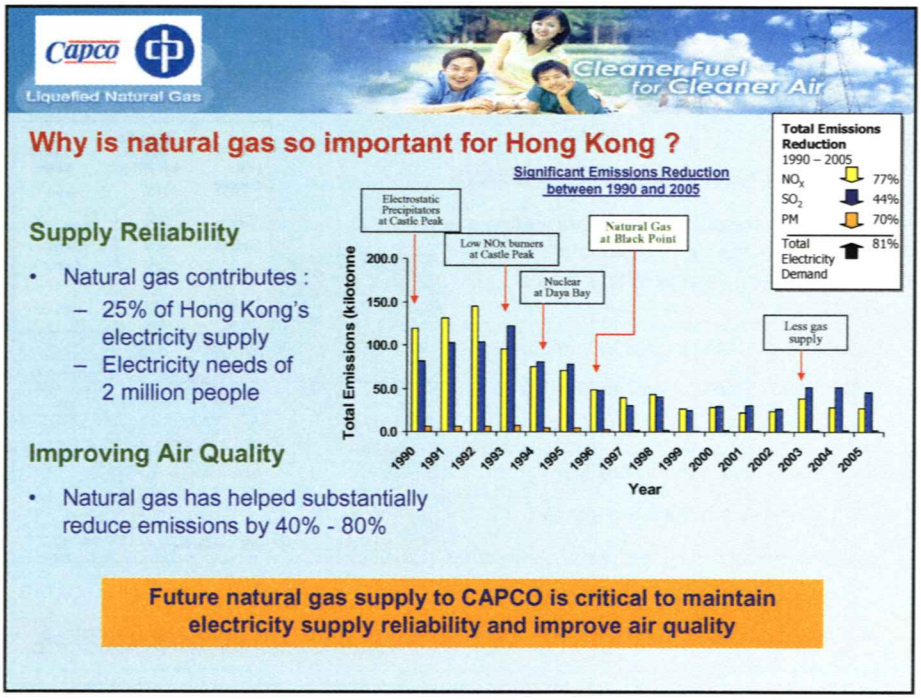
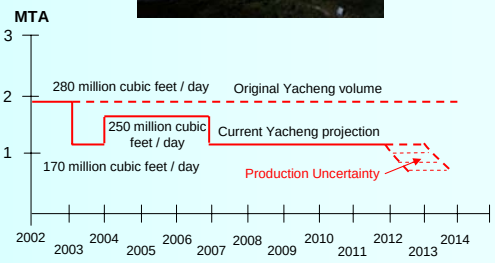
Powerpoint slides presented by CAPCO at the EIASC meeting on 19 January 2007



Capco
Liquefied Natural Gas

Current Gas Supply from Yacheng

- Yacheng gas field has supplied natural gas to Black Point Power Station, one of the largest gas-fired power stations in the world, since 1996
- The large volume of gas required is 8 times that of either HEC or Towngas
- Reserve re-determination in 2002 found the field to have less gas than originally estimated
- The rate of gas consumption has been reduced to ensure a balanced supply electricity generation can be maintained until a replacement gas supply is obtained
- A safe, secure, reliable and robust long-term replacement is urgently needed to refuel Black Point

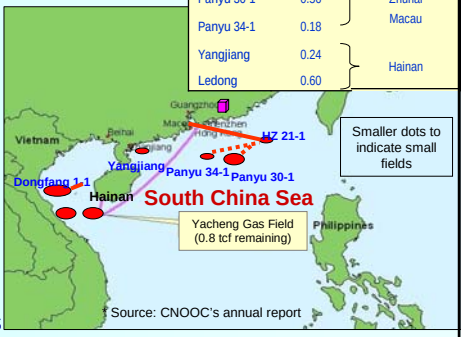


Capco
Liquefied Natural Gas

Pipeline Gas Resources in S. China Not Sufficient to Meet CLP's Needs

- Explored all possible options for pipeline gas supply within the region – none could meet CAPCO's large volume in time frame required
- Assessment made against key criteria
  - Certainty of timely availability
  - Supply security for Hong Kong
  - Adequate volume and flexibility
  - Competitive marketplace supply
  - High environmental and safety standards

Field	Remaining Reserve (end 2005, tcf)	Committed Market
Dongfang 1-1	1.3	Hainan
HZ 21-1	0.08	Zhongshan
Panyu 30-1	0.56	Zhuhai
Panyu 34-1	0.18	Macau
Yangjiang	0.24	Hainan
Ledong	0.60	

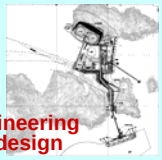


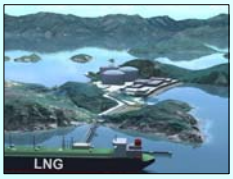
LNG is the only option to meet CAPCO's gas need for power generation

Capco
Liquefied Natural Gas

Advanced Stage of Project Planning

- Planning started in 2003
- Intensive activities over the last 4 years :


Engineering & design

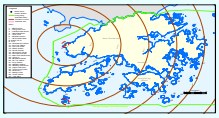


Stakeholders Engagement

EIA study conducted


Gas supply

Site selection



LNG ship

Overseas Experience

Comprehensive project to bring LNG to Hong Kong as early as possible

Capco
Liquefied Natural Gas

Communications Activities
(April to July, 2006)


Launch of revamped LNG website


Energy Forum (I) - Civic Exchange


Island DC visit

Chamber Talks:
- AmCham
- BritCham
- BEC
- Consumer Council
- BPF

Networking meetings


Contributing articles by third parties

Apr | May | June | July



LNG Advertorials in free papers

LNG Slogan Competition

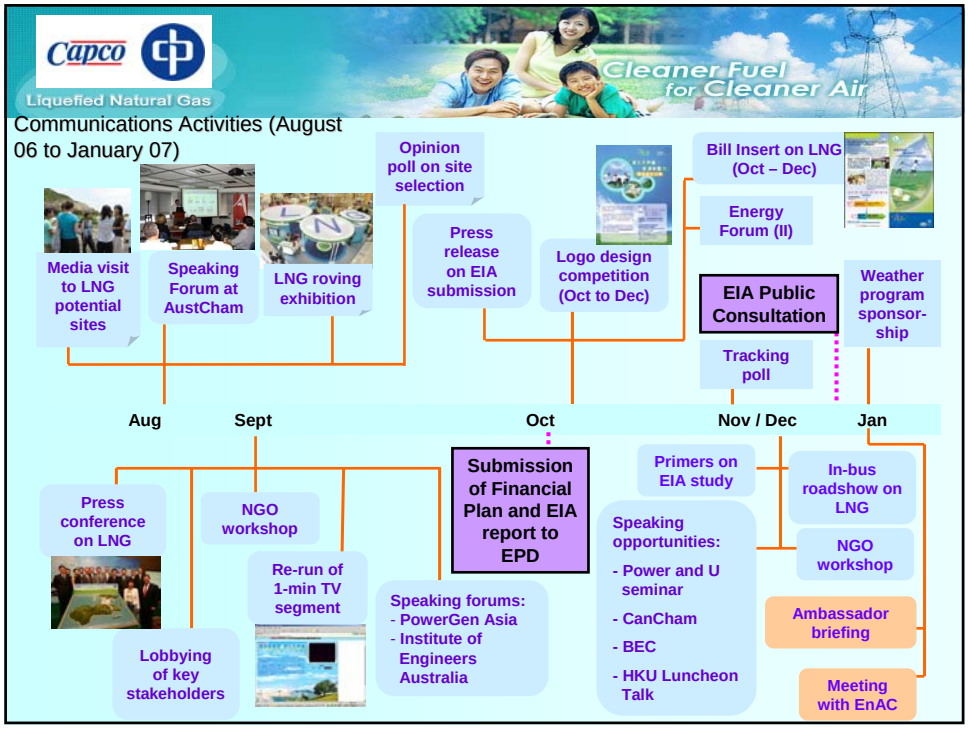

1-min TV segment & on-line game on LNG

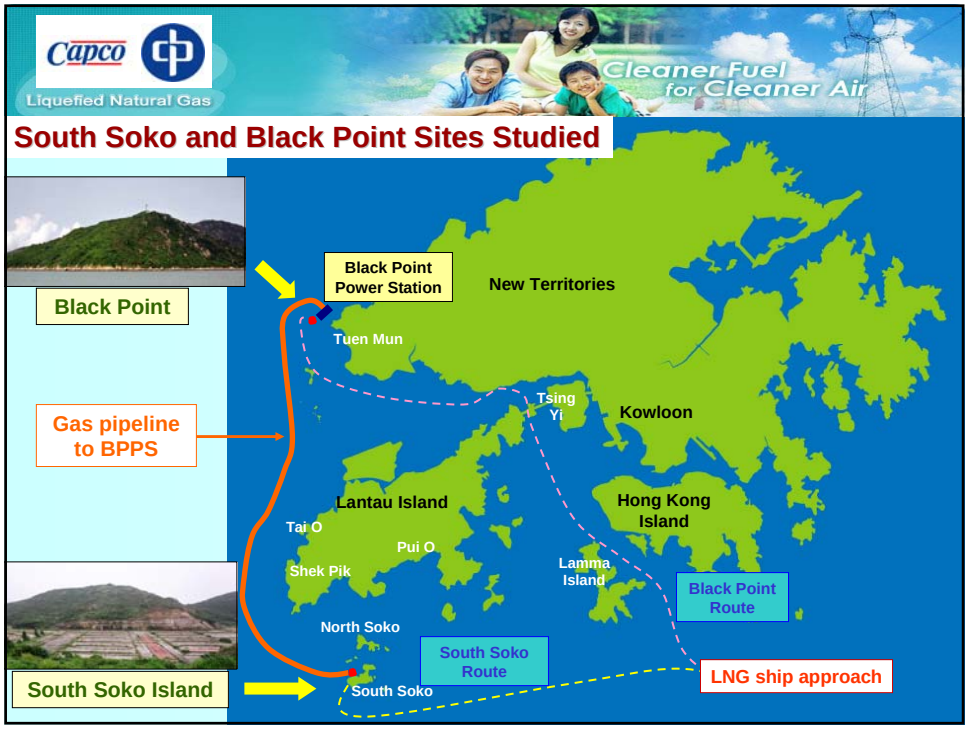

EnAC visit

Media Briefings / interviews

Newsline to customers

BPPS 10th Anniversary celebration & feature stories


Capco
Liquefied Natural Gas
Cleaner Fuel for Cleaner Air
Communications Activities (August 06 to January 07)
Media visit to LNG potential sites
Speaking Forum at AustCham
LNG roving exhibition
Opinion poll on site selection
Press release on EIA submission
Logo design competition (Oct to Dec)
Bill Insert on LNG (Oct – Dec)
Energy Forum (II)
EIA Public Consultation
Weather program sponsor-ship
Tracking poll
Aug
Sept
Oct
Nov / Dec
Jan
Press conference on LNG
NGO workshop
Re-run of 1-min TV segment
Lobbying of key stakeholders
Speaking forums:
- PowerGen Asia
- Institute of Engineers Australia
Submission of Financial Plan and EIA report to EPD
Primers on EIA study
Speaking opportunities:
- Power and U seminar
- CanCham
- BEC
- HKU Luncheon Talk
In-bus roadshow on LNG
NGO workshop
Ambassador briefing
Meeting with EnAC

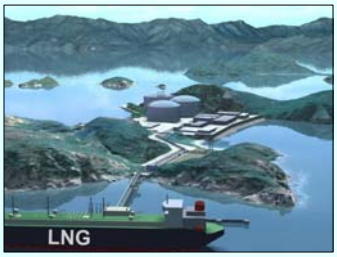

Capco
Liquefied Natural Gas
Cleaner Fuel for Cleaner Air
South Soko and Black Point Sites Studied
Black Point
Gas pipeline to BPPS
South Soko Island
Black Point Power Station
New Territories
Tuen Mun
Tsing Yi
Kowloon
Lantau Island
Tai O
Pui O
Shek Pik
North Soko
South Soko
Lamma Island
Hong Kong Island
Black Point Route
South Soko Route
LNG ship approach

Benefits of South Soko option

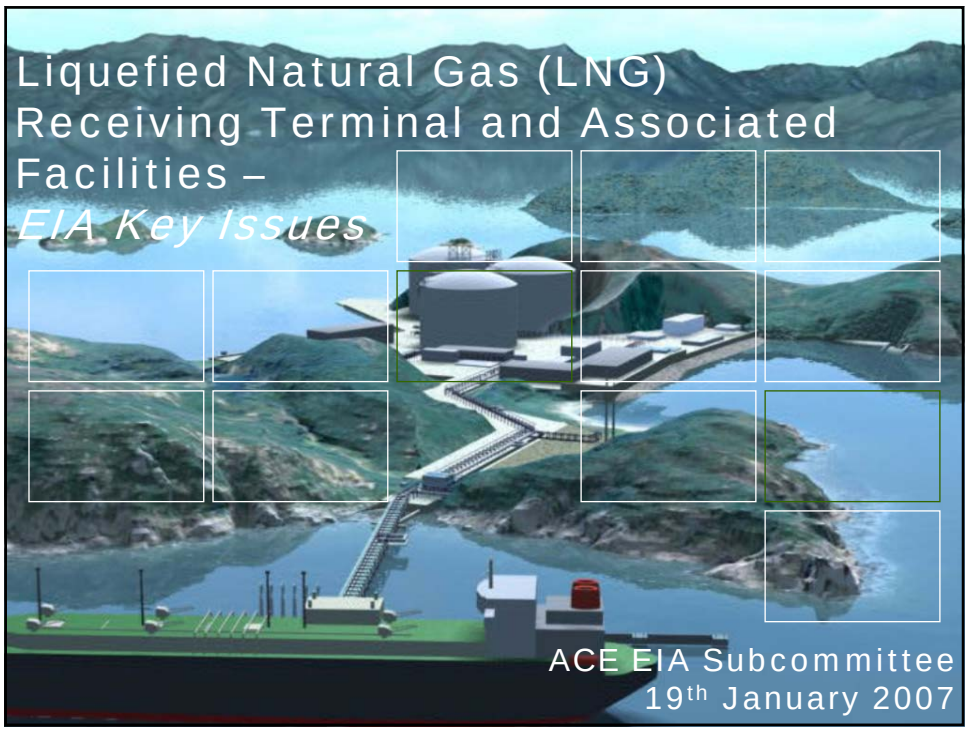
- **Shorter project lead time** – at least one year earlier in completion, meaning the environment benefit can be brought to Hong Kong people more quickly
- **Minimal reclamation** – less than 1 hectare by making use of the concrete platform of the former abandoned detention centre
- **Minimal maintenance dredging** – once every 10 years
- **Minimal risk** – the remote, un-inhabited island is away from busy marine traffic

South Soko option ensures timely completion of the project for continuous gas supply by early next decade

The Project



- **Land Required** : An area of 30 hectares
- **Facilities :**
  - 3 LNG Storage Tanks
  - Vaporizers
  - Marine facilities
  - Auxiliary utilities
- **Project lead time** : 4 years for construction
- **Target Completion Date** : First delivery of LNG in 2011 if timely Government approvals secured



Key Issues Identified in the EIA

- Specialist studies conducted for the EIA
- Development of the Site Layout
- Hazard to Life
- Marine Ecology
- Pipeline

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Engineering studies included

- **Land and marine SI works**
- **Marine geophysical surveys**
- **Engineering design studies:**
  - Site formation, dredging, excavation;
  - Design of process facilities;
  - Jetty studies

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Environmental studies included

- **Archaeological investigations (terrestrial and marine)**
- **Photomontages for LVIA**
- **Computational modelling (water, air, noise)**
- **QRA studies (marine, terminal and pipeline)**

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Ecological studies included

- Marine ecology surveys
- Terrestrial ecology surveys
- Marine mammal surveys
- Fish fry surveys

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Development of a 3D EIA

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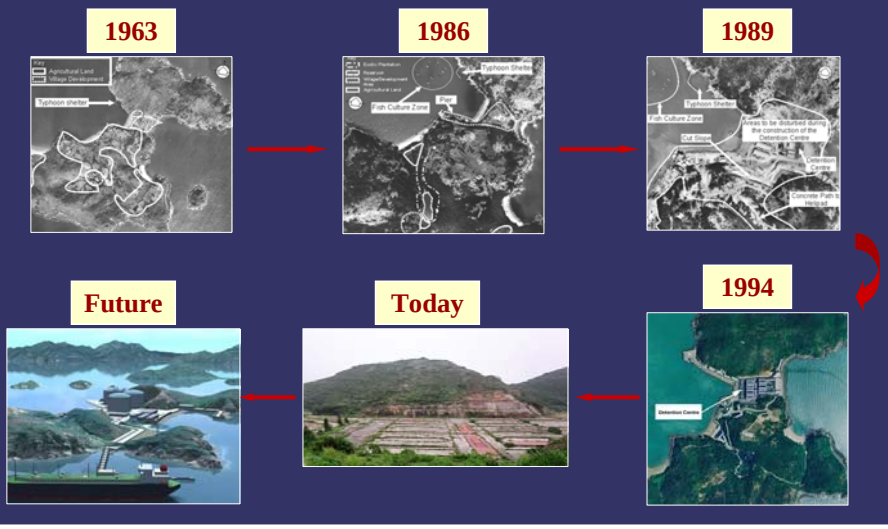
Historical Development of South Soko



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ERM

Development of Site Layout

- **Design Adopted in Pre-EIA Studies**
  - 13 ha of reclamation to accommodate the LNG terminal facilities
  - Total dredging volumes exceeded 4 Mm^3
  - Field work revealed low ecological value of the terrestrial habitats
  - ESMG and NGOs questioned whether less reclamation could be done and more land utilised

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ERM

Development of Site Layout

- **Design Presented in the Project Profile**
  - Reduced reclamation (< 5 ha)
  - Utilised more existing land
  - NGOs and ACE members questioned whether the LNG jetty could be located in the deeper waters to the south of the island to reduce dredging and avoid the waters between the North and South Soko Islands

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Development of Site Layout

- **Design at EIA commencement**
  - Design took into account:
    - Consultations with ACE, Rural Committees, District Councils, NGOs, Fishermen, LegCo members
    - Ongoing process, civil and marine engineering reviews
    - Environmental baseline
  - Reclamation reduced to 1.7 ha
  - Jetty relocated to southeast
  - Dredging reduced to 1.4 Mm^3
  - Positioning of the tanks improves visual impacts

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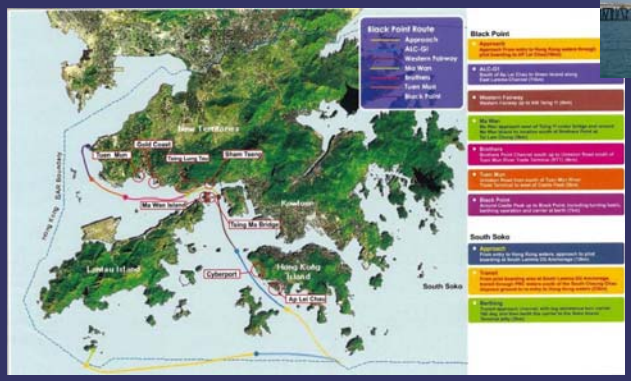
ERM

Development of Site Layout

- **Preferred Scenario**
  - Design took into account:
    - Ongoing process, civil and marine engineering reviews
    - Updated environmental baseline including presence of Amphioxus in Tung Wan
  - Reduction in reclamation to approximately 0.6 ha in Sai Wan and no reclamation in Tung Wan
  - Reduces the magnitude of impacts on the coastal resources of South Soko Island

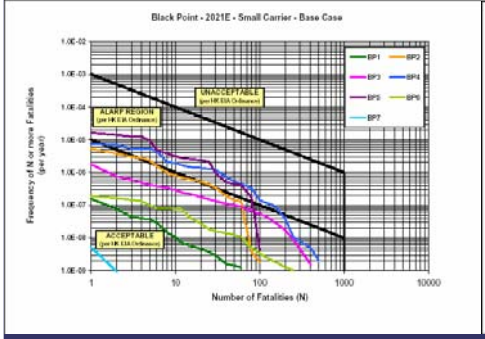
LNG Carrier Route



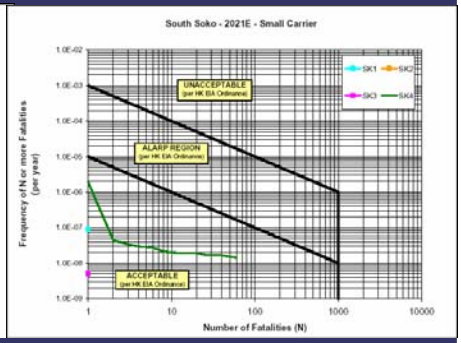
- Land based population along Black Point Route = ~ 1,030,000
- Land based population along South Soko Route = ~ 300

Hazard to Life

Black Point – ALARP



South Soko - Acceptable



- Societal risk of the marine transit to Black Point is As Low As Reasonably Practicable (ALARP) for some areas of the marine transit. Measures to mitigate the risk from ALARP to Acceptable are not considered to be implementable at this time due to their impact on other marine traffic in the busy Hong Kong environment.

Hazard to Life

- **LNG Carrier transit to Soko is Acceptable along entire route**
- **Contrasts with Black Point transit, segments of which are in ALARP due to presence of densely populated areas**
- **Selection of the South Soko site removes the need to transit these areas**
- **South Soko's remoteness provides for very low numbers of surrounding land and marine-based populations for both the terminal and marine transit of the LNG Carrier.**

Marine Ecology

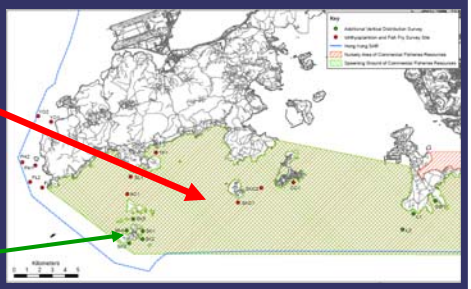
- **Reclamation of 0.6 ha of seabed**
  - Hong Kong is an international leader in environmentally acceptable reclamation
    - Chek Lap Kok Airport (~950 ha)
    - Lamma Extension (22 ha)
  - Proven track-record in reclamation management and mitigation
- **Dredging of 3.89 Mm^3 of marine sediment**
  - Long term history of dredging / disposal management and mitigation
  - Relatively small volumes in comparison to recently approved EIAs e.g.
    - Contaminated Mud Pit 5 = 12 Mm^3
    - Theme Park at Penny's Bay = 46 Mm^3

Marine Ecology

- **Area affected at SSI by dredging = 51 ha**
  - A shrimp trawler in Hong Kong operating for 3 hours will disturb 50 ha of seabed
  - Hong Kong seabed recolonises rapidly and is accustomed to disturbance (trawling, typhoons etc)
- **Maintenance dredging at jetty area (every ~10 years)**
- **Cooled water discharge**
- **Operation phase impacts are not expected as cooled water discharge disperses to meet guidelines within 200m of outfall point**

Fisheries Spawning Grounds and Nursery Areas

- **Baseline surveys of S Lantau Spawning and Nursery Areas conducted from July 05 through March 06**
- **LNG terminal will require approximately 0.6 ha of reclaimed land at South Soko**



- **Equal to < 0.003% of the total spawning ground / nursery areas (22,000 ha) in south Lantau**
- **A short section (< 3 km) of the pipeline is also located within the identified fisheries spawning ground in south Lantau but will not pass through such areas in north Lantau**

Fisheries Impacts

- **Construction**
  - Impacts from construction works not predicted to be adverse as a result of the employment of controlled working rates
  - Loss of ~ 0.6 ha of marine waters is relatively small in context of surrounding fisheries areas
- **Operation**
  - Operation phase impacts are not expected to occur as the area affected by the cooled water discharge is within 200m of outfall
- **No unacceptable adverse residual impacts**

Pipeline to Black Point

- **Eighth submarine pipeline to be installed in Hong Kong waters**

Pipeline	Date	Length	Passes through / close to Sensitive Habitat				
			Marine Reserve	Marine Park	CWD	FP	Corals
Towngas Shenzhen - Tai Po	2005	~45km		Yes			Yes
Towngas Tai Lam - Lantau	1996	~5km			Yes		
HEC Shenzhen - Lamma	2005	~90km	Yes	Yes		Yes	Yes
AAHK PAFF - Sha Chau	2006/7	~8km		Yes	Yes		
AAHK Sha Chau - Airport	1996	~10km		Yes	Yes		
CNOOC Yacheng-Black Point in PRD	1995	~75km		Yes	Yes	Yes	

- **Proven track-record in installation management and mitigation**

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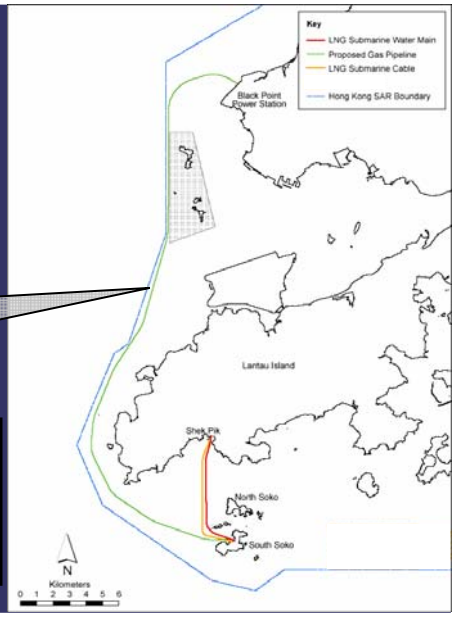
Marine Ecology - Monitoring / Mitigation Measures at South Soko

No dredging works for the submarine gas pipeline during the peak calving season of the Chinese White Dolphin from March through August; restricted to a daily maximum of 12 hours with daylight operations (aside from in the Urmston road)

Exclusion zone (250 m) during dredging works for the construction phase

Long-term monitoring for the distribution and abundance of dolphins and porpoises during the construction and post-construction phase. A pre-construction period of dolphin monitoring will also be conducted



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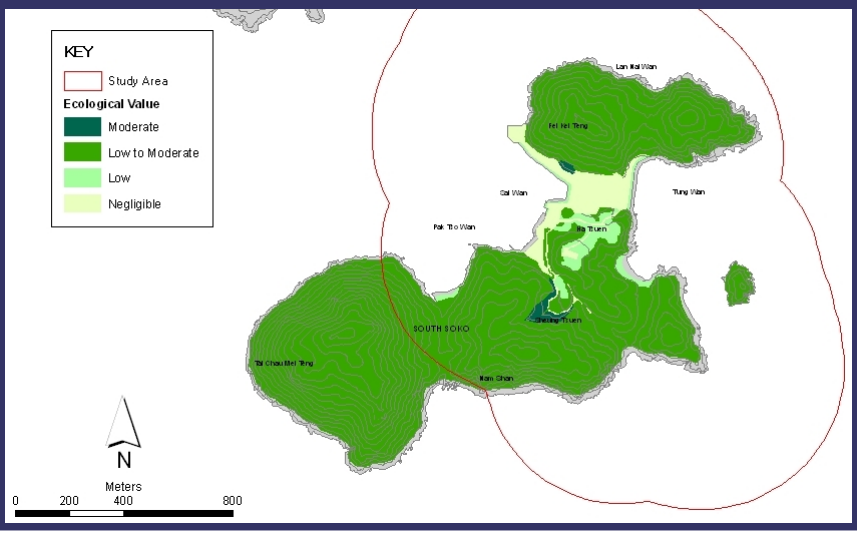
Benefits of LNG Terminal at South Soko

- South Soko will enable replacement gas supply 12-18 months earlier than Black Point
- South Soko enables CAPCO to meet the HKSAR emission targets sooner than Black Point
- South Soko requires less reclamation than Black Point
- South Soko remoteness provides for very low numbers of surrounding land and marine-based populations for both terminal and marine transit of the LNG Carrier
- Siting at South Soko provides an opportunity to enhance the island's terrestrial & marine environments
- CAPCO has identified key potential enhancements to the island and will work with Government and stakeholders to further develop the plan

end

Habitats on South Soko



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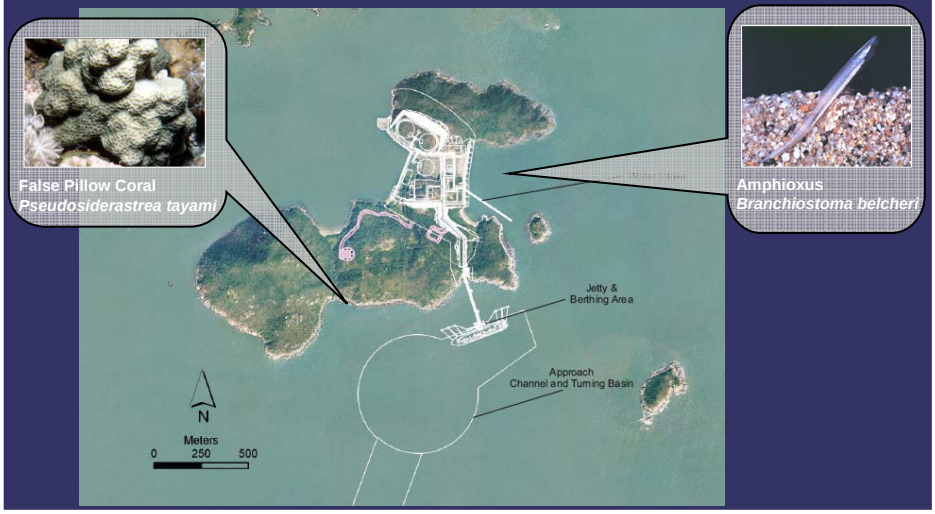
Marine Ecology - Baseline



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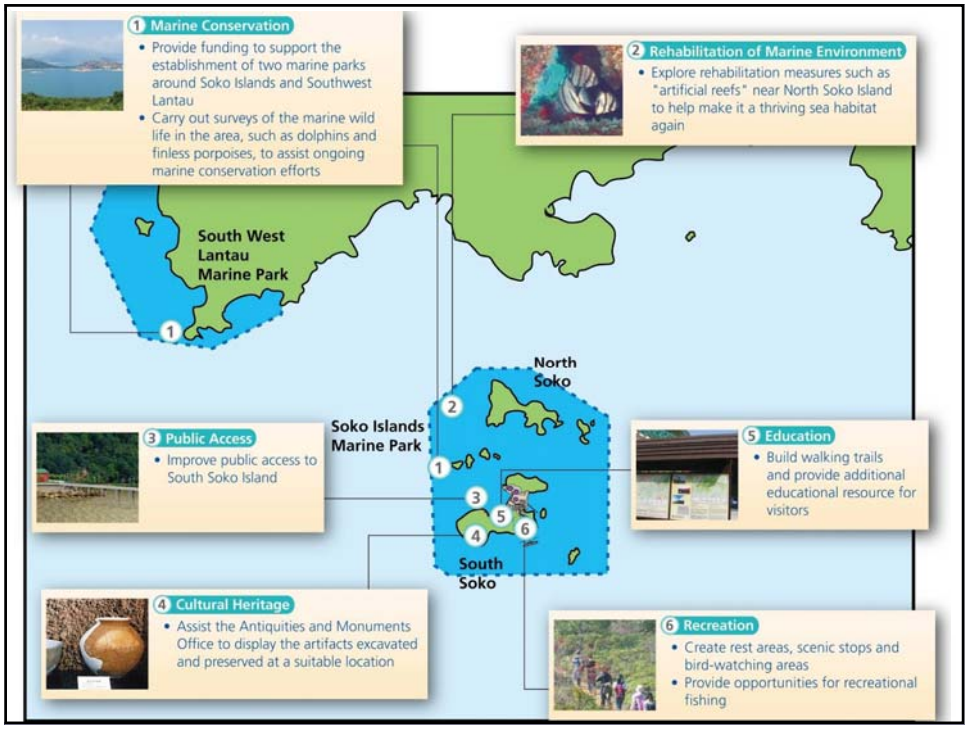
1 Marine Conservation
• Provide funding to support the establishment of two marine parks around Soko Islands and Southwest Lantau
• Carry out surveys of the marine wild life in the area, such as dolphins and finless porpoises, to assist ongoing marine conservation efforts
2 Rehabilitation of Marine Environment
• Explore rehabilitation measures such as "artificial reefs" near North Soko Island to help make it a thriving sea habitat again
South West Lantau Marine Park
North Soko
Soko Islands Marine Park
South Soko
3 Public Access
• Improve public access to South Soko Island
5 Education
• Build walking trails and provide additional educational resource for visitors
4 Cultural Heritage
• Assist the Antiquities and Monuments Office to display the artifacts excavated and preserved at a suitable location
6 Recreation
• Create rest areas, scenic stops and bird-watching areas
• Provide opportunities for recreational fishing

Terminal Outside of Hong Kong

- Locations suggested including Macau or Huangmao island
- Pipeline for either would pass through dolphin habitat
- Additional sensitive areas present
- Site requirements would remain
- Water depth constraints present the further in the PRD
- Bottom line – offers no distinct environmental advantages over a HK terminal

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Why Coastal Location in Hong Kong

- Site Selection undertaken using approach **consistent with other similar studies** undertaken under the EIAO in Hong Kong
- Entire area of Hong Kong, both land mass and water body, was reviewed for suitability based on ***general site requirements for an LNG Terminal***
- Key requirements were:
  - *30ha of land (existing or able to create) to locate terminal infrastructure*
  - *Approach channel, turning basin and berth depth of -15mPD*
  - *Pipeline to Black Point Power Station*

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Tonggu Waterway – HK version

- **Tonggu Channel Project was proposed 14 May 2003, rejected by EPD on 24 March 2005**
- **Roughly 20% of the dredging was proposed for Hong Kong waters**
- **The EIA was rejected for many reasons, but most notably:**

"…the Project will likely affect substantially the marine environment including the Chinese White Dolphin and other marine life, thus putting them under high ecological risk when the project is being constructed and in operation."

	Length km	Width m	Depth m	Dredged Volume million m3	Operation Date
Phase 1	18	200	-13.5	32.8	2003
Phase 2	18.6	215	-15.7	48.5	2008
Phase 3	19.2	455	-17	102.4	If necessary

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Tonggu Waterway – Present version

- **New alignment proposed**
- **Unidirectional channel**
- **Majority of route falls within the core area of the Pearl River Estuary Chinese White Dolphin Nature Reserve**
  - Any "destructive activities" are prohibited in this area
  - Area is governed by a Protected Area Management Board

The New Tonggu Channel		
Length	20	km
Width	210	m
Depth	15.8	m
Dredged volume	50	million m^3
Maintenance Dredging	2.6	million m^3/yr
Completion	2007	

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Tonggu Waterway – LNG Carrier transit

- 250m minimum channel width required based on PIANC guidelines; bidirectional (400m) preferred
- Would result in incremental construction dredging of 10 Mm^3
- Would result in incremental annual maintenance dredging of 0.5 Mm^3/yr
- Concern regarding incremental impacts to Chinese White Dolphins if this option was pursued

Dredging Volumes

- **Black Point w/ Tonggu = 13.15 Mm^3**
- **South Soko = 3.89 Mm^3**

(Soko gas pipeline dredged volume = 2.06 Mm^3)

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Longlist Site Selection

- **Phase I – Longlisting of Viable Sites**
  - Task 1 Definition of Necessary Characteristics/ Features of the Required Site
  - Task 2 Environmental Constraint Mapping
  - Task 3 Physical & Social Constraint Mapping
  - Task 4 Identification of Longlist of Viable Sites

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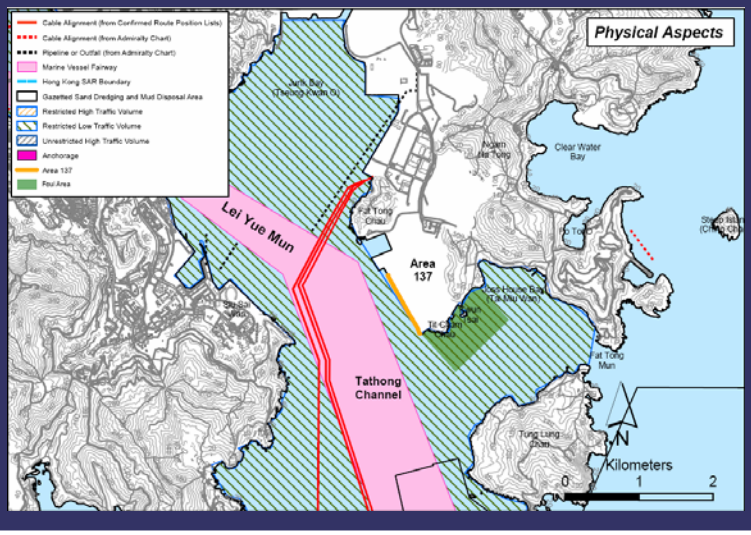
ERM

Area 137



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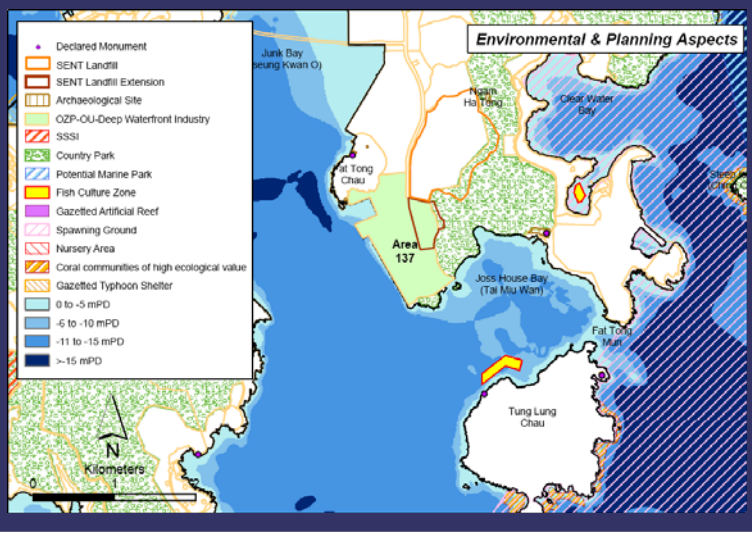
ERM

Area 137



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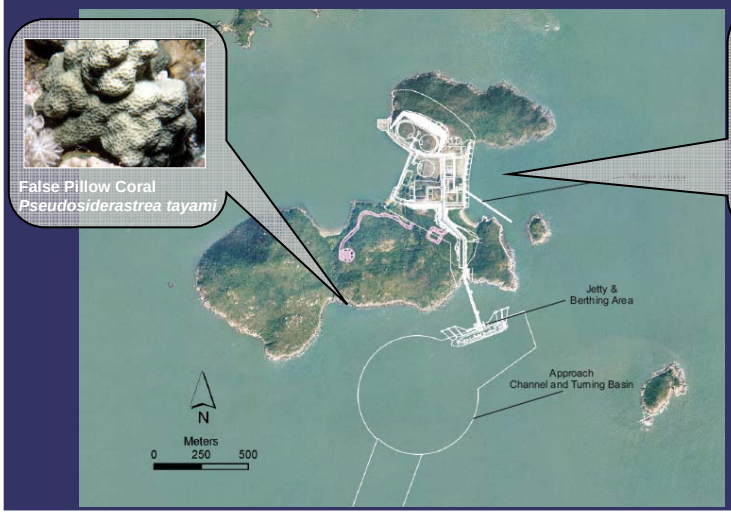
Area 137 - Advantages

- Area 137 has been zoned in the OZP for uses compatible with Deep Waterfront Industry.
- Little to no dredging would be required to access the site.
- The absence of key sensitive terrestrial, coastal and marine habitat due to the recent artificial nature of the site. The construction and operation of the site would not lead to the direct loss of important habitats. Furthermore, based on existing data sets on marine mammals distribution in HKSAR waters, neither Indo-Pacific Humpback dolphins (*Sousa chinensis*), nor Finless Porpoises (*Neophocaena phocaenoides*) have been recorded in the immediate vicinity of the site.

Area 137 - Disadvantages

- The approach channel, turning basin and jetty will have to be located on the western limit of the site and in close proximity to the Tathong Shipping Channel, which may disrupt operations transit.
- The location of the jetty exposes moored LNG carriers and the jetty to potential collisions with passing ships. An MQRA will be required. The necessary safety zone would not be permitted in Hong Kong.
- The area is visually exposed to densely populated residential areas. Siu Sai Wan which is located less than 2 km away. The site's visibility to major urban districts will lead to a high level of public interests and impacts to perceived safety of the local population.
- Require a pipeline of > 80 km. The route is highly constrained by submarine cables. Once passed the Soko Islands, the pipeline route is largely unconstrained.

Marine Ecology - Baseline



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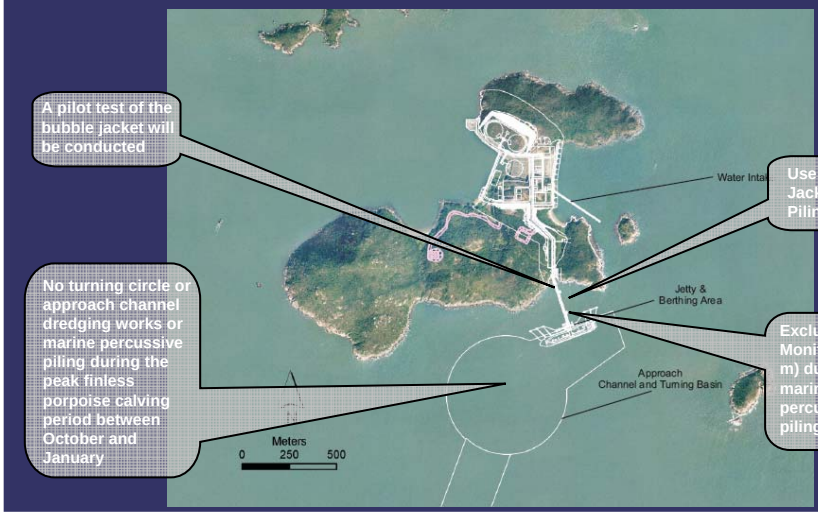
Page 1

ERM

Marine Ecology - Mitigation / Additional Measures at South Soko



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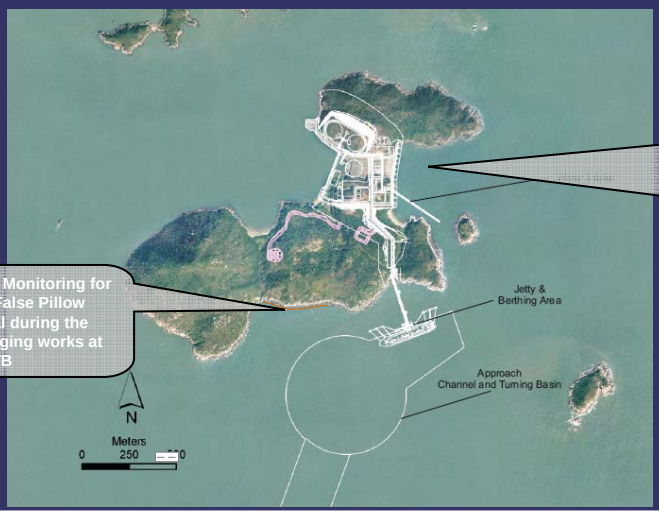
Page 2

ERM

Marine Ecology - Monitoring at South Soko



Pre-and Post-construction surveys of Amphioxus within Tung Wan to confirm the presence/absence of this species in the benthic sediments

Dive Monitoring for the False Pillow Coral during the dredging works at AP/TB

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Page 3

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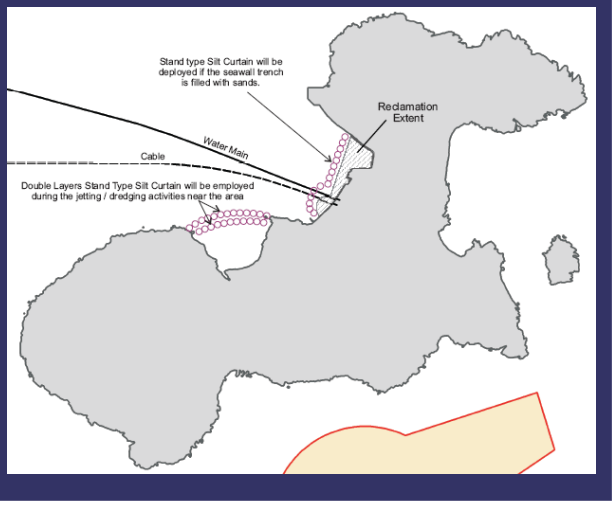
Silt Curtain – Pak Tso Wan

- **Silt Curtains:** Should plumes of muddy water occur, an additional measure to stop them spreading is the installation of silt curtains. These act as mesh-like walls within the water column and trap sediment to prevent it spreading beyond the works area.



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Page 4

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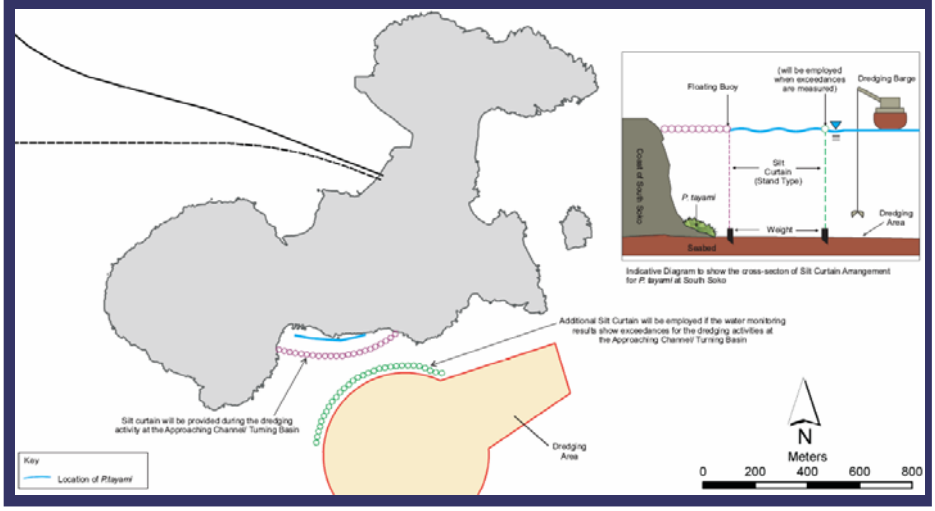
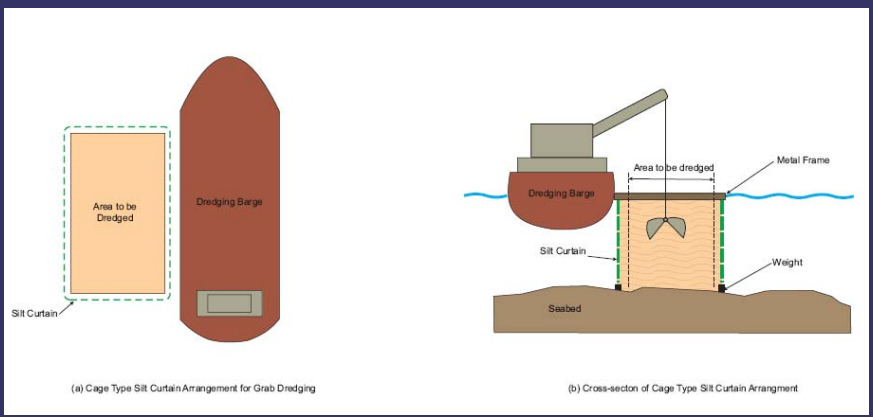
Silt Curtain – False Pillow Coral



Silt Curtain – Grab Dredger

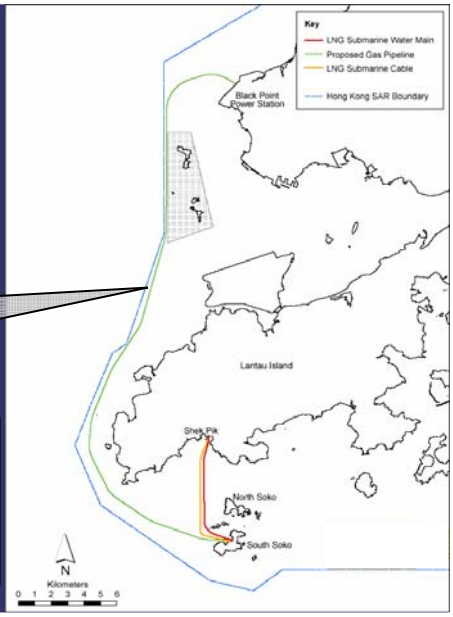


Marine Ecology - Monitoring / Mitigation Measures at South Soko

No dredging works for the submarine gas pipeline during the peak calving season of the Chinese White Dolphin from March through August; restricted to a daily maximum of 12 hours with daylight operations (aside from in the Urmston road)

Exclusion zone (250 m) during dredging works for the construction phase

Long-term monitoring for the distribution and abundance of dolphins and porpoises during the construction and post-construction phase.
A pre-construction period of dolphin monitoring will also be conducted



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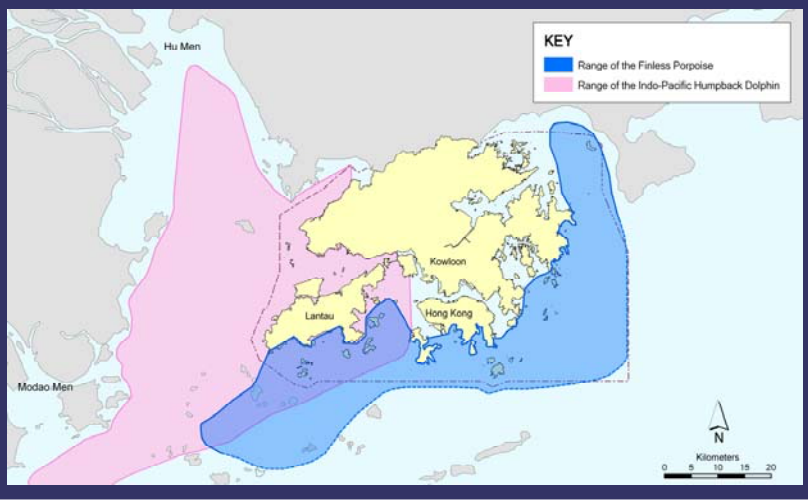
Chinese White Dolphin (pink) and Finless Porpoise (blue) distribution of sightings in Hong Kong and adjacent waters, 1996-2005



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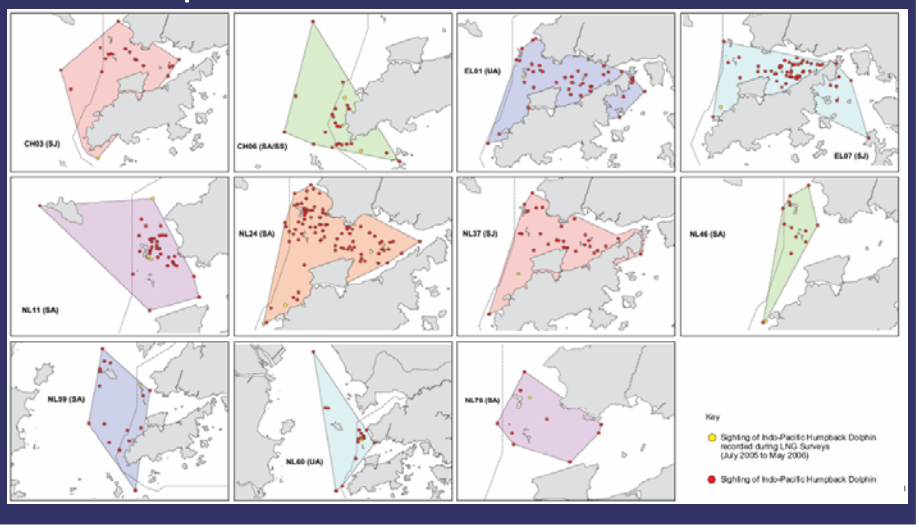
Known Ranging Patterns of Individual Chinese White Dolphins



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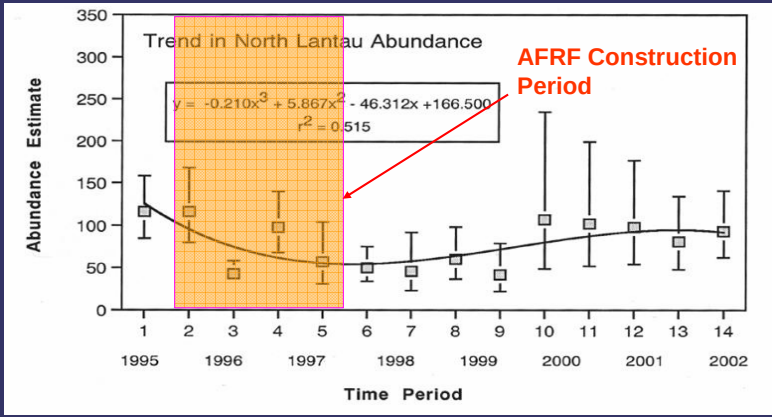
Abundance Trends of Chinese White Dolphins Relative to AFRF Construction



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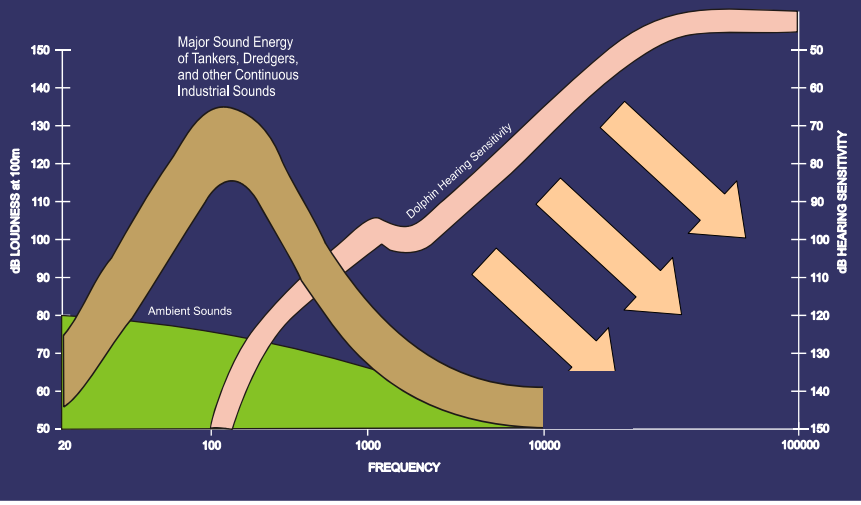
A Comparison of Industrial Sounds and Hearing Ability of Dolphins and Porpoises



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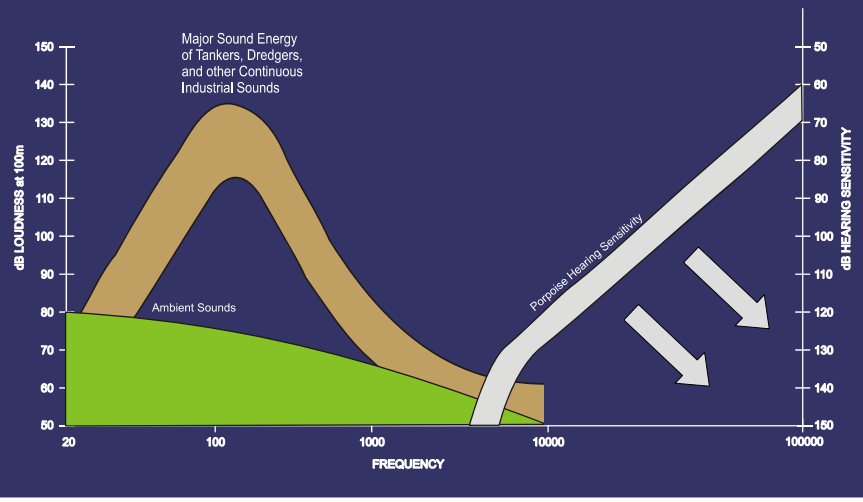

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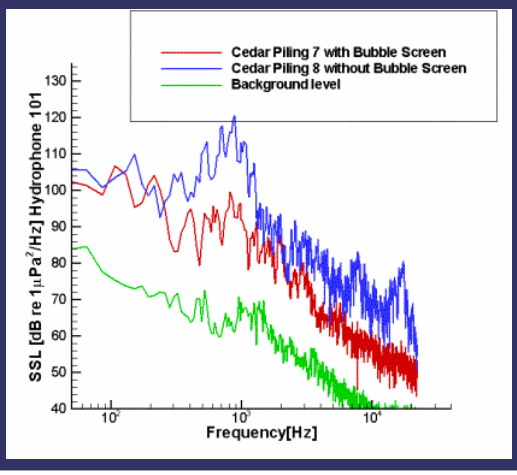
Example of pile driving intensity with and without bubble screening, measurements at 100m (From Vagle 2003)



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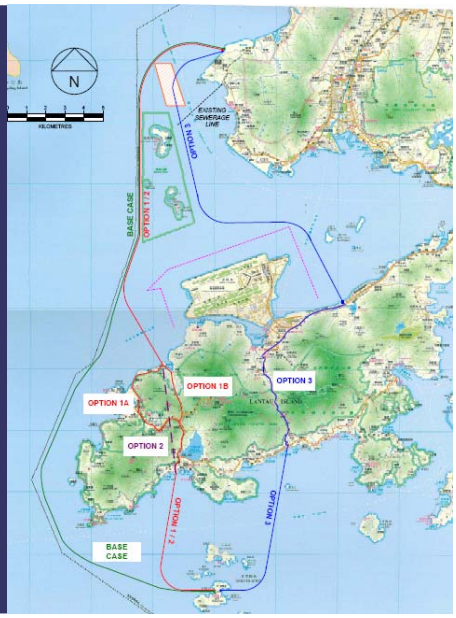
Pipeline to Black Point

- **Four alternatives examined in the EIA:**
  - Base Case - marine
  - Options 1 and 3 – overland by road plus marine
  - Option 2 - tunnel through Lantau plus marine
- **General agreement that Option 1 and 3 are not viable**
- **EIA concludes marine route is best environmental option**



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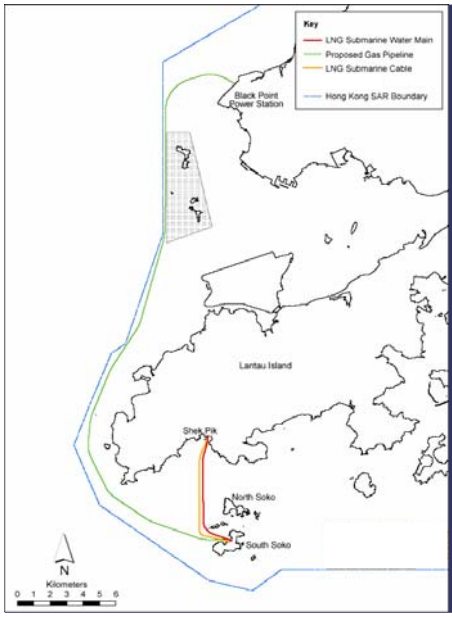
Page 1

ERM



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Page 2

ERM

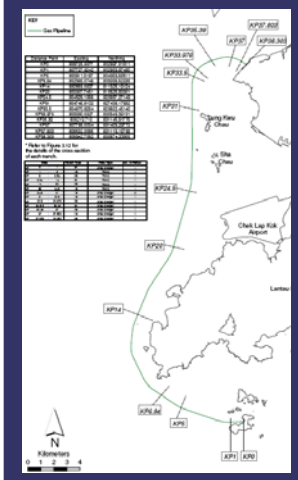
Pipeline to Black Point

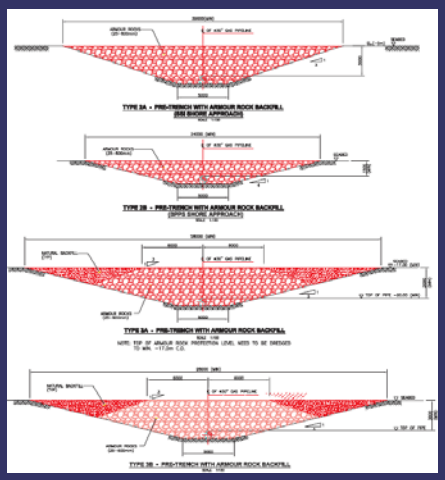
- **Tunnel:**
  - Two reclamations (3 ha) – none for marine – that may require decommissioning
  - Two additional areas of natural coastline impacts – none in marine
  - Four dredged approaches – two in marine
  - Additional land based construction impacts on air, noise, landscape, visual, terrestrial ecology and heritage SRs
  - Potential ventilation and access roads required for tunnel in Lantau – none required for marine
  - Tunnel route avoids ~ 10 km marine waters

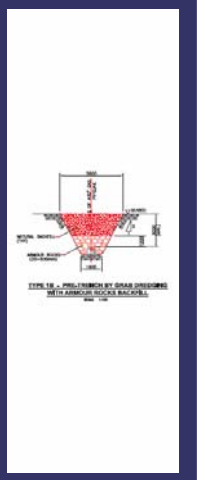
Pipeline to Black Point

- **Marine option:**
  - Monitored exclusion zone around the works
  - No night time dredging
  - No dredging during calving season of Chinese White Dolphin
  - EM&A for water quality impacts
- **Marine route preferred due to short term nature of impacts**
- **Tunnel route introduces longer term impacts to a wider range of sensitive receivers**

Pipeline Design







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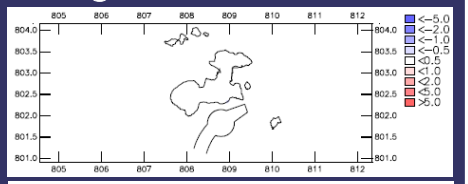
Cooling Water Discharge

- **Dry Season**
- Maximum reduction in temperature below ambient conditions
- Discharge temp = -12.5 °C below ambient

Surface



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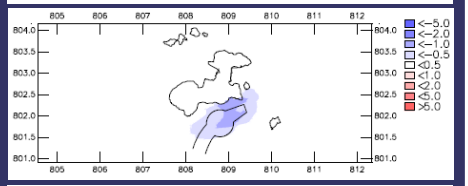

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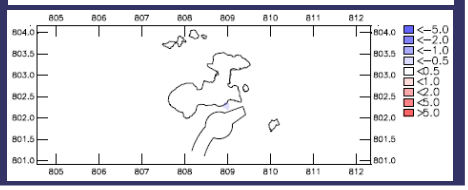

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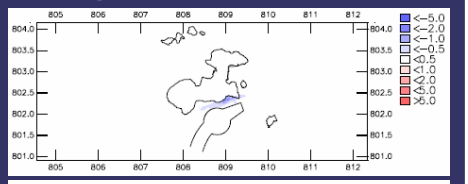
Cooling Water Discharge

- **Wet Season**
- Maximum reduction in temperature below ambient conditions
- Discharge temp = -12.5 °C below ambient

Surface



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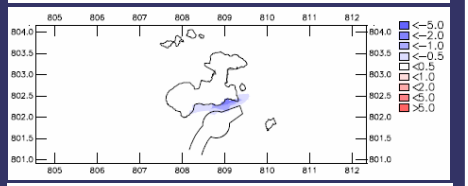

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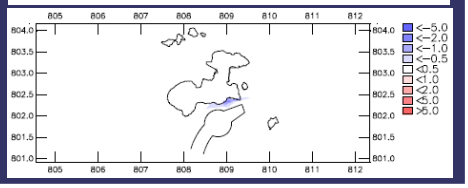

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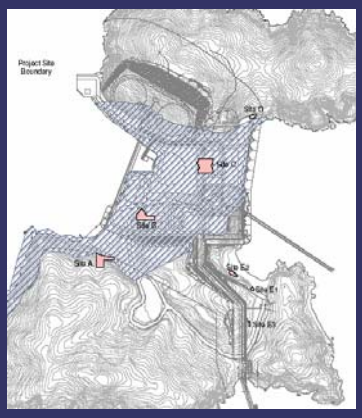
Marine Disposal of Contaminated Mud

- Marine sediments requiring Type 2 – Confined Marine Disposal (0.6 Mm3)
- At present, East of Sha Chau Mud Pits are designated for confined marine sediment disposal. Due to the size of these existing pits, it is noted that the capacity may not be available at the time of the disposal
- In view of such a situation, an alternative site for confined marine sediment disposal would be identified in discussion with the Marine Fill Committee and the Environmental Protection Department

Cultural Heritage

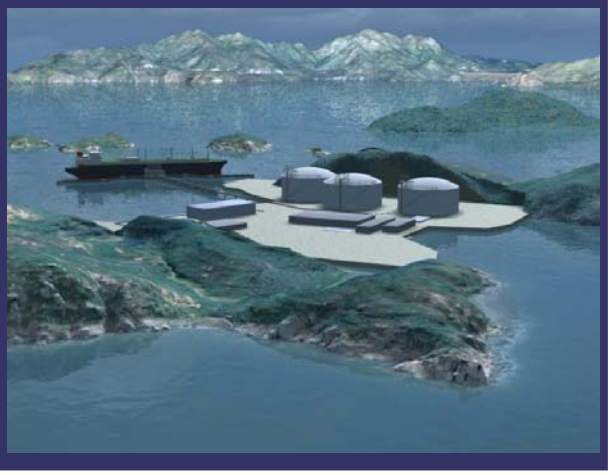
- **South Soko – detailed surveys conducted**
  - Areas identified and delineated of archaeological potential at South Soko
  - Design focus on avoidance but some artefact removal will be necessary in highlighted areas
  - Rescue excavation to be conducted in consultation and with involvement of AMO as per AAB practice



- Marine archaeological investigations confirm low archaeological potential of project site

Reduction in Landscape Character Impact - Design

- **Reclamation of ~ 13 ha**
- **Tanks prominent in centre of Island**



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Reduction in Landscape Character Impact - Design

- **Reclamation of ~ 0.6 ha**
- **Tanks tucked into hillside for screening**
- **Scale of development much reduced**

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Landscape Character Impact – Mitigation

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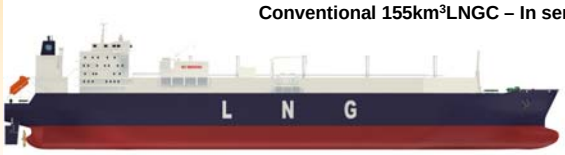
Size Comparison Membrane Type LNGC

90,000m3 LNGC
Cargo Capacity = 90,000 m^3
Length = 248 m
Breadth = 37 m
Depth = 23 m
Draft = 11.1 m
Dwt = 49,000 MT

Small 90km3 LNGC (nominal only not in service or under construction)

155,000 m^3 LNGC
Cargo Capacity = 155000 m^3
Length = 280 m
Breadth = 46 m
Depth = 25 m
Draft = 11.6 m
Dwt = 72,000 MT

Conventional 155km^{3}LNGC – In service



215,000 m^3 LNGC
Cargo Capacity = 215,000 m^3
Length = 315 m
Breadth = 50 m
Depth = 27 m
Draft = 12 m
Dwt = 106,000 MT

Large 215km^3 LNGC – Under construction for delivery 2007

- Ship Dimensions do not increase in a linear fashion in relations to the increase in capacity