Annex A

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ACE-EIA Paper 1/2018
For advice on 23 July 2018

Environmental Impact Assessment Ordinance (Cap. 499)
Environmental Impact Assessment Report

Hong Kong Offshore LNG Terminal

PURPOSE

This paper presents the key findings and recommendations of the Environmental Impact Assessment (EIA) report for "Hong Kong Offshore LNG Terminal" ("the Project") submitted under section 6(2) of the Environmental Impact Assessment Ordinance (EIAO) (Application No. EIA-256/2018). The CLP Power Hong Kong Limited (CLP) ("the Applicant") and its consultants would present the EIA report at the meeting of EIA Subcommittee.

ADVICE SOUGHT

2. Members' views are sought on the findings and recommendations of the EIA report. The Environmental Protection Department (EPD) would take into account comments from the public and the Advisory Council on the Environment (ACE) in deciding whether or not to approve the EIA report under section 8(3) of the EIAO.

BACKGROUND

3. Electricity generation is a major source of air pollutant and greenhouse gas emissions. In 2015, after considering, *inter alia*, the views received during the Public Consultation on the Future Fuel Mix for Electricity Generation, the Government announced the plan of increasing the percentage of natural gas in the fuel mix for electricity generation to around 50% by 2020 to meet the emission reduction targets for major air pollutants like nitrogen oxides, sulphur dioxide and respirable suspended particulates. In 2017, the Government published the Hong Kong's Climate Action Plan 2030+ to set out the target of reducing carbon emissions by 2030 and a plan of phasing down coal for electricity generation and replacing more coal in the fuel mix with more natural gas and non-fossil fuel sources to reduce carbon emissions in the medium term.

4. CLP and The Hongkong Electric Company Limited (HKE) are the two power companies in Hong Kong supplying electricity to all consumers. CLP and HKE are jointly exploring the feasibility of developing a liquefied natural gas (LNG) receiving terminal in Hong Kong offshore waters, using floating storage and regasification technology, to enhance the security and reliability of sourcing natural gas for Hong Kong.

5. CLP is leading the development of the Project, acting for and on behalf of HKE, and hence the project proponent for the EIA study. CLP submitted the EIA report for the Project to EPD for approval. The Director of Environmental Protection (DEP), in consultation with the relevant authorities, considered that the EIA report had met the requirements in the EIA Study Brief and the Technical Memorandum on EIA Process (TM) of the EIAO for the purpose of exhibiting the report for public inspection, under section 7(4) of the EIAO.

NEED FOR THE PROJECT

6. According to the EIA report, the Project will provide an additional natural gas supply source to meet Hong Kong's fuel mix target of having around 50% natural gas-fired electricity generation in Hong Kong by 2020 so as to further reduce carbon emissions and improve the local air quality. The Project will diversify the natural gas supply sources and increase the options to access competitively priced gas directly from the global LNG market for Hong Kong. The Project will also enhance the security and reliability of using natural gas for electricity generation to cope with the

potential risks of disruption in gas supply[1].

ENVIRONMENTAL BENEFITS

7. According to the EIA report, the Project is a proposed infrastructure for LNG supply which can have the following potential benefits from the environmental point of view :

(a) Support to the Government's Objective of Improving Air Quality: Natural gas produces virtually no particulates, negligible sulphur dioxide and less nitrogen oxides than other fossil fuels during combustion to produce energy. Gradual replacement of the existing coal-fired power generation units with gas-fired units will help reduce air pollutant emissions from the power plants in Hong Kong.

(b) Contribution to Hong Kong's Climate Change Commitments of Reducing Carbon Emissions: Local electricity generation is the biggest contributor to Hong Kong's carbon emissions, accounting for about 70% in total. Natural gas is a fossil fuel with the lowest carbon content. The plan of phasing down coal for electricity generation and replacing coal with natural gas by 2030, as one of the major carbon reduction measures in the Hong Kong's Climate Action Plan 2030+, will enable Hong Kong to reduce carbon emissions significantly in the medium term.

8. According to the EIA report, from the point of supply security, the Project can also help secure more natural gas supply options with flexibility for direct access to the global LNG market, and ensure electricity reliability with certainty and timely availability of gas supply and also flexibility to augment the existing gas supplies to meet the future growth in gas demand.

[1] There is only one gas pipeline supplying gas to HKE from Dapang LNG Terminal at present. As natural gas will constitute 70% of the fuel mix of HKE in 2023, any disruption to the current gas pipeline will seriously jeopardise the electricity supply in Hong Kong. The Project is vital to provide alternative gas sources for HKE. Examples of gas supply disruptions are:

a. The disruption of gas supply in Singapore resulted in blackouts in many parts of the Singapore in summer months of 2004.
b. A landslide in Shenzhen disrupted CLP's supply of natural gas via the Second West-to-East Pipeline in December 2013.

DESCRIPTION OF THE PROJECT

9. According to the EIA report, the Project proposed is to develop a LNG receiving terminal in Hong Kong offshore waters. It includes the following major infrastructural facilities :

(a) a Floating Storage and Regasification Unit (FSRU) vessel equipped with LNG storage tanks and regasification equipment;

(b) a double berth jetty with mooring facilities for the FSRU vessel and LNG carriers;

(c) two subsea gas pipelines connecting the FSRU with CLP's Black Point Power Station (BPPS) and HKE's Lamma Power Station (LPS) respectively; and

(d) one gas receiving station (GRS) each located entirely within the BPPS and the LPS respectively.

10. The location of the Project, including its major infrastructural facilities, is shown in Figure 1. The Project covers the following Designated Projects (DPs) under Part I, Schedule 2 of the EIAO :

(a) Item C.12 : *a dredging operation which is less than 500m from the nearest boundary of an existing or planned marine park*;

(b) Item H.2 : *a submarine gas pipeline*; and

(c) Item L.2 : *a storage, transfer and trans-shipment of liquefied natural gas facility with a storage capacity of not less than 200 tonnes*.

CONSIDERATION OF ALTERNATIVES

11. The EIA report has included the consideration of various alternative options, including storage technology, LNG terminal siting, gas pipeline alignment, design and construction methods, etc., for the development of the Project to avoid and minimise environmental impacts. The key alternative considerations and outcomes in the EIA report are highlighted below.

Offshore versus Onshore LNG Terminal

12. Development of an onshore land-based LNG receiving terminal will place the LNG storage facility closer to the populated areas, occupy a much larger footprint of some 40 hectares and require a longer construction time of some 36 months. By comparison, an offshore LNG terminal adopting the FSRU technology will distance the LNG storage facility away from the populated areas, lessen the footprint to about 2.5 hectares, shorten the construction time to about 21 months and hence reduce environmental impacts during construction and operation.

Siting of the Offshore LNG Terminal

13. The Applicant has conducted a site search study taking into account the environmental, marine and social constraints to identify the preferred area in Hong Kong waters to site the offshore LNG receiving terminal. Locating the terminal at southwest Hong Kong Water Boundary as shown in Figure 1 is recommended in the EIA report having regard to the following key considerations :

(a) The site is adjacent to the south of Cheung Chau Sediment Disposal Area and outside the proposed South Lantau Marine Park. It is relatively less environmentally sensitive, not frequented by Chinese White Dolphin and of relatively lower sighting density of Finless Porpoise.

(b) The site has sufficient water depth for operating the Project and thus avoiding or minimising dredging;

(c) The site is not in the dense marine traffic areas and can maintain a suitable distance from various vessel fairways and allow a relatively short transit of the FSRU vessel and LNG carriers in Hong Kong waters; and

(d) The site is distant from recreational beaches and population (with the closest residential areas approximately 7 km away on Cheung Chau and southern Lantau).

Alignments of the Gas Pipelines

14. The EIA report includes the consideration of various alignment options for the gas pipelines connecting to the BPPS and LPS (i.e. BPPS Pipeline and LPS Pipeline). The “marine only” route is selected for the BPPS Pipeline to avoid routing the pipeline through the Lantau Island and hence disturbing the country parks and

imposing potential risk to the populated areas. The alignments for both the BPPS Pipeline and LPS Pipeline are selected taking into account marine safety and environmental constraints as well as the need to avoid encroachment onto the existing Sha Chau and Lung Kwu Chau Marine Park and the proposed South Lantau Marine Park and Southwest Lantau Marine Park.

Designs and Construction Methods

15. The EIA report proposes to adopt the design of steel jacket substructure for the jetty, which can reduce the number of piles from about 400 piles under the conventional piled substructure design to about 80 piles. A shorter piling duration of about 9 months can also be achieved. A review has been conducted for the piling methods. Taking into consideration the long installation time for bored piles (owing to the deep bedrock at about 80 to 100m) and thus the requirement of using multiple jack-up barges/temporary platforms at any one time resulting in more environmental impacts, the increase in waste generation/sediment disposal and marine traffic risk, the construction risks and the lengthier piling programme, bored piling is considered not viable for the Project. Owing to the concerns of the potentially excessive lateral movement and the seabed conditions, the use of suction piles is also considered technically not viable. The EIA report recommends to use the open-ended steel tubular piles for the jetty substructures and adopt the quieter hydraulic piling method together with noise reduction system and bubble curtain to reduce both the airborne and underwater noise levels (see also paragraph 23 for noise mitigation measures).

16. Concerning the construction methods for the subsea gas pipelines, the EIA report proposes to adopt a combination of dredging and jetting methods for construction of different sections of the pipelines to minimise the generation of dredged sediment amid the fulfillment of water quality criteria and safety requirement of providing sufficient protection to the pipelines.

Avoidance and Minimisation of Impacts

17. The key approaches proposed in the EIA report for adoption for the Project to avoid and minimise the environmental impacts are summarised as follows :

(a) Distance the Project away from populated areas and busy marine vessel fairways to avoid or minimise potential hazard to life;

(b) Adopt off-shore terminal with FSRU technology to avoid coastal reclamation, loss of sizable seabed and landscape impacts;

(c) Locate the GRSs entirely within the BPPS and LPS premises to avoid impacts on natural terrestrial habitats and natural shores;

(d) Site the LNG receiving terminal in the area adjacent to the relatively less environmentally sensitive Sediment Disposal Area and outside the boundary of the proposed South Lantau Marine Park, with sufficient water depth to minimise dredging, and of rare and relatively less sighting density of Chinese White Dolphins and Finless Porpoises respectively to minimise impacts on these marine mammals;

(e) Adopt jetty design to reduce the number of piles, and piling method to shorten the duration of construction and reduce the underwater sound level; and

(f) Adopt construction methods for jetty piling and pipeline laying to minimise the need of dredging and hence the generation of dredged sediment.

SPECIFIC ENVIRONMENTAL ASPECTS TO HIGHLIGHT

Hazard to Life

18. The EIA study has assessed both the individual risk and societal risk associated with the operation of the Project covering marine transits of LNG carriers and FSRU vessel to the LNG receiving terminal, LNG transfer at the receiving terminal, natural gas transfer in the subsea pipelines and natural gas receiving at the GRSs at the BPPS and LPS, etc.. It concludes that the risk criteria of the TM will be complied with. The Project will implement a series of safety management measures such as various safety systems embedded in the design of the Project, a Safety Zone forming part of the Project's site to impose safety precautionary measures and regular safety inspections to audit the proper functioning of the safety measures.

Water Quality

19. Water quality impacts on various sensitive receivers, including marine parks, coral communities, fish culture zones, and bathing beaches, etc., have been assessed in the EIA study. Release of suspended solids (SS) caused by dredging and jetting works for laying the gas pipelines will be the key concern on water quality.

With mitigation measures such as control of dredging/jetting rates and deployment of silt curtains, the assessment has demonstrated that there will be no adverse water quality impacts arising from the construction of the Project.

20. The potential water quality impacts due to various discharges from the operation of the Project, including cooled seawater with residual chlorine from the regasification process and small quantity of treated sewage effluent from sewage treatment system, etc., have been assessed. The assessment has demonstrated that the relevant criteria will be met.

Ecology

21. The EIA study has assessed the potential ecological impacts with special attention on the key ecological sensitive receivers, including existing and proposed marine parks, Finless Porpoise, Chinese White Dolphin, coral communities and avifauna, etc.

22. According to the EIA report, the areas of temporary loss and disturbance of seabed habitats owing to construction of the jetty and laying of the two pipelines are relatively small in the context of the extent of similar habitats available in the vicinity and the affected seabed habitats are of comparatively low ecological value. It is expected that the affected areas will be re-colonised and re-habituated by marine organisms after construction and the impact is considered as environmentally acceptable to marine ecology.

23. Underwater sound arising from piling has the potential to cause impact on marine mammals in particular Finless Porpoise. With the adoption of the recommended mitigation measures, including avoidance of piling works at night-time and during Finless Porpoise peak season (December to May), implementation of a marine mammal exclusion zone of 500m, adoption of quieter hydraulic piling method with noise reduction system and use of bubble curtain, etc., no unacceptable impacts on marine mammals are expected.

24. Other precautionary/mitigation measures, including avoidance of works at night-time and peak calving months of Chinese White Dolphin (May and June) at certain locations of the pipelines, restriction of the speed of working vessels, use of pre-defined and regular routes to avoid encroachment onto marine parks, etc., have also been recommended in the EIA report to further reduce potential impacts to marine mammals due to disturbance from pipeline construction and increased marine traffic from construction activities.

25. During the operation of the Project, there will be a loss of about 2.5 hectares marine water habitat for marine mammals within the jetty footprint, which is considered acceptable to marine and terrestrial ecology (including Finless Porpoise and offshore avifauna) as the habitat is small in size in the context of the surrounding habitats available for the key species, and not unique or critical in terms of habitat utilisation by the species. The potential ecological impacts associated with the discharge of cooled seawater arising from regasification have also been assessed and no unacceptable ecological impacts are expected owing to a small drop in temperature. For the potential impacts due to impingement and entrainment of marine ecological resources (including also fisheries resources), considering the area of seawater intake and discharge is of low ecological sensitivity and productivity in eggs and planktonic larvae based on field survey results, unacceptable impact is not anticipated.

26. Taking into account the relatively small scale of the jetty footprint, the sizable movement ranges and mobility of marine mammals, and the recommended mitigation measures for water quality and ecological impacts, the EIA report concludes that there will be no unacceptable ecological impact arising from the construction and operation of the Project.

27. The EIA report has also recommended implementing enhancement measures in the form of an independent fund to support initiatives contributing to the benefits of the marine environment, biodiversity and community of southern Lantau.

Fisheries

28. According to the EIA report, the Project will cause temporary disturbance to fisheries habitats during the pipeline construction, temporary loss of access to potential fishing grounds of about 18 hectares within the jetty works area, and a permanent loss of about 0.8 hectares of marine water habitat for fisheries owing to the jetty piles during the operation stage. The EIA study has assessed that the fishing ground within and near the LNG receiving terminal is of low importance to the Hong Kong fishing industry. Having regard to the temporary nature of the construction works and the small size and low importance of the loss of fisheries habitat, the EIA concludes that there is no unacceptable fisheries impact arising from the Project.

29. The mitigation measures recommended in the EIA report for water quality and ecological impacts will also help minimise and mitigate the impacts on fisheries during the construction and operation of the Project. The recommended enhancement

measures of setting up an independent fund can also enhance fisheries resources of southern Lantau and help support the sustainable development of fisheries industry.

Waste Management

30. The key waste management issue arising from the Project will be the generation and disposal of dredged marine sediment during the construction of the subsea gas pipelines. In the EIA report, with the adoption of the non-dredging method (i.e. jetting) for laying of the pipelines as far as possible to avoid and minimise the generation of dredged marine sediment, it is estimated that about 0.35 million m^3 of dredged marine sediment, comprising uncontaminated sediment (Category L) of some 0.03 million m^3 and lightly contaminated sediment (Category Mpass) of some 0.32 million m^3, will be generated. As dredged marine sediments are not suitable for reuse on-site, they will require off-site disposal. According to the Practice Note for Authorised Persons, Registered Structural Engineers and Registered Geotechnical Engineers (PNAP) No. ADV-21 on Management Framework for Disposal of Dredged/Excavated Sediment, the dredged marine sediments of Category L and Category Mpass will be suitable for Type 1 Open Sea Disposal and Type 1 Open Sea Disposal (Dedicated Sites)[2] respectively. The Applicant will liaise with the Marine Fill Committee in accordance with the PNAP No. ADV-21 to obtain allocation of disposal sites for the dredged marine sediment and comply with the requirements of the Dumping at Sea Ordinance.

31. Quantities of other wastes to be generated during the construction and operation of the Project will be minimal. The EIA report concludes that there will be no adverse waste management implication arising from the Project.

Other Environmental Impacts

32. The EIA report has also included other environmental impacts. The LNG receiving terminal will be distant from the visually sensitive receivers and the GRSs will be located entirely within the existing power stations. No adverse visual impact is anticipated owing to these structures. Similarly, air quality and noise sensitive receivers are distant from the Project and no adverse air quality and noise impacts are anticipated. No cultural heritage resources including any potential marine archaeological resources will be affected by the Project.

[2] Currently, the Type 1 Open Sea Disposal refers to the dumping sites at South of Cheung Chau and East of Ninepin, whilst Type 1 Open Sea Disposal (Dedicated Sites) refers to the confined disposal at the East Sha Chau Mud Pits.

ENVIRONMENTAL MONITORING AND AUDIT (EM&A)

33. The EIA report includes an EM&A Manual which recommends EM&A programmes during the construction and operation phases of the Project. Key recommended EM&A requirements cover water quality, ecology and waste management.

PUBLIC CONSULTATION

34. The Applicant has made the EIA report, EM&A Manual and Executive Summary available for public inspection under the EIAO from 15 June 2018 to 14 July 2018. A summary of all public comments received by EPD during the public inspection period and a gist of the main concerns raised in the public comments will be provided separately.

July 2018
Environmental Assessment Division
Environmental Protection Department