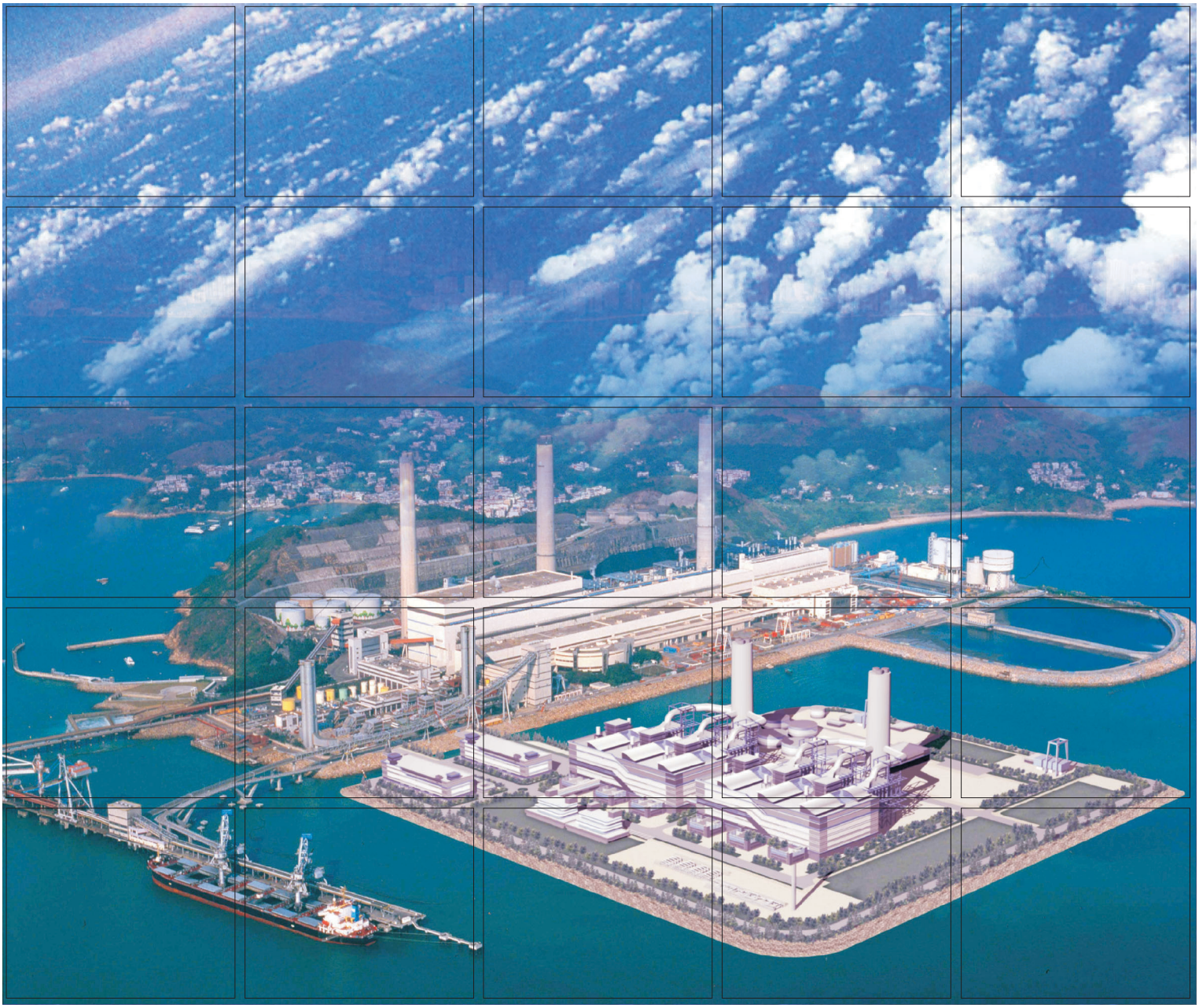

香港電燈有限公司
The Hongkong Electric Co., Ltd.

Lamma Power Station Units L4 & L5 Flue Gas Desulphurization Plant Retrofit Project
南丫發電廠第四及五號機組烟氣脫硫裝置加裝工程：

Executive Summary
行政摘要

February 2006
二零零六年二月

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EXECUTIVE SUMMARY
行政摘要

The Hongkong Electric Co Ltd
香港電燈有限公司

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February 2006
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For and on behalf of 代表 ERM-Hong Kong, Limited 香港環境資源管理顧問有限公司	
Approved by: 批核 :	鄧瑋庫 (Steven Duckworth)
Position: 職位 :	Deputy Managing Director 副董事總經理
Date: 日期 :	2 February 2006 二零零六年二月二日

CONTENTS

1 INTRODUCTION

1.1 BACKGROUND TO THE STUDY

The Hongkong Electric Company, Limited (HEC) is planning to retrofit the two existing 350MW coal-fired generating Units L4 and L5 of Lamma Power Station with Flue Gas Desulphurisation (FGD) plant for reducing sulphur dioxide emissions in support of Government policy to improve the air quality of the Pearl River Delta.

It is proposed to adopt the "Wet Limestone-Gypsum" process for the FGD plants, a technology which is already used in, and proved effective and reliable for the existing coal-fired units L6, L7 & L8.

The proposed FGD process involves directing the flue gas from the boilers of Units L4 and L5 to FGD plants, in which limestone slurry is introduced to react with flue gas for removal of SO_2, before discharging to the chimney. As a result, besides a significant reduction of the SO_2 concentration in the flue gas, the temperature of flue gas entering the chimney will be reduced, waste water from the FGD absorber will be produced and gypsum will also be produced as a by-product.

1.2 PURPOSE AND SCOPE OF THE EIA

The Project is classified under EIAO as a material change to an exempted designated project, the Lamma Power Station as a *Public Utility Electricity Power Plant* (Item D.1 Part I Schedule 2 of the EIAO Chapter 499), because of the changes induced by the FGD operations to the types and quantities of emissions, wastes and effluents. In addition, the demolition of two existing Light Oil Tanks is a designated project under item 16 Part II (*Decommissioning Projects*) Schedule 2 of EIAO (i.e. *a store for oil with a storage capacity exceeding 200 tonnes*).

The main objective of this Environmental Impact Assessment (EIA) study is to provide a detailed assessment of the nature and extent of potential environmental benefits and impacts arising from the construction and operation of the Project in relation to the issues specified in the *EIA Study Brief* (No. ESB-133/2005), including air quality, noise, water quality, waste, land contamination and landscape and visual impacts.

2 PROJECT DESCRIPTION

2.1 PURPOSE AND NATURE OF THE PROJECT

Lamma Power Station has an installed capacity of 3,420MW comprising 3x250MW and 5x350MW coal-fire units, 1x365MW oil-fired combined cycle unit, 1x55MW and 4x125MW oil-fired open cycle gas-turbine units. The latest three 350MW coal-fired units, Units L6, L7 & L8, are equipped with FGD plants. The proposed retrofit project will include the installation of FGD plants with flue gas desulphurization efficiency of 90% for the two 350MW coal-fired Units L4 & L5 to reduce the overall SO_2 emissions from Lamma Power Station.

2.2 PROPOSED ADDITIONS, MODIFICATIONS AND ALTERATIONS

At present, the flue gas from Units 4&5 Boilers is directly discharged to the atmosphere via a 210 m high chimney. The retrofit work will involve demolishing the existing Nos. 4 & 5 Light Oil Tanks (each of 250m^3 capacity) and relocating some of the pipeworks located in front of the respective boiler to provide areas for installing FGD plant for each of Units L4 & L5. *Figures 2.1* & *2.2* show the location and the schematic of the proposed FGD plants.

The flue gas from the boiler will be directed to the FGD absorber inside which removal of SO_2 will take place by reaction with limestone slurry. After passing through the absorber, the treated flue gas will be heated up by a gas-gas heater to over 80ºC at boiler rated capacity and directed back to the existing chimney for discharge to the atmosphere.

As majority of the existing common limestone powder/gypsum handling and storage facilities for Units L6, L7 & L8 FGD plants have spare capacity to cater for two more FGD units, the additional equipment required for Units L4 & L5 FGD retrofits will be limited to the extension of the existing gypsum dewatering system.

The equipment to be installed for the proposed retrofit project for Units L4 and L5 includes:

- Two sets of FGD absorbers and associated ductworks
- Two sets of booster fans
- Two sets of gas-gas heaters
- FGD Switchgear and Equipment Building
- Gypsum dewatering system comprising two sets of hydrocyclones and belt filters

2.3 PROJECT PROGRAMME

The targeted key dates for the proposed FGD retrofit project are as follows:

- Commencement of demolition of Light Oil Tanks April 2006
- Commencement of civil works September 2006
- Commencement of plant erection for L5 Unit October 2007
- Commencement of plant erection for L4 Unit August 2008
- Commercial operation of L5 FGD Plant July 2009
- Commercial operation of L4 FGD Plant April 2010

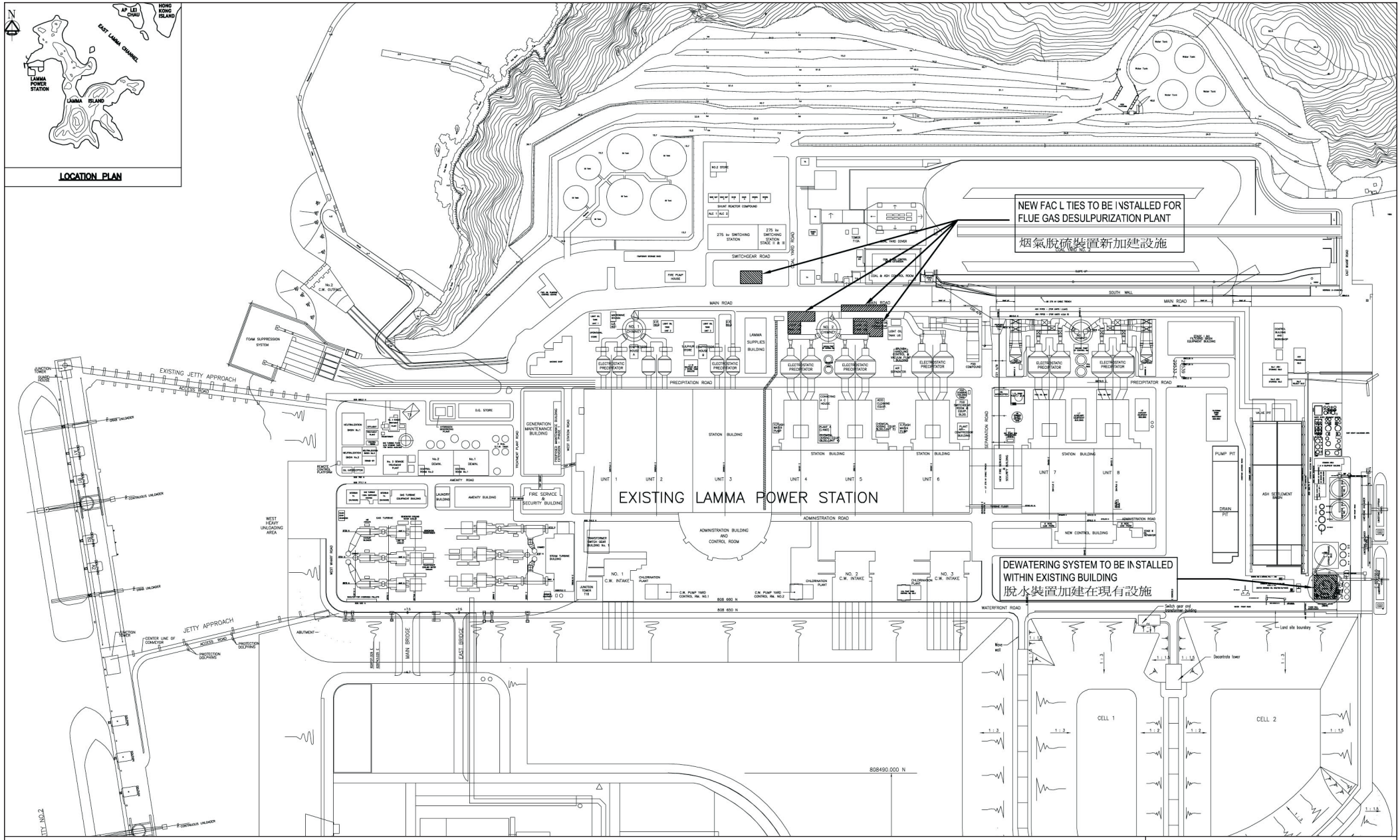

Figure 2.1

Location of Proposed New Facilities for L4 & L5 FGD Plant

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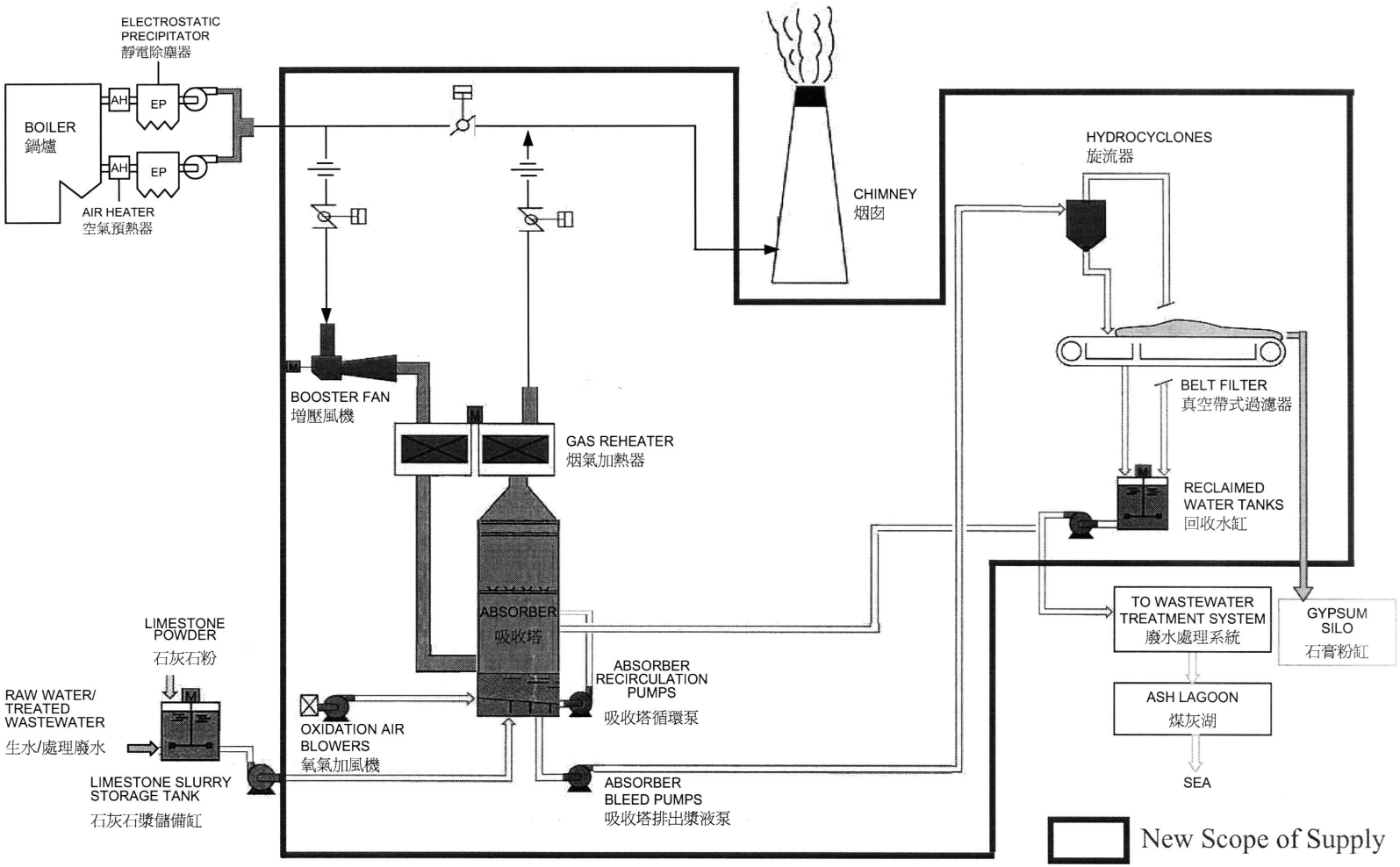

Figure 2.2

Schematic Diagram of Proposed FGD Plant

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DATE: 16/12/2005

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3 ENVIRONMENTAL IMPACTS

The nature and extent of the environmental impacts associated with the construction and operation phases of the Project are summarised below.

3.1 LAND CONTAMINATION

For installation of the FGD plants, two above ground oil storage tanks (No. 4 and No. 5 Light Oil Tanks) with associated pipelines and one oil separation sump are to be demolished to provide space for installation of the FGD plants. Contamination Assessment Plan (CAP) has been prepared and approved by the EPD in November 2005 and site investigation (SI) was conducted in the area adjacent to the tanks and oil separation sump. The SI results indicated that total petroleum hydrocarbon (TPH) was detected at one soil samples and five groundwater samples exceeding Dutch B guideline for mineral oil. Results of the SI and recommendations have been reported in the Contamination Assessment Report (CAR) and the Remedial Action Plan (RAP) (see Annex of the EIA Report). Therefore, remedial measures and procedure for TPH contamination are recommended in the RAP.

With the implementation of the remedial measures in RAP, no land contamination would be anticipated.

3.2 AIR QUALITY

Dust nuisance is the key concern during the construction of the Project. Demolition of the existing Nos 4 and 5 Light Oil tanks with each of 250m^3 storage capacity, civil works of the retrofitting of FGD Plants to two existing 350MW coal-fired Units L4 & L5 are the major construction works of the Project. Due to small scale of the Project and with the implementation of the recommended dust suppression measures stated in the *Air Pollution Control (Construction Dust) Regulation*, no dust impact is anticipated. In addition, only limited number of diesel-driven equipment will be operated on site, therefore, impact from construction equipment is not expected.

For the operational air quality assessment, the re-assessment of the previous wind tunnel modelling data has confirmed that the FGD retrofit project at units L4 and L5 of the Lamma Power Station will lead to significant reductions of the worst-case hourly SO_2 concentrations for most ASRs throughout the area studied.

Other environmental benefit of the FGD retrofit includes the reduction of the particulate matter (PM) emissions resulted from the wet scrubbing process of the FGD plant.

The NO_x emissions will not be reduced nor increased by the project, however changing of the stack exhaust parameters may result in a re-distribution of NO_x in the vicinity of the power station. The cumulative concentrations of

NO_2 after the retrofit have been estimated and their AQO compliance demonstrated for at all ASR locations.

Based on the impact assessment, the current monitoring programme for the Lamma Power Station can cover the Project and no additional EM&A measures are required.

3.3 WATER QUALITY

Construction runoff and sewage effluents generated from the workforce are the potential sources of water quality impacts during construction. Assessment results indicate that no unacceptable water quality impacts will arise from the construction activities provided that the recommended mitigation measures are implemented.

Potential source of impacts to water quality from the operation of the FGD plants are as a result of filtrate generated from the dewatering of gypsum slurry. Since the existing WWTP has spare capacity to cater for the additional wastewater produced from the proposed retrofit project, it is expected that effluent from the WWTP to the Ash Lagoon will meet the requirements in the *WPCO* licence for the Ash Lagoon Decantrate Tower. Thus, no water quality impact arising from the operation of the FGD plants are anticipated.

Based on the impact assessment, the current monitoring programme for the Lamma Power Station can cover the Project and no additional EM&A measures are required.

3.4 WASTE MANAGEMENT

The key potential impacts during the construction phase are related to management of demolition materials, excavated materials and construction waste. With the implementation of the mitigation measures recommended, the potential environmental impacts arising from storage, handling, collection, transport and disposal of wastes should be able to meet the criteria specified in the *EIAO-TM*. Hence, no unacceptable waste management impact is anticipated.

All the additional gypsum (about 46,000 tonnes per year) and sludge (about 1,200 tonnes per year) will be generated and reused in Hong Kong and/or in Mainland China and no disposal is required. With the implementation of the recommended mitigation measures, the potential environmental impacts associated with the storage, handling, collection, transport and disposal of a small quantity of industrial and chemical wastes arising from the operation of the two new FGD units will meet the criteria specified in the *EIAO-TM* and no unacceptable waste management impact is anticipated.

3.5 *NOISE*

The proposed Project is in small scale. Additionally, in the view that the residential developments are shielded from construction noise to varying degrees by the intervening hill (Kam Lo Hom) and the existing plants, and considerable separation distance between the NSR and the Project, the noise generated during the construction stage is not expected to be a concern. . However, in order to ensure that the construction noise levels at the NSRs controlled within the relevant criteria, good site practice and noise management is recommended during the construction phase.

Based on a worst-case scenario, the operational noise levels due to additional equipment will comply with the noise criterion and will have insignificant contribution to the cumulative operational noise of the Lamma Power Station. Therefore, the plant noise associated with the retrofit plant is not expected to give rise to unacceptable environmental impacts.

In addition, most of the noise sources associated with the retrofit project will be housed within individual acoustic enclosure to minimise the noise impact to the environment.

In view of the anticipated insignificant noise impact in both construction and operational phases, additional noise monitoring work for this Project is considered not necessary.

3.6 *PROJECT VISIBILITY*

The proposed retrofit works will not have any negative impact on the surrounding landscape, and will have a very low visibility for the following reasons:

- The location for the proposed retrofit works is within a large existing industrial facility;
- There will be no impacts on the surrounding landscape area;
- The new infrastructure will be finished to complement the existing industrial surroundings;
- The relatively small scale of the retrofit works within the existing facility means that the works will have a low visibility.

The Project will result in significant reductions of the SO_2 and particulate emissions which will lead to improvements of the local and regional air quality.

The detailed impact assessment concluded that both during the construction and operational phases, no adverse environmental impacts are envisaged in the areas of air quality, water quality, waste management, noise, landscape and visual impacts.

Planned demolition of two above ground oil storage tanks with associated pipelines and one oil separation sump raised concerns of possible land contamination issues. Their investigation is separately reported in the Contamination Assessment Plan (CAP), Contamination Assessment Report (CAR) and Remediation Action Plan (RAP) that are included in Annexes to the EIA Report.

香港電燈有限公司

南丫發電廠第四及五號機組烟氣脫硫裝置加裝工程：
行政摘要

二零零六年二月

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目錄

1 引言

1.1 項目背景

爲支持政府改善珠江三角洲空氣質素的政策，香港電燈有限公司（以下簡稱“港燈”）計劃於南丫發電廠的第四及五號機組（兩台現有的350兆瓦燃煤機組）加裝兩台烟氣脫硫裝置。

港燈建議爲第四及五號機組加裝“濕潤式石灰石／石膏”程序的烟氣脫硫裝置。此烟氣脫硫技術已採用於現時南丫發電廠第六、七及八號機組，經過驗證爲最有效及可靠的程序。

建議中的烟氣脫硫裝置加裝工程需要將烟氣從第四及五號機組鍋爐送入烟氣脫硫裝置，與石灰石漿產生脫硫反應後經現有的烟囪排放。烟氣脫硫裝置除了可以大大減低烟氣中的二氧化硫外，烟氣進入烟囪的溫度亦會降低，而烟氣脫硫裝置吸收塔亦會產生廢水及石膏副產品。

1.2 環境影響評估的目的和範圍

由於烟氣脫硫裝置運作期間會改變氣體排放，廢物和廢水的類型和數量，因此，本改建計劃定爲獲豁免的指定工程項目的實質改變（根據《第499章：環境影響評估條例》附表2 – 第I部項目D.1，公用事業電力廠，即現時的南丫發電廠，是指定的工程項目）。此外，根據《第499章：環境影響評估條例》附表2 – 第II部項目16(即貯存量超過200公噸的油類倉庫)，兩台現有的輕油缸拆卸工程亦屬指定工程項目。

此項環境影響評估〔環評〕的目的是爲本工程項目在施工及運作階段所產生的潛在環境影響及益處作詳細的評估。根據環境影響評估概要（編號ESB-133/2005）中詳述的評估範疇包括空氣質素、噪音、水質、廢物管理、土地污染和景觀及視覺影響評估。

2 工程項目說明

2.1 工程項目說明

南丫發電廠總發電量爲3,420兆瓦，分別爲三台250兆瓦及五台350兆瓦燃煤機組，一台365兆瓦燃油聯合循環機組，及一台55兆瓦及四台125兆瓦燃油氣輪發電機組。最近期的三台350兆瓦燃煤機組，即第六，七及八號機組已裝設有烟氣脫硫裝置。建議中的加裝工程會包括安裝烟氣脫硫效率達百分之九十的烟氣脫硫系統於第四及五號350兆瓦燃煤機組，從而減少南丫發電廠總二氧化硫排放。

2.2 擬議的增補、改良及修改工程

現時第四及五號機組鍋爐烟氣是經高210米的煙囪直接排放到大氣。是項加裝工程將現有第四及五號輕油缸（每台爲250立方米）拆卸及將在鍋爐前相關的管道改位，務求騰出空間供第四及五號機組安裝烟氣脫硫裝置。圖2.1及2.2顯示擬建烟氣脫硫裝置的位置及流程。

鍋爐烟氣會被引入到烟氣脫硫吸收塔內與石灰石漿發生化學作用，除去烟氣中的二氧化硫。經處理的烟氣會由烟氣加熱器加熱至80°C (鍋爐額定功率) ，再送到現有的烟囪排出。

現時第六，七及八號機組烟氣脫硫裝置的共用石灰石/石膏儲存及處理裝置在設計上基本可滿足五台350兆瓦機組，建議中第四及五號機組烟氣脫硫裝置加裝工程的新增設備只會局限於擴建現時的石膏脫水系統。

建議中的烟氣脫硫系統加裝工程將安裝的新增設備，包括:

- 兩台吸收塔及相連管道
- 兩台增壓風機
- 兩台烟氣加熱器
- 烟氣脫硫開關裝置及設備大樓
- 石膏脫水系統，包括兩台旋流器及真空帶式過濾器

2.3 規劃大綱

這項建議中的烟氣脫硫裝置加裝工程的預訂竣工日期如下:

- 第四及五號輕油缸拆卸工程動工 2006年 4月
- 土木工程動工 2006年 9月
- 第五號機組烟氣脫硫裝置安裝 2007年 10月
- 第四號機組烟氣脫硫裝置安裝 2008年 8月
- 第五號機組烟氣脫硫裝置開始運作 2009年 7月
- 第四號機組烟氣脫硫裝置開始運作 2010年 4月

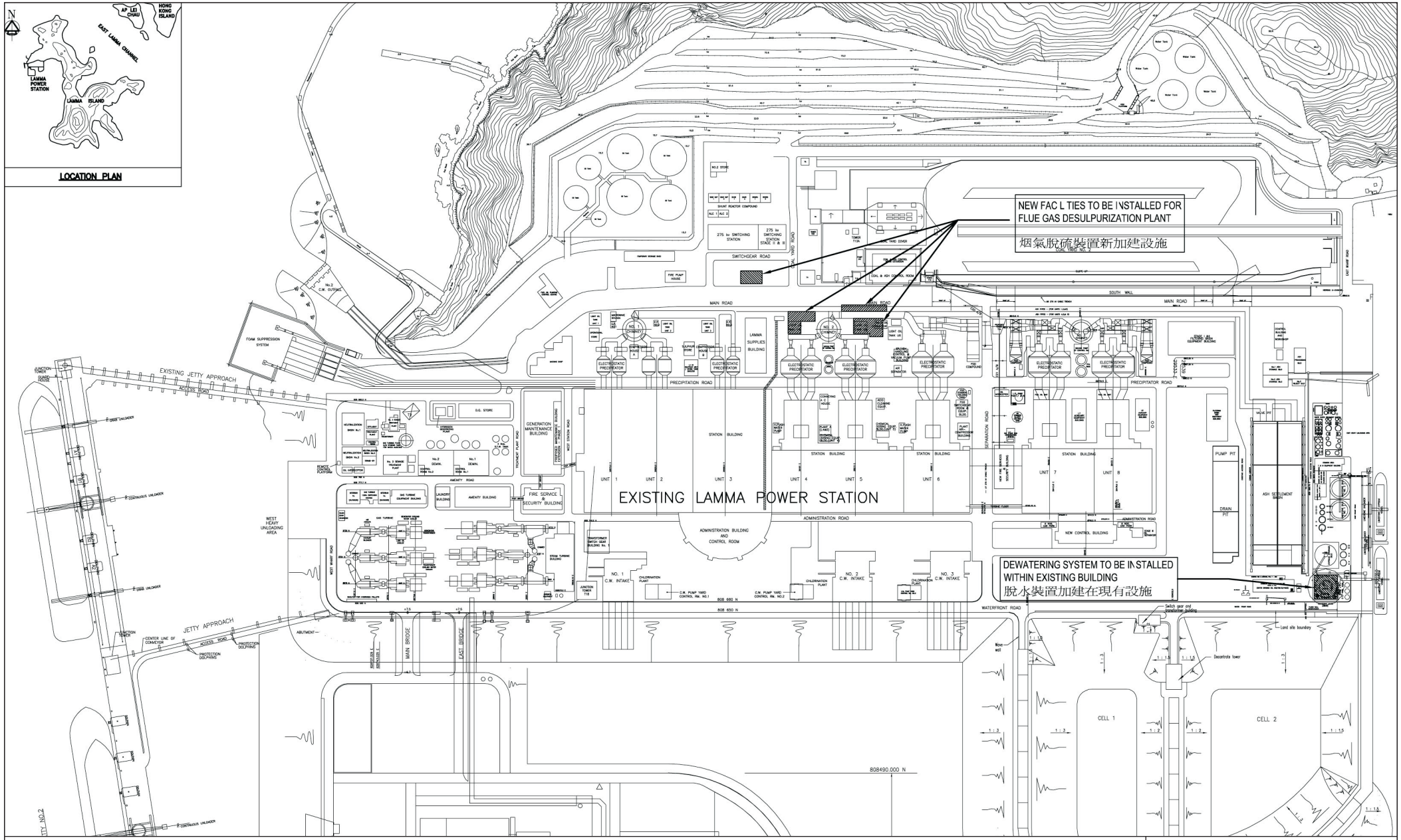

圖 2.1

第四及五號機組擬建烟氣脫硫裝置新設施的位置圖

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DATE: 22/12/2005

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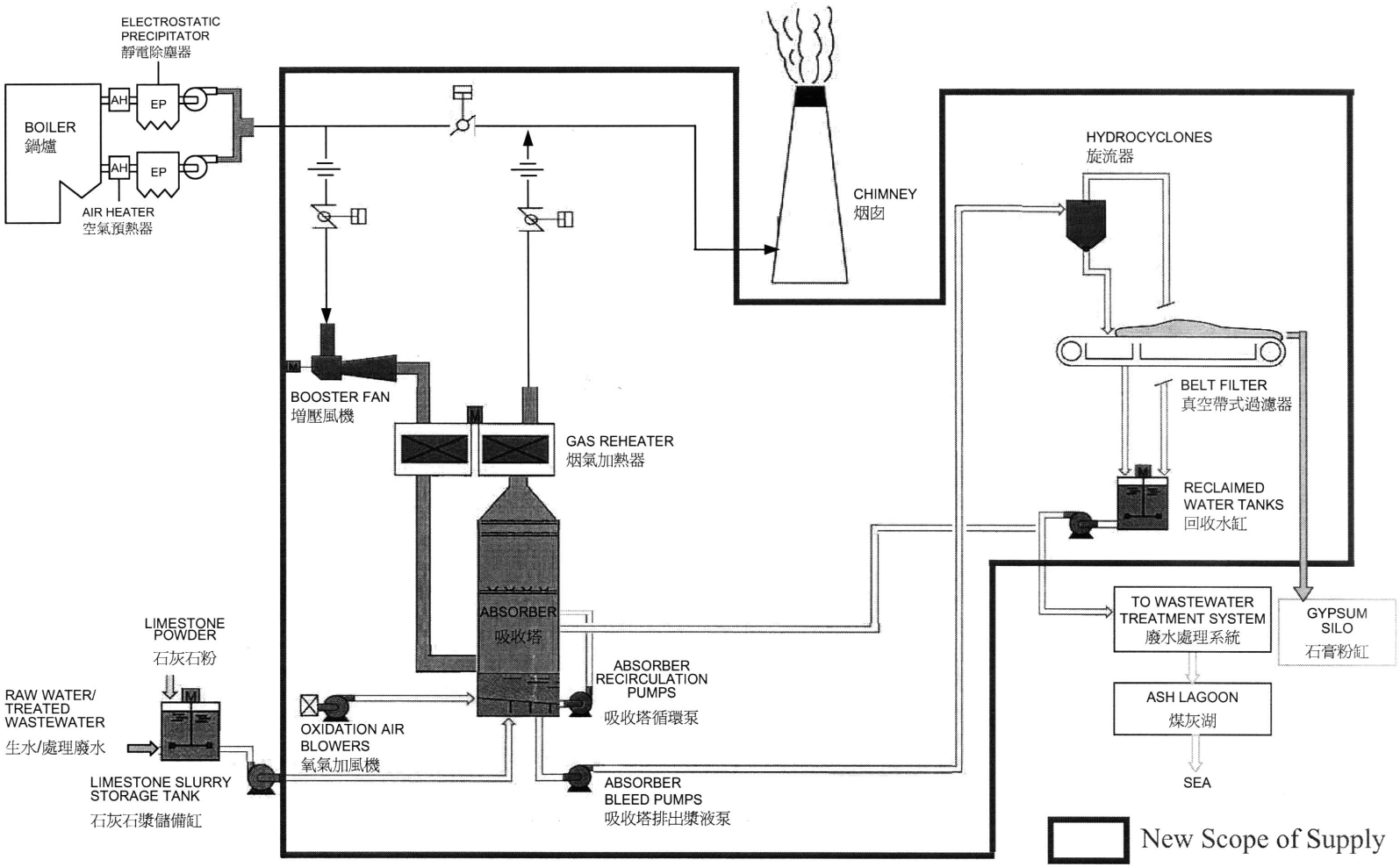

圖 2.2

擬建烟氣脫硫裝置加裝的流程圖

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DATE: 22/12/2005

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3 環境影響

下文摘述了本工程項目在施工和運作階段造成的環境影響性質和範圍。

3.1 土地污染

兩個地面儲油缸（4號及5號輕油缸）及相關的油管及一個隔油池將會清拆提供空間作安裝烟氣脫硫裝置。污染評估計劃書已經預備及在2005年11月得到環保署審核並已在油缸及隔油池附近地方進行土地勘察。土地勘察的結果顯示在其中一個土壤樣本及五個地下水樣本的石油碳氫化合物（TPH）超過荷蘭礦物油“B”等的標準。相關的調查已經在污染評估報告及整治計劃書內詳述（見環評報告的附錄）。因此在整治計劃書內建議一系列針對石油碳氫化合物污染的整治方法及程序。

若進行在整治計劃書內建議的整治方法，預計本工程在施工階段不會造成土地污染。

3.2 空氣質素

塵埃影響是施工階段的主要影響。清拆現有的的４號及５號輕油缸〔250立方米儲存容量〕及烟氣脫硫裝置加裝的相關土木工程是本工程項目的主要建築工序。由於工程項目規模細小及在工程中會執行空氣污染管制（塵埃）條例內的滅塵措施，因此預計不會產生塵埃影響。並且，在工地上只有有限數量的建築機器同時運作，因此建築機器也不會對空氣質素造成不良影響。

運作階段的空氣質素評估是參考以前從風洞模型收集的數據作重新評估，結果確定南丫發電廠L4及L5機組加裝烟氣脫硫裝置後，在最壞的情況下，在研究範圍內的大部份空氣敏感受體（ASRs）的二氧化硫濃度將會有明顯減少。

加裝烟氣脫硫裝置亦會帶來其他對環境有好處包括由烟氣脫硫裝置的濕式洗滌器減低顆粒性物質的排放。

本工程項目不會增加或減少氮氧化物的排放。但改變廢氣排放的參數可能導致電廠附近環境中的氮氧化物會有重新分佈。加裝工程後的累積二氧化氮濃度在環評中已作評估並證明在所有空氣敏感受體（ASRs）能達致空氣質素指標。

根據影響評估結果，南丫發電廠現行的環境監察計劃已經可以涵蓋本工程項目，因此將不需要額外的環境監察及審核措施。

3.3 水質

在施工階段，地面逕流及工人所產生的生活污水可能產生水質污染，評估結果顯示只要進行所建議的緩解措施，施工工序將不會引致不能接受的水質影響。

由石膏漿脫水過程所產生的濾液可能會造成水質污染。但現時的污水處理系統有足夠的備用容量承接因擬議加裝工程所產生的額外污水，因此，預計由污水處理系統排至煤灰湖的污水將會符合煤灰湖潭水塔的水質污染管制條例內的牌照要求。因此在加裝烟氣脫硫裝置後之運作並不會對水質造成影響。

根據影響評估結果，南丫發電廠現行的環境監察計劃已經可以涵蓋本工程項目，因此將不需要額外的環境監察及審核措施。

3.4 廢物管理

於建築期間所產生廢物的主要影響包括拆建物料、開鑿物料及建築廢物的管理。實行所建議的緩解措施將使儲存、處理、收集、運送及棄置廢物時所產生的潛在環境影響符合環評條例中的標準。

所有額外產生的石膏（每年產生約46,000噸）及淤泥（每年產生約1,200噸）將會於香港及／或中國再用，而無須棄置。只要實行所建議的緩解措施，因兩台新的烟氣脫硫裝置運作階段所產生的少量工業及化學廢物的儲存、處理、收集、運送及棄置，將不會造成潛在的環境影響及符合環評條例中的標準。

因此，預計於建築及運作期間的廢物處理將不會產生任何影響。

3.5 噪音

建議工程屬於小型的加裝工程。再者，由於週遭的民居受到中間的山脊（禽螃礴）及現有設備所阻擋，並加上週遭的民居和工程相距甚遠，建築階段所產生的噪音影響將不會對居民造成影響。爲了確保能控制在易受噪音影響的受體的建築噪音符合有關的標準，建議在施工階段，實施良好工地管理及噪音管理。

根據最壞情況，附加的設備所產生的噪音符合噪音標準，並不會對現時南丫發電廠運作階段的噪音構成累積影響。因此，加裝工程所產生的噪音將不會造成不能接受的環境影響。

並且大部份有關本工程的噪音源將個別加上隔音罩以達致減低對環境的噪音影響。

預計於建築及運作階段所產生的噪音影響極輕微，故這工程並不需要附加的噪音監察。

3.6 工程項目的顯眼程度

所建議的加裝工程對週遭景觀將不會有任何負面的影響，亦非常不顯眼，因爲：

- 所建議的加裝工程是在現有的工業設施中進行；
- 對於週遭的景觀範圍並無影響；
- 新的建設將會被加以修飾以配合周圍現有的工業環境；
- 加裝工程的規模相對較小，故此不顯眼。

4 總結

本工程項目能大大減低二氧化硫和微粒的排放，藉以改善本區及區域的空氣質素。

詳細的影響評估總結本工程項目在施工和運作階段，不會對空氣質數、水質、廢物管埋、噪音和景觀造成不良的影響。

計劃拆卸兩台地面輕油缸及相關的油管和一個隔油池可能會引致土地污染。相關的調查已經在污染評估計劃書，污染評估報告和整治計劃書內詳述，並包括在環境影響評估報告的附錄內。