Hussein TPS Power Generation Project

Zarqa, Jordan

Environmental and Social Impact Assessment

Volume 1 – Non-Technical Summary

Prepared for:

ACWA Power

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1 PROJECT DESCRIPTON

Table 1-1 Key Project Information

Project Title	Hussein Thermal Power Station – Power Generation Project
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ACWA Power is proposing to develop a new 485MW gas fired power plant within the existing landholding of the Hussein Thermal Power Station (HTPS), located in Zarqa, Jordan. The proposed project will be operated and maintained by the Central Electricity Generating Company (CEGCO), with the output energy being supplied to the National Electricity Power Company of Jordan (NEPCO), under a 25-year Power Purchase Agreement.

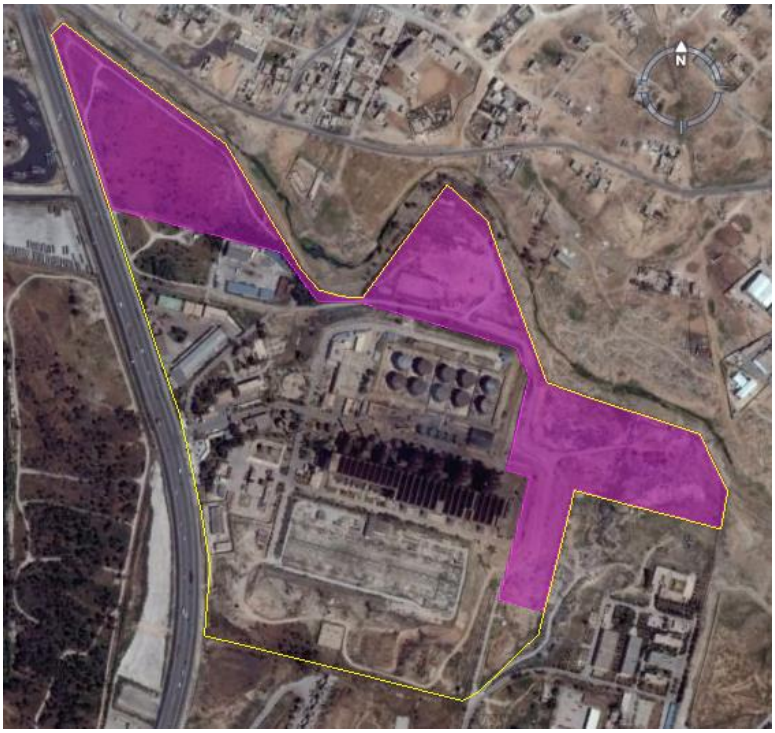
The original HTPS Heavy Fuel Oil (HFO) plant, ceased to operate in December 2015 and is to be decommissioned under a separate contract in the future. The proposed project will therefore be constructed on other land within the HTPS' landholding, with no additional land take required.

The rationale for the project is due to the closure of the original Hussein TPS and the continued growth in electrical demand in Jordan. The proposed project will therefore provide a much cleaner energy source than the previous plant and at a much improved operational efficiency (estimated efficiency will be 49.6%).

1.1 Site Condition and Local Area

Due to available space within the HTPS landholding, the proposed plant will be constructed entirely on un-developed land within the existing boundary, but will operate as a standalone facility.

Figure 1-1 Project Area: Local (HTPS Boundary in Yellow, Project Site in Purple)



Satellite Image Source: Google Earth

Parts of the project site have previously been used for temporary scrap storage area which was cleared in March 2016 and sold to local scrap dealers.

Areas of the site have some existing infrastructure, including a total of three high voltage overhead transmission line pylons, an existing water pipeline entering the east of the site, security lookout points an oil water separator (for the existing HTPS HFO Plant) and several groundwater wells and pump houses that were previously used for operational purposes at the existing HTPS HFO plant.

The HTPS is located in a predominantly industrial area of Zarqa to the north of the city. The area also includes other industries such as the only petrochemical refinery in Jordan, a steel fabrication plant and large wastewater treatment facility.

Local infrastructure and resources around the industrial area of Zarqa, progressed since its establishment. This has led to the proximal location of sensitive receptors with respect to the site. In particular, there are residences close to the north of the proposed project site (Hashmiyeh) and CEGCO staff accommodation in relative proximity to the south within the HTPS landholding.

1.2 Project Design

The project will comprise of one (1) power block, consisting of the following units:

- Three (3) Gas Turbine Generators (GTG).
- Three (3) Heat Recovery Steam Generators (HRSG).
- One (1) Steam Turbine Generator (STG).

Fuel used for the operation of the HTPS will be Natural gas and Light Distillate Oil (LDO) will be used as back up.

The HTPS will be equipped with six (6) stacks, one per GTG (3) and one per HRSG (3). The proposed stack height for the HRSG is 60 meters, whilst the height of the bypass stack is 45 meters.

Dry Air Cooled Condensers (ACC) will be used for condensation of the steam from the STG, thereby considerably reducing the power stations demand for raw water. The ACCs operate on the basis of direct cooling by air only and do not result in water losses due to evaporation, or drift.

Raw water supply to the Plant will be sourced from a pipeline to be provided by the Water Authority of Jordan (WAJ), based on a water supply agreement. The project will also install three new deepwater wells on-site (450-500m depth), as a contingency for back up water supply in the event of an emergency.

The plant will operate on a zero liquid discharge basis, and will therefore not discharge any treated or untreated wastewater effluents off-site. All treated wastewater effluent will either be re-used, irrigated or evaporated.

Associated Facilities

Natural Gas will be supplied by NEPCO via a new subsurface gas pipeline connection to Jordan's main gas pipeline, which is located approximately 600m to the southeast of the project boundary. No land acquisition is required.

Back up fuel will be delivered via an existing fuel oil pipeline from the adjacent petrochemical refinery.

WAJ will install a new water pipeline from the local main line. Construction will occur beneath existing roads, no land acquisition is required.

The evacuation of electric power generated by the Facility will be through the existing 132kV substation, owned and operated by NEPCO and located within the existing Hussein TPS landholding.

A new site access will be constructed from the plant to the existing local road to the north of the project. The access road will be approximately 40m in length.

1.3 Construction Phase

Construction of the proposed project is expected to last 2 years in total from the EPC Contractors Notice to Proceed to the commercial operation of the combined cycle plant. Commercial operation of the plant under simple cycle operation will occur approximately 6 months prior to this.

At the peak of construction, it is anticipated that up to 1,500 workers will be employed on site. The construction laydown area will comprise several areas within the existing HTPS landholding. An area for the EPC Contractors worker accommodation has been provisionally located off-site in an area of land close to the Al Samra power plant, approximately 3km north of the Hussein TPS.

1.4 Operational Phase

The operation of the project will be initially based on a 25-year Power Purchase Agreement (PPA). The operation of the plant will effectively include the generation of power from the installed units and ongoing maintenance activities associated with this generation. The key power generating activity will be conducted in combined cycle mode via operation of the gas turbines, and the transfer of hot exhaust gases to the HRSG for steam generation.

1.1 Existing HTPS HFO Plant Decommissioning

It is understood that the decommissioning of the existing HTPS will be undertaken as a separate project unrelated to the proposed 485MW repowering project. In line with an initial decommissioning timeline provided by CEGCO, this will occur gradually between December 2016 until March 2019. This period of decommissioning will coincide with both the construction and operational phases of the proposed project.

2 ESIA PROCESS

5 Capitals Environmental and Management Consulting (5 Capitals) has been commissioned by ACWA Power to undertake the Environmental Impact Assessment (EIA) process required for the approval of the Jordanian Ministry of Environment (in accordance with the "EIA Regulation No.(37) of the year 2005"), and lender requirements.

5 Capitals has partnered with ECO Consult who are a registered environmental consultant in Jordan.

The ESIA process has used a best practice methodology to assess environmental parameters outlined in the Environmental Scoping Report approved by the MoE in Jordan and discussed with EBRD and IFC over conference calls.

Consultation at the scoping stage has been undertaken with various identified stakeholders to confirm the scope of the ESIA, prior to scoping approval from the MoE.

The ESIA includes:

- Baseline Assessment (surveys, site observations, secondary data, consultation)
- Impact Assessment & Significance (Construction, Commissioning, Operation, Cumulative)
- Mitigation
- Residual Impact Significance

3 SUMMARY ASSESSMENT OF ENVIRONMENTAL PARAMETERS

Air Quality

Baseline

The proposed project location in a predominantly industrial area of Zarqa has several evident point, diffuse and mobile source emissions. Notable points sources of air emissions include the petrochemical refinery in Zarqa owned by the Jordanian Petrochemical Refinery

Company Ltd, as well as two facilities for steel fabrication. The existing Hussein TPS is now closed and is no longer an emissions source to the local air shed.

Despite the local emission sources, the results from short-term continuous and longer-term monitoring activities indicate that the air shed is not degraded in regard to the national Jordanian ambient air quality standards, for all parameters. Compliance with IFC and EC guidelines/standards is also evident despite some elevated concentrations for sulphur dioxide.

Key Construction Impacts

The key construction impacts will be dust dispersion from earthworks and vehicle movements on un-paved surfaces, as well as emissions from vehicles and construction plant. Minor impacts may be evident from VOC storage and odour from wastewater temporary storage on –site and at accommodation area.

Key Operational Impacts

Greenhouse Gases

The gas turbine generator manufacturers General Electric, have performed a detailed analysis on the operational regime of the proposed plant and the expected greenhouse gas emissions per the operational fuel type.

CO2 Balance: Natural Gas	**Evap cooler On**	**Evap cooler Off**
Heat cons (GJ/h)	1 200	1 148
Annual operating hours	8000	8000
Annual GHG emitted in CO2 equivalent (tonnes)	**531,099**	**507,825**
CO2 equivalent per kWh	**0.594**	**0.601**
CO2 Balance: LDO	**Evap cooler On**	**Evap cooler Off**
Heat cons (GJ/h)	1 234	1 182
Annual operating hours	500	500
Annual GHG emitted in eq CO2 equivalent (tonnes)	**34,093**	**32,665**
CO2 equivalent per kWh	**0.610**	**0.616**

Air Emissions

The proposed projects design guarantees ensure compliance with the air emission standards specified by Jordan (as per: JS 1189-2006), the IFC EHS guidelines for Thermal Power Plants (Combustion Turbines: Non-Degraded Airsheds) and the European Commissions Industrial Emission Directive standards.

The potential impact of the proposed facility on local air quality has been assessed using Breeze AERMOD7. For normal operation utilising natural gas in combined cycle mode, the modelling study predicts that ground-level pollutant concentrations of NO2 and CO at sensitive receptors will be well within all applicable air quality standards of Jordan, the IFC and EC, even with the cumulative effects of the existing airshed concentrations. For natural-gas fired, single cycle operation, the predicted impacts are reduced further due to enhanced dispersion; primarily due to the exit temperature of the plume.

Operation of the project using LDO would only occur emergency situations. For both combined cycle and simple cycle operation using light diesel oil, the predicted NO_2, CO and

PM_{10} concentrations at receptor location, even when considering the cumulative impacts of the background concentrations. However, maximum predicted concentrations of SO_2 are potentially significant, at the worst affected modelled receptor. As the baseline monitoring data indicates that existing SO_2 concentrations are relatively low, an exceedance of the relevant air quality standards at sensitive receptor locations is considered unlikely.

VOC Emissions & Odour

Emissions from Volatile Organic Compounds (VOC's) may occur where there is inadequate transfer or storage of liquid fuels, solvents, paints and other volatile substances. Due to the inclusion of wastewater treatment facilities on-site, there is the potential for impacts relating to odour that may result from poor management of the treatment plant.

Cumulative Impacts of HTPS Decommissioning

The key air quality impacts relating to the decommissioning of the existing HTPS plant will include:

- Particulate matter dispersion – as structures are dismantled
- Gaseous and particulate emissions from equipment and vehicles
- VOC emissions from exposed fuel tanks and piping infrastructure.

Mitigation Measures

Mitigation during construction will be handled through the application of best practice techniques. For operation, the project will include emissions abatement from Low NOx burners, but is already at low emissions due to use of gas turbines and natural gas a primary fuel. Use of LDO fuel will be se din emergency situations only.

Noise and Vibration

Baseline

The consistently noisiest location locally is close to the highway and the entrance of the adjacent refinery. During both day and night time monitoring activities there was a constant flow of vehicles, consisting of many HGV's. The local residential area of Hashimeyeh to the north of the plant also observed higher noise levels, particularly due to the rumbling and flare sounds from the refinery.

Generally, noise levels are just below the limit of compliance at the site for the IFC noise guidelines and are within the Jordanian noise limits. Off-site locations such as the residential areas of Hashimiyah, are under influence of noise from the highway and the nearby refinery, with noise levels slightly exceeding the IFC noise guidelines for both day and night time periods.

A specific study for vibration was not undertaken as detailed in the Environmental Scoping Report. However, no noticeable vibrations were encountered during the site visits.

Key Construction Impacts

Temporary and short duration increases in the noise and vibration levels will be generated via a range of processes and propagated locally. Pertinent construction activities in relation

to noise and vibration are likely to include earthworks, piling, site levelling, laying of concrete, installation of services, etc.

Key Operational Impacts

The operation of proposed plant will include the use of heavy equipment throughout the power production process. Such processes have the potential to emit high levels of noise, which are likely to be continuous and sustained during daily activities, due to the 24-hour operation of the plant. The main sources of noise are likely to be emitted from the Gas Turbines, HRSG's, Steam Turbines and ACC fans.

Noise levels have been modelled to be within the required standards for daytime (Jordanian and IFC EHS Guidelines) at all modelled receptors. At night, there is compliance with all Jordanian standards, however the off-site nearest residential receptor and CEGCO accommodation area may be exposed to noise levels in excess of the IFC EHS noise guidelines.

Mitigation Measures

Mitigation during construction will generally follow best practices, with the noisiest works being undertaken during weekday daytimes. Where significant noises are expected the EPC will notify the local community in this regard.

All equipment has been specified by the manufacturer to a maximum of 85dB(A) at 1m, this includes an amount of in-built mitigation. During commissioning and operation, noise monitoring will b e undertaken at the local receptors and where exceedances are identified further mitigation will be considered.

Soil, Geology and Groundwater

Baseline

Soil

Areas of the proposed site have historically been used for the temporary storage of waste and scrap material, from operation and maintenance at the existing Hussein TPS. These areas have since been cleared. Soil analysis has been undertaken several times over the past 4 years. The most recent analysis from March 2016 indicated that site soils are uncontaminated but have noticeable concentrations. The area of the proposed power block, which has had the most recent scrap storage exceeds the Dutch soil standards 'Intervention Values' several heavy metals.

Groundwater Quality

It was identified in 2012 that two of the wells at the Hussein TPS were pumping a small volume of oil, which indicated contamination of the groundwater, source from the original HTPS HFO plants boiler drains. Further to remediation works, laboratory analysis in 2016 has returned results that are less than detectable for hydrocarbons; indicating that the remediation has bene successful.

Groundwater Quality – Proposed Deep wells

A baseline quality sample of the groundwater will not be available until the wells are installed. No other wells locally have been drilled to this aquifer layers.

Geology

Geology underlying the site is consistent with the surrounding local geology, and is not of any particular geological value, or subject to any geological designations.

Key Construction Impacts

Where construction processes involving hazardous materials, fuels and liquids (including wastes) can interact with soils, there is the potential for contamination to occur. Area of the site with exceeding heavy metal concentrations may also result in cross contamination if these are not managed properly.

Key Operational Impacts

Impacts to soils and groundwater from hazardous materials, fuels, liquids and wastes are generally limited due to the hard standing nature of the site and mitigation provision for storage of such materials. The drilling of 3 new deepwater wells may result in a pollution pathway to the deep groundwater.

Mitigation Measures

At the initial stage of construction, the topsoil in the identified area of heavy metal contamination will be removed form the site by a licensed hazardous waste contractor.

Best practices for the storage, handling and transportation of materials, fuels and liquids will be implemented for construction and operation. The deepwater wells will be lined to ensure that impacts relating to a new pollution pathway are minimised.

Water and Wastewater Management

Baseline

The WAJ is responsible for the provision of water locally. Several users locally also access well water within the initial aquifer layers. A hydrogeology study was prepared in 2012 that identifies suitable deep aquifers which have not previously been tapped by other wells locally.

The As-Samra wastewater treatment facility, the largest wastewater treatment facility in Jordan is located approximately 5km north east of the proposed site, which serves populations of Greater Amman and the Zarqa areas.

Storm water runoff from within the local catchment is directly by overland flow to a wadi that located immediately to the north of the proposed project boundary. Potential Impacts

Key Construction Impacts

The key uses of water during the construction and commissioning phases are expected to be for personal consumption, domestic use, dust control, civil works (e.g. lubrication) and commissioning for hydro testing and steam cleaning.

Wastewater generation during the construction and commissioning phases will include the following key streams:

- Sanitary and Domestic Wastewater;
- Commissioning Wastewater (hydro testing & Steam Cleaning);
- Storm water;

Flooding at the site is not an issue, and is not expected to change as a result of construction activities.

Key Operational Impacts

Water will be sourced primarily from the incoming water pipeline provided as an associated facility by the WAJ, under a water supply agreement. As a back up to the pipeline water for the WAJ, three new deepwater bores will be installed on the site. The new boreholes will penetrate to a depth between 450-500m below the surface to access a previously untapped aquifer layer. Impacts of groundwater abstraction would only be temporary and would not affect others, as there are no wells locally that have drilled this deep.

Mitigation

The project design has included specific water efficient features, such as Air Cooled Condensers (ACC) for the cooling of the HRSG/Steam Turbine water/steam cycle. In addition, the re-use of water where possible has also been considered, to avoid the consumption of additional resources.

The plant will operated on a zero liquid discharge basis. In this instance, no wastewater will be discharged outside of the plants boundaries, due to either re-use, evaporation, or irrigation; all occurring on-site. All industrial and domestic wastewaters will be treated by onsite wastewater treatment facilities.

Solid and Hazardous Wastes

Baseline

Solid waste in Jordan is managed by the local municipalities in accordance with the "Municipalities Law No.13 of 2007" - this includes the collection of solid waste, transportation, and final disposal to landfills. Hazardous waste is managed and regulated by Ministry of Environment. Waste is transferred to designated landfills by MoE approved private companies.

Key Construction Impacts

The majority of waste generated during the construction phase will be inert and non-hazardous. Small quantities of hazardous waste will be generated.

Key Operational Impacts

In general, few wastes will be generated during the operation of the power plant. Some of these will be direct products resulting from the operation and maintenance of the facilities, whilst other wastes will be the by-products of primary waste treatment processes, for example the sludge that results from wastewater treatment, and from administration/office wastes.

Mitigation Measures

The mitigation measures provided refer to both hazardous and non-hazardous wastes. A site specific Waste Management Plan will need to be included as part of the Construction and Operational environmental and Social Management Plans respectively.

Ecology and Biodiversity

Baseline

The proposed site is located within a fenced area of the existing HTPS HFO plant. There are no designated sites within 30km of the project. The on-site ecology is representative of frequently disturbed ground with common pioneer species for the local area. In addition, several species which are associated with iron rich soils are also found on the site. Within the site there is evidence of feral dogs. It was notable that the site supports various species of insects including butterflies, beetles, grasshoppers etc.

A managed wadi is located immediately north of the project boundary and is subject to overflows from a buried wastewater pipeline that follows it channel. The wadi is typically dry and supports common grasses.

Key Construction Impacts

Due to the managed lands on-site and the low baseline sensitivity, the impacts during construction will be minor, relating to the removal of on-site vegetation.

Key Operational Impacts

Significant operational impacts are not expected to occur to ecology during operation.

Mitigation Measures

Uncontmainated topsoil will be stored for re-use in informal landscaped areas. Tree and vegetation planting on landscaped areas of the site should use native species.

Social & Economic

Baseline

The project is a timely replacement for the existing HTPS HFO plant that ceased operations in December 2015. The local area of the HTPS grew due to industries in the area. The landholding at the includes several CEGCO support services that serve the operational and maintenance of CEGCO assets. These include the transportation department, central stores, warehouses, laboratories, NEPCO training centre (on CEGCO land) and some CEGCO worker accommodation (for Hussein TPS employees).

CEGCO plays an interactive with the local community within Hashimyah, Zarqa and throughout Jordan generally, with initiatives and support for the local community.

Key Construction Impacts

The construction of the proposed expansion project will generate a number of jobs for construction workers and skilled labourers locally. Positive impacts will therefore occur as a result of increased local employment, dissemination of skills to the local workforce and purchase of local good and services to stimulate the local economy.

Besides workers sourced locally, a number of staff from external areas may be required; particularly for specialist and skilled positions. The majority of SEPCO III's EPC staff will be expatriates from China (amounting to approximately 200 staff), which will result in an amount of population influx to the local area.

Key Operational Impacts

The completion of the proposed Hussein TPS Power Generation project will result in the secure provision and increased capacity of electrical energy to the population of Jordan. This will include a cleaner generation process and subsequently fewer environmental impacts relating to local air quality, noise, use of resources and wastewater compared to the original Hussein TPS plant.

Besides improved electrical infrastructure and enhanced security of power supply in Jordan, the most significant local benefits will include the potential employment opportunities related to the operation of the facility. Up to 100 new operational jobs are expected.

Mitigation

Mitigation for both construction and operation include measures that favour local employment and ensure appropriate compliance to International Labour Organisation Laws.

A grievance mechanism will be implemented so that external grievances from local stakeholders can be received ad followed up.

Traffic & Transport

Baseline

The key local roads around the project site include Highway 25 to the west of the HTPS and the local road to the north of the HTPS which will provide direct access to the proposed project entrance.

Observations of the local roads during the site visits have identified a general poor condition of the roads, with uneven surfacing, potholes, unmarked speed humps, as well as many unsigned exits and junctions. The vehicle flows on the roads appeared to be busy, but not congested during observation periods. Vehicles in the local area included multiple fuel trucks which are associated with the adjacent petrochemical refinery.

Key Construction Impacts

Two aspects of transport during construction can potentially generate impacts: The transport of the workforce and the transport of equipment and materials to the site. It is estimated that up to 100 HGV will enter and depart the site per day during peak periods, along with minibuses to shuttle workers and private cars for certain staff and specialist contractors. This will result in a noticeable impacts of vehicles along the local road north of the HTPS site.

Where materials and equipment are shipped, they will go via Aqaba port, and will then require road hauling to the site via the national highway network. All vehicles will eventually need to use Highway 25 and the local access road to the immediate north of the project site.

The WAJ installation of the water pipeline may result in some temporary disruption to road users, as the pipeline will be installed beneath the road surface.

Key Operational Impacts

Project related vehicles movements will revert back to similar flows experienced during the operation of the original Hussein TPS, which closed in December 2015. Mitigation Measures

Mitigation Measures

In general, good practices will be implemented to stagger shifts, deliveries and removal from the construction site. A traffic management plan will be developed to outline necessary routes for travel to avoid sensitivities and to outline any traffic management required.

Cultural Heritage and Archaeology

Baseline

Jordan has a wide range of archaeological sites of significance. Zarqa Governorate has a long heritage including the occupation by different civilisations dating back to the bronze age. Whilst undertaking the various site visits, no general signs or visual evidence of cultural/archaeological features have been identified or there is no knowledge of such sites from personnel, or from the scoping consultation exercise. A search on the MEGA-Jordan website identifies an unknown feature within the HTPS landholding, but approximately 300m from the project site.

Key Construction Impacts

For the reasons outlined in the baseline, it is considered unlikely that potential impacts of cultural or archaeological value will occur during the construction phase. However there is always the chance of uncovering unknown artefacts.

Key Operational Impacts

It is not considered that any significant impacts upon archaeological or cultural resources will occur during the operational phase, as this phase of the project will not include further earthworks.

Mitigation

The EPC contractor is expected to implement appropriate measures for chance find procedures which are standard requirements by the DoA as required by the "Antiquities Law No. 21 for 1988 and its amendments No. 23 for 2004".

Training and awareness programmes will be provided to ensure that construction staff and labourers are aware of the procedures relating to the Archaeological Watching Brief will any artefacts or anthropogenic finds be uncovered.

Landscape & Visual

Baseline

The area of the proposed project site is located within the existing HTPS landholding in the industrialised area to the north of the city of Zarqa. The proposed project will be located at the lowest point of the HTPS site and is at one of the lowest points in the surrounding area, which will be overlooked by some properties to the north.

Key Construction Impacts

Temporary impacts relating to the construction phase will mostly affect the residential areas to the north. Movement of vehicles, dust, laydown areas, and the various construction activities and processes will be directly visible. However, the existing solid perimeter wall will help to minimise the visual impact.

There may be a requirement for additional lighting at night particularly for security purposes.

Key Operational Impacts

The proposed power plant will ultimately not result in a significant change to the existing industrialised and commercial landscape in North Zarqa. A key aspect of the proposed plant will likely be the inclusion of additional lighting at night.

Mitigation

Several best practices will be implemented to reduce general landscape and visual impacts. Specific measures to avoid light spill will also be implemented.

Community Safety & Security

Key Construction Impacts

Public risks during construction have the potential to result in isolated incidents, if not controlled (e.g. large scale oil spills, spontaneous combustion of fuels, dust, fire etc.). The construction phase may present an unwanted opportunity for local communities to access the site, in terms of trespassing, with associated health and safety risks.

Key Operational Impacts

The project will carry several risks that could result in impacts to public safety where such impacts are transferred or received outside of the project site. Such impacts may relate to fire, VOC fumes, explosions, spills of back up fuels, un-warranted releases of wastewater, exposure to hazardous as well as, environmental impacts (e.g. excessive noise, air emissions, dust etc.) and security concerns of trespassers.

Mitigation

Risks to public safety will be appropriately addressed and prepared in the construction and operational phase 'Emergency Preparedness and Response Plan' and training. The project will employ its own security staff, who will provide 24*7 security control across the site and dedicated security staff at gatehouses.

Worker Conditions and Occupational Health & Safety

Key Impacts (Construction and Operation)

Common activities undertaken during construction such as the movement of heavy machinery, excavation, handling of chemicals works undertaken at height etc. can all introduce significant risk to the health and safety for the associated work force.

Unless effective systems are properly designed and implemented, worker conditions could be poor, particularly related to site services and accommodation.

Mitigation

The EPC Contractor and O&M Company will implement robust and comprehensive occupational health and safety policies, plans and teams to monitor activities. This will include training of staff and permits to work.

Human resource policies and procedures will be adapted and will comply to ILO standards to avoid instances of discrimination, inequality, forced labour and child labour as a minimum.

A grievance mechanism will be implemented at both the construction and operational phases to receive and follow up on worker grievances.

4 MONITORING

Volume 3 of the ESIA (Outline ESMMP) includes a framework for monitoring during the construction and operational phases. This framework recommends specific monitoring activities to be undertaken for the various environmental parameters outlined previously.

The project will be subject to periodic independent monitoring as per the requirements of the lenders. The independent audits will cover on-site activities as well as reviews of ESMMP's and compliance documentation that has been recorded form regular monitoring activities by the EPC Contractor and O&M Company on-site.

This will ensure quarterly auditing and annual (minimum) auditing for the construction and operational phases respectively, with reporting to the lenders.

5 CONCLUSIONS

Following the implementation of the design based and additional recommended mitigation measures, there are no impacts of a major residual significance.

Key factors that should be noted are in respect to the identified heavy metal contamination on one area of the site (proposed power block area), which will require surface/topsoil excavation and disposal at a licensed hazardous waste facility at the start of construction.

In regard to predicted noise, the Jordanian noise standards are modelled for compliance at the operational phases (day and night time), however the more stringent IFC EHS night time guidelines are modelled to be in excess for operations at the nearest residential receptor. During commissioning and operation, noise monitoring will be required at various local receptors to monitor noise compliance. Where exceedances are identified, additional mitigation should be considered; either on site, or at the receptor.

Besides the above, all other potential construction and operational impacts are considered to be acceptable to meet the required standards of Jordan, IFC and EBRD (European Commission).