

EIA/OIB.2/84

EXECUTIVE SUMMARY

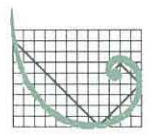
ARCO CHINA INC

Natural Gas Supply to Black Point Power Station: Submarine Pipeline for Hong Kong Territorial Waters, Gas Receiving Station and Related Facilities: *Environmental Impact Assessment*

August 1994

CONSULTING SERVICES BY ENVIRONMENTAL RESOURCES MANAGEMENT

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ERM

EIA-032-1/84

ARCO CHINA INC

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Power Station: Submarine Pipeline
for Hong Kong Territorial Waters,
Gas Receiving Station and Related
Facilities: *Environmental Impact
Assessment*

August 1994

Reference C1119 and C1136

For and on behalf of ERM Hong Kong

Approved by: SM Law

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Date: 12th August 1994

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INTRODUCTION

1.1

BACKGROUND TO THE STUDY

In November 1992, ARCO and its partners, China National Offshore Oil Co and KUPEC, signed an agreement with Castle Peak Power Company Ltd (CAPCO) for the supply of natural gas from the Yacheng Gas Field in the South China Sea. The gas will be used to fire Phase I of the Large Thermal Power Station (LTPS) at Black Point which is currently being constructed and is scheduled for commissioning in 1996 and 1997. In addition, gas will also be supplied to the Castle Peak 'B' Power Station where existing coal fired units will be replaced with gas fired units. The natural gas will be delivered via a 778 km pipeline from the Yacheng 13-1 Wellhead Platform to a Gas Receiving Station (GRS) at the Black Point site as illustrated in *Figure 1.1a*.

ARCO China Ltd commissioned ERM Hong Kong to carry out an Environmental Impact Assessment (EIA) for the submarine pipeline in the Hong Kong territorial waters, the GRS and its related facilities.

A separate EIA for the pipeline section within China waters has been undertaken in the PRC and approved by the Chinese Authorities. A risk assessment study is being carried out under the direction of the Gas Standards Office of Electrical and Mechanical Services Department by DNV Technica and this will quantify the risks associated with the development.

This report summarises the findings of the EIA on the submarine pipeline and GRS prepared by ERM Hong Kong.

1.2

PURPOSE OF THE STUDY

The purpose of this EIA study is to minimize pollution, environmental disturbance and nuisance arising from the construction, operation and decommissioning of the natural gas submarine pipeline within Hong Kong waters, the on-shore GRS at Black Point and the related facilities by providing information on the nature and extent of the potential environmental impacts. This information will contribute to decisions on:

- the acceptability of any adverse environmental consequences that are likely to arise from the construction, operation and decommissioning of the project; and
- the design, construction, operation and decommissioning of the project.

OBJECTIVES OF THE STUDY

The objectives of the EIA Study are:

- a) to describe the project and the requirements for its development;
- b) to identify and describe the elements of the community and the environment likely to affect/be affected by the project;
- c) to identify, predict and evaluate the net environmental impacts and cumulative effects likely to arise from the construction, operation and decommissioning of the project in relation to the existing and planned community, the beneficial uses of the areas concerned and the neighbouring land uses;
- d) to identify and specify methods, measures and standards to be included in the detailed design which may be necessary to mitigate the impacts to acceptable levels;
- e) to recommend the environmental monitoring and audit requirements necessary to ensure the effectiveness of the environmental protection measures adopted; and
- f) to identify additional studies where necessary to fulfil the objectives or requirements of this EIA study.

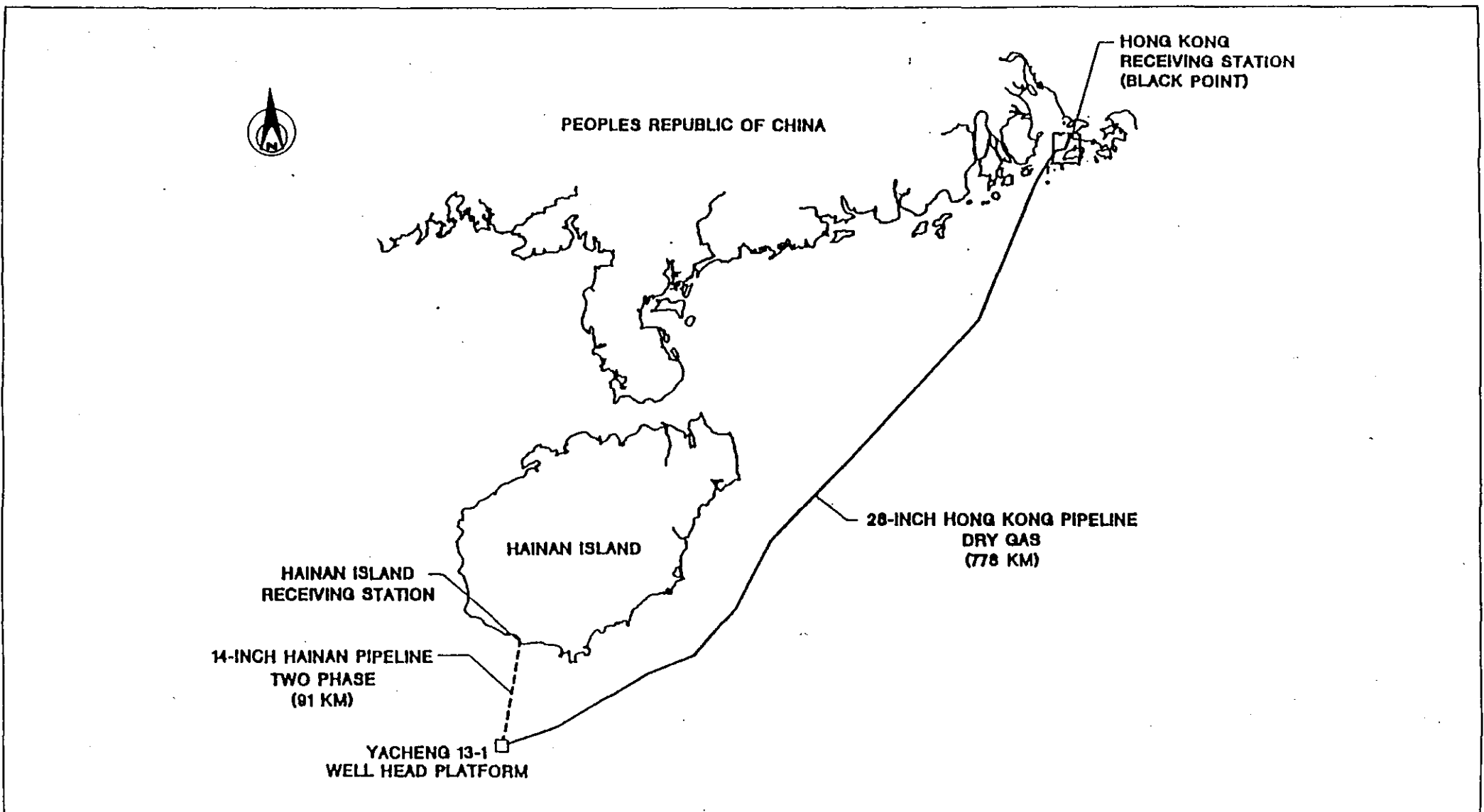


Figure 1.1a

Overview of Pipeline Route

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 9 Chatham Road,
 Tsimshatsui,
 Kowloon, HONG KONG



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PROJECT DESCRIPTION

The project will be a part of the Yacheng Gas Development Programme which consists of the following:

- the installation of a drilling platform and one processing platform at 60 miles south of Hainan Island;
- a dry gas pipeline to Hong Kong;
- a gas/condensate pipeline to Hainan Island; and
- a dry GRS at Black Point (Hong Kong).

The submarine pipeline section within Hong Kong waters involves a 5km section of the 778 km pipeline which extends from the Yacheng Platform. The 711mm (28 inch) outside diameter pipeline with thickness of 17.12mm which will be covered by an average 100mm (4 in) nominal thickness of reinforced concrete, will be laid in a trench and buried beneath the seabed. The pipeline will deliver gas at a rate up to 19MMSCMD. The pipeline will not carry any liquid fuel. *Figure 2a* shows the pipeline routing within Hong Kong waters and the location of the GRS.

The Hong Kong GRS will be a receiving and pressure reduction station for transfer of gas to the LTPS and Castle Peak Power Station. At the GRS, Gas will be heated to the required temperature at the gas heaters and gas pressure regulated at the pressure reduction station to the desired pressure.

Facilities to be installed within the GRS will include:

- Inlet Safety Shut-Off Valve
- Pig Receiver
- Slug Catcher and Filtration
- Inlet Filters/Separators
- Gas Heaters
- Pressure Reduction Stations
- Outlet Filter/Separators
- Gas Transfer Meter
- Drain/slop oil system
- Overpressure/Emergency Shutdown
- Vent Stack

The GRS elevated vent stack will safely dispose of Process Shutdown releases, and blowdown gas from the pipeline. In addition, there will be a very small continuous flow of purge gas from the vent stack to maintain a slight positive pressure to prevent oxygen from accumulating in the venting system.

Figures 2b shows the proposed plant layout.

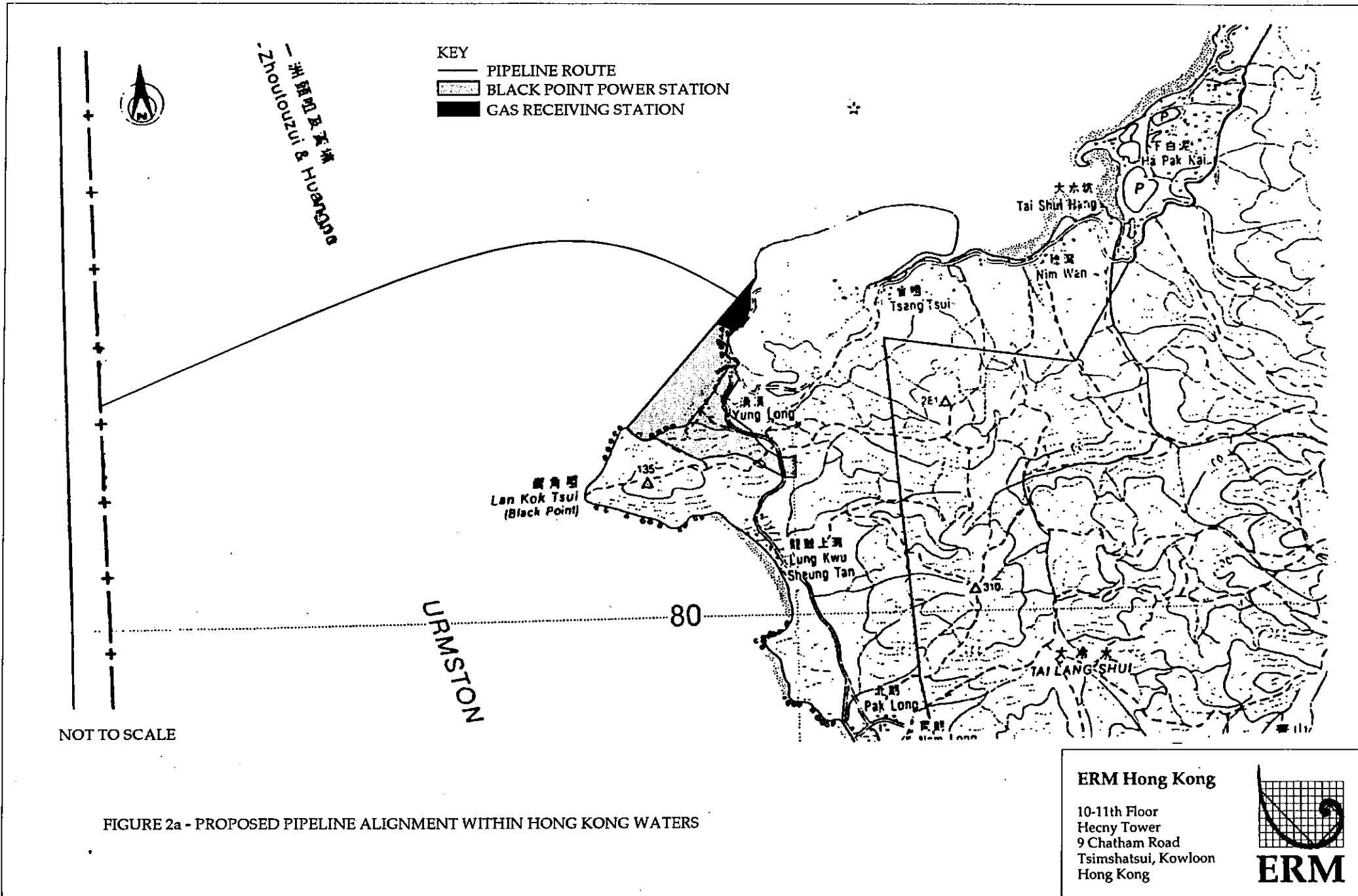


FIGURE 2a - PROPOSED PIPELINE ALIGNMENT WITHIN HONG KONG WATERS

ENVIRONMENTAL IMPACT ASSESSMENT OF THE GAS PIPELINE WITHIN HONG KONG TERRITORIAL WATERS

3.1 CONSTRUCTION IMPACTS

3.1.1 Pipeline Installation

A section approximately 75 km long of the overall 778km of the pipeline will be laid from Black Point and subsequently tied-in to the remainder of the previously laid pipeline. Whilst details of pipeline installation have not yet been finalised, typical operations will involve the following:

- Pretrenching
- Pipelaying
- Post trenching
- Backfilling

Depending on the final decision on the installation method, pipeline installation can involve pretrenching by conventional dredging and post trenching by mechanical pipeline trenching devices such as ploughing or by jetting or fluidisation. There will be no marine blasting.

3.1.2 Water Quality

Water quality impacts from the pipeline construction works within the proposed pipeline corridor were assessed with respect to the Deep Bay Water Quality Objectives (WQO), in relation to the baseline data available from Environmental Protection Department (EPD) and China Light and Power Company Limited (CLP) and the consultant's previous work experience in the area. The suspended solids (SS) levels in Urmston Road, especially around the borrow pit area (dumping in the Urmston Road area is substantially complete), reach high levels naturally and are known to exceed 1000mg/l on occasions. Taking into account the cumulative water quality impacts, it is estimated that the worst case rate of loss of sediment to the water column during trenching is between one and two orders of magnitude (in the region of 10 to 108 kg/sec) lower than the natural rate of sediment (ranging from 1950 to 4875 kg/sec) transport across the pipeline corridor, thus the trenching operations will have a negligible effect on the suspended sediment regime in Urmston Road. Whichever trenching method is selected provided that normal good work practices are followed, the increases in SS levels at the Water Sensitive Receivers (WSRs) will be well within the natural variation range and are therefore not envisaged to cause incompliance with the Water Quality Objectives (WQO).

A water quality monitoring programme is recommended during the pipeline installation to confirm these findings. An Action Plan has been prepared to outline action to be taken by relevant parties in the event of an exceedance in Trigger/Action/Target (TAT) levels. The setting of the TAT levels allow the site staff to be alerted of potential exceedance of the Water

Quality Objectives and to implement the appropriate mitigation measures. Recommended mitigation measures associated with the pipeline installation eg review of working methods and practices, inspection and maintenance of plant/equipment, are incorporated in the contract requirements to facilitate implementation and enforcement.

3.1.3 *Waste*

Results of sediment sampling in the Outer Deep Bay Borrow Area indicate that the marine sediment is uncontaminated. Therefore the dredged sediments should be acceptable for disposal at the gazetted marine dump sites at South Cheung Chau and East of Ninepins.

3.1.4 *Ecology*

All species identified in the Black Point area (with the exception of the Chinese White Dolphin and The King Crab, both species of high conservation value) are commonly found in marine habitats throughout Hong Kong waters and therefore the marine ecology in these waters is not of special ecological value. The King Crab breeding sites at Lung Kwu Sheung Tan and Lung Kwu Tan will not be adversely affected by the pipeline installation works given the considerable distance from the proposed pipeline corridor. Similarly, the fisheries resource in these waters is limited. The annual fish catch in the Black Point area accounts for approximately 0.06% of the territories total fisheries production in 1991. In view of the low number of species found and their moderate fisheries productivity. Therefore, the small loss of benthic marine life associated with the construction works is anticipated to exert only a localised impact on the marine environment, and will not result in any significant disturbance to the marine ecosystem and fisheries resource of Hong Kong. The main issue for the marine ecology of the area is the potential disturbance to the Chinese White Dolphin. However, since impact from construction of the proposed pipeline will be both temporary and geographically limited and it is therefore not expected to adversely affect the Dolphin. There are also ongoing dolphin studies undertaken by AFD and PAA to study the ecology of the Chinese White Dolphin community in the area.

3.1.5 *Noise*

Noise levels at the two principal settlements in the area, Lung Kwu Sheung Tan and Tsang Tsui, associated with the construction activities of the pipeline for a "worst case scenario" will meet established Standards/Guidelines for construction works and it is therefore considered that no specific noise controls or monitoring will be required.

3.2 **OPERATIONAL IMPACTS**

3.2.1 ***Water Quality Impacts***

There will be no discharges into Hong Kong waters during either the precommissioning and commissioning stages. Similarly, for the operational stage, the pipeline will deliver dry natural gas to the GRS at Black Point and no effluent discharge thus is anticipated from the pipeline system.

3.2.2 ***Waste***

The operation of the pipeline is not envisaged to produce any waste arisings.

3.2.3 ***Noise***

No operational noise is anticipated from the operation of the gas pipeline.

3.2.4 ***Ecology***

The trench will be reinstated with engineering backfill to protect the pipeline. Fishing activities which may be interrupted during the pipeline installation will return to normal. With the high sediment deposition rate in the Pearl River estuarine area, the seabed will be restored to its natural profile within a short period and be recolonised by the local fauna.

Minimal disturbance to the seabed will result from the operation of the gas pipeline as no specific maintenance is envisaged.

4.1 CONSTRUCTION IMPACTS**4.1.1 Air**

The construction of the GRS will not pose significant air quality impacts to the surrounding area as the GRS is located at a remote site, 1.2km from the nearest Air Sensitive Receivers (ASRs).

The Fugitive Dust Model (FDM) was used to predict the level of dust from the construction site to the surrounding area. The predicted worst case 1-hour dust concentrations at the nearest ASRs at Lung Kwu Sheung Tan will fall well within the 1-hour Total Suspended Particulates (TSP) limit and the 24-hour Air Quality Objectives (AQO) for TSP. Appropriate mitigation measures and good on-site management practice should further reduce this dust impact to a minimum.

4.1.2 Waste Management

With good construction practice and management whereby waste arising will be stored, transported and disposed of using approved methods, no significant adverse environmental impacts are envisioned. Inert wastes from construction could be used as fill material at reclamation sites. Other land sourced construction wastes unsuitable for reclamation or land formation will be disposed of to WENT Landfill, whilst chemical wastes will be disposed of to the Chemical Waste Treatment Centre at Tsing Yi. Recycling of construction wastes should be carried out wherever feasible to conserve resources and landfill capacity.

4.1.3 Water Quality Impacts

Water quality impacts from the construction of the GRS will be similar to typical land based construction activities which involve construction runoff, litter and debris, spillages and domestic sewage. These will not result in incompliance with water quality objectives provided proper site management and good construction practices are implemented.

4.1.4 Noise

The nearest village settlements in the area are relatively remote from the GRS and as there is a substantial screening effect due to topographical features in the area, predicted noise impacts from construction of the GRS will be within the established Standards/Guidelines.

4.2 OPERATIONAL IMPACTS

4.2.1 Air Quality

The potential air pollutants from the GRS will be from the gas heaters which are used to warm the gas to the required temperature before delivery to the LTPS. These pollutants include hydrocarbons (HC), sulphur dioxide (SO₂), total suspended particulates (TSP), nitrogen oxides (NO_x) and carbon monoxide (CO).

Purge gas will also be emitted continuously from the high stack throughout the operation of the GRS in order to provide a positive pressure in the gas delivery system. The potential pollutants emitted from the vent system will be hydrocarbons and hydrogen sulphide.

The Industrial Source Complex Short Term Version (ISCST2) model was used to predict the pollutant concentrations from the potential sources of emission during the operational phase. Modelling results indicate that the operation of the proposed GRS will not cause air pollution impacts exceeding the limits of the Hong Kong AQO's to arise. In view of the low level of emissions from the GRS, air quality monitoring is not considered necessary.

4.2.2 Waste

During the operation of the GRS, only small quantities of waste will result from the day to day activities of the station. General refuse and industrial waste could be disposed of to the WENT landfill. Oil/water mixtures from the slop receiver will be sent to the Chemical Waste Treatment Centre. With the correct storage, transport and disposal procedures, none of the waste arisings are expected to result in any adverse environmental impacts.

4.2.3 Water Quality Impacts

There will be no major effluent discharge from the operation of the GRS. Drainage from the plant will be diverted to the treatment plants at the LTPS for subsequent treatment prior to discharge. All effluent from the GRS will comply with the Technical Memorandum on Effluent Standards prior to discharge.

4.2.4 Noise

The noise levels at the nearest village settlements which are over a Kilometre from the GRS, are predicted to be well below the established Standards/Guidelines during the operational phase.

CONCLUSION

Having assessed the potential worst case environmental impacts, the EIA has concluded that the construction, operation and decommissioning of the submarine gas pipeline within Hong Kong waters and Gas Receiving Station will not result in any environmental impacts in exceedance of the criteria laid down in the relevant Government Ordinance or the HKPSG. An EM&A manual will be prepared to outline the water quality monitoring programme, Action Plan and mitigation measures for the construction phase. In view of the low potential for environmental impacts from the operation of the GRS, no environmental monitoring is considered necessary for the operational phase.