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Environmental and Social Data Sheet

Overview

Project Name:	*AQABA AMMAN WATER DESALINATION & CONVEYANCE*
Project Number:	*2019-0712*
Country:	*Jordan*
Project Description:	The primary objective of the Project is to provide 300 MCM of potable water to Amman and other governorates in Jordan and, possibly, to areas along the project pipelines route. The water will come from a seawater reverse osmosis plant south of Aqaba and will be conveyed to Amman via a new, approximately 420 km long water conveyor that would run for most of its part parallel to the existing South-North Water Conveyor.

EIA required:	yes
Project included in Carbon Footprint Exercise[1]:	yes

(details for projects included are provided in section: “EIB Carbon Footprint Exercise”)

Environmental and Social Assessment

The Investment Loan will support the development of a 300 MCM/year Seawater Reverse Osmosis (SWRO) Desalination Plant in the Gulf of Aqaba and an approx. 420km long water conveyance system to Amman. About 50 MCM/a will be used for the Aqaba region, the remainder will be supplied to Amman and through turnouts along the pipeline to other Governorates. The Aqaba-Amman Water Conveyance system will be the backbone of the Government’s National Water Strategy by creating a National Water Carrier that delivers potable water from the South to the North of the country.

Jordan has one of the lowest levels of water availability per capita in the world making the country the world’s second most water-scarce country according to the World Bank. Water availability levels will decline even further over the next years. This is due to the impacts of climate change and the expected increase in the country’s population from the current estimated 10 to 18 million inhabitants by 2047. The latter includes about 750,000 registered refuges from Syria. Already, the existing water supply is inadequate to meet the water demand of the population and the government has implemented a strict water-rationing program where water is supplied to households on average one day a week.

The project will be implemented as a Public Private Partnership with a Build Own Operate Transfer (BOT) Contractor responsible for the financing, construction and operation of the project.

[1] Only projects that meet the scope of the Carbon Footprint Exercise, as defined in the EIB Carbon Footprint Methodologies, are included, provided estimated emissions exceed the methodology thresholds: 20,000 tonnes CO2e/year absolute (gross) or 20,000 tonnes CO2e/year relative (net) – both increases and savings.

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Environmental Assessment

Legal Framework:

Authorities and Institutions

The main identified authorities and institutions relevant to the AAWDC project are the Ministry of Water and Irrigation (MWI), the Ministry of Environment (MoEnv), the Aqaba Special Economic Zone Authority (ASEZA), the Water Authority of Jordan (WAJ), Miyahuna, the Ministry of Local Administration (MoLA), the Aqaba Development Corporation (ADC), the Jordan Maritime Authority (JMA), the Royal Jordanian Navy and municipalities along the pipeline route.

National Policies and Legislation

Key relevant national policies and strategies identified include the National Water Strategy (2016-2025) and Jordan's Climate Change Policy. The legal framework for the AAWDC project is mainly defined by the Environmental Protection Law 6 of 2017 and the Aqaba Special Economic Zone Law No. 32 of 2000. A number of other national regulations apply.

International Standards and Commitments

In addition to multilateral international agreements that Jordan has signed, the AAWDC is required to abide by the following:

- EIB Environmental and Social Standards
- USAID Requirements
- Relevant EU Directives including the EIA Directive, the Drinking Water Directive, and Directives related to Labour and Working Conditions.

Gaps in Relevant Environmental Legislations

A gap analysis was undertaken between the national environmental requirements in Jordan and the EIB environmental and social standards particularly as they relate to the following key aspects: Environmental Permitting, Environmental Management, Land Acquisition, and Public Consultations and Disclosure and subsequently was presented in the ESIA report. If gaps were identified, the “stricter” standards were applied in line with the EIB Environmental & Social standards.

Project Categorization and Permitting

The Jordanian regulators MoEnv and ASEZA both reviewed the project documentation submitted and concluded that the AAWDC Project requires conducting a comprehensive EIA as per Jordanian law. In addition, based on the types of projects listed in Annex I of the EU EIA Directive 2014/52/EC amending EIA Directive 2011/92/EU, the proposed AAWDC Project would require a full EIA process if it was located in an EU member country.

Environmental Impact Assessment on specific aspects of the project

Marine Environment:

Locating the seawater abstraction at a seabed depth of 12 – 20 m (further referred to as a Shallow Intake) provides a feasible solution for the AAWDCP seawater desalination plant. The

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ESIA and the related studies demonstrate that such an intake depth optimises environmental and technical/operational benefits:

- Due to natural marine stratification effects of nutrients in the area, the shallow depth location has relatively reduced algae productivity in the summer months compared to deeper water intakes, reducing the need for pre-treatment.
- On the basis of existing scientific literature, due to the specific seasonal stratification cycles in the Gulf of Aqaba the risk of entrainment of coral reef larvae is expected to be similar at depths above 100m and above 20m. Nevertheless, the shallower depth allows better management and reduction of entrainment risks.
- The short distance intake location reduces the intake pipe trench resulting in less disturbance of the benthic community during construction.
- Relatively flat ground is available for construction of the intake towers, allowing for relatively simple foundations and reducing physical impact on the seabed.

Entrainment and impingement impacts on planktonic organisms will be effectively minimised through the design of the intake system as follows:

- A horizontal velocity cap design type of intake to be selected if an intake tower is used.
- The through-screen velocity shall not exceed 0.15 m/s with all intake towers in operation, the screens clean, and at the ultimate SWRO capacity of 300 MCM/y.
- The intake screens shall have an aperture hole size not exceeding 75 mm.
- The intake window lower sill shall be at least 3 m above the seabed to minimise sand, silt, and benthic organisms' entrainment.
- The top of the intake tower window shall be at least 5 m below the seawater surface to minimise the potential of the entrainment of surface pollution, particularly oils.

Impacts of Brine Discharge – Local, Regional and Cumulative

Marine Ecology Impact at the AAWDC Site

Brine discharge follows the principle of "zero additional discharge", meaning that nothing shall be discharged with the brine that wasn't previously in the seawater at the intake. This concerns particularly the possible discharge of Chlorine (set to 0 mg/l) and THMs (set to "Zero" above ambient) but also the level of anti-scalent residuals. The ESMP provides a comprehensive account on all chemicals considered. Whole Effluent Toxicity (WET) testing on local flora and fauna is proposed for this Project during plant construction and during operation to establish the no impact dilutions for the brine discharge.

Most significant impacts of development in coral reef areas are usually associated with pipeline construction, where corals could be physically destroyed. The baseline conditions of benthic communities at the site (established with underwater surveys conducted for the ESIA) indicate a low coral cover and predominance of sand and rubble, also due to several past construction activities resulting in impacts on the benthic communities.

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Other most relevant potential impact for brine discharge is the increase in salinity that can have an impact on salinity sensitive benthic organisms. For this purpose specific near and far field modelling of the brine plume was undertaken as part of the ESIA.

Near field modelling carried out for this project indicated that a brine discharge at a seabed depth of 25-30 m through diffusers distributed over a linear extension of 200 m long diffusers achieves the mixing zone requirement for brine salinity concentration of ≤2% at the end of the mixing zone, i.e., 100 m from the diffusers. The mixing zone requirement below 2% was defined on the basis of international best practice. Given the baseline conditions of the seabed at these distances from the diffusers and the measures required to maximise diffusion, the residual impact on local benthic flora and fauna has been estimated as low.

Far field modelling carried out for this project demonstrates that at distances of approx. 1.5 km from the diffusers, it would be difficult to detect the brine plume salinity concentration. It is important to note that the seawaters of the Gulf of Aqaba (like the Red Sea in general) has relatively high salinity because of the high evaporation rates in a closed basin. As a result, the species that inhabit these areas tend to have a high tolerance to salinity, reducing the likelihood that the small changes in ambient salinity around the diffusers and beyond might have a significant impact on benthic communities.

Marine Ecology Impact on Aqaba Marine Reserve

About 25% (7 km) of the Jordanian coastline has been under special management for coral reef conservation since the late 1970s. In 2020, this stretch was declared as the Aqaba Marine Reserve (AMR), whose southern boundary is about 3km north of the proposed AAWDC brine discharge location. According to design salinity of the AADWC, brine salinity concentration will drop to ≤ 2% above ambient seawater salinity at the boundaries of the mixing zone. This is 100 m from diffusers in all directions. The mixing zone will expand at a water depth between 25 m and 70 m. With brine being denser than the surrounding seawater it will have a significant tendency to sink down the steeply sloping bottom at the discharge location than to spread horizontally. Any horizontal dispersion will be more to the south in the opposite direction of AMR. Therefore, it is highly unlikely that any elevated salinity will be detected within the boundaries of the marine reserve.

Potential Wider Impacts (Gulf of Aqaba and Red Sea) and cumulative effects

The brine from the AAWDC Project desalination plant once dispersed in the sea, is anticipated to behave in a similar manner to the brine formed by solar evaporation in the Gulf of Aqaba. The ultimate capacity of the desalination plant will remove approx. 740 MCM per year (or 2,017,471 m^3/d) of seawater to produce 300 MCM per year of treated water at 97% overall plant availability and 42% plant recovery, which is less than approx. 12% of the water volume naturally evaporated at 5mm per day. Given a surface area of the Gulf of about 3.2 x 10^9 m^2 this implies evaporation from the Gulf of about 16,000,000 m^3/day. The brine produced by natural evaporation in the northern Gulf makes its way to the bottom of the Gulf of Aqaba where it discharges to the Red Sea. Lower salinity seawater enters the Gulf of Aqaba at the Straits of Tiran. The brine produced by solar evaporation in the Red Sea makes its way to the south of the Red Sea and discharges into the lower salinity Indian Ocean at the Strait of Bab el Mandeb, where lower salinity Indian Ocean seawater replenishes the Red Sea.

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The existing Jordan power station at Aqaba Industrial port discharges 80,000 m^3/d of spent cooling seawater with a temperature of 3^0C above the ambient. The AAWDC Project desalination plant at ultimate capacity would discharge approx. 48,630 m^3/hr of brine (at 42% recovery) with a temperature ranging from 0.5^0C to 1^0C above the ambient. Because the Aqaba Gulf circulation and stratification are mainly affected by temperature changes, it is not anticipated that the AWDCC brine will significantly impact salinity levels, stratification, or the circulation currents of the Gulf.

It is possible that antiscalant will not be needed for the AAWDC Project SWRO desalination plant. However, if it is used, then it will need to be readily biodegradable to avoid persistence of the antiscalant and it needs to be free of nitrogen, considering that nitrogen is the limiting factor for primary productivity in the Gulf of Aqaba, to avoid its accumulation into the Gulf of Aqaba when degradation of the antiscalant occurs.

Small quantities of iron particulate and soluble iron used as coagulants in seawater pre-treatment will be discharged with the brine. This brine concentration will be diluted by at least a factor of 41 by the outfall diffuser design. It is not anticipated that this iron will settle quickly when leaving the near field mixing zone, because it has already passed through a solids process facility at the desalination plant using gravity thickening. The particulate iron (iron hydroxide) is anticipated to migrate to the deeper water (>700 m) in the centre of the Gulf of Aqaba as part of a density current. Iron is not toxic to marine life and accumulation of iron is not considered to raise concern because it is not the primary productivity-limiting nutrient in the northern Gulf of Aqaba, which appears to be nitrogen.

Terrestrial environment:

Construction works of the onshore facilities of the water desalination component (i.e., the IPS and SWRO Plant) will be limited to the construction zone/corridor within the selected land plot. This includes land clearance, cut-and-fill operations, pilling of cut materials and construction materials, temporary storage of construction waste on site, construction and finishing works of the IPS facility, installation works of the IPS, installation of the pipelines and other auxiliary equipment, etc.

The above activities are associated with (1) total habitat loss and clearance of the vegetation cover within the construction site and materials temporary storage locations, (2) habitat loss within the routes for vehicles and machineries movement and parking, (3) generation of elevated noise levels which can reach up to 110 dB at source (i.e., within one meter from the machinery), (4) emissions to air from the vehicles and machineries, (5) oil spills from machineries' on-site lubrication and petrol supply, contamination due to leaks/spills of construction chemicals (e.g. paints, lubricant oils, etc.), and (6) possible attraction of species (especially birds) due to increased food supply.

Based on available information the proposed onshore facilities (IPS, SWRO Plant) are within an urban environment (port and industrial activities), and thus is already degraded and of very low value as a terrestrial habitat. However, behavioural disturbance to avifauna during migratory and breeding seasons is possible and require regular monitoring, though the two sites are not reported as feeding, roosting or breeding sites for birds.

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The Water Conveyance will be built along the entire route from the proposed IPS location, heading to the north until it reaches the Abu Alanda Reservoir and Al Muntazah reservoir. These works are expected to be limited to the construction zone/corridor along the selected route and is assumed to have a construction corridor not exceeding 100 m. The construction activities will include land preparation, levelling and clearance, cut-and-fill operations, pilling of cut materials and construction materials, temporary storage of construction waste on site, construction and finishing works of the above ground installations (AGIs), installation of the pipelines and other auxiliary equipment, etc. Logically, the above activities are associated with the following impact categories: 1. Impact on local morphology and surface hydrology. 2. Pollution impact on biodiversity 3. Disturbance of natural fauna from noise, vibration and lighting, 4. Hunting and active taking of wildlife.

The studies of the conveyance components have mainly focused on laying the conveyance parallel to the existing Disi pipeline, to avoid changes in existing land use and land acquisition as much as practically possible and avoid impact to pristine, undisturbed areas. Therefore a large part of the pipeline will run parallel to the Disi pipeline, while other parts will be laid within public roads. Nevertheless, during the construction phase, the BOT Developer shall apply maximum care not to conduct unnecessary damage to the local landscape and natural resources beyond the determined construction footprint (i.e., the planned facilities and above ground installations). Where clearing is required for permanent works, for approved construction activities and for excavation operations, local geomorphology, natural drainage systems and natural vegetation must be conserved and protected from the resulting damage. Changing the morphology, the local drainage systems and clearing of flora shall be prohibited outside the proposed Project construction zones and corridor.

In summary, the BOT Developer shall abide by all provisions for mitigation/management measures as set out in the Project ESMP. By following these mitigation measures, it is expected that the intensity of the above listed impacts will be confined and prevented from extending beyond the construction footprint. Therefore, any significance of the residual impact terrestrial biodiversity is expected to be avoided or at least minimized to acceptable low levels.

The Project does not cross any established or proposed natural protected area. However, the conveyance line does pass through the buffer zone of the Wadi Rum Protected Area and World Heritage Site.

Climate Change Vulnerability and Resilience

The ESIA included a full Climate Change Vulnerability and Resilience Assessment (CRVA). According to the CRVA the project is mainly vulnerable to (inland) flooding that could damage the pipeline. The (final) design of the project will take these aspects into account.

EIB Carbon Footprint Exercise

There is no sensible alternative project to the AAWDC project. Carbon emissions will be substantially reduced (compared to the Base Design) by setting a maximum specific emission target for the project to meet.

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The project's likely relative Greenhouse Gas Emissions (GHG) are expected to be in the range of 965,000 t CO_2e per year. The specific GHG for the entire transfer system including the SWRO plant will be less than 3,200 g CO_2e per cubic meter. The specific GHG for the SRWO plant will be in the range of 1050 g CO_2e per cubic meter and complies with the "Do no significant harm" threshold of 1080 g CO_2e per cubic meter currently proposed for seawater desalination plants in the EU taxonomy for sustainable investment.

For the annual accounting purposes of the EIB Carbon Footprint, the project emissions will be prorated according to the EIB lending amount signed in that year, as a proportion of project cost'.

Social Assessment

The project will have short and long-term positive social impacts in terms of enhancing water security and provision of reliable, safe, and drought-proof supply of fresh water. The availability of desalinated water will help to restore the overused underground aquifers and to address the climate change induced reduction of the replenishment of freshwater resources. The latter qualifies the project as contributing to climate change adaptation. Availability of desalinated water will also enable Jordan to increase water transfers to other Governorates, positively impacting the population living in those areas. The project will also increase the amount of reused wastewater for the agricultural users, thus helping farmers to switch away from freshwater usage and easing the pressure on underground aquifers.

A total amount of 128 plots of land (87 of which are privately owned) will be impacted by the projects in different degrees (land acquisition, right of way or easement). The actual number of households and plots affected will be confirmed during final design stage.
The project is not expected to trigger any physical displacement but some permanent and temporary economic displacement and/ or disruption of economic activities during the construction phase. A land acquisition and resettlement policy framework details the procedures for the preparation of subsequent Resettlement action plans and/or livelihood restoration plans.

Labour standards: The Hashemite Kingdom of Jordan became a member of the ILO in 1956, ten years after gaining independence. Jordan has ratified 26 ILO Conventions, including seven of the eight Fundamental conventions. The government, the social partners and the ILO are implementing the Decent Work Country Programme 2018-22[2]. Which articulates the common commitment of the three partite partners to promote decent work, social justice and equity.
As part of the mitigation measures foreseen in the Environmental and social management plan, the BOT contractor will develop:
- A Code of conduct for the project related worksites and facilities aligned with
- labour conditions compliant with national legislation and EIB standards. These include fair treatment for all workers, non-discrimination and equal opportunities at work)
- An Employee grievance mechanism

[2] The Jordan Decent Work Country Programme (2018–2022) articulates the common commitment of the Government of Jordan, workers' and employers' organizations and the International Labour Organization (ILO) to promote Decent Work, social justice and equity. The 2018–2022 Decent Work Country Programme (DWCP) is the third strategic programming framework adopted by the ILO and its constituents in Jordan

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Occupational Health and Safety: Jordan has extensive occupational health and safety legislation in place, modelled on recognised international health and safety standards. Within the desalination industry, both in terms of construction and operational health and safety the Bank's monitoring has been positive, with low levels of reported workplace accidents and near misses. The compliance with both labour and occupational health standards during construction and operation are part of the tender documentation, and thus will be part of the contractual obligations of the concessionaire and on a back-to-back basis of all first tier suppliers and contractors. Site inspections and reporting on compliance with Occupational health safety and security requirements will be will be carried out by the MWI's supervision team, as well as the respective Labour Inspectorate of the Ministry of Social Development.
Moreover, the BOT contractor will develop health and safety management plans (occupational health and safety as well as a community one), a security strategy and plan for project facilities and traffic and transport management plan[3].

Public Consultation and Stakeholder Engagement

The details related to the stakeholder engagement conducted during the preparation of the ESIA are provided in Chapter 7 and Annexes 12 and 13 of the ESIA study.

On March 1, 2021, the ESIA Team, in coordination with ASEZA and MWI, held a scoping session at the Hyatt Regency Aqaba Ayla Hotel and online (in hybrid format) to present the results of the scoping phase of the AAWDC project to stakeholders and obtain their feedback. During the session, the project was presented along with associated environmental and social issues and the methodology of the ESIA. The participants were invited to ask questions and voice concerns. In addition, meetings with local authorities and communities were conducted as part of stakeholder engagement activities in the field, whereby 32 meetings were held between June and July 2021.

This is reflected in the Project's Environmental and Social Management Plan (ESMP) appended as Annex 15 to the ESIA study. More specifically, the impacts from the marine discharge of brine were assessed in detail in the Brine Risk Assessment Report and mitigation measures were based on near and far field modelling (Annex 1 of the ESIA study) and the precautionary approach so that any residual impacts were assessed as negligible(Chapter 8 of the ESIA study). Traffic impacts were assessed in detail both during the construction and operation phases of the AAWDC Project (Chapter 8 of the ESIA study) and respective mitigation measures were included in the Project ESMP (Table 2-4 and Table 2-5 of the Project ESMP). Initial consultations were conducted with the local communities and subsequent activities were put in place for efficient engagement (Annex 13 of the ESIA study).Recruitment and labour issues were assessed in the ESIA study and appropriate mitigation measures were provided in the Project ESMP (Table 2-4, Table 2-5 and Section 2.9.3.2 of the Project ESMP).

The promoter has prepared a Stakeholder Engagement Plan SEP inclusive of a Grievance mechanism. The BOT contractor will also develop a Community engagement plan inclusive of a grievance mechanism (aligned with the principles described in the project SEP).

[3] Ref to Environmental and social management plan (2.10.2 Operation plans, mechanism and procedures) for more details

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Conclusions and Recommendations

The effluent standards for the brine and any other described design parameters have been included in the tender documents as explicit technical specifications and through the ESMP and will become contractually binding.

The results and recommendations of the ESIA, which cover the Aqaba Amman Project, are acceptable to the Bank and follow good environmental and social practices.

The project will have a positive social impact and will contribute to the country's adaptation to climate change conditions, in a water stressed area.

With the following conditions in place, the Project is acceptable for financing in environmental and social terms.

Disbursement conditions
N/A

Undertakings

- The promoter shall ensure that the Project (including all works performed by the contractors) is carried out in accordance with the provisions contained in the ESIA documents, associated management and action plans;
- The promoter shall notify the Bank, within 2 days after its occurrence, of any significant environmental, occupational health and safety, security relevant event; and within 30 days provide to Bank with a summary report that includes a description of such significant event, and the measures that the promoter is taking or plans to take to address the event and prevent any future similar events; and
- The promoter shall comply with the applicable laws, ILO labour standards, EIB and international best practices and that relevant contracts financed under the Project include specific clauses on these undertakings.
- A Resettlement Action Plan (RAP) to the satisfaction of the EIB needs to be submitted not later than 6 months after the Notice to proceed has been issued and in any case before the start of relevant construction works.
- Any compensation measure to Project Affected Persons need to be completed before start of construction in the respective section of the overall construction programme. To this effect the promoter shall submit a construction programme to the satisfaction of the EIB not later than 6 months after Notice to Proceed.