



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

Additional Gas-fired Generation Units Project

Executive Summary

April 2016

Environmental Resources Management

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CLP Power Hong Kong Limited (CLP) and Castle Peak Power Company Limited (CAPCO) are responsible for providing a safe, highly reliable and clean supply of electricity to over 80% of Hong Kong's population at reasonable cost. Within Hong Kong, CLP operates three power stations, namely the Castle Peak Power Station (CPPS), Black Point Power Station (BPPS) and Penny's Bay Power Station (PBPS), all owned by CAPCO, a joint venture between CLP and China Southern Power Grid Company Limited, in which CLP holds a 70% interest.

CLP and CAPCO support the HKSAR Government's objective of improving air quality and environmental performance in Hong Kong. Consistent with the HKSAR Government's medium-term strategy of increasing the use of natural gas for local power generation, and reducing carbon intensity of local electricity generation, provision for additional local gas-fired generation capacity is considered by CLP and CAPCO to be the preferred choice. This also provides sufficient generation capacity to meet load demand which is vital to a reliable electricity supply, helps maintain appropriate reserve margins to cater for unplanned outages, and prepare for gradual retirement of existing coal-fired generation units in CPPS.

The purpose of CAPCO's current proposal is to consider the installation of up to two additional gas-fired generation units in phases at the BPPS (hereafter referred to as "the Project"). The proposed additional gas-fired generation unit(s) will adopt combined cycle gas turbine (CCGT) configuration using natural gas as the primary fuel. Such configuration is aimed at reducing emissions as compared with coal-fired generation, thereby providing a relatively clean source of electricity for Hong Kong. When the additional CCGT unit(s) are commissioned, they will be operated as a priority plant and topped up by BPPS and CPPS plants to meet the future electricity generation demand. The sent-out from the additional CCGT unit(s) will normally displace the sent-out from the existing CAPCO generation units of CPPS and BPPS. In this circumstance the implementation of additional CCGT unit(s) would allow for a reduction in the total quantities of air pollutants emitted from CAPCO power generation system (up to 19% reduction in NO_x emissions for one additional CCGT unit scenarios and up to 33% reduction in NO_x emissions for two additional units scenarios assessed in this Environmental Impact Assessment (EIA) study). The implementation of this Project is therefore a critical step for supporting long term air quality improvement in Hong Kong.

The submission of and content described in this *EIA Report* does not amount to a commitment by or on behalf of CLP and/or CAPCO to proceed with the Project.

1.2

PURPOSE & NATURE OF PROJECT

The scope of the Project involves the construction and operation of up to two 600 MW class additional gas-fired generation units in phases at the BPPS to both increase local gas-fired electricity generating capacity and accommodate growth in electricity demand.

The following elements of the Project are classified as Designated Projects under the *Environmental Impact Assessment Ordinance (EIAO)* (Cap. 499):

- Installation of additional gas-fired generation unit(s) in phases at the BPPS (Schedule 2, Part I, Item D.1 - Public utility electricity power plant); and
- If a second unit is to be installed, a dredging operation less than 100 m from the existing BPPS seawater intake location would be required (Schedule 2, Part I, Item C.12(b) - A dredging operation which is less than 100 m from a seawater intake point).

1.3

PURPOSE AND OBJECTIVES OF THE EIA STUDY

This *EIA Report* is prepared by ERM-Hong Kong, Ltd (ERM) for CLP in accordance with the *EIA Study Brief No. ESB-286/2015* ("the *EIA Study Brief*"), issued in June 2015, and the *Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM)*.

The purpose of this *EIA Study* is to provide information on the nature and extent of environmental impacts arising from the construction and operation of the Project and associated works that will take place concurrently in accordance with the requirements described in the *EIA Study Brief*. This information will contribute to decisions by the Director of Environmental Protection on:

- The overall acceptability of any adverse environmental consequences that are likely to arise as a result of the Project;
- The conditions and requirements for the detailed design, construction and operation of the Project to mitigate against adverse environmental consequences wherever practicable; and
- The acceptability of residual impacts (if any) after the proposed mitigation measures are implemented.

The detailed requirements of the *EIA Study* are set out in *Clause 3* of the *EIA Study Brief*. As specified in the *EIA Study Brief*, the *EIA Study* has addressed the key environmental issues associated with the construction and operation of the Project.

2 **OBJECTIVES AND BENEFITS OF THE PROJECT AND CONSIDERATION OF ALTERNATIVES**

2.1 **OBJECTIVES AND BENEFITS OF THE PROJECT**

The objectives, needs and benefits of the Project are considered in detail in the EIA Study and are summarised as follows:

- *Supporting Government's Objective of Improving Air Quality:* Revamping the fuel mix for power generation is the only practicable way to significantly reduce air emissions from power companies in the short to medium term future. Following a public consultation the Government has set a policy direction to increase the proportion of natural gas-fired electricity generation in Hong Kong. The Government has also envisaged that a small number of additional gas units would need to be built in order to increase the use of natural gas. This project is therefore proposed to support Government towards meeting such additional gas-fired electricity generation capacity needs.
- *Meeting Increasing Electricity Demand and Maintaining Adequate Reserve Margin:* Despite CLP putting increasing effort on demand side management, the latest outlook for economic and population growth as well as infrastructure development in Kowloon and New Territories means that CLP's system demand is anticipated to grow gradually. The current reserve capacity will reduce further if no additional electricity generation capacity is installed to meet future demand growth. Having a reserve capacity is particularly important to Hong Kong because of the very high economic and social costs of any general system failure. Hence, provision of additional electricity generating unit(s) to increase the electricity generation capacity is therefore necessary.
- *Preparation for Retirement of Existing Coal-fired Generation Units and Supporting Long Term Air Quality Improvement:* Many of the generation units in CPPS are getting towards the end of their design lives in the next decade and they will be phased out eventually. For environmental reasons, the Government has not allowed power companies to build new coal-fired electricity generation units since 1997. In order to ensure a secure and stable electricity supply, it is important to have sufficient gas-fired generation capacity to replace the coal-fired generation capacity retired from CPPS and also to meet long term demand growth. In the long run, the gradual replacement of power generation from coal-fired units to gas-fired units will help to lower emissions from power generating activities. Hence, there will be long term benefits to air quality from the installation of the proposed additional gas-fired generation unit(s).

2.2

CONSIDERATION OF ALTERNATIVE OPTIONS FOR ELECTRICITY GENERATION

Different options have been explored to meet the requirement to increase electricity generation within the emission allowances and to support the HKSAR Government's target of increasing electricity generation in 2020 by gas-fired unit(s). The options considered include:

- converting coal-fired units to gas-fired units;
- constructing additional gas-fired unit(s);
- importing more power supply from Mainland; and
- use of more renewable energy.

The construction of additional gas-fired unit(s) using combined cycle gas turbine (CCGT) technology is considered the most practicable and preferred option to pursue given its high performance efficiencies and low emissions, impracticality and uncertainties in adopting the other options. This option is considered practicable to pursue to meet both the short-term and long-term needs of CLP.

2.3

CONSIDERATION OF SITING AND LAYOUT OPTIONS

The benefits and dis-benefits of siting the new CCGT unit(s) at the existing three power stations of CLP/ CAPCO are further discussed in *Section 2.3* of the *EIA Report*. As the PBPS does not provide sufficient land to accommodate the CCGT unit(s) of the planned scale, locating sites at CPPS and BPPS were considered. A number of factors were considered during site selection, including:

- Site condition;
- Space adequacy;
- Existing cooling water intake and outfall culverts;
- Electrical connection;
- Brownfield concerns; and
- Environmental considerations.

Given cost, programme, spatial constraints, technical complexity, environmental impacts, and relative distance to sensitive receivers, the preferred location to develop the additional CCGT unit(s) is at the BPPS. Site layout options were also examined in order to optimise the preferred layout.

With the Project in place, CLP could support the HKSAR Government to meet the target of increasing electricity generation from gas-fired units in 2020. The Project will also help to further reduce the air pollutant emissions from CLP's power generation system and improve air quality, and help to provide adequate reserve capacity to ensure a reliable electricity supply.

Without the Project, CLP will not be able to support the Government's 2020 fuel mix targets, and CLP's adequate and stable supply of electricity will be put at risk. The long-term plan for gradual replacement of power generation from coal-fired units to gas-fired units helping to further lower emissions from power generating activities could also be impacted.

3 PROJECT OVERVIEW

3.1 SITE LOCATION AND HISTORY

Black Point, where the BPPS is situated, is located in the western-most part of the New Territories. It comprises a headland extending from the east (land) to the west (sea) with granitic soil underneath, typical of the Tuen Mun and Castle Peak areas. The major development at Black Point is the BPPS, which is the first natural gas-fired power plant in Hong Kong. The BPPS is located to the north of the headland on reclaimed land. BPPS is surrounded by mountain to the east and south while to the immediate north and west is the mouth of Deep Bay.

The proposed location for the Project is within the existing boundaries of the BPPS site as illustrated in *Figure 3.1*.

3.2 PROJECT COMPONENTS

The Project is comprised of the following key components which are discussed in detail in *Section 3.2* of the *EIA Report*:

- CCGT unit(s) - with an installed capacity of up to 600 MW for each unit and a stack of 80 m to 100 m high, supported by associated facilities such as power generation equipment enclosed in buildings, outdoor pipe racks and underground pipes and cables. A Selective Catalytic Reduction (SCR) system will be installed to reduce NO_x emissions;
- Cooling water intake facility - including a newly constructed cooling water pumping station and underground water pipelines for CCGT Unit No.1. Should the CCGT Unit No.2 be installed, a new pumping station, an electrochlorination facility and cooling water intake will be required with new underground water pipelines; and
- Cooling water discharge facility - including a new seal pit and the underground water pipelines for CCGT Unit No.1, and a new seal pit and culvert or a newly constructed outfall for CCGT Unit No. 2, should it be installed.

The location of these components is shown in *Figures 3.2a* and *3.2b*. Infrastructure for making connection with existing plants and equipment of the BPPS, such as fuel pipes, pipe racks, utility pipes and 400 kV cables, will also be required for the additional CCGT unit(s).

The EIA Study also identified a list of committed or planned projects surrounding the BPPS which may potentially interface with the construction and operation of this Project.

Legend 圖例

Project Site
工地位置

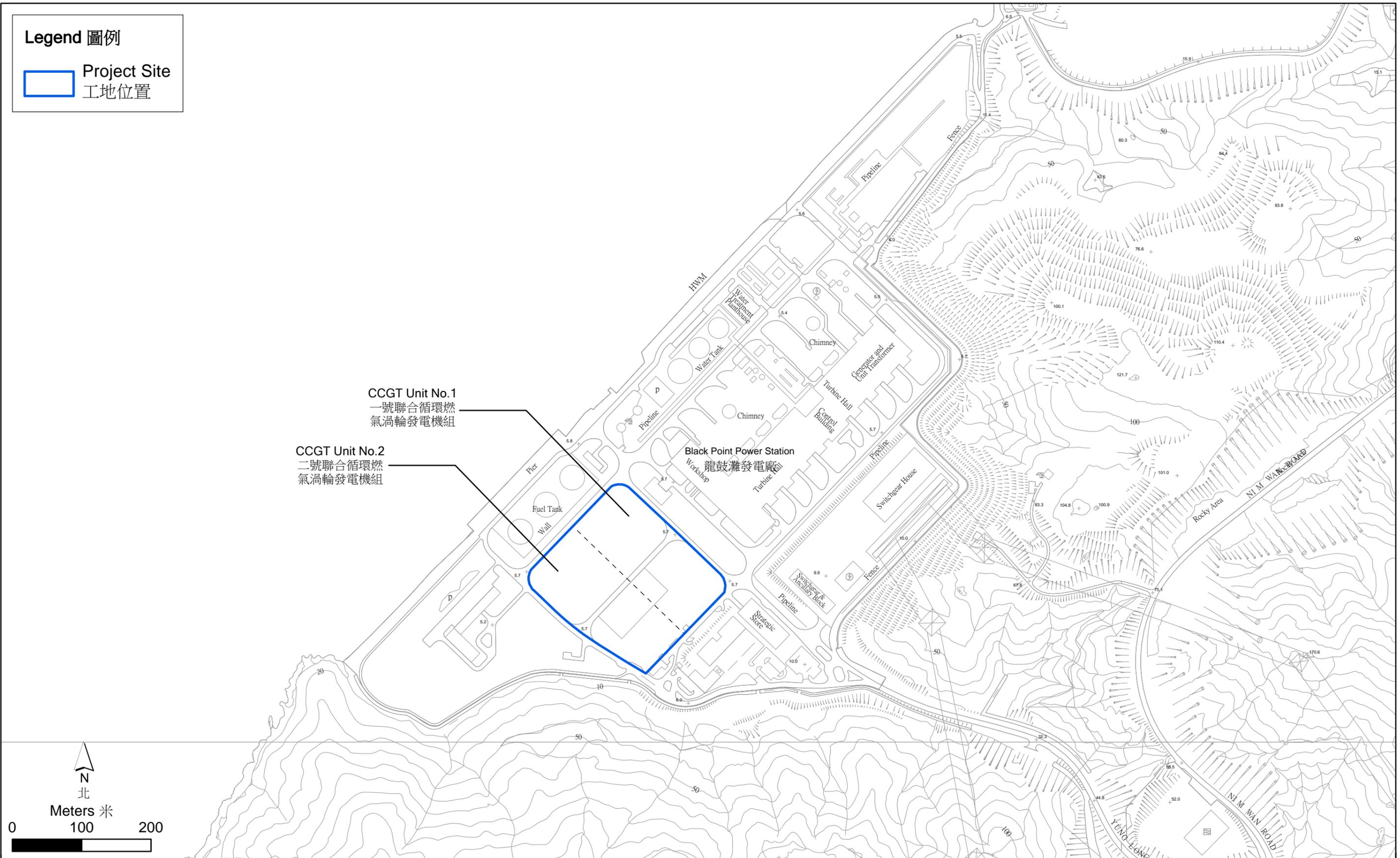


Figure 3.1
圖 3.1

Indicative Location of Additional Gas-fired Generation Units
新增燃氣發電機組的初步位置

File: T:\GIS\CONTRACT\0308057\Mxd\ES\0308057_Location_of_Additional_CCGT_ES_Bi.mxd
Date: 1/4/2016

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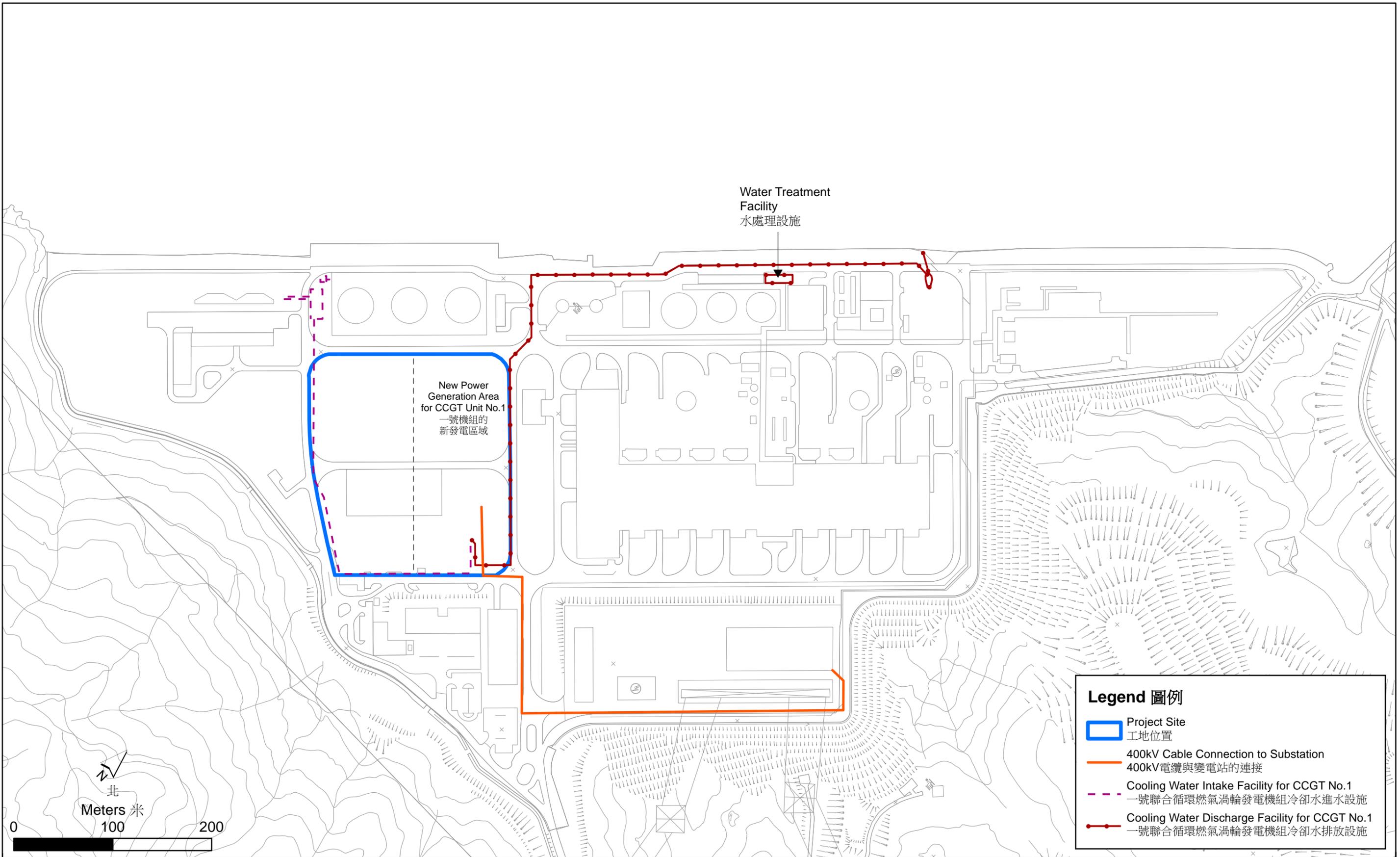


Figure 3.2A
圖 3.2A

Indicative Location of Key Project Components for CCGT No.1
主要工程項目組成部份的初步位置 - 一號聯合循環燃氣渦輪發電機組

File: T:\GIS\CONTRACT\0308057\Mxd\ES\0308057_Indicative_Location_of_Key_Project_Components_ES_Unit1_Bi.mxd
Date: 1/4/2016

Infrastructure for making connection from existing plant equipment in BPPS to the new CCGT not shown
連接現有龍鼓灘發電廠機組設備與新增聯合循環燃氣渦輪發電機組的基礎建設並無顯示

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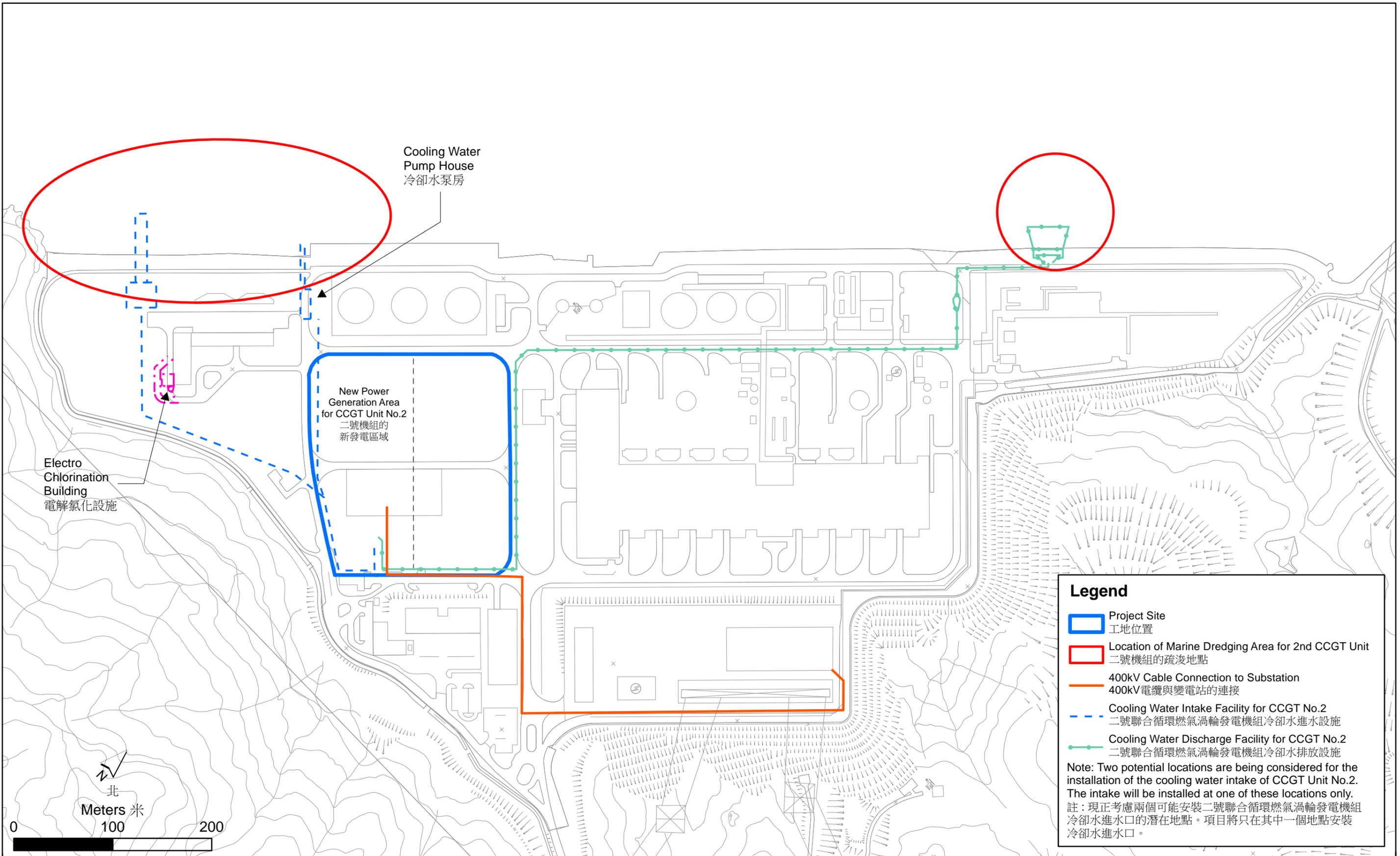


Figure 3.2B
圖 3.2B

Indicative Location of Key Project Components for CCGT No.2
主要工程項目組成部份的初步位置 - 二號聯合循環燃氣渦輪發電機組

File: T:\GIS\CONTRACT\0308057\Mxd\ES\0308057_Indicative_Location_of_Key_Project_Components_ES_Unit2_Bi.mxd
Date: 15/4/2016

Infrastructure for making connection from existing plant equipment in BPPS to the new CCGT not shown
連接現有龍鼓灘發電廠機組設備與新增聯合循環燃氣渦輪發電機組的基礎建設並無顯示

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4 LEGISLATIVE REQUIREMENTS, EVALUATION CRITERIA AND SENSITIVE RECEIVERS

4.1 AIR QUALITY

This EIA Study has examined the construction and operation phase impacts to air quality. The impacts have been identified and analysed for compliance with the prevailing Air Quality Objectives (AQOs) stipulated under the *Air Pollution Control Ordinance (APCO)* and the criteria and guidelines stated in the *EIAO-TM Annexes 4 and 12* respectively.

Baseline condition within the Assessment Area, which is defined as an area within 15 km from the Project Site boundary, is primarily influenced by traffic emissions and industrial emissions from the existing BPPS, CPPS and other industrial facilities. The potential impacts arising from the construction and operation phases of this Project to a total of 74 representative Air Sensitive Receivers (ASRs) located in Lung Kwu Tan, Lung Kwu Sheung Tan, Ha Pak Nai, Sheung Pak Nai, Lau Fau Shan, Tin Shui Wai, Yuen Long, Tuen Mun North, Hung Shui Kiu, Tuen Mun South, So Kwun Wat, Siu Lam, Tai Lam, Tung Chung and Siu Ho Wan, have been evaluated.

4.2 HAZARD TO LIFE

The potential hazards arising from the construction and operation phases of this Project have been evaluated for compliance with Section 2 of *Annex 4* of *EIAO-TM* which specifies the individual risk guidelines and societal risk guidelines. The BPPS area is generally remote with very low population density in the vicinity. All surrounding population, including land, road traffic and marine vessel population was considered in this assessment.

4.3 NOISE

The potential impacts of noise caused by construction and operation activities of this Project have been assessed in this *EIA Report*. The impacts have been identified and analysed for compliance with the criteria and guidelines stated in the *EIAO-TM Annexes 5 and 13* respectively and the applicable criteria stipulated under the *Noise Control Ordinance (NCO)*.

The Project Site is located within the BPPS which is surrounded by natural terrain with an open sea in the north-west. Background noise is dominated by the operation of the existing BPPS. No existing or planned Noise Sensitive Receiver (NSR) was identified within the Assessment Area which covered a distance of 300 m from the Project Site boundary.

4.4

WATER QUALITY

The EIA Study has described the potential impacts associated with the construction and operation of the Project on water quality. The impacts have been identified and analysed for compliance with the prevailing Water Quality Objectives (WQOs) stipulated under the *Water Pollution Control Ordinance (WPCO)* and the criteria and guidelines stated in the *EIAO-TM Annexes 6 and 14* respectively.

The Assessment Area for the water quality assessment covers the Deep Bay Water Control Zone (WCZ) and the North Western (WCZ). Baseline condition within the Assessment Area is heavily influenced by discharges from the Pearl River and some local discharges and surface run-off from the Northwest New Territories as well as north Lantau, with relatively low dissolved oxygen level and high nutrient levels, organic loading and bacterial levels. The key Water Quality Sensitive Receivers (WSRs) identified in the Assessment Area include:

- *Fisheries Resources*: oyster production area at Sheung Pak Nai, recognised spawning grounds of commercial fisheries resources in North Lantau, and artificial reef deployment area at Sha Chau and Lung Kwu Chau;
- *Marine Ecological Resources*: mangroves in Sheung Pak Nai and Ngau Hom Shek, Sha Chau and Lung Kwu Chau Marine Park, intertidal mudflats in Ha Pak Nai, seagrass beds in Ha Pak Nai and Sheung Pak Nai, horseshoe crab nursery grounds in Ha Pak Nai, Lung Kwu Sheung Tan and Ngau Hom Shek, and coral colonies on the BPPS seawall;
- *Non-gazetted beaches*: Lung Kwu Sheung Tan and Lung Kwu Tan;
- Secondary Contact Recreation Subzone; and
- Seawater intakes of the BPPS, CPPS, Tuen Mun Area 38, Shiu Wing Steel Mill, and Sludge Treatment Facilities.

The potential impacts arising from the construction and operation phases of this Project to these WSRs have been evaluated.

4.5

WASTE MANAGEMENT

The potential waste management implications caused by construction and operational activities of this Project have been assessed in this *EIA Report*. The impacts have been identified and analysed for compliance with the criteria and guidelines stated in the *EIAO-TM Annexes 7 and 15* respectively.

Sediment sampling and testing was conducted under this EIA Study to identify the level of sediment contamination within the marine construction works area for CCGT Unit No.2. The sediment testing results are compared against the relevant sediment quality criteria specified in *ADV-21 Management Framework for Disposal of Dredged/Excavated Sediment*, which show compliance

with the Lower Chemical Exceedance Levels for all parameters except Arsenic in all sediment samples. This is consistent with the results of the nearby EPD sediment quality monitoring data and the general pattern all over western Hong Kong, indicating a mild level of sediment contamination in the vicinity of the Project.

4.6 *LAND CONTAMINATION*

This EIA Study has examined the potential of land contamination at the Project Site. A land contamination assessment was completed in accordance with the guidelines stated in the *EIAO-TM Annex 19* and other relevant guidance note and practice guide.

No land contamination hotspots were identified during a site walkover and a desktop review of current and historical land uses. Site investigations conducted in accordance with the *Contamination Assessment Plan* endorsed by the EPD supplemented by desktop data indicate that soil and groundwater samples do not exceed the relevant standards for Industrial land use. The potential land contamination impacts arising from the construction and operation phases of this Project have been evaluated.

4.7 *ECOLOGY*

The potential impacts of construction and operation activities of this Project on terrestrial and marine ecology have been assessed in this *EIA Report*. The impacts have been identified and analysed for compliance with the criteria and guidelines stated in the *EIAO-TM Annexes 8* and *16* respectively.

A series of detailed field surveys, which include intertidal, subtidal, marine mammal, terrestrial habitat and wildlife surveys, were conducted during the dry and wet seasons of 2015 to update the baseline conditions of the terrestrial and marine habitats and assemblages within and around the Project's footprint. Findings of the field surveys confirmed the findings of the literature review that waters around Black Point did not report large numbers of dolphin sightings and are considered as marginal habitat of the dolphins in Hong Kong, while the coverage of coral was low and generally affected by the heavy sedimentation in the western waters. Terrestrial species of conservation importance were identified within the Assessment Area but none are anticipated to be directly affected. Marine and terrestrial ecological resources and habitats in the Project Site and its vicinity are considered as of negligible to low ecological values.

There are no terrestrial ecological sensitive receivers identified within the Assessment Area which covered a distance of 500 m from the Project Site boundary. The Assessment Area for marine ecology covers the Deep Bay WCZ and the North Western WCZ and the marine ecological sensitive receivers identified in this area are described in *Section 4.4*. The potential impacts arising from the construction and operation phases of this Project to these sensitive receivers have been evaluated.

4.8

FISHERIES

The potential impacts to fisheries caused by construction and operational activities of this Project have been assessed in this *EIA Report*. The impacts have been identified and analysed for compliance with the criteria and guidelines stated in the *EIAO-TM Annexes 9 and 17* respectively.

The Assessment Area for fisheries covers a distance of 500 m from the Project Site boundary. Findings of the desktop review of baseline conditions of commercial fisheries resources and fishing operations suggest that this area is of low importance to the Hong Kong fishing industry. No fisheries sensitive receivers were identified in this area and the fisheries sensitive receivers located in the Deep Bay and Black Point areas are described in *Section 4.4*. The potential impacts arising from the construction and operation phases of this Project to these sensitive receivers have been evaluated.

4.9

LANDSCAPE & VISUAL

The EIA Study has described the landscape and visual impacts associated with the construction and operation of this Project. The purpose of the assessment was to evaluate the predicted impacts to landscape resources and visual sensitive receivers as per *EIAO GN 8/2010* and the criteria and guidelines stated in the *EIAO-TM Annexes 10 and 18* respectively.

The EIA Study has identified the following Visually Sensitive Receivers (VSRs), Landscape Resources (LRs) and Landscape Character Areas (LCAs):

- Six VSRs including recreational, occupational and travelling users;
- Nine LR: Artificial Rocky/ Hard Shoreline, Natural Rocky Shore, Highly Modified Area, Plantation, Rocky Grassland/ Shrubland Slopes, Mixed Shrubland, Vegetated Modified Slopes, Water Channel and Seascape; and
- Four LCAs: Inshore Landscape, Power Station Landscape, Headland Landscape and Hillside Landscape.

The potential landscape and visual impacts from the construction and operation phases of this Project to these sensitive receivers have been evaluated.

4.10

CULTURAL HERITAGE

The potential impacts to cultural heritage, marine archaeological and historic resources caused by construction and operational activities of this Project have been assessed in this *EIA Report*. The impacts have been identified and analysed to be in compliance with the criteria and guidelines stated in the *EIAO-TM Annexes 10 and 19* respectively.

There is no built heritage or sites of archaeological interest located within 500m from the proposed Project Site. Therefore, the proposed Project Site is of no terrestrial built heritage and archaeological potential. A Marine Archaeological Investigation has been undertaken and it confirms that the Project Site has no marine sites of cultural heritage / archaeological value present and has no archaeological potential. The potential impacts on cultural heritage arising from the construction and operation phases of this Project have been evaluated.

4.11

HEALTH

This EIA Study has examined potential impacts to human health related to emission of toxic air pollutants (TAP) from Project operation. The impacts have been identified and analysed in accordance the technical requirements set out in Section II of Appendix A of the *EIA Study Brief*. Acute and chronic (both non-carcinogenic and carcinogenic) health risks to a total of 74 representative Human Sensitive Receivers (HSRs) located within a 15 km Assessment Area have been evaluated.

5 SUMMARY OF ENVIRONMENTAL IMPACTS

5.1 INTRODUCTION

This Part of the *Executive Summary* describes construction and operational activities associated with the Project and addresses the related key environmental issues.

5.2 PROJECT DESCRIPTION

The scope of the Project involves the phased construction and operation of up to two additional CCGT units (with an installed capacity of up to 600 MW each) at the BPPS. The proposed location for the additional CCGT units ("CCGT Unit No.1" and "CCGT Unit No.2") is illustrated in *Figure 3.2a* and *3.2b*.

5.2.1 Construction & Operational Activities

No major earthworks or site formation works will be required during the construction of the Project. Marine dredging works would not be required for the construction of CCGT Unit No.1. Minor marine dredging works adjacent to the existing BPPS seawall are anticipated to be required for CCGT Unit No.2. Key activities for the construction and operation of CCGT Unit No. 1 and CCGT Unit No.2 are summarised in *Table 5.1*.

Table 5.1 *Summary of Key Project Details*

Item	Detail
CCGT Unit No.1 and Associated Facilities (Figure 3.2a)	
Project Scope	<ul style="list-style-type: none">• Clearance activities within the Project Site, including alternation of temporary warehouse• Civil works and electrical / mechanical works for installation of one CCGT unit (with an installed capacity of up to 600 MW), its associated auxiliary equipment and supporting facilities which include four buildings of about 30m high (subject to final design) to house power generation equipment such as turbines, generators, transformers, etc., outdoor pipe racks and equipment, an exhaust stack of about 80m to 100m above ground, infrastructures for making utilities connections (e.g. 400 kV cables, electrical and control cables, pipes for fuel gas, fuel oil, water supplies, auxiliary gas supplies, etc.) from existing plant equipment in BPPS to the CCGT unit and necessary works for enhancement/expansion of existing plant equipment.• Installation of cooling water intake facility which includes a newly constructed cooling water pumping station, enhanced electrochlorination system and underground water pipelines.• Installation of cooling water discharge facility which includes underground water pipelines, a new seal pit, and connection between the seal pit and the existing outfall.

Item	Detail
Construction Activities	<ul style="list-style-type: none"> Relocation or demolition of existing facilities/ utilities within the Project Site by typical equipment such as hydraulic crusher, flame cutting, excavators, etc. Site construction, excavation, trenching, modification of existing box culvert supplementary seawater intake, and equipment installation by typical equipment such as excavators, mobile cranes, welding machines, cutting equipment, powered mechanical hand tools, micro-tunnel boring machine, etc.
Operational Activities	<ul style="list-style-type: none"> CCGT unit and its associated supporting facilities will normally be operated except closing for general maintenance works. Discharge of cooling water.

CCGT Unit No.2 and Associated Facilities (Figure 3.2b)

Project Scope	<ul style="list-style-type: none"> Clearance activities within the Project Site, including alternation of temporary warehouse Civil works and electrical / mechanical works for installation of one CCGT unit (with an installed capacity of up to 600 MW), its associated auxiliary equipment and supporting facilities which include four buildings of about 30m high (subject to final design) to house power generation equipment such as turbines, generators, transformers, etc., outdoor pipe racks and equipment, an exhaust stack of about 80m to 100m above ground, infrastructures for making utilities connections (e.g. 400 kV cables, electrical and control cables, pipes for fuel gas, fuel oil, water supplies, auxiliary gas supplies, etc.) from existing plant equipment in BPPS to the CCGT unit and necessary works for enhancement/expansion of existing plant equipment. Installation of cooling water intake facility which includes a newly constructed cooling water pumping station, new electrochlorination facility and building, a new intake culvert, and underground water pipelines. Installation of cooling water discharge facility which includes a newly constructed seal pit, a new outfall culvert, and underground water pipelines.
Construction Activities	<ul style="list-style-type: none"> Relocation or demolition of existing facilities/ utilities within the Project Site by typical equipment such as hydraulic crusher, flame cutting, excavators, etc. Site construction, excavation, trenching, and equipment installation by typical equipment such as excavators, mobile cranes, welding machines, cutting equipment, powered mechanical hand tools, micro-tunnel boring machine, etc. Minor marine dredging for cooling water intake and discharge facilities by one closed grab dredger supported by hopper barge and tug boat Seawall cofferdam construction, installation of cooling water intake and outfall culverts and temporary seawall removal and reinstatement by piling rig-mounted/ jack-up barge, derrick lighter and crane barge

Item	Detail
Operational Activities	<ul style="list-style-type: none"> • CCGT unit and its associated supporting facilities will normally be operated except closing for general maintenance works. • Discharge of cooling water. • Maintenance dredging near the cooling water intake and discharge facilities, expected to be at about once every 4 to 5 years.
Area of Seabed Affected by the installation of Cooling Water Intake and Discharge Facilities	<ul style="list-style-type: none"> • Two areas of about 100m x 100m each
Length of Existing Artificial Seawall affected by the installation of Cooling Water Intake and Discharge Facilities	<ul style="list-style-type: none"> • ~150 m of seawall to be reinstated as sloping artificial seawall • ~50 m of seawall to be transformed as intake/ outfall culverts
Dredging Volumes (<i>in situ</i> volume) from the installation of Cooling Water Intake and Discharge Facilities	<ul style="list-style-type: none"> • From two areas of about 20,000 m³ each
Dredging Volumes (<i>in situ</i> volume) from Maintenance Dredging	<ul style="list-style-type: none"> • ~6,600 m³ for each facility

5.2.2 *Tentative Implementation Programme*

Subject to obtaining HKSAR Government approval of the Project and a final investment decision on the Project being taken by CLP/CAPCO, it is anticipated that the construction of the Project would be implemented in phases with CCGT Unit No.1 commencing in the second half of 2016. Commercial operation of CCGT Unit No.1 is anticipated by the end of 2019. The commencement date for construction of CCGT Unit No.2 is expected to be after 2019. An indicative construction programme is shown in *Figure 5.1*

Figure 5.1 Preliminary Construction Programme of the Project

	2016				2017				2018				2019			
	Q1	Q2	Q3	Q4												
CCGT Unit No.1																
Civil Works			█													
Equipment Supply & Installation			█													

	Year 1				Year 2				Year 3				Year 4	
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
CCGT Unit No.2 (Tentative)														
Civil Works	█													
Cooling Water Pumping Station	█				█									
Equipment Supply & Installation	█													

5.3 AIR QUALITY

5.3.1 Construction Phase

Potential nuisance from dust generating activities during construction of CCGT Unit No.1 and No.2 have been considered. The Project construction site is small, with relative small quantities of construction and demolition materials and excavated materials generated from construction activities. The minor marine dredging works for CCGT Unit No.2 are not dust generating. Due to the large separation distance between the worksite and the nearest ASR (> 1 km), adverse dust impact arising from the construction activities of the Project is not anticipated. With the implementation of standard mitigation measures, no unacceptable dust impact is anticipated.

Due to the small quantities of C&D materials and excavated materials that require off-site disposal, the number of additional truck trips generated per day will be limited (about 23 truck trips per day). Furthermore, major equipment for the Project will be transported to the Project site by barges, as far as practicable, in order to minimise the number of additional truck trips on the roads due to the construction of the Project. The potential air quality impact due to vehicular emissions from additional trucks during the construction phase of the Project is minimal.

When the additional CCGT unit(s) are commissioned, they will be operated as a priority plant and topped up by BPPS and CPPS plants to meet the future electricity generation demand. The sent-out from the additional CCGT unit(s) will normally displace the sent-out from the existing CAPCO generation units of CPPS and BPPS. The assessment scenarios for the long-term impacts covered the potential operation scenarios with the Project, including displacement of generation from the existing coal-fired plants and gas-fired plants by the additional CCGT unit(s). The assessment has considered the installation of one or two CCGT units at 440 MW or 600 MW. This allows an evaluation of the magnitude of impacts from the operation of CCGT units in the range of 440 MW and 600 MW. The total annual sent-out from the CAPCO plants have been assumed to remain unchanged in all the long-term impact assessment scenarios.

Implementation of additional CCGT unit(s) would allow for a reduction in the total quantities of air pollutants emitted from CAPCO power generation system. Substantial reductions in total annual emission loading are demonstrated in the displacing both coal-fired and gas-fired generation scenarios when comparing with the 2020 emission cap. For the one additional CCGT scenarios, significant reductions in NO_x emissions of up to 16% and 19% are predicted for 440MW CCGT and 600MW CCGT, respectively. Further reductions in NO_x emissions are shown in the two additional CCGT scenarios, up to 26% and 33% for 440MW CCGT and 600MW CCGT, respectively. For the displacing gas-fired generation only scenarios, reductions in NO_x emissions are still demonstrated under worst case situation with least reduction of up to 2% for one 440 MW CCGT.

Assessment of potential impacts to ambient air quality from the proposed installation of the additional CCGT units indicated that whilst the contribution from the proposed additional generation capacity was minimal, current monitoring indicated that ambient nitrogen dioxide (NO₂) concentrations already exceeded the AQO standard in certain areas.

Further modelling and analysis of cumulative air quality impacts from emission sources in the Areas of Influence by the Project at the opening year (2020) were completed considering a number of operating scenarios which are summarised in *Table 5.2* and *Table 5.3*. For the operation of one or two additional CCGT units, it is concluded that for short-term impacts, the predicted pollutant concentrations at the ASRs contributed from the additional CCGT units are insignificant and the predicted cumulative 1-hour NO₂, 10-minute SO₂, 24-hour RSP (PM₁₀), 24-hour FSP (PM_{2.5}) and 24-hour SO₂ at the concerned ASRs comply with their relevant ambient air quality criteria. For long-term impacts, the annual average concentrations for NO₂, RSP (PM₁₀) and FSP (PM_{2.5}) were below the assessment criteria at all locations with the exception of NO₂ at Parkview Court in Tuen Mun. The exceedance at Parkview Court is due to background and road traffic contributions, while the annual average NO₂ contribution from the CAPCO power generation facilities

at this ASR is insignificant (a maximum of $0.12 \mu\text{g m}^{-3}$ at the height of 100m for “without Project” scenario, which is about 0.3% of the annual average NO_2 criterion). When the background and road traffic contributions are removed, the modelling results showed that there would be a reduction in NO_2 concentration at this ASR with the implementation of either one or two additional CCGT units. Furthermore, the maximum annual NO_2 contribution at the concerned ASRs due to the operation of the additional CCGT unit(s) is insignificant (from 0.02% of total concentration for the installation of one 440MW CCGT unit displacing gas-fired generation only to 0.06% of total concentration for the installation of two 600MW CCGT units displacing both coal-fired and gas-fired generation). The potential change in ambient ozone levels due to the operation of the additional CCGT units would be minimal. Overall, it is concluded that the contribution from the Project emission to ambient air quality at the identified representative ASRs is insignificant and hence acceptable.

Table 5.2 Summary of Operation Phase Air Quality Modelling Results – Short-term Cumulative Impacts

Area of Influence	19 th Highest 1-Hour NO ₂ (µg m ⁻³)				10 th Highest 24-Hour RSP (µg m ⁻³)				10 th Highest 24-Hour FSP (µg m ⁻³)				4 th Highest 10-Minute SO ₂ (µg m ⁻³) ^(a)				4 th Highest 24-Hour SO ₂ (µg m ⁻³)				AQO Compliance
	440MW Normal	600MW Normal	440MW Backup	600MW Backup	440MW Normal	600MW Normal	440MW Backup	600MW Backup	440MW Normal	600MW Normal	440MW Backup	600MW Backup	440MW Normal	600MW Normal	440MW Backup	600MW Backup	440MW Normal	600MW Normal	440MW Backup	600MW Backup	
Operation of One Additional CCGT Unit																					
Butterfly Estate	148.6	148.6	148.6	148.6	83.0	83.0	83.0	83.0	62.3	62.3	62.3	62.3	183.8	183.8	183.8	183.8	34.8	34.8	34.8	34.8	Yes
Tin Shui Wai	152.1	152.1	152.1	152.1	84.0	84.0	84.0	84.0	63.0	63.0	63.0	63.0	270.5	270.5	270.5	270.5	37.5	37.5	37.5	37.5	Yes
Tuen Mun	160.7	160.7	160.7	162.9	87.2	87.2	87.2	87.2	65.3	65.3	65.3	65.3	201.4	201.4	201.4	201.4	32.5	32.5	32.4	32.5	Yes
Yuen Long	163.4	163.4	163.4	164.6	84.0	84.0	84.0	84.0	63.0	63.0	63.0	63.0	261.9	261.9	261.9	261.9	28.5	28.6	28.4	28.4	Yes
Tung Chung	172.2	172.2	172.2	172.2	79.3	79.3	79.3	79.3	59.6	59.6	59.6	59.6	181.5	181.5	181.5	181.5	39.2	39.2	39.2	39.2	Yes
Operation of Two Additional CCGT Units																					
Butterfly Estate	148.6	148.6	148.6	148.6	83.0	83.0	83.0	83.0	62.3	62.3	62.3	62.3	183.8	183.8	183.8	183.8	34.8	34.8	34.8	34.8	Yes
Tin Shui Wai	152.1	152.1	154.8	156.4	84.0	84.0	84.0	84.0	63.0	63.0	63.0	63.0	270.5	270.5	270.5	270.5	37.5	37.5	37.5	37.5	Yes
Tuen Mun	160.7	160.7	163.9	163.9	86.9	87.0	87.3	87.5	65.3	65.3	65.3	65.4	201.4	201.4	201.4	201.4	32.5	32.5	32.5	32.5	Yes
Yuen Long	163.4	163.4	164.6	164.9	84.0	84.0	84.0	84.0	63.0	63.0	63.0	63.0	261.9	261.9	261.9	261.9	28.7	28.8	28.5	28.5	Yes
Tung Chung	172.2	172.2	172.2	172.2	79.3	79.3	79.3	79.3	59.6	59.6	59.6	59.6	181.5	181.5	181.5	181.5	39.2	39.2	39.2	39.2	Yes
AQO Criteria	200	200	200	200	100	100	100	100	75	75	75	75	500	500	500	500	125	125	125	125	

Note:

(a) For conservative assessment, the predicted cumulative 4th highest 10-minute SO₂ concentrations presented were calculated from the predicted cumulative maximum hourly SO₂ concentrations based on the stability-dependent multiplicative factors. According to this conversion method, the predicted cumulative 4th highest 10-minute SO₂ concentration is equal to the predicted cumulative maximum 10-minute SO₂ concentration.

Normal: Normal operation using natural gas

Backup: Back-up operation using ultra-low sulphur diesel

Table 5.3 Summary of Operation Phase Air Quality Modelling Results – Long-term Cumulative Impacts

Area of Influence	Annual Average NO ₂ (µg m ⁻³)					Annual Average RSP (µg m ⁻³)					Annual Average FSP (µg m ⁻³)					AQO Compliance
	Without Project	440MW displacing BPPS only	440MW displacing BPPS & CPPS	600MW displacing BPPS only	600MW displacing BPPS & CPPS	Without Project	440MW displacing BPPS only	440MW displacing BPPS & CPPS	600MW displacing BPPS only	600MW displacing BPPS & CPPS	Without Project	440MW displacing BPPS only	440MW displacing BPPS & CPPS	600MW displacing BPPS only	600MW displacing BPPS & CPPS	
Operation of One Additional CCGT Unit																
Butterfly Estate	31.7	31.7	31.7	31.7	31.7	42.8	42.8	42.8	42.8	42.8	30.4	30.4	30.4	30.4	30.4	Yes
Tin Shui Wai	28.1	28.1	28.1	28.1	28.1	44.0	44.0	44.0	44.0	44.0	31.3	31.3	31.3	31.3	31.3	Yes
Tuen Mun	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.6	44.7	44.7	31.9	31.9	31.9	31.9	31.9	Yes ^(a)
Yuen Long	33.1	33.1	33.1	33.1	33.1	43.9	43.9	43.9	43.9	43.9	31.2	31.2	31.2	31.2	31.2	Yes
Tung Chung	36.8	36.8	36.8	36.8	36.8	40.2	40.2	40.2	40.2	40.2	28.6	28.6	28.6	28.6	28.6	Yes
Operation of Two Additional CCGT Units																
Butterfly Estate	31.7	31.7	31.7	31.7	31.7	42.8	42.8	42.8	42.8	42.8	30.4	30.4	30.4	30.4	30.4	Yes
Tin Shui Wai	28.1	28.1	28.1	28.1	28.1	44.0	44.0	44.0	44.0	44.0	31.3	31.3	31.3	31.3	31.3	Yes
Tuen Mun	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.7	31.9	31.9	31.9	31.9	31.9	Yes ^(a)
Yuen Long	33.1	33.1	33.1	33.1	33.1	43.9	43.9	43.9	43.9	43.9	31.2	31.2	31.2	31.2	31.2	Yes
Tung Chung	36.8	36.8	36.8	36.8	36.8	40.2	40.2	40.2	40.2	40.2	28.6	28.6	28.6	28.6	28.6	Yes
AQO Criteria	40	40	40	40	40	50	50	50	50	50	35	35	35	35	35	

Note:

(a) Except annual NO₂ impact in at Parkview Court in Tuen Mun where the exceedances are due to background and road traffic emissions.

5.4 *HAZARD TO LIFE*

5.4.1 *Construction Phase*

The individual risk and societal risks posed by the Project and the existing BPPS facilities for construction phase are acceptable and in compliance with risk criteria in Section 2 of *Annex 4* of *EIAO-TM*. No unacceptable risks are foreseen as a result of the construction of the proposed Project with safety management measures in place to further manage and minimise the external hazards from constructions activities.

5.4.2 *Operation Phase*

The individual risk and societal risks posed by the Project and the existing BPPS facilities for operation phase are acceptable and in compliance with risk criteria in Section 2 of *Annex 4* of *EIAO-TM*. No unacceptable risks are foreseen as a result of the operation of the Project. No mitigation measures are thus deemed necessary and no monitoring will be required.

5.5 *NOISE*

5.5.1 *Construction Phase*

Since no existing or planned NSRs have been identified within the Assessment Area, no unacceptable noise impact associated with the construction of the Project is anticipated. Mitigation measures and monitoring are therefore not required during construction.

5.5.2 *Operation Phase*

Similarly, in view of the insignificant noise impact arising from the operation of the Project and the large separation distance to the nearest NSR (> 900 m away), mitigation measures and monitoring are therefore not required during operation. Residual impacts are not anticipated.

Cumulative noise impacts are not expected during both construction and operation phases of the Project.

5.6 *WATER QUALITY*

5.6.1 *Construction Phase*

No marine works will be required for the construction of CCGT Unit No.1. For land-based construction activities of CCGT Unit No.1 and No.2, it is anticipated that no unacceptable water quality impacts would arise from the land-based runoff and sewage discharges with standard site practices and mitigation measures in place.

Computational modelling has been conducted to predict various potential water quality impacts from the proposed marine dredging operation associated with CCGT Unit No.2. Full compliance is predicted at all identified WSRs for all parameters in both wet and dry seasons with the implementation of recommended mitigation measures, hence no unacceptable impacts on water quality is expected to occur. Also no unacceptable water quality impact is anticipated to arise from the pre-commissioning chemical cleaning activities of both CCGT units with appropriate treatment of the effluent before discharge.

5.6.2 *Operation Phase*

The potential change in hydrodynamic and water quality from Project operation was assessed alongside potential fuel spillage risk, pollution load management, and maintenance dredging for CCGT Unit No.2 intake and discharge facilities. For the operation of one or two additional CCGT units, computational modelling predicted that the change in water temperature and total residual chlorine level from cooling water discharge would be highly localised in both seasons, and the discharge would be diluted and dissipated soon after leaving the discharge outfall (*Table 5.4*). Design features, such as secondary containment, shutdown valves and leak detector, and contingency plan have been included in BPPS operation to avoid and minimise the risk of fuel spillage, which is considered to be of very low potential given that no additional fuel tank or fuel transshipment would be required for the proposed Project. Also, with the implementation of the proposed measures in controlling overall pollution load discharge from the BPPS, there would be no net increase in pollution load into the Deep Bay WCZ from the BPPS upon the future expanded operation. No unacceptable water quality is expected from the additional operational discharge from the Project. Maintenance dredging for CCGT Unit No.2 intake and discharge facilities can proceed at the proposed rate with the implementation of recommended mitigation measures. Overall, no unacceptable water quality impact from the operation of the proposed additional CCGT units is expected.

No unacceptable construction and operational-phase residual impacts, or cumulative water quality impacts with other developments in the vicinity, are predicted to occur.

Table 5.4 *Predicted Change in Maximum Water Temperature (°C) from Baseline Condition without Project*

Sensitive Receiver in Area	Change in Maximum Water Temperature (°C) from Baseline		WQO Compliance (<2°C)
	Dry Season	Wet Season	
<i>Operation of One Additional CCGT Unit</i>			
Black Point	0.00 - 0.33	0.15 - 0.38	Yes
Deep Bay	0.07 - 0.24	0.00 - 0.29	Yes
Lung Kwu Tan, Lung Kwu Chau and Sha Chau	0.00 - 0.10	0.02 - 0.39	Yes
Tuen Mun and Castle Peak	0.00 - 0.03	0.00 - 0.03	Yes
<i>Operation of Two Additional CCGT Units</i>			
Black Point	0.01 - 0.63	0.34 - 0.55	Yes

Sensitive Receiver in Area	Change in Maximum Water Temperature (°C) from Baseline		WQO Compliance (<2°C)
	Dry Season	Wet Season	
Deep Bay	0.13 - 0.44	0.00 - 0.54	Yes
Lung Kwu Tan, Lung Kwu Chau and Sha Chau	0.00 - 0.21	0.02 - 0.42	Yes
Tuen Mun and Castle Peak	0.01 - 0.04	0.02 - 0.05	Yes

5.7 WASTE MANAGEMENT

5.7.1 Construction Phase

Analysis of waste management implications involving the consideration of options for layout, construction methods and programmes was conducted at the early stage of the Project to try to reduce waste generation and to maximise opportunities for reuse and recycling of waste from construction activities. The key potential impacts during the construction of the two CCGT units are related to management of site clearance, civil and building construction works, and excavation wastes, and a small amount of chemical waste and general refuse. With the implementation of the mitigation measures recommended, no unacceptable environmental impacts arising from storage, handling, collection, transport and disposal of wastes are expected.

Marine sediments to be dredged for CCGT Unit No. 2 intake and discharge facilities were found to be suitable for Type 1 Open Sea (Dedicated Sites) disposal. Marine sediment sampling, testing and reporting in accordance with the requirement stated in *PNAP ADV-21* for EPD approval as required under the *Dumping at Sea Ordinance* is recommended prior to dredging and disposal.

5.7.2 Operation Phase

The key potential impacts during the operation of the two CCGT units are related to management of chemical and general wastes. With the implementation of the mitigation measures recommended, no unacceptable environmental impacts arising from storage, handling, collection, transport and disposal of wastes are expected.

Similar to the arrangement for CCGT Unit No.2 construction, sediment sampling, testing, handling and disposal procedures as stipulated by the *PNAP ADV-21* will be undertaken prior to maintenance dredging and disposal. With the implementation of the recommended mitigation measures, no unacceptable environmental impacts arising from storage, handling, collection, transport and disposal of wastes are expected.

No residual waste management impact is envisaged during the construction and operation phases of the Project.

5.8 *LAND CONTAMINATION*

No land contamination was identified within the Project Site. Therefore, no unacceptable environmental impact in respect of land contamination is expected. During construction stage, good house-keeping practices shall be maintained by the contractor(s) to minimise the risk of land contamination due to construction activities. No contamination causing insurmountable impacts to the future land users is expected. No further mitigation measures are recommended.

5.9 *ECOLOGY*

5.9.1 *Construction Phase*

No marine works will be required for the construction of CCGT Unit No.1. The assessment indicates that unacceptable construction phase impacts from land-based runoff are not expected to occur to marine ecology with standard site practices and mitigation measures in place.

The loss of about 50 m and temporary disturbance of about 150 m of artificial seawall, and loss of about 0.2 ha and temporary disturbance of 1.8 ha of subtidal soft-bottom habitats due to minor marine dredging for the construction of the cooling water intake and outfall for the 2nd CCGT unit are considered as environmentally acceptable since the areas affected are small and of low ecological importance.

The minor dredging works is expected to involve only 1-2 slow-moving marine vessels at a time, and considering the small scale of the dredging works, the frequency/ trip of vessel is low. Marine vessels will make use of the Urmston road to access the BPPS and will not traverse sensitive habitats such as the Sha Chau and Lung Kwu Chau Marine Park. Therefore only temporary and minor impacts to the marine mammals are anticipated in the inshore waters of the BPPS due to the marine works, which reported very low densities of dolphins.

As discussed in *Section 5.6.1*, no unacceptable impacts on water quality is expected to occur during minor marine dredging and thus potential impacts on marine ecology including marine mammals are expected to be acceptable.

The Project Site is located in urbanised/ disturbed areas within the boundary of the BPPS with negligible ecological value. No species of local conservation interest was recorded. Terrestrial ecological impacts from habitat loss, physical disturbance and degradation of habitat/ecological function are expected to be acceptable with the implementation of good construction practices.

5.9.2 *Operation Phase*

The assessment indicates that considering the low sensitivity and productivity in eggs and planktonic larvae in the Assessment Area, unacceptable impacts

due to impingement and entrainment of marine ecological resources by the cooling water intake is not anticipated. Also, full compliance with the WQO for seawater temperature and the assessment criterion for total residual chlorine is predicted at all marine ecological sensitive receivers in both seasons. Hence, the potential change in water quality associated with an increase in operational discharge is not anticipated to cause unacceptable operational phase impacts to marine ecology including marine mammals. As discussed in *Section 5.6.2*, no unacceptable adverse impacts on water quality is expected to occur during maintenance dredging and thus potential impacts on marine ecology including marine mammals are expected to be acceptable.

Terrestrial ecological impacts from increased human activity and disturbance (including lighting, etc), are expected to be acceptable with proposed mitigation and precautionary measures.

Residual ecological impacts are expected to be acceptable.

5.10 FISHERIES

5.10.1 Construction Phase

No marine works will be required for the construction of CCGT Unit No.1, hence no loss or direct disturbance to fishing grounds and fisheries habitats is expected. For land-based construction activities of CCGT Unit No.1 and No.2, indirect impacts to fisheries resources related to perturbations to key water quality parameters from land-based discharges and runoff are also expected to be insignificant with standard site practices and mitigation measures in place.

Temporary disturbance to approximately 2 ha of fisheries habitats and fishing grounds due to minor seabed dredging for the construction of the cooling water intake and outfall for the 2nd CCGT unit are considered as environmentally acceptable given the small size of the affected areas, temporary nature of the disturbance and low fisheries importance.

As discussed in *Section 5.6.1*, no unacceptable impacts on water quality is expected to occur during minor marine dredging and thus potential impacts on fisheries are expected to be acceptable. Indirect impacts to fisheries resources related to perturbations to key water quality parameters from land-based discharges and runoff are also expected to be within acceptable levels with standard site practices and mitigation measures in place.

5.10.2 Operation Phase

No loss or direct disturbance of fisheries habitats or fishing ground is expected. With large separation between the cooling water intake facility and the identified spawning ground at North Lantau and the absence of significant ichthyoplankton and fish larvae resources in the Assessment Area, impingement and entrainment of fisheries resources is not anticipated. Also, full compliance with the WQO for seawater temperature and the assessment

criterion for total residual chlorine is predicted at all fisheries sensitive receivers in both wet and dry seasons, thus potential impacts to fisheries as a result of cooling water discharge are not expected to occur. As discussed in *Section 5.6.2*, no unacceptable impacts on water quality is expected to occur during maintenance dredging and thus potential impacts on fisheries are expected to be acceptable. No unacceptable operational phase impacts to fisheries resources, habitats and fishing operations are expected to occur.

Construction and operational-phase cumulative fisheries impacts with other developments in the vicinity are not expected to occur.

5.11 *LANDSCAPE & VISUAL*

5.11.1 *Construction Phase*

Construction landscape and visual impacts are considered to be limited to within the BPPS site and its seafront, and will be caused by activities such as site clearance, excavation, and installation of the new facilities and equipment, marine dredging and construction of cooling water intake and discharge facilities. Landscape resources (LRs) and landscape character Areas (LCAs) will be reinstated to their former state by operation. The landscape and visual impacts associated with Project construction are considered acceptable and only reinstatement of artificial shoreline and some affected road is required. Good site practice is recommended to be implemented to minimise potential impacts on landscape and visual resources.

5.11.2 *Operation Phase*

The Project comprises building certain new elements within an existing power station that already has similar structures. The Project Site is relatively shielded from views due to surrounding hills and headlands and located in a more remote area of Hong Kong where there are fewer potential VSRs. Impacts on LR and LCAs are therefore limited and slight at worst, even prior to mitigation. Impacts on workers at BPPS are anticipated to be moderate at worst for prior to mitigation, with slight impacts on the other five VSRs. Photomontages illustrating the presence of CCGT Units No.1 and No.2 (*Figure 5.2*) show that visual changes for most VSRs are limited. Given the limited landscape and visual impacts due to the Project, mitigation measures are not required for both construction and operation phases. Nevertheless, measures including the use of sensitive architectural design of new facilities and preservation of vegetation are recommended to further enhance the visual and landscape elements associated with the proposed Project. Residual impacts are considered slight and acceptable.

Overall, it is considered that the Project will not cause unacceptable cumulative impacts.



Figure 5.1

Photomontage illustrating the view from near shore of the Black Point Power Station with the installation of CCGT Unit No.1 (Top) together with CCGT Unit No.2 (Bottom)

FILE: 0308057o.cdr
DATE: 07/04/2016

由龍鼓灘發電廠近岸處視點展示安裝一號聯合循環燃氣渦輪發電機組（上圖）及二號聯合循環燃氣渦輪發電機組（下圖）的合成照片

Environmental
Resources
Management



5.12 *CULTURAL HERITAGE*

The proposed Project Site is of no terrestrial built heritage and archaeological potential. The Project will have no unacceptable impact on terrestrial built heritage and archaeological resources. No marine works will be required for construction and operation of CCGT Unit No.1 and therefore no marine archaeological impact is expected to occur during its construction and operation. No mitigation measures are considered necessary.

CCGT Unit No.2 will involve minor marine dredging works. The proposed dredging areas have no marine archaeological potential; therefore, no marine archaeological impact is expected to occur during the Project construction and operation. No mitigation measures are considered necessary.

There are no planned projects that could have cumulative cultural heritage impacts with the Project.

5.13 *HEALTH*

The Project's contributions to the criteria pollutants and TAP are insignificant. There is no unacceptable health risk associated with the emission of the criteria pollutants during operation of the one or two additional CCGT units. The predicted maximum concentrations (including background) of all TAP for the operation of one or two additional CCGT units comply with the respective assessment criteria for evaluating acute non-carcinogenic health risk and chronic non-carcinogenic health risk at the most exposed HSR. The acute hazard quotient calculated for each of the sensitive HSR is less than 1, indicating that the cumulative short-term non-carcinogenic health risk is acceptable. The chronic hazard quotient at the most exposed HSR for respiratory impacts showed no difference between the current situation and that with the Project sources added, indicating that the risk of chronic impact with the Project operating is not increased and no unacceptable chronic non-carcinogenic health risk is anticipated. The predicted total incremental carcinogenic risks at all HSRs are smaller than 1×10^{-6} , thus the increase in risks are within the acceptable range according to the cancer risk guidelines. Overall, no unacceptable health impacts associated with the operation of the Project is anticipated.

5.14 *ENVIRONMENTAL MONITORING AND AUDIT*

The EIA Study of the Project has been demonstrated to comply with the *EIAO-TM* requirements. Actual impacts during the construction works will be monitored through a detailed EM&A programme. Full details of the programme are presented in the *EM&A Manual* associated with the *EIA Report*. This programme will provide management actions and supplemental mitigation measures to be employed should any impacts arise, thereby ensuring the environmental acceptability of the construction and operation of this Project.

5.14.1 *Construction Phase*

During construction phases of both CCGT units, regular site inspections and audits will be conducted to confirm effective and timely implementation of the recommended mitigation measures.

Water quality monitoring will be necessary to assess the effectiveness of measures implemented to mitigate potential construction impacts for CCGT Unit No.2. During marine dredging works, marine water quality monitoring is recommended. Monitoring of an exclusion zone for the presence of marine mammals around the dredging areas is recommended as a precautionary measure.

5.14.2 *Operation Phase*

During operation of the Project, it is recommended to continuously monitor and record the levels of criteria air pollutants of the exhaust gas streams emitted from the stack of the CCGT units. Continuous monitoring of ambient concentrations of SO₂, NO and NO₂ will be continued at the current CLP's air quality monitoring stations. Regular monitoring of effluent quality as well as marine water monitoring during the first year of Project commissioning are recommended. Marine water quality monitoring would also be required for maintenance dredging at cooling water intake and discharge facilities for CCGT Unit No.2.

This EIA Study has critically assessed the overall acceptability of the environmental impacts likely to arise as a result of the construction and operation of the Project. It has demonstrated the acceptability of any residual impacts from this Project and the protection of the population and environmentally sensitive resources. The EIA Study concluded that, with the implementation of the recommended mitigation measures, the Project would be environmentally acceptable and in compliance with the relevant assessment standards/criteria of the *EIAO-TM*. 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.

The implementation of this Project is in line with the Government's objective of improving air quality and reducing carbon intensity of Hong Kong, and is consistent with the Government's strategy of increasing the use of natural gas for local power generation. The Project also increases electricity generation capacity, allowing the increasing electricity demand to be met and adequate reserve capacity to be maintained to allow a reliable supply of electricity. The Project is also a key step to ensure sufficient gas-fired generation capacity would be available for the preparation for gradual retirement of existing coal-fired generation units at CPPS and supporting long term air quality improvement in Hong Kong.

This EIA Report has been prepared in full compliance with the requirements of the EIA Study Brief and the EIAO-TM. 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 time of preparing this EIA Report, it is CAPCO's intention to apply for the Environmental Permit for the construction and operation of one additional gas-fired generation unit. Any formal proposal by CLP/CAPCO to proceed with building any additional gas-fired generation capacity, however, requires further analysis as such investment decision is dependent upon a host of factors including the rate of demand growth, environmental requirements, technical feasibility, the economic merits of the Project and HKSAR Government approval. The submission of this Environmental Impact Assessment (EIA) Report and the said Environmental Permit application (s) does not amount to a commitment by or on behalf of CLP and/or CAPCO to proceed with the Project.

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