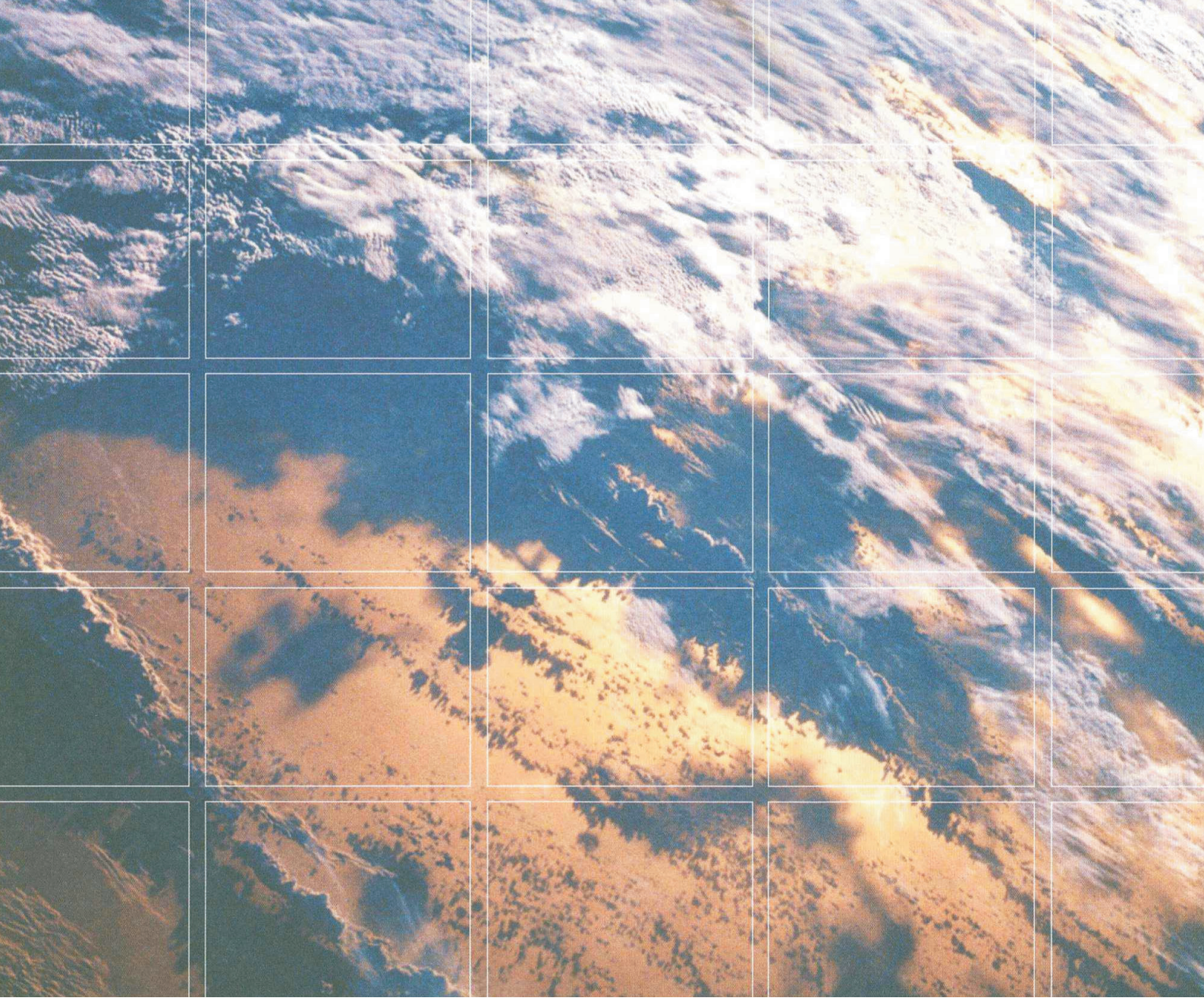

中華電力
CLP Power

ExxonMobil

Capco 青山發電有限公司 Castle Peak Power Co. Ltd.

Liquefied Natural Gas (LNG) Receiving Terminal and Associated Facilities
液化天然氣接收站及相關設施

EIA Study (EIA Study Brief ESB-126/2005)
環境影響評估(環評研究概要ESB-126/2005)

Executive Summary
行政摘要

22nd December 2006
二零零六年十二月二十二日

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ERM

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液化天然氣接收站及相關設施

22nd December 2006
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For and on behalf of 代表	
ERM-Hong Kong, Limited	
香港環境資源管理顧問有限公司	
Approved by: 批核:	Dr Robin Kennish 簡樂文
Position: 職位:	Director 董事
Date: 日期:	22nd December 2006 二零零六年十二月二十二日

ERM

ENVIRONMENTAL IMPACT ASSESSMENT ORDINANCE (CAP. 499), SECTION 5(7)

PROJECT TITLE: LIQUEFIED NATURAL GAS (LNG) RECEIVING TERMINAL AND ASSOCIATED FACILITIES

NAME OF APPLICANT: CASTLE PEAK POWER COMPANY LIMITED

EXECUTIVE SUMMARY

CONTENTS

FOREWORD

Hong Kong currently obtains approximately 25% of its electricity requirements from the Castle Peak Power Company's (CAPCO) Black Point Power station (BPPS). This power plant is fuelled by natural gas supplied via pipeline from the Yacheng gas field off Hainan Island. The gas supply from the Yacheng field is expected to be depleted by early in the next decade. In 2003, CAPCO commenced studies to identify a replacement source of natural gas.

The replacement studies examined importing gas from nearby gas fields, similar to the current arrangement, importing Natural Gas (NG) via the Guangdong Dapeng Liquefied Natural Gas (LNG) terminal or one of the proposed LNG terminals in mainland China, or by importing LNG via a new terminal in Hong Kong. The studies concluded that a LNG terminal located in Hong Kong is the only viable means of providing an adequate, secure and reliable supply of gas within the necessary time frame to meet Hong Kong's requirements.

To find a suitable location, CAPCO undertook a site search throughout Hong Kong, which included 29 possible locations, and identified two sites having the best potential overall; Black Point in the western New Territories, and South Soko Island, located to the south of Lantau Island.

CAPCO then undertook an Environmental Impact Assessment of both sites, consistent with the Study Brief issued by the Hong Kong Government under the Environmental Impact Assessment Ordinance (EIAO) and following the Technical Memorandum of the Environmental Impact Assessment Process (EIAO-TM). Following a comprehensive analysis of comparative factors, South Soko has been selected as the preferred option. The South Soko option will enable a replacement gas supply 12 to 18 months earlier than the Black Point option which would assure electricity supply reliability and result in CAPCO burning less coal, avoiding the associated emissions, and meeting the Hong Kong Government's emission targets sooner. In addition, South Soko requires less land reclamation while its pipeline installation will result only in temporary environmental impacts over a short duration which can be adequately mitigated. Finally, the location of South Soko provides for very low numbers of surrounding land and marine based populations with exposure to both the terminal and the marine transit.

The overall conclusion of the EIA and this report is that there is a clear need for a LNG terminal in Hong Kong and that, of all the potential alternatives examined, South Soko is the preferred option. In accordance with the EIAO, CAPCO considers that this EIA provides a suitable basis for the Director of Environmental Protection to consider granting the Environmental Permit to allow the construction and operation of this project at the South Soko Island site.

1 INTRODUCTION

1.1 BACKGROUND

Castle Peak Power Company Limited (CAPCO), a joint venture between CLP Power Hong Kong Limited (CLP) and ExxonMobil Energy Limited (EMEL), is proposing the development of a Liquefied Natural Gas (LNG) Receiving Terminal in the Hong Kong SAR. The facility will provide the infrastructure for a sustainable supply of natural gas (NG), primarily to fuel CAPCO's power plant at Black Point. CAPCO initiated preliminary site search and environmental studies in 2003. Subsequent meetings and discussions with Government and other stakeholders commenced in 2004. The EIA report for the project, which is covered by this Executive Summary, is the outcome of several years' of informal and formal discussion between CAPCO, Government and non Government stakeholders. To ensure adequate public input, more than 350 seminars, meetings, workshops and exhibitions have been held with key stakeholders and the community.

1.2 PURPOSE AND NATURE OF THE PROJECT

The Project will provide a replacement for the gas currently supplied to CAPCO from the Yacheng gas field, which is expected to be depleted by early in the next decade. The project involves the construction and operation of a LNG receiving terminal and associated facilities at either South Soko Island or Black Point. The receiving terminal will provide a facility for receiving and unloading of LNG carriers, onshore LNG storage, LNG regasification, and a pipeline for transporting natural gas (regasified LNG) to the existing Black Point Power Station (BPPS). For the South Soko option, the natural gas will be sent via a submarine gas pipeline to a Gas Receiving Station (GRS) at BPPS. For the Black Point option the connection to BPPS will be via a short onshore pipeline within the boundaries of the proposed terminal and the power station. For both site locations, the principal natural gas user will be CAPCO.

1.3 PURPOSE AND SCOPE OF THIS EIA

The following elements of the Project addressed in this EIA Report are classified as Designated Projects under the *Environmental Impact Assessment Ordinance* (*Cap. 499*) (*EIAO*).

For both the South Soko Island and Black Point options:

- Construction of a storage facility for LNG with a storage capacity of more than 200 tonnes (item *L.2* of *Part I* of *Schedule 2 of EIAO*);
- Dredging operation for the approach channel and turning circle that exceeds 500,000 m^3 (item *C.12* of *Part I* of *Schedule 2* of *EIAO*).

For the South Soko Island option only:

- Installation of a submarine gas pipeline connecting the proposed LNG terminal at the South Soko Island and the Black Point Power Station (item *H.2* of *Part I* of *Schedule 2* of *EIAO*);

- Dredging operation for the installation of a submarine power cable connecting Shek Pik with South Soko. The works at Shek Pik will be less than 500m from the nearest boundary of an existing Site of Cultural Heritage (item *C.12(a)* of *Part I* of *Schedule 2* of *EIAO*); and,

- Potential dredging operation for the installation of a submarine water main connecting Shek Pik Reservoir with the proposed LNG terminal at South Soko which is less than 500m from the nearest boundary of an existing Site of Cultural Heritage (item *C.12(a)* of *Part I* of *Schedule 2* of *EIAO*).

For the Black Point option only:

- Reclamation works (including associated dredging works) of more than 5 ha in size (item *C.1* of *Part I* of *Schedule 2* of *EIAO*).

The EIA has been prepared by ERM-Hong Kong, Ltd (ERM) for CAPCO in accordance with the *EIA Study Brief* (No. ESB-126/2005) , issued in June 2005, and the *Technical Memorandum of the Environmental Impact Assessment Process (EIAO-TM)*.

The purpose of this EIA Study has been to provide information on the nature and extent of environmental impacts arising from the construction and operation of the Project and related activities that take place concurrently. This information will contribute to decisions by the Director of the Environmental Protection Department (EPD) on:

- the overall acceptability of any adverse environmental consequences that may arise as a result of the Project and the associated activities of the Project;

- the conditions and requirements for the detailed design, construction and operation of the Project to mitigate against adverse environmental consequences; and

- the acceptability of residual environmental impacts after the proposed mitigation measures are implemented.

The detailed requirements of the EIA studies of each site are set out in the *EIA Study Brief*.

1.4 WHAT IS LNG?

Liquefied Natural Gas (LNG) is the liquid form of natural gas, the main component of which is methane. In the liquefied form, at atmospheric pressure, LNG occupies only 1/600th of its volume at gaseous state under normal temperature and atmospheric pressure and is therefore more economical to store and transport over long distances in contrast to the traditional pipeline delivery of natural gas.

LNG is produced by cooling natural gas to -162 °C (-260 °F) through a liquefaction process. Prior to cooling and condensing the natural gas into LNG, impurities such as carbon dioxide, water and sulphur are removed. The end result of this process is an odourless, colourless fuel consisting mostly of methane (approximate range 85% to 99%) with small amounts of ethane, propane, butane and pentane.

Large scale LNG trade began in 1964, with the UK as the importing country. Since then, the LNG industry has built up globally and in 2005 there were 13 countries producing (liquefying) LNG and 15 importing/receiving (re-gasifying) LNG. The world's four largest producers in 2005 were Indonesia (17% global production), Malaysia (15%), Qatar (14%) and Algeria (13%).

1.5 THE NEED FOR A LNG RECEIVING TERMINAL IN HONG KONG

1.5.1 Introduction

Since 1996 with the commissioning of the Black Point Power Station (BPPS), natural gas has been an important component of CAPCO's fuel supply. Use of natural gas has delivered significant environmental benefits as well as added diversity to the fuel mix used for electricity generation, thereby enhancing the security of electricity generation.

Fuel diversity has enabled air emissions reductions to be achieved while maintaining competitive tariffs and world-class reliability in the supply of electricity. Often taken for granted, these factors are key contributors to Hong Kong's quality of life, competitiveness in the global market, and ability to attract investment. Businesses in Hong Kong ranging from large multi-national companies to small local shops are all dependent on a cost-competitive and uninterrupted supply of electricity.

There are a number of benefits to utilising natural gas as a fuel in power generation, including:

- **Proven Use in Power Generation:** Natural gas has been employed in the combined cycle gas turbines (CCGT) at BPPS which has enabled this facility to have higher thermal efficiency than coal or oil fired power stations with the same generating capacity.

- **Adequate Reserves Available:** World gas reserves are large and LNG technology makes them available to consumers in locations remote from existing sources. This, along with coal and nuclear capabilities, continues to provide a diverse fuel supply to CAPCO.

- **Environmental Benefits:** Natural gas is one of the cleanest and most efficient forms of energy available, producing virtually no particulates and less nitrogen oxides (NO_x) and carbon dioxide (CO_2 than other fossil fuels. Since sulphur is almost entirely removed in the liquefaction process, combustion of regasified LNG emits negligible amounts of sulphur dioxide (SO_2).

The 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. The recognition of the role of natural gas in emission control was affirmed by the Government in the 2005-06 Policy Address (1):

> "***61.*** *To fully achieve the emissions reduction targets in 2010, we have asked the power companies to … use natural gas for power generation as much as possible.*

1.5.2 The Need for a New Gas Supply

Extensive technical studies carried out by consultants substantiate that the existing source of CAPCO's gas supply, the Yacheng field off Hainan Island in the South China Sea, will be depleted early in the next decade, depending upon the rate of offtake and actual reserve levels. Consequently, a reliable new source of natural gas is required as a successor to Yacheng.

As Black Point Power Station (BPPS) provides about 25% of Hong Kong's total electricity needs, having a reliable supply of natural gas that fuels this power station is critical for maintaining Hong Kong's electricity supply. In the event that gas is not available to BPPS, CAPCO will need to meet electricity demand by a higher reliance on coal-fired generation , which will increase emissions beyond existing levels and Government's targets. Although the BPPS is able to use diesel as a fuel, this capability is designed only for short term emergency backup use (2).

Under such circumstances, Hong Kong consumers could be exposed to supply interruptions or power rationing. Therefore, the absence of a replacement gas supply will not only entail an environmental impact in terms of air emissions but it will also compromise Hong Kong's electricity supply reliability.

(1) The 2005-06 Policy Address, Strong Governance For the People, Paragraph 61.
(2) Long term diesel use would require additional investment in infrastructure, higher fuel cost, and would increase emissions beyond existing levels and Government's targets.

Given Hong Kong's total dependence on imported fuel and the necessity of a quality replacement gas supply, it is vital to have a clear understanding of the requirements for supply of this important fuel in order to assess the various replacement options. There are five fundamental requirements of the replacement gas supply, namely

1. **Certainty of timely availability:** Given the depletion of the Yacheng field early next decade, CAPCO must have absolute certainty that replacement gas will be available on time.

2. **Supply security for Hong Kong:** Gas is a vital part of CAPCO/CLP's fuel mix and security of gas supply is essential to continued electricity reliability in Hong Kong. The required supply security can be provided by:

   a. priority for CAPCO 's gas requirements,

   b. diversification of supply; and

   c. gas supply chain managed by companies with proven track records for operating in line with industry best practices.

3. **Adequate volume and flexibility**: CAPCO's LNG requirement for its current gas-fired generation facilities is about 2.6 million tonnes per annum (MTA), which represents roughly 75% of Hong Kong's gas demand. The replacement supply must be able to meet this initial requirement as well as the following:

   a. meet gas demand growth in future years as a result of Government's environmental initiatives and Hong Kong's electricity demand growth;

   b. provide the flexibility for CAPCO to meet seasonal demand patterns and the power plants' operational requirements; and

   c. enable a smooth transition from Yacheng gas.

4. **Competitive supply:** CAPCO is competing with numerous other buyers in a highly competitive marketplace for quality supplies of LNG. For CAPCO to attract suppliers and achieve the best possible terms on behalf of its electricity consumers, the procurement process must be structured efficiently so as to demonstrate the financial and operational strengths of CAPCO as a buyer able to undertake long term commitments and demonstrate Hong Kong as a sustainable market.

5. **High environmental and safety standards:** CAPCO is committed to responsible environmental management and safe operations. The replacement supply source and its suppliers must perform to internationally acceptable environmental and safety standards.

1.6 REPLACEMENT GAS SUPPLY ALTERNATIVES

Given the importance of the availability of replacement gas to Hong Kong, CAPCO has carefully explored and evaluated the possible alternatives to fulfill this fuel supply requirement. Five potential alternatives have been identified. Each has been systematically evaluated against Hong Kong's requirements as discussed below.

1. **Import gas via pipeline from a nearby gas field:** The South China Sea contains only limited discovered reserves of natural gas, with the majority of these gas reserves being exploited. These fields are significantly smaller than Yacheng, are of varying qualities, and have been committed to identified customers (Dongfang and Ledong – committed to Hainan, Panyu and Huizhou – targeted to Zhuhai). Given the above, importing gas from any of the proven South China Sea fields is not feasible because there is insufficient supply available to meet CAPCO's and Hong Kong's long-term needs. In 2006, there are reports of what could be a significant deep water gas discovery in the South China Sea At present, information is very preliminary and insufficient to assess whether this deep water field is commercially viable and can play a role in CAPCO's future gas supply. However, historically progressing a deepwater gas project from discovery to production has taken 8 to 14 years. For example, although not a deepwater project, the Yacheng 13-1 gas field took 12 years from discovery to start-up. This would be an unacceptably long timeframe for CAPCO's replacement gas supply.

2. **Import Natural Gas (NG) via the Guangdong Dapeng LNG terminal (GDLNG):** The GDLNG terminal in Shenzhen, China's first LNG terminal, was commissioned this year. GDLNG's initial capacity of 3.7MTA and supply are fully committed to its founding shareholders, including Guangdong gas users, Hong Kong Electric and Hong Kong & China Gas. CAPCO assessed the option and understands that the additional capacity from expansion of the terminal will be dedicated to Guangdong gas users with unknown timing.

3. **Import NG via a proposed LNG terminal in mainland China:** Recently, two LNG terminals have been proposed in the Zhuhai area, one to serve Zhuhai and the other to serve Macau. However these terminals are both in the early planning stages. Based on meetings with these projects sponsors and CAPCO's due diligence reviews, there is no certainty that these terminals will be completed in time and be available to meet CAPCO's needs. Furthermore, these terminals would be located at a greater distance from the Black Point Power Station as compared to a Hong Kong terminal, and this would require a longer sub sea pipeline with increased ecological and cost impacts. If either of these terminals are to be considered for supplying Hong Kong in addition to their target markets, project execution will be exceedingly complex, involving several permitting jurisdictions requiring additional time for project completion.

For example, the Guangdong Dapeng LNG (GDLNG) terminal took around 10 years from project planning to terminal commissioning in 2006.

Of even greater importance, LNG supply cannot be secured without a clear execution plan for a receiving terminal that ensures the terminal will be ready to receive the first LNG shipments. This is particularly important when LNG supply is in a very competitive market, where LNG suppliers select buyers with both proven market certainty and a well defined terminal execution plan. CAPCO has been engaged in negotiations for over a year with LNG suppliers and is in a good position to secure LNG supply. These discussions will be jeopardised if plans were switched to a mainland receiving terminal with no demonstrated engineering and environmental feasibility and uncertain timing and approvals.

4. **Importing LNG via a new terminal in Hong Kong:** CAPCO has been progressing development activities for a LNG terminal in Hong Kong since 2003. Having completed engineering and environmental feasibility studies, CAPCO has concluded that constructing a LNG receiving terminal in Hong Kong will be able to meet CAPCO's timing and supply requirements in order to replace the depleting Yacheng field. For example, extensive site investigation work, preliminary engineering as well as the pipeline route survey have been completed. The 18-month EIA process has also reached a major milestone with the submission of this EIA study. Consultation with Government and the public has been ongoing since 2004. Discussions with LNG suppliers and LNG shipping providers are also underway. In short, CAPCO's development of the Hong Kong LNG terminal is now at an advanced stage to meet the 2011 timing. An LNG terminal located entirely within Hong Kong enables smoother and faster project development under a single jurisdiction with clear policy and regulations. Similar advantages are offered by CAPCO's well established commercial structure under the Scheme of Control (SoC). Given the expected gas depletion by early in the next decade and an LNG Terminal requirement date of 2011, CAPCO is progressing the development of a Hong Kong terminal as the only viable alternative.

5. **No action or defer decision:** As noted previously with BPPS providing about 25% of Hong Kong's total electricity needs, having a reliable supply of natural gas that fuels this power station is critical for maintaining Hong Kong's electricity supply. In the event that gas is not available to BPPS, CAPCO will need to meet electricity demand by a higher reliance on coal-fired generation which will increase emissions beyond existing levels and Governments targets and would not be sufficient to meet electricity demand. For example, a one year delay in obtaining a replacement gas supply would result in an incremental 60,000 tons of SO2, NOx, and particulates. Under such circumstances, in order to meet Government emission targets, Hong Kong consumers would be exposed to possible power cuts or rationing.

There must be a degree of certainty to the arrival of a replacement gas supply by 2011. Of the five options evaluated, the alternative that offers the highest degree of certainty for a replacement gas supply within this timeframe is to import LNG via a new terminal in Hong Kong. Following the due process, once an Environmental Permit is obtained which is anticipated for early 2007, and with timely progress on regulatory regime resolution and other key approvals, CAPCO will be able to enter into a long term LNG supply commitment. This will allow sufficient time for the construction of the LNG supply chain and ensure Yacheng replacement by 2011. CAPCO cannot commit to buy and no seller will commit to sell LNG to CAPCO if the availability of the Hong Kong terminal in 2011 is in doubt.

In summary, the absence or delay of a replacement gas supply will not only entail an environmental impact but will also compromise Hong Kong's electricity supply reliability.

1.6.1 Summary Comparison of Alternatives Against Hong Kong's Requirements

The analysis reveals that a Hong Kong LNG receiving terminal is the only option that is capable of fully meeting the requirement of a replacement gas supply with respect to timing, security of supply, volume adequacy and flexibility, and competitiveness (*Table 1*). Moreover, there are other external benefits to Hong Kong flowing from the project as a Hong Kong terminal will provide construction and operation jobs in Hong Kong as well as tax and land grant revenues for the Government. With energy issues high on government agendas internationally, the LNG terminal will be a strategic asset for Hong Kong as it will provide the means of access to global natural gas supplies. Now that engineering and environmental feasibility studies have been completed, and with timely progress on regulatory regime resolution and other key approvals, a terminal in Hong Kong can be completed by 2011 to meet CAPCO's requirements. CAPCO believes the Hong Kong LNG receiving terminal is the only viable solution available to ensure a reliable electricity supply for Hong Kong.

HK's Gas Requirements	Pipeline Gas from Nearby Field	GDLNG Terminal	New Mainland Terminal	Hong Kong Terminal	Do nothing / Defer decision
1. Certainty of timely arrival	Low – No proven gas field with adequate capacity and timing certainty available.	Low - Additional long-term capacity not available to CAPCO / HK. Priority for PRC users.	Unknown - No project to meet CAPCO / HK's needs within the time frame.	High - Terminal and supply preparation since 2003 and work progressing to achieve 2011 target.	None – Any indecision or delay will not provide timely gas arrival.
2. Supply Security for Hong Kong	Moderate – May serve as one of the multiple sources required for Hong Kong.	Low – Additional long-term capacity not available to CAPCO / HK. Also, imprudent to have the entire HK and Guangdong demand supplied through a single terminal	Unknown - No project to meet CAPCO / HK's needs within the time frame. Supply source also uncertain.	High. - Priority for CAPCO/HK is ensured. Additional security with multiple LNG sources.	None – Any indecision or deferral will not provide the required gas supply for Hong Kong.
3. Adequate Volume and Flexibility	Low - No credible gas field with adequate capacity and volume available.	Low – Additional long-term capacity not available to CAPCO / HK.	Unknown - No project to meet CAPCO / HK's volume and flexibility requirements.	High - Terminal designed to meet HK's increasing gas demand. Capacity will be assured for Hong Kong's needs.	None – No gas supply is available to serve Hong Kong's needs.
4. Competitive Supply of Gas	Low – Commercial structure and competitiveness of procurement process yet to be determined. No supplier with credible proven reserves to contract with.	Low – Long-term capacity and supply not available to HK. Presence of third party operator as middleman adds cost for their profit in the supply chain.	Unknown - No credible supply source identified. Presence of third party operator as middleman increases cost and complexity.	High – Competes in international LNG markets to allow a transparent process with competitive market pricing on supply terms.	None – No gas supply is available to serve Hong Kong's needs.
5. Environmental and Safety Standards	Issues and Standards not known at this time.	Issues and Standards not known at this time. The required pipeline is longer with its later part traversing same marine area as HK terminal.	Issues and Standards not known at this time. The required pipeline is longer with its later part traversing same marine area as HK terminal.	High - Environmental issues are understood and can be mitigated.	None - Increased emissions from more coal burn

Certainty of each of the five alternatives to meet Hong Kong's gas requirements is ranked as none, low, moderate, or high.

Table 1 – Summary Comparison of Alternatives Against Hong Kong's Requirements

1.7 CONSIDERATION OF ALTERNATIVE SITE LOCATIONS

CAPCO conducted a preliminary evaluation of the options for a LNG receiving terminal in Hong Kong which included a Gravity Based Structure, Floating Storage Regasification Unit, Artificial Island and Coastal Location. Due to insufficient storage, lack of suitable locations, relatively new technology, high cost and lengthy construction time, the assessment concluded that a coastal location was cost effective and the only viable option for a receiving terminal in Hong Kong that could reliably supply natural gas to the Black Point Power Station all year round and meet the target of first gas delivery in 2011.

Over the following twenty four months, an alternative site location study encompassing 29 sites was conducted to determine the most suitable coastal site(s) in Hong Kong for the LNG terminal. A phased approach to the screening and assessment of sites within Hong Kong was conducted, including periodic consultation with Government via an Environmental Study Management Group (ESMG). Environmental sensitive receivers (e.g., existing Country Parks, Marine Parks, Fish Culture Zones, Gazetted Beaches) were screened out in the early phases to aid in avoiding environmental impacts. The results of this Hong Kong wide site location study indicated that, from a long list of 29 locations across Hong Kong, two sites offered the best potential for further analysis based on environmental, risk, planning, social, marine traffic and engineering criteria. The two preferred sites were South Soko Island, at the location of the former Detention Centre, and Black Point, on the headland adjacent to the existing power station (BPPS) (*Figure 1.1*).

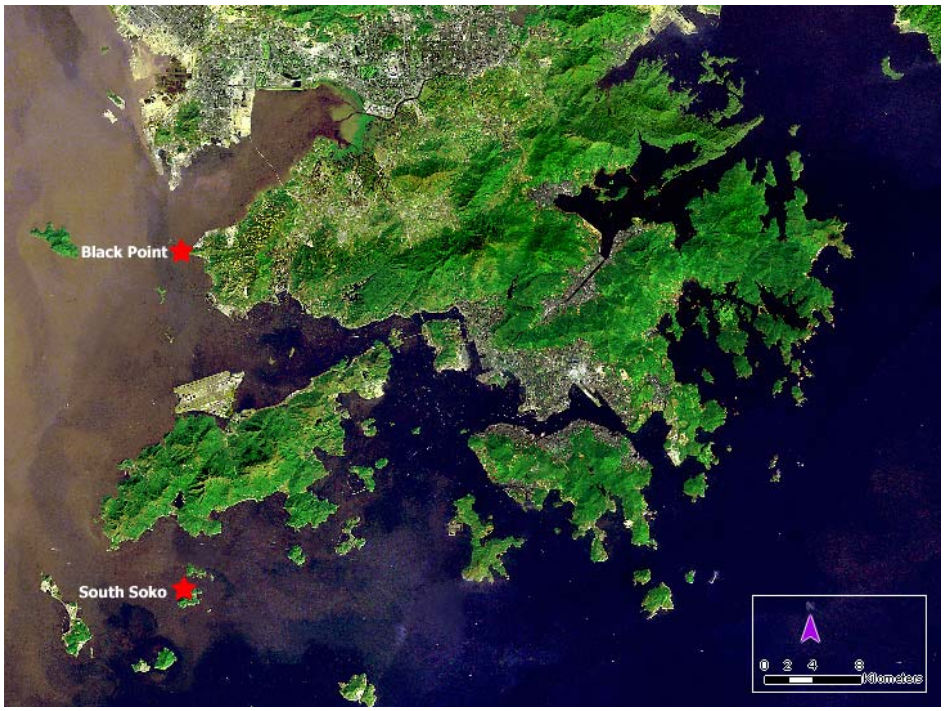

Figure 1.1 ***Location of South Soko and Black Point Candidate Sites for the LNG Terminal***

1.8 WHAT IS REQUIRED TO BRING LNG TO HONG KONG

1.8.1 The LNG Supply Chain Requires Long Term Planning

The LNG industry can be described by an LNG value chain consisting of 5 key elements (*Figure 1.2*):

- Exploration, development and production of gas
- Liquefaction
- Shipping
- Storage and Regasification
- End use (e.g. power generation)

Each of these elements has its own technological and investment requirements, but they share a common characteristic. They all require long project lead time and significant resources and investment commitment. Each element of the chain must be carefully planned and integrated with other elements; hence the supply chain requires long-term sales and purchase relationships between each participant. The whole process is referred to as the LNG Supply Chain and is illustrated in *Figure 1.2*.

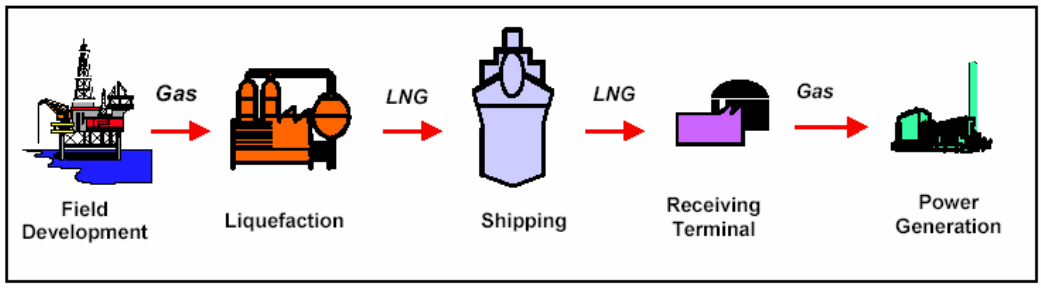

Figure 1.2 LNG Supply Chain

1.8.2 LNG Receiving Terminal

Near the end of the supply chain is the receiving terminal. The key components of the proposed LNG terminal include marine jetty facilities for unloading LNG, special tanks for LNG storage, equipment for converting the LNG back to gas, utilities and other infrastructure. LNG tanks are specially designed to contain the LNG at a temperature of approximately -162 °C near atmospheric pressure (*Figure 1.3*).

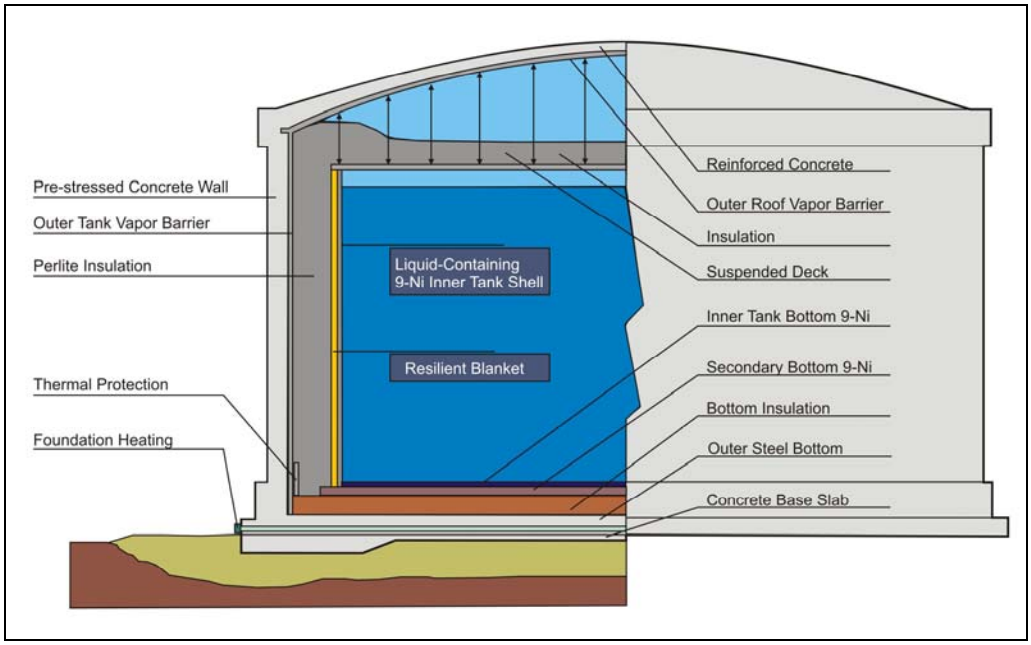

Figure 1.3 Example of a Full Containment LNG Storage Tank

1.8.3 *LNG Carriers*

LNG carriers have insulated cargo tanks and are of double-hull design. The double hull provides the location for the segregated ballast and provides optimum protection for the integrity of the cargo tank containment in the unlikely event of collision or grounding. There are two types of LNG carriers: Moss and Membrane. Moss LNG carriers have four or five spherical tanks contained in the hull, with a substantial proportion of each tank above the weather deck. In a membrane design the larger proportion of each tank is below the weather deck (*Figures 1.4*). Both carrier types are commonly utilized for LNG transit with no significant operational difference between them.

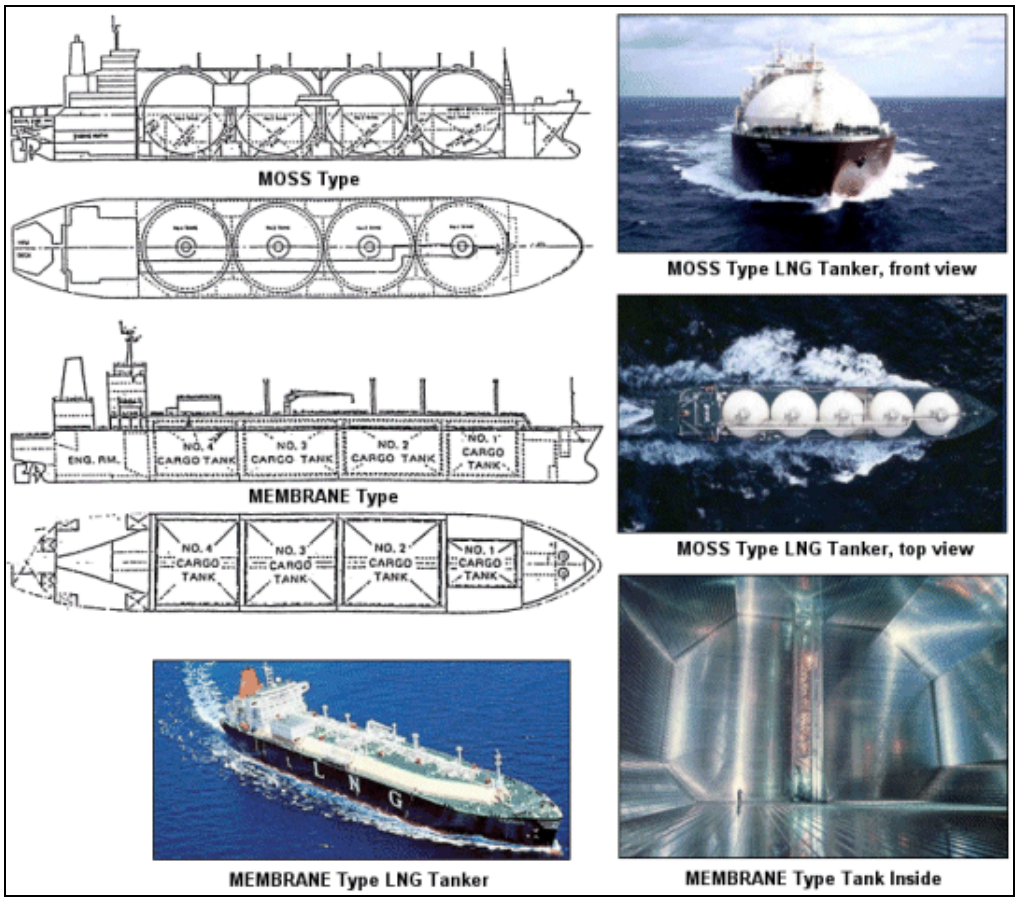

Figure 1.4 ***Moss and Membrane LNG Carriers***

LNG shipping has an outstanding safety record, with over 60,000 LNG carrier voyages, covering more than 90 million miles, and over 40 years of operation without a failure or loss of cargo. This excellent safety record can be attributed to the high technical standards employed in the design, construction and operation of LNG facilities and carriers and also the physical properties of LNG. In part, the safety record is a result of the adoption worldwide of a series of standards, codes, regulations, and operating procedures and practices. For example, these extra measures that will be applied in Hong Kong include daylight only transit, use of two local pilots in

addition to the Ship's Master while transiting in Hong Kong, and between two and four escort tugs at all times.

2 SOUTH SOKO EIA

2.1 PROJECT DESCRIPTION

It is proposed that the LNG terminal will be located on 36.5 ha of land located in the centre of South Soko Island. The majority of the terminal's facilities will be located on land that was developed in the late 1980s as a Detention Centre. The Detention Centre was demolished in the mid 1990s and what remains is a series of cut slopes, access roads and paths coming from the large concrete platform in the centre of the island. In order to locate all of the necessary equipment for the terminal, reclamation totalling less than 0.6 hectares will be required in Sai Wan. Seawall modifications will also be required at South Soko which will occupy 1.1 ha of artificial and natural coastline. The key elements of the LNG terminal are presented in the preliminary layout on *Figure 2.1* and include:

- Jetty including unloading arms located on the southeast coast of south Soko Island capable of accommodating LNG carriers with capacities ranging from 125,000 m^3 up to a class of 215,000 m^3;
- Process Area;
- Three full containment cryogenic LNG Tanks (capacity of up to 180,000 m^3 each);
- Low Pressure and High Pressure pumping systems;
- Vaporization (Re-gasification) Area;
- Seawater intake and outfall systems;
- Vents (low pressure and high pressure);
- Ancillary features: (Guard House, Maintenance Workshop, Administration Building, Utility Area, Control Room);
- In order to deliver the regasified natural gas from the terminal to BPPS, a 38 km long submarine gas pipeline (provisional alignment as shown in *Figure 2.2*) will be constructed;
- A gas receiving station is required at the BPPS to receive the gas and send it on to the power station;
- Submarine power cable and water main to connect the terminal to electricity and water supply sources on Lantau Island;
- Provision of gas turbines for onsite power generation requirements at South Soko Island.

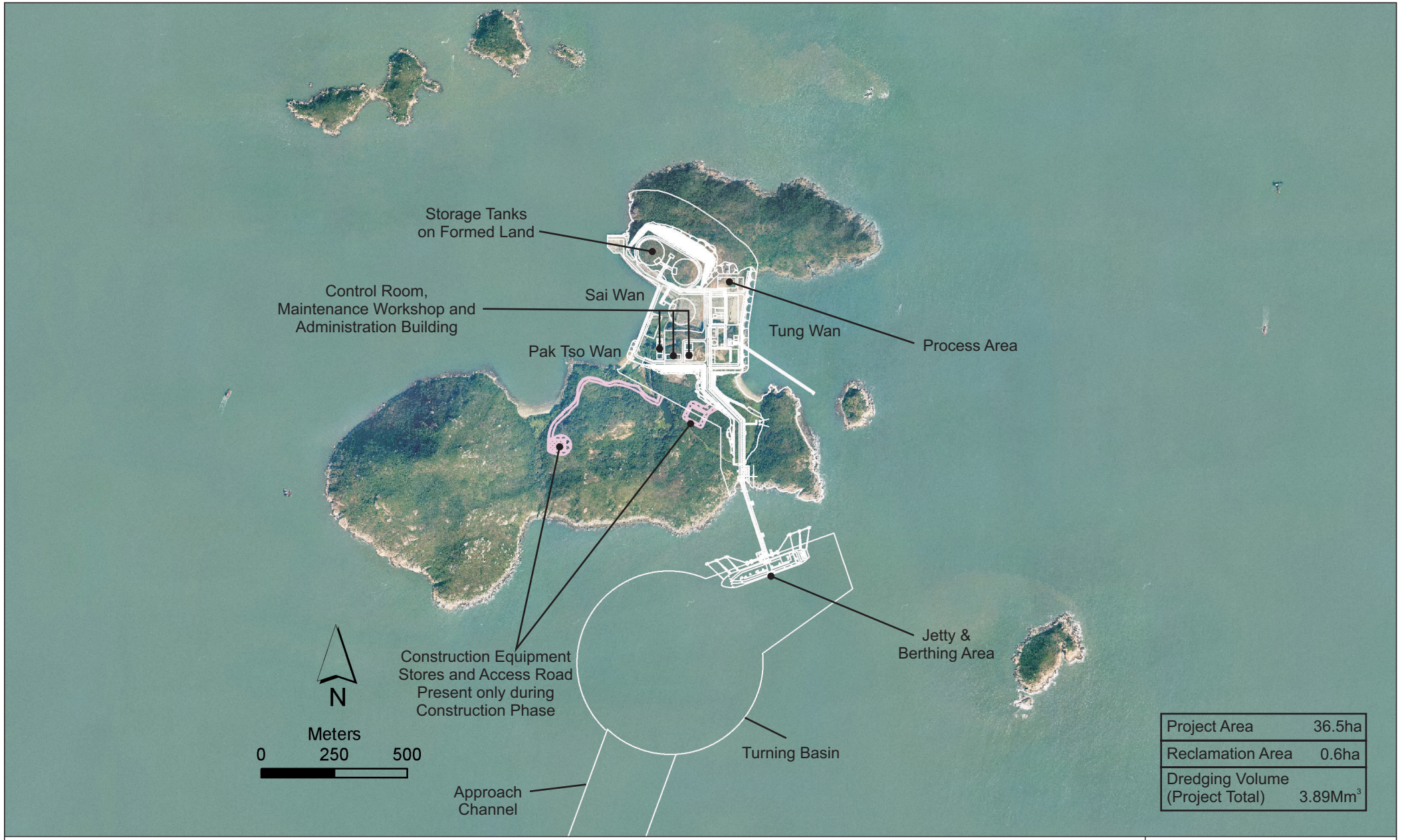

Figure 2.1

Preliminary Indicative Layout for the Proposed South Soko LNG Terminal
(Aerial photograph source: Lands Department)

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Environmental
Resources
Management

ERM

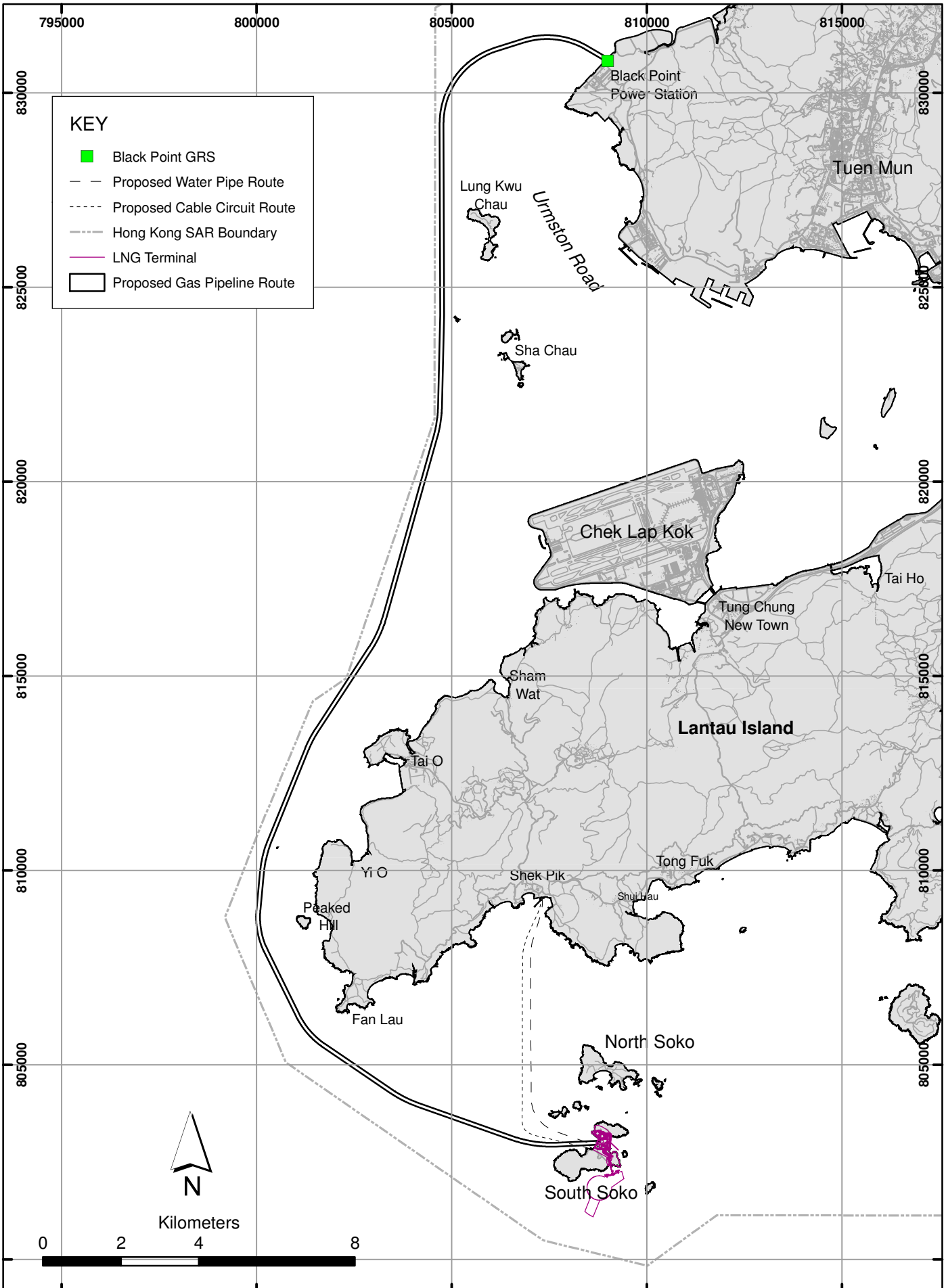

Figure 2.2

Locations of Works

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Environmental Resources Management

ERM

The LNG terminal will be designed and operated according to the *European Standard EN 1473 – Installation and Equipment for Liquefied Natural Gas - Design of Onshore Installations*.

The LNG carrier will access the site via the southern approaches to Hong Kong waters before berthing at South Soko. Dredging work (approximately 1 Mm^3) will be required to provide the necessary approach to the jetty and for a turning circle for the LNG carrier. The marine transit route is presented in *Figure 2.3*.

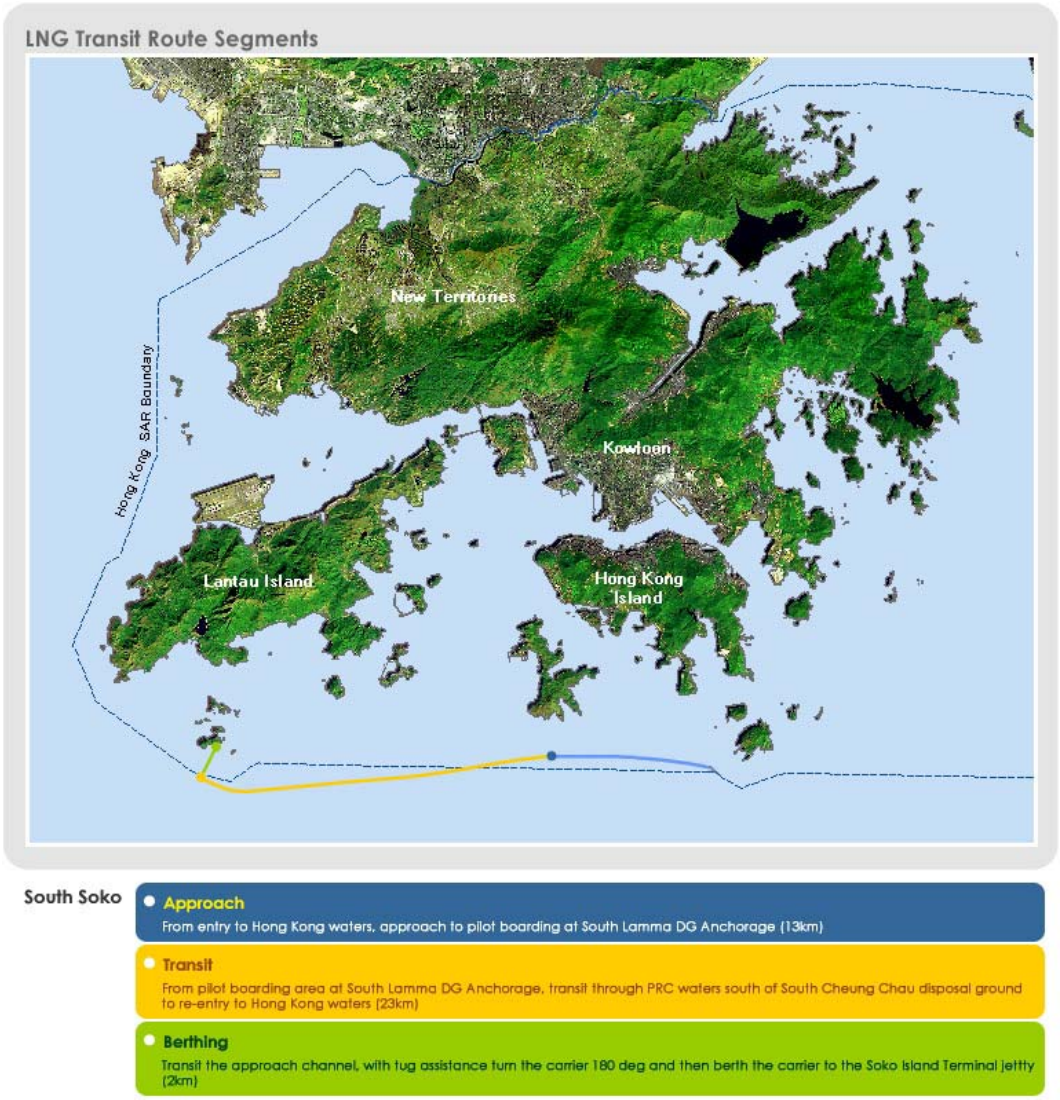

Figure 2.3 Location of South Soko LNG Carrier Transit Route

2.2 CONSIDERATION OF DIFFERENT LAYOUTS, DESIGN OPTIONS & CONSTRUCTION METHODS

An assessment was conducted to investigate the environmental considerations of each preliminary layout and design option, as well as to examine in-depth the applicable engineering aspects. The preferred layout that was taken forward to the EIA stage was based on locating the terminal in the centre of South Soko Island with the LNG receiving jetty on the south eastern coast. This layout was prepared following discussions with stakeholders including members of the Advisory Council on the Environment and non-governmental organisations (NGOs) during site visits to South Soko Island. This layout provides many significant environmental benefits when compared to earlier layouts examined, and aids in avoiding environmental impacts to the maximum practical extent. Key environmental benefits include:

- Reduction in dredging volumes (from approximately 5 Mm^3 to 1.32 Mm^3 at the terminal site) with reduced impacts to water quality, fisheries and marine ecology through adoption of partially dredged site formation works.
- Avoidance of substantial dredging in the sensitive area between North and South Soko Islands.
- Reduction in reclamation from 13 ha to approximately 0.6 ha which reduces impacts to water quality, fisheries and marine ecological sensitive receivers.
- The amount of natural coastline lost to reclamation works has been reduced from over 1 km to approximately 300 m which in turn reduces impacts to marine ecological sensitive receivers.
- By locating the terminal facilities in the centre of the island the disturbance to natural habitats on the island has been reduced and the view of the storage tanks from visual sensitive receivers on Lantau Island is in part obscured.

In addition to the above, construction methods will be adopted including the use of a bubble jacket to reduce underwater sound levels during marine percussive piling work for the construction of the jetty and deployment of silt curtains during dredging operations at specific locations.

2.3 CONSIDERATION OF PIPELINE ALIGNMENT

Various route options for the South Soko-BPPS gas pipeline have been examined. The assessment concluded overland routes across Lantau will have the greatest potential impacts for water quality, ecological and landscape impacts within the Country Parks (North Lantau and South Lantau) and along the roads in Lantau and are not preferred. A tunnel option through Lantau has been examined and although it will avoid most of the land-based sensitive

receivers, it also presents more drawbacks with respect to the offshore option (Base Case). These include:

- larger volumes of waste materials (primarily excavated rock);
- greater permanent loss of natural habitats (marine and terrestrial);
- long term landscape and visual impacts;
- potential impacts on the Tai Long Wan and Sham Wat archaeological sites;
- potential disturbance to Country Parks as a result of the site investigation activities;
- water quality impacts due to the dredging and reclamation of the tunnel portal working areas; and,
- a longer construction schedule (resulting in a 15 month delay in first gas).

Based on these environmental and unacceptable schedule drawbacks, it is not considered a viable option for the pipeline construction.

The assessment concluded that due to the short-term and transient nature of the water quality and marine ecological impacts, a completely marine route is preferred. The marine route also avoids additional ecological, noise, air, cultural heritage, waste, landscape and visual impacts to land based sensitive receivers. In addition, construction methods have been designed to reduce the impacts in sensitive marine mammal habitat, including restricted working hours, controlling construction rates, and avoiding peak calving periods for specific works.

2.4 *AIR QUALITY*

Two (2) Air Sensitive Receivers (ASR) were identified (Shek Pik Prison and the administration building for the Black Point Power Station) and the potential impacts arising from the construction and operation phases of the LNG terminal to these ASRs have been evaluated. No exceedance of the Air Quality Objective (AQO) is anticipated at the ASRs and therefore no air quality monitoring will be required for either the construction or operational phase.

2.5 *NOISE*

No Noise Sensitive Receivers (NSRs) have been found on South Soko and the nearest NSR has been identified on Lantau Island (Shek Pik Prison) which is located approximately 6 km away from the site. The predicted construction noise levels are within the stipulated noise criterion of 75 dB(A). The noise levels generated from the equipment during the operation of the LNG terminal are within daytime and night-time noise criteria.

2.6 WATER QUALITY

Sensitive receivers potentially affected by the construction and operational activities of the LNG terminal have been identified and the potential impacts on them evaluated. The key sensitive receivers include marine mammal habitat, the Sha Chau and Lung Kwu Chau Marine Park, commercial fisheries spawning/rearing habitat, fish culture zones, ecologically sensitive areas, beaches and water intakes.

The assessment, utilising water quality and hydrodynamic models, has included the potential impacts caused by marine works (i.e. dredging, reclamation, pipeline and utilities installation) on water quality due to the increases in suspended sediments concentrations, potential decreases in dissolved oxygen and increases in nutrients concentration, as well as those caused by operational activities such as the alteration of the hydrodynamic regime, discharges of cooled water and antifoulants.

Potential impacts arising from the proposed dredging, backfilling and jetting works are predicted to be mainly confined to the specific works areas. Modelling results indicate that the suspended solids elevations as a result of dredging and jetting for the installation of the submarine utilities are expected to be compliant with the assessment criteria at all point specific sensitive receivers in both seasons. In the few exceptions in which the modelling results indicate elevations above the criteria (i.e. open waters in western part of Lantau and open waters around South Soko during dredging activities) these are of short duration (typically less than one day) and not considered sufficient to cause an unacceptable deterioration of water quality. The elevation predicted at Pak Tso Wan beach and at the False Pillow Coral location can be mitigated through the adoption of silt curtains. Hence it is anticipated that such elevations above the criteria would be temporary and unacceptable impacts would be unlikely to arise. Overall the predicted elevations of suspended sediment concentrations during the construction phase are transient in nature and not predicted to cause adverse impacts to water quality at the sensitive receivers.

During the operation phase, adverse impacts to water quality are not expected to occur as the area affected by the cooled water and antifoulants discharge is extremely small and in the direct vicinity of the discharge point.

Exceedances of water quality standards at sensitive receivers have largely been avoided during the construction phase through the selection of acceptable working rates and methods for the marine works (i.e., dredging/jetting operational measures and deployment of silt curtains at specific locations) and appropriate on-site land based controls. Water quality monitoring and auditing is recommended for the construction phase.

As no unacceptable impacts have been predicted to occur during the operation of the LNG terminal at South Soko Island, no mitigation measures or monitoring are considered necessary.

2.7 WASTE MANAGEMENT

The potential impacts of waste management caused by construction and operational activities of the LNG terminal and its associated facilities at South Soko have been assessed. The key potential impacts during the construction phase are related to waste generated from site clearance, site formation, blasting, dredging, reclamation, seawall construction, filling and concreting. The storage, handling, collection, transport, disposal and/or re-utilisation of these materials and their associated environmental impacts have been the primary focus of the assessment and measures proposed to facilitate their management. Impacts associated with the storage, handling, collection, transport and disposal of waste produced during operational activities have been estimated to be manageable and meet the criteria specified in the *EIAO-TM*.

2.8 TERRESTRIAL ECOLOGY

The potential impacts to terrestrial ecology caused by construction and operational activities of the LNG terminal at South Soko have been assessed. The terrestrial habitats and wildlife on South Soko Island were characterised through the conduct of seasonal surveys during 2004, 2005 and 2006. The surveys covered habitats, vegetation and general wildlife (including mammals, avifauna, herpetofauna, dragonflies, butterflies, aquatic fauna).

The terrestrial ecological resources recorded on South Soko Island comprise secondary woodland and plantation, shrubland, grassland, backshore shrubland, seasonal stream, abandoned wet agricultural land, abandoned dry agricultural land, abandoned reservoir and disturbed areas, with their associated wildlife. Of these habitats, a small patch of secondary woodland in the Project Area has moderate ecological importance. The rest of secondary woodland and plantation, shrubland, abandoned wet agricultural land and seasonal stream have low to moderate ecological importance. The remaining habitats are of low or negligible ecological importance.

The LNG terminal and its associated facilities will be located mainly in habitats of low ecological value such as the already disturbed areas which were formerly part of the now demolished Detention Centre. The construction impact on the natural habitats and associated wildlife is considered to be manageable, and no adverse residual impact is expected after the implementation of the recommended mitigation measures.

Mitigation measures include the transplantation of individuals of the orchid Golden Eulophia as well as compensatory tree planting on South Soko. After transplantation and planting, monitoring will be undertaken to check the performance and health conditions of the individuals. No adverse residual impact is expected after implementation of these measures.

During the operational phase, adverse impacts are not expected to occur. Therefore, no terrestrial ecology monitoring will be required.

2.9 MARINE ECOLOGY

In order to characterise the marine ecological resources in areas potentially affected by the Project, a series of detailed seasonal field surveys were conducted during 2004, 2005 and 2006 examining the organisms present on intertidal and subtidal shores and within the soft seabed around South Soko Island and along the gas pipeline route. Land (12 months in 2004 - 2005) and vessel (July 2005 to May 2006) based marine mammal surveys were also conducted around South Soko Island and along the submarine gas pipeline and submarine utility alignments.

The waters and coastal areas of West Lantau and Southwest Lantau including the Soko Island group, which are located away from the major population centres of Hong Kong, have been considered by some academics, government and green groups to be a general area of high ecological value including from a marine perspective. However, it is important to note that there are significant spatial variations in the ecological values and characteristics within this large area which encompasses the smaller Study Area.

Ecologically sensitive receivers have been identified and the potential impacts arising from the construction and operation phases of the LNG terminal on them have been evaluated. The key sensitive receivers include habitats of the Indo-pacific Humpback Dolphin (*Sousa chinensis*) and Finless Porpoise (*Neophocaena phocaenoides*), the Sha Chau and Lung Kwu Chau Marine Park and other ecologically sensitive areas such as spawning and nursery grounds and coral habitat.

As previously discussed, the layout selected for South Soko Island reduces reclamation to approximately 0.6 ha of Sai Wan bay. Coastline disturbance for modification of the seawalls is limited to approximately 300 m of natural coastline. The area of seawall modification is 1.1 ha which includes both natural and artificial coastlines. As a result of the small size of habitat directly affected by the works and the previous history of reclamation along this particular coastline, the impacts are classified as acceptable.

The results of the water quality modelling activities indicate that indirect impacts arising from the marine works will generally be transient and confined to the works areas and compliant with the assessment criteria after implementation of mitigation measures. It is therefore predicted that there will be no unacceptable impacts to the marine ecology (including marine mammals) of the Study Area as a result of the LNG terminal's construction activities.

Unacceptable impacts to marine ecology sensitive receivers have been addressed through the adoption of mitigation measures including the

provision of rubble mound/armour rock seawalls on the edges of the reclamations to facilitate colonisation by intertidal and subtidal organisms. Specific mitigation measures have been designed to minimize impacts on marine mammals including restrictions on vessel speed and the use of predefined and regular routes by all marine vessels involved in the Project. The mitigation measures designed to mitigate impacts to water quality to acceptable levels (compliance with assessment criteria) are also expected to mitigate impacts to marine ecological resources.

No adverse residual ecological impact is expected following the implementation of the mitigation measures.

Unacceptable impacts from discharges of cooled water and antifoulants are not anticipated to occur, as they will be localised to the direct vicinity of the outfall, will remain predominantly in the bed layer and will not affect ecological sensitive receivers.

2.10 FISHERIES

The potential impacts to commercial fisheries caused by construction and operational activities of the LNG terminal and its associated facilities at South Soko have been assessed using the findings of literature reviews and surveys of ichthyoplankton and fish larvae in southern waters.

The Water Quality modelling activities indicate that the impacts arising from the proposed dredging or jetting works are predicted to be largely confined to the specific works areas and the predicted elevations in suspended sediment concentrations are not predicted to cause large area exceedances of the assessment criterion. Adverse impacts to fishing grounds or species of importance to the fisheries are therefore not expected to occur.

Unacceptable impacts from discharges of cooled water are not anticipated to occur as the effects from these discharges will be localised to the lower layers of the water column in direct vicinity of the outfall. Compliance with the relevant discharge standards to control water quality impacts to within acceptable levels is expected to control impacts to fisheries resources.

2.11 LANDSCAPE AND VISUAL IMPACT

The potential impacts to the landscape and visual sensitive receivers caused by the presence of the LNG terminal at South Soko have been assessed. The assessment has covered a wide range of potential landscape impacts including the alteration of the landscape caused by the excavation and reclamation, and the introduction of the LNG terminal in South Soko Island's natural landscape. The baseline Landscape Resources are generally of low to moderate sensitivity and there will be no significant impacts on any of the Landscape Resources. The baseline Landscape Character of the Soko Islands is of generally high quality. There will be varied impacts on the landscape

character which range from a significant impact on the LCA1 Island Landscape, to slight-moderate impacts on the LCA2 Abandoned Institutional Landscape. The LNG terminal will only be visible from a limited number of locations, and these impacts will only be significant when viewed from closer than 1,260 m to South Soko Island. As VSRs within this distance are located in ocean areas, or from other islands in the Soko chain, the impact is greatly reduced. No VSRs located in residential areas, on public roads, or in publicly accessible lookouts or Country Parks will experience a significant visual impact. Measures have been proposed to mitigate the effects of the development, including compensatory planting of indigenous species, the orientation and positioning of the LNG terminal's lighting system to reduce glare, the design of structures to complement the surrounding landscape where practical, and colours to reduce the visibility of the LNG terminal.

2.12 *CULTURAL HERITAGE*

The impact assessment identified several terrestrial sites of cultural heritage importance. The landtake for the LNG terminal will directly impact the Tai A Chau Tin Hau Temple, 21 graves and one associated tablet, 7 earth shrines and the Tai A Chau archaeological site. Potential direct impacts on five archaeological deposits of the Tai A Chau Archaeological Site are considered unavoidable. Detailed design of soil nailing and soil excavation work will be reviewed to minimise the impact extent of Site A. Rescue excavation will be undertaken at impacted areas to preserve the archaeological resources by record prior to the start of construction works. To ensure that no surviving archaeological deposits are missed, an archaeological watching brief has been recommended during construction. An archaeological action plan will be submitted to and agreed with AMO by the project proponent prior to licence application by a qualified archaeologist detailing the requirement of the rescue excavation and watching brief with contingency plan in case of discovery of significant finds. It should be noted that the identified archaeological deposits have been partly disturbed by natural erosion and Site C has been heavily disturbed by previous construction and decommissioning works for the Detention Centre. Additional measures will be adopted to relocate the Tin Hau Temple to a site with a similar cultural landscape and an archaeological survey will be undertaken at the site to evaluate potential archaeological impact and appropriate mitigation measures will be provided if necessary, relocate the 7 earth shrines and relocate the 21 graves and the associated tablets. No marine sites of cultural heritage/archaeological value have been identified and thus no impacts to marine archaeological resources are expected.

2.13 *HAZARD TO LIFE*

The assessment has evaluated the hazards to life associated with the LNG terminal, the submarine gas pipeline and the Gas Receiving Station as well as the marine transit of LNG. The assessment has concluded that the risks

related to transit of LNG to South Soko, the operation of the terminal, the submarine gas pipeline and the Gas Receiving Station are acceptable as per the individual and societal risk criteria set out in *Annex 4* of the *EIAO-TM*.

2.14 ENVIRONMENTAL MONITORING AND AUDIT (EM&A)

During construction of the Project, environmental monitoring will be necessary to assess the effectiveness of measures implemented to mitigate potential water quality impacts. Regular site audits will also be conducted during construction.

2.15 SOUTH SOKO SUMMARY

A summary of the key design and environmental aspects of the South Soko option, with a comparison against the Black Point option, is presented in *Table 4.1*

3 BLACK POINT EIA

3.1 PROJECT DESCRIPTION

The LNG terminal would be located on 32 ha of land located on the headland southwest of the Black Point Power Station. The terminal's facilities will be located on a site to be formed as part of a balanced cut and fill 16 ha reclamation. The key elements of the LNG terminal are presented in the preliminary layout on *Figure 3.1* and include:

- Jetty including unloading arms capable of accommodating LNG carriers with capacities ranging from 125,000 m^3 up to a class of 215,000 m^3
- Process Area
- Three full containment cryogenic LNG Tanks (capacity of up to 180,000 m^3 each)
- Low Pressure and High Pressure pumping systems
- Vaporization (Re-gasification) Area
- Seawater intake and outfall system
- Vents (low pressure and high pressure)
- Ancillary features: (Guard House, Maintenance Workshop, Administration Building, Utility Area, Control Room)

The LNG terminal will be designed and operated according to the *European Standard EN 1473 – Installation and Equipment for Liquefied Natural Gas - Design of Onshore Installations*.

The LNG carrier will access the site via the East Lamma Channel, transit the Ma Wan Channel, Urmston road before berthing at Black Point (*Figure 3.2*). Dredging work (approximately 2.5 Mm^3) will be involved to provide the necessary approach to the jetty and for a turning circle for the LNG carrier.

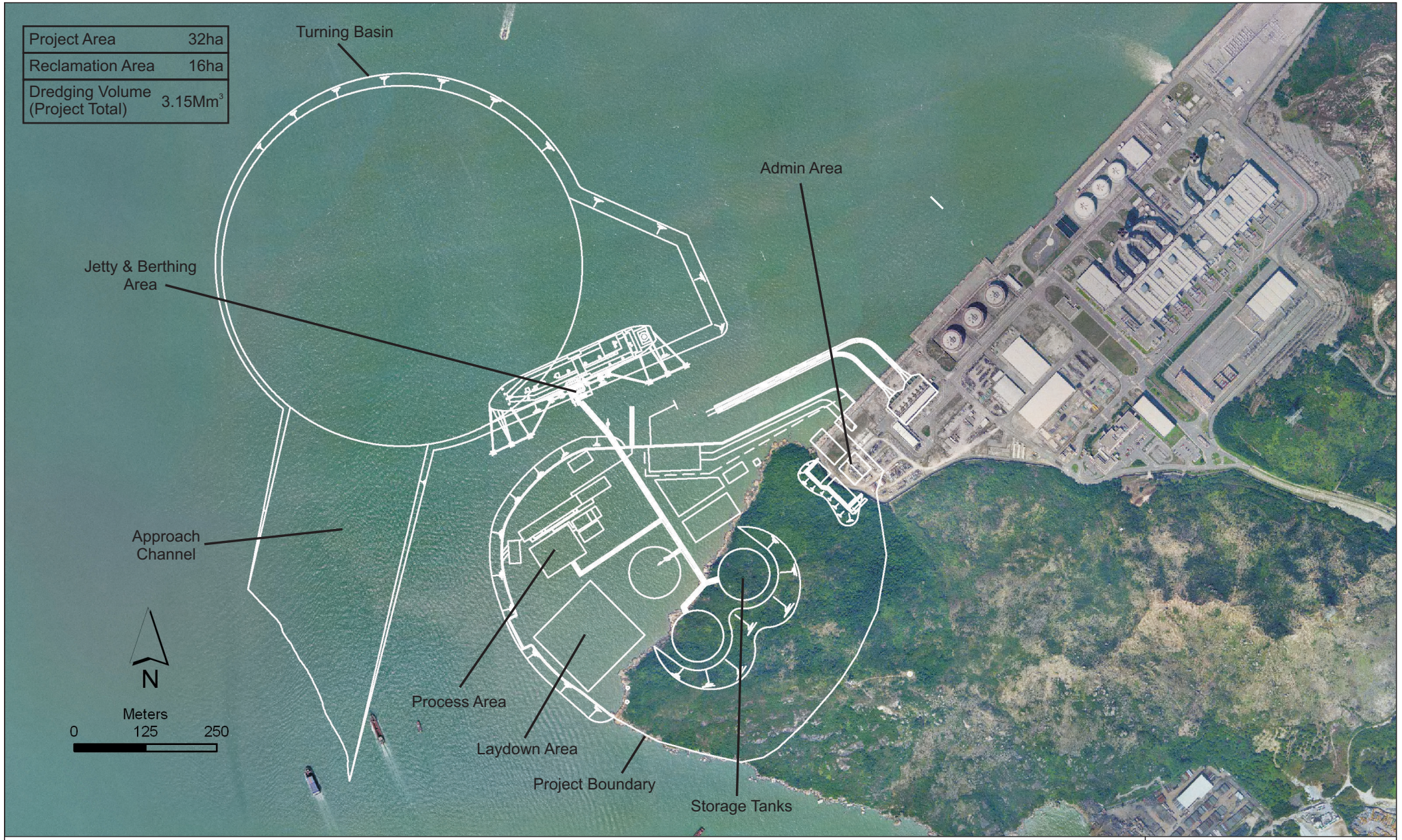

Figure 3.1

Layout for the Proposed Black Point LNG Terminal
(Aerial photograph source: Lands Department)

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Environmental Resources Management

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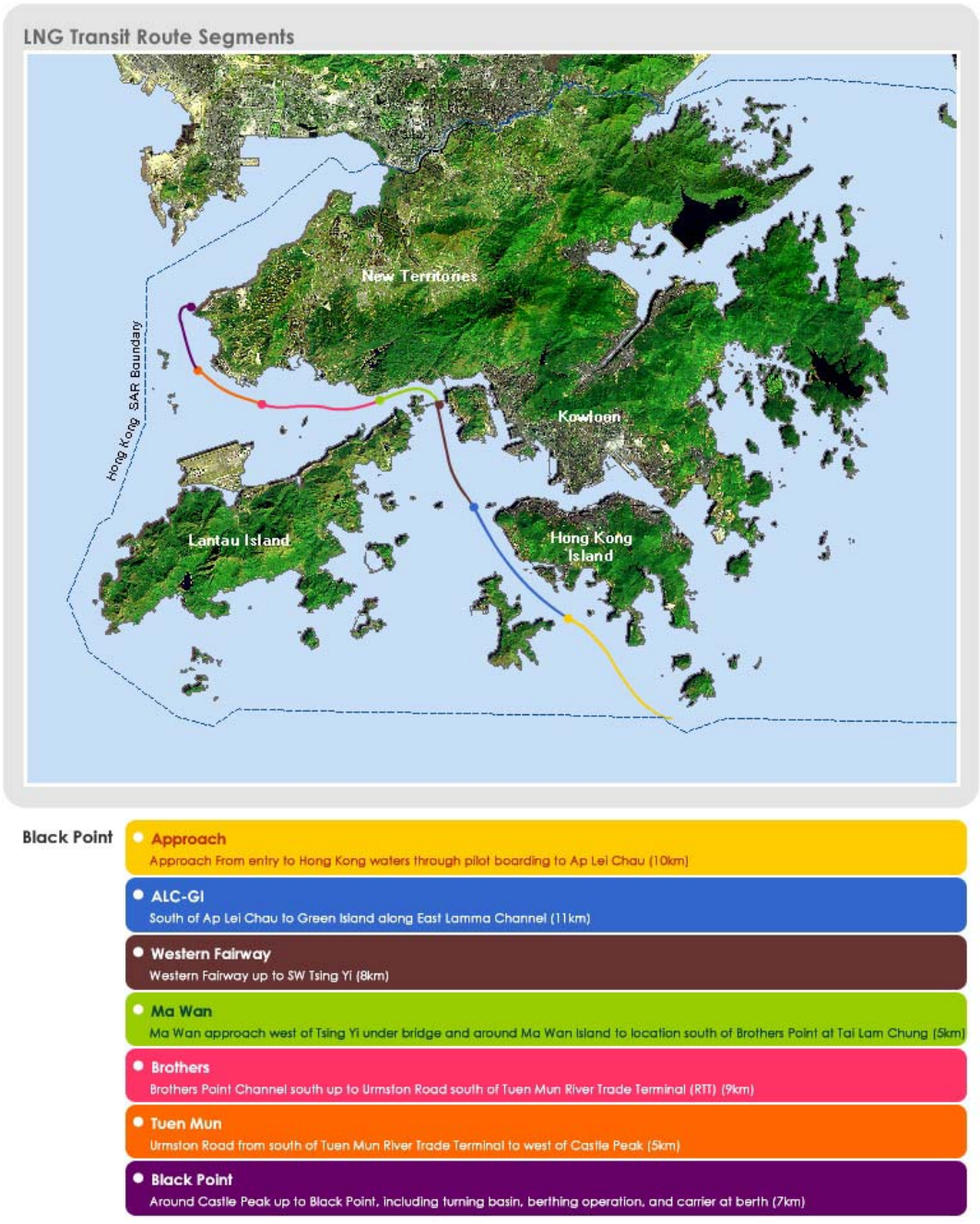


Figure 3.2 Location of Black Point LNG Carrier Transit Route

3.2 CONSIDERATION OF DIFFERENT LAYOUTS, DESIGN OPTIONS & CONSTRUCTION METHODS

An assessment of different layouts and design options was conducted to investigate the environmental considerations of each preliminary layout and design option, as well as to examine the engineering aspects for various layouts. Of the three selected layouts, both the engineering and environmental assessments have identified a layout that achieves the best balance between reclamation and excavation quantities. The location of two of the LNG tanks in the Black Point headland also reduces the potential for impacts to landscape and visual sensitive receivers.

Two construction options were considered, the Fully Dredged Option and the Partially Dredged Option. The Partially Dredged Option is adopted to minimise the volume of dredged material for disposal.

For the construction of the LNG Jetty, two alternatives for the installation of marine piles have been assessed (bored or percussive). The assessment proposed that either method would be suitable for the construction of the LNG Jetty as part of the Black Point terminal. In addition to the above, construction methods will be adopted including the use of a bubble jacket to reduce underwater sound levels during marine percussive piling work for the construction of the jetty.

Two dredging plants have been assessed: grab dredgers and trailing suction hopper dredgers (TSHD). Both are commonly used in Hong Kong and as such have been considered as viable options.

3.3 *AIR QUALITY*

The potential impacts to air quality caused by construction and operational activities of the LNG terminal and its associated facilities at Black Point have been assessed. Air Sensitive Receivers (ASRs) were identified and the potential impacts arising from the construction and operation phases of the LNG terminal evaluated. No exceedances of the Air Quality Objective (AQO) criteria are anticipated at the ASRs and therefore no air quality monitoring will be required for either the construction or operational phase.

3.4 *NOISE*

The potential impacts to noise caused by construction and operational activities of the LNG terminal and its associated facilities at Black Point have been assessed. Noise Sensitive Receivers (NSRs) were identified and the potential impacts arising from the construction and operation phases of the LNG terminal evaluated. No exceedances of the noise criteria are anticipated at the NSRs and therefore no noise monitoring will be required for either the construction or operational phase. The noise levels generated from the equipment during the operation of the LNG terminal are within daytime and night-time noise criteria.

3.5 *WATER QUALITY*

The potential impacts to water quality caused by construction and operational activities of the LNG terminal and its associated facilities at Black Point have been assessed. Sensitive receivers potentially affected by construction and operational activities of the LNG terminal have been identified and the potential impacts to these have been evaluated. The key sensitive receivers include Indo-pacific Humpback Dolphin habitat of Northwest Lantau Island, the Sha Chau and Lung Kwu Chau Marine Park, commercial fisheries

spawning habitat of Northern Lantau, fish culture zones, ecologically sensitive areas (mangroves, horseshoe crab habitat, seagrass beds and intertidal mudflats), beaches (gazetted and non – gazetted) and water intakes. The assessment, utilising water quality and hydrodynamic models, has included the potential impacts caused by marine works (i.e., dredging and reclamation) on water quality due to the increases of suspended sediments concentrations, potential decreases of dissolved oxygen and increases in nutrients concentration, as well as those caused by operational activities such as the alteration of the hydrodynamic regime, discharges of cooled water and antifoulants.

Potential impacts arising from the proposed dredging, backfilling and reclamation works are predicted to be largely confined to the specific works areas and compliant with assessment criteria at the sensitive receivers. Water quality monitoring and auditing is recommended for the construction phase. During the operation phase, adverse impacts to water quality are not expected to occur as the area affected by the cooled water and antifoulants discharge is extremely small and in the direct vicinity of the discharge point. Monitoring of impacts to marine water quality during the operational phase is not considered necessary.

3.6 WASTE MANAGEMENT

The potential impacts of waste management caused by construction and operational activities of the LNG terminal at Black Point have been assessed. The key potential impacts during the construction phase are related to waste generated from site clearance, site formation, blasting, dredging, reclamation, seawall construction, filling and concreting. The storage, handling, collection, transport, disposal and/or re-utilisation of these materials and their associated environmental impacts have been the primary focus of the assessment and measures proposed to facilitate their management. Impacts associated with the storage, handling, collection, transport and disposal of waste produced during operational activities have been estimated to be manageable and meet the criteria specified in the *EIAO-TM*.

3.7 TERRESTRIAL ECOLOGY

The potential impacts to terrestrial ecology caused by construction and operational activities of the LNG terminal at Black Point have been assessed. The terrestrial habitats and wildlife on Black Point were characterised by conducting seasonal surveys during 2004, 2005 and 2006. The surveys covered habitats, vegetation and general wildlife (including mammals, avifauna, herpetofauna, dragonflies, butterflies, aquatic invertebrates and fish).

The terrestrial ecological resources recorded within the Study Area include plantation, shrubland, shrubby grassland, stream/channel, orchard and developed areas, with their associated wildlife. Of these habitats, shrubland located at the western part of the headland is of moderate ecological importance, shrubland located at the southern part of the headland and the stream are low to moderate in ecological importance, while the remaining habitats are of low or negligible ecological importance.

The impact on natural habitats and associated wildlife is considered to be low to moderate, and no adverse residual impact is expected after the implementation of the proposed mitigation measures, comprising appropriate construction practices, reclamation of affected areas of shrubland (temporary haul road), transplantation of Pitcher Plants and Bamboo Orchids and compensatory planting of shrubland. Environmental monitoring and audit measures in the form of regular checks will be undertaken.

During the operation phase of the LNG terminal at Black Point, adverse impacts to terrestrial ecological resources are not expected to occur.

3.8 MARINE ECOLOGY

The potential impacts to marine ecology caused by construction and operational activities of the LNG terminal and its associated facilities at Black Point have been assessed.

A series of detailed seasonal field surveys were conducted during 2004, 2005 and 2006 examining the organisms present on intertidal and subtidal shores and within the soft seabed around Black Point. Land (12 months in 2004 - 2005) and vessel (July 2005 to May 2006) based marine mammal surveys were also conducted around Black Point. Ecologically sensitive receivers have been identified and the potential impacts arising from the construction and operation phases of the LNG terminal to these have been evaluated. The key sensitive receivers include the Indo-pacific Humpback Dolphin (*Sousa chinensis*) habitat of Northwest Lantau, the Sha Chau and Lung Kwu Chau Marine Park and ecologically sensitive areas (mangroves, horseshoe crab habitat, seagrass beds and intertidal mudflats).

Potential construction phase impacts to marine ecological resources of the Study Area, including marine mammals, may arise from the permanent loss of 16 ha of habitat due to reclamation, disturbances to benthic habitats in the turning circle and approach channel, loss of 600m of natural coastline or, indirect impacts through changes to key water quality parameters, as a result of the dredging and reclamation.

The results of the water quality modelling activities indicate that indirect impacts arising from the marine works will generally be transient and confined to the works areas and compliant with the assessment criteria. It is therefore predicted that there will be no unacceptable impacts to the marine

ecology (including marine mammals) of the Study Area as a result of the LNG terminal's construction activities.

All marine vessels involved in the Project will be required to observe a speed limit in areas where marine mammals are present. The mitigation measures designed to mitigate impacts to water quality to acceptable levels (compliance with assessment criteria) are also expected to mitigate impacts to marine ecological resources.

As a supplement to the construction phase water quality monitoring, it is proposed that additional construction and post-construction phase monitoring of marine mammals be undertaken. The main identified residual impact is the loss of 16 ha of marine mammal habitat. No adverse residual ecological impact is expected following the implementation of the mitigation measures.

Unacceptable impacts from discharges of cooled water and antifoulants are not anticipated to occur, as they will be localised to the direct vicinity of the outfall and will remain predominantly in the bed layer.

3.9 FISHERIES

The potential impacts to commercial fisheries caused by construction and operational activities of the LNG terminal at Black Point have been assessed using the findings of literature reviews. The Water Quality modelling activities indicate that the impacts arising from the proposed dredging and reclamation works are predicted to be largely confined to the specific works areas and the predicted elevations in suspended sediment concentrations are not predicted to cause large area exceedances of the assessment criterion. Adverse impacts to fishing grounds or species of importance to the fisheries are therefore not expected to occur.

Unacceptable impacts from discharges of cooled water are not anticipated to occur as the effects from these discharges will be localised to the lower layers of the water column in direct vicinity of the outfall. Compliance with the relevant discharge standards to control water quality impacts to within acceptable levels is expected to control impacts to fisheries resources.

3.10 LANDSCAPE AND VISUAL IMPACT

The potential impacts to the landscape and visual sensitive receivers caused by the presence of the LNG terminal at Black Point have been assessed. The assessment has covered a wide range of potential landscape impacts including the alteration of the landscape caused by the reclamation and the introduction of the LNG terminal in Black Point's natural landscape. The baseline Landscape Resources are generally of varying sensitivity and there will be no significant impacts on any of the Landscape Resources. The LNG terminal will only be visible from a limited number of locations, and these impacts will only be significant at close proximity (< 1,260m) to the Black Point Terminal. As

most of the VSRs within this distance are located in ocean areas, the impact is greatly reduced as all visitors will experience this impact from marine vessels. There will be a moderate to significant visual impact from the publicly accessible lookout of Lung Kwu Chau on clear days. However there will be low visitor numbers to experience this impact. The presence of LNG terminal will have a moderate to significant negative impact on the existing Landscape Character of Black Point, particularly the hill slope area, however the impacts on the other LCA's will range from moderate to negligible

Measures have been proposed to mitigate the effects of the development, including compensatory planting of indigenous species, the orientation and positioning of the LNG terminal's lighting system to reduce glare, the design of structures to complement the surrounding landscape where practical, and colours to reduce the visibility of the LNG terminal.

3.11 *CULTURAL HERITAGE*

The potential impacts to cultural heritage caused by construction and operational activities of the LNG terminal and its associated facilities at Black Point have been assessed. The assessment identified three terrestrial sites of low cultural resource value: two building structures at Terrace 1, a WWII cave at Terrace 2 and a stone structure at Terrace 3. Construction activities will impact these structures; however their loss is considered acceptable due to their low cultural resource value and provided that a recording is undertaken for the sites following requirements of the Antiquities and Monuments Office (AMO). Appropriate mitigation measures comprising the preparation of photographic and cartographic records prior to their removal will therefore be undertaken to preserve these structures by record. No marine archaeological sites have been identified. Thus, the proposed development imposes no marine archaeological impact and no mitigation measures are considered necessary.

3.12 *HAZARD TO LIFE*

The assessment has evaluated the hazards to life associated with the LNG terminal as well as the marine transit of LNG. Based on the risk criteria set out in *Annex 4* of the *EIAO-TM,* the assessment has concluded that the individual risk for the marine transit and the LNG terminal are acceptable. However, the societal risk of the marine transit to Black Point is As Low As Reasonably Practicable (ALARP) (1 for some areas of the marine transit; the difference in risk for these areas is due to busy marine traffic and high population density particularly through the Ma Wan channel. Measures to

(1) Under Hong Kong *EIAO-TM* guidelines, there are three regions of risk categorisation: "Acceptable" requires no further action; risk within "ALARP" should be mitigated to as low as reasonably practicable; and, "Unacceptable" cannot be permitted.

mitigate the marine societal risk through these areas from ALARP to Acceptable are not considered to be implementable at this time by the relevant Authority due to their impact on other marine traffic in the busy Hong Kong environment. LNG transit through these areas is avoided by the selection of the South Soko site, where the risk of the marine transit has been assessed as Acceptable along the entire route.

3.13 ENVIRONMENTAL MONITORING AND AUDIT (EM&A)

During construction of the Project, environmental monitoring will be necessary to assess the effectiveness of measures implemented to mitigate potential water quality impacts. Marine mammal exclusion zone monitoring for specific activities and site audits will also be conducted during construction.

3.14 SUMMARY

A summary of the key design and environmental aspects of the Black Point option, with a comparison against the South Soko option, is presented in *Table 4.1.*

4 CONCLUSIONS AND SITE PREFERENCE

4.1 BENEFITS OF THE PROJECT

Implementation of the Project will secure sufficient and dependable supplies of fuel to meet electricity generation needs, and make a significant contribution to managing emissions of air pollutants in Hong Kong. Natural gas is recognised as a comparatively clean burning fuel as it emits less particulates and negligible SO_2, as well as less NO_x and CO_2 than other fossil fuels. Locating the LNG terminal in Hong Kong will enable the project to be developed under a single jurisdiction with clear policy and regulations. A CAPCO owned and operated LNG terminal under the SoC provides greater project certainty and commercial assurance of bringing about these environmental benefits compared to other options.

As noted previously with BPPS providing about 25% of Hong Kong's total electricity needs, having a reliable supply of natural gas that fuels this power station is critical for maintaining Hong Kong's electricity supply. In the event that gas is not available to BPPS, CAPCO will need to meet electricity demand by a higher reliance on coal-fired generation, with increased emissions as a result. Under such circumstances, Hong Kong consumers could be exposed to supply interruptions or power rationing.

4.2 ENVIRONMENTAL OUTCOMES

For each of the components assessed in the South Soko *EIA Report*, the assessments and the residual impacts have all been shown to be acceptable within the relevant standards/criteria of the *EIAO-TM* and the associated *Annexes*.

The marine risk for the transit of LNG carriers to Black Point is in the As Low As reasonably Practicable (ALARP) (1) region for some areas of the marine transit of the LNG carrier but for all other aspects of the Black Point EIA Report, the assessments and the residual impact have all been shown to be acceptable within the relevant standards/criteria of the *EIAO-TM* and the associated *Annexes*.

(1) Under Hong Kong *EIAO-TM* guidelines, there are three regions of risk categorisation: "Acceptable" requires no further action; risk within "ALARP" should be mitigated to as low as reasonably practicable; and, "Unacceptable" cannot be permitted.

4.3 ENVIRONMENTAL PERFORMANCE COMPARISON

A comparison of the environmental performance of the two options for a LNG terminal in Hong Kong was conducted with reference to key engineering design parameters and environmental impacts. The comparison is presented below in *Table 4.1*.

Table 4.1 Summary of the Key Findings of the Environmental Performance Comparison – (site parameters are based on the preliminary indicative site design and are approximate)

ISSUE	SOUTH SOKO	BLACK POINT
KEY ENVIRONMENTAL IMPACTS		
WATER	• The result of the construction of the terminal at South Soko will be the reduction in sea area by approximately 0.6 ha. • Maintenance dredging less than once every 10 years.	• The result of the construction of the terminal at Black Point will be the reduction in sea area by approximately 16 ha. • Maintenance dredging approximately once every 4 to 5 years.
WASTE	• Need to dispose of 3.89 Mm^3 of marine sediment. • Need to dispose of 179,000 m^3 of excavation waste off site assuming 1.30 Mm^3 is used to rock armour the submarine gas pipeline.	• Need to dispose of 3.15 Mm^3 of marine sediment. • 0 m^3 of excavation waste (assuming all material accommodated within the reclamation site)
TERRESTRIAL ECOLOGY	• South Soko: permanent loss of approximately 0.2 ha of secondary woodland, 2.8 ha of plantation, 7.3 ha of shrubland, 0.5 ha of abandoned wet agricultural land, 1.8 ha of grassland and 5.3 ha of disturbed area. The affected areas are considered to be generally low to moderate quality habitats. • Shek Pik: permanent loss of approximately 0.004 ha of plantation and 0.02 ha of developed area. The affected areas are considered to be generally low/negligible quality habitats. • Many of the habitats on South Soko Island are highly modified and disturbed as a result of village developments up to the 1960s, the construction of a Detention Centre in 1980s and its subsequent demolition in the 1990s.	• Permanent loss of approximately 4.2 ha of shrubland considered to be of moderate ecological value and 1.0 ha of disturbed area • Although the terrestrial ecology at Black Point is mainly dominated by moderate-low value shrubland/grass habitat typical of Hong Kong, it must be noted that the Project Area is relatively undisturbed with no significant human alterations.
MARINE ECOLOGY	• Permanent loss of approximately 265 m of natural rocky shore/natural subtidal habitat and approximately 35 m of sandy shore which are of low to medium ecological value. The residual impact is considered to be acceptable, as the loss of these habitats will be compensated by the provision of 0.6 km of sloping rubble mound/rock or concrete armour seawalls. • Permanent loss of approximately 0.6 ha of subtidal soft bottom assemblages and marine waters within the reclamation site. The	• Permanent loss of approximately 600 m of natural rocky shore/intertidal habitat which are of low ecological value. The residual impact is acceptable, as the loss will be compensated by the provision of approx. 1.1 km of sloping rubble mound/rock or concrete armour seawalls. • Permanent loss of approximately 16 ha of subtidal soft bottom assemblages within the reclamation sites. The residual impact is acceptable as even though the size of habitat lost is relatively large it is of relatively low ecological value.

ISSUE	SOUTH SOKO	BLACK POINT
	residual impact is acceptable as the habitat is of medium to low ecological value and supports low sightings of marine mammals.. • Permanent loss of approximately 1.1 ha of coastal habitat as a result of seawall modifications. The residual impact is acceptable as the habitat supports assemblages of low ecological value. • Maintenance dredging of specific areas of the approach channel and turning basin is expected to be required once every 10 years. Although impact to water quality is expected to be compliant with current WQO standards, the works will result in occasional disturbance to the low to moderate ecological value habitat within the dredged areas. • Short term and temporary impacts from the installation of the submarine gas pipeline, watermain and power cable. • No adverse residual ecological impacts have been identified. The marine environment around the South Soko Island has been subject to disturbance in the past as a result of the reclamations in Sai Wan and Tung Wan. To the East of the South Soko island lies the active South Cheung Chau Mid Disposal Ground and to the West the now inactive but gazetted Sand Dredging and Mud Disposal Area.	• The identified residual impact is the permanent loss of approximately 16 ha of marine waters including habitat that supports moderate sightings of marine mammals. • Maintenance dredging of specific areas of the approach channel and turning basin is expected to be required once every 4 to 5 years. Although impact to water quality is expected to be compliant with current WQO standards, the works will result in relatively regular disturbance to the low ecological value habitat within the dredged areas. • No adverse residual ecological impacts have been identified. It must also be noted that the marine environment around Black Point has been subject to disturbance in the past as a result of the reclamation at BPPS and sand dredging.
FISHERIES	• Acceptable residual impact is loss of 0.6 ha of seabed used for small-scale fishing operations.	• Residual impact is loss of 16 ha of fishing grounds. Considered acceptable despite relatively large size as production values are low.
LANDSCAPE & VISUAL	• Overall the residual impacts on the Landscape Resources would be slight. • The principal visual change will be for those few viewers who visit the surrounding area and particularly the ocean between South and North Soko. • Land based VSRs will experience negligible to moderate adverse impacts. • VSRs on South Soko and on waters around South Soko will experience significant adverse impacts. However, there are low visitors numbers in this area, and no residents, to experience this impact.	• There will be a residual impact on the Shrubland. However, the impacts on the Landscape Resources will overall be slight-moderate. • LNG terminal only visible from limited viewpoints, including visitors to the remote island of Lung Kwu Chau in the Marine Park and the transient passengers on ferry routes. • Visitors to Lung Kwu Chau may experience a moderate to significant visual impact during clear days. However there are low user numbers to this area. The users of the ferry routes may experience a moderate visual impact. • Potential glare and lighting impacts will be low due to the distances between the site and viewers and careful lighting selection and

ISSUE	SOUTH SOKO	BLACK POINT
	• Potential glare and lighting impacts will be low due to the distances between the site and careful lighting selection and placement. • Overall there will be moderate residual impact on the landscape character of the South Soko Island. • Overall according to *Annex 10* of the *EIAO-TM* the Landscape and Visual impacts are considered to be acceptable with mitigation.	placement. • Residual impact on the landscape character of Black Point headland is overall considered to be slight. • Overall according to *Annex 10* of the *EIAO-TM* the Landscape and Visual impacts are considered to be acceptable with mitigation.
CULTURAL HERITAGE	• Direct loss of archaeological deposits areas Sites A to E. Given the construction of underground utilities making in-situ preservation impossible, as a last resort, an archaeological action plan has been recommended which is a separate document containing the detailed rescue excavation plan, archaeological watching brief plan and contingency plan to preserve impacted archaeological deposits by record. • Impact on the Tai A Chau Tin Hau Temple, 21 graves and the associated tablet and 7 earthshrines is expected. These sites will be relocated with the provision of photographic and cartographic records to preserve them by record prior to their removal. An archaeological survey will be undertaken at the suitable relocation site for the Tai A Chau Tin Hau Temple to confirm if any archaeological deposits will be impacted at the relocation site. If archaeological deposits are identified, appropriate mitigation measures will be implemented to mitigate the impact.	• Loss of two building structures at Terrace 1, a WWII cave at Terrace 2 and a stone structure at Terrace 3 of low cultural resource value. • The loss is considered acceptable provided that a photographic and cartographic recording is undertaken for the sites following AMO's requirements.

ISSUE	SOUTH SOKO	BLACK POINT
HAZARD TO LIFE	• The results of the Marine Quantitative Risk Assessment of the transit of the LNG carrier to South Soko indicated that individual and societal risk levels are acceptable as per the HKSARG risk guidelines presented in *Annex 4* of the *EIAO-TM*. • The results of the Terminal and Pipeline Quantitative Risk Assessments of the LNG terminal at South Soko indicated that individual and societal risk levels comply with the HKSARG risk guidelines presented in *Annex 4* of the *EIAO-TM*. • The location of the South Soko Island provides for very low numbers of surrounding land and marine-based populations with exposure to both the terminal site and the marine transit.	• The results of the Marine Quantitative Risk Assessment of the transit of the LNG carrier to Black Point indicated that individual risk is acceptable and the societal risk is as low as reasonably practicable (ALARP) as set out in HKSARG risk guidelines presented in *Annex 4* of the *EIAO-TM*. • The results of the Terminal Quantitative Risk Assessments of the LNG terminal at Black Point indicated that individual and societal risk levels comply with the HKSARG risk guidelines presented in *Annex 4* of the *EIAO-TM*. • Access to the Black Point site today requires marine transit through busy harbour traffic, and along densely populated areas, of: - Western Hong Kong Island: Ap Lei Chau, Cyberport; - Ma Wan Island and Tsing Ma Bridge; - New Territories: Sham Tseng, Tsing Lung Tau, Gold Coast, Tuen Mun.

4.4 SITE PREFERENCE

CAPCO has identified a preference for the South Soko option for the following reasons:

- South Soko will enable a replacement gas supply 12 to 18 months earlier than the Black Point option;
- South Soko allows an earlier replacement of natural gas supply and can provide flexibility for higher gas off-take depending on certainty of remaining Yacheng gas availability which would result in CAPCO burning less coal, and avoiding the associated emissions;
- South Soko enables CAPCO to meet the Hong Kong SAR Government's emission targets sooner than the Black Point option;
- South Soko requires less land reclamation, while its offshore pipeline to Black Point results in only temporary environmental impacts of short duration;
- The location of South Soko provides for very low numbers of surrounding land and marine-based populations with exposure to both the terminal and the marine transit and all aspects of the marine transit are acceptable from a societal risk standpoint.

4.5 BENEFITS TO THE COMMUNITY THROUGH LNG TERMINAL DEVELOPMENT AT SOUTH SOKO

CAPCO believes that siting the LNG terminal on South Soko Island provides an opportunity to enhance the island's marine and terrestrial environments for the benefit of the community and would support a Soko Islands and Southwest Lantau Marine Park. By assisting government through the provision of initial funding for education and research to support the establishment of the Parks, CAPCO believes it can create the necessary stimulus to bring this conservation area to fruition.

The enhancements envisaged are not intended to address or mitigate the potential impacts of the LNG terminal on South Soko Island as such will be addressed through specific construction practices, mitigation measures and monitoring programs. Rather, the enhancements envisaged are similar to recent local and overseas experience whereby industrial facilitates and conservation areas co-exist within the same area [1,2].

With input from a range of stakeholders including Government, NGOs, local community groups and fishing interests, CAPCO proposes that an Enhancement Plan be developed. This Plan will contain various components as described below and draw on local marine conservation programmes enhanced by overseas experience in the establishment of marine parks and conservation areas. In this regard, CAPCO has commissioned detailed and

extensive marine studies as part of its EIA process, obtaining expert views from well known and highly respected specialists in marine conservation. CAPCO will provide access to those studies as part of any Enhancement Plan.

CAPCO has identified the following key possible enhancements through its discussions with stakeholders and experts:

- **Marine Conservation:** CAPCO understands that the waters around the Soko Islands and Southwest Lantau have the potential to be zoned for the purposes of marine conservation. As discussed in the introduction to this section, CAPCO is prepared, as a stakeholder, to assist government in funding a portion of the initial cost of establishing such a marine conservation area. CAPCO envisages supporting the Authority to consider and decide on the optimal size of and the objectives for the marine conservation area. During and after construction of the LNG terminal, CAPCO will carry out line transect surveys of dolphins and finless porpoises and acoustic studies surveys as part of census and behavioural investigations. These surveys and investigations will assist in ongoing marine conservation efforts and information gathering in respect of these mammals. CAPCO will also undertake studies into the population biology of amphioxus. These surveys will follow accepted protocols for pre, during and post construction phases of the project. The aforementioned behavioural and biological studies would form part of CAPCO's scientific support for the marine park programme.

- **Rehabilitation of Marine Environments:** CAPCO's experts have advised that artificial reefs could be deployed in the area to the west of the North Soko Island formerly used as a sand dredging and marine borrow area, to aid its rehabilitation and encourage fisheries production. CAPCO would fund a study to confirm the suitability of the artificial reef programme and, subject to the results of this study, provide assistance in funding the establishment of the artificial reef proposal.

- **Cultural Heritage:** A portion of the South Soko Island is known to be of archaeological interest. As part of the LNG terminal project, CAPCO will conduct a rescue excavation and watching brief at the impacted archaeological deposit areas prior and during the construction stage respectively. CAPCO suggests that as part of any Enhancement Plan, it assists AMO in placing these artefacts on public display at a suitable location.

- **Public Access:** In order to maintain and improve access for grave visitation, and for fishermen and recreational users of South Soko Island, CAPCO will provide a new public pier and will support programs to maintain the public areas and amenities in a clean and tidy condition. The LNG facility will also bring potable water to South Soko.

- **Education:** CAPCO is willing to potentially support education efforts focusing on cultural heritage, marine and terrestrial ecology conservation

at and around the Soko Islands. Such efforts could include the production of educational materials that relate to the marine conservation areas of Fan Lau and Soko Islands as well as the benefits of clean energy.

- **Recreation:** Recreational use of the Island will be enhanced by the provision of improved public access with the incorporation of rest areas, view points, and bird watching areas near the existing freshwater reservoir.

Figure 4.1 illustrates some of the key attributes of an indicative Enhancement Plan at South Soko Island and Southwest Lantau.

CAPCO is committed to working with the Country Marine Parks Authority, other relevant Government departments and other stakeholders to formulate and then agree, after the EIA process has been completed, on the most appropriate means, funding and time of implementation of an Enhancement Plan for South Soko Island and Southwest Lantau.

(1) AAHK's Aviation Fuel Receiving Facility located in the Lung Kwu Chau and Sha Chau Marine Park, HK

(2) Dominion Cove Point Liquid Natural Gas, LP's LNG terminal operated within the Cove Point Natural Heritage Trust, Chesapeake Bay, Maryland, USA

4.6 OVERALL CONCLUSION

This Environmental Impact Assessment has critically assessed the overall acceptability of the environmental impacts likely to arise as a result of the construction and operation of the proposed LNG terminal in Hong Kong. The EIA has demonstrated the acceptability of any residual impacts from a South Soko LNG Terminal Project and the protection of the population and environmentally sensitive resources. Where appropriate, EM&A mechanisms have been recommended to verify the accuracy of the EIA predictions to ensure the effectiveness of the recommended mitigation measures.

This environmental assessment report has been prepared in full compliance with the requirements of the Study Brief and the EIAO Technical Memorandum. The overall conclusion of the EIA report is that there is a clear need for a LNG terminal located in Hong Kong and that, of all the potential alternatives examined, South Soko is the preferred option. In accordance with the EIAO, CAPCO considers that this EIA provides a suitable basis for the Director of Environmental Protection to consider granting the Environmental Permit to allow the construction and operation of this project at the South Soko Island site.

South West
Lantau
Marine Park

North
Soko

Soko Islands
Marine Park

South
Soko

Rehabilitation - Marine Systems

Possible artificial reefs to enhance fish abundance and diversity

Marine Conservation

Explore designation as a Marine Park utilising data collected during the EIA to re-define boundaries considering operational requirements and marine conservation objectives

Biodiversity

Line transect surveys and behavioural investigations for marine mammals

Legend

- Pier & Relocated Tin Hau Temple
- Natural Heritage Displays
- Existing Reservoir
- Heritage Trail
- Eco Trail
- Previously Proposed Marine Park

Capco

SOUTH SOKO
Fig 4.1 Indicative Enhancement Plan 1 of 2

Landscape Architecture & Urban Design
21 / F Lincoln House
979 Kings Road
Taikoo Place
Island East, Hong Kong

Project No. 0018180
June 2006

ERM
ENVIRONMENTAL RESOURCES MANAGEMENT LTD

Public Access

Existing Pier

Potential Pier

Access will be maintained through a replacement to the existing pier

Cultural Heritage - Display

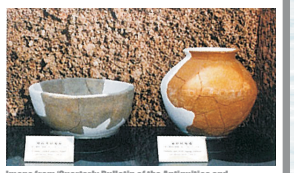
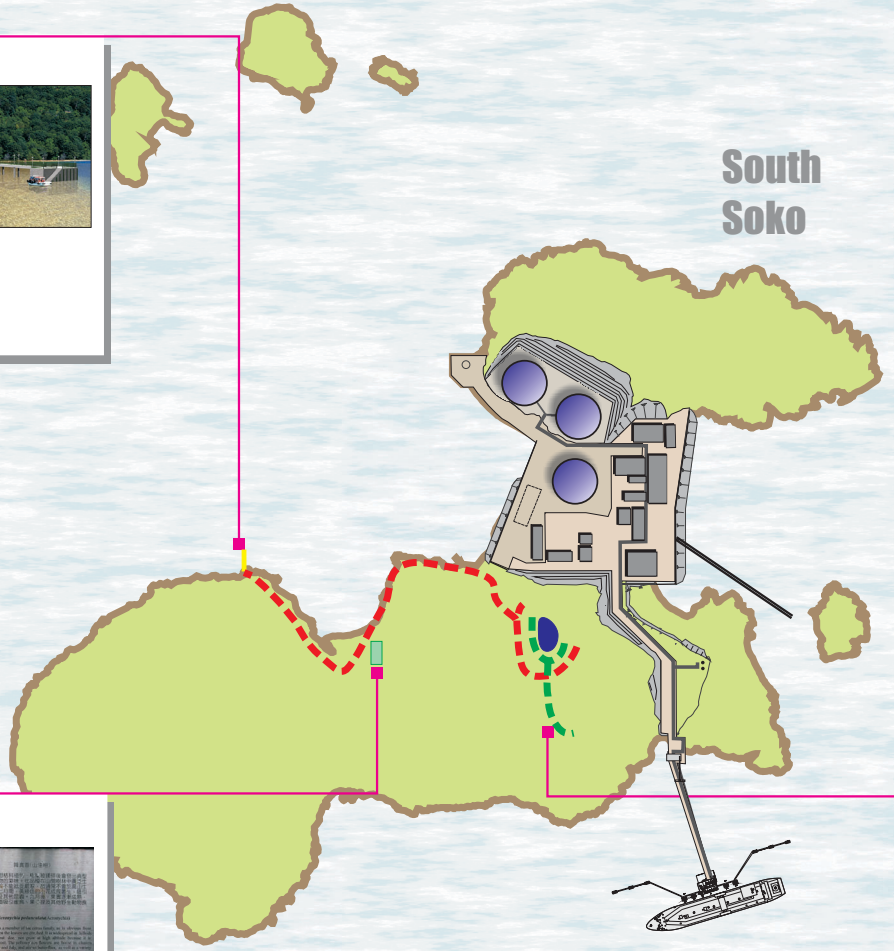


Image from 'Quarterly Bulletin of the Antiquities and Monuments Office, Vol 4 No. 2'

Establish a display of recovered artefacts



Education

Provide facilities to support education efforts on marine and terrestrial ecology and cultural heritage features of Island

Legend

- Pier & Relocated Tin Hau Temple
- Natural Heritage Displays
- Existing Reservoir
- Heritage Trail
- Eco Trail

Recreation

Opportunities for outdoor recreation

Capco

SOUTH SOKO
Fig 4.1 Indicative Enhancement Plan 2 of 2

Landscape Architecture & Urban Design
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Island East, Hong Kong

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June 2006

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