AL-RAJEF 82 MW WIND POWER PROJECT

NON-TECHNICAL SUMMARY IN ENGLISH

5 May 2016

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1. INTRODUCTION

As part of Jordan's overall strategy to diversify energy resources and increase the share of renewable energy, a number of renewable energy projects have been proposed by the private sector to the Ministry of Energy and Mineral Resources (MEMR).

Green Watts Renewable Energy (GWRE) Co. L.L.C (hereafter referred to as 'the Developer') has been selected by MEMR for the development of an 82 Mega Watt (MW) Wind Power project (hereafter referred to as 'the Project') in Ma'an Governorate.

This document (the Non-Technical Summary (NTS)) provides a summary in non-technical language of the Project and specifically the findings contained in the Environmental and Social Impact Assessment (ESIA) Report, which has been submitted and approved by the Ministry of Environment (MoEnv) with an environmental permit granted in November 2015.

The ESIA Report contains more detailed information on the Project and the environmental and social issues considered (refer to Chapter 6 for details on disclosure of the ESIA report). It includes a description of the need for the Project; details of the Project and the main alternatives considered; the assessment of the potential effects from the proposed development upon the environment and community; and details of any required procedures to mitigate significantly adverse environmental effects. It includes an Environmental and Social Management Plan (ESMP) which describes the monitoring and mitigation requirements for the duration of the Project, including responsibilities and any legal requirements. The Developer commits to the ESMP.

A Stakeholder Engagement Plan (SEP) has also been developed for the Project, which describes the planned stakeholder consultation activities and engagement process.

1.1. Project Alternatives

During the Project's development, a number of alternatives have been identified and analyzed, including Project location, processes, technology and the "no project" alternative:

- MEMR has identified priority areas in Jordan for wind farm development projects. The Developer has considered other potential sites in the north and south of Jordan for the development of the Project in such priority areas, and based on a due diligence exercise the Rajef area was selected. Such sites were excluded for several factors to include but not limited to location in congested areas, rugged terrain, long distance to high voltage national grid, seismic hazards, etc.
- In addition, based on technical factors (landscape, topography, wind capacity, land issues, etc.) and consultations with several governmental and non-governmental organizations as well as local communities in the area, the final Project lands in the Rajef area were selected and leased. The leased lands for the development of the Project are presented in Figure 1 below, while additional details on the land acquisition process is provided in Section 3.4 below.
- The ESIA also investigated solar technology and thermal power plants as technological alternatives to wind power.
- Project design alternatives were also considered, which took into account technical as well as environmental and social considerations, to include but not limited to archaeology and cultural heritage and potential impacts on nearby communities (such as noise and shadow flicker).

3. PROJECT DESCRIPTION

The Project is located within the western borders of Ma'an Governorate in the South of Jordan, approximately 200km south of the capital city of Amman. More specifically, the Project site is located in the Sharah highlands – where the closest villages to the Project site are: (i) Al-Rajef and Dlaghah & Rassees both of which are located on the western border of the Project site, (ii) Taybeh which is located around 3km to north of the Project site, and (iii) Fardakh and Sadaqah located to the eastern borders of the Project site at a distance of around 2.5 and 1.5 km respectively as presented in Figure 1 below.

The Project area consists mainly of hilly areas at altitudes ranging from 1550-1700m above sea level. The Project area is characterized as being barren and heavily degraded with few vegetation strips and scattered trees of remnant forests that use to prevail in the entire mountain of Al-Rajef area.

The Project site is mainly accessed through Highway #35 (better known as the 'King's Highway'); one of the highways which connects Ma'an Governorate with the capital city of Amman in the North – but is not the major one. Highway #35 runs through some parts of the Project site. In addition, within the site there are other access roads and several additional small agricultural roads.

The Project area is approximately 7.6km^2 which will be used for the development of the 82MW Wind Farm Project. The 7.6km^2 consists of 49 parcels of land that have been leased by GWRE from the local community land owners (mainly Al-Rajef, Dlaghah and Taybeh) for the development of the Project (represented in green in Figure 1 below). Such leased lands are spread over an area of 26km^2 which represents the Project boundary (represented in blue in Figure 1 below).

In addition, the Project is located around 8km south of the Petra World Heritage Site boundary which is most notably known for the City of Petra that includes the Treasury (Khazneh) – which is located around 16km north of the Project site. The location of the Project site in relation to the Petra World Heritage Site boundary is presented in Figure 2 below.

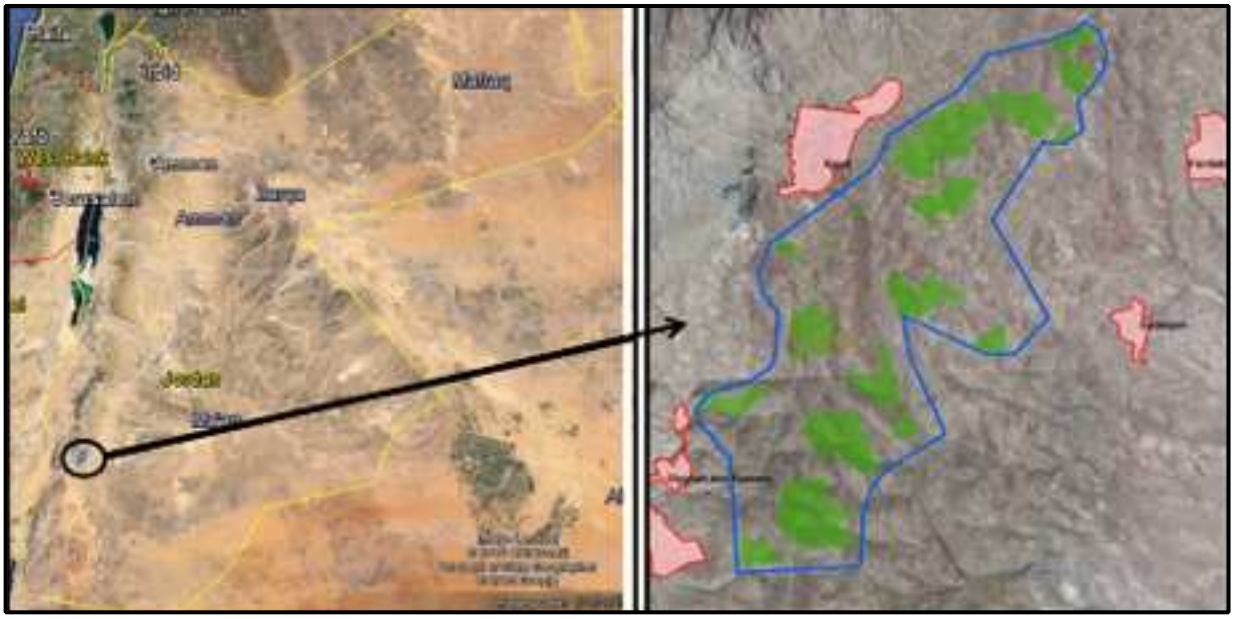

Figure 1: Overview of Project Location

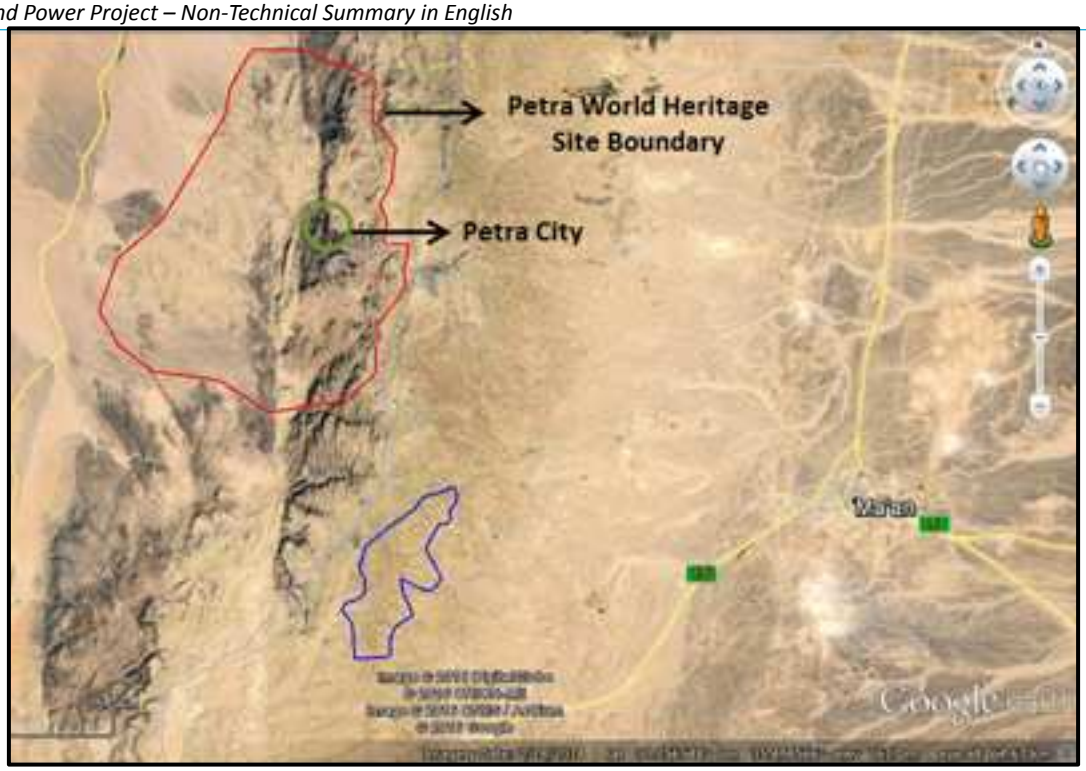

Figure 2: Location of Project Site in Relation to Petra World Heritage Site

3.1. Project Rationale

The Project will result in crucial positive environmental and economic impacts on the strategic and national level given the current challenges the energy sector in Jordan is facing. Such positive impacts underpin rationale for the project:

- The Project allows for more sustainable development and shows the commitment of the Government of Jordan to realizing its Energy Strategy and meeting the set targets for renewable energy sources;
- The Project will contribute to increasing energy security through reliance on an indigenous, inexhaustible and mostly import-independent energy resource. The expected electricity generation from the Project will serve the average annual electricity needs of more than 60,000 average local households in Jordan;
- The Project will produce clean energy which will contribute to lowering electricity generation costs when compared to the current costs associated with liquid fuels, and thus leads to a decrease in the Government of Jordan's fiscal deficit; and
- Generating electricity through wind power is rather pollution-free during operation. Compared with the conventional way of producing electricity in Jordan, the clean energy produced is expected to reduce the consumption of liquid fuels and reduce greenhouse gas emissions and air pollution. The Project will save more than 160,000 ton of CO_2 per year in Jordan.

3.2. Project Components

The key components of the Project are the wind turbines which convert the kinetic energy in wind (i.e. movement of wind) into electricity. A typical wind turbine is shown in Figure 4 below. There will be 41 turbines spread out throughout the Project site. Each turbine will be of 2.0MW capacity with a hub height of 80m, rotor diameter of 114m (or blade length of 57m) and thus a tip height of 137m.

The Project will also include underground cables which connect the wind turbines with a substation located onsite. This substation will connect to the National Grid located at around 11km to the east of the Project site. An approximately 10.5 km long 132kV overhead power line will be developed to allow this connection

by the National Electrical Power Company (NEPCO), and an initial high-level assessment of this project component has been completed in April 2016 as an addendum to the wind farm ESIA disclosure package. This power line will be subject to a further detailed Environmental and Social Impact Assessment. This will be developed by the Developer on behalf of NEPCO and in accordance with European Bank for Reconstruction and Development Policy and International Finance Corporation Standards.

The route of the transmission line has not currently been fully defined, however, it is understood that the OHL route will be within a corridor +/- 500m of the route indicated in Figure 3 and would be approximately 10.5km long.

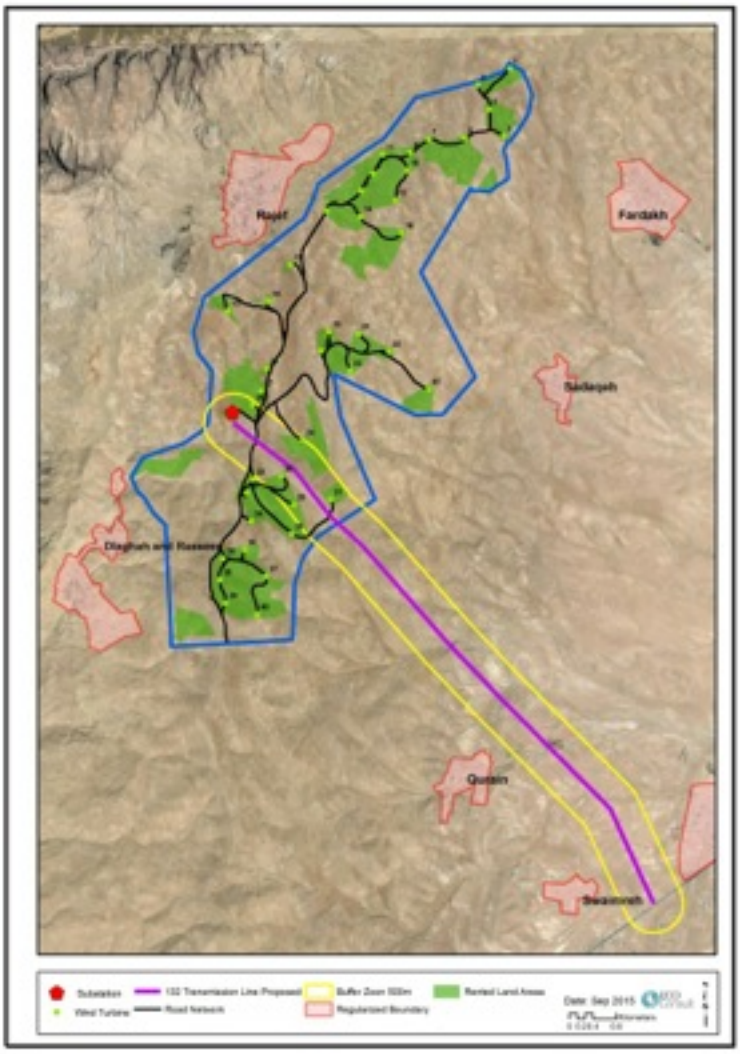

Figure 3: Project Site and Indicative OHL Route

Other buildings and infrastructure needed onsite include:

- Office buildings used for normal daily operational related work;
- A warehouse for storage of equipment and machinery;
- Crane pad next to each wind turbine to accommodate cranes for the installation of the wind turbines and for maintenance activities during operation. Each crane pad will be around 1,500m^2 in area; and
- A road network will be required for installation of the turbines during the construction process and for ease of access to the turbines for maintenance purposes during operation. The internal roads are designed to follow the existing agricultural roads within the Project area to the greatest extent possible. The road network will have a width of 6m and a total length of 28.5km.

Figure 5 below presents the layout of the various project components discussed above.

Jobs during construction will include engineers, electrical and mechanical technicians, consultants and unskilled workers (to perform site clearing, support civil works, installation, site keeping etc.). During operation, jobs will include skilled labour (such as engineers, electrical and mechanical technicians, administrative employees,) and unskilled labour (such as security personnel and drivers) for a duration of 20 years. The Developer shall provide further details on the final number of job opportunities available for each of skilled and unskilled labour during the Project phases as well as the capacity building and training programs.

3.3. Project Phases

- Planning and Construction Phase (current – June 2018): This includes preparation of a detailed design, planning and transportation of the various components to the site, and onsite preparation activities for installation of the turbines and other components. Site preparation activities will be limited to the relatively small individual footprints of the turbines and other components and will include excavations, grading, and land clearing activities.
- Operations Phase (2018- approximately 2038): This phase involves the normal daily operation of the Project and the maintenance of the turbines and all the various electrical equipment.
- Decommissioning Phase (to be determined): it is unclear whether MEMR would take ownership of the Project after 20 years and continue operating it, or whether the Project will be completely decommissioned. In the case of decommissioning of the Project, decommissioning activities could include the disconnection of the various Project components for final disposal.

Figure 4: Typical Wind Turbine with 137 m Tip Height

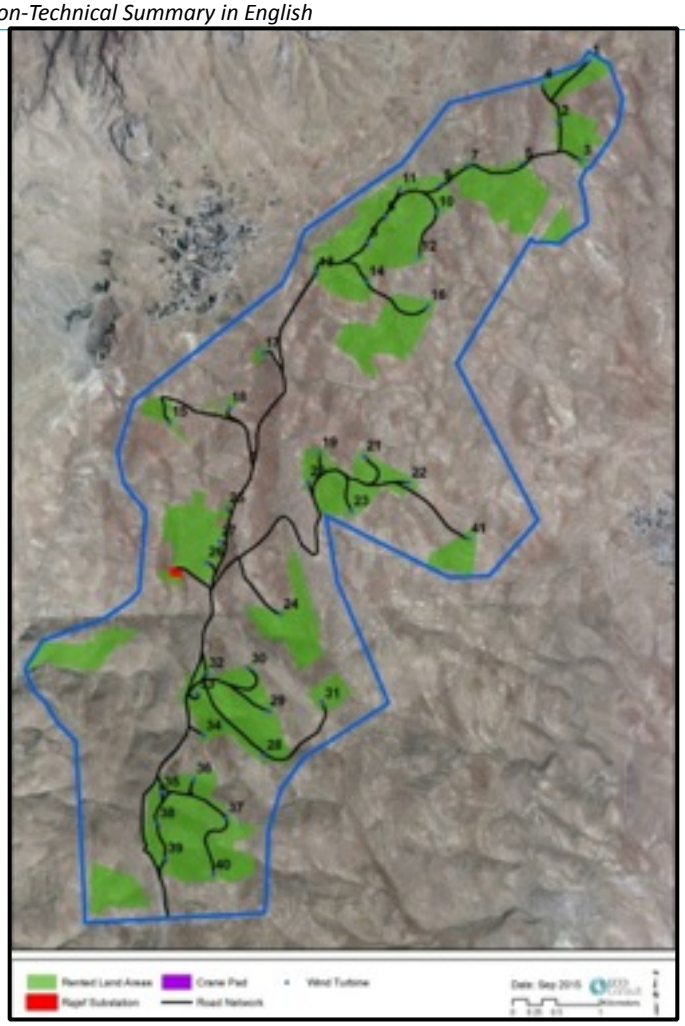

Figure 5: Layout of Project Components within the Project Site

4. ESIA, STAKEHOLDER ENGAGEMENT AND LAND ACQUISITION PROCESS

4.1. ESIA Process

The ESIA has been prepared with consideration of the:

- Jordanian environmental clearance process to obtain an environmental permit, and the legal framework including the "Environmental Impact Assessment Regulation No. (37) of 2005"; and
- European Bank for Reconstruction and Development (EBRD) 2014 Environmental and Social Policy, which includes a comprehensive set of Performance Requirements (PRs) covering key areas of environmental and social impacts and issues.

4.2. Jordanian Environmental Clearance Process

The process for environmental clearance and obtaining the environmental permit for this Project is stipulated by the "Environmental Protection Law No. (52) of 2006", "Environmental Impact Assessment Regulation No. (37) of 2005", and the "Instructions for Site Selection of Development Projects for the year 2012". This comprises of a number of key steps:

- Location/Site Approval Permit Application & Decision: The Developer applies to the MoEnv with the intention to undertake a development project and the MoEnv determines the appropriateness of the site for the proposed development.
- Screening Decision/EIA Requirement: As part of the location/site approval permit decision, the MoEnv determines whether or not an ESIA is required of the proposed development project and the nature of this report.

  To this extent, the site for the Project has been approved by the MoEnv conditional that a comprehensive ESIA study is undertaken before commencement of any construction or operational activities.

- EIA Study Phases: The ESIA comprises of 2 phases:
  - Scoping Phase: This includes the undertaking of a scoping session and submission of a Scoping Report/Terms of Reference (ToR) approved by MoEnv for the study. The scoping session for the Project was held on 3 September 2013 and the Scoping Report/ToR was submitted to the MoEnv and was approved on 3 November 2013; and
  - Assessment Phase: This includes undertaking the baseline studies, evaluation and assessment of impacts, and the development of an environmental management plan.
  - The assessment phase has been carried out in accordance with the approved ToR by the MoEnv.
- Approval of EIA*:* Upon submission of the ESIA document, the MoEnv reviews the report and either approves the study and grants the environmental clearance and environmental permit for the Project or rejects it. The ESIA has been submitted to the MoEnv and was approved with an environmental permit granted on 25 November 2015.

4.3. Stakeholder Engagement Process

Stakeholder engagement is an integral part of ESIA good practice and is a statutory requirement of the national EIA legal framework in Jordan. It is also a requirement of EBRD PR10[1], which sets out certain recommendations for stakeholder engagement to ensure that stakeholders are appropriately engaged on environmental and social issues that could potentially affect them through a process of information disclosure and meaningful consultation.

Stakeholder consultation and engagement has been carried out in accordance with the regulatory requirements in Jordan and international best practice. A Stakeholder Engagement Plan (SEP) has been

[1]EBRD Performance Requirement Ten: Information Disclosure and Stakeholder Engagement; November 2008

prepared to identify the key project stakeholders and the planned stakeholder engagement that will be implemented throughout the Project as summarized below (Refer to Chapter 6 for details on disclosure of the SEP report):

- Engagement of local community with the objective of providing information on the stakeholder engagement program, regular updates on project activities, job opportunities and recruitment procedures, etc.
- Engagement of certain stakeholder groups (to include national and local governmental entities and non-governmental organizations) regarding information or communication related to ESMP implementation amongst others.
- Engagement of other stakeholder groups whom may have an interest in the implementation of the Project (such as national and local governmental entities, non-governmental organizations, research and academic institutions, etc.) ; and
- The SEP also sets out a grievance/project complaints mechanism for all stakeholders.

4.4. Land Acquisition Process

The land acquisition process for the Project involved a due diligence exercise which involved consultations with various governmental and non-governmental organizations. The objective was to identify any high level potential impacts (including environmental and social) which could be avoided or reduced from an early stage to guide the land selection process within the Al-Rajef area.

After that, the Developer met with community leaders in the area and undertook extensive consultations and discussions with the local community of the area (mainly Al-Rajef, Dlaghah & Rassees, and Taybeh). The local community assisted the Developer in identifying lands in the area available for leasing for the proposed development. GWRE first opted for attached lands that were not spread over a big area; however this was not possible due to several factors that needed to be taken into account throughout the selection process of the lands. Such factors included but not limited to: (i) land parcels that are suitable technically for the development of the Project (in terms of landscape, topography, wind capacity); (ii) availability of contact details for owners to negotiate a land lease agreement, (iii) land parcels where the owner is willing to lease the land for the development of the Project, (iv) land parcels with uncomplicated inheritance status, and other.

Based on the above (as well as other technical factors), 49 parcels of lands were selected to be leased and the Developer signed 49 land lease agreements with the owners for 29 years (since the year 2011) and registered these leases with Department of Lands and Survey Office in Ma'an Governorate. These 49 parcels are spread over an area of 26km^2 which represents the Project boundary as presented earlier in Figure 1.

For the OHL, further site visits and consultation will be required to determine the land use activities being undertaken on site by the local population and nomadic groups. Where necessary, appropriate mitigation measures will be developed to ensure the local community and nomadic groups are not adversely affected by the OHL. Such measures are likely to include the local community and nomadic groups being able to continue with grazing and agricultural activities within the OHL route.

As detailed in the ESIA for the wind farm, land acquisitions will be required by NEPCO and will be undertaken in accordance with the requirements of the "Land Acquisition Law No. (12), 1987" and its amendments, which details a framework for the acquisition process to include advertising requirements, determination of fair compensations, negotiation processes with land owners, grievance and dispute procedures. Additionally, the General Electricity Law no. 64, 2002, and its amendments identify the land process to be followed, which largely mirror the Land Acquisition Law.

NEPCO will perform a survey to determine the best route (or options for the best route) for the OHL. The review includes an assessment of land ownership. NEPCO has a department that liaises with landowners regarding land acquisition needs.

Further detail of the process to be followed by NEPCO for determining the final OHL route design and the land acquisition and compensation process is provided below:

Acquisition and Compensation Process undertaken by NEPCO for the OHL	
(Art.6) of LAL: Marking of Expropriation on Land Registry and Preliminary Survey	▪ NEPCO will start this step in the process by submitting a copy of decision and acquisition plan to the land registry (Department of Lands and Survey (DLS)) to provide the provisional route along with a +/- 500m buffer and request the land ownership within this zone. This process generally requires around one (1) month to be completed. NEPCO already initiated this process and contacted the DLS first week of May 2016. ▪ NEPCO will compile an inventory of landholdings, crops in agricultural land, and buildings to identify a reasonable level of compensation for the land parcels along the transmission line route. ▪ NEPCO as developer of the project shall work with representatives from local entities and form a committee to identify the public benefits of the project as well as agree the appropriate level of compensation with the Project Affected Peoples (PAP's). Agencies that that could provide assistance in this as necessary include: Ministry of Finance, Ministry of Municipalities, Department of Land and Survey, Ministry of Agriculture, and Ministry of Environment.
Project (i.e. OHL) Development Process and Detailed Surveys	▪ In parallel, NEPCO announces a tender in the local newspapers requesting a proposal from a local contractor to undertake required site assessments and surveys, finalise the design, and construct the OHL. Procurement process follows government procedures and NEPCO awards the tender to the most suitable bidder. ▪ Contractor undertakes site assessments and surveys (topography, geotechnical, infrastructure and utilities...etc.). ▪ The final design shall take into account the main principle which is to avoid land acquisition of private properties to the extent possible, or minimised where unavoidable. ▪ Contractor prepares final design for the route.
(Art.4) of LAL and (Art. 43) of Electricity Law Declaration of Acquisition for Public Benefit	▪ Before undertaking any construction works, NEPCO is required to place an advert in at least two (2) daily newspapers stating that in 15 days time they will start constructing the OHL. The announcement shall identify the land parcels on which the OHL will be constructed. ▪ Land owners wanting to receive compensation are asked to submit application once OHL is energised.
Construction of the OHL	▪ After the 15 day period, the construction works are started and the final (as-built) design of the OHL is decided based on actual work on the ground as the Contractor may have to modify the designs to avoid potential obstacles. ▪ OHL is energised. ▪ Upon final authentication by the DLS and land valuation committee, an authentication of the Cabinet is required.

(Art.9and Art.10) of LAL and (Art. 44) of Electricity Law: Announcement on Decision of Expropriation and Negotiation on Compensation	▪ Land owners submit a request for compensation once OHL is energised. ▪ NEPCO will provide each PAP with a Compensation Statement that records the precise loss of property (type, physical dimensions, and replacement value) or livelihood and state the compensation due for this loss to each property holder. If the PAPs confirm the content of the Statement and his acceptance of the compensation offered, he/she will sign the Statement. ▪ According to Article 9 of the law, direct negotiation between NEPCO and land owners may be conducted until agreement is reached. However, compensation amounts are based on the land valuation and compensation amounts decided by the committee. ▪ NEPCO's land acquisition team will monitor the delivery of such funds so as to ensure that all amounts reach all intended beneficiaries. ▪ In the event that agreement cannot be found between the two parties cases are referred to the Primary Court that has jurisdiction in this area and to higher courts if necessary.

An observer from the lender team would be present with NEPCO during their detailed routing survey and in subsequent discussions on routing and monitoring activities related to the construction of the transmission line.

An initial high-level environmental and social assessment of this project component has been completed as an addendum to the wind farm ESIA disclosure package as described in Section 2 above.

5. SUMMARY OF ENVIRONMENTAL AND SOCIAL BASELINE CONDITIONS & IMPACTS

5.1. Introduction

The environmental and social impact assessment (ESIA) comprised of environmental and social baseline studies and an assessment of impacts. Mitigation measures, which are included in the ESMP, were identified for potential significant effects and the significance of residual effects determined. The impact assessment followed an assessment methodology developed to reflect current best practice.

The ESIA has provided the engineers and designers with important information regarding the sensitivities of baseline environmental and social resources that could be affected by the proposed development. The resulting design proposal has been developed to take account of these sensitivities and avoid negative environmental effects wherever possible. The key baseline and impact assessment findings are further discussed below.

5.2. Environmental & Social Baseline Conditions & Impacts

(i) <u>Landscape and Visual</u>

The landscape of the Project site can be described as arid with frequent rock outcrops on hillsides. The Project site is barren and heavily degraded with few vegetation strips and scattered trees. In addition, the key visual receptors in the area include the villages surrounding the wind farm development site and also the Petra World Heritage site – a major touristic site in Jordan known for the city of Petra which includes the Treasury (Khazneh). The ESIA visual assessment has considered both of these receptors.

The key anticipated impact from the Project is during the operation phase and which relates to the interaction of the Project with the character of the surrounding landscape and any key visual receptor which might be present.

To study such impacts, a visibility analysis was undertaken through a computer software (WindPRO) which aims to identify the number of turbines that would be visible from nearby areas. The most important outcome of the assessment is that from the main part of the Petra World Heritage Site, where the most

important key visual sensitive receptor is located (i.e. Petra city), no views to the wind farm could be identified due to the fact that it is located at the ground of a valley surrounded with side-valleys and mountains with steep climbs. However, a level of visibility would be apparent from within the Petra UNESCO World Heritage Site boundary area, see Figure 6 below.

Figure 6: Virtual View from Jabal Haroun (within the Petra WHS boundary) towards the Project Site (Source: Google Earth with simulation of the Project with WindPRO)

It is important to note that GWRE has obtained the approval of Petra Development and Tourism Region Authority (PDTRA) for the development of the Project – the responsible governmental entity for the Petra World Heritage Site in Jordan. Consultation has also been undertaken with UNESCO. ECO Consult provided UNESCO with a Project brief along with the outcomes of the visual assessment as presented in the ESIA. Their initial response was that due to the location of the Project outside of the Petra World Heritage Site and its buffer zone no issues of concern are anticipated. The PDTRA Chief Commissioner agreed to coordinate directly with UNESCO to discuss this matter and the Ministry of Tourism and Antiquity will also be kept informed.

The assessment also undertook a visibility analysis of the Project from the nearby villages in which the turbines are expected to be visible. This includes Al-Rajef, Dlaghah & Rassees, Taybeh, Fardakh and Sadaqah. The assessment concludes that from Taybeh and Rajef and at the most elevated part of the village around 15 turbines will be visible, whereas in the other villages around 5 turbines will be visible only. Photorealistic simulations were also undertaken from such receptors to determine how such turbines would look like. An exemplary photo on the photorealistic simulation of the Project from Taybeh is presented below.

Based on a consultation exercise undertaken with local community representatives, the outcomes of the visual assessment were presented and discussed. No objections were raised with regards to the visual impacts from the Project on those villages.

Figure 7: Exemplary Photo on the Photorealistic Simulation of the Project from Taybeh

(ii) Land Use

The Project site location does not conflict with any land use planning as set by the various governmental institutions (such as the Ministry of Municipal Affairs, Ministry of Environment, Ministry of Agriculture, etc.). Given that the Project does not conflict with any of the formal land use planning set by the various governmental entities above, there are no impacts on formal land use.

With regards to the actual land use of the Project site, several site visits were undertaken as well as detailed consultation with affected communities to determine if the Project site provides any value. Based on that it was concluded that the local community of Al-Rajef and Dlaghah & Rassees undertake agricultural and grazing activities during specific times of the year in the Project area (generally between February and July). In addition, the area in general is known for nomadic settlements during specific times of the year (generally between April and September) whom also undertake grazing and agricultural activities – however they do not settle in the exact specific area every year.

With regards to the informal land use, the Project development could affect the activities currently undertaken by the local community and nomads in the area. However, such impacts are minor and not significant. The Project components have a very minimal footprint (around 7% of the land leased areas and 2% of the total Project boundary area) – therefore agricultural and grazing activities currently undertaken by the local community can continue to take place in other undisturbed areas. In addition, based on a consultation exercise undertaken with local community representatives as well the nomads no objection with regards to such impacts were raised.

Finally, the ESMP requires that the Project Operator allow nomadic settlers as well as local community members to continue with their grazing and agricultural activities in the Project area. The Developer is committed to such an issue as this was included as a term within the land lease agreements that were signed with the local community land owners.

A Land Acquisition and Compensation Framework will be included in the project environmental and social management system to ensure a mechanism is in place for continuance of good practice should unexpected land access needs or issues arise as the project progresses.

(iii) Geology and Hydrology

The only anticipated potential impacts during the construction and operation phase from Project on geology and hydrology are related to improper management of waste streams (solid waste, wastewater, hazardous waste, etc.) which could contaminate and pollute soil which in turn could pollute groundwater resources.

Appropriate mitigation measures have been identified to be taken into account during the construction and operation phase to ensure good housekeeping practices (e.g. proper management of waste streams, proper storage of hazardous materials, etc.) will minimize contamination, soil pollution and impacts to groundwater resources.

(iv) Biodiversity

The Project site is considered of low ecological significance due to its natural setting; being barren and heavily degraded with few vegetation strips and scattered trees of remnant forests that use to prevail in the entire mountain of Al-Rajef. The site has been heavily degraded due to massive grazing, tree cutting and ploughing that have occurred extensively throughout the site for decades.

In addition, most recorded floral and faunal species are considered of least concern and common to such habitat areas. However, an important issue that must be taken into account is the Spur-thighed Tortoise which is considered threatened at the national level and which was recorded within the Project site.

Site preparation activities during construction may disturb existing habitats, however these impacts are generally considered to be minor due to the site's low ecological significance. However, given the presence of the Spur-thighed Tortoise within the site specific mitigation measures will be developed to ensure potential impacts are prevented and/or minimised.

Mitigation measures have been identified, such as good housekeeping, and these measures will be implemented throughout the construction and operation phase of the Project. Such housekeeping practices include for example prohibiting hunting at any time by workers, ensure proper storage and disposal of waste streams, and others. In addition, a detailed survey must be undertaken before commencement of any construction activities to identify the presence of any tortoises within assigned areas for construction. Should any tortoises be recorded, they should be relocated outside of the Project site to a suitable receptor site.

(v) Birds

A bird baseline survey was undertaken at the Project site in 4 different seasons to include spring 2012, autumn 2012, autumn 2013 and spring 2015. The objective was to observe and record the number and behavior of migratory and resident soaring birds passing through the Project site. A total of 547 monitoring hours were undertaken during the spring season and 250 hours during autumn. The total number of target migratory birds recorded throughout all the surveys is around 11,000 which belong to 18 species.

The assessment concludes that the Project site is not located within a highly sensitive area as explained below. Comparing the results to other areas in Jordan where similar studies were undertaken by other wind farm developments (and where data was available) reveals the following:

- The number of migratory birds recorded is relatively small, especially when compared to other areas that are closer to the rift valley and its margins (the main migration route in Jordan). In such areas a much higher number and diversity of migratory soaring birds were recorded. As the Project site is located at a distance from the rift valley and its margins it is not considered within an area of intensive passage of migratory birds; and
- Number of resident bird species and their activity in the Project area is much lower when compared to other areas, especially those located closer to Important Bird Areas (IBA) in Jordan. In such areas a higher number of species and higher activity was recorded especially of those with an important local conservation status (such as the Griffon Vulture). In order to implement the precautionary principle further areas of assessment have been identified in regard to the presence of birds in the area and on-going assessment of these species (including saker falcon and steppe eagle) will be undertaken.

The key impact on birds is during the operation phase and which is mainly related to risks of strikes and collision on both migratory and resident soaring birds. Such impacts could have crucial effects especially on certain species which have an international and/or local conservation status.

However, to control such impacts the ESIA requires that a birds monitoring plan is implemented during the operation phase of the Project. Monitoring must be undertaken at the Project site by qualified

ornithologists' continuously and mainly throughout the spring and autumn season. The objective of the monitoring is for collision avoidance through observer-led turbine(s) shutdown in situations which pose an imminent risk on a list of key species of concern that has been identified. In addition, the monitoring plan must be complemented with a carcass search plan implemented during operation to demonstrate the effectiveness of the monitoring and allow an estimation of the annual number of bird deaths caused by the turbine. Additional details on the monitoring and carcass search plan is provided in the ESMP. Pre-construction surveys will also be undertaken on site during 2016.

(vi) Bats

A bat survey was undertaken at the Project site. Bat activity was very low as only 1 species was recorded with minimal activity. This species is considered of least concern and the most common species in Jordan. Such low activity is attributed to the natural characteristics of the Project site being arid with very low vegetation coverage, which do not offer an attractive feeding habitat for bats.

The key impacts on bats are during the operation phase and which are mainly related to risk of bat strikes and collisions with rotors of the operating wind turbines. However, bat activity within the Project site is minimal and therefore such impacts are considered minor and not significant. Pre-construction surveys will also be undertaken on site during 2016.

(vii) Archaeology and Cultural Heritage

An archeology and cultural heritage survey was undertaken for the Project site by the Department of Antiquities (DoA). The survey identified 18 sites which were considered of archeological importance and which are located in the Project area in general (only 6 of which are located within the leased land areas). Such sites include remains of streets, building structures, architectural elements, etc. which generally date back to the Nabataean/Roman period.

Such sites are considered important given their archeological and cultural value however they are not unique or distinctive and most importantly would not be affected by the Project development. Such sites can be found extensively especially in the Petra Region and other mountainous areas in Jordan.

The detailed design prepared has avoided sitting any of the Project components (to include the turbines, roads, substation, warehouses, etc.) within such delineated areas along with an appropriate buffer zone. In addition, during construction, appropriate mitigation measures have been identified which includes for example proper planning of construction activities into/out of the site to avoid those areas, prohibit movement of vehicles near those areas, etc. In addition, chance finds procedure will be implemented during construction so that risks to any as yet identified remains are adequately managed.

(viii) Air Quality and Noise

Construction activities may produce an increased level of dust and particulate matter emissions, which will temporarily impact ambient air quality. The use of machinery and equipment are expected to be a source of noise and vibration within the Project site and its surroundings. Appropriate mitigation measures have been identified for dust and noise control. This includes for example regular watering of all active construction areas, proper management of stockpiles, the use of well-maintained mufflers and noise suppressants for high noise generating equipment and machinery, etc.

(ix) Infrastructure and Utilities

- Water Supply: water supply to the Project will most likely be from the Wadi Mousa water supply system. Water requirements of the Project during construction and operation are minimal and are expected to be easily supplied with no constraints on the existing users
- Wastewater, Solid Waste and Hazardous Waste Utilities: Wastewater from the Project will most likely be disposed at the Wadi Mousa or Ma'an Wastewater Treatment Plant (WWTP), while Solid waste will most likely be disposed at Al-Basta Landfill (for municipal waste) and Shabit Al Dabe landfill (for construction debris). Hazardous waste will likely be disposed at the Swaqa Hazardous Waste Treatment Facility. All such quantities generated during the construction and operation phase are minimal and are expected to be easily handled by the utilities discussed above.

- Road Networks: a Transport Study has been prepared which analysed the entire route for transportation of the Project components from the port of Aqaba till the Project site. The study concludes that the suggested route for the transportation of the Project components is feasible but there are several accommodations which must be taken into account such as bridges which need to be bypassed (due to the heavy loads of trucks) through existing detours available on the highways. The Study will be submitted to the relevant authorities to obtain a permit and allow for the above accommodations to be completed before commencement of any transportation activities.
- Aviation, Telecommunication and Television and Radio Links: formal communications were established with the relevant governmental entities responsible for such infrastructure elements. No issues of concern were raised by those entities with regards to the Project, but there are routine additional requirements which must provided by the Developer at a later stage of the Project development.

(x) Occupational Health and Safety

During the construction and operation phase there will be generic occupational health and safety risks to workers which increase the risk of injury or death due to accidents. This includes risks from working at heights, electric shocks and burns, moving machinery, etc.

A detailed Occupational Health and Safety Plan (OHSP) for the construction and operation phase will be prepared. The objective is to ensure the health and safety of all personnel in order to maintain a smooth and proper progress of work at the site and prevent accidents.

(xi) Community, Health, Safety and Security

The key impacts anticipated are during the operation phase and which are related to noise and shadow flicker from the operating turbines.

Noise originates from mechanical and aerodynamic effects; where mechanical sound is generated by the machinery and aerodynamic sound emanates from the movement of air around the turbine blades and tower. On the other hand, shadow flicker occurs when the sun passes behind the wind turbine and casts a shadow several hundred meters away from the turbines location. As the rotor blades rotate, shadows pass over the same point causing an effect known as 'shadow flicker'. Both of these impacts could potentially be a source of disturbance and nuisance to the receptors and residents of the nearby villages.

To study such impacts, modelling software was used to predict the sound propagation from the Project's wind turbines and expected level of shadow flicker on the nearby receptors to include the villages of Al-Rajef, Dlaghah & Rassees, Taybeh, Fardakh and Sadaqah.

With regards to noise, the model took into account most adverse/worst-case assumptions. Results were then compared with the Jordanian "Instruction for Reduction and Prevention of Noise for 2003" which requires a maximum allowable limit of noise levels in villages of 50dBA and 40dBA during daytime and night time respectively.

Results of this modeling indicates that the maximum allowable limits for noise identified within the Instruction would not be exceeded in the majority of nearby villages, with the exception of small limited parts at Al-Rajef village – where such limits will be exceeded during night time only. Taking a closer look at Al-Rajef area, the limited parts where such exceedances are expected (those areas which lie up till the 40dBA orange line in the figure below) mainly include a number of dwellings (highlighted in blue below in the figure below). Such exceedances are from a number of turbines only located in the northwestern part of the Project site.

Nevertheless, to ensure compliance with Instruction limits during nighttime, the ESIA requires that the Developer implement a wind turbine reduced power operation strategy for the turbines causing exceedances. In addition, a grievance mechanism must be in place to allow the local community to submit complaints regarding nuisances related to noise from the turbines (however this is highly unlikely once the reduced power strategy is implemented). Nevertheless, in such cases compensation measures must be implemented to limit such impacts through for example sound reducing windows (double glazed), planting of trees and shrubs, etc. There will also be a further stage of assessment, in order to implement a fully precautionary approach and to ensure that noise will not be a cause of concern on the project.

As for shadow flicker, the model also took into account the most adverse/worst-case assumptions. Results were then compared with the IFC EHS Guidelines for Wind Energy (IFC, 2015) which recommend that shadow flicker effects not exceed 30 hours per year and 30 minutes per day.

The results indicate that there are no issues of concern in the majority of nearby villages with the exception of limited parts in Al-Rajef village which are expected to experience more than 30 hours per year and more than 30 minutes per day; the analysis estimates that around 10 buildings only are situated in such areas. However, it is important to note that a realistic shadow flicker effect is expected to last about one third of the calculated worst case time.

Nevertheless, the ESIA requires that a grievance mechanism must be in place to allow the local community to submit complaints regarding shadow flicker nuisances from the turbines (however this is highly unlikely given realistic effects of shadow flicker). In such cases, compensation measures must be implemented to limit such impacts through for example introduction of vegetative buffers as a barrier for shadow flicker and/or providing window blinds.

Other impacts on community health and safety include impacts from public access to Project components, impacts from blade/ice throws from turbines, tower glints, and other. However, those are considered not significant and appropriate mitigation and monitoring measures have been identified in the ESIA to control such impacts.

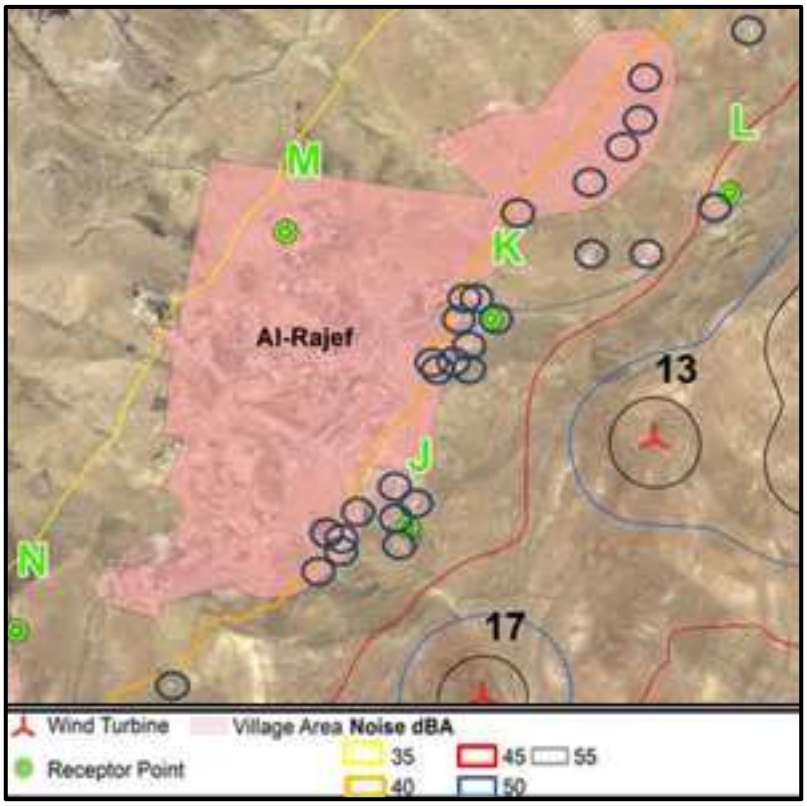

Figure 8: Noise Contours for Potentially Affected Receptor Locations in Al-Rajef

(xii) <u>Socio-economic Conditions</u>

The Developer is committed to social responsibly and local community engagement and development. The Developer is aiming to hire local community members to the greatest extent possible throughout the construction and operation phase for skilled and unskilled jobs. During the construction phase this could be for security and administrative assistance in addition to unskilled construction workers, however the exact numbers have not been determined at this stage.

During the operation phase, this could include job opportunities for the local communities such as security, drivers, and administrative assistance, and the Developer will be providing a capacity building and training programs (in cooperation with the Project Operator) for around 10 selected local community members to ensure they are equipped with the skills and qualifications required.

There will also be a further stage of assessment in order to ensure that the project benefits will be tailored to the extent possible, and any potential impacts minimised, in consideration of local conditions including the specific circumstances of any vulnerable groups.

The Developer shall provide further details on the final number of job opportunities available for each of skilled and unskilled labour during the Project phases as well as the capacity building and training programs. This information will be made available in the Social Action Plan to be prepared by the Developer which is envisaged to provide all information and concrete action plans necessary to achieve community engagement.

Finally, the Developer will also be developing a CSR program. The program will include a needs assessment to identify priority development projects which benefit all local communities. Based on the outcomes of the needs assessment the CSR program will be developed along with an action plan which identifies the priority projects to be developed, allocated budget, timeline for implementation, etc.

6. ENVIRONMENTAL & SOCIAL MANAGEMENT & MONITORING

The ESIA contains an outline plan for managing and monitoring the environmental and social impacts during construction, operation and decommissioning of the Project. Monitoring will form an important part of the implementation and operation of the project. In accordance with the "EIA Regulation No. (37) of 2005", the Regulator (being MoEnv), will be responsible for undertaking compliance monitoring to ensure that the responsible entity is adhering to the ESMP requirements.

During both construction and operation, certain activities, indicators and environmental and social receptors will be monitored such as birds, biodiversity, archaeology, etc. Monitoring may include observation and recording, or may include data gathering and sampling. Monitoring reports will be required during the construction and operational phases. The monitoring results will be useful for assessing the long term cumulative effects, if any. If ongoing problems occur, adaptive mitigation measures can be developed and implemented.

An independent ornithological expert (IOE) will be appointed to undertake monitoring of bird and bats in line with International best practice. This will include a 3 year post construction monitoring period. The IOE will make recommendations including procedure(s) to limit impacts including with respect to turbines management and operations. An annual report will be provided to the Lenders and submitted by the IOE to RSCN and BirdLife. The scope of monitoring will be reviewed every 3 years and an IOE will continue to be engaged based on the recommendations as agreed with the Lenders and relevant stakeholders.

In order to ensure that both the Developer and the Construction and Maintenance contracts implement processes which align with the Jordanian and International Investor requirements, and Environmental and Social Action Plan (ESAP) has also been agreed for the project which will ensure that the management controls, further assessments and ongoing monitoring is fully implemented on the project.

7. FURTHER INFORMATION & CONTACT DETAILS

Full project preparation documents, including the ESIA (its respective annexes, including the ESMP) and the NTS and SEP are available on the Developer website (https://www.XXX.com/). In addition, hard copies are available at the following entities:

1. Ministry of Environment

Location: Amman – Um Uthaina – King Faisal bin Abdul Aziz Street – Building No. 83
P.O. Box: 1408
Postal Code: 11941

City: Amman
Phone: 962 6 5560113
Fax: 962 6 5560288
Email address: info@moenv.gov.jo

2. Petra Development and Tourism Region Authority (PDTRA)

Location: Wadi Mousa, Jordan
P.O. Box: 28 Wadi Mousa
City: Wadi Mousa
Phone: 962 3 2157093
Fax: 962 3 2157091
Email: info@pra.gov.jo

3. Ma'an Governorate – Local Development Unit

Location: Ma'an – Satih Ma'an District – Al Mohafatha Street - Ma'an Governorate Building
City: Ma'an
Phone: 962 3 2132004
Fax: 962 3 2131434