Bahrain LNG Environmental Impact Assessment (2014) Summary

Summary

WorleyParsons was engaged to complete an Environmental Impact Assessment (EIA) for Bahrain LNG (BLNG) in 2014. This document provides a summary of the 2014 Environmental Impact Assessment.

The overall objectives of the EIA were to identify and analyse sensitive components of the existing environment, determine the type, nature and significance of the probable environmental impacts during the construction and operation phases, identify and recommend practical and cost effective mitigation measures, and recommend a framework for an environmental management and monitoring plan for BLNG.

The EIA complied with Bahrain Ministerial Order No. 1 of 1998 on Environmental Assessment of Projects. The EIA was accepted by the Supreme Council for Environment and an Environmental License was issued on September 13, 2015.

The EIA included:

- A summary of applicable national regulatory limits and international guidelines.
- A description of the proposed components, location, layouts, phases, schedule, labour requirements and proposed execution plans.
- A description of the discharges during construction and operations, such as liquid effluents, solid wastes, air emissions, and noise levels.
- A description of the existing environment, which included the outcome of field visits to the proposed site area as well as a thorough literature review. Activities conducted during the field visits included measurements for ambient air quality, noise, seawater quality, and sea sediment sampling.
- An environmental impact assessment included a detailed classification of the potential positive and negative impacts from the proposed construction and operations, and including impacts due to non-routine (accidental) events. It was found that the main negative impacts before applying any mitigation measures are due to dredging activities as well as accidental events such as fire and explosion. Positive impacts were found to be mainly due to the creation of employment opportunities.
- A list of mitigation measures required to eliminate or reduce negative impacts. The majority of the resultant residual impacts are considered to be minor and moderate.
- A framework environmental management plan, which included Bahrain LNG's commitment to implement required mitigating measures.

Finally, the EIA presented conclusions and recommendations, which are presented below.

Conclusions and Recommendation

Various environmental impacts were assessed and their significance was rates as: insignificant, minor, moderate, or major. Those impacts rated as minor, moderate or major were considered to require mitigation measures in order to eliminate the impact or, where that is not possible, to reduce their significance to minor or insignificant.

Based on the findings and recommendations of the environmental impact assessment, WorleyParsons concluded that if mitigation and monitoring measures are followed properly, the project shall meet all regulatory requirements without any tangible impacts to the environment.

The main conclusions from the EIA are:

Air Quality

Air quality emissions during construction are expected to be caused by the following activities: site preparation, excavation, vehicle and equipment movement, and earthworks and grading as well as running combustion sources. The air quality impact of the construction phase is rated moderate.

During the construction phase, air emissions will be managed by mitigation measures such as regular monitoring and maintenance of machinery and equipment; covering vehicle loads when travelling offsite; and prohibiting open burning of wastes.

Air dispersion modelling of pollutants emitted from the different air emissions sources was undertaken for the operations phase. The contaminants of potential concern during the operations phase are: NOx, SO2, CO, PM10, PM2.5 and CO. Air emissions during operations are mostly generated from offshore activities. Modelling results indicated that, in general, project activities have negligible contribution to the background measured pollutants.

The air quality impact of the operation phase is rated moderate. Different mitigation measures will be implemented during this phase, including equipment maintenance, monitoring air emissions generating from the combustion sources, and monitoring ambient air quality at the borders of the site.

Soil Quality

Removal of the surface layer of the land and potential contamination can affect soil quality during construction. Key potential sources of contamination are accidental spills of diesel, petrol, or lubricants. It is anticipated that impacts to soil quality caused by construction activities are classified as minor. Mitigation measures during the construction phase include minimizing areas of excavation and work as possible, training field staff on the contents and use of spill kits, and inspecting all storage areas for signs of cracks or holes.

For the operations phase, impacts on soil could result from the use of equipment and onsite machinery, leakage of material at storage locations, and minor spills and leaks of fuel, oil, or

lubricant from the use of vehicles. The anticipated impact on soil is considered insignificant and, consequently, no mitigation measures are needed.

Sea Sediment Quality

The different offshore construction and operational activities may result in change of sediment composition and characteristics, contamination, or even total loss. In general, offshore activities have moderate impact on the sea sediment quality. Mitigation measures include applying sediment control measures to protect sensitive habitats.

Seawater Quality

Offshore activities will have a number of impacts on the seawater quality. During the construction phase, impacts will arise from the construction of the jetty, regas platform, and breakwater as well as dredging activities. During the operations phase, impacts will arise from seawater suction and cold water discharges as well as vessel ongoing movements. In general, impacts include turbidity, temperature variation, or salinity variation. Computer modelling was undertaken to simulate different scenarios for seawater suction and cold water discharge. The results of the modelling indicated that temperature change and chlorine concentration complied with the limits set in the national legislation. The impact of both construction and operation phases on seawater quality is moderate. Mitigation measures include prohibiting the overloading of vessels and assessing weather and marine conditions before work commencement each day.

Terrestrial Ecology

The terminal area is considered of industrial nature and, consequently, the site is degraded in terms of biodiversity value. Construction activities, such as site clearing and grading and the construction of access roads, will result in flora and habitat loss which is not considered significant. The low sensitivity of biodiversity together with the small magnitude and localised nature of the impact, which occurs in the immediate area of the activity, will result in an impact during the construction phase that is considered minor. Mitigation measures include using vehicle tracks and roads to decrease habitat destruction, minimizing areas of excavation and work as possible, and regular inspection and maintenance of equipment.

Marine Ecology

Degradation of the marine environment or loss of marine resources during the construction phase may occur due to offshore activities such as dredging and construction of the jetty, breakwater, and regas platform. Increased suspended sediments resulting from such activities can lead to an overall reduction in seawater quality. Increased turbidity may be detrimental to some plant and animal species.

During the operations phase, marine ecology is likely to be impacted by the ongoing vessel movements, as well as seawater suction and cold water discharges. The impact of both construction and operation phases on seawater quality is moderate.

Mitigation measures include minimising unnecessary vessel movements, such as propeller thrusting, to avoid sediment disturbance and regular monitoring to ensure that water discharges comply with national limits.

Economic Activities

The creation of employment opportunities is anticipated during the different phases of the project. During operation, BLNG is expected to provide employment opportunities and revenue to supporting businesses and industries within Bahrain. BLNG is expected to support Bahrain economic growth as it will boost natural gas availability and hence support population growth and industrial development. Therefore, it is expected that there will be positive benefits for the local community in terms of employment and income. Employment prospects will exist for skilled and unskilled labour, administration staff, caterers and medical staff.

Population

Both construction and operations phases will impact on local communities due to the nuisance resulting from noise and air emissions. Also, incidental noise may occur from warning alarms, fog horns, etc. Air quality computer modeling indicated that the nearest residential area of Arad will not be significantly affected by the offshore operational activities. Noise modeling indicated that the contribution of the proposed project noise during normal operation to the background noise levels is negligible at all the surrounding tested locations.

Mitigation measures include installing silencers on machinery and generators, restricting working hours for particularly loud construction activities, and communicating with the local community prior to conducting any activity that might cause noise nuisance. Applying the proposed mitigation measures will reduce the impact to minor during the construction and operations phases.

Commercial Fishing

Given the limited extent of proposed dredging and reclamation activities and the distance to known fishing sites, the risk of BLNG impacting fishing grounds is not considered to be of great significance. The impact of the offshore construction activities on commercial fishing is minor. Mitigation measures include coordination with fishermen communities and avoiding fishing spots as applicable.

Traffic

Traffic movements associated with construction activities are expected to affect the local community, nearby facilities, and air quality. The anticipated impact to traffic due to the proposed construction activities is expected to be moderate. Mitigation measures include

avoiding vehicle movements during rush hours, adopting a traffic plan and ensuring adequate planning of activities, and complying with all statutory vehicle standards such as width, height, axle loading, and gross weight.

Accidental Events

During the different phases of BLNG, accidental events may occur, including spills and leaks, vehicles collisions or accidents, fire, and explosion in addition to earth or marine works collapse. Mitigation measures include implementation of security measures to control unauthorized access, training employees to promptly contain, report and clean up any oil or hazardous material spills, implementing a comprehensive waste management policy to ensure the safe storage and timely treatment and removal of waste, and implementing an emergency notification system to inform nearby industries and residential communities of an emergency.