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Castle Peak Power Co. Ltd.

Black Point Gas Supply Project

Project Profile

June 2009

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1 INTRODUCTION & BACKGROUND

1.1 BACKGROUND

Castle Peak Power Company Limited (CAPCO) is presently pursuing a secure and sustainable supply of natural gas primarily to replace its depleting natural gas fuel supply from the existing Yacheng 13-1 field.

The Hong Kong Special Administrative Region (HKSAR) Government's environmental policy includes the control of emissions from existing power stations in Hong Kong. Central to this effort is the use of natural gas. As a consequence, natural gas is positioned to play an increasingly important role in the generation of electricity. A stable, cost-efficient way to supply natural gas to Hong Kong will play a key role in the continued use of gas at Black Point Power Station (BPPS) facilitating CAPCO's ability to meet the Government's emission reduction objectives.

On 28 August 2008, the HKSAR Government signed a Memorandum of Understanding (MoU) with the National Energy Administration of the Central People's Government (NEA) in support of continuous natural gas supply to Hong Kong in the coming two decades ⁽¹⁾. As part of the MoU, the NEA supports the China National Offshore Oil Corporation's (CNOOC) renewal of its supply agreement with Hong Kong for a further term of 20 years.

In addition, according to the MoU, it was agreed, in principle, that the feasibility of supplying natural gas to Hong Kong via the Second West-East Natural Gas Pipeline would be studied, and that the Mainland would jointly build with party(ies) in Hong Kong a LNG terminal on the Mainland for supplying natural gas to Hong Kong.

Recent developments with the signing of the MoU have enabled CAPCO to examine the potential of working with gas suppliers in the Mainland to obtain natural gas for BPPS. It is understood that gas will arrive at BPPS via new submarine gas pipeline(s) prior to use. This Study, namely *Black Point Gas Supply Project*, presents CAPCO's options and approach for obtaining natural gas from Mainland supplier(s) to BPPS.

Preliminary discussion with Mainland gas suppliers has indicated that the gas export facilities are likely to be located on Dachan Island on the western Shenzhen coastline. The cross boundary nature of the proposed submarine pipelines linking the Mainland gas export facilities with BPPS is expected to involve the regulatory and permitting systems of both the Mainland authorities and HKSAR government.

(1) HKSAR (2008) Memorandum of Understanding on Energy Co-operation. Press Release. Accessed on <<http://www.info.gov.hk/gia/general/200808/28/P200808280188.htm>>

It is estimated that the BPPS can consume up to about 3.4 billion cubic metres (BCM) of natural gas a year by early next decade. Increase in demand for electricity and as Hong Kong progressively tightens caps on emissions from local sources, gas consumption of CAPCO may further increase to over 4 BCM. Depletion of the Yacheng 13-1 field is expected to start as early as 2012. To meet Hong Kong's substantial need, it is essential that a reliable replacement gas supply is available and the associated pipeline(s) and facilities to bring this gas to CAPCO can be timely permitted for construction.

On the HKSAR side, the submarine pipeline(s) and the associated gas receiving facilities will require an *Environmental Permit* (EP) from the HKSAR Government under the *Environmental Impact Assessment Ordinance EIAO* (Cap. 499). In preparing this document to support the Environmental Permit Approval CAPCO has made cross reference to the design and environmental impacts previously presented in the Environmental Impact Assessment (EIA) Report for the Hong Kong Liquefied Natural Gas (HKLNG) project (formally entitled *Liquefied Natural Gas (LNG) Receiving Terminal and Associated Facilities*; Register No.: AEIAR-106/2007) ⁽²⁾ which was submitted formally under the EIAO on 19 October 2006 and approved on 3 April 2007. An Environmental Permit to construct and operate the HKLNG project was awarded to CAPCO on 3 April 2007 under reference EP-257/2007.

1.2 *PROPOSED FACILITIES IN HKSAR FOR GAS IMPORT*

1.2.1 *Cross-Border Submarine Gas Pipelines*

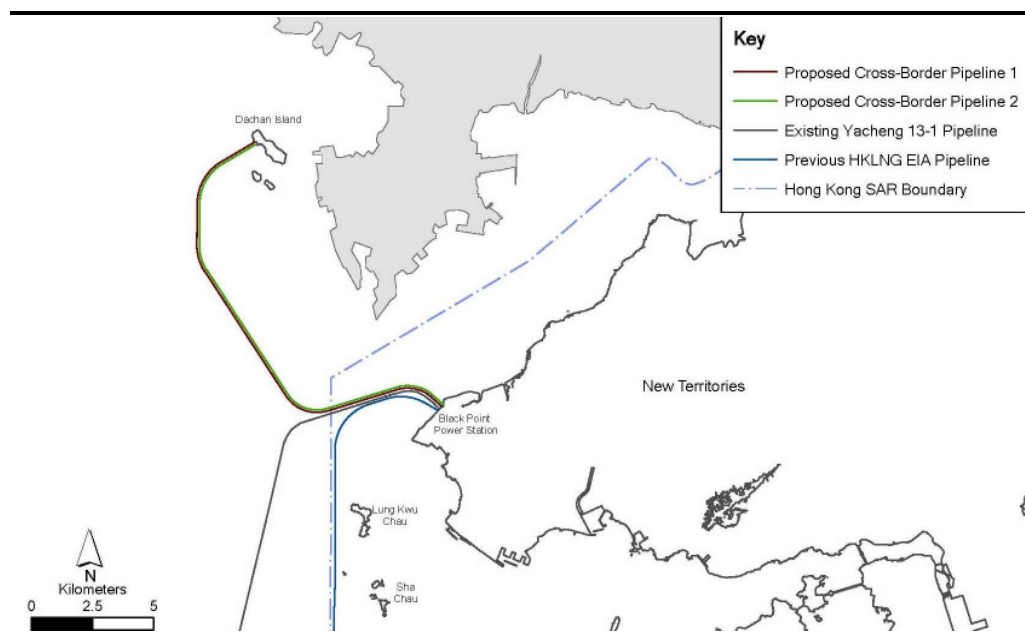
The present proposal by CAPCO to bring gas to Hong Kong is focussed on the construction of two (2) submarine gas pipelines. Both pipelines, in a size range of 30" – 42", would be approximately 20 km long, with around 5 km in HKSAR waters.

Indicative routings of the two proposed pipelines are depicted in *Figure 1.1*. Both routings share a broadly similar pipeline corridor and the same landing point at Black Point, but would involve potentially different supply points on Dachan Island. It is expected that both subsea pipelines will be installed to the north of the existing Yacheng 13-1 Pipeline and the pipeline proposed in the HKLNG EIA, by approximately 200 – 300 m.

Indicative design and specifications of the proposed pipelines are described in *Section 2.5 Project Description*.

(2) ERM (2006) *Liquefied Natural Gas (LNG) Receiving Terminal and Associated Facilities: EIA Study* (EIA Study Brief ESB-126/2005). Prepared for CAPCO

Figure 1.1 *Indicative routings of the cross-border submarine gas pipeline connecting the BPPS and the new gas export facility on Dachan Island*

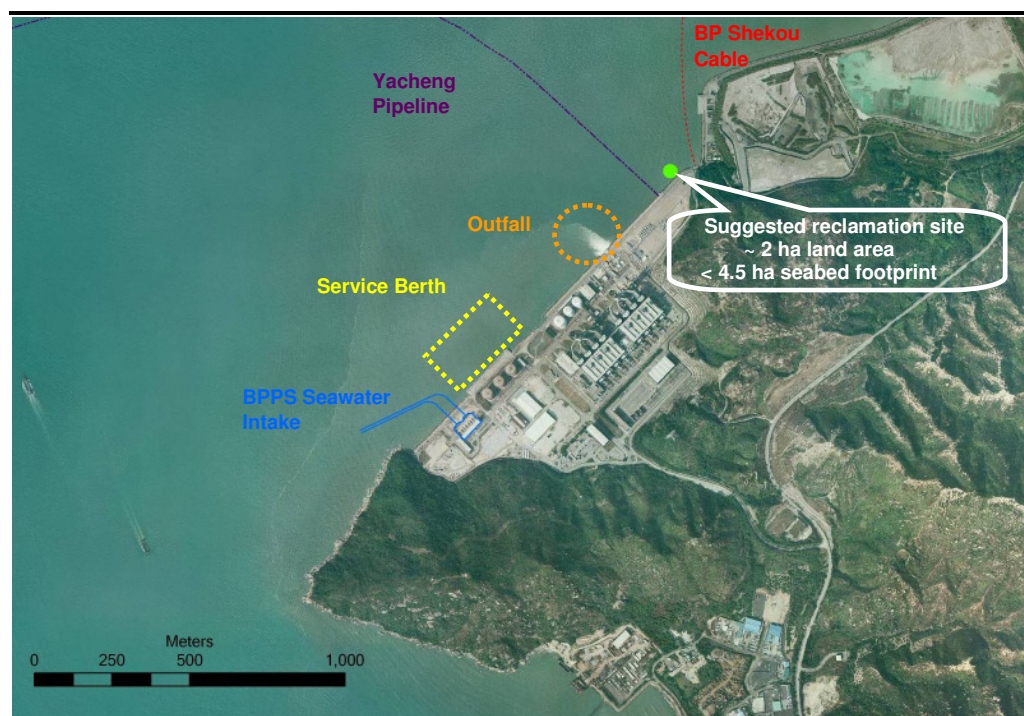


1.2.2 *Gas Receiving Facilities at BPPS*

The cross-border submarine pipelines to Hong Kong will terminate at two new Gas Receiving Stations (GRSs, one GRS for each submarine pipeline). Existing information on details of the potential gas supply (e.g. volume of receiving gas from several sources, etc) has suggested that the size for such facilities will require a land footprint of approximately 2 ha.

CAPCO has undertaken a detailed study to examine potential siting options for the facilities. It has been assumed at this stage that there would be no requirement to cross the Yacheng 13-1 Pipeline and hence the gas receiving stations would need to be to the north of the Yacheng 13-1 Pipeline. Findings of the study have concluded that the one of the suggested options would be for the proposed facilities to be built on reclaimed land north of BPPS (*Figure 1.2*). It is expected that a maximum of 4.5 ha (seabed footprint) may need to be reclaimed.

Figure 1.2 Suggested location of the gas receiving stations (GRSs)



Indicative design and specifications of the proposed gas receiving facilities are described in *Section 2.5 Project Description*.

1.3 PROJECT PROFILE

This document, the *Project Profile*, is produced as part of the present Study to obtain an EIA Study Brief under the EIAO. It includes a description of the potential environmental impacts associated with the preliminary construction and operation plans of the two proposed submarine gas pipelines and the associated gas receiving facilities at BPPS. The description presented herein has been based on best available information compiled by CAPCO describing construction activities, operational details and baseline information describing the condition at the Study Area, i.e. a 500 m wide corridor centred on the proposed gas pipeline route and the area within 500 m of the site boundary of the proposed gas receiving facilities at BPPS.

2 BASIC INFORMATION

2.1 PROJECT TITLE

Black Point Gas Supply Project

2.2 PURPOSE & NATURE OF PROJECT

The Project will involve the construction and operation of two submarine natural gas pipelines connecting Black Point Power Station (BPPS) with gas export facilities on Dachan Island, Shenzhen. To the north of the BPPS two Gas Receiving Stations (GRSs) will be constructed and operated. The gas from the two GRSs will connect with BPPS via a short onshore pipelines within the boundaries of the power station.

2.3 NAME OF PROJECT PROPONENT

Castle Peak Power Company Limited (CAPCO).

2.4 LOCATION & SITE HISTORY

Black Point is the western-most part of the New Territories, and is comprised of a headland extending from the east (land) to the west (sea) with granitic soil underneath, which is typical of the Tuen Mun and Castle Peak areas. The major development at Black Point is the BPPS (the first natural gas-fired plant in Hong Kong), which is located to the north of the headland. The lowland areas at the southeastern edge of the headland are occupied by an orchard, concrete batching plant and cargo storage site. To the west of Black Point lies the route of the Urmston Road shipping channel and Tonggu Waterway, both of which have a depth of > -15 mPD at present.

The site for the proposed GRSs is adjacent to the existing BPPS, to the left of the Tsang Tsui ash lagoons (proposed location as shown in *Figure 1.2*). The proposed pipelines (provisional alignment as shown in *Figure 1.1*) will traverse between the GRSs to natural gas export facilities on Dachan Island, across the Urmston Road shipping channel and the Tonggu Waterway.

2.5 PROJECT DESCRIPTION

2.5.1 Submarine Natural Gas Pipeline

Two submarine gas pipelines of a range of 30" – 42" diameter will be installed in pre-dredged trench(es) to the north of the existing Yacheng 13-1 Pipeline by approximately 100 – 300 m. The total length of the pipelines in HKSAR waters is approximately 5 km and the alignment has been arranged to avoid

crossing of the Yacheng 13-1 Pipeline. The pipelines would be situated below the seabed to a depth that would be dependent on the conditions and the area to be traversed. The pipelines may be installed separately or in a common trench.

The preferred alignment avoids direct impacts to ecologically sensitive habitats within the Sha Chau and Lung Kwu Chau Marine Park. The alignment is also located at a sufficient distance from marine ecological sensitive receivers, such as mud flats, seagrass beds and areas of highest density of dolphin sightings. Construction phase impacts to water quality should be temporary and minor.

The land-based construction works associated with the Black Point site would include laying the pipelines into an open trench followed by direct burial. The pipelines would, typically, be buried at about 1.1 m below ground level within a trench approximately 1 m wide. The land-based work will be within the power plant site and the existing GRS for the Yacheng 13-1 Pipeline.

The marine-based burial depths would generally be 1 - 3 m below the existing seabed level. For marine areas that are considered to pose a threat to the integrity of the pipeline system through anchor drop/drag, protective measures would be required and may include rock armouring. The pipelines would have a protective coating and will be provided with cathodic protection.

Due to the relatively short construction time for the pipelines and proven installation methods, impacts to marine traffic are expected to be minimal.

2.5.2 *Gas Receiving Stations*

The submarine pipelines from Dachan Island to the BPPS will terminate at Gas Receiving Stations. Facilities associated with the GRSs are not complex and the site area requirements usually are small, requiring a reclamation with a land footprint of approximately 2 ha and a seabed footprint of < 4.5 ha. Layout of facilities within the GRSs can be arranged to suit the shape of the site, with due consideration being given to separation from sources of ignition, according to the relevant codes and standards. The reclamation will be formed using dredging, seawall construction and sand-filling works.

2.6 *NUMBER & TYPES OF DESIGNATED PROJECTS TO BE COVERED BY THE PROJECT PROFILE*

This Project covers two Designated Projects as described under the *Environmental Impact Assessment Ordinance (EIAO) (Cap. 499)*:

- Schedule 2, Part I, Item H.2 – Installation of submarine gas pipelines connecting the proposed Gas Receiving Stations at the Black Point Power

Station (BPPS) and gas export facilities on Dachan Island, western Shenzhen;

- Schedule 2, Part I, Item C.12 – A dredging operation exceeding 500,000 m³ for the reclamation and pipeline trenches.

2.7

NAME, POSITION, TITLE & TELEPHONE NUMBER OF CONTACT PERSON

Name, Position & Title	Telephone Number
Mr John Cullen <i>Project Director, Gas Supply Project, CLP Power Hong Kong Limited (as operator of CAPCO generating facilities)</i>	2678-4992

3 *OUTLINE OF PLANNING & IMPLEMENTATION PROGRAMME*

3.1 *PROJECT PLANNING & IMPLEMENTATION*

The Project Proponent is the Castle Peak Power Company Limited (CAPCO) with overall responsibility for the planning, design, construction and operation of the Project. The Project Proponent has engaged Environmental Consultants to conduct an Environmental Impact Assessment (EIA) Study and Engineering Consultants to undertake the engineering design work. The Project will be implemented by Contractor(s) to be appointed at a subsequent stage.

3.2 *PROJECT PROGRAMME*

Depletion of the Yacheng 13-1 field is expected to start as early as 2012 and hence there is an urgent need for a replacement gas supply, and the timely permitting and construction of associated pipeline(s) and facilities to bring this gas to Hong Kong is of prime importance. The planning stage of the Project, including the EIA, engineering design and statutory permitting, is anticipated to commence in mid 2009 for completion within a study period of up to 9-24 months (i.e., depends on various permitting requirements). The construction works of the Project will commence in 2011.

3.3 *INTERACTIONS WITH BROADER PROGRAMME REQUIREMENTS OR OTHER PROJECTS*

At present the only known project that is planned to be constructed in sufficient proximity of the proposed GRs at BPPS and the submarine gas pipelines is the HKSAR Government's Sludge Treatment Facilities which have been proposed to be located at Tsang Tsui (i.e. east of the existing CAPCO Ash Lagoon at Tsang Tsui and west of the WENT Landfill), at > 1.2 km from the proposed GRs location. The Sludge Treatment Facilities are currently scheduled to commence construction in early 2010 for completion by the end of 2012. However given the separation distance cumulative impacts are unlikely to occur.

Information from the Shenzhen Port Tonggu Channel Developing Office indicates that maintenance dredging of the Tonggu Waterway may take place annually. The EIA will review any updated information to determine if there is any overlap with the construction for this Project.

Various activities have been proposed for the Nim Wan and Tsang Tsui areas including an extension to the WENT landfill, an Animal Carcass Treatment Facility and Waste-to-energy Facility. The programmes for these projects

remain uncertain. Nevertheless, the separation distance from this Project is such that cumulative impacts are unlikely to occur.

The above working assumptions will be re-examined and confirmed during the EIA.

4 POSSIBLE IMPACTS ON THE ENVIRONMENT

4.1 INTRODUCTION

The following sections identify potential impacts to the environment.

4.2 HAZARD TO LIFE

Safety is the principal consideration in the design and operation of the Gas Receiving Stations (GRSs) and submarine pipelines. These facilities will be classified as a Notifiable Gas Installation and hence subject to the requirements under the *Gas Safety Ordinance (Cap. 51)*.

As per the requirements of the *EIAOTM*, a detailed quantitative risk assessment (QRA) was carried out as part of the HKLNG EIA study ⁽³⁾, examining the installation of a submarine gas pipeline and GRS facility at BPPS. The findings of that study were that potential risks of the operation of a submarine gas pipeline to BBPS and a GRS at BPPS would be acceptable as per the individual and societal risk criteria set out in *Annex 4* of the *EIAO-TM*. The conclusion was that the operation of such types of facilities is not likely to cause unacceptable risks.

As the design of the submarine gas pipelines and GRSs for the proposed project are broadly similar to that assessed in the HK LNG EIA, it is expected that the results of a similar assessment would also reach the same conclusion with regard to no unacceptable risk during operation. The EIA will confirm this interim conclusion through detailed risk assessment of the submarine gas pipeline and GRSs.

4.3 WATER QUALITY

4.3.1 Construction Phase

Construction phase impacts of the Project are divided into the following marine work components:

- Installation of two submarine pipelines using methods traditionally used in Hong Kong (e.g. dredging);
- Dredging trenches for the pipeline, which will be backfilled (potentially with gravel and rock) to provide armouring protection;
- Dredging for the GRSs reclamation works; and

(3) CAPCO (2006) Liquefied Natural Gas (LNG) Receiving Terminal and Associated Facilities Register No.: AEIAR-106/2007

- Filling the reclamation area with sand and suitable fill material.

The above works have the potential to affect the Water Quality Sensitive Receivers (WQSRs). The WQSRs are listed in *Table 4.1*.

Table 4.1 *Water Quality Sensitive Receivers Potentially Affected by the Project*

No.	Description
1	Pak Nai Site of Specific Scientific Interest (Pak Nai SSSI)
2	Seagrass bed and horseshoe crab nesting ground at Ha Pak Nai
3	Indo-Pacific Humpback Dolphin Feeding Ground (Urmston Road)
4	Cooling water intake for Black Point Power Station
5	Non-gazetted beaches at Lung Kwu Sheung Tan (Upper and Lower)
6	Sha Chau and Lung Kwu Chau Marine Park (including artificial reefs)
7	Cooling water intake for Castle Peak Power Station
8	Fisheries spawning and nursery ground NW Lantau waters
9	Indo-Pacific Hump-back Dolphin Feeding Ground (W Airport)

Submarine Gas Pipelines

The trench dredged sections of the pipelines alignment have the potential to cause impacts to water quality. In the area adjacent to the Black Point Power Station, it is expected that the main concern will be related to the release of suspended solids into the water column during dredging and potential effects on the power station cooling water intake.

The estimated total volume of sediment to be dredged and disposed of for the pipeline route is not expected to exceed 600,000 m³ (assuming separate pipeline trenches and a worst case option of a trench with a 1:5 slope).

Computer modelling of sediment plume dispersion and water quality will be carried out as part of the EIA to simulate the impacts from dredging operations. Such modelling would determine the fate of sediments entering suspension during dredging and the resultant suspended sediment concentrations in the receiving waters and at sensitive receivers.

GRSs Reclamation at Black Point

Based on preliminary engineering information, it is envisaged that marine sediments will need to be removed from within the reclamation and underneath the proposed seawalls. The dredging will likely be undertaken using grab dredgers. The primary impacts of the dredging on water quality are temporary increases in suspended sediment concentrations. Such impacts may not only affect the water body within the works area but also the sensitive receivers in the vicinity.

Information on sediment quality from around Black Point indicates that there may be elevated Arsenic concentrations. The impact of the dredging works on water quality will be assessed in detail during the EIA Study. Mitigation

measures will be proposed, if necessary, to reduce any impacts to an acceptable level.

The estimated total volume of sediment to be dredged and disposed of for the reclamation is not expected to exceed 350,000 m³.

Discharges and runoff from the site during the construction phase, particularly during the filling and site formation works, will contain suspended solids. As this will potentially cause a water quality impact, mitigation measures will be implemented to ensure that any discharges resulting from the construction of the GRSs comply with the marine water quality standards detailed in the *Water Pollution Control Ordinance (Cap. 358)*.

4.3.2 *Operation Phase*

The potential impacts to water quality arising from the operation of the Project have been identified as follows:

- Changes to the hydrodynamic regime through the reclamation of the GRSs; and,
- Storm water run-off from the GRSs.

It is recommended that computer modelling of hydrodynamics be carried out as part of the EIA to simulate any changes in water current patterns due to the GRSs reclamation.

4.4 *MARINE ECOLOGY*

4.4.1 *Construction*

As part of the HKLNG EIA, the CAPCO team conducted detailed reviews of literature on marine ecological resources as well as extensive marine ecological surveys, carried out during the wet and dry seasons between 2004 and 2006. The surveys examined the major habitats and species surrounding Black Point. It was found that the marine ecological habitat and resources were generally of low to medium ecological importance dependent on the location.

The survey work and literature review indicated that the Indo-Pacific humpback dolphin *Sousa chinensis* is present in the vicinity of Black Point. Based on analysis of the density of dolphins sighted, marine waters to the north of Black Point Power Station were regarded as of low importance to these marine mammals. Aside from the marine mammals, no other marine species or habitats of high or medium ecological importance were identified around Black Point.

Potential impacts to ecological resources during construction may consist of direct loss of < 4.5 ha of marine habitats located within the reclamation area.

The habitats located within the reclamation area include artificial seawall and soft benthos. All habitats have been determined to be of low to low / medium ecological value through field surveys conducted as part of the HKLNG EIA and recent field update surveys in the dry and wet seasons of 2009. Recolonisation by marine organisms on the seawalls is expected to occur rapidly. Soft-bottom subtidal organisms that will be lost during the reclamation works are commonly recorded elsewhere in Hong Kong waters.

Although the loss of a very small amount of marine mammal habitat would be an inevitable consequence of the project, the residual impact would be expected to be acceptable after taking into consideration a number of factors. The loss of marine mammal habitat is small (< 4.5 ha) in the context of the size of habitat available to dolphins. Taking account of the sizable home ranges and mobility of affected animals, it is expected that the loss would not give rise to biologically significant adverse impacts on individual dolphins or the dolphin population as a whole. The habitat which would be lost would not be considered as key marine mammal habitat in particular due to considerable disturbance by heavy marine traffic in nearby waters. Due to the number of marine mammal surveys conducted for the HKLNG EIA between 2004 and 2006 and the relevance to the present Project, it is not considered necessary to undertake further baseline ecological surveys.

Indirect impacts to marine ecological resources around the marine works areas may have the potential to occur as a result of perturbations to water quality due to the activities described in *Section 4.3*. Survey information on the seabed conditions along the proposed pipelines route indicates that the seabed is composed mainly of soft muds that are repeatedly reworked by the demersal trawlers that operate in the area. Sediment plume modelling, recommended to be conducted as part of the EIA, is necessary for a detailed assessment of impacts to water quality which is, in turn, essential for a thorough evaluation of indirect impacts to marine ecological resources.

4.4.2 *Operation*

No adverse impacts to marine ecological sensitive receivers would be expected to occur during the operation phase.

4.5 *FISHERIES*

4.5.1 *Construction Phase*

Reviews of existing information on commercial fisheries resources and fishing operations in the water of the proposed submarine pipelines and GRSs have been undertaken. Information from a study on fishing operations in Hong Kong and the Agriculture, Fisheries and Conservation Department (AFCD) Port Survey 2001/2002 indicate that fisheries production values in the vicinity of the assessment area are low. There are no licensed fish culture activities present within 20 km of the project works.

Potential impacts to fisheries resources and fishing operations may arise from disturbances to benthic habitats on which the fisheries resources depend for food, or through changes to key water quality parameters, as a result of the dredging works and installation of the gas pipelines. As impacts arising from the proposed dredging works are expected to be largely confined to the specific works areas and of short duration, and the expected elevations of suspended sediment due to the Project are not expected to exceed environmental standards, they are not expected to cause adverse impacts to water quality, fishing grounds or species of importance to the fishery. While no special mitigation measures are required, constraints on dredging operations recommended to control impacts to water quality to within acceptable levels are also expected to mitigate impacts to fisheries resources.

4.5.2 *Operation*

No adverse impacts to fisheries would be expected to occur during the operation phase.

4.6 *TERRESTRIAL ECOLOGY*

Owing to the marine nature of this Project sensitivities that are terrestrial in nature are unlikely to be affected in any way by the Project. No impacts to terrestrial ecology are thus expected to arise from the construction and operation of this Project.

4.7 *WASTE MANAGEMENT*

The most significant construction waste impact for the Project will be handling and disposal of marine sediment associated with the dredging works for GRSs reclamation and submarine pipelines installation. Operation of the project facilities is not expected to generate any solid wastes or by-products.

Whilst the reuse of inert excavated materials will be maximised during the reclamation works where practicable, surplus excavated material will be disposed of off-site. The management and disposal of the dredged material will follow the procedures and requirements specified in *ETWBTC 34/2002*, and a Marine Dumping Permit will be obtained under the *Dumping at Sea Ordinance (Cap. 466)*.

With the appropriate management procedures in place, it would be expected that potential impacts of waste management would meet the criteria specified in the *EIAO-TM*.

4.8 *CULTURAL HERITAGE & ARCHAEOLOGY*

There is no declared/ deemed monument or graded/ recorded heritage resources located in the immediate proximity to the Project, and no existing

sites of cultural heritage protected under the *Antiquities and Monuments Ordinance (Cap. 53)* have been identified. Terrestrial cultural heritage/archaeological resources, such as Building Heritage and Archaeological Sites, are unlikely to be affected in any way due to the marine nature of this Project and their distance from works areas. No impacts to these resources are thus expected to arise from the construction and operation of this Project.

No marine sites of cultural heritage/archaeological value are expected to be present in waters surrounding Black Point and along the proposed pipeline corridor. As such, no impacts to marine archaeological resources are expected and no mitigation measures are considered likely to be necessary. The EIA will confirm this interim conclusion.

4.9 *LANDSCAPE & VISUAL*

The Project Site is considered to be with a landscape of low importance owing to its close proximity to large areas of industrialised landscape, i.e. disturbed/developed area, including the BPPS and ash lagoons, with the majority of the shoreline being artificial seawall.

For the installation of the proposed submarine pipelines, since the pipeline conduits are laid under the seashore and the submarine pipelines are buried in the seabed, they will not cause any visual obstruction or inconvenience to the public. Potentially adverse landscape impacts are therefore unlikely to occur and no mitigation measure is required. Potential visual implications of the submarine gas pipelines will only arise during construction by marine vessels and equipment used to lay and bury the pipelines, which are considered to be negligible. No operational visual impacts are expected.

As with the proposed GRSs, they will contain facilities similar to the existing GRSs at BPPS and will be of a similar appearance to the existing facility. They will be constructed on an area of reclaimed land (~ 2 ha) that will extend along the existing artificial shoreline of BPPS. Whilst < 200 m² of existing artificial seawall at BPPS is expected to be lost due to the reclamation, new sloping rubble-mound and vertical seawall will be constructed. Landscape changes caused by the proposed GRSs reclamation would be consistent with the existing industrial character of the area and thus there will be negligible landscape impacts associated with the new GRSs. It is anticipated that the reclamation area will utilise natural rocks for the engineered seawalls to integrate new structures into existing landscape and minimise potential landscape impacts.

Visual Sensitive Receivers (VSRs) to be potentially affected are passengers on vessels passing by Black Point, and the proposed reclamation would not be visible to the majority of the land-based VSRs. In particular, the more sensitive VSR including Lung Kwu Tan village, which is the nearest residential development located at least 3 km southeast of the site, would be screened by the existing natural and man-made landscape of Black Point.

Other VSRs including visitors to Lung Kwu Chau will have very restricted views of the reclamation, since a relatively small reclamation like this is likely to be screened by the Black Point headland. In view of the transient nature of this impact, the level of visual impacts is considered to be minimal and acceptable and no specific mitigation measure is required.

4.10

AIR QUALITY

Existing air quality in the vicinity of the proposed Project Site is primarily influenced by local emissions from the BPPS and CPPS, and is expected to be fair to good due to its coastal location. No Air Sensitive Receivers (ASRs) are identified in close proximity of the Project Site; the nearest ASR would be the administration building of BPPS which is about 500 m away. Other ASRs include the site offices of various industrial sites in the Black Point area, which are at least 3 km away.

Nuisance from dust generating activities has the potential to arise during construction activities. The major construction works include dredging, reclamation, gas pipeline installation works and GRSS facilities installation works. Whilst no dust impact is anticipated with regard to dredging and pipeline installation works due to the high moisture content of dredged materials and marine nature of works, sand filling and fill materials handling are considered to be the major dust generating activities during the GRSS reclamation works. Due to the large separation distances between the proposed GRSS reclamation and the ASRs and with the implementation of the dust suppression measures stipulated in the *Air Pollution Control (Construction Dust) Regulation*, potential dust impacts associated with these activities would be very limited, if at all, and well within the relevant criteria. No dust impacts will occur during operation of the pipelines and GRSSs.

Likewise, potential adverse impacts of gaseous emissions from diesel-driven equipment, such as grab dredgers, barges and tug boats, during construction activities and from the operation of gas heaters at the GRSSs are also not anticipated. This is because such small amounts of air emissions will disperse very rapidly over the large works areas to low levels, and the separation distances between the works areas and the ASRs are relatively large. These emissions are expected to be well within the relevant air quality standards and criteria. Adverse air quality impacts from both construction and operation activities are thus not envisaged. No specific mitigation measure is required.

4.11

NOISE

4.11.1

Construction

Construction activities including reclamation, dredging and facilities construction will involve the use of Powered Mechanical Equipment (PME).

The use of PME has the potential to generate construction noise. Noise Sensitive Receivers (NSRs) are remote to the site and are consequently not expected to be affected by construction noise. The EIA will confirm this interim conclusion.

4.11.2 *Operation*

There will be no plant emitting noise in the GRSs hence no operational noise impacts would be expected to occur. The EIA will confirm this interim conclusion.

4.12 *OTHER ISSUES*

Odour: No odour impacts are expected during either the construction or operation phases of the proposed project.

Night-time Operations: Whilst it is expected that the majority of the proposed marine works will be conducted during normal working hours, some of the submarine gas pipeline dredging and installation works will be performed during the evening or night-time hours. For works to be conducted during the evening or night-time hours, a Construction Noise Permit (CNP) will be applied for. Owing to the distance of the Project Site from sensitive receivers potential noise impacts for night-time works are expected to be minimal. Assessments to demonstrate that the construction activities will not cause adverse noise impacts will need to be provided by the contractor to support an application for a CNP.

Traffic Generation: Only short-term, minimal increase in traffic movements is expected to be generated as a result of the Project and this is unlikely to generate significant noise or gaseous emissions. Traffic will not be generated during operation of the GRSs and submarine pipelines.

4.13 *CUMULATIVE AND TRANSBOUNDARY IMPACTS*

Cumulative impacts due to other committed concurrent projects would need to be considered during the EIA. The assessment should be based on best publicly available information at the time of reporting.

Similarly, potential transboundary impacts should be examined in the EIA based on publicly available information.

4.14 *SUMMARY OF KEY ENVIRONMENTAL IMPACTS*

The table below (*Table 4.2*) presents a summary of the key issues under various technical aspects for proposed project.

Table 4.2 Summary Table of Key Issues

Technical Aspect	Summary of Key Issues
Hazard To Life	The societal and individual risks for the Black Point site are expected to meet the Hong Kong Risk Guidelines. A study to confirm this will be conducted.
Water Quality	Water quality impacts as a result of the construction and operation phase are likely to be short term and transient in nature. A study to confirm this will be conducted. If necessary, mitigation measures will be proposed to reduce any impacts to acceptable levels.
Marine Ecology	No unacceptable impacts are expected to occur to marine ecological resources with the implementation of appropriate mitigation measures.
Fisheries	Mitigation measures that will be designed to mitigate impacts to water quality to acceptable levels (compliance with Water Quality Objectives) are also expected to mitigate impacts to fisheries resources.
Terrestrial Ecology	No unacceptable impacts are expected to occur to terrestrial ecological resources.
Waste Management	The key potential impacts during the construction phase are likely to be related to the disposal of dredged marine sediments. No unacceptable waste management impacts are anticipated.
Cultural Heritage	No unacceptable impacts to cultural heritage resources are expected to occur.
Landscape & Visual	The proposed GRSs would only be visible from limited viewpoints, including the small number of visitors on Lung Kwu Chau and the transient passengers on ferry routes. Considering the small number of potential Visual Sensitive Receivers (VSRs) affected and the existing industrial character of the area, the level of visual impact is considered to be of low severity.
Air Quality	Due to the large separation from the Air Sensitive Receivers (ASRs) and the implementation of the dust suppression measures stipulated in the Air Pollution Control (Construction Dust) Regulation, the construction dust impacts and operational emissions are expected to be within the Air Quality Objectives criteria.
Noise	Due to the large separation distance between Noise Sensitive Receivers (NSRs), construction noise would not be considered to be of a concern. There will be no operational noise impacts.

Whilst the Gas Receiving Stations are proposed to be located on reclaimed land north of the existing Black Point Power Station (BPPS), the submarine gas pipelines are proposed to be installed in the northwestern waters of Hong Kong, north of the existing Yacheng 13-1 Pipeline.

Major environmental elements surrounding the above facilities are summarised below.

5.1 SHIPPING FAIRWAYS

It is expected that the proposed pipeline corridor will unavoidably cross the Urmston Road shipping channel, which is at present not a designated channel. The Urmston Road is a major vessel fairway that connects the Pearl River Estuary, the west and northwestern Hong Kong waters and the waters between Chek Lap Kok and Tuen Mun.

The proposed submarine gas pipelines are also expected to cross the Tonggu Waterway in PRC waters, which extends southward from Chiwan (west of Shekou) to the end of the Lingding Fairway.

5.2 SUBMARINE UTILITIES, INCLUDING CABLES, PIPELINES & OUTFALLS

Approximately 115 m to the south of the proposed pipelines is the existing Yacheng 13-1 Pipeline. As with submarine cables, the Black Point to Shekou Submarine Cable System lands approximately 45 m to the north of the proposed GRSs reclamation. The closest outfall to the proposed facilities is the outfall for the Black Point Power Station, which is approximately 260 m to the south.

The proposed routing of the pipeline corridor avoids crossing any of the existing pipelines, cables and outfalls.

5.3 GAZETTED BATHING BEACHES

There are no gazetted beaches within 5 km of the Project. For non-gazetted beaches, the Lung Kwu Sheung Tan (Upper and Lower) is at least 2 km from the Project. These beaches are considered to be too remote to be affected by the Project works.

5.4 SEAWATER INTAKE

Seawater (cooling water) intake for the BPPS is located about 1.3 km from the proposed GRSs reclamation. Seawater intakes for the Castle Peak Power

Station, PAFF and Tuen Mun are located over 5 km away from the proposed GRSs reclamation, and are considered to be too remote to be affected by the Project works.

5.5 *SITES OF SPECIAL SCIENTIFIC INTEREST*

To the north of the proposed Project site is the Pak Nai Site of Specific Scientific Interest (Pak Nai SSSI), which is an intertidal mudflat/ mangrove habitat 4.8 km away from the proposed GRSs reclamation. This SSSI is considered to be too remote to be affected by the Project works.

5.6 *COASTAL PROTECTION AREA*

Ha Pak Nai, Pak Nai and Sheung Pak Nai are designated Coastal Protection Areas (CPA) by the *Town Planning Ordinance, Hong Kong Town Planning Board* in the *Sheung Pak Nai and Ha Pak Nai Outline Zoning Plan No. S/YL-PN/9*. The closest of these CPA is approximately 2.5 km from this Project, and these CPA are considered to be too remote to be affected by the Project works.

5.7 *OTHER ECOLOGICAL SENSITIVE RECEIVERS*

5.7.1 *Marine Mammals*

As part of the HK LNG EIA, the CAPCO team conducted detailed reviews of literature on marine ecological resources as well as extensive marine ecological surveys, carried out during the wet and dry seasons between 2004 and 2006.

The key finding of the literature review was the recorded presence in the waters in Deep Bay and Northwest Lantau of humpback dolphins (*Sousa chinensis*). From October 1995 to November 2004, there were 29 sightings of humpback dolphins (20 from vessels and 9 from helicopter) in Deep Bay ⁽⁴⁾. It was reported that Deep Bay is used by a small number of humpback dolphins (3 to 6) throughout the year. The review highlighted that the waters around Black Point did not report large number of sightings.

For the HK LNG EIA, an extensive programme of land and vessel-based surveys was conducted to supplement data available from ongoing long-term AFCD monitoring. Surveys were conducted monthly covering the period July 2005 through May 2006. The survey data gathered to date (July 2005 through May 2006) supported previous findings in the literature and indicated that Deep Bay has relatively low densities (0.08 - 0.232 dolphins km⁻² depending on the season) and low estimates of abundance (<10 dolphins). In contrast, Northwest Lantau, which is adjacent to but outside of the works

(4) Jefferson, *pers.com.*

area, had significantly higher level of dolphin density (0.57 - 0.94) and abundance (49-82) than Deep Bay.

Based on analysis of the density of dolphins sighted, marine waters to the north of Black Point Power Station were regarded as of low importance to these marine mammals.

5.7.2 Subtidal Hard Bottom Habitat

Surveys in Northwest waters ⁽⁵⁾ have found that only a few hermatypic hard corals (Family Faviidae) were recorded within the subtidal of the survey area. Although these surveys were conducted at some distance from Black Point, the results of these surveys are deemed applicable due to similar environmental conditions. Coral communities of ecological value are thus not predicted to occur within the Study Area.

5.7.3 Subtidal Soft Bottom Habitats

As part of the HKLNG EIA, a total of 18 grab samples were taken from three sites off Black Point during both the wet and dry seasons. All of these sites lie either in or within close proximity to the proposed submarine gas pipeline route and site for the GRSs. In both seasons, benthic assemblages were dominated by polychaete worms except for the Urmston Road during the wet season where bivalves had higher numbers. In terms of diversity, benthic communities at the sites were similar to other locations reported in Hong Kong. Owing to a generally higher proportion of bivalves, the biomass of benthos off Black Point was relatively high compared to the Hong Kong average reported in the literature. An update survey of benthic habitats has been conducted by CAPCO in June 2009 and results will be presented in the EIA Report.

5.7.4 Intertidal Hard Bottom Habitat

Quantitative transect surveys and spotchecks were conducted on natural rocky shore and artificial seawalls at the BPPS and on Black Point headland for HKLNG EIA. Rocky shore species were common and widespread and no species of conservation interest were recorded. In comparison to records of other shores in Hong Kong reported in the literature, the diversity of intertidal biota at Black Point was low. Update surveys of intertidal habitats have been conducted by CAPCO in the dry and wet seasons of 2009 and results will be presented in the EIA Report.

(5) ERM – HK Ltd 1995. Environmental Impact Assessment of the Proposed Aviation Fuel Receiving Facility at Sha Chau, prepared for the Provisional Airport Authority.

5.7.5 *Mudflats, Seagrass and Horseshoe Crab Nesting Grounds*

To the north of the proposed Project site also lies the seagrass bed and horseshoe crab nursery ground at Ha Pak Nai (> 3 km). The Sha Chau and Lung Kwu Chau Marine Park (including artificial reefs) is also located approximately 3 km away. These sensitive receivers are considered to be too remote to be affected by the Project works.

5.8 *SITES OF CULTURAL HERITAGE*

No Declared/deemed monuments or graded/ recorded heritage resources are located in the vicinity of the proposed GRSs reclamation and pipeline corridor. There are three archaeological sites in the areas of Sheung Pak Nai and Ha Pak Nai north of the BPPS, including:

- Sheung Pak Nai Archaeological Site, located north east of the SSSI at Sheung Pak Nai and ~ 5 km from the project;
- Long Jok Tsuen Archaeological Site, located along both sides of Nim Wan Road near the shoreline and ~ 4km from the project; and
- Ha Pak Nai Archaeological Site, which covers partly the Coastal Protection Area at Ha Pak Nai and located ~ 3 km from the project.

To the south of BPPS are the terrestrial culture heritage resources including Build Heritage (comprising of two building structures, a World War II cave and a grave site) and the Lung Kwu Sheung Tan Archaeological Sites, which are located ~ 1.5 km away. The former Yung Long site is closest to the GRSs area at a distance of ~ 650 m.

The above sites of cultural heritage are either terrestrial in nature or are considered to be too remote to be affected in any way by the Project.

5.9 *OTHER SENSITIVE RECEIVERS*

Sensitive receivers identified for hazard to life, air quality, noise and landscape and visual impacts include the village houses at Lung Kwu Sheung Tan.

5.10 *OTHER PROPOSED FACILITIES OR AMENITIES*

At present, there are no proposed marine facilities or amenities that the pipeline corridor will cross or that are in sufficient proximity to the proposed GRSs reclamation.

Potential measures are outlined below to minimize possible environmental impacts. These measures will be further reviewed during the EIA process.

6.1 HAZARD TO LIFE

In addition to the EIA there will be several other risk-related permitting procedures that have to be completed before installation of the submarine gas pipelines and construction and operation of GRSs can occur. The facilities are classified as a Notifiable Gas Installation and hence subject to its requirements under the *Gas Safety Ordinance (Cap. 51)*.

6.2 WATER QUALITY

A number of mitigation measures are expected to be required for the pipeline trenches and reclamation activities. The measures would serve to control the potential impacts to within acceptable levels. The mitigation measures are divided into two facets, general operating procedures and specific measures to reduce the quantities of sediment lost to suspension during dredging and backfilling. The general mitigation measures relate to the use of closed, watertight grabs, the speed of lowering of the grab, the loading of barges and the operating conditions of the barges.

The need for mitigation measures would be established through the use of computer modelling to determine sediment plume dispersion impacts to water quality during the EIA.

It is expected that an Environmental Monitoring and Audit (EM&A) programme will be required to monitor impacts to water quality during construction activities. This monitoring programme would be able to confirm that the necessary mitigation measures are being implemented and the impacts are within acceptable levels. Should unacceptable impacts be detected, the EM&A programme would serve to trigger additional measures.

6.3 MARINE ECOLOGY

Practical measures should be taken to minimise impacts to water quality during dredging so as to prevent subsequent impacts to marine ecological resources. It is acknowledged that measures recommended to control water quality impacts to within acceptable levels are also expected to control impacts to marine ecological resources. Additional measures, if deemed necessary in the EIA study, will be recommended to control potential impacts of the construction works to marine mammals.

It is expected that an Environmental Monitoring and Audit (EM&A) programme will be required to monitor impacts to marine mammals during the marine works.

The EM&A programme would be able to confirm that the necessary mitigation measures are being implemented and the impacts are within acceptable levels. Should unacceptable impacts be detected, the EM&A programme would serve to trigger additional mitigation measures.

6.4 *FISHERIES*

Construction impacts to fisheries resources and fishing operations will be avoided and minimised through the planning and design of the works; in particular those associated with backfilling and dredging. Reclamation impacts will be limited due to the small footprint of the GRSs and consequently impacts to fisheries resources will be reduced. The main works will be designed to control water quality impacts to within acceptable levels and hence are also expected to control and minimise impacts to fisheries resources. No fisheries-specific mitigation measures would be expected to be required during construction.

Significant operational phase impacts to fisheries resources and fishing operations would not be expected to occur. No additional fisheries-specific mitigation measures would be expected to be required during operation.

6.5 *TERRESTRIAL ECOLOGY*

As neither the submarine pipelines nor GRSs will encroach on any existing land supporting habitats of terrestrial ecological value, no construction or operational impacts would be expected to occur to terrestrial ecology. As such, no mitigation measures are expected to be required specific to terrestrial ecology.

6.6 *WASTE*

Mitigation measures and good site practices will be incorporated into the design to avoid or reduce potential adverse environmental impacts associated with handling, collection and disposal of waste arising from the construction and operation activities.

Dredged sediments would be handled in accordance with the requirements of the *ETWBTC(W) No 34/2002*. Detailed sampling and chemical testing will be carried out prior to the commencement of the dredging activities to confirm the sediment disposal method. The final disposal site will be determined by the Marine Fill Committee (MFC) and a dumping licence will be obtained from EPD prior to the commencement of the dredging works. Uncontaminated sediments will be disposed of at open sea disposal sites

designated by the MFC. If any sediments requiring Type 2 confined marine disposal are present in the dredging areas, CAPCO will ensure that the relevant contract documents will specify the allocation conditions of the MFC and EPD.

6.7 *CULTURAL HERITAGE & ARCHAEOLOGY*

As neither the submarine pipelines nor GRSs will encroach on any existing archaeological resources, no construction or operational impacts would be expected to occur to cultural heritage or archaeology. As such, no mitigation measures are expected to be required.

6.8 *LANDSCAPE & VISUAL*

Adverse impacts to Visual Sensitive Receivers (VSRs) are not expected to occur, as the GRSs are low profile and remote and only visible from sea level in the Deep Bay and Urmston Road area to passing vessel traffic. The GRSs are not visible from the Lung Kwu Tan or Tuen Mun areas. Mitigation measures are consequently not considered necessary.

6.9 *AIR QUALITY*

Given the relatively remote location of the submarine pipeline installations and GRSs it is not anticipated that adverse air quality impacts will occur during either construction or operation. Standard measures will be implemented to control dust emissions from the site.

6.10 *NOISE*

As with air impacts, given the relatively remote location of the submarine pipeline installations and GRSs it is not anticipated that adverse noise impacts will occur during either construction or operation. Standard measures will be implemented to control on-site noise generation.

6.11 *POTENTIAL SEVERITY, DISTRIBUTION AND DURATION OF ENVIRONMENTAL IMPACTS*

It is anticipated that the construction work will commence in 2011. Water, waste, marine ecology are potential issues during the construction period. Water quality and hazard to life impacts are potential issues during the operation of the project.

With the implementation of appropriate mitigation measures, no unacceptable impacts are expected. This will be confirmed in the EIA study.

Implementation of the Project will make a significant contribution to managing emissions and air quality in Hong Kong. Natural gas is widely recognised as a comparatively clean burning fuel and its use is encouraged in the 2005 Policy Address and the HKSAR Government's policy to control of emissions from existing power stations in Hong Kong. As such timely completion of this Project is critical for the delivery of this clean fuel from Mainland to BPPS. Without this project CAPCO's ability to optimise the use of natural gas as fuel and to contribute to air quality improvements in Hong Kong will be compromised.

In addition, there are a number of advantages to the commissioning of this gas supply project for BPPS, which are summarized below.

1. **Fuel security and reliable supply of electricity:** Dependable fuel sources are critical to maintain reliable power supply to our customers while providing environmental benefits. This Project allows CAPCO to secure sufficient and dependable supplies of this clean fuel in a timely manner and to meet future needs.
2. **Environmental benefits:** With sufficient replacement natural gas supplies, CAPCO will be able to maintain compliance with air emission requirement. As natural gas emits virtually no particulates and negligible SO₂, as well as less NO_x and CO₂ than other fossil fuels, it will contribute to further improvements in the air quality in Hong Kong.

Similar projects that have been conducted under the EIAO include the following:

- *Liquefied Natural Gas (LNG) Receiving Terminal and Associated Facilities – EIA Study.* The EIA Report for this Study was submitted to EPD in December 2006. The Study concluded that there would be no adverse long term or cumulative effects/impacts on the environment and the Environmental Permit was granted on 3 April 2007 (EP-257/2007). The relevance to this Project is that the mentioned EIA study examined the impacts to the environment from the installation of a submarine pipeline with a similar alignment of the proposed pipelines for this Project. The EIA also examined the hazard to life impacts of the operation of the pipeline and GRS which has direct relevance to the present EIA study.
- *The Proposed Submarine Gas Pipelines from Cheng Tou Jiao Liquefied Natural Gas Receiving Terminal, Shenzhen to Tai Po Gas Production Plant, Hong Kong – EIA Study.* The EIA Report for this Study was submitted to EPD in March 2003. The Study concluded that there would be no adverse long term or cumulative effects/impacts on the environment and the Environmental Permit was granted on 30 May 2003 (EP-167/2003). The relevance to this Project is that the mentioned EIA study examined the impacts to the environment from the installation of cross-border, twin submarine pipelines. Relevance from the assessments may be drawn to the submarine gas pipeline component of the present study.
- *Permanent Aviation Fuel Facility for Hong Kong International Airport – EIA Study.* The EIA Report for this Study was submitted to EPD in 2002. The Study concluded that there would be no adverse long term or cumulative effects/ impacts to the environment as a result of installing submarine aviation fuel pipelines in the Sha Chau and Lung Kwu Chau Marine Park and the Environmental Permit was granted on 30 May 2007 (EP-262/2007). The relevance to this Project is that the mentioned EIA study examined the impacts to the environment from the installation of twin submarine pipelines. Relevance from the assessments may be drawn to the submarine gas pipeline component of the present study.
- *Environmental Impact Assessment of a 1,800MW Gas-Fired Power Station at Lamma Extension.* The EIA Report for this Study, which included installation of an 89 km cross-border, submarine natural gas pipeline, was submitted to EPD in February 1999. The Study concluded that there would be no adverse long term or cumulative effects/ impacts on the environment, and consequently, the Environmental Permit was granted on 8 August 2000 (EP- 071/2000/A). The relevance to this Project is that the mentioned EIA study examined the impacts to the environment from the installation of a submarine gas pipeline. Relevance from the assessments

may be drawn to the submarine gas pipeline component of the present study.

The following projects have relevance due to their location.

- *Sludge Treatment Facilities – EIA Study.* The EIA Report for this Study was submitted to EPD in November 2008. The Study concluded that there would be no adverse long term or cumulative effects/impacts on the environment and the Environmental Permit was granted on 26 March 2009 (EP-334/2009).
- *EIA of the Proposed 6,000 MW Thermal Power Station at Black Point.* The EIA Report for this Study was submitted to and approved by EPD before the EIAO came into operation on 1 April 1998 (EIA-015/BC). The Study concluded that there would be no adverse long term or cumulative effects/impacts on the environment.

This project profile has presented information concerning the intention of CAPCO to install two submarine gas pipelines and Gas Receiving Stations at the Black Point Power Station. Implementation of the Project will make a significant contribution to managing emissions of air pollutants. Natural gas is acknowledged widely as a comparatively clean burning fuel and its use is encouraged in the 2005 Policy Address and the HKSAR Government's policy to control of emissions from existing power stations in Hong Kong.

The EIA Study will pay particular attention to impacts to the sensitive receivers identified in this project profile and where necessary, mitigation measures will be proposed in accordance with the requirements of the *EIAO*.

The English version of this Project Profile shall prevail wherever there is a discrepancy between the English version and the Chinese version.