significantly. In 1999, a local entrepreneur associated with Layta opened his own salt business (Lac Assal Exploitation Company) which he set up in the site of the current village of Lac Assal, which at the time, was only inhabited by a handful of small traders. The company grew rapidly and the population of Lac Assal increased as a result.

The demand for salt significantly decreased in 2002 and the company operating in Layta ceased operating causing the population of Layta to shrink significantly. However, the Lac Assal Exploitation Company remained in place. It was later bought up by Chinese investors and further expanded under the name “Salt Investment”.

In 2016, Cité Moumina was constructed with financial support of the African Kuwaiti Islamic Relief Committee and other NGOs from Qatar, Saudi Arabia and Bahrein. The accommodation was allocated mainly to the ex-residents of Layta, but also to a number of residents from Lac Assal. Since the inauguration of Cité Moumina, the houses of Layta have been abandoned.

The AoI forms part of a national scale project detailed in the Vision Djibouti 2035 Plan, to transform the Lake Assal area into an industrial zone. Previous initiatives include:

- The geothermal plant launched in October 2016 and financed by the Kuwaiti Fund for Development (KFD).
- The construction of two industrial production units by December 2017: one for the production of sodium bromide and the other for the production of caustic soda. The project is carried by Salt Investment and supported by private Chinese investors.
- The mineral port of Ghoubet, inaugurated in June 2017. The port was built by China Harbour Engineering Company with the view of exporting 5 million tons of salt per year.

6.9.3 Country Context and Administrative Summary

The Republic of Djibouti achieved independence from France in 1977. The President is the head of the State and of the Government (article 22) and is elected for 6 years by direct universal suffrage (article 23). The legislative power (National Assembly) is also elected by direct universal suffrage (article 4). The multi-party system is established in article 6.

Djibouti is divided into 6 administrative regions: the capital Djibouti City which has special status, Ali Sabieh region, Dikhil region, Tadjoura region, Obock region and Arta region. The number of members of each region’s assembly is defined on the basis of one elected member per 1000 registered voters. The regional councillors are elected for 5 years by direct universal suffrage. A quota of 10% of women was introduced in 2002. The process of decentralisation is not yet fully completed. Regional structures collect very little revenue from local taxes and are still very much dependent on state subsidies.

6.9.4 Human Rights in Djibouti

The republic of Djibouti has ratified or adheres to the main Human Rights Instruments, see *Annex F* for full details. At an institutional level, the National Commission for Human Rights (CNDH), created in 2014, is in charge of ensuring the implementation and respect of the fundamental instruments related to Human Rights. The legal framework appears to offer relative protection to salaried workers and daily workers that were engaged with in the Project area during the social baseline studies in February 2018. The main issues relating to human rights concern working conditions and the protection of migrant populations.

A report published in 2005 by the American State Department on Human Trafficking[1] stated more than 90,000 men, women and children from Ethiopia, Somalia and Eritrea are estimated to have transited through Djibouti as paperless voluntary economic migrants on their way to Yemen and other Middle Eastern destinations. During their transit through Djibouti, which can last for long periods, these populations are vulnerable to various forms of exploitation, including human trafficking.

The Lac Assal region is on the Ethiopia to Djibouti City corridor. No form of migrant exploitation was observed by the team during their studies in February 2018, nor mentioned by the persons interviewed in the Project AoI. Nonetheless, it is possible that certain inhabitants in the local area or wider region take part in the underground economy linked to these population movements.

6.9.5 Local Demographics

The population in the AoI are of the Afar ethnic group. They are mainly young with little formal education.

There is a total of 129 households and 780 inhabitants in the two villages of the AoI. Cité Moumina is significantly more populated as it became the main local centre of attraction after its inauguration in 2016 (La Nation, 20162). The villages of Lac Assal is in decline and the village of Layta has been completely abandoned in favour of Cité Moumina.

The population in the AoI is younger than the Djibouti average: 56% of the population of the two villages is under 15 years of age compared to 34% in the overall population and 38% in rural and nomadic populations nationally. The distribution by sex observed in the project zone does not show an imbalance and is comparable to that of rural and nomadic populations nationally. This suggests that economic migration of men towards economic opportunities is limited.

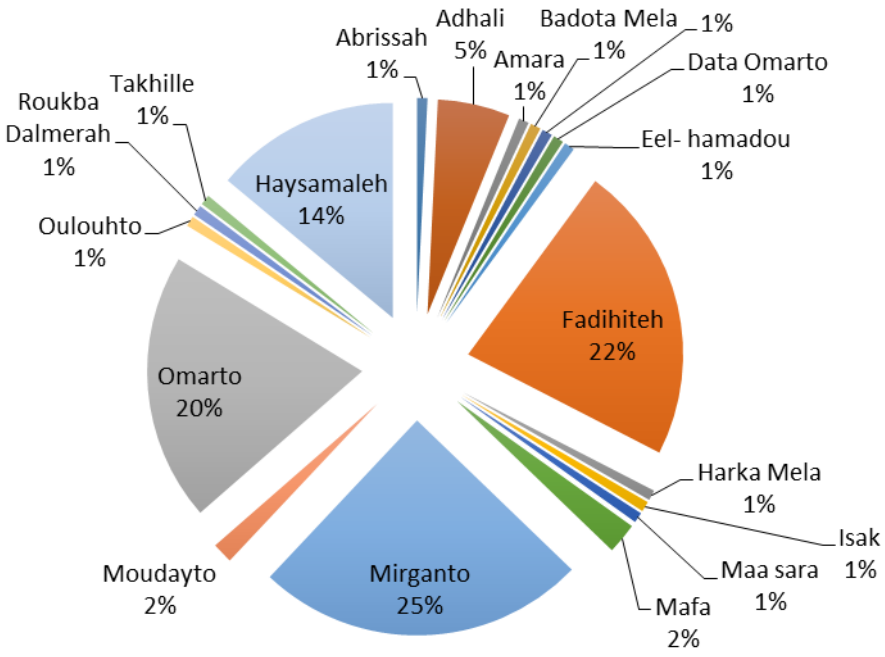
6.9.6 Ethnic Groups and Languages

Except for a single household of Ethiopian origin and one Issa household, all the heads of households of the AoI belonged to the Afar ethnic group; the Afars and the Issa are the two main ethnic groups of Djibouti. The heads of households of the Project AoI mainly come from four tribes: Omarto, Mirganto, Fadihiteh, Haysamaleh, Figure 6.15. These four tribes all belong to the intertribal confederation Debné, and the historical entity known as "*Adorassou*". These four tribes are bound by an alliance based on a codified matrimonial exchange system, and the sharing of a common territory.

[1] https://www.state.gov/documents/organization/245365.pdf [accessed 29.02.2018]

[2] La Nation, 2016. Inauguration du village Moumina 1 au Lac Assal : Des logements décents pour une centaine de familles à Layta, (Inauguration of Moumina 1 village at Lac Assal : Decent Lodgings for a Hundred Families from Layta) Consulted on line 29th February 2016

Figure 6.15 Tribal Distribution of Heads of Household from the Social AoI (n=129)



Source: Annex F Social Field Survey Report, INSUCO 2018

6.9.7 Indigenous Peoples

The Afar people, who inhabit the region that the Project site is located within, are an ethinic majority in Djibouti (~30% of total population) and are not considered to be subject to particular discrimination. They have not been the object of conquest and domination therefore they are holders of the power on their territory. They are not enslaved, stigmatised or marginalised by another ethno-linguistic group. The Afar people are therefore not considered to be an indigenous people (according to IFC PS7 or United Nations definitions).

6.9.8 Gender Context

In traditional Afar society, focused on pastoralism, women benefit from relative social and economic autonomy due to retaining some degree of control over those animals which were given to them at birth in the herd of a household. In the Project AoI, the transition from a pastoral economy towards an economy of services (salaried work, daily work) is underway. So far, this transition appears to offer a wider range of opportunities to men than to women.

Women rarely have access to jobs in local businesses or administrations and even less to daily work. They nevertheless manage to generate some revenue through small businesses, such as selling tobacco or coffee, managing general food shops and creating handicrafts. They are three times less likely to be literate than men and play no official role in traditional structures of governance.

In January 2018, a women's association was formed by women from Cité Moumina and Lac Assal in order to promote local handicrafts. This association is consulted by the Village Organisation and Management Committee on certain topics.

6.9.9 Training and Education

The majority of the population in the AoI is illiterate: 68% of men and 88% of women can neither read nor write in any language. This is considerably higher than the national average where 33% of men and 47% women are illiterate. Adults who can read and write are mainly literate in French and Arabic. Only a small minority master

Afar and Somali. Two-thirds of the adults (over 15 years) have not been to school: 83% of the women and 69% of the men. The remaining third left school at the end of primary school. Only 1% of the people had followed professional or technical training. This could limit the access of local people to qualified positions in local businesses or the administration.

6.9.10 Local Livelihoods

Salaried work and daily work are the main sources of income for the surveyed households. Salt Investment provides most of the opportunities for daily labour. Other positions available are night guard, head of security or construction worker. The geothermic project, the Djibouti National Telecommunication company, the Centre for Seismic Studies and the Karta Health Centre also provide a few job opportunities. Finally, the house building project and road maintenance also call for some daily labour.

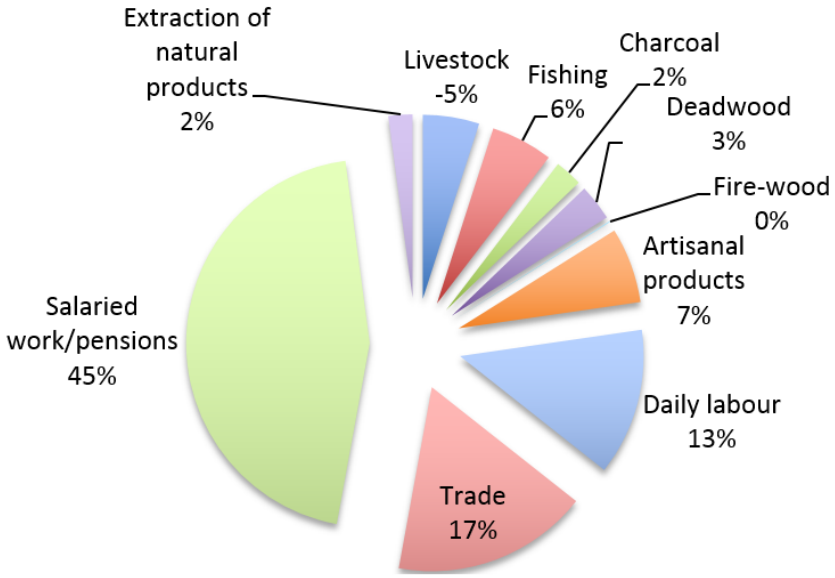
The sale of handicrafts is widely practised but not very profitable and forms only 7% of an average household income. With the exception of limestone sculptures, women produce most of the handicrafts. These consist mostly of weaving various household objects using the leaves of the local palm tree (called anga in vernacular).

Only 7.5% of the households practised fishing at sea, which is thus a minor activity. It contributes an average of 6% of revenue and is practised on calm nights (no waves), along the shores of Ghoubet beach, during the hot season.

Livestock breeding is still practised by a large part of the population (67%) even though it has an annual cost of 18,525 DJF per year (for the surveyed households). This is due to the poor availability of pasture land in the area which implies that people have to purchase concentrated feed for a portion, or even all of the year. Goats are better adapted to the arid local conditions and they are the main animals kept, with an average of almost 8 goats per household. Goats are kept mainly for their milk. Households who only own one or two goats generally let them feed on the village refuse. Larger herds are entrusted to a herdsman who is paid monthly. The goat's diet is supplemented with corn, at least during the hot season. Goats are penned in at night, in stone or metal sheet shelters,that protect them from the wind and predators.

Figure 6.16 shows the contribution of activities to average household revenue.

Figure 6.16 Contribution of Different Activities to Average Household Revenue in the Social AoI



Source: Annex F Social Field Survey Report, INSUCO 2018

Half the surveyed households (53%) had an estimated income that was below the food poverty threshold and about two third of the households (68%) were below the extreme poverty threshold. Only one household in five (23%) lives above the overall poverty threshold . However, the sampling methodology did not enable definitive conclusions to be drawn about the incidence of poverty in the Project AoI because low income households were overrepresented.

6.9.11 Land Tenure and Land Use

Land legislation is governed by the principle of state-ownership: any non-registered plot belongs to the State (Art. 1 of Law n° 171 from 1991 concerning the organisation of the public domain[1]). Law n°173 from 1991 on the organisation of the State's private domain[2] fixes the conditions for access to land ownership. The conditions for access to rural land are stated in Articles 22 and 45. Rural land is awarded, under the form of a temporary concession, by decree taken in a Council of Ministers and on a proposition by the Minister in charge of Land, after advice from the Land Commission (Art. 22). The local communities have not taken any steps to obtain a temporary concession for the land within the Project site. Land rights and obligations concerning use of land and natural resources are ruled by customary law and principles in the Project area.

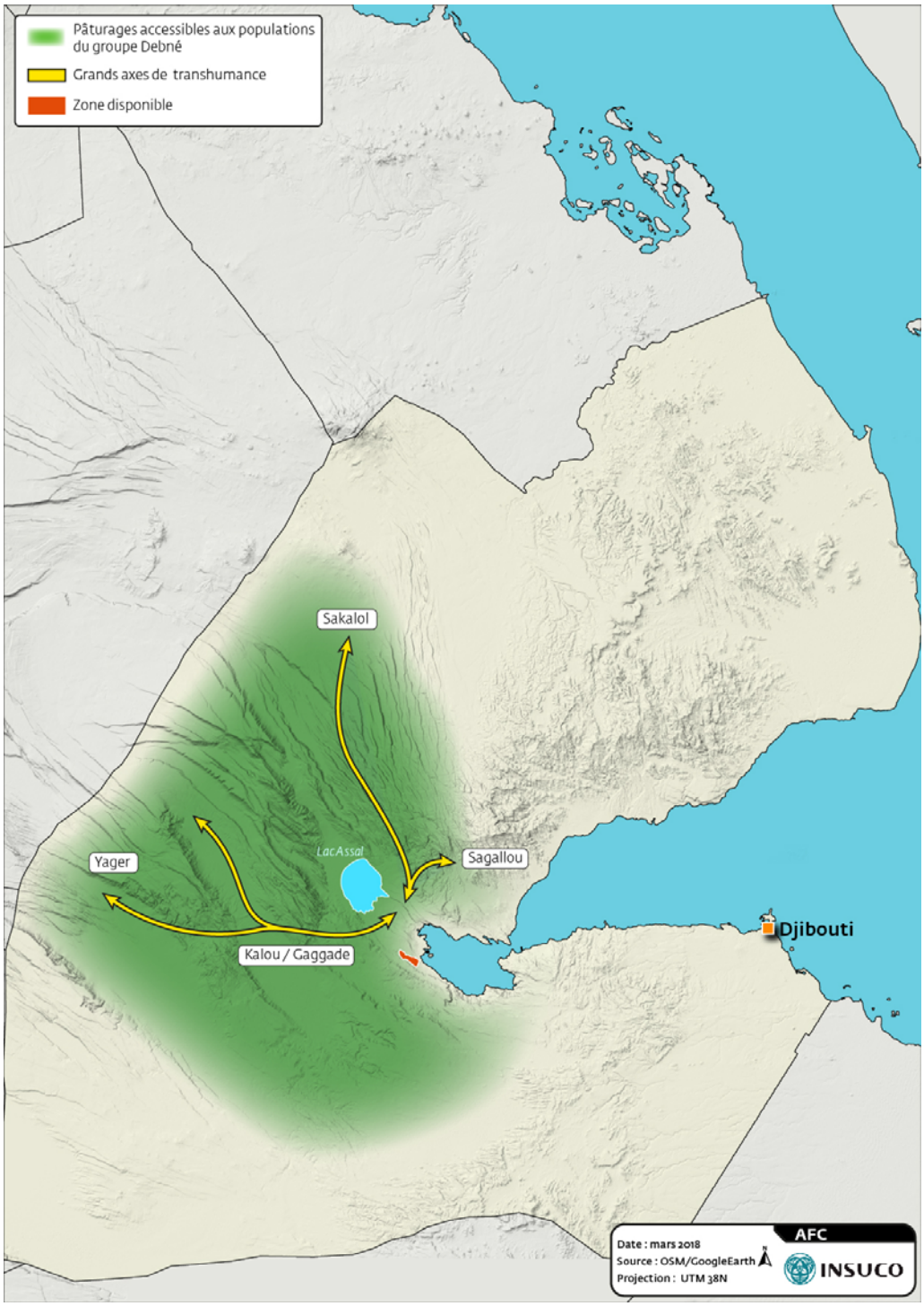
The social AoI is included within the territory of the confederation of Debné tribes. Despite the fact that it is not possible to draw precise boundaries for this territory, its overall limits are: Sagallou to the northeast, the Ethiopian border to the north, Galafi to the West, Dikhil and the grand Bara to the south, and at last the village known as "kilometre 51" to the east. It is a vast expanse in common management where all members of the Debné confederation tribes enjoy a wide range of equal rights to what is perceived by the confederation as a common resource.

As a common resource, livestock breeders benefit from free circulation and access to resources over the entire territory. This allows freedom of movement between

[1] Loi N° 171/AN/91/2e L of October 10th 1991 concerning setting up and organisation of the public domain
[2] Loi n°173/AN/91/2ème L of October 10th 1991 concerning organisation of the State's private domain

different areas in order to find the best pastures. Choices are based on agro-ecological conditions and the distribution of rains. The spread of mobile phones has greatly facilitated decision making for people moving with their herds. The area of pasture land available to members of the Debné group, and main migration pathways around Ghoubet and Lake Assal are shown in Figure 6.17.

Figure 6.17 Pasture Land Available to Members of the Debné Confederation and Main Pathways around Ghoubet and Lake Assal



Source: Annex F Social Field Survey Report, INSUCO 2018

The inhabitants of the AoI consider the land within the Project perimeter as unsuitable for any type of productive activity. Lack of water is a major issue and the land is considered unfit for pasture. When asked about land use in the Project perimeter, informants were unanimous in declaring that it had no use.

Through the social studies conducted, it appears that no one has settled inside or near the Project boundary since the 1980s. Furthermore, no agricultural activity was ever undertaken in the Project boundary. However, the Project boundary is crossed by migrating herds travelling between pasture zones. In conclusion, except for the passage of migrating herds, the area within the project perimeter is effectively unused.

6.9.12 Local Governance

Local governance is structured around the two communities in the area at Cité Moumina and Lac Assal.

Cité Moumina

Cité Moumina, was only inaugurated in 2016 and does not yet have any official administrative agents. The Okal general[1], the highest customary authority of the Debné confederation, resides in Cité Moumina. The Okal general always comes from the Omarto tribe. At the village level, he has considerable power to mobilize the community either for or against a project. He is also the representative of his tribe at the village level. The three other tribes (Mirganto, Hayssamaleh, Fadihiteh) are also represented by a customary authority called the *makaban*. The group of four customary authorities that represent the four tribes meet up in a committee called the Village Organisation and Management Committee; all decisions are taken at the committee level.

Lac Assal

Lac Assal does not share the same system of governance as Cité Moumina. However, the Okal general is a recognised authority in Lac Assal. Lac Assal is managed by authorities who do not have customary legitimacy. It is the seat of the sub-prefecture and the sub-prefect resides there and the village chief manages current affairs. In case of need, the inhabitants approach the tribal representatives that live in Cité Moumina.

During the social baseline studies, there was no evidence of political marginalisation of the project social AoI. On the contrary, the area benefits from considerable efforts on the part of the central government, in terms of the scale of investments and productive projects. The projects do not appear to harm the local population. According to both villages, the only form of marginalisation that they might experience will be that the projects planned for their area, end up sourcing external (non-local) labour.

6.9.13 Development Plan

Each region must produce a Regional Development Plan (RDP) that serves as a tool for planning, for mobilisation of funds and for monitoring of actions for a 5-year period. The social AoI is at the boundary between two regions. This means that the area is included in two different RPDs: that of Tadjoura and that of Arta, both prepared in 2017:

- Tadjoura's regional plan focuses on the potential of the Lake Assal mineral harvesting and the port activities at Ghoubet for shipping Lac Assal salt and other mineral resources such as perlite, gypsum and diatomaceous earth.

[1] The introduction of the Okal general was created during the colonial period (Decree n° 68/SPCG defining the status of the Okals, 31 May 1958), with the purpose of enlisting native figures of authority to represent the colonial administration to their communities.

- Arta's regional plan focuses more on basic equipment and infrastructure, and has identified the development of water storage and distribution infrastructure as one of the main priorities.

6.9.14 Community Health and Wellbeing

The latest National Health Development Plan (2012-2017) states that the decentralization of the health system is one of the priorities of the health policy. In Djibouti, health centers are the base unit of health public service and are managed by a nurse. Health centers are responsible for caring activities, prevention and education about health. In remote areas, the health center is linked to the nearest hospital. Each district has its own hospital that provides surgery, maternity care and distributes medication. However, the plan states that the health care system is not sufficiently funded and there is also a medical staff shortage.

In the inland remote regions there is 1 doctor per 74,500 people. All the specialist doctors and 79% of the medical staff are located in the Djibouti city, as well as most of the health infrastructure.

There is no health service in either of the two villages in the social AoI, apart from a health out-post within the police station in Lac Assal where there is a nurse who distributes free medicine when they are in stock. It appears that the population of Cité Moumina does not have access to this service. Most households surveyed (85%) initially consult the clinic in Karta Sub-prefecture, about 20 km away, when they require medical attention. In the case of a more serious problem, patients from Cité Moumina are referred to the Regional Arta hospital (in We'a, 60 km away), and patients from Lac Assal are referred to Tadjoura (83 km). An ambulance stationed in Lac Assal is made available for the inhabitants of both villages by the Tadjoura region, it enables transport of patients needing swift care. However, there is only one ambulance for the entire population of the social AoI.

6.9.15 Education

Apart from the Koranic school in Cité Maimouna, there are no educational structures in the project zone. The closest primary school is in Karta. Due to the distance and the absence of a bus, only children who can be housed by a family member in Karta have access to school. The survey indicated that the majority of children between 6 and 10 years old did not go to school.

The closest junior high (*collège*) and high school (*lycée*) are in We'a. A free school bus, furnished by the Arta region, allows students based in Karta to attend. The twelve class Koranic school building integrated into the Cité Moumina plan has never been used. A football field and basketball hoops are the only sports infrastructure for both villages.

6.9.16 Local Infrastructure

The two villages in the social AoI are supplied with water by tank truck once a week. They are chartered by the Arta region for Cité Moumina and by Salt Investment for Lac Assal village. This service is entirely free with no prior subscription. The villages agree together on how to share the volume of water delivered. In Cité Moumina, the Village Organisation and Management Committee mediates any potential conflicts. The water comes from a bore-hole situated at PK 50 on the NR1. Poor hygiene at the bore-hole and in the oxidised storage tanks has given rise to water-borne diseases and contamination detrimental to health[1]. The households surveyed use on average

[1] Arta, Regional Development Plan – Arta Region, March 2017).

546 litres of water per week, an amount considered inadequate to cover a family's basic needs (drinking water, cooking, washing dishes and clothes, hygiene) as well as the animal's needs. Unused storage reservoirs exist in both localities: a buried tank to furnish running water in Cité Moumina, several tanks offered by Salt Investment to Lac Assal village, as well as a buried tank situated within the perimeter of the planned wind farm. Therefore the amount delivered was identified as the limiting issue.

Neither village is linked to the electrical power grid. About one out of five households (22%) have a few small solar panels, one out of ten has a battery, and two thirds (67%) have no available source of electricity. There is no organisation for collecting garbage, or a waste storage site. In most cases, refuse is either deposited in an open rubbish tip, such as may be found in Cité Moumina (45% of households), or put out onto the roadway to be blown away (45%). Some households bury their trash (7.5%) or burn it (2.5%).

The mobile phone network is good in Cité Moumina, erratic or inexistent in Lac Assal village. Both villages have a hard-wall mosque and are linked to Djibouti City and Tadjoura by the NR9. Basic necessities are available from three shops in Cité Moumina and from a single shop in Lac Assal.

6.10 CULTURAL HERITAGE

6.10.1 Overview

For the purposes of this specific baseline, the Project study area or AoI comprises the following:

- the Project site (including the location of all of the turbines, access roads, substation and aerial cabling);
- the 3.5 km transmission line Right of Way (RoW) connecting the Project to the Ghoubet substation; and
- A buffer area 500 m from the edge of the Project site boundary and transmission line RoW.

Culturally significant sites in the area beyond this have been considered where they provide useful context. All cultural heritage sites (assets) within the study area with the potential to be directly or indirectly affected were considered. The extent and value of cultural heritage assets including archaeological and palaeo-environmental remains, historic buildings, the built environment and historic landscape were also considered.

6.10.2 Baseline Methods and approach

There is no national guidance on the methodology for assessment of impacts on the Cultural Heritage. However, existing methodologies and guides such as the draft guidance on Heritage Impact Assessments for Cultural World Heritage Sites (International Council on Monuments and Sites) and a range of other international guidance were considered in the preparation of the baseline.

Cultural Heritage assets were identified through a range of different sources and fieldwork studies. These sources included:

- a desk-based remote sensing survey which included:
    - examination of satellite imagery; and
    - a review of historical publications and internet resources
- a site survey in January 2018 which covered:
    - the main project site containing the turbines and access roads; and

- the wider surrounding study area.

6.10.3 Data Sources

The following information sources were consulted during the desk study of Cultural Heritage in the Project AoI.

- National legislation of Dijbouti;
- International regulations and conventions ratified by Dijbouti;
- Published accedemic research of the region and district;
- Topography; and
- Cartographic materials and data of Earth remote sensing (ERS) including:
  - Topographic maps;
  - Historic maps; and
  - Aerial Photography.

6.10.4 Archaeological & Historical Background

Early Prehistory

Djibouti has produced evidence for early hominid occupation. The Gobaad Basin area to the southwest was first noted to contain fossils by Dreyfuss in 1930. Geological mapping projects over 40 years later reported lithic discoveries and small samples of fossils were recovered. Subsequent fieldwork by de Bonis (1983-6) and Chavaillon (1985-90) targeted pre- Holocene sites and resulted in the identification of five pre-Holocene sites in the Gobaad: Haïdalo , Gafalo, Hara Idé, Anabo Koma (including Wadi Chekheyti), and Barogali. Of these, the most important finds came from the Lower Paleolithic Oldowan elephant butchery site at Barogali and the Homo erectus/sapiens maxilla from Hara Idé. In 2007, the Mission archéologique et paléontologique Afar Djibouti (MAPAD) carried out a new survey of the Gobaad Basin and discovered several new archaeological and paleontological sites attributed to the Lower Paleolithic. Three sites contain rich concentrations of lithic artifacts on the surface that can be attributed to Oldowan. The site at Chekheyti Issie 3 (see Figure 6.18) consists of a surface of over 100 m^2 with abundant Oldowan lithics in spatial association with fossil hippopotamus remains (over 100 individuals). The presence of lithic refits suggests that the site was minimally disturbed in the past[1]. Djibouti's Lower Pleistocene hominid sites can be compared with the Oldowan sites in Ethiopia, Kenya, and Tanzania and are at the dawn of lithic technology.

[1] S. Harmand et al., C. R. Palevol 8. Nouveaux sites paléolithiques anciens en République de Djibouti : bilan préliminaire de prospections récentes dans le Bassin du Gobaad, Afar central

Figure 6.18 Fossil Remains of a Butchered Hippopopomus from Chekheyti Issie 3

Source: S. Harmand et al. 2009, C. R. Palevol 8. Nouveaux sites paléolithiques anciens en République de Djibouti

Later Prehistory

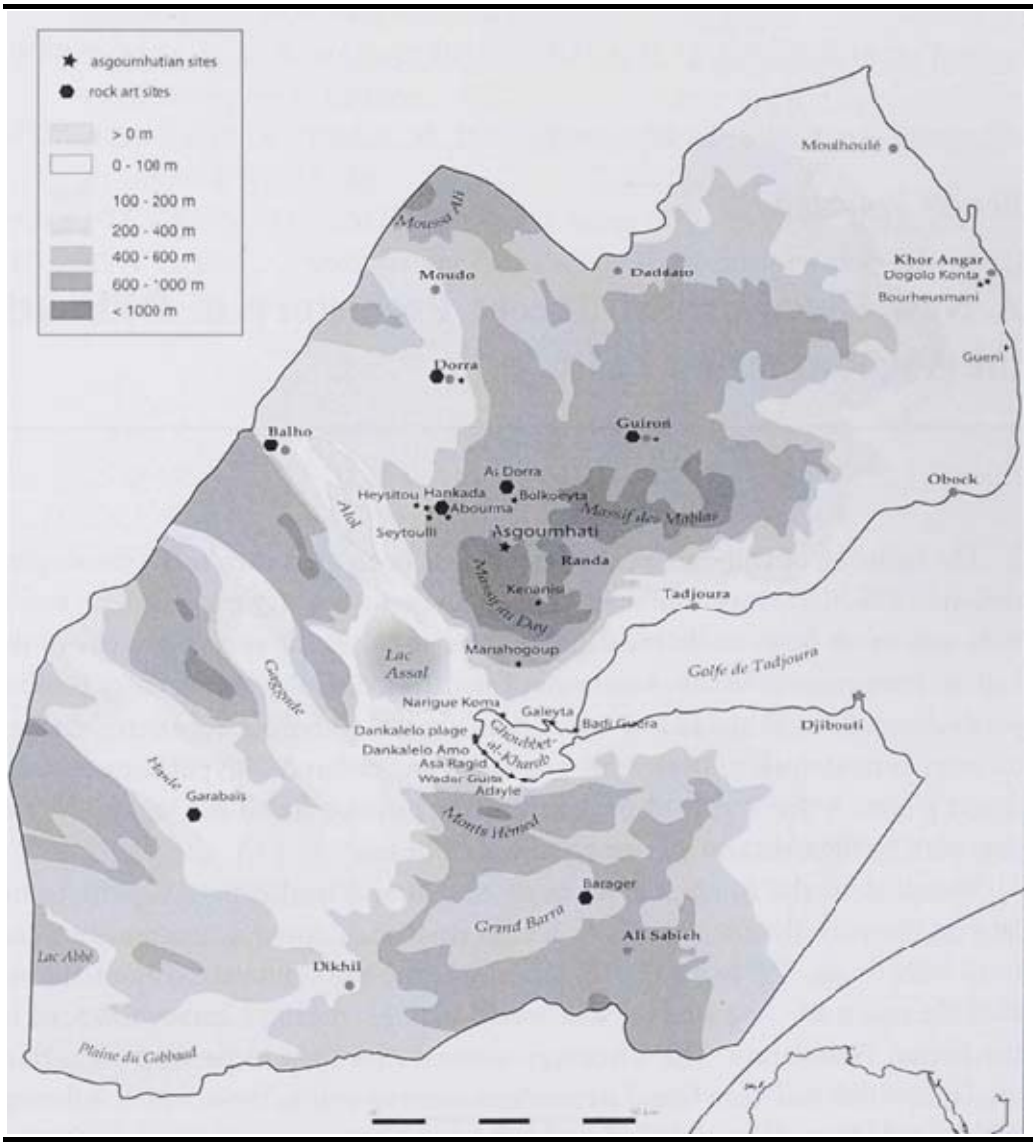
The nature of the land ascribed a life of nomadic pastoralism for prehistoric occupants of Djibouti. However, a high level of social organisation is apparent by 3rd millennium BC. Current research indicates extended familial groups moving between upland and lowland pasture, with developed handicrafts including high quality ceramics. Settlement evidence is small-scale and dispersed, consisting of marine diet deposition areas (shell heaps/middens, which often covered hearths) and stone rings, likely platforms for small huts. These were placed only in areas with access to pasture and fresh water, and where possible, on higher ground. Mortuary monuments appear to be actively situated at distance from the associated occupation sites. One of the better known sites is Handoga[1], in the south, where evidence of flint knapping, ceramics and the finding of a single glass bead, took place within the ruins of a sub-circular drystone wall complex (see Figure 6.19).

Figure 6.19 Archaeological Site at Handoga, Djibouti

Source: archiqoo.com

[1] Niall Finneran (2013) The Archaeology of Ethiopia

Figure 6.20 Distribution of Main Known Later Prehistoric Sites in Djibouti (after Poisblaud, 2012)

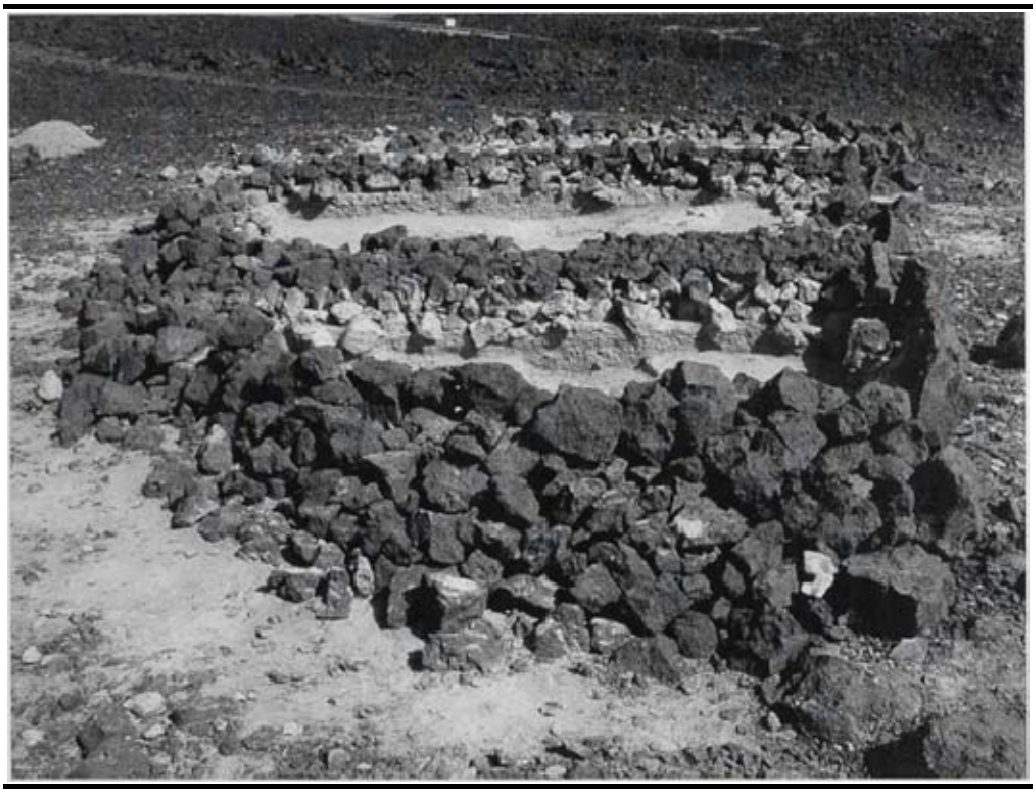


Source: Benoit Poisblaud, 2012., A New Discovery of Recent Prehistory in Djibouti: the Asgoumhatian Culture

The Gulf of Ghoubet, to the east of the study area, will have provided a wide range of resources to prehistoric populations, rich in salt, fish, and water for livestock. A number of prehistoric settlement sites are located along the shoreline of Ghoubbet al-Kharab (see Figure 6.20), where Poisblaud[1] notes ten associated tombs (cairns or aowelos). They are formed by circular walls with a maximum height of 50 cm between 5-20 m long, with a width of 4-8 m (see Figure 6.21). At the site of Dankalelo, on the shore of the gulf immediately to the north-east of the site, there is extensive evidence of Neolithic settlement, including numerous shell middens formed from the discarded shells of thousands of oysters. One particularly significant type of find are characteristic stone picks that were almost certainly used to mine salt from around the fringes of Lake Ghoubbet. It is quite possible that other settlement or funerary evidence of this period extended as far as the proposed windfarm site. In addition, there is also an extant and continuous culture of rock art which can be seen across the country.

[1] Benoit Poisblaud, 2012., A New Discovery of Recent Prehistory in Djibouti: the Asgoumhatian Culture

Figure 6.21 Later Prehistoric Burial Monuments in Djibouti (after Poisblaud, 2012)

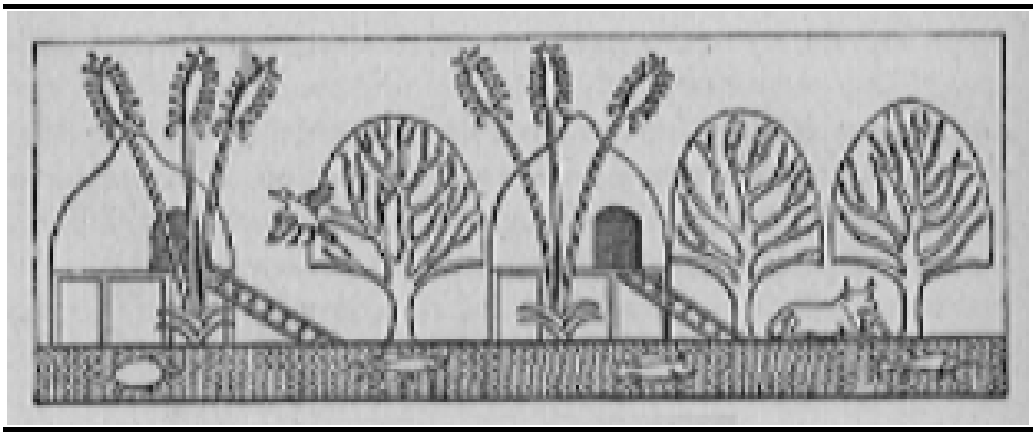


Source: Benoit Poisblaud, 2012., A New Discovery of Recent Prehistory in Djibouti: the Asgoumhatian Culture

Egyptian Influence

Djibouti, in association with northern Somalia, Eritrea and the Red Sea coast of Sudan, likely formed the 25th century BC trading region of Punt, a nation with close ties to Egypt during the reign of the pharaohs. Trading expeditions to Punt are recorded in many Egyptian dynasties, with goods such as gold, ivory, animal skins and mortuary goods such as frankincense, ebony and myrrh. Egyptian carvings depict typical Punt houses as domed circular huts raised on stilts with a ladder providing access to the entrance (see Figure 6.22).

Figure 6.22 Punt Houses Carved in the Mortuary Temple of Hatshepsut at Deir el-Bahri, Egypt



Source: Amelia Edwards, 1891. Pharaohs Fellahs And Explorers

Bronze/Iron age/Roman Periods

There is little evidence for Roman remains or occupation in Djibouti. The only confirmed site is called Berenice Epideires (Berenice on the Neck of the Land), and is

located on a coastal promontory in northern Djibouti, nearby the more substantial town of Deira[1]

Medieval

Early chiefdoms in Djibouti were succeeded by a series of Muslim sultanates, which held land that extended beyond the current nation borders. Until the twelfth century, these are likely to have largely been concentrated along the coast, the result of trade and cultural contact with the Islamic polities in Arabia to the east. regionsRegionally the most significant centre of power in the region will have been at Zeila, a coastal entrepot in north-western Somalia, which is first mentioned in in historical sources in the later ninth century. The Sultanate of Ifat, which existed from the 13th – 15th centuries, covered much of Djibouti, eastern Ethiopia and western Somilia as well as the Project site. The fall of Ifat led to a new Sultinate, the Kingdom of Adal centered on Zeila, ruling the area up until the end of the 16th entury until it was overtaken by the Ottomans. The main social, religious and cultural changes occurred in isolated coastal ports, which formed part of the wider network of medieval Red Sea/Indian Ocean trading culture. Ports such as Zeila formed the focus of widespread inland camel caravan networks, that spread across the region, bringing, among other things, salt to be traded with the ships coming from the north and east. Meanwhile, the traditional pastoral way of life of the greater part of the Afar in Djibouti and the Danakil depression is likely to have continued much as it was in prehistory. While orthodox Islam gradually established a foothold at port sites such as Tadjoura, across much of the region the traditional pastoral culture of the Afar is likely to have remained largely intact. The form of their burials, among other things, indicates this, with stone cairns surrounded by a circular outer wall, sometimes with an adjacent row of stones marking the victims that had fallen to the deceased during his lifetime[2].

Colonial / Modern

From 1860 to 1894, the region north of the Gulf of Tadjoura was known as Obock, and was ruled by the Issa Somali, and Afar Sultans, with whom the French signed several treaties (1883-1887) to start the colonization of the area. The French founded Djibouti city in 1888, and later made it the capital of French Somaliland in 1896. In the 1900s, the city considerably grew in size thanks to the construction of the Imperial Ethiopian Railway which linked Djibouti to southern Ethiopia and the Ogaden[3] During the second World War Djibouti was invaded by Italian forces from Ethiopia who occupied considerable portions of the fringes of the territority, while the French Vichy government (who controlled Djibouti) was also subjected to a British navel blockage which led to the death of over 20% of the local population. French Somaliland existed until 1967, when it became known as the French Territory of the Afars and Issas (Territoire Français the Afars et des Issas (TFAI)). In 1977, following the results of a third referendum, Djibouti gained independence and installed Hassan Gouled Aptidon as president until 1999. Between 1991-94 Djibouti was gripped by civil war, in which a rebel organization known as the Front for the Restoration of Unity and Democracy (FRUD), rose up against the government calling for greater political participation of Afar. Military clashes took place all over Djibouti but ceased with the signing of the Abb'a peace agreement, in December 1994. In recent years part of the project site was used as a military training ground[4].

[1] www.perseus.tufts.edu/hopper/text?doc=Perseus:text:1999.04.0064:entry=berenice-geo

[2] Insoll T. 2003. The Archaeology of Islam in sub-Saharan Africa. P.80.

[3] https://afrolegends.com/2014/04/14/why-the-name-djibouti/

[4] This information was provided by local residents during the field visit in January 2018

6.10.5 Key Baseline findings

Potential cultural heritage sites or 'assets' within the study area are identified with a unique reference code (for example CH01). Further detail on these potential assets can be found in the gazetteer in Table 6-13. Maps showing the location of all confirmed and potential cultural heritage assets identified through the baseline study can be found in Figure 6.23.

There are no designated cultural heritage sites at the Project site or within the study area.

Thirty-five non-designated cultural heritage sites (confirmed assets and potential assets) were identified within the study area. Of these, one (CH26) is Lac Assal village cemetery, which is in current use but could contain earlier graves, one (CH24) is Le Garabl'iya camp & cemetery, which was abandioned in the 1980s, nineteen (CH02-05, 06-07, 11, 14-16, 20-22, 25, 28-30 & 34-35) are individual or groupings of irregular dry-stone enclosures of uncertain date (all or some could be pastoral), six (CH10, 12-13, 19 & 31-33) are circular stone enclosures, all or some of which could be hut sites, five (CH08-09, 17-18 & 23) are stretches of meandering dry-stone walls ranging in length from 20-50 m, while one is a square stone enclosure with entrance way which was not visible prior to 2012 (CH01). A possible Qanat (underground irrigation canal) was also identified at the southern limits of the scheme (CH27).

The social survey undertaken for the Project[(1)] highlighted both Lac Assal village cemetery (CH26) and Le Garabl'iya camp & cemetery (CH24) as important intangible cultural heritage sites for the local community.

In addition, the tradition of goat herding exists across the Project site with the social survey highlighting that on average each household has 8 goats[(2)]. The tradition has adapted to the difficult terrain and climate and utilises stone shelters to corral and protect the goats at night. Under UNESCO definitations[(3)], this practice can be classed as Intangible Cultural Heritage belonging to the local community.

No other features of intangible cultural heritage were identified.

[1] INSUCO Social Impact Assessment, March 2018, page 40

[2] INSUCO Social Impact Assessment, March 2018, page 24

[3] https://ich.unesco.org/en/what-is-intangible-heritage-00003

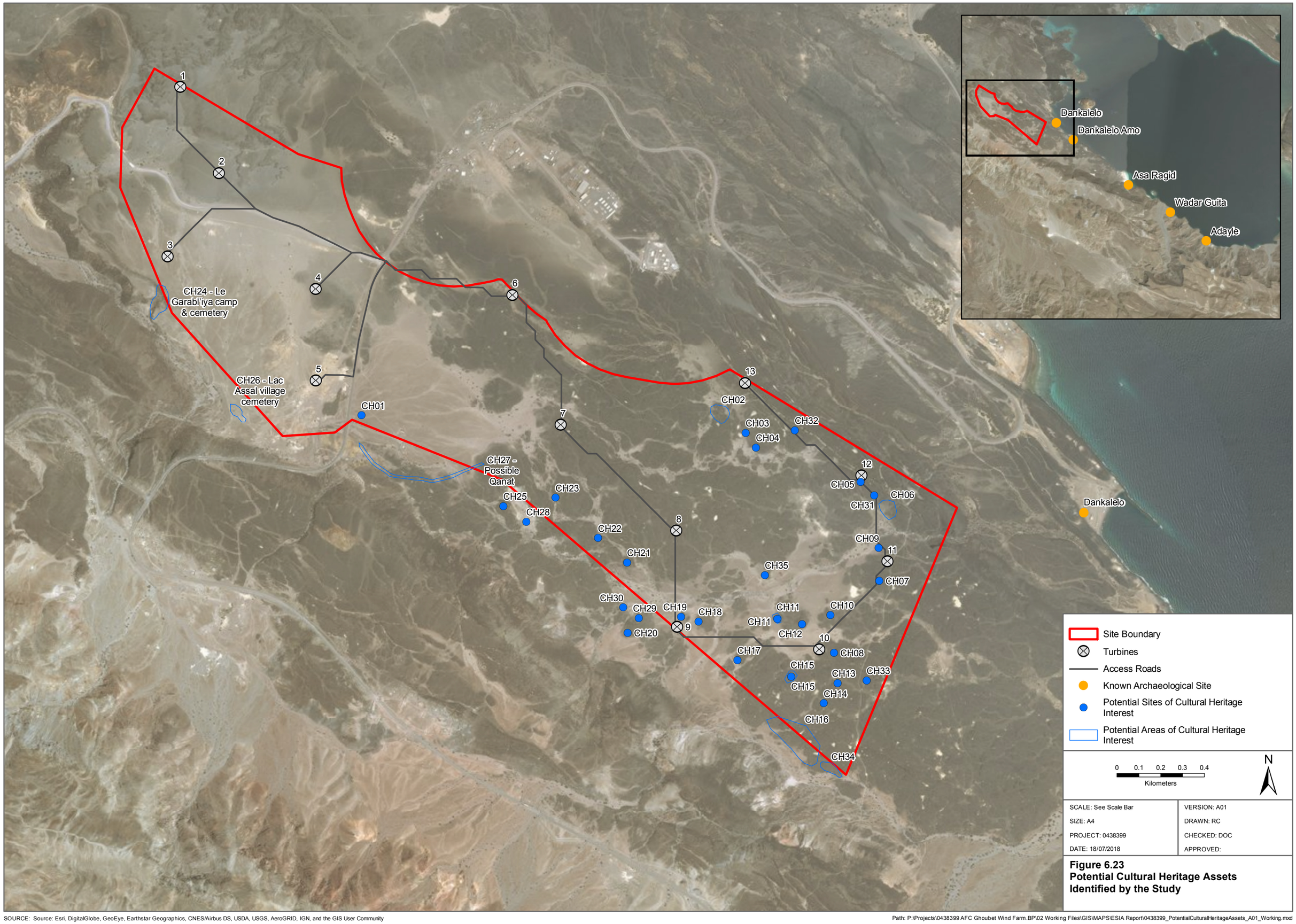


Figure 6.23
Potential Cultural Heritage Assets Identified by the Study

PROJECTION: WGS 1984 UTM Zone 38N

SOURCE: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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Table 6-12 Summary of Cultural Heritage Confirmed Assets & Potential Assets

Confirmed Assets	Within Project Site	Outside Project Site
Cemetery	-	1
Camp Site & Cemetery	-	1
Potential Assets		
Possible Qanat	-	1
Pastoral Enclosures	12	7
Circular Enclosures	7	-
Stone Walls	5	-
Square Enclosure	1	-
Total	**25**	**10**

Table 6-13 Gazetteer of Identified Cultural Heritage Assets & Potential Assets

Asset	Type	Source	Notes	Latitude	Longitude
CH01	Square Structure	Remote Sensing	Does not appear in imagery earlier than 2012	11.530229	42.492466
CH02	Irregular enclosures	Remote Sensing	Grouping of sub-oval stone enclosures	11.530388	42.507501
CH03	Irregular enclosures	Remote Sensing	Grouping of sub-oval stone enclosures	11.529641	42.508574
CH04	Irregular enclosures	Remote Sensing	Grouping of sub-oval stone enclosures	11.529034	42.50901
CH05	Irregular enclosure / wall	Remote Sensing	Sub-oval enclosure c.20 m across	11.527642	42.513408
CH06	Irregular enclosures	Remote Sensing	Grouping of sub-oval stone enclosures	11.526694	42.514327
CH07	Irregular enclosures	Remote Sensing	Grouping of sub-oval stone enclosures	11.52356	42.514232
CH08	Irregular wall	Remote Sensing	Length of wall running north-south, meandering c.50 m in length	11.52057	42.512359
CH09	Irregular wall	Remote Sensing	Length of wall slightly 'c' shaped, meandering c.30 m in length	11.52492	42.514199
CH10	Circular enclosure	Remote Sensing	Small circular enclosure	11.522146	42.512193
CH11	Irregular enclosures	Remote Sensing	Grouping of sub-oval stone enclosures	11.521946	42.509974
CH12	Circular enclosure	Remote Sensing	Small circular enclosure	11.521752	42.511013
CH13	Circular enclosure	Remote Sensing	Small circular enclosure	11.519318	42.512524
CH14	Irregular enclosures	Remote Sensing	Grouping of sub-oval stone enclosures	11.518485	42.511946
CH15	Irregular enclosures	Remote Sensing	Grouping of sub-oval stone enclosures	11.519579	42.510573
CH16	Irregular enclosures	Remote Sensing	Grouping of sub-oval stone enclosures	11.517134	42.510575
CH17	Irregular wall	Remote Sensing	Length of wall slightly 'c' shaped	11.520234	42.508311
CH18	Irregular wall	Remote Sensing	Meandering wall	11.521817	42.506674
CH19	Circular enclosure	Remote Sensing	Small circular enclosure	11.522013	42.505932
CH20	Irregular enclosures	Remote Sensing	Grouping of sub-oval stone enclosures and irregular walls	11.521324	42.503707
CH21	Irregular enclosures	Remote Sensing	Grouping of sub-oval stone enclosures and irregular walls	11.524241	42.503654
CH22	Irregular enclosures	Remote Sensing	Grouping of sub-oval stone enclosures and irregular walls	11.525234	42.502423
CH23	Irregular wall	Remote Sensing	Meandering wall	11.526888	42.500633
CH24	Camp and Cemetery	Remote Sensing / Social Survey	Le Garabl'iya camp & cemetery. The camp has been abandoned since the 1980's. The former inhabitants now live in Lac Assal village, which is a modern settlement. The cemetery has about 4-5 tombs, which the social survey has revealed are no longer used.	11.534684	42.483955
CH25	Irregular enclosures	Remote Sensing	Grouping of sub-oval stone enclosures	11.526522	42.498443
CH26	Graveyard	Site Visit / Social Survey	Lac Assal village cemetery, contains aboput 50 graves. Unbounded - consists of a number of sub-circular stone mounds with kerbing and pillar posts. Some	11.530321	42.487243

Asset	Type	Source	Notes	Latitude	Longitude
			possible early graves in the form of a stone circle with a mound in the centre. Seems to have been used in modern times from 2000 onwards, with earlier tomb types in the majority.		
CH27	Possible Qanat	Remote Sensing	Possible Qanat (underground irrigation canal) running for c.600 m. Ideitified as a series of evenly spaced surface protusions (shaft heads) aligned closely together in a straight line.	11.527851	42.493552
CH28	Irregular enclosures	Remote Sensing	Grouping of sub-oval stone enclosures	11.525878	42.499418
CH29	Irregular enclosures	Remote Sensing	Grouping of sub-oval stone enclosures	11.521945	42.504164
CH30	Irregular enclosures	Remote Sensing	Grouping of sub-oval stone enclosures	11.522375	42.503512
CH31	Circular enclosures	Remote Sensing	Grouping of circular stone enclosures - possible hut sites	11.527089	42.513991
CH32	Circular enclosure	Remote Sensing	Small circular enclosure	11.529764	42.510636
CH33	Circular enclosures	Remote Sensing	Grouping of circular stone enclosures - possible hut sites	11.519445	42.51374
CH34	Irregular enclosures	Remote Sensing	Grouping of sub-oval stone enclosures	11.515769	42.512354
CH35	Irregular enclosures	Remote Sensing	Grouping of sub-oval stone enclosures and possible hut sites	11.523761	42.509428

6.11 LANDSCAPE AND VISUAL

6.11.1 Landscape Baseline

Geology/topography

The Project site is located approximately one kilometre west of Lake Ghoubet, where the N9 and N10 roads intersect. The landscape of the area is characterised by high seismic and volcanic activities resulting in a series of escarpments running north west to south east. This activity has also resulted in a rocky barren landscape which is very much devoid of vegetation.

Jointed, vesicular and weathered basalt and scoria are the main components of the substratum. The basalt outcrops over most of the Project site but is covered by a compact and cemented layer of silt and gravel or volcanic ashes.

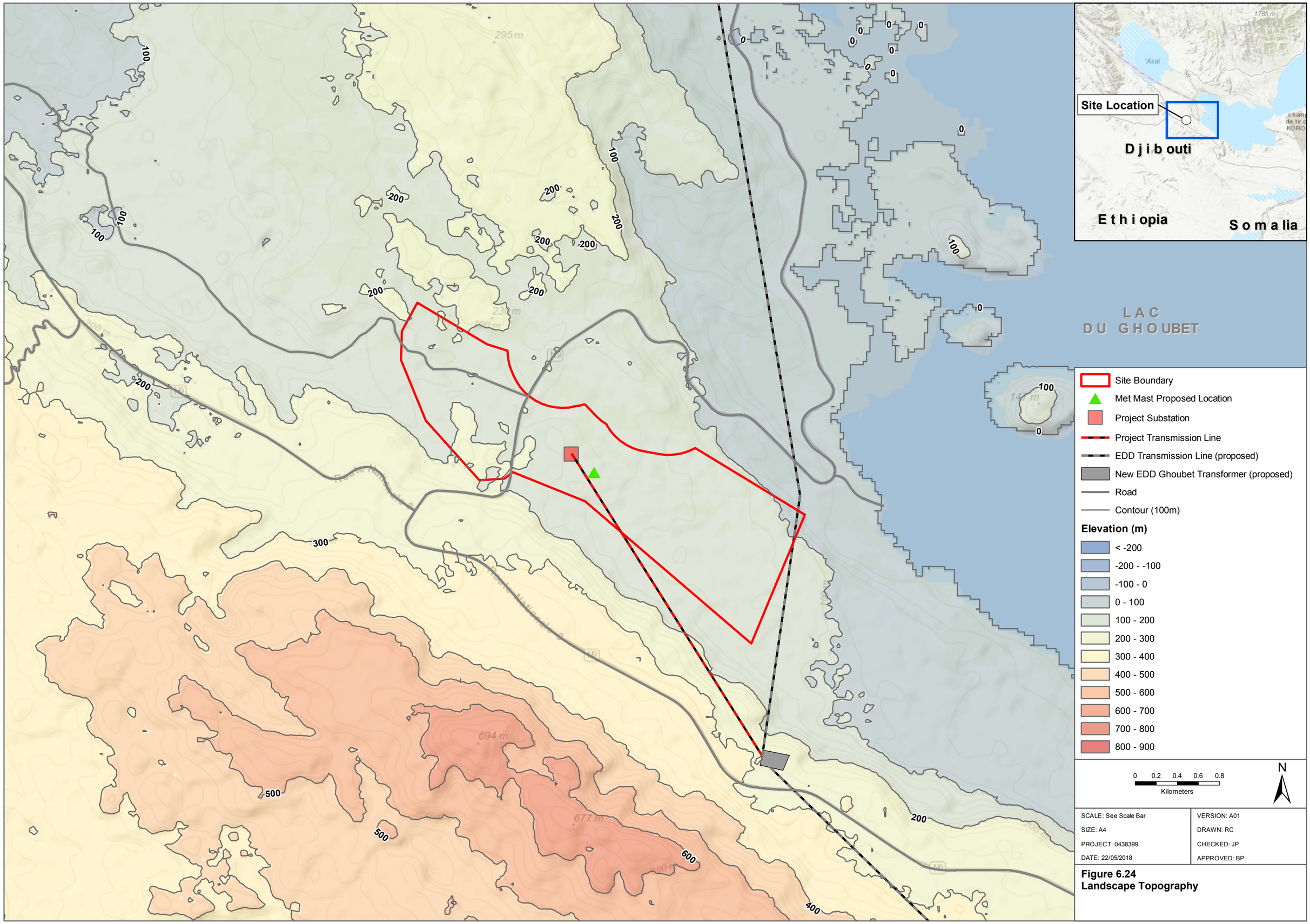
A figure has been prepared (see Figure 6.24 Landscape Topography) which illustrates the varied nature of the landscape in the study area. The figure illustrates the contour heights in coloured bands indicating the escarpments, low lying areas and the mountainous area in relation to the Project.

The proposed windfarm sits at an elevation of 100 m to 200 m AOD which is relatively low compared to ground levels to the south and west reflecting its proximity to the coast. There is a steep escarpment immediately south of the project site rising to 300 m AOD and then levelling off. Ground levels then rise again steeply up to 500 m to 600 m AOD forming a ridge to the south of the Project site before levelling out at beteen 400 m to 500 m AOD for several kilometres. Eventually ground levels rise steeply to form the mountains of Arta reaching elevations of +900 m AOD.

To the north of the Project site, ground levels reflect the location of the two lakes dropping down to 0 m AOD at Lake Ghoubet and Lake Assal.

West of the Project site, a ridge continues running north west at between 300 m and 400 m AOD whilst to the south east the mountainous area returns near to Lac Du Ghoubet before falling steeply towards the shore.

The variation in topography, resulting from the underlying geology, results in extremely restricted visibility within the study area. This factor means that longer distance views are mainly obtained from the northeast and east across Lake Ghoubet. The alignment of main roads is determined by the alignment of the escarpments and ridges to a northwest and south east orientation. Settlement distribution is generally restricted to immediately adjacent the main roads.


Site Location
Djibouti
Ethiopia
Somalia
LAC
DU GHOUBET
Site Boundary
Met Mast Proposed Location
Project Substation
Project Transmission Line
EDD Transmission Line (proposed)
New EDD Ghoubet Transformer (proposed)
Road
Contour (100m)
Elevation (m)
< -200
-200 - -100
-100 - 0
0 - 100
100 - 200
200 - 300
300 - 400
400 - 500
500 - 600
600 - 700
700 - 800
800 - 900
0 0.2 0.4 0.6 0.8
Kilometers
N
SCALE: See Scale Bar
SIZE: A4
PROJECT: 0438399
DATE: 22/05/2018
VERSION: A01
DRAWN: RC
CHECKED: JP
APPROVED: BP
Figure 6.24
Landscape Topography
PROJECTION: WGS 1984 UTM Zone 38N
SOURCE: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap
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Designation

There are no landscape designations located within the landscape and visual study area. In addition, there are no relevant ecological or archaeological designations which apply within the landscape and visual study area which could have a bearing on the sensitivity of the landscape via an increase in its value.

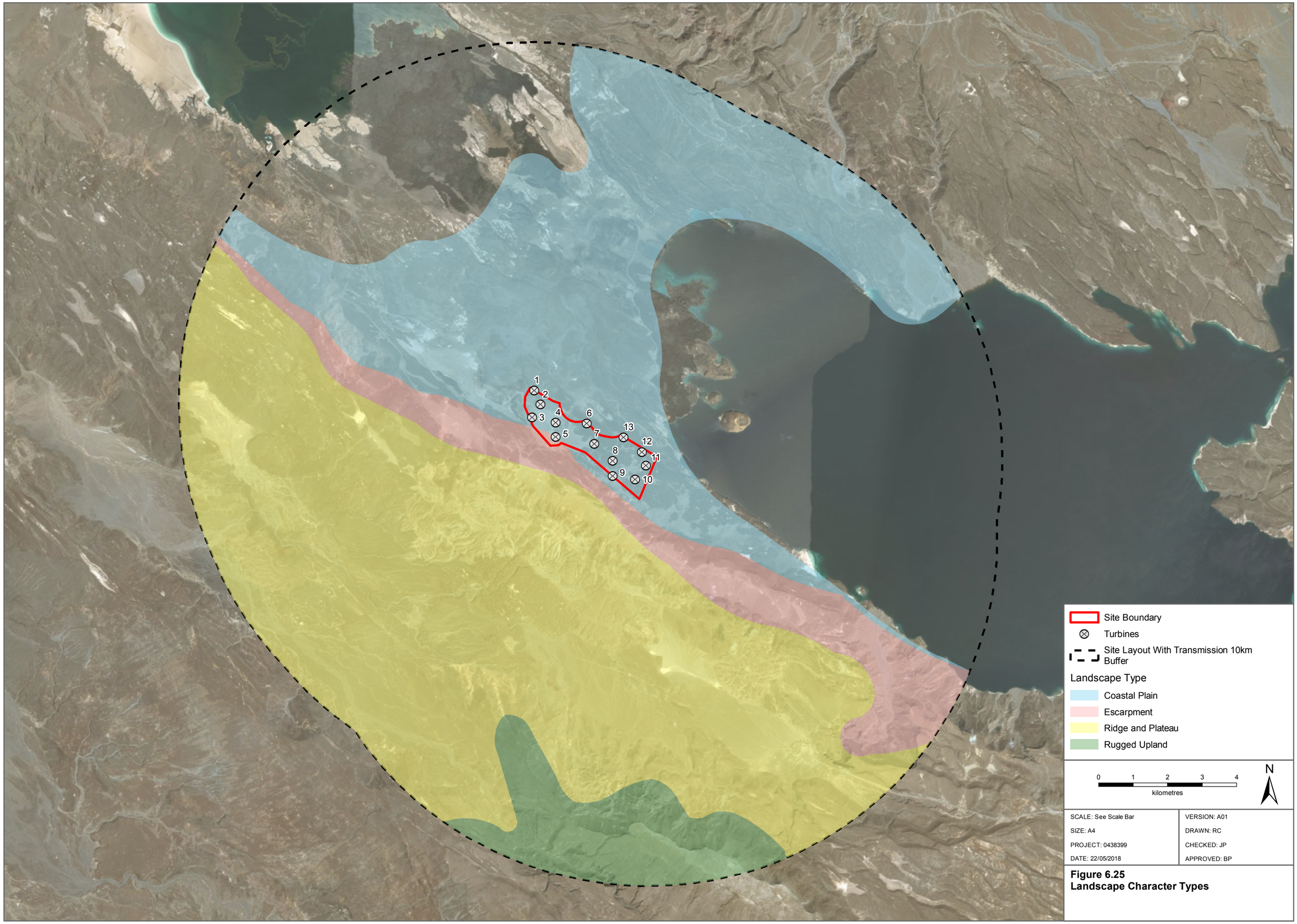
The Government of Djibou has initiated a proposal with UNESCO to declare the Lake Assal zone and the Ardoukoba volcano (approximately 8km north of the Project site) as a World Heritage Site. However, due to recent modifications of the landscape, such as the Salt Investment Compound, this application will likely be discontinued and not pursued further.

Landscape Character Areas/Types

Based on available data, desk based research and a site visit, ERM has sub divided the study area into the following landscape character types (LCT). This exercise has been carried out by reviewing aerial maps, geology, topography, hydrology and land use data collected from various sources and analysing and assessing as per the noted guidelines for landscape characterisation.

- Coastal Plain LCT
- Escarpment LCT
- Ridge and Plateau LCT
- Rugged Upland LCT

See Figure 6.25 for the broad extents of the LCT within the study area.



SCALE: See Scale Bar	VERSION: A01
SIZE: A4	DRAWN: RC
PROJECT: 0438399	CHECKED: JP
DATE: 22/05/2018	APPROVED: BP

Figure 6.25
Landscape Character Types

PROJECTION: WGS 1984 UTM Zone 38N

SOURCE: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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The ZTV which has been prepared for the Project (see Annex D) illustrates that there is very limited visibility of the turbines to the west, south and east due to the escarpment and the various ridges. Visibility is almost exclusively to the north east across Lake Ghoubet. To the north, visibility is restricted as ground levels are lower as they fall towards Lac Assal.

As a consequence of the very limited visibility, only two LCTS are considered further in this assessment, the Coastal Plain LCT and the Escarpment LCT. These types are described below and their location in relation to the project components discussed. For each LCT, the existing landscape quality and the landscape sensitivity to the Project is outlined.

Coastal Plain LCT
Most of the Project components will be located within this LCT.

This landscape type follows the base of the escarpment to the south and extends north to the shorelines of both Lac Du Ghoubet and Lac Assal. It also covers the area of land which separates the two lakes. The landscape type is primarily between 0 m and 200 m AOD although the area between the two lakes has a central area which exceeds 200 m AOD in the vicinity of the Ardoukoba Volcano. In addition, a small area within the project site also exceeds 200 m AOD. Its character is influenced by its proximity to the two adjacent lakes enabling long views across these two landscape features.

Within the vicinity of the Project site, the landscape quality and condition are largely poor due to the absence of vegetation and the harshness of the rocky environment. However, the ruggedness of the surrounding landscape particularly to the south is a distinctive feature and largely intact. Although there is geological interest in the landscape, the basalt outcrops and desert land cover are locally common and there are no landscape designations covering the area. The landscape further north, particularly where seen in relation to Lake Ghoubet has a higher scenic quality and especially when viewed against the mountainous backdrop.

Part of the northwestern area of the landscape type is situated adjacent to Lake Assal. The Government of Djibou has initiated a proposal with UNESCO to declare the Lake Assal zone and the Ardoukoba volcano (approximately 8km north of the Project site) as a World Heritage Site. This increases the value of this resource.

There are a few villages located within this landscape type including Lac Assal. A mineral port is located adjacent to Lac Du Ghoubet. The R9 main road runs through this type travelling north to the Tadjourah Region.

Taking the above factors into account it is considered that the value of the landscape type is low to medium and the susceptibility to the project type is low. The sensitivity of the landscape type therefore varies between medium to low with the lower rating nearer to the project site.

Escarpment LCT
The transmission line will cross this LCT. The windfarm and substation will be located to the north and immediately adjacent to this LCT.

This landscape type is associated with the escarpment which extends in a northwest to south east orientation to the south of the Coastal Plain LCT. The escarpment is situated between 200 m and 300 m AOD close to the project site and between 100 m and 300 m AOD to the north and south. The escarpment flattens out at the top before climbing again at the next alignment of ridges which also orientated northwest/southeast. It forms a very distinctive landscape feature in views from the north.

The quality and condition of this landscape type is good as, apart from the traversing road, the escarpment feature appears to be unaffected by human influence or activity.

The R9 and R10 main roads traverse this landscape type at the top of the escarpment, utilising the plateau area, with the R9 crossing the type before heading north.

There are two villages located within this landscape type including Cité Moumina.

Taking the above factors into account it is considered that the value of the landscape type is low and the susceptibility to the Project type is medium. The sensitivity of the landscape type is therefore medium.

Table 6-14 Summary of the sensitivity of the Landscape Character Types

Landscape Character Type	Quality & Condition / Value	Susceptibility	Sensitivity
Coastal Plain Landscape Type	Poor to Good/Low	Low	Low to Medium
Escarpment Landscape Type	Good /Low	Medium	Medium

6.11.2 Visual Baseline

The Study Area: Existing Visual Amenity

The project components extend over a relatively compact area with turbines up to 150 m high. Wind turbines of such a height will be visible for large distances unless screened by intervening topography or vegetation. In the Arta and Tadjourah Regions, screening of such tall structures relies exclusively on topography due to the absence of vegetation.

The proposed site benefits from large changes in level to the south of the Project site which will effectively limit views of the turbines from the south except for approximately 1.5km. A similar benefit will arise to the northwest and northeast of the Project site where visibility of the turbines will be confined to distances of up to 6km and intermittent visibility at further distances. The limited project ZTV is illustrated in Annex D.

Views of the turbines to the northeast will be more expansive due to the proximity of Lake Ghoubet. Due north, the extent of visibility of the turbines will be limited by intervening topography near Ardoukoba.

Villages are generally located adjacent to main roads in flat areas to the north and south of the Project site. The village of Lac Assal is located north of the site adjacent to the R9 main road. Another village, which appears abandoned, is located to the west of the Project site adjacent to the R10 main road. As this village appears abandoned it is not considered further in the assessment.

Three main roads traverse the study area. The R8 main road approaches from the west and joins the R10 west of the Project site. The R10 approaches from the coast of Lake Assal to the northwest and travels along the top of the escarpment to the south of the Project site before becoming the R9 and heading off southeast. Finally, the R9 approaches from the Tadjourah Region to the north, heads towards the port and then northeast before crossing the Project site and meeting the R10 at the top of the escarpment. Due to the changes in topography, users of a number of these roads have elevated views across the Project site.

The R9 is used by tourists heading to Tadjoura and also some sealed roads are used by tourists to access Lake Assal.

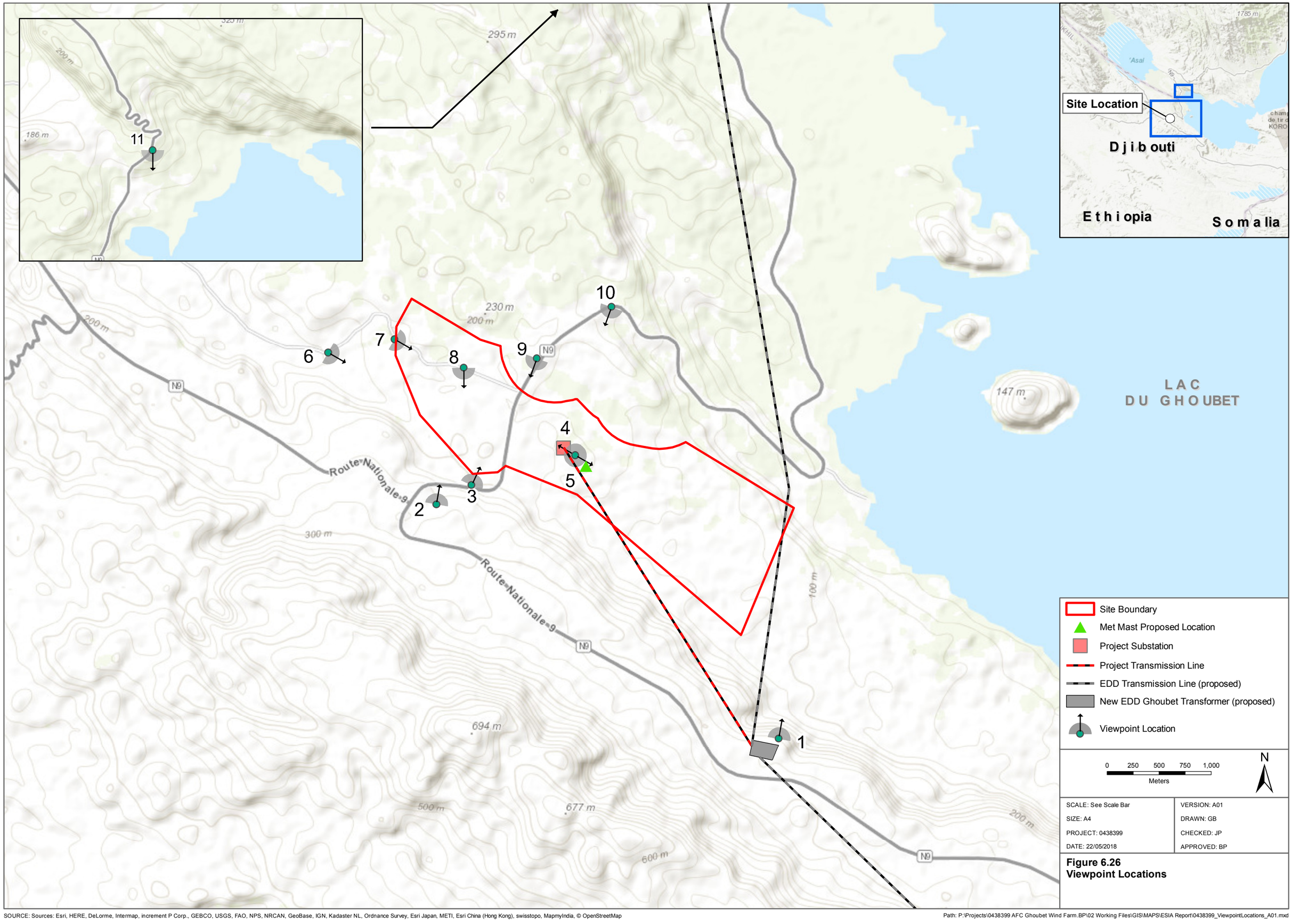
Villagers use a number of rocky outcrops within the project site to watch over their goat herds.

Viewpoints have been selected across the Study area to represent the above visual receptors with potential views of the Project. The location of viewpoints is shown in Figure 6.26.

Table 6-15 Representative Viewpoint Locations

VP No.	Viewpoint Location	Receptor Type	Sensitivity	VP justification	VP Distance and approx. elevation
1	South of site near RN9.	Road users	Low	View from main road looking northwest over project site	1.1 km 250 m AOD
2	Behind Lac Assal Village (Primary).	Residential	Low	Area used as rubbish dump for community-footpath along top of escarpment.	0.4 km 287 m AOD
3	RN9 road descending from escarpment to project site.	Road users	Low	Road is only accessed between Cité Moumina and Lac Assal village. View from Lac Assal village	0.3 km 285 m AOD
4	Rocky outcrop on site.	Workers	Low	Used by herders as vantage point	On site 196 m AOD
5	Rocky outcrop on site.	Workers	Low	Used by herders as vantage point	On site 196 m AOD
6	Sealed road to Lac Assal.	Road users/ Tourists	Medium	Road used by tourists and drivers accessing Lac Assal and point where pedestrians verge off road onto footpath between Lac Assal and southern site boundary (wadi channel).	0.6 km 157 m AOD
7	Sealed road to Lac Assal.	Road users/ Tourists	Medium	Road used by tourists and drivers accessing Lake Assal.	On boundary 193 m AOD
8	Sealed road to Lac Assal.	Road users/ Tourists	Medium	Road used by tourists and drivers accessing Lake Assal .	On site 190 m AOD

VP No.	Viewpoint Location	Receptor Type	Sensitivity	VP justification	VP Distance and approx. elevation
9	Lac Assal village (Secondary) at police checkpoint.	Residential	High	View from outskirts of Nicolicevo looking Resiential households in Lac Assal village.	0.35 km 197 m AOD
10	RN9 road on ascent to Lac Assal village (Secondary)	Road users/ Tourists	Medium	Road used by tourists and drivers heading to Tadjoura.	0.95 km 180 m AOD
11	Sarbanovac	Residential	High	Road used by tourists and drivers heading to Tadjoura.	6.5 km 95 m AOD



SCALE: See Scale Bar	VERSION: A01
SIZE: A4	DRAWN: GB
PROJECT: 0438399	CHECKED: JP
DATE: 22/05/2018	APPROVED: BP

Figure 6.26
Viewpoint Locations

PROJECTION: WGS 1984 UTM Zone 38N

SOURCE: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap

Path: P:\Projects\0438399 AFC Ghoubet Wind Farm.BP\02 Working Files\GIS\MAPS\ESIA Report\0438399_ViewpointLocations_A01.mxd

6.11.3 Visual Baseline Viewpoints

Viewpoint 1

This is an elevated location compared to the Project site and encompasses a range of distinct landscape features. The view extends north across Lake Ghoubet and includes the opposite shoreline and mountains on the horizon. The island of Guinni Koma is a notable feature in the middle distance. The difference in land cover is discernible between the exposed basalt and the covering of sand and silt. Wadis are also notable due to the presence of sporadic vegetation along their courses as they head towards the lake. Ghoubet Port is visible due north as well as Lac Assal Village and the Salt Investment compound near the horizon.

Viewpoint 2

This viewpoint is located at the top of the escarpment close to Cité Moumina. It is an expansive view towards the north across the coastal plain and includes part of Lake Ghoubet to the east. To the west, the escarpment can be seen extending towards Lake Assal. Lac Assal village is visible adjacent to the RN9 route as it heads north. More local sealed roads are also visible heading west towards Lake Assal. The escarpment takes the form of very distinctive hill in the foreground of the view.

Viewpoint 3

This viewpoint is taken from the main road which crosses the escarpment. The view is similar to viewpoint 2 but further east and at a lower elevation. It is a less expansive view constrained by higher ground to the east and west. Lake Ghoubet and the island of Guinee Koma are visible to the extreme east as well as Lac Assal village. The hill noted in viewpoint 2 is also a distinctive landscape feature in this view although its connection to the escarpment is more obvious. The local graves can be seen clearly in the foreground of the view.

Viewpoint 4

This viewpoint is taken from the summit of a local rock outcrop situated in the middle of the Project site and frequented by goat herders. The escarpment is the main landscape feature in this expansive northwest view with the RN9 traversing to higher ground. High topography is visible in the background which separates the Project site from the shore of Lake Assal. There are several commercial/industrial structures in various locations across the view associated salt extraction as well as an abandoned water reservoir in the centre of the view. Lac Assal village is located to the north in the viewpoint.

Viewpoint 5

Taken from the same location as viewpoint 4 but looking southeast, this view also includes the escarpment as the main landscape feature. However, the higher ridge further south is a distinctive feature. The land cover in the middlegound is distinctive, particularly the difference in colour and texture of the sand/silt material and the darker and courser basalt material. Lake Ghoubet is a scenic component of this view particularly due to the contrast with the arid land cover in the foreground. The island Guinee Koma is a focal point of the view despite the location of Lac Assal village to the north.

Viewpoint 6

This view is obtained by tourists and drivers heading away from the Lake Assal area. It is also the location where pedestrians access the footpath between Lake Assal and the southern site boundary close to the wadi channel. The foreground, covered with scattered vegetation, rises before descending in the middleground towards the project site. The escarpment and higher ridges are clearly visible in the background.

Viewpoint 7
This viewpoint is taken from the same sealed road as viewpoint 6 but is further north and on the site boundary of the project. The main landscape features of the view are the escarpment and the higher ridgelines to the south. The dip slope of the escarpment is a particularly notable feature. The Project site is visible in the central part of the viewpoint and straddles the sealed road.

Viewpoint 8
This viewpoint is taken from within the project site on the sealed road which crosses part of the site before joining the RN9. It is a very similar view to viewpoint 7 but facing due south towards the escarpment. Therefore, the escarpment and the ridges to the rear are prominent landscape features. These features extend much further southeast than the Project site and prevent views further south from within the project boundary. Views to the east are very open by comparison. A few derelict vehicles are dispersed across the Project site.

Viewpoint 9
This viewpoint is representative of views from Las Assal Village and is located close to the police checkpoint on the RN9. The view is quite expansive and includes the escarpment and ridge landscape features which limit views further south. The remainder of the landscape is fairly featureless except for sporadic evidence of habitation and human activity. Structures associated with the police check at the edge of the village are just visible at the edge of the view.

Viewpoint 10
This viewpoint is taken from the RN9 and represent views obtained by tourists and road users travelling to and from Tadjoura. Due to the twisting nature of the road, views towards the site are available when traveling in both directions. The view is restricted by locally higher ground and only the uppermost parts of the escarpment and ridges are visible. The buildings and infrastructure associated with the Lac Assal Village also restrict visibility towards the project site. Views towards Lake Ghoubet to the east are less restricted and the island of Guinni Koma can be seen.

Viewpoint 11
This viewpoint is taken on the RN9 descending towards Lake Ghoubet. It is an elevated, expansive and high-quality view and includes a number of distinctive landscape features. Lake Ghoubet provides a serene setting and contrast to the ruggedness of the adjacent ridgelines. The view is uninterrupted down to the shoreline and across to the skylines. There are a few detracting features such as the carpark adjacent to the road but the large scale of the landscape reduces the negative effects of these features. Visibility is affected by heat haze and it is difficult to discern the Project site at this distance (6 km).

6.12 TRAFFIC

Public Road Network

The national roads—RN1, RN3 and RN9—are two lane, paved roads, with a typical pavement width of about 7m, although road widths vary considerably, with wider sections at certain intersections and narrower sections within towns. Notably, the RN1 within the town of We'a narrows to as little as 5m, which is insufficient to allow two trucks to pass simultaneously.

A security check point is situated along the RN9 at the entrance to Lac Assal village, opposite the gendarmerie, just north of the Project site. The site is also crossed by an

unnamed road heading to Lac Assal to the northwest. Photographs of these roads are provided in Figure 6.27.

Table 6-16 provides traffic counts conducted for the Project in February 2018 on the RN9 near Lac Assal village. These counts indicate that RN9 is lightly travelled. Observers report that most of the "Other SUV" traffic is generated by existing businesses and industrial facilities, notably Salt Investment S.A.

Traffic counts are not available for RN1. However, based on recent observations and the Project Feasibility Study, this road is heavily travelled, and carries substantial truck traffic between Djibouti and Ethiopia, to the west.

No data exist for traffic incidents or crashes on the RN1, RN3, or RN9.

Table 6-16 Traffic Counts on RN9 near Lac Assal Village

Vehicle type	Weekend daily traffic	Weekday daily traffic
Automobile	9	9
Tourist SUV	10	9
Other SUV	58	101
Minibus	6	4
Bus/Coach	0	15
Van	2	23
Tractor-trailer	1	6
Tanker Truck	7	12

Source: Insuco, February 2018.

Figure 6.27 Photographs of the Local Road Network

View (southeast) of RN9 descending the escarpment to Lac Assal village

View (northwest) of RN9 at edge of Lac Assal village

View (northwest) of unnamed road towards Lac Assal

Source: ERM Scoping Survey (2017)

6.13 TOURISM

Lake Assal and Lake Ghoubet are tourist attractions and visitors travel on the RN9 national road to access the lakes; the RN9 passes north to south through the Project site. There is a small tourist camp site on Lake Ghoubet's western shore where visitors stay to kite surf on the lake. There are no other known tourist accommodation or attractions in the Project AoI. No quantitative data is available on the numbers of visitors to these specific areas; however, they are expected to be relatively low as the number of visitors to Djibouti are some of the lowest in Africa (~60,000 visitors a year[1]).

Figure 6.28 Lake Assal as viewed from the RN9 National Road

Source: ERM 2017

Figure 6.29 Lake Ghoubet as viewed from the RN9 National Road

Source: ERM 2017

[1] Data from 2013 from World Tourism Organisation Djibouti: Country-specific: Basic indicators (Compendium)

7 IMPACT ASSESSMENT

7.1 INTRODUCTION

The objectives and legal basis for environmental and social assessment in Djibouti are described in Section 1 and Section 2, respectively. This section provides an assessment of the environmental and social impacts that may result from the Project and provides details of the mitigation measures and management actions that will be implemented to avoid, reduce, remedy or compensate for significant adverse impacts and, where practicable, to maximise potential positive benefits and opportunities from the Project.

The approach adopted for the ESIA was to identify and assess the impacts that are likely to be significant and those impacts that are not likely to be significant are excluded (scoped out) from the assessment, as detailed in the February 2018 Scoping Report. Worker occupational health and safety topics are not addressed within the ESIA process as these issues are more comprehensively assessed and controlled through Project and health and safety management plans and site procedures.

Where there is uncertainty in the assessment process the potential impacts are included in the assessment, therefore, there will be potential impacts included in the assessment that are ultimately judged to be not significant.

7.2 ASSESSMENT METHODOLOGY

The general impact assessment methodology is outlined below. Topic-specific methodologies are provided in Annex D (Landscape and Visual Assessment) and Annex I (Geology and Soils, Surface Water and Groundwater, Air Quality, Biodiversity, Noise, Social, Traffic and Cultural Heritage). These methodologies have been used for this impact assessment and provide topic-specific definitions for magnitude of impact, value of resource or vulnerability of receptor and impact significance.

7.2.1 Predicting the Magnitude of Impacts

The impact assessment describes what will happen by predicting the magnitude of impacts and quantifying these to the extent practicable.

The term ‘magnitude’ covers all the dimensions of the predicted impact to the natural and social environment including:

- the nature of the change (what resource or receptor is affected and how);
- the spatial extent of the area impacted or proportion of the population or community affected;
- its temporal extent (i.e. duration, frequency, reversibility); and
- where relevant, the probability of the impact occurring as a result of accidental or unplanned events.

Table 7-1 provides definitions for the spatial and temporal dimension of the magnitude of impacts used in this assessment.

Table 7-1 Magnitude Definitions

Impact Magnitude	
Spatial Scale	**Local** – impacts that are limited to within the Project site and the immediate surrounding area. **Regional** – impacts that are experienced beyond the local areas to the wider district(s) or region e.g. Arta region or Tadjoura region **National** – impacts that are experienced at a national scale. **Trans-boundary/International** – impacts that are experienced at an international scale i.e. affecting another country.
Temporal Scale	**Short-term** - predicted to last only for the duration of construction (i.e. up to approximately 18 months). **Medium-term** - predicted to last during the operational life of the Project (i.e. up to 25 years from completion of construction). **Long-term** - predicted to continue beyond the operational life of the Project but will cease in time. **Permanent** – impacts that cause a permanent change in the affected receptor or resource that endures substantially beyond the project lifetime. **Continuous** – impacts that occur continuously or frequently. **Intermittent** – impacts that are occasional or occur only under specific circumstances

Source: ERM (2017)

Magnitude, therefore, describes the actual change that is predicted to occur in the resource or receptor (e.g. the area and duration over which disturbance of the land will occur; the degree of impact on the livelihoods of a local community; the probability and consequences in terms of accidental events). An assessment of the overall magnitude of an impact is provided that takes into account all the dimensions of the impact described in Table 7-1 to determine whether an impact is of small, medium or large magnitude.

Impacts on ecological resources consider the effect on long-term functioning of ecosystems and the abundance of the habitat or size of a species' population.

For social impacts, the magnitude considers the perspective of those affected by taking into account the likely perceived importance of the impact and the ability of people to manage and adapt to change.

In the case of positive impacts, it is sufficient to indicate that the Project will result in a positive impact, without characterising the exact degree of positive change likely to occur.

7.2.2 Value of Resources and Vulnerability of Receptors

The significance of the impacts resulting from an impact of a given magnitude will depend on the characteristics of resources and receptors to that impact in terms of their value or vulnerability (i.e. quality, importance or sensitivity).

For ecological resources importance or quality can be assigned as low, medium or high based on the conservation value (including protection status) of habitats and species, their ecosystem functions and their sensitivity to the impact. For habitats

these are based on factors such as naturalness, extent, rarity, fragility, diversity and importance as a community resource. For species, protection, conservation status and ecosystem role are considered.

Sensitivity is not an inherent characteristic of a receptor or resource. It is the degree to which it is tolerant of, adaptable to and able to recover from a change in its environment. Therefore in addition to considering the quality and importance of the affected receptor or resource, its response (or sensitivity) to a particular impact is also considered. It is possible for a resource or receptor to interact with the Project, be of high value but not be sensitive to its impacts.

For socio-economic and health impacts sensitivity is based on individuals' ability to adapt to changes and maintain their livelihoods (judged by their physical, social, human, economic and natural capital) and health.

7.2.3 Evaluation of Significance

Virtually all human activity imposes some disturbance to aspects of the natural and social environment because of physical impacts on natural systems or due to interactions with other human activities. To provide information to decision makers and other stakeholders on the importance of different Project impacts an evaluation of the significance of each effect will be made by the ESIA team.

The evaluation of impacts presented in the ESIA will be based on the judgement of the ESIA team, informed by legal standards, national and regional government policy, current industry good practice and the views of stakeholders. Where specific standards are either not available or provide insufficient information on their own to allow grading of significance, evaluation of significance will take into account the magnitude of the impact and the quality, importance or sensitivity of the affected resource or receptor.

The quality or importance of a resource will be judged taking into account, for example, its local, regional, national or international designation, its importance to the local or wider community, its ecosystem function or its economic value. The assessment of the sensitivity of human receptors, for example a fishing community or wider social group, will consider their likely response to the change and their ability to adapt to and manage the effects of the impact.

Magnitude and receptor quality/importance/sensitivity are looked at in combination to evaluate whether an impact is, or is not, significant and if so its degree of significance (defined in terms of *Minor, Moderate* or *Major).* Impacts classed as *Not Significant* include those that are slight or transitory, and those that are within the range of natural environmental and social change. This principle is illustrated schematically in Figure 7.1.

Figure 7.1 Evaluation of Significance

		Sensitivity/Vulnerability/Importance of Receptor or Resource		
		Low	Medium	High
Magnitude of Impact	Negligible	Not Significant	Not Significant	Not Significant
	Small	Not Significant	Minor	Moderate
	Medium	Minor	Moderate	Major
	Large	Moderate	Major	Major

Source: ERM (2017)

7.2.4 Mitigation Measures

One of the key objectives of an ESIA is to identify and define socially and environmentally acceptable, technically feasible and cost-effective mitigation measures. Mitigation measures are developed to avoid, reduce, remedy or compensate for the significant negative impacts identified during the ESIA process, and to create or enhance positive impacts such as environmental and social benefits. In this context the term mitigation measures includes operational controls as well as management actions.

Where a significant impact is identified, a hierarchy of options for mitigation is explored as set out in Box 7.1.

Box 7.1 Mitigation Hierarchy

- **Avoid at Source; Reduce at Source:** avoiding or reducing at source through the design of the Project (e.g., avoiding by siting or re-routing activity away from sensitive areas or reducing by restricting the working area or changing the time of the activity).
- **Abate on Site:** add something to the design to abate the impact (e.g., pollution control equipment, traffic controls, perimeter screening and landscaping).
- **Abate at Receptor:** if an impact cannot be abated on-site then control measures can be implemented off-site (e.g., noise barriers to reduce noise impact at a nearby residence or fencing to prevent animals straying onto the site).
- **Repair or Remedy***:* some impacts involve unavoidable damage to a resource (e.g. agricultural land and forestry due to creating access, work camps or materials storage areas) and these impacts can be addressed through repair, restoration or reinstatement measures.
- **Compensate in Kind; Compensate Through Other Means:** where other mitigation approaches are not possible or fully effective, then compensation for loss, damage and disturbance might be appropriate (e.g., planting to replace damaged vegetation, financial compensation for damaged crops).

Source: ERM (2017)

Mitigation measures are often established through industry standards and may include the following.

- Changes to the design of the Project during the design process (e.g. changes to the location of turbines).

- Engineering controls and other physical measures applied (e.g. use of sound proofing, bunding in fuel storage areas).

- Operational plans and procedures (e.g. notification to nearby communities or waste management plans).

For impacts that are initially assessed during the ESIA process to be of *Major* significance, a change in design is usually required to avoid, reduce or minimise these, followed by a reassessment of significance. For impacts assessed during the ESIA process to be of *Moderate* significance, where appropriate the discussion explains the mitigation measures that have been considered, the one selected and the reasons (e.g. in terms of technical feasibility and cost-effectiveness) for that selection. Impacts assessed to be of *Minor* significance are usually managed through good industry practice, operational plans and procedures.

ESIA is intended to help decisions on projects to be made in full knowledge of their likely impacts on the environment and society. As noted below, the residual impacts and their significance reported in this ESIA are based on the proposed Project as described, i.e. inclusive of all proposed mitigation.

The mitigation measures and monitoring plans discussed in this section are presented in more detail in Section 9.

7.2.5 Assessing and Reporting Impact Significance

Reporting the significance of a residual impact is based on:

- the predicted magnitude of an impact, taking into consideration all the mitigation measures the project team is committed to that are relevant to that impact; and (where appropriate); and
- the quality/importance/sensitivity of the receptor.

The degree of significance attributed to residual impacts is related to the weight the ESIA team considers should be given to them by the authorities in making decisions on the proposed Project and developing conditions for approval.

Impacts of *Major* significance are considered to warrant substantial weight, when compared with other environmental, social or economic costs and benefits, for those making decisions on the Project; conditions will be expected to be imposed to control and, if necessary, monitor adverse impacts.

Impacts of *Moderate* significance are considered to be of reducing importance to making decisions, but still warranting careful attention to conditions regarding mitigation and monitoring, to ensure the most appropriate (technically feasible and cost-effective) mitigation measures are used and to ensure benefits are delivered.

Impacts of *Minor* significance are brought to the attention of decision-makers but will be identified as warranting little if any weight in their decision; mitigation will be achieved using normal good practice and monitoring may be required to confirm that impacts are as predicted.

7.2.6 Uncertainty

Even with a final project description and an unchanging environment, predictions of impacts and their effects on resources and receptors can be uncertain. Predictions can be made using varying means ranging from qualitative assessment and expert judgement through to quantitative techniques (e.g. noise modelling). The accuracy of predictions depends on the methods used and the quality of the input data for the Project and the environment. Where uncertainty affects the assessment of impacts a conservative (i.e. reasonable worst case) approach to assessing the likely residual impacts is adopted with mitigation measures developed accordingly. To verify predictions and to address areas of uncertainty, monitoring plans are proposed for some potential impacts.

7.3 GEOLOGY AND SOILS

7.3.1 Scope of the Assessment

This section is a limited assessment of the following Project activities' potential impacts on land and soils:

Project phase	*Activity with potential impact*
Construction	Groundworks and construction activity resulting in soil compaction and loss of soil stabilising vegetation (therefore increasing surface runoff and localised erosion)
	Accidental leaks/spills contaminating soils
Operation	None

7.3.2 Value of Resource

The soils within the Project site comprise rock and salt flats. The soil is of very poor agricultural quality, and is relatively homogenous across the Project site and transmission line corridor. The importance of the land and soil considering it's widespread occurrence in the surrounding landscape and the fact that the majority of the site does not support any vegetation or human activity is considered to be *Low*.

7.3.3 Construction – Soil Compaction and Loss of Soil Stabilising Vegetation

Areas affected by soil compaction will be localised and limited during construction (temporary land take area of 55 acres in the 978 acre (<6%) Project site). The magnitude of impact is therefore considered to be *Small* and the impact *Not Significant*.

7.3.4 Construction – Accidental Spills Resulting in Localised Soil Contamination

Refer to Section 8.1.1.

7.4 SURFACE WATER AND GROUNDWATER

7.4.1 Scope of the Assessment

This section is a limited assessment of the following Project activities potential impacts on surface water and groundwater resources (it must be noted that all water required for construction and operation of the Project will be transported to site):

Project phase	*Activity with potential impact*
Construction	Groundworks, creation of access roads and earthworks associate with construction of turbine foundations and installation of turbines and supporting infrastructure resulting in changes to surface flows (increasing volumes of surface water runoff)
	Accidental leaks/spills
Operation	Location of turbines affecting surface water flow in wadi channel during rainfall events

7.4.2 Value of Resource

There are no known permanent surface water features on the Project site. There is one man-made, rain fed, buried cistern in the Project site designed to collect rainwater. However, due to the arid climate this very rarely contains water, therefore communities rely on water being delivered by truck from a bore-hole at PK 50 adjacent to the RN1), approximately 30 km from the Project site. There is a network of ephemeral surface water channels present on the Project site, known as a wadi network. However, they also very rarely contain water due to the arid climate. Therefore the sensitivity of surface water resources is considered to be of *Low* value.

7.4.3 Construction – Turbines, Laydown Areas and Access Roads in Wadi Channels Resulting in Changes to Surface Water Flows

Refer to Section 7.6.3.

7.4.4 Construction – Turbines, Laydown Areas and Access Roads in Wadi Channels Resulting in Changes to Community Access

Refer to Section 7.12.

7.4.5 Construction – Accidental Spills Resulting in Surface Water Pollution

Refer to Section 8.1.1.

7.4.6 Operation – Location of Turbines and Access Roads in Wadi Channels

Refer to Section 7.6.9.

Mitigation/Management Measures

The following measures will be considered during the Project detailed design or undertaken prior to Project construction:

- All Project components (permanent and temporary) have been sited outside of wadi channels wherever practicable to do so.
- Where a Project component such as an access track crosses a wadi channel it should be constructed to allow free drainage to not significantly prohibit flow of water.
- A Water Resources Study to confirm Office National de l'Eau et de l'Assainissement de Djibouti's (ONEAD) statement that the source of water used for the Project is sufficient to supply to water required for the Project and not impact supply to other parties. Such a study should include a review of the design/feasibility reports of the Transboundary Ethiopia-Djibouti Drinking Water Supply Project to assess the sustainable yield of the well-field. Another meeting with ONEAD should also be conducted to confirm further details of their supply (such as individual borehole yield, water availability and when the other planned boreholes will come on line).
- A Water and Wastewater Management Plan will be developed and implemented.

Impact significance

In consideration of the measures set out above, the impacts on surface and groundwater are considered to be *Not Significant.*

7.5 AIR QUALITY

7.5.1 Scope of the Assessment

This section is a limited assessment of the following Project activities' potential impacts on air quality:

Project phase	*Activity with potential impact*
Construction	Increased emissions and dust generation from construction activities on ambient air quality outlined in Section 3
Operation	None

7.5.2 Value of Resource/Receptor

There are no residential settlements within the Project site or within 500 m[1] of the Project site. Additionally, there are no nationally protected areas within 10 km of the Project site. Therefore, the receptor sensitivity is considered to be *Low.*

7.5.3 Construction

The largest source of emissions affecting air quality will be fugitive dust from construction activities, including construction traffic and potentially blasting. The area of construction within the Project site is relatively small and the construction activities are local and short-term so the magnitude of impact is considered to be *Small*.

Mitigation/Management Measures

The following inherent mitigation measures and best practice approaches will be incorporated into the construction of the Project.

- International best practice[2] dust control measures, such as using covers when transporting or storing stock-piled materials, will be followed to suppress dust emissions.
- Use of modern equipment and vehicles meeting appropriate emissions standards, and regular preventative maintenance (in line with manufacturer's recommended maintenance schedules, taking into account intensity of use and operating environment).
- Excavation, handling and transport of erodible materials shall be avoided under high wind conditions where practicable. Where not feasible, transported erodible materials shall be covered.
- Where possible, any soil stock piles should be located in sheltered areas where they are not exposed to wind. If not feasible, stock piles of soil (or other erodible materials) should be securely covered.
- Vehicle speeds shall not exceed 40 km/hr along dust roads or 20 km/hr along unconsolidated areas.

Impact significance

With the general management measures set out above, the impacts on air quality are considered to be *Not Significant.*

7.6 BIODIVERSITY – HABITATS, FLORA AND FAUNA (EXCLUDING BIRDS AND BATS)

7.6.1 Scope of the Assessment

This section assesses the following Project activities with the potential to impact non-avian biodiversity resources:

Project phase	*Activity with potential impact*
Construction	Vegetation clearance for access tracks, turbines bases, cable array, transformer and substation and laydown areas. Vegetation clearance for transmission line and access tracks.
	Construction activity and noise
	Vehicle movements
	Presence of construction workforce
	Introduction of invasive alien species
	Accidential leaks/spills
Operation	Presence of operational workforce

[1] 500 m around a construction zone is typically accepted as the AoI for air quality. Guidance on the Assessment of the Impacts of Construction on Air Quality and the Determination of their Significance December 2011 – Institute of Air Quality Management (IAQM)
[2] IFC EHS General Guidelines

7.6.2 Value of Resource/Vulnerability of Receptor

The majority of plant and animal species recorded on site are all common and widespread. Two mammal species of conservation concern, the IUCN VU Dorcas gazelle and IUCN NT striped hyena, are considered to be of medium sensitivity/value. One reptile species, the Djibouti whip snake is currently considered to be endemic to Djibouti and is considered to be of medium sensitivity/value as a result of its known limited distribution and likely small population size.

The sensitivity of all other terrestrial biodiversity resources (expect birds and bats) within the Project AoI is assessed through the baseline studies as being low. This is because the habitats and majority of species present on site are common and widespread across Djibouti.

7.6.3 Construction – Vegetation Clearance Resulting in Loss of Habitats and Species

Mitigation/Management Measures

The following inherent mitigation measures and best practice approaches will be incorporated into the construction of the Project.

- Turbine bases and access tracks have been sited outside of wadi channels wherever practicable to do so.
- Where access tracks cross wadi channels they should be constructed to allow free drainage to not significantly prohibit flow of water.
- Habitat loss will be limited to the minimum needed for safe implementation of the works.
- Habitat disturbed during construction in areas not required for permanent works, will be fully restored or re-created on completion of the works. Restoration will be progressive to minimise soil storage times.
- Internal tracks will be constructed as soon as possible and tracking of vehicles on site will be avoided outwith these roads, so that adjacent vegetation and soil is left undisturbed and uncompacted as far as possible.
- For transmission line construction, pylon locations will be sited to reduce vegetation clearance and access tracks will be sited to minimise loss of trees.
- Vehicles and access for the transmission line will be restricted to the right of way and access tracks.
- The ESMMP will detail best practice measures including those listed above and others to be implemented, to reduce the risk of secondary impacts to habitats and fauna species including to control dust etc.
- Borrow pit locations will be sited away from vegetated areas.

Impact Significance

Table 7-2 Impact Assessment Summary: Vegetation Clearance Resulting in Loss of Habitats and Species

Impact	Species and habitat loss			
Nature	**Negative**	Positive	Neutral	
	Habitat loss will have a negative effect on the plants and animals that rely upon it.			
Type	**Direct**	Indirect	Induced	
	Habitat loss will occur directly as a result of vegetation clearance.			
Duration	**Temporary**	Short term	Long term	**Permanent**
	Loss will be permanent for access roads, turbine locations and substation, and temporary for cable trenches, the construction camp and laydown areas.			
Extent	**Local**	Regional	National	International
	Impacts will only occur within Project site.			

Impact	Species and habitat loss				
Scale	Vegetation clearance will be restricted to areas of project infrastructure within the Project site, resulting in approximately 75 acres of habitat cleared or enclosed.				
Frequency	One-off		Intermittent		**Continuous**
	Impacts will occur during construction – habitat loss will last for the duration of the Project, apart from temporary construction areas which will be restored (~55 acres).				
Magnitude	Positive	Negligible	**Small**	Medium	Large
	Due to minimal amount of vegetation present and relatively small area required within the project boundary the magnitude will be small.				
Receptor sensitivity	**Low**		Medium		High
	The sensitivity/value of all other terrestrial biodiversity resources (expect birds and bats) within the Project AoI is assessed through the baseline studies as being low. This is because the habitats and majority of species present on site are common and widespread across Djibouti.				
Significance	**Not significant**	**Minor**	Moderate	Major	
	With the mitigation and management measures set out above, the impacts on receptors will be reduced to Negligible and the effect is considered to be Not Significant for all habitats and species.				

7.6.4 Construction – Activity and Noise Resulting in Disturbance to Fauna Species

Mitigation/Management Measures

The following inherent mitigation measures and best practice approaches will be incorporated into the construction of the Project.

- Construction activity will be undertaken sequentially with access to other areas of the site controlled to reduce disturbance.
- Access to parts of the site not required for construction will be controlled to reduce disturbance from movements of construction vehicles and workforce.
- The EPC contractor should detail best practice measures including those above and others, including best practice noise reduction measures, to be implemented to reduce the risk of disturbance to non-avian fauna species including; to control dust, noise, activity etc.

Impact Significance

Table 7-3 Impact Assessment Summary: Activity and Noise Resulting in Disturbance to Species

Impact	Disturbance to species				
Nature	**Negative**		Positive		Neutral
	Activity and noise will have a negative effect on fauna.				
Type	**Direct**		Indirect		Induced
	Activity and noise will directly disturb fauna.				
Duration	**Temporary**	Short term		Long term	Permanent
	Construction activity will last for approximately 12 months. Within this period, only part of the Project site will be affected at any one time.				
Extent	**Local**	Regional		National	International
	Elevated noise levels and activity from construction will only affect part of the Project site at any one time, and noise levels likely to disturb fauna will be restricted to the close proximity of construction areas. Activity will be restricted to within construction areas.				
Scale	Impacts will only occur within close proximity of the Project site, and will result in a regular small increase in baseline noise levels and movements of vehicles, with occasional large short duration increases in noise associated with blasting or rock hammering.				
Frequency	One-off		Intermittent		**Continuous**

Impact	Disturbance to species				
	Elevated noise levels and activity will occur regularly throughout the 12 month construction period.				
Magnitude	Positive	Negligible	**Small**	Medium	Large
	The magnitude will be small.				
Receptor sensitivity	**Low**	Medium	High		
	The sensitivity/value of all other terrestrial biodiversity resources (expect birds and bats) within the Project AoI is assessed through the baseline studies as being low. This is because the habitats and majority of species present on site are common and widespread across Djibouti.				
Significance	**Not significant**	**Minor**	Moderate	Major	
	With the mitigation and management measures set out above, the magnitude of impacts on common and widespread species will be negligible, and the effect on low sensitivity/value receptors is considered to be *Not Significant*. The magnitude of the impact on Dorcas gazelle is considered to be small, as gazelles may be wary of construction activity and noise and maintain a stand-off distance from the Project during resulting in a loss of territory. As a result the effect on this medium sensitivity/value receptor is considered to be of *Minor significance*. The magnitude of the impact on stripped hyena is considered to be negligible as the species is partly commensal with man, foraging on waste from local settlements, and the effect is considered to be *Not Significant*. Individuals of the Djibouti whip snake may be temporarily displaced but are likely to return to suitable habitat once construction activity has ceased. The magnitude of the impact is therefore considered to be negligible and the effect is considered to be *Not Significant*.				

7.6.5 Construction - Vehicle Movements and Construction Activity Resulting in Direct Mortality of Species

Increased numbers of vehicle movements associated with Project construction can increase the mortality of wildlife (particularly of slow moving or cryptic wildlife) along roads.

Mitigation/management measures

The following inherent mitigation measures and best practice approaches will be incorporated into the construction of the Project.

- Undertake reptile check surveys of the Project site prior to the start of construction to check for the presence of Djibouti whip snake.
- Site speed restrictions will be implemented, which all vehicle drivers must to adhere to.
- Undertake driver awareness training on the species present in the area that may be affected by vehicles collisions (particularly snakes and other reptiles basking on roads).
- Implement a logging system requiring construction workers and drivers to report any sightings or collisions of fauna species and allow additional mitigation to be identified and implemented as necessary (e.g. use of speed bumps near areas identified as high risk, fencing, light reflectors).
- Check surveys of construction areas each morning to check for any reptiles, particularly snakes, which may have entered construction areas, trenches etc overnight.

Develop a reptile management plan to evaluate any reptiles recorded during check surveys, and if safe to do so, capture and translocate individuals to suitable habitats off site.

Impact Significance

Table 7-4 Impact Assessment Summary: Vehicle Movements Resulting in Direct Mortality of Species

Impact	Direct mortality of species					
Nature	**Negative**		Positive		Neutral	
	Increased numbers of vehicle movements associated with Project construction can increase the mortality of wildlife					
Type	**Direct**		Indirect		Induced	
	Vehicle movements will result in the direct mortality of species.					
Duration	**Temporary**	Short term		Long term		Permanent
	Construction activity will last for approximately 1 year.					
Extent	**Local**	Regional		National		International
	Elevated mortality of fauna may occur along roads and access tracks both on site and in the local area on the way to site, and in areas where construction activity is taking place on site.					
Scale	Direct mortality is likely to affect a small numbers of inviduals of any one species, resulting in a small level of additional mortality for any species population.					
Frequency	One-off		Intermittent		**Continuous**	
	There will be regular daily movements of vehicles on and to the site during daytime, and construction activity will occur daily					
Magnitude	Positive	Negligible	**Small**	Medium	Large	
	The magnitude will be small.					
Receptor sensitivity	**Low**		Medium		High	
	The sensitivity/value of all other terrestrial biodiversity resources (expect birds and bats) within the Project AoI is assessed through the baseline studies as being low. This is because the habitats and majority of species present on site are common and widespread across Djibouti.					
Significance	**Not significant**	Minor		Moderate		Major
	With the mitigation and management measures set out above, the magnitude of impacts on common and widespread species will become negligible, and the effect on low sensitivity/value receptors is considered to be *Not Significant*.					

7.6.6 Construction and Operation - Presence of Construction Workforce Temporary Compound on Site

The temporary presence of the construction work force staying on site will result in the generation of food and sanitary waste which may attract wildlife to the Project site. The influx of a large, temporary workforce into the area may also increase the demand for bushmeat or traditional medicines, which could increase the local hunting or collection pressure on certain species.

Mitigation/Management Measures

- All food and refreshment for the construction workforce will be provided by the Project.
- Welfare and first aid facilities will be provided on site during construction.
- A strict prohibition on contractors and construction workforce from purchasing food or traditional medicine items from local communities will be implemented.
- Wildlife awareness training will be obligatory for all contractors to highlight the threats to wildlife from hunting to provide food and traditional medicines.
- All waste produced on site will be correctly stored and disposed of off-site.
- No edible waste (e.g. remains of animal carcasses, bones etc) will be left on site during construction.

Impact Significance

Table 7-5 Impact Assessment Summary: Presence of Construction Workforce Temporary Compound on Site

Impact	Presence of construction workforce temporary compound on site				
Nature	**Negative**	Positive	Neutral		
	There will be a negative impact.				
Type	**Direct**	Indirect	Induced		
	There will be a direct impact.				
Duration	**Temporary**	Short term	Long term	Permanent	
	Impacts will only occur during the Construction phase.				
Extent	**Local**	Regional	National	International	
	Impacts will occur within the Project site, but may result in increased hunting or collecting pressure off site.				
Scale	Impacts may result in a small level of additional mortality or reduction in local populations of species affected by hunting or collecting, or the attraction of a small number of scavengers to the Project site.				
Frequency	One-off	Intermittent	**Continuous (cons)**		
	Waste will be produced regularly during construction. Hunting and collecting may occur regularly during construction in the absence of mitigation.				
Magnitude	Positive	Negligible	**Small**	Medium	Large
	The magnitude will be small.				
Receptor sensitivity	**Low**	Medium	High		
	The sensitivity/value of all other terrestrial biodiversity resources (expect birds and bats) within the Project AoI is assessed through the baseline studies as being low. This is because the habitats and majority of species present on site are common and widespread across Djibouti.				
Significance	**Not significant**	Minor	Moderate	Major	
	With the mitigation and management measures set out above, the impacts on receptors will be reduced to negligible and the effect is considered to be *Not Significant*.				

7.6.7 Construction – Introduction of Invasive Alien Species

No invasive alien species were recorded during baseline surveys. However the movement of equipment and construction vehicles to site has the potential to introduce invasive alien species to the Project site and surrounds.

Mitigation/Management Measures

The following measures and procedures will be implemented during the construction of the Project:

- Check origin of equipment and materials used on site; and
- Implement invasive species management procedure as part of BAP, including cleaning of equipment prior to shipping to site.

Table 7-6 Impact Assessment Summary: Introduction of Invasive Alien Species

Impact	Introduction of invasive alien species				
Nature	**Negative**	Positive	Neutral		
	There will be a negative impact.				
Type	**Direct**	Indirect	Induced		
	There will be a direct impact.				
Duration	Temporary	Short term	Long term	**Permanent**	
	Once introduced, invasive species are often very hard to eradicate. It is assumed that alien species introduced will colonise the area permanently.				
Extent	**Local**	Regional	National	International	
	Introduced alien invasive plant species may spread from the Project site to the local area.				
Scale	Only a small number of species already present in Djibouti (but not in the local area) have the potential to be introduced. However single individuals of introduced species can have a large impact on the ecosystem at the receiving site.				
Frequency	One-off	Intermittent	**Continuous (cons)**		
	The potential for species to be introduced will occur whenever new equipment or vehicles move onto the site from other areas.				
Magnitude	Positive	Negligible	**Small**	Medium	Large
	The magnitude of impact will be small.				
Receptor sensitivity	**Low**	Medium	High		
	The sensitivity/value of all other terrestrial biodiversity resources (expect birds and bats) within the Project AoI is assessed through the baseline studies as being low. This is because the habitats and majority of species present on site are common and widespread across Djibouti.				
Significance	**Not significant**	**Minor**	Moderate	Major	
	The Project will involve localised vehicle movements from within Djibouti, minimising the likelihood of non-native species being introduced via equipment, vehicles and personal belongings of the workforce. The turbines and other project components will have passed through import checks prior to being cleared for movement to the site. Taking this into account, and with the mitigation measures set out above, the impact on receptors will be reduced to negligible and the effect is considered to be *Not Significant*.				

7.6.8 Construction - Accidental Leaks/Spills Resulting in Degredation of Habitat

Mitigation/Management Measures

The following inherent mitigation measures and best practice approaches will be incorporated into the construction of the Project.

- Oil will be stored at designated areas with secondary containment.
- Refuelling will take place off site or on hardstanding areas with drip trays in place.
- Disposal and cleanup of any liquid waste will be in accordance to the procedures outlined in Section 9.

Impact Significance

Table 7-7 Impact Assessment Summary: Accidental Leaks/Spills Resulting in Degredation of Habitat

Impact	Degradation of habitat			
Nature	**Negative**	Positive	Neutral	
	There will be a negative impact.			
Type	**Direct**	Indirect	Induced	
	There will be a direct impact.			
Duration	Temporary	Short term	Long term	**Permanent**
	Any spills could result in permenant impacts, in the absence of mitigation.			
Extent	**Local**	Regional	National	International
	Volumes of liquid fuels and chemicals on site will be small and will only affect a small area in the event of a spill.			
Scale	Spills will result in a local effect on a small area of habitat within the Project site.			
Frequency	One-off	**Intermittent**	Continuous (cons)	
	A number of control measures are in place and the frequency of spills is predicted to be infrequent.			
Magnitude	Positive	Negligible	**Small**	Medium	Large
	The magnitude of impact will be small.			
Receptor sensitivity	**Low**	Medium	High	
	The sensitivity/value of all other terrestrial biodiversity resources (expect birds and bats) within the Project AoI is assessed through the baseline studies as being low. This is because the habitats and majority of species present on site are common and widespread across Djibouti.			
Significance	**Not significant**	**Minor**	Moderate	Major
	With the mitigation measures set out above, the impact on receptors will be reduced to negligible and the effect is considered to be *Not Significant*.			

7.6.9 Operation – Disturbance to Fauna from Presence of Operational Workforce, Vehicle Movements and Presence of Infrastructure

Mitigation/Management Measures

The presence of the turbines will result in a low level of ongoing disturbance to fauna present on the Project Site. The following mitigation measures will reduce the active disturbance from the movement of the operations personnel around the site:

- During routeing operations, operations personnel will keep to official Project access roads and tracks within the Project site.
- All waste produced on site will be correctly stored and disposed of off-site.
- No edible waste (e.g. remains of animal carcasses, bones etc) will be left on site during construction.

Impact significance

Table 7-8 Impact Assessment Summary: Disturbance to Fauna from Presence of Operational Workforce, Vehicle Movements and Presence of Infrastructure

Impact	Disturbance to fauna			
Nature	**Negative**	Positive	Neutral	
	There will be a negative impact.			
Type	**Direct**	Indirect	Induced	
	There will be a direct impact.			
Duration	Temporary	Short term	Long term	**Permanent**
	Disturbance impacts will occur throughout the operational lifetime of the Project, although wildlife is likely to habituate to the presence of the turbines over time.			
Extent	**Local**	Regional	National	International
	The presence of the turbines and activity from operational personnel will occur across the Project site and close proximity during operation.			
Scale	The presence of Project infrastructure and operational personnel will result in localised small scale disturbance, affecting a relatively low number of species.			
Frequency	One-off	**Intermittent**	Continuous (cons)	
	Project infrastructure will constantly be present, and operational workforce will be on site throughout operation.			
Magnitude	Positive	Negligible	**Small**	Medium	Large
	The magnitude of impact will be small.			
Receptor sensitivity	**Low**	Medium	High	
	The sensitivity/value of all other terrestrial biodiversity resources (expect birds and bats) within the Project AoI is assessed through the baseline studies as being low. This is because the habitats and majority of species present on site are common and widespread across Djibouti.			
Significance	**Not significant**	**Minor**	Moderate	Major
	With the mitigation and management measures set out above, the magnitude of impacts on common and widespread species will be negligible and the effect on low sensitivity/value receptors is considered to be *Not Significant*. The magnitude of the impact on Dorcas gazelle is considered to be small, as gazelles may be wary of constructed turbines and associated infrastructure and maintain a stand-off distance from the Project during operation resulting in a loss of territory. As a result, the effect on this medium sensitivity/value receptor is considered to be of *Minor significance*. The magnitude of the impact on stripped hyena is considered to be negligible as the species is partly commensal with man, foraging on waste from local settlements, and the effect is considered to be *Not Significant*. Individuals of the Djibouti whip snake are unlikely to be deterred from using suitable habitat habitat during operation if they are found to occur. The magnitude of the impact is therefore considered to be negligible and the effect is considered to be *Not Significant*.			

Operational Monitoring

As Djibouti whip snake is an endemic species which meets Criterion 2 for Critical habitat (see *Section 6.8.8)* the following operational monitoring is proposed:

- If Djibouti whip snake is recorded during baseline check surveys, annual monitoring will be undertaken to monitor the presence of the species on site. The results of the monitoring work will be shared with Nature Djibouti.

7.6.10 Non Avian Biodiversity Impact Summary

A summary of the effects on non-avian biodiversity receptors is presented in Table 7-9.

Table 7-9 Summary of Effects on Habitats, Flora and Fauna (Excluding Birds and Bats)

Impact	*Project Phase*	*Significance (including inherent and design mitigation and management)*
Vegetation Clearance Resulting in Loss of Habitats and Species	Construction	Not Significant
Activity and Noise Resulting in Disturbance to Species	Construction	Minor Significance for Dorca's gazelle Not Significant for all other species
Vehicle Movements and Construction Activity Resulting in Direct Mortality of Species	Construction	Not Significant
Presence of Construction Workforce	Construction	Not Significant
Introduction of Invasive Alien Species	Construction	Not Significant
Accidental Leaks/Spills Resulting in Degradation of Habitat	Construction	Not Significant
Disturbance to fauna from presence of operational Workforce, Vehicle Movements and Presence of Infrastructure	Operation	Minor Significant for Dorca's gazelle Not Significant for all other species
Overall Significance		Minor Significance for Dorca's gazelle Not Significant for all other species

7.7 BATS

7.7.1 Scope of the Assessment

This section assesses the following Project activities with the potential to impact bats:

Project phase	*Activity with potential impact*
Construction	Vegetation clearance for access tracks, turbines bases, on site cable network, transformer and substation and laydown areas. Vegetation clearance for transmission line and access tracks.
	Construction activity and noise
Operation	Turbine presence and operation

Specific baseline surveys for bats within the Project Site have not been undertaken to date and hence the numbers and seasonal use of the site by bats has not been characterised. The assessment of impacts on bats presented here is therefore precautionary, and one of the key mitigation and management measures proposed is to undertake baseline pre-construction surveys to characterise the baseline.

The following baseline surveys are proposed prior to the start of construction, based on a reduced scope of surveys set out in best practice guidelines (e.g. Sowler & Stoffberg, 2015 and NE, 2009), given the predicted low bat diversity and abundance of the site.

- Foraging and commuting activity surveys using walked, or driven transects and acoustic detectors – 3 transects, one in early summer (April – May), one in autumn (September – November), one in winter (December).

- Acoustic detector survey to understand bat activity (at rotor height if practicable) – 3 deployments of up to 10 nights each deployment undertaken at the same time as the transect surveys.
- Roost identification and characterisation surveys and emergence surveys to identify important roosts within 2 km of the Project site – 3 days of survey, one in early summer, one in autumn, one in winter.

It is proposed that the early summer and autumn surveys are run in parallel with the proposed bird vantage point surveys, to maximise surveyor efficiency and safety.

Following the completion of baseline surveys, the impact assessment presented here should be re-visited and an updated assessment undertaken, informed by the findings of the baseline surveys. This should be included as an addendum to this assessment and subject to the same submission process as this ESIA.

7.7.2 Value of Resource/Vulnerability of Receptor

Based on a review of published information and species distributions, the majority of the bat species that may occur within the Project site are listed by IUCN as of LC. These species are considered to have a low sensitivity/value. One species, Samburu pipistrelle, is listed by IUCN as DD, and is considered of medium value/sensitivity.

7.7.3 Construction – Vegetation Clearance Resulting in Loss of Habitats and Species

Vegetation clearance on the Project Site for both the wind turbines and associated infrastructure may reduce foraging habitat and potential roosting habitat for tree roosting bats.

Mitigation/management measures

The following inherent mitigation measures and best practice approaches will be incorporated into the construction of the Project.

- Turbine bases and access tracks have been sited outside of wadi channels wherever practicable to do so.
- Habitat loss will be limited to the minimum needed for safe implementation of the works.
- Habitat disturbed during construction in areas not required for permanent works will be fully restored, or re-created on completion of the works.
- Internal tracks will be constructed as soon as possible and tracking of vehicles on site will be avoided outwith these roads, so that adjacent vegetation is left undisturbed as far as possible.
- All turbines will be set back 200 m from escarpments which may provide roosting habitat for bats.
- For transmission line construction, pylon locations and access tracks will be sited to reduce vegetation clearance.
- Check surveys for day roosting bats should be undertaken prior to clearance of trees to move bats to other areas of suitable habitat.

Impact Significance

Table 7-10 Impact Assessment Summary: Vegetation Clearance Resulting in Loss of Habitats and Species

Impact	Loss of habitat and species				
Nature	**Negative**	Positive	Neutral		
	There will be a negative impact.				
Type	**Direct**	Indirect	Induced		
	There will be a direct impact.				
Duration	Temporary	Short term	Long term	**Permanent**	
	Disturbance impacts will occur throughout the operational lifetime of the Project, although wildlife is likely to habituate to the presence of the turbines over time.				
Extent	**Local**	Regional	National	International	
	The presence of the turbines and activity from operational personnel will occur across the Project site and close proximity during operation.				
Scale	The presence of Project infrastructure and operational personnel will result in localised small scale disturbance, affecting a relatively low number of species.				
Frequency	One-off	Intermittent	**Continuous (cons)**		
	Project infrastructure will constantly be present, and operational workforce will be on site throughout operation.				
Magnitude	Positive	**Negligible**	Small	Medium	Large
	The magnitude of impact will be small.				
Receptor sensitivity	**Low**	Medium	High		
	The majority of the bat species that may occur within the Project site are listed by IUCN as of LC. These species are considered to have a low sensitivity/value.				
Significance	**Not significant**	**Minor**	Moderate	Major	
	With the mitigation measures set out above, the magnitude of the impact is considered to be small. The effect will be *Not Significant* for common and widespread IUCN LC species and will be of *Minor Significance* for DD Samburu pipistrelle.				

7.7.4 Construction – Activity and Noise Resulting in Disturbance to Species

Construction activity may result in disturbance of bats from daytime roosts if present on site. No night time construction is proposed, and so disturbance to flying and feeding bats is not predicted if they are onsite.

Mitigation/Management Measures

The following inherent mitigation measures and best practice approaches will be incorporated into the construction of the Project.

- Habitat loss should be limited to the minimum needed for safe implementation of the works.
- Check surveys for day roosting bats should be undertaken prior to clearance of trees to move bats present to other areas of suitable habitat.
- The EPC contractor will detail best practice measures including those above and others to be implemented to reduce the risk of secondary impacts to bats including to control dust, noise, workforce activity etc.

Impact Significance

Table 7-11 Impact Assessment Summary: Activity and Noise Resulting in Disturbance to Species

Impact	Disturbance to species				
Nature	**Negative**	Positive	Neutral		
	There will be a negative impact.				
Type	**Direct**	Indirect	Induced		
	There will be a direct impact.				
Duration	**Temporary**	Short term	Long term	Permanent	
	Construction activity will last for approximately 12 months. Within this period, only part of the Project Site will be affected at any time.				
Extent	**Local**	Regional	National	International	
	Elevated noise levels and activity from construction will only affect part of the Project site at any one time, and noise levels likely to disturb fauna will be restricted to the close proximity of construction areas. Activity will be restricted to within construction areas.				
Scale	Impacts will only occur within close proximity of the Project site, and will result in a regular small increase in baseline noise levels and movements of vehicles, with occasional louder short duration increases in noise associated with blasting or rock hammering.				
Frequency	One-off	Intermittent	**Continuous (cons)**		
	Elevated noise levels and activity will occur regularly throughout the 12 month construction period.				
Magnitude	Positive	Negligible	**Small**	Medium	Large
	The magnitude of impact will be small.				
Receptor sensitivity	**Low**	Medium	High		
	The majority of the bat species that may occur within the Project site are listed by IUCN as of LC. These species are considered to have a low sensitivity/value.				
Significance	**Not significant**	**Minor**	Moderate	Major	
	With the mitigation measures set out above, the impact is considered to be of small magnitude. This will result in effects which are *Not Significant* for common and widespread IUCN LC species. The use of the site by the IUCN DD Samburu pipistrelle bat is not known, and small numbers of these medium sensitivity receptors may be disturbed and displaced, resulting in *Minor Significant* impacts.				

7.7.5 Operation – Turbine Operation Resulting in Collision Mortality

Collision with operating wind turbines is recognised as one of the key risks of wind power developments on bats. Bats which travel and hunt below tree height are typically less affected than bats which travel or hunt higher up and therefore spend more time within the rotor swept area. Without site specific information on the level of bat activity, or the size of local populations, a precautionary assessment has been undertaken.

Mitigation/Management Measures

The following inherent mitigation measures and best practice approaches will be incorporated into the construction of the Project.

- All turbines will be set back 200 m from escarpments which may provide roosting habitat for bats, thereby reducing the likelihood of bats interacting with active turbines.

Impact significance

Table 7-12 Impact Assessment Summary: Turbine Operation Resulting in Collision Mortality

Impact	Collision mortality					
Nature	**Negative**		Positive		Neutral	
	There will be a negative impact.					
Type	**Direct**		Indirect		Induced	
	There will be a direct impact.					
Duration	Temporary	Short term		**Long term**		Permanent
	This impact will occur throughout the turbine operation.					
Extent	**Local**	Regional		National		International
	Impacts will be restricted to bats when they are in the Project Site.					
Scale	The level of collisions is unknown and cannot be predicted with the current baseline information.					
Frequency	One-off		Intermittent		**Continuous**	
	Impacts will occur when turbines are rotating and when bats are present within the Project Site.					
Magnitude	Positive	Negligible		Small	**Medium**	Large
	The magnitude of impact will be medium.					
Receptor sensitivity	**Low**		Medium		High	
	The majority of the bat species that may occur within the Project site are listed by IUCN as of LC. These species are considered to have a low sensitivity/value.					
Significance	Not significant	**Minor**		**Moderate**		Major
	With the design measures set out above, the impact is considered to be of medium magnitude and will result in effects of *Minor Significance* for common and widespread IUCN LC species. Impacts on DD Samburu pipistrelle are predicted to be of potentially *Moderate Significance*. This assessment should be revisited once baseline surveys have been undertaken.					

Operational Monitoring

The following operational monitoring will be implemented by the Project.

- Surveys of roosts of communal species identified during pre-construction surveys will be undertaken during the first 2 years of operation to monitor potential changes in species composition, abundance, disturbance and loss of any important roosts.
- Bat activity surveys – monitoring the possible changes in species composition, activity and passes/night. If practicable, this should include at-height monitoring on the nacelle to monitor bat activity and to compare mortalities with recorded level of activity.
- Carcass searches should be undertaken annually for 2 years post construction. Monthly surveys should be undertaken in line with methods set out in SNH (2009)[1]. Detection bias and scavenger removal should be taken into consideration in survey design and implementation.

The operational monitoring will provide data which will feed into an adaptive management approach by recording the project impact on bats and informing further measures required to reduce impacts.

If operational monitoring records carcasses of IUCN DD or threatened species, additional measures will be developed to mitigate impacts on the relevant species populations.

[1] SNH (2009) Monitoring the impact of onshore wind farms on birds - January 2009

7.7.6 Bat Impact Summary

A summary of the effects on bats is presented in Table 7-13.

Table 7-13 Summary of Effects on Bats

Impact	*Project Phase*	*Significance (including inherent and design mitigation and management)*
Vegetation Clearance Resulting in Loss of Habitat and Species	Construction	Minor Significant for Samburu pipistrelle Not Significant for all other species.
Activity and Noise Resulting in Disturbance to Species	Construction	Minor Significant for Samburu pipistrelle Not Significant for all other species.
Turbine Operation Resulting in Collision Mortality	Operation	Minor Significant for Samburu pipistrelle Not Significant for all other species.
Overall Significance		Minor Significant for Samburu pipistrelle Not Significant for all other species.

7.8 BIRDS

7.8.1 Scope of the Assessment

This section assesses the following Project activities with the potential to impact birds:

Project phase	Activity with potential impact
Construction	Vegetation clearance for access tracks, turbines bases, cable array, transformer and substation and laydown areas. Vegetation clearance for transmission line and access tracks.
	Construction activity and noise
	Presence of construction workforce
Operation	Turbine presence and operation Transmission line presence

The baseline vantage point surveys covered 3 months, and it is likely that during other periods of the year the use of the site by birds is different. The lack of a full year of baseline vantage point data to inform the assessment is recognised as a gap. A summary of the vantage point survey findings in Table 7-14.

Table 7-14 Summary of the Vantage Point surveys detailing all surveys and each sighting of a raptor species

Site	Date	VP	Observer	Session start	Session end	Wind speed	Wind direction	Visibility	Map ref	Species	Count	Height band	Duration (s)	Comment/activity
EC	26/01/2018	1	IGH/HR	08:04	11:04	6	E to W	M	F1	Kestrel	1	1	15	Flying
EC	26/01/2018	1	IGH/HR	08:04	11:04	6	E to W	M	F1	Kestrel	1	2	180	Flying
EC	26/01/2018	2	IGH/HR	11:40	14:40	5	E to W	M	0	0	0	0	0	No birds seen
EC	27/01/2018	2	IGH/HR	07:45	10:45	2	E to W	M	F1	Kestrel sp.	1	2	10	Flying
EC	27/01/2018	1	IGH/HR	11:04	14:04	2	E to W	M	0	0	0	0	0	No birds seen
EC	18/02/2018	1	HR/EM	07:30	10:30	4	E to W	P	0	0	0	0	0	No birds seen
EC	18/02/2018	2	HR/EM	11:05	14:05	4	E to W	P	0	0	0	0	0	No birds seen
EC	19/02/2018	2	HR/EM	08:00	11:00	5	E to W	M	F1	Egyptian Vulture	1	1	2	Flying/landed
EC	19/02/2018	1	HR/EM	12:00	15:00	5	E to W	M	0	0	0	0	0	No birds seen
EC	26/02/2018	2	HR/EM	07:45	10:45	4	E to W	M	0	0	0	0	0	No birds seen
EC	26/02/2018	1	HR/EM	11:00	14:00	4	E to W	M	0	0	0	0	0	No birds seen
EC	27/02/2018	2	HR/EM	08:45	11:45	5	E to W	M	0	0	0	0	0	No birds seen
EC	27/02/2018	1	HR/EM	12:00	15:00	5	E to W	M	0	0	0	0	0	No birds seen
EC	02/03/2018	2	HR/EM	09:05	12:05	5	E to W	M	0	0	0	0	0	No birds seen
EC	02/03/2018	1	HR/EM	12:30	15:30	5	E to W	M	F1	Osprey	1	1	45	flying
EC	03/03/2018	2	HR/EM	07:00	10:00	3	E to W	M	0	0	0	0	0	No birds seen
EC	03/03/2018	1	HR/EM	10:30	13:30	3	E to W	M	0	0	0	0	0	No birds seen
EC	10/03/2018	2	HR/EM	10:00	13:00	5	E to W	M	0	0	0	0	0	No birds seen
EC	10/03/2018	1	HR/EM	13:25	16:25	5	E to W	M	0	0	0	0	0	No birds seen
EC	11/03/2018	2	HR/EM	07:05	10:05	4	E to W	P	0	0	0	0	0	No birds seen
EC	11/03/2018	1	HR/EM	10:20	13:20	4	E to W	P	F1	Egyptian Vulture	2	1	15	Flying/landing
EC	14/03/2018	2	HR/EM	10:45	13:45	4	E to W	M	0	0	0	0	0	No birds seen
EC	14/03/2018	1	HR/EM	14:05	17:05	4	E to W	M	0	0	0	0	0	No birds seen
EC	15/03/2018	2	HR/EM	07:15	10:15	4	E to W	M	F1	Egyptian Vulture	1	3	120	Soaring
EC	15/03/2018	1	HR/EM	10:30	13:30	4	E to W	M	0	0	0	0	0	No birds seen

The results of the desk based study indicate that the Project site may be used by migratory soaring birds. Surveys in March 2018 indicate the site is not used by migratory soaring birds during early spring, however migratory birds may pass through the area during late spring, and in autumn. It is also possible that resident birds are more active in the Project site during the northern hemisphere breeding season (April – August).

The assessment of impacts on birds presented here is therefore precautionary, and one of the key mitigation and management measures proposed is to undertake baseline pre-construction surveys to characterise the baseline throughout the year.

As a result it is recommended that the following baseline surveys are undertaken prior to the start of construction, in line with best practice guidelines (e.g. SNH (2014)[1] and Jenkins *et al* (2015)[2].

- Late spring and early breeding season vantage point survey of the Project site and transmission line route during April – June 2019.
- Autumn vantage point surveys of the Project site and transmission line route during September, October and November 2018.
- Breeding bird surveys during April – June 2019.
- Egyptian vulture surveys should be undertaken during the breeding and wintering seasons to identify the locations of breeding territories and key feeding areas in the vicinity of the Project to inform adaptive management.

The proposed surveys will provide a more representative baseline data set for the Project site, including data from key seasons when the site may be used by internationally important populations of birds but which are outside of the ESIA schedule timeline. Following the completion of baseline surveys, the impact assessment presented here should be re-visited and an updated assessment undertaken, informed by the findings of the baseline surveys.

7.8.2 Value of Resource/Vulnerability of Receptor

During the walkover surveys, the diversity and density of resident birds was extremely low and typical of an extremely arid habitat. The passerine species recorded were common and widespread and all are listed as IUCN LC. These species are susceptible to loss of habitat and disturbance and are classed as low value/sensitivity.

During the baseline vantage point surveys, Egyptian vultures (IUCN EN) were observed to the south of the Project site on three occasions. Egyptian vultures are in rapid decline and are susceptible to collision with turbines and transmission lines, as well as electrocution with some designs of transmission line. As a result they are considered to be of high sensitivity/value.

Vantage point surveys were only undertaken over 3 months during baseline data collection, and other sensitive species may occur at other times of the year, particularly during late spring and autumn migration. The Birdlife International Soaring Bird Mapping Sensitivity Tool[3] identifies the Project sits as being potentially sensitive for migratory soaring birds due to records of GPS tagged birds within 10 km.

[1] SNH (2014) Recommended bird survey methods to inform impact assessment of onshore wind farms (2014) Guidance Note Series. SNH, Battleby.
[2] Jenkins, A.R., Rooyen, C.S., Smallie, J.J., Harrison, J.A., Diamond, M., Smit-Robinson, H.A. and Ralston, S. (2015) Birds and Wind Energy Best Practice Guidelines. Birdlife South Africa, Endangered Wildlife Trust
[3] https://maps.birdlife.org/MSBtool/

Other migratory soaring birds (such as steppe eagles, white storks etc) which may migrate through the Project site are also considered to be of high value/sensitivity.

7.8.3 Construction – Vegetation Clearance Resulting in Loss of Habitats and Species

During construction, the vegetation under the proposed project infrastructure will be cleared. This will result in a loss of supporting habitat for bird species Table 7-15 below shows the impact magnitude.

Many of the ground-nesting species (larks, wheatears etc) observed during the walkover surveys will be adversely affected during construction through habitat loss and disturbance. This will reduce the number of individuals occupying the area but it is expected that, apart from a small reduction due to the permanent habitat loss, numbers will recover to near the baseline levels after construction.

Egyptian vultures will not be adversely affected during construction, as they forage over large areas, and there is little food for them on the Project site. The habitats on site do not provide foraging opportunities for migratory soaring birds.

Mitigation/Management Measures

The following mitigation measures and best practice approaches will be incorporated into the construction of the Project.

- Check surveys for nesting birds should be undertaken prior to clearance of any vegetation. If active nests are recorded, clearance of the vegetation should be delayed until nesting has completed and the nesting area protected from disturbance by a radius defined by a suitably qualified ornithologist.
- Turbine bases and access tracks have been sited outside of wadi channels wherever practicable to do so.
- Habitat loss will be limited to the minimum needed for safe implementation of the works.
- Habitat disturbed during construction in areas not required for permanent works will be fully restored, or re-created, on completion of the works. Restoration will be progressive to minimise soil storage times.
- Internal tracks will be constructed as soon as possible and tracking of vehicles on site will be avoided outwith these roads, so that adjacent vegetation is left undisturbed.
- Ensure that no edible waste (e.g. remains of animal carcasses, bones etc) is left on site during construction

Impact Significance

Table 7-15 Impact Summary Assessment: Vegetation Clearance Resulting in Loss of Habitats and Species

Impact	Loss of habitat and species			
Nature	**Negative**	Positive	Neutral	
	There will be a negative impact.			
Type	**Direct**	Indirect	Induced	
	There will be a direct impact.			
Duration	Temporary	Short term	Long term	**Permanent**
	The majority of vegetation clearance will be permanent. There will be some temporary habitat loss.			
Extent	**Local**	Regional	National	International
	Impacts will only occur within the Project site.			
Scale	Vegetation clearance will be restricted to areas of project infrastructure within the Project site.			

Impact	Loss of habitat and species				
Frequency	One-off		Intermittent		**Continuous**
	Impacts will occur during construction – some habitat loss will last for the duration of the Project (~20 acres).				
Magnitude	Positive	Negligible	**Small**	Medium	Large
	The magnitude of impact will be small.				
Receptor sensitivity	**Low**		Medium		**High**
	Resident birds are susceptible to loss of habitat and disturbance and are classed as low value/sensitivity. Egyptian vultures are in rapid decline and are susceptible to collision with turbines and transmission lines, as well as electrocution with some designs of transmission line and as a result are considered to be of high sensitivity/value. Other migratory soaring birds (such as steppe eagles, white storks etc) which may migrate through the Project site are also considered to be of high value/sensitivity.				
Significance	**Not significant**	Minor	Moderate	Major	
	With the mitigation and management measures set out above, the magnitude of the impact on, the breeding bird assemblage, Egyptian vultures, and migratory soaring birds is considered to be reduced to negligible in the long term. There are large areas of similar habitat in the surrounding area that can support similar species and be utilised by birds displaced from the site. The effect is therefore considered to be *Not Significant*.				

7.8.4 Construction – Activity and Noise Resulting in Disturbance to Species

Construction activity (including presence of workforce and vehicles, elevated noise levels, creation of dust) could result in the temporary disturbance of birds from around the Project site, resulting in loss of feeding or nesting habitat. Table 7-16 below shows the impact magnitude.

Noise impacts birds by displacing them from habitats through disturbance and interfering with their vocalisations, thus potentially disrupting the breeding season, when they are most vocal. Effects on Egyptian vulture will be minimal as the only records are away from the Project site. It is unlikely to have a long-lasting effect on the breeding assemblage once construction is complete. Migratory soaring birds passing over the site will not be affected.

Mitigation/Management Measures

- Avoid blasting and rock hammering during the breeding season, where practicable.
- The EMMP will detail best practice measures including those above and others to be implemented to reduce the risk of secondary impacts to birds including to control dust, noise and general activity.

Impact significance

Table 7-16 Impact Assessment Summary: Activity and Noise Resulting in Disturbance to Species

Impact	Disturbance to species			
Nature	**Negative**	Positive	Neutral	
	There will be a negative impact.			
Type	**Direct**	Indirect	Induced	
	There will be a direct impact.			
Duration	Temporary	Short term	Long term	**Permanent**
	Construction activity will last for approximately 12 months. Within this period, only part of the Project site will be affected at any one time.			
Extent	**Local**	Regional	National	International
	Elevated noise levels and activity from construction will only affect part of the Project site at any one time, and noise levels likely to disturb fauna will be restricted to the close proximity of construction areas. Activity will be restricted to within construction areas.			
Scale	Impacts will only occur within close proximity of the Project site, and will result in a regular small increase in baseline noise levels and movements of vehicles, with occasional louder short duration increases in noise associated with blasting or rock hammering.			
Frequency	One-off	Intermittent	**Continuous**	
	Elevated noise levels and activity will occur regularly throughout the 12 month construction period.			
Magnitude	Positive	Negligible	**Small**	Medium	Large
	The magnitude of impact will be small.			
Receptor sensitivity	**Low**	Medium	**High**	
	Resident birds are susceptible to noise and activity and are classed as low value/sensitivity. Migratory soaring birds (such as steppe eagles, white storks etc) which may migrate through the Project site are considered to be of high value/sensitivity.			
Significance	**Not significant**	Minor	Moderate	Major
	Without mitigation the impact of noise on Egyptian vulture and migratory soaring birds is considered negligible. With mitigation and management measures set out above, the magnitude of the impact on the breeding bird assemblage is considered to be negligible in the long term. The effect is therefore considered to be *Not Significant.*			

7.8.5 Construction – Presence of Construction Workforce Temporary Compound on Site

The temporary presence of the construction workforce will result in the generation of food and sanitary waste which may attract wildlife to the Project site. The influx of a large, temporary workforce into the area may also increase the demand for bushmeat or traditional medicines, which could increase the local hunting or collection pressure on certain species. Table 7-17 shows the impact magnitude.

Mitigation/Management Measures

- All food and refreshment for construction workforce will be provided by the Project.
- Welfare and first aid facilities will be provided on site during construction so that human waste and waste food are controlled.
- Implement a strict prohibition on contractors from purchasing food or traditional medicine items from local communities.
- Undertake wildlife awareness training for contractors to highlight the threats to wildlife from hunting to provide food and traditional medicines.
- All waste produced on site will be correctly stored and disposed of off-site.
- No edible waste (e.g. remains of animal carcasses, bones etc) will be left on site during construction.

Impact Significance

Table 7-17 Impact Assessment Summary: Presence of Construction Workforce Temporary Compound on Site

Impact	Presence of construction workforce temporary compound on site			
Nature	**Negative**	Positive	Neutral	
	There will be a negative impact.			
Type	**Direct**	Indirect	Induced	
	There will be a direct impact.			
Duration	**Temporary**	Short Term	Long term	Permanent
	Impacts will only occur during the construction phase.			
Extent	**Local**	Regional	National	International
	Impacts will occur within the Project site, but may result in increased hunting or collecting pressure off site.			
Scale	Impacts may result in a small level of additional mortality or reduction in local populations of species affected by hunting or collecting, or the attraction of a small number of scavengers to the Project site.			
Frequency	One-off	Intermittent	**Continuous**	
	Waste will be produced regularly during construction. Hunting and collecting may occur regularly during construction in the absence of mitigation.			
Magnitude	Positive	Negligible	**Small**	Medium	Large
	The magnitude of impact will be small.			
Receptor sensitivity	**Low**	Medium	High	
	Receptor sensitivity is classed as low.			
Significance	**Not significant**	Minor	Moderate	Major
	With the mitigation and management measures set out above, the impacts on receptors will be reduced to negligible and the effect is considered to be *Not Significant.*			

7.8.6 Operation – Turbine Operation Resulting in Collision Mortality

Collision Risk

Once a windfarm is constructed, it may impact on bird populations by causing additional mortality through birds colliding with the turbines or associated structures including overhead lines. Several factors influence the risk of collision, including:

- the location of these structures (ie are they sited on regular local flight paths or migration routes);
- the extent to which birds are flying at heights at which the turbines are operating;
- the extent to which the birds exhibit avoidance behaviour (ie alter their flight path to avoid the structures);
- the extent to which some bird species fly at night, a time when the structures are much less visible;
- the extent to which the birds' flight patterns change naturally during poorer weather conditions, or in the case of raptors when stooping or pursuing prey (Bevanger, 1994), hence making them more susceptible to collisions;
- use of lighting on the turbines which may attract birds to them at night; and
- the extent of habituation.

During baseline surveys, observations of three target species were recorded: Egyptian vulture, osprey, and common kestrel. Of these, a single common kestrel flight was recorded within 500 m of the Project site at collision risk height. As a result of the low level of flight activity recorded within 500 m of the Project site by the surveys to date, collision risk modelling has not been undertaken.

Although no flights at collision risk height within the Project site or 500 m buffer were recorded, the nearest sighting of an Egyptian vulture to the Project site at

collision risk height was approximately 900 m from the southern boundary. Egyptian vultures flying below collision risk height were recorded within 200 m of the Project site and it is very likely that birds will pass into the site at collision risk height.

The assessment of impacts has been based on the precautionary assumption that Egyptian vulture, and other target migratory bird species are likely to pass through the Project site at collision risk height, and the impact magnitude and assessment of significance below reflect this – see Table 7-18.

Mitigation/Management Measures

Baseline surveys undertaken between January and March did not record activity of Egyptian vultures of migratory soaring birds within the Project site. However it is acknowledged that species susceptible to collision impacts may fly within the Project site at other times of the year. As a result it is recommended that the following pre-construction baseline surveys are undertaken, and the results used to inform the adaptive management of the Project:

- Late spring and early breeding season vantage point survey during April – June 2019
- Autumn vantage point surveys during September, October and November 2018.
- Breeding bird surveys during April – June 2019.

The proposed surveys will provide a more representative baseline data set for the Project site, including data from key seasons when the site may be used by internationally important populations of birds, but which are outside of the ESIA schedule timeline.

The following inherent mitigation measures and best practice approaches will be incorporated into the operation of the Project.

- All turbines will be set back 200 m from escarpments and landscape features which may be used by soaring birds.
- Waste from operational activities will be strictly controlled and disposed of offsite to reduce attraction of Egyptian vultures to the Project site.
- To reduce attraction of birds to turbines and towers, minimize or avoid the use of sodium vapor lights at site facilities and use blinking lights with at least a 3 second gap between flashes.

Impact Significance

Table 7-18 Impact Summary Assessment: Turbine Operation Resulting in Collision Mortality

Impact	Collision mortality			
Nature	**Negative**	Positive	Neutral	
	There will be a negative impact.			
Type	**Direct**	Indirect	Induced	
	There will be a direct impact.			
Duration	Temporary	Short Term	Long term	**Permanent**
	The risk of collisions will be permanent during the operational lifetime of the Project			
Extent	**Local**	Regional	National	International
	Collision with turbines can only take place in the Project site, but may affect birds from the local area.			

Impact	Collision mortality				
Scale	Low levels of flight activity by bird species sensitive to collision impacts have been recorded by the baseline surveys undertaken to date. However even small numbers of collisions can have a population level affect over the operational lifetime of a windfarm. On a precautionary basis, the scale of the impact is medium.				
Frequency	One-off		Intermittent		**Continuous**
	Turbines will operate 24/7 except for routine maintenance.				
Magnitude	Positive	Negligible	Small	**Medium**	Large
	The magnitude of impact will be medium.				
Receptor sensitivity	**Low**		Medium		High
	The Egyptian vulture is highly sensitive whereas the resident kestrels are of low sensitivity/value.				
Significance	Not significant	**Minor**	Moderate	**Major**	
	The proposed mitigation may reduce the magnitude of the impact, however given the level of uncertainty over the use of the site by Egyptian vultures outside of January-March, the potential residual impact is still considered to be of medium magnitude. As a result, the effect on the high sensitivity Egyptian vulture population is still predicted to be of *Major Significance*. Similarly, the potential residual impact on migratory soaring birds is predicted to be of medium magnitude, and the residual effect of *Major Significance*. The residual impact on low sensitivity/value resident kestrels is considered to be of *Minor Significance* with mitigation in place. As a result of the residual *Major Significant* effects on Egyptian vulture and migratory soaring birds, additional mitigation and management measures may be required depending on results of further surveys and collision risk modelling are presented below.				

Additional Mitigation/Management Measures

- A programme of community engagement and education will be undertaken to promote changes to waste management, and if relevant, animal husbandry and butchery, on and around the Project site, including Lac Assal village to reduce or move feeding resources for Egyptian vulture.
- Targeted shut down on demand system will be implemented during the key autumn and spring migration months to shut down turbines during peak migration periods to reduce collision risk. This will utilise a team of observers in direct communication with the site control room to shut down turbines immediately if target bird species approach the site.
- If the results of the proposed baseline surveys indicate that the site isn't important for migratory birds, the shut down on demand system will be discontinued.

Residual Impact Significance

With the standard and additional mitigation and management measures set out above, the magnitude of the impact on Egyptian vultures is reduced to small/negligible and the effect reduced to *Minor Significant* in the long term. The magnitude of the impact on other migratory soaring bird species at risk from collision is considered to be reduced to negligible, and the effect reduced to *Not Significant*. Effects on common kestrel are predicted to be *Not Significant*.

Operational Monitoring

Operational monitoring will be undertaken to validate the predictions made in this ESIA and to inform ongoing management of the effects of the Project on sensitive bird species. Operational monitoring will include:

- Vantage point surveys of the Project site focussed on the turbine layout plus 500 m buffer in line with the proposed pre-construction surveys. Surveys will be undertaken for 12 months post construction. The results of surveys will be used to inform windfarm operation, including adaption of mitigation measures.

- Monthly carcass searches will be undertaken for 2 years post construction. Monthly surveys should be undertaken in line with methods set out in SNH (2009)[(1)]. Searches by operations staff of roads and turbine pads should be continued for the duration of the Project. Detection bias and scavenger removal should be taken into consideration in survey design and implementation. If carcasses of IUCN EN or migratory soaring bird species are recorded, the Project will work with Nature Djibouti to look at additional mitigation measures (e.g. supplementary feeding, nest provision, community engagement measures).

7.8.7 Operation – Displacement of Birds from the Windfarm Area

Birds may be displaced by the physical presence of operating turbines and the movement and noise they create. This could result in some birds maintaining a stand-off distance from the turbines and avoiding the area, or foraging elsewhere.

Some exclusion of birds from habitat surrounding operating windfarms has been reported from monitoring studies undertaken at windfarms to date, due to the avoidance of the areas closest to the wind turbines and hence displaced from suitable habitat. However there seem to be many species-specific differences, with some species including raptors foraging to within 25 m of operating windfarms, whilst other species including those on passage showing avoidance distances of up to 800 m (Percival, 2001).

The breeding bird assemblage (e.g. wheatears, larks) is species poor and is comprised of species that, once construction is complete, are likely to return to breed in the area. The densities may be slightly lower than those present prior to construction, but these groups of species are more tolerant of disturbance.

Actively migrating soaring birds may pass over the area, or move around the edges of the windfarm. Although, technically displaced, they will only be in the area for a matter of minutes, before moving on further with their migration, so effects will be minimal. The Project site does not support suitable habitats likely to encourage migrants to stop over and forage, therefore any displacement effects will be negligible on this group.

Egyptian vultures currently take advantage of poorly-managed refuse at the Lac Assal village to the South of the Project site however, baseline surveys indicate that use of the Project site itself is very low. The Project site does not offer many resources for the Egyptian vultures and the displacement effect will be negligible.

Mitigation/Management Measures

No mitigation or management measures are proposed.

[1] SNH (2009) Monitoring the impact of onshore wind farms on birds - January 2009

Impact Significance

Table 7-19 Impact Assessment Summary: Displacement of Birds from the Project AoI

Impact	Displacement of birds from windfarm area				
Nature	**Negative**	Positive	Neutral		
	There will be a negative impact.				
Type	**Direct**	Indirect	Induced		
	There will be a direct impact.				
Duration	Temporary	Short Term	Long term	**Permanent**	
	Impacts will occur throughout the operational lifetime of the Project				
Extent	**Local**	Regional	National	International	
	Displacement will affect species which occur in the local area, and may result in displacement of individuals of some species out to 1 km from the Project site.				
Scale	Birds which have territories that overlap with the Project site may be displaced. Baseline survey results suggest this will be a relatively low number of territories of any particular species.				
Frequency	One-off	Intermittent	**Continuous**		
	Displacement effects are due to the physical structure and/or noise or movement of the turbines and so will be a constant effect.				
Magnitude	Positive	**Negligible**	Small	Medium	Large
	The magnitude of impact will be negligible.				
Receptor sensitivity	**Low**	Medium	High		
	The breeding bird assemblage is species poor and the Project site does not support suitable habitats likely to encourage migrants to stop over and forage, therefore their sensitivity is considered to be low.				
Significance	**Not significant**	Minor	Moderate	Major	
	As a result of the predicted Negligible magnitude of displacement, effects on all bird species are considered to be *Not Significant*.				

7.8.8 Operation – Barrier Effect

Barrier effects have been identified as a potential effect pathway for some species, although to date there is little evidence of significant energetic effects arising from avoidance and there is much uncertainty about the importance of such impacts (Fox *et al* 2016). Species which make regular movements to and from roosting and foraging sites, or a number of regular foraging areas such as waterfowl, and migrants which have to pass through an area on passage may be more susceptible to barrier impacts.

No regular movements of birds were observed through the Project site during the vantage point surveys undertaken to date. Some migratory soaring birds might pass through the area in spring and autumn but are likely to be flying at a height above the turbine blades as, to pass over the escarpment to the south of the site, they will need to gain c. 100-200 m in height from the ground level of the Project site just to pass over it. Even if migrating birds detoured around the Project site, it is small and the extra energy expenditure will be negligible.

Mitigation/management measures

No mitigation or management measures are proposed.

Impact significance

Table 7-20 Impact Assessment Summary: Barrier Effect

Impact	Barrier effect				
Nature	**Negative**	Positive	Neutral		
	There will be a negative impact.				
Type	**Direct**	Indirect	Induced		
	There will be a direct impact.				
Duration	Temporary	Short Term	Long term	**Permanent**	
	A barrier effect will occur while the windfarm is present on site				
Extent	**Local**	Regional	National	International	
	Impacts will only occur on birds attempting to cross the Project site.				
Scale	If the project was acting as a barrier, there will be a buffer around the site where an effect will be expected. Even in the most extreme circumstances this will be small (e.g. <500 m)				
Frequency	One-off	Intermittent	**Continuous**		
	Barrier effects are caused by the physical structure and/or noise or movement of the turbines and so will be a constant effect.				
Magnitude	Positive	**Negligible**	Small	Medium	Large
	The magnitude of impact will be negligible.				
Receptor sensitivity	**Low**	Medium	High		
	No regular movements of birds was observed from vantage point surveys done to date. If migrating birds detoured around the Project site, it is a small deviation and the extra energy expenditure would be negligible. Therefore their sensitivity is considered low.				
Significance	**Not significant**	Minor	Moderate	Major	
	As a result of the predicted Negligible magnitude of barrier effects on all bird species, the effect is considered to be *Not Significant*.				

7.8.9 Operation – Presence of Overhead Transmission Line and Turbine Interconnection Grid

Birds are known to be susceptible to electrocutions and collision with overhead transmission lines. The majority of collisions occur in poor weather and with the top or earth wire which is finer and harder for birds to see. Larger perching bird species such as raptors are more susceptible to electrocution, because their larger wingspan means they are more likely to create a short circuit between a live cable and another component resulting in electrocution. Table 7-21 shows the impact magnitude.

The baseline vantage point surveys covered 3 months, and it is likely that during other periods of the year other species, potentially including migratory soaring birds in late spring and autumn, may pass through the Project site. The lack of a full year of baseline vantage point data to inform the assessment is recognised as a gap, and additional surveys are proposed under Mitigation and Management Measures below.

Mitigation/Management Measures

The following inherent mitigation measures and best practice approaches will be incorporated into the operation of the Project:

- All internal interconnectors and the export grid connection will be designed to remove electrocution risk, following best practice designs set out in the Migratory Soaring Bird Project Transmission Line Guidance http://migratorysoaringbirds.undp.birdlife.org/en/documents
- Apply bird deflectors along sections of the line where baseline surveys identify high activity by raptors or migratory soaring birds, bird additional mitigation measures will be applied. These will include:

- Installation of bird deflectors along sections with high levels of flight activity. These should increase line visibility by thickening the appearance of the line by a minimum of 20 cm over a length of 10-20cm.
- Markers should be moveable, of contrasting colours (e.g. black and white), contrast with the background, protrude above and below the line, and be placed 5-10 m apart
- Removing the thin neutral or earth (shield) wire above the high voltage transmission lines where feasible, and where this is not possible, mark the line to make it more visible.
- Where practicable, bundle high voltage wires to reduce the area and using spacers to increase visibility.
- Minimising the vertical spread of power lines by arranging lines in a horizontal plane to reduces collision risk.

Operational Monitoring

The operational monitoring vantage point surveys set out in Section 6.8.7 will cover the transmission line route and provide operational monitoring of flight activity of birds in relation to the transmission line. In addition the following operational monitoring will be undertaken.

- Monthly carcass searches under the transmission line will be undertaken for 2 years post construction. Carcass searches will include assessment of scavenger removal and searcher efficiency. If carcasses of IUCN EN or migratory soaring bird species are recorded, the Project will work with Nature Djibouti to look at additional mitigation measures.

Impact Significance

Table 7-21 Impact Assessment Summary: Electrocutions and Collisions with the Overhead Transmission Line and Turbine Interconnection Grid

Impact	Electrocutions and collisions				
Nature	**Negative**	Positive	Neutral		
	There will be a negative impact.				
Type	**Direct**	Indirect	Induced		
	There will be a direct impact.				
Duration	Temporary	Short Term	Long term	**Permanent**	
	The risk of electrocution and collision will be present throughout the operation of the Project.				
Extent	**Local**	Regional	National	International	
	Impacts will be restricted to those birds which collide with, or are electrocuted on the transmission line.				
Scale	Collision can only take place along the line's length.				
Frequency	One-off	Intermittent	**Continuous**		
	Collisions or electrocutions have the potential to occur daily when birds perch on are collide with the transmission line.				
Magnitude	Positive	Negligible	**Small**	Medium	Large
	The magnitude of impact will be small.				
Receptor sensitivity	**Low**	Medium	High		
	Surveys to date have shown very low levels of activity of species susceptible to electrocutions and collisions therefore sensitivity is considered to be low.				
Significance	**Not significant**	Minor	Moderate	Major	
	With mitigation and management measures set out above, the magnitude of the impact on Egyptian vultures and other soaring bird species at impact from collision and electrocution is considered to be reduced to negligible in the long term. Residual effects are therefore considered to be *Not Significant*.				

7.8.10 Bird Impact Summary

A summary of the effects on birds is presented in Table 7-22.

Table 7-22 Summary of the Effects on Birds

Impact	Project Phase	*Significance (including inherent and design mitigation and management)*	Residual Significance (*including additional mitigation and management)*
Vegetation Clearance Resulting in Loss of Habitat and Species	Construction	Not Significant	Not Significant
Activity and Noise Resulting in Disturbance to Species	Construction	Not Significant	Not Significant
Turbine Operation Resulting in Collision Mortality	Operation	Egyptian vulture – Major Significance Migratory soaring birds – Major Significance All other species – Not Significant	Egyptian vulture – Minor Significance Migratory soaring birds – Minor Significance All other species – Not Significant
Displacement of Birds from the Windfarm Area	Operation	Not Significant	Not Significant
Barrier Effect	Operation	Not Significant	Not Significant
Transmission Line Presence resulting in Electrocution	Operation	Egyptian Vulture - Major Significance Migratory soaring birds – Major Significance All other species – Not Significant	Egyptian vulture – Minor Significance Migratory soaring birds – Minor Significance All other species – Not Significant
Overall Significance		Egyptian Vulture - Major Significance Migratory soaring birds – Major Significance All other species – Not Significant	Egyptian vulture – Minor Significance Migratory soaring birds – Minor Significance All other species – Not Significant

7.9 NATURAL AND CRITICAL HABITAT IMPACTS

7.9.1 Natural Habitat

The site is considered to comprise relatively species poor natural habitat with limited biodiversity value, supporting a relatively impoverished community of species which are common and widespread in similar habitats across Djibouti and north east Africa. Development of the Project will result in the loss of approximately 75 acres of primarily rock and sparsely vegetated gravel habitat, with mitigation to avoid, reduce and restore habitats affected identified and included in the Project ESMM framework and will be further developed in the ESMMP. No significant residual impacts on natural habitats are predicted.

7.9.2 Critical Habitat

The Project DMU meets the thresholds for Critical Habitat under Criterion 2 for two endemic species;

- *Aloe ericahenriettae*; and
- Djibouti whip snake.

Neither species has been confirmed on the Project site. *Aloe ericahenriettae* is restricted to a single site 15 km north of the Project site, and no impacts on the species are predicted.

Suitable habitat is present on the Project site for Djibouti whip snake and it may occur. With embedded mitigation in place, impacts are predicted to be *Not Significant*.

Paragraph 17 of IFC Performance Standard 6 indicates: *"In areas of critical habitat, the client will not implement any Project activities unless all of the following are demonstrated"*:

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

Section 4 of this ESIA presents the assessment of alternatives for the Project. The impact assessment presented above predicts there will be no significant impacts on either critical habitat feature species, and the Project is not predicted to result in a net reduction in the regional population of any CR or EN species. The ESMM framework includes long term biodiversity monitoring measures for key biodiversity receptors, together with adaptive management measures to address impacts identified through operational monitoring. This will be developed further in the full ESMMP.

Additionally, in areas of Critical Habitat International finance organisations typically expect a Project demonstrate net gains of the biodiversity values for which Critical Habitat has been designated, in line with IFC PS6 Paragraph 18.

No significant residual impacts are predicted on either Djibouti whip snake or *Aloe ericahenriettae*, or their supporting habitats as a result of the development of the Project. As a result, measures to offset residual effects on these two critical habitat features are not proposed. Additional conservation actions to enhance the understanding and long term survival of both species are instead proposed.

In order to deliver a biodiversity net gain for Djibouti whip snake the following additional conservation actions are proposed:

- Commission surveys for Djibouti whip snake in suitable habitat around Arta where the type specimens have been recorded, and in five other areas of suitable habitat in Djibouti, in collaboration with Nature Djibouti, or IUCN Reptile Specialist Group.

- Fund the preparation of materials to assist in the IUCN evaluation of the species and the preparation of a species action plan, if the species is found to be threatened.

In order to deliver a biodiversity net gain for *Aloe ericahenriettae* the following additional conservation actions are proposed:

- Commission surveys of *Aloe ericahenriettae* on suitable lava flow habitat around Lake Ghoubet. Fund the gathering of viable seed or cuttings to take

the species into cultivation at a suitable botanic garden, in collaboration with Nairobi Botanic Garden or another suitable organisation.

The selected additional conservation actions, together with further baseline and check surveys, relevant mitigation and monitoring measures will be captured in a Project Biodiversity Action Plan (BAP), to be developed as part of the ESMMP.

7.10 NOISE

7.10.1 Scope of the Assessment

This section assesses the following Project activities that have the potential to impact the acoustic environment of the Project site and surrounding communities.

Project phase	*Activity with potential impact*
Construction	Site preparation and construction works for installation of wind turbines, substation and associated facilities.
	Road traffic during construction.
Operation	Operation of wind turbines.
	Operation of substation.
	Vehicle movements for maintenance operations.

The potential for aeolian/corona noise impacts from the transmission line was considered unlikely, thus it has not been further assessed in this study.

7.10.2 Value of Resource/Vulnerability of Receptor

Two main settlements are located within 1 km of the Project site. According to the noise monitoring performed (see Section 6.6), high ambient noise levels were recorded that exceeded the noise limit for residential areas at night time set by international standards (45 dB(A)). Based on the above considerations, the existing noise environment within the Project AoI is assessed as being of *Medium* sensitivity.

7.10.3 Construction – Noise Emissions from Site Preparation and Construction Works

Impact magnitude

During construction a variety of vehicles and construction equipment will be in use, such as excavators, lifting equipment, batching plants, dumpers, trucks, compressors and generators.

Noise emissions from construction equipment may generate an increase in the background noise levels at the receptors located in the proximity of the work sites. The magnitude of noise impact will be a function of the number and types of equipment being used, the operation time and the distances between the construction equipment and the noise-sensitive areas.

Noise emissions from construction will be temporary and limited to the duration of the equipment operations at the work sites. It is planned that turbines will be sited at least 500 m from any community receptors (i.e. residential dwellings), thus work sites should be sufficiently distant from receptors to not generate significant noise emission levels. Construction activities, wherever construction methods allow, will occur during daytime working hours on weekdays when higher background noise levels are typically present (as resulted from baseline survey, see Section 6.6), therefore noise that could potentially impact local residents, as a result of construction activities, should not occur during sleeping hours.

Mitigation/management measures

The following mitigation measures and best practice approaches will be implemented during the construction of the Project:

- Construction equipment and mobile vehicles will be selected according to best available practices for noise control and management.
- Construction equipment and mobile vehicles will be equipped with abatement devices (e.g., mufflers, noise enclosures for generators).
- Regular maintenance of construction equipment and vehicles will be ensured, in accordance with supplier specifications to prevent increases in noise emissions.
- Fixed plant items (i.e., generator) will be located as far from the nearest potential sensitive receptors as possible, orienting it to direct emissions away from receptors, and using on-site structures and terrain to screen sensitive locations wherever practicable.
- The noisiest construction activities (e.g., excavation of foundations) will be planned to occur outside sensitive daytime hours.
- Local community will be informed about the scheduled works which are predicted to have increased noise impacts.
- The ESMMP will detail best practice measures including those above and others to be implemented to reduce the risk of noise impacts.

Impact significance

Table 7-23 Impact Assessment Summary: Noise Emissions from Site Preparation and Construction Works

Impact	Noise emissions				
Nature	**Negative**	Positive	Neutral		
	There will be a negative impact.				
Type	**Direct**	Indirect	Induced		
	There will be a direct impact.				
Duration	**Temporary**	**Short term**	Long term	Permanent	
	Impacts will be temporary and limited to the duration of each construction activity.				
Extent	**Local**	Regional	National	International	
	Impacts will occur within the Project site and in proximity of the work sites.				
Scale	Impacts will be restricted to the work site and near surroundings.				
Frequency	One-off	Intermittent	**Continuous**		
	Impacts will occur during construction period.				
Magnitude	Positive	Negligible	**Small**	Medium	Large
	The magnitude of impact will be medium.				
Receptor sensitivity	Low	**Medium**	High		
	The value of the acoustic climate resource within the Project AoI is assessed as being of medium sensitivity/value.				
Significance	Not significant	**Minor**	Moderate	Major	
	With the mitigation measures set out above, the impact on acoustic climate at sensitive receptors from site preparation and construction works is considered to be *Minor*.				

7.10.4 Construction – Noise Emissions from Road Traffic

Impact magnitude

During construction, the vehicular traffic to and from work sites generated by the Project is a potential source of noise. Vehicle's movements along the public road (national roads, RN3, RN1 and RN9) and the new gravel access roads will create a temporary noise disturbance at receptors located along these roads. The noise impact will be temporary and only limited to the transit of the vehicles.

Mitigation/management measures

The following inherent mitigation measures and best practice approaches will be implemented during the construction phase of the Project to minimise the noise from road traffic:

- Vehicle's speed will be reduced when crossing or in proximity of settlement or isolated dwellings; and
- Regular maintenance of trucks and access roads will be ensured.

Impact significance

Table 7-24 Impact Assessment Summary: Noise Emissions from Road Traffic

Impact	Noise emissions				
Nature	**Negative**	Positive	Neutral		
	There will be a negative impact.				
Type	**Direct**	Indirect	Induced		
	There will be a direct impact.				
Duration	**Temporary**	**Short term**	Long term	Permanent	
	Impacts will be temporary and only limited to the transit of the trucks.				
Extent	**Local**	Regional	National	International	
	Impacts will be limited to the near proximity of the access roads.				
Scale	Impacts will be restricted to receptors located along the road side.				
Frequency	One-off	**Intermittent**	Continuous		
	Impacts will occur only during the transit of trucks along the access roads.				
Magnitude	Positive	Negligible	**Small**	Medium	Large
	The magnitude of impact will be small.				
Receptor sensitivity	Low	**Medium**	High		
	The value of the acoustic climate resource within the Project AoI is assessed as being of medium sensitivity/value.				
Significance	**Not significant**	Minor	Moderate	Major	
	With the mitigation measures set out above, the noise impact on sensitive receptors from construction road traffic is considered to be *Not Significant*.				

7.10.5 Construction – Vibration Emissions from Site Preparation, Construction Works and Road Traffic

Impact magnitude

The potential for vibration emissions from construction equipment at neighbouring sensitive locations during construction is typically limited to excavation works. Based on typical levels of vibration from construction activities, human annoyance impacts are not typically anticipated for receptors at distances greater than 100 m; furthermore, structural damage impacts are not typically anticipated at distances greater than 50 m. It is planned that turbines will be sited at least 500 m from any community receptors (i.e. residential dwellings), thus construction activities are not considered to generate vibration impacts.

The vehicular traffic to and from work sites might also generate vibration emissions. Vibration from pneumatic tired vehicles is typically very low. A heavy vehicle impacting a road surface discontinuity represents the worst-case vibration generation from traffic. Available monitored data of vibration for heavy traffic reports vibration levels well below human comfort and building damage criteria [(1)]. The vibration from a truck passing on a well-maintained road will typically be

[1] Source data: *Wilkinson Murray Pty Ltd* has measured such events and shown the vibration to typically be up to 0.5 mm/s PPV at approximately 15m from the road.

imperceptible to humans outside the road reserve [1]. Therefore, impacts are not expected at receptors from access roads traffic.

Mitigation/management measures

The following good practice approaches will be implemented during the construction of the Project:

- Good maintenance regime of construction equipment will be implemented during construction.
- Truck's speed will be reduced when crossing or in proximity of settlement or isolated dwellings.
- Regular maintenance of trucks and access roads will be undertaken.

Impact significance

Table 7-25 Impact Assessment Summary: Vibration Emissions from Site Preparation, Construction Works and Road Traffic

Impact	Vibration emissions				
Nature	**Negative**	Positive	Neutral		
	There will be a negative impact.				
Type	**Direct**	Indirect	Induced		
	There will be a direct impact.				
Duration	**Temporary**	**Short term**	Long term	Permanent	
	For construction activities, impacts will be temporary and limited to the duration of each construction activity. For traffic noise, impacts will be temporary and only limited to the transit of the vehicles.				
Extent	**Local**	Regional	National	International	
	For construction activities, impacts will occur within 100 m from work sites. For traffic noise, impacts will be limited to the locations within 100 m of the access roads.				
Scale	For construction activities, impacts will be restricted to the work site (no receptors located less than 500 m from work sites). For traffic noise, impacts will be restricted to receptors located along the road side.				
Frequency	One-off	**Intermittent**	Continuous		
	For construction activities, impacts will occur mainly during excavation works. For traffic noise, impacts will occur only during the transit of vehicles along the access roads.				
Magnitude	Positive	Negligible	**Small**	Medium	Large
	The magnitude of impact will be small.				
Receptor sensitivity	Low	**Medium**	High		
	The value of the acoustic climate resource within the Project AoI is assessed as being of medium sensitivity/value.				
Significance	**Not significant**	Minor	Moderate	Major	
	With the mitigation measures set out above, the vibration impact on sensitive receptors from road traffic during construction is considered to be *Not Significant.*				

[1] Road reserve is an area within which facilities such as roads, footpaths, and associated features may be constructed for public travel. Within the road reserve the construction of buildings is not allowed.

7.10.6 Construction – Noise and Vibration Emissions from Blasting during Construction of Turbine Foundations

Impact magnitude

Due to the presence of hard basalt rock, the construction of turbine foundations and the installation of access roads, hardstandings and laydown areas may require localised blasting to allow site clearance and excavation works.

Blasting is a particular source of impulsive acoustic effect and can cause both noise and vibration. Noise is caused by the blast of air pressure radiating out from the blast and is commonly referred to as airblast overpressure. Blasting also causes ground-borne vibrations through the ground and can affect structures causing cosmetic or structural damage and disturbance for people and livestock.

The level of airblast noise and ground-borne vibration will vary depending on the size of the explosion, geology and the distance to the measurement location. The size is usually represented by the Maximum Instantaneous Charge (MIC), that is the explosive charge mass (kg) detonated per delay (e.g. 8 millisecond interval). A detailed blasting design is presently unknown. Blast design and sizes will vary throughout the construction period and depend on numerous factors including the site location and the thickness of the hard basalt rock. Therefore meaningful quantitative modelling of blast impacts is not possible to do at this time.

Based on literature data (e.g. historical blast emissions monitoring data and blasting guidelines [(1)]), a typical 100 kg MIC blast will have the potential to cause noise and vibration impacts at receptors within 500-600 m of the blast location. Thus, receptors located in the surroundings of the Project site may experience an impact during blast events. A blast design programme will help to limit the nuisance at these receptors.

Mitigation/management measures

The following measures will be implemented during the construction of the Project:

- All necessary precautions and good practice will be used to reduce any unnecessary damage or noise nuisance. In particular, the Project will develop and implement an Explosives: Transport, Storage, Handling, Charging and Blasting Plan. Typical blast design mitigation and management measures shall be included, such as:
    - Limiting any blast events to standard or approved hours (i.e., no blasting will be undertaken at night);
    - Maximising the distance from the blast site to receptors;
    - Minimising the MIC (Maximum Instantaneous Charge) value that is incorporated into the design;
    - Minimising the number of blast events that occur;
    - Assessing and documenting the condition of existing adjacent structures prior to blasting;
    - Controlling access to site and cordoning off areas where explosives are being used (to be determined by EPC contractor);
    - Notifying the local community in advance of blasting programme; and
    - Conducting a monitoring survey during the occurrence of blast events at the nearest receptors to monitor the levels of airblast and vibration caused by blasting and use the results as necessary to design future blasting to avoid significant impacts.

[1] Methodology outlined in the ICI Blasting Guide (ICI 1995) for airblast overpressure and ground-borne vibrations.

Impact significance

Table 7-26 Impact Assessment Summary: Noise and Vibration Emissions from Blasting during Construction of Turbine Foundations

Impact	Noise and vibration emissions					
Nature	**Negative**		Positive		Neutral	
	There will be a negative impact.					
Type	**Direct**		Indirect		Induced	
	There will be a direct impact.					
Duration	**Temporary**	**Short term**		Long term		Permanent
	Impacts will be temporary and limited to the duration of each blast event.					
Extent	**Local**		Regional		National	International
	Considering a 100kg MIC, impacts might occur within 500-600 m from work sites. A higher value of MIC will increase the distance at which impacts may occur.					
Scale	Impacts will be restricted to the near surroundings of the work site.					
Frequency	One-off		**Intermittent**		Continuous	
	Impacts will occur at each blast events during construction works.					
Magnitude	Positive	Negligible		Small	**Medium**	Large
	The magnitude of impact will be medium.					
Receptor sensitivity	Low		**Medium**		High	
	The value of the acoustic climate resource within the Project AoI is assessed as being of medium sensitivity/value.					
Significance	Not significant	**Minor**		Moderate		Major
	With the mitigation measures set out above, the noise and vibration impact on receptors from blasting during construction of turbine foundations is considered to be *Minor.*					

7.10.7 Operation – Noise Emissions from Operation of Wind Turbines

Impact magnitude

The operation of the wind turbines has the potential to cause noise disturbance to adjacent residential receptors. For the purpose of this study, the most stringent night-time limit of 45 dB (A) set by IFC guidelines was considered as the compliant limit for the assessment.

In order to evaluate the noise emissions from wind turbines, a noise modelling study was developed, which took into account wind turbine location, wind turbine dimensions (e.g. hub height of 83m), technical specifications (e.g. model of turbine) and sound power emission profiles based on manufacturer supplied data. A detailed description of the noise modelling approach and results is provided in *Annex C*.

Noise emission levels from wind turbines vary with wind speed: the sound power level of wind turbines increases with higher wind speed, as a consequence of the increased rotation speed of the turbine blades. The noise study considered the maximum sound power level (i.e., 106 dB(A)) at which the selected Nordex N133/4.8MW wind turbine can operate (i.e., sound power level occurring at the maximum wind speed at which the turbine can operate).

Considering the installation of 13 N133-4.8MW turbines, predicted noise emissions from wind turbines at the assessed receptors ranged between approximately 37.5 dB(A) and 44.4 dB(A). The predicted noise levels lie within the adopted criteria of 45 dB(A) for night-time.

It has to be noted that the noise monitoring survey carried out recorded high background noise levels (see *Section 6.6*). The Project noise contribution is well below the monitored noise levels, thus it is unlikely that wind turbines operating at the Project site will result in a perceivable noise disturbance to the local population.

Additionally, noise emissions will not cause the ambient noise level to rise by more than 3 dB(A), set as minimum increase needed for a variation in existing noise level to be perceived by human receptors and in line with IFC guidelines.

Mitigation/management measures

The Project layout was subject to a site investigation and screening assessment aiming at identifying the required set-back distance between turbines and the nearest noise sensitive receptors, to avoid or minimize significant noise impacts. For this purpose, in the selected layout, the turbines will be sited at least 400 m from one another and at least 500 m from any community receptors. If the layout and/or turbine model should change, the design of the Project should ensure that the operational noise of the turbines does not exceed 45 dB(A).

The following inherent mitigation measures and best practice approaches will be further incorporated into the Project design to minimise the noise from wind turbines operation phase:

- Based on this assessment, turbines with sound power levels of ≤106dB(A) will be preferred to the alternative analysed (i.e., 109.5dB(A)) as reported in *Annex C*[(1)].
- An appropriate design of turbines will be implemented to minimise noise, including adherence to relevant international acoustic design standards.

Impact significance

Table 7-27 Impact Assessment Summary: Noise Emissions from Operation of Wind Turbines

Impact	Noise emissions				
Nature	**Negative**	Positive	Neutral		
	There will be a negative impact.				
Type	**Direct**	Indirect	Induced		
	There will be a direct impact.				
Duration	**Temporary**	Short Term	**Medium term**	Long term	Permanent
	Impacts will last during the operational life of the Project.				
Extent	**Local**	Regional	National	International	
	Impacts will be limited to the Project site and surrounding area.				
Scale	Impacts will be restricted to the Project site and surrounding area.				
Frequency	One-off	Intermittent	**Continuous**		
	Impacts will occur continuously (wind turbines in operation 24h per day).				
Magnitude	Positive	Negligible	**Small**	Medium	Large
	The magnitude of impact will be small.				
Receptor sensitivity	Low	**Medium**	High		
	The value of the acoustic climate resource within the Project AoI is assessed as being of medium sensitivity/value.				
Significance	**Not significant**	Minor	Moderate	Major	
	With the general management measures set out above, the noise impact on sensitive receptors from wind turbines operation is considered to be *Not Significant*.				

[1] The Siemens turbine is characterised by a higher sound power level, that potentially results in an increase of noise levels at receptors (higher than 5dB(A) compared to the N133-4.8MW model) and consequently in an exceedance of the noise limit.

7.10.8 Operation – Noise Emissions from Operation of Substation

Impact magnitude

A 20kV to 230 kV substation compound will be constructed within the central area of the site. The transformers are considered to be the only permanent piece of equipment within the substation with the potential to generate noise impacts. Auxiliary equipment required within the substation may generate noise at the source, but emissions are expected to be significantly lower than that of the transformer. Therefore, considering that the substation will be constructed within the central area of the site, approximately 700 m from the nearest sensitive receptors, and that transformers are the only relevant source of noise, substation operations are not anticipated to generate significant noise impacts to receptors.

Mitigation/management measures

Best practice approaches will be incorporated into the substation design to minimise the noise from substation operations, and in particular from transformers.

Impact significance

Table 7-28 Impact Assessment Summary: Noise Emissions from Operation of Substation

Impact	Noise emissions				
Nature	**Negative**	Positive	Neutral		
	There will be a negative impact.				
Type	**Direct**	Indirect	Induced		
	There will be a direct impact.				
Duration	Temporary	**Short term**	Long term	Permanent	
	Impacts will last during the operational life of the Project.				
Extent	**Local**	Regional	National	International	
	Impacts will be limited to the substation site.				
Scale	Impacts will be restricted to the substation site.				
Frequency	One-off	Intermittent	**Continuous**		
	Impacts will occur continuously (substation in operation 24h per day).				
Magnitude	Positive	Negligible	Small	Medium	Large
	The magnitude of impact is small.				
Receptor sensitivity	Low	**Medium**	High		
	the value of the acoustic climate resource within the Project AoI is assessed as being of medium sensitivity/value.				
Significance	**Not significant**	Minor	Moderate	Major	
	With the general management measures in place, the noise impact on sensitive receptors from substation operations is considered to be *Not Significant*.				

7.10.9 Operation – Noise Emissions from Maintenance Activities

Impact magnitude

Temporary noise emissions might be generated during routine site inspections and maintenance operations. Noise disturbance will be localised to the immediate surroundings of the Project site and will not likely be perceived by near sensitive receptors.

Mitigation/management measures

Specific mitigation measures are not required; good practice approaches will be incorporated into maintenance of the Project.

Impact significance

Table 7-29 Impact Assessment Summary: Noise Emissions from Maintenance Activities

Impact	Noise emissions				
Nature	**Negative**	Positive	Neutral		
	There will be a negative impact.				
Type	**Direct**	Indirect	Induced		
	There will be a direct impact.				
Duration	**Temporary**	**Short term**	Long term	Permanent	
	Impacts will be temporary and only limited to the duration of maintenance operations.				
Extent	**Local**	Regional	National	International	
	Impacts will be limited to the site where maintenance operations will take place.				
Scale	Impacts will be restricted to the Project site.				
Frequency	One-off	**Intermittent**	Continuous		
	Impacts will be rare and occur only during the maintenance activity.				
Magnitude	Positive	Negligible	**Small**	Medium	Large
	The magnitude of impact is small.				
Receptor sensitivity	Low	**Medium**	High		
	the value of the acoustic climate resource within the Project AoI is assessed as being of medium sensitivity/value.				
Significance	**Not significant**	Minor	Moderate	Major	
	With the general management measures set out above, the noise impact on sensitive receptors from maintenance operations is considered to be *Not Significant.*				

7.11 EMPLOYMENT, PROCUREMENT AND THE ECONOMY (INCLUDING LABOUR AND WORKING CONDITIONS)

7.11.1 Scope of the Assessment

This section assesses the following Project activities in relation to employment and the economy:

Project phase	***Activity with potential impact***
Construction	Temporary direct and indirect job creation for local skilled and unskilled workers through the Project, procurement and sale of produce to the workforce.
Operation	Indirect job creation

This section assesses the potential economic and employment impacts associated with the Project. Construction and operation phase impacts are described together. It also assesses impacts on the wellbeing of the workforce as well as the potential for a disempowered workforce through the failure to provide suitable protective measures including protecting worker rights and ensuring worker health and safety. Worker occupational health and safety topics are not addressed within the ESIA process as these issues are more comprehensively assessed and controlled through Project and health and safety management plans and site procedures that can be referred to in Section 9.

7.11.2 Vulnerability of Receptors

Receptors vulnerable to this impact include the residents of nearby communities including Cité Moumina and Lac Assal. However, given the small population in these settlements, employees are likely to be sourced from urban and semi-urban settlements further away from the Project site, including Arta, Djibouti City and Tadjoura. The socio-economic baseline indicates that there is a high dependence on one local company in the area (the Salt Investment company), which employs daily labour supporting 30% of households and providing 45% of household revenue

locally. Other activities such as herding livestock and handicrafts are no longer profitable and are expensive to maintain. Therefore there will likely be a willing uptake of labouring jobs in the local area.

While enthusiasm and expectations for jobs is predicted to be high, 88% of women and 68% of men can neither read nor write in any language in the local area and over two thirds of adults have not been to school. This implies that the jobs made available to men and women residing in the Project AoI will be labouring jobs only. While this will provide much needed steady income, there is a likelihood that local employees will not be able to read their contracts or be aware of their rights with respect to labour laws and regulations.

Djibouti has ratified all eight core International Labour Organisation (ILO) conventions and a legal framework is in place to protect salaried workers, however local workers in Djibouti are vulnerable to poor working conditions. Migrant populations are also particularly vulnerable to exploitation, forced labour and trafficking, which must be considered in the procurement supply chain and sub-contracting arrangements. Baseline findings suggest that adequate working conditions in terms of working hours and rest times are not always respected locally. Due to the context of labour and working conditions and human rights in Djibouti, receptors are considered to have High vulnerability to impacts that affect wellbeing and health and safety and worker rights in the absence of any active mitigation measures.

Workers will also be vulnerable during retrenchment at the end of the construction period, particularly if they do not understand their rights with respect to retrenchment.

7.11.3 Construction and Operation – Employment, Procurement and the Economy

Enhancement measures

The benefit to jobs and the local economy is predicted to be greatest during construction and negligible during operation due to the small, specialised workforce required to operate the Project. Measures to enhance benefits include:

- The Project will implement a Human Resources Policy and Management Plan setting out recruitment procedures, training requirements and targets around the hiring of local workers. The Human Resources Management Plan will also include measures to ensure fair employment, avoiding the potential for favouritism or nepotism. The Human Resources Policy and Management Plan will adhere to Djibouti national labour regulations, ILO core conventions and IFC PS 2. Priority will be given to local workers (inclusive of women), provided they are suitably qualified to undertake the work.
- The Project will implement a Local Content Policy as part of the Human Resources and Management Plan, setting specific targets for local procurement and SME support in the Project AoI. Procurement locally and within Tadjoura and Arta Regions will be prioritised where possible. In the event that goods and services cannot be provided from within these Regions, then preference will be given to Djiboutian companies.
- The Project (and its contractors) will provide information on the specific jobs available and specific skills required, at least two months prior to the hiring period. This is mainly to ensure opportunities are known in advance for unskilled and in some cases, semi-skilled positions, which are more likely to be filled by local residents. Communication of positions will also allow for literacy levels in the local communities.

- Project contractors will be required to follow local hiring and procurement policies and procedures.

Impact significance

Table 7-30 Impact Assessment Summary: Employment, Procurement and the Economy

Impact	Job creation and increased local economic activity				
Nature	Negative	**Positive**	Neutral		
	Job creation and increased local spending and sourcing of goods is a positive impact for the local economy and the labour market.				
Type	**Direct**	**Indirect**	**Induced**		
	The impact will be direct (direct employment), indirect (contractor jobs) and induced as a result of direct and indirect worker expenditure.				
Duration	Temporary	**Short term**	Long term	**Permanent**	
	The majority of employment opportunities will be during construction. It is expected that fewer than 10 specialised operation and security jobs be required for operation.				
Extent	Local	**Regional**	**National**	International	
	Jobs will be made available to local residents however workers will likely come from the wider region to fill all the vacancies required during construction in particular, and operation. Procurement opportunities further enhances the extent of the impact, providing indirect jobs through the provision of goods and services.				
Scale	The Project scale is assessed as medium and will provide up to 300 jobs during the peak period of construction. In a Project area with a population of 780, this is quite significant, especially given that 70% of these jobs will be low skilled jobs that could be made available to the local population. Additional opportunities will also be provided through procurement contracts and the provision of goods and services. During operation, the scale will be small.				
Frequency	One-off	**Intermittent**	Continuous		
	The frequency is considered to be intermittent. Labour requirements will go up and down during the construction phase.				
Magnitude	Positive	**Negligible (op)**	Small	Medium	**Large (con)**
	Large during construction. Negligible during operation.				
Receptor sensitivity	Low	Medium	**High**		
	Job creation and workers spending is considered of high importance to local communities due to a current lack of waged employment opportunities.				
Significance	Not significant	Minor	Moderate	Major	**Positive**
	The impact is predicted to be *Positive* during construction following the application of enhancement measures. The impact is predicted to remain *Positive* during operation, although employment requirements will be much lower.				

7.11.4 Construction – Disempowered Workforce

Mitigation / management measures

Employment conditions may disempower the workforce or result in forced or child labour. Active measures to mitigate and manage potential disempowerment of workforce include:

- The Project will develop and implement a Human Resources Management Plan. This Plan will specify clear contracting procedures and worker rights in accordance with Djibouti Labour Codes and IFC PS2. The Human Resources Management Plan will incorporate human rights and non-discrimination principles.
- All workers, including contract workers, will be given a contract in accordance with Djibouti Labour Codes, ILO core conventions and IFC PS2 requirements. Worker contracts must clearly detail workers' rights and provide clear details about the contract period. Contracts will be clearly explained to those who cannot read to ensure they understand the contents of their contract, with

trusted witnesses (chosen by employees) present if requested, to ensure all information has been communicated.

- A Grievance Mechanism will be implemented for all workers, including direct employees and contractors, to provide a means for raising any workplace concerns. All workers will be made aware of the mechanism, which will be easily accessible and included in employment contracts and with key process steps placed on Project site notice boards. The Project will use an understandable and transparent process and provide timely feedback to those concerned, without retribution. The Grievance Mechanism will also allow workers to raise any concerns about retrenchment processes, particularly once the construction phase is completed.
- The Grievance Mechanism will describe an internal process for responding to feedback and concerns; it will not impede access to other judicial or administrative remedies that are available to workers under law or through any collective (union) agreement
- A contractual management system will be established including policies and codes of practices, which dictate rules of engagement for sub-contractors working on behalf of the Project. Expectations on labour and working conditions will be made clear at the bidding stage and will be clearly articulated in procurement and contract documentation.
- The Project will implement contract auditing to ensure that contract provisions in the Human Resources Management Plan are applied to all contract staff, including compliance with maximum working hours and rest periods. A programme of contractor monitoring will be implemented, and routinely enforced penalties where breaches are identified will be established.
- It is recommended that a Human Rights Policy on labour and working conditions be implemented, to focus on worker rights. Procurement contracts will incorporate the Human Rights Policy to monitor non-discrimination, avoid supply chain human rights risks such as forced or child labour and specify clear provisions on working hours and rest periods.
- In the event of retrenchment and unavoidable collective redundancies, the Project will implement a Retrenchment Plan, which details how retrenchment will be managed. The Retrenchment Plan will incorporate the principles of non-discrimination set out in the Human Resources Management Plan. The Retrenchment Plan will provide detailed information on severance pay to full-time employees and other agreements, and will adhere to Djibouti Labour Codes. Following retrenchment, all outstanding payments and benefits will be paid by the project in accordance with specified and agreed timelines.

Impact significance

Table 7-31 Impact Assessment Summary: Disempowered Workforce

Impact	Disempowered workforce			
Nature	**Negative**	Positive	Neutral	
	Employment conditions may disempower the workforce or result in forced or child labour.			
Type	**Direct**	Indirect	Induced	
	The impact will be direct (direct employment).			
Duration	Temporary	**Short term**	Long term	Permanent
	This impact is considered to be a particular concern during construction.			

Impact	Disempowered workforce				
Extent	**Local**	**Regional**	National		International
	Jobs will be made available to local residents however workers will likely come from the wider region to fill all the vacancies required during construction in particular, and operation. However, procurement contracts could result in individuals being exposed to poor labour and working conditions beyond the construction area and affect workers in regions outside the Project AoI.				
Scale	The scale of impact is considered to be large, where the majority of workers will likely be illiterate and unaware of their rights.				
Frequency	One-off		Intermittent		**Continuous**
	This impact could be ongoing throughout the construction period.				
Magnitude	Positive	Negligible	Small	Medium	**Large**
	The magnitude of impact will be large during construction.				
Receptor sensitivity	Low		Medium		**High**
	Workers will be vulnerable during retrenchment at the end of the construction period, particularly if they do not understand their rights with respect to retrenchment.				
Significance	Not significant	**Minor**	Moderate	Major	Positive
	The application of the active mitigation will reduce the vulnerability of the workforce from High to Low and reduce magnitude to medium. The impact is therefore predicted to be *Minor* with the application of mitigation / management measures.				

7.11.5 Construction and Operation – Decreased Wellbeing of Workforce

Mitigation / management measures

Active measures to mitigate and manage occupational health and safety, other than the requirement to follow national labour regulations, include:

- The Project will appoint an Environmental, Social, Health and Safety (EHS) Manager, and will require the EPC contractor and all subcontractors to have EHS staff to monitor and manage EHS.
- The Project will develop an Emergency Response Plan and Emergency Management Plan and monitor contractors to ensure consistent implementation.
- The Project will provide potable water for all workers, including contract workers.
- It is recommended that the Human Resources Management Plan incorporates a commitment to training for all personnel. The detailed training requirements for all workers on health and safety during the construction phase should be contained in an Occupational Health and Safety (OHS) Management Plan as part of the Human Resources Management Plan. Training will be provided to all workers, including contract workers, on how to perform their jobs safely.
- All worker contracts (including those for contract workers) will clearly state the OHS terms and conditions of their employment, including their legal rights to a safe working environment. This will be explained in person to all those who cannot read their contracts (with witnesses chosen by workers if requested).
- The Project will incorporate OHS management provisions in to EPC contracts. Contractors will be audited to check that contract provisions on OHS are applied to all contract staff. A programme of contractor monitoring will be implemented, and routinely enforced penalties where breaches are identified will be established.
- It is recommended that procurement contracts incorporate OHS expectations and that suppliers are audited to identify OHS compliance and risk with suppliers.
- Worker accommodation will be managed by a by a Camp Management Plan that will meet the requirements of PS 2 as well as the IFC Workers' Accommodation: Processes and Standards Guidance Note (2009). In alignment with these requirements, worker accommodation will provide adequate sanitary and waste management. Accommodation and the construction camp will be audited monthly to ensure compliance.

- The Project will establish monthly internal communications through Project meetings to discuss OHS. Daily / weekly toolbox talks will be implemented to review OHS risk, management actions and performance.
- A Grievance Mechanism will be implemented for all directly employed workers, who will be made aware of the grievance mechanism and their rights to a safe and health working environment in their contracts and through training.

Impact significance

Table 7-32 Impact Assessment Summary: Worker Health and Safety

Impact	Decreased wellbeing of workforce				
Nature	**Negative**	Positive	Neutral		
	Employment conditions may not adequately protect worker health and safety				
Type	**Direct**	Indirect	Induced		
	The impact will directly affect employees.				
Duration	Temporary	**Short term**	**Long term**	Permanent	
	This impact is considered to be a particular concern during construction. However, there is still a risk to worker health and safety during operation, which is a medium term impact.				
Extent	**Local**	**Regional**	National	International	
	This impact could affect the entire construction and operational workforce. Procurement contracts could result in individuals being exposed to poor health and safety conditions beyond the construction area and affect workers in regions outside the Project AoI. During operation, extent will be local.				
Scale	The scale of impact is considered to be large during construction. Construction workers will be exposed to the risks and hazards associated with the construction of a windfarm including laying cables, vehicles and driving, managing heavy and large loads, managing power tools, noise, and erecting large turbines. These activities have the potential to put workers (including contract workers) at risk of exposure to accidents and injury. During operation, with up to 10 full time employees, impact scale is predicted to be small.				
Frequency	One-off	Intermittent	**Continuous**		
	Risk of exposure to health and safety impacts will be ongoing throughout the construction period and operation period.				
Magnitude	Positive	Negligible	**Small (op)**	Medium	**Large (con)**
	The magnitude of construction will be large during construction and small during operation.				
Receptor sensitivity	Low	Medium	**High**		
	Due to the context of labour and working conditions and human rights in Djibouti, receptors are considered to have high vulnerability to impacts that affect well-being, health and safety and worker rights in the absence of any active mitigation measures.				
Significance	**Not significant**	**Minor**	Moderate	Major	Positive
	The application of active mitigation will reduce the vulnerability of the workforce from High to Low and reduce magnitude to Medium for construction. The impact is therefore predicted to be *Minor* with the application of mitigation/management measures for construction and *Not Significant* for operation.				

7.12 LAND USE AND LIVELIHOODS

7.12.1 Scope of the Assessment

This section assesses the following Project activities in relation to land use and livelihoods:

Project phase	*Activity with potential impact*
Construction	Site clearing, road construction, grading and fencing can impact existing local access due to closure of existing footpaths
	Change to land use could impact households utilising the site land for pasture or other livelihood activity
	Construction activities may result in accidents with livestock and affect other livelihood assets
Operation	Change to land use could impact households utilising the site land for pasture or other livelihood activity

This section assesses the potential impacts associated with loss of land and access to land, and in particular, impacts to livelihoods.

7.12.2 Vulnerability of Receptors

The proposed Project site is not extensively used by local communities other than as part of a migratory route for livestock. At present, 67% of households surveyed maintain livestock, even though this is at a direct cost to the household. It is expensive to keep livestock because of the limited availability of pasture and the cost of purchasing feed to supplement local pasture. The need to hire workers / herdsmen to look after livestock adds to the cost. The main livestock kept are goats, due to their adaptability to the local arid environment.

At present, livestock owners have free access to the Project site, which falls within the zone of land apportioned to the confederation of Debné tribes. This free access, managed through customary authorities, provides access to a wide area and offers freedom of movement within the zone for pastoralists and their livestock. However, local community residents consider the area of land proposed for the Project to be unsuitable for any type of livelihood activity. The land is now only used as part of a migratory route within the wider confederation of Debné tribes zonal land with paths crossing the site that link pastures south of Lac Assal with those north of Lac Assal and those in the north east as well as those pastures close to the Ethiopian border. The land is not used for crop production or pastoral activity.

Therefore local residents are considered to have Low vulnerability to impacts to livelihoods and land use. Project activities may disrupt livestock migratory paths in the short term. There is also potential for accidents associated with livestock that may be killed or injured as a result of road accidents or accidentally entering construction zones.

7.12.3 Construction - Temporary Loss of Livelihoods and Household Income

Mitigation/management measures

The Project will phase construction of the turbines to ensure that only 25% of the land is inaccessible at any one time. Additional active measures to mitigate and manage this impact should also include:

- The Project will implement a Stakeholder Engagement Plan (SEP) outlining an approach to engagement and consultation with local residents, including the grievance procedure.

- The Project will implement a Grievance Mechanism, allowing local residents to raise concerns about the behaviour of Project including grievances related to land access. Stakeholders will be made aware of the key guiding principles of the mechanism, as well as how and where they can submit grievances.
- The Project will engage with local land users and customary authorities (the Okal General) to identify or create alternative temporary pathways during phased construction.
- The Project will develop a Livelihood Restoration Framework (LRF), which will set out entitlement measures and a compensation strategy and process in the event that livestock assets are lost as a result of construction activities.

Impact significance

Table 7-33 Impact Assessment Summary: Land Use and Livelihoods

Impact	Temporary loss of livelihoods and household income					
Nature	**Negative**		Positive		Neutral	
	Loss of livelihood associated with land take.					
Type	**Direct**		Indirect		Induced	
	The impact will be direct on the farmers and cattle herders including vulnerable groups.					
Duration	Temporary	**Short term**		Long term		Permanent
	The majority of land take will be short term during construction only. While some permanent land take will be required for the wind turbines and access roads and power station, this is not expected to impede on the migration of livestock through the Project site.					
Extent	**Local**	Regional		National		International
	The impact will be very localised. Turbine construction will be phased and so 25% of land on the Project site will be inaccessible at any one time. Herders will still be able to access other parts of the land during construction. Accidents associated with livestock will also be very localised to the construction area and nearby road networks.					
Scale	The impact is considered to be small scale, only disrupting but not impeding the movement of livestock herds. Accidents resulting in the loss of livestock is also predicted to be of small scale.					
Frequency	**One-off**		**Intermittent**		Continuous	
	Land take will be a one-off event prior to and during construction in discrete areas of the Project site. Accidents involving livestock are predicted to be infrequent.					
Magnitude	Positive	Negligible	**Small**	Medium		Large
	The magnitude of change is considered small during construction.					
Receptor sensitivity	**Low**		Medium		High	
	Project activities may disrupt livestock migratory paths in the short term. There is also potential for accidents associated with livestock that may be killed or injured as a result of road accidents or accidentally entering construction zones.					
Significance	**Not significant**	Minor		Moderate		Major
	The application of embedded active mitigation will ensure magnitude of impact remains small. The impact is therefore predicted to be *Not Significant*.					

7.13 COMMUNITY HEALTH, SAFETY AND SECURITY

7.13.1 Scope of the Assessment

This section assesses the following Project activities in relation to community health, safety and security, and community cohesion:

Project phase	*Activity with potential impact*
Construction	Presence of the workforce and influx of job seekers from outside the area
	Construction activities which lead to the presence of heavy equipment, increased traffic and dust within and surrounding the Project site
	Security measures during construction to mitigate theft of Project facilities and equipment eg guards and fencing
Operation	Operation of wind turbines causing shadow flicker and impacting the health of local residents
	Security measures during construction to mitigate theft of Project facilities and equipment eg guards and fencing

This section assesses the potential impacts to community health and wellbeing associated with exposure and spread of communicable diseases and sexually transmitted illnesses during the construction phase. It also looks into the potential impacts to community safety and security related to Project construction activities from a workforce, traffic and security measure angle, as well as during the operational phase of the Project. Finally, it assesses the potential impacts that an influx of workers during the construction phase might have on community cohesion, traditional community norms and authority structures.

7.13.2 Vulnerability of Receptors

Health and well being

The youth population (aged under 15 years) in the Project AoI is higher than the national average. The youth population in Cité Moumina is 59% and is 45% in Lac Assal, while the national average is 34%.

There are no health provisions in these communities and the majority of households (85%) rely on the health clinic in Karta Sub-prefecture, approximately 20 km east of the Project site for basic treatment. For more serious conditions, patients from Cité Moumina are referred to the Regional Arta hospital (in Wea, a distance of 60 km), and patients from Lac Assal are referred to Tadjoura (83 km). There is however, an ambulance stationed in Lac Assal, which is also made available for residents of Cité Moumina.

The relatively small population in the Project AoI and limited healthcare provision leaves all residents of Lac Assal and Cité Moumina vulnerable to exposure and to the spread of communicable diseases and sexually transmitted illnesses, which may be brought in by construction workers and / or opportunistic in-migrants. Outbreaks of water-borne illnesses due to poor water borehole and water storage hygiene are already known to be common in the two communities. Young women are particularly vulnerable to sexually transmitted illnesses. In addition, non-communicable illnesses may arise through the presence of excessive dust during construction. Youth and the elderly are particularly vulnerable to respiratory illnesses associated with poor air quality.

Local residents are considered to have high vulnerability to the spread of communicable diseases and sexually transmitted illnesses in the absence of active mitigation due to the limited healthcare provision in the area, the high number of youth and low literacy levels.

Annex F - Section 5.3 - Community Health includes further detail on the health and wellbeing of the local communities within the Social AoI.

Community Safety and Security

Receptors vulnerable to potential safety and security impacts include all 780 residents of Lac Assal and Cité Moumina villages including any opportunistic in-migrants. Increased road traffic and the movement of heavy vehicles and large loads may result in accidents and injury, including life changing or life threatening injury, through lack of awareness of the safety and security risks associated with construction traffic and other Project activities. Many local residents will be exposed to construction activities of this nature for the first time, and might not understand the signage due to the very low literacy levels in the area (which at 12% for women and 32% for men are much lower than the national average). There is limited emergency care available in the Project AoI to assist those who may be injured through their interaction with Project. Interest in construction activities may also result in trespass (including accidental trespass by herders and other local residents) into construction sites, which may also result in serious accidents or injury.

The presence of security workers patrolling the site during construction and operation could result in conflict with local community members and in-migrants who, due to their lack of connection with the local area, may be at greater risk of exposure to infringements by security guards. This will particularly be the case if security guards are recruited from the local area.

Due to the low local literacy levels and limited previous exposure to industrial / construction activities of this nature, local residents are considered to have High vulnerability to the safety and security changes that will be brought about by the Project. Children, youth and the elderly are considered to be particularly vulnerable to safety and security impacts.

Community Cohesion

Community cohesion refers to the quality and quantity of interactions between members of a community (intra-community) and between different communities (inter-community). Community cohesion is a continuous process interweaving a broad fabric of issues such as access to education and employment, poverty and socioeconomic inequalities, socioeconomic and cultural diversity, access to communication and information, and community support networks. A high level of community cohesion will imply respect for individuals, sensitivity to ethnic and socioeconomic differences and a sense of belonging to the community and to a local set of values. A change in the overall socioeconomic setting of an area by any new project is likely to influence relationships among community members and between different communities, resulting in, for example, heightened tensions which will affect the complex fabric of community cohesion.

Receptors sensitive to community cohesion impacts include the local communities of Lac Assal and Cité Moumina. Women, and particularly young women, are considered to be more vulnerable to anti-social behaviour, especially when this leads to increased violence, prostitution and pregnancy. Children are also vulnerable to increased violence and anti-social behaviour. Lac Assal and Cité Moumina are both situated on the main NR9 road with close proximity to the NR10 road, making them accessible to opportunistic migrants who may choose settle in the vicinity of the Project site in the hope of finding jobs.

Interconnectedness is an important aspect of community cohesion. In this case, community road connections and pathways are not predicted to be impacted or

severed by the Project during construction and may actually be enhanced once new access roads are built.

Although both communities are relatively recent settlements that emerged in response to the local salt extraction and export industry, both now have settled governance structures. The Okal General is an important customary leader belonging to the Omarto ethnic group in Cité Moumina and presides over a clear tribal hierarchy involving the Omarto (the leading ethnic group) and three additional ethnic groups Migranto, Hayssamaleh and Fadihiteh tribes. These additional three ethnic groups also have leaders, called Makaban, who sit under the Omarto Okal General. A Village Organisation and Management Committee has representatives from all four tribes and is an important decision making institution in the village. Occasionally tensions do erupt between the Okal General and Makaban over decision making in the community. Cité Moumina does not have any administrative representatives as it was only officially recognized in 2016.

Governance in Lac Assal is different and is aligned with official government administration. It is the seat of the sub-prefecture and the Sub-Prefect resides in the settlement. A village chief also presides over the community. The current village chief was the village founder and is also head of security for the Salt Investment company. However the village is generally overseen by official government authorities and so any required customary decision making is made by the Okal General in Cité Moumina.

Local expectations for jobs from the Salt Investment company are high and remain high given this is the primary reason for the existence of the settlements. These high expectations will likely be passed on to the Project once site preparation activities commence. There is a strong community management system in place in both communities. However, a large influx of both workers and opportunistic settlers could unsettle local governance and community cohesion, where tensions between the two systems do exist as well as tensions between the four ethnic groups in Cité Moumina. Conflicts over benefits and perceived benefits are also likely.

The history of these settlements and the strong governance in place indicates that communities will have at least some ability to adapt to any changes brought about by the Project although women and young children will remain particularly vulnerable to anti-social behaviour that may result from influx. Overall receptors are considered to have Medium vulnerability to community cohesion impacts caused by influx and Project activities.

7.13.3 Construction – Community Health and Wellbeing

Mitigation/management measures

Active measures to mitigate and manage any impact to community health and wellbeing, such as an increased incidence of communicable and non-communicable diseases or specifically the increased incidence of sexually transmitted infections (STIs), include:

- The Project will implement a Workforce Code of Conduct for construction workers, governing their behaviour and interactions with local residents. The Workforce Code of Conduct will be clearly explained to all workers, including contract workers, during inductions and toolbox sessions to ensure those who cannot read or write fully understand the expections of the Project with respect to code of conduct.
- The Project will implement a Community Grievance Mechanism, for local residents, allowing local residents to raise concerns about the behaviour of

Project and contract staff. Stakeholders will be made aware of the key guiding principles of the mechanism, as well as how and where they can submit grievances.

- The Project will adhere to WHO recommended food hygiene standards (*Five Keys to Safer Food*)[1] and encourage early reporting of illness amongst food handlers. The construction camp will implement a Camp Management Plan specifying measures for managing hygiene, water and sanitation.
- The Project will establish a site clinic to provide workers with emergency medical treatment. The site clinic will ensure there is sufficient capacity to meet the day to day needs of Project staff. In the event of an outbreak of disease or a pandemic, the Project clinic will support medical units Wea, Tadjoura or the smaller medical unit in Karta Sub-Prefecture in responding to the incident.
- The Project will implement an Emergency Response and Preparedness Plan that will incorporate measures in the event of pandemic outbreaks of disease such as cholera or typhoid. Measures will include collaboration with sub-prefecture and regional health authorities in the event of an outbreak.
- The Project will develop a worker EHS induction programme to include specifics on basic hygiene and sexual health. Basic hygiene and sexual health aspects will be included in occupational health and safety training for all workers.

Impact significance

Table 7-34 Impact Assessment Summary: Communicable and Non-Communicable Diseases

Impact	Increased incidence of communicable and non-communicable diseases			
Nature	**Negative**	Positive	Neutral	
	There will be a negative impact in the communities and additional stress on the limited health care.			
Type	**Direct**	Indirect	Induced	
	Increased incidence of diseases (such as water/food-borne diseases such as diarrhoea and cholera) directly affecting the communities.			
Duration	Temporary	**Short term**	Long term	Permanent
	It is predicted that local residents will be exposed to the risk of communicable diseases for the short term during the construction period.			
Extent	**Local**	**Regional**	National	International
	The impact of disease may be experienced by local residents surrounding the Project site, including opportunistic in-migrants. This impact will be predominantly local however impacts could spread regionally due to the movement of people/workforce.			
Scale	The impact is considered to be medium scale, potentially affecting significant numbers of the local population in the absence of mitigation.			
Frequency	One-off	Intermittent	**Continuous (con)**	
	Exposure to the risk of disease transmission will continue throughout the construction phase in the absence of mitigation and management due to the number of likely interactions between the workforce and local residents.			
Magnitude	Positive	Negligible	Small	**Medium**	Large
	The magnitude of impact will be medium during construction in the absence of mitigation.			
Receptor sensitivity	Low	**Medium**	High	
	The application of active mitigation will reduce the vulnerability of the population from high to medium.			
Significance	Not significant	Minor	**Moderate**	Major
	The impact is therefore predicted to be *Moderate* with the application of mitigation / management measures during construction.			

[1] World Health Organization, Food Safety - http://www.who.int/foodsafety/publications/consumer/en/5keys_en.pdf [accessed 10/05/2018]

Table 7-35 Impact Assessment Summary: Sexually Transmitted Infections (STIs)

Impact	Increased incidence of Sexually Transmitted Infections (STIs)			
Nature	**Negative**	Positive	Neutral	
	There will be a negative impact.			
Type	**Direct**	Indirect	Induced	
	Increased incidence of STIs directly affecting the local communities.			
Duration	Temporary	Short term	Long term	Permanent
	It is predicted that local residents will be exposed to the risk of STIs for the short term during the construction period. However, if contracted, the impact may be felt longer term, due to potential serious long term or permanent health implications.			
Extent	Local	Regional	National	International
	The impact of STIs may be experienced by local residents surrounding the Project site, including opportunistic in-migrants. This impact will be predominantly local, however impacts could spread regionally due to the movement of people.			
Scale	The impact is considered to be medium scale, potentially affecting significant numbers of the local population in the absence of mitigation.			
Frequency	One-off	Intermittent	Continuous (con)	
	Exposure to the risk of disease transmission will continue throughout the construction phase in the absence of mitigation and management due to the number of likely interactions between the workforce and local residents.			
Magnitude	Positive	Negligible	Small	**Medium**	Large
	The magnitude of impact will be medium during construction in the absence of mitigation.			
Receptor sensitivity	Low	**Medium**	High	
	The application of active mitigation will reduce the vulnerability of the community from high to medium.			
Significance	Not significant	Minor	**Moderate**	Major
	The impact is therefore predicted to be *Moderate* with the application of mitigation / management measures during construction.			

While malaria is present in Djibouti, the assessment also considered the potential increase in the disease due to the in-migration of workers and opportunistic jobseekers and considered the impact to be *Not Significant*.

Dust and other air quality issues may also be present throughout the construction period potentially causing or exacerbating existing respiratory illnesses. However, as noted in the Air Quality section, international best practice dust control measures will be followed to suppress dust emissions, and therefore the impact is considered to be N*ot Significant*.

7.13.4 Operation – Community Health and Wellbeing

In consideration of community health and wellbeing during Project operation, a separate shadow flicker assessment has been undertaken based on the current turbine layout and Project design. The full assessment is included in *Annex E*.

As per the definition adopted in the World Bank Group Environmental, Health and Safety (EHS) Guidelines for Wind Energy (August 2015), shadow flicker occurs when the sun passes behind the wind turbine and casts a shadow. As the rotor blades rotate, shadows pass over the same point causing an effect termed 'shadow flicker'. Shadow flicker may become a problem when potentially sensitive receptors (e.g., residential properties, workplaces, learning and/or health care spaces/facilities) are located nearby, or have a specific orientation to the wind energy facility.

The modelling predicted that, under certain conditions, people in three residential buildings located in proximity to the Project site will theoretically experience shadow flicker exceeding the recommended threshold of 30 hours per year. However, the

model is based on conservative assumptions and therefore likely to over-estimate the duration of occurrences when shadow flicker might be experienced at a specific location. Also, the model does not consider localised screening of residential properties and or the number/orientation of windows/openings in the buildings that might provide the conditions for shadow flicker to be experienced by the occupants.

In the unlikely event that residents are affected by shadow-flicker once the turbines are operational, the Project proponent will assess the situation on a case-by case basis and work with the residents to implement suitable mitigation.

In consideration of the above impact significance is predicted to be *Not Significant* during operation.

7.13.5 Construction – Community Safety and Security

Mitigation/management measures

The Project intends to construct a security fence around construction sites including phased elements of the turbine construction, the substation, construction camp and temporary maintenance buildings. However additional active measures to mitigate and manage impact to community safety and security include:

- The Project will ensure that clear and visible signs are put in place across the Project Site and along roads as required to warn local community members and other external stakeholders of any risks and hazards. Signs will be explained to local residents by CLOs to ensure they are fully understood by those who cannot read or may not be familiar with safety and warning signs.
- A Workforce Code of Conduct will be enforced that sets out the standards of behaviour expected from employees. The Code will provide guidelines for what is acceptable behaviour as well as examples of prohibited actions or behaviour that will be regarded as misconduct. Workers will be warned that there will be consequences if violations are made. The Code of Conduct will be adhered to by all Project staff, including contract staff.
- The Project will develop and implement a Traffic Management Plan and will ensure / monitor compliance with procedures and rules.
- The Project will implement a robust stakeholder engagement programme and implement the Project SEP. Engagement will provide regular information through the CLOs on Project activities, the movement of Project personnel, and awareness on traffic and road safety in communities along the transport corridor.
- The Project will develop a detailed Security Management Plan containing measures to protect the Project facilities and personnel, with a specific patrolling procedure.
- Project security will comply with Djibouti laws and regulations as well as the requirements of the UN Voluntary Principles for Security and Human Rights. The security will include, among other things, selection of personnel based on a careful background screening, training with regards to human rights requirements, and monitoring of performance.
- The Project will implement a Grievance Mechanism for the Project to allow stakeholders to submit grievances they may have about the Project, including grievances related to the behaviour and conduct of Project workers and security personnel. Stakeholders will be made aware of the key guiding principles of the Grievance Mechanism, as well as how and where they can submit grievances. Detail of the Grievance Mechanism is included in Annex G, the Stakeholder Engagement Plan.
- Development and implementation of blasting design mitigation and management measures by the EPC contractor, as detailed in Section 9.

Impact significance

Table 7-36 Impact Assessment Summary: Community Safety and Security

Impact	Increased community safety and security risks				
Nature	**Negative**	Positive	Neutral		
	The impact of the Project construction activities on community safety and security will be negative.				
Type	**Direct**	Indirect	Induced		
	Activities will have a direct impact on local community safety and security.				
Duration	Temporary	**Short term**	**Long term**	Permanent	
	The impact from increased traffic, heavy equipment and security measures will mainly be experienced during construction, however security impacts may also be experienced during operation.				
Extent	**Local**	Regional	National	International	
	This impact is only relevant for residents and in-migrants into Lac Assal and Cité Moumina communities. To a lesser extent, road users from outside of the area passing though the Project site may also be exposed to health and safety risk associated with construction traffic.				
Scale	The scale of impact is considered to be medium overall. While all local residents and in-migrants will be exposed to increased health and safety risk, not all residents will experience health and safety impacts. However the severity of impact could be very large with life changing consequences.				
Frequency	One-off	**Intermittent**	Continuous		
	Security and safety incidents are predicted to be infrequent or happening occasionally although exposure to risk will be ongoing in the absence of mitigation.				
Magnitude	Positive	Negligible	Small	Medium	**Large**
	The magnitude of the health, safety and security impact will be large in the absence of mitigation.				
Receptor sensitivity	Low	**Medium**	High		
	Despite the proposed mitigation measures to ensure the safety and security of the community, incidents may occur resulting in injuries. The application of active mitigation will reduce the vulnerability of the community from high to medium.				
Significance	Not significant	Minor	**Moderate**	Major	
	The impact significance is predicted to be *Moderate* with the application of mitigation/management measures during construction.				

7.13.6 Operation – Community Safety and Security

During operation, the number of employees will reduce from up to 300 during peak construction to a small maintenance and security team of up to 10 individuals. Construction activities will cease and traffic movements will only be required for routine maintenance. Security personnel will still remain present to monitor and protect turbine infrastructure and the substation. All operation personnel will be required to sign and comply with the Workforce Code of Conduct.

The Security Management Plan will remain in place for operation as well as the Traffic Management Plan. A CLO will also be present to engage with local communities. A community development plan will also be in place to support local community development priorities. With these measures in place, impact significance is predicted to be *Not Significant* during operation.

7.13.7 Construction – Community Cohesion

Mitigation/management measures

The Project does not have any embedded measures to manage impacts to local community cohesion. Active measures to mitigate and manage this impact therefore include:

- The Project will recruit a Community Liaison Officers (CLO) who will be present at the Project site and will proactively and regularly engage with local communities prior to construction activities, providing updates and answering their queries. A CLO will remain in place during operation to continue community liaison.
- The Project will implement a Grievance Mechanism that is easily accessible to local communities, through which complaints related to contractor or employee behaviour or Project activities, can be lodged and responded to in a timely manner.
- All Project workers, including contract workers will undergo an induction outlining expected behaviours when interacting with local communities. The Project will also develop a Workforce Code of Conduct for all workers including contract workers. A copy of the Workforce Code of Conduct will be presented to all workers and signed by each person, and will address the following aspects:
  - respect for local residents including guidelines for interaction;
  - zero tolerance of illegal activities by all personnel including unlicensed prostitution, illegal sale or purchase of alcohol, purchase or consumption of drugs, illegal gambling or fighting;
  - description of disciplinary measures for infringement of the Workforce Code of Conduct and company rules.
- The Project will aim to manage expectations and detract work-seeking in-migration to the local area through the communication of Project labour needs and clear policies and procedures for recruitment.
- The Project (and its contractors) will provide information on the specific jobs available and specific skills required, at least two months prior to the hiring period. Information will also be circulated through the CLO to the Okal General of Cité Moumina, the village head of Lac Assal and the Village Organisation and Management Committee. This is mainly to ensure opportunities are known in advance for unskilled and in some cases, semi-skilled positions, which are more likely to be filled by local residents. It will also deter opportunistic in-migration and casual employment enquiries at the site and will help manage local expectations with respect to employment.
- Project contractors will be required to follow local hiring and procurement policies and procedures.
- The Project will implement a community development plan that supports inclusive and participatory local community development within the Project AoI and which also provides opportunities for local procurement. This programme will align with existing development plans for the region such as Tadjoua and Arta Regional Development Plans. It must also be based on a specific needs assessment to understand development issues and priorities. The Project will investigate options for implementing the community development plan and partnering opportunities with other agencies and development actors.

Table 7-37 Impact Assessment Summary: Community Cohesion

Impact	Detrimental affect on community cohesion			
Nature	**Negative**	Positive	Neutral	
	There will be a negative impact.			
Type	**Direct**	Indirect	Induced	
	The presence of the construction workforce will impact local community cohesion.			
Duration	Temporary	**Short term**	Long term	Permanent
	The impact will only be experienced during construction while up to 300 construction workers are present on site, and when expectations will be highest for jobs and other benefits.			
Extent	**Local**	Regional	National	International
	This impact is only relevant for Lac Assal and Cité Moumina communities.			
Scale	The scale of impact is considered to be medium, potentially affecting all local residents.			
Frequency	One-off	Intermittent	**Continuous**	
	The impact will likely be ongoing throughout the construction phase due to the presence of workers and their interactions with the local communities and the potential for grievances.			
Magnitude	Positive	Negligible	**Small**	Medium	Large
	The magnitude of impact will be small.			
Receptor sensitivity	Low	**Medium**	High	
	Overall receptors are considered to have medium vulnerability to community cohesion impacts caused by influx and Project activities.			
Significance	Not significant	**Minor**	Moderate	Major
	The application of active mitigation will reduce the vulnerability of the workforce from high to medium. The impact is therefore predicted to be *Minor* with the application of mitigation / management measures.			

7.14 PRESSURE ON PUBLIC SERVICES AND INFRASTRUCTURE

7.14.1 Scope of the Assessment

This section assesses the following Project activities in relation to pressure on infrastructure and services:

Project phase	*Activity with potential impact*
Construction	Recruitment and expectations from job seekers resulting in an influx of job seekers
Operation	None

This section assesses the potential impacts associated with the in-migration of workers and opportunistic job seekers and the pressure this may exert on local services and infrastructure during the construction phase.

7.14.2 Vulnerability of Receptors

Local services that may be sensitive to pressure from the presence of Project workers and an influx of opportunistic job seekers include water, where local supply is considered inadequate to meet household needs. Water is provided free of charge by Arta regional authority to Cité Moumina and by the Salt Investment company to Lac Assal weekly. However storage tanks are poorly maintained. The supply of water is considered a top development priority by women in the Project AoI.

The local ambulance service will also be sensitive to the influx of workers. Only one ambulance is present in the Project AoI servicing a population of 780 people. Housing is also limited in the area and an influx of in-migrants may therefore place pressure on existing accommodation, which may result in new, unplanned housing being built. Abandoned accommodation also exists in the abandoned village of

Layta, 2 km from the Project site. There is no waste management in the Project AoI and domestic waste is deposited in an unmanaged open pit or is blown away or burnt.

Electricity is not provided in the area and households rely on battery or in some cases, solar panels. The majority of households (67%) do not have any electricity. Education services are also limited, with the only school a Koranic school in Cité Moumina. The closest primary school is in Karta, requiring a bus journey and as such, the majority of children do not attend school. The nearest secondary school is in Arta.

Road infrastructure is good and both Lac Assal and Cité Moumina are situated on the well-constructed national RN9 road. The Project will also be constructing up to 10 km of access roads that communities will be able to use once constructed. This is a positive benefit to the local communities.

Sensitive receptors to any impacts on infrastructure, including impacts to water and the ambulance service include the residents of Lac Assal and Cité Moumina. The Project will develop a temporary construction camp providing accommodation for construction workers, which will take some pressure off local services, however without active mitigation, local residents are predicted to have High vulnerability to any changes brought by the Project with respect to water and the ambulance service. These are the only services of note in the Project AoI that may be affected and where local residents may struggle to adapt to any change.

7.14.3 Construction – Pressure on Public Services and Infrastructure

Mitigation/management measures

The Project intends to build a camp on site for the construction workforce. Active measures will be required to mitigate and manage impacts to local services and infrastructure, including:

- A Camp Management Plan will developed and implemented to meet the requirements of IFC PS 2 as well as the IFC Workers' Accommodation: Processes and Standards Guidance Note (2009). In alignment with these requirements, worker accommodation will provide adequate sanitary and waste management and the provision of potable water to avoid any additional pressure on community water provision.
- The Project will implement a Waste Management Plan and Water and Wastewater Management Plan as outlined in *Section 9* to manage additional waste and not add pressure to the local inadequate waste management.
- The Project will establish a site clinic to treat construction workers and provide emergency first aid and avoid reliance on the local ambulance service and limited local medical services in Karta Sub-prefecture. In the event of a situation where the required medical treatment cannot be performed at the site clinic, a decision will be made on the basis of the most appropriate options available which may include medical evacuation.
- The Project will establish an Influx Monitoring Programme. This will involve: liaison with local leaders and regional authorities to monitor population levels to identify whether induced influx is occurring, in addition to direct employment that may be affecting local service provision, particularly water, education (school in Karta) and medical services (ambulance and Karta clinic).
- Should influx monitoring indicate that population increase is significant and that limited local infrastructure and services are being affected, the Project will develop an Influx Management Plan, which will detail actions to reduce / manage influx and the impacts associated with it. If monitoring data indicates the

potential for a significant and swift increase in population in addition to the workforce, the Project will initiate discussions with local and regional authorities in order to plan for anticipated increased demand on local facilities.

- The Project will develop and implement an induction programme for all Project staff (including contract staff) to enhance sensitivity on local norms so that they are aware of appropriate and acceptable behaviour. A Workforce Code of Conduct will be enforced that sets out the standards of behaviour expected from employees. The Code will provide guidelines for what is acceptable behaviour as well as examples of prohibited actions or behaviour that will be regarded as misconduct. Workers will be warned that there will be consequences if violations are made. The Code of Conduct will be adhered to by all Project staff, including contract staff.
- The Project will ensure the SEP developed for the Project outlines an approach to engagement and consultation with local residents who may be concerned about influx and local services. Engagement on influx and services should ensure the two affected communities are fully aware of the actions being taken by the Project to manage influx and associated impacts. The Project will also recruit a CLO who will be accessible to local residents and other concerned stakeholders to lead engagement with local residents.
- The Project will implement the Grievance Mechanism with a rapid response time should inconvenience and disruption result from Project activities.

Impact significance

Table 7-38 Impact Assessment Summary: Public Services and Infrastructure

Impact	Pressure on public services and infrastructure				
Nature	**Negative**	Positive	Neutral		
	Increased pressure on public services and infrastructure, particularly ambulance/healthcare services.				
Type	**Direct**	Indirect	Induced		
	The impacts will directly affect public services and infrastructure.				
Duration	Temporary	**Short term**	Long term	Permanent	
	The impact will only be experienced during construction while up to 300 construction workers are present on site.				
Extent	**Local**	Regional	National	International	
	This impacts will affect local services.				
Scale	The scale of impact is considered to be small				
Frequency	One-off	Intermittent	**Continuous (con)**		
	The impacts will be ongoing throughout the construction phase.				
Magnitude	Positive	Negligible	Small	Medium	**Large**
	The impact magnitude is assessed as large in the absence of mitigation				
Receptor sensitivity	Low	Medium	**High**		
	Without active mitigation, local residents are predicted to have high vulnerability to any changes brought by the Project				
Significance	Not significant	**Minor**	Moderate	Major	Positive
	The application of active mitigation will reduce the vulnerability of the workforce from High to Medium and also reduce magnitude to Small. The impact is therefore predicted to be *Mino*r with the application of mitigation / management measures during construction.				

7.15 LANDSCAPE & VISUAL

7.15.1 Scope of the Assessment

This section assesses the following Project activities in relation to landscape and visual amenity:

Project phase	*Activity with potential impact*
Construction	Clearance of vegetation and stripping of land cover/topsoil
	Construction of buildings and other structures
	Introduction of tall construction machinery including cranes.
	Construction of new paved roads and crane pads, erection of wind turbines, overhead high voltage pylons and substation
	Creation of site compounds(s) including welfare facilities, laydown areas and storage space
	Plant and vehicle movements
Operation	Presence of new structures such as 13 x 150 m high wind turbines
	Presence of new smaller structures such as the substation and on-site overhead transmission network
	Presence of a new high voltage overhead line including a number of approximately 30 m high pylons
	Introduction of access roads between the turbines
	Occasional presence and movement of maintenance vehicles within the Project site

7.15.2 Value of Resource

As discussed in Section 6.11, it is considered that the value of the landscape type is low and the susceptibility to the Project type is medium. The sensitivity of the landscape type is therefore medium. A summary of the sensitivity of landscape character types in the Project area is provided in Table 6-14 (also included in Table 7-39). The sensitivity of visual receptors from selected viewpoints is provided in Table 6-15 (also included in Table 7-40).

7.15.3 Construction and Operation – Effects on Landscape Character and Visual Amenity

Mitigation/management measures

Not all landscape and visual effects can be practicably mitigated during the construction phase due to the visibility of certain construction components, in particular the tall construction plant required.

A number of measures, however, can be applied to reduce, as far as practicable, the temporary effects during the construction phase. These include:

- Limiting land clearance and occupation to the minimum necessary for the works;
- Restricting construction site lighting outside normal working hours as far as practicable to the minimum required for safety and security; and
- Maintenance of tidy and contained site compounds.

Due to the height of most of the Project elements, the open landscape and lack of natural vegetation, visual screening with vegetation will not be possible and is unlikely to mitigate any potential landscape and visual effects during operation. In addition, it is unlikely that any planting will establish and reach the heights necessary for screening, due to the harsh existing climatic conditions.

Impact Assessment

Table 7-39 describes the potential effects on landscape character and Table 7-40 the effect on visual amenity during construction.

7.15.4 Impact Assessment

Table 7-39 Effects on Landscape Character

LCT.	Sensitivity	Construction Phase Effects Description of Effects	Magnitude of Change	Significance of Effect	Operational Phase Effects Description of Effects	Magnitude of Change	Significance of Effect
Coastal Plain	Low to Medium	The project is located within this LCT and therefore effects will be direct including the introduction of construction plant and machinery. There is very little construction activity within the area and where present is in isolated location. Although the footprint of the project is fairly small compared to the area of the LCT, tall cranes and assembled components will influence most of the character of the area during the construction period. Taking the above factors into account the magnitude of change is considered to be medium.	Medium	Minor adverse taking into account the temporary nature of the effects.	The presence of the project will have a localised effect on the landscape due to the limited visibility of the turbines. This is illustrated by the ZTV. However, most of this LCT will be affected due to the height of the turbines. There are no similar structures within the area and therefore their introduction will have a discernable effect on the landscape character. The sensitivity of this LCT varies where there is an increase in value or where the scenic quality improves, particularly in the area adjacent to Lake Ghoubet. However, in the vicinity of the project the sensitivity is considered to be lower. The localized magnitude of change is considered to be large in proximity to the project and medium to low at greater distances.	Large	Moderate
Escarpment	Medium	The turbine components and substation are located adjacent to this LCT. However, the project transmission line crosses this LCT. The character of the escarpment is viewed mainly from the north and construction activities will be visible against the LCT. Direct effects will occur during the installation of the project transmission line whereas	Small	Minor adverse	The character of this LCT is defined by the distinctive escarpment which forms a feature of the landscape. The turbines will form a new localised feature which will detract from the simplicity of this landform. However, the remaining sections of the escarpment will be less indirectly affected. The project transmission line will cross this LCT and will be visible further afield particularly from the coast. Taking the above factors	Medium	Moderate

LCT.	Sensitivity	Construction Phase Effects Description of Effects	Magnitude of Change	Significance of Effect	Operational Phase Effects Description of Effects	Magnitude of Change	Significance of Effect
		other effects will be indirect. There are no construction activities occurring in this LCT. Taking the above factors into account it is considered that the magnitude of change will be small.			into account it is considered that the magnitude of change will be medium.		

Table 7-40 Effects on Visual Receptors (photomontages and Wireframes can be viewed in Annex D)

Viewpoint ref.	Sensitivity	Construction Phase Effects Description of Effects	Magnitude of Change	Significance of Effect	Operational Phase Effects Description of Effects	Magnitude of Change	Significance of Effect
VP1 South of site near RN9.	Low	Construction activity and tall equipment will be visible from this elevated viewpoint. However, these will comprise a small part of the view. Most of the view towards Lake Ghoubet will be unaffected. In addition, only a part of the project construction will be visible from this viewpoint as the remaining will be hidden behind the escarpment. The construction of the project transmission line will be visible in this view. Considering the fairly expansive nature of this view and the temporary nature of the works the magnitude of change is considered to be small.	Small	Not significant	Thirteen wind turbines as well as the paved roads connecting each turbine will be visible from this elevated viewpoint. The distinct landscape feature noted in the baseline section will be unaffected by the presence of the wind turbines. Although the windfarm will be a new component in the view it will not hugely detract from the quality of the existing view. Most of the turbines sit below the horizon which will assist in reducing their visibility. Although not shown in the photomontage, the project transmission line will be a new feature in the view. However, it will be situated to the west and will not affect views towards the Lake nor the islands. The magnitude of change is considered to be medium.	Medium	Minor

Viewpoint ref.	Sensitivity	Construction Phase Effects Description of Effects	Magnitude of Change	Significance of Effect	Operational Phase Effects Description of Effects	Magnitude of Change	Significance of Effect
VP2 Behind Lac Assal Village (Primary).	High	Construction activity and tall equipment will be wholly visible within this elevated view. This will include the construction of the substation and the project transmission line as well as the wind turbines. These will be viewed against a backdrop of land and distant hills which will help reduce the visibility of the construction work. It is considered that the magnitude of change is medium.	Medium	Moderate to major adverse but considered moderate adverse due to temporary nature of effect.	Eight wind turbines, the substation and a small part of the project transmission line will be visible from this elevated viewpoint. This will include the paved roads between each turbine. All the components of the project will be seen against a backdrop of land and distant hills which will help reduce the visibility of the smaller components and the prominence of the turbines. There are detracting features in the view such as the infrastructure associated with the salt works and the perimeter of the village. Existing uninterrupted views towards the lake and the hills in the distance will be slightly affected by the location of the turbines. The magnitude of effect is considered to be medium.	Medium	Moderate to Major
VP3 RN9 road descending from escarpment to project site.	Low	Construction activity and tall equipment will be wholly visible within this view. This will include the construction of the substation and the project transmission line as well as the wind turbines. Much of this activity will be seen from the nearby graves area. It is considered that the magnitude of change is medium.	Medium	Minor adverse	Eight wind turbines, the substation and a small part of the project transmission line will be visible from this viewpoint. This will include the paved roads between each turbine. It appears that the wind turbines will be viewed more against a sky background than those in viewpoint 2. This will make them more obvious. Turbine 5 appears to be in proximity to the graves area and may have a dominant effect on visitors to this sensitive feature. The magnitude of effect is considered to be medium.	Medium	Minor but increasing to moderate near the graves area.

Viewpoint ref.	Sensitivity	Construction Phase Effects Description of Effects	Magnitude of Change	Significance of Effect	Operational Phase Effects Description of Effects	Magnitude of Change	Significance of Effect
VP4 Rocky outcrop on site.	Low	Construction activity and tall equipment will be wholly visible within this relatively elevated view. This will include the construction of the substation and the project transmission line as well as the wind turbines. It is considered that the magnitude of change is medium.	Medium	Minor adverse	Five wind turbines, the substation and a small part of the project transmission line will be visible from this viewpoint. The wind turbines will be viewed against the sky which will make them more obvious. Turbine 5 will be viewed against the hill feature noted in the baseline. The magnitude of effect is considered to be medium.	Medium	Minor
VP5 Rocky outcrop on site.	Low	Construction activity and tall equipment will be wholly visible within this relatively elevated view and in close proximity. This will include the construction of the project transmission line as well as the wind turbines. This activity will be viewed against a low horizon which extends across Lake Ghoubet. The construction of the transmission line will affect views towards the escarpment which is one of the features of the view. It is considered that the magnitude of change is large.	Large	Minor to moderate adverse	Seven wind turbines and a large part of the project transmission line will be visible from this viewpoint. Four of the turbines will be viewed against a sea and sky backdrop which will make them more apparent. Turbine 7 will be a prominent feature in the view due to its proximity to the viewer (300 m). Turbine 13 will appear close to the island and will be a detraction. The other turbines form a cohesive group. Although not shown on the photomontage, the project transmission line will be a notable feature crossing the escarpment as it climbs in elevation towards the EDD Ghoubet Transformer. (Near to viewpoint 1). It is considered that the magnitude of change is large.	Large	Minor to moderate

Viewpoint ref.	Sensitivity	Construction Phase Effects Description of Effects	Magnitude of Change	Significance of Effect	Operational Phase Effects Description of Effects	Magnitude of Change	Significance of Effect
VP6 Sealed road to Lac Assal.	Medium	Construction activity and tall equipment will be partially visible from this viewpoint. The majority will be hidden behind the rising topography. The construction of the transmission line will be visible at it climbs the escarpment but at distances of over 3km. It is considered that the magnitude of change is small.	Small	Minor adverse	Five wind turbines will be visible from this viewpoint. All but one of the turbines (1) will be partially screened behind topography and only the blades of turbines 4 & 5 will be intermittently visible. None of the turbines will interfere with views of the escarpment. Although not illustrated on the photomontage it is possible that the project transmission line will be visible climbing the escarpment, but this will be at distances of over 3km. It is considered that the magnitude of change is small.	Small	Minor
VP7 Sealed road to Lac Assal.	Medium	Construction activity and tall equipment will be partially visible within this view. This might include the construction of the substation as well as the project transmission line and the wind turbines. It is considered that the magnitude of change is small.	Small	Minor adverse	Seven wind turbines will be visible from this viewpoint. Turbines 6,7 & 9 will be partially visible. Turbines 3 and 5 will be partially backgrounded by the escarpment and ridges which will help reduce their visibility despite their proximity to the viewer. Turbine 2 will be the most noticeable. Although not illustrated on the photomontage it is possible that the project transmission line will be visible climbing the escarpment, but this will be at distances of over 3km. It is considered that the magnitude of change is medium.	Medium	Moderate

Viewpoint ref.	Sensitivity	Construction Phase Effects Description of Effects	Magnitude of Change	Significance of Effect	Operational Phase Effects Description of Effects	Magnitude of Change	Significance of Effect
VP8 Sealed road to Lac Assal.	Medium	Construction activity and tall equipment will be wholly visible within this view and in close proximity. This will include the construction of the substation as well as the wind turbines. However, only the construction of three turbines will be available from this view. It is feasible that the rising ground will screen most of the low-level construction activity associated with the roads. It is considered that the magnitude of change is small.	Small	Minor adverse	Turbines 4, 5 & 7 will be visible from this view with only the hub and blades visible for turbine 7. It is feasible that the other two turbines will be seen against the escarpment and ridges to the south reducing their prominence. The uppermost parts of the substation could be visible from this viewpoint. It is considered that the magnitude of change is medium.	Medium	Moderate
VP9 Lac Assal village (Secondary) at police checkpoint.	High	Construction activity and tall equipment will be wholly visible within this view. This will include the construction of the substation and the project transmission line as well as the wind turbines. A large part of this activity will be in proximity to the viewer. It is considered that the magnitude of change is medium.	Medium	Moderate to major adverse	All 13 turbines will be visible from this view as well as the substation and the project transmission line. Turbines 1 to 7 will be fully visible in relative proximity to the viewer and often against a sky background. The remaining turbines will be partially visible at larger distances and against the background of the escarpment and ridges to the south. The existing views of the escarpment and ridges will be interrupted to a large degree. As a consequence of the above, the character of this view will be changed substantially. It is considered that the magnitude of change is large.	Large	Major

Viewpoint ref.	Sensitivity	Construction Phase Effects Description of Effects	Magnitude of Change	Significance of Effect	Operational Phase Effects Description of Effects	Magnitude of Change	Significance of Effect
VP10 RN9 road on ascent to Lac Assal village (Secondary)	Medium	Only tall construction equipment will be partially visible from this viewpoint. It is considered that the magnitude of change is small.	Small	Minor adverse	Parts of five turbines will be visible from this viewpoint, 4,6,7,8 and 10 and only two will include the masts. It is conceivable that the tips of a small number of other turbines could be visible just above the intermediate horizon, which is formed by the paved road. It is unlikely the introduction of turbines in this view will change the character or enjoyment of the view particularly to the east towards the Lake. It is considered that the magnitude of change is small.	Small	Minor
VP11 RN9 road on descent towards Lac du Ghoubet.	High	At a distance of 6 km it is very unlikely that construction activity will be discernable from this viewpoint. It is possible that tall construction equipment could be just visible due to the necessary brighter colours. Heat haze will be a factor at this distance which will also restrict visibility. It is considered that the magnitude of change is negligible.	Negligible	Not significant	All 13 turbines will be theoretically visible from this distant viewpoint as well as the substation and the project transmission line. It is highly unlikely that the substation will be discernable, and the lattice nature of the transmission pylons will make them very difficult to see at this distance. The movement of the blades may make the turbines discernable and the lightness of the colour may make them just about visible against the solid backdrop of the hills to the south. In the context of this expansive view and with key components unaffected it is considered that the magnitude of change is negligible.	Negligible	Not significant

7.16 TRAFFIC

7.16.1 Scope of the Assessment

This section discusses the potential impacts of the Project on the following aspects of traffic and transportation:

- Traffic function: the capacity of the existing road network to accommodate the traffic volumes generated by the Project and the likelihood of traffic congestion or delays;
- Road infrastructure: the physical ability of roads to accommodate the vehicles used for Project activities (considering proposed road improvements) and the likelihood of road surfaces experiencing deterioration or damage; and
- Transportation safety: increased safety risks on public roads due to Project-related traffic.

Table 7-41 summarises the potential sources of transportation impacts associated with each Project phase.

Table 7-41 Traffic Impacts by Project Phase

Project phase	*Activity with potential impact*
Construction	Transport of turbine and transmission line components and materials from Doraleh Port to the Project site.
	Transport of concrete and water to the Project area (aggregate will be sourced from site).
	Movement of construction workers to and from the worker compound.
	Delivery of supplies to worker compound.
Operation	Travel to the Project area by full time, on-site employees; periodic travel to the site for inspection, maintenance and repair.
Decommissioning	Transport of dismantled materials from the site; movement of construction workers during the decommissioning process.

7.16.2 Value of Resource/Vulnerability of Receptor

Potential receptors for the Project's traffic-related impacts include users of and residents near the RN1, RN3, RN9, and local roads. Receptor sensitivity is characterised as either Low, Medium, or High, based on the ability of these receptors to adapt to Project-related changes in road traffic volumes, degradation of road infrastructure, and increases in transportation safety risk. Table 7-42 describes potential receptor sensitivity levels.

Table 7-42 Receptor Sensitivity to Transportation Impacts

Sensitivity	*Description*
Low	These receptors can easily adapt to Project traffic because they are accustomed to high traffic volumes and frequent heavy truck traffic, are comfortable sharing the road with these types of vehicles, or are able to reach their destination using other (non-Project) roads.
Medium	Somewhat frequent or regular users of the affected roads. Residents of settlements impacted by Project traffic, but whose property is not adjacent to Project roads. These receptors can adapt to Project traffic with some difficulty, either because of lack of comfort with frequent heavy truck traffic or a lack of alternative routes. These receptors may choose to delay or reschedule trips due to Project traffic.
High	Frequent, regular users of the affected roads and residents of properties along Project roads. These receptors will have great difficulty adapting to Project traffic, either because of lack of comfort with frequent heavy truck traffic, a lack of alternative routes, or concerns about direct access to their property. These receptors may avoid travel altogether, or may find even limited travel on Project roads to be highly stressful.
Note: These criteria only assume negative impacts. The Project could have positive transportation impacts if upgraded public road facilities make travel easier or safer. No gradation of positive impacts is provided in this analysis.	

The receptor descriptions are applied as follows:

- **Low sensitivity:** Residents of the Djibouti urban area (i.e. along the RN1, RN3, or connecting arterial roadway), who are likely to be accustomed to heavy traffic, large trucks, and other traffic disturbances, and who have alternative routes available.
- **Medium sensitivity:** Residents living close to RN1 outside the urban area. While these residents are likely to be accustomed to heavy traffic, large trucks, and other traffic disturbances on N1, alternative routes may be limited or not available, making these residents more sensitive to road delays or closures.
- **High sensitivity:** Individuals in rural areas, particularly those who rely on RN9 for travel to and from services and businesses, or whose property is adjacent to these routes. These users are not accustomed to high traffic volumes or large vehicles, and have few alternative travel routes.

7.16.3 Construction - Traffic Function Impacts

Description of Project Traffic

Project construction will generate traffic associated with the movement of turbine and transmission line components from Doraleh Port and Djibouti to the Project site, movement of construction materials to the Project site, and transport of workers and worker-related supplies to the worker compound. Table 7-43 shows the total estimated Project construction traffic associated with movement of turbine components. Figure 7.2 shows the selected construction traffic route (Option 1).

Table 7-43 Turbine Components Heavy Load Vehicle Movements

Wind turbine component	*Number of heavy haul vehicle movements (one-way)*
Turbine blade	3
Nacelle	1
Hub	1
Controllers and converters	1
Tower sections	3
Total per turbine	10
Container for tools and kit	5
PROJECT TOTAL (13 turbines)	135

In addition to these heavy haul movements, the Project is expected to generate the following one-way heavy load traffic movements during construction:

- around 350 water deliveries over the 12 month construction period (calculations provided in Section 3.9.3);
- around 550 concrete deliveries over a 12 month period; and
- numerous loads of components for the overhead transmission lines (both on and off site) to be brought from the port to the Project site.

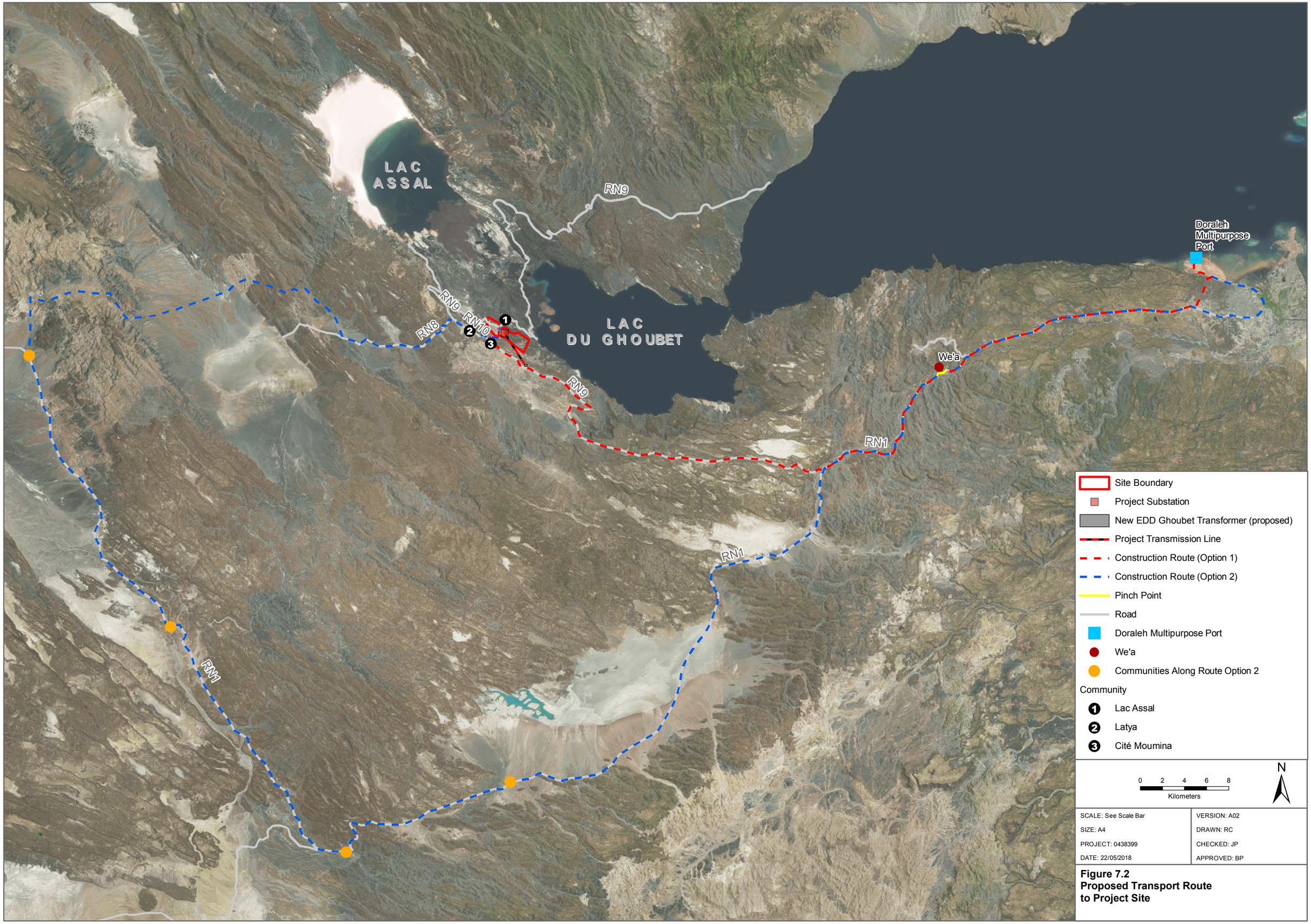
The concrete batching plant will be sited within a 10 km radius of Project site. If necessary, access roads will be built or existing local roads improved to handle these truck movements. Aggregate will be sourced from on-site borrow pits.

As discussed in Section 3.8.2, up to a maximum of 300 workers during peak construction will be accommodated at the worker compound on the Project site.

Movement and supply of Project workers will generate the following traffic:

- Up to six bus trips per day between the worker compound and the Project site;

- Up to two tractor-trailer trips per week delivering supplies to the worker compound; and,
- Up to four bus trips per month [over the entire 12-month construction period, etc.] to transport workers to and from Djibouti for shift changes, holidays, and other reasons.



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PROJECT: 0438399	CHECKED: JP
DATE: 22/05/2018	APPROVED: BP

Figure 7.2
Proposed Transport Route to Project Site

PROJECTION: WGS 1984 UTM Zone 38N

SOURCE: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Path: P:\Projects\0438399 AFC Ghoubet Wind Farm.BP\02 Working Files\GIS\MAPS\ESIA Report\0438399_RoadNetworkImpactedbyProjectConstruction_A02.mxd

Impact on Traffic Function

The primary source of traffic congestion and delays will be the movement of oversized turbine components. Oversize trucks will likely move slower than typical traffic, particularly at bends or intersections. In some cases, these movements could require brief road closures, particularly in locations where the haul vehicle must occupy parts of both lanes. Other Project traffic, such as employee buses or tractor trailers delivering supplies, could contribute a few vehicle trips per day (or, during extremely busy times, up to a few vehicle trips per hour). Such additional traffic will marginally contribute to existing traffic congestion in Djibouti or other settlements, particularly at already congested intersections or other locations. Table 7-44 summarizes the impact of Project construction on traffic function.

Mitigation/management measures

The following measures will be implemented to address the identified impacts:

- Prepare a Routing Study to identify the detailed route from Doraleh Port (or alternate port) to the Project site, and to identify specific road upgrades, including those necessary to accommodate oversize vehicles at key intersections;
- Construct temporary bypasses or other adaptations at key locations including:
  - Roundabouts near Doraleh Port (including a potential temporary bridge or bypass;
  - RN1 within We'a, where the combination of a narrow road section and buildings immediately adjacent to the roadway create a "pinch point";
  - Intersection of RN1 and RN9, where road geometry is insufficient for vehicles carrying turbine components, and where structures are located close to the intersection; and
  - sharp bends on the RN1 and RN9, including through settlements near the Project site.
- When possible, schedule delivery of oversized loads outside of peak traffic hours on the RN1, RN3, and connecting arterial road. This could include night deliveries, if noise and safety considerations can be addressed.

Impact Significance

Table 7-44 Impact Assessment Summary: Construction Impacts on Traffic Function

Impact	Congestion and impact on capacity of the existing road network				
Nature	**Negative**	Positive	Neutral		
	Project traffic will have a negative impact.				
Type	**Direct**	Indirect	Induced		
	The impact will be direct on the road network and users.				
Duration	**Temporary**	**Short term**	Long term	Permanent	
	Entire 12-month construction period				
Extent	**Local**	**Regional**	National	International	
	Traffic impacts will occur within the immediate surroundings of the Project site (local impacts) as well as in the broader region between Lac Assal and Djibouti (regional impacts).				
Scale	The impact is considered small-medium scale. Congestion may occur within the immediate surroundings of the Project site (although current traffic volumes are low) and between Lac Assal and Djibouti.				
Frequency	One-off	Intermittent	**Continuous**		
	Transport of turbine components, supplies, aggregate, concrete and workers will occur daily, if not several times per day. Multiple truck trips per day will occur on roads carrying aggregate and concrete; multiple trips per week will be anticipated between Djibouti and the Project site.				
Magnitude	Positive	Negligible	**Small**	**Medium**	Large

Impact	Congestion and impact on capacity of the existing road network			
	RN1, RN3, and roads near the Port already experience heavy truck traffic. Project-related conventional truck traffic will not significantly increase congestion. Oversize vehicles could require brief road closures at intersections, sharp turns, or narrow road sections. Temporary closures or slow-moving traffic could increase congestion.			
	RN9 and local roads have low traffic volumes and adequate width for conventional truck traffic. Project traffic volumes will not result in major traffic delays or congestion. Project-related traffic volume increases will be large in proportion to the existing volumes, and could result in brief congestion or delays, particularly during passage of oversized loads.			
Receptor sensitivity	**Low**	**Medium**	High	
	Users of roads within and near Djibouti have alternate routes and are accustomed to heavy traffic. Generally, sensitivity to a temporary increase in truck volumes is low. However, temporary road blockages can cause major delays in areas of heavy traffic. Users of roads outside the urban area, within towns and the rural area, have few or no alternate routes available and are not accustomed to frequent heavy truck traffic or temporary road closings. However, the incidents of congestion or closure are expected to be brief. Receptor sensitivity is medium.			
Significance	Not significant	**Minor**	Moderate	Major
	With the mitigation and management measures set out below, the magnitude of traffic function impacts during construction will be *Minor*.			

7.16.4 Construction – Road Infrastructure Impacts

National roads are generally in good condition and will be capable of handling 90 to 100 ton loads, such as those associated with turbine components; however, the wear and tear of multiple such loads, in addition to other Project traffic (see Section 12.8.3) could still degrade road infrastructure, leading to more frequent repairs or safety risks for road users. Table 7-45 summarizes the impact of Project construction on road infrastructure.

Mitigation/management measures

The following measures will be implemented to address the identified impacts:

- Coordination between the Project proponent and the government agencies responsible for road maintenance to identify necessary road repairs prior to and during Project construction; and
- Repair of any damaged road surfaces as needed following completion of the construction phase, or financial considerations (i.e. bonding) to enable government agencies to complete these repairs.

Impact significance

Table 7-45 Impact Assessment Summary: Construction Impacts on Road Infrastructure

Impact	Damage to road infrastructure			
Nature	**Negative**	Positive	Neutral	
	Roads will experience increased wear and deterioration			
Type	**Direct**	Indirect	Induced	
	The heavy truck traffic will directly affect the road surfaces.			
Duration	**Temporary**	**Short term**	**Long term**	Permanent
	Road impacts will occur during the 12-month construction period, which is considered short term. With no mitigation, degraded roads will impact road users beyond the construction phase, until maintenance and repairs occur.			
Extent	**Local**	**Regional**	National	International
	Road infrastructure impacts will occur within the immediate surroundings of the Project (local impacts) as well as in the broader region between Lac Assal and Djibouti (regional impacts).			

Impact	Damage to road infrastructure				
Scale	The impact is considered small-medium scale. Roads will experience increased wear from truck traffic.				
Frequency	One-off		Intermittent		**Continuous**
	Impacts to road infrastructure will occur gradually and continuously during Project construction.				
Magnitude	Positive	Negligible	**Small**	**Medium**	Large
	RN1, RN3, and roads near the Port already experience high traffic volumes, including heavy truck traffic. Project traffic originating or terminating in the Djibouti urban area will add incrementally to the normal level of wear and deterioration. The magnitude of impact will be small.				
	The construction phase will result in an unusual volume of heavy truck traffic on the RN9 and local roads, which could accelerate road wear and deterioration above typical activities. Medium impacts are expected.				
Receptor sensitivity	Low		**Medium**		High
	Impacts on road infrastructure will affect the regional road network. Towns and rural areas generally do not have alternate routes. Receptor sensitivity to degraded road conditions will be medium.				
Significance	Not significant	**Minor**	Moderate		Major
	With mitigation, in the form of timely road repair and maintenance, the impact significance will be *Minor*.				

7.16.5 Construction - Transportation Safety Impacts

Impact Magnitude

Table 7-46 summarizes the impact of Project construction on transportation safety. With all other factors being equal, the likelihood of traffic incidents such as crashes or injury increases along with increases in traffic volumes. The presence of heavy vehicles such as trucks or buses also increases the likelihood of traffic incidents.

Oversize Project vehicles delivering turbine components creates particular safety concerns. These vehicles will be up to 50 m long and 4 m wide (compared to a standard tractor-trailer that measures 22 m long and 3 m wide). Safety risks associated with these vehicles will include potential property damage, as well as crashes resulting from to the lack of public familiarity with the slow manoeuvring and travel speeds of these oversize vehicles.

Mitigation/management measures

The evaluation and implementation of road improvements will also address potential safety impacts. In addition, the following measures must be implemented to mitigate potential impacts:

- As part of the Routing Study, evaluate the transportation safety risks implications of all Project construction traffic. Address hours of transport, community notification, signage, education and other measures to minimize safety hazards;
- As part of a Project-related public engagement programme, regularly inform, educate, and update stakeholders about Project construction traffic, and related safety considerations; and
- Carefully consider timing of Project traffic, along with road improvements to facilitate safe movement will be important. Consider moving oversize loads at night, when temporary road closures are less likely to cause congestion, delay, or traffic safety incidents. Other loads should travel in the daytime for greater safety to local residents and workers.

Impact significance

Table 7-46 Impact Assessment Summary: Construction Impacts on Transportation Safety

Impact	Increased transportation safety risks				
Nature	**Negative**	Positive	Neutral		
	Project traffic will have a negative impact on traffic safety by increasing traffic volumes and requiring oversized loads.				
Type	**Direct**	Indirect	Induced		
	The impact will be direct on the road network and users.				
Duration	Temporary	**Short term**	Long term	Permanent	
	12-month construction period				
Extent	**Local**	**Regional**	National	International	
	Traffic impacts will occur within the immediate surroundings of the Project (local impacts) as well as in the broader region between Lac Assal and Djibouti (regional impacts).				
Scale	Roads will experience a small to medium-scale increase in traffic hazards.				
Frequency	One-off	Intermittent	**Continuous**		
	The presence of oversize loads and Project truck traffic will result in a continuous increased *risk* of traffic incidents or damage to property in close proximity to the roadway, although an increased number of incidents is not certain.				
Magnitude	Positive	Negligible	**Small**	**Medium**	Large
	RN1, RN3, arterial road in Djibouti: Several existing roundabouts, intersections, and road sections cannot accommodate the Project's oversized vehicles. Without mitigation, oversized trucks could not pass safely through these locations.				
	RN9 and local roads near Project site: Substantially higher truck traffic volumes and oversized loads, especially in settlements, could result in hazards for residents unaccustomed to such traffic.				
Receptor sensitivity	Low	**Medium**	High		
	Road users are vulnerable to increased risks, but can reduce the risk through their actions and the management measures below.				
Significance	Not significant	**Minor**	Moderate	Major	
	With the mitigation and management measures set out above, in general, Project transportation safety impacts during construction will be of *Minor* significance.				

7.16.6 Operation – Transportation Impacts

Table 7-47 summarizes the impact of Project operations on all aspects of transportation (traffic function, road infrastructure, and transportation safety). Project operations will employ up to five full time personnel at the Project site in security, operation and caretaker roles, 24 hours per day. Additionally, on-site inspections will be carried out every six months. These activities will generate a negligible amount of regular traffic. Periodic, maintenance and repair activities will also generate occasional traffic. The minimal traffic volumes generated by these ongoing activities will have a negligible impact on traffic function, road infrastructure and transportation safety; therefore, no further evaluation is made of road impacts during operation of the proposed windfarm.

Table 7-47 Impact Assessment Summary: Project Operation Impacts on Transportation

Impact	Impacts on transportation (traffic function, road infrastructure, and safety)			
Nature	Negative	Positive	**Neutral**	
	Traffic generated during Project operations will generally not be distinguishable from other traffic using the impacted roads.			
Type	**Direct**	Indirect	Induced	
	The impact of traffic will be direct.			
Duration	Temporary	Short term	**Long term**	Permanent
	Operations will be ongoing for 25 years.			
Extent	**Local**	**Regional**	National	International
	Road impacts will occur within the immediate surroundings of the Project (local impacts) as well as in the broader region between Lac Assal and Djibouti (regional impacts).			
Scale	The impact is small-scale. Roads within the immediate surroundings of the Project and between Lac Assal and Djibouti will experience little additional traffic as a result of the project.			
Frequency	One-off	**Intermittent**	**Continuous**	
	On-site employees will commute daily; other trips will occur every six months and as needed for repairs.			
Magnitude	Positive	**Negligible**	Small	Medium	Large
	Project operations require a small number of permanent, on-site personnel. Regular inspections will take place every six months; periodic repairs may require heavy truck trips.			
Receptor sensitivity	Low	**Medium**	High	
	Receptor sensitivity to road impacts is medium; however, operational traffic will not be of a magnitude to have impacts on the roads.			
Significance	**Not significant**	Minor	Moderate	Major
	Due to the low level of traffic needed for operations, the transportation impacts during operation are *Not Significant*.			

7.16.7 Decommissioning

Following the end of the Project's operational life (i.e., at least 25 years following the start of operations) the Project will be decommissioned. A detailed decommissioning plan will be prepared and submitted to the Djibouti authorities prior to commencing any decommissioning works. Because detailed decommissioning plans will not be available for many years, this phase is not evaluated in detail. Decommissioning will likely generate traffic associated with worker movements, disassembly of turbines, and transport of materials away from the site, along with temporary or permanent road infrastructure improvements necessary to facilitate those activities. Overall, it is assumed that decommissioning will result in impacts similar in character and significance to those identified for the construction phase.

7.17 CULTURAL HERITAGE

7.17.1 Scope of the Assessment

This section is an assessment of the following Project activities potential impacts on cultural heritage:

Project phase	***Activity with potential impact***
Construction	Groundwork activities resulting in impacts on potential features of cultural heritage through disturbance, such as: establishment of site compounds and lay down areas; aggregate sourcing and transportation (from on-site quarry); construction of turbine foundations; cable trenching and laying; construction of substation; and the construction of the 3.5 km transmission line to the EDD Ghoubet substation.
Operation	None

7.17.2 Value of Resource

Cultural heritage potential assets CH05 and CH31 are the only cultural heritage resource identified within the Project site that may be physically impacted by the development. The potential assets are a dry-stone sub-oval enclosures c.20 m across (CH05) and a group of small circular enclosures (CH31), identified from aerial/satellite imagery. Using the cultural heritage definitions set out in the IFC's Performance Standard 8, assets CH05 and CH31 have been categorised as 'Replicable Cultural Heritage', which equates to a low sensitivity.

No evidence of buried archaeology has been identified although there is a residual risk of such remains being present.

Other potential cultural heritage assets identified on site include stone enclosures likely to be used as goat shelters. Using the cultural heritage definitions set out in the IFC's Performance Standard 8, these assets have been categorised as 'Replicable Cultural Heritage', which equates to a low sensitivity.

7.17.3 Construction

A number of Project activities associated with the construction phase were identified during scoping as having the potential to impact on cultural heritage, principally through ground disturbance activities.

Impact magnitude

Construction of the Project will include, amongst other things described in Section 3, the provision of access roads to the turbines within the Project site. Installation of the roads will require ground disturbance using mechanical equipment (and potentially blasting) to create a suitable road foundation and driving surface. Although the Project has been designed to maintain a buffer from the known cemeteries, CH24 and CH26, potential assets CH05 and CH31 (stone enclosures) will be bisected by the access road to Turbine 12. With the potential impact from these works likely to be local, extensive, permanent and irreversible, this impact has been assessed as Medium.

Traditional goat herding (intangible cultural heritage) is undertaken on the Project site. The herders use the stone shelters for their livestock. The tradition may be disrupted during construction of the access roads to the turbines by restricting access to the shelters. The potential impact from these works is likely to be local, minor, temporary and reversible. This impact has been assessed as Small.

Mitigation and Management

Management Control	***Timing***
CH05 Relocate the proposed access road to the west so that asset CH05 is avoided.	Detailed design phase
CH31 Relocate the proposed access road to the west so that asset CH31 is avoided.	Detailed design phase
Goat Herding Ensure that safe access is maintained at all times during construction of the access roads, allowing the local community to continue using the goat shelters as part of their local tradition.	During construction
Potential cultural heritage assets Once the Project design is finalised, further archaeological site inspection must be undertaken before commencement of works to ensure all potential cultural heritage assets (i.e.	Prior to commencement of site works

rock structures) are avoided or, if unavoidable, these potential assets are assessed for their cultural heritage value and appropriate management measures are implemented (if required).	
Unknown archaeology or artefacts Design and implement a Chance Finds Procedure to manage any unexpected discovery of archaeological material in-line with national and international requirements and guidelines.	Prior to commencement of site works

Impact significance

Table 7-48 Impact Assessment Summary: Construction Impacts on Potential Cultural Heritage Assets and Traditional Practices

Impact	Damage to/disturbance of potential assets CH05 and CH31				
Nature	**Negative**	Positive	Neutral		
	Earthworks (disturbance of soil) associated with the construction of site access roads will have a negative impact.				
Type	**Direct**	**Indirect**	Induced		
	The impact will be direct on CH05 and CH31. Indirect on the traditional practice of goat herding.				
Duration	**Temporary**	Short term	Long term	**Permanent**	
	Construction impact will be permanent for CH05 and CH31 and temporary for the traditional practice of goat herding.				
Extent	**Local**	Regional	National	International	
	Construction impacts will be local.				
Scale	The impact is considered medium scale for CH05 and CH31, and small scale for the traditional practice of goat herding.				
Frequency	**One-off**	Intermittent	Continuous		
	Impacts will be restricted to the construction period.				
Magnitude	Positive	Negligible	**Small**	**Medium**	Large
	Construction impacts are assessed as medium magnitude impacts on CH05 and CH31.				
	Construction impacts are assessed as small magnitude impacts on the traditional practice of goat herding.				
Receptor sensitivity	**Low**	Medium	High		
	CH05, CH31 and the traditional practice of goat herding all have a low sensitivity.				
	Not Significant	**Minor**	Medium	Major	
	The significance of effect on CH05, CH31 and the traditional practice of goat herding has been assessed as *Not Significant*.				

7.17.4 Operation

It is not anticipated that there will be any impacts on cultural heritage from the operation of the Project.

Access to the Lac Assal village cemetery (CH26) and Le Garabl'iya camp & cemetery (CH24), as well as the pastoral goat shelters identified across the Project site and used as part of the tradition of goat herding, will be maintained throughout operation.

7.18 TOURISM & RECREATION

7.18.1 Scope of the Assessment

This section is an assessment of the following Project activities' potential impacts on local tourism and recreation:

Project phase	*Activity with potential impact*
Construction	Construction traffic and construction activity resulting in impacts on access to tourist attractions
Operation	Potential tourist attraction

7.18.2 Value of Resource

Lake Assal and Lake Ghoubet are easily accessible via the RN9 National Road. Therefore, the sensitivity of these tourist attractions is considered to be of *Low* value.

7.18.3 Construction

It is not anticipated that access to Lake Assal or the camp at Lake Ghoubet will be affected by the Project as there are no plans to close or restrict access to any of the national roads, such as the RN9, that visitors use to access Lake Assal and Lake Ghoubet. Any changes to roads required by the Project will improve overall conditions and improve access to the attractions. The windfarm itself also has the potential to be an attraction. Therefore, the impact is considered to be *Positive.*

Please refer to Transport assessment in Section 7.16 for additional consideration of impacts on road access and use.

7.19 CLIMATE CHANGE

7.19.1 Scope of the Assessment

This section is an assessment of the following Project activities' potential impacts on climate change:

Project phase	*Activity with potential impact*
Construction	Increased greenhouse gas (GHG) emissions from construction activities outlined in Section 3
Operation	Clean, renewable energy will be produced avoiding consumption of higher GHG emitting alternatives

7.19.2 Value of Resource/Vulnerability of Receptor

Because climate change affects global receptors, the impact magnitude and resource/receptor sensitivity cannot be determined in the same way it can be for other topics. For this reason, impact significance is only determined to be *Significant or Not Significant.*

7.19.3 Construction

The annual estimate of GHG emissions, over the life of the Project is highly likely to be less than the IFC threshold value of significance of 25,000 tonnes of carbon dioxide equivalent (tCO_2e) per year[(1)]. Therefore, the impact is considered *Not Significant*.

7.19.4 Operation

Wind energy facilities do not typically generate emissions during their operation[(2)]. Additionally, energy generated from renewable sources will avoid emissions that will otherwise be generated wholly or partly from more carbon-intensive higher GHG emitting sources. Since the Project is a renewable energy generation project, its operation phase emissions are considered to displace emissions that will otherwise be sourced from other electricity generation technologies[(3)]. This is likely to have a positive impact on climate change. Assuming a moderate average capacity factor of

[1] IFC Greenhouse Gas Reduction Accounting Guidance for Climate Related Projects. IFC Climate Business Department. May 2017
[2] IFC World Bank Group: Environmental, Health and Safety Guidelines Wind Energy 2015
[3] *IFI Approach to GHG Accounting for Renewable Energy Projects (World Bank, 2015)*

40%[1], this Project will avoid approximately 150,000 metric tons CO_2 emissions/year[2].

7.20 CUMULATIVE IMPACTS

Impacts associated with the Project have the potential to produce cumulative impacts with other windfarms (proposed with similar construction timeframes or existing) and other developments in the broader area.

Impacts associated with multiple windfarm sites include cumulative impacts to birds and bats, changes to landscape character and landtake. However, there are no other known permitted windfarms within the broader region[3]. Therefore cumulative effects are considered *Not Significant.*

Other known developments currently being considered in the vicinity of the Project include a geothermal power installation near Lac Assal (north of the Project site). However, at the time of conducting this assessment, no further details could be established and it is understood that this has not yet been permitted. Therefore cumulative effects have not been considered.

The Project site is located northwest of a proposed transmission corridor[4] that will run along the RN9 and RN4 roads towards Djibouti City. It is the intention to connect the windfarm into a 230 kV circuit located along this transmission corridor (via the proposed EDD Ghoubet transformer). It is understood that an ESIA has been undertaken for this development and it has been permitted. Further details of the design, construction and scheduling of the transmission has not yet been forthcoming and therefore it has not been possible to consider cumulative effects at the time of writing this report. If this information does become available, a cumulative assessment should be completed (especially with regard to potential construction traffic, social, labour and landscape and visual cumulative impacts).

[1] As this Project would be the first wind farm in Djibouti and the design (including turbine model, number and layout) are not yet finalised the capacity factor for the Project is not available.
[2] United States Environmental Protection Agency (2017) AVERT, U.S. annual wind national marginal emission rate, year 2016 data. U.S. Environmental Protection Agency, Washington, DC.
[3] At the time of assessment.

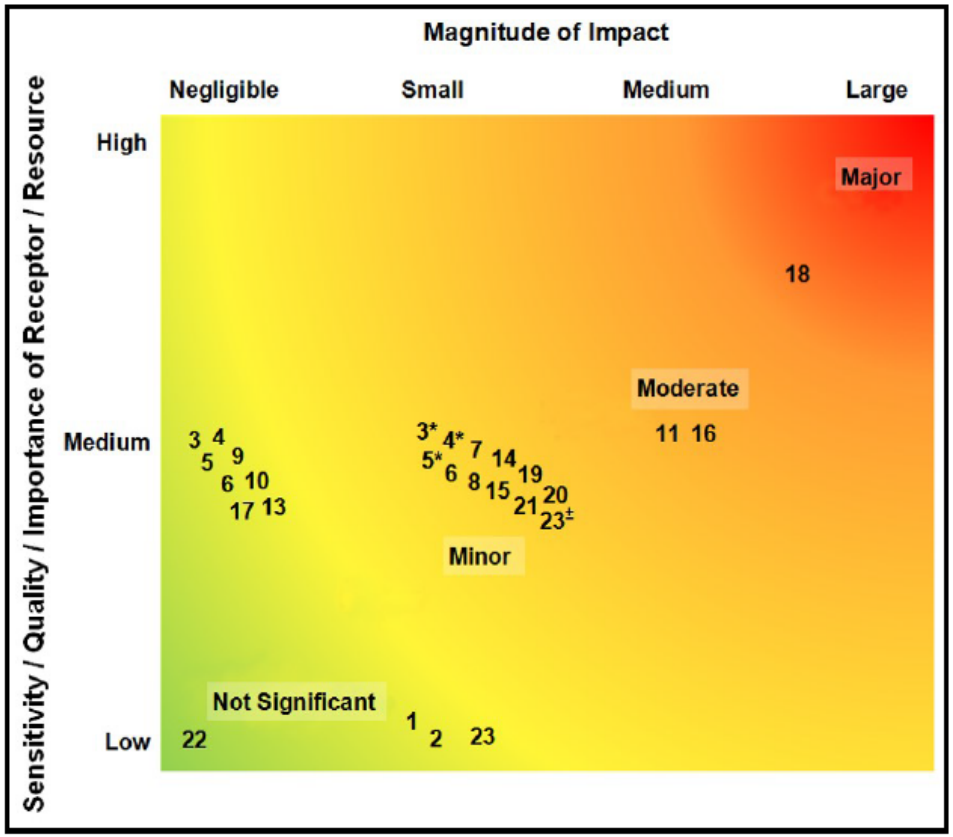
[4] EDD are responsible for constructing a 63 kV / 230 kV transformer and 38 km transmission line to facilitate evacuation of electricity from the Ghoubet windfarm.

7.21 SUMMARY OF IMPACT SIGNIFICANCE

Significance	Significance Context
Negligible	A resource/receptor (including people) will essentially not be affected in any way by a particular activity or the predicted effect is deemed to be 'imperceptible' or is indistinguishable from natural background variations.
Minor	A resource/receptor will experience a noticeable effect, but the impact magnitude is sufficiently small (with or without mitigation) and/or the resource/receptor is of low sensitivity/ vulnerability/ importance. In either case, the magnitude should be well within applicable standards.
Moderate	Has an impact magnitude that is within applicable standards, but falls somewhere in the range from a threshold below which the impact is minor, up to a level that might be just short of breaching a legal limit.
Major	An accepted limit or standard may be exceeded, or large magnitude impacts occur to highly valued/sensitive resource/receptors.

CONSTRUCTION

1. Land and Soils
2. Air quality
3. Biodiversity (excluding birds and bats)
3* *Dorcas Gazelle*
4. Bats
4* *Samburu pipistrelle*
5. Birds
5* *Egyptian Vulture and Migratory soaring birds*
6. Noise
7. Disempowered Workforce
8. Decreased Wellbeing of Workforce
10. Land Use and Livelihoods
11. Communicable and Non-Communicable Diseases
14. Pressure on Public Services and Infrastructure
15. Community cohesion
16. Community Safety and Security
18. Landscape and Visual
19. Traffic function
20. Road Infrastructure
21. Transportation Safety
23. Cultural Heritage
23± Cultural Heritage



OPERATION

1. Land and Soils
2. Air quality
3. Biodiversity (excluding birds and bats)
3* *Dorcas Gazelle*
4. Bats
4* *Samburu pipistrelle*
5. Birds
5* *Egyptian Vulture and Migratory soaring birds*
6. Noise
9. Decreased Wellbeing of Workforce
12. Communicable and Non-Communicable Diseases
13. Operation shadow flicker
17. Community Safety and Security
18. Landscape and Visual
22. Traffic

POSITIVE IMPACTS

Employment, Procurement and the Economy

Road Infrastructure

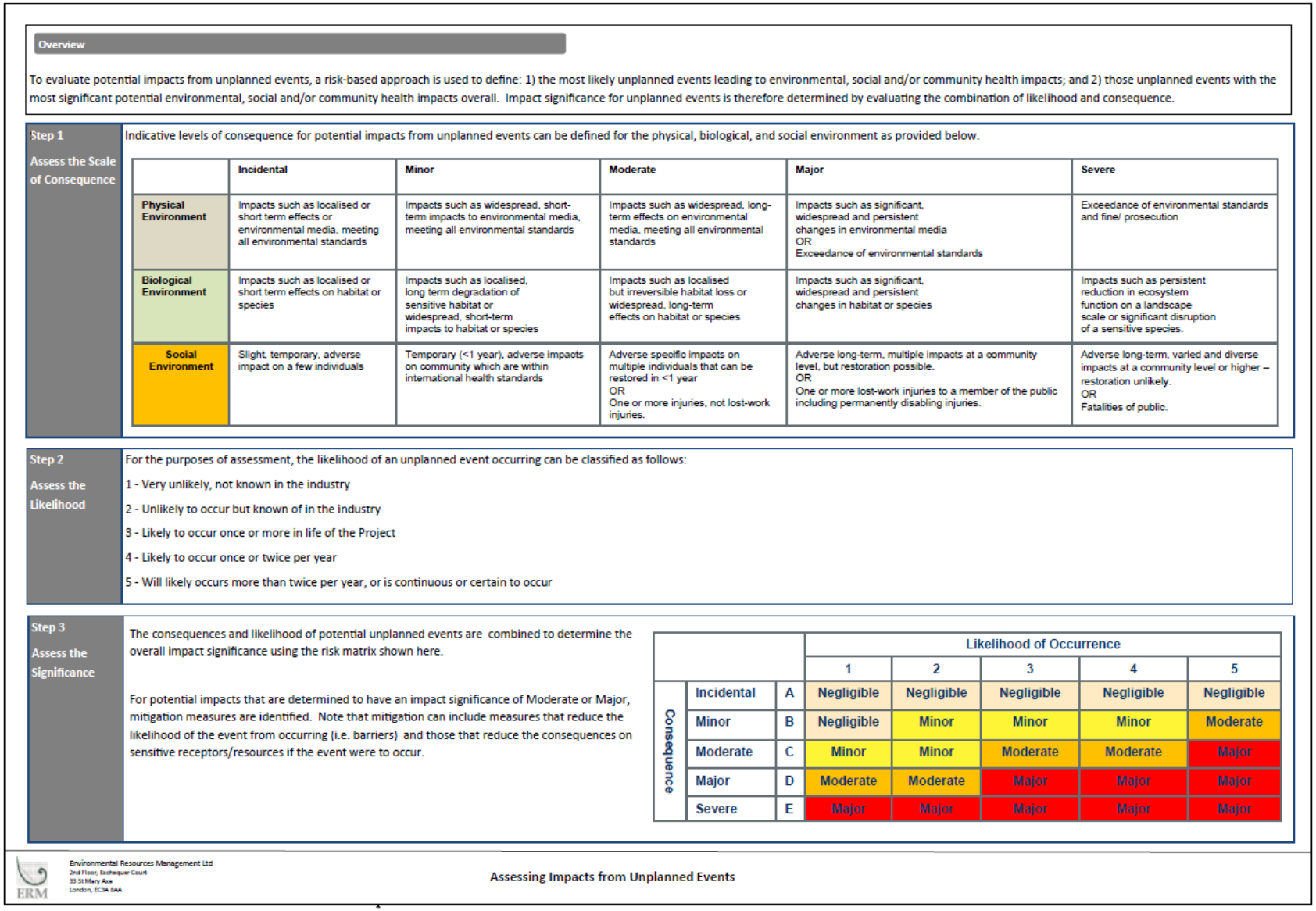
Climate Change

Tourism

8 UNPLANNED EVENTS

Based on the Project activities, the potential unplanned events considered to have the highest potential risks during construction and operation are detailed in this section. The methodology followed for assessing potential impacts due to unplanned events is outlined in Figure 8.1 and follows a risk-based approach.

Figure 8.1 Unplanned Events Assessment Methodology



Overview

To evaluate potential impacts from unplanned events, a risk-based approach is used to define: 1) the most likely unplanned events leading to environmental, social and/or community health impacts; and 2) those unplanned events with the most significant potential environmental, social and/or community health impacts overall. Impact significance for unplanned events is therefore determined by evaluating the combination of likelihood and consequence.

Step 1 — Assess the Scale of Consequence

Indicative levels of consequence for potential impacts from unplanned events can be defined for the physical, biological, and social environment as provided below.

	Incidental	Minor	Moderate	Major	Severe
Physical Environment	Impacts such as localised or short term effects or environmental media, meeting all environmental standards	Impacts such as widespread, short-term impacts to environmental media, meeting all environmental standards	Impacts such as widespread, long-term effects on environmental media, meeting all environmental standards	Impacts such as significant, widespread and persistent changes in environmental media OR Exceedance of environmental standards	Exceedance of environmental standards and fine/ prosecution
Biological Environment	Impacts such as localised or short term effects on habitat or species	Impacts such as localised, long term degradation of sensitive habitat or widespread, short-term impacts to habitat or species	Impacts such as localised but irreversible habitat loss or widespread, long-term effects on habitat or species	Impacts such as significant, widespread and persistent changes in habitat or species	Impacts such as persistent reduction in ecosystem function on a landscape scale or significant disruption of a sensitive species.
Social Environment	Slight, temporary, adverse impact on a few individuals	Temporary (<1 year), adverse impacts on community which are within international health standards	Adverse specific impacts on multiple individuals that can be restored in <1 year OR One or more injuries, not lost-work injuries.	Adverse long-term, multiple impacts at a community level, but restoration possible. OR One or more lost-work injuries to a member of the public including permanently disabling injuries.	Adverse long-term, varied and diverse impacts at a community level or higher – restoration unlikely. OR Fatalities of public.

Step 2 — Assess the Likelihood

For the purposes of assessment, the likelihood of an unplanned event occurring can be classified as follows:

1 - Very unlikely, not known in the industry

2 - Unlikely to occur but known of in the industry

3 - Likely to occur once or more in life of the Project

4 - Likely to occur once or twice per year

5 - Will likely occurs more than twice per year, or is continuous or certain to occur

Step 3 — Assess the Significance

The consequences and likelihood of potential unplanned events are combined to determine the overall impact significance using the risk matrix shown here.

For potential impacts that are determined to have an impact significance of Moderate or Major, mitigation measures are identified. Note that mitigation can include measures that reduce the likelihood of the event from occurring (i.e. barriers) and those that reduce the consequences on sensitive receptors/resources if the event were to occur.

Consequence		Likelihood of Occurrence 1	2	3	4	5
Incidental	A	Negligible	Negligible	Negligible	Negligible	Negligible
Minor	B	Negligible	Minor	Minor	Minor	Moderate
Moderate	C	Minor	Minor	Moderate	Moderate	Major
Major	D	Moderate	Moderate	Major	Major	Major
Severe	E	Major	Major	Major	Major	Major

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Assessing Impacts from Unplanned Events

8.1 IMPACTS OF POTENTIAL UNPLANNED EVENTS

8.1.1 Fuel and Oil Spills during Construction Activities

Scale of Consequence

Considering the scale of spill likely to occur from the Project activities: levels of consequence will be *Moderate* to the physical environment and *Minor* to the biological and social environment.

Likelihood

Small, localised spillages are *Likely* to occur during transfers of fuel and general construction activities, maintenance of machinery, improper storage of hazardous materials, malfunction of handling systems and poor practice of workers and force majeure.

Large releases of hazardous materials that will require the involvement of emergency services are not known to have occurred during windfarm construction and operation, therefore are considered *Very Unlikely*.

Mitigation/management measures

The following management measures will be implemented through the Project's ESMMP:

- The Project will develop a Hazardous Materials Management Plan to prevent spills of hazardous materials during all phases of the Project.

- The Project will develop Emergency Preparedness and Response Plan (EPRP) including an Oil Spill Response Procedure (OSRP) which includes community notifications when required. The Project will maintain spill clean-up and response capability adequate for addressing spills for all phases of the Project. All spills will be immediately contained and cleaned up. Contaminated areas will be remediated and post remediation verification will be carried out.

- Refuelling of equipment and vehicles will be carried out in designated areas on hard standing ground to prevent seepage of any spillages to ground. Collection systems will be installed in these areas to manage any spills, fuels will be collected and either reused, treated by incineration or removed by a local contractor. Drip trays must be used when refuelling and servicing vehicles or equipment, where it is not on a hardstanding surface.

- Hazardous material storage will be on hard standing and impermeable surface and the bulk storage facility will be bunded. The Project will restrict storage and handling of hazardous materials and fuels to bunded areas of sufficient capacity to contain a release. Storage containers will be regularly checked and maintained.

Impact Significance

Potential impacts to the physical, biological and social environment will be *Minor*.

8.1.2 Incident Involving Construction Traffic

Scale of Consequence

Considering the scale of traffic incident likely to occur from Project activities: levels of consequence will be *Incidental* to the physical and biological environment. However, they could be *Severe* to the social environment i.e. a fatality.

Likelihood

Traffic incidences, such as a traffic collision, are considered *Likely* to occur once or more in the lifetime of the Project.

Mitigation/management measures

The following risk mitigation measures, in line with World Bank Group General EHS Guidelines, should be implemented through the ESMMP to minimize the risks/hazards of a traffic incident:

- Adoption of best transport safety practices across all aspects of project operations with the goal of preventing traffic accidents and minimizing injuries suffered by project personnel and the public. Measures should include:
  - Emphasizing safety aspects among drivers
  - Improving driving skills and requiring licensing of drivers
  - Adopting limits for trip duration and arranging driver rosters to avoid overtiredness
  - Avoiding dangerous routes and times of day to reduce the risk of accidents
  - Use of speed control devices (governors) on trucks, and remote monitoring of driver actions
- Regular maintenance of vehicles and use of manufacturer approved parts to minimize potentially serious accidents caused by equipment malfunction or premature failure.

Where the Project may contribute to a significant increase in traffic along existing roads, or where road transport is a significant component of a project, recommended measures include:

- Minimizing pedestrian interaction with construction vehicles
- Collaboration with local communities and responsible authorities to improve signage, visibility and overall safety of roads, particularly along stretches located near schools or other locations where children may be present. Collaborating with local communities on education about traffic and pedestrian safety (e.g. school education campaigns)
- Coordination with emergency responders to ensure that appropriate first aid is provided in the event of accidents
- Using locally sourced materials, whenever possible, to minimize transport distances. Locating associated facilities such as construction camps close to project sites and arranging worker bus transport to minimizing external traffic
- Employing safe traffic control measures, including road signs and flag persons to warn of dangerous conditions

Impact Significance

Potential impacts to the physical and biological environment will be *Negligible.* However, impacts to the social environment will be *Major.*

8.1.3 Turbine Failure Resulting in Rotor Blade 'Throw'

Scale of Consequence

Levels of consequence for turbine failure resulting in throwing a blade will be *Incidental* to the physical and biological environment. However, they could be *Severe* to the social environment i.e. a fatality.

Likelihood

Table 8-1 presents probabilities of turbine failure from published sources and Table 8-2 presents probabilities of fatality due to impact from a fragment of a wind turbine due to wind turbine failure. Based on this published information, the likelihood of wind turbine failure resulting in 'blade throw' impacting on public safety is *Unlikely*.

Table 8-1 Probability of Wind Turbine Failure[1]

Component	*Probability of Failure per turbine per year*
Blade	8.4×10^{-4}
Tower	1.3×10^{-4}
Rotor	3.2×10^{-4}

Table 8-2 Probability of Fatality due to Impact from Fragment of Large (≥2.3MW) Wind Turbine Compared to Other Societal Risks[2]

Source of Fatality	*Annual Risk*	*Assumptions*
Wind turbine - Direct impact by blade/fragment	10^{-9}	At 2x hub height from wind turbine
Wind turbine - Indirect impact by blade/fragment	10^{-8}	At 2x hub height from wind turbine
Aircraft Accident (annual risk – holidaymaker)	1.60×10^{-8}	Annual risk of fatality: 2 flights per annum
Road Accidents (all forms)	5.95×10^{-5}	Based on UK data from 1999

Mitigation/management measures

One of the key siting criteria *of the turbines* was to include a 500 m buffer zone *between residential areas and the turbines*. This buffer zone follows the World Bank Group EHS Guidelines for Wind Energy risk management strategy which recommends a minimum setback distance of 1.5 x turbine height between turbines and populated locations to reduce the risk of 'blade throw' resulting in public injury.

In addition, the following risk mitigation measures should be implemented through the ESMMP as part of the EHS Emergency Preparedness and Response Plan (EPRP) to minimize the risks/ hazards of accidents:

- Communicating with the local community about the accidental risks and safety features of the wind turbines within the windfarm;
- Communicating with the local community on the appropriate procedures to follow during emergency scenarios such as turbine failure;
- Third party insurance cover to meet the financial loss to any third party due to such emergencies.

Impact significance

Potential impacts to the physical and biological environment will be *Negligible*. However, although likelihood of turbine failure and fatality due to turbine failure are unlikely, due to the scale of consequence on the social environment the impacts will be *Major.*

[1] Study and development of a methodology for the estimation of the risk and harm to persons from wind turbines. 2013. HSE

[2] Study and development of a methodology for the estimation of the risk and harm to persons from wind turbines. 2013. HSE

8.1.4 Aviation Incident with a Turbine

Scale of Consequence

In the event of an aircraft colliding with a turbine the scale of consequence to physical and biological environment will be *Incidental* but will be *Severe* to the social environment i.e. a fatality.

Likelihood

There are examples where aircraft have collided with wind turbines and resulted in fatalities; however, this is not something that is expected to occur during the lifetime of the project. Therefore, this is considered *Unlikely*.

Mitigation/management measures

Consultation will be undertaken with the relevant aviation authorities (public and military) to determine prevention and control measures. However, these could include:

- Use of anti-collision lighting and marking systems on towers and/or blades and consult with the relevant aviation authorities to determine appropriate lighting and marking requirements in line with national standards. In the absence of national standards, refer to good practice guidance[(1)].

A separate technical aviation (including electromagnetic interference, EMI) assessment will be undertaken outside of the ESIA process.

Impact Significance

Potential impacts to the physical and biological environment will be *Negligible* but social environment will be *Major*.

8.1.5 Equipment Malfunction or Damage due to Natural Disasters

Scale of Consequence

In the event of damage to a turbine due to a natural disaster the scale of consequence to the physical and biological environment will be *Incidental* but *Severe* to the social environment i.e. a fatality.

Likelihood

The Project site is not prone to storms, cyclones or lightning. However, the Project site is prone to flash flooding during heavy rainfall events. Djibouti faces annual torrential rainfall (usually following a long dry period). These rainfall events can consist of up to 100cm of rainfall in a single day (more than half the annual average) which leads to flash flooding[(2)]. Figure 8.2 shows a typical flash flood event in Djibouti.

[1] International Civil Aviation Organization (ICAO) 2012; CAA 2013; American Wind Energy Association (AWEA) 2008; CanWEA 2011

[2] World Health Organization. Republic of Djibouti. April 2004 Floods. Assessment Report

Figure 8.2 Example of Flash Flood Event in the Karta area in 2010

Source: http://annpylesafricanblog.blogspot.co.uk/2010/04/flooding-in-djibouti-countryside.html [accessed April 2018]

The Project site is in an area of volcanic activity; Ardoukoba volcano (a fissure vent) is approximately 8km from the Project site and last erupted in 1978, having been dormant for the previous 3,000 years. The Project site is also in a medium risk area for seismic activity, meaning there is a 10% chance of a potentially damaging earthquake occurring in the next 50 years[1]. Therefore, the likelihood of this unplanned event is considered to be *Likely.*

Mitigation/management measures

Reduction of potential hazards from natural disasters is best accomplished during the design phase when the structural design, layout and site modifications can be adapted. The following issues should be considered and incorporated as appropriate into the planning, siting, and design phases of the Project:

- Facilities, buildings, plants, and structures should be situated to minimize potential risks from forces of nature (e.g. earthquakes, floods, volcanoes and fires from surrounding areas); and
- Incorporation of siting and safety engineering criteria to prevent failures due to natural risks posed by earthquakes, volcanoes, flooding, landslides and fire. To this end, all project structures should be designed in accordance with engineering and design criteria mandated by site-specific risks, including but not limited to seismic activity, slope stability, wind loading, and other dynamic loads.

In addition, the following risk mitigation measures should be implemented through the ESMMP to minimize the risks/ hazards of natural disasters:

[1] Global Facility for Disaster Reduction and Recovery (GFDRR)

- Involving the emergency services while preparing for emergency situations due to natural disasters.

Impact significance
Potential impacts to the physical and biological environment will be *Negligible.* However, due to the scale of consequence on the social environment the impacts if a turbine malfunctioned or was damaged due to natural disaster and caused a fatality the impact will be *Major.*

8.2 RESIDUAL IMPACTS FROM UNPLANNED EVENTS

Because the majority of the mitigation for unplanned events that will result in *Moderate* or *Major* impacts is preventative, the primary goal of these measures is to reduce the likelihood of the unplanned event from occurring. However, if these unplanned events occur, impacts of *Moderate* and *Majo*r significance could still occur.

9 ENVIRONMENTAL & SOCIAL MANAGEMENT AND MONITORING FRAMEWORK

9.1 INTRODUCTION

This section presents the Environmental and Social Management and Monitoring (ESMM) framework, providing a reference point and scope for the development of a detailed Environmental and Social Management and Monitoring Plan (ESMMP) for the Project. The ESMMP will be further developed and implemented by the Consortium and EPC Contractor(s) to manage environmental and social risks associated with the construction, operation and decommissioning of the Project.

The ESMM framework has been developed to demonstrate how the Project intends to fulfil the requirements presented in the International Finance Corporation (IFC) Performance Standard 1 (PS 1), Assessment and Management of Environmental and Social Risks and Impacts.

In addition to the requirements of PS 1, the ESMM framework content has taken into account the required management, mitigation and monitoring measures as identified in the ESIA, the IFC General Environmental, Health, and Safety Guidelines, the IFC Technical Guidelines for Wind Energy, the IFC Guideline on Electric Power Transmission and Distribution and other relevant IFC Performance Standards.

9.2 PURPOSE OF THE ESMM FRAMEWORK

The ESMM framework, and subsequent ESMMP, provides the structure to enable environmental and social (including community health and safety) risks to be identified and assessed throughout construction and operation, and mitigation measures to be developed, implemented and appropriately managed. The ESMM framework will therefore assist the Consortium to comply with relevant authorizations, legal requirements, and IFC Standards in a systematic and structured way.

9.3 SCOPE OF THE ESMMP

The ESMMP will be developed specifically for the Project based on this ESMM framework. The ESMMP will cover all activities conducted by or on behalf of the Consortium on the Project site, including those of contractors. The ESMMP provides for the management of significant environmental and social risks, incorporating the community as well as the health and safety of the Project personnel, contractors and visitors.

The ESMMP is a dynamic document, and will therefore be reviewed and updated from time to time to continually improve the management of environmental and social impacts. Changes may be based on the Project phase, the environmental and social performance of the Project, or updated to reflect changes in operations, the receiving environment, legislation, stakeholders, and personnel.

9.4 PROJECT ESMMP

9.4.1 Roles and Responsibilities

The effective implementation of the ESMMP is dependent on established and clear roles, responsibilities and reporting lines. The organisational structure for environmental and social management for the Project is defined below. The structure will be maintained throughout the construction, operation and decommissioning phases, while being reviewed on a regular basis to adapt as necessary. The key roles and responsibilities are outlined below.

Project Manager

The Project Manager (PM) is the senior representative for the Site and, as such, is the ultimate authority on all matters including environmental and social management. The PM will be appointed by the Consortium. The objective is to actively work towards the elimination of Company and Sub-contractor environmental damage. The PM is responsible for providing the human and financial resources necessary for ensuring compliance to the ESMMP. The PM must be fully conversant with the conditions of the environmental approval and ensure that all stipulations within the ESMMP are communicated and adhered to by the construction team (and any subcontractors).

Site Manager

The Site Manager shall be responsible for the day-to-day operations of the Contract and may deputise for the Project Manager if required. They will be appointed by the EPC contractor and are expected to be in place throughout construction and operation.

The Site Manager's responsibilities include:

- To ensure that all Supervisors and employees are familiar with the contents of the ESMMP.
- Advise or instruct any person on site in matters related to environmental, social, health and safety management.
- To attend environmental committee meetings when required.
- To achieve compliance with all Statutory Acts, Regulations and Codes of Practice.
- Report to the Project Manager on all accidents and incidents and corrective and preventative measures.
- Report to the Project Manager any public grievances (the responsibility for the grievance mechanism will be outlined in detail in the Stakeholder Engagement Plan) or concerns raised by the local communities with respect to the project.
- Project related Health and Safety.

The Site Manager reports directly to the Project Manager, oversees site work and liaises with the construction team.

Environmental, Social, Health and Safety Manager

The Environmental, Social, Health and Safety Manager (EHS) Manager will be responsible for the day-to-day environmental and social management. The EHS Manager is responsible for implementing the monitoring programmes and maintaining the monitoring databases as well as the reporting of the results. During the Project development phase, the EHS Manager will report directly to the E&S lead of the Consortium. During the Project construction phase, the EHS manager will report directly to the Project company CEO.

Environmental, Social, Health and Safety Officer

The local Environmental, Social, Health and Safety (EHS) Officer will be appointed by the Consortium and will support the EHS Manager in their duties and receive on-the-job training from the EHS Manager. The role of the EHS Manager will be gradually transitioned to the EHS Officer during the first six months of construction. Thereafter, the EHS Officer will assume the role of EHS Manager for the remainder of the construction phase and for continuation into the operational phase.

Community Liaison Officer

The Community Liaison Officer (CLO) will be appointed by the Consortium and will be responsible for grievances, and will hold/own a grievance log to manage and resolve them with support from the EHS Manager and Project Manager. The CLO will also be responsible for communication between the Project and non-governmental stakeholders e.g. members of local communities. The CLO will report directly to the EHS Manager.

Employees

Key responsibilities of each Project employee include:

- Reading and understanding the requirements contained in this ESMM framework and ESMMP;
- Attending EHS training as required;
- Being responsible for observing measures for their own safety and for others who may be affected by their acts or omissions;
- Co-operating with the Consortium management on environmental, social, health and safety related measures;
- Adhering to safety rules at all times;
- Specific responsibilities as defined by the ESMMP;
- Seeking out hazards and reporting them for correction;
- Intervening when they come across unsafe work/conditions and use right/ obligation to stop work, unless act/condition is safe; and
- Adhering to EHS rules at all times.

9.4.2 Contractor Management

A Contractor Management Plan will be developed and the management and mitigation actions identified in Section 9.4.10 will form part of this plan.

9.4.3 Inspection, Monitoring and Audit

Inspection and monitoring of the environmental, social, health and safety impacts of the Project activities will increase the effectiveness of the ESMMP. Through the process of inspection and auditing, the Project will ensure that the conditions

stipulated in various permits are complied with. The inspection and audits will be done by the Project HSE staff in coordination with contractors and any other external agencies identified. The entire process of inspections and audits should be documented. The inspection and audit findings are to be implemented by the Project staff in-charge in their respective areas.

9.4.4 Reporting and Review

The Project will develop and implement a programme of reporting through all stages of the Project cycle. Delegated personnel shall be required to fully comply with the reporting programme including both timely submissions of reports and acceptable level of detail. Reporting will include maintaining an incident record register and EHS performance reports (weekly, monthly, quarterly, half yearly, yearly etc.).

9.4.5 Documentation and Record Keeping

Documentation is an important step in implementing the ESMMP. The Consortium will establish a documentation and record keeping system to ensure recording and updating of documents. Responsibilities have to be assigned to relevant personnel for ensuring that the ESMMP documentation system is maintained and that document control is ensured through access by and distribution to, identified personnel in form of the following:

- Environment, Social, Health and Safety Management System manual;
- Legal register;
- Operation control procedures;
- Work instructions;
- Incident reports;
- Emergency preparedness and response procedures;
- Training records;
- Monitoring reports;
- Auditing reports; and
- Complaints register and issues attended/closed.

9.4.6 External Reporting and Communication

The EHS Manager is the responsible person for ensuring that communication with regulatory agencies and stakeholders are maintained as per the requirements of all Statutory Acts, Regulations and Codes of Practice. All complaints and enquiries are to be appropriately dealt with and records are to be maintained in a Complaint/Enquiry Register by the responsible member of the EHS team. All communications made to regulatory agencies should also be reported to the Consortium's EHS Manager.

9.4.7 Internal Reporting and Communication

Inspection and audit findings, along with their improvement program, are to be regularly reported to the senior management for their consideration. The same are also to be communicated within the staff working on the Project. To maintain an open communication between the staff and management on EHS issues the following communication methods will be adopted:

- Team briefings;
- On-site work group meetings;
- Work specific instructions; and

- Meeting with stakeholders.

9.4.8 Review and Amendments

As previously mentioned, the ESMMP acts as an environmental, social, health and safety management tool which needs to be reviewed periodically to address changes in the organisation, process or regulatory requirements. Following a review, the EHS Manager will be responsible for making the amendments in the ESMMP and seeking approval from the Project Manager, and where necessary, the CEO of FMO as EHS Lead of the Consortium. The amended ESMMP will be communicated to all staff to which changes are relevant.

9.4.9 Project Plans

The ESIA process has identified plans (and policies) that will be prepared by the Consortium and its chosen contractor prior to the commencement of construction as part of an integrated ESMMP system. Some of these plans maybe combined where appropriate;

- Construction Management Plan;
- Hazardous Materials Management Plan;
- Water and Wastewater Management Plan;
- Waste Management Plan;
- Traffic Management Plan;
- Emergency Preparedness and Response Plan;
- Chance Finds Procedure;
- Biodiversity Action Plan;
- Workforce Code of Conduct;
- Stakeholder Engagement Plan (including Grievance Mechanism);
- Influx Monitoring Programme;
- Community Development Plan;
- Human Resources Policy and Management Plan (including Workers Grievance Mechanism and Local Procurement Policy);
- Human Rights Plan;
- Security Management Plan;
- Explosives: Transport, Storage, Handling, Charging and Blasting Plan; and
- Camp Management Plan (including food hygiene procedure).

9.4.10 ESIA Commitments and Actions

This section summarizes the outcomes of the ESIA process, tabulating the commitments and actions that need to be taken forward through the next stages of the Project to ensure appropriate mitigation and management of Project related environmental and social impacts.

The commitments and actions in Table 9.1 form the basis for the development of the overarching ESMMP and related plans and policies. The following are listed alongside each commitment or action: the party responsible for implementation; the means of verification; timings and frequency; and reporting requirements and applicable standards.

The responsibility for implementation of ESMMP will primarily lie with the Consortium EHS Department.

Table 9.1 Summary of ESIA Commitments and Actions

Project activity	EHS and/or safety aspect and potential effect being addressed	ESIA reference	Specific commitment/action	Party responsible for implement-tation	Means for verification	Timing and frequency	Reporting requirements and applicable standards
CONSTRUCTION AND OPERATION PHASE							
Environmental, social, health and safety (EHS) training of construction staff to minimize the occurrence of environmental impacts to the work area	Management of environmental, social, health and safety effects	Sections 7.11, 7.13	1. All staff are to receive EHS training through an EHS induction programme and are to be made aware, and understand the requirements of this ESMM framework and subsequent ESMMP. Refresher EHS training will be available as and when required. 2. All staff are to be made aware, and understand their individual roles and responsibilities in achieving compliance with the ESMM framework and ESMMP. 3. EHS awareness training should include the following as a minimum: - description of significant EHS impacts related to their work activities; - mitigation measures to be implemented when carrying out specific activities; - emergency preparedness and response plan; - water and wastewater management plan; - construction management plan, including waste procedure; - hazardous materials management plan; - workforce code of conduct, including sanitation procedure and disease prevention; and - Chance Find Procedure for archaeological/ historical sites discovered during construction.	Consortium EHS Manager	A record of all environmental awareness training undertaken as part of the ESMMP must be available. An attendance register of all staff that have received the training must be available.	Routine as required during construction and operation.	Internal reporting only.
Emergency preparedness and response to unplanned events	Appropriate response to unplanned emergency events	Section 8 Unplanned Events	4. Consortium to develop a site specific Emergency Preparedness and Response Plan (EPRP) including but not limited to: construction traffic incidents, aviation incidents, disease outbreak and natural disasters. The EPRP should also include a plan for communicating with	Consortium EHS Manager with Project Manager	Production of an EPRP and review of implementation, follow up reports.	Follow EPRP in an emergency situation throughout	Internal reporting. IFC General EHS Guidelines

Project activity	EHS and/or safety aspect and potential effect being addressed	ESIA reference	Specific commitment/action	Party responsible for implement-tation	Means for verification	Timing and frequency	Reporting requirements and applicable standards
			the local communities on the appropriate procedures to follow during unplanned emergency events. 5. Implement a training program to familiarise staff with emergency procedures and practices for all phases.			construction and operational activities.	for Community Health and Safety outline the requirements for an EPRP.
Oil spill response	Minimise the risk of unplanned events and accidental spills, and the effects arising from their impacts on soil, surface water, habitat and local flora/fauna	Section 8 Unplanned Events	6. A spill response procedure will be incorporated into the Emergency Preparedness and Response Plan (EPRP) which includes community sensitisation/ notifications when required. The Project will maintain spill clean-up and response capability adequate for addressing spills for all phases of the Project. All spills will be immediately contained and cleaned up. Contaminated areas will be remediated and post remediation verification will be carried out. 7. The spill response procedure should contain the following: - response strategies for coordinated response to a spill; - internal organization and responsibilities; - reporting requirement; - spill response resources; - commitment to train personnel to conduct fuel and chemical handling according to formal procedures to reduce risk of accidental releases and fire and explosion hazards; - conduct regular drills for practicing spill response actions; - maintenance of any storage containers, treatment plants, pipes and components to be carried out regularly;	EPC Site Manager with support from Consortium EHS Manager	Production of an oil spill response procedure for inclusion in the EPRP and conduct regular visual inspections of equipment, machinery and storage tanks. Records of incidents as they occur.	Develop EPRP prior to construction. Daily visual inspection of storage tanks and fuelling equipment. Review of incident as and when they occur. Regular maintenance of equipment.	Internal reporting. In case of a major spill, the IFC General EHS Guidelines on Community Health and Safety and Occupational Health and Safety.

Project activity	EHS and/or safety aspect and potential effect being addressed	ESIA reference	Specific commitment/action	Party responsible for implement-tation	Means for verification	Timing and frequency	Reporting requirements and applicable standards
			- provide firefighting equipment around the fuel tank; - all spills to be immediately contained and cleared up - proper wash down of the area and waste water to be conveyed to an appropriate waste management site for treatment; and - if necessary, contaminated areas will be remediated and post remediation verification will be carried out. 8. Oil will be stored at designated areas with secondary containment. 9. Refuelling of equipment and vehicles will be carried out in designated areas on hard standing ground to prevent seepage of any spillages to ground. Collection systems will be installed in these areas to manage any spills, fuels will be collected and either reused, treated by incineration or removed by a local contractor. Drip trays must be used when refuelling and servicing vehicles or equipment, where it is not on a hard standing surface. 10. Hazardous material storage will be on hard standing and impermeable surface and the bulk storage facility will be bunded. The Project will restrict storage and handling of hazardous materials and fuels to bunded areas of sufficient capacity to contain a release.				
Water Management	Minimise and manage pressure on water resources	Section 7.4 Surface Water and Groundwater	11. A Water Resources Study to confirm Office National de l'Eau et de l'Assainissement de Djibouti's (ONEAD) statement that the source of water used for the Project is sufficient to supply to water required for the Project and not impact supply to other parties. Such a study should include a review of the design/feasibility reports of the Transboundary Ethiopia-Djibouti Drinking Water Supply Project to assess the sustainable yield of the well-field. Another meeting with ONEAD should also be	Consortium EHS Manager	Production of water resources study Production of a Water and Wastewater Management Plan	Prior to construction Monitoring of water resource and usage throughout construction	Internal reporting only

Project activity	EHS and/or safety aspect and potential effect being addressed	ESIA reference	Specific commitment/action	Party responsible for implement-tation	Means for verification	Timing and frequency	Reporting requirements and applicable standards
			conducted to confirm further details of their supply (such as individual borehole yield, water availability and when the other planned boreholes will come on line). 12. A Water Management Plan will be developed and implemented.			phase	
Pre-Construction through to Operation	Biodiversity Net Gain	Section 7.6 Biodiversity	13. The Consortium will develop and implement a Biodiversity Action Plan (BAP) for the Project 14. Commission surveys for Djibouti whip snake in suitable habitat around Arta where the specimens have been recorded, and in five other areas of suitable habitat in Djibouti, in collaboration with Nature Djibouti, or IUCN Reptile Specialist Group. 15. Fund the preparation of materials to assist in the IUCN evaluation of the species and the preparation of a species action plan, if the species is found to be threatened. 16. Commission surveys of *Aloe ericahenriettae* on suitable lava flow habitat around Lake Ghoubet. Fund the gathering of viable seed or cuttings to take the species into cultivation at a suitable botanic garden, in collaboration with Nairobi Botanic Garden or another suitable organisation.	Consortium Project Manager	Production of Project BAP	Production of BAP within 1st year of construction	Produce BAP as part of ESIA Supplementary Information Package or Addendum IFC PS 6 stipulates the requirements for protecting and conserving biodiversity and managing living natural resources.
Combustion emissions from construction plant and onsite traffic.	Air quality - good construction site practice	Section 7.5 Air Quality	17. Use of modern equipment and vehicles meeting appropriate emissions standards, and regular preventative maintenance (in line with manufacturer's recommended maintenance schedules, taking into account intensity of use and operating environment).	EPC Site Manager with support from Consortium EHS Manager	Visual inspection of maintenance records and on site equipment.	Monthly inspection and review of maintenance records.	Reporting to the Consortium on a monthly basis, internal reporting only.
Dust emissions from construction activities, plant,	Air quality - good construction site practice	Section 7.5 Air Quality	18. Excavation, handling and transport of erodible materials shall be avoided under high wind conditions where practicable. Where not feasible, transported erodible materials shall be covered.	EPC Site Manager with support from Consortium	Visual inspection on a daily basis.	Continuously throughout construction activities.	Internal reporting only, there are no applicable air

Project activity	EHS and/or safety aspect and potential effect being addressed	ESIA reference	Specific commitment/action	Party responsible for implement-tation	Means for verification	Timing and frequency	Reporting requirements and applicable standards
offsite traffic on unsealed roads.			19. Where possible, soil stock piles should be located in sheltered areas where they are not exposed to wind. If not feasible, stock piles of soil (or other erodible materials) should be securely covered. 20. Vehicle speeds shall not exceed 40 km/hr along dust roads or 20 km/hr along unconsolidated areas. 21. Appropriate dust suppression methods should be used when dust generation is unavoidable (in prolonged periods of dry weather) in construction areas and on access tracks in line with IFC EHS general guidelines.	EHS Manager			quality standards for construction activities.
Land clearance, groundworks and site preparation	Biodiversity - direct loss of habitat and species	Section 7.6 Biodiversity	22. Turbine bases and access tracks have been sited outside of wadi channels wherever practicable to do so. 23. All turbines will be set back 200 m from escarpments which may provide roosting habitat for bats. 24. Where access tracks cross wadi channels they should be constructed to allow free drainage to not significantly prohibit flow of water. 25. Habitat loss will be limited to the minimum needed for safe implementation of the works. 26. Habitat disturbed during construction in areas not required for permanent works, will be fully restored or re-created on completion of the works. Restoration will be progressive to minimise soil storage times. 27. Internal tracks will be constructed as soon as possible and tracking of vehicles on site will be avoided outwith these roads, so that adjacent vegetation and soil is left undisturbed and uncompacted as far as possible. 28. For transmission line construction, pylon locations will be sited to reduce vegetation clearance and access tracks will be sited to minimise loss of trees. 29. Vehicles and access for the transmission line will be	Project Design Team and EPC Site Manager with support from Consortium EHS Manager	EPC Site Manager with support from Consortium EHS Manager and Lead Engineer to make observations and report to the Consortium.	During design Monitor during site preparation and through construction activities	Internal reporting only

Project activity	EHS and/or safety aspect and potential effect being addressed	ESIA reference	Specific commitment/action	Party responsible for implement-tation	Means for verification	Timing and frequency	Reporting requirements and applicable standards
			restricted to the right of way and access tracks. 30. The ESMMP will detail best practice measures including those listed above and others to be implemented, to reduce the risk of secondary impacts to habitats and fauna species including to control dust etc. 31. Borrow pit locations will be sited away from vegetated areas.				
Land clearance, groundworks, site preparation and construction	Biodiversity – activity and noise resulting in disturbance to fauna species	Section 7.6 Biodiversity	32. Construction activity will be undertaken sequentially with access to other areas of the site controlled to reduce disturbance. 33. Access to parts of the site not required for construction will be controlled to reduce disturbance from movements of construction vehicles and workforce. 34. The EPC contractor will detail best practice measures in the EMMP, including those above and best practice noise reduction measures, to be implemented to reduce the risk of disturbance to non-avian fauna species. 35. Avoid blasting and rock hammering during the breeding bird season, where practicable.	EPC Site Manager with support from Consortium EHS Manager	Visual inspection on a daily basis	Continuous through construction activities	Internal reporting only. IFC PS 6 stipulates the requirements for protecting and conserving biodiversity and managing living natural resources.
Land clearance, groundworks, site preparation and construction	Biodiversity - vehicle movements and construction activity resulting in direct mortality of species	Section 7.6 Biodiversity	36. Undertake reptile check surveys of the Project site prior to the start of construction to check for the presence of Djibouti whip snake. 37. Check surveys for nesting birds and roosting bats should be undertaken prior to clearance of any vegetation. If active nests are recorded, clearance of the vegetation should be delayed until nesting has completed (i.e. chicks have fledged). 38. Site speed restrictions will be implemented, which all vehicle drivers must to adhere to. 39. Undertake driver awareness training on the species present in the area that may be affected by vehicles	EPC Site Manager with support from Consortium EHS Manager	Visual inspection for mortalities on a daily basis	Continuous through construction activities	Internal reporting only. IFC PS 6 stipulates the requirements for protecting and conserving biodiversity and managing living natural resources.

Project activity	EHS and/or safety aspect and potential effect being addressed	ESIA reference	Specific commitment/action	Party responsible for implement-tation	Means for verification	Timing and frequency	Reporting requirements and applicable standards
			collisions (particularly snakes and other reptiles basking on roads). 40. Implement a logging system requiring construction workers and drivers to report any sightings or collisions of fauna species and allow additional mitigation to be identified and implemented as necessary (e.g. use of speed bumps near areas identified as high risk, fencing, light reflectors). 41. Check surveys of construction areas each morning to check for any reptiles, particularly snakes, which may have entered construction areas, trenches etc. overnight. Where practicable, prevent reptiles, particularly snakes, from entering any construction equipment or project components by covering entrances. 42. Develop a reptile management procedure as part of the BAP to evaluate any reptiles recorded during check surveys, and if safe to do so, capture and translocate individuals to suitable habitats off site.				
Movement of construction vehicles, equipment and materials into the Project area	Biodiversity - introduction of invasive species to the Project area and surrounds	Section 7.6 Biodiversity	43. Check origin of equipment and materials used on site. 44. Implement invasive species management procedure as part of BAP, including cleaning of equipment prior to shipping to site.	EPC Site Manager with support from Consortium EHS Manager	Visual inspection on a daily basis	Continuous through construction activities	Internal reporting only. IFC PS 6 stipulates the requirements for protecting and conserving biodiversity and managing living natural resources.
Presence of	Biodiversity –	Section 7.6	45. All food and refreshment for construction workforce will	EPC Site	Visual inspection on a	Continuous	Internal

Project activity	EHS and/or safety aspect and potential effect being addressed	ESIA reference	Specific commitment/action	Party responsible for implement-tation	Means for verification	Timing and frequency	Reporting requirements and applicable standards
construction workers	increased hunting and collecting pressure on native species	Biodiversity	be provided by the Project. 46. Welfare and first aid facilities will be provided on site during construction. 47. Implement a strict prohibition on contractors and construction workforce from purchasing food or traditional medicine items from local communities. 48. Undertake wildlife awareness training for contractors to highlight the threats to wildlife from hunting to provide food and traditional medicines.	Manager with support from Consortium EHS Manager	daily basis	through construction activities.	reporting only.
Presence of construction workers	Biodiversity – attraction of wildlife and scavengers to the Project site	Section 7.6 Biodiversity	49. All waste produced on site will be correctly stored and disposed of off-site. 50. No edible waste (e.g. remains of animal carcasses, bones etc.) will be left on site during construction	EPC Site Manager with support from Consortium EHS Manager	Visual inspection on a daily basis	Continuous through construction activities.	Internal reporting only.
Presence of construction workers	Community cohesion - impacts to community dynamics and networks	Section 7.13 Community Health, Safety and Security	51. The Consortium will recruit a Community Liaison Officer 52. The Consortium will develop a Stakeholder Engagement Plan (SEP) to ensure ongoing communication with project affected communities and to manage expectations in relation to employment and compensation. 53. Ensure ongoing communication with local leaders, in the form of weekly meetings, to capture information in relation to conflicts resulting from project activities and help to resolve them. 54. Communication of jobs and labour requirements in advance of construction to manage expectations 55. The Consortium will develop and implement the following: - Community Grievance Mechanism - Workforce Code of Conduct and Induction Programme	EPC Site Manager with support from Consortium Community Liaison Officer.	Community liaison and grievance records.	Continuous through construction activities.	Internal reporting only.

Project activity	EHS and/or safety aspect and potential effect being addressed	ESIA reference	Specific commitment/action	Party responsible for implement-tation	Means for verification	Timing and frequency	Reporting requirements and applicable standards
			- Community Development Plan - Human Resources Policy and Management Plan - Livelihood Restoration Framework 56. Track grievances related to construction activities and adjust mitigation/management measures accordingly where necessary.				
Presence of workforce and construction activities	Community health, safety and security – wellbeing of workforce	Section 7.13 Community Health, Safety and Security	57. Recruitment of an EHS Officer 58. Daily / weekly health and safety toolboxes 59. Installation of clear and visible signs placed across Project site, along roads. Signs to be explained by CLO 60. Provision of potable water to workers 61. Worker contracts outlining health and safety rights 62. The Consortium will develop and implement: - Worker Grievance Mechanism - Workforce Code of Conduct - Traffic Management Plan - Stakeholder Engagement Plan - Emergency Response and Preparedness Plan - Security Management Plan - Human Resources Management Plan - Camp Management Plan - Human Rights Policy	EPC Site Manager with support from Consortium EHS Manager and Community Liaison Officer	Community liaison and grievance records. Contractor management system and contractor auditing.	Continuous through construction activities.	Compliance with Djibouti laws and regulations and UN Voluntary Principles for Security and Human Rights
Presence of construction workers	Pressure on public services and infrastructure	Section 7.14 Pressure on Public Services and Infra-structure	63. Construction camp will have health and waste facilities on site to alleviate pressure on local facilities, including: - A site clinic to provide day-to-day and emergency medical care; and - Provision of potable water for all workers, including contract workers. 64. The Consortium will develop and implement the	EPC Site Manager with support from Consortium EHS Manager and Community Liaison Officer	Community liaison and grievance records	Prepare plans prior to start of any works. Monitor during construction activities.	Compliance with Djibouti laws and regulations and UN Voluntary Principles for Security and

Project activity	EHS and/or safety aspect and potential effect being addressed	ESIA reference	Specific commitment/action	Party responsible for implement-tation	Means for verification	Timing and frequency	Reporting requirements and applicable standards
			following: - Camp Management Plan - Waste Management Plan - Water Management Plan - Influx Monitoring Programme - Influx Management Plan (if influx is identified as a growing concern during monitoring programme) - Stakeholder Engagement Plan				Human Rights
Presence of construction workers	Community health and wellbeing - increase in communicable and non-communicable diseases, including sexually transmitted infections/HIV	Section 7.13 Community Health, Safety and Security	65. Engage with local health workers (if available) to develop and implement a sensitisation plan regarding sexual health as well as distribution of contraceptives 66. The Consortium will develop and implement the following: - Workforce Code of Conduct (in relation to worker-community interaction) - Grievance Mechanism - Camp Management Plan (including food hygiene procedure) - Emergency Response and Preparedness Plan - Worker Health and Safety Induction Programme 67. Track grievances related to worker-community interaction and health issues (both real and perceived) in relation to construction activities and adjust mitigation accordingly in consultation with the complainant where appropriate. 68. The Project will adhere to WHO recommended food hygiene standards for on-site catering.	EPC Site Manager with support from Consortium EHS Manager and Community Liaison Officer	Community liaison and grievance records	Continuous through construction activities	Internal reporting only
Construction workforce	Employment, procurement and the economy -	Section 7.11 Employment, Procurement	69. The following will be developed and implemented: - Worker Grievance Mechanism - Human Resources Management Plan	Consortium EHS Manager	HR records on the percentage of local versus non-local employment	Pre-construction and throughout	National labour policy and International

Project activity	EHS and/or safety aspect and potential effect being addressed	ESIA reference	Specific commitment/action	Party responsible for implement-tation	Means for verification	Timing and frequency	Reporting requirements and applicable standards
	local employment	and the Economy	- Human Rights Policy		Monitoring of local recruitment procedure Grievance records	construction activities	Labour Organisation Requirements Worker contracts in compliance with ILO core conventions and IFC PS2
Procurement of construction materials and supplies	Employment and economy - increase in business for shops and service providers	Section 7.11 Employment, Procurement and the Economy	70. The Consortium will develop a Local Procurement Policy within the Human Resources Policy and Management Plan, including provisions for local content in procurement and recruitment processes. 71. Review and monitoring of supply chain, in particular child labour and human rights issues.	EPC Site Manager	Records of procurement process and employees (including sub-contractors)	Continuous through all Project phases	Internal reporting only.
Land clearance, groundworks and site preparation	Land use and livelihoods - temporary loss of access to land	Section 7.12 Land Use and Livelihoods	72. Engagement with local land users and customary authorities (Okal General) 73. The Consortium will develop and implement the following: - Stakeholder Engagement Plan - Livelihood Restoration Framework	EPC Site Manager with support from Consortium Community Liaison Officer	Community liaison and grievance records.	Preconstructi on	Internal reporting only.
Land clearance, groundworks and site preparation	Cultural heritage- impacts on potential cultural heritage assets and traditional practices	Section 7.17 Cultural Heritage	74. Once the Project design is finalised, further archaeological site inspection must be undertaken before commencement of works to ensure all potential cultural heritage assets (i.e. rock structures) are avoided or, if unavoidable, these potential assets are assessed for their cultural heritage value and appropriate management measures are implemented (if required). 75. A Chance Finds Procedure will be developed and	EPC Site Manager and Consortium EHS Manager	Production of Chance Finds Procedure and records of finds	Preconstructi on and during construction	Internal reporting only unless cultural heritage assets are found (MHUE to be informed).

Project activity	EHS and/or safety aspect and potential effect being addressed	ESIA reference	Specific commitment/action	Party responsible for implement-tation	Means for verification	Timing and frequency	Reporting requirements and applicable standards
			implemented. The procedure must be informed by a prior site survey of the turbine locations and access roads by an experienced archaeologist.				
Land clearance, groundworks and site preparation	Landscape and visual – impact to landscape character and visual amenity	Section 7.15 Landscape and Visual	76. Selective vegetation clearance only where necessary. 77. Soil/landscape resources disturbed will be reinstated (where practicable) to complement existing conditions.	EPC Site Manager and Consortium EHS Manager	Visual inspection on a daily basis.	Continuous through construction activities.	Internal reporting only.
Site preparation and construction	Noise and vibration - impacts from construction equipment causing nuisance to local communities	Section 7.10 Noise	78. Construction equipment and mobile vehicles will be selected according to best available practices for noise control and management. 79. Construction equipment and mobile vehicles will be equipped with abatement devices (e.g., mufflers, noise enclosures for generators). 80. Regular maintenance of construction equipment and vehicles will be ensured, in accordance with supplier specifications to prevent increases in noise emissions. 81. Fixed plant items (i.e., generator) will be located as far from the nearest potential sensitive receptors as possible, orienting it to direct emissions away from receptors, and using on-site structures and terrain to screen sensitive locations wherever practicable. 82. The noisiest construction activities (e.g., excavation of foundations) will be planned to occur outside sensitive daytime hours. 83. Local community will be informed about the scheduled works which are predicted to have increased noise impacts. 84. Vehicle's speed will be reduced when crossing or in proximity of settlement or isolated dwellings; and 85. Regular maintenance of trucks and access roads will be	EPC Site Manager with support from Consortium Community Liaison Officer	Grievance reports	At least weekly	Reporting to Consortium on a monthly basis, internal reporting only.

Project activity	EHS and/or safety aspect and potential effect being addressed	ESIA reference	Specific commitment/action	Party responsible for implement-tation	Means for verification	Timing and frequency	Reporting requirements and applicable standards
			ensured. 86. The ESMMP will detail best practice measures including those above and others (once detailed technical design known) to be implemented to reduce the risk of noise impacts.				
Blasting for construction of turbine foundations (if required)	Noise and vibration - impacts from construction equipment causing nuisance to local communities	Section 7.10 Noise	87. All necessary precautions and good practice will be used to reduce any unnecessary damage or noise nuisance. In particular, the Project will develop and implement an Explosives: Transport, Storage, Handling, Charging and Blasting Plan. Typical blast design mitigation and management measures shall be included, such as: - Limiting any blast events to standard or approved hours (i.e., no blasting will be undertaken at night); - Maximising the distance from the blast site to receptors; - Minimising the MIC (Maximum Instantaneous Charge) value that is incorporated into the design; - Minimising the number of blast events that occur; - Assessing and documenting the condition of existing adjacent structures prior to blasting; - Controlling access to site and cordoning off areas where explosives are being used (to be determined by EPC contractor); - Notifying the local community in advance of blasting programme; and - Conducting a monitoring survey during the occurrence of blast events at the nearest receptors to monitor the levels of airblast and vibration caused by blasting and use the results as necessary to design future blasting to avoid significant impacts.	EPC Site Manager with support from Consortium Community Liaison Officer.	Production of blast design programme Grievance reports	Dependent on blasting programme	Reporting to Consortium on a monthly basis, internal reporting only.

Project activity	EHS and/or safety aspect and potential effect being addressed	ESIA reference	Specific commitment/action	Party responsible for implement-tation	Means for verification	Timing and frequency	Reporting requirements and applicable standards
Project traffic movements	Traffic and transport – impacts on traffic function and road infrastructure	Section 7.16 Traffic	88. The Consortium will prepare a Routing Study to identify the detailed route from Doraleh Port (or alternate port) to the Project site, and to identify specific road upgrades, including those necessary to accommodate oversize vehicles. 89. Construct temporary bypasses or other adaptations at key locations to facilitate transport of construction materials and turbine components – alterations to the road infrastructure should avoid, where practicable, economic impacts or physical resettlement. 90. Coordination between the Project proponent and the government agencies responsible for road maintenance to identify necessary road repairs prior to and during Project construction. 91. Repair of any damaged road surfaces as needed following completion of the construction phase, or financial considerations (i.e., bonding) to enable government agencies to complete these repairs.	Project Design Team EHS Manager and EPC Site Manager.	Design checks Grievance records during construction	Project design and during construction	Carried out as part of construction procedures.
Project traffic movements	Safety and security - road safety issues	Section 7.13 Community Health, Safety and Security and Section 7.16 Traffic	92. The Consortium will develop and implement a Traffic Management Plan to minimise risk to road users (e.g. Project equipment will be transported at night when fewer road users) and road closures will be conducted outside of peak hours. 93. Speed limits will be enforced and monitored along transportation routes. 94. Notify communities of when construction traffic (particularly oversized loads) will be transported through or close to residential areas for example We'a and Cité Moumina. 95. Carry out education programme in local communities and in schools in the Project area and transportation route regarding hazards associated with project	Consortium Project Manager with EHS Manager and EPC Site Manager	Traffic Management Plan will be developed as part of internal procedures. A record of awareness training undertaken as part of the traffic management plan must be available. Grievance records during construction	Continuously throughout construction phase.	No reporting required, will be carried out as part of normal construction procedures.

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			machinery and construction activities, as well as signage as part of the Stakeholder Engagement Plan.				
Project design	Surface water - permanent disturbance of surface water flows	Section 7.4 Surface Water and Ground Water	96. All Project components (permanent and temporary) should be sited outside of wadi channels wherever practicable to do so. 97. Where a Project component such as an access track crosses a wadi channel it should be constructed to allow free drainage to not significantly prohibit flow of water.	Project Design Team	Pre-construction review of Project layout	During site preparation	Internal reporting only.
Project design and construction	Surface water - contamination	Section 7.4 Surface Water and Ground Water	98. Suitably designed sewage management and effluent disposal for construction camp facilities. 99. Implement good site management, construction practices and pollution prevention/control measures.	EPC Site Manager	'As built drawings' and inspections by Consortium EHS Manager	Continuously throughout construction phase.	Internal reporting only.
Production of construction waste	Waste management and facilities – inundation of local waste facility or causing pollution if not being properly disposed of (i.e. fly tipped)	Section 7.14 Pressure on Public Services and Infra-structure	100. A detailed assessment will be undertaken to identify suitable waste management facilities or contractors suitably qualified to process waste. 101. A Waste Management Plan will be prepared (following waste hierarchy), supported by staff training. 102. Use of authorised contractors and waste management facilities for hazardous and any other wastes which the project cannot dispose of safely.	EPC Site Manager	Visual inspections Training records Records in the form of chain of custody documents	Plans prepared prior to construction Routine weekly checks of waste management through construction Conduct waste audit annually	IFC General EHS Guidelines: Waste Management (Section 1.6) sets out requirements for the management of general and hazardous wastes excluding waste management facilities. IFC General

Project activity	EHS and/or safety aspect and potential effect being addressed	ESIA reference	Specific commitment/action	Party responsible for implement-tation	Means for verification	Timing and frequency	Reporting requirements and applicable standards
							EHS Guidelines: Construction & Demolition gives examples of common hazardous and non-hazardous solid waste generated at construction and decommissioning sites.
Turbine operation	Biodiversity – bird collision mortalities with operating turbines	Section 7.8 Biodiversity	103. Micro-siting of turbines at least 200 m from escarpments. 104. Late spring and early breeding season vantage point survey during April – June 2019. 105. Autumn vantage point surveys during September, October and November 2018. 106. Breeding bird surveys during April – June 2019. 107. Egyptian vulture surveys should be undertaken during the breeding and wintering seasons to identify the locations of breeding territories and key feeding areas in the vicinity of the Project to inform adaptive management. 108. Undertake bat foraging and commuting activity surveys using walked, or driven transects and acoustic detectors 109. Undertake bat acoustic detector survey to understand bat activity (at rotor height if practicable) 110. Undertaken roost identification and characterisation	Project Design Team, Consortium Project Manager with EHS Manager and Site Manager.	Consortium to engage an expert to periodically assess bird / bat status. The expert shall also train the operational staff at site to address the incidents of bird strike / injury. Production of baseline survey reports to be submitted to MHUE as ESIA Addendum. Production of monitoring reports	Project design, pre-construction (survey work) and during operation (monitoring)	IFC PS 6 stipulates the requirements for protecting and conserving biodiversity and managing living natural resources.

Project activity	EHS and/or safety aspect and potential effect being addressed	ESIA reference	Specific commitment/action	Party responsible for implement-tation	Means for verification	Timing and frequency	Reporting requirements and applicable standards
			surveys and emergence surveys to identify important roosts within 2 km of the Project site. 111. Operational monitoring for collision mortality (carcass monitoring) for first 2 years of operation. Detection bias and scavenger removal should be taken into consideration in survey design and implementation. Searches by operations staff of roads and turbine pads should be continued for the duration of the Project. Adaptive management approach if mortality of Egyptian vultures or migratory soaring birds recorded. 112. Operational flight activity monitoring during first year of operation through vantage point surveys. Adaptive management approach if Egyptian vultures recorded using wind farm area. 113. Community engagement and awareness raising to promote changes to waste management in local communities. 114. Community engagement and awareness raising on butchery and disposal of livestock to reduce presence of birds of prey. 115. Targeted shut down on demand system will be implemented during the key autumn and spring migration months to shut down turbines to reduce collision risk. If the results of the proposed baseline surveys indicate that the site isn't important for migratory birds, the shut down on demand system will be discontinued.		Documentation of community engagement		
Presence and operation of transmission lines	Biodiversity – bird and bat collision and electrocution mortalities	Section 7.6 Biodiversity	116. Incorporate design measures into transmission line to remove electrocution risk for bats and birds. Live wires at least 2 m apart, full insulation of supporting structures, with insulators, transformers etc. pointing down from cross poles.	Project Design Team, Consortium Project Manager with	'As built drawings' will be developed as part of internal procedures.	Project design, construction phase and during	Internal reporting. Reporting to MHUE.

Project activity	EHS and/or safety aspect and potential effect being addressed	ESIA reference	Specific commitment/action	Party responsible for implement-tation	Means for verification	Timing and frequency	Reporting requirements and applicable standards
			117. Installation of bird deflectors along sections with high levels of flight activity. These should increase line visibility by thickening the appearance of the line by a minimum of 20 cm over a length of 10-20cm. 118. Markers should be moveable, of contrasting colours (e.g. black and white), contrast with the background, protrude above and below the line, and be placed 5-10 m apart 119. Removing the thin neutral or earth (shield) wire above the high voltage transmission lines where feasible, and where this is not possible, mark the line to make it more visible. 120. Where practicable, bundle high voltage wires to reduce the area and using spacers to increase visibility. 121. Minimising the vertical spread of power lines by arranging lines in a horizontal plane to reduces collision risk. 122. If practicable, arrangement of project transmission line route in parallel with physical features such as the escarpment to avoid collisions with birds 123. Monthly carcass searches under the transmission line will be undertaken for 2 years post construction. Carcass searches will include assessment of scavenger removal and searcher efficiency. If carcasses of IUCN EN or migratory soaring bird species are recorded, the Project will work with Nature Djibouti to look at additional mitigation measures.	EHS Manager and EPC Site Manager	Consortium to engage an expert to periodically assess bird / bat status. The expert shall also train the operational staff at site to address the incidents of bird strike / injury.	operation (monitoring)	IFC PS 6 stipulates the requirements for protecting and conserving biodiversity and managing living natural resources.
Construction activities	Land use and land-based livelihoods – loss of livestock		124. The Project will develop a Livelihood Restoration Plan, which will set out entitlement measures and a compensation strategy and process in the event that livestock assets are lost as a result of construction activities	EPC Site Manager and Consortium Community Liaison Officer	Ongoing liaison with affected communities Grievance records	Continuous through construction	Internal reporting only.

Project activity	EHS and/or safety aspect and potential effect being addressed	ESIA reference	Specific commitment/action	Party responsible for implement-tation	Means for verification	Timing and frequency	Reporting requirements and applicable standards
Project operation	Noise and vibration - mechanical and aerodynamic noise from turbines and emissions from substation	Section 7.10 Noise	125. Final turbine model and layout to include sufficient set-back distances from receptors to keep noise emissions within IFC standards. 126. An appropriate design of turbines will be implemented to minimise noise, including adherence to relevant international acoustic design standards. 127. Best practice approaches will be incorporated into the substation design to minimise the noise from substation operations, and in particular from transformers.	Project Design Team	Periodic noise monitoring at sensitive receptors during commissioning of windfarm	To be determined prior to operation	Operational noise of turbines does not exceed 45 dB(A)
DECOMMISSIONING PHASE							
Project de-commissioning	Community health and well-being - noise and dust nuisance	Section 7.12 Land Use and Livelihoods	128. Engage with land users and local communities regarding decommissioning activities. 129. Limit hours of work to cause minimal disturbance to nearby communities. 130. Engage with land users and local communities regarding land restoration. 131. A decommissioning management plan will be developed that includes land restoration measures.	EPC Site Manager and Community Consortium Liaison Officer	Grievance records	Continuously throughout decommissio ning phase.	Internal reporting.
Decommission-ing of turbines and associated project facilities	Safety and security - Short-term risks associated with decommissioning of turbines, including looting of waste materials	Section 7.16 Traffic	132. The Consortium will develop a Waste Management Plan for disposal of waste from decommissioning activities.	Consortium EHS Manager with Project Manager.	Decommissioning Waste Management Plan in place prior to decommissioning commencing. Clear signage following international standards. Training to contractors and	Routine weekly checks of waste management arrangements should be undertaken. Particular attention should be given to the provision of sufficient spaces,	The Consortium should ensure that the inventories are updated at least once a month. IFC General EHS Guidelines: Waste

Project activity	EHS and/or safety aspect and potential effect being addressed	ESIA reference	Specific commitment/action	Party responsible for implement-tation	Means for verification	Timing and frequency	Reporting requirements and applicable standards
					engineers on the proper handling and storage of hazardous waste. Production of hazardous and non-hazardous waste inventory. Records in the form of chain of custody documents should be kept of transfers of hazardous waste to ensure wastes are transported by suitable carriers to a permitted disposal facility.	adequacy of resources and facilities for on-site sorting and temporary storage of decommissio ning waste. Review inventory of applicable laws and regulations on a monthly basis. Routine weekly checks throughout decommissio ning. Ad hoc inspection of waste inventories.	Management (Section 1.6) sets out requirements for the management of general and hazardous wastes. IFC General EHS Guidelines: Construction & Demolition gives examples of common hazardous and non-hazardous solid waste generated at decommissioni ng sites.