



Environmental Assessments and their application to RES Shams Ma'an- Jordan

Workshop on Life Cycle Assessment and GIS Tools for Energy planning (TW3-TW4)

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INTRODUCTION

- Shams Ma'an Power Generation PSC was selected by MEMR, as part of the twelve (12) solar PV development projects, for the development of a 50MW PV project.
- The Project is located within Ma'an Governorate in the South of Jordan, approximately 200km south of the capital city of Amman. The Project site is 9km southeast of Ma'an city.





INTRODUCTION

- The environmental clearance for this Project is governed by the Ministry of Environment (MoEnv). The MoEnv requires the preparation of a comprehensive Environmental Impact Assessment (EIA).
- The Developer will be seeking financing for the Project from prospective lenders, including international Financial Institutions (IFIs).
- For the purpose of the ESIA this has therefore been developed in accordance:
 - IFC Environmental & Social Sustainability Performance Standards (2012).
 - IFC General Environment, Health, and Safety (EHS) Guidelines.
 - Applicable IFC Industry Sector EHS Guidelines.



ENVIRONMENTAL AND SOCIAL BASELINE CONDITIONS

- Landscape and Visual;
- Land Use;
- Geology and Hydrology;
- Biodiversity;
- Archeology;
- Air Quality and Noise;
- Infrastructure and Utilities;
- Socio-economic conditions.



LANDSCAPE AND VISUAL

- The Project area can be characterized as flat surfaces.
- The elevation of the Project site is generally between 1,000 m - 1,015 m above sea level.
- the site can be classified as a desert-like habitat that is barren.
- the surroundings of the project area there are no recreational activities, environmental reserves, remarkable historical or cultural sites, water courses or other natural structures.





LAND USE

The land use of the Project site was investigated based on available plans set by the relevant governmental authorities.

This includes the following:

- land use planning by **MoMA** (Ministry of Municipal Affairs),
- planning for areas of critical environmental concern by **MoEnv** (Ministry of Environment),
- forest lands and grazing reserves planning by **MoA** (Ministry of Agriculture)
- Development Area planning by the **DFZC** (Development and Free Zones Commission) and **MDC** (Ma'an Development Company).





GEOLOGY, HYDROGEOLOGY, AND HYDROLOGY

- The bed rock outcropping in the investigated area, it is covered by superficial deposits of Pleistocene to Recent age.
- The Hydrogeology of the study area is controlled by the geological set-up, which also controls the piezometry, occurrence and movement of the ground water and the distribution of productive areas in the aquifers.
- The land has only seasonal floods to short duration mainly during flashflood events during the winter season.



AIR QUALITY AND NOISE

- The average daily concentration for a pollutant is equivalent to the 24-hour concentration. When comparing results with the Jordanian Standard, the hourly concentration must be compared with the maximum allowable hourly limits.
- The average noise levels during daytime and nighttime are all within the maximum allowable limits specified within the Instruction.

INFRASTRUCTURE AND UTILITIES

- water resources and utilities,
- wastewater, solid waste, and hazardous waste utilities,
- road networks,
- railway, and
- electricity network,



SOCIO-ECONOMIC CONDITIONS

- population and demographics,
- livelihood and employment,
- income, unemployment, and poverty,
- education services, and
- health services.





ASSESSMENT OF ENVIRONMENTAL AND SOCIAL IMPACTS

- The Project will result in crucial positive environmental and economic impacts on the strategic and national level given the current challenges of the energy sector in Jordan.
- The positive impacts are important to highlight, consider, and take into account before investigating the potential negative environmental impacts.



MANAGEMENT OF WASTE STREAMS

- potential impacts from improper housekeeping practices (e.g. improper management of waste streams, such impacts can be adequately controlled through the implementation of general best practice housekeeping measures. (e.g. improper management of waste streams, improper storage of construction material and of hazardous material, etc).
- A long-term duration throughout the construction and operation phase.
- negative in nature which is could be noticeable and are therefore of medium magnitude.
- the residual significance can be reduced to not significant





SOLID WASTE GENERATION

- Construction waste (such as debris).
- Municipal solid waste generated (such as cardboard, plastic, food waste, etc).

Mitigation Measures :

- Coordinate with Ma'an Municipality for the collection of solid waste.
- Prohibit fly-dumping of any solid waste to the land.
- Distribute appropriate number of contained litter bins and containers properly marked as "Municipal Waste“.
- Implement proper housekeeping practices on the construction site at all times.





WASTEWATER GENERATION

Include black water (sewage water from toilets and sanitation facilities), and grey water (from sinks, showers, etc) generated from workers during the construction and operation phase.

Mitigation Measures:

- Coordinate with Ma'an Water to hire a private contractor for the collection of wastewater from the site to the Industrial Park Wastewater Treatment Plant (WWTP).
- EPC (Engineering, Procurement, and Construction) Contractor constructed septic tanks during construction to be used during operation and impermeable to prevent leakage of wastewater into soil.
- Ensure that septic tanks are emptied and collected by wastewater contractor.





HAZARDOUS WASTE GENERATION

It's include the consumed oil, chemicals, paint cans, etc. it will be collected and stored onsite and then disposed at the 'Swaqa Hazardous Waste Treatment Facility'.

Mitigation Measures:

- Coordinate with the MoEnv and hire a private contractor for the collection of hazardous waste from the site to the Swaqa Hazardous Waste Treatment Facility.
- Follow the requirements for management and storage as per the 'Instructions for Hazardous Waste Management and Handling of the Year 2003' of the MoEnv;
- Prohibit illegal disposal of hazardous waste to the land.
- Possibly contaminated water (e.g. runoff from paved areas) must be drained into appropriate facilities
- (such as sumps and pits). The oil sumps below the transformers of the substation area need to be prevented from intrusion of run-off water. Contaminated drainage must be orderly disposed of as hazardous waste;





HAZARDOUS WASTE GENERATION

- Ensure that containers are emptied and collected by the contractor at appropriate intervals to prevent overflowing; and
- Maintain records and manifests that indicate volume of hazardous waste generated onsite, collected by contractor, and disposed of at the Swaqa Facility. The numbers within the records are to be consistent to ensure no illegal discharge at the site or other areas.





HAZARDOUS MATERIAL

The use of various hazardous materials in the construction such as oil, chemicals, and fuel for the various equipment and machinery.

Mitigation Measures:

- Ensure that hazardous materials are stored in a location where they cannot reach the land in case of accidental spillage.
- Maintain the all of hazardous materials used and accompanying Material Safety Data Sheet present at all time.
- incorporate dripping pans at machinery, equipment, and areas that are prone to contamination by leakage.
- Regular maintenance of all equipment and machinery used onsite.



HAZARDOUS MATERIAL

- Ensure that a minimum of 1,000 liters of general purpose spill absorbent is available at hazardous material storage facility. Appropriate absorbents include zeolite, clay, peat and other products manufactured for this purpose;
- If spillage on soil occurs, spill must be immediately contained, cleaned-up, and contaminated soil disposed as hazardous waste.





POTENTIAL IMPACTS ON AIR QUALITY

The installation of the PV arrays include transmission cables, switchgear, internal road network, buildings, etc. it will increase the level of dust and emissions, and temporarily impact ambient air quality.

Mitigation Measures:

- If dust or pollutant emissions were found, construction activities should be stopped
- Comply with the Occupational Safety and Health Administration (OSHA) requirements and the Jordanian Codes.
- Apply basic dust control which include:
 - watering of all active construction areas.
 - planning of dust causing activities to reduce the dust incidents over the construction period.
 - management of stockpiles and excavated material.



POTENTIAL IMPACTS ON NOISE

The use of machinery such as generators, hammers, compressors, etc are expected to be a source of noise and vibration generation within the Project site and its surroundings. there is risk of nuisance and health affects to construction workers onsite.

Mitigation Measures:

- If noise levels were found to be excessive, construction activities should be stopped until adequate control.
- Apply adequate general noise suppressing measures.
- Comply with the Occupational Safety and Health Administration (OSHA) requirements and the Jordanian Codes.





POTENTIAL IMPACTS ON OCCUPATIONAL HEALTH AND SAFETY

- Exposure to chemicals, hazardous or flammable materials.
- the PV plant workers are potentially exposed to electric shocks and burns when touching.
- construction workers are expected to work in very hot weather conditions.
- the potential risks to the construction workers from the railway.

Mitigation Measures:

- Identification of roles and responsibilities of the personnel involved.
- Identifies in details information in relation to formulation of safety committees.
- Identifies in details the hazards which may be associated.





POTENTIAL IMPACTS ON COMMUNITY HEALTH, SAFETY, AND SECURITY

- Potential risks from several hazards of the various Project components.

Mitigation Measures:

- Ensure fence around the facility is well maintained at all times and in good conditions.
- Ensure onsite guards are adequately trained to deal with trespassing incidents.



ASSESSMENT OF CUMULATIVE IMPACTS

- Solar Park: is located within the MDA, an area of approximately 9km² consisting of complementary components for industrial activity and vocational training centers.
- Industrial Park: spreads across 2.5 km², it will cater to a wide variety of industries (light, medium, and heavy) and be home to an important number of manufacturing and production plants.





ASSESSMENT OF CUMULATIVE IMPACTS

- The cumulative impacts could result from incremental impacts from the other known existing and/or planned developments in the area.
- the assessment of cumulative impacts will mainly include those anticipated impacts from the various PV development Projects.

Developer	Capacity (MW)
Shams Ma'an	50
Anwar Al-Ardh (EJRE)	20
SunEdison	20
Arabia One (or Ennera)	10
Ardh Al-Amal (GLAE)	10
Catalyst	20
Martifer	10
Bright Group Investments	10
CEC	10
Total	160



ASSESSMENT OF CUMULATIVE IMPACTS

The main cumulative impacts investigated include the following:

- Landscape and visual;
- Land use;
- Geology, hydrogeology, and hydrology;
- Biodiversity;
- Archeology;
- Air Quality and noise;
- Infrastructure and utilities; and
- Socio-economic development.



THANK YOU

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