

Non-Technical Summary

Introduction

Mitsubishi Corporation and Tokyo Electric Power Company (TEPCO), together the 'Consortium', have been identified as the successful bidder for the Umm Al Houl independent water and power project (IWPP) (the 'Project') located 15km south of Doha, Qatar. The proposed Project will comprise 2,520MW of net electricity capacity, utilising combined cycle gas turbines (CCGT) and 136.5 million imperial gallons per day (MIGD) (516,000m³/day) of net water capacity, comprising 60MIGD utilising reverse osmosis (RO) technology and 76.5MIGD utilising multiple stage flash (MSF) technology. In order to comply with the Ministry of Environment (MoE) requirements in Qatar and anticipated requirements of lender banks for the Project, an environmental impact assessment (EIA) of the Project is necessary.

Qatar General Electricity & Water Authority, KAHRAMAA, has identified that Qatar faces a potential shortfall of power and particularly water production in the short to medium term, which is from 2016 for water and 2017 for power. For this reason, the project construction schedule requires fast-tracking in order to provide early power and water to meet Qatar's anticipated demand.

An initial Environmental Scope of Works and Terms of Reference (SoW/ToR) describing the proposed methodology for the EIA was submitted to the MoE on 9 June 2015. In addition, to support the Consortium's request for early construction activities to commence on site, a Preliminary Environmental Assessment (PEA) was also undertaken and submitted on 30 June 2015. The PEA focussed on onshore activities and the potential impacts associated with the proposed early works activities. Subsequently, following comments received from MoE in August, a revised PEA for onshore activities was submitted at the end of August 2015.

Due to the fast-track nature of the Project, the PEA and EIA have been undertaken in parallel with the ToR review by MoE. Experience gained from MoE's reviews of previous environmental assessments has been employed in the survey methodologies and receptor consideration in order to ensure consistency in approach for MoE's requirements. It is anticipated that discussions with MoE will further refine mitigation measures proposed within this EIA as necessary. The

following sections provide summaries of the main findings from the EIA. Following a conditional EIA approval being issued on 6 December 2015, the EIA has been updated to account for remaining comments to be addressed within a revised EIA (this report) as expressed during the written communications with MoE.

Marine environment

The proposed Project involves a number of construction and operational elements which have the potential to impact upon the marine environment, particularly with regards to the construction of the intake pipeline and the brine discharged during the desalination plant's operations.

In order to adequately assess the potential impacts, the EIA has commissioned extensive marine baseline surveys and advanced three dimensional hydrodynamic modelling. The marine baseline surveys and modelling have explicitly considered the requirements of the MoE for other power/water plants, particularly with respect to the number of detailed survey points and extent of the survey area. Marine baseline surveys were undertaken by Five Oceans Environmental Services, an experienced subcontractor that has been involved in a number of previous surveys in Qatar, including several phases of the RAF Complex to the north of the Umm Al Houl IWPP site. Hydrodynamic modelling was carried out by HR Wallingford, a specialist modelling company that is internationally recognised as one of the leaders in their field.

Extensive marine surveys undertaken at the site considered water quality, in-situ habitats and flora/fauna, sediment quality and benthic infauna. All laboratory testing was undertaken at a nationally accredited laboratory using internationally standardised testing methodologies.

The marine surveys found extensive seagrass habitat within the survey area footprint of the Project and very limited intermittent coral which appears to have suffered significant mortality with little live coral remaining, as a result of previous regional bleaching events. Pearl oyster beds were also found within the survey area. These important habitats are considered very sensitive, and, with particular reference to the seagrass, is typically classified as a 'critical' habitat; acting both

as a food source for many species (such as IUCN vulnerable dugongs and endangered sea turtle species) as well as a nursery for young organisms, while providing important ecosystem services that supports other adjacent habitats. Water quality in the area appeared to generally be good, though levels of zinc appeared to be elevated above international quality criteria (no Qatar standards exist) and possibly caused by as yet unknown anthropogenic influences, with some local small exceedances of iron, similarly caused by an unknown influence. General biomass found in the sediment in the area appeared to be medium to low and dominated by small polychaete worms and, in certain areas, by pearl oyster beds with associated biota.

As a result of the habitat surveys and in recognition of the ecological sensitivities offshore, the Consortium revised their originally proposed intake/outfall design to realign their positions, changed the open outfall to closed pipeline and increased the lengths proposed in order to try to minimise the impacts associated with construction and operation of the proposed IWPP.

Construction

As a result of the changed design, the anticipated construction impacts have been reduced, though areas of seagrass (and mixed algae/oyster beds) will still be impacted upon. The EIA has quantified the sensitive habitats which are predicted to be impacted by the direct construction impacts through the use of geographical information systems, considering the predicted design, construction methodologies and offshore habitats identified as a result of the extensive baseline surveys. Construction activities related to the intake and outfall structures are expected to directly impact upon approximately 7.8 hectares of dense seagrass and 0.2 hectares of mixed oyster beds. These areas are based on the anticipated width of dry construction works which comprises bunding the area where pipes will be laid, dewatering the seawater between the bunds and then working in the dry with land-based equipment. Following construction and removal of dry works it is expected that, in the medium to long-term, the construction footprint will rehabilitate to some extent though active/enhanced rehabilitation through marine planting and other such methods may be necessary to realise the full extent of rehabilitation. While some new hard substrate will be

created by the intake/outfall works which has some habitat offsetting benefit, the sensitive habitats lost, if all areas impacted within the construction footprint fully recover, is anticipated to be approximately 2.7 hectares of dense seagrass lost and 0.16 hectares of mixed oyster beds. Marine surveys and monitoring will be required throughout the construction and operational periods in order to quantify actual habitat losses. This will allow development of an appropriate habitat compensation plan to result in a 'net gain' of critical habitats considered to include the dense seagrass and mixed oyster beds. The Project Company is committed to realise a 'net gain' in critical habitats.

Sediment modelling considering the chainage of intake pipeline which will be dredged rather than utilising the 'dry works' methodology was also undertaken for the EIA. The modelling determined that, even without mitigation, increased turbidity is likely to primarily fall within the less sensitive 'coarse sand' habitat. With the deployment of silt curtains around offshore works, residual increased turbidity is anticipated to be minimal though monitoring throughout the construction period will be necessary to check their. With appropriate mitigation measures followed, including settlement and water quality monitoring, dewatering for the dry works is not anticipated to be a significant issue. A separate permit for dewatering will be applied for by the EPC Contractor, with subsequent adherence to MoE conditions.

Operation

The average discharge plume predicted during operations is expected to be limited as a result of the revised layout. Model predictions show that during the standard operational phase of the facility the extent of the 3°C mixing zone will be less than 0.1km² on average and is not predicted to impinge on any sensitive habitats, with the plume constrained within habitat classified as 'coarse sand' with low sensitivity. In contrast, the original design was predicted to have a mixing zone between 0.5km² to 0.9km² on average, with the habitats most affected being dense seagrass (0.4- 0.7km²) and moderately dense seagrass areas (0.2- 0.4km²) falling within the 3°C mixing zone. Following calibration of the hydrodynamic model with oceanographic and bathymetric results from the site, the modelling has

been re-run with results correlating well with the uncalibrated model results. The 3°C mixing zone is predicted to remain within the 'coarse sand' area of habitat.

Notwithstanding the advantages of the newly proposed design, it is anticipated that a number of mitigation and monitoring activities will be required during construction and operational phases to minimise and manage impacts. Consideration will need to be given, in consultation with the MoE, to further potential habitat offsetting for construction and operational impacts- such as the use of 'reef balls' to create further habitat for coral colonisation, pearl oyster relocation and seagrass habitat offsetting and endangered species monitoring for organisms which may enter the intake system during operations. The use of follow up marine surveys in order to establish long-term trends in the area is also recommended.

Air quality

The combustion of fossil fuel gives rise to a number of pollutants with the potential to negatively affect air quality. With respect to natural gas (the only fuel to be burnt in the gas turbines), the only pollutant of concern is oxides of nitrogen (NOx). During construction and decommissioning emissions of particulates has the potential to cause air quality impacts.

Construction

A qualitative assessment of construction and decommissioning phase air quality impacts has been undertaken. This included consideration of the likely activities to be carried out, their potential for particulate emissions, and the locations of receptors that could be affected. Best practice mitigation measures for construction and decommissioning to control particulate emissions have been identified. Due to the temporary nature of the impacts, and the use of mitigation measures, impacts are concluded to be not significant.

Operation

Air quality impacts resulting from emissions from the stack during operation were assessed using a new generation dispersion model; AERMOD. The proposed design incorporates NOx abatement technologies to ensure that operational emissions are minimised and comply with MoE's anticipated emission limits of 9ppm in addition to compliance with Qatar's legislative limits. As a result of the Project's operation there will be increases in ground level concentrations of NO₂, however, these changes are predicted to be small. The effects from the proposed Project during operation are considered to be not significant when assessed against relevant standards.

Soil and groundwater

The assessment considered the potential impacts to ground and groundwater conditions associated with construction, operation and decommissioning of the Project in the project area and 500m beyond the boundary.

The baseline conditions were based on published data and two ground investigations undertaken at the site, which did not identify any soil contamination. This is consistent with the understanding that no potentially contaminating activities have been undertaken at the site. Soils in the project area have no agricultural value and support little to no vegetation, thus are considered to have negligible value. The groundwater is shallow and saline, thus unsuitable for drinking without treatment, but is considered to be in continuity with the sea, thus it is considered to be a moderate sensitivity receptor. The MoE also requested additional analysis be undertaken on soils and groundwater which was completed in August 2015 the results of which are included within the EIA. The original laboratory analysis and additional testing has confirmed that soils and groundwater at the site do not exhibit any notable contamination based on the broad suite of contaminants considered, which included nutrients, heavy metals, hydrocarbons and biological indicators.

Construction

The principal potential impacts to soil and groundwater are from storage, handling and disposal of any contaminated soils, dredged sediment and sanitary waste, spills and leaks, drainage and runoff, with possible secondary impacts on human health, sea water quality and marine ecology. Appropriate mitigation measures to avoid or reduce any identified significant impacts include adherence to a CEMP and local regulations. Residual impacts after mitigation are mostly negligible, with a minor potential adverse impact from dredged sediment and a minor beneficial impact from remediation of contaminated soil, if any, is subsequently found on the site. Dewatering during construction will largely be restricted to deeper excavations which comprises the pump station area. Given the proximity to the sea there is likely considerable interaction between groundwater and coastal waters. There are no immediate water users around the site who may be impacted upon by the localised dewatering. The EPC contractor will be required to monitor groundwater levels and estimate extraction volumes where appropriate throughout the construction period. Dredged material from offshore is anticipated to be stored on site, which will require dewatering, with subsequent effluent required to adhere to the necessary MoE standards. A separate dewatering permit will be applied for and submitted to the MoE by the EPC contractor, who will subsequently be required to adhere to and implement the relevant conditions on site during construction.

Operation

Potential impacts to soil and groundwater during operation are considered to be largely restricted to hazardous materials stored/used on site should there be spills. Appropriate storage and management procedures employed on site (and outlined within the subsequent operational environmental management plan (OEMP)) will reduce the risks of such impacts to acceptable levels.

Noise impacts

The noise and vibration chapter presents an assessment of the potential noise and vibration impacts that are expected to arise during the construction,

operational and decommissioning phases. The assessment is founded on relevant Qatari and international guidance and standards to evaluate the impacts against criteria in order to identify the potential significant adverse effects and describe appropriate measures that could be applied to mitigate them. The key sensitive receptors are Al Wakrah city and the public beach, a mosque to the south-west, the coast guard station to the north-east and the accommodation for workers to be constructed to the west of the site. The description of the existing noise conditions in the area of the nearest receptors has been informed by the findings of a baseline noise survey carried out by Mott MacDonald in May 2015.

Construction

Noise impacts during construction have been assessed using the most stringent criteria which would apply if the works are undertaken at night. This found that noise from construction is not expected to result in significant adverse effects at any receptor.

Noise impacts from construction-related traffic during the daytime at a worst case frequency of 90 vehicles/hour are not expected to result in significant adverse effects if haul routes are more than 30 metres from any sensitive receptor. Therefore, in order to ensure adequate mitigation is in place it is recommended that the locations for sensitive receptors (e.g. workers camp) and haul routes are selected so they are separated by at least 30 metres or acoustic screening is introduced where this cannot be achieved.

Operation

Operational noise impacts due to fixed plant to be installed on the site are not expected to result in significant adverse effects at any sensitive receptors. This is based on the noise emission data for plant items available at the current stage of the design.

The frequency of operational traffic movements (chemical tankers and the attendance of site personnel) are expected to be sufficiently low such that no significant adverse effects are expected.

Underwater noise impacts during the construction of the offshore elements have not been quantitatively assessed but measures to avoid significant adverse effects within the marine environments are presented within the EIA.

No significant residual impacts have been identified based on the stated assumptions associated with the current design.

Social impacts

The EIA considered the proposed Project with regards to potential social impacts within the local, national and wider international context. With the Project to be built on state-owned land and away from population centres, significant impacts associated with the plant are anticipated to be predominantly beneficial. Such benefits include generating employment amongst skilled and unskilled workers in the national and international labour pool and the generation of potable water and energy thereby improving national supply and energy exports.

Construction

The construction period is anticipated to require up to approximately 3,400-3,700 workers on site during peak periods, with the majority of workers being sourced from South East Asia. Comparatively the operational phase will utilise far fewer workers and it is anticipated that these will be primarily sourced in-country where possible, facilitating Qatarisation and transfer of employable skills. The Consortium (and/or Operator) will be expected to enact recruitment and employment policies and contracts, and provide worker accommodation which all conforms to national and international requirements and guidelines throughout both phases. It is recommended within the EIA that, during the Construction phase, the Consortium enacts policies which assist workers in gaining appropriate certifications/qualifications and running basic skills programmes for unskilled and low skilled workers. This will help facilitate their future employability as well as improving efficiencies on the Project in general. The Consortium should also enact a suitable retrenchment / transition plan prior to construction finishing, ensuring that workers who reach the end of their employment on site are supported as appropriate.

Operation

While the majority of impacts are likely to be beneficial, the Consortium will still be required to develop and enact suitable grievance mechanisms to provide avenues by which local communities and workers (including subcontractors) can express any concerns they have with the Umm Al Houl development. The community based Grievance Mechanism is considered further within the accompanying Stakeholder Engagement Plan (Appendix M: electronic appendices). The Project may also lead to the loss or disturbance of local public beach areas although no businesses or visitors depend on these areas and there are alternative locations available.

Terrestrial ecology

Baseline studies undertaken on the site for the EIA indicate that the site has been significantly impacted by anthropogenic influences with particular reference to four wheel driving which has taken place and continues to take place across the site. No trees are visible at the site and vegetation is comprised of sparse low-lying shrubs of commonly occurring species within Qatar, such as *bean caper* (*Zygophyllum qatarense*).

Construction

The proposed IWPP necessitates levelling of the site and, as such, all current vegetation will effectively be lost as a result of its construction.

While no sensitive species were identified within the ecological appraisals, within the context of the local coastline and the intensive development which has been taken north and south of the coast (Ras Abu Fontas QEZ and Umm Al Houl QEZ respectively in particular), the eastern coastline has been losing large sections of coastal habitat and flora and the loss of terrestrial ecology associated with the Umm Al Houl IWPP site is considered of moderate significance. Where possible the current topsoil should be retained on site for future relaying once the levelling has been completed in order to act as 'seed banks' for future recolonisation and re-vegetation at the site.

Operation

Following construction, the Project Company should also consider retaining and promoting site buffers around the site (subject to area/security restrictions) which encourage recolonisation by native vegetation and landscaping. No significant terrestrial ecology impacts are anticipated during operations.