Agreement No. CE 11/2015 (HY)
Technical Study on Transport Infrastructure at Kennedy Town for Connecting to East Lantau Metropolis - Feasibility Study

Explanatory Note to be read in conjunction with the Report on Preliminary Traffic and Transport Impact Assessments (Final) and the Final Report

Final Report

<u>Explanatory Note to be read in conjunction with the Report on Preliminary Traffic and Transport Impact Assessments (Final) and the Final Report</u>

Preamble

1. *The Report on Preliminary Traffic and Transport Impact Assessments (Final) (the "RPTTIA") and the Final Report (the "FR") were completed in December 2016 and November 2017 respectively under the Agreement No. CE 11/2015(HY) – Technical Study on Transport Infrastructure at Kennedy Town for Connecting to East Lantau Metropolis – Feasibility Study (the "Study").*

2. *The RPTTIA and the FR contain certain information relating to incomplete analysis, research or statistics, where the disclosure of such information could produce a misleading impression. Clause 2.13.2 of the "Code on Access to Information – Guidelines on Interpretation and Application" (the "Guidelines") provides –*

    > *"The provision in paragraph 2.13(a) of the Code[1] recognizes that departments may withhold information relating to incomplete analysis, research or statistics where the incompleteness could produce a misleading impression. Departments may however decide to release this type of information if it is possible for the information to be accompanied by an explanatory note explaining the ways in which it is defective."*

3. *In view of the public concern on the content of the RPTTIA and the FR, having balanced the public interest in disclosure of the information against any harm or prejudice that could result, the Civil Engineering and Development Department (CEDD), having consulted concerned departments, has decided to release the information including, inter alia, the various planning data, parameters and assumptions adopted in forecasting the traffic and transport condition of year 2041 as well as the corresponding forecast results under the Study, although such information, depicted in the RPTTIA and the FR, are obsolete, outdated, relating to incomplete analysis/ research or no longer applicable as of today. Pursuant to Clause 2.13.2 of the Guidelines, this Explanatory Note is prepared to explain the ways in which this information is defective with a view to avoiding readers of the RPTTIA and the FR from having a misleading impression about the planning data, parameters and assumptions adopted and the corresponding forecast results depicted in the RPTTIA and the FR.*

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[1] It refers to the "Code on Access to Information".

Explanatory Note to be read in conjunction with the Report on Preliminary Traffic and Transport Impact Assessments (Final) and the Final Report

Explanatory Note

Summary of key information in the Preliminary Traffic and Transport Impact Assessments ("Preliminary TTIA") which is now outdated, obsolete, relating to incomplete analysis / research or not applicable as of today :

- The Preliminary TTIA adopted the Enhanced 2011-based Territorial Population and Employment Data Matrix ("TPEDM"), which was compiled on the basis of total population projection of about 8.47 million by 2041 released in July 2012 by the Census and Statistics Department ("C&SD"), whereas the latest population projection released by C&SD in September 2017 is about 8.21 million by 2041.
- The Preliminary TTIA adopted a population total of close to 9.5 million for 2041.
- Population and employment assumptions were made without the support of land use proposal and detailed planning parameters.
- The highway and railway networks adopted are different from the new strategic transport networks proposed under the Lantau Tomorrow Vision (LTV).
- The Preliminary TTIA assumed that 60% of housing units at the East Lantau Metropolis (ELM) was public housing, vs 70% on Kau Yi Chau Artificial Islands as announced in the 2018 Policy Address.
- The employment opportunities assumed for ELM under the Preliminary TTIA are less than that on the Kau Yi Chau Artificial Islands under the LTV.

1. Readers of the RPTTIA and the FR should note that the primary objectives of the Study are to identify possible technically feasible schemes for the Transport Infrastructure ("TI") (which means new or upgrading of existing highway and railway infrastructure works) linking the western Hong Kong Island and the proposed ELM near Kau Yi Chau, and assess the preliminary impacts on the existing, planned and potential developments at Kennedy Town due to the TI.

2. The Preliminary TTIA, carried out at the initial phase of the Study, was conducted on the basis of various assumptions on the broad development parameters, population, employment level and development phasing of the ELM as well as the total population of

Hong Kong made at the time when the Preliminary TTIA was carried out in 2015 and 2016.

3. The information which is now outdated, obsolete, relating to incomplete analysis/ research or not applicable as of today includes but not limited to the following:

(a) Being the latest version at the time of the Study, the Enhanced 2011-based Territorial Population and Employment Data Matrix ("TPEDM") was adopted in the Preliminary TTIA. It was compiled on the basis of the total population projection (about 8.47 million by 2041) released in July 2012 by the C&SD. Further, its assumptions, including future territorial population, employment structure, economic growth as well as the land use patterns reflecting a set of preferred options of future land use development current at the time of compilation, are subject to changes in light of the results of latest planning studies from time to time. In particular, the latest population projection released by C&SD in September 2017 is about 8.21 million by 2041.

(b) When forecasting the traffic and transport condition of year 2041, the population total for the year 2041 adopted in the Preliminary TTIA was crudely taken as the summation of the territory-wide population of the Enhanced 2011-based TPEDM, and the planned population under the respective major development scenarios of the two proposed Strategic Growth Areas, namely the ELM and New Territories North (NTN)[2]. The territory-wide population (for the scenario with the NTN and full development of the ELM) adopted in the Preliminary TTIA was close to 9.5 million, which was used for the purpose of assessing the traffic impact only. When conducting further studies, due consideration has to be taken into account the potential reduction in population capacity due to replacement of inadequate housing (such as sub-divided units) by proper housing and substantial redevelopment of the aged building blocks into more liveable communities, as well as the general public's aspiration for larger living space and more public facilities.

(c) The population and employment figures for various projects adopted in the Preliminary TTIA were based on broad assumptions in 2016 which might be overtaken by events or outdated. References were also made to the new towns

[2] For ELM, a total population of 440,000 was assumed for the base case development scenario and a total population of 700,000 was assumed for the full development scenario. For NTN, a total population of 350,000 was assumed.

and rural townships, and core business districts at that time for the population and employment assumptions for ELM without the support of land use proposal and detailed planning parameters at that time.

(d) The data on land occupancy by port back-up and open storage uses adopted in the Preliminary TTIA was compiled from various sources of information including planning permission records and desktop estimation based on aerial photos. Owing to the method of compilation which was not supported by a field survey, the information serves to provide a broad picture of the distribution by such uses at a particular point in time for general reference rather than a meticulous record of such uses.

(e) The highway and railway networks adopted under the Study was based on the transport networks proposed under the "Hong Kong 2030+: Towards a Planning Vision and Strategy Transcending 2030" ("Hong Kong 2030+") promulgated in 2016. This is different from the new strategic transport networks proposed under the Lantau Tomorrow Vision ("LTV") as announced in the 2018 Policy Address.

(f) The Preliminary TTIA assumed that 60% of the housing units at the ELM was public housing. However, 70% of the housing units on the Kau Yi Chau Artificial Islands will be assumed as announced in the 2018 Policy Address, which also encourages more use of public transport for a liveable city.

(g) At the time of conducting the Preliminary TTIA, it was assumed that the ELM would have a total employment of about 206,400. Under the LTV, it is estimated that the Hong Kong's third Core Business District (CBD3) on the Kau Yi Chau Artificial Islands alone would have a minimum of about 200,000 jobs (excluding employment opportunities outside the CBD3). With more employment opportunities for the residents on the Kau Yi Chau Artificial Islands, there should be comparatively lesser traffic to the existing urban areas.

(h) As announced in the 2018 Policy Address, the Government will initiate a review on the toll policy based on the concept of congestion charging and the principle of efficiency first. The toll assumption scenario will be subject to more comprehensive analysis in future assessment, taking into account the prevailing toll policy.

4. Given that some information including the various planning data, parameters and assumptions adopted in the Preliminary TTIA are obsolete, outdated, relating to incomplete analysis/ research or no longer applicable as of today, the findings of the RPTTIA and the FR could not fully reflect the forecasting on traffic and transport condition of year 2041. The traffic demand may have been over-estimated. The Study has mentioned that the proposed transport infrastructures connecting between the ELM and other developments are required to be examined in future studies.

Civil Engineering and Development Department
May 2019

參閱初步交通及運輸影響評估報告及最終報告時需注意的註釋

序言

1. *根據合約編號 CE 11/2015（HY） - 連接堅尼地城與東大嶼都會的運輸基建技術性研究 - 可行性研究（"本研究"），分別於 2016 年 12 月和 2017 年 11 月完成初步交通和運輸影響評估報告及最終報告。*

2. *初步交通和運輸影響評估報告及最終報告包含部份與不完整或未完成的分析、研究或統計有關的資料，披露有關的資料可能會令人產生誤解。《公開資料守則 - 詮釋和應用指引》（《指引》）第 2.13.2 段條規定 –*

   《守則》[1] 第 2.13(a)段的條文認同，如與不完整或未完成的分析、研究或統計有關的資料會造成誤解，部門可不予披露。不過，如附上註釋解釋資料的不足之處，部門或可決定發放這類資料。

3. *鑑於公眾對初步交通和運輸影響評估報告及最終報告的內容表示關注，在平衡了披露資料的公眾利益，以及可能造成的任何傷害或損害後，土木工程拓展署經諮詢有關部門後，決定披露這些資料，其中包括：為預測 2041 年交通和運輸狀況所採用的各種規劃數據、參數和假設，以及研究中的相關的預測結果，儘管這些在初步交通和運輸影響評估報告及最終報告內的資料陳舊、過時、與不完整或未完成的分析/研究有關，或在現時已不再適用。根據《指引》第 2.13.2 段，本註釋旨在解釋該些資料的不足之處，以避免當讀者參閱初步交通和運輸影響評估報告及最終報告時，會對規劃數據，參數和假設，以及在初步交通和運輸影響評估報告及最終報告中相關的預測結果產生誤解。*

[1] 《守則》指《公開資料守則》

參閱初步交通及運輸影響評估報告及最終報告時需注意的註釋

註釋

在初步交通和運輸影響評估中屬陳舊、過時、與不完整或未完成的分析/研究有關，或在現時已不再適用的主要資料摘要如下:

- 初步交通和運輸影響評估採用《以 2011 年為基礎年期的全港人口及就業數據矩陣 (更新版)》 (下稱《2011 基年數據矩陣》)。該數據矩陣是根據政府統計處於 2012 年 7 月公布全港人口於 2041 年將達 847 萬的推算所編製，而政府統計處於 2017 年 9 月公布最新推算為全港人口於 2041 年將達 821 萬。
- 初步交通和運輸影響評估中採用全港人口於 2041 年接近 950 萬。
- 人口和就業假設是在沒有土地用途建議和詳細規劃參數的情況下提出。
- 研究採用的公路及鐵路網絡，與「明日大嶼願景」下提出的新策略運輸網絡不同。
- 初步交通和運輸影響評估假設東大嶼都會提供的房屋單位當中六成為公營房屋，而 2018 年施政報告公布的交椅洲人工島上的房屋單位當中則七成為公營房屋。
- 進行初步交通和運輸影響評估時假設東大嶼都會的就業機會，比「明日大嶼願景」下提出的交椅洲人工島的就業機會為少。

1. 當參閱初步交通和運輸影響評估報告及最終報告時需留意，本研究的主要目的，是提出可能在技術上可行的運輸基建方案(即新的或提升現有的公路和鐵路基礎設施工程)以連接香港島西部及擬議鄰近交椅洲的東大嶼都會，並評估運輸基建方案對堅尼地城現有、計劃及可能發展的初步影響。

2. 初步交通和運輸影響評估是在本研究的首階段時進行，並根據對東大嶼都會的概括發展參數、人口、就業水平和分階段發展，以及於 2015 至 2016 年進行初步交通和運輸影響評估時有關香港人口總數，所作出的各種假設。

3. 陳舊、過時、與不完整或未完成的分析/研究有關，或在現時已不再適用的資料包括但不限於以下資料：

    (a) 初步交通和運輸影響評估採用了在進行研究當時為最新的《以 2011 年

<u>**參閱初步交通及運輸影響評估報告及最終報告時需注意的註釋**</u>

為基礎年期的全港人口及就業數據矩陣 (更新版)》 (下稱《2011 基年數據矩陣》)。該數據矩陣是根據政府統計處於 2012 年 7 月公布的全港人口數據編製，當中推算全港人口於 2041 年將達 847 萬。此外，該數據矩陣的假設，包括未來的全港人口、就業結構、經濟增長，以及土地使用模式，以反映在編製當時認為可取的未來土地使用發展方案，可能需因應最新的規劃研究結果而需不時進行更改。需注意的是，政府統計處於 2017 年 9 月公布全港人口數據，推算全港人口於 2041 年將達 821 萬。

(b) 在預測 2041 年的交通和運輸狀況時，初步交通和運輸影響評估採用的 2041 年人口總數，粗略地以《2011 基年數據矩陣》中的全港人口，加上在主要發展情景中兩個擬議的策略增長區(即東大嶼都會和新界北[2])的規劃人口的總和計算。初步交通和運輸影響評估中採用的全港人口接近 950 萬（在新界北發展和東大嶼都會全面發展的情景中)。這人口數目只用於評估交通影響。在進行下階段研究時，會適當考慮若以合適房屋單位取代現時不足的住房（例如劏房）和為發展更宜居的社區而大量重建舊樓，以及公眾對更大生活空間和更多公共設施的渴望，而可能會導致人口容量減少。

(c) 初步交通和運輸影響評估中採用的各個發展項目有關的人口和就業數據是基於 2016 年的概括假設，這些假設可能已被其他事件所取代，或已過時。在當時沒有土地用途建議和詳細規劃參數支持的情況下，東大嶼都會的人口和就業假設主要參考了當時的新市鎮和鄉鎮，以及核心商業區。

(d) 初步交通和運輸影響評估採用的港口後勤和露天貯物用途的土地佔用數據是根據各種資料來源編製，包括規劃許可記錄，以及根據航空照片所作的桌面估算。由於該編製的方法並不包括實地調查，有關資料旨在提供在特定時間這些用途分佈的概括景象，以供一般參考而不是這些用途的詳細記錄。

(e) 本研究採用的公路及鐵路網絡是根據《香港 2030+：跨越 2030 年的規劃願景與策略》(《香港 2030+》) 在 2016 年提出的運輸網絡。這與 2018

[2] 本研究假設東大嶼都會在初步發展情景中的總人口為 440,000，而在全面發展情景中的總人口為 700,000。另外，本研究假設新界北發展的總人口為 350,000。.

<u>參閱初步交通及運輸影響評估報告及最終報告時需注意的註釋</u>

年施政報告公布的「明日大嶼願景」下提出的新策略運輸網絡不同。

(f) 初步交通和運輸影響評估假設東大嶼都會提供的房屋單位當中六成為公營房屋。而 2018 年施政報告公布的「明日大嶼願景」預計交椅洲人工島提供的房屋單位當中七成為公營房屋，亦鼓勵更多地利用公共交通工具以作為一個宜居城市。

(g) 在進行初步交通和運輸影響評估時，假設東大嶼都會的總就業人數約為 206,400。「明日大嶼願景」預計單是位於交椅洲人工島上的香港第三個核心商業區將可提供最少約 20 萬個就業機會 (不包括在第三個核心商業區外的就業機會)。由於交椅洲人工島上的居民將會有更多的就業機會，前往市區的交通量會相對較少。

(h) 正如 2018 年施政報告所公布，政府正準備按「擠塞徵費」為理念、「效率優先」為原則開展研究，檢討收費政策。假設的收費情景在未來的評估中需進行更全面的分析，包括考慮最新的收費政策。

4. 鑑於初步交通和運輸影響評估中採用的一些資料，包括各種規劃數據、參數和假設，屬陳舊、過時、與不完整或未完成的分析/研究有關，或在現時已不再適用，初步交通和運輸影響評估報告及最終報告的結果或不能完全反映有關於 2041 年的交通和運輸狀況的預測。交通需求可能被高估。本研究已提及，在未來的研究中，需要就連接東大嶼都會及其他發展的運輸基礎設施進行研究。

土木工程拓展署
2019 年 5 月

土木工程拓展署
Civil Engineering and Development Department
Civil Engineering Office

Agreement No. CE 11/2015 (HY)
Technical Study on Transport Infrastructure at Kennedy Town for Connecting to East Lantau Metropolis - Feasibility Study

Final Report

(Ref. R15-04)

AECOM ASIA COMPANY LIMITED

Please note that the Technical Study on Transport Infrastructure at Kennedy Town for Connecting to East Lantau Metropolis – Feasibility Study is a technical study of preliminary nature only aiming at identifying possible options for the Transport Infrastructure. All technical assessments have been conducted based on preliminary assumptions, which may include sensitive/confidential information related to other developments. All findings and recommendations of this study will be reviewed and updated in later stage of the project.

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1 INTRODUCTION

1.1 Background

1.1.1 Kennedy Town is located at the north-western end of Hong Kong Island and has been served by the West Island Line starting from end 2014. Capitalizing on the enhanced traffic connection, there is an opportunity to increase the housing supply and Government, institution and community facility in the western part of Kennedy Town to better meet the needs of the community. The waterfront area of Kennedy Town may also be enhanced with a view to reserve the waterfront area for public enjoyment.

1.1.2 As set out in the 2014 Policy Address, the Government will explore ways to further develop the eastern waters off Lantau Island and neighbouring areas, with a view to developing an East Lantau Metropolis (ELM) for accommodating new population. It will also become the third core business district in addition to Central and Kowloon East for promoting economic development and providing job opportunities.

1.1.3 New or upgrading of existing highway and railway infrastructure works (the "Transport Infrastructure (TI)") is required to provide transport link between western Hong Kong Island and the proposed East Lantau Metropolis near Kau Yi Chau. It will affect some areas of Kennedy Town including site(s) at Kennedy Town as well as its nearby area/nearshore reclamation of Hong Kong Island necessary for accommodating the Transport Infrastructure (KT Site). It may have direct interface with land use proposals and their implementation programme at Kennedy Town, and the adjacent areas of Hong Kong Island. The Transport Infrastructure should be properly planned to minimize the implications and restrictions on the land use proposals.

1.2 The Assignment

1.2.1 On 21 July 2015, Civil Engineering and Development Department (CEDD) commissioned AECOM Asia Company Limited (AECOM) as the Consultants to undertake a technical study (the "Study") on Transport Infrastructure at Kennedy Town for connecting to ELM (near Kau Yi Chau). The objective of the Study is to identify possible technically feasible schemes for the Transport Infrastructure taking into account the existing, planned and potential developments at Kennedy Town and potential interface with ELM and assess the preliminary impacts on the developments at Kennedy Town due to the Transport Infrastructure.

1.3 Scope of Final Report

1.3.1 This Final Report is a consolidated compilation of the key findings, recommendations and conclusions of the Study which consists of three phases, namely the Initial Phase, the Technical Assessment Phase and the Study Finalisation Phase.

1.3.2 The Initial Phase includes the establishment of a baseline profile of the Study Area.

1.3.3 In the Technical Assessment Phase, Preliminary Traffic and Transport Impact Assessments TTIAs, Evaluation of Different Structural Forms of Transport Infrastructure across Busy Fairways and Channels, Preliminary Feasibility Study on Transport Infrastructure for Highway Connection, Preliminary Feasibility Study on Transport Infrastructure for Railway Connection and Preliminary Assessment of Implications on Developments at Kennedy Town have been conducted to ascertain the preliminary technical feasibility of the Transport Infrastructure for both highway and railway connections between western Hong Kong Island and the ELM near Kau Yi Chau and assess the potential implications on the existing/ planned/ potential developments at KT Site.

1.3.4 This Final Report as well as the Executive Summary have been prepared in the Study Finalisation Phase.

1.3.5 The structure of this Report is outlined as below:

- Section 1 sets the background and introduces the scope of this Report;
- Section 2 presents the baseline opportunities, constraints and issues;
- Section 3 presents the findings from the preliminary traffic and transport impact assessments;
- Section 4 presents the possible structural forms of transport infrastructure across busy fairways and channels;
- Section 5 presents the possible alignment schemes for Transport Infrastructure for highway connection;
- Section 6 presents the possible alignment schemes for Transport Infrastructure for railway connection;
- Section 7 presents the outcome of the administrative route protection plans;
- Section 8 presents the preliminary assessment of implications on developments at Kennedy Town; and
- Section 9 concludes the Report and recommends the way forward.

1.4 Summary

1.4.1 A brief summary of the findings of the Study is presented in this section. Details of the Study can be referred to the relevant sections of this report.

Study Objectives

1.4.2 This Study aims to identify possible Highway and Railway Connection Schemes for Transport Infrastructure connecting ELM and Kennedy Town and assess the preliminary impacts on the developments at Kennedy Town due to the Transport Infrastructure. Scenarios for the Highway and Railway Connections are listed below:

- Highway Connection

  Scenario 1 - without linkage to the potential Route 4 Extension[1] (R4E)

  Scenario 2 - with linkage to the potential Route 4 Extension (R4E)

- Railway Connection

  Scenario 1 - extension of the Island Line

  Scenario 2 - a new railway line

1.4.3 Firstly, a baseline profile of the Study Area has been established by making reference to previous and on-going Government studies, public resources and research findings. Secondly, the opportunities, constraints and key issues for the Transport Infrastructure were identified.

[1] Extension of Route 4 from Kennedy Town to Aberdeen (previously known as Route 7)

1.4.4 The Transport Infrastructure will run across a number of fairways and channels, including but not limited to Southern Fairway and Western Fairway. The preliminary feasibility of different structural forms of Transport Infrastructure, including submarine tunnel and bridge options has been assessed. The pros and cons of various structural forms have been evaluated.

1.4.5 The Transport Infrastructure connecting ELM and Kennedy Town will include highway and railway connections. Various conceptual schemes of highway and railway connections under the Scenarios listed in 1.4.2 have been studied and the possible schemes have been discussed.

Structural Form

1.4.6 After in-depth comparison of different options in terms of their environmental, marine traffic and port operations impacts, cost and speed of construction, resistance to wind and seismic activities, safety of construction, flexibility of profile and vulnerability to damage, it is found that both tunnel and bridge are feasible structural forms for highway connection while only tunnel form would be feasible for railway connection.

1.4.7 The horizontal alignments for both highway and railway connections can be achieved by tunnel in the structural form of Immersed Tube Tunnel (IMT) or Tunnel Boring Machine (TBM). Both IMT and TBM will inevitably have different issues to be addressed, such as impacts on marine traffic during construction, land requirements at Kennedy Town, permanent reclamations within Victoria Harbour, etc. This Study identified these issues and recorded them for future studies, to ascertain the various temporary and permanent impacts and to determine whether there are surmountable or insurmountable issues as well as whether mitigation measures are available. From this Study, it has been found that both IMT and TBM options are technically feasible and the potential environmental impact, while it may be greater for IMT tunnel, could be acceptable[2]. In consideration of the requirements of Protection of Harbour Ordinance (PHO) and Housing, Planning and Lands Bureau Technical Circular (HPLB TC) No. 1/04, any new proposals should start with an assumption of zero reclamation within Victoria harbour. The IMT tunnel structural form would be able to achieve minimum reclamation within Victoria Harbour and also has a number of advantages relating to gradients, cross passage requirement, construction safety, construction cost and programme. It is therefore recommended that the IMT tunnel as one of the possible structural forms for the Transport Infrastructure across busy fairways and channels under this Study. The impact on marine traffic of IMT and TBM will need to be fully ascertained in future studies and both tunnel construction methods shall be re-visited taking into consideration the findings from a detailed Marine Traffic Impact Assessment and stakeholder consultations to look into any possible mitigation measures.

[2] Environmental impacts associated with the construction options of IMT and TBM will need to be assessed fully in a future Environmental Impact Assessment (EIA) study in order to identify the necessary environmental mitigation measures and to ascertain the environmental acceptability.

Possible Highway Connection Schemes

Possible Highway Connection Schemes

1.4.8 The possible highway connection schemes identified in the Study are summarized in the table below:

Option Reference No.			
Reference No.	**Scenario**	**Scheme**	**Option**
H1-1A	1 – without R4E	1 – offshore tunnel	A – North alignment (north of Green Island)
H1-1B			B – South alignment (south of Green Island)
H2-1A	2 – with R4E	1 – grade separated junction at PCWA (i.e. 3 westbound+3 eastbound lanes for TI & 2 westbound +2 eastbound lanes for R4E at KET)	A – R4E in bridge form
H2-1B			B – R4E in sub-sea tunnel form, separate portals
H2-3		3 – grade separated junction at PCWA & grade separated interchange outside Victoria Harbour (i.e.3 westbound +3 eastbound lanes for TI & 2 eastbound lanes for R4E at KET)	N/A

Scenario 1 - without linkage to the potential Route 4 Extension

1.4.9 With due consideration of Land Use Review on Western Part of Kennedy Town, PHO, marine aspect, etc., two possible options (H1-1A and H1-1B) are considered to be the possible options under the scenario without linkage to potential Route 4 Extension.

Scenario 2 - with linkage to the potential Route 4 Extension

1.4.10 In view of the discussions above and in accordance with HPLB Technical Circular No. 1/04, Possible Options H2-1A, H2-1B and H2-3 are considered as the possible options for further studies if Route 4 Extension is needed in the future. With the uncertainties for the possible options with Route 4 Extension due to their traffic performance, technical feasibility, marine traffic impacts and potential environmental impacts, the feasibility of those options is subject to further studies. However, future implementation of Route 4 Extension would be less preferable and more difficult if Possible Scheme H1-1 is adopted in the first place.

Possible Railway Connection Schemes

Possible Railway Connection Schemes

1.4.11 The possible railway connection schemes considered in the Study are summarized in the table below:

Reference No.	**Connection**	**Scenario**	**Scheme**
R1-1	R - Railway	1 – extension of existing ISL	1 – Station at Existing KET Station
R2-1		2 - new railway line with new station	1 – New station near Kwun Lung Lau (KLL)

Scenario 1 – Extension of the Island Line

1.4.12 If the railway connection of the Transport Infrastructure is formed by an extension of the existing Island Line (ISL) (Possible Scheme R1-1), it would be expected to run with 8-car Urban Railway Line (URL) trains and provide a through running service to the ELM, i.e. the ISL would be extended from the Kennedy Town Station (KET) to the ELM. The train service and operating hours would match those of the ISL service.

1.4.13 As this possible scheme is formed by the extension of the existing ISL from the KET Station, a new station is not required, only new tunnel infrastructure and associated facilities will be required such as ventilation building, etc. The catchment area of the existing ISL service would remain the same as there is no new station for this possible scheme.

1.4.14 From a passenger point of view, this option would be the most convenience as there is no need to interchange to another railway line, people travelling from the ELM on the ISL stay on the railway to reach various destinations on the north shore of Hong Kong Island. Passengers from the ELM could simply ride the ISL into the Central Business District (CBD) without changing trains. However, the URL train speeds are relatively slower compared to the District Lines and the train journey time will take slightly longer.

1.4.15 The construction of the ISL extension requires connecting the new tunnels to the existing WIL overrun tunnel, which is in operation. The construction of the connection and junction chamber with the existing overrun tunnel will be extremely difficult to build and is of very high risk due to the need to carry out the works in an operational environment. The poor ground conditions where the connections are to be made and the nearby building constraints make the construction works even more technically difficult.

Scenario 2 – A New Railway Line

1.4.16 This new railway line (Possible Scheme R2-1) could be designed as a District Line, and potentially form a strategic railway corridor route to North Lantau/Tuen Mun via the ELM as part of the LanDAC strategic railway infrastructure concept. The transport infrastructure could therefore be designed to meet the forecast patronage demands and use rolling stock with higher speeds (up to 130 km/h or more) to reduce the journey time and be more attractive to rail users.

1.4.17 The New Railway Line has the advantages over the Extension of the ISL in the following aspects:

- It is neither restricted by the capacity of the ISL nor the design standards such as speed, signalling system and rolling stock type, etc.;
- It does not need to make a connection and break-in to the WIL overrun tunnel which, based on preliminary study, would be very difficult and may impact on the existing railway in operation;
- The new station would potentially increase the catchment of the railway network in the Kennedy Town area;
- The connection to the existing KET Station is relatively simple by passenger adits; and
- Potential extension of the new rail line into other parts of Hong Kong Island.

1.4.18 From a passenger point of view, this possible scheme is less convenient than the direct extension of the ISL as passengers need to interchange at KET Station to the ISL.

1.4.19 The two possible scenarios for railway connection for the ELM to Kennedy Town should be brought forward for further investigation in the next stage of implementation.

Preliminary assessment of implications on developments at Kennedy Town

1.4.20 The potential impacts on the developments at Kennedy Town by the proposed highway and railway connection schemes have been assessed. The mitigation measures to minimize those impacts have been studied. The findings of the assessment are presented in this report.

1.4.21 At Kennedy Town, there are existing development which is a mixture of residential developments, local retail shops and industrial godowns and specialized facilities including a public mortuary. In recent years, Kennedy Town has experienced a major transformation sparked by the implementation of the new WIL. As the WIL commences operation in December 2014, it is expected that further mixed-use developments to capture the area's improved connectivity will escalate.

1.4.22 The Transport Infrastructure should be properly planned to minimize the implications and restrictions on the existing / planned / potential developments at Kennedy Town.

1.4.23 Administrative Route Protection Plans for the Transport Infrastructure at Kennedy Town Site have been proposed for further assessments with an aim to facilitate future planning to minimize the implications and restrictions on the existing / planned / potential developments at Kennedy Town.

<u>Highway Connection</u>

1.4.24 For highway connection, the affected zone is from the existing stub ends of Connaught Road West Flyover all along to the New Praya, Kennedy Town. The Davis's Street Pier and Kennedy Town Old Cattle Pier would be temporarily closed during the construction of Transport Infrastructure and reinstated after construction. The construction area boundary should be carefully planned in Kennedy Town to avoid affecting the existing developments.

1.4.25 No housing flats and community facilities would be lost due to the proposed Transport Infrastructure for highway connection. However, loss of existing and planned open spaces at the waterfront near Western District PCWA is unavoidable which would be reprovisioned at proper location as far as practicable in the detailed design of the Transport Infrastructure.

1.4.26 The road alignments have been designed to ensure the continuation of the waterfront area is not severed and sufficient width along the waterfront has been reserved for accessibility by the public as far as practicable.

<u>Railway Connection</u>

1.4.27 The proposed railway connection of the Transport Infrastructure may run through some areas at Kennedy Town underground. During construction, temporary occupation of such areas would be required. No permanent loss of housing flats and community facilities would be expected. The protection requirements for existing structures will be developed with geotechnical information obtained in future studies. All new buildings and engineering works including utilities works within the limits of the route protection boundary shall be subject to special scrutiny of the Government prior to giving approval to any plans and/or consent for commencing construction works.

1.4.28 The railway connection of the Transport Infrastructure would involve interface with and/or modification of the existing KET station and WIL overrun tunnel depending on the alignment schemes.

Way Forward

1.4.29 The implications on developments at Kennedy Town identified in this report should be taken into consideration in the future stages of the implementation of the Transport Infrastructure for connecting Kennedy Town to future ELM. As the exact alignment of the Transport Infrastructure is yet to be determined, the affected land lots assessed in this report are still subjected to review upon further studies.

1.4.30 Under the Study, the IMT structural form has been identified as one of the possible structural forms for the Transport Infrastructure that can achieve the objective to minimize reclamation within the Victoria Harbour. In future studies, the structural forms shall be holistically reviewed taking site constraints at the time of development into consideration, advancement in construction technologies as well as impact to the environment, especially marine traffic impact in the busy fairways, to fully ascertain the selection of structural form for the Transport Infrastructure.

1.4.31 The Preliminary TTIA carried out under this project studied and identified the recommendations on the requirements for the new transport infrastructure or upgrading/improvement works to cater the development of ELM. The purpose of the Preliminary TTIA was to facilitate the development of possible highway and railway connection schemes between ELM and Kennedy Town only and was based on various assumptions made on the traffic forecasts and development planning. A Detailed TTIA should be carried out in future to verify the assumptions, results and assess the impacts to the local road networks. Mitigation measures should be proposed in future studies for road links affected by the transport infrastructure.

1.4.32 A Detailed Marine Traffic Impact Assessment and Navigation Simulation should be conducted in future studies to further assess the marine traffic impacts arising from the Project and the associated marine works; and to recommend mitigating measures to maintain marine safety, alleviate/minimize the impacts and effects to an acceptable level. In addition, detailed assessments on any potential underwater blasting and subsea diving operations should be conducted in future studies to ensure the feasibility and safety of the proposed construction methods.

1.4.33 The possible alignment schemes of the Transport Infrastructure have been identified based on desktop study on available ground investigation records. These records will need to be supplemented with further ground investigation works in the preliminary/detailed design stages for further development of the alignment designs. For tunnelling works, more ground investigation works should be proposed and undertaken with reference to GEO Technical Guidance Note TGN No. 24 during the preliminary/detailed design stage.

1.4.34 Under the Study, only three nearby existing man-made features are located within 100m from the possible alignment schemes, which would unlikely affect or be affected by the proposed works. At later stages of the project, all existing man-made features which could affect or be affected by the proposed project and natural terrain catchments that may affect the proposed project shall be further reviewed and the necessity of slope works and hazard mitigation measures shall be assessed. A geotechnical assessment shall also be carried out at appropriate stage(s) of the project to define the scope and programme of slope works and hazard mitigation measures, if necessary.

1.4.35 Strategic Environmental Assessment including comparison of the environmental benefits / impacts as well as assessment on the relevant environmental aspects shall be conducted in future studies for the development of ELM, so that the comprehensive evaluation and findings can be incorporated in the development of Transport Infrastructure. The study area and scope of the assessment shall be determined in consultation with EPD when appropriate in future studies.

1.5 Abbreviations

1.5.1 The following words/expressions/abbreviations are used in this Note:

Government Bureaux, Departments and Related Organisations / Authorities

CEDD	Civil Engineering and Development Department
HAD	Home Affairs Department
HyD	Highways Department
LanDAC	Lantau Development Advisory Committee
MTRC	MTR Corporation
PlanD	Planning Department
TD	Transport Department

Roads / Rails

Transport Infrastructure	Proposed new or upgrading of existing highway and railway infrastructure works for transport link between western Hong Kong Island and the East Lantau Metropolis near Kau Yi Chau
EWL	East-West Line
HZMB	Hong Kong-Zhuhai-Macao Bridge
ISL	Island Line
NSL	North-South Line
R4E	Route 4 Extension
SCL	Shatin to Central Link
TM-CLKL	Tuen Mun - Chek Lap Kok Link
URL	Urban Rail Lines
WIL	West Island Line

Locations / Places

CWD	Chai Wan Depot
ELM	East Lantau Metropolis
HKBCF	Hong Kong Boundary Crossing Facilities
HKU	The University of Hong Kong
KT Site	The site(s) at Kennedy Town as well as its nearby area/ nearshore reclamation of Hong Kong Island necessary for accommodating the Transport Infrastructure for connecting to the East Lantau Metropolis near Kau Yi Chau
KET	Kennedy Town
KYC	Kau Yi Chau
NTN	New Territories North

NWNT	Northwest New Territories
TST	Tsim Sha Tsui
PCWA	Public Cargo Working Area
WDPCWA	Western District Public Cargo Working Area

Others

CBD	Central Business District
D&B	Drill and Blast
DSM	The New Works Design Standard Manual by MTRC
ELS	Excavation and Lateral Support System
EIA	Environmental Impact Assessment
GI	Ground Investigation
G/IC	Government, Institution or Community
IMT	Immersed Tube
Land Use Proposals	Land use proposals under the Land Use Review on the Western Part of the Kennedy Town
MTIA	Marine Traffic Impact Assessment
NIMBY	Not In My Backyard
OZP	Outline Zoning Plan
PHO	Protection of the Harbour Ordinance
TBM	Tunnel Boring Machine
TPDM	Transport Planning and Design Manual
TTIA	Traffic and Transport Impact Assessment

2 BASELINE OPPORTUNITIES, CONSTRAINTS AND ISSUES

2.1 Overall Constraints and Issues

Constraints at the Kennedy Town Area

2.1.1 The Transport Infrastructure shall avoid impact on land use proposals under the Land Use Review on the Western Part of Kennedy Town (the Land Use Proposals) as far as practicable and should not affect the programme of their implementation. Furthermore, the PHO should be placed at the highest consideration in the planning of alignment of the Transport Infrastructure. The extent of reclamation, if unavoidable, must be kept to a minimum.

2.1.2 Various planned and potential developments, as well as planned infrastructure works, will be taken into account in the traffic and transport impact assessment of the Transport Infrastructure. Various road and railway alignments will be developed and assessed by taking into account the site constraints. **Figure 2.1** shows the Strategic Cavern Area, land use review and estate developments at Kennedy Town.

Marine and Air Traffic

2.1.3 The alignment of the Transport Infrastructure will run across various busy fairways and channels. The implication to marine traffic has to be considered in the assessment of various alignment options and structural form. Similarly, the Transportation Infrastructure shall avoid infringing the Airport Height Restriction and affect the operation of helicopter. **Figure 2.2** and **Figure 2.3** show the constraints in regard to marine traffic and air traffic respectively.

Protection of the Harbour Ordinance (PHO)

2.1.4 As stipulated in paragraph 5 of HPLB TC No. 1/04, the Government will not undertake any further reclamation in the Victoria Harbour apart from the Central Reclamation Phase III and the reclamation proposals for Wan Chai North and South East Kowloon. In this regard, there shall be an assumption of zero reclamation when considering any proposals of the Transport Infrastructure. For considering any reclamation proposal within the Victoria Harbour, three basic questions will need to be addressed: 1) The whole process including the decisions as to whether there is a compelling and present public need; 2) whether there is any reasonable alternative; and 3) whether the proposed reclamation extent is the minimum. These issues must be clearly documented and substantiated by cogent and convincing materials.

2.1.5 Kennedy Town currently enjoys an extensive shoreline of the Victoria Harbour. The introduction of Transport Infrastructure at Kennedy Town could potentially necessitate temporary or permanent reclamation works at the Victoria Harbour. As a result, PHO should be taken as a primary consideration in the formulation of alignment options for highway connection of the Transport Infrastructure.

2.2 Major Considerations in Developing the Railway Connection

2.2.1 Kennedy Town has been transforming in recent years with the pace of redevelopment accelerating greatly with the introduction of MTR WIL service to areas which greatly enhances the accessibility and connectivity of the area, various driving forces have come into play in reshaping this long established residential community, including a growing number of business and restaurants. As a result, more diversified shops and services have emerged in Kennedy Town.

2.2.2 It is noted that there were planning reviews of Kennedy Town, in particular the western part of Kennedy Town which is less developed and is also occupied by many NIMBY uses. Relevant studies include the "Land Use Review on Western Part of Kennedy Town" undertaken by the

Planning Department, and the "Western Harbourfront Conceptual Master Plan" conducted by The University of Hong Kong for the Central and Western District Council.

2.2.3 The government has been making great efforts in increasing housing supply to address territorial housing needs, and is reflected as one of the objectives under the "Land Use Review on Western Part of Kennedy Town". If the proposed transport infrastructure impact on the potential housing sites identified, mitigation measures should be proposed to maintain the original housing supply and area proposed for government, institution and community (GIC) and open space uses, such as land swapping or incorporating purposely designed engineering solutions to avoid adverse impact on those sites.

2.2.4 The government has also been trying to relocate existing NIMBY facilities (such as sewerage treatment works, refuse collection facilities) into cavern to increase land supply for housing development. The reprovisioning of the Victoria Public Mortuary (VPM) comprises of a 4-storey mortuary building at a site along Victoria Road. Besides, the cavern previously used as MTRCL's magazine storage would be used to accommodate the mortuary related facilities, which is a low traffic generator and its impact to the traffic flow at Victoria Road is limited. The railway alignment will be required to explore and to avoid / minimize the potential impact to the cavern developments.

2.3 Major Considerations in Developing the Highway Connection

2.3.1 The draft Kennedy Town & Mount Davis Outline Zoning Plan (OZP) No. S/H1/20, reflecting the findings of the Land Use Review on the Western Part of Kennedy Town, was gazetted on 11 March 2016 with amendments confirmed on 1 August 2017 after hearing of the representations, comments and further representations. In view of the pressing need and priority for housing supply and the requirements of community facilities and open space, it is prudent that the Transport Infrastructure shall not compromise the proposed new housing provision, open space and other supporting / GIC facilities to meet local needs in Kennedy Town.

2.3.2 In 2013, the Central and Western District Council commissioned a study to formulate a waterfront enhancement proposal for the 2.4 km long stretch of waterfront between the Western Wholesale Food Market and the WDPCWA. This study proposes the creation of an iconic and vibrant waterfront attraction for public enjoyment under the Western Harbourfront Conceptual Master Plan. The major components of the conceptual master plan include:

- A vibrant public market place and outdoor food and beverage facilities at the finger piers of the Western Wholesale Food Market;
- A leisure waterfront promenade with water edge seating and floating performance stage at the inner harbour dock; and
- Active waterfront open space with provisions for cycle tracks and sports facilities at the western end of the WDPCWA.

2.3.3 The revitalization of the western harbourfront will improve the physical environment and attractiveness of the Kennedy Town area. The funding for the implementation of the "Harbourfront Enhancement and Revitalisation at the Western Wholesale Food Market" which is the stage 1A of the Master Plan has been approved in July 2015. The construction commenced in early 2016 for completion and opening in around late 2017. There is currently no implementation programme for the further stages.

2.3.4 As the Transport Infrastructure is proposed to connect to the existing reserved stub ends at Connaught Road West Flyover and turns southwards to run along WDPCWA, the waterfront open space proposed for WDPCWA under the Western Harbourfront Conceptual Master Plan may be affected. Instead of open space, other means of enhancement to the harbourfront will be explored. The space underneath the elevated structure may accommodate the sports facilities and cycle tracks, while landscape deck with resting area and viewing pavilion can be provided to reduce visual impacts.

2.3.5 By making reference to the design of Central-Wan Chai Bypass, a stepped roof-top is a possible feature to cover the portal area and develop open space or other community uses on top of it. The stepped roof-top is not practical to construct above the abutment and elevated section of the Transport Infrastructure as the level of the stepped roof-top will be at least +13mPD. Therefore, the possible stepped roof-top extent is limited to the area between portal and abutment of Transport Infrastructure.

3 PRELIMINARY TRAFFIC AND TRANSPORT IMPACT ASSESSMENTS

3.1 General

3.1.1 This Feasibility Study aims to identify possible highway and railway connection schemes for Transport Infrastructure connecting ELM and Kennedy Town and assess the preliminary impacts on the developments at Kennedy Town due to the Transport Infrastructure. The Preliminary Traffic and Transport Impact Assessment (Preliminary TTIA) carried out under this Study assessed and identified the adequacy of the capacity of the existing and planned transport systems, recommended the requirements for new transport infrastructure or upgrading/improvement works to cater for the development of ELM. The purpose of the Preliminary TTIA was to facilitate the development of possible highway and railway connection schemes between ELM and Kennedy Town only and has been based on various assumptions made on traffic forecasts and related developments. A detailed TTIA should be carried out in future to verify the assumptions and to update the results.

3.1.2 The initial concept for connections to ELM is shown in **Figure 3.1**. The assumptions adopted in the Preliminary TTIA and major findings are summarized in this chapter.

3.2 Findings of the Preliminary TTIA

3.2.1 In the Preliminary TTIA under this Study, strategic transport models have been developed covering six aspects including (i) The Development Phasing; (ii) Land Use Options; (iii) With and without New Territories North (NTN) development; (iv) With and without Route 4 Extension; (v) Different railway schemes including extension of existing ISL/WIL and new railway line with interchange at Kennedy Town; and (vi) Toll Level arrangement at new infrastructures.

Highway Connection Forecast

3.2.2 For initial development at ELM, the road link between Kau Yi Chau and Kennedy Town could be operated within the design capacity. Thus, a dual-3 carriageway would be sufficient to handle the traffic demand of ELM and all other through traffic. It is necessary to review all the relevant assumptions including the development sizing, land use options and detailed planning data of ELM for further assessment in future studies.

3.2.3 For full development at ELM, the through traffic travelling between NWNT and Hong Kong Island via ELM is an important factor causing the traffic demand to exceed the capacity of the road links between Kau Yi Chau and Kennedy Town as well as between Kau Yi Chau and North Lantau. Thus, the proposed transport infrastructures between ELM and other developments as well as the number of lanes for road links between Kau Yi Chau and North Lantau is required to be examined in future studies with detailed planning data of ELM.

3.2.4 One of the functions of Route 4 Extension is to provide the bypass road connecting Aberdeen and Kennedy Town which is parallel to the existing Pok Fu Lam Road. However, there is currently no timetable for the design and implementation programme of Route 4 Extension from Kennedy Town to Aberdeen.

Railway Connection Forecast

3.2.5 For initial development at ELM, the new railway line scheme with interchange at Kennedy Town has a lower patronage flows (KYC-KET) than the extension of ISL railway scheme. With inclusion of the ELM patronage, the highest line segment of Hong Kong Island Line is between Central and Sheung Wan with around 61,000 patronage flows.

3.2.6 For full development at ELM, two new railway lines connecting between (i) Kau Yi Chau and West Kowloon; and (ii) Kau Yi Chau and North Lantau could release the patronage generated from ELM. The highest line segment of Hong Kong Island Line is between Sheung Wan and Central during the morning peak with around 54,000 patronage flows.

4 POSSIBLE STRUCTURAL FORMS OF TRANSPORT INFRASTRUCTURE ACROSS BUSY FAIRWAYS AND CHANNELS

4.1 Route Options

4.1.1 There are two possible routes, namely "offshore" and "inland" routes, for the Transport Infrastructure to run across the fairways and channels towards ELM. The indicative "offshore" and "inland" routes are shown in **Diagram 4.1** below.

4.1.2 From the reserved stub end at the existing Connaught Road West Flyover, the Transport Infrastructure can either turn offshore for a more direct route, or turn inland and run through Kennedy Town and Mount Davis to minimize the impact on Victoria Harbour.

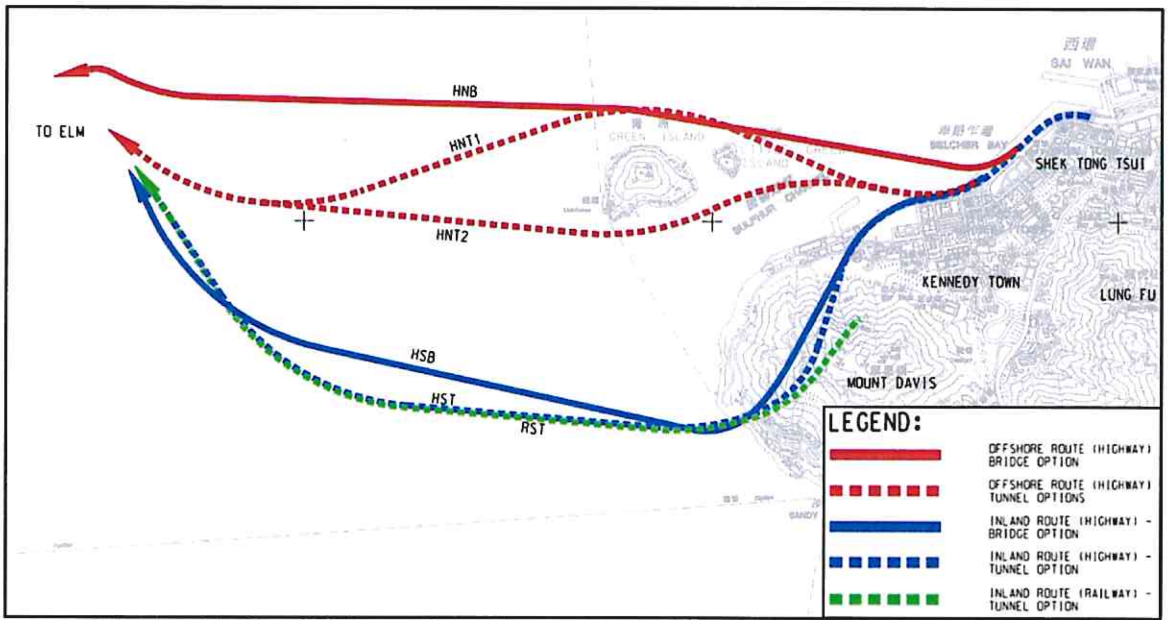

Diagram 4.1 - Possible Routes from Kennedy Town to ELM

4.1.3 The anticipated routes for "offshore" and "inland" options with tunnel and bridge structural forms are shown in **Figure 4.1**.

4.2 Offshore Route Options

4.2.1 For the offshore route option, the Transport Infrastructure turns seawards (northwards) after the connection with existing Connaught Road West Flyover and runs west outside the footpath of Hong Kong Island.

4.2.2 The offshore route would be the most straight forward option. The Transport Infrastructure would head west directly outside Kennedy Town. The Transport Infrastructure would not run across Kennedy Town and Mount Davis. This route can avoid affecting the existing and planned developments in the western part of Kennedy Town.

4.2.3 Subject to further assessments in this study, the offshore route may require reclamation within Victoria Harbour. The reclamation may be temporary, permanent or a combination of both. The reclamation and structure of the Transport Infrastructure may have possible visual impact to the surrounding area.

4.2.4 The offshore route would need to run across the Western and Southern Fairway, thus causing more impact on the marine traffic.

4.2.5 Also, the Transport Infrastructure would very likely affect the operation of China Merchant Wharf during construction stage. The impact on the operation of China Merchant Wharf upon completion of Transport Infrastructure needs to be further assessed.

Offshore Tunnel Option 1 – Highway (HNT1)

4.2.6 Two routes have been developed for the offshore tunnel. They would both run from existing Connaught Road West Flyover and go down below the existing seabed level from WDPCWA.

4.2.7 After running outside the footprint of Hong Kong Island, the first route would turn northwards to avoid China Merchant Wharf. It would pass the Green Island and Little Green Island from the north.

4.2.8 This route would minimize the impact on the operation of China Merchant Wharf Pier.

Offshore Tunnel Option 2 – Highway (HNT2)

4.2.9 The second offshore route is similar to the first one. After running along shore of Kennedy Town and turns to avoid China Merchant Wharf, it would turn back to pass the Green Island and Little Green Island from the south.

4.2.10 This route would be straightforward and result in a shorter Transport Infrastructure. However, comparing to the first route, its clearance from China Merchant Wharf would be smaller by approximately 10 meters and may therefore likely have larger impact on the existing wharf.

Offshore Bridge Option – Highway (HNB)

4.2.11 This is a route with long span bridge connection. The Transport Infrastructure would run along the WDPCWA while climbing. This way, the Transport Infrastructure would gain enough level when running across the Southern Fairway to provide sufficient airdraft. The Transport Infrastructure would then head westwards to ELM.

4.2.12 The bridge would be crossing the Western Fairway and Southern Fairway. Therefore, this route would likely require two long span bridges, one for each fairway. The long span bridge, which consists of one main span and two side spans, should be straight. The turning point shall therefore be located so as to avoid side spans.

4.3 Inland Route Options

4.3.1 Inland route options are considered in order to avoid reclamation within Victoria Harbour.

4.3.2 After stub ends at Connaught Road West Flyover and running along the WDPCWA, the Transport Infrastructure would turn southwards to cross Kennedy Town and Mount Davis.

4.3.3 The Transport Infrastructure would turn northwards and head towards ELM after passing the limit of Victoria Harbour.

4.3.4 By adopting inland route, reclamation within Victoria Harbour would be significantly reduced or eliminated.

4.3.5 However, the inland route would face significant constraints from the existing and planned developments in Kennedy Town. These constraints and associated impacts on the Transport Infrastructure need to be further assessed.

Inland Tunnel Option – Highway (HST)

4.3.6 The Transport Infrastructure would run through Mount Davis, most likely by drill-and-blast tunnel. After passing the limit of Victoria Harbour, it would turn northwards towards the ELM.

Inland Bridge Option – Highway (HSB)

4.3.7 The long span bridge would be required to cross the North and South Cheung Chau Fairways and Western Fairway. The main span would be much longer than the offshore bridge option. As a result, the side spans would become longer as well.

4.3.8 The adoption of long span bridge at the south would therefore result in a much longer straight route. In order to accommodate the straight part, the turning of the south bridge route would be sharper.

Inland Tunnel Option – Railway (RST)

4.3.9 The Transport Infrastructure would start near the existing Kennedy Town Station and run through Mount Davis, most likely by drill-and-blast tunnel. After passing the limit of Victoria Harbour, it would turn northwards towards the ELM.

4.4 Possible Structural Forms

4.4.1 Possible structural forms include submarine tunnels and long span bridges as listed below:

- Immersed Tube Tunnel (IMT);
- Tunnels by Tunnel Boring Machine (TBM);
- Cable Stayed Bridge;
- Suspension Bridge; and
- Hybrid of Cable Stayed Bridge and Suspension Bridge.

4.5 Tunnel Structural Forms

Immersed Tube (IMT) Tunnel

4.5.1 Construction of an IMT tunnel consists of excavating an open trench in the seabed. Tunnel elements are fabricated in casting basin. The ends of each tunnel element are closed by bulkheads to make the tunnel elements watertight. After fabrication of the tunnel elements, they are floated by flooding the casting basin and then towed into position over the excavated trench. Ballast is placed in the tunnel element so that it can be lowered to its final position. Once the tunnel element is in its final position, it is butted up against the previously placed tunnel element. After any remaining foundation works has been completed and locking fill is in place, the joint can be completed and the area made watertight. The tunnel is then backfilled and a protective layer of stone is placed over the top of the tunnel.

Tunnel Boring Machine (TBM) Tunnel

4.5.2 The TBM moves forward as it excavates the tunnel by extending the pushing jacks at the back. When the advancement of the machine reaches distance of the length of a ring, the excavation stops and the pushing jacks are retrieved, a concrete circular ring in form of a numbers of segments were then put together at the tail of the shield. The pushing arms are once again extended in full contact with the concrete ring just erected and excavation is resumed. The cycle of excavation and ring erection is repeated as the TBM is advanced to form the lining of the tunnel.

4.5.3 From preliminary assessment under this Study, there are two types of TBM that can cope with the potential weak ground that may be encountered during tunnelling for the proposed

Transport Infrastructure: Slurry Face Machine or Earth Pressure Balance (EPB) Machine. The decision on the choice of the type of TBM shall be guided by through assessment of the ground types and conditions to be encountered and by numerous other aspects in future studies.

4.6 Comparison between IMT and TBM Tunnel

4.6.1 The IMT tunnel option is considered to be potentially lower cost alternative to the TBM tunnel option. It might be demonstrated by the following recent subsea tunnelling projects in Hong Kong and abroad.

Table 4.1 – Recent Subsea Tunnelling Projects in Hong Kong and Abroad

Project Name	Tuen Mun – Chek Lap Kok Link	Fehmarnbelt Fixed Link	Shatin to Central Link
Location	Hong Kong	Denmark and Germany	Hong Kong
Project Description	• Construction of a sub-sea tunnel between Tuen Mun Area 40 and the HZMB HKBCF and reclamation of about 16.5 ha at Tuen Mun Area 40. • Includes a dual 2-lane trunk road	• Construction of a subsea tunnel with associated landside works between Denmark and Germany. • Includes four-lane motorway and a two-track, electrified railway.	• Construction of a cross harbour rail tunnel between Hung Hom and Causeway Bay typhoon shelter
Tunnelling Method	TBM	IMT	IMT
Length of Subsea Tunnel	about 5km	About 17.6km	About 1.7km
Total Estimated Cost/Contract Sum	HK$18.20 Billion	€6.20 billion (HK$54.13 Billion)	HK$4.35 Billion
Approximate Cost of tunnel per metre	HK$3.6 Million	€0.4 billion (HK$3.08 Million)	HK$2.56 Million

4.6.2 According to **Table 4.1**, immersed tube tunnelling method is generally more cost effective than TBM tunnelling method. However, the cost of different tunnelling methods may be varied, subject to the nature and the scope of the project. Apart from the construction of the subsea tunnel itself, construction of the approach tunnel, launching shaft, retrieval shaft, 2 TBMs & back-up equipment, slurry treatment plant and cross passages should also be considered for TBM tunnel; while the approach tunnel, dredging and casting yard should be taken into account for IMT tunnel. Obviously, the cost of cut-and-cover approach tunnel for TBM tunnel is expected to be higher than that for IMT tunnel since an approximately one diameter of cover is required for TBM tunnel. However, detailed cost estimate should be carried out in future studies to determine the cost estimate of the subsea tunnel after the alignment is confirmed.

4.6.3 Apart from the construction cost issues, key issues to be considered include its technical feasibility and the environmental and disruption effects that it could cause.

4.6.4 Size of the tunnel is governed by the following dominant factors:

- Structural gauge for vehicular clearance;
- Space for signage and lighting;
- Space for services and utilities;
- Ventilation ducts; and
- Electrical and mechanical plant.

4.6.5 Typical sections of the IMT Tunnel and TBM Tunnel are shown in **Figure 4.2** to **Figure 4.5**.

4.6.6 Generally, IMT tunnel offers greater flexibility as its cross section can be configured to carry roads, railways, and service walkways with the most efficient use of space; while space in TBM tunnel is less efficient in space utilization due to its circular shape.

4.6.7 It is noted that the IMT tunnel would produce approximately 4 million m^3 of dredged sediment from trench excavation and construction of the IMT tunnel. Further investigation is needed in future studies to determine the properties of the dredged sediment for development of the dredged sediment management plan which should identify possible reuse or disposal strategies for the dredged sediment. As stipulated in the ETWB Technical Circular (Works) No. 34/2002, the method of disposing of dredged sediment depends on the level of contamination of the sediment. Sediment disposal methods currently used in Hong Kong are open sea disposal and confined disposal at East Sha Chau.

4.6.8 IMT tunnels consist of a very large pre-cast concrete or steel tunnel elements fabricated under dry environment and installed under water. More than a hundred IMT tunnels have been built to provide road and rail connections. In this Study, we have considered only concrete IMT tunnel construction for the proposed Transport Infrastructure for the following reasons:

- It is the prevalent method employed in Hong Kong. Therefore, it is considered a more likely approach to be taken in the event of the adoption of the immersed tunnel option;
- Steel tunnels tend to be binocular in shape. A deeper vertical alignment is therefore anticipated and the amount of dredging is thus increased.

4.6.9 TBMs come in a variety of sizes and configurations and can deal with ground conditions that range from loose soil to extremely hard rock under very high hydrostatic pressure. As TBMs remain below ground, their use can avoid many environmental issues.

4.6.10 The overall comparison between IMT and TBM tunnel is summarized in **Table 4.2** below.

Table 4.2 – Comparison between IMT and TBM

	IMT	**TBM**
Ground condition	No specific requirement for ground condition. Underwater blasting may be required when shallow rockhead is encountered. Site specific GI should be carried out at the later stages of the projects to identify if a possible alignment can be determined without affecting by shallow rockhead issues.	For weak ground, compressive air mode, earth balancing mode or slurry mode should be employed to prevent water ingress and face stability.
Soil cover	2m	Generally requires 1 x diameter of tunnel.
Tunnel length	As only requires soil cover of 2m, tunnel normally shallower and shorter.	Due to large cover required, tunnel normally deeper and longer.
Efficient use of tunnel space	More efficient use of space with rectangular tunnel cross section	Less efficient space utilization with circular tunnel cross section
Environmental and ecological impact	Dredging of seabed required and will cause impacts on environment and ecology in the region.	Insignificant

	IMT	TBM
Marine traffic impact	Marine operation of IMT will affect the marine traffic especially in Western Fairway and Adamasta Channel. Temporary diversion of navigation channel and special restriction on speed may be required in the nearby influence zone.	The reclamation required for the Transport Infrastructure to reach desirable level (1d below existing seabed) may encroach into the Southern Fairway. Hence causes impact on marine traffic and operation of China Merchant Wharf.
Land Requirement	Casting basin away from the project site need to be identified.	Launching and retrieval shaft within the project site shall be allocated.
Diving Works	Frequent diving works under strong current and low visibility are required for tunnel joint constructions. Decompression procedure should be carried out according to Code of Practice: Safety and Health at Work for Industrial Diving.	Diving works may be required for emergency situations for cutter head intervention. Same decompression procedure should be followed for diving works of IMT construction.
Hong Kong Experience	5 Immersed tube tunnels have been constructed in Hong Kong across the Victoria Harbour. These include Harbour Crossing Tunnel (Road Tunnel), Eastern Harbour Crossing (Road + Railway), Western Crossing Tunnel (Road) and Western Immersed tube tunnel (Railway). SCL cross harbour tunnel (Railway) is currently being constructed by IMT method.	TMCLKL is currently under construction and it will be the first TBM subsea tunnel (Road Tunnel) in Hong Kong.
Long Term Maintenance	Tunnel joints between IMT units would be spaced at about 100m and less long term maintenance against water leakage if any.	Joints between each segmental lining are more than that of immersed tube tunnel. The risk of long term maintenance against water leakage is comparatively higher.
Reclamation Requirement	Due to the constraint of vertical profile, the extent of permanent reclamation for IMT will be lesser since less ground cover is required.	Due to the constraint of vertical profile, the extent of permanent reclamation for TBM will be larger since it will be relatively deeper in order to obtain adequate ground cover for boring.
Cross Passage Requirement	Cross passages are formed by the partition wall inside the IMT and of low construction risk. Cross passages are constructed at the casting basin before immersion. No ground treatment is required.	Cross passage is required connecting two separated bored tunnels. This will be a very high risk subsea construction activity.
Construction Cost	More cost-effective	More expensive
Construction Programme	Faster programme where simultaneous work fronts such as tunnel fabrication in	Slower programme due to long lead time required for TBM procurement

	IMT	TBM
	casting basin, marine operations, installation of tunnel elements can be carried out concurrently	

4.7 Bridge Structural Forms

Minimum Span Width Requirements for Long Span Bridge

4.7.1 In order to maintain the existing traffic movements along the Western Fairway and Southern Fairway, the bridge towers would need to be constructed outside the demarcated fairway and ensure the existing width of navigable water would not be compromised. The bridges would need to be constructed in stages to ensure two-way transits could be maintained at all time during construction. Marine Traffic Impact Assessment and Navigation Simulation should be conducted in future studies to assess the marine navigation impacts in details.

4.7.2 The minimum navigation width is considered as a requirement for determining the span width:

- *Western Fairway - A span width for the passage of vessels at minimum 260m for one way Ultra Large Container Ship or OGV transits or at minimum 580m for two-way transits; and*
- *Southern Fairway - A span width for the passage of vessels at minimum 160m for one way Barges and Lighters transits or at minimum 370m for two-way transits.*

Minimum Structure Height Requirements for Long Span Bridge

4.7.3 For preliminary assessment, the minimum structural height requirements will be adopted for the proposed long span bridge routes benchmarking against existing height restrictions at:

- *Stonecutters Bridge at 68.5m*: depicts the vessels restriction into Kwai Tsing container terminal via the Western Fairway; and
- *Kap Shui Mun and future Hong Kong Link Road at 41m* (along section between Lantau Island Boundary and HKSAR boundary): depicts the vessels currently conducting transits between Hong Kong Central Harbour/Western Waters and Zhuhai/Macau.

4.7.4 From the above assessment of benchmarking exercise, the minimum soffit levels for the long span bridge options are recommended as below:

- across the Western Fairway at 68.5 m PD; and
- across the Southern Fairway at 41m PD.

4.7.5 Vessel airdraft limitation via the Western Fairway towards Tsing Yi and Urmston Road is currently restricted by the Tsing Ma Bridge at 53m. Therefore it is not anticipated that the Transport Infrastructure across the Western Fairway at 68.5m will pose an impact to existing traffic activities.

4.7.6 In case of the Transport Infrastructure runs offshore from Kennedy Town, a height restriction will be imposed at waterspace south of the Western District Public Cargo Working Area and therefore vessels of airdraft exceeding 41m in particular dumb steel lighters will be impacted under this option.

Cable Stayed Bridge

4.7.7 Cable-stayed bridges are a recent adaptation of the suspension bridge principle. The deck structure is supported by tension stays sloping from one or more towers. There may be either a single plane of stays down the centre of the bridge, or two planes; one on each side of the bridge.

4.7.8 The towers act in compression and can have a variety of forms. The deck girders sustain compression forces as well as bending forces.

4.7.9 Economic spans range from 200m to over 850m. The very large spans have only recently been feasible due to developments in dynamic analysis, and methods for damping oscillations. Russky Bridge is the world's longest cable-stayed bridge, with a 1,104 m long central span.

4.7.10 For the superstructure, a streamlined vented girder system can be adopted. In terms of aesthetics, the low profile decks, striking towers and raking cables are effective and dramatic.

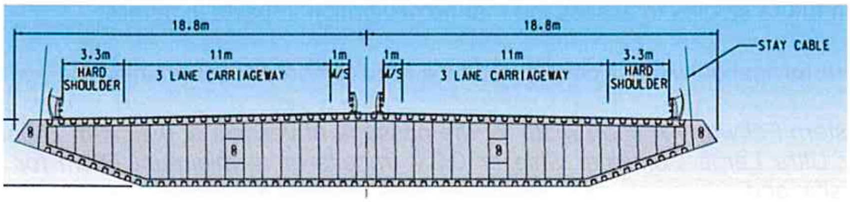

Diagram 4.2 - Example of Cross Section of Cable Stayed Bridge

4.7.11 Key advantages of the cable-stayed form are as follows:

- much greater stiffness than the suspension bridge, so that deformations of the deck under live loads are reduced
- can be constructed by cantilevering out from the tower - the cables act both as temporary and permanent supports to the bridge deck
- for a symmetrical bridge, the horizontal forces balance and large ground anchorages are not required

4.7.12 In cable-stayed bridge construction, the steel segments are generally fabricated and assembled in casting yard and the assembled segments are transported to site by barge. The superstructure erection can be by cantilever construction, through lifting the steel segments from a barge, and stressing them into the predicted geometry by stay cable installation. The marine traffic can be maintained during bridge construction.

4.7.13 During bridge erection, the marine traffic impacts will be determined by the size of the working area and in particular the affected length across the concerned fairway. In principal, the affected length would be subject to the similar marine navigation constraints as described in Section 4.7. Marine Traffic Impact Assessment and Navigation Simulation should be conducted in future studies to assess the marine navigation impacts in details.

Suspension Bridge

4.7.14 The suspension bridges are used for the longest of modern bridge spans because of their fundamental simplicity and economy of structural action. The deck of a suspension bridge is supported by vertical tension hangers, which are supported in turn by large tension cables extending over two towers from anchorage to anchorage.

4.7.15 A stiffening girder running the full length of each span is an essential part of a suspension bridge. It distributes the concentrated traffic loads and provides stiffness against bending, twisting and oscillation.

4.7.16 Aesthetically, the graceful curve of the suspension bridge combined with the strong visual line of the deck give a pleasing effect. The combination of grace and grandeur in such situations leads to the acknowledged view that many of the world's most exciting bridges are suspension bridges.

4.7.17 The rail-road suspension bridge can be either one-level scheme or two-level scheme. For the superstructure, a streamlined vented, three-box deck girder system can be adopted for a single-level bridge scheme. Geometrically the vented girder is a grillage system with three longitudinal steel box interconnected by cross beams spanning at intervals across the two air gaps. The railway is on the central girder and the roads on the side girders. This vented deck system has significant advantages in that it has high porosity, light-weight, and a high stiffness-to-mass ratio. A high stiffness-to-mass ratio enhances structural efficiency, cost competitiveness and aesthetical merits. A reduced mass and an increased stiffness help improve the aerodynamic and seismic performance of the bridge. The two air gaps in the bridge superstructure, together with a streamlined deck girder edge profile, constitute a high performance aerodynamic design.

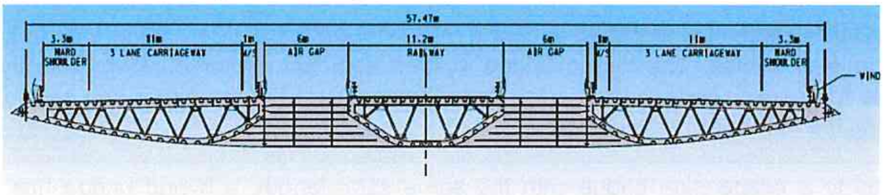

Diagram 4.3 - Example of Cross Section of One-level Suspension Bridge

4.7.18 A steel truss with an aerodynamic profile can be adopted for a two-level bridge scheme. The two-level option configures the highway at the top deck and the railway in the central region of the lower deck. Emergency traffic lanes can be provided in the lower deck, adjacent to the railway.

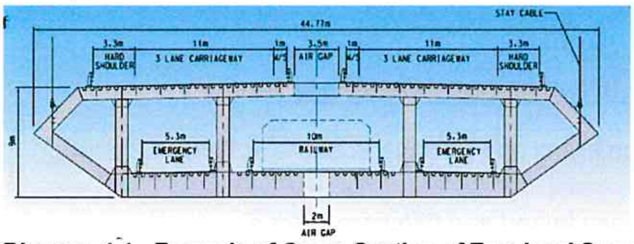

Diagram 4.4 - Example of Cross Section of Two-level Suspension Bridge

4.7.19 Key advantages of the suspension bridge form are as follows:

- Longer main spans are achievable than with any other type of bridge
- Less material may be required than other bridge types, even at spans they can achieve, leading to a reduced construction cost
- Except for installation of the initial temporary cables, little or no access from below is required during construction, for example allowing a waterway to remain open while the bridge is built above
- May be better to withstand earthquake movements than heavier and more rigid bridges

- Bridge decks can have deck sections replaced in order to widen traffic lanes for larger vehicles or add additions width for separated cycling/pedestrian paths

4.7.20 For suspension bridge construction, the steel segments are fabricated and assembled in casting yard before bringing to site. Concurrently, the main suspension cable is installed on site. A moving crane can then roll atop the main suspension cable and lifts the deck sections into place. During bridge erection, the marine traffic impacts will be determined by the size of the working area and in particular the affected length across the concerned fairway. In principal, the affected length would be subject to the similar marine navigation constraints as described in Section 4.7. Marine Traffic Impact Assessment and Navigation Simulation should be conducted in future studies to assess the marine navigation impacts in details.

Hybrid Cable-Stayed and Suspension Bridge

4.7.21 This type of bridge is a hybrid structure of cable-stayed bridge and suspension bridge. The deck girders are supported by stay cables. The suspension cables support the deck girders in the central part of the span.

4.7.22 This innovative form of hybrid bridge has benefits compared to a cable-stayed bridge and a suspension bridge.

4.7.23 Compared to a cable-stayed bridge, a hybrid bridge has a lower pylon height due to the fewer number of stay cables. The hybrid bridge system also has better buckling stability and is applicable for longer spans, because the axial forces exerted in the girder can be reduced by decreasing the number of stay cables.

4.7.24 Compared to a suspension bridge with the same span length, a hybrid bridge has a much shortened suspension portion and hence the tension forces in the main cables are greatly decreased. The hybrid bridge system will reduce the construction costs of the main cables and massive anchors. The hybrid bridge system also has better aerodynamic stability as the stay cables restrain the deformation of the girder.

4.7.25 The construction of hybrid bridge will follow the construction method of ordinary cable-stayed bridge and suspension bridge.

4.8 Overall Comparison between Inland and Offshore Bridge

4.8.1 The overall comparison between Inland and Offshore Bridge is at **Table 4.3** below.

Table 4.3 – Comparison between Inland and Offshore Bridge

	Offshore	Inland
Main Structures	Road-rail Option: 1,000m main span hybrid road- rail bridge with a minimum air draft of 68m across the Western Fairway connecting ELM and Green Island AND 400m main span cable-stayed road bridge with a minimum air draft of 41m across the Southern Fairway connecting Green Island and existing Route 4 AND 350m main span suspension rail bridge with a minimum air draft	Road-rail option and Road only Option: 0.6km drill and blast tunnel running through Mt. Davis AND 2,500 main span suspension bridge across the Western Fairway OR two- 1,400m main span suspension bridge across the Western Fairway

	Offshore	Inland
	connecting Green Island and Mt. Davis Road only Option: 1,120m main span cable-stayed road bridge with a minimum air draft of 68m across the Western Fairway connecting ELM and Green Island AND 400m cable-stayed road bridge with a minimum air draft of 41m across the Southern Fairway connecting Green Island and existing Route 4	
Deck structural form	Road-rail option: Two-level steel truss with an aerodynamic profile Road only option: Streamlined vented, three box deck girder system	Road-rail option: Two-level steel truss with an aerodynamic profile Road only option: Streamlined vented, three box deck girder system
Landfall on HK Island	Belcher Bay	Waters west of KT Site south of Sulphur Channel
Affected Channels/ Waters (Visibility or traffic constrains)	- Western Fairway - Southern Fairway - Reserved Dangerous Goods Anchorage - Western Anchorage No. 3	- Western Fairway - Reserved Dangerous Goods Anchorage - Western Anchorage No. 3
Impacts on sensitive receivers during construction	Air and noise impact on activities located in the vicinity of the proposed route	Air and noise impact on activities located in the vicinity of the proposed route
Impacts on sensitive receivers on completion of work	Visual impacts to the residents at Kennedy Town and opposition from stake holders are likely to arouse	Minimal
Impact on offshore traffic movement on completion of work	More severe as it crosses the waters with higher traffic densities	Less severe as it crosses the waters with lower traffic densities
Protection of the Harbour Ordinance (PHO)	Substantial Implication	No implication
Maintenance	Low level Underdeck gantry for the inspection of soffit	Low level Underdeck gantry for the inspection of soffit
Traffic Impact Assessment	Same potential impact to connecting road networks for both options	Same potential impact to connecting road networks for both options

4.9 Railway Route Options

4.9.1 The route options and structural form of the railway connection of the Transport Infrastructure have been explored. Due to the constraints from Land Use Proposals, the northern route option is deemed unpreferable.

4.9.2 Based on initial assessment of the tunnel crossing options between the ELM and Hong Kong Island, the tunnel alignment will pass through Mount Davis south-westward, then turn northwest and run beneath Western Fairway towards ELM.

4.9.3 On the landside, various schemes regarding connection from the proposed TI to existing railway system have been explored. Two major options were identified: extension of the Island Line (ISL) or a new railway line, i.e., possible new station locations in the Kennedy Town area which required interchange to existing KET Station.

4.9.4 A minimum air draft of 68.5m is required to be maintained in the Western Fairway. Thus landing point of the railway bridge would be approx. +70mPD at Mount Davis. Since the track level of KET station is -5.3mPD, there would be insufficient distance for the heavy rail system to climb up from -5.3mPD to +70mPD even by adopting a gradient of 4%.

4.9.5 Also, if long span bridges would be considered / adopted, the port of Hong Kong will strategically be affected. Besides, adverse impacts on marine traffic are anticipated, e.g. possible impact on existing Western Channel navigable width due to bridge towers, reduction of anchorage waterspace and restriction on large vessels with very high airdraft.

4.9.6 Therefore, the structural form of long span bridge would be less preferred due to the excessive level difference between the required level across the Western Fairway and the existing KET station track level, and other factors such as marine implication.

4.9.7 For the tunnel structural form, as compared in **Table 4.2**, invert level at landing point for IMT and TBM tunnel would differ due to different soil cover depth. The level of TBM tunnel would be much deeper than that of the IMT tunnel. Considering track level of the existing KET station and overrun tunnel, the larger level difference resulted from TBM tunnel cannot be catered for, should the direct extension option is adopted. The structural form of TBM tunnel can only be feasible if a new station is to be constructed with the track level lower than the existing KET station. .

4.9.8 The feasibility of the structural form and the land side options are summarized in **Table 4.4** below.

Table 4.4 – Landside Options and Structural Form

Landside Options:	Feasibility
Extension of the ISL	IMT feasible; Bridge and TBM Tunnel not feasible
New Railway Line	Both IMT and TBM feasible; Bridge not feasible

4.10 Scheme of Transport Infrastructure with Combined Highway and Railway Connections

4.10.1 The schemes of Transport Infrastructure with combined highway and railway connections have been explored and examined.

4.10.2 The inland route for highway connection would inevitably cause adverse impact on Land Use Proposals, which would generate housing supply and provide open space and GIC facilities. The highway connection of the Transport Infrastructure would connect to the existing road network at Connaught Road West Flyover in the north part of the Kennedy Town and run offshore towards the ELM after passing WDPCWA. Therefore, the highway connection would run offshore after the landfall at the WDPCWA as shown on **Diagram 4.5**.

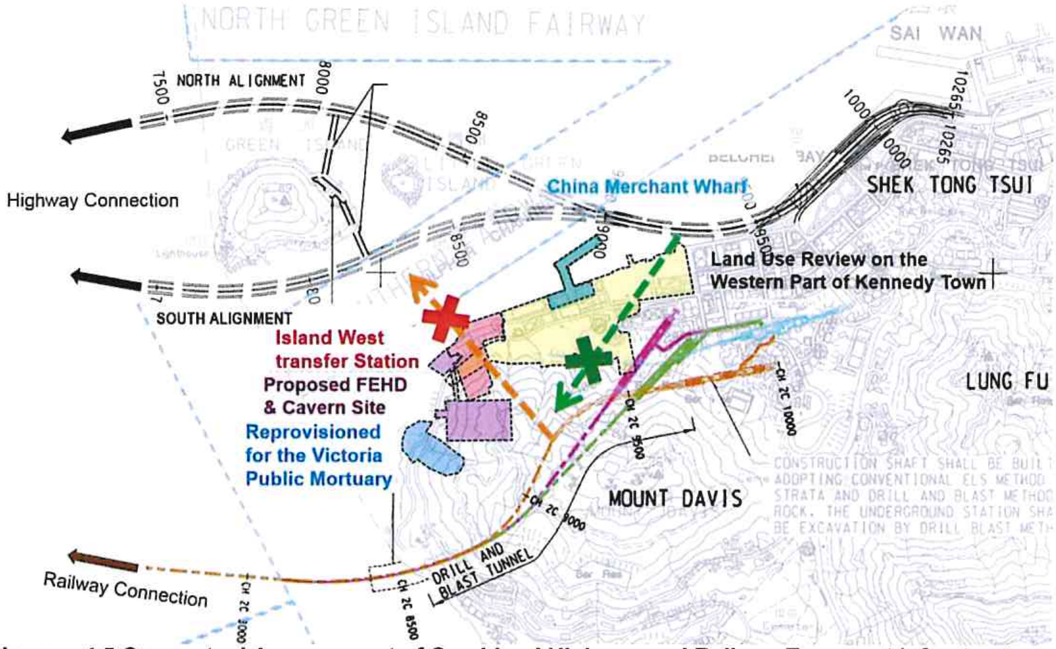

Diagram 4.5 Conceptual Arrangement of Combined Highway and Railway Transport Infrastructure

4.10.3 For the railway connection at the Kennedy Town consists of two schemes: extension of the ISL from the existing KET overrun tunnel; or new railway line formed by a new connection from the ELM to a new station in the vicinity of the existing KET Station.

4.10.4 The alignments for both options head southwest from Kennedy Town area under Mount Davis towards to the landing point at the subsea crossing, avoiding the PHO boundary line and other constraints imposed by the existing Island West Transfer Station and Land Use Proposals.

4.10.5 In light of the above, a combined highway and railway transport infrastructure is not feasible and not pursued as the highway and railway infrastructure are both veering off in opposite directions in the Kennedy Town area to avoid the various constraints highlighted above and the need to provide connections back to the existing road and railway network on Hong Kong Island respectively.

4.10.6 The option to merge the highway and railway tunnel away from Kennedy Town is also investigated. Based on the highway and railway horizontal alignment requirement as well as the constraints discussed above, the tunnel will be merging at approximately half way across the Western Fairway. This option is not preferred as it will render the alignment flexibility at ELM and increase the engineering complexity with construction of a tunnel junction within Western Fairway which has an average depth of approximately -30mPD.

4.10.7 In summary, based on the highway and railway horizontal alignment requirements as well as the constraints identified in the Study, the tunnel will be merging at approximately half way across the Western Fairway. This option is not preferred as it will limit the alignment flexibility at ELM and increase the engineering complexity with construction of a tunnel junction within Western Fairway which has an average depth of approximately -30mPD, thus implication to construction risk and cost. Construction of the tunnel junction would require temporary reclamation of approximately 25Ha within the Western Fairway and would cause severe disruption to the existing traffic along the Fairway during construction. The impact to the Western Fairway for the combined connection is considered to be unacceptable as Western

Fairway is the only major route to Kwai Tsing Container Terminals with no restriction on airdraft. **Diagram 4.6** indicates the approximate alignment and tunnel junction location of the combined route. It is expected that the cost benefit of a combined connection would diminished if the tunnel junction is located to the west of the Western Fairway. The scheme with combined Highway and Railway Connections would need to be reviewed in future studies if the alignments of the possible schemes are different as a result of changes to the consideration of the Study.

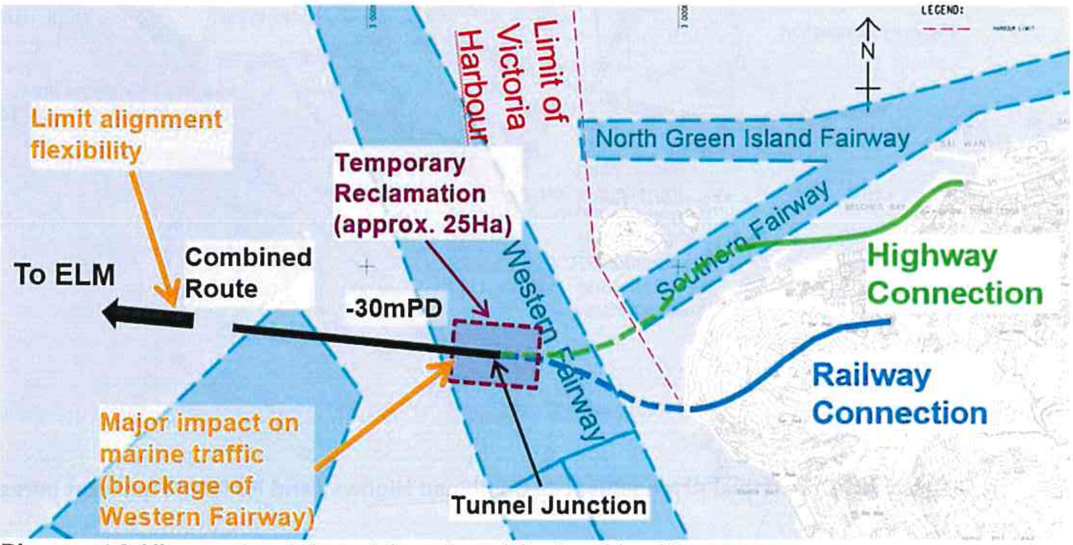

Diagram 4.6 Alignment and Tunnel Junction of the Combined Route

4.11 Summary

4.11.1 Under the Study, after in-depth comparison of different options in terms of their environmental, marine traffic and port operations impacts, cost and speed of construction, resistance to wind and seismic activities, safety of construction, flexibility of profile and vulnerability to damage, it is considered that offshore routes are feasible for highway connection in the form of tunnel and bridge. While only inland railway tunnel would be feasible for railway connection.

4.11.2 In relation to the highway connection, only tunnel form would be able to achieve zero permanent reclamation within Victoria Harbour. Bridge form would involve permanent reclamation due to the pile caps and affected water area underneath the bridge. The bridge form would also impose permanent constraints on vessel airdraft, and would cause more significant landscape and visual impact to the surrounding areas. Therefore, tunnel form is recommended under this Study. Subject to further studies, we do not preclude the bridge form if the associated impacts could be mitigated and justified.

4.11.3 For the structural form, the horizontal alignments for both highways and railway connections can be achieved by tunnel in the form of IMT or TBM as discussed above. Both IMT and TBM will inevitably have different issues, such as impacts on marine traffic during construction, land requirements at Kennedy Town, permanent reclamations within Victoria Harbour, etc. This preliminary Feasibility Study identifies these issues and records them for future studies, to ascertain the various temporary and permanent impacts and to determine whether there are surmountable or insurmountable issues as well as whether mitigation measures are available. From this Study, it is initially assessed that both IMT and TBM options are to be technically feasible and the environmental impact, while it is greater for IMT tunnel, could be acceptable[2]. The impact on marine traffic of IMT and TBM will need to be fully ascertained in future studies with a detailed Marine Traffic Impact Assessment and stakeholder consultations to look into any possible mitigation measures. In consideration of the requirements of PHO and HPLB TC No. 1/04, any new proposals should start with an assumption of zero reclamation within Victoria harbour. Both tunnel construction methods shall be re-visited in future studies taking into consideration of the findings from Marine Traffic Impact Assessment. IMT also has a number of advantages relating to gradients, cross passage requirement, construction safety, construction cost and programme. It is therefore recommended that the IMT tunnel as one of the possible structural forms for the Transport Infrastructure across busy fairways and channels under this assignment. Followings are the limitations for adopting TBM tunnelling scheme for the proposed Transport Infrastructure identified under the Study for further assessments in future studies.

4.11.4 With regards to the offshore route, the proposed landfall will be located at the north of Kennedy Town. There is lack of a suitable undeveloped coastline for the landfall connection, construction of the portal for the submarine tunnels and the approach structures. Restriction on permanent reclamation under the Protection of the Harbour Ordinance is a major constraint that has to be considered. The vertical profile of the proposed Transport Infrastructure is mainly controlled by the vertical gradient of the approach ramp and the soil cover below the seabed. The extent of permanent reclamation for TBM will therefore be significantly larger than that for IMT tunnel since TBM tunnel will be relatively deeper in order to obtain adequate ground cover for boring.

4.11.5 With regards to the inland route, the proposed landfall will be located at the west of Mount Davis where high rock head is expected. When TBM tunnelling method is adopted, the TBM shall be equipped with cutter discs and stone crusher for rock excavation. The rate of boring will become slow and damage of cutter tools are anticipated. Given the high hydrostatic pressure, for cutterhead maintenance would have to be carried out under compressed air condition. This is a very high risk construction activity.

4.11.6 In relation to the railway connection, vertical profile and its gradient is critical to railway construction. Vertical profile of TBM tunnel would be deeper than that of the IMT tunnel In order to have adequate ground cover for boring. As a result, it would constraint the feasibility of adopting TBM tunnelling for the railway connection to the existing Kennedy Town Station of the West Island Line due to substantial level difference.

[2] Environmental impacts associated with the construction options of IMT and TBM will need to be assessed fully in a future Environmental Impact Assessment (EIA) study in order to identify the necessary environmental mitigation measures and to ascertain the environmental acceptability.

5 POSSIBLE ALIGNMENT SCHEMES FOR HIGHWAY CONNECTION

5.1 Major Considerations for Alignment Schemes for Highway Connection

5.1.1 The highway Transport Infrastructure shall provide direct connection with the existing strategic road of Hong Kong Island in order to maintain the completeness of the whole strategic road network in the territory.

5.1.2 Connaught Road West (Route 4) is the road artery along the west Hong Kong Island that ends at Kennedy Town connecting to Central. Linking to existing Route 4 with connecting point at Kennedy Town should be the most reasonable option. The connection occurs approximately 150m west of the Hill Road at Kennedy Town. Currently 2 temporary ramps are provided for the use by local traffic to connect into ground level roads at Kennedy Town. Adequate clearance should be allowed for the new flyover to span over the existing roads and tramline.

5.1.3 ELM forms part of Hong Kong's long term land supply strategy. Based on preliminary estimation, it is anticipated that ELM would be able to provide developable land after 2030. Strategic Studies and Planning and Engineering Studies, including public consultation, will be conducted in future as part of the implementation of ELM to fully review the possible transport infrastructure schemes as well as other proposed connection methods discussed in this Report. The Central and Western District Council and Harbourfront Commission will be consulted on any proposed design which may have influence on the seaside area at Kennedy Town.

5.1.4 From the reserved stub end at Existing Connaught Road West Flyover, the Transport Infrastructure will first turn southwards to run along the shoreline of WDPCWA. The Transport Infrastructure will then turn northwards to run outside the shoreline of Kennedy Town, so as to avoid the existing development such as The Merton and Manhattan Heights.

5.1.5 The minimum radius for new roads with a design speed of 80 km/h or above is between 320m (R4) to 230m (R3) as stipulated in Clause 3.3.3.1 of Volume 2 of TPDM. However, a permanent reclamation area of approximately 4.8Ha will be resulted outside the WDPCWA if a radius of 320m (R4) is adopted for this turning as shown in **Figure 5.1**. Alternatively, if a minimum radius of 230m (R3) is adopted, reclamation outside WDPCWA can be avoided. Since PHO is one of the major consideration for the Transport Infrastructure, a minimum radius of 230m (R3) is adopted for the road alignments.

5.1.6 From the point of passing the existing developments, the Transport Infrastructure can either turn inland to avoid / minimize the reclamation within Victoria Harbour, or turn offshore to avoid the constraints in the north-west harbourfront of Hong Kong Island.

5.1.7 The structural form can either be long span bridge or subsea tunnel. For subsea tunnel, IMT tunnel is adopted for further development in this Study as discussed in Section 4 above.

5.1.8 The development of possible alignment options for highway connection of the Transport Infrastructure has taken into consideration the following major factors:

- Alignment
- Connection with existing road network
- Topography
- Engineering considerations and constraints
- Land aspects
- Marine impact
- Environmental impact
- Landscape impact
- Visual impact
- Cost and programme

5.1.9 When developing the alignment options, the considerations and constraints have been taken into account, among which the consideration of "zero" permanent reclamation in Victoria Harbour under the spirit of PHO was taken as the utmost importance.

5.1.10 Alignment options for the following two scenarios have been developed. Details of the developed alignment options are presented in the following sections.

- Scenario 1 – without linkage to the potential Route 4 Extension (R4E)
- Scenario 2 – with linkage to the potential Route 4 Extension (R4E)

5.2 Scenario 1 – Possible Scheme of Highway Connection without linkage to Potential Route 4 Extension (R4E)

5.2.1 An offshore tunnel scheme (Possible Scheme Option H1-1) has been developed as the possible scheme under Scenario 1 (without linkage to potential Route 4 Extension). It would not affect Land Use Proposals. It would be able to achieve zero permanent reclamation within Victoria Harbour. It would also cause the least marine impact, landscape impact and visual impact. Although it may cause impact on water quality during construction and on air quality during operation, those impact would be manageable with proper mitigation measures and design. Details of this scheme option are outlined in this section below.

Option Reference No.				
Reference No.	**Connection**	**Scenario**	**Scheme**	**Option**
H1-1A	H –Highway	1 – without R4E	1 – offshore tunnel	A – North alignment (north of Green Island)
H1-1B				B – South alignment (south of Green Island)

Alignment

5.2.2 The alignment and structural form of the possible scheme without linkage to Route 4 Extension (Possible Scheme H1-1) are discussed above. The layout and typical section are shown in **Figure 5.2**, while the vertical profile of the south alignment and north alignment are shown in **Figure 5.3** and **Figure 5.4** respectively. A gradient of 6% is required to achieve zero permanent reclamation. The Transport Infrastructure will descend at the section above WDPCWA, so as to achieve the desirable level of subsea tunnel. The reduction in speed of goods vehicles and buses for going up will be compensated by the provision of a climbing lane for the section of eastbound depressed road and flyover abutment in accordance with relevant design requirements. Since the Transport Infrastructure will be mainly straight at this section of larger gradient, the potential safety issue from the larger gradient is considered to be less significant.

Connection with Existing Road Network

5.2.3 The Transport Infrastructure would connect to the existing stub ends at Connaught Road West Flyover. Slip roads are proposed at both sides of the Transport Infrastructure for the connection to local road network. The existing bridges connecting the existing Route 4 and Shing Sai Road would be demolished and reconstructed as shown in **Figure 5.5**. An at-grade roundabout junction is proposed at Shing Sai Road to facilitate the connectivity between Transport Infrastructure and the local road network.

5.2.4 The layout, elevation and sections of the connectivity at Kennedy Town are shown in **Figure 5.6, 5.7** and **5.8.**

Topography

5.2.5 The eastern landfall of the proposed subsea tunnel is targeted at a location to the north of Kennedy Town. In this area, the necessity of permanent reclamation is subject to the gradient of the proposed Transport Infrastructure.

5.2.6 The IMT section continues westward from either South Alignment or North Alignment of Green Island (where the seabed levels ranges approximately from -25mPD to -4mPD and -11mPD to -8mPD, respectively) and runs towards the KYC of ELM. The middle section of the alignment runs across the Western Fairway where the seabed level is around -27mPD.

5.2.7 To the north of Kennedy Town, the proposed tunnel section would be transitioned into the approach ramp/tunnel, at-grade road and viaduct sections where the existing ground levels vary approximately between +4mPD and +6mPD.

5.2.8 Deep below the existing ground level (approximately -120mPD), the sewerage tunnel of HATS runs along the WDPCWA, with a tunnel protection area of 100m wide. The Transport Infrastructure would be located above the said tunnel. The smallest level difference between the Harbour Area Treatment Scheme tunnel and tunnel structure of Transport Infrastructure is approximately 100m. Due to the large depth of the HATS tunnel, it will unlikely affect / be affected by the Transport Infrastructure. Nonetheless, the proposals for works should be submitted to Drainage Services Department and Geotechnical Engineering Office in future studies in accordance with ETWB TC No. 28/2003.

Engineering Considerations and Constraints

Eastern Landfall at the Existing WDPCWA

5.2.9 The approach ramp structure will be constructed in the eastern landfall to connect the cut-and-cover tunnel. The approach ramp will predominantly be in the form of a U-trough RC structure although a section of L-shaped RC retaining wall will be provided where the ramp approaches ground level.

5.2.10 It is envisaged that the temporary retaining wall for the excavation will be in the form of a diaphragm wall, pipe pile wall (with grouting) or sheetpile wall, depending on the ground conditions and excavation depth. The ELS system may contain waling, struts, king posts, and other associated works together with a dewatering system such as pumping from wells in the base of the excavation.

5.2.11 Upon completion of the cofferdam, the approach ramp structure will be cast in-situ by using a bottom-up construction method.

5.2.12 If a deeper gradient of the proposed Transport Infrastructure is adopted in order to avoid permanent reclamation, certain cut-and-cover tunnel sections will have to be constructed at the eastern landfall. The cut-and-cover tunnel structure is envisaged to be constructed between the temporary retaining structures such as a diaphragm/pipe pile wall by using bottom-up method. This method involves substantial temporary ELS works together with a dewatering system such as pumping from wells in the base of the excavation.

5.2.13 The cut-and-cover tunnels would be cast in-situ within the cofferdam. The advantage of casting the cut-and-cover tunnel in-situ is that a waterproof membrane can be installed on all buried faces and thus improves the watertightness.

5.2.14 The foundation of the cut-and-cover tunnel is expected to be on compacted general fill, alluvium or Grade V material. Further assessment on the bearing capacity is required in the preliminary/detailed design stage to investigate the necessity of ground improvement works or piled foundation.

5.2.15 The geotechnical constraints and construction considerations for the proposed approach ramp structure are discussed below:

- Retaining walls formed during cut-and-cover excavations can move laterally and lead to settlement at the ground surface. Therefore extreme care needs to be adopted in built-up areas to control these deflections. The deflections are primarily a function of the active ground and groundwater pressures acting on the wall, the stiffness of the wall and strutting system and the excavation stages adopted.

- Groundwater drawdown, as may be required to maintain a dry excavation can also have a significant impact on ground settlement.

- It is recommended that a record of the pre-construction conditions of buildings and structures along the alignment that may be affected by the proposed construction work are recorded. The necessity of protective works for any of the buildings within influencing distance of the works should be identified during the preliminary/detailed design stage for the works.

- It is likely that piled foundations, such as pre-bored H piles, would be required for the U-trough RC structure and approach tunnel structure. The piles would need to be founded on rock or in the weathered rock as a combination of side friction and end bearing. The choice of pile will depend on the rock head level and also the presence of corestones which will need to be investigated in subsequent stages of the project. The presence of the inferred fault in the area could also affect rockhead levels and will also need to be investigated in subsequent stages of the project.

Reclamation along the Kennedy Town Shoreline

5.2.16 The main purpose of the permanent reclamation is to provide soil cover for the tunnel structure. The necessity and extent of permanent reclamation is partly governed by the vertical alignment which is largely a function of the gradient of the approach ramp and the soil thickness below the seabed. As a result, the Protection of the Harbour Ordinance (PHO) will need to be taken into consideration in the formulation of the alignment options for highway connections. If a road gradient of 4% is adopted at the eastern landfall, approximately 1.8Ha of permanent reclamation will be required and its extent is illustrated in **Figure 5.9**. No permanent reclamation is required if a road gradient of 6% is adopted and is illustrated in **Figure 5.38 to 5.41**.

5.2.17 Dredging works for the IMT tunnel construction adjacent to the existing seawalls along the Kennedy Town sea front could potentially affect the stability of these existing structures. In order to reduce the impact on these structures, the formation of a temporary reclamation is recommended as a safe, feasible and practicable way of constructing the subsea tunnel and thereby ultimately avoiding both dredging and permanent reclamation works. Diaphragm walls would be installed through the temporary reclamation in a safe working environment and allow the construction of the tunnel box at depth. After the tunnel structure has been completed, the temporary reclamation and seawalls above the seabed level would be removed and the seabed reinstated, thereby returning this part of the harbour to its original condition. Approximately 1.9Ha or 3.7Ha of temporary reclamation will be resulted if a road gradient of 4% or 6% is adopted respectively. A typical section through the temporary reclamation is illustrated in **Figure 5.10**.

5.2.18 The extent of reclamation and dredging should be kept to minimum in order to minimise the environmental impact and comply with the PHO. Other factors affecting the required extent of reclamation works are summarised below.

- The vertical alignment and the required ground cover of the subsea tunnel for the highway connection;

- The proposed diaphragm/pipe pile wall for the cut-and-cover tunnel should not encroach into the seawall foundation;

- Sufficient clearance between the IMT tunnel and existing seawall foundation should be provided to avoid any impact to seawall stability; and

- Potential reprovisioning requirements of existing piers (e.g. Kennedy Town Old Cattle Pier).

5.2.19 Details and extent of the temporary and permanent reclamation should be further investigated in the preliminary/detailed design stage after determination of the ground conditions by site specific GI and confirmation of the alignment. Preparation of the cogent and convincing materials for permanent or temporary reclamation works within the Victoria Harbour would then be followed.

5.2.20 A vertical blockwork seawall is preferred along the proposed reclamation as this would provide a vertical berthing face for potential future public berths and for loading and unloading of heavy construction plant for tunnel construction.

5.2.21 The majority of seawalls constructed worldwide adopt a fully dredged method whereby all soft/compressible materials below the founding level are first removed. Imported sand fill/rock fill materials are then placed to provide a suitable founding horizon to avoid long term settlement and deformation of the seawall. This is also the common practice for the design of seawalls in Hong Kong. Notwithstanding the above, considerations should be given to the feasibility of non-dredged methods such as band drains, Stone Column, Deep Cement Mixing (DCM) and Sand Compaction Pile (SCP) in the preliminary/detailed design stage.

5.2.22 With regard to the reclamation behind the seawall, a key issue to be addressed in deciding whether the non-dredged reclamation (with consolidation measures) or fully-dredged reclamation should be adopted will depend on whether the construction programme can accommodate the time-consuming activities in non-dredged reclamations, such as laying of geotextile & sand blanket onto the seabed surface, installing band drains and surcharging. Another key issue to be considered is the environmental advantages of non-dredge reclamation as it obviates dredging and reduces reclamation filling.

5.2.23 In view of the close distance between the coastal area and the proposed reclamation area, a non-dredged reclamation is initially considered under this assignment subject to further assessments in future studies. The non-dredged methods can minimise the stability problems of the nearby existing seawalls due to dredging during reclamation works. The method of band drains and surcharge is recommended as the settlement control measures within the reclamation area.

5.2.24 Sand fill has been widely used in previous reclamation projects in Hong Kong with uniform and well controlled residual settlements achieved. There is also a programming advantage to the use of sand fill since vibro-compaction can be carried out which limits creep settlement of the sand fill and hence enables the commencement of construction works at an earlier date.

5.2.25 As it is the government policy to make beneficial use of public fill to reduce environmental impact, both sand fill and public fill are considered as suitable fill material for reclamation works. Strict site control is necessary to ensure that the public fill does not contain unsuitable material such as oversized boulders, refuse or top soil with organic matter. Public fill can also require a longer time to achieve the required limit of residual settlement due to creep settlement. The rate of supply is also not easily controlled since it depends mainly upon the progress of works in other projects. Potential impacts caused by the fluctuation of supply rates on the construction programme and the availability of large stockpiling areas, need to be considered if public fill is proposed.

5.2.26 The geotechnical constraints and construction considerations for the proposed reclamation are summarised below:

- If a non-dredged method of reclamation is adopted, primary and secondary consolidation settlement of the underlying cohesive deposits (i.e. marine and alluvial clays & silts) will occur during the course of construction and may continue over time even after construction is completed. Fill material placed in the reclamation area will also undergo creep settlement.

- Whilst the published geological maps indicate that much of the Kennedy Town shoreline is underlain by marine sands, detailed GI and assessment of the settlement characteristics of these materials will be required during the preliminary/detailed design stage.

- The uses of sand fill and public fill in different parts of the site and the arrangement of delivery of public fill, should be further investigated in the preliminary/detailed design stage to ensure that the programme requirements of the project can be met. Liaison with relevant parties such as CEDD shall be conducted in the preliminary/detailed design stage to confirm the detailed arrangement of supplying the public fill materials to the project.

- The existing piers (i.e. Kennedy Town Old Cattle Pier) are located along the tunnel alignment. It is envisaged that these piers may have to be temporarily removed or relocated. The impact assessment on these existing piers should be carried out after the alignment and extent of reclamation are confirmed in the preliminary/detailed design stage.

- The proposed reclamation is very close to the existing seawalls along the Kennedy Town sea front. No as-built records of these existing seawalls along the New Praya Kennedy Town are found. Detailed inspection and assessment should be conducted to evaluate the impact on the existing seawalls due to dredging for seawall foundation in the preliminary/detailed design stage.

Cut-and-cover Tunnel on Reclaimed Land

5.2.27 It is recommended that the construction of the cut-and-cover tunnel adopts a similar approach to that being used on the Central – Wan Chai Bypass project. The concerned tunnel section would be constructed using the cut-and-cover method on reclaimed land. The excavation and lateral support works will comprise diaphragm walls with the support of waling and struts.

5.2.28 A working platform would be formed first by temporary reclamation, on which diaphragm walls and subsequent excavation works would be carried out. The diaphragm wall would be installed to a depth that provides sufficient embedment. For areas of shallow rock where sufficient embedment cannot be achieved, the diaphragm wall will be installed only down to bedrock. Shear pins, at regular spacing, can then be installed to prevent 'kick out' failure. Grouting at the wall toe can also be carried out to improve the water-tightness of the cofferdam.

5.2.29 The excavation would be carried out in stages with struts and walings installed until the final excavation level is achieved. Upon completion of the cofferdam, the reinforced concrete tunnel box would be cast in-situ by using a bottom-up construction method. The advantage of casting the cut-and-cover tunnel in-situ is that a waterproof membrane can be installed on all buried faces, thus minimising leakages.

5.2.30 Backfilling and the removal of struts would be carried out in stages after completion of cut-and-cover tunnel. All temporary works in the temporary reclamation area, including reclamation and diaphragm wall, should be removed above the original sea bed level; while they will generally be left in place in the permanent reclamation area. A typical section through the cut-and-cover tunnel on reclaimed land is illustrated in **Figure 5.10**.

5.2.31 The geotechnical constraints and construction considerations for the proposed approach tunnel on reclaimed land are discussed below:

- The clearance between the rock mound of the seawalls (both the existing sea walls and the proposed seawall for reclamation) and the diaphragm wall alignment shall be specified such that it will not be in conflict with the extent of the rock mound.

- Retaining walls formed during cut-and-cover excavations can move laterally and lead to settlement at the ground surface. Therefore extreme care needs to be adopted in built-up areas to control these deflections. The deflections are primarily a function of the active ground and groundwater pressures acting on the wall, the stiffness of the wall and strutting system and the excavation stages adopted.

- Groundwater drawdown, as may be required to maintain a dry excavation can also have a significant impact on ground settlement.

- It is recommended that a record of the pre-construction conditions of buildings and structures along the alignment that may be affected by the proposed construction work are recorded. The necessity of protective works for any of the buildings within influencing distance of the works should be identified during the preliminary/detailed design stage for the works.

- The proposed cut-and-cover tunnel is very close to the existing seawalls along the Kennedy Town Sea Front. No as-built record of these existing seawalls along the New Praya Kennedy Town is found. Detailed inspection and assessment should be carried out in the preliminary/detailed design stage to evaluate the impact on the existing seawalls due to the deep excavation. The presence of the inferred fault in the area could also affect rockhead levels and will also need to be investigated in subsequent stages of the project.

- It is recommended that all marine deposits under the tunnel should be removed for construction of the cut-and-cover tunnel section. Typically the dredging and disposal of marine deposits would be carried out during reclamation works. However, in order to minimise potential impacts on the nearby existing seawalls, the excavation of marine deposits should take place during the construction of the cut-and-cover tunnel within the cofferdam.

- It is likely that deep, piled foundations would be required such as pre-bored H piles or barrettes. The piles would need to be founded on rock or in the weathered rock as a combination of side friction and end bearing. The choice of pile will depend on the rockhead levels and also the presence of corestones which will need to be investigated in subsequent stages of the project.

- If permanent reclamation is required, the foundations for the cut-and-cover tunnel will have to be designed to allow for the long term settlements of the reclamation. Any negative skin friction caused by the long term settlements of the reclamation fill will have to be taken into account during the detailed design stage.

Subsea Tunnel

5.2.32 The route options of the Transport Infrastructure for the north and south alignment are shown in **Figure 5.11**. For both north and south alignment, an Immersed Tube (IMT) tunnel is adopted for further development in this Study to cross the approximately 4km distance between KET and the KYC of ELM. The normal length of individual tunnel elements is anticipated to be 135 to 140m. The actual length of tunnel elements will be determined in future studies to suit the fabrication facilities, programme and marine operation as well as other constraints identified under the Study. This indicates that a total of approximately 30 elements will be required.

5.2.33 The tunnel trench should be dredged so that the necessary bottom width and profile can be maintained during lowering of the tunnel elements and placing of the foundation materials.

5.2.34 The land requirement for a casting basin is very high and finding a suitable location in Hong Kong can be problematic. In addition, the formation of the casting basin involves extensive excavation and lateral support systems. The previous Shek O Quarry is currently used as the casting yard for fabrication of tunnel elements for the SCL harbour crossing tunnel and could potentially be used again for options considered in this Study. Besides, as the Study has recommended a Transport Infrastructure which connects the KYC of ELM, it would be possible to modify the reclamation profile of the KYC of ELM to allow construction of a casting basin. However, the KYC of ELM site might not have land access at the required time and thus would have to rely on marine access. Possible locations for a casting basin should be further investigated during the preliminary/detailed design stage.

5.2.35 Typically, three methods of foundation construction are normally considered for the pre-cast tunnel elements: sand jetting, sand flow and screeded foundation. Sand jetting and sand flow methods are carried out after the tunnel element is placed, whereas the screeded foundation is prepared prior to the sinking of the unit. The sand flow method may be used from inside the tunnel unit whereas the sand jetting method requires external equipment.

5.2.36 To lower a tunnel element to its final position, it is usual to utilize a temporary ballasting system that gives the tunnel element sufficient negative buoyancy to maintain stability and control during immersion. After placing the new tunnel element and joining it with the previously placed element, the space between the bulkheads of the two adjoining tunnel elements is then dewatered. Water pressure due to depth of immersion on the exposed end of the newly placed tunnel element compresses the joint against the previously installed tunnel element. Typical joints between tunnel elements include Gina gaskets and Omega seals.

5.2.37 After each element is sunk, it will be backfilled to enable the temporary water ballast to be removed and the permanent concrete ballast placed. When the general fill is complete, suitably sized rock armour is placed overall to resist scour and damage by sinking ships or falling/dragging anchors.

5.2.38 The geotechnical constraints and construction considerations for the proposed subsea IMT tunnel are discussed below:

- Areas of high rockhead have been identified, from previous geophysical surveys, to the south of Green Island. This is likely to present a major constraint to the construction of an IMT along the south alignment as conventional dredging techniques will not be capable of forming the IMT trench in the thickness of rock identified. Underwater rock excavation by chiselling or blasting would be required in the area close to Green Island subject to the strength of the rock to be excavated. If the adoption of underwater blasting is confirmed at future studies of the project, not only the blasting-related issues, but also the potential adverse impacts to the nearby onshore and underwater structures, the delivery and storage of explosives over water in the busy fairways and channels, the difficulties of underwater charging and misfire handling, the required marine traffic closure during charging and 'firing, the supply of qualified blasting personnel (e.g. shot firers) for underwater blasting works in Hong Kong have to be considered. Consultation and liaison with Mines Division and other relevant stakeholders (such as local community/nearby residents, utility undertakers, EPD and MD) on the matters related to storage, transport and use of explosives should be carried out as soon as the need for underwater blasting has been confirmed at future studies of the project.

- In view of the abovementioned constraint due to shallow rockhead to the south of Green Island, the south alignment should therefore be reviewed at future studies. Site specific GI should also be carried out in future studies of the project to verify the rockhead levels and provide information on the engineering properties such that appropriate excavation/tunnelling methods can be further examined. The north alignment however does not impose any severe constraints due to shallow rockhead and as such the ground conditions are more favourable for IMT construction.

- Other geological/geotechnical risks associated with the IMT tunnel are the stability of the trench and the strength of the founding soils. Although there is only very limited GI information available for the offshore portion of the study area, the IMT trench is likely to be formed in soft marine silts and clays for much of the alignment and therefore the trench side slopes will need to be formed at relatively low gradients. This not only increases the total amount of material to be dredged but also the amount of imported material required for backfill. The extent of over excavation of the tunnel foundation level needs to be confirmed in the preliminary/detailed design stage after determination of the ground conditions by site specific GI.

- Where the layers of marine clay or alluvial clay are thick, the placement of tunnel elements on soft materials may cause consolidation and creep settlement, thus leading to differential settlement along the length of the tunnel. More flexible joints would allow movement between tunnel elements whilst maintaining water tightness of the tunnel. Settlement can also be controlled by designing the IMT tunnel structure to limit additional stress on the base materials, thus controlling the amount of consolidation.

<u>Landfall and Reclamation</u>

5.2.39 As discussed in the above sections, clearance should be allowed between the dredging extent for IMT construction and the existing seawall to avoid adverse impact on the stability of the existing seawall. The dredging for IMT tunnel would form a trench with approximately 1:3 side slopes of approximately 45m wide. Based on the limited as-built information of the existing seawalls, the foundation of the existing seawall is assumed to be 18m outside the surface of the existing seawall. At this preliminary stage with limited GI information, approximately 10m clearance is assumed outside the existing seawall to avoid adverse impact from the dredging. Cut-and-cover method would be adopted as the Transport Infrastructure runs closer to the existing shoreline with a clearance smaller than the above discussed requirements. Also, to avoid adverse impact from the diaphragm wall for cut-and-cover construction, approximately minimum 20m clearance is allowed from the tunnel structure of the Transport Infrastructure to the surface of the existing seawall. As for the new seawall for the temporary reclamation, based on the limited GI information in the vicinity, approximately 40m clearance is assumed from the tunnel structure to the surface of new seawall, such that the diaphragm wall would avoid the foundation of the new seawall, assuming the conventional method of full dredging is to be adopted. The temporary reclamation extent is thus determined as shown in **Figure 5.12**.

5.2.40 A 2m cover above the tunnel structure of the Transport Infrastructure would be provided for the protective armour. If a gradient of 6% is adopted, the Transport Infrastructure can reach the required level before existing shoreline. No permanent reclamation would be required at the landfall. However, if a gradient of 4% is adopted, the Transport Infrastructure would need to run outside of the existing shoreline to reach the required level. Permanent reclamation is therefore required. With reference to the vertical profile of the Transport Infrastructure adopting a gradient of 4%, the permanent reclamation extent is determined as shown in **Figure 5.13**.

Land Aspects

5.2.41 A tentative buffer zone is determined to allow for sufficient construction space for Transport Infrastructure. 10m clearance from the road and structures is provided for the land based part of Transport Infrastructure. The 10m clearance for highway connection has taken into account the provision of sufficient work space for typical construction method. As for the subsea tunnel, the tentative buffer zone would take the dredging and temporary reclamation into consideration.

5.2.42 Part of the Belcher Bay Park and Kennedy Town Swimming Pool fall within the tentative buffer zone. Construction near the existing development and landscape resources should be carefully planned to minimize its impact.

5.2.43 The Transport Infrastructure would occupy the existing WDPCWA, which has been included in the Western Harbourfront Conceptual Master Plan. The waterfront open space with provisions for cycle tracks and sports facilities proposed for WDPCWA would be affected. The Harbourfront Commission (HC), the Central & Western District Council and other relevant stakeholders shall be consulted about the future project proponents of the Transport Infrastructure. The land use impact on the Kennedy Town is shown in **Figure 5.14**.

5.2.44 To minimize the impact on the Western Harbourfront Conceptual Master Plan, other means of enhancement to the harbourfront are explored. Instead of at the western end of the WDPCWA, the cycle tracks and sports facilities can be accommodated underneath the elevated structure of the Transport Infrastructure. The harbourfront of WDPCWA and Shing Sai Road Bus Terminus can still form an open space despite of the width being reduced. A landscape deck with resting area and viewing pavilion can be proposed over the at-grade or depressed part of the Transport Infrastructure to provide space for public enjoyment and to reduce the visual impact. A stepped roof-top is also proposed to cover the portal area and develop into an open space or for other community uses on top of it. A conceptual plan is shown in **Figure 5.15**.

5.2.45 A future harbourfront access from Kennedy Town to Sai Wan can be provided between the northernmost slip road of Transport Infrastructure and coastline. A continuous walkway with a minimum 11.2m width can be provided if the Transport Infrastructure is implemented without linkage to Route 4 Extension (**Figure 5.15**).

5.2.46 It is possible to reinstate the existing piers (i.e. Kennedy Town Old Cattle Pier) affected by the Transport Infrastructure at the original locations. Re-provision of the piers should be subjected to assessment and consultation with Development Bureau Harbour Unit, Planning Department, Marine Department and other associated stakeholder in future studies of the project. Considerations on operation, land use, future planning of the WDPCWA area and Western Harbourfront Conceptual Master Plan should be taken in the re-provisioning assessment.

Marine Impact

Marine Traffic and Transport

5.2.47 The Transport Infrastructure in the form of IMT tunnel would run across the Southern Fairway and the Western Fairway, thus impact on the marine traffic for the installation of IMT segments during construction is anticipated. It is estimated that a maximum works area of 190m (length) x 50m (width) within the Western Fairway and 185m (length) x 50m (width) within the Southern Fairway will be anticipated for construction activities. The feasibility of IMT in regards to marine traffic and transport will need to be fully ascertained in future studies with a detailed Marine Traffic Impact Assessment and stakeholder consultations to look into any mitigation measures for possible impacts on marine traffic and port facilities. Close liaison with MD would be required at future studies of the project to maintain marine safety and to minimize the potential impacts to an acceptable level.

5.2.48 No permanent impact on the anchorage areas are anticipated by the proposed IMT options. The Western Anchorage No.3 and Reserved Dangerous Goods Anchorage waterspace, their utility and access would have temporary impacts during construction of the IMT tunnel. Consultation with the relevant stakeholders, government departments as well as the relevant advisory, statutory and consultative committees under Marine Department's purview should be conducted during future studies to ensure that potential impacts to the anchorage areas are minimized and mitigation measures are effective and to the satisfaction of all relevant parties. The cumulative effects on the anchorage waterspace by the possible reclamation at Kau Yi Chau shall be assessed under separated future studies.

<u>Marine Facilities</u>

5.2.49 The Transport Infrastructure would occupy Berth 1 to Berth 11 of the WDPCWA for the connection with existing road networks. It is noted that Berth 1 to Berth 3 are proposed to be released and handed over to relevant government departments for reallocation. According to C&W DC Paper No. 39/2016, the occupancy rates for WDPCWA is 73% in 2014. With Berth 4 to Berth 11 accounting for approximately 50% of the existing sea frontage, there may be potential to relocate the affected operation to other PCWA with available capacity. As PCWA operation serve important economic and social functions for Hong Kong, the re-provision of WDPCWA should be explored in details in future studies along with Western Harbourfront Conceptual Masterplan and development of ELM where it may be considered as one of the potential re-provisioning sites subject to the timing, land use compatibility and availability of land access, etc. WDPCWA is essential for cargo handling industry and in particular for cargo transport to outlying islands in Hong Kong. Hence, relevant stakeholders, including the WDPCWA cargo operators, should be consulted at the earliest opportunity in future stage of the project if their operation is affected by the construction of the Transport Infrastructure and if re-provision of WDPCWA is required.

5.2.50 The Transport Infrastructure is in conflict with the tip of the existing Kennedy Town Old Cattle Pier. Also, the temporary reclamation required for the construction of Transport Infrastructure would cover this pier. The existing Kennedy Town Old Cattle Pier is currently not in use and is proposed under the Land Use Review on the Western Part of Kennedy Town as part of the proposed waterfront park. Therefore, removal and re-provision of the pier during temporary reclamation for construction of the Transport Infrastructure would be carried out.

5.2.51 The Transport Infrastructure would also run near the China Merchant Wharf. If the north alignment is adopted, the dredging during IMT construction would not affect the structure of the China Merchant Wharf. On the other hand, if the south alignment is adopted, dredging beneath the pier structure would be required and there would be a risk of adversely affecting the pier structure. As a mitigation measure, temporary sheetpile wall could be adopted at the locations where the dredging extent is close to the China Merchant Wharf. As such, the dredging extent would not encroach upon the footprint of China Merchant Wharf and it is unlikely to induce significant impact to the existing China Merchant Wharf with end-bearing piles on rock. However, detailed impact assessment on the existing China Merchant Wharf is recommended to be carried out in future studies of this project.

5.2.52 As construction activities including dredging, construction of seawall and installation of IMT units would be carried out near the China Merchant Wharf, the operation of the China Merchant Wharf is anticipated to be affected. Liaison with China Merchants Godown, Wharf & Transportation Co. Ltd. and MD will be carried out in future studies for mitigation measures.

5.2.53 An overlay of the Transport Infrastructure and the marine traffic and facilities is shown in **Figure 5.16**.

Environmental Impact

5.2.54 With the tunnel portal and potential ventilation building located in Kennedy Town, impact on air quality is anticipated. Mitigation measures including relocation of or additional ventilation building at Green Island can be adopted. The site of decommissioned Green Island Reception Centre can be utilized to accommodate potential relocated or additional ventilation building at Green Island. This arrangement would be examined in future studies.

5.2.55 Noise impact is also anticipated with the large scale road connectivity between Transport Infrastructure, Existing Route 4 and local road network proposed at existing Shing Sai Road. Mitigation measures including noise barriers / enclosure can be provided along the proposed roads subject to detailed assessment in next stage of the study.

5.2.56 The WSD flushing water intake is a water sensitive receiver located outside the existing shoreline of Kennedy Town. Impact on water quality at the water sensitive received is anticipated during the construction of IMT tunnel. The impact shall be assessed and mitigation measure shall be proposed in next stage of the study.

5.2.57 There are coral communities along the northern shore and southern shore of Green Island. The south alignment of the possible scheme (south of the Green Island) would have direct impact on the coral community along the southern shore. On the other hand, the north alignment which is located more offshore would avoid direct impact on the coral community occurring along the northern shore of Green Island. Potential water quality impact is anticipated on the recorded coral community on the northern shore of Green Island. Given the structural form of IMT, which is below the existing seabed level, there will be no permanent seabed loss. The White-bellied Sea Eagle (WBSE) nesting site on Green Island is active. The potential impact on coral, water quality and terrestrial ecological impact to WBSE shall be assessed and mitigation measure shall be proposed in future studies.

5.2.58 The Transport Infrastructure avoids the cultural heritages for a minimum clearance of 100m. No impact on the terrestrial cultural heritages is anticipated.

5.2.59 On the other hand, the marine archaeological potential has not yet been clearly established. Historically, the two ends of Victoria Harbour were busy fairways that contained active maritime traffic since perhaps the Tang-Song period. There have also been several sea battles happened in the historical period (such as the Joint Sino-Portugal force against pirates and the Sino-British conflicts during the 19th century). There are uncertain marine archaeological potentials, which require a Marine Archaeological Investigation (MAI) to be conducted in future studies.

5.2.60 No important spawning or nursery ground of commercial fisheries would be affected by the Transport Infrastructure. The loss of fishing grounds would be temporary during the construction phase and the area of permanent reclamation required is small, the fisheries impact is considered not significant. The Strategic Environmental Assessment under future studies should include a detailed fisheries impact assessment.

5.2.61 Strategic Environmental Assessment including comparison of the environmental benefits / drawbacks as well as assessment on the relevant environmental aspects shall be conducted in future studies for the development of ELM, so that comprehensive evaluation and findings can be incorporated in the development of the Transport Infrastructure. The study area and scope of the assessment shall be determined in consultation with EPD when appropriate in future studies.

5.2.62 The environmental impact discussed above is highlighted in **Figure 5.17**.

Landscape Impact

5.2.63 As zero permanent reclamation within Victoria Harbour can be achieved with a gradient of approximately 6%, the impact on landscape resource of Victoria Harbour can be avoided. The Transport Infrastructure also avoids the Belcher Bay Park. No landscape impact is anticipated as shown in **Figure 5.18**.

Visual Impact

5.2.64 Since tunnel structural form is adopted for the Transport Infrastructure, the visual impact would be minimal. Insignificant visual impact may be resulted for the residential buildings between Kennedy Town New Praya and Catchick Street, residential buildings between Kennedy Town New Praya and Belcher Street, and residential buildings between Des Voeux Road West and Queen's Road West.

Cost and Programme

5.2.65 The Transport Infrastructure would involve construction of subsea tunnel of approximately 4300m and approximately 750m tunnel, depressed road, abutment and elevated road on land.

5.2.66 With reference to past projects of similar nature, the construction cost for the highway connection of Transport Infrastructure is [redacted]

5.2.67 The construction period would be approximately 6 years based on the immersed tunnel option. The recurrent cost for both type of structural form would comprise staff costs, maintenance costs, utility expenses and administration expenses. The recurrent costs of the highway connection would also depend on the financial and contractual arrangement for the construction and operation of the Project. Available information on the Western Harbour Crossing suggested that the annual recurrent cost is [redacted]

5.2.68 With details of the ELM development yet to be defined, there are uncertainties on the final alignment and design of the Highway Connection which would have great influence on the recurrent costs for the Project. A detailed assessment on the recurrent costs for the possible schemes can only be conducted in future stages of the project when there are more details.

Ordinance and Gazettal Requirements

5.2.69 The Transport Infrastructure would be subject to the below ordinances, and depending on the design of the Transport Infrastructure may also need to be gazetted under these ordinances:

- Environmental Impact Assessment Ordinance;
- Foreshore and Sea-bed (Reclamations) Ordinance;
- Lands Resumption Ordinance;
- Protection of the Harbour Ordinance;
- Road Traffic Ordinance;
- Roads (Works, Use and Compensation) Ordinance; and
- Town Planning Ordinance.

5.3 Scenario 2 – Possible Scheme of Highway Connection with linkage to Potential Route 4 Extension (R4E)

5.3.1 Route 4 Extension – Section between Kennedy Town and Aberdeen (previously known as Route 7) was planned at Kennedy Town in year nineteen-nineties. For the former Route 7 between Kennedy Town and Aberdeen, 8km dual 3 lanes carriageway was proposed to connect Kennedy Town and Aberdeen to relieve the traffic congestion at Aberdeen Tunnel and Pok Fu Lam Road. There is currently no timetable for the design and implementation programme of Route 4 Extension from Kennedy Town to Aberdeen.

5.3.2 Various options have been proposed including viaducts along the coastal area of Kennedy Town and Pok Fu Lam. The proposed alignment has also taken Green Island Reclamation as one of the consideration in the development of the alignment. In view of the potential deferral or cancellation of Green Island Reclamation, alternative tunnel options have also been developed. The tunnel alignment will start at the end of the existing Route 4 flyover, run along the coastal area of Kennedy Town, follow south westerly direction where it will traverse Victoria Road and reach Mount Davis. It will go through Mount Davis and reach Po Fu Lam and Aberdeen subsequently.

5.3.3 In the past, two options were proposed for the potential Route 4 Extension. In the first option, the Route 4 Extension would run foreshore across Sandy Bay after going through Mount Davis. In the other option, the Route 4 Extension would run inland between Kennedy Town and Aberdeen.

5.3.4 Potential Route 4 Extension could likely relieve the loading of the major north-south corridor at Hong Kong Island, i.e. Pok Fu Lam Road and Aberdeen Tunnel. The need for provision of Route 4 Extension in the future and its potential schemes shall be assessed and further developed based on the traffic need under separate study. The conceptual schemes of Transport Infrastructure under the scenario with linkage to the potential extension of Route 4 are considered in this section.

5.3.5 To ensure potential connection of Route 4 Extension to Western Hong Kong Island is not impeded by the Transport Infrastructure, conceptual schemes of the highway connection with linkage to the potential Route 4 Extension are developed based on the possible schemes without linkage to Route 4 Extension, while taking into account the constraints and consideration discussed above. The constraints posed by PHO and existing / planned developments in Kennedy Town are of the most importance. Different options of alignments, structural forms and interchange locations were explored to identify the possible options. Due to the length and magnitude of the Transport Infrastructure, landscape and visual considerations are also important factors while developing the conceptual schemes. With the uncertainties for the possible options with Route 4 Extension due to their traffic performance, technical feasibility, marine traffic impacts and potential environmental impacts, the feasibility of those options is subject to further studies undertaken by the project office for Route 4 Extension.

5.3.6 Under this Study, three Scheme Options (H2-1A, H2-1B and H2-3) are considered to be the possible options of highway connection under Scenario 2 (with linkage to the potential Route 4 Extension).

Option Reference No.				
Reference No.	**Highway / Railway**	**Scenario**	**Scheme**	**Option**
H2-1A	H – Highway	2 – with R4E	1 – grade separated junction at PCWA (i.e. 3 westbound+3 eastbound lanes for TI & 2 westbound +2 eastbound lanes for R4E at KET)	A – R4E in bridge form
H2-1B				B – R4E in sub-sea tunnel form, separate portals
H2-3			3 – grade separated junction at PCWA & grade separated interchange outside Victoria Harbour (i.e.3 westbound +3 eastbound lanes for TI & 2 eastbound lanes for R4E at KET)	N/A

5.3.7 Possible Options H2-1A and H2-1B (conceptual scheme with interchange of Route 4 Extension at Kennedy Town) would be able to achieve zero reclamation for the Transport Infrastructure prior to the implementation of Route 4 Extension. Details of this possible scheme are outlined in this section.

Alignment

5.3.8 The alignment, vertical profile and structural form of the Transport Infrastructure in the possible scheme with linkage to Route 4 Extension (Possible Options H2-1A and H2-1B) are similar to the possible scheme without linkage to Route 4 Extension (Possible Scheme H1-1).

5.3.9 As the Transport Infrastructure is shifted northward to allow space for the Route 4 Extension to run along the shore, the landfall of the Transport Infrastructure is moved northwards along the shoreline of WDPCWA. To achieve zero permanent reclamation, the length available for the Transport Infrastructure to descend from the existing stub ends at Connaught Road West Flyover to below existing seabed at the shoreline is shorter. A larger gradient of approximately 7.1% is therefore required to achieve zero permanent reclamation, comparing to a gradient of 6% adopted in the possible scheme without linkage to Route 4 Extension (Possible Scheme H1-1). The 7.1% gradient is within the absolute maximum requirement of TPDM. There are similar precedent cases. It should be subject to further assessment in future studies.

5.3.10 After the landfall, the Transport Infrastructure would adopt the same routes as Possible Scheme H1-1 towards the KYC of ELM. The layout is shown in **Figure 5.19**, while the vertical profile is shown in **Figure 5.20** and **5.21**.

Connection with Existing Road Network

5.3.11 Based on the connectivity of the Possible Scheme without linkage to Route 4 Extension, connection between the existing Route 4 and Route 4 Extension is introduced. The connection between the existing Route 4 and Route 4 Extension should be at the fast lane side of the connection between the existing Route 4 and local road network. Also, with the Transport Infrastructure occupying the underground level and the local roads running at-grade, the connection between the existing Route 4 and Route 4 Extension would need to run at a higher level above WDPCWA.

5.3.12 The layout, elevation and sections of the connectivity at Kennedy Town are shown in **Figure 5.22 to 5.24**.

Topography

5.3.13 The eastern landfall of the proposed subsea tunnel is targeted at a location to the north of Kennedy Town. In this area, the necessity of permanent reclamation is subject to the gradient of the proposed Transport Infrastructure.

5.3.14 The IMT section continues westward from south of Green Island (where the seabed levels ranges approximately from -25mPD to -4mPD) and runs towards the KYC of ELM. The middle section of the alignment runs across the Western Fairway where the seabed level is around -27mPD.

5.3.15 To the north of Kennedy Town, the proposed tunnel section would be transitioned into the approach ramp, at-grade road and viaduct sections where the existing ground levels vary between +4mPD and +6mPD.

5.3.16 Deep below the existing ground level (approximately -120mPD), the sewerage tunnel of HATS runs along the WDPCWA, with a tunnel protection area of 100m wide. The Transport Infrastructure would be located above the HATS tunnel. The smallest level difference between the two tunnels would be approximately 100m. Due to the large depth of the HATS tunnel, it will unlikely affect / be affected by the Transport Infrastructure. Nonetheless, the proposals for works should be submitted to Drainage Services Department and Geotechnical Engineering Office in future studies in accordance with ETWB TC No. 28/2003.

5.3.17 Two existing DN750 fresh water submarine pipelines for supplying fresh water from Lantau to Hong Kong Island run in east-west direction with the landfall at Sandy Bay. The Transport Infrastructure would not encroach into the area within 100m on plan from the centre line of the submarine pipeline. Detailed assessment of the impacts due to Route 4 Extension should be conducted under separate study.

Engineering Considerations and Constraints

Eastern Landfall at Existing WDPCWA

5.3.18 The approach ramp structure will be constructed in the eastern landfall to connect the cut-and-cover tunnel on reclaimed land. The approach ramp will predominantly be in the form of a U-trough RC structure although a section of L-shaped RC retaining wall will be provided where the ramp approaches ground level.

5.3.19 It is envisaged that the temporary retaining wall for the excavation will be in the form of a diaphragm wall, pipe pile wall (with grouting) or sheetpile wall, depending on the ground conditions and excavation depth. The ELS system may contain waling, struts, king posts, and other associated works together with a dewatering system such as pumping from wells in the base of the excavation.

5.3.20 Upon completion of the cofferdam, the approach ramp structure will be cast in-situ by using a bottom-up construction method.

5.3.21 If a deeper gradient of the proposed Transport Infrastructure is adopted in order to avoid permanent reclamation, certain cut-and-cover tunnel sections will have to be constructed at the eastern landfall. The cut-and-cover tunnel structure is envisaged to be constructed between the temporary retaining structures such as a diaphragm/pipe pile wall by using bottom-up method. This method involves substantial temporary ELS works together with a dewatering system such as pumping from wells in the base of the excavation.

5.3.22 The cut-and-cover tunnels would be cast in-situ within the cofferdam. The advantage of casting the cut-and-cover tunnel in-situ is that a waterproof membrane can be installed on all buried faces and thus improves the watertightness.

5.3.23 The foundation of the cut-and-cover tunnel is expected to be on compacted general fill, alluvium or Grade V material. Further assessment on the bearing capacity is required in the preliminary/detailed design stage to investigate the necessity of ground improvement works or piled foundation.

5.3.24 The geotechnical constraints and construction considerations for the eastern landfall are discussed below:

- Retaining walls formed during cut-and-cover excavations can move laterally and lead to settlement at the ground surface. Therefore extreme care needs to be adopted in built-up areas to control these deflections. The deflections are primarily a function of the active ground and groundwater pressures acting on the wall, the stiffness of the wall and strutting system and the excavation stages adopted.

- Groundwater drawdown, as may be required to maintain a dry excavation can also have a significant impact on ground settlement.

- It is recommended that a record of the pre-construction conditions of buildings and structures along the alignment that may be affected by the proposed construction work are recorded. The necessity of protective works for any of the buildings within influencing distance of the works should be identified during the preliminary/detailed design stage for the works.

- It is likely that piled foundations, such as pre-bored H piles, would be required for the U-trough RC structure and approach tunnel structure. The piles would need to be founded on rock or in the weathered rock as a combination of side friction and end bearing. The choice of pile will depend on the rockhead level and also the presence of corestones which will need to be investigated in subsequent stages of the project. The presence of the inferred fault in the area could also affect rockhead levels and will also need to be investigated in subsequent stages of the project.

Reclamation along the Kennedy Town Shoreline

5.3.25 The main purpose of the permanent reclamation is to provide soil cover for the tunnel structure. The necessity and extent of permanent reclamation is partly governed by the vertical alignment which is largely a function of the gradient of the approach ramp and the soil thickness below the seabed. As a result, the Protection of the Harbour Ordinance (PHO) will need to be taken into consideration in the formulation of the alignment options for highway connections. If a road gradient of 4% is adopted at the eastern landfall, approximately 2.8Ha of permanent reclamation will be required and its extent is illustrated in **Figure 5.23**. Zero permanent reclamation can be achieved for the implementation of Transport Infrastructure if larger road gradient is adopted.

5.3.26 Dredging works for the IMT tunnel construction adjacent to the existing seawalls along the Kennedy Town seafront could potentially affect the stability of these existing structures. In order to reduce the impact on these structures, the formation of a temporary reclamation is recommended as a safe, feasible and practicable way of constructing the subsea tunnel and thereby ultimately avoiding both dredging and permanent reclamation works. Diaphragm walls would be installed through the temporary reclamation in a safe working environment and allow the construction of the tunnel box at depth. After the tunnel structure has been completed, the temporary reclamation and seawalls above the seabed level would be removed and the seabed reinstated, thereby returning this part of the harbour to its original condition.

Approximately 1.9Ha to 4.7Ha of temporary reclamation is required for the implementation of Transport Infrastructure depending on the road gradient. A typical section through the temporary reclamation is illustrated in **Figure 5.10**.

5.3.27 The extent of reclamation and dredging should be kept to minimum in order to minimise the environmental impact and comply with the PHO. Other factors affecting the required extent of reclamation works are summarised below.

- The vertical alignment and the required ground cover of the subsea tunnel for the highway connection.
- The proposed diaphragm/pipe pile wall for the cut-and-cover tunnel should not encroach into the existing seawall foundation.
- Sufficient clearance between the IMT tunnel and existing seawall foundation should be provided to avoid any impact to seawall stability;
- Potential reprovisioning requirements of existing piers (e.g. Kennedy Town Old Cattle Pier).

5.3.28 Details and extent of the temporary and permanent reclamation should be further investigated in the preliminary/detailed design stage after determination of the ground conditions by site specific GI and confirmation of the alignment.

5.3.29 A vertical blockwork seawall is preferred along the proposed reclamation as this would provide a vertical berthing face for potential future public berths and for loading and unloading of heavy construction plant for tunnel construction.

5.3.30 The majority of seawalls constructed worldwide adopt a fully dredged method whereby all soft/compressible materials below the founding level are first removed. Imported sand fill/rock fill materials are then placed to provide a suitable founding horizon to avoid long term settlement and deformation of the seawall. This is also the common practice for the design of seawalls in Hong Kong. Notwithstanding the above, considerations should be given to the feasibility of non-dredged methods such as band drains, Stone Column, Deep Cement Mixing (DCM) and Sand Compaction Pile (SCP) in the preliminary/detailed design stage.

5.3.31 With regard to the reclamation behind the seawall, a key issue to be addressed in deciding whether the non-dredged reclamation (with consolidation measures) or fully-dredged reclamation should be adopted will depend on whether the construction programme can accommodate the time-consuming activities in non-dredged reclamations, such as laying of geotextile & sand blanket onto the seabed surface, installing band drains and surcharging. Another key issue to be considered is the environmental advantages of non-dredge reclamation as it obviates dredging and reduces reclamation filling.

5.3.32 In view of the close distance between the coastal area and the proposed reclamation area, a non-dredged reclamation is initially considered under this assignment subject to further assessments in future studies. The non-dredged methods can minimise the stability problems of the nearby existing seawalls due to dredging during reclamation works. The method of band drains and surcharge is recommended as the settlement control measures within the reclamation area.

5.3.33 Sand fill has been widely used in previous reclamation projects in Hong Kong with uniform and well controlled residual settlements achieved. There is also a programming advantage to the use of sand fill since vibro-compaction can be carried out which limits creep settlement of the sand fill and hence enables the commencement of construction works at an earlier date.

5.3.34 As it is the government policy to make beneficial use of public fill to reduce environmental impact, both sand fill and public fill are considered as suitable fill material for reclamation works. Strict site control is necessary to ensure that the public fill does not contain unsuitable material such as oversized boulders, refuse or top soil with organic matter. Public fill can also require a longer time to achieve the required limit of residual settlement due to creep settlement. The rate of supply is also not easily controlled since it depends mainly upon the progress of works in other projects. Potential impacts caused by the fluctuation of supply rates on the construction programme and the availability of large stockpiling areas, need to be considered if public fill is proposed.

5.3.35 The geotechnical constraints and construction considerations for the proposed reclamation are summarised below:

- If a non-dredged method of reclamation is adopted, primary and secondary consolidation settlement of the underlying cohesive deposits (i.e. marine and alluvial clays & silts) will occur during the course of construction and may continue over time even after construction is completed. Fill material placed in the reclamation area will also undergo creep settlement.

- Whilst the published geological maps indicate that much of the Kennedy Town shoreline is underlain by marine sands, detailed GI and assessment of the settlement characteristics of these materials will be required during the preliminary/detailed design stage.

- The uses of sand fill and public fill in different parts of the site and the arrangement of delivery of public fill, should be further investigated in the preliminary/detailed design stage to ensure that the programme requirements of the project can be met. Liaison with relevant parties such as CEDD shall be conducted in the preliminary/detailed design stage to confirm the detailed arrangement of supplying the public fill materials to the project.

- The existing piers (e.g. Kennedy Town Old Cattle Pier) are located along the tunnel alignment. It is envisaged that these piers may have to be temporarily removed or relocated. The impact assessment on these existing piers should be carried out after the alignment and extent of reclamation are confirmed in the preliminary/detailed design stage.

- The proposed reclamation is very close to the existing seawalls along the Kennedy Town seafront. No as-built record of these existing seawalls along the New Praya Kennedy Town is found. Detailed inspection and assessment should be conducted to evaluate the impact on the existing seawalls due to dredging for seawall foundation in the preliminary/detailed design stage.

<u>Cut-and-cover Tunnel on Reclaimed Land</u>

5.3.36 It is recommended that the construction of the cut-and-cover tunnel adopts a similar approach to that being used on the CWB project. The concerned tunnel section would be constructed using the cut-and-cover method on reclaimed land. The excavation and lateral support works will comprise diaphragm walls with the support of waling and struts.

5.3.37 A working platform would be formed first by temporary reclamation, on which diaphragm walls and subsequent excavation works would be carried out. The diaphragm wall would be installed to a depth that provides sufficient embedment. For areas of shallow rock where sufficient embedment cannot be achieved, the diaphragm wall will be installed only down to bedrock. Shear pins, at regular spacing, can then be installed to prevent 'kick out' failure. Grouting at the wall toe can also be carried out to improve the water-tightness of the cofferdam.

5.3.38 The excavation would be carried out in stages with struts and walings installed until the final excavation level is achieved. Upon completion of the cofferdam, the reinforced concrete tunnel box would be cast in-situ by using a bottom-up construction method. The advantage of casting the cut-and-cover tunnel in-situ is that a waterproof membrane can be installed on all buried faces, thus minimising leakages.

5.3.39 Backfilling and the removal of struts would be carried out in stages after completion of cut-and-cover tunnel. All temporary works in the temporary reclamation area, including reclamation and diaphragm wall, should be removed above the original sea bed level; while they will generally be left in place in the permanent reclamation area. A typical section through the cut-and-cover tunnel on reclaimed land is illustrated in **Figure 5.10**.

5.3.40 The geotechnical constraints and construction considerations for the proposed cut-and-cover tunnel on reclaimed land are discussed below:

- The clearance between the rock mound of the seawalls (both the existing sea walls and the proposed seawall for reclamation) and the diaphragm wall alignment shall be specified such that it will not be in conflict with the extent of the rock mound.
- Retaining walls formed during cut-and-cover excavations can move laterally and lead to settlement at the ground surface. Therefore extreme care needs to be adopted in built-up areas to control these deflections. The deflections are primarily a function of the active ground and groundwater pressures acting on the wall, the stiffness of the wall and strutting system and the excavation stages adopted.
- Groundwater drawdown, as may be required to maintain a dry excavation can also have a significant impact on ground settlement.
- It is recommended that a record of the pre-construction conditions of buildings and structures along the alignment that may be affected by the proposed construction work are recorded. The necessity of protective works for any of the buildings within influencing distance of the works should be identified during the preliminary/detailed design stage for the works.
- The proposed cut-and-cover tunnel is very close to the existing seawalls along the Kennedy Town seafront. No as-built record of these existing seawalls along the New Praya Kennedy Town is found. Detailed inspection and assessment should be carried out in the preliminary/detailed design stage to evaluate the impact on the existing sea walls due to the deep excavation. The presence of the inferred fault in the area could also affect rockhead levels and will also need to be investigated in subsequent stages of the project.
- It is recommended that all marine deposits under the tunnel should be removed for construction of the cut-and-cover tunnel section. Typically the dredging and disposal of marine deposits would be carried out during reclamation works. However, in order to minimise potential impacts on the nearby existing seawalls, the excavation of marine deposits should take place during the construction of the cut-and-cover tunnel within the cofferdam.
- It is likely that deep, piled foundations would be required such as pre-bored H piles or barrettes. The piles would need to be founded on rock or in the weathered rock as a combination of side friction and end bearing. The choice of pile will depend on the rockhead levels and also the presence of corestones which will need to be investigated in subsequent stages of the project.
- If permanent reclamation is required, the foundations for the cut-and-cover tunnel will have to be designed to allow for the long term settlements of the reclamation. Any

negative skin friction caused by the long term settlements of the reclamation fill will have to be taken into account during the detailed design stage.

Subsea Tunnel

5.3.41 The route options of the Transport Infrastructure for the north and south alignment are shown in **Figure 5.25**. An Immersed Tube (IMT) tunnel is adopted for further development in this Study to cross the approximately 4km distance between Kennedy Town and the KYC of ELM. The normal length of individual tunnel elements is anticipated to be 135 to 140m. The actual length of tunnel elements will be determined in future studies to suit the fabrication facilities, programme and marine operation as well as other constraints identified under the Study. This indicates that a total of approximately 30 elements will be required.

5.3.42 The tunnel trench should be dredged so that the necessary bottom width and profile can be maintained during lowering of the tunnel elements and placing of the foundation materials.

5.3.43 The land requirement for a casting basin is very high and finding a suitable location in Hong Kong can be problematic. In addition, the formation of the casting basin involves extensive excavation and lateral support systems. The previous Shek O Quarry is currently used as the casting yard for fabrication of tunnel elements for the SCL harbour crossing tunnel and could potentially be used again for options considered in this Study. Besides, as the Study has recommended a Transport Infrastructure which connects the KYC of ELM, it would be possible to modify the reclamation profile of the KYC of ELM to allow construction of a casting basin. However, the KYC of ELM site might not have land access at the required time and thus would have to rely on marine access. Possible locations for a casting basin should be further investigated during the preliminary/detailed design stage.

5.3.44 Typically, three methods of foundation construction are normally considered for the pre-cast tunnel elements: sand jetting, sand flow and screeded foundation. Sand jetting and sand flow methods are carried out after the tunnel element is placed, whereas the screeded foundation is prepared prior to the sinking of the unit. The sand flow method may be used from inside the tunnel unit whereas the sand jetting method requires external equipment.

5.3.45 To lower a tunnel element to its final position, it is usual to utilize a temporary ballasting system that gives the tunnel element sufficient negative buoyancy to maintain stability and control during immersion. After placing the new tunnel element and joining it with the previously placed element, the space between the bulkheads of the two adjoining tunnel elements is then dewatered. Water pressure due to depth of immersion on the exposed end of the newly placed tunnel element compresses the joint against the previously installed tunnel element. Typical joints between tunnel elements include Gina gaskets and Omega seals.

5.3.46 After each element is sunk, it will be backfilled to enable the temporary water ballast to be removed and the permanent concrete ballast placed. When the general fill is complete, suitably sized rock armour is placed overall to resist scour and damage by sinking ships or falling/dragging anchors.

5.3.47 The geotechnical constraints and construction considerations for the proposed subsea IMT tunnel are discussed below:

- Areas of high rockhead have been identified, from previous geophysical surveys, to the south of Green Island. This is likely to present a major constraint to the construction of an IMT along the south alignment as conventional dredging techniques will not be capable of forming the IMT trench in the thickness of rock identified .Underwater rock excavation by chiselling or blasting would be required in the area close to Green Island subject to the strength of the rock to be excavated. If the adoption of underwater blasting is confirmed at future studies of the project, not only the blasting-related issues, but also the potential adverse impacts to the nearby onshore and underwater structures, the delivery and storage of explosives over water in the busy fairways and channels, the difficulties of underwater charging and misfire handling, the required marine traffic closure during charging and 'firing, the supply of qualified blasting personnel (e.g. shot firers) for underwater blasting works in Hong Kong have to be considered. Consultation and liaison with Mines Division and other relevant stakeholders (such as local community/nearby residents, utility undertakers, EPD and MD) on the matters related to storage, transport and use of explosives should be carried out as soon as the need for underwater blasting has been confirmed at future studies of the project.

- In view of the abovementioned constraint due to shallow rockhead to the south of Green Island, the south alignment should therefore be reviewed at future studies. Site specific GI should also be carried out in future studies of the project to verify the rockhead levels and provide information on the engineering properties such that appropriate excavation/tunnelling methods can be further examined. The north alignment however does not impose any severe constraints due to shallow rockhead and as such the ground conditions are more favourable for IMT construction.

- Other geological/geotechnical risks associated with the IMT tunnel are the stability of the trench and the strength of the founding soils. Although there is only very limited GI information available for the offshore portion of the study area, the IMT trench is likely to be formed in soft marine silts and clays for much of the alignment and therefore the trench side slopes will need to be formed at relatively low gradients. This not only increases the total amount of material to be dredged but also the amount of imported material required for backfill. The extent of over excavation of the tunnel foundation level needs to be confirmed in the preliminary/detailed design stage after determination of the ground conditions by site specific GI.

- Where the layers of marine clay or alluvial clay are thick, the placement of tunnel elements on soft materials may cause consolidation and creep settlement, thus leading to differential settlement along the length of the tunnel. More flexible joints would allow movement between tunnel elements whilst maintaining water tightness of the tunnel. Settlement can also be controlled by designing the IMT tunnel structure to limit additional stress on the base materials, thus controlling the amount of consolidation.

<u>Landfall and Reclamation</u>

Transport Infrastructure

5.3.48 Similar to Possible Scheme H1-1, clearance would be allowed between the dredging extent for IMT construction and the existing seawall to avoid adverse impact on the stability of the existing seawall. Cut-and-cover method would be adopted as the Transport Infrastructure runs closer to the existing shoreline. The temporary reclamation extent is shown in **Figure 5.26**.

5.3.49 2m cover above the tunnel structure of the Transport Infrastructure would be provided for the protective armour. If a gradient of 7.1% is adopted, the Transport Infrastructure can reach the required level before existing shoreline. No permanent reclamation would be required at the landfall. However, if a gradient of 4% is adopted, the Transport Infrastructure would need to run outside of the existing shoreline to reach the required level. The permanent reclamation extent for a gradient of 4% is shown in **Figure 5.27**.

Route 4 Extension – Bridge (Possible Option H2-1A)

5.3.50 As discussed above, the Route 4 Extension needs to be at the higher level to provide sufficient headroom for the at-grade local roads.

5.3.51 The Route 4 Extension would then maintain its level or rise to run above the China Merchant Wharf, so as to provide sufficient headroom for the vehicles serving the wharf.

5.3.52 For the IWTS, a minimum 41m airdraft should be maintained. The bridge spans and piers outside the IWTS would also require special design to minimize the impact on the operation of the IWTS.

5.3.53 The pile caps of the Route 4 Extension in bridge form would result in permanent reclamation. Furthermore, the water area that would be decked over or surrounded by the marine viaduct structure should also be considered under the PHO as affected water area. The approximate permanent reclamation area and affected water area are shown in **Figure 5.28**.

Route 4 Extension – Tunnel (Possible Option H2-1B)

5.3.54 Tunnel structural form is adopted for the Route 4 Extension in Possible Option H2-1B. The Route 4 Extension would descend after passing the at-grade local roads at a higher level and transform from a bridge structure to a subsea tunnel below existing seabed. Permanent reclamation would be resulted from the pier and pile cap of the bridge structure and the landfall of the tunnel structure. In order to minimize the permanent reclamation, the maximum road gradient should be as large as possibly allowed in TPDM. The approximate extents of permanent reclamation for the tunnel form of Route 4 Extension when adopting a gradient of 4% and a gradient of 8% are shown in **Figure 5.29** and **5.30**.

Land Aspects

5.3.55 A Tentative Buffer Zone is determined to allow for sufficient construction space for the Transport Infrastructure. 10m clearance from the road and structures is provided for the land based part of Transport Infrastructure. As for the subsea tunnel, the Tentative Buffer Zone would take the dredging and temporary reclamation into consideration. Part of the Belcher Bay Park and Kennedy Town Swimming Pool fall within the Tentative Buffer Zone. Construction near the existing development and landscape resources should be carefully planned. The Tentative Buffer Zone has been taken into account together with the Transport Infrastructure when developing the administrative route protection plan under this Study.

5.3.56 Similar to the Possible Scheme H1-1, the Transport Infrastructure would occupy the existing WDPCWA, which has been included in the Western Harbourfront Conceptual Master Plan. The Harbourfront Commission (HC), the Central & Western District Council and other relevant stakeholders shall be consulted by the future project proponents of the Transport Infrastructure and Route 4 Extension.The waterfront open space with provisions for cycle tracks and sports facilities proposed for WDPCWA would be affected. The land use impact on the Kennedy Town is shown in **Figure 5.31**.

5.3.57 Similar to the Possible Scheme H1-1, to minimize the impact on the Western Harbourfront Conceptual Master Plan, the cycle tracks and sports facilities can be relocated to the space underneath the elevated structure of the Transport Infrastructure. The space outside the carriageway at WDPCWA and Shing Sai Road Bus Terminus can form open space. Landscape deck can be proposed at higher level alongside with the connection to Route 4 Extension, or at an even higher level to function as a noise mitigation measure at the same time. A stepped roof-top is also proposed to cover the portal area and develop open space or other community uses on top of it.

5.3.58 A future harbourfront access from Kennedy Town to Sai Wan can be provided between the northernmost slip road of Transport Infrastructure and coastline. However, the walkway is discontinuous as the two sections of walkway will be separated by an at-grade section of the newly constructed slip road for connection to the Route 4 Extension and Connaught Road West flyover.

5.3.59 It is possible to reinstate the existing piers (i.e. Kennedy Town Old Cattle Pier) affected by the Transport Infrastructure at the original locations. Re-provision of the piers should be subjected to assessment and consultation with Development Bureau Harbour Unit, Planning Department, Marine Department and other associated stakeholder in future studies of the project. Considerations on operation, land use, future planning of the WDPCWA area and Western Harbourfront Conceptual Master Plan should be taken in the re-provisioning assessment.

Marine Impact

Marine Traffic

5.3.60 The Transport Infrastructure in the form of IMT tunnel would run across the Southern Fairway and the Western Fairway, thus impact on the marine traffic for the installation of IMT segments during construction is anticipated. A maximum works area of 190m (length) x 50m (width) within the Western Fairway and 185m (length) x 50m (width) within the Southern Fairway will be anticipated for construction activities. The feasibility of IMT in regards to marine traffic and transport will need to be fully ascertained in future studies with a detailed Marine Traffic Impact Assessment and stakeholder consultations to look into any mitigation measures for possible impacts on marine traffic and port facilities. Close liaison with MD would be required at future studies of the project to maintain marine safety and to minimize the potential impacts to an acceptable level.

5.3.61 No permanent impact on the anchorage areas is anticipated by the proposed IMT options. The Western Anchorage No.3 and Reserved Dangerous Goods Anchorage waterspace, their utility and access would have temporary impacts during construction of the IMT tunnel. Consultation with the relevant stakeholders, government departments as well as the relevant advisory, statutory and consultative committees under Marine Department's purview should be conducted during future studies to ensure that potential impacts to the anchorage areas would be minimized and mitigation measures would be effective and to the satisfaction of all relevant parties. The cumulative effects on the anchorage waterspace by the possible reclamation at Kau Yi Chau shall be assessed under separate future studies.

5.3.62 For the Route 4 Extension, if the bridge form is adopted as in Possible Option H2-1A, the bridge would be able to turn southwards at a smaller radius. It would avoid the Southern Fairway and Western Fairway. No significant impact on marine traffic would be resulted.

5.3.63 If the Route 4 Extension adopts the tunnel form as in Possible Option H2-1B, although the alignment would not encroach into the Western Fairway, the construction of IMT tunnel may occupy a small area at eastern part of the Western Fairway.

Marine Facilities

5.3.64 In order to allow space for the Route 4 Extension along the shoreline of Kennedy Town, the Transport Infrastructure is shifted northwards comparing to the possible scheme without linkage to Route 4 Extension. As a result, the structure of the Transport Infrastructure would be able to avoid the existing Kennedy Town Old Cattle Pier. However, as cut-and-cover method would be adopted for construction of the tunnel structure that is near shore, the existing Kennedy Town Old Cattle Pier would still be within the extent of temporary reclamation. It can be reinstated after the construction of the Transport Infrastructure.

5.3.65 The Transport Infrastructure would occupy Berth 1 to Berth 11 of the WDPCWA for the connection with existing road networks. It is noted that Berth 1 to Berth 3 are proposed to be released and handed over to relevant government departments for reallocation. According to C&W DC Paper No. 39/2016, the occupancy rate for WDPCWA was 73% in 2014. With Berth 4 to Berth 11 accounting for approximately 50% of the existing sea frontage, there may be potential to relocate the affected operation to other PCWA with available capacity. As PCWA operation serve important economic and social functions for Hong Kong, the re-provision of

WDPCWA should be explored in details in future studies along with Western Harbourfront Conceptual Masterplan and development of ELM where it may be considered as one of the potential re-provisioning sites subject to the timing, land use compatibility and availability of land access, etc. WDPCWA is essential for cargo handling industry and in particular for cargo transport to outlying islands in Hong Kong. Hence, relevant stakeholders, including the WDPCWA cargo operators, should be consulted at the earliest opportunity in future stage of the project if their operation is affected by the construction of the Transport Infrastructure and if re-provisioning of WDPCWA is required.

5.3.66 With the Transport Infrastructure shifting northwards, the clearance from the China Merchant Wharf to the Transport Infrastructure increases accordingly. The dredging during construction of the Transport Infrastructure would not affect the pier structure. The impact on its operation would still exist during construction. Liaison with China Merchants Godown, Wharf & Transportation Co. Ltd. and MD shall be carried out in future studies to minimize the impact.

5.3.67 Impact on the marine facilities is anticipated for the implementation of Route 4 Extension. In case the Route 4 Extension adopts bridge form as in Possible Option H2-1A, the foreshore bridge would deck over the marine facilities including Kennedy Town Old Cattle Pier, China Merchant Wharf and IWTS. The bridge of Route 4 Extension would require careful planning and design for the location of the piers and airdraft of the bridge, so as to minimize the impact on the operation of the marine facilities.

5.3.68 In case the Route 4 Extension adopts tunnel form as in Possible Option H2-1B, the existing Kennedy Town Old Cattle Pier would fall within the landfall of the tunnel. It would be temporarily removed and can be re-provided in close vicinity of its original location. Depending on the gradient adopted for the Route 4 Extension, the location and extent of tunnel landfall varies, together with its impact on the China Merchant Wharf. The permanent reclamation for the tunnel landfall can avoid the structure of China Merchant Wharf if the absolute maximum gradient of 8% as stipulated in TPDM is to be adopted. However, impact on the operation of the south berth of China Merchant Wharf is still anticipated. On the other hand, if a gradient of 4% is to be adopted, the tunnel landfall would be in conflict with the existing China Merchant Wharf. Relocation of the China Merchant Wharf would be required. The IWTS is not anticipated to be permanently affected by the tunnel of Route 4 Extension. Its operation would be affected during the construction of the Route 4 Extension tunnel due to temporary reclamation.

5.3.69 An overlay of the Transport Infrastructure and the marine traffic and facilities is shown in **Figure 5.32**.

Environmental Impact

5.3.70 The environmental impact from the Transport Infrastructure with linkage to Route 4 Extension would be similar to it without linkage to Route 4 Extension (Possible Option H2-1A) as discussed above.

5.3.71 Since the Route 4 Extension would run along the shoreline of the Kennedy in Possible Option H2-1A and H2-1B, impact on the air quality and noise would be resulted for the sensitive receivers along the shoreline. Mitigation measures including noise barriers / enclosures can be provided along the bridge of Route 4 Extension for Possible Option H2-1A, or noise absorptive panels fixed in the tunnel section near portal for Possible Option H2-1B, subject to detailed assessment in future studies.

5.3.72 Water quality impact on the WSD Flushing Water Intake during the construction of Route 4 Extension is also anticipated. The impact shall be assessed and mitigation measure shall be proposed in future studies.

5.3.73 No significant direct marine and terrestrial ecological impacts are anticipated from the Route 4 Extension. Given the structural form of IMT, which is below the existing seabed level, there will be no permanent seabed loss. The White-bellied Sea Eagle (WBSE) nesting site on Green Island is active. The potential impact on coral, water quality and terrestrial ecological impact to WBSE shall be assessed and mitigation measure, if required, shall be proposed in future studies. On the other hand, there are uncertain marine archaeological potential. Particularly focused should be placed along the future alignment of the Route 4 Extension that could disturb the seabed.

5.3.74 No important spawning or nursery ground of commercial fisheries would be affected by the Transport Infrastructure. The loss of fishing grounds would be temporary during the construction phase and the area of permanent reclamation required is small, the fisheries impact is considered not significant. The Strategic Environmental Assessment under future studies should include a detailed fisheries impact assessment.

5.3.75 Strategic Environmental Assessment including comparison of the environmental benefits / drawbacks as well as assessment on the relevant environmental aspects shall be conducted in future studies for the development of ELM, so that comprehensive evaluation and findings can be incorporated in the development of the Transport Infrastructure. The study area and scope of the assessment shall be determined in consultation with EPD when appropriate in future studies.

5.3.76 The environmental impact discussed above is highlighted in **Figure 5.33**.

Landscape Impact

5.3.77 As discussed above, no landscape impact is anticipated from the Transport Infrastructure.

5.3.78 As permanent reclamation would be resulted from implementation of Route 4 Extension, the landscape resource of Victoria Harbour would be affected. The impact on the landscape resource of Kennedy Town Temporary Recreation Playground can be avoided with careful planning and design of Route 4 Extension.

5.3.79 The Landscape impact is highlighted in **Figure 5.34**.

Visual Impact

5.3.80 If bridge form is adopted for Route 4 Extension as in Possible Option H2-1A, significant visual impact on the residence in Kennedy Town is anticipated. If tunnel form is adopted for Route 4 Extension as in Possible Option H2-1B, visual impact on the residence in The Merton and the Manhattan Heights, would still be resulted, while less significant comparing to the bridge form. The ventilation building for Route 4 Extension in this scheme is likely to cause visual impact to the visually sensitive receivers.

Cost and Programme

5.3.81 The possible scheme of the Transport Infrastructure under the scenario with linkage to potential Route 4 Extension is the same with the possible scheme without linkage to Route 4 Extension, except for the connectivity arrangement after landfall. Therefore, the programme for Possible Scheme H2-1 is similar to the possible scheme without linkage to potential Route 4 Extension as discussed in Section 5.2.

5.3.82 The quantities and cost are similar to the possible scheme without linkage to potential Route 4 Extension. Route 4 Extension provision considered to include construction of connection bridges from Connaught Road West Flyover to future Route 4 Extension with stub ends, construction of foundations for future Route 4 Extension connection bridges above or adjacent to the TI tunnel alignment and additional temporary reclamation. With reference to past projects of similar nature, the construction cost for the highway connection of Transport Infrastructure is [redacted]

Ordinance and Gazettal Requirements

5.3.83 The Transport Infrastructure would be subject to the below ordinances, and depending on the design of the Transport Infrastructure may also need to be gazetted under these ordinances:

- Environmental Impact Assessment Ordinance;
- Foreshore and Sea-bed (Reclamations) Ordinance;
- Lands Resumption Ordinance;
- Protection of the Harbour Ordinance;
- Road Traffic Ordinance;
- Roads (Works, Use and Compensation) Ordinance; and
- Town Planning Ordinance.

Possible Scheme H2-3 (Grade Separated Interchange outside Victoria Harbour without weaving and Dedicated Lane to Aberdeen)

5.3.84 The Possible Option H2-3 landfall and connections would be similar to Possible Option H2-1B with a wider tunnel portal for 2 additional R4E eastbound lanes. The layout and vertical profiles are shown in **Figure 5.35** to **5.37** respectively. It is considered that this possible option would have similar land, marine, environment, landscape and visual impacts as Possible Option H2-1B as discussed above.

5.3.85 A grade separated interchange is located at the waters west of Mount Davis as shown in **Figure 5.35**. A gradient of 7.1% for the depressed road similar to the possible Options H2-1A and H2-1B are adopted for this option to minimise the reclamation requirement at Kennedy Town and would have an approximately 0.6 Ha to 1.2 Ha of permanent reclamation and 1.8 Ha to 1.2 Ha of temporary reclamation respectively depending on the road gradient within Victoria Harbour as a result of the additional lanes and wider tunnel portal.

5.3.86 This possible option needs to adopt the cut and cover construction method at the interchange due to the radius limitation for IMT. A minimum radius of 320m is used for the R4E grade separated interchange with TI to minimise temporary reclamation during construction. During construction of the interchange, temporary reclamation of approximately 50Ha, of which about 15Ha within Victoria Harbour, is necessary until completion of Route 4 Extension implementation. The temporary reclamation would encroach 100m into the eastern part of Western Fairway. However, the alignment of this possible option crosses at the wider section of the Western Fairway compared to Possible Option H2-1A and H2-1B. Therefore, this possible option should have similar impact on marine traffic during construction as Possible Option H2-1A and H2-1B.

5.3.87 Permanent reclamation of 1.1Ha at the junctions is required for the ventilation and evacuation West of Mount Davis. However, such permanent reclamation may be replaced by construction of ventilation building at the coast near Sandy Bay with a sub-sea ventilation adit connecting to the tunnel subject to future studies.

5.3.88 For this option, no dedicated lanes are provided for Route 4 Extension westbound traffic from Kennedy Town to Aberdeen to reduce land requirement for tunnel portal and landfall at WDPCWA. The Westbound nearside lane of the Transport Infrastructure diverges inside the tunnel northwest of Mount Davis to provide connection to Aberdeen. As lane change is not allowed in the tunnel structure according to TPDM, only the nearside lane of westbound Transport Infrastructure can provide the Route 4 Extension connection to Aberdeen. With the limited traffic capacity that can be provided by one shared lane of Transport Infrastructure, the traffic performance for Route 4 Extension in this option would be unfavourable comparing with other possible schemes and have adverse effect on the viability of Route 4 Extension. The connection layout at Kennedy Town is shown in **Figure 5.37**.

5.3.89 There is no precedent case of sub-sea interchange construction within Hong Kong or overseas for cost reference, hence no cost estimation are carried out at this stage. Considering the construction difficulties and substantially larger temporary reclamation for the construction of subsea interchange, it is expected that the cost of Possible Scheme H2-3 would be higher than Possible Scheme H2-1.

5.4 Possible Scheme of Highway Connection before Implementation of Route 4 Extension

5.4.1 Under the scenario with linkage to potential Route 4 Extension, the Transport Infrastructure and the Route 4 Extension are considered and assessed in different aspects as a whole. However, the Route 4 Extension does not necessarily need to be implemented at the same time with the Transport Infrastructure. Hence, the possible scheme of the Transport Infrastructure before implementation of Route 4 Extension is discussed in this sub-section.

5.4.2 As discussed above, the Possible Scheme Options H2-1A and H2-1B would allow totally separate implementation of the Transportation Infrastructure with provisions for linkage to potential Route 4 Extension. In Possible Option H2-1A, the Transport Infrastructure would adopt offshore tunnel scheme, with the landfall shifted northwards comparing to the possible scheme without linkage to Route 4 Extension (Possible Scheme H1-1); and the Route 4 Extension would adopt a structural form of bridge outside Kennedy Town along the existing shoreline. In Possible Option H2-1B, the Transport Infrastructure would adopt the same alignment as the Possible Option H2-1A, while adopting a tunnel structural form for the Route 4 Extension. The Route 4 Extension could either adopt bridge or tunnel form after over-decking the at-grade road (**Figure 5.22** refers).

5.4.3 With the Transport Infrastructure shifting northwards, the Transport Infrastructure has a shorter landfall along WDPCWA and would require a larger gradient to achieve zero permanent reclamation within Victoria Harbour (7.1% instead of 6%). The clearance from the China Merchant Wharf to the Transport Infrastructure increases accordingly. Less impact to marine facilities such as Kennedy Town Old Cattle Pier and China Merchant Wharf is anticipated.

5.4.4 If Possible Scheme H1-1 is adopted in the first place, there is insufficient space for the Route 4 Extension to run along shore. Future implementation of Route 4 Extension would be less preferable and more difficult.

5.4.5 The arrangement of the Transport Infrastructure in these two possible options (Possible Option H2-1A and H2-1B) is the same. The overall layout before implementation of Route 4 Extension is shown in **Figure 5.19**.

5.4.6 For the connectivity along WDPCWA, the possible scheme with Route 4 Extension would result in a small portion of affected water area by the deck over of the eastbound connection from Smithfield Road to Connaught Road West Flyover. As shown in **Figure 5.22**, this slip road can be shifted southwards during the implementation of Transport Infrastructure and before implementation of Route 4 Extension, so as to avoid PHO implication.

5.4.7 Minor reconfiguration of the interchange at WDPCWA is needed during the implementation of Route 4 Extension. A section of at-grade road and abutment of the slip road connecting the local road and Connaught Road West flyover has to be demolished for the construction of a new elevated slip road for connection to the Route 4 Extension and Connaught Road West flyover. A short section of elevated road has to be modified for the construction of interchange. The sections for the connectivity at Kennedy Town are shown in **Figure 5.24**.

5.5 Possible Scenario with Route 4 Extension Implemented Prior to Transport Infrastructure

5.5.1 Possible schemes for Transport Infrastructure (TI) with linkage to the potential Route 4 Extension (R4E) between Kennedy Town and Aberdeen have been explored and identified in this Study with the assumption that the implementation of the Transport Infrastructure would be after completion of R4E. It is also noted that assessment of the implementation of Route 4 Extension will be subject to separate technical study which should be conducted in accordance with the HPLB Technical Circular No.1/04.

5.5.2 For the possible scenario where R4E would be implemented prior to TI with consideration of the construction works for R4E at Kennedy Town landfall and the provisional works required for TI if both TI and R4E follow the same alignment as Possible Option H2-1A and Possible Option H2-1B, it is considered that the general alignments for both R4E and TI would not deviate from Possible Options H2-1A and H2-1B if R4E is implemented prior to TI since it is more effective for R4E to take a foreshore route towards Aberdeen and TI to take a route North of R4E towards ELM with an interchange between R4E, TI and Connaught Road West Flyover at Kennedy Town. The anticipated construction works for R4E and provisional works for TI, which need to be constructed in advance together with R4E, are shown on the **Diagram 5.4** below.

5.5.3 As indicated on the diagram, the main provisional works would include a section of TI cut and cover tunnel (approx. 200m) directly underneath the R4E eastbound bridge at the western end of the existing WDPCWA. The TI cut and cover tunnel needs to be constructed together with R4E in order to avoid future modification of the R4E bridge structure as well as substantial excavation and temporary support works underneath and in proximity of the operating R4E eastbound bridge for the implementation of TI. However, temporary reclamation of approximately 2Ha is required to construct the section of pre-constructed cut and cover tunnel as part of it is beyond the existing seawall. Space is also reserved between the eastbound and westbound carriageways of R4E and local road connections for the future construction of tunnel portal, depressed road and elevated road connecting the TI with Connaught Road West Flyover. In order to avoid possible traffic disruption to the local road network during construction of TI, the provisional works may also include foundation works for the elevated road's pier, abutment and ramp for the connection with Connaught Road West Flyover subject to further assessment in future studies.

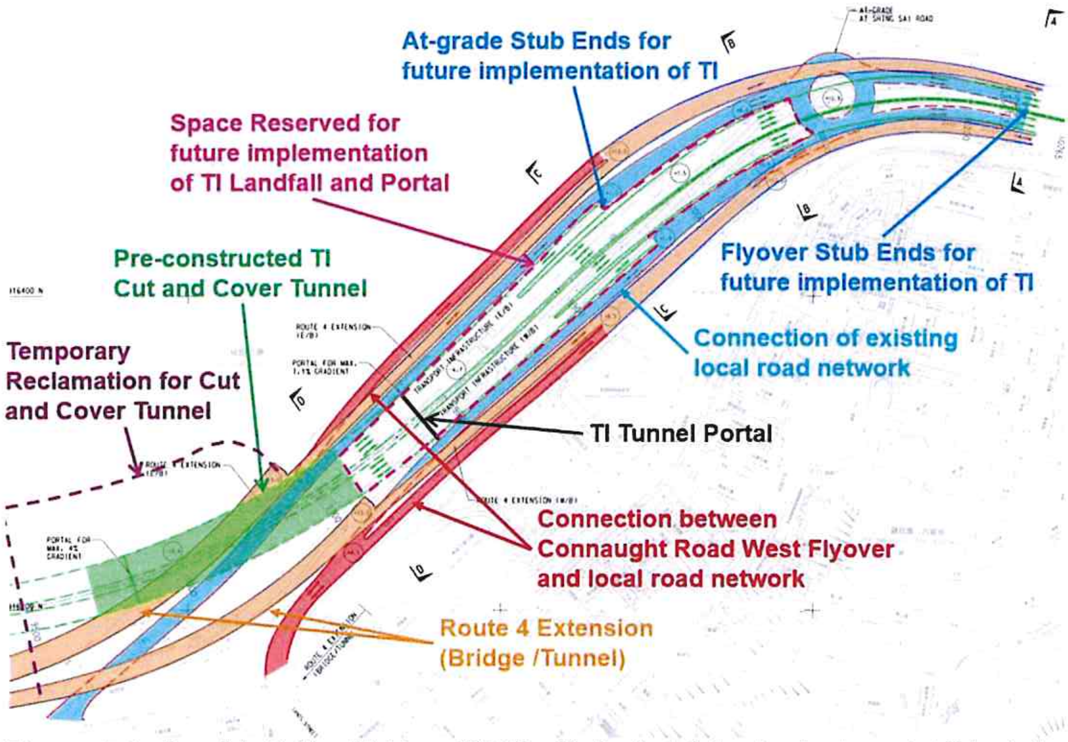

Diagram 5.4 – Possible Option H2-1A and H2-1B with Route 4 Extension Implemented Prior to the Transport Infrastructure

5.6 Possible Alternative Route from ELM to Western Harbour Crossing via Fung Mat Road

5.6.1 The possible schemes presented above would require traffic from ELM to Western Harbour Crossing to travel via Connaught Road West Flyover or Connaught Road West. To provide flexibility for traffic from ELM to Western Harbour Crossing, an alternative route is possible via TI's at-grade roundabout and Fung Mat Road with a new connection from Fung Mat Road to Western Harbour Crossing. The new connection from Fung Mat Road to Western Harbour Crossing would require modification of the eastern end of Fung Mat Road including construction of a minor junction for crossover of traffic and a merger lane with the Western Harbour Crossing carriageway. Details of the possible connection from Fung Mat Road to Western Harbour Crossing is subject to further assessment in future studies. Arrangement of the possible alternative route from ELM to Western Harbour Crossing via Fung Mat Road is shown on the **Diagram 5.5** below.

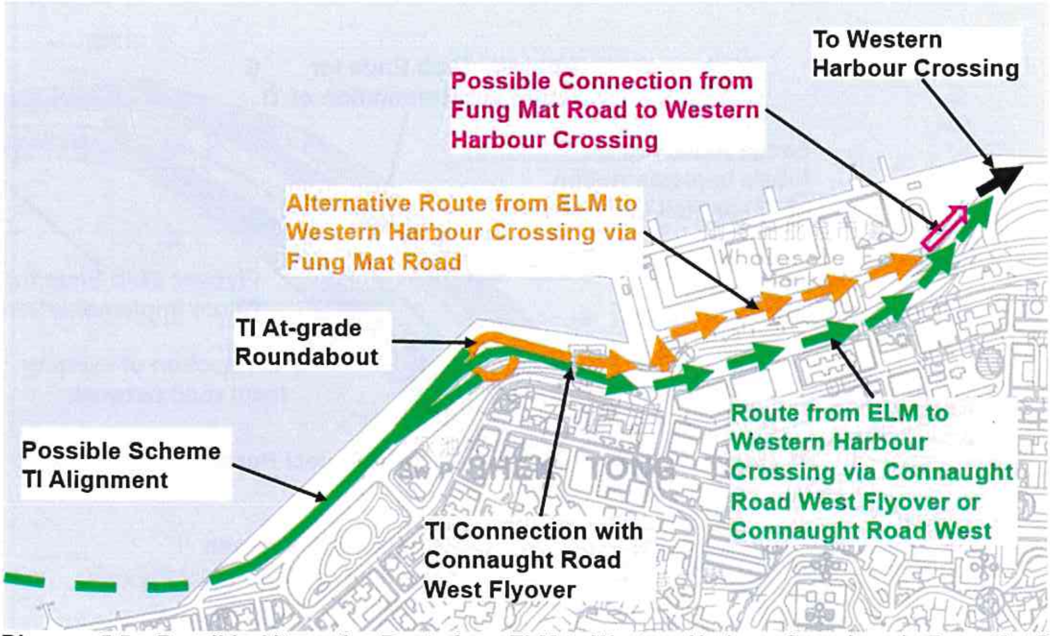

Diagram 5.5 – Possible Alternative Route from ELM to Western Harbour Crossing via Fung Mat Road

5.7 Summary

5.7.1 Constraints and considerations of various aspects for developing conceptual schemes and possible schemes of highway connection of Transport Infrastructure are discussed in **Section 2** of this report.

5.7.2 Under the scenario "without linkage to potential Route 4 Extension", the offshore tunnel possible scheme (Possible Scheme H1-1) is considered to be the possible scheme under this scenario. Details of this possible scheme have been outlined for further assessment in future studies.

5.7.3 Under the scenario "with linkage to potential Route 4 Extension", in view of the discussions above and in accordance with HPLB Technical Circular No. 1/04, Possible Options H2-1A, H2-1B and H2-3 are considered as the possible options for further studies if Route 4 Extension is needed in the future. Permanent reclamation is not required for the implementation of Scheme H2-1A and H2-1B prior to implementation of Route 4 Extension; but is required for the implementation of Route 4 extension under Scheme H2-1A and H2-1B or provision for Route 4 Extension under Scheme H2-3. However, there exist uncertainties for these possible options due to the traffic performance, technical feasibility, marine traffic impacts and potential environmental impacts. The feasibility of these options is subject to further studies undertaken by the project proponent of the Route 4 Extension. In any case, it is anticipated that future implementation of Route 4 Extension would be less preferable considering the completed Transport Infrastructure as a constraint especially if Possible Scheme H1-1 is adopted in the first place.

6 POSSIBLE ALIGNMENT SCHEMES FOR RAILWAY CONNECTION

6.1 New Railway Corridors in Kennedy Town

6.1.1 The Transport Infrastructure will have direct interface with land use proposals and their implementation programme at Kennedy Town and its nearby area of Hong Kong Island. It was also recognised that any potential railway connections in urban areas in particular western area of Hong Kong Island would be technically difficult.

6.1.2 It is noted that the direct extension of the existing Island Line (ISL) to the ELM would not only be constrained by the existing as-built railway infrastructure but also by the existing estate developments in the western part of Hong Kong Island. Alternatively, a new corridor serving between the ELM and Kennedy Town shall also be explored with the identification of a station location that is close to the existing/planned railways to facilitate convenient interchange between the different railway lines. Other key concerns for the railway corridor include:

- Direct extension of the ISL and the necessity to demolish the adjoining building(s) and may affect the Forbes Street Playground tree walls;
- Land resumption and demolition of existing buildings/structures in the proposed vicinity of the station and entrance/connections to the existing railway network;
- One train rule for Subsea section which will limit the headway;
- Track level of the Subsea section is constrained by railway maximum gradient of 3% and existing levels of the WIL's overrun tunnel;
- Landfall reclamation for the landing point of the subsea tunnel;
- Immersed tube tunnel (IMT) will affect the navigation channel and cause environmental impacts;
- Depot for maintenance and stabling of the railway, without which the operation of the railway will not be feasible.

6.1.3 The Transport Infrastructure should be carefully planned to minimise the implications and restrictions on the land use proposals for the western part of Hong Kong Island whilst also retaining the concept of the strategic land development ideas and transport network under LanDAC for the territory.

6.1.4 The Study primarily focuses on the railway infrastructure between the ELM and western part of Hong Kong Island. It has evaluated different tunnel forms and alignments of the recommended railway Infrastructure between ELM and Hong Kong Island from across busy fairways and channels onto the land connections with the existing railway infrastructure.

6.2 Development of the Railway Schemes

6.2.1 This section introduces the process of developing the railway options for the railway infrastructure. A number of key issues and constraints discussed above have been considered when developing the alignment and options for the ELM-KT railway infrastructure.

6.2.2 In considering potential schemes, a multi-dimensional approach has been taken:

- Planning issues: the location of future developments housing population, services and jobs which are likely to influence the rail network expansion;
- Environmental issues: many areas may be considered to be 'environmentally sensitive'; though sensitive treatment (such as construction of line in tunnel may allow these to be partially mitigated;

- Infrastructure: the physical rail links that can be constructed, and their connection points to the existing and committed rail network; and
- Services: the pattern of rail operations over the new rail infrastructure, and how they integrate with existing and committed services, together with potential new lines such as the strategic corridor along North Lantau-ELM-Hong Kong Island axis.

6.3 Railway Alignment Schemes

6.3.1 Alignment schemes for the following two scenarios have been developed. Details of the developed alignment schemes are presented in the following sections.

- Scenario 1 – extension of the existing Island Line
- Scenario 2 – a new railway line

6.3.2 The possible railway connection schemes considered in the Study are summarized in the table below:

Reference No.	Connection	Scenario	Scheme
R1-1	R - Railway	1 – extension of existing ISL	1 – Station at Existing KET Station
R2-1		2 - new railway line with new station	1 – New station near KLL

6.3.3 In developing the new railway line options, considerable effort has been made to maximise the convenience of the interchange. The layout of the railway alignment schemes is shown in **Figure 6.1**.

Scheme R1-1 – Extension of the ISL

Route Alignment

6.3.4 The starting point of the scheme is from the existing overrun tunnel of the ISL/WIL. The KET Station is located at a shallow level (rail level is approximately -5.3mPD) relative to the ground level. The future road network and the nearby residential buildings such as Sai Wan Estates and Kwun Lung Lau constrain the horizontal alignment. The vertical alignment would also need to drop relatively quickly from the KET Station passing through Mount Davis where the existing ground level reaches elevations of up to +250mPD to the landing point of the IMT tunnels. The IMT section runs westward to the south of Kau Yi Chau, where the seabed level is about -5mPD. The middle section of the marine portion of the alignment runs across the Western Fairway where the seabed level is around -30mPD.

6.3.5 Based on our assessment of the tunnel crossing options between the ELM and Hong Kong Island, the IMT tunnel crossing would be at about -24mPD (invert level) at the landing point on Hong Kong Island, whilst the TBM tunnel option would be at about -48.0mPD, as it requires sufficiently more cover from the seabed. From our assessment of the alignment profile, if the ELM to Hong Kong Island connection is formed by ISL/WIL extension, it would limit the subsea tunnel to an IMT tunnel as the vertical alignment from the KET Station (-5.3mPD) would not be able to descend sufficiently quickly enough (assuming a gradient of 4%) to reach the proposed crossing level of -48.0mPD for a TBM crossing.

6.3.6 The route alignment for the extension of the ISL assuming an IMT subsea crossing is shown on **Figures 6.2** to **6.6**.

Scheme R2-1 – New Railway Line

Route Alignment

6.3.7 This scheme is a New Railway Line from ELM to Kennedy Town. From the landing point of the subsea crossing (either -24mPD for the IMT or -48mPD for the TBM), the railway runs eastwards under Mount Davis towards the new station at Kwun Lung Lau. For this scheme, there is no constraint on the subsea tunnel form and it can be either an IMT or bored tunnel option as there is no need to make a connection with the existing WIL overrun tunnel.

6.3.8 The route alignment for the New Railway Line assuming an IMT and Bored Tunnel subsea crossing is shown on **Figures 6.7** to **6.11**.

6.4 Station Planning

Stations for the New Railway Line

6.4.1 This Study aims to secure a viable option for the connection between ELM and Kennedy Town and potential railway schemes connecting to other stations along ISL/WIL or the future SIL(W) are not included. Under Scheme R2-1 - New Railway Line, alternative station locations in the Kennedy Town area have been explored. Land Use Review in the Western Part of Kennedy Town is taken as a major constraint. Therefore potential new station locations at the western part of Kennedy Town are not to be further pursued due to the impact on the land use planning. Furthermore, under the New Railway Line scheme, if the railway cannot be extended beyond Kennedy Town, it was considered lack of future extension opportunities.

6.4.2 A further negative aspect of the New Railway Line is the need to interchange to the ISL in order to reach the CBD and other areas on Hong Kong Island. Due to the dense urban clusters and hilly topography, the distance between the new station options and the existing KET Station is quite far apart requiring a long passenger adit for interchange. The distances and the interchange time would be comparable to the long interchange time between the MTR TST Station and East Tsim Sha Tsui Station which is over 5 minutes.

6.4.3 Bases on the review of the land use planning information, constructability, and the exploration of alternative station locations, the underground station adjacent to Kwun Lung Lau (Scheme R2-1) is the preferred location. Apart from providing interchange with the ISL, it will serve the same catchment area around the Kennedy Town area as KET Station which is predominantly residential with high rise residential blocks.

Kwun Lung Lau Station

6.4.4 The proposed station has achieved the following objectives:

- Maximised the convenience of the interchanged with the ISL KET Station. Interchange efficiency will influence journey times and the attractiveness to ride the system in preference to using other modes of transport;
- Minimised the land impact;
- No impact to the WIL/ISL overrun tunnel;
- Limited impact to existing KET Station. Connection will need to be made at concourse level of the existing KET Station for interchange;
- Allow further extension to HK Island and possible interchange with other railway lines such as the SIL(W) in future.

Interchange Passenger Adit

6.4.5 Two interchange adits connecting the two stations are proposed. Detailed passenger modelling in future studies of the project would confirm the possible operational arrangement for the interchanging passengers (i.e. unidirectional flow or bidirectional flow). As the passenger adits pass through an area which is heavily built-up, the adits have been aligned to avoid the major foundation of the tower blocks at Kwun Lung Lau, passing through areas under the podium deck or under the roadways, etc. wherever practicable.

6.4.6 The breakthrough connection is planned at the concourse level of the existing KET Station near where the station trading areas are located. Modification works include making openings in the external and the relocation of the station trading areas to elsewhere. During construction, it will be essential to maintain and protect the safe operation of the existing station.

Modification Works to the Existing KET Station and Overrun Tunnel

6.4.7 For Scheme R1-1, there is a need to break into the existing WIL overrun tunnel to form the extension to the ISL. Our initial review of the as-constructed WIL overrun tunnels has found that they were built in faults and mixed ground conditions. The WIL overrun tunnel was constructed using two different methods. The first 120m section of tunnel, starting from the west of the KET Station passed through an area of mixed / soft ground conditions. The tunnel was excavated using mechanical methods with support provided by pipe roofing, lattice arches and shotcrete. The remaining 530m section of the tunnel was built in hard rock excavated by drill and blast method.

6.4.8 Based on the above as-constructed tunnel and geological conditions, the connection and break-in to the existing WIL overrun tunnel would be immensely difficult to construct as parts of the existing tunnel will need to be broken out to create the turnouts for the tunnel extension. The necessary modification works and strengthening works to the existing overrun tunnel will have to be carried out in poor ground conditions. The limited open space at ground for railway construction also prohibits conventionally grouting techniques from the ground level. Nearby buildings (such as Sai Wan Estate and Kwun Lung Lau), steep slopes and existing trees including the tree wall along Forbes Street will pose significant constraints. The construction of the ISL extension would be further complicated by the need to maintain the ISL operation at all times. The ISL uses the overrun tunnel to turn back the trains for the ISL service. Any interruptions to the ISL operation during construction would be highly undesirable. It is considered that the construction of the ISL extension to the ELM would have similarities to the extension of the ISL tunnels at Sheung Wan which involved breaking out parts of the existing Sheung Wan tunnels to form the tunnel extension of the WIL. The difference is that the extension of the Sheung Wan tunnels was carried out in an existing turnout box structure. At the time, the construction of the WIL tunnels involved the closure of Sheung Wan Station for a couple of days. At this early stage in the Study, the proposed extension of the ISL tunnel would require more detailed studies and careful planning to minimise disruptions to the ISL operation and confirm construction viability.

6.4.9 For Option R2-1, the new station requires a relative long passenger subway to connect to the existing KET Station for interchange. It requires breaking through the existing station external wall for this connection at the concourse level. If a comparison is to be made for the modifications works to the WIL overrun tunnel under Option R1-1 and the station connection under Option R2-1, the modification works to the existing station under Option R2-1 would be comparably much less disruptive to the MTR operation and service.

6.5 Depot Planning

6.5.1 The Chai Wan Depot (CWD) currently stables and maintains the ISL trains. [redacted]

[redacted]	
[redacted]	
[redacted]	
[redacted]	
[redacted]	
[redacted]	
[redacted]	

6.5.2 It is understood that the CWD is near to capacity and there is no more spare capacity for stabling additional trains. Furthermore, due to existing site constraints, the CWD cannot be further expanded. Therefore any trains required ELM-KT connection options would require a new depot.

6.5.3 [redacted]

6.5.4 As Kennedy Town is heavily built up and the western part of Hong Kong Island is already planned for development, there is no suitable large open space left in the Kennedy Town area for a depot. Hence, the obvious location for the depot would be on the ELM. The new depot will need to have sufficient capacity to serve the ELM-Lantau connection and any future expansion. It will need good connectivity to the main line to facilitate train launching and withdrawal in order to minimise any possible service disruptions or perturbations.

6.5.5 The size of the depot should be planned for the ultimate phase and include any stabling and maintenance facilities.

6.6 Future Extension and Provisions

6.6.1 To date, we have only considered the ELM-KT connection. However, for the long-term outlook, the ELM-KT connection could be extended in line with the strategic railway corridors mentioned by the Government. The extensions could be formed from the extension of the ISL or the New Railway Line or a combination of both.

6.6.2 As discussed earlier, the urban and district lines have different characteristics in terms of speed, comfort, service frequency, infrastructure requirements, and are tailored to suit the particular function of the railway.

6.6.3 For the purposes of recommending the infrastructure for the railway connection between the ELM–KT, it has been concluded not to eliminate either the ISL extension or the New Railway Line. Both schemes should be carried forward for more detailed engineering, environmental and financial assessments in future studies.

6.7 Interfaces with other Major Projects / Infrastructures

6.7.1 A number of major infrastructure projects, which are in planning or implementation stage have been considered in the EKM-KT planning. Interface with the railway links will need to be further developed at the detailed design stage. The interfacing projects are discussed below:

6.7.2 The Island West Transfer Station caverns – located in the north-west of Mount Davis. The railway connection of Transport Infrastructure, with the connection to KET Station, will need to avoid the existing caverns.

6.7.3 [redacted]

6.7.4 As shown in **Figure 2.1**, Mount Davis accommodates the Strategic Cavern Area No. 41, which occupies the Western Mount Davis area. The railway connection of the Transport Infrastructure will need to avoid the strategic cavern area as far as practicable. If the alignment of the railway connection cannot avoid the strategic cavern area, the profile of the railway connection will be developed to minimize its impact on the cavern.

6.7.5 As presented earlier, the railway connection of the Transport Infrastructure may be an extension to the existing ISL, or a separate railway line with a new station and a connection to the existing KET Station. The railway connection for Scheme R1-1 will interface with the existing WIL overrun tunnel. Scheme R2-1 will interface with the KET Station as modification works are required to connect the two stations via an interchange subway.

6.7.6 Other than the existing and planned caverns in Mount Davis, the Kennedy Town Salt Water Service Reservoir is located above the WIL overrun tunnel. The construction of the tunnel in the vicinity should consider these existing structures and future caverns.

6.7.7 The potential Route 4 Extension will run from Kennedy Town to Aberdeen possibly via Mount Davis or along the western coastline of Hong Kong Island. The alignment and profile of the railway connection should take the Route 4 Extension into account and plan for potential intersection of the horizontal alignment.

6.8 Railway Operation and Maintenance Requirements

6.8.1 The railway operation will be dedicated by the type of railway system to serve the ELM-KT connection and potentially the wider strategic railway network. At this earlier stage, there are too many unknowns to identify the railway system, signalling or the ultimate formation of the railway; hence it is not possible to identify the operational and maintenance requirements for the railway system.

6.8.2 Once the type of railway is determined for the connection to the ELM, it will be possible to outline the operations plan which includes the train services, central control, and station and depot operations. Nevertheless, the following principles should be followed:

- The railway system to be deployed shall meet the ultimate capacity of the system;
- A cost-effective operation system and organization emphasizing optimum deployment of manpower, and resources at large;
- A working environment for all staff conducive to safe and secure operations;
- A safe, secure and user-friendly travelling environment and convenient interchanges with the existing and proposed MTR stations.

6.9 Scheme R1-1 - ISL Extension

6.9.1 If the Transport Infrastructure is formed by an extension of the ISL, it would run with 8-car URL trains and provide a through running service to the ELM, i.e. the ISL would be extended from the KET Station to the ELM. The tunnel infrastructure for the ISL extension would follow the URL design requirements in the DSM. The train service and operating hours would match those of the ISL service.

6.9.2 As this option is formed by the extension of an existing ISL from the KET Station, a new station is not required at Kennedy Town, only new tunnel infrastructure and associated facilities such as ventilation building, etc. will be required. The catchment area of the existing ISL service would remain the same as there is no new station for this scheme.

6.9.3 From a passenger point of view, this option would be the most convenience as there is no need to interchange to another railway line. People travelling from the ELM on the ISL stay on the railway to reach various destinations on the north shore of Hong Kong Island. Passengers from the ELM could simply ride the ISL into the CBD without changing trains. However, the URL train speeds are relatively slower compared to the District Lines and the train journey time will take slightly longer.

6.9.4 As mentioned earlier, the CWD is near to capacity and any spare capacity is reserved for future fleet expansion. A new depot for train stabling and light maintenance will likely be required on the ELM for the extension of the ISL.

6.9.5 From an environmental perspective, there are unlikely to be any significant environmental issues with this railway option, as it runs entirely underground. The alignment also avoids any reclamation inside Victoria Harbour. Based on the preliminary design information at this stage, provided that mitigation measures can be properly implemented, there would unlikely be any critical impacts or insurmountable issues on the indicative corridor. Environmental concerns identified in the assessment would be addressed and studied during future planning and detailed design of the railway project. Strategic Environmental Assessment including comparison of the environmental benefits / drawbacks shall be conducted in future studies for the development of ELM, so that the comprehensive evaluation and findings can be incorporated in the development of the Transport Infrastructure. The study area and scope of the assessment shall be determined in consultation with EPD when appropriate in future studies.

6.9.6 The construction of the ISL extension requires connecting the new tunnels to the existing WIL overrun tunnel, which is in operation. The construction of the connection and junction chamber with the existing overrun tunnel will be extremely difficult to build and is at very high risk due to the need to carry out the works in an operational environment. The poor ground conditions where the connections are to be made and the nearby building constraints make the construction works even more technically difficult.

6.9.7 Under Scheme R1-1, the construction of the ISL extension requires connecting the new tunnels to the existing WIL overrun tunnel where the railways are under operation. It is noted that the proposed alignment encroaches onto the estate boundary of Sai Wan Estate. Despite that there is currently no redevelopment plan for Sai Wan Estate by the Hong Kong Housing Authority, this Estate should not be adversely affected by the proposed railway connection. Due to the close proximity of Scheme R1-1 to Sai Wan Estate, there should not be any adverse impacts related to structural, safety, management, maintenance and possible nuisance, etc. on the buildings and residents of Sai Wan Estate. Housing Department shall be consulted in relation to any potential interface issues with development of Sai Wan Estate in future studies.

6.9.8 As revealed from the as-built construction records, the first 120m section of the WIL overrun tunnel starting from the west of the KET Station passed through a section of mixed / soft ground conditions. The tunnel was excavated using mechanical methods with support provided by pipe roofing, lattice arches and shotcrete were recorded. The remaining 530m section of tunnel was built in hard rock excavated by drill and blast method.

6.9.9 The locations of the proposed tunnel junctions are shown in **Figure 6.1**. Based on the as-built drawings of the WIL overrun tunnel and the preferred alignment option of extending the ISL, a summary of the required modification works is shown in **Table 6.3**:

Table 6.3 – Summary of Geotechnical Information for the Proposed Tunnel Junctions

	Junction 1	**Junction 2**
Type of Existing WIL Overrun Tunnel	Twin Track Undrained Tunnel	Single Track Undrained Tunnel
Ground Condition	Mixed Ground	Rock
Proposed Works	Construct a new single-track undrained tunnel connecting the existing WIL overrun tunnel	Construct a new single-track undrained tunnel connecting the existing WIL overrun tunnel
Estimated Length of Existing Tunnel Lining to be modified	50m	130m

6.10 Scheme R2-1 - New Railway Line

6.10.1 This new railway line could be designed as a District Line, and potentially form a strategic railway corridor route to North Lantau/Tuen Mun via the ELM (refer to **Figure 6.1**). The Transport Infrastructure could therefore be designed to meet the forecast patronage demands and use rolling stock with higher speeds (of up to 130 km/h or more) to reduce the journey time and be more attractive to rail users.

6.10.2 The New Rail Line has the advantages over the Extension of the ISL in the following aspects:

- The form of the subsea tunnel crossing can be either formed by IMT or bored tunnel;
- It is not restricted by the capacity of the ISL nor the design standards such as speed, signalling system and rolling stock type, etc.;
- It does not need to make a connection and break-in to the WIL overrun tunnel which based on our preliminary study would be very difficult and may impact on the operational railway;
- The new KLL Station would increase the catchment of the railway network in the Kennedy Town area;
- The connection to the KET Station is relatively simple with long passenger adits connecting the concourses of the KLL Station and KET Station;
- The line can be extended further into Hong Kong Island, with potential to connect to the SIL(W) or other stations closer to the CBD;

6.10.3 From a passenger point of view, this scheme is less convenient than the direct extension of the ISL as passengers need to interchange at KET Station to the ISL.

6.10.4 Similar to the ISL Extension, a new depot for train stabling and maintenance will be required on the ELM.

6.10.5 Similar to the ISL Extension, there are unlikely to be any significant environmental issues with this railway option, as it runs entirely underground. The alignment also avoids any reclamation inside Victoria Harbour.

6.10.6 Based on the available geological information, the proposed underground station (under Scheme R2-1) will be excavated in hard rock. A construction shaft located in close proximity to the station is likely to be required. The soil portion of the construction shaft could be excavated with pipe piles/diaphragm wall and multi-layer temporary struts. Upon reaching the rock head, excavation will be continued in rock and rock bolts and shotcrete are likely to be sufficient to provide support to the excavated rock faces. It is envisaged that the cavern station will be then excavated using drill and blast techniques.

6.10.7 In order to control groundwater inflow, ground treatment from inside the caverns is envisaged. Grouting may be required anywhere around the caverns if the inflow criteria of the probe holes are not met during construction.

6.10.8 The cavern station will be excavated incrementally using staged excavation sequence with installation of support. The primary load carrying element of the lining system will be the rock mass surround to the cavern. In short term, this will be enhanced as necessary to maintain adequate stability by the installation of ground support (such as rock bolts and shotcrete). The thickness of shotcrete will vary around the cavern profile and will vary with ground conditions encountered.

6.10.9 The presence of any temporary support including rock bolts and shotcrete will not be taken into account in the permanent lining design. The permanent support comprises a cast in-situ concrete lining which is cast against the waterproof membrane. The lining will be cast in stages, with a bottom upward sequence of placement.

6.10.10 In view of the potential site constraints including physical constraints such as overlying buildings/structures, heavily used carriageways/footpaths, congested utilities, a construction adit that connects with a construction shaft at a suitable location could be used to facilitate the cavern construction. The spoil could then be removed through the construction shaft and adit.

6.10.11 For construction of passenger adits in soft ground in the vicinity of the KET Station, cofferdam retaining system in the form of sheet pile/pipe piles, depending on the ground conditions and excavation depth, and bottom-up method are recommended. With due consideration of geometry and site constraints, certain portions of the adit may be constructed using fore poling/spiling and grouting techniques. Fore poles or spiles will be installed above the adit crown to provide immediate crown support during adit excavation. The adits located in hard rock are envisaged to be constructed using drill and blast techniques where blasting is allowed. Mechanical excavation may be required where the blasting works are critical to the sensitive receivers (such as buildings). Adit structures will be constructed after the mucking out of debris.

6.10.12 The geotechnical constraints and construction considerations for the proposed underground station (Scheme R2-1) and associated the passenger adits are summarised below:

- The works are to be carried out in close proximity to many existing sensitive buildings and structures. It is extremely important to ensure that the construction works do not cause unacceptable impact to the structural integrity or serviceability of the nearby buildings and structures, as well as the operation of the existing MTR services. Control measures will need to be put in place to ensure that ground movements, vibration, groundwater drawdown and other impacts remain within acceptable levels.

- Excavation in rock may involve installation of rock bolts/dowels and grouting works. The design of the works will depend on the actual ground conditions identified on site. In view of the close proximity of the construction works to nearby buildings and foundations, it is important that the actual design and execution of the rock bolts and grouting works are carried out without causing physical clashes with the existing buildings and foundations.

- Excavation of the large-span cavern may encounter sub-vertical joints or other adversely oriented weakness planes. Such features can present construction difficulties and risks to cavern construction and need to be identified as early as possible in the design stages through comprehensive GI works.

- Poor rock quality/mixed ground tunnelling conditions have been encountered in the nearby WIL overrun tunnel. Whilst hard rock conditions are expected to be encountered in the proposed station location, this will need to be confirmed by GI works.

- The location of the proposed underground station falls within the Mount Davis Strategic Cavern Area (SCVA) No. 41. The proposed underground station may therefore affect the cavern development potential of the SCVA. In order to minimise the impacts, the design and construction aspects in relation to the Mount Davis SCVA should be thoroughly considered in the later stage of the project. The detailed railway tunnel alignment should be optimised as far as possible in later stage of the project in order to preserved the development potential of the SCVA.

- Detailed impact assessment of the nearby foundation structures due to the proposed works should be conducted at preliminary/detailed design stages after the location of the proposed station and the alignments of the passenger adits are confirmed.

Existing Man-made Features Affected or Affected by the Proposed Underground Station

6.10.13 Information on existing man-made slopes and retaining walls within the study area has been retrieved from the Slope Information System (SIS).

6.10.14 A total of 196 nos. of existing man-made slopes and retaining walls have been identified within a distance of 100m from the alignment of different options.

6.10.15 **Tables 6.5** summarise the information of the existing man-made features that could affect, or be affected by, the proposed underground station adjacent to Kwun Lung Lau Estate under Scheme R2-1.

Table 6.5 – Nearby Existing Man-made Features Affected, or Affected by the Proposed Underground Station adjacent to Kwun Lung Lau Estate under Scheme 2-1

Existing Man-Made Feature No.	Location	Type of Features	Slope Angle (°)	Slope Height/ Retaining height (m)
11SW-A/NS 5	On Mount Davis Hillside Behind Kwun Lung Lau Phase 1, Redevelopment, 20 Lung Wah Street, Kennedy Town, IL No.8041	Stabilisation measure	-	-
11SW-A/CR 3	West of Block F, Kwun Lung Lau Estate , Lung Wah Street, Kennedy Town	Cut slope with retaining wall	20	0.3
11SW-A/C 368	Below Block D, Kwun Loong Lau Estate, Kennedy Town, Hong Kong	Cut slope	50	8.5
11SW-A/FR 178	Next To Block A, Kwun Lung Lau, Western District, Hong Kong	Fill slope with retaining wall	38	10.2
11SW-A/ND 8	On Mount Davis Hillside Behind Kwun Lung Lau Phase 1, Redevelopment, 20 Lung Wah Street, Kennedy Town, IL No.8041	Defence measure	-	-

Existing Man-Made Feature No.	Location	Type of Features	Slope Angle (°)	Slope Height/ Retaining height (m)
11SW-A/ND 9	On Mount Davis Hillside Behind Kwun Lung Lau Phase 1, Redevelopment, 20 Lung Wah Street, Kennedy Town, IL No.8041	Defence measure	-	-
11SW-A/FR 179	South Of Block E, Kwun Loong Lau, Sai Wan	Fill slope with retaining wall	35	12.5
11SW-A/C 561	North of Kennedy Town S/R	Cut slope	55	20
11SW-A/R 309	Below Block C, D, Kwun Lung Lau, Kennedy Town.	Retaining wall	-	12.5
11SW-A/F 80	Below Block B And Block C, Kwun Lung Lau	Fill slope	35	21
11SW-A/C 1	Below Kennedy Town F.W. S/R	Cut slope	40	41

6.10.16 The consequence-to-life categories of most of the above existing man-made features are 1 and 2. Only the consequence-to-life category of 11SW-A/FR 178 is 3. The above existing man-made features are located directly above the proposed underground station under Option 2. The site formation works for the construction shaft, which is constructed to facilitate the construction of the underground station, may require formation of cut slopes, fill slopes and retaining walls which may modify the existing features entirely or partially. The effect of site formation works for the construction shaft on these features should be assessed at the later stage of the project after the alignment is confirmed. Apart from the man-made features listed in the above tables, assessments of the stability and consequence-to-life categories of the features, which failure could potentially affect the proposed works, should also be conducted in the later stage of the project after the alignment is confirmed.

6.10.17 There are 196 nos. existing features identified within the preliminary blasting study area (as defined in Section 5.8) that may not affect or be affected by the proposed permanent works but may be affected by the tunnelling works when blasting method is used for the tunnel excavation. The existing features that may affect or by affected by the project should be reviewed in the later stages of the project after the alignment is confirmed. In addition, the influence zone of the features that may be affected by the blasting works should be further reviewed in the preliminary/detailed design stages based on the detailed blasting assessment and the corresponding allowable vibration limits for each feature.

6.11 Envisaged Construction Method, Geotechnical Constraints and Construction Considerations

6.11.1 Based on our initial assessment of the tunnel crossing, an IMT tunnel crossing at the landing point on Hong Kong Island would be at about -24mPD. From our initial assessment of the alignment profile, an ISL/WIL extension to the ELM subsea tunnel would be formed by an IMT tunnel as the vertical alignment from the KET Station (-5.3mPD) could not descend quickly enough to reach the TBM crossing level of -48mPD at the landing point. For the New Rail Line, either IMT could also be adopted since IMT has a number of advantages relating to gradients, cross passage requirement, construction safety, construction cost and programme.

6.11.2 The geotechnical constraints and construction considerations for the proposed subsea IMT tunnel are discussed below:

- The main geological/geotechnical risks associated with the IMT tunnel are the stability of trench and the strength of the founding soils. Although there is only very limited GI information available for the offshore portion of the study area, the IMT trench is likely to be formed in soft marine silts and clays and therefore the trench side slopes will need to be formed at relatively low gradients. This not only increases the total amount of material to be dredged but also the amount of imported material required for backfill.

- Where the layers of marine clay or alluvial clay are thick, the placement of tunnel elements on soft materials may cause consolidation and creep settlement, thus leading to differential settlement along the length of the tunnel. More flexible joints would allow movement between tunnel elements whilst maintaining water tightness of the tunnel. Settlement can also be controlled by designing the IMT tunnel structure to limit additional stress on the base materials, thus controlling the amount of consolidation.

- Areas of high rock head profile have been identified, from existing GI, to the potential landing points at the west of Mount Davis. By constructing a temporary waterproof cofferdam with internal strut within the offshore area, mechanical rock excavation can be carried out within the cofferdam. However, the adverse impact due to mechanical rock excavation on the construction programme should be taken into account in scheduling the construction programme of the project during the preliminary/detailed design stage after the alignment is confirmed.

6.11.3 The primary waterproofing system of the abovementioned waterproof cofferdam is achieved by driving sheet pile walls surrounding the installed pipe pile cofferdam; while the permeation grouting and cement bentonite between the sheet pile wall and the pipe pile wall will become the secondary waterproofing system.

6.11.4 Above rock head, temporary support could be provided by pipe pile walls (up to rock head level) with the support of waling's and struts. Rock fissure grout is also required to be carried out at the toe of the pipe pile to reduce groundwater seepage into the excavation area. Once the soft ground section has been excavated to rock head, top-down excavation in rock will commence. The temporary support system is likely to consist of combination of steel fibre reinforced shotcrete and rock bolts in areas of good rock. Rock excavation may have to be carried out by mechanical breaking; however, this could adversely affect construction progress.

6.11.5 After completion of excavation, the transition tunnel structure could be built bottom-up whilst the temporary struts are removed in stages. After the tunnel has been constructed, backfilling will be carried out over the tunnel structure to reinstate the ground above it. The temporary cofferdam structure above the seabed level will then be removed and the seabed will be reinstated to its original levels. Afterward, the corresponding IMT tunnel element can connect to the abovementioned cut-and-cover transition tunnel structure.

6.11.6 The geotechnical constraints and construction considerations for the proposed transition tunnel structure are discussed below:

- In order to reduce the construction risk due to marine cofferdam construction, the current load, wave load and the accidental ship impact load have to be taken into account in the design of the marine cofferdam structure during the preliminary/detailed design stage.

- Since the bedrock in this area is relatively shallow, a significant volume rock may have to be removed by mechanical breaking. This may lead to great impact on the construction progress. The adverse impact due to mechanical rock excavation on the construction programme should be taken into account in scheduling the construction programme of the project during the preliminary/detailed design stage after the alignment is confirmed.

6.11.7 Based on the available geological information, the proposed land tunnel will be excavated through predominantly hard rock. It is envisaged that the majority of the tunnel will be excavated using D&B techniques. Mechanical excavation may be required in areas of weak ground or reduced rock cover if required, or where the blasting works are critical to the sensitive receivers (such as existing WIL and WSD fresh/salt water service reservoirs). Spoil removal from the tunnels and construction material delivery to the work sites can take place through the main tunnel and construction shaft.

6.11.8 Grouting may be required anywhere along the alignment if the inflow criteria of the probe holes are not met during construction. In particular, tight control of groundwater inflow should be considered in the vicinity of existing WIL and WSD fresh/salt water service reservoirs to control the groundwater inflow and drawdown, and therefore potential damage to existing structures.

6.11.9 The temporary support system is likely to comprise of combination of steel fibre reinforced shotcrete and rock bolts in areas of good rock. In areas of soft/mixed ground, a system of fibre reinforced shotcrete, lattice arches, and canopy tubes can be adopted.

6.11.10 It is envisaged that all permanent tunnel linings will be cast in-situ concrete linings which are constructed after the completion of tunnel excavation and installation of temporary support. Bar reinforcement is required where necessary. A formwork shutter will be erected to facilitate the construction of an approximately 8 to 10m length of lining.

6.11.11 In order to achieve the water tightness requirements, a waterproof membrane will be installed around the crown and sidewalls of the excavated profile. In the case of undrained tunnels, this membrane will extend around the excavated profile, including the tunnel invert.

6.11.12 The geotechnical constraints and construction considerations for the proposed land tunnel are summarised below:

- Whilst the hard rock conditions below Mount Davis are likely to make D&B a suitable option for the formation of rail tunnels, there are a number of ground related risks which are predominantly associated with the presence of adverse geological structures such as highly fractured or weak zones of rock formed by faults, shear zones, dykes or deep zones of weathering. These features can result in generally difficult tunnelling conditions and slower progress, increased temporary support requirements and higher groundwater inflows. Further ground investigation will be required in the later stage of the project to investigate their effect on tunnel construction.

- Although no major faults are indicated to intersect any of the tunnel alignments around Mount Davis, minor faults/shear zones and dykes are likely to be encountered. The as-built records for the WIL overrun tunnel indicate the presence of four faults in the approximately 520m long overrun tunnel where the Q values were <1. The drill and blast tunnelling method may also be unsuitable for mixed ground tunnelling conditions as might be encountered near KET Station and at the temporary tunnel portal location west of Mount Davis. For the WIL overrun tunnel, over 100m of mixed/soft ground tunnelling conditions were encountered near the KET Station.

6.11.13 Other ground related risks associated with D&B tunnelling are:

- The effect of the tunnel on the hydrogeological regime i.e. potential drawdown in superficial deposits and associated settlement. If significant water inflows are encountered in advanced probing, grouting can be utilised to control the water ingress. The hydrology of the land tunnelling area shall be investigated by the detailed ground investigation works at a later stage of the project after the alignment is confirmed.

- Potential adverse effects of blasting on nearby sensitive receivers e.g. buried structures (WIL overrun tunnel and HATS Sai Ying Pun tunnel), above ground structures/buildings, geotechnical features (e.g. man-made slopes and retaining walls) and natural slopes.

- In order to achieve an economic tunnel design and minimise geotechnical risks, it is essential that a detailed ground investigation is undertaken to characterise the geological and hydrogeological conditions along the tunnel alignment.

- The alignment of the proposed tunnel falls within the Mount Davis Strategic Cavern Area (SCVA). The proposed tunnel and portal locations may affect the cavern development potential of the SCVA. In order to minimise the impacts, the design and construction aspects in relation to the Mount Davis SCVA should be thoroughly considered in the later stage of the project.

6.12 Cost and Programme

6.12.1 The construction period would be approximately 7 years based on the immersed tunnel option. The estimated capital costs of Possible Scheme R1-1 and Possible Scheme R2-1 are [redacted]

6.13 Summary

6.13.1 In this Study, conceptual railway transport infrastructure schemes between the ELM and Kennedy Town area have been explored, including extension of the ISL and new railway line.

6.13.2 The Transport Infrastructure associated with each scheme has also been determined. The tunnel alignment can largely be split into two zones, the subsea crossing and the land portion.

6.13.3 For the subsea crossing, both IMT and bored tunnel options have been considered for each scheme. At this early stage, it is considered the current tunnel options recommended for each scheme are viable and will not limit the flexibility of developing future possible extension or connections to other lines.

6.13.4 For the land portion, connections to the existing ISL and various possible new station locations have been considered in the Kennedy Town area. These conceptual stations have been broadly discussed in terms of the service catchment, geology, constructability, connectivity to existing railway lines, connections to proposed development areas and potential benefit from the proposed new railway station.

6.13.5 The connection to form the junction chamber at the WIL overrun tunnel under Scheme R1-1 is considered to be technically difficult.

6.13.6 The stations located in the Kennedy Town area are considered to be feasible with no insurmountable issues identified but require further assessment in future studies and further coordination / discussions with different parties including government departments and MTRC.

6.13.7 The possible railway infrastructures for the ELM to Kennedy Town should be further explored in future studies in the next stage of the project.

7 ADMINISTRATIVE ROUTE PROTECTION PLAN

7.1 Purpose of Administrative Route Protection Plans

7.1.1 The purposes of administrative protection for the proposed Transport Infrastructure are:

(a) To ensure through concerted efforts within the Government that new works, land disposals or planning proposals, which may affect/be affected by the proposed Transport Infrastructure are taken forward in such a manner as not to preclude, render unviable or otherwise jeopardize the construction and operation of the future Transport Infrastructure;

(b) To identify the Government land allocations, engineering works, reserves and private developments, which may affect/be affected by the proposed Transport Infrastructure so that the interfacing implications can be assessed; and

(c) To ensure that the Government is able to consider the implications of any conflicts arising from development proposals likely to affect/be affected by the Transport Infrastructure.

7.1.2 The intention of administrative route protection is not to create planning blight, nor freeze development unnecessarily. Rather, it is intended that by adopting administrative route protection procedures, departments will have an early understanding of the interfacing issues arising from the Transport Infrastructure proposals. Where there are likely conflicts, necessary and appropriate actions in line with the Government's objectives and policy could be taken timely to resolve them.

7.2 Formulation of Administrative Route Protection Plans

7.2.1 The Administrative Route Protection Plans are formed based on the Transport Infrastructure and the tentative buffer zone.

7.2.2 The tentative buffer zone is determined to allow for sufficient construction space for Transport Infrastructure; and to ensure the existing / potential developments would not affect / be affected by the Transport Infrastructure.

7.3 Possible Schemes of Transport Infrastructure

Highway Connection

7.3.1 Two scenarios of with and without linkage to potential Route 4 Extension were studied and possible scheme(s) was recommended for each scenario. The possible schemes for the two scenarios are similar in alignment and profile, with only minor difference at the landfall and connectivity in Kennedy Town. Therefore, the possible schemes of the Highway Connection of the Transport Infrastructure are considered as a whole when developing the Administrative Route Protection Plans.

7.3.2 The highway connection of the Transport Infrastructure starts from the reserved stub ends at Connaught Road West Flyover and connects to Kau Yi Chau of the ELM. It would firstly run along the shoreline of WDPCWA from high level to tunnel below ground level. After the landfall outside the shoreline of Kennedy Town, it might adopt the structural form of subsea tunnel and run towards the ELM from north of the Green Island.

Railway Connection

7.3.3 The Railway Connection would connect the Kennedy Town and the ELM in tunnel form. The railway connection might adopt drill and blast tunnel for the section below Mount Davis, and subsea tunnel from the landfall at the southwest of Mount Davis to ELM.

7.3.4 Two schemes were developed for the connection at Kennedy Town. In Scheme R1-1, the railway connection of Transport Infrastructure would connect to the existing railway system at Kennedy Town Station. In Scheme R2-1, a new railway line is proposed with the station connecting to the existing Kennedy Town Station with a passenger adit.

7.4 Tentative Buffer Zone

Construction

7.4.1 For highway connection, cut-and-cover method on temporarily reclaimed land would be adopted for the tunnel section right outside of the existing shoreline of Kennedy Town. Dredging would be required for the foundation of the temporary seawall prior to the temporary reclamation.

7.4.2 For railway connection, drill and blast method of construction would be adopted for the tunnel section through Mount Davis.

7.4.3 The subsea tunnel for both highway and railway connection outside the landfall would be constructed by IMT method. Dredged trench would be formed at the existing seabed along the alignment of the tunnel.

Others

7.4.4 The Administrative Route Protection Plans identify Government land allocations, engineering works, reserves and private developments, which may affect/be affected by the proposed Transport Infrastructure so that the interfacing implications can be assessed.

7.4.5 In the densely developed Kennedy Town, the adverse impact from the construction on the existing and proposed developments and features should be minimized. Therefore, the construction area boundary should be carefully planned and reflected in the Administrative Route Protection Plans.

7.5 Summary

7.5.1 The possible schemes of both highway and railway connections of the Transport Infrastructure are described. Tentative buffer zone is determined to allow for sufficient construction space. The Administrative Route Protection Plans are developed by taking into account the Transport Infrastructure and the tentative buffer zone.

7.5.2 The Administrative Route Protection Plans for highway connection are shown in **Figures 7.1** to **7.6**.

7.5.3 The Administrative Route Protection Plans for railway connection are shown in **Figures 7.7** to **7.10**.

8 IMPLICATION ON DEVELOPMENTS AT KENNEDY TOWN

8.1 Implication on Existing Developments

Affected Existing Land Uses by Highway Connection of Transport Infrastructure

8.1.1 The existing development of area occupied by the proposed Transport Infrastructure and area included in the Administrative Route Protection Boundary would be potentially affected by the proposed Transport Infrastructure. Mitigation measures will be proposed in this section to minimize the impacts on the affected land uses. The demolition and reconstruction plan of the buildings and facilities on the affected land uses will also be discussed.

8.1.2 The Administrative Route Protection Boundary of highway connection of the Transport Infrastructure is prepared to protect the elevated road, at-grade road, depressed road, piers and abutment, tunnel portal, tunnel structure and dredging area.

8.1.3 In the densely developed Kennedy Town, the adverse impact from the construction on the existing and proposed developments should be minimized. The alignment of the Transport Infrastructure has been designed to follow existing Shing Sai Road to minimise additional land requirement where possible. The construction area boundary should be carefully planned to avoid affecting the Kennedy Town Swimming Pool and Belcher Bay Park along Shing Sai Road and the residential buildings along New Praya, Kennedy Town.

8.1.4 In the possible schemes for highway connection of the Transport Infrastructure, the proposed landfall of the Transport Infrastructure tunnel, the slip roads and roundabout for connection to the existing road network would occupy the WDPCWA and the coastal praya areas along the waterfront of Kennedy Town. This area is Government Land Allocations (GLAs), clearance of GLA would be required.

8.1.5 There are five piers and a wharf located along the coastal praya areas along the waterfront of Kennedy Town, they are Davis's Street Pier, Kennedy Town Old Cattle Pier, Kennedy Town Poultry Pier, Kennedy Town Abattoir Pier, Kennedy Town Incinerator Pier and China Merchant Wharf. Except Kennedy Town Incinerator Pier, the other four piers and the wharf fall within or partially fall within the Administrative Route Protection Boundary. Davis's Street Pier was a government pier for municipal use. Kennedy Town Old Cattle Pier, Kennedy Town Poultry Pier and Kennedy Town Abattoir Pier were temporarily used for WIL construction and there is currently no access allowed for the public.

8.1.6 The alignment of the Transport Infrastructure has been designed to avoid adverse impact on the China Merchant Wharf. By adopting the north alignment, the Transport Infrastructure would be further away from the existing China Merchant Wharf to reduce the impact on the wharf operation during construction. Detailed impact assessment on the existing China Merchant Wharf should be carried out in future studies.

8.1.7 The existing bridges connecting existing Route 4 and Shing Sai Road would be demolished and reconstructed as shown in **Figure 5.5**. An at-grade roundabout junction is proposed at Shing Sai Road to facilitate the connectivity between the Transport Infrastructure and local road network.

8.1.8 No existing or planned housing flats, community facilities and open space would be lost due to the proposed Transport Infrastructure for highway connection. However, temporary loss of existing open spaces at the waterfront during construction is unavoidable.

8.1.9 The affected existing developments due to the Transport Infrastructure for highway connection are shown in **Figure 8.1** and the proposed mitigation measures / demolition and reconstruction plans summarized in **Appendix A – Table 8.1**.

Affected Existing Land Uses by Railway Connection of Transport Infrastructure

8.1.10 The Administrative Route Protection Boundary of Railway Connection is prepared to protect the underground station, entrance, passenger adit, tunnel structure and dredging area.

8.1.11 For railway connection Possible Scheme R1-1, the Transport Infrastructure would connect to the existing railway system at Kennedy Town Station. In Possible Scheme R2-1, a new railway line is proposed with the station connecting to the existing Kennedy Town Station with 2 passenger adits. The new station is located near Kwun Lung Lau.

8.1.12 As the proposed railway connection of the Transport Infrastructure would adopt tunnel form and the proposed new railway station with passenger adits in Possible Scheme R2-1 are underground structures, the proposed railway connection may run through some areas at underground. During construction, temporary occupation would be required for construction of station, entrances and passenger adits.

8.1.13 No existing or planned housing flats, community facilities and open spaces would be lost due to the proposed railway connection of the Transport Infrastructure.

8.1.14 The affected existing developments due to the railway connection of the Transport Infrastructure are shown in **Figure 8.2** and the proposed mitigation measures / demolition and reconstruction plans are summarized as in **Appendix A – Table 8.2.**

8.2 Implication on Planned Developments

Affected Planned Developments by Highway Connection of Transport Infrastructure

8.2.1 In the possible scheme for highway connection of the Transport Infrastructure, the proposed landfall of the Transport Infrastructure tunnel, the slip roads and roundabout for connection to existing road network would occupy the WDPCWA and coastal praya areas along the waterfront of Kennedy Town. This area is proposed to be a waterfront open space under the Western Harbourfront Conceptual Master Plan. On the Draft Kennedy Town & Mount Davis OZP, there is a planning intention to provide a promenade at the waterfront since there is a shortage of public open space in the district.

8.2.2 Kennedy Town (Belcher Bay) Bus Terminus is zoned "Open Space" on the Draft Kennedy Town & Mount Davis OZP to facilitate the implementation of the public open space / promenade. A piece of land along the waterfront to the west of Cadogan Street has also been rezoned from "Undetermined" ("U") to "Open Space (1)" ("O(1)"). Kennedy Town Old Cattle Pier, Kennedy Town Poultry Pier, Kennedy Town Abattoir Pier and Kennedy Town Incinerator Pier are incorporated into the planning scheme area and zoned "O(1)". The China Merchant Wharf has also been rezoned to "OU" annotated "Commercial, Leisure and Tourism Related Uses" ("OU (Commercial, Leisure and Tourism Related Uses)").

8.2.3 The Kennedy Town Old Cattle Pier, Kennedy Town Poultry Pier and Kennedy Town Abattoir Pier would be temporarily affected during construction and reinstated for future public open space after construction. No impact on the Davis's Street Pier and Kennedy Town Incinerator Pier is anticipated.

8.2.4 Influence on planned uses in the Western Harbourfront Conceptual Masterplan is unavoidable. Mitigation measures have been explored to enhance connectivity and accessibility to the waterfront. The space underneath the elevated structure may accommodate the sports facilities and cycle tracks, while landscape deck with resting area and viewing pavilion can be provided to reduce the visual impacts. Provision of the other community facilities including sports, cultural and other social services venues may also considered.

8.2.5 Stepped roof-top could be provided to cover the portal area and develop into open space or other community uses on top of it. The stepped roof-top is not practical to construct above the abutment and elevated section of the Transport Infrastructure as the level of the stepped roof-top would be at least +13mPD which would lead to visual impact to the residential area nearby. Therefore, the possible stepped roof-top extent is limited to the area between portal and abutment of the Transport Infrastructure.

8.2.6 A future harbourfront access from Kennedy Town to Sai Wan can be provided between the northernmost slip road of the Transport Infrastructure and coastline. The minimum walkway widths are different under scenario 1 (without linkage to Route 4 Extension) and scenario 2 (with linkage to Route 4 Extension). A continuous walkway can be provided along the existing waterfront under scenario 1 but only before the implementation of Route 4 Extension under scenario 2 The conceptual plans are shown in **Figure 8.3 & 8.4**.

8.2.7 Minor reconfiguration of the interchange at WDPCWA is needed during the implementation of Route 4 Extension. The harbourfront walkway would become discontinuous after the implementation of Route 4 Extension as the two sections of walkway would be separated by the at-grade section of the newly constructed slip road to connect the Route 4 Extension and Connaught Road West flyover. The conceptual plan is shown in **Figure 8.5**. Boardwalk outside the existing seawall and underneath the northernmost slip road of the Transport Infrastructure could be provided to connect the harbourfront walkway. The potential measures to provide a continuous walkway will be studied in future studies of Route 4 Extension.

8.2.8 The affected planned developments due to the Transport Infrastructure for highway connection are shown in **Figure 8.1** and the proposed mitigation measures / demolition and reconstruction plans summarized as follows in **Appendix A – Table 8.3**.

Affected Planned Developments by Railway Connection of Transport Infrastructure

8.2.9 The proposed railway connection of the Transport Infrastructure would adopt tunnel form and the proposed new railway station with a passenger adit in Possible Scheme R2-1 are underground structures. To protect these underground structures, all new buildings and engineering works including utilities works within the limits of the route protection boundary shall be subject to special scrutiny of the Government prior to giving approval to any plans and/or consent for commencing construction works. Areas above the proposed alignment of railway connection of the Transport Infrastructure and areas within the Administrative Route Protection Boundary may be restricted from future development.

8.2.10 As set out in the Cavern Master Plan, Mount Davis accommodates the Strategic Cavern Area No. 41. The railway connection of the Transport Infrastructure will need to avoid the strategic cavern area as far as practicable. Any impacts related to the design and construction aspects in relation to the Mount Davis SCVA should be thoroughly considered in the later stage of the project. The detailed railway tunnel alignment should be optimised as far as possible in later stage of the project in order to preserved the development potential of the SCVA.

9 CONCLUSIONS AND RECOMMENDATIONS

9.1 Conclusion

9.1.1 The potential impacts on the developments at Kennedy Town by the proposed highway and railway connection schemes have been assessed. The mitigation measures to minimize those impacts have been studied. The findings of the assessment are presented in this report.

9.1.2 At Kennedy Town, there are existing developments which is a mixture of residential developments, local retail shops and industrial godowns and specialized facilities including a public mortuary. In recent years, Kennedy Town has experienced a major transformation sparked by the implementation of the new WIL. As the WIL commences operation in December 2014, it is expected that further mixed-use developments to capture the area's improved connectivity will escalate.

9.1.3 The Transport Infrastructure should be properly planned to minimize the implications and restrictions on the existing / planned / potential developments at Kennedy Town.

9.1.4 Administrative Route Protection Plans are proposed for both highway connection and railway connection. The preliminary impacts on the existing / planned / potential developments at Kennedy Town are assessed base on the Administrative Route Protection Boundary.

Highway Connection

9.1.5 For the possible schemes of highway connection for the Transport Infrastructure, the affected zone is from the stub ends of Connaught Road West Flyover all along to the New Praya, Kennedy Town. The Davis's Street Pier and Kennedy Town Old Cattle Pier would be temporarily closed during the construction of the Transport Infrastructure and reinstated after construction. Measures have been taken to reduce the impact by dredging works on China Merchant Wharf. The construction area boundary should be carefully planned in Kennedy Town to avoid affecting the existing developments.

9.1.6 No existing or planned housing flats and community facilities would be lost due to the proposed Transport Infrastructure for highway connection. However, loss of the planned open space at Kennedy Town (Belcher Bay) Bus Terminus and the waterfront area is unavoidable which would be reprovisioned in the detailed design of the Transport Infrastructure or alternative sites would be identified in the further studies. A landscape deck with resting area and viewing pavilion is proposed over the at-grade and depressed part of the Transport Infrastructure to provide space for public enjoyment and to reduce the visual impact. A stepped roof-top is also proposed to cover the tunnel portal area for the development of open space or other community uses on top of the tunnel portal area.

9.1.7 It is concluded that the highway connection of the Transport Infrastructure has implications on the future development of the waterfront area. Measures had been proposed to ensure the continuation of the waterfront promenade is not severed with sufficient width along the waterfront reserved for provision of walkway as far as practicable.

9.1.8 For the Possible Schemes H1-1 and H2-1, zero permanent reclamation can be achieved if the Transport Infrastructure can adopt a minimum radius of 230m for the turn after the connection to existing stub ends at Connaught Road West Flyover and adopting a larger gradient for the part along existing WDPCWA. However, a permanent reclamation of about 1.0 Ha or 2.7 Ha within Victoria Harbour are needed for the implementation of Route 4 Extension under Possible Scheme H2-1A (Route 4 Extension by bridge) or H2-1B (Route 4 Extension by tunnel) respectively. In addition, the implementation of Route 4 Extension would have an affected water area of about 14.6 Ha or 0.7 Ha within Victoria Harbour for Possible Scheme H2-1A or H2-1B respectively.

9.1.9 Possible Scheme H2-3 has a permanent reclamation of about 0.6 Ha to 1.2 Ha within Victoria Harbour for the implementation of Route 4 Extension depending on the road gradient. However, this possible scheme has a lower traffic performance for Route 4 Extension connection towards Aberdeen comparing to Possible Scheme H2-1 since it only has single shared lane with Transport Infrastructure towards Aberdeen.

9.1.10 It is concluded that temporary reclamation will be required and permanent reclamation will not be required for the development of the Transport Infrastructure under the scenario without linkage to the potential Route 4 Extension. Under the scenario with potential Route 4 Extension, permanent reclamation will be required when the Extension materialise. Before that, only temporary reclamation will be required.

Railway Connection

9.1.11 The railway connection of the Transport Infrastructure may run through some underground areas and temporary occupation would be required during construction. Moreover, all new building and engineering works including utilities works within the limits of the route protection boundary shall be subject to special scrutiny of the Government prior to giving approval to any plans and/or consent for commencing construction works.

9.1.12 No existing or planned housing flats, community facilities and open space would be lost due to the proposed Transport Infrastructure for Railway Connection. The protection requirements for existing structure will be developed with geotechnical information obtained in future studies. All new buildings and engineering works including utilities works within the limits of the route protection boundary shall be subject to special scrutiny of the Government prior to giving approval to any plans and/or consent for commencing construction work.

9.1.13 The impacts due to the new railway connection of the Transport Infrastructure also include the interface with the existing KET station and WIL overrun tunnel. For Possible Scheme R1-1, connection to the existing WIL overrun tunnel would be difficult. For Possible Scheme R2-1, modification works are required to connect the two stations via an interchange subway.

9.1.14 The alignment of the proposed tunnel falls within the Mount Davis Strategic Cavern Area (SCVA). The proposed railway tunnel may affect the cavern development potential of the SCVA. In order to minimise the impacts, the design and construction aspects in relation to the Mount Davis SCVA should be thoroughly considered in the later stage of the project. The detailed railway tunnel alignment should be optimised as far as possible in later stage of the project in order to preserve the development potential of the SCVA.

9.2 Way Forward

9.2.1 The implications on developments at Kennedy Town identified in this Study should be taken into consideration in the future stages of the implementation of Transport Infrastructure for connecting Kennedy Town to ELM. As the exact alignment of the Transport Infrastructure is yet to be fixed, the affected land lots assessed in this report will be subjected to review by further studies.

9.2.2 The Preliminary TTIA carried out under this project studied and identified the recommendations on the requirements for the new Transport Infrastructure or upgrading/improvement works to cater the development of ELM. The Preliminary TTIA was carried out to facilitate the development of possible highway and railway connection schemes between ELM and Kennedy Town only and was based on various assumptions made on the forecast and development. A Detailed TTIA shall be carried out in future to verify the assumptions, results and assess the impacts to the local road networks.

9.2.3 A Detailed Marine Traffic Impact Assessment and Navigation Simulation should be conducted in future studies to further assess the marine traffic impacts arising from the Project and the associated marine works; and to recommend mitigating measures to maintain marine safety, alleviate/minimize the impacts and effects to an acceptable level. In addition, detailed assessments on the possible underwater blasting and the subsea diving operations concerned should be provided in future studies to ensure the feasibility and safety of the proposed construction methods (e.g. Detailed Blasting Assessment).

9.2.4 Under this feasibility study, only three nearby existing man-made features are located within 100m from the possible alignment schemes for highway connection but they would be unlikely to affect or be affected by the proposed works. These 3 man-made features are located at Green Island and are far away from the proposed works. No tunnelling operations will be undertaken in the proximity of these features. Hence, the proposed works would not be likely to have adverse effect on the stability of these existing man-made features. Besides, no natural terrain hazards exist since the possible highway alignment is located within offshore areas. A total of 196 nos. of existing man-made slopes and retaining walls have been identified within a distance of 100m from the possible alignment schemes for railway connection, of which eleven existing man-made features that could affect, or be affected by, the proposed underground station adjacent to Kwun Lung Lau Estate under Scheme R2-1. The potential impact on these features should be assessed at the later stage of the project.

9.2.5 At the later stages of the project after the alignment is confirmed, all existing man-made features which could affect or be affected by the proposed project and natural terrain catchments that may affect the proposed project shall be further studied and the necessity of slope works and hazard mitigation measures shall be assessed.

9.2.6 A Geotechnical Assessment shall also be carried out for the possible development option at the Study/investigation/Preliminary Design Stage to define the scope and programme of necessary slope works and hazard mitigation measures to be carried out under the project.

9.2.7 Many sections of the proposed railway alignment have very few ground investigation records, particularly the offshore/marine areas and the section of the alignment beneath Mount Davis. Recommendations for further ground investigation works, to be carried out in the subsequent feasibility/investigation level assignment, are described below. These GI works will need to be supplemented with further ground investigation works in the preliminary/detailed design stages. For tunnelling works, more ground investigation works should be proposed and undertaken with reference to GEO Technical Guidance Note TGN No. 24 during the preliminary/detailed design stage.

9.2.8 For the highway connection, three vertical boreholes with installation of standpipes and ground monitoring are recommended for the land portion of the alignment. These boreholes will need to determine the rockhead levels, thickness and engineering properties of the soils for the design of the approach tunnel/ramp structure, at-grade roads and viaduct, and the hydrogeological conditions.

9.2.9 Three vertical boreholes and two Cone Penetration Tests are recommended for the marine portion of the highway connection alignment for the determination of the thickness of soft marine deposits that may need to be dredged prior to reclamation. The boreholes will also need to identify the rockhead level for the design of the cut-and-cover tunnel section. The locations of these drillholes will need to be reviewed upon confirmation of the preferred alignment, in order to coincide with the proposed reclamation locations and provide more accurate information on the ground conditions.

9.2.10 Sixteen vertical boreholes and Six Cone Penetration Tests are recommended for the remaining marine portion of the highway connection alignment. As well as providing essential information on the engineering properties of the marine deposits and alluvium, the boreholes will provide further information on the general geology of the area and will also be used to verify and assist in the interpretation of the existing and proposed geophysical surveys.

9.2.11 For the railway connection, eight vertical boreholes, with installation of standpipes and groundwater monitoring, are recommended to determine the rock head profile, assess the soil/rock properties and hydrogeological conditions for the land portion of the alignment. The objectives of these vertical boreholes are as follows:

- One borehole on the western side of Mount Davis near the shoreline for the proposed landfall structure.
- One vertical and one inclined boreholes on Mount Davis due to the absence of existing records in this area.
- Five boreholes near the Kennedy Town area to investigate possible railway connections and a potential new station.

9.2.12 Twelve vertical borehole and six Cone Penetration Tests are recommended for the marine portion of the railway connection alignment to provide general information on the ground conditions and to better characterise the marine deposits/alluvium for the design of the IMT and trench.

9.2.13 In additional to the above recommended marine ground investigation works, it is also recommended to undertake marine geophysical survey along the possible alignment of the proposed transport infrastructure. The survey is considered to be a more cost-effective method than marine ground investigation since it can provide an efficient determination of ground conditions with wider coverage. The wider coverage of data can cater for the possible future adjustments to the possible alignment and also identify areas where rock excavation works could be minimised.

9.2.14 Moreover, since there are uncertain marine archaeological potentials, it is recommended to conduct a Marine Archaeological Investigation (MAI) along the alignment in future studies of the project. Marine Archaeological Investigation (MAI) should be conducted prior to commencement of any marine ground investigations which may produce potential marine archaeological impact.

9.2.15 The feasibility of IMT in regards to marine traffic and transport will need to be fully ascertained in future studies with a detailed Marine Traffic Impact Assessment and stakeholder consultations to look into any mitigation measures for possible impacts on marine traffic and port facilities. Close liaison with MD would be required at future studies of the project to maintain marine safety and to minimize the potential impacts to an acceptable level.

9.2.16 All possible options for the Highway Connection would affect the WDPCWA, which had been included in the Western Harbourfront Conceptual Master Plan. As PCWA operation serve important economic and social functions for Hong Kong, the re-provision of WDPCWA should be explored in details in future studies along with Western Harbourfront Conceptual Masterplan and development of ELM where it may be considered as one of the potential re-provisioning sites subject to the timing, land use compatibility and availability of land access, etc. WDPCWA is essential for cargo handling industry and in particular for cargo transport to outlying islands in Hong Kong. Hence, relevant stakeholders, including the WDPCWA cargo operators, should be consulted at the earliest opportunity in future stage of the project if their operation is affected by the construction of the Transport Infrastructure and if re-provisioning of WDPCWA is required.

9.2.17 Strategic Environmental Assessment including comparison of the environmental benefits / drawbacks as well as assessment on the relevant environmental aspects shall be conducted in future studies for the development of ELM, so that comprehensive evaluation and findings can be incorporated in the development of the Transport Infrastructure. The study area and scope of the assessment shall be determined in consultation with EPD when appropriate in future studies.

9.2.18 It is noted that the possible options for railway connection may have potential impact on the historic buildings/items at Mount Davis area and the surrounding area. This Study has considered historic buildings that were confirmed on or before 7 September 2017. The project proponent is required to observe the Development Bureau Technical Circular (Works) No. 6/2009 regarding Heritage Impact Assessment Mechanism for Capital Works Projects, in future studies of this Project and take the action as required according to the Circular.

9.2.19 Based on the highway and railway horizontal alignment requirements as well as the constraints identified in the Study, a combined tunnel will be merging at approximately half way across the Western Fairway. This option is not preferred as it will limit the alignment flexibility at ELM and increase the engineering complexity with construction of a tunnel junction within Western Fairway, thus implication to construction risk and cost. The scheme with combined Highway and Railway Connections would need to be reviewed in future studies if the alignments of the possible schemes are different as a result of changes to the consideration of the Study.

9.2.20 To provide flexibility for traffic from ELM to Western Harbour Crossing, a possible alternative route via TI's at-grade roundabout and Fung Mat Road with a new connection from Fung Mat Road to Western Harbour Crossing is presented in this Report. Details of the possible connection from Fung Mat Road to Western Harbour Crossing, such as traffic impacts, engineering alignment and environmental considerations, are subject to further assessment and review in future studies.

9.2.21 **Table 9.1** summarizes the major issues to be further assessed in future studies and the recommended assessment or way forward for the issues.

Table 9.1 – Summary of Major Issues and Recommendation

	Major Issues	Recommendation
Traffic Planning	Preliminary TTIA based on information at time of study	Conduct Detailed TTIA
	Marine traffic impact in Western & Southern Fairway	Conduct Detailed MTIA
Geological	Limited existing geological information	Conduct Geological Assessment and Ground Investigation
Highway	Permanent occupation of WDPCWA	Identify reprovisioning site
	Public use of waterfront area	Enhance connectivity/continuity Landscape deck/Stepped roof-top
	Temporary impact on existing marine facilities, e.g. piers	Reinstatement of marine facilities
	Air, noise, visual impacts on nearby residential areas	Conduct SEA as part of ELM development
	Ecological values at Green Island	Conduct SEA as part of ELM development Protection measures during construction
	Alternative connection between ELM and Western Harbour Crossing	Conduct review and detailed assessment

	Major Issues	Recommendation
Railway	Temporary suspension of WIL	Consult MTRC on operation impact
	Interface with KET Station/Kwun Lung Lau/Sai Wan Estate	Further study alignment of adits / connection to KET Station
	Potential impact on the historic building/items at Mount Davis area	Take the required action according to the Development Bureau Technical Circular (Works) No. 6/2009 regarding Heritage Impact Assessment Mechanism for Capital Works Projects
	Combined Highway and Railway Tunnel	Reviewed in future studies if alignments of TI different from possible schemes

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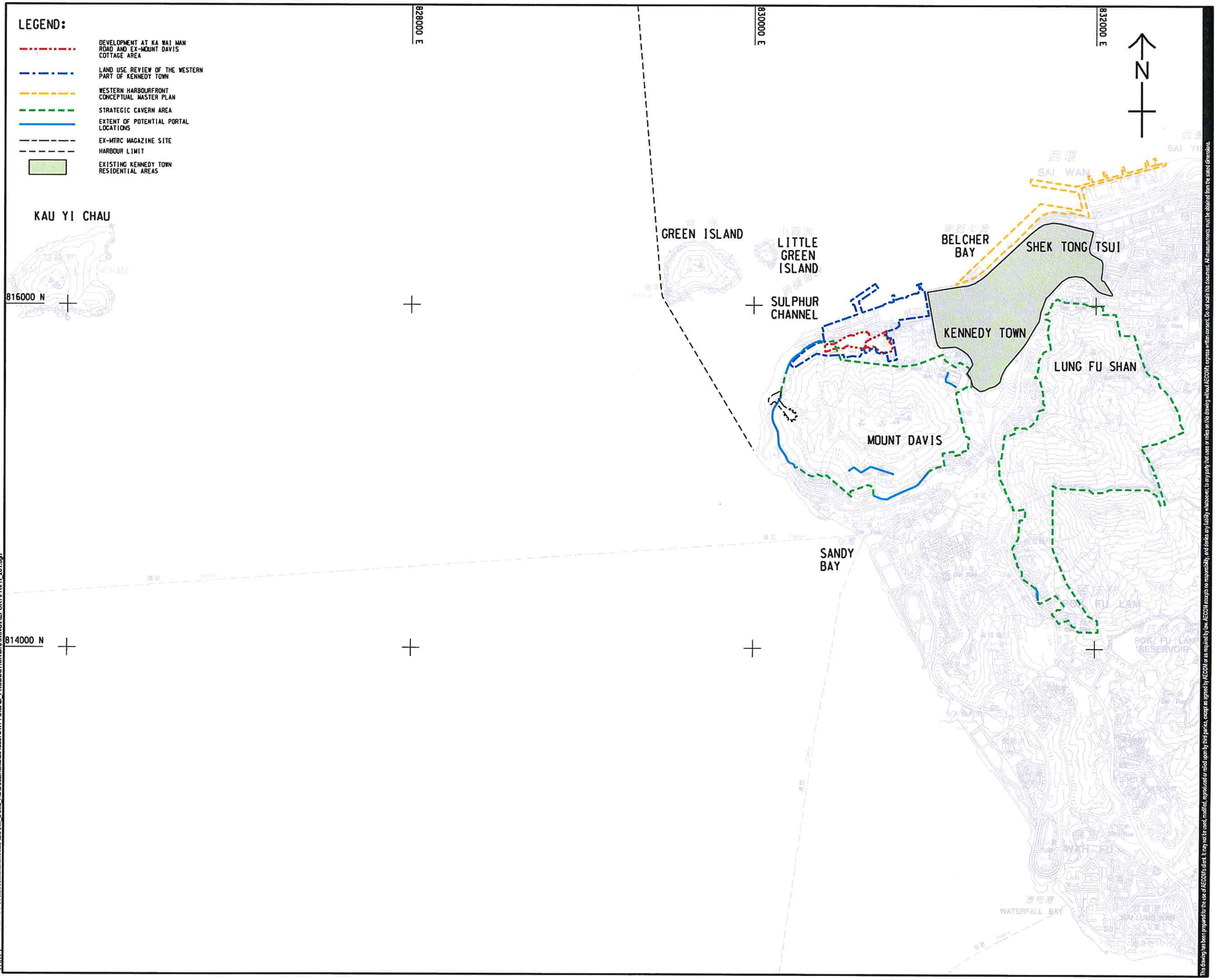
Figures



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PROJECT

TECHNICAL STUDY ON TRANSPORT INFRASTRUCTURE AT KENNEDY TOWN FOR CONNECTING TO EAST LANTAU METROPOLIS - FEASIBILITY STUDY

CLIENT

CEDD 土木工程拓展署 Civil Engineering and Development Department

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KEY PLAN

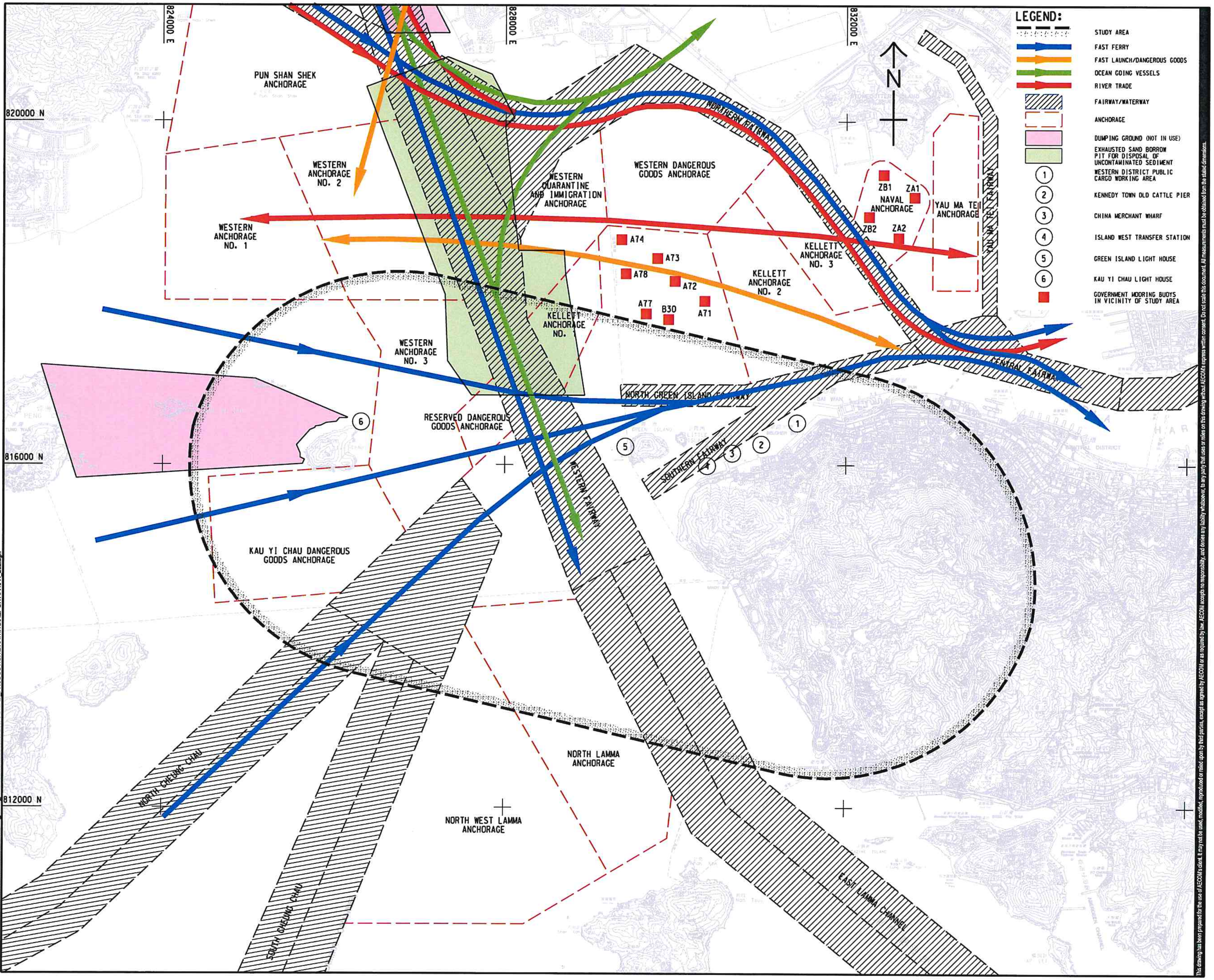
PROJECT NO.	AGREEMENT NO.
60438078	CE 11/2015 (HY)

SHEET TITLE

STRATEGIC CAVERN AREA, LAND USE REVIEW AND ESTATE DEVELOPMENTS

SHEET NUMBER

60438078/FR/FIGURE 2.1



ISO A1 594mm x 841mm

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Designer:

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PROJECT 項目

TECHNICAL STUDY ON TRANSPORT INFRASTRUCTURE AT KENNEDY TOWN FOR CONNECTING TO EAST LANTAU METROPOLIS - FEASIBILITY STUDY

CLIENT 業主

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SCALE 比例 A3 1 : 40000

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PROJECT NO. 項目編號 60438078

AGREEMENT NO. 協議編號 CE 11/2015 (HY)

SHEET TITLE 圖紙名稱

MARINE TRAFFIC AND PORTS

SHEET NUMBER 圖紙編號

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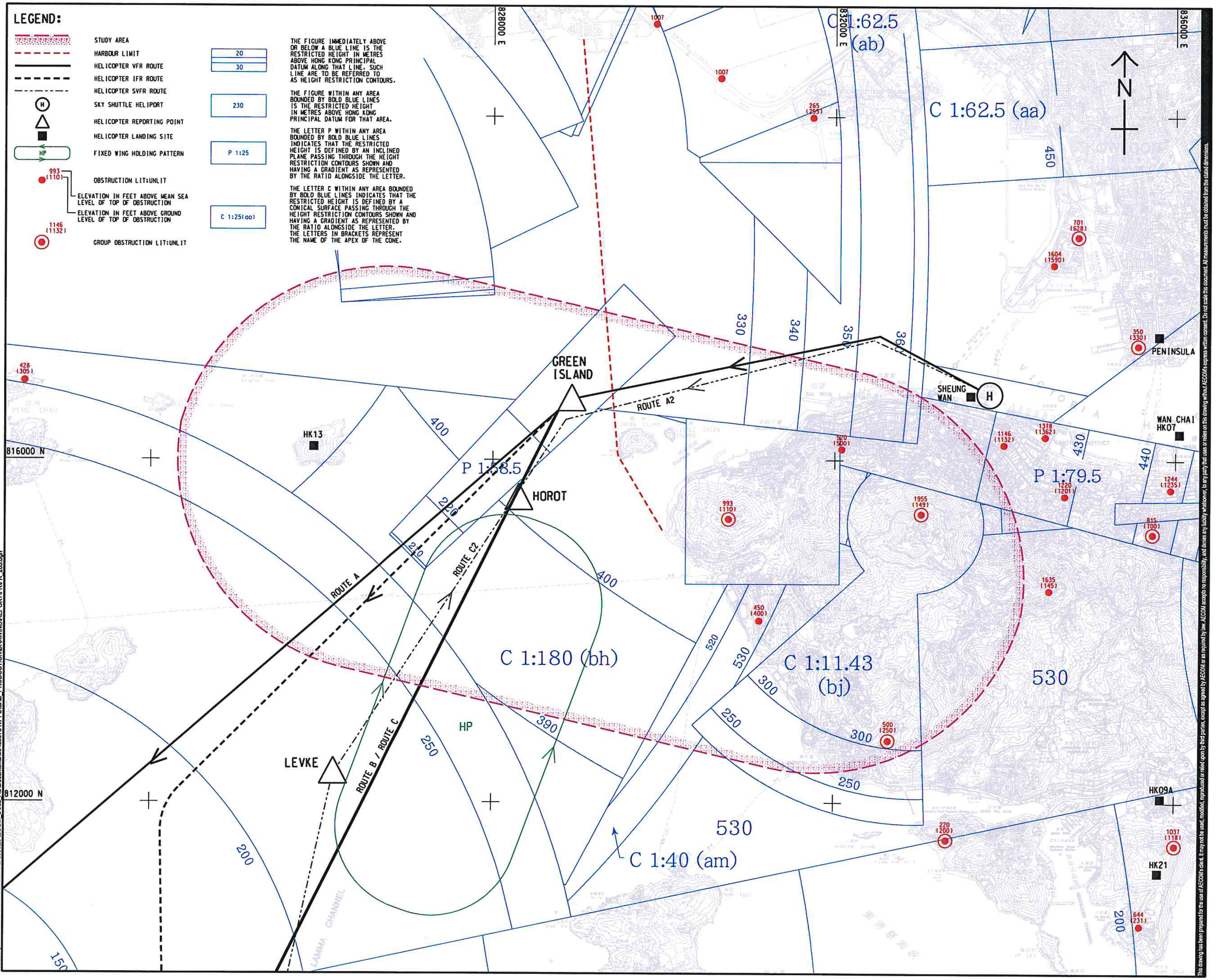

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DIMENSION UNIT
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PROJECT NO.
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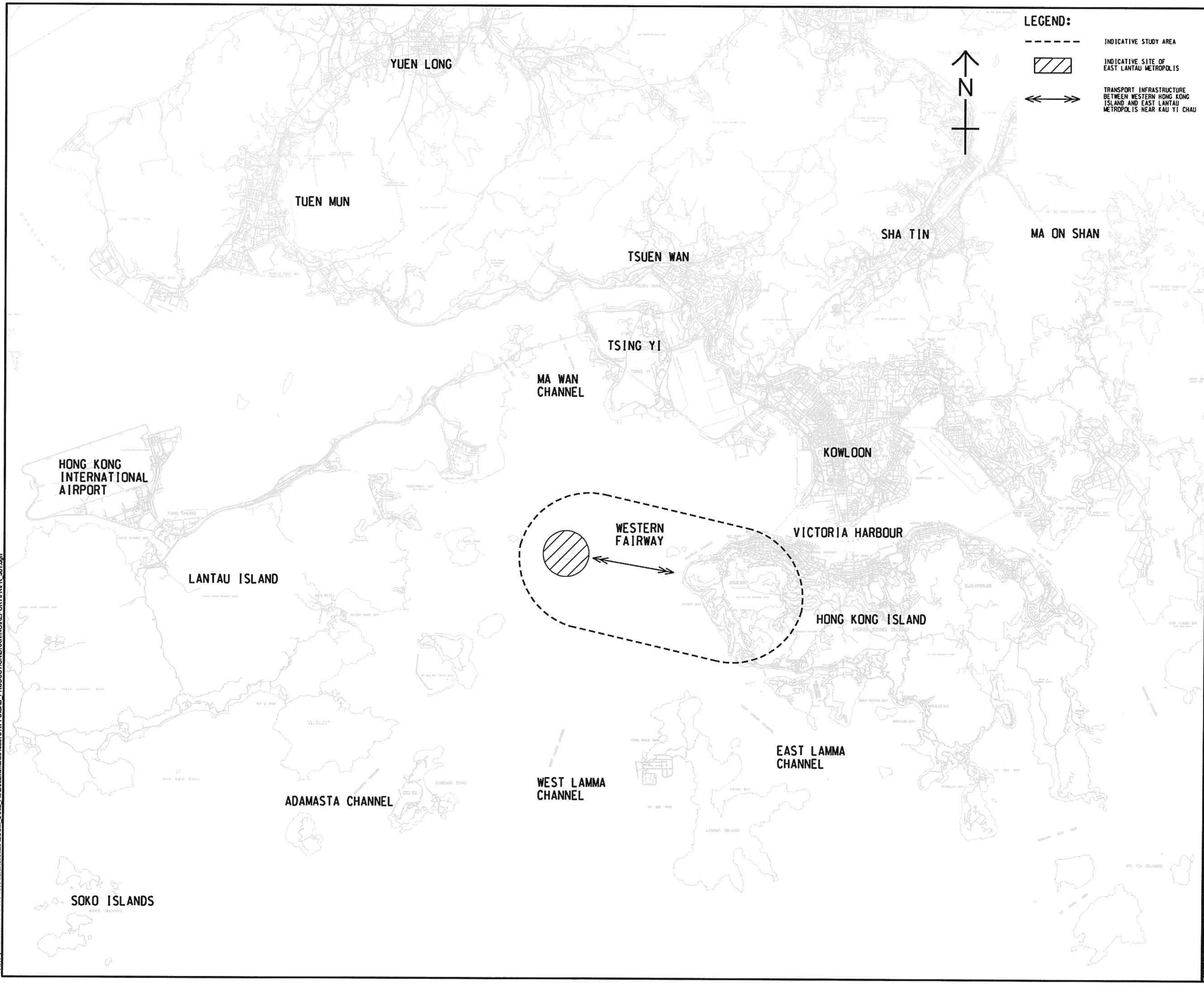
HELICOPTER FLYING ROUTES AND AIRPORT HEIGHT RESTRICTIONS AND HARBOUR LIMIT

SHEET NUMBER
圖紙編號

60438078/FR/FIGURE 2.3



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PROJECT

TECHNICAL STUDY ON TRANSPORT INFRASTRUCTURE AT KENNEDY TOWN FOR CONNECTING TO EAST LANTAU METROPOLIS - FEASIBILITY STUDY

CLIENT

CEDD 土木工程拓展署 Civil Engineering and Development Department

CONSULTANT

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I/R	DATE	DESCRIPTION	CHK.

STATUS

SCALE: A3 1 : 120000

DIMENSION UNIT: METRES

KEY PLAN

PROJECT NO.: 60438078

AGREEMENT NO.: CE 11/2015 (HY)

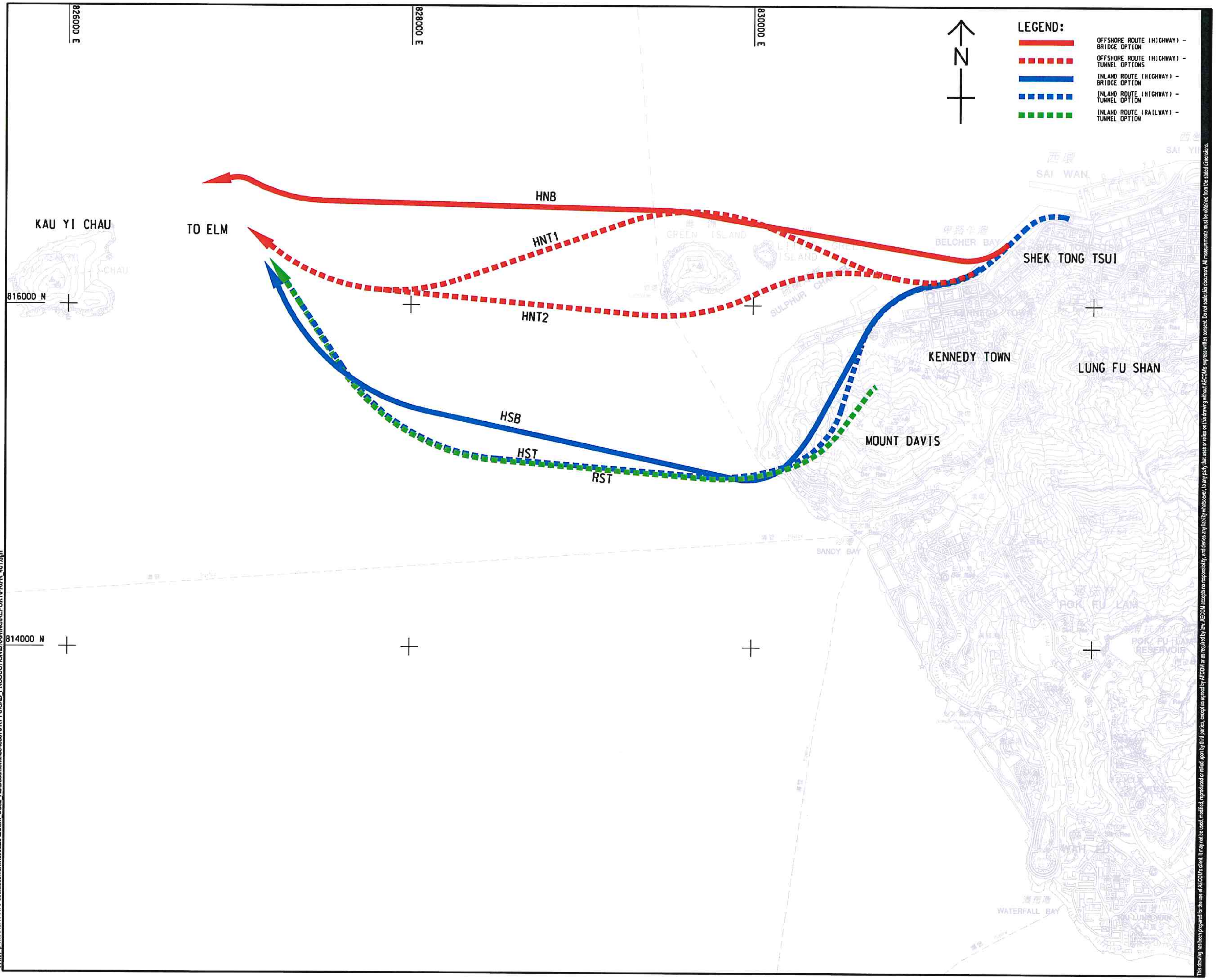
SHEET TITLE

INITIAL CONCEPT OF EAST LANTAU METROPOLIS

SHEET NUMBER

60438078/FR/FIGURE 3.1

ISO A1 594mm x 841mm
Approved:
Checked:
Designer:
Project Management Initials:
Plot File by: ZHANGWRS 2017/8/7
PATH pw:\\HKSHT1VAP096.aecomonline.local:AECOM_DS02_AS\Documents\60438078 KT FS\CAD_PRODUCTION\DRAWING\REPORT\FR\FR_301.dgn



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PROJECT

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SCALE: A3 1 : 20000

DIMENSION UNIT: METRES

KEY PLAN

PROJECT NO.: 60438078

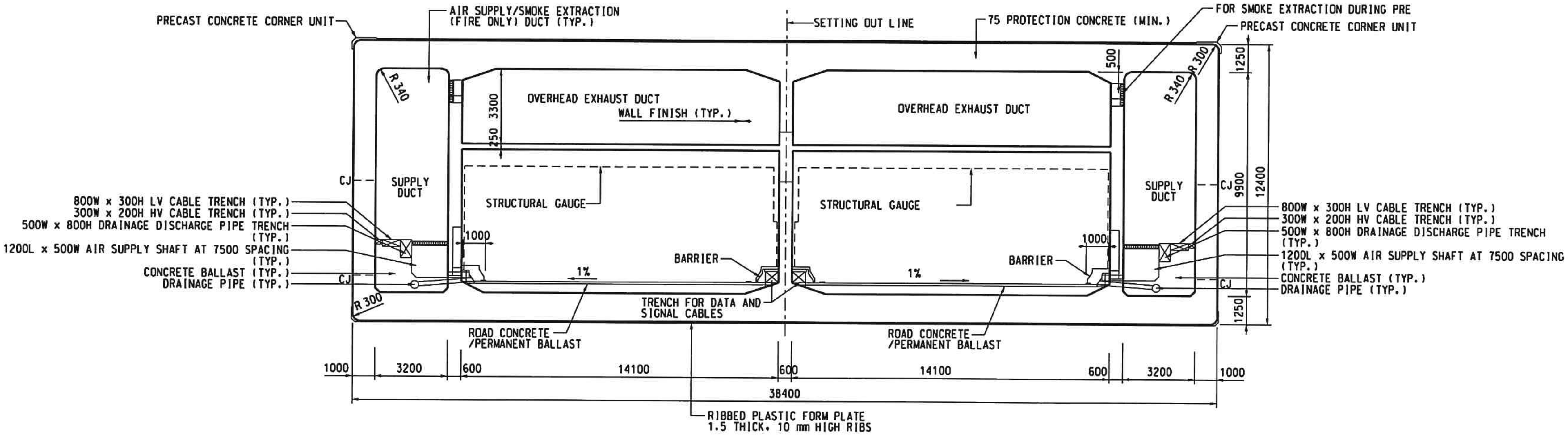
AGREEMENT NO.: CE 11/2015 (HY)

SHEET TITLE

TRANSPORT INFRASTRUCTURE ROUTE OPTIONS

SHEET NUMBER

60438078/FR/FIGURE 4.1



GENERAL ARRANGEMENT OF DUAL 3-LANE IMT TUNNEL FOR HIGHWAY CONNECTION

AECOM

PROJECT

TECHNICAL STUDY ON TRANSPORT INFRASTRUCTURE AT KENNEDY TOWN FOR CONNECTING TO EAST LANTAU METROPOLIS - FEASIBILITY STUDY

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I/R	DATE	DESCRIPTION	CHK.

STATUS

SCALE: A3 1 : 200

DIMENSION UNIT: MILLIMETRES

KEY PLAN

PROJECT NO.: 60438078

AGREEMENT NO.: CE 11/2015 (HY)

SHEET TITLE

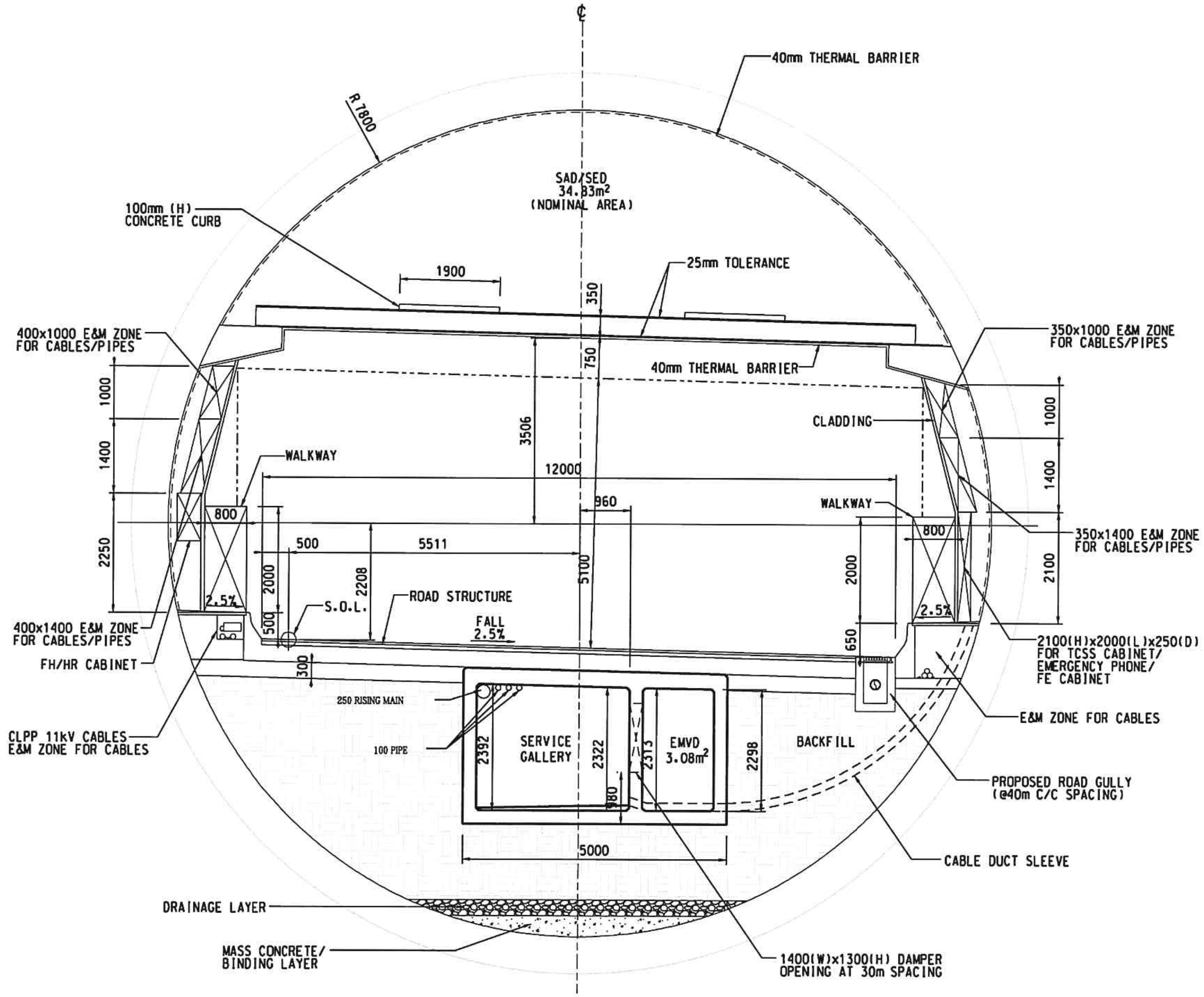
GENERAL ARRANGEMENT OF IMT TUNNEL FOR HIGHWAY CONNECTION

SHEET NUMBER

60438078/FR/FIGURE 4.2

NOTE:

1. 2 SINGLE THREE-LANE TBM TUNNELS SHALL BE PROVIDED FOR THE PROPOSED TRANSPORT INFRASTRUCTURE FOR HIGHWAY CONNECTION ACROSS BUSY FAIRWAYS AND CHANNELS.



GENERAL ARRANGEMENT OF DUAL 3-LANE TBM TUNNEL FOR HIGHWAY CONNECTION

AECOM

PROJECT 項目

TECHNICAL STUDY ON TRANSPORT INFRASTRUCTURE AT KENNEDY TOWN FOR CONNECTING TO EAST LANTAU METROPOLIS - FEASIBILITY STUDY

CLIENT 業主

CEDD 土木工程拓展署 Civil Engineering and Development Department

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STATUS 階段

SCALE 比例	DIMENSION UNIT 尺寸單位
A3 1 : 100	MILLIMETRES

KEY PLAN 索引圖

PROJECT NO. 項目編號	AGREEMENT NO. 協議編號
60438078	CE 11/2015 (HY)

SHEET TITLE 圖紙名稱

GENERAL ARRANGEMENT OF TBM TUNNEL FOR HIGHWAY CONNECTION

SHEET NUMBER 圖紙編號

60438078/FR/FIGURE 4.3

Plot File by: WONGKK 28-Jan-17
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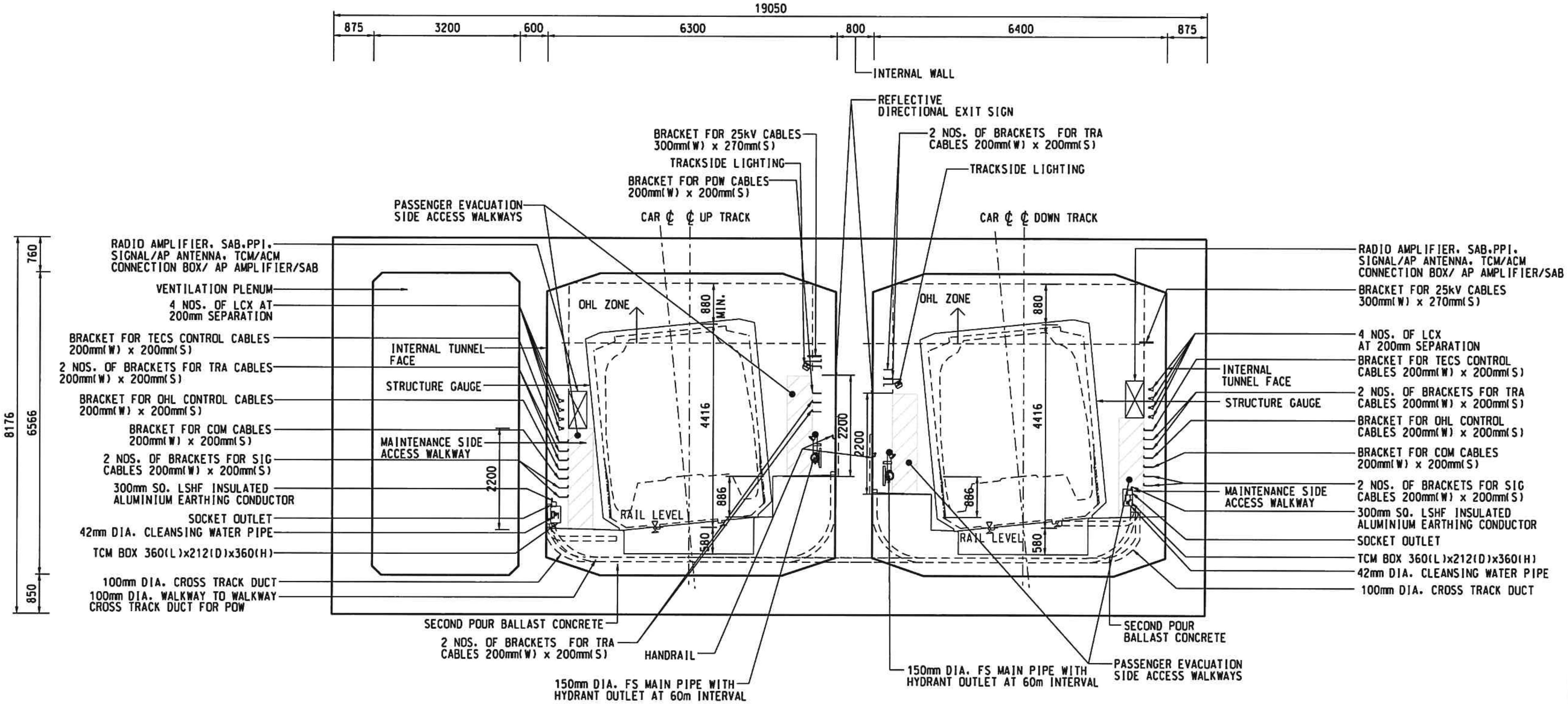
Project Management Initials: Designer: Checked: Approved: ISO A1 594mm x 841mm



GENERAL ARRANGEMENT OF DUAL TRACK
IMT TUNNEL FOR RAILWAY CONNECTION

AECOM

PROJECT 項目

TECHNICAL STUDY ON TRANSPORT INFRASTRUCTURE AT KENNEDY TOWN FOR CONNECTING TO EAST LANTAU METROPOLIS - FEASIBILITY STUDY

CLIENT 業主

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STATUS

SCALE: A3 1 : 100

DIMENSION UNIT: MILLIMETRES

KEY PLAN

PROJECT NO.: 60438078

AGREEMENT NO.: CE 11/2015 (HY)

SHEET TITLE

GENERAL ARRANGEMENT OF IMT TUNNEL FOR RAILWAY CONNECTION

SHEET NUMBER

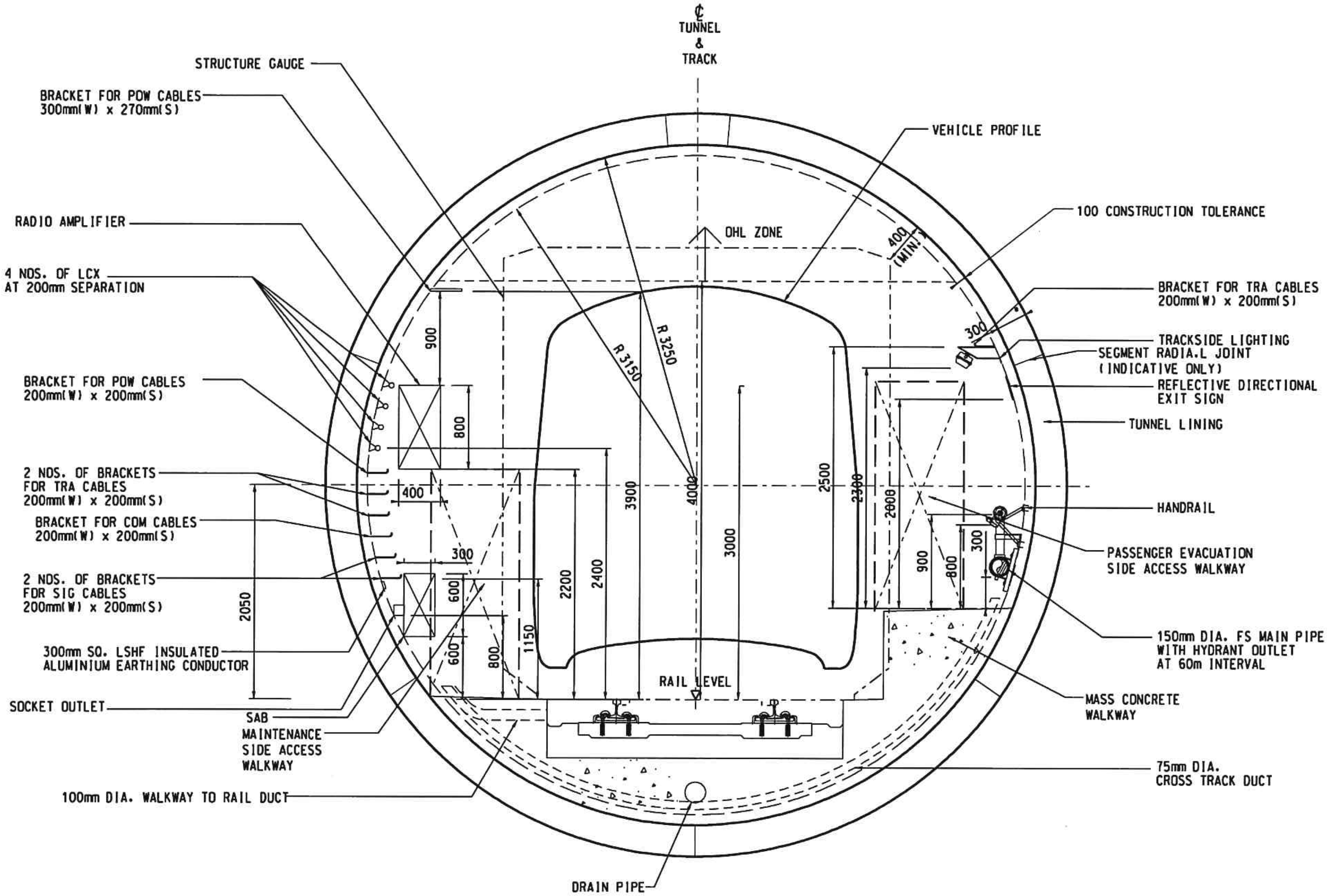
60438078/FR/FIGURE 4.4

ISO A1 594mm x 841mm Approved: Checked: Designer: Project Management Initials:

Plot File by: WONGKKK 09-Nov-17

NOTE:

1. 2 SINGLE TRACK TBM TUNNELS SHALL BE PROVIDED FOR THE PROPOSED TRANSPORT INFRASTRUCTURE FOR RAILWAY CONNECTION ACROSS BOSY FAIRWAYS AND CHANNELS



GENERAL ARRANGEMENT OF SINGLE TRACK TBM TUNNEL FOR RAILWAY CONNECTION

AECOM

PROJECT
TECHNICAL STUDY ON TRANSPORT INFRASTRUCTURE AT KENNEDY TOWN FOR CONNECTING TO EAST LANTAU METROPOLIS - FEASIBILITY STUDY

CLIENT
CEDD 土木工程拓展署 Civil Engineering and Development Department

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STATUS

SCALE: A3 1:50
DIMENSION UNIT: MILLIMETRES

KEY PLAN

PROJECT NO.: 60438078
AGREEMENT NO.: CE 11/2015 (HY)

SHEET TITLE
GENERAL ARRANGEMENT OF TBM TUNNEL FOR RAILWAY CONNECTION

SHEET NUMBER
60438078/FR/FIGURE 4.5

Plot File by: WONGKK 10-Aug-17
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PROJECT 項目

TECHNICAL STUDY ON TRANSPORT INFRASTRUCTURE AT KENNEDY TOWN FOR CONNECTING TO EAST LANTAU METROPOLIS - FEASIBILITY STUDY

CLIENT 業主

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STATUS 階段

SCALE 比例 A3 1 : 2500

DIMENSION UNIT 尺寸單位 METRES

KEY PLAN 索引圖

PROJECT NO. 項目編號 60438078

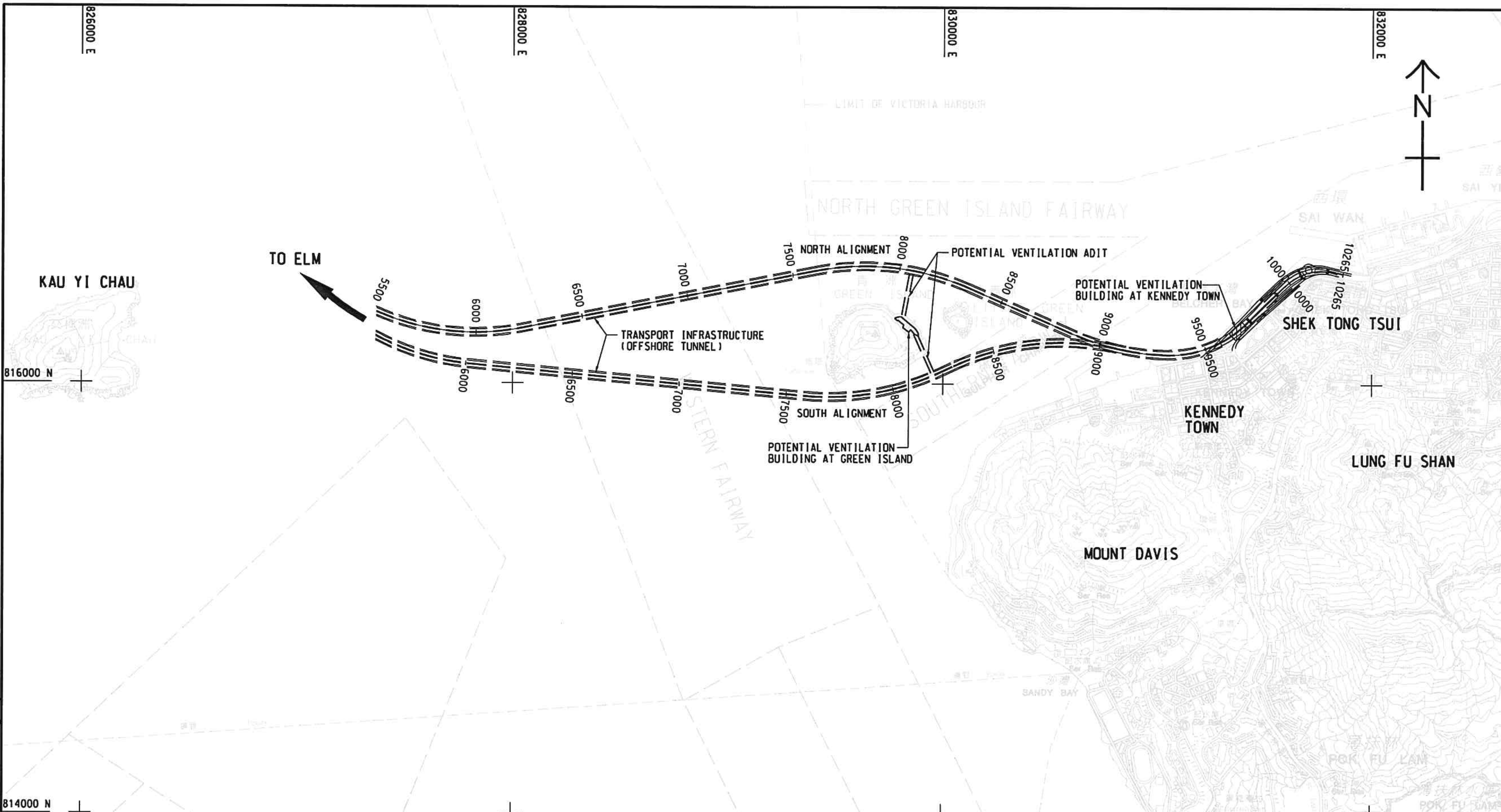
AGREEMENT NO. 協議編號 CE 11/2015 (HY)

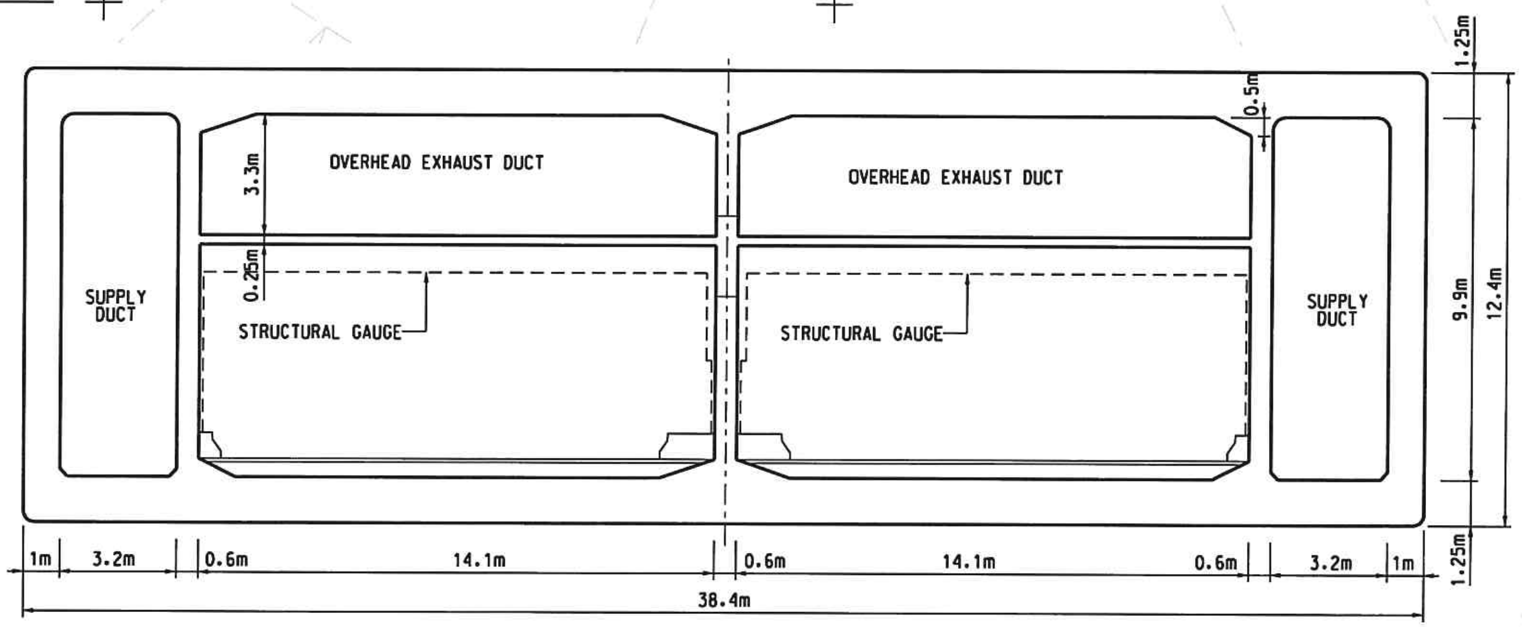
SHEET TITLE 圖紙名稱

INDICATIVE PERMANENT RECLAMATION AREA FOR MINIMUM RADIUS OF R320

SHEET NUMBER 圖紙編號

60438078/FR/FIGURE 5.1





TYPICAL SECTION
SCALE 1 : 200

AECOM

PROJECT

TECHNICAL STUDY ON TRANSPORT INFRASTRUCTURE AT KENNEDY TOWN FOR CONNECTING TO EAST LANTAU METROPOLIS - FEASIBILITY STUDY

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STATUS

SCALE	DIMENSION UNIT
A3 1 : 20000	METRES

KEY PLAN

PROJECT NO.	AGREEMENT NO.
60438078	CE 11/2015 (HY)

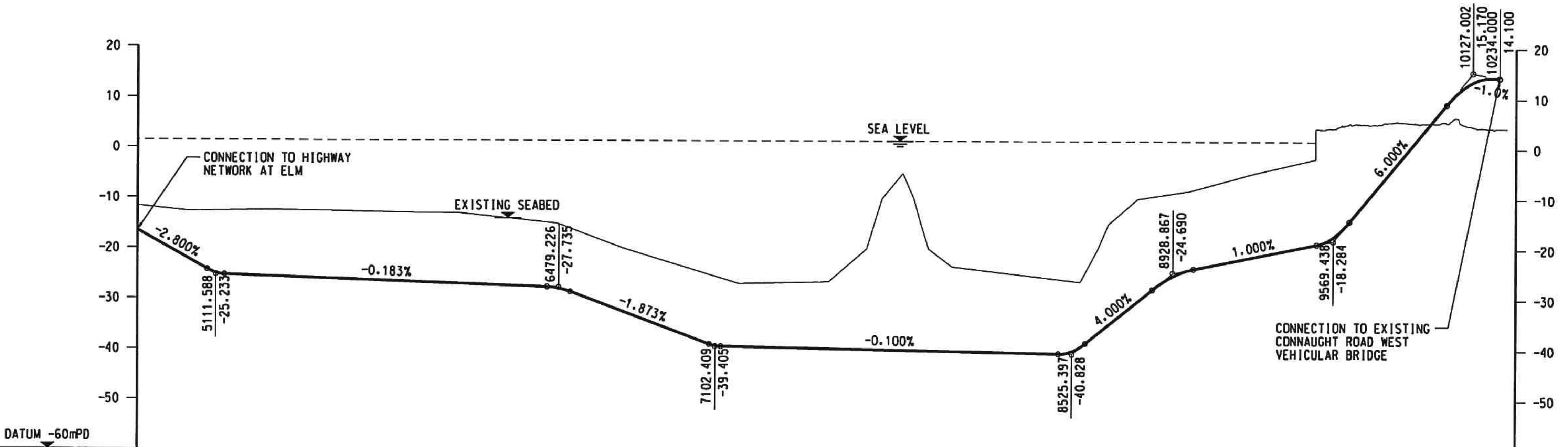
SHEET TITLE

POSSIBLE SCHEME W/O ROUTE 4 EXTENSION - OVERALL LAYOUT PLAN

SHEET NUMBER

60438078/FR/FIGURE 5.2

ISO A1 594mm x 841mm
Approved:
Checked:
Designer:
Project Management Initials:



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PROPOSED LEVEL	-16.509	-22.109	-25.944	-26.859	-28.184	-37.488	-39.803	-40.303	-40.653	-23.990	-18.978	7.550	

VERTICAL PROFILE

SCALE HOR. 1 : 20000
VER. 1 : 1000

AECOM

PROJECT 項目

TECHNICAL STUDY ON TRANSPORT INFRASTRUCTURE AT KENNEDY TOWN FOR CONNECTING TO EAST LANTAU METROPOLIS - FEASIBILITY STUDY

CLIENT 業主

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STATUS 階段

SCALE 比例 | DIMENSION UNIT 尺寸單位

A3 AS SHOIWN

KEY PLAN 索引圖

PROJECT NO. 項目編號 | AGREEMENT NO. 協議編號

60438078 | CE 11/2015 (HY)

SHEET TITLE 圖紙名稱

POSSIBLE SCHEME W/O ROUTE 4 EXTENSION VERTICAL PROFILE - SOUTH ALIGNMENT

SHEET NUMBER 圖紙編號

60438078/FR/FIGURE 5.3

Project Management Initials: Designer: Checked: Approved: ISO A1 594mm x 841mm

Plot File by: WONGKK 26-Jan-17
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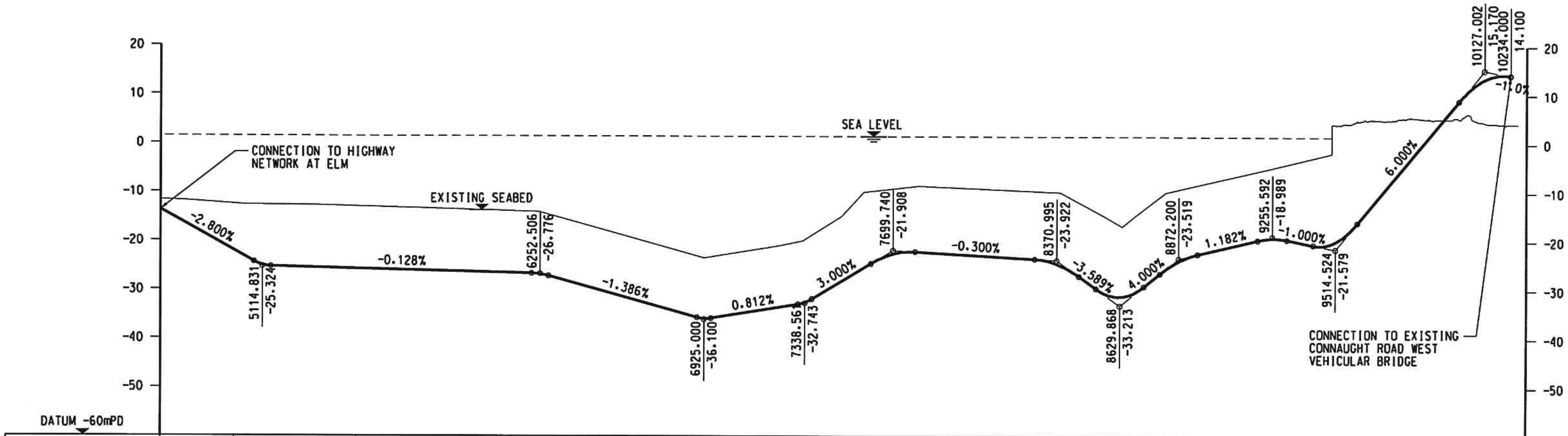

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PROPOSED LEVEL	-13.709	-22.109	-25.816	-26.454	-30.208	-35.491	-27.900	-22.809	-28.552	-22.009	-20.309	7.550

VERTICAL PROFILE

SCALE HOR. 1 : 20000
VER. 1 : 1000

AECOM

PROJECT 項目

TECHNICAL STUDY ON TRANSPORT INFRASTRUCTURE AT KENNEDY TOWN FOR CONNECTING TO EAST LANTAU METROPOLIS - FEASIBILITY STUDY

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STATUS 階段

SCALE 比例 A3 AS SHOWN

DIMENSION UNIT 尺寸單位

KEY PLAN 索引圖

PROJECT NO. 項目編號 60438078

AGREEMENT NO. 協議編號 CE 11/2015 (HY)

SHEET TITLE 圖紙名稱

POSSIBLE SCHEME W/O ROUTE 4 EXTENSION VERTICAL PROFILE - NORTH ALIGNMENT

SHEET NUMBER 圖紙編號

60438078/FR/FIGURE 5.4

Project Management Initials: Designer: Checked: Approved: ISO A1 594mm x 841mm

Plot File by: WONGKK 28-Jan-17
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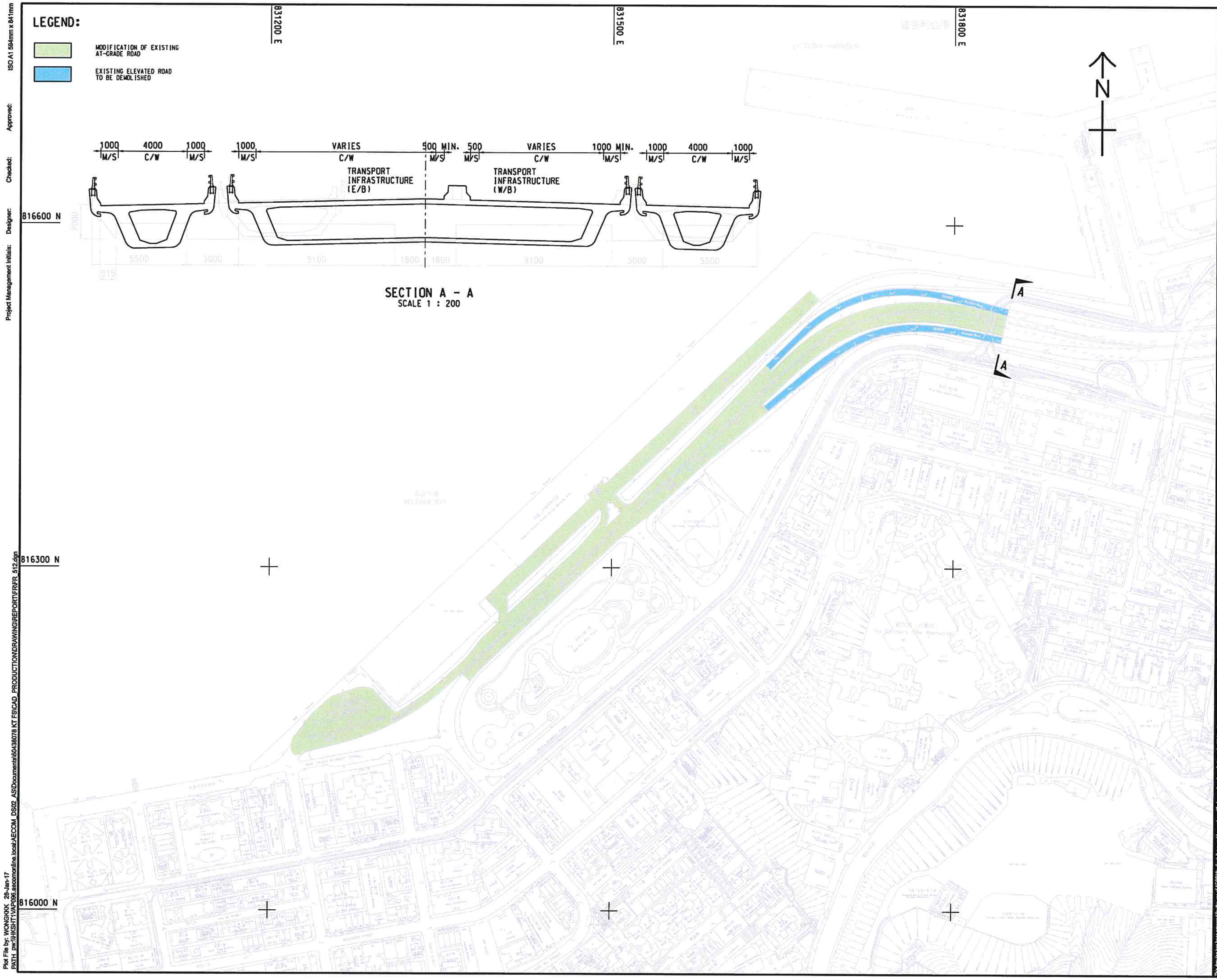

ISO A1 594mm x 841mm

Approved:

Checked:

Designer:

Project Management Initials:

Plot File by: WONGKK 28-Jan-17

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PROJECT

TECHNICAL STUDY ON TRANSPORT INFRASTRUCTURE AT KENNEDY TOWN FOR CONNECTING TO EAST LANTAU METROPOLIS - FEASIBILITY STUDY

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STATUS

SCALE: A3 1 : 3000

DIMENSION UNIT: METRES

KEY PLAN

PROJECT NO.: 60438078

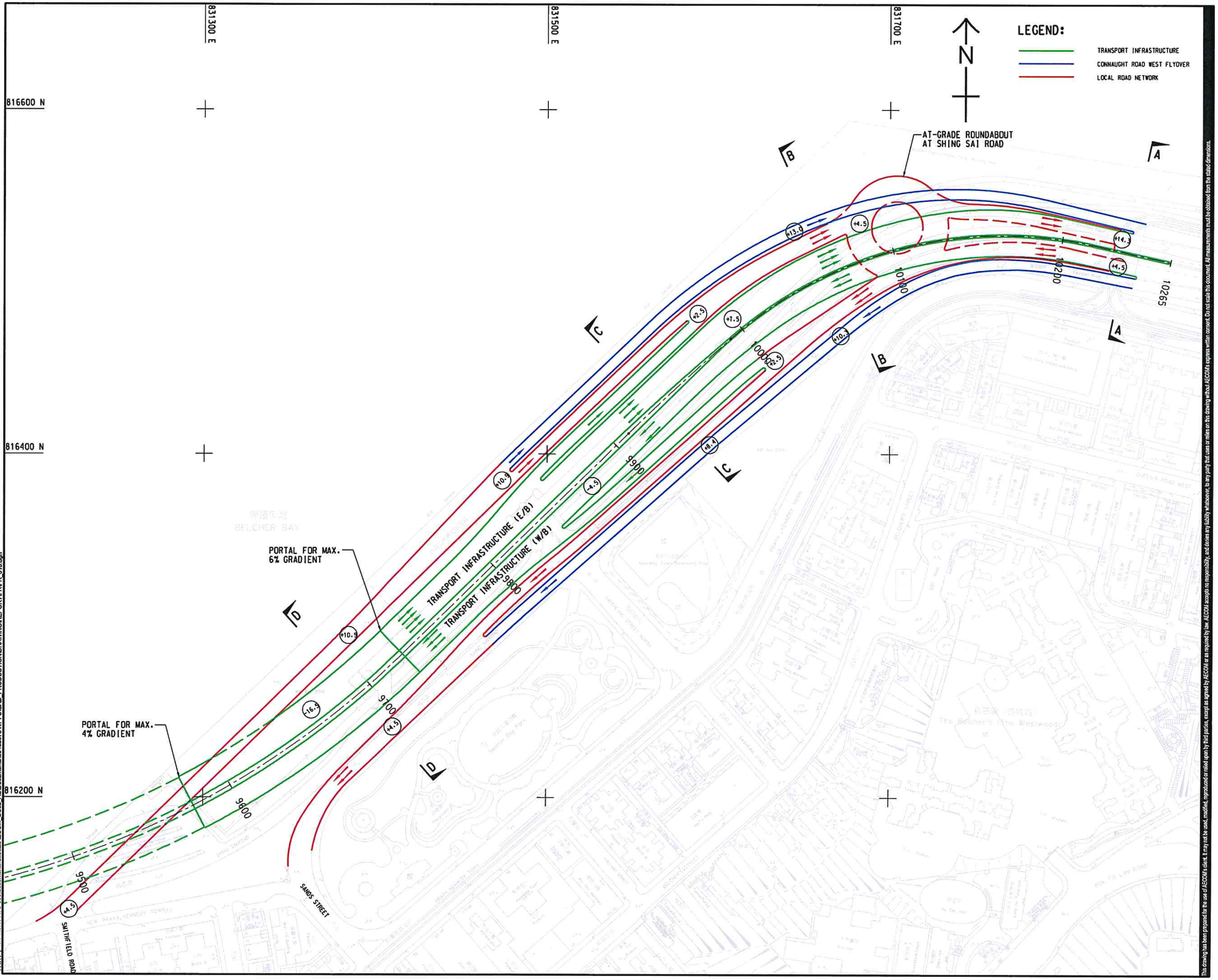
AGREEMENT NO.: CE 11/2015 (HY)

SHEET TITLE

EXISTING ROAD NETWORK DEMOLITION & MODIFICATION PLAN

SHEET NUMBER

60438078/FR/FIGURE 5.5



PROJECT

TECHNICAL STUDY ON TRANSPORT INFRASTRUCTURE AT KENNEDY TOWN FOR CONNECTING TO EAST LANTAU METROPOLIS - FEASIBILITY STUDY

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STATUS

SCALE: A3 1 : 2000

DIMENSION UNIT: METRES

KEY PLAN

PROJECT NO.: 60438078

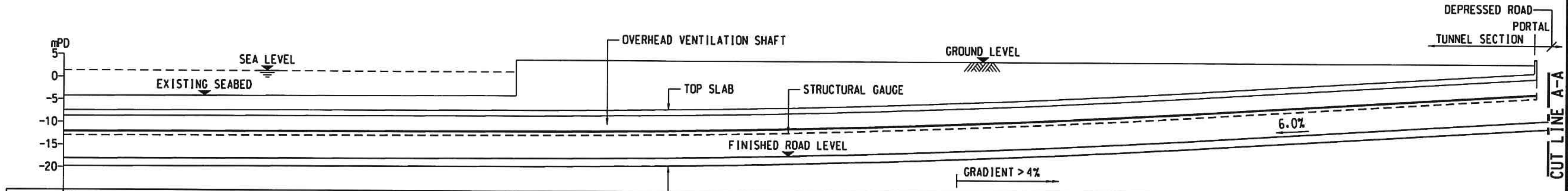
AGREEMENT NO.: CE 11/2015 (HY)

SHEET TITLE

POSSIBLE SCHEME W/O ROUTE 4 EXTENSION CONNECTION LAYOUT AT KENNEDY TOWN

SHEET NUMBER

60438078/FR/FIGURE 5.6



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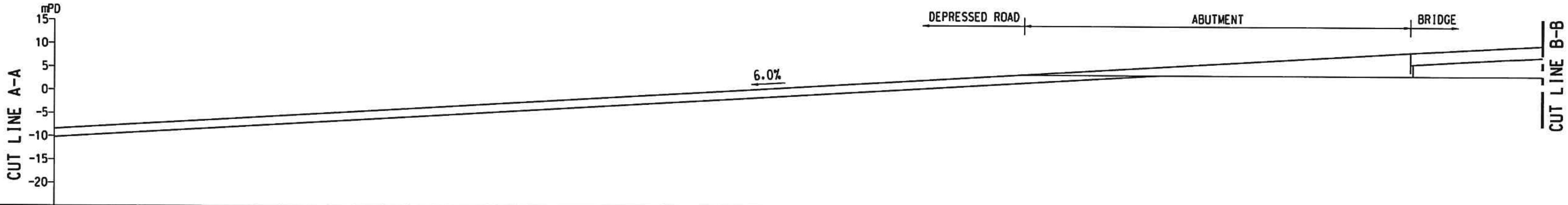
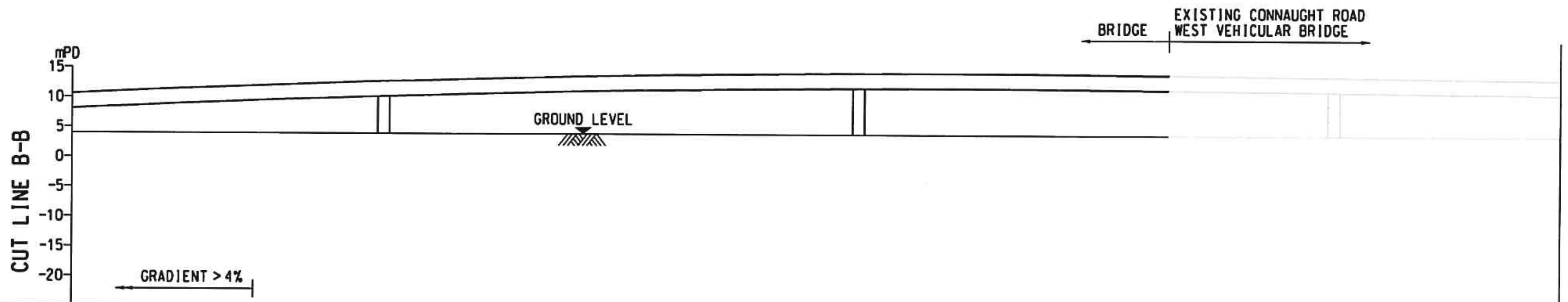
FINISHED ROAD LEVEL	-18.110	-17.760	-15.729	-10.277



CHAINAGE	9800.000	9900.000	10000.000
FINISHED ROAD LEVEL	-4.277	1.723	7.723



CHAINAGE	10100.000	10200.000	10264.683	10300.000
FINISHED ROAD LEVEL	12.643	14.295		

ELEVATION ALONG S.O.L. (MAX. 6% GRADIENT)

ISO A1 594mm x 841mm

Approved:

Checked:

Designer:

Project Management Initials:

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PROJECT 項目

TECHNICAL STUDY ON TRANSPORT INFRASTRUCTURE AT KENNEDY TOWN FOR CONNECTING TO EAST LANTAU METROPOLIS - FEASIBILITY STUDY

CLIENT 業主

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STATUS 階段

SCALE 比例: A3 1 : 1000

DIMENSION UNIT 尺寸單位: METRES

KEY PLAN 索引圖

PROJECT NO. 項目編號: 60438078

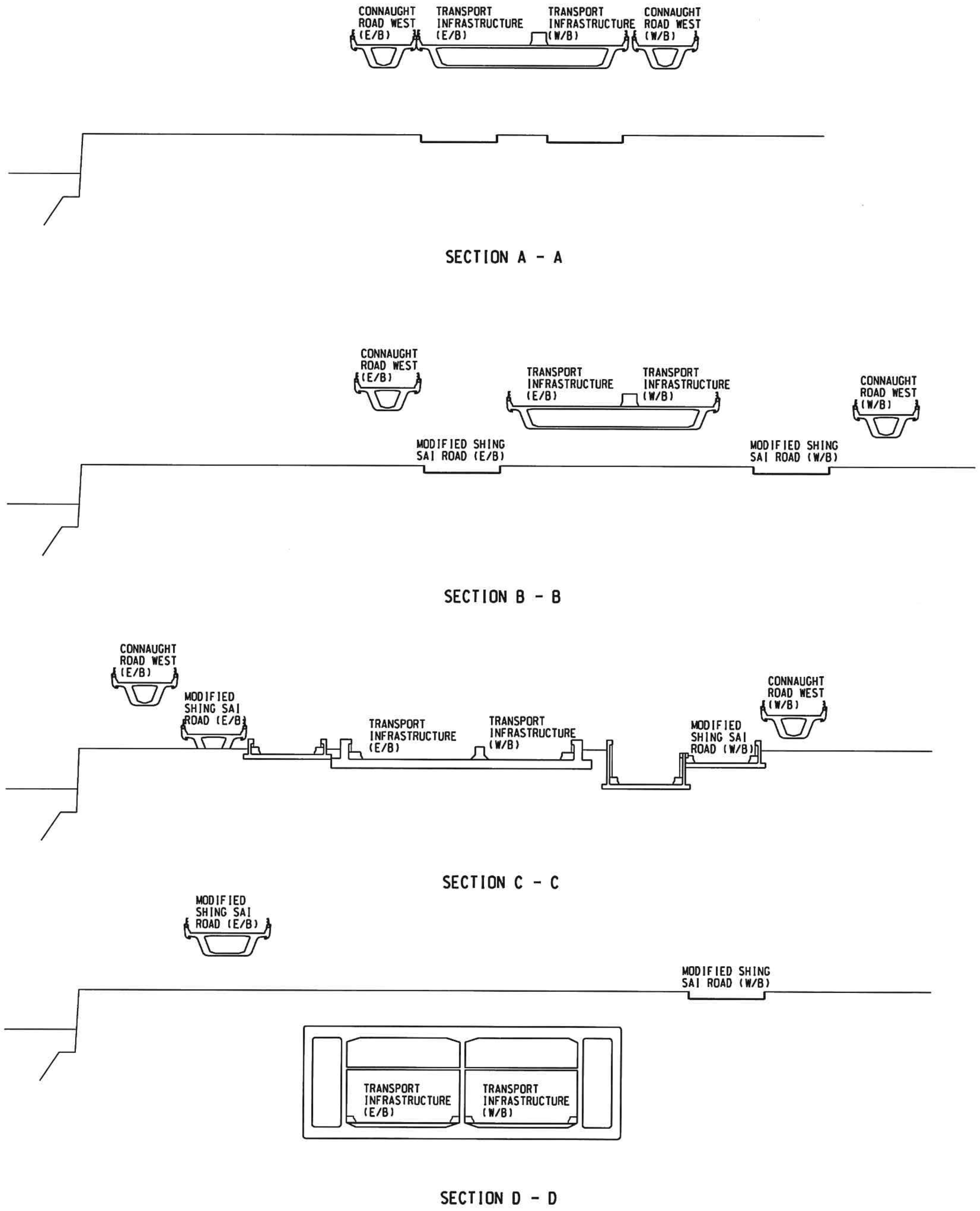
AGREEMENT NO. 協議編號: CE 11/2015 (HY)

SHEET TITLE 圖紙名稱

POSSIBLE SCHEME W/O ROUTE 4 EXTENSION ELEVATION AT KENNEDY TOWN FOR 6% GRADIENT

SHEET NUMBER 圖紙編號

60438078/FR/FIGURE 5.7



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PROJECT

TECHNICAL STUDY ON TRANSPORT INFRASTRUCTURE AT KENNEDY TOWN FOR CONNECTING TO EAST LANTAU METROPOLIS - FEASIBILITY STUDY

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STATUS

SCALE	DIMENSION UNIT
A3 1 : 500	MILLIMETRES

KEY PLAN

PROJECT NO.	AGREEMENT NO.
60438078	CE 11/2015 (HY)

SHEET TITLE

POSSIBLE SCHEME W/O ROUTE 4 EXTENSION SECTION AT KENNEDY TOWN FOR 6% GRADIENT

SHEET NUMBER

60438078/FR/FIGURE 5.8

ISO A1 594mm x 841mm
Approved:
Checked:
Designer:
Project Management Initials:

Plot File by: ZHANGWRS 2017/8/7
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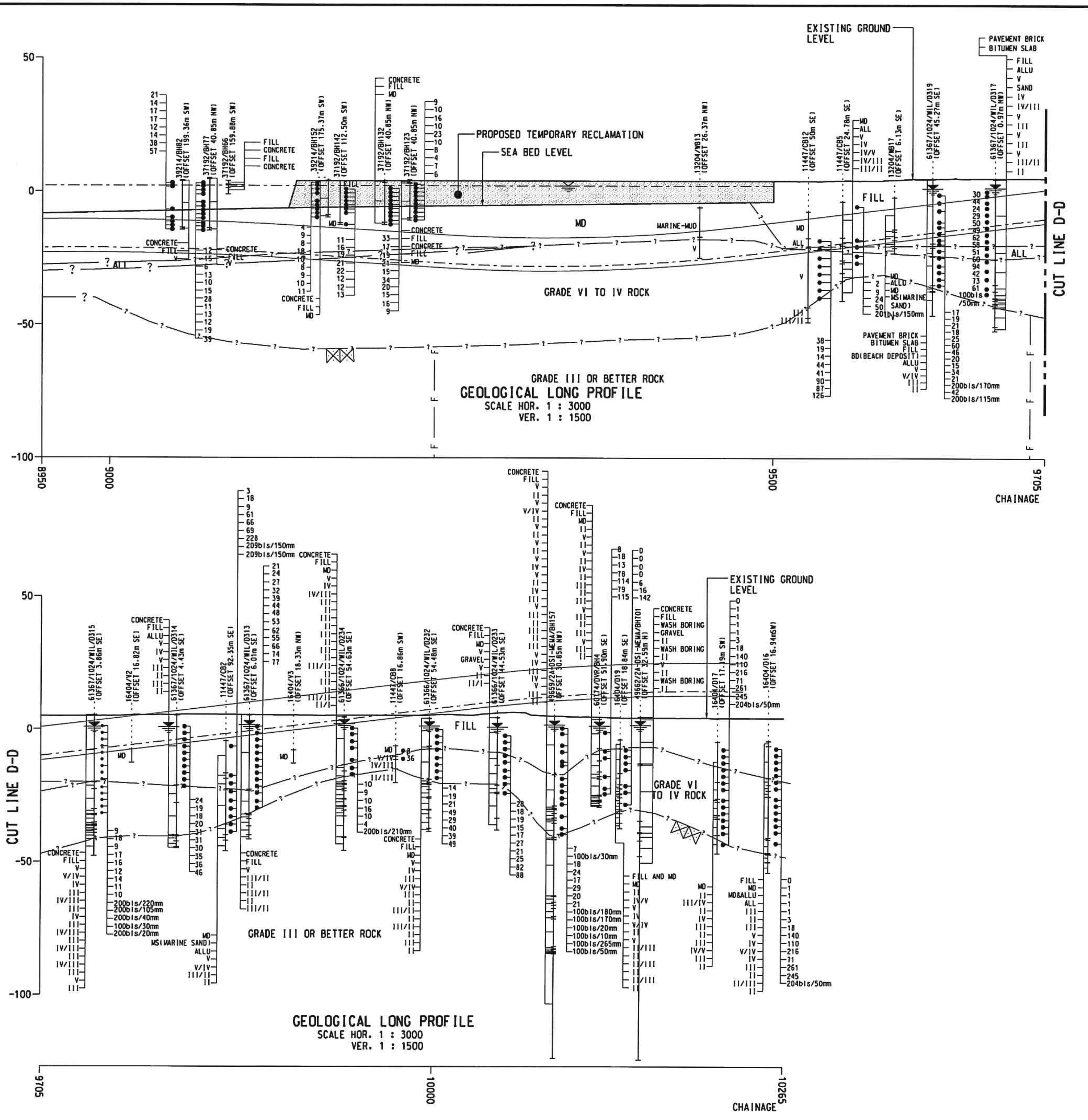

NOTES:

1. ALL LEVELS ARE IN METRES ABOVE PRINCIPAL DATUM (mPD).
2. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE STATED.
3. THE ACTUAL GROUND CONDITIONS MAY VARY FROM THAT SHOWN ON THE GEOLOGICAL SECTIONS.
4. ALL INFORMATION SHOWN IN THE LONGITUDINAL SECTIONS HAS BEEN INFERRED FROM LIMITED FACTUAL DATA. OTHER INTERPRETATIONS COULD BE MADE. AS SUCH, THE ACTUAL GROUND CONDITIONS AND ENGINEERING IMPLICATIONS AT ANY LOCATION MAY BE DIFFERENT FROM THOSE INFERRED IN THIS DRAWING.
5. ROCKHEAD LEVEL & MATERIAL PROFILES ARE REFERRED FROM ADJACENT DRILLHOLES, GEOPHYSICAL SURVEY RESULTS AND CHARTS FOR LOCALVESSLES HONG KONG WATERS.
6. INDIVIDUAL BOREHOLE RECORDS SHOULD BE REFERRED TO FOR DETAILS.
7. DETAILS AND EXTEND OF THE TEMPORARY RECLAMATION SHOULD BE FURTHER INVESTIGATED IN THE PRELIMINARY DETAILED DESIGN STAGE AFTER DETERMINATION OF THE GROUND CONDITIONS BY SITE SPECIFIC GI AND CONFIRMATION OF THE ALIGNMENT.

LEGEND:

SOIL:

MD	MARINE DEPOSITS
COLL	COLLUVIUM
ED	ESTUARINE DEPOSIT
ALL	ALLUVIUM

ROCK DECOMPOSITION GRADES

VI	RESIDUAL SOIL
V	COMPLETELY DECOMPOSED
IV	HIGHLY DECOMPOSED
III	MODERATELY DECOMPOSED
II	SLIGHTLY DECOMPOSED
I	FRESH

BH01 (O/S XXm Y) { XX - OFFSET DISTANCE FROM SECTION CUTLINE; Y - OFFSET DIRECTION FROM SECTION CUTLINE

● { SPT 'N' VALUE

— F — FAULT LINE

WATER LEVEL

HIGHEST GROUNDWATER LEVEL

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PROJECT 項目

TECHNICAL STUDY ON TRANSPORT INFRASTRUCTURE AT KENNEDY TOWN FOR CONNECTING TO EAST LANTAU METROPOLIS - FEASIBILITY STUDY

CLIENT 業主

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STATUS 階段

SCALE 比例: A3 AS SHOWN

DIMENSION UNIT 尺寸單位: METRES

KEY PLAN 索引圖

PROJECT NO. 項目編號: 60438078

AGREEMENT NO. 協議編號: CE 11/2015 (HY)

SHEET TITLE 圖紙名稱

GEOLOGICAL SECTION ALONG POSSIBLE SCHEME H1-1 AT EASTERN LANDFALL

SHEET NUMBER 圖紙編號

60438078/FR/FIGURE 5.9

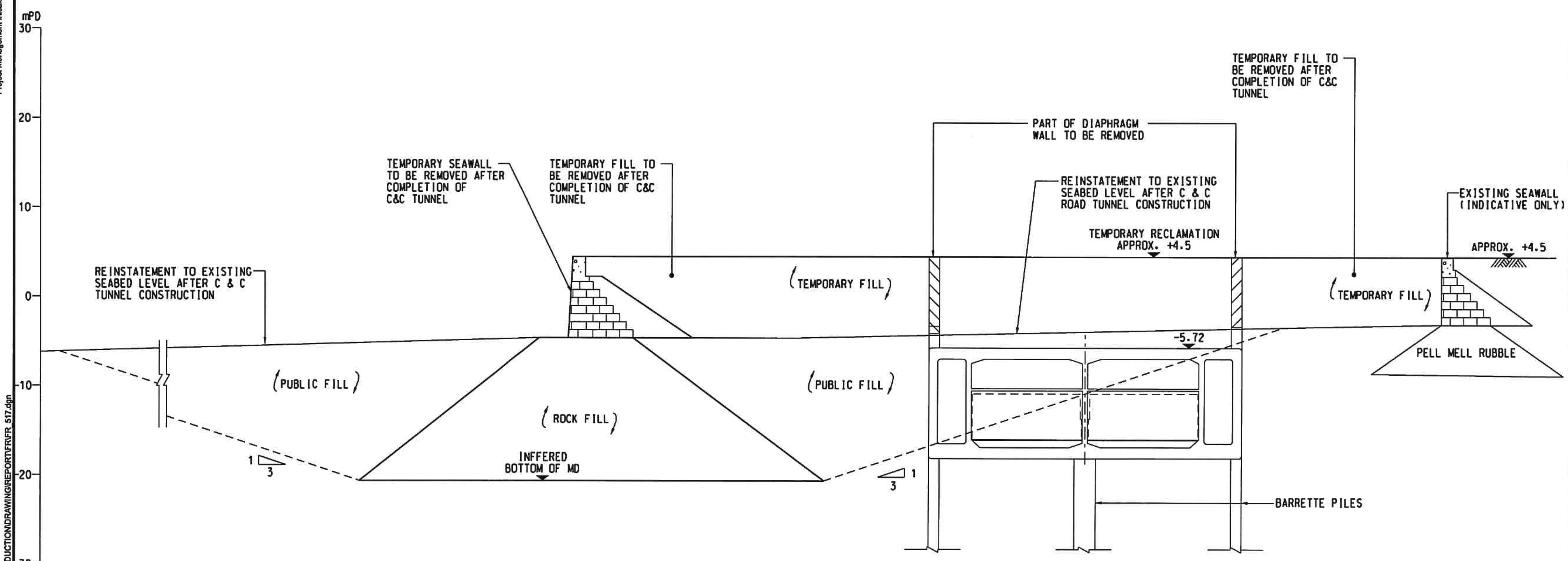
ISO A1 594mm x 841mm

Project Management Initials: Designer: Checked: Approved:

Plot File by: WONGKKK 04-Oct-17

NOTES:

1. NO AS-BUILT RECORD OF THE CONCERNED EXISTING SEA WALLS CAN BE FOUND. FURTHER INSPECTION IS REQUIRED TO BE CARRIED OUT IN THE LATER STAGES OF THE PROJECTS TO OBTAIN MORE INFORMATION RELATED TO THE SEA WALL STRUCTURES AND ITS FOUNDATION.
2. THE PROPOSED DIAPHRAGM WALL FOR THE CUT AND COVER TUNNEL SHOULD NOT ENCROACH INTO THE EXISTING SEA WALL FOUNDATION A SAFE SEPARATION SHOULD BE DEFINED AFTER DETAILED ASSESSMENT IN THE PRELIMINARY/ DETAILED DESIGN STAGE.
3. ADDITIONAL GI SHOULD BE CARRIED OUT TO INVESTIGATE THE SOIL PROFILE AT THE LATER STAGE IN ORDER TO DETERMINE THE EXTEND OF DREDGING ACCURATELY.



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PROJECT 項目

TECHNICAL STUDY ON TRANSPORT INFRASTRUCTURE AT KENNEDY TOWN FOR CONNECTING TO EAST LANTAU METROPOLIS - FEASIBILITY STUDY

CLIENT 業主

CEDD 土木工程拓展署 Civil Engineering and Development Department

CONSULTANT 工程顧問公司

AECOM Asia Company Ltd.
www.aecom.com

SUB-CONSULTANTS 分判工程顧問公司

ISSUE/REVISION 修訂

I/R 修訂	DATE 日期	DESCRIPTION 內容摘要	CHK. 審核

STATUS 階段

SCALE 比例 | **DIMENSION UNIT** 尺寸單位

A3 1:500 | METRES

KEY PLAN 索引圖

PROJECT NO. 項目編號 | **AGREEMENT NO.** 協議編號

60438078 | CE 11/2015 (HY)

SHEET TITLE 圖紙名稱

TEMPORARY RECLAMATION AT EASTERN LANDFALL - TYPICAL SECTION

SHEET NUMBER 圖紙編號

60438078/FR/FIGURE 5.10

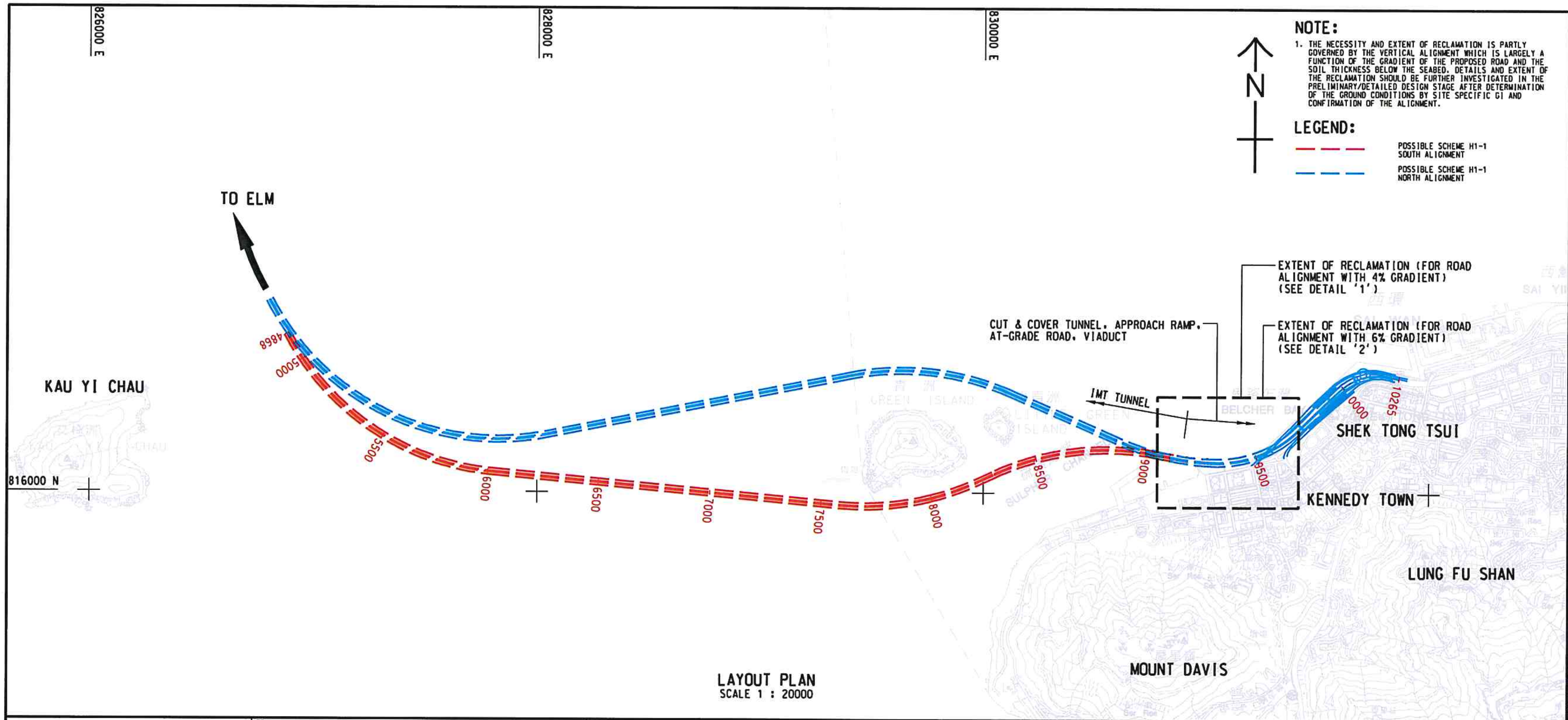
NOTE:

1. THE NECESSITY AND EXTENT OF RECLAMATION IS PARTLY GOVERNED BY THE VERTICAL ALIGNMENT WHICH IS LARGELY A FUNCTION OF THE GRADIENT OF THE PROPOSED ROAD AND THE SOIL THICKNESS BELOW THE SEABED. DETAILS AND EXTENT OF THE RECLAMATION SHOULD BE FURTHER INVESTIGATED IN THE PRELIMINARY/DETAILED DESIGN STAGE AFTER DETERMINATION OF THE GROUND CONDITIONS BY SITE SPECIFIC GI AND CONFIRMATION OF THE ALIGNMENT.

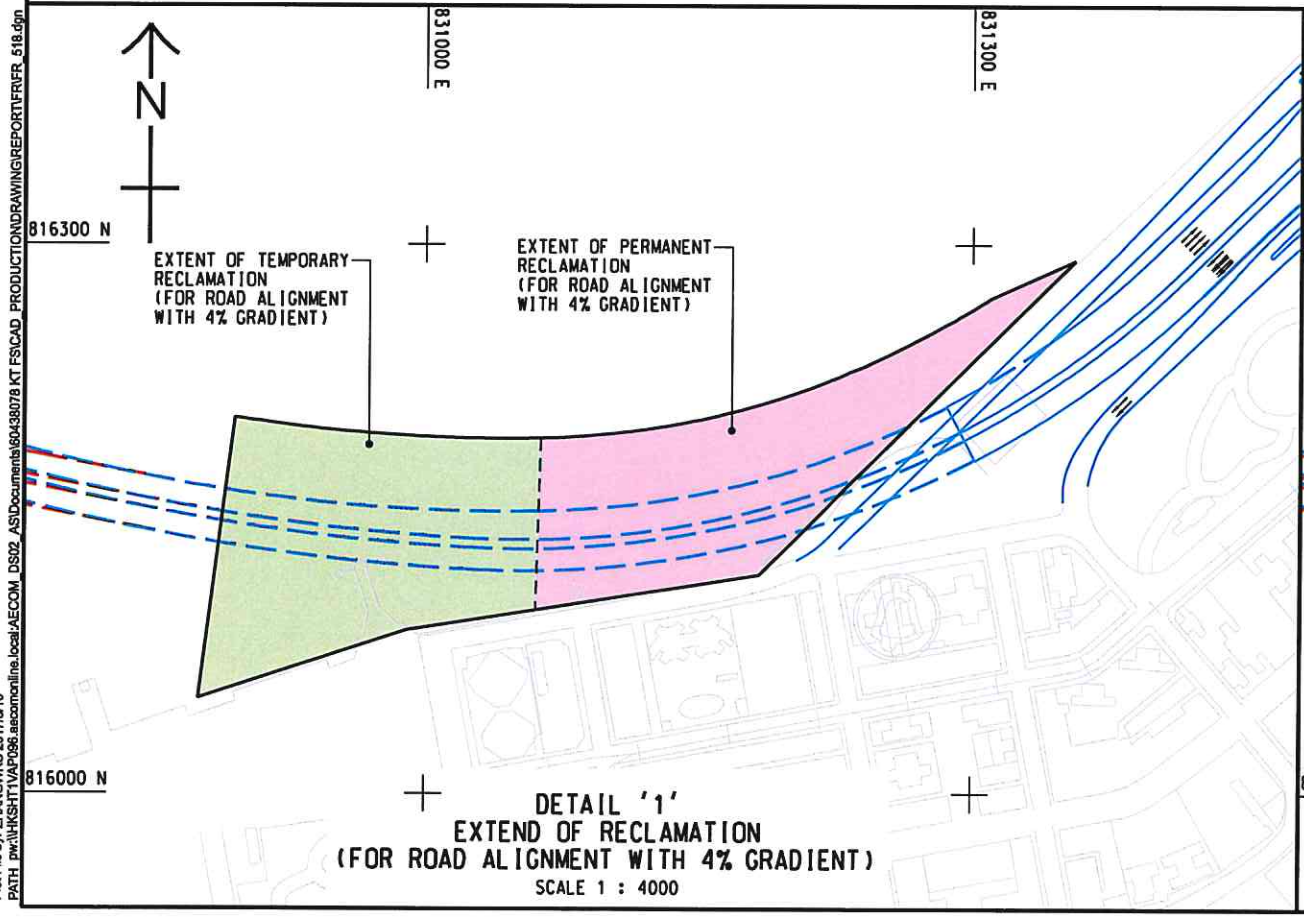
LEGEND:

POSSIBLE SCHEME H1-1 SOUTH ALIGNMENT

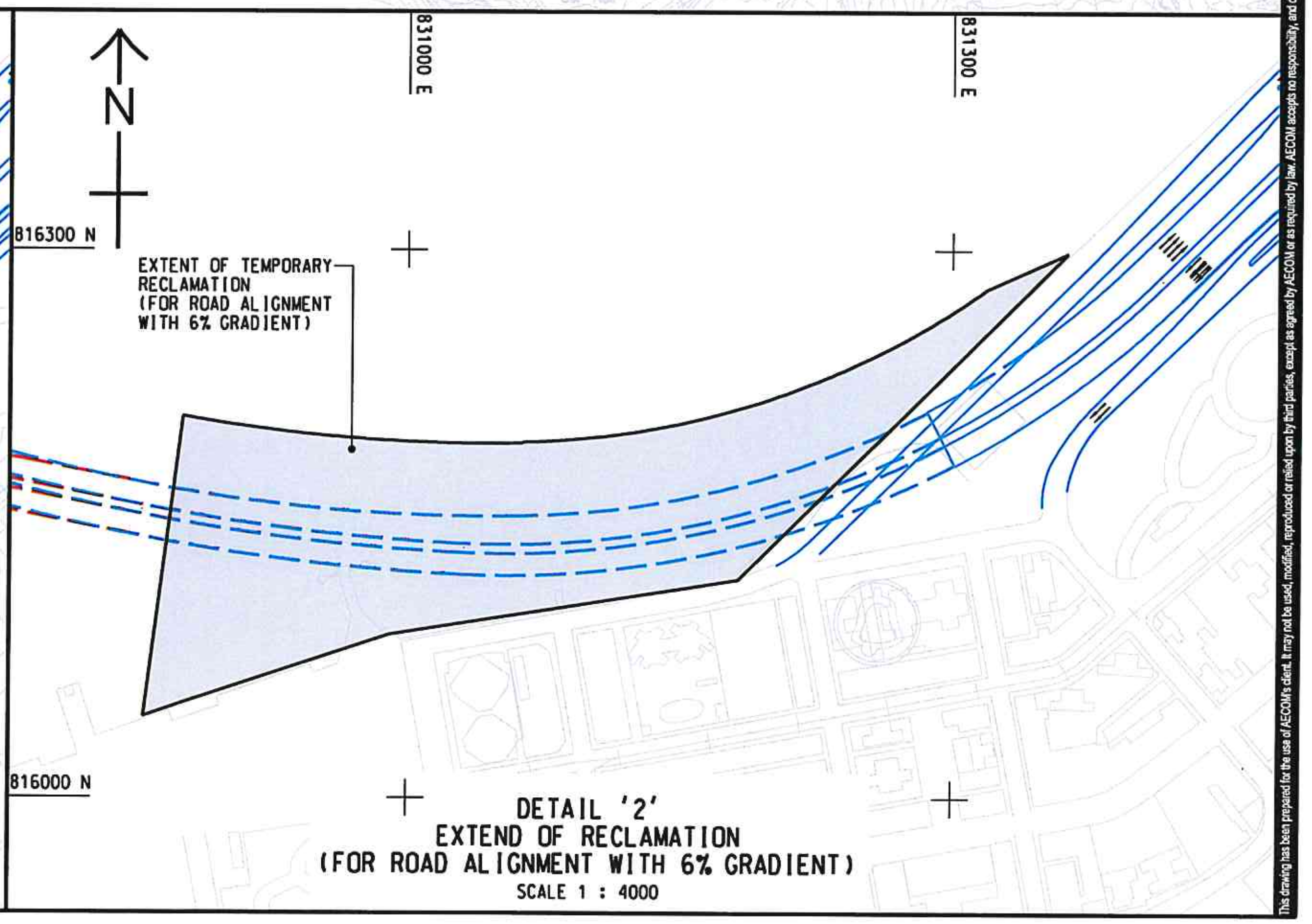
POSSIBLE SCHEME H1-1 NORTH ALIGNMENT



LAYOUT PLAN
SCALE 1 : 20000



DETAIL '1'
EXTEND OF RECLAMATION
(FOR ROAD ALIGNMENT WITH 4% GRADIENT)
SCALE 1 : 4000



DETAIL '2'
EXTEND OF RECLAMATION
(FOR ROAD ALIGNMENT WITH 6% GRADIENT)
SCALE 1 : 4000

AECOM

PROJECT

TECHNICAL STUDY ON TRANSPORT INFRASTRUCTURE AT KENNEDY TOWN FOR CONNECTING TO EAST LANTAU METROPOLIS - FEASIBILITY STUDY

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ISSUE/REVISION

I/R	DATE	DESCRIPTION	CHK.

STATUS

SCALE	DIMENSION UNIT
A3 AS SHOWN	METRES

KEY PLAN

PROJECT NO.	AGREEMENT NO.
60438078	CE 11/2015 (HY)

SHEET TITLE

OUTLINE CONSTRUCTION SCHEME FOR POSSIBLE SCHEME H1-1 (NORTH AND SOUTH ALIGNMENT)

SHEET NUMBER

60438078/FR/FIGURE 5.11

ISO A1 594mm x 841mm Approved: Checked: Designer: Project Management Initials:

Plot File by: ZHANGWRS 2017/8/10
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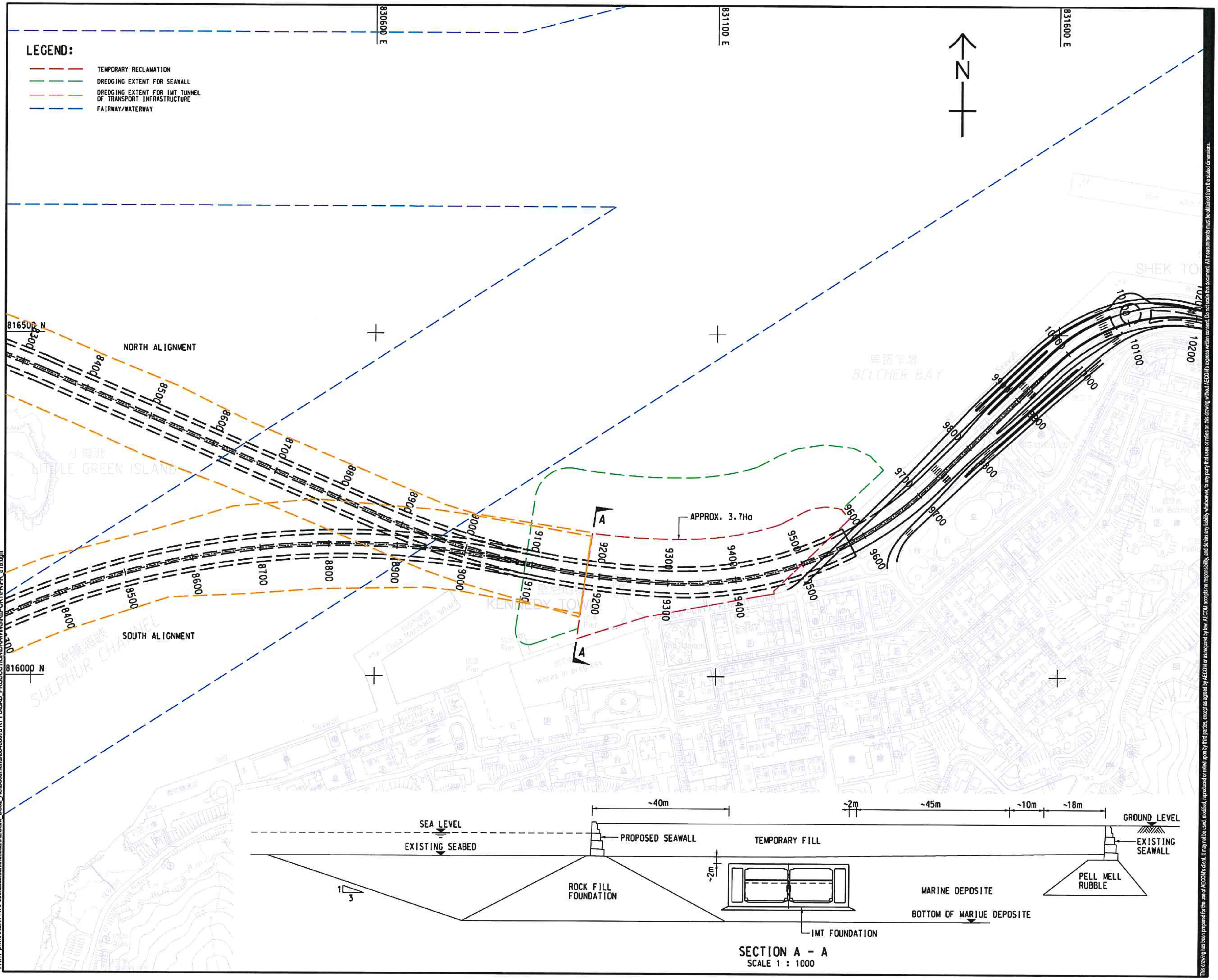

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PROJECT

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I/R	DATE	DESCRIPTION	CHK.

STATUS

SCALE	DIMENSION UNIT
A3 1 : 5000	METRES

KEY PLAN

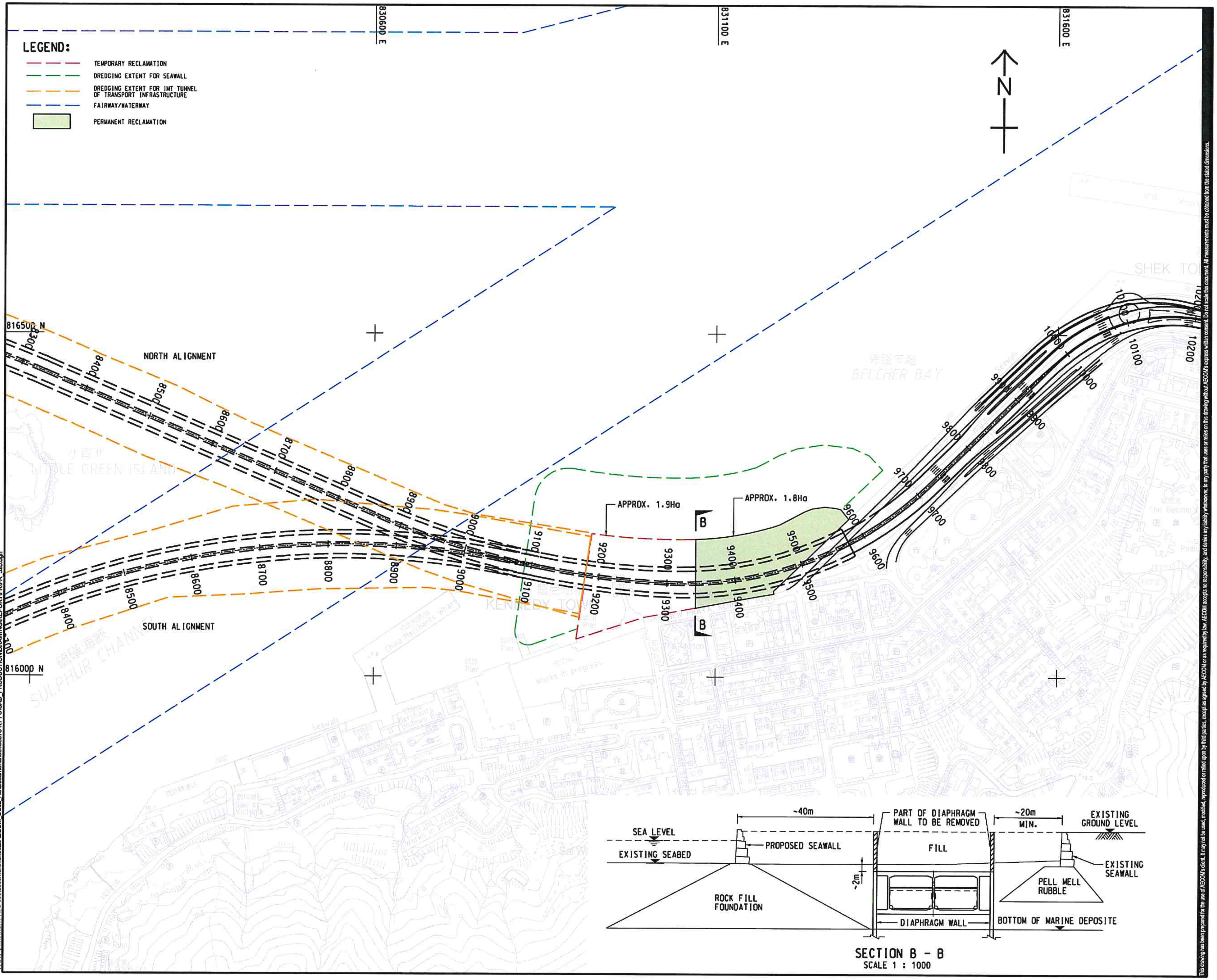
PROJECT NO.	AGREEMENT NO.
60438078	CE 11/2015 (HY)

SHEET TITLE

POSSIBLE SCHEME W/O ROUTE 4 EXTENSION CONSTRUCTION AT LANDFALL

SHEET NUMBER

60438078/FR/FIGURE 5.12



ISO A1 594mm x 841mm

Project Management Initials: Designer: Checked: Approved:

Plot File by: WONGKK 08-Feb-17

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STATUS

SCALE: A3 1 : 5000

DIMENSION UNIT: METRES

KEY PLAN

PROJECT NO.: 60438078

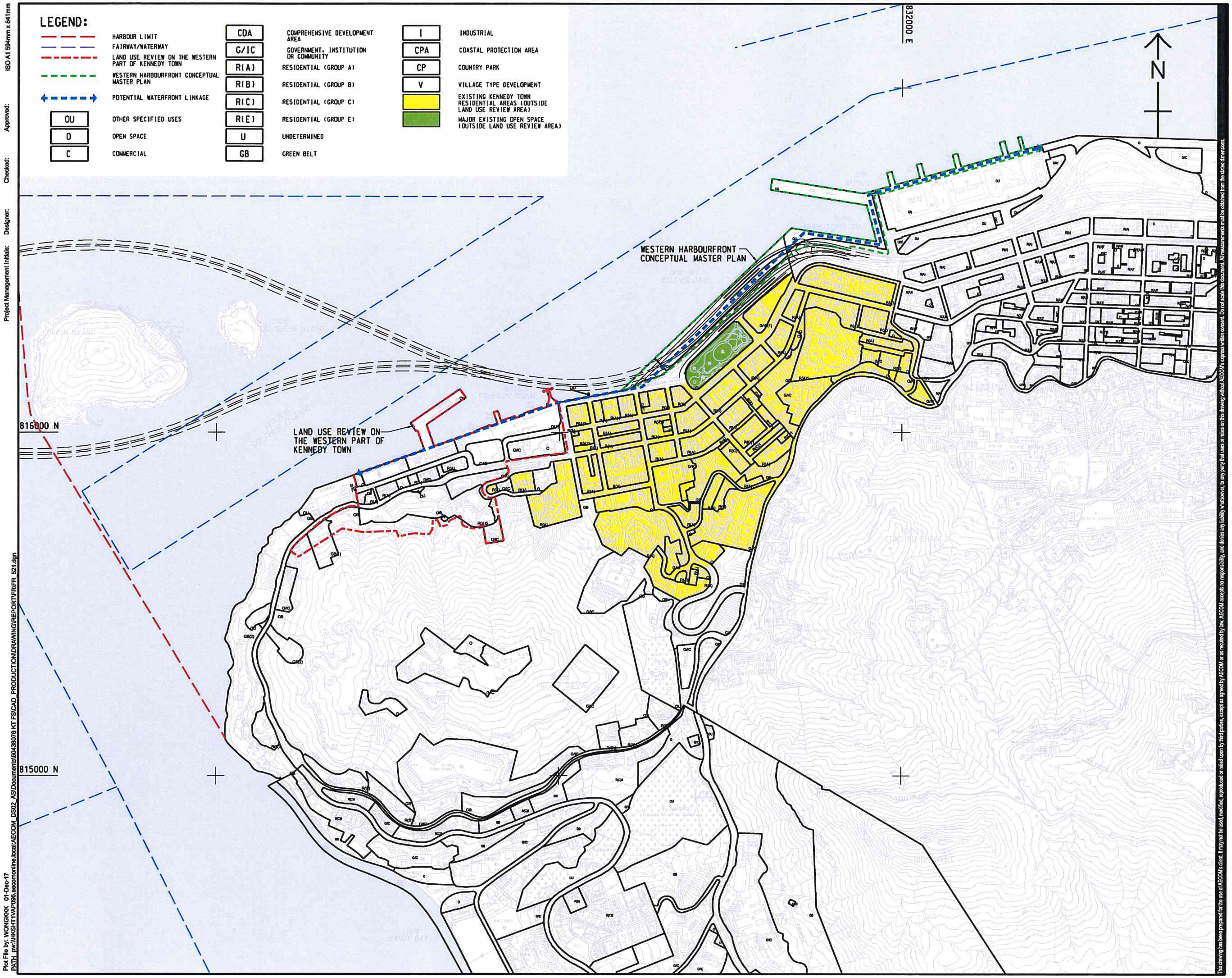
AGREEMENT NO.: CE 11/2015 (HY)

SHEET TITLE

POSSIBLE SCHEME W/O ROUTE 4 EXTENSION RECLAMATION EXTENT FOR 4% GRADIENT

SHEET NUMBER

60438078/FR/FIGURE5.13



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PROJECT

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I/R	DATE	DESCRIPTION	CHK.

STATUS

SCALE: A3 1 : 10000

DIMENSION UNIT: METRES

KEY PLAN

PROJECT NO.: 60438078

AGREEMENT NO.: CE 11/2015 (HY)

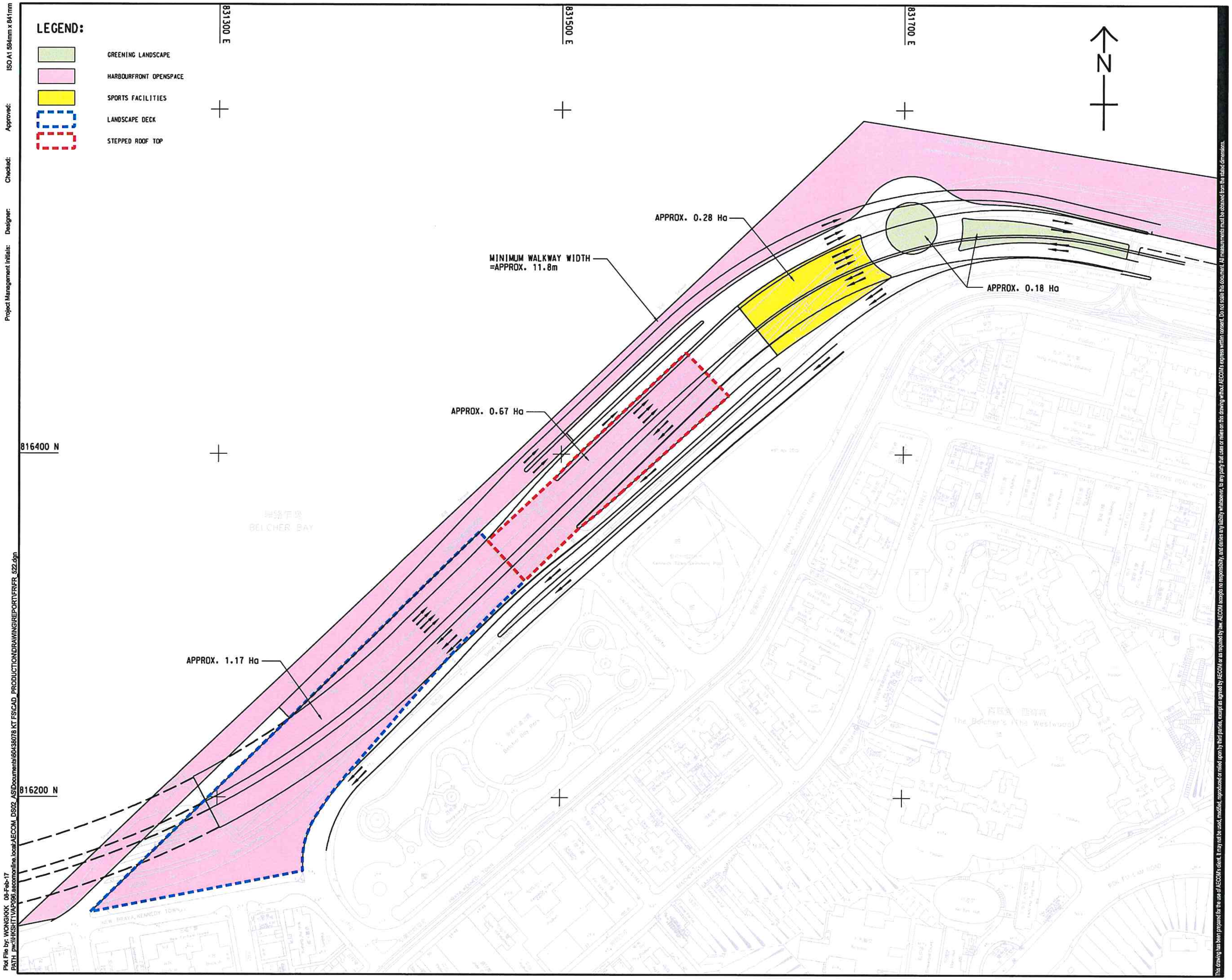
SHEET TITLE

POSSIBLE SCHEME W/O ROUTE 4 EXTENSION LAND USE IMPACT

SHEET NUMBER

60438078/FR/FIGURE 5.14

ISO A1 594mm x 841mm
Approved:
Checked:
Designer:
Project Management Initials:
Plot File by: WONGKK 01-Dec-17



ISO A1 594mm x 841mm

Approved:

Checked:

Designer:

Project Management Initials:

Plot File by: WONGKK 08-Feb-17

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STATUS 階段

SCALE 比例	**DIMENSION UNIT** 尺寸單位
A3 1 : 2000	METRES

KEY PLAN 索引圖

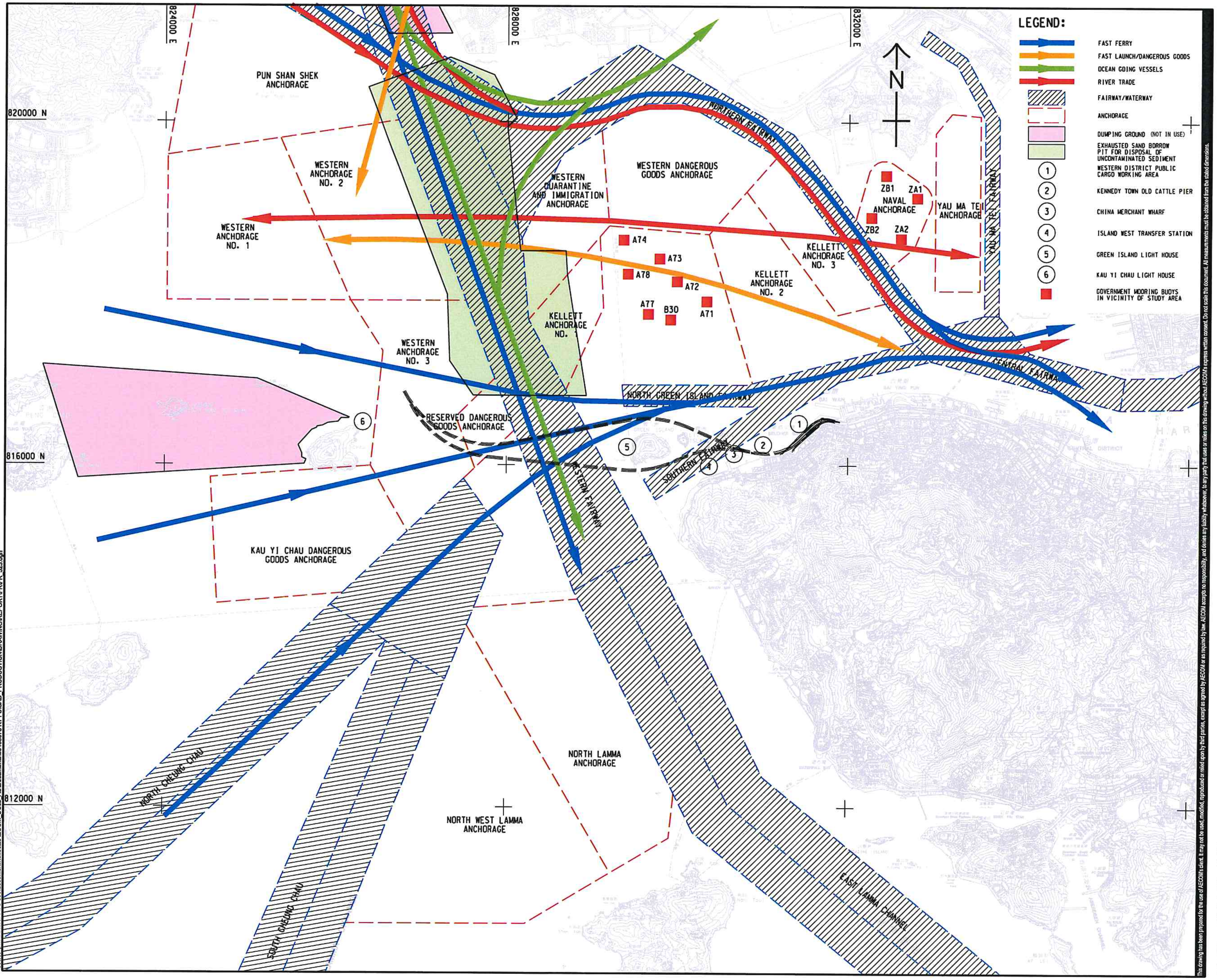
PROJECT NO. 項目編號	**AGREEMENT NO.** 協議編號
60438078	CE 11/2015 (HY)

SHEET TITLE 圖紙名稱

POSSIBLE SCHEME W/O ROUTE 4 EXTENSION PCWA CONCEPTUAL PLAN

SHEET NUMBER 圖紙編號

60438078/FR/FIGURE 5.15



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PROJECT 項目

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SCALE 比例: A3 1 : 40000

DIMENSION UNIT 尺寸單位: METRES

KEY PLAN 索引圖

PROJECT NO. 項目編號: 60438078

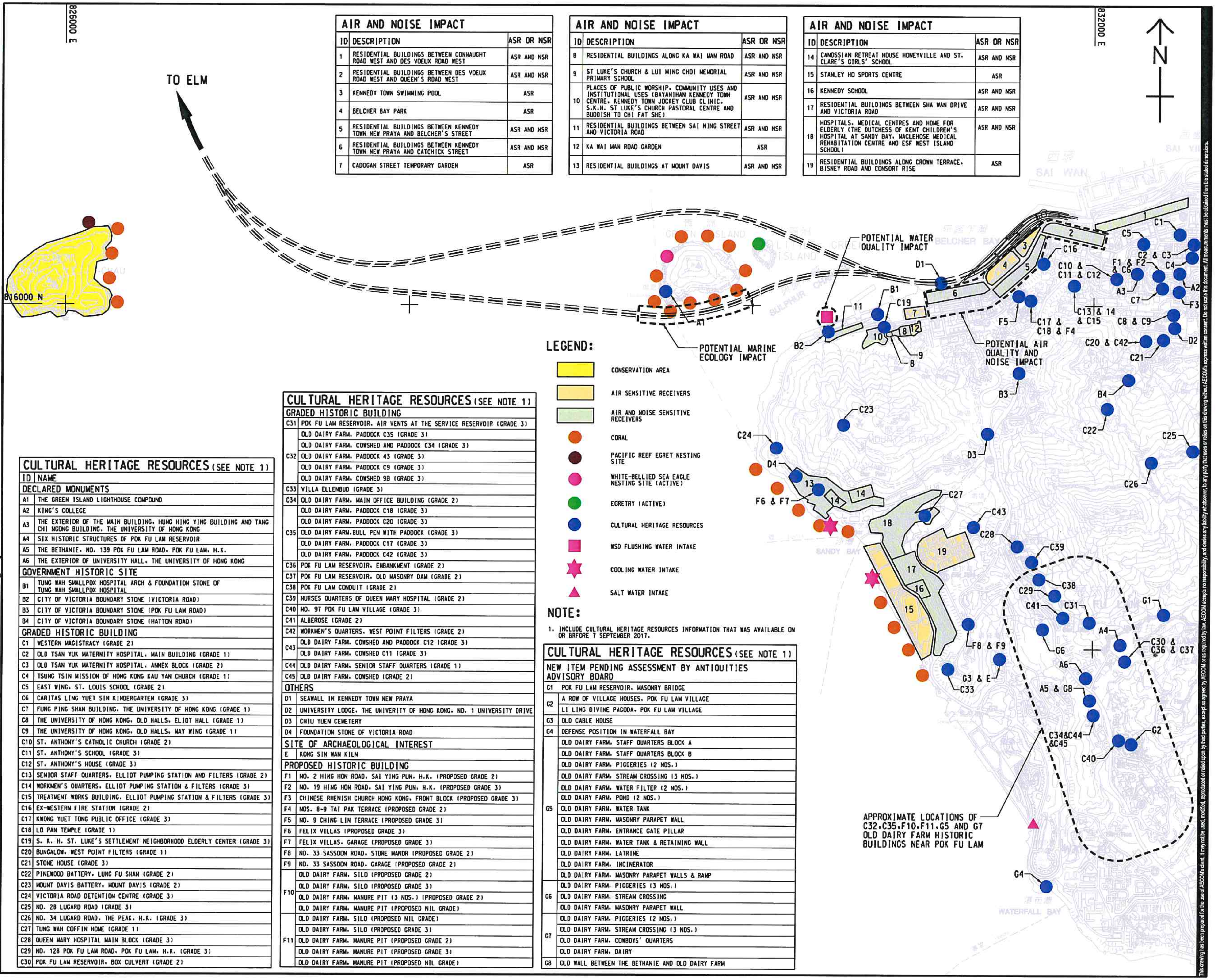
AGREEMENT NO. 協議編號: CE 11/2015 (HY)

SHEET TITLE 圖紙名稱

POSSIBLE SCHEME W/O ROUTE 4 EXTENSION MARINE IMPACT

SHEET NUMBER 圖紙編號

60438078/FR/FIGURE 5.16



LEGEND:

Yellow box	CONSERVATION AREA
Light orange box	AIR SENSITIVE RECEIVERS
Light green box	AIR AND NOISE SENSITIVE RECEIVERS
Orange circle	CORAL
Dark red circle	PACIFIC REEF EGRET NESTING SITE
Pink circle	WHITE-BELLIED SEA EAGLE NESTING SITE (ACTIVE)
Green circle	EGRETRY (ACTIVE)
Blue circle	CULTURAL HERITAGE RESOURCES
Pink square	WSD FLUSHING WATER INTAKE
Pink star	COOLING WATER INTAKE
Pink triangle	SALT WATER INTAKE

NOTE:

1. INCLUDE CULTURAL HERITAGE RESOURCES INFORMATION THAT WAS AVAILABLE ON OR BRFORE 7 SEPTEMBER 2017.

AIR AND NOISE IMPACT

ID	DESCRIPTION	ASR OR NSR
1	RESIDENTIAL BUILDINGS BETWEEN CONNAUGHT ROAD WEST AND DES VOEUX ROAD WEST	ASR AND NSR
2	RESIDENTIAL BUILDINGS BETWEEN DES VOEUX ROAD WEST AND QUEEN'S ROAD WEST	ASR AND NSR
3	KENNEDY TOWN SWIMMING POOL	ASR
4	BELCHER BAY PARK	ASR
5	RESIDENTIAL BUILDINGS BETWEEN KENNEDY TOWN NEW PRAYA AND BELCHER'S STREET	ASR AND NSR
6	RESIDENTIAL BUILDINGS BETWEEN KENNEDY TOWN NEW PRAYA AND CATCHICK STREET	ASR AND NSR
7	CADOGAN STREET TEMPORARY GARDEN	ASR

AIR AND NOISE IMPACT

ID	DESCRIPTION	ASR OR NSR
8	RESIDENTIAL BUILDINGS ALONG KA WAI MAN ROAD	ASR AND NSR
9	ST LUKE'S CHURCH & LUI MING CHOI MEMORIAL PRIMARY SCHOOL	ASR AND NSR
10	PLACES OF PUBLIC WORSHIP, COMMUNITY USES AND INSTITUTIONAL USES (BAYANIHAN KENNEDY TOWN CENTRE, KENNEDY TOWN JOCKEY CLUB CLINIC, S.K.H. ST LUKE'S CHURCH PASTORAL CENTRE AND BUDDISH TO CHI FAT SHE)	ASR AND NSR
11	RESIDENTIAL BUILDINGS BETWEEN SAI NING STREET AND VICTORIA ROAD	ASR AND NSR
12	KA WAI MAN ROAD GARDEN	ASR
13	RESIDENTIAL BUILDINGS AT MOUNT DAVIS	ASR AND NSR

AIR AND NOISE IMPACT

ID	DESCRIPTION	ASR OR NSR
14	CANOSSIAN RETREAT HOUSE HONEYVILLE AND ST. CLARE'S GIRLS' SCHOOL	ASR AND NSR
15	STANLEY HO SPORTS CENTRE	ASR
16	KENNEDY SCHOOL	ASR AND NSR
17	RESIDENTIAL BUILDINGS BETWEEN SHA WAN DRIVE AND VICTORIA ROAD	ASR AND NSR
18	HOSPITALS, MEDICAL CENTRES AND HOME FOR ELDERLY (THE DUTCHESS OF KENT CHILDREN'S HOSPITAL AT SANDY BAY, MACLEHOSE MEDICAL REHABILITATION CENTRE AND ESF WEST ISLAND SCHOOL)	ASR AND NSR
19	RESIDENTIAL BUILDINGS ALONG CROWN TERRACE, BISNEY ROAD AND CONSORT RISE	ASR

CULTURAL HERITAGE RESOURCES (SEE NOTE 1)

ID	NAME
DECLARED MONUMENTS	
A1	THE GREEN ISLAND LIGHTHOUSE COMPOUND
A2	KING'S COLLEGE
A3	THE EXTERIOR OF THE MAIN BUILDING, HUNG HING YING BUILDING AND TANG CHI NGONG BUILDING, THE UNIVERSITY OF HONG KONG
A4	SIX HISTORIC STRUCTURES OF POK FU LAM RESERVOIR
A5	THE BETHANIE, NO. 139 POK FU LAM ROAD, POK FU LAM, H.K.
A6	THE EXTERIOR OF UNIVERSITY HALL, THE UNIVERSITY OF HONG KONG
GOVERNMENT HISTORIC SITE	
B1	TUNG WAH SMALLPOX HOSPITAL ARCH & FOUNDATION STONE OF TUNG WAH SMALLPOX HOSPITAL
B2	CITY OF VICTORIA BOUNDARY STONE (VICTORIA ROAD)
B3	CITY OF VICTORIA BOUNDARY STONE (POK FU LAM ROAD)
B4	CITY OF VICTORIA BOUNDARY STONE (HATTON ROAD)
GRADED HISTORIC BUILDING	
C1	WESTERN MAGISTRACY (GRADE 2)
C2	OLD TSAN YUK MATERNITY HOSPITAL, MAIN BUILDING (GRADE 1)
C3	OLD TSAN YUK MATERNITY HOSPITAL, ANNEX BLOCK (GRADE 2)
C4	TSUNG TSIN MISSION OF HONG KONG KAU YAN CHURCH (GRADE 1)
C5	EAST WING, ST. LOUIS SCHOOL (GRADE 2)
C6	CARITAS LING YUET SIN KINDERGARTEN (GRADE 3)
C7	FUNG PING SHAN BUILDING, THE UNIVERSITY OF HONG KONG (GRADE 1)
C8	THE UNIVERSITY OF HONG KONG, OLD HALLS, ELIOT HALL (GRADE 1)
C9	THE UNIVERSITY OF HONG KONG, OLD HALLS, MAY WING (GRADE 1)
C10	ST. ANTHONY'S CATHOLIC CHURCH (GRADE 2)
C11	ST. ANTHONY'S SCHOOL (GRADE 3)
C12	ST. ANTHONY'S HOUSE (GRADE 3)
C13	SENIOR STAFF QUARTERS, ELLIOT PUMPING STATION AND FILTERS (GRADE 2)
C14	WORKMEN'S QUARTERS, ELLIOT PUMPING STATION & FILTERS (GRADE 3)
C15	TREATMENT WORKS BUILDING, ELLIOT PUMPING STATION & FILTERS (GRADE 3)
C16	EX-WESTERN FIRE STATION (GRADE 2)
C17	KWONG YUET TONG PUBLIC OFFICE (GRADE 3)
C18	LO PAN TEMPLE (GRADE 1)
C19	S. K. H. ST. LUKE'S SETTLEMENT NEIGHBORHOOD ELDERLY CENTER (GRADE 3)
C20	BUNGALOW, WEST POINT FILTERS (GRADE 1)
C21	STONE HOUSE (GRADE 3)
C22	PINEWOOD BATTERY, LUNG FU SHAN (GRADE 2)
C23	MOUNT DAVIS BATTERY, MOUNT DAVIS (GRADE 2)
C24	VICTORIA ROAD DETENTION CENTRE (GRADE 3)
C25	NO. 28 LUGARD ROAD (GRADE 3)
C26	NO. 34 LUGARD ROAD, THE PEAK, H.K. (GRADE 3)
C27	TUNG WAH COFFIN HOME (GRADE 1)
C28	QUEEN MARY HOSPITAL MAIN BLOCK (GRADE 3)
C29	NO. 128 POK FU LAM ROAD, POK FU LAM, H.K. (GRADE 3)
C30	POK FU LAM RESERVOIR, BOX CULVERT (GRADE 2)

CULTURAL HERITAGE RESOURCES (SEE NOTE 1)

GRADED HISTORIC BUILDING	
C31	POK FU LAM RESERVOIR, AIR VENTS AT THE SERVICE RESERVOIR (GRADE 3)
C32	OLD DAIRY FARM, PADDOCK C35 (GRADE 3)
	OLD DAIRY FARM, COWSHED AND PADDOCK C34 (GRADE 3)
	OLD DAIRY FARM, PADDOCK 43 (GRADE 3)
	OLD DAIRY FARM, PADDOCK C9 (GRADE 3)
	OLD DAIRY FARM, COWSHED 9B (GRADE 3)
C33	VILLA ELLENBUD (GRADE 3)
C34	OLD DAIRY FARM, MAIN OFFICE BUILDING (GRADE 2)
C35	OLD DAIRY FARM, PADDOCK C18 (GRADE 3)
	OLD DAIRY FARM, PADDOCK C20 (GRADE 3)
	OLD DAIRY FARM.BULL PEN WITH PADDOCK (GRADE 3)
	OLD DAIRY FARM, PADDOCK C17 (GRADE 3)
	OLD DAIRY FARM, PADDOCK C42 (GRADE 3)
C36	POK FU LAM RESERVOIR, EMBANKMENT (GRADE 2)
C37	POK FU LAM RESERVOIR, OLD MASONRY DAM (GRADE 2)
C38	POK FU LAM CONDUIT (GRADE 2)
C39	NURSES QUARTERS OF QUEEN MARY HOSPITAL (GRADE 2)
C40	NO. 97 POK FU LAM VILLAGE (GRADE 3)
C41	ALBEROSE (GRADE 2)
C42	WORKMEN'S QUARTERS, WEST POINT FILTERS (GRADE 2)
C43	OLD DAIRY FARM, COWSHED AND PADDOCK C12 (GRADE 3)
	OLD DAIRY FARM, COWSHED C11 (GRADE 3)
C44	OLD DAIRY FARM, SENIOR STAFF QUARTERS (GRADE 1)
C45	OLD DAIRY FARM, COWSHED (GRADE 2)
OTHERS	
D1	SEAWALL IN KENNEDY TOWN NEW PRAYA
D2	UNIVERSITY LODGE, THE UNIVERITY OF HONG KONG, NO. 1 UNIVERSITY DRIVE
D3	CHIU YUEN CEMETERY
D4	FOUNDATION STONE OF VICTORIA ROAD
SITE OF ARCHAEOLOGICAL INTEREST	
E	KONG SIN WAN KILN
PROPOSED HISTORIC BUILDING	
F1	NO. 2 HING HON ROAD, SAI YING PUN, H.K. (PROPOSED GRADE 2)
F2	NO. 19 HING HON ROAD, SAI YING PUN, H.K. (PROPOSED GRADE 3)
F3	CHINESE RHENISH CHURCH HONG KONG, FRONT BLOCK (PROPOSED GRADE 3)
F4	NOS. 8-9 TAI PAK TERRACE (PROPOSED GRADE 2)
F5	NO. 9 CHING LIN TERRACE (PROPOSED GRADE 3)
F6	FELIX VILLAS (PROPOSED GRADE 3)
F7	FELIX VILLAS, GARAGE (PROPOSED GRADE 3)
F8	NO. 33 SASSOON ROAD, STONE MANOR (PROPOSED GRADE 2)
F9	NO. 33 SASSOON ROAD, GARAGE (PROPOSED GRADE 2)
F10	OLD DAIRY FARM, SILO (PROPOSED GRADE 2)
	OLD DAIRY FARM, SILO (PROPOSED GRADE 3)
	OLD DAIRY FARM, MANURE PIT (3 NOS.) (PROPOSED GRADE 2)
	OLD DAIRY FARM, MANURE PIT (PROPOSED NIL GRADE)
F11	OLD DAIRY FARM, SILO (PROPOSED NIL GRADE)
	OLD DAIRY FARM, SILO (PROPOSED GRADE 3)
	OLD DAIRY FARM, MANURE PIT (PROPOSED GRADE 2)
	OLD DAIRY FARM, MANURE PIT (PROPOSED GRADE 3)
	OLD DAIRY FARM, MANURE PIT (PROPOSED NIL GRADE)

CULTURAL HERITAGE RESOURCES (SEE NOTE 1)

NEW ITEM PENDING ASSESSMENT BY ANTIQUITIES ADVISORY BOARD	
G1	POK FU LAM RESERVOIR, MASONRY BRIDGE
G2	A ROW OF VILLAGE HOUSES, POK FU LAM VILLAGE
	LI LING DIVINE PAGODA, POK FU LAM VILLAGE
G3	OLD CABLE HOUSE
G4	DEFENSE POSITION IN WATERFALL BAY
G5	OLD DAIRY FARM, STAFF QUARTERS BLOCK A
	OLD DAIRY FARM, STAFF QUARTERS BLOCK B
	OLD DAIRY FARM, PIGGERIES (2 NOS.)
	OLD DAIRY FARM, STREAM CROSSING (3 NOS.)
	OLD DAIRY FARM, WATER FILTER (2 NOS.)
	OLD DAIRY FARM, POND (2 NOS.)
	OLD DAIRY FARM, WATER TANK
	OLD DAIRY FARM, MASONRY PARAPET WALL
	OLD DAIRY FARM, ENTRANCE GATE PILLAR
	OLD DAIRY FARM, WATER TANK & RETAINING WALL
	OLD DAIRY FARM, LATRINE
	OLD DAIRY FARM, INCINERATOR
	OLD DAIRY FARM, MASONRY PARAPET WALLS & RAMP
G6	OLD DAIRY FARM, PIGGERIES (3 NOS.)
	OLD DAIRY FARM, STREAM CROSSING
	OLD DAIRY FARM, MASONRY PARAPET WALL
G7	OLD DAIRY FARM, PIGGERIES (2 NOS.)
	OLD DAIRY FARM, STREAM CROSSING (3 NOS.)
	OLD DAIRY FARM, COWBOYS' QUARTERS
	OLD DAIRY FARM, DAIRY
G8	OLD WALL BETWEEN THE BETHANIE AND OLD DAIRY FARM

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STATUS 階段

SCALE 比例: A3 1 : 20000

DIMENSION UNIT 尺寸單位: METRES

KEY PLAN 索引圖

PROJECT NO. 項目編號: 60438078

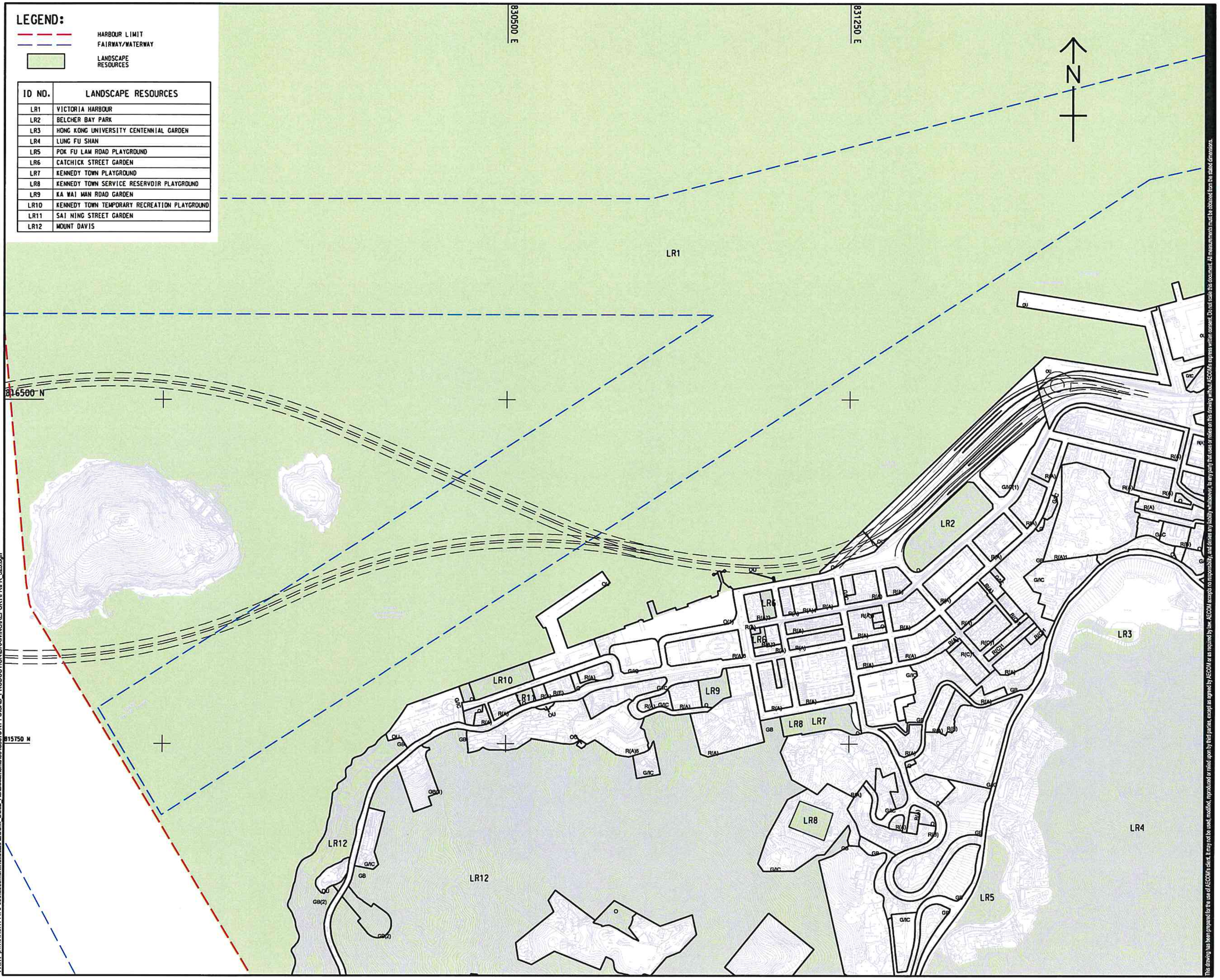
AGREEMENT NO. 協議編號: CE 11/2015 (HY)

SHEET TITLE 圖紙名稱

POSSIBLE SCHEME W/O ROUTE 4 EXTENSION ENVIRONMENTAL IMPACT

SHEET NUMBER 圖紙編號

60438078/FR/FIGURE 5.17



LEGEND:

- HARBOUR LIMIT
- FAIRWAY/WATERWAY
- LANDSCAPE RESOURCES

ID NO.	LANDSCAPE RESOURCES
LR1	VICTORIA HARBOUR
LR2	BELCHER BAY PARK
LR3	HONG KONG UNIVERSITY CENTENNIAL GARDEN
LR4	LUNG FU SHAN
LR5	POK FU LAM ROAD PLAYGROUND
LR6	CATCHICK STREET GARDEN
LR7	KENNEDY TOWN PLAYGROUND
LR8	KENNEDY TOWN SERVICE RESERVOIR PLAYGROUND
LR9	KA WAI MAN ROAD GARDEN
LR10	KENNEDY TOWN TEMPORARY RECREATION PLAYGROUND
LR11	SAI NING STREET GARDEN
LR12	MOUNT DAVIS

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PROJECT
項目

TECHNICAL STUDY ON TRANSPORT INFRASTRUCTURE AT KENNEDY TOWN FOR CONNECTING TO EAST LANTAU METROPOLIS - FEASIBILITY STUDY

CLIENT
業主

土木工程拓展署
CEDD Civil Engineering and Development Department

CONSULTANT
工程顧問公司

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ISSUE/REVISION

I/R	DATE	DESCRIPTION	CHK.

STATUS

SCALE
A3 1 : 7500

DIMENSION UNIT
METRES

KEY PLAN

PROJECT NO.
60438078

AGREEMENT NO.
CE 11/2015 (HY)

SHEET TITLE

POSSIBLE SCHEME W/O ROUTE 4 EXTENSION LANDSCAPE IMPACT

SHEET NUMBER
60438078/FR/FIGURE 5.18

ISO A1 594mm x 841mm
Approved:
Checked:
Designer:
Project Management Initials:
Plot File by: WONGKK 08-Feb-17
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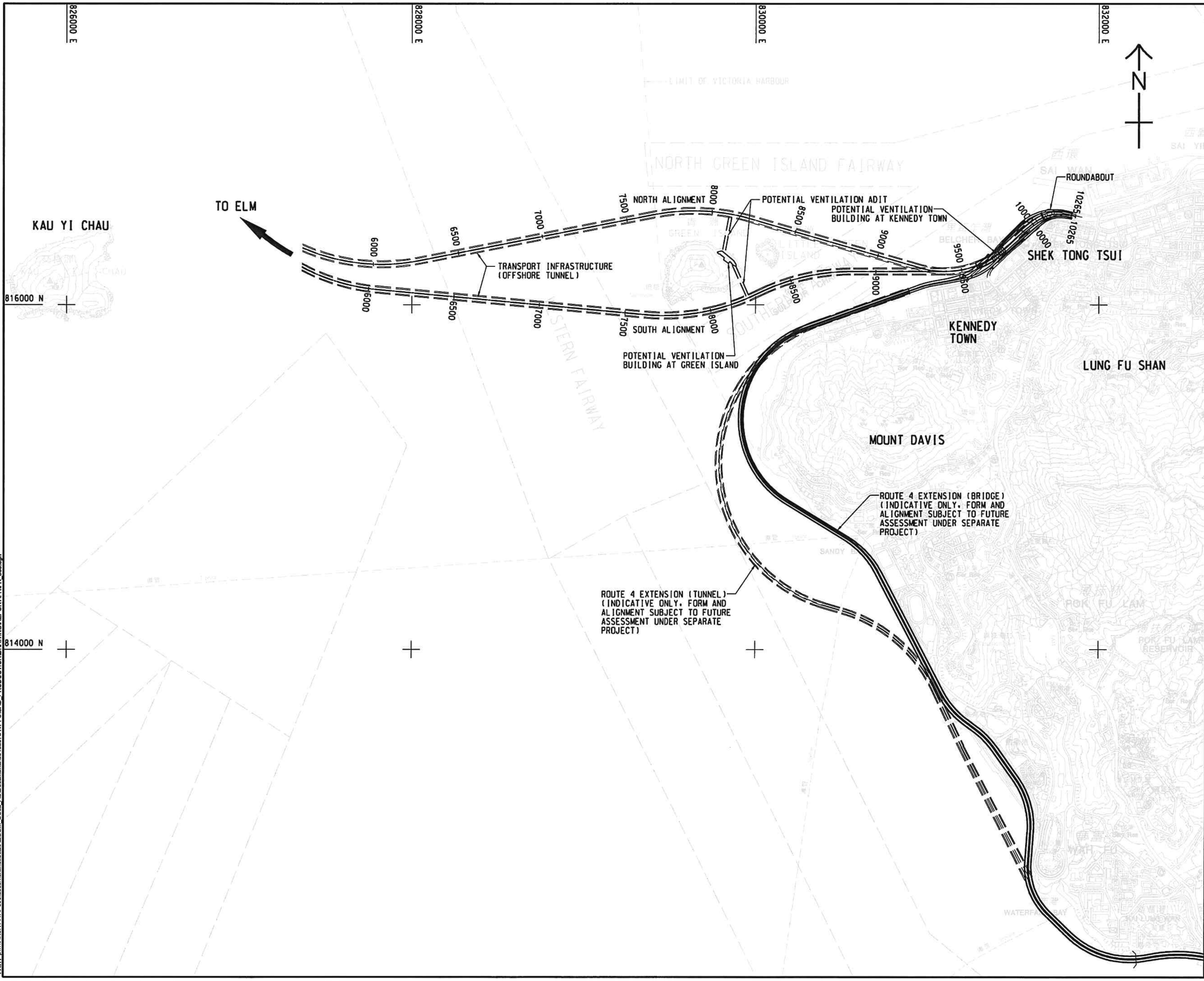

ISO A1 594mm x 841mm

Project Management Initials: Designer: Checked: Approved:

Plot File by: ZHANGWRS 2017/8/10

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PROJECT 項目

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CLIENT 業主

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I/R 修訂	DATE 日期	DESCRIPTION 內容摘要	CHK. 審核

STATUS 階段

SCALE 比例	**DIMENSION UNIT** 尺寸單位
A3 1 : 20000	METRES

KEY PLAN 索引圖

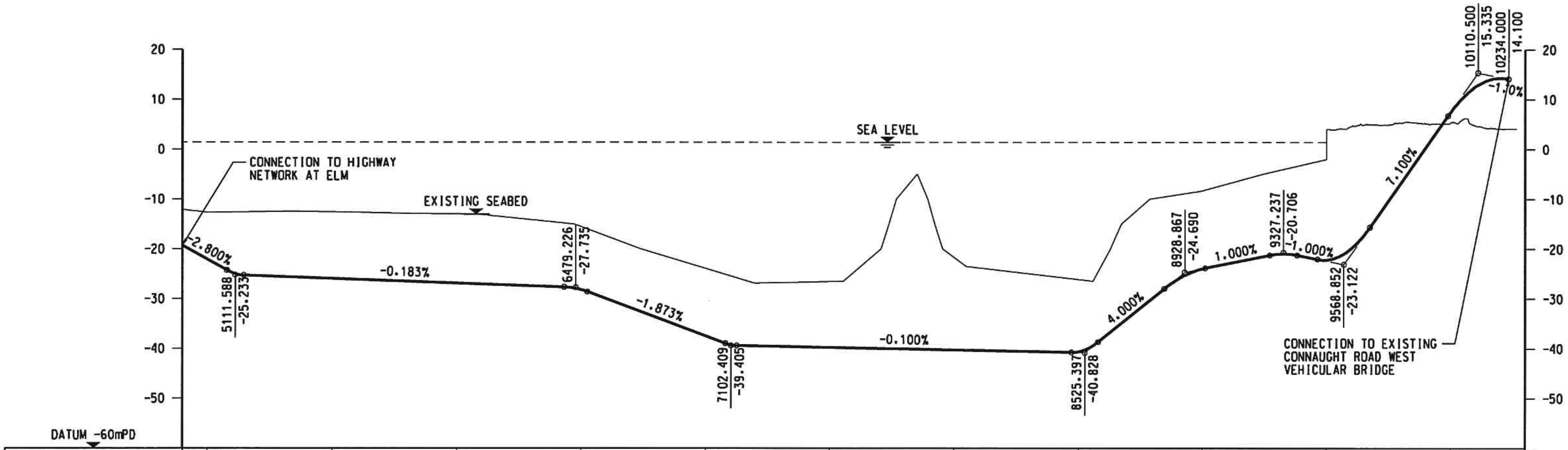
PROJECT NO. 項目編號	**AGREEMENT NO.** 協議編號
60438078	CE 11/2015 (HY)

SHEET TITLE 圖紙名稱

POSSIBLE SCHEME WITH ROUTE 4 EXTENSION - OVERALL LAYOUT PLAN

SHEET NUMBER 圖紙編號

60438078/FR/FIGURE 5.19



CHAINAGE (m)	4900.000	5000.000	5500.000	6000.000	6500.000	7000.000	7500.000	8000.000	8500.000	9000.000	9500.000	10000.000	10300.000
PROPOSED LEVEL	-19.309	-22.109	-25.944	-26.859	-28.184	-37.488	-39.803	-40.303	-40.653	-23.990	-22.178	7.469	

VERTICAL PROFILE
SCALE HOR. 1 : 20000
VER. 1 : 1000

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PROJECT

TECHNICAL STUDY ON TRANSPORT INFRASTRUCTURE AT KENNEDY TOWN FOR CONNECTING TO EAST LANTAU METROPOLIS - FEASIBILITY STUDY

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I/R	DATE	DESCRIPTION	CHK.

STATUS

SCALE: A3 AS SHOWN
DIMENSION UNIT

KEY PLAN

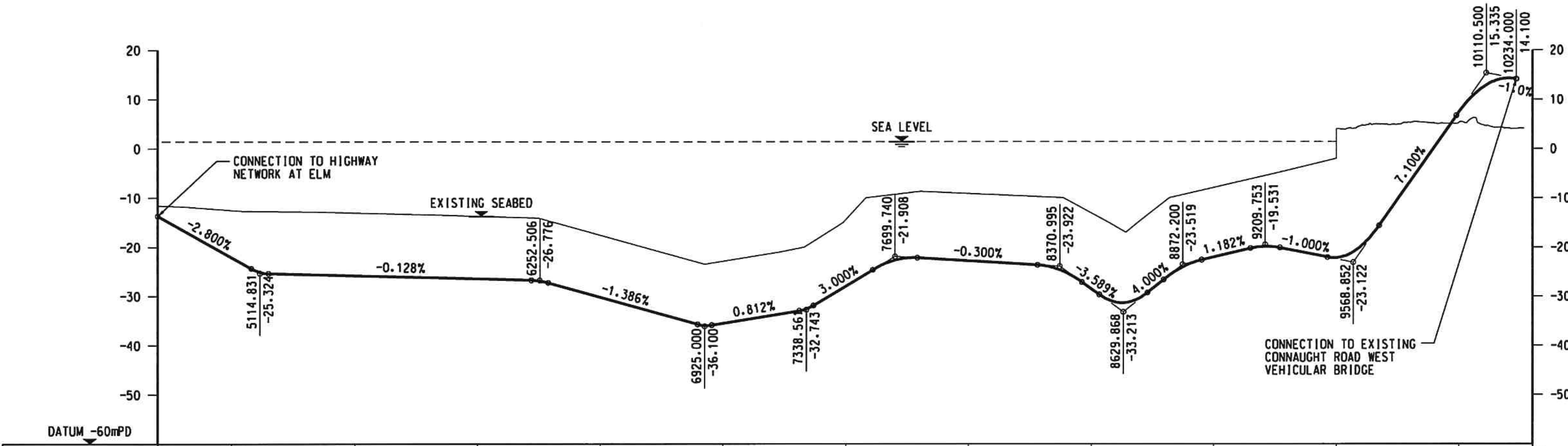
PROJECT NO.: 60438078
AGREEMENT NO.: CE 11/2015 (HY)

SHEET TITLE

POSSIBLE SCHEME WITH ROUTE 4 EXTENSION VERTICAL PROFILE - SOUTH ALIGNMENT

SHEET NUMBER

60438078/FR/FIGURE 5.20



CHAINAGE (m)	4700.000	5000.000	5500.000	6000.000	6500.000	7000.000	7500.000	8000.000	8500.000	9000.000	9500.000	10000.000	10300.000
PROPOSED LEVEL	-13.709	-22.109	-25.816	-26.454	-30.208	-35.491	-27.900	-22.809	-28.552	-22.009	-22.178	7.469	

VERTICAL PROFILE

SCALE HOR. 1 : 20000
VER. 1 : 1000

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PROJECT 項目

TECHNICAL STUDY ON TRANSPORT INFRASTRUCTURE AT KENNEDY TOWN FOR CONNECTING TO EAST LANTAU METROPOLIS - FEASIBILITY STUDY

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I/R	DATE	DESCRIPTION	CHK.

STATUS

SCALE: A3 AS SHOIWN

DIMENSION UNIT

KEY PLAN

PROJECT NO.: 60438078

AGREEMENT NO.: CE 11/2015 (HY)

SHEET TITLE

POSSIBLE SCHEME WITH ROUTE 4 EXTENSION VERTICAL PROFILE - NORTH ALIGNMENT

SHEET NUMBER

60438078/FR/FIGURE 5.21

Plot File by: WONGKK 03-Feb-17
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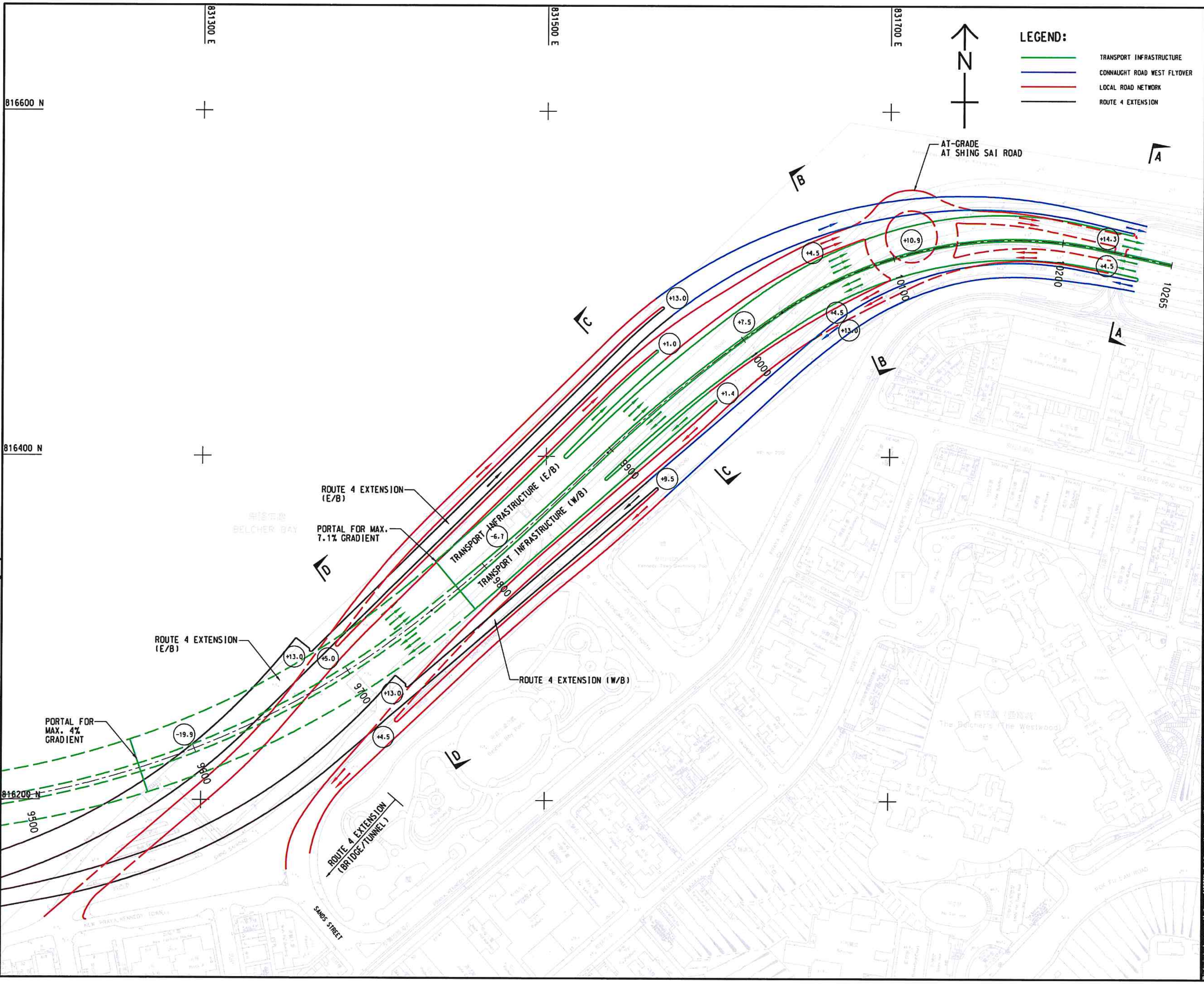
Project Management Initials: Designer: Checked: Approved: ISO A1 594mm x 841mm



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PROJECT
項目

TECHNICAL STUDY ON TRANSPORT INFRASTRUCTURE AT KENNEDY TOWN FOR CONNECTING TO EAST LANTAU METROPOLIS - FEASIBILITY STUDY

CLIENT
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STATUS
階段

SCALE
比例

A3 1 : 2000

DIMENSION UNIT
尺寸單位

METRES

KEY PLAN
索引圖

PROJECT NO.
項目編號

60438078

AGREEMENT NO.
協議編號

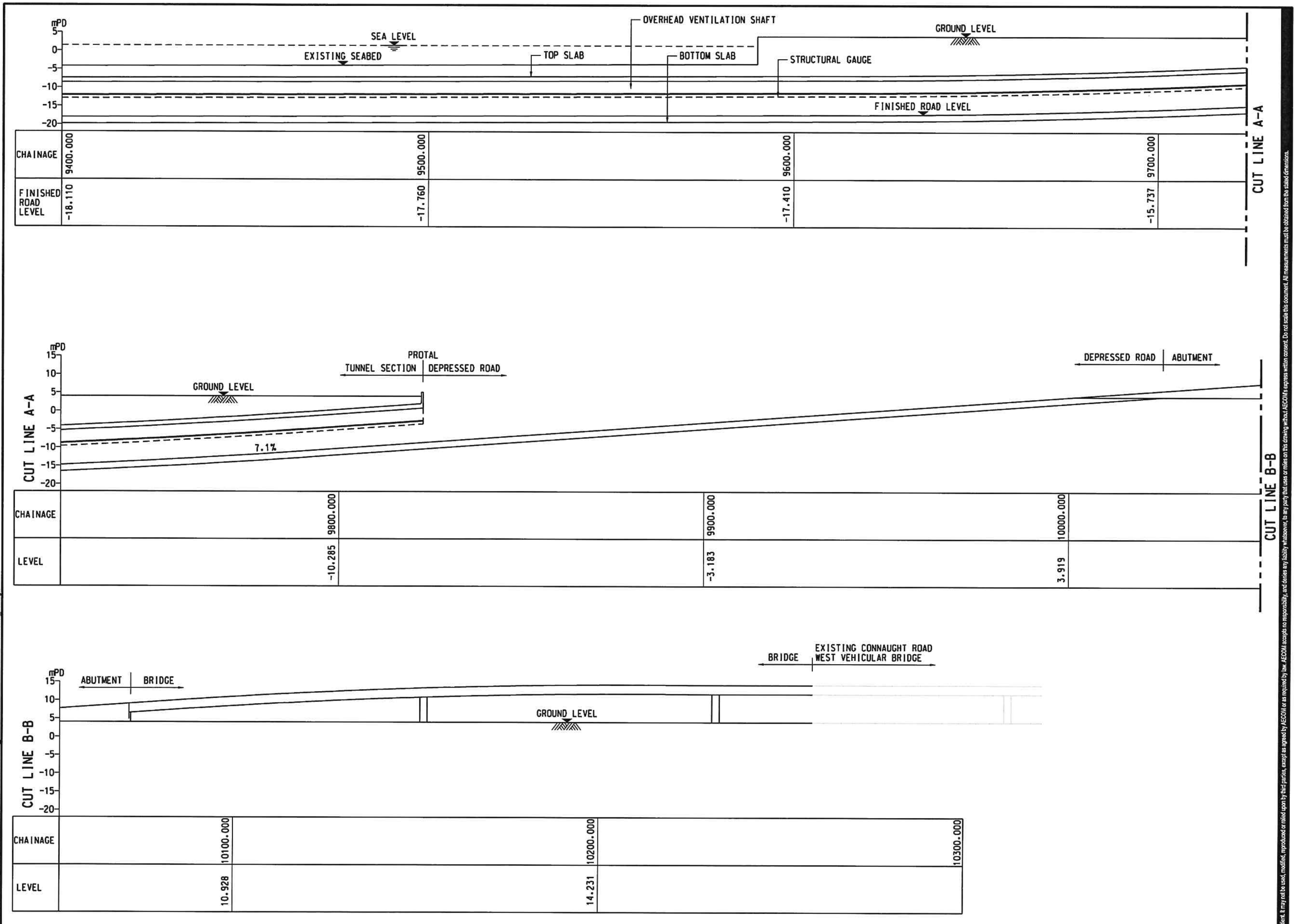
CE 11/2015 (HY)

SHEET TITLE
圖紙名稱

POSSIBLE SCHEME WITH ROUTE 4 EXTENSION CONNECTION LAYOUT AT KENNEDY TOWN

SHEET NUMBER
圖紙編號

60438078/FR/FIGURE 5.22



ELEVATION ALONG S.O.L. (MAX. 7.1 GRADIENT)

ISO A1 594mm x 841mm

Approved:

Checked:

Designer:

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PROJECT

TECHNICAL STUDY ON TRANSPORT INFRASTRUCTURE AT KENNEDY TOWN FOR CONNECTING TO EAST LANTAU METROPOLIS - FEASIBILITY STUDY

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STATUS

SCALE: A3 1 : 1000

DIMENSION UNIT: METRES

KEY PLAN

PROJECT NO.: 60438078

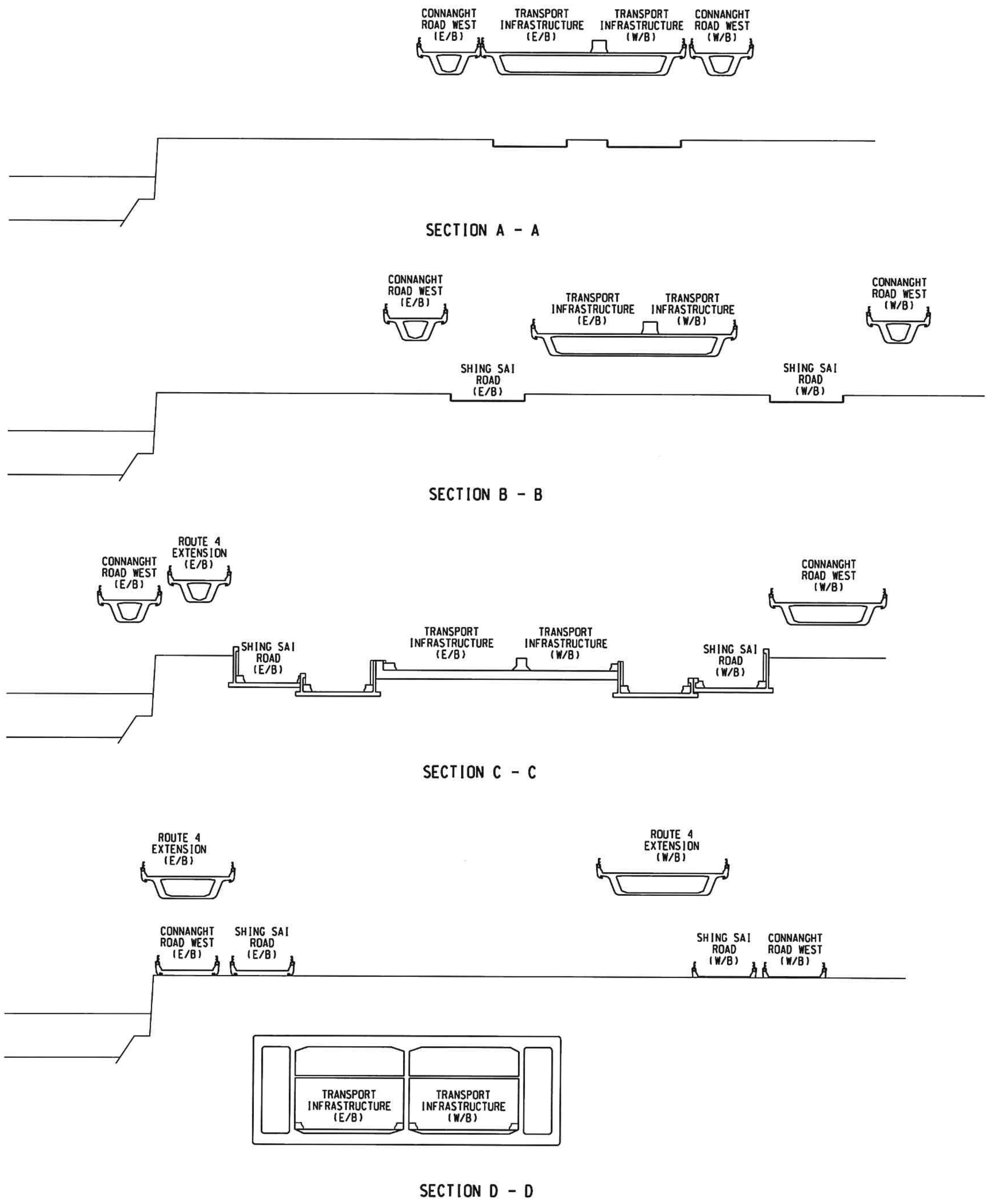
AGREEMENT NO.: CE 11/2015 (HY)

SHEET TITLE

POSSIBLE SCHEME WITH ROUTE 4 EXTENSION ELEVATION AT KENNEDY TOWN

SHEET NUMBER

60438078/FR/FIGURE 5.23



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PROJECT 項目

TECHNICAL STUDY ON TRANSPORT INFRASTRUCTURE AT KENNEDY TOWN FOR CONNECTING TO EAST LANTAU METROPOLIS - FEASIBILITY STUDY

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STATUS 階段

SCALE 比例: A3 1 : 500

DIMENSION UNIT 尺寸單位: MILLIMETRES

KEY PLAN 索引圖

PROJECT NO. 項目編號: 60438078

AGREEMENT NO. 協議編號: CE 11/2015 (HY)

SHEET TITLE 圖紙名稱

POSSIBLE SCHEME WITH ROUTE 4 EXTENSION SECTION AT KENNEDY TOWN FOR 7.1% GRADIENT

SHEET NUMBER 圖紙編號

60438078/FR/FIGURE 5.24

Project Management Initials: Designer: Checked: Approved: ISO A1 594mm x 841mm

Plot File by: WONGKK 03-Feb-17

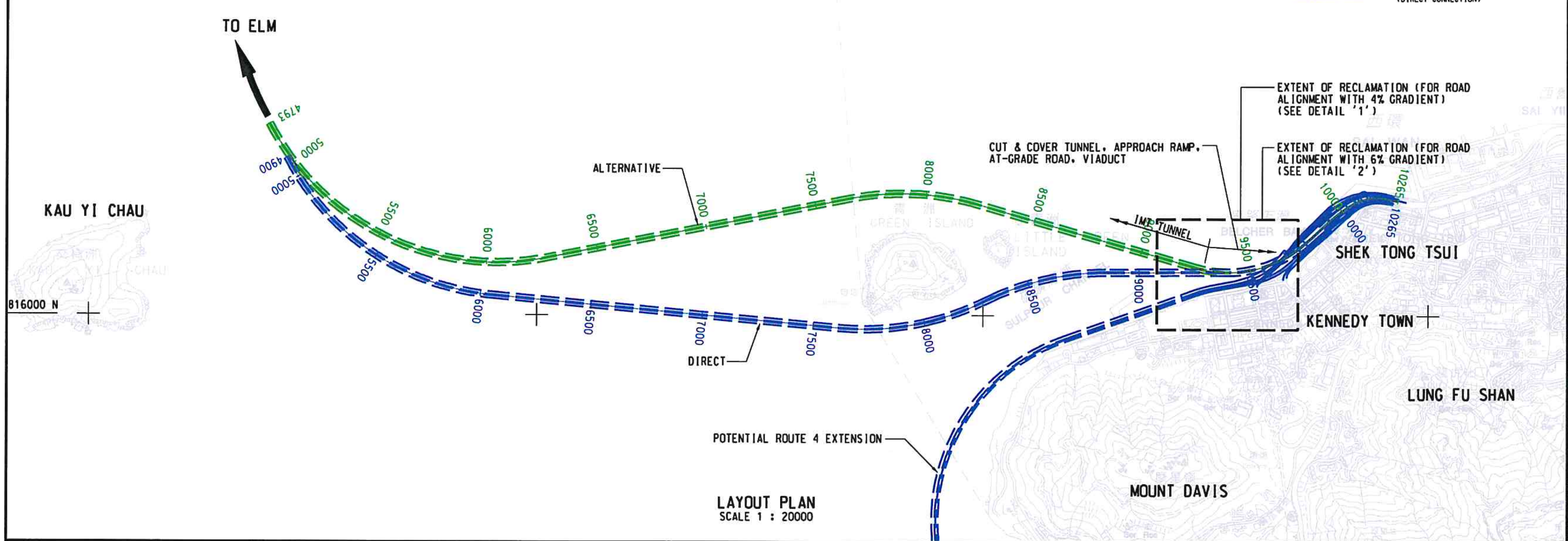
NOTE:

1. THE NECESSITY AND EXTENT OF RECLAMATION IS PARTLY GOVERNED BY THE VERTICAL ALIGNMENT WHICH IS LARGELY A FUNCTION OF THE GRADIENT OF THE PROPOSED ROAD AND THE SOIL THICKNESS BELOW THE SEABED. DETAILS AND EXTENT OF THE RECLAMATION SHOULD BE FURTHER INVESTIGATED IN THE PRELIMINARY/DETAILED DESIGN STAGE AFTER DETERMINATION OF THE GROUND CONDITIONS BY SITE SPECIFIC GI AND CONFIRMATION OF THE ALIGNMENT.

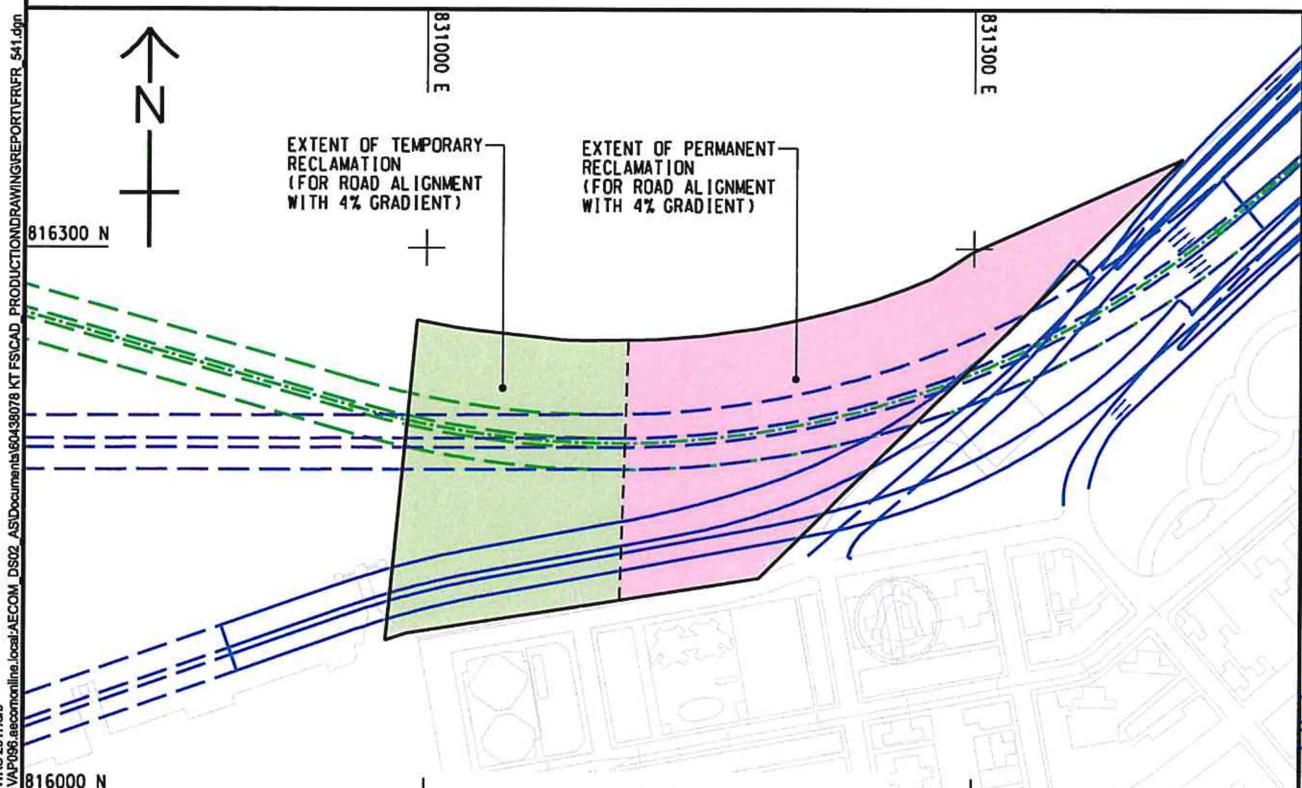
LEGEND:

POSSIBLE OPTION H2-1B (ALTERNATIVE CONNECTION)

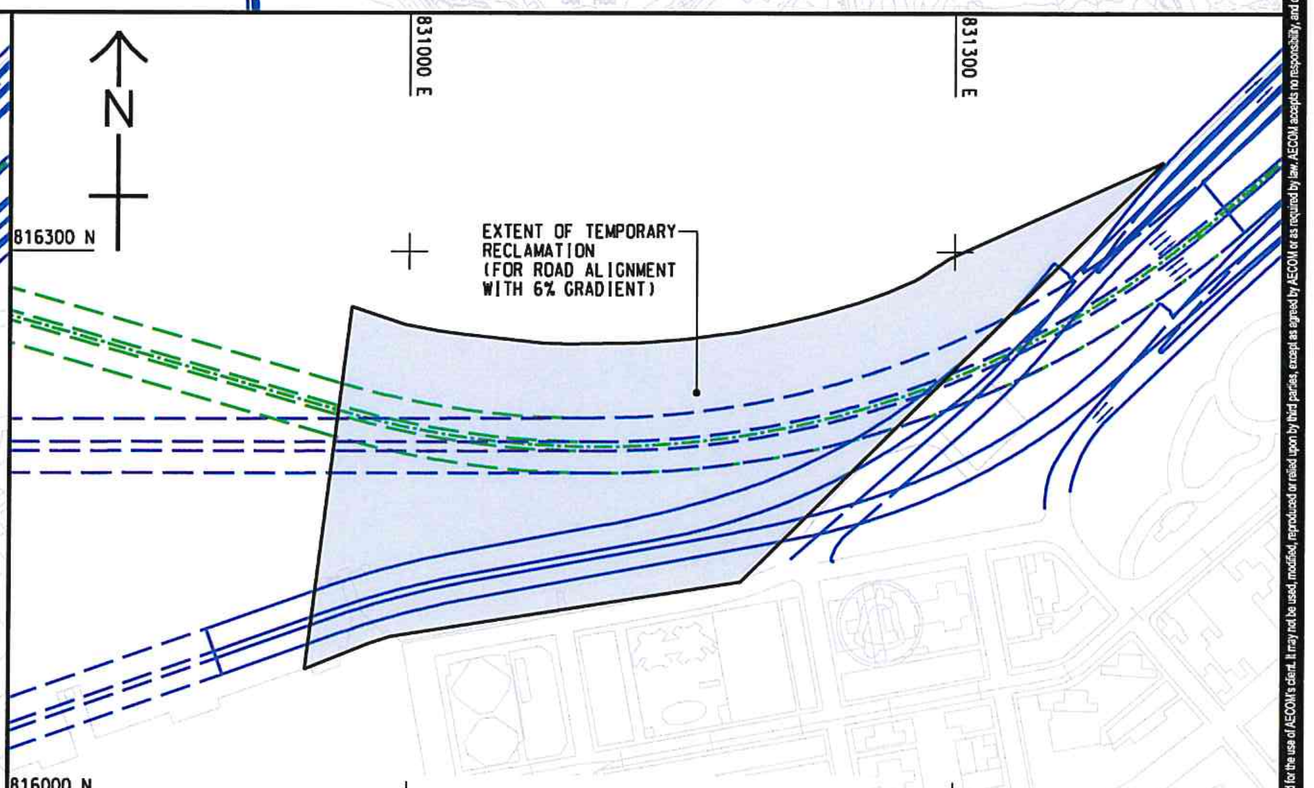
POSSIBLE OPTION H2-1B (DIRECT CONNECTION)



LAYOUT PLAN
SCALE 1 : 20000



DETAIL '1'
EXTEND OF RECLAMATION
(FOR ROAD ALIGNMENT WITH 4% GRADIENT)
SCALE 1 : 4000



DETAIL '2'
EXTEND OF RECLAMATION
(FOR ROAD ALIGNMENT WITH 6% GRADIENT)
SCALE 1 : 4000

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PROJECT 項目

TECHNICAL STUDY ON TRANSPORT INFRASTRUCTURE AT KENNEDY TOWN FOR CONNECTING TO EAST LANTAU METROPOLIS - FEASIBILITY STUDY

CLIENT 業主

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STATUS 階段

SCALE 比例: A3 1 : 20000

DIMENSION UNIT 尺寸單位: METRES

KEY PLAN 索引圖

PROJECT NO. 項目編號: 60438078

AGREEMENT NO. 協議編號: CE 11/2015 (HY)

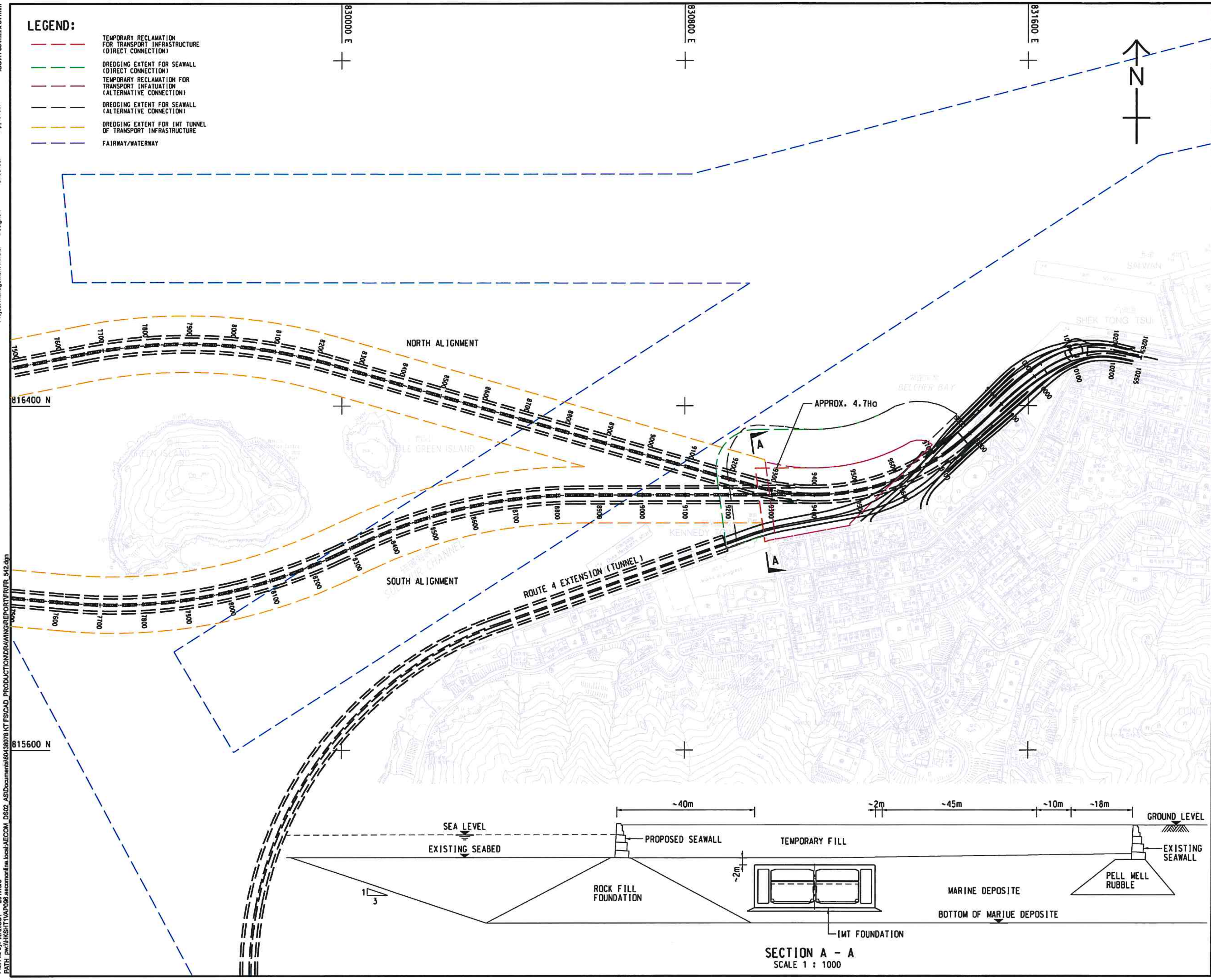
SHEET TITLE 圖紙名稱

OUTLINE CONSTRUCTION SCHEME FOR POSSIBLE OPTION H2-1B (NORTH AND SOUTH ALIGNMENT)

SHEET NUMBER 圖紙編號

60438078/FR/FIGURE 5.25

ISO A1 594mm x 841mm Approved: Checked: Designer: Project Management Initials:



ISO A1 594mm x 841mm

Approved:

Checked:

Designer:

Project Management Initials:

Plot File by: WANGSY 2017/8/8

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STATUS
階段

SCALE 比例
A3 1 : 8000

DIMENSION UNIT 尺寸單位
METRES

KEY PLAN
索引圖

PROJECT NO. 項目編號
60438078

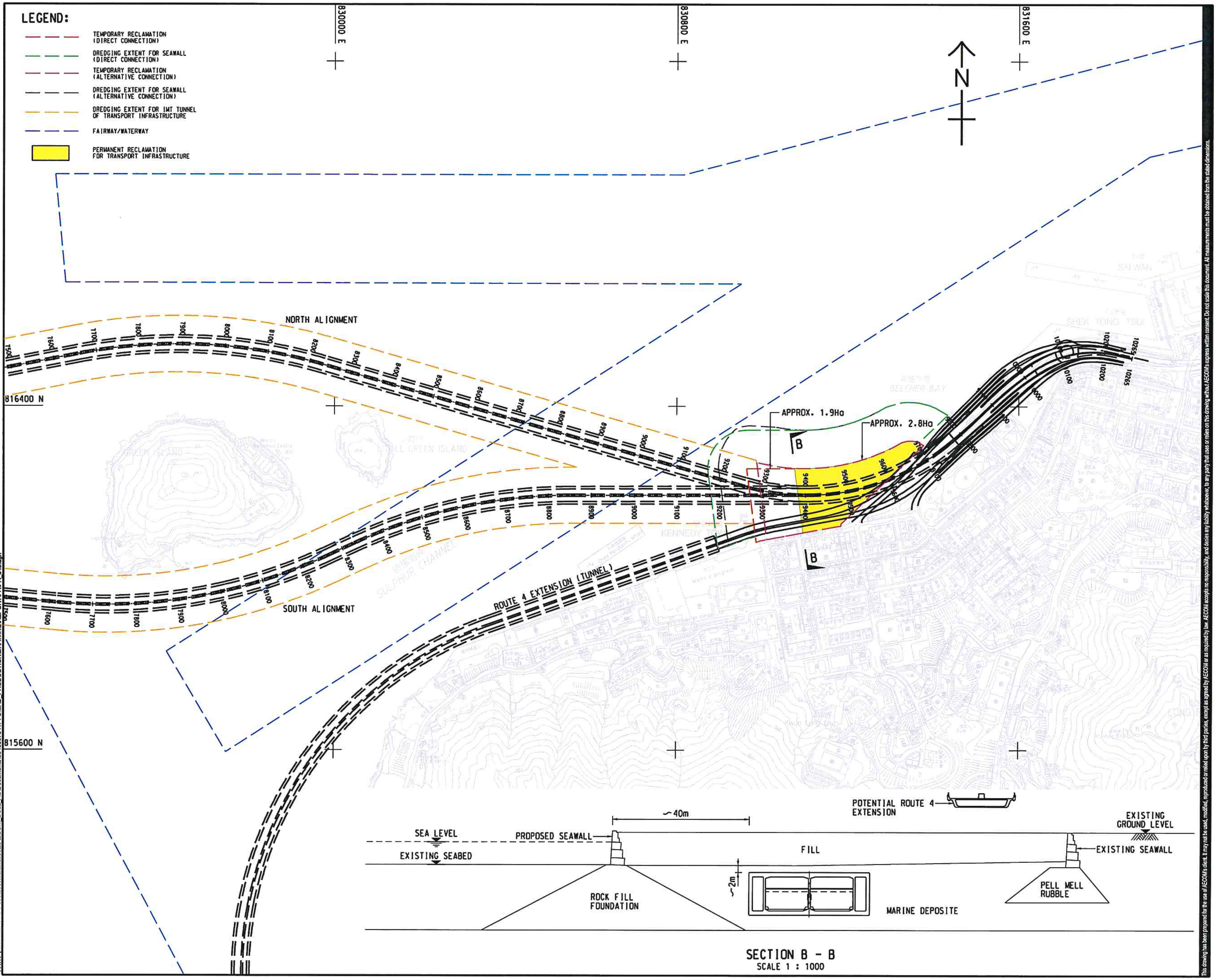
AGREEMENT NO. 協議編號
CE 11/2015 (HY)

SHEET TITLE
圖紙名稱

POSSIBLE SCHEME WITH ROUTE 4 EXTENSION (TUNNEL) CONSTRUCTION OF LANDFALL

SHEET NUMBER
圖紙編號

60438078/FR/FIGURE 5.26



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STATUS 階段

SCALE 比例	DIMENSION UNIT 尺寸單位
A3 1 : 8000	METRES

KEY PLAN 索引圖

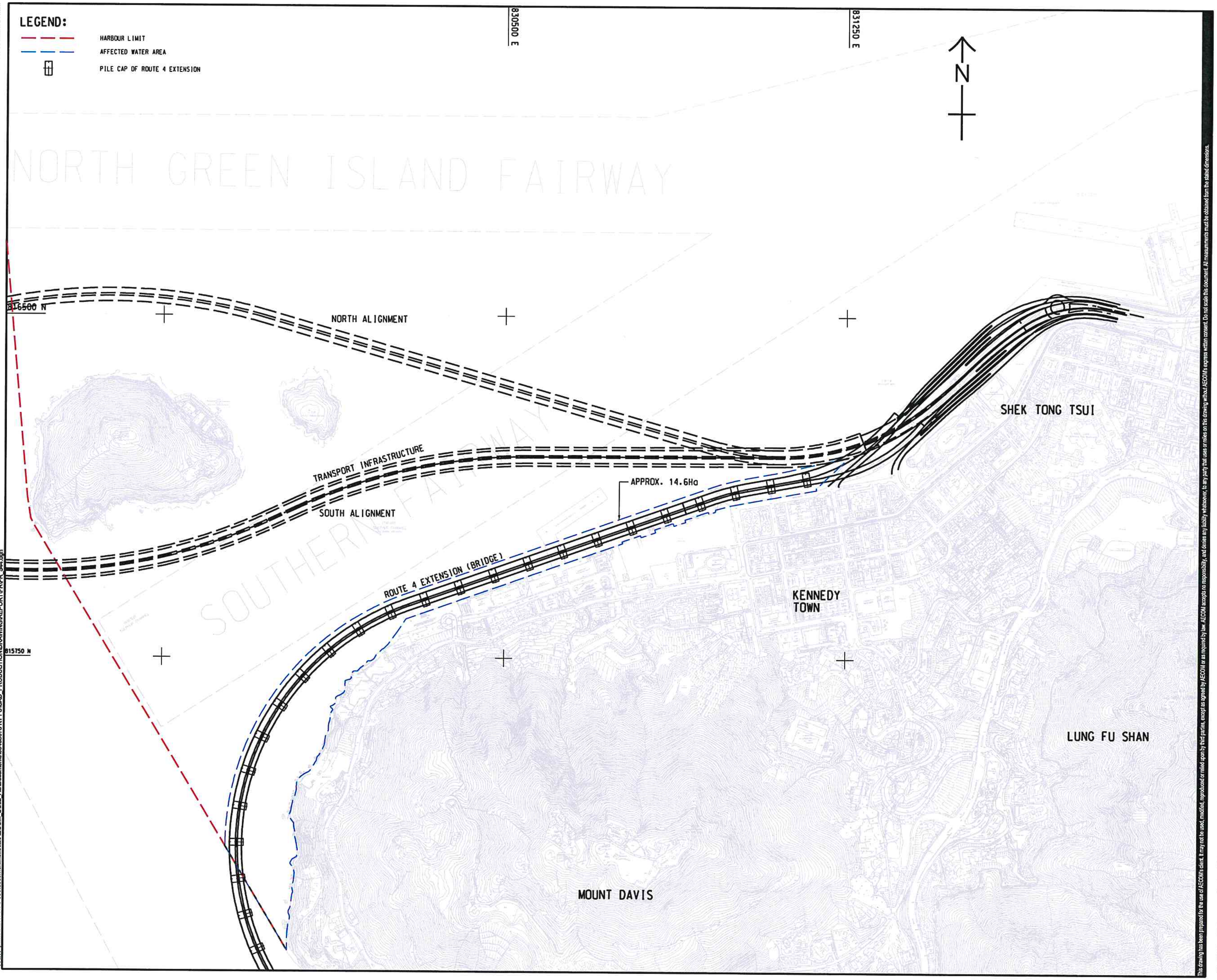
PROJECT NO. 項目編號	AGREEMENT NO. 協議編號
60438078	CE 11/2015 (HY)

SHEET TITLE 圖紙名稱

POSSIBLE SCHEME WITH ROUTE 4 EXTENSION (TUNNEL) RECLAMATION EXTENT FOR TRANSPORT INFRASTRUCTURE 4% GRADIENT

SHEET NUMBER 圖紙編號

60438078/FR/FIGURE 5.27



ISO A1 594mm x 841mm

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PROJECT

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STATUS

SCALE	DIMENSION UNIT
A3 1 : 7500	METRES

KEY PLAN

PROJECT NO.	AGREEMENT NO.
60438078	CE 11/2015 (HY)

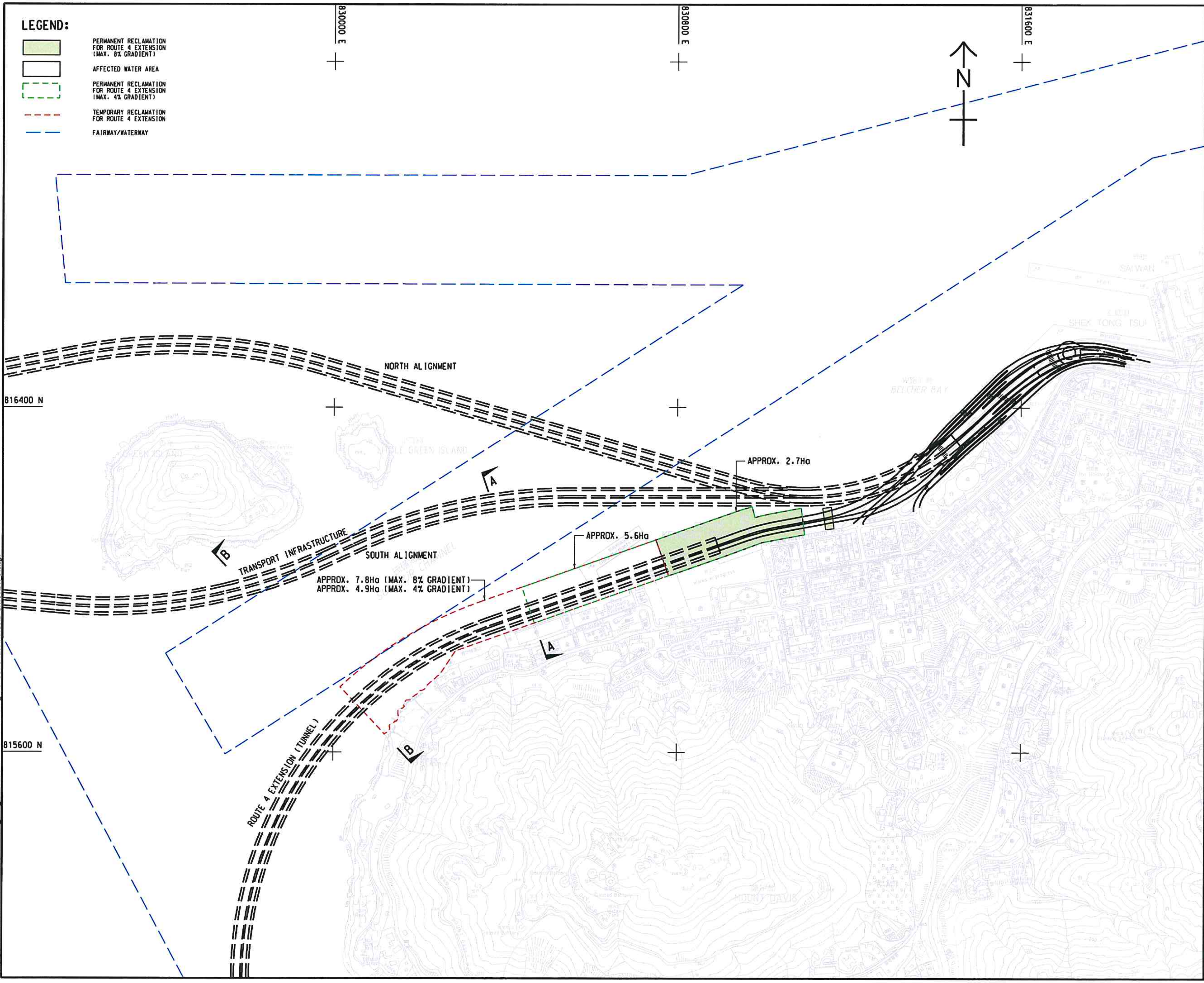
SHEET TITLE

POSSIBLE SCHEME WITH ROUTE 4 EXTENSION PERMANENT RECLAMATION BY ROUTE 4 EXTENSION (BRIDGE)

SHEET NUMBER

60438078/FR/FIGURE 5.28

ISO A1 594mm x 841mm
Approved:
Checked:
Designer:
Project Management Initials:



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STATUS 用途

SCALE 比例: A3 1 : 8000

DIMENSION UNIT 尺寸單位: METRES

KEY PLAN 索引圖

PROJECT NO. 項目編號: 60438078

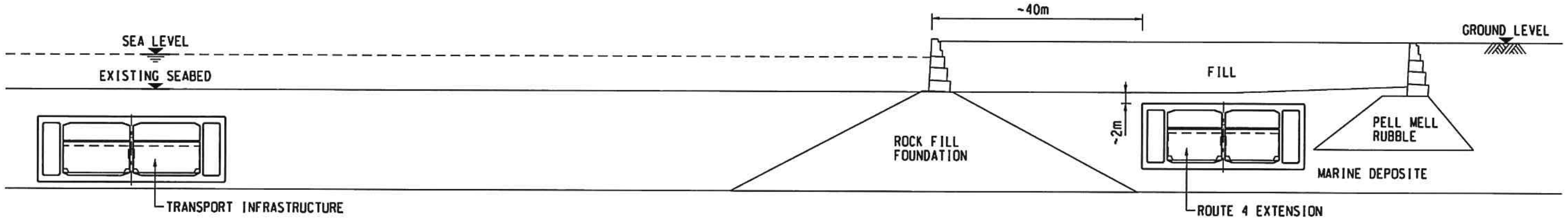
AGREEMENT NO. 協議編號: CE 11/2015 (HY)

SHEET TITLE 圖紙名稱

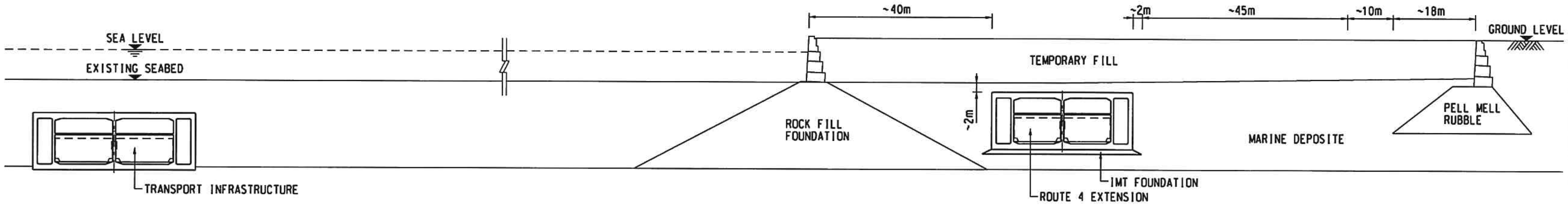
POSSIBLE SCHEME WITH ROUTE 4 EXTENSION RECLAMATION FOR ROUTE 4 EXTENSION (TUNNEL)

SHEET NUMBER 圖紙編號

60438078/FR/FIGURE 5.29



SECTION A - A



SECTION B - B

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PROJECT 項目

TECHNICAL STUDY ON TRANSPORT INFRASTRUCTURE AT KENNEDY TOWN FOR CONNECTING TO EAST LANTAU METROPOLIS - FEASIBILITY STUDY

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STATUS 用途

SCALE 比例: A3 1 : 1000

DIMENSION UNIT 尺寸單位: METRES

KEY PLAN 索引圖

PROJECT NO. 項目編號: 60438078

AGREEMENT NO. 協議編號: CE 11/2015 (HY)

SHEET TITLE 圖紙名稱

POSSIBLE SCHEME WITH ROUTE 4 EXTENSION RECLAMATION FOR ROUTE 4 EXTENSION (TUNNEL) - SECTIONS

SHEET NUMBER 圖紙編號

60438078/FR/FIGURE 5.30

ISO A1 594mm x 841mm
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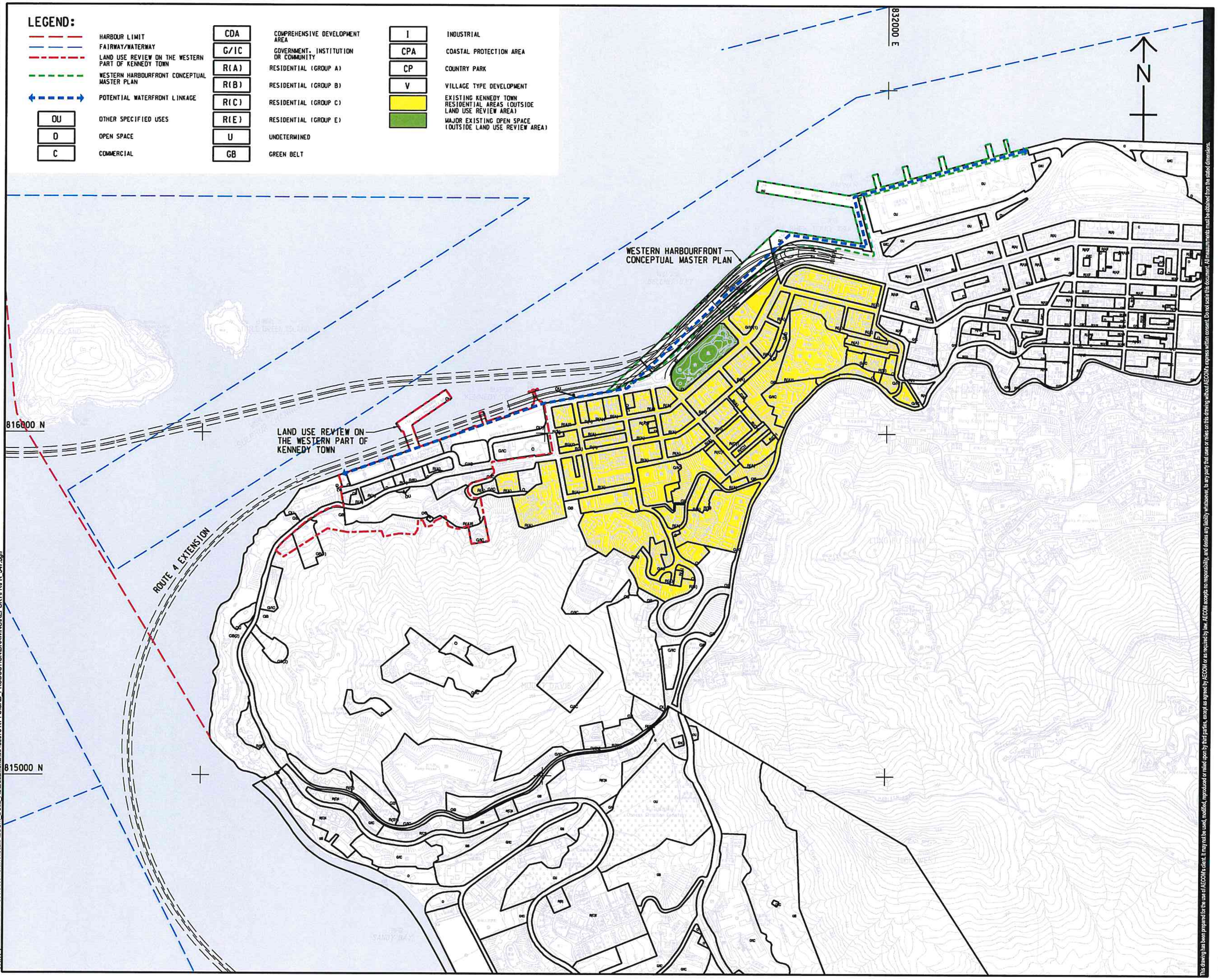
Designer:
Project Management Initials:

Plot File by: WANGSY 2017/8/8



ISO A1 594mm x 841mm

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Designer:

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PROJECT 項目

TECHNICAL STUDY ON TRANSPORT INFRASTRUCTURE AT KENNEDY TOWN FOR CONNECTING TO EAST LANTAU METROPOLIS - FEASIBILITY STUDY

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STATUS 階段

SCALE 比例 A3 1 : 10000

DIMENSION UNIT 尺寸單位 METRES

KEY PLAN 索引圖

PROJECT NO. 項目編號 60438078

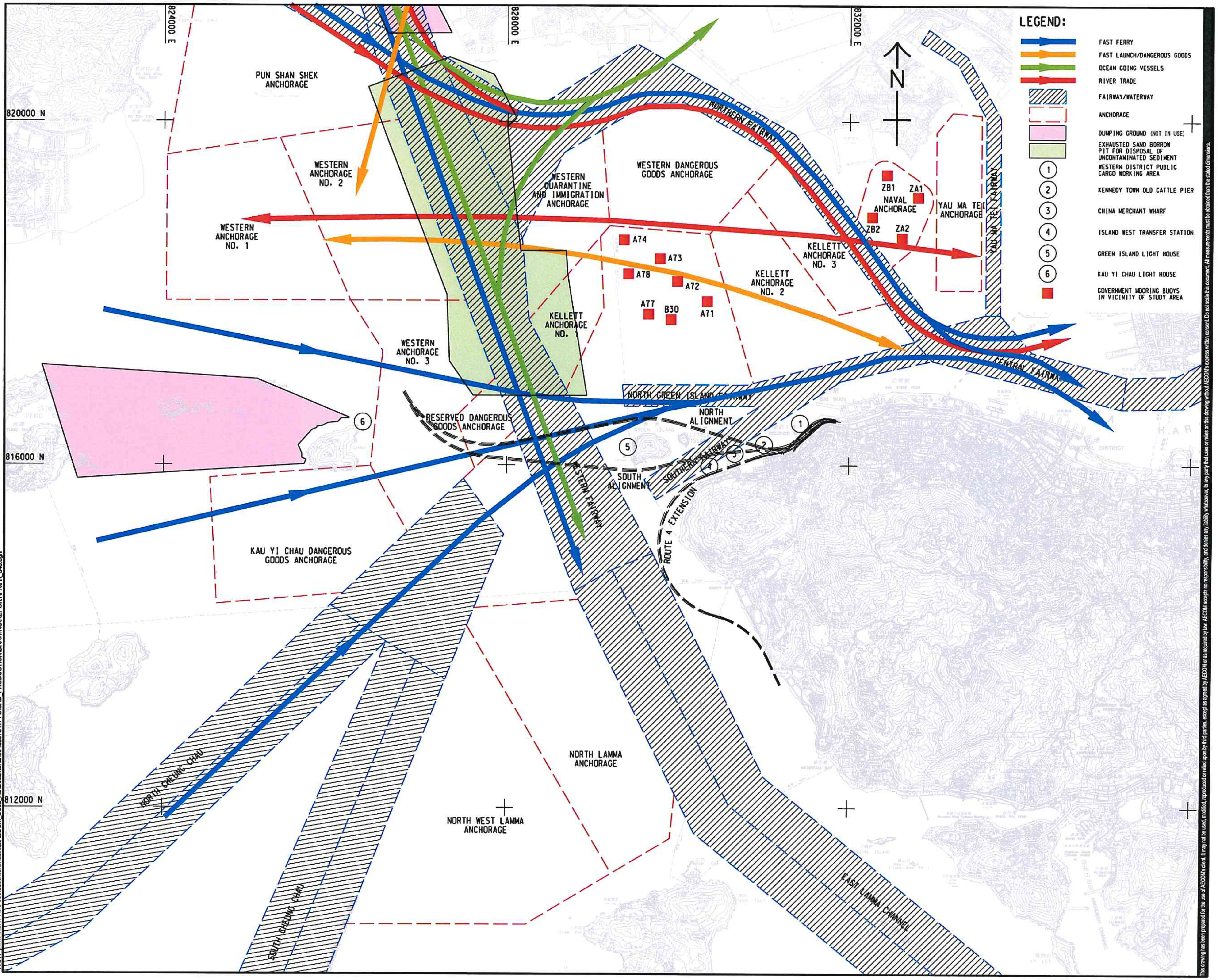
AGREEMENT NO. 協議編號 CE 11/2015 (HY)

SHEET TITLE 圖紙名稱

POSSIBLE SCHEME WITH ROUTE 4 EXTENSION LAND USE IMPACT

SHEET NUMBER 圖紙編號

60438078/FR/FIGURE 5.31



ISO A1 594mm x 841mm

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PROJECT 項目

TECHNICAL STUDY ON TRANSPORT INFRASTRUCTURE AT KENNEDY TOWN FOR CONNECTING TO EAST LANTAU METROPOLIS - FEASIBILITY STUDY

CLIENT 業主

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ISSUE/REVISION 修訂

I/R 修訂	DATE 日期	DESCRIPTION 內容摘要	CHK. 審核

STATUS 階段

SCALE 比例 A3 1 : 40000

DIMENSION UNIT 尺寸單位 METRES

KEY PLAN 索引圖

PROJECT NO. 項目編號 60438078

AGREEMENT NO. 合約編號 CE 11/2015 (HY)

SHEET TITLE 圖紙名稱

POSSIBLE SCHEME WITH ROUTE 4 EXTENSION MARINE IMPACT

SHEET NUMBER 圖紙編號

60438078/FR/FIGURE 5.32

AIR AND NOISE IMPACT

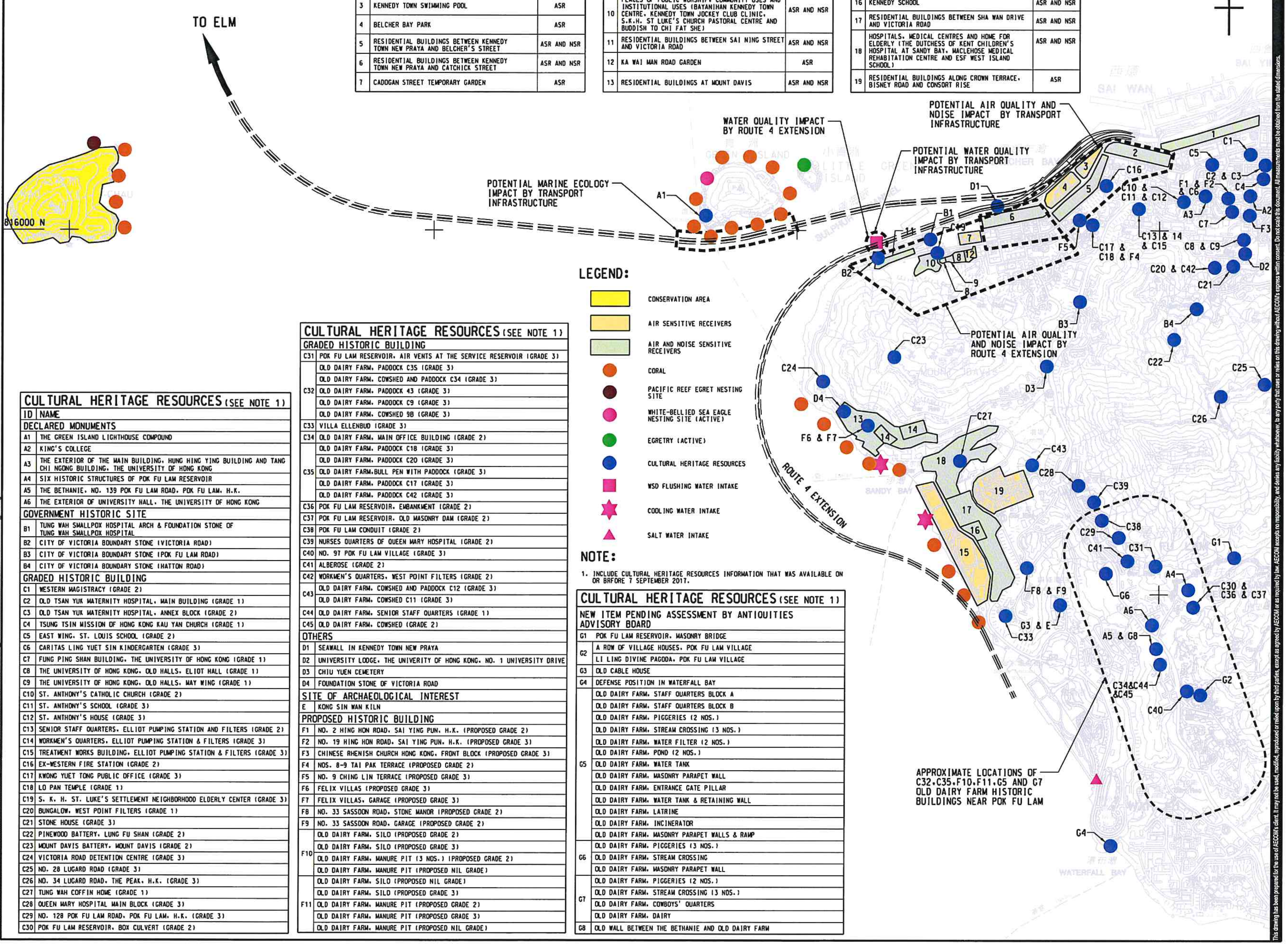
ID	DESCRIPTION	ASR OR NSR
1	RESIDENTIAL BUILDINGS BETWEEN CONNAUGHT ROAD WEST AND DES VOEUX ROAD WEST	ASR AND NSR
2	RESIDENTIAL BUILDINGS BETWEEN DES VOEUX ROAD WEST AND QUEEN'S ROAD WEST	ASR AND NSR
3	KENNEDY TOWN SWIMMING POOL	ASR
4	BELCHER BAY PARK	ASR
5	RESIDENTIAL BUILDINGS BETWEEN KENNEDY TOWN NEW PRAYA AND BELCHER'S STREET	ASR AND NSR
6	RESIDENTIAL BUILDINGS BETWEEN KENNEDY TOWN NEW PRAYA AND CATCHICK STREET	ASR AND NSR
7	CADOGAN STREET TEMPORARY GARDEN	ASR

AIR AND NOISE IMPACT

ID	DESCRIPTION	ASR OR NSR
8	RESIDENTIAL BUILDINGS ALONG KA WAI MAN ROAD	ASR AND NSR
9	ST LUKE'S CHURCH & LUI MING CHOI MEMORIAL PRIMARY SCHOOL	ASR AND NSR
10	PLACES OF PUBLIC WORSHIP, COMMUNITY USES AND INSTITUTIONAL USES (BAYANIHAN KENNEDY TOWN CENTRE, KENNEDY TOWN JOCKEY CLUB CLINIC, S.K.H. ST LUKE'S CHURCH PASTORAL CENTRE AND BUDDISH TO CHI FAT SHE)	ASR AND NSR
11	RESIDENTIAL BUILDINGS BETWEEN SAI NING STREET AND VICTORIA ROAD	ASR AND NSR
12	KA WAI MAN ROAD GARDEN	ASR
13	RESIDENTIAL BUILDINGS AT MOUNT DAVIS	ASR AND NSR

AIR AND NOISE IMPACT

ID	DESCRIPTION	ASR OR NSR
14	CANOSSIAN RETREAT HOUSE HONEYVILLE AND ST. CLARE'S GIRLS' SCHOOL	ASR AND NSR
15	STANLEY HO SPORTS CENTRE	ASR
16	KENNEDY SCHOOL	ASR AND NSR
17	RESIDENTIAL BUILDINGS BETWEEN SHA WAN DRIVE AND VICTORIA ROAD	ASR AND NSR
18	HOSPITALS, MEDICAL CENTRES AND HOME FOR ELDERLY (THE DUTCHESS OF KENT CHILDREN'S HOSPITAL AT SANDY BAY, MACLEHOSE MEDICAL REHABILITATION CENTRE AND ESF WEST ISLAND SCHOOL)	ASR AND NSR
19	RESIDENTIAL BUILDINGS ALONG CROWN TERRACE, BISNEY ROAD AND CONSORT RISE	ASR



NOTE:

1. INCLUDE CULTURAL HERITAGE RESOURCES INFORMATION THAT WAS AVAILABLE ON OR BRFORE 7 SEPTEMBER 2017.

CULTURAL HERITAGE RESOURCES (SEE NOTE 1)

ID	NAME
DECLARED MONUMENTS	
A1	THE GREEN ISLAND LIGHTHOUSE COMPOUND
A2	KING'S COLLEGE
A3	THE EXTERIOR OF THE MAIN BUILDING, HUNG HING YING BUILDING AND TANG CHI NGONG BUILDING, THE UNIVERSITY OF HONG KONG
A4	SIX HISTORIC STRUCTURES OF POK FU LAM RESERVOIR
A5	THE BETHANIE, NO. 139 POK FU LAM ROAD, POK FU LAM, H.K.
A6	THE EXTERIOR OF UNIVERSITY HALL, THE UNIVERSITY OF HONG KONG
GOVERNMENT HISTORIC SITE	
B1	TUNG WAH SMALLPOX HOSPITAL ARCH & FOUNDATION STONE OF TUNG WAH SMALLPOX HOSPITAL
B2	CITY OF VICTORIA BOUNDARY STONE (VICTORIA ROAD)
B3	CITY OF VICTORIA BOUNDARY STONE (POK FU LAM ROAD)
B4	CITY OF VICTORIA BOUNDARY STONE (HATTON ROAD)
GRADED HISTORIC BUILDING	
C1	WESTERN MAGISTRACY (GRADE 2)
C2	OLD TSAN YUK MATERNITY HOSPITAL, MAIN BUILDING (GRADE 1)
C3	OLD TSAN YUK MATERNITY HOSPITAL, ANNEX BLOCK (GRADE 2)
C4	TSUNG TSIN MISSION OF HONG KONG KAU YAN CHURCH (GRADE 1)
C5	EAST WING, ST. LOUIS SCHOOL (GRADE 2)
C6	CARITAS LING YUET SIN KINDERGARTEN (GRADE 3)
C7	FUNG PING SHAN BUILDING, THE UNIVERSITY OF HONG KONG (GRADE 1)
C8	THE UNIVERSITY OF HONG KONG, OLD HALLS, ELIOT HALL (GRADE 1)
C9	THE UNIVERSITY OF HONG KONG, OLD HALLS, MAY WING (GRADE 1)
C10	ST. ANTHONY'S CATHOLIC CHURCH (GRADE 2)
C11	ST. ANTHONY'S SCHOOL (GRADE 3)
C12	ST. ANTHONY'S HOUSE (GRADE 3)
C13	SENIOR STAFF QUARTERS, ELLIOT PUMPING STATION AND FILTERS (GRADE 2)
C14	WORKMEN'S QUARTERS, ELLIOT PUMPING STATION & FILTERS (GRADE 3)
C15	TREATMENT WORKS BUILDING, ELLIOT PUMPING STATION & FILTERS (GRADE 3)
C16	EX-WESTERN FIRE STATION (GRADE 2)
C17	KWONG YUET TONG PUBLIC OFFICE (GRADE 3)
C18	LO PAN TEMPLE (GRADE 1)
C19	S. K. H. ST. LUKE'S SETTLEMENT NEIGHBORHOOD ELDERLY CENTER (GRADE 3)
C20	BUNGALOW, WEST POINT FILTERS (GRADE 1)
C21	STONE HOUSE (GRADE 3)
C22	PINEWOOD BATTERY, LUNG FU SHAN (GRADE 2)
C23	MOUNT DAVIS BATTERY, MOUNT DAVIS (GRADE 2)
C24	VICTORIA ROAD DETENTION CENTRE (GRADE 3)
C25	NO. 28 LUGARD ROAD (GRADE 3)
C26	NO. 34 LUGARD ROAD, THE PEAK, H.K. (GRADE 3)
C27	TUNG WAH COFFIN HOME (GRADE 1)
C28	QUEEN MARY HOSPITAL MAIN BLOCK (GRADE 3)
C29	NO. 128 POK FU LAM ROAD, POK FU LAM, H.K. (GRADE 3)
C30	POK FU LAM RESERVOIR, BOX CULVERT (GRADE 2)

CULTURAL HERITAGE RESOURCES (SEE NOTE 1)

GRADED HISTORIC BUILDING	
C31	POK FU LAM RESERVOIR, AIR VENTS AT THE SERVICE RESERVOIR (GRADE 3)
C32	OLD DAIRY FARM, PADDOCK C35 (GRADE 3)
	OLD DAIRY FARM, COWSHED AND PADDOCK C34 (GRADE 3)
	OLD DAIRY FARM, PADDOCK 43 (GRADE 3)
	OLD DAIRY FARM, PADDOCK C9 (GRADE 3)
	OLD DAIRY FARM, COWSHED 9B (GRADE 3)
C33	VILLA ELLENBUD (GRADE 3)
C34	OLD DAIRY FARM, MAIN OFFICE BUILDING (GRADE 2)
C35	OLD DAIRY FARM, PADDOCK C18 (GRADE 3)
	OLD DAIRY FARM, PADDOCK C20 (GRADE 3)
	OLD DAIRY FARM.BULL PEN WITH PADDOCK (GRADE 3)
	OLD DAIRY FARM, PADDOCK C17 (GRADE 3)
	OLD DAIRY FARM, PADDOCK C42 (GRADE 3)
C36	POK FU LAM RESERVOIR, EMBANKMENT (GRADE 2)
C37	POK FU LAM RESERVOIR, OLD MASONRY DAM (GRADE 2)
C38	POK FU LAM CONDUIT (GRADE 2)
C39	NURSES QUARTERS OF QUEEN MARY HOSPITAL (GRADE 2)
C40	NO. 97 POK FU LAM VILLAGE (GRADE 3)
C41	ALBEROSE (GRADE 2)
C42	WORKMEN'S QUARTERS, WEST POINT FILTERS (GRADE 2)
C43	OLD DAIRY FARM, COWSHED AND PADDOCK C12 (GRADE 3)
	OLD DAIRY FARM, COWSHED C11 (GRADE 3)
C44	OLD DAIRY FARM, SENIOR STAFF QUARTERS (GRADE 1)
C45	OLD DAIRY FARM, COWSHED (GRADE 2)
OTHERS	
D1	SEAWALL IN KENNEDY TOWN NEW PRAYA
D2	UNIVERSITY LODGE, THE UNIVERITY OF HONG KONG, NO. 1 UNIVERSITY DRIVE
D3	CHIU YUEN CEMETERY
D4	FOUNDATION STONE OF VICTORIA ROAD
SITE OF ARCHAEOLOGICAL INTEREST	
E	KONG SIN WAN KILN
PROPOSED HISTORIC BUILDING	
F1	NO. 2 HING HON ROAD, SAI YING PUN, H.K. (PROPOSED GRADE 2)
F2	NO. 19 HING HON ROAD, SAI YING PUN, H.K. (PROPOSED GRADE 3)
F3	CHINESE RHENISH CHURCH HONG KONG, FRONT BLOCK (PROPOSED GRADE 3)
F4	NOS. 8-9 TAI PAK TERRACE (PROPOSED GRADE 2)
F5	NO. 9 CHING LIN TERRACE (PROPOSED GRADE 3)
F6	FELIX VILLAS (PROPOSED GRADE 3)
F7	FELIX VILLAS, GARAGE (PROPOSED GRADE 3)
F8	NO. 33 SASSOON ROAD, STONE MANOR (PROPOSED GRADE 2)
F9	NO. 33 SASSOON ROAD, GARAGE (PROPOSED GRADE 2)
F10	OLD DAIRY FARM, SILO (PROPOSED GRADE 2)
	OLD DAIRY FARM, SILO (PROPOSED GRADE 3)
	OLD DAIRY FARM, MANURE PIT (3 NOS.) (PROPOSED GRADE 2)
	OLD DAIRY FARM, MANURE PIT (PROPOSED NIL GRADE)
F11	OLD DAIRY FARM, SILO (PROPOSED NIL GRADE)
	OLD DAIRY FARM, SILO (PROPOSED GRADE 3)
	OLD DAIRY FARM, MANURE PIT (PROPOSED GRADE 2)
	OLD DAIRY FARM, MANURE PIT (PROPOSED GRADE 3)
	OLD DAIRY FARM, MANURE PIT (PROPOSED NIL GRADE)

CULTURAL HERITAGE RESOURCES (SEE NOTE 1)

NEW ITEM PENDING ASSESSMENT BY ANTIQUITIES ADVISORY BOARD	
G1	POK FU LAM RESERVOIR, MASONRY BRIDGE
G2	A ROW OF VILLAGE HOUSES, POK FU LAM VILLAGE
	LI LING DIVINE PAGODA, POK FU LAM VILLAGE
G3	OLD CABLE HOUSE
G4	DEFENSE POSITION IN WATERFALL BAY
G5	OLD DAIRY FARM, STAFF QUARTERS BLOCK A
	OLD DAIRY FARM, STAFF QUARTERS BLOCK B
	OLD DAIRY FARM, PIGGERIES (2 NOS.)
	OLD DAIRY FARM, STREAM CROSSING (3 NOS.)
	OLD DAIRY FARM, WATER FILTER (2 NOS.)
	OLD DAIRY FARM, POND (2 NOS.)
	OLD DAIRY FARM, WATER TANK
	OLD DAIRY FARM, MASONRY PARAPET WALL
	OLD DAIRY FARM, ENTRANCE GATE PILLAR
	OLD DAIRY FARM, WATER TANK & RETAINING WALL
	OLD DAIRY FARM, LATRINE
	OLD DAIRY FARM, INCINERATOR
	OLD DAIRY FARM, MASONRY PARAPET WALLS & RAMP
G6	OLD DAIRY FARM, PIGGERIES (3 NOS.)
	OLD DAIRY FARM, STREAM CROSSING
	OLD DAIRY FARM, MASONRY PARAPET WALL
G7	OLD DAIRY FARM, PIGGERIES (2 NOS.)
	OLD DAIRY FARM, STREAM CROSSING (3 NOS.)
	OLD DAIRY FARM, COWBOYS' QUARTERS
	OLD DAIRY FARM, DAIRY
G8	OLD WALL BETWEEN THE BETHANIE AND OLD DAIRY FARM

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STATUS 階段

SCALE 比例: A3 1 : 20000
DIMENSION UNIT 尺寸單位: METRES

KEY PLAN 索引圖

PROJECT NO. 項目編號: 60438078
AGREEMENT NO. 協議編號: CE 11/2015 (HY)

SHEET TITLE 圖紙名稱

POSSIBLE SCHEME WITH ROUTE 4 EXTENSION ENVIRONMENTAL IMPACT

SHEET NUMBER 圖紙編號

60438078/FR/FIGURE 5.33

ISO A1 594mm x 841mm
Project Management Initials: Designer: Checked: Approved:
Plot File by: WONGKKK 13-Dec-17
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ISO A1 594mm x 841mm

Approved:

Checked:

Designer:

Project Management Initials:

Plot File by: wumt 2017/9/26

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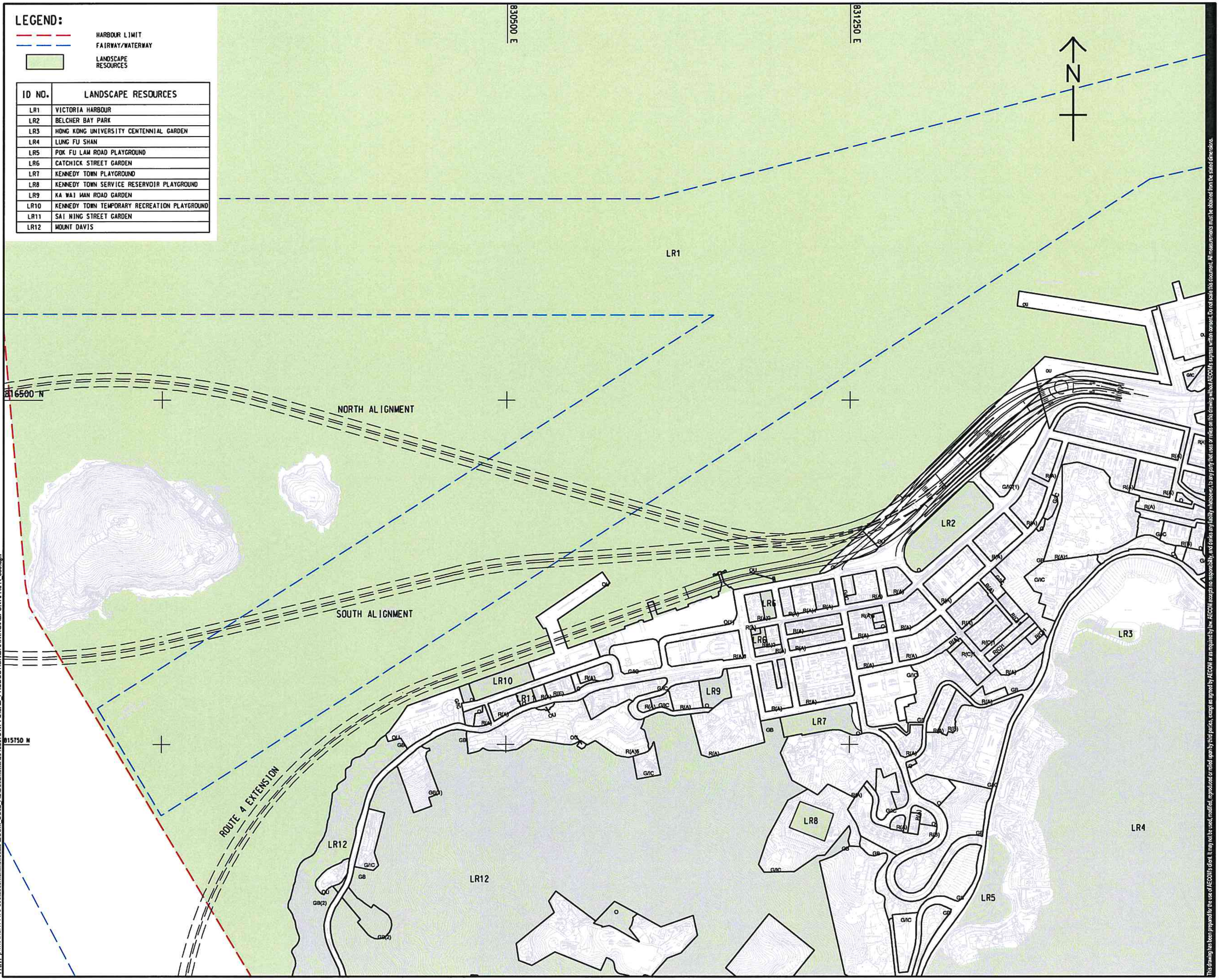

ID NO.	LANDSCAPE RESOURCES
LR1	VICTORIA HARBOUR
LR2	BELCHER BAY PARK
LR3	HONG KONG UNIVERSITY CENTENNIAL GARDEN
LR4	LUNG FU SHAN
LR5	POK FU LAM ROAD PLAYGROUND
LR6	CATCHICK STREET GARDEN
LR7	KENNEDY TOWN PLAYGROUND
LR8	KENNEDY TOWN SERVICE RESERVOIR PLAYGROUND
LR9	KA WAI MAN ROAD GARDEN
LR10	KENNEDY TOWN TEMPORARY RECREATION PLAYGROUND
LR11	SAI NING STREET GARDEN
LR12	MOUNT DAVIS

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STATUS 階段

SCALE 比例: A3 1 : 7500

DIMENSION UNIT 尺寸單位: METRES

KEY PLAN 索引圖

PROJECT NO. 項目編號: 60438078

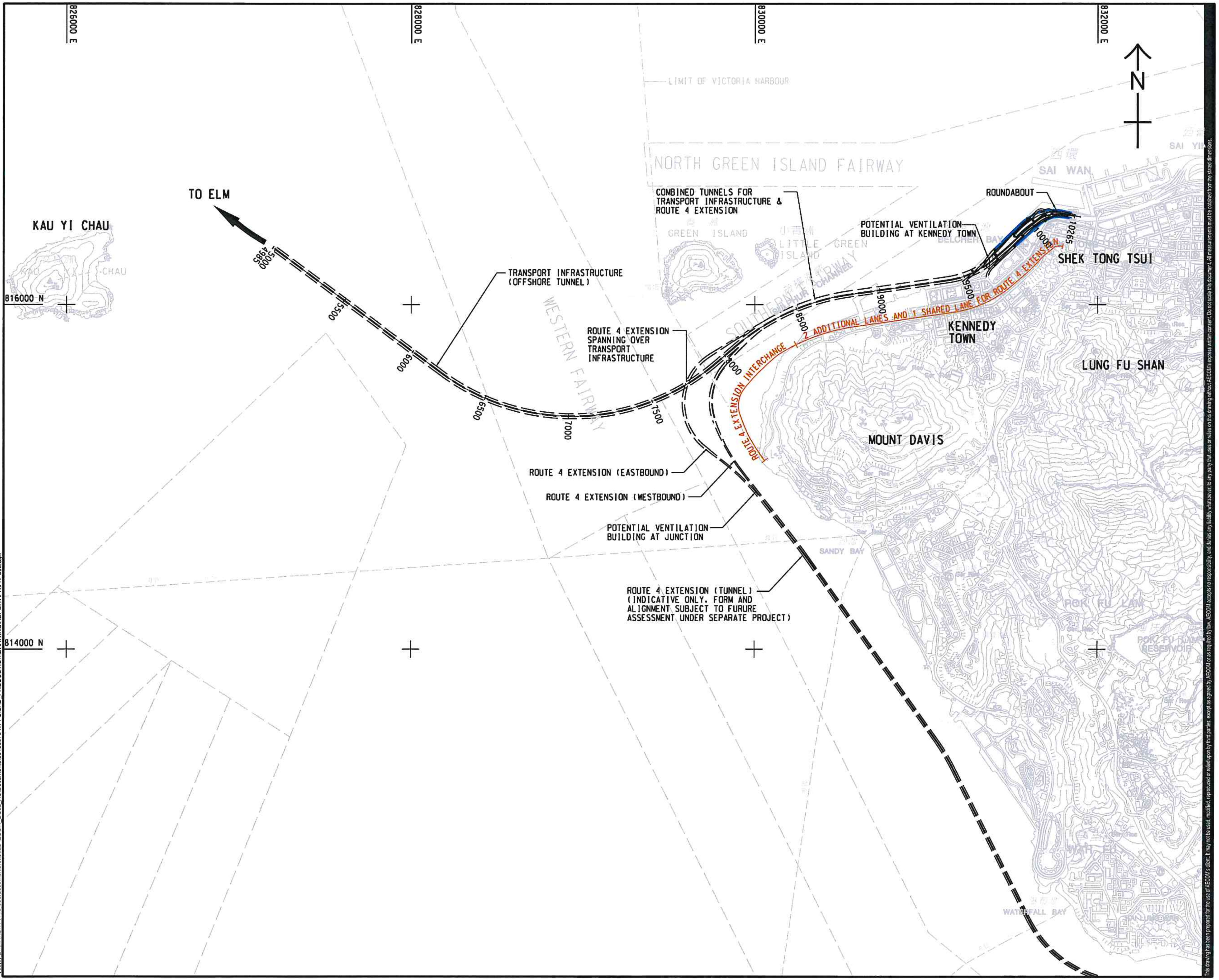
AGREEMENT NO. 協議編號: CE 11/2015 (HY)

SHEET TITLE 圖紙名稱

POSSIBLE SCHEME WITH ROUTE 4 EXTENSION LANDSCAPE IMPACT

SHEET NUMBER 圖紙編號

60438078/FR/FIGURE 5.34



ISO A1 594mm x 841mm

Project Management Initials: Designer: Checked: Approved:

Plot File by: Tsuiwy 11/28/2017

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PROJECT

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I/R	DATE	DESCRIPTION	CHK.

STATUS

SCALE: A3 1 : 20000

DIMENSION UNIT: METRES

KEY PLAN

PROJECT NO.: 60438078

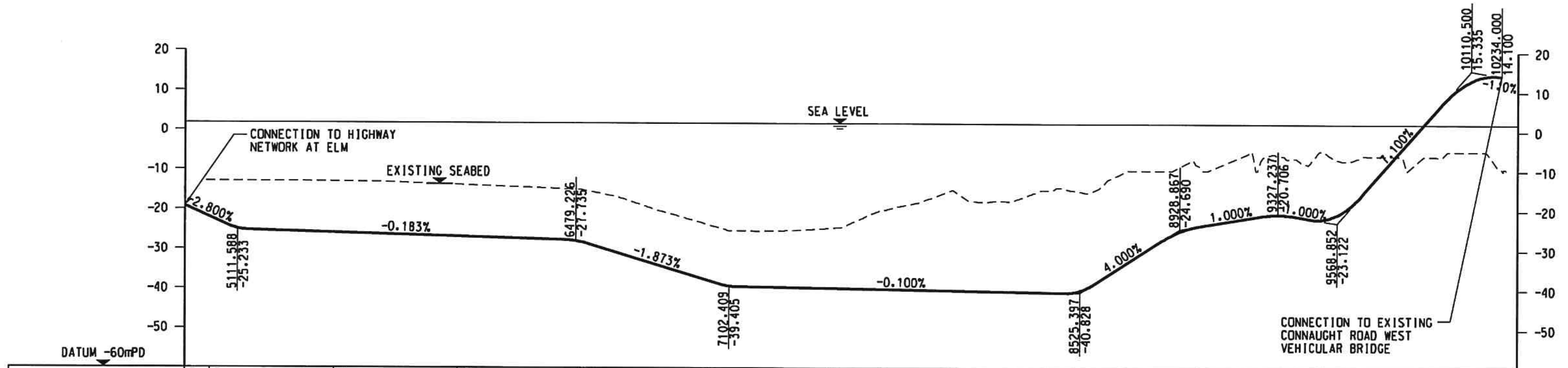
AGREEMENT NO.: CE 11/2015 (HY)

SHEET TITLE

POSSIBLE SCHEME H2-3
OVERALL LAYOUT PLAN

SHEET NUMBER

60438078/FR/FIGURE 5.35



CHAINAGE (m)	4900.000	5000.000	5500.000	6000.000	6500.000	7000.000	7500.000	8000.000	8500.000	9000.000	9500.000	10000.000	10300.000
PROPOSED LEVEL	-19.309	-22.109	-25.944	-26.859	-28.184	-37.488	-39.803	-40.303	-40.653	-23.990	-22.178	7.469	

VERTICAL PROFILE

SCALE HOR. 1 : 20000
VER. 1 : 1250

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I/R	DATE	DESCRIPTION	CHK.

STATUS

SCALE: A3 AS SHOWN

DIMENSION UNIT

KEY PLAN

PROJECT NO.: 60438078

AGREEMENT NO.: CE 11/2015 (HY)

SHEET TITLE

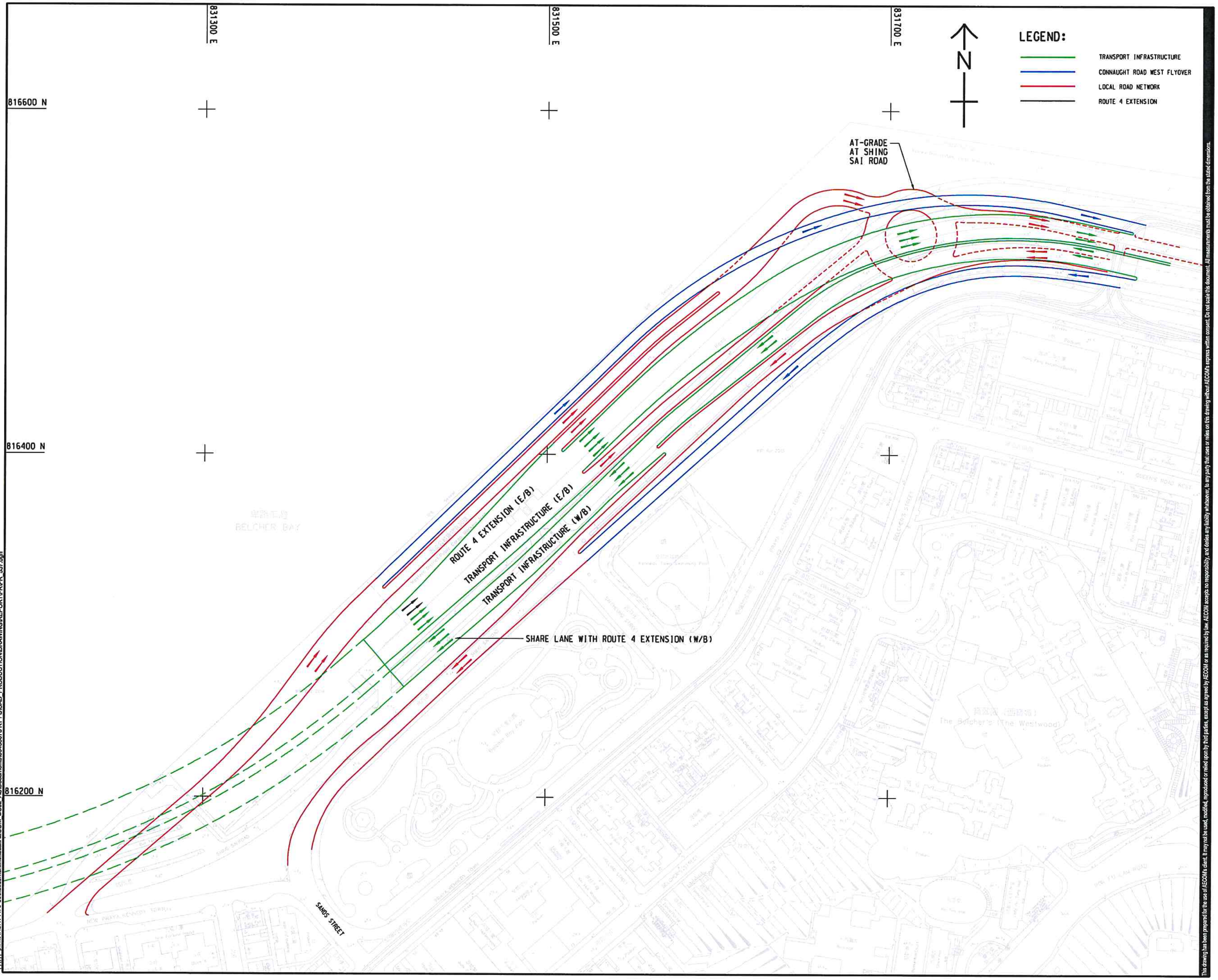
POSSIBLE SCHEME H2-3 VERTICAL PROFILE

SHEET NUMBER

60438078/FR/FIGURE 5.36

Project Management Initials: Designer: Checked: Approved: ISO A1 594mm x 841mm

Plot File by: ZHOUJIE 9/28/2017



ISO A1 594mm x 841mm

Approved:

Checked:

Designer:

Project Management Initials:

Plot File by: WONGKK 16-Oct-17

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SCALE 比例 A3 1 : 2000

DIMENSION UNIT 尺寸單位 METRES

KEY PLAN 索引圖

PROJECT NO. 項目編號 60438078

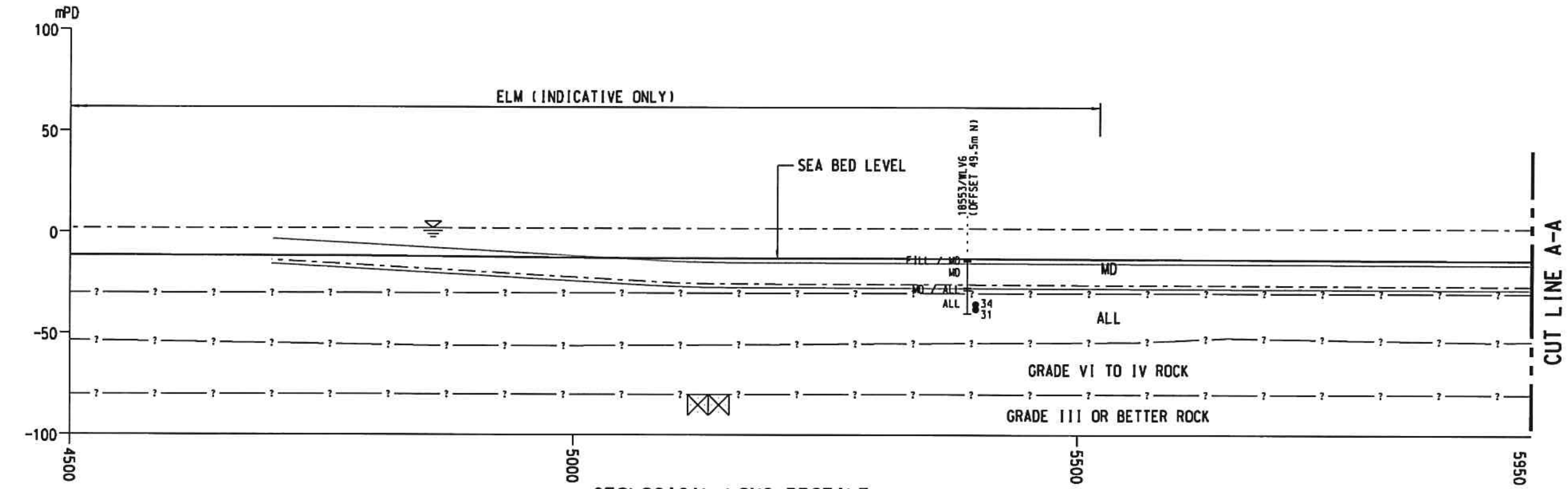
AGREEMENT NO. 協議編號 CE 11/2015 (HY)

SHEET TITLE 圖紙名稱

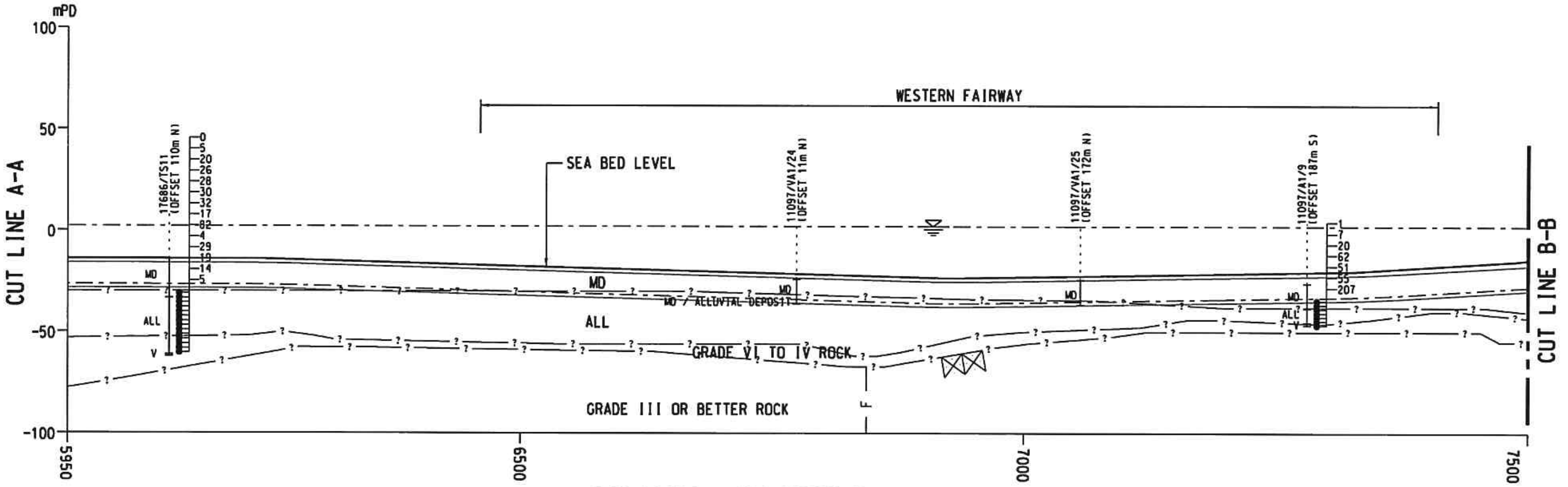
POSSIBLE SCHEME H2-3 CONNECTION LAYOUT AT KENNEDY TOWN

SHEET NUMBER 圖紙編號

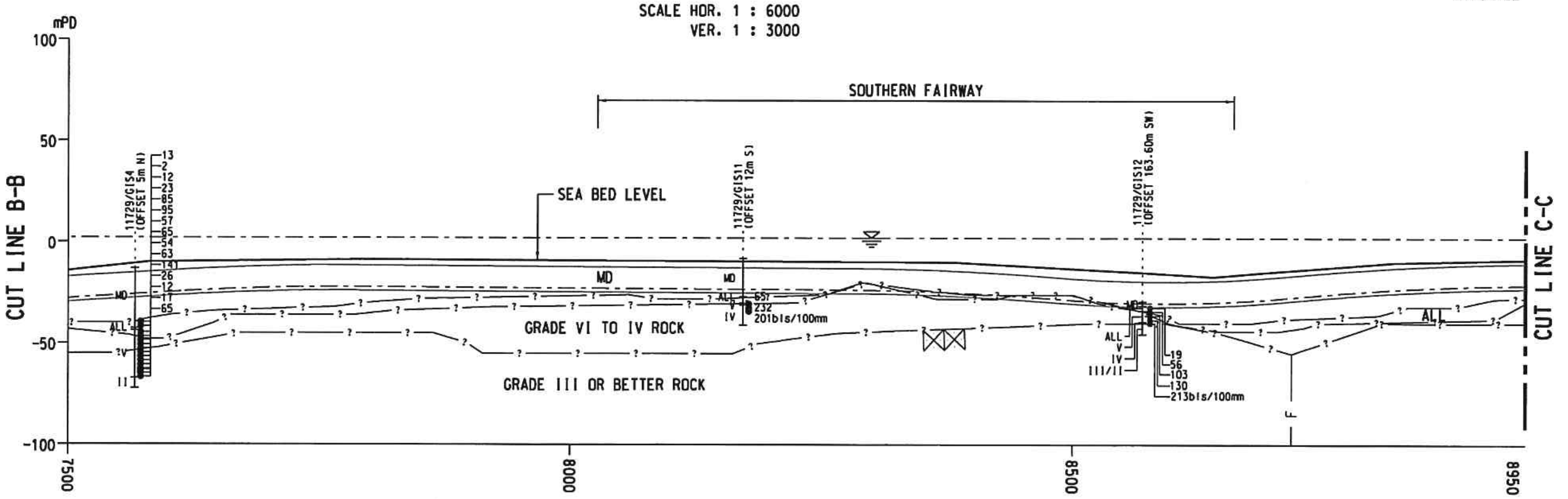
60438078/FR/FIGURE 5.37



GEOLOGICAL LONG PROFILE
SCALE HOR. 1 : 6000
VER. 1 : 3000



GEOLOGICAL LONG PROFILE
SCALE HOR. 1 : 6000
VER. 1 : 3000



GEOLOGICAL LONG PROFILE
SCALE HOR. 1 : 6000
VER. 1 : 3000

NOTES:

1. ALL LEVELS ARE IN METRES ABOVE PRINCIPAL DATUM (mPD).
2. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE STATED.
3. THE ACTUAL GROUND CONDITIONS MAY VARY FROM THAT SHOWN ON THE GEOLOGICAL SECTIONS.
4. ALL INFORMATION SHOWN IN THE LONGITUDINAL SECTIONS HAS BEEN INFERRED FROM LIMITED FACTUAL DATA. OTHER INTERPRETATIONS COULD BE MADE. AS SUCH, THE ACTUAL GROUND CONDITIONS AND ENGINEERING IMPLICATIONS AT ANY LOCATION MAY BE DIFFERENT FROM THOSE INFERRED IN THIS DRAWING.
5. ROCKHEAD LEVEL & MATERIAL PROFILES ARE REFERRED FROM ADJACENT DRILLHOLES. GEOPHYSICAL SURVEY RESULTS AND CHARTS FOR LOCALVESSLES HONG KONG WATERS.
6. INDIVIDUAL BOREHOLE RECORDS SHOULD BE REFERRED TO FOR DETAILS.
7. DETAILS AND EXTEND OF THE TEMPORARY AND PERMANENT RECLAMATION SHOULD BE FURTHER INVESTIGATED IN THE PRELIMINARY DETAILED DESIGN STAGE AFTER DETERMINATION OF THE GROUND CONDITIONS BY SITE SPECIFIC GI AND CONFIRMATION OF THE ALIGNMENT.

LEGEND:

SOIL:

MD	MARINE DEPOSITS
COLL	COLLUVIUM
ED	ESTUARINE DEPOSIT
ALL	ALLUVIUM

ROCK DECOMPOSITION GRADES

VI	RESIDUAL SOIL
V	COMPLETELY DECOMPOSED
IV	HIGHLY DECOMPOSED
III	MODERATELY DECOMPOSED
II	SLIGHTLY DECOMPOSED
I	FRESH

BH01 (O/S XXm Y) { XX - OFFSET DISTANCE FROM SECTION CUTLINE; Y - OFFSET DIRECTION FROM SECTION CUTLINE

● { SPT 'N' VALUE

— F — FAULT LINE

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SCALE 比例	DIMENSION UNIT 尺寸單位
A3 AS SHOWN	METRES

KEY PLAN 索引圖

PROJECT NO. 項目編號	AGREEMENT NO. 協議編號
60438078	CE 11/2015 (HY)

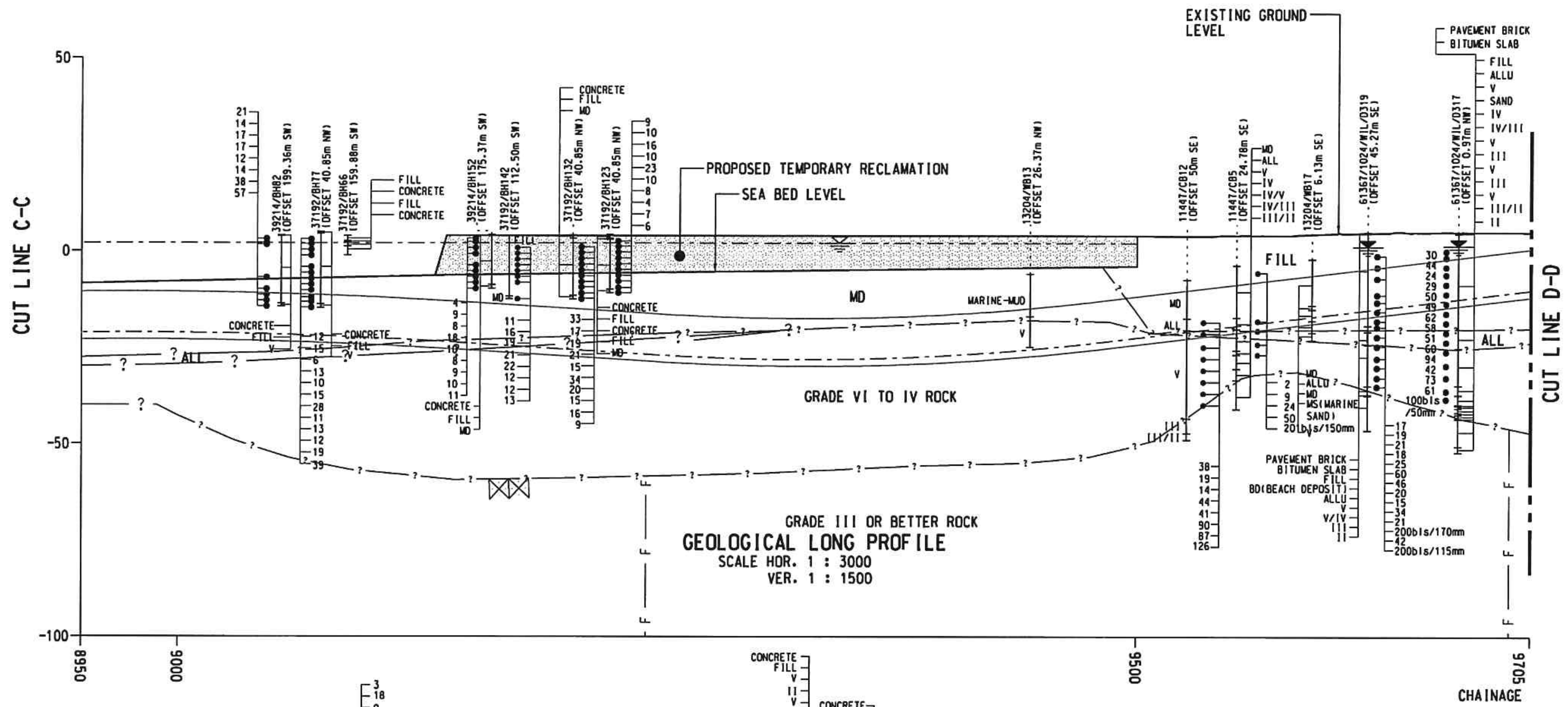
SHEET TITLE 圖紙名稱

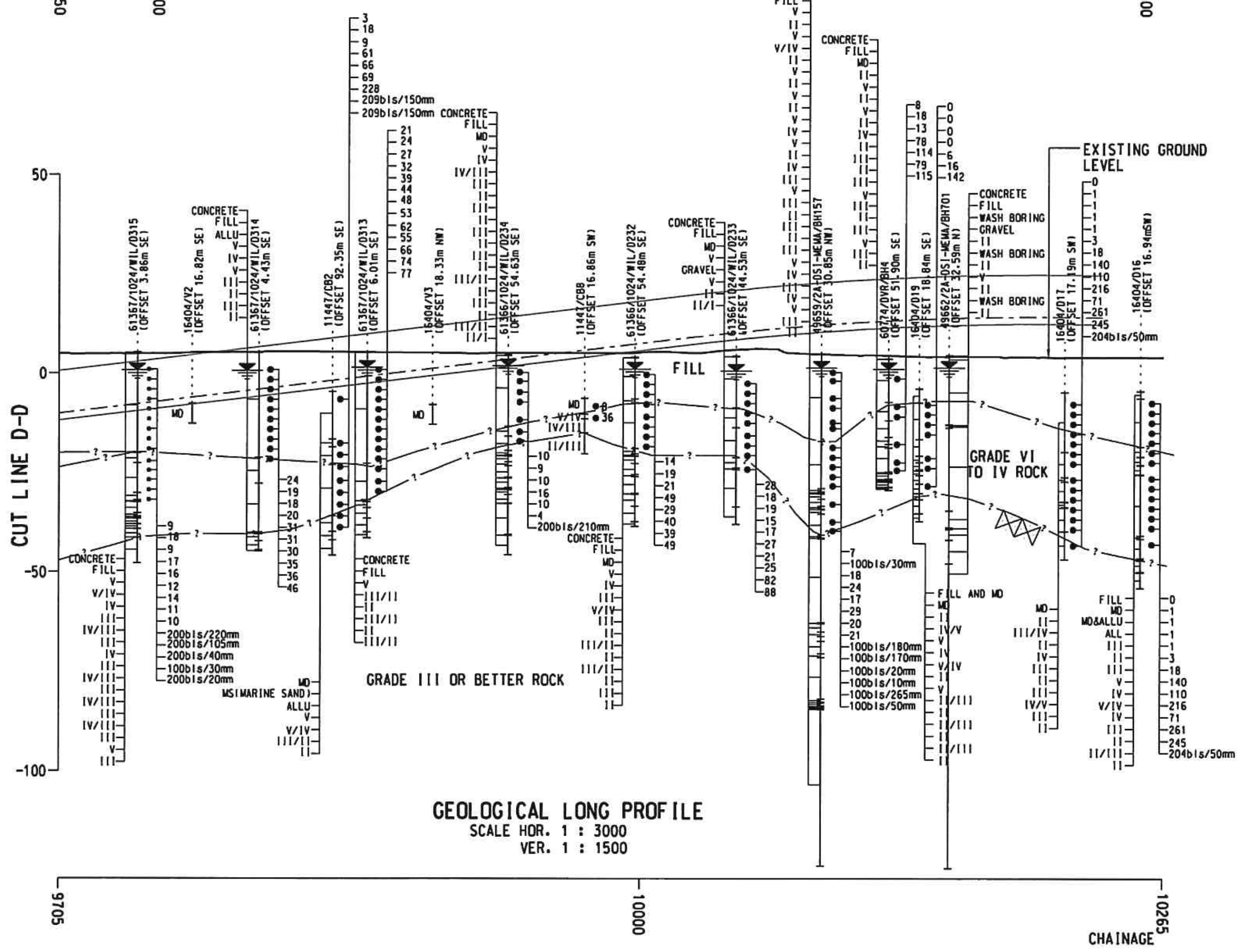
GEOLOGICAL SECTION ALONG POSSIBLE SCHEME H1-1 NORTH ALIGNMENT

SHEET 1 OF 2

SHEET NUMBER 圖紙編號

60438078/FR/FIGURE 5.38





NOTES:

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2. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE STATED.
3. THE ACTUAL GROUND CONDITIONS MAY VARY FROM THAT SHOWN ON THE GEOLOGICAL SECTIONS.
4. ALL INFORMATION SHOWN IN THE LONGITUDINAL SECTIONS HAS BEEN INFERRED FROM LIMITED FACTUAL DATA. OTHER INTERPRETATIONS COULD BE MADE. AS SUCH, THE ACTUAL GROUND CONDITIONS AND ENGINEERING IMPLICATIONS AT ANY LOCATION MAY BE DIFFERENT FROM THOSE INFERRED IN THIS DRAWING.
5. ROCKHEAD LEVEL & MATERIAL PROFILES ARE REFERRED FROM ADJACENT DRILLHOLES. GEOPHYSICAL SURVEY RESULTS AND CHARTS FOR LOCALVESSLES HONG KONG WATERS.
6. INDIVIDUAL BOREHOLE RECORDS SHOULD BE REFERRED TO FOR DETAILS.
7. DETAILS AND EXTEND OF THE TEMPORARY AND PERMANENT RECLAMATION SHOULD BE FURTHER INVESTIGATED IN THE PRELIMINARY DETAILED DESIGN STAGE AFTER DETERMINATION OF THE GROUND CONDITIONS BY SITE SPECIFIC GI AND CONFIRMATION OF THE ALIGNMENT.

LEGEND:

SOIL:

MD	MARINE DEPOSITS
COLL	COLLUVIUM
ED	ESTUARINE DEPOSIT
ALL	ALLUVIUM

ROCK DECOMPOSITION GRADES

VI	RESIDUAL SOIL
V	COMPLETELY DECOMPOSED
IV	HIGHLY DECOMPOSED
III	MODERATELY DECOMPOSED
II	SLIGHTLY DECOMPOSED
I	FRESH

BH01 (O/S XXm Y) { XX - OFFSET DISTANCE FROM SECTION CUTLINE; Y - OFFSET DIRECTION FROM SECTION CUTLINE

● { SPT 'N' VALUE

— F — FAULT LINE

WATER LEVEL

HIGHEST GROUNDWATER LEVEL

AECOM

PROJECT 項目

TECHNICAL STUDY ON TRANSPORT INFRASTRUCTURE AT KENNEDY TOWN FOR CONNECTING TO EAST LANTAU METROPOLIS - FEASIBILITY STUDY

CLIENT 業主

CEDD 土木工程拓展署 Civil Engineering and Development Department

CONSULTANT 工程顧問公司

AECOM Asia Company Ltd.
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ISSUE/REVISION 修訂

I/R 修訂	DATE 日期	DESCRIPTION 內容摘要	CHK. 複核

STATUS 階段

SCALE 比例: A3 AS SHOWN
DIMENSION UNIT 尺寸單位: METRES

KEY PLAN 索引圖

PROJECT NO. 項目編號: 60438078
AGREEMENT NO. 協議編號: CE 11/2015 (HY)

SHEET TITLE 圖紙名稱

GEOLOGICAL SECTION ALONG POSSIBLE SCHEME H1-1 NORTH ALIGNMENT

SHEET 2 OF 2

SHEET NUMBER 圖紙編號

60438078/FR/FIGURE 5.39

Plot File by: $USERS 05/08/2016 08:45:25
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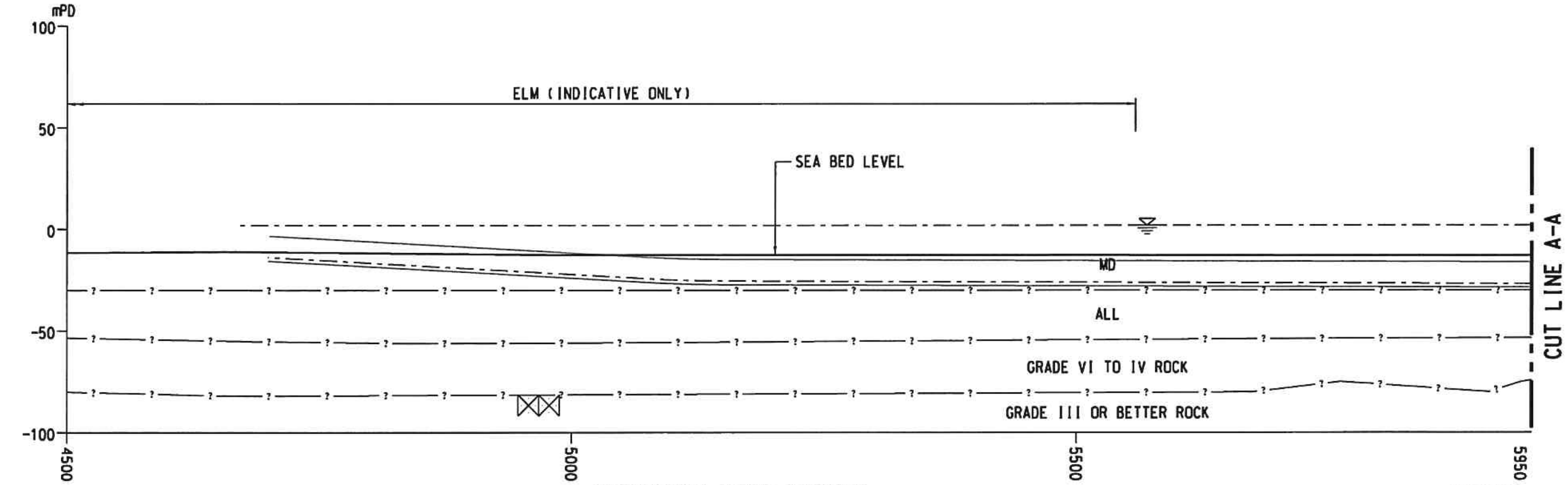
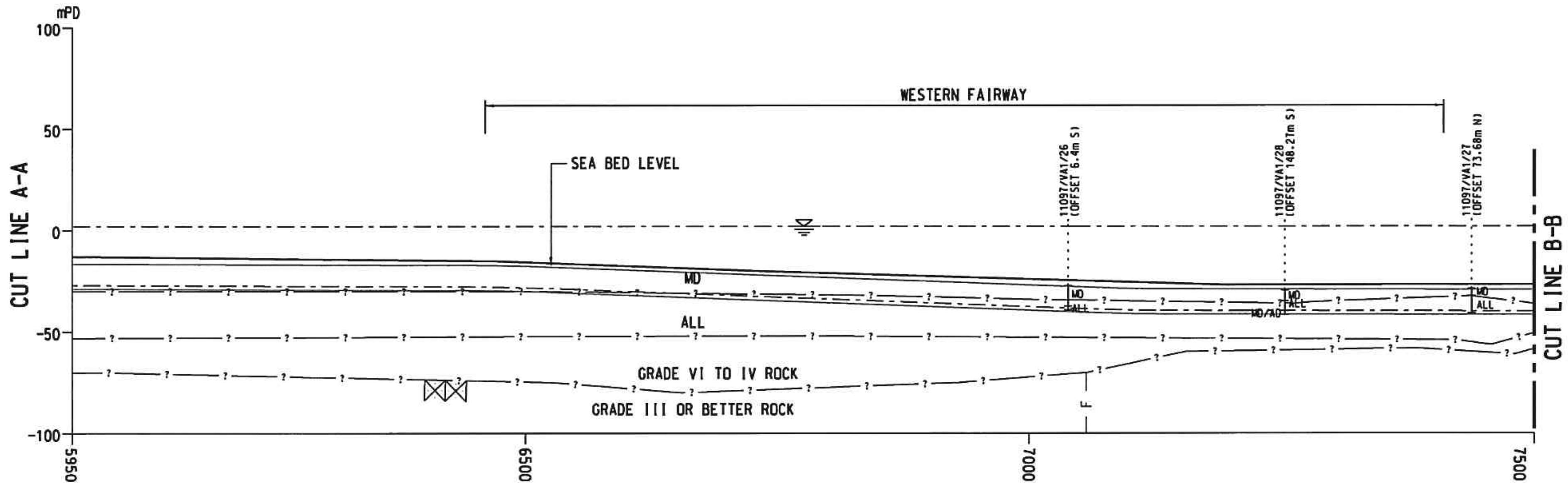


GEOLOGICAL LONG PROFILE

CHAINAGE

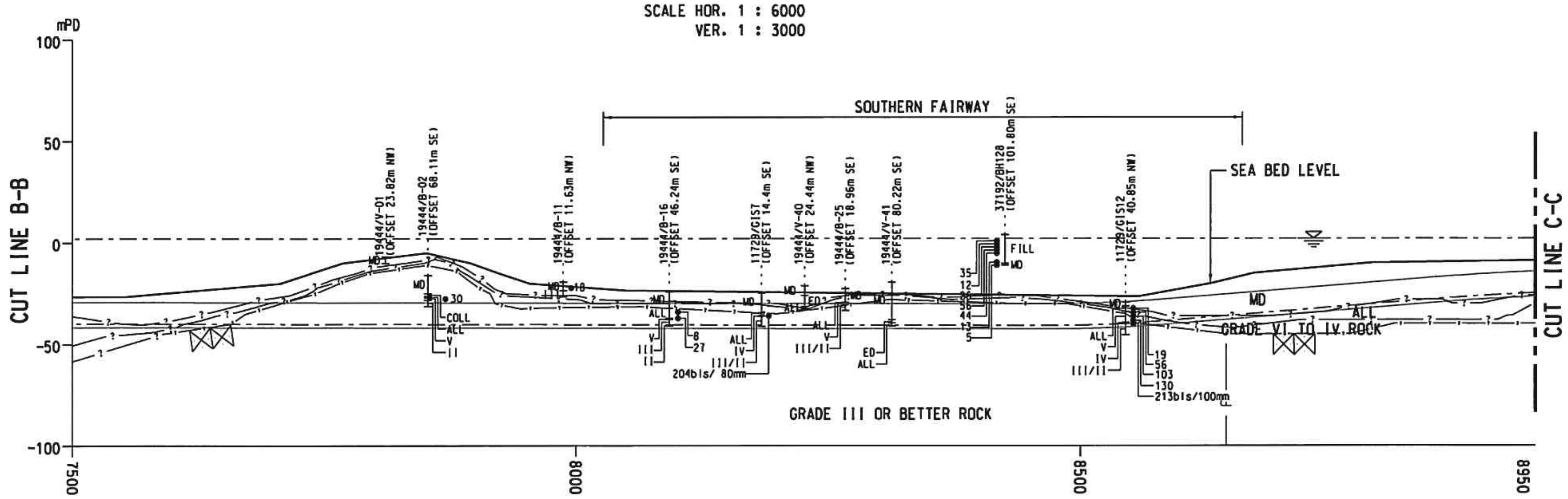
SCALE HOR. 1 : 6000
VER. 1 : 3000



GEOLOGICAL LONG PROFILE

CHAINAGE

SCALE HOR. 1 : 6000
VER. 1 : 3000



GEOLOGICAL LONG PROFILE

CHAINAGE

SCALE HOR. 1 : 6000
VER. 1 : 3000

NOTES:

1. ALL LEVELS ARE IN METRES ABOVE PRINCIPAL DATUM (mPD).
2. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE STATED.
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LEGEND:

SOIL:

MD	MARINE DEPOSITS
COLL	COLLUVIUM
ED	ESTUARINE DEPOSIT
ALL	ALLUVIUM

ROCK DECOMPOSITION GRADES

VI	RESIDUAL SOIL
V	COMPLETELY DECOMPOSED
IV	HIGHLY DECOMPOSED
III	MODERATELY DECOMPOSED
II	SLIGHTLY DECOMPOSED
I	FRESH

BH01 (O/S XXm Y) $\left\{\right.$ XX - OFFSET DISTANCE FROM SECTION CUTLINE; Y - OFFSET DIRECTION FROM SECTION CUTLINE

● $\left\{\right.$ SPT 'N' VALUE

— F — FAULT LINE

AECOM

PROJECT

TECHNICAL STUDY ON TRANSPORT INFRASTRUCTURE AT KENNEDY TOWN FOR CONNECTING TO EAST LANTAU METROPOLIS - FEASIBILITY STUDY

CLIENT

土木工程拓展署
CEDD Civil Engineering and Development Department

CONSULTANT

AECOM Asia Company Ltd.
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SUB-CONSULTANTS

ISSUE/REVISION

I/R	DATE	DESCRIPTION	CHK.

STATUS

SCALE	DIMENSION UNIT
A3 AS SHOWN	METRES

KEY PLAN

PROJECT NO.	AGREEMENT NO.
60438078	CE 11/2015 (HY)

SHEET TITLE

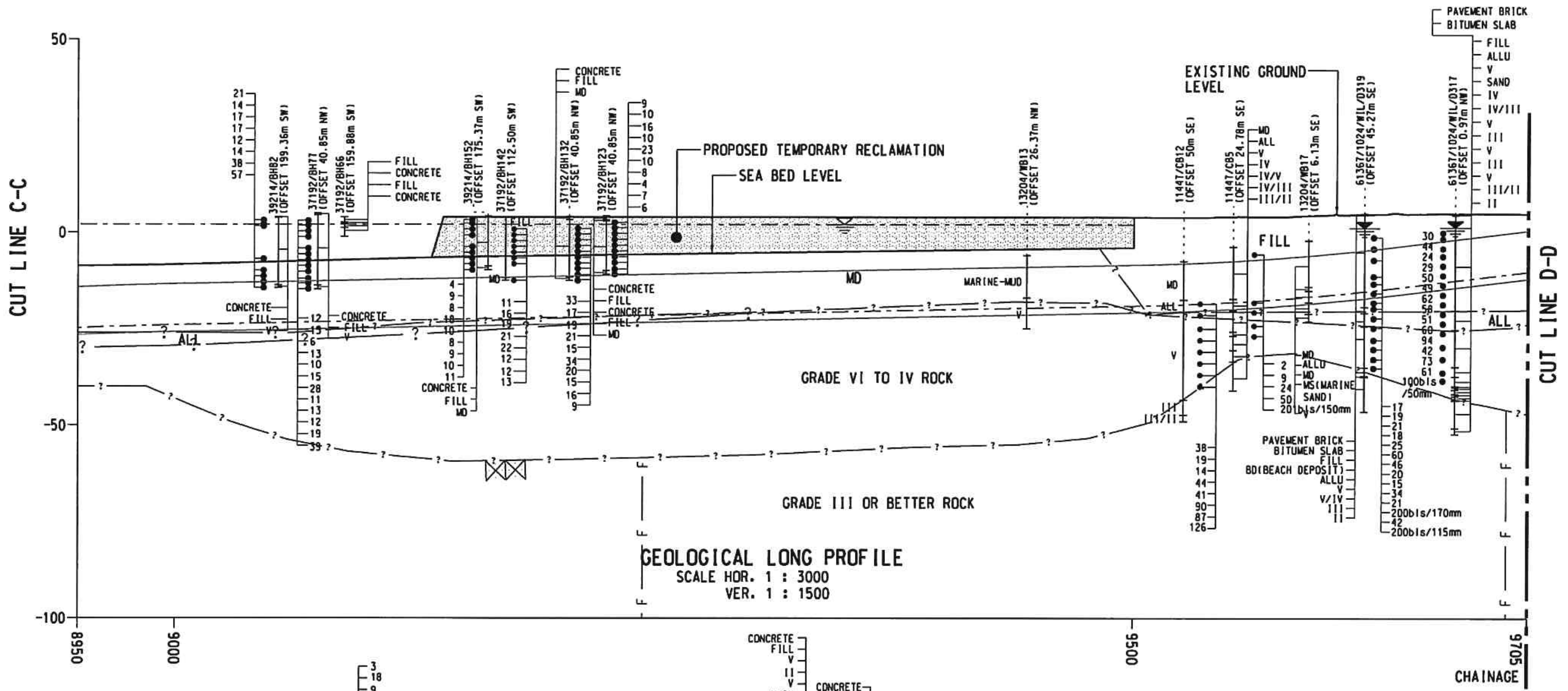
GEOLOGICAL SECTION ALONG POSSIBLE SCHEME H1-1 SOUTH ALIGNMENT

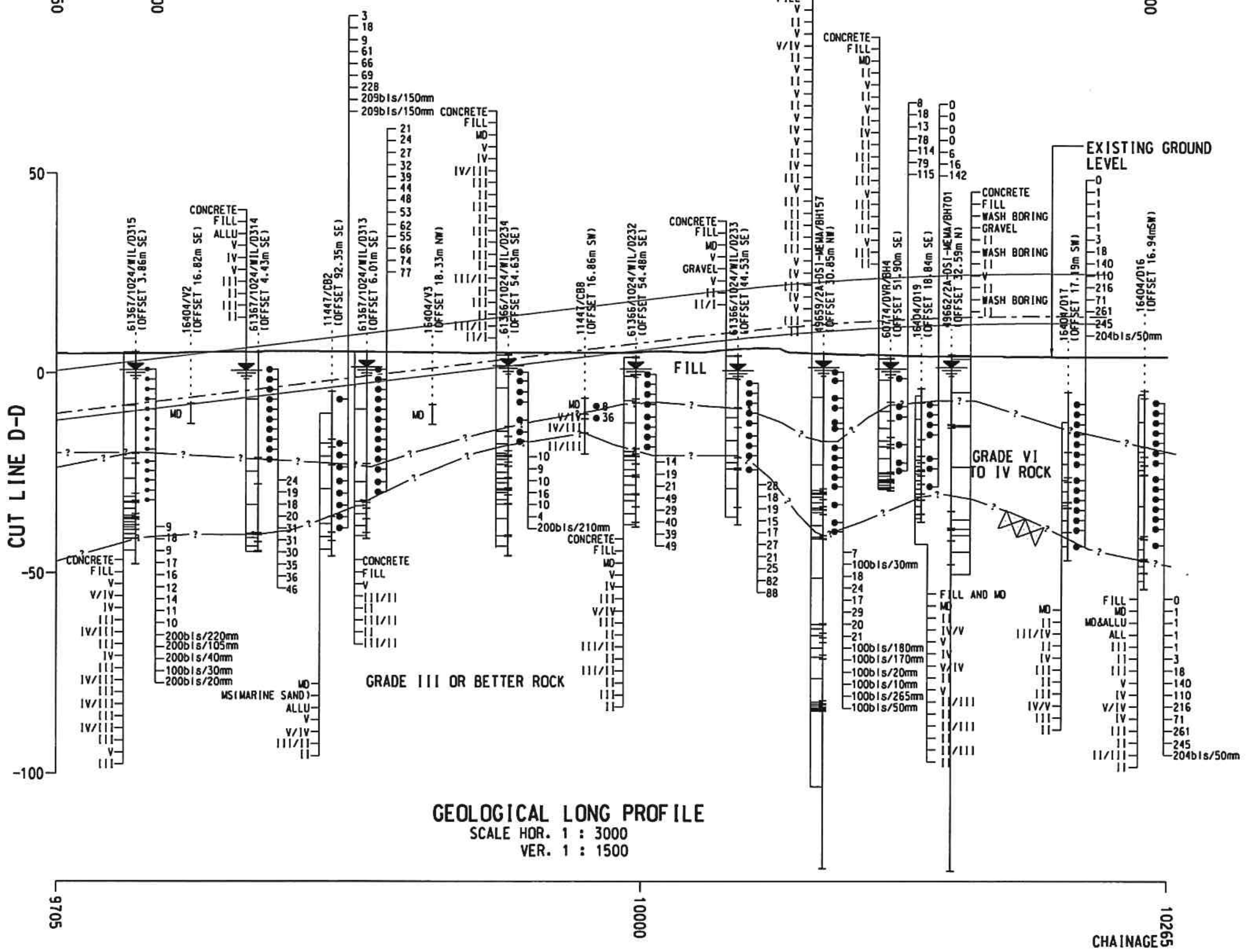
SHEET 1 OF 2

SHEET NUMBER

60438078/FR/FIGURE 5.40

ISO A1 594mm x 841mm
Approved:
Checked:
Designer:
Project Management Initials:





NOTES:

1. ALL LEVELS ARE IN METRES ABOVE PRINCIPAL DATUM (mPD).
2. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE STATED.
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LEGEND:

SOIL:

MD	MARINE DEPOSITS
COLL	COLLUVIUM
ED	ESTUARINE DEPOSIT
ALL	ALLUVIUM

ROCK DECOMPOSITION GRADES

VI	RESIDUAL SOIL
V	COMPLETELY DECOMPOSED
IV	HIGHLY DECOMPOSED
III	MODERATELY DECOMPOSED
II	SLIGHTLY DECOMPOSED
I	FRESH

BH01 (O/S XXm Y) { XX - OFFSET DISTANCE FROM SECTION CUTLINE; Y - OFFSET DIRECTION FROM SECTION CUTLINE

● { SPT 'N' VALUE

— F — FAULT LINE

WATER LEVEL

HIGHEST GROUNDWATER LEVEL

AECOM

PROJECT 項目

TECHNICAL STUDY ON TRANSPORT INFRASTRUCTURE AT KENNEDY TOWN FOR CONNECTING TO EAST LANTAU METROPOLIS - FEASIBILITY STUDY

CLIENT 客戶

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ISSUE/REVISION 修訂

I/R	DATE	DESCRIPTION	CHK.

STATUS 階段

SCALE 比例	DIMENSION UNIT 尺寸單位
A3 AS SHOWN	METRES

KEY PLAN 索引圖

PROJECT NO. 項目編號	AGREEMENT NO. 合約編號
60438078	CE 11/2015 (HY)

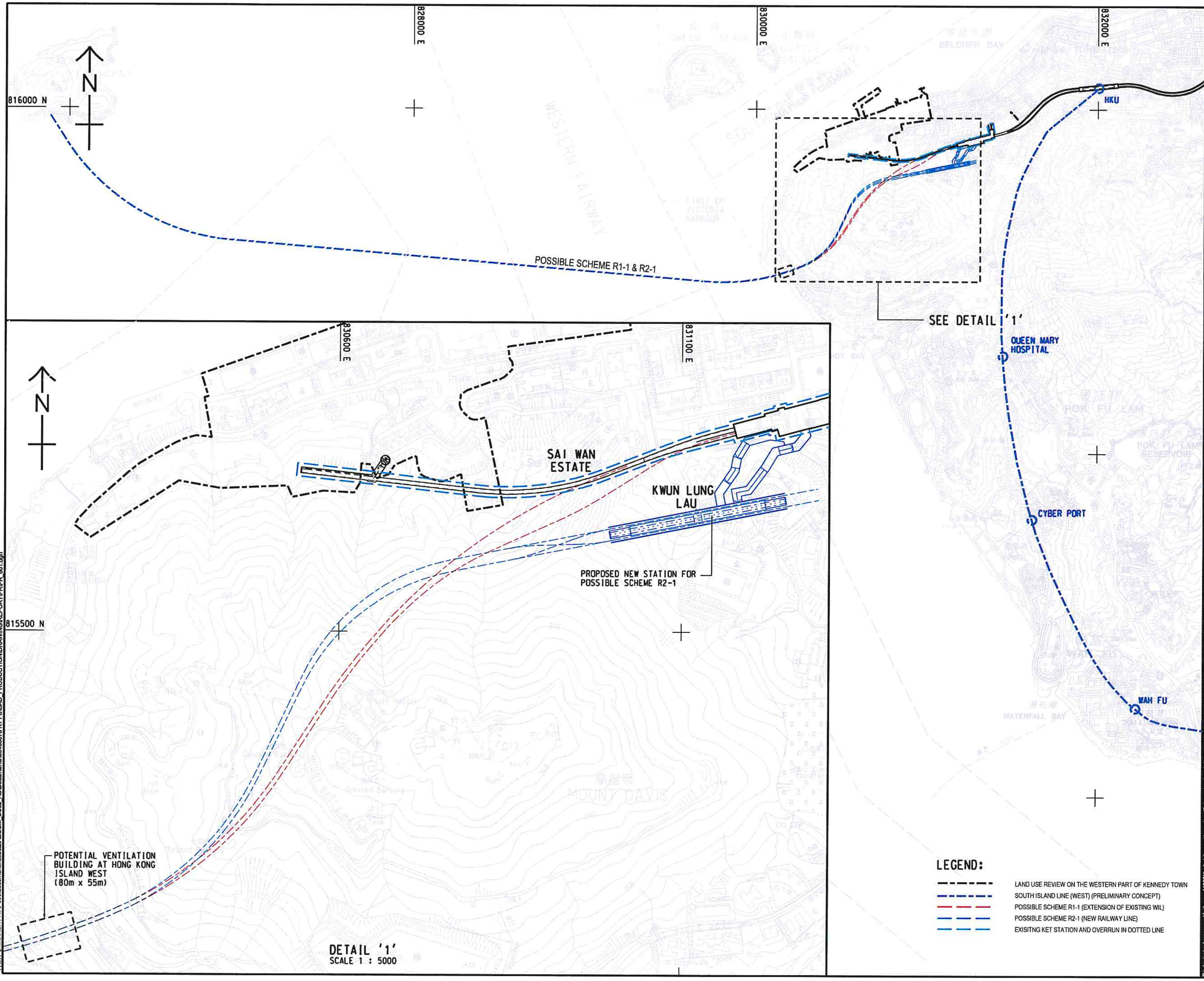
SHEET TITLE 圖紙名稱

GEOLOGICAL SECTION ALONG POSSIBLE SCHEME H1-1 SOUTH ALIGNMENT

SHEET 2 OF 2

SHEET NUMBER 圖紙編號

60438078/FR/FIGURE 5.41



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PROJECT

TECHNICAL STUDY ON TRANSPORT INFRASTRUCTURE AT KENNEDY TOWN FOR CONNECTING TO EAST LANTAU METROPOLIS - FEASIBILITY STUDY

CLIENT

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I/R	DATE	DESCRIPTION	CHK.

STATUS

SCALE	DIMENSION UNIT
A3 1 : 20000	METRES

KEY PLAN

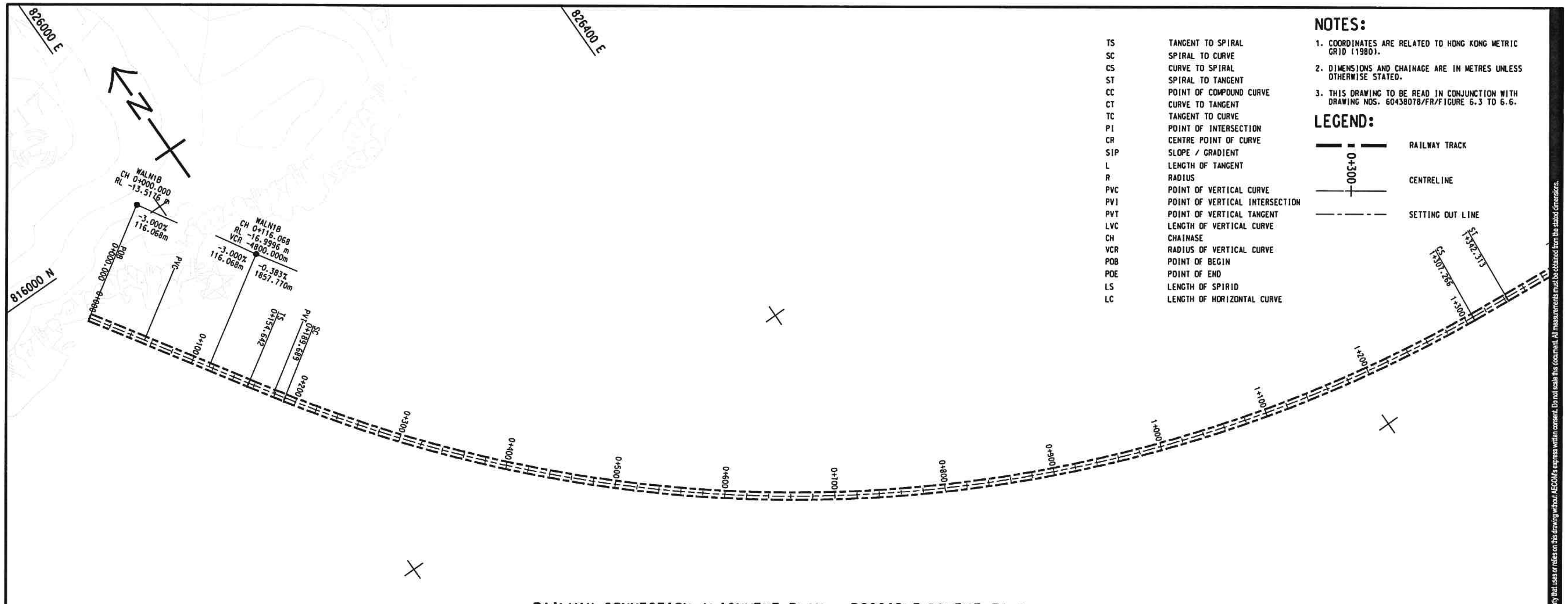
PROJECT NO.	AGREEMENT NO.
60438078	CE 11/2015 (HY)

SHEET TITLE

RAILWAY CONNECTION CONCEPTUAL SCHEME

SHEET NUMBER

60438078/FR/FIGURE 6.1



TS	TANGENT TO SPIRAL
SC	SPIRAL TO CURVE
CS	CURVE TO SPIRAL
ST	SPIRAL TO TANGENT
CC	POINT OF COMPOUND CURVE
CT	CURVE TO TANGENT
TC	TANGENT TO CURVE
PI	POINT OF INTERSECTION
CR	CENTRE POINT OF CURVE
SlP	SLOPE / GRADIENT
L	LENGTH OF TANGENT
R	RADIUS
PVC	POINT OF VERTICAL CURVE
PVI	POINT OF VERTICAL INTERSECTION
PVT	POINT OF VERTICAL TANGENT
LVC	LENGTH OF VERTICAL CURVE
CH	CHAINAGE
VCR	RADIUS OF VERTICAL CURVE
POB	POINT OF BEGIN
POE	POINT OF END
LS	LENGTH OF SPIRID
LC	LENGTH OF HORIZONTAL CURVE

NOTES:

1. COORDINATES ARE RELATED TO HONG KONG METRIC GRID (1980).
2. DIMENSIONS AND CHAINAGE ARE IN METRES UNLESS OTHERWISE STATED.
3. THIS DRAWING TO BE READ IN CONJUNCTION WITH DRAWING NOS. 60438078/FR/FIGURE 6.3 TO 6.6.

LEGEND:

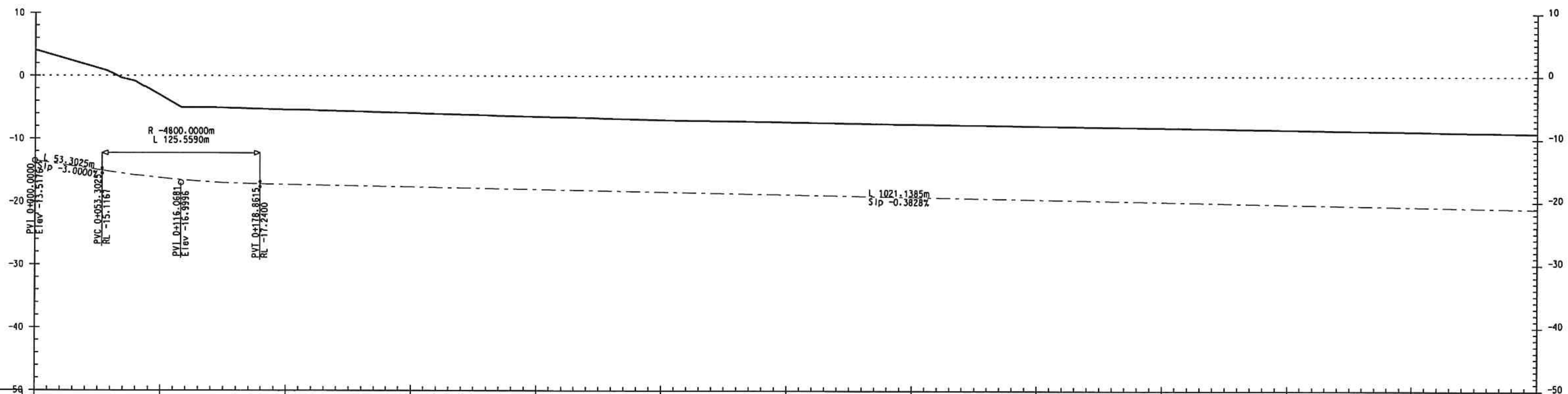
RAILWAY TRACK

CENTRELINE

SETTING OUT LINE

RAILWAY CONNECTION ALIGNMENT PLAN - POSSIBLE SCHEME R1-1

SCALE 1:4000



STATION: 0+000.000, 0+050.000, 0+100.000, 0+150.000, 0+200.000, 0+250.000, 0+300.000, 0+350.000, 0+400.000, 0+450.000, 0+500.000, 0+550.000, 0+600.000, 0+650.000, 0+700.000, 0+750.000, 0+800.000, 0+850.000, 0+900.000, 0+950.000, 1+000.000, 1+050.000, 1+100.000, 1+150.000, 1+200.000

DESIGN RAIL LEVELS: -13.518, -14.118, -14.718, -15.313, -15.843, -16.290, -16.654, -16.934, -17.131, -17.244, -17.321, -17.398, -17.474, -17.551, -17.627, -17.704, -17.780, -17.857, -17.934, -18.010, -18.087, -18.163, -18.240, -18.316, -18.393, -18.469, -18.546, -18.623, -18.699, -18.776, -18.852, -18.929, -19.005, -19.082, -19.159, -19.235, -19.312, -19.388, -19.465, -19.541, -19.618, -19.695, -19.771, -19.848, -19.924, -20.001, -20.077, -20.154, -20.231, -20.307, -20.384, -20.460, -20.537, -20.613, -20.690, -20.767, -20.843, -20.920, -20.996, -21.073, -21.149

HORIZ. ALIGNMENT: L 154.6421; Ls 35.0468; R = -1253.3500, Lc 1117.5770

VERT. ALIGNMENT: L 53.3025, Slp -3.0000%; LVC125.5590, R-4800.0000; L = 1780.1652, Slp = -0.3828%

RAILWAY CONNECTION ALIGNMENT PROFILE - POSSIBLE SCHEME R1-1

SCALE 1:4000 (HOR.)
1:800 (VER.)

AECOM

PROJECT 項目

TECHNICAL STUDY ON TRANSPORT INFRASTRUCTURE AT KENNEDY TOWN FOR CONNECTING TO EAST LANTAU METROPOLIS - FEASIBILITY STUDY

CLIENT 業主

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I/R 修訂	DATE 日期	DESCRIPTION 内容摘要	CHK. 審核

STATUS 階段

SCALE 比例: A3 AS SHOWN

DIMENSION UNIT 尺寸單位: METRES

KEY PLAN 索引圖

PROJECT NO. 項目編號: 60438078

AGREEMENT NO. 協議編號: CE 11/2015 (HY)

SHEET TITLE 圖紙名稱

RAILWAY CONNECTION ALIGNMENT PLAN AND PROFILE - POSSIBLE SCHEME R1-1

SHEET 1 OF 5

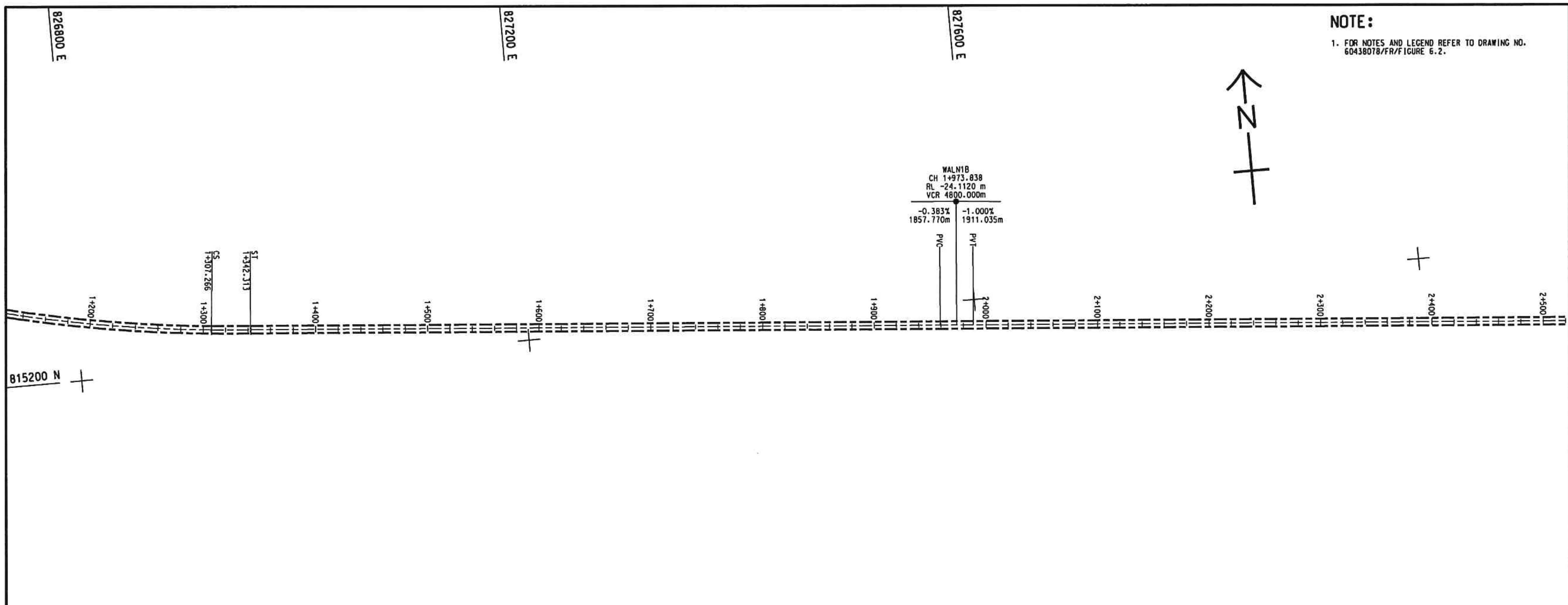
SHEET NUMBER 圖紙編號

60438078/FR/FIGURE 6.2

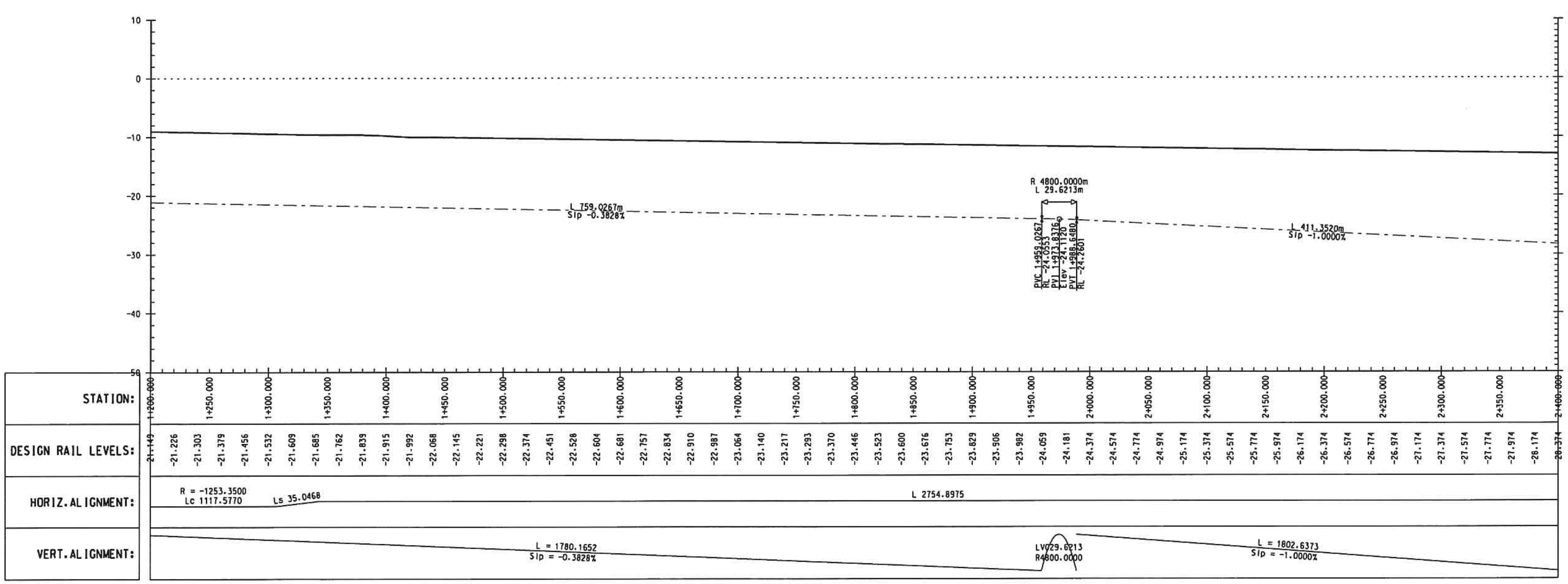
Project Management Initials: Designer: Checked: Approved: ISO A1 594mm x 841mm

Plot File by: ZHANGWRS 2017/8/9

ISO A1 594mm x 841mm
Project Management Initials: Designer: Checked: Approved:



RAILWAY CONNECTION ALIGNMENT PLAN - POSSIBLE SCHEME R1-1
SCALE 1:4000



RAILWAY CONNECTION ALIGNMENT PROFILE - POSSIBLE SCHEME R1-1
SCALE 1:4000 (HOR.)
1:800 (VER.)

Plot File by: ZHANGWRS 2017/8/9

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PROJECT

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STATUS

SCALE	DIMENSION UNIT
A3 AS SHOWN	METRES

KEY PLAN

PROJECT NO.	AGREEMENT NO.
60438078	CE 11/2015 (HY)

SHEET TITLE

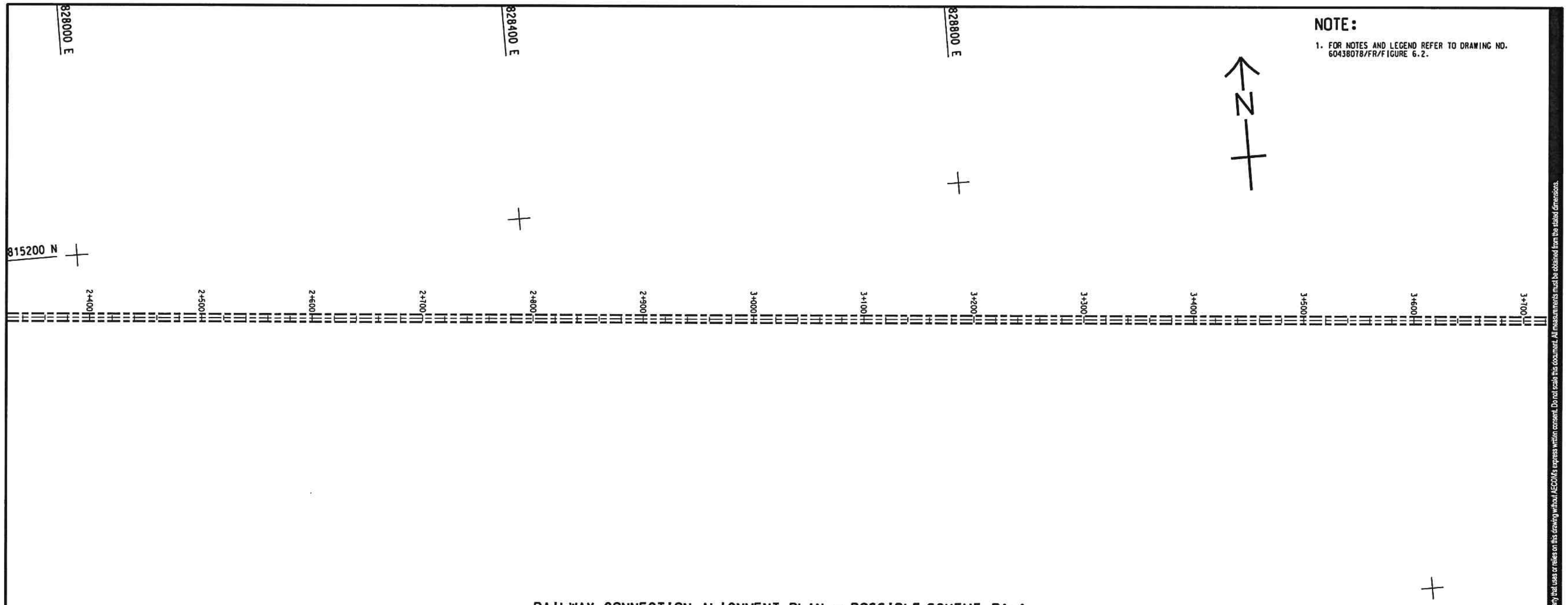
RAILWAY CONNECTION ALIGNMENT PLAN AND PROFILE - POSSIBLE SCHEME R1-1
SHEET 2 OF 5

SHEET NUMBER

60438078/RF/FIGURE 6.3

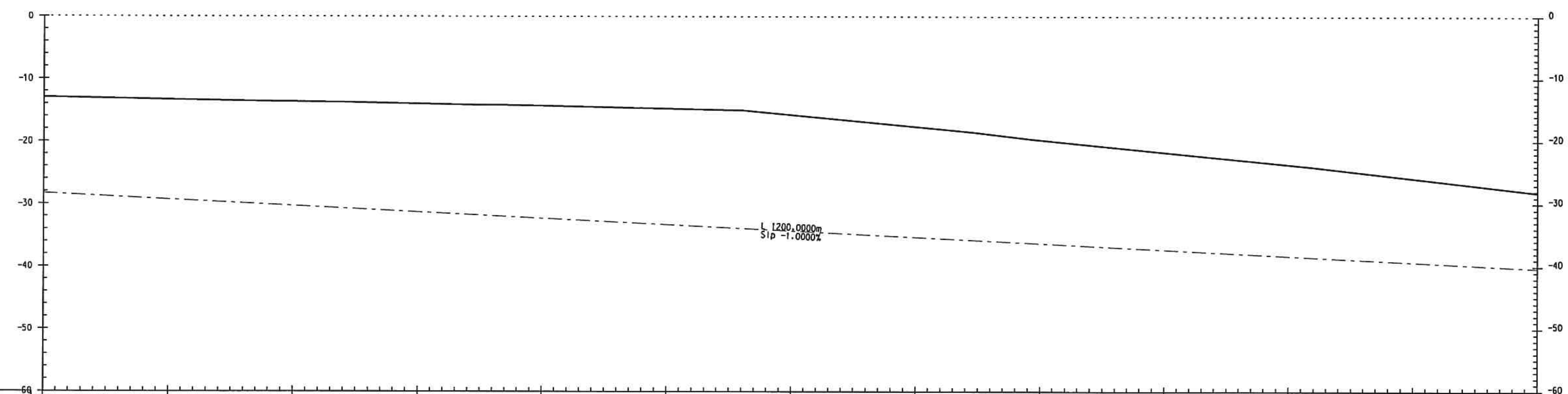
NOTE:

1. FOR NOTES AND LEGEND REFER TO DRAWING NO. 60438078/FR/FIGURE 6.2.



RAILWAY CONNECTION ALIGNMENT PLAN - POSSIBLE SCHEME R1-1

SCALE 1:4000



STATION:	2+400.000 2+450.000 2+500.000 2+550.000 2+600.000 2+650.000 2+700.000 2+750.000 2+800.000 2+850.000 2+900.000 2+950.000 3+000.000 3+050.000 3+100.000 3+150.000 3+200.000 3+250.000 3+300.000 3+350.000 3+400.000 3+450.000 3+500.000 3+550.000 3+600.000
DESIGN RAIL LEVELS:	-28.374 -28.574 -28.774 -28.974 -29.174 -29.374 -29.574 -29.774 -29.974 -30.174 -30.374 -30.574 -30.774 -30.974 -31.174 -31.374 -31.574 -31.774 -31.974 -32.174 -32.374 -32.574 -32.774 -32.974 -33.174 -33.374 -33.574 -33.774 -33.974 -34.174 -34.374 -34.574 -34.774 -34.974 -35.174 -35.374 -35.574 -35.774 -35.974 -36.174 -36.374 -36.574 -36.774 -36.974 -37.174 -37.374 -37.574 -37.774 -37.974 -38.174 -38.374 -38.574 -38.774 -38.974 -39.174 -39.374 -39.574 -39.774 -39.974 -40.174 -40.374
HORIZ. ALIGNMENT:	L 2754.8975
VERT. ALIGNMENT:	L = 1802.6373 Slp = -1.0000%

RAILWAY CONNECTION ALIGNMENT PROFILE - POSSIBLE SCHEME R1-1

SCALE 1:4000 (HOR.)
1:800 (VER.)

AECOM

PROJECT 項目

TECHNICAL STUDY ON TRANSPORT INFRASTRUCTURE AT KENNEDY TOWN FOR CONNECTING TO EAST LANTAU METROPOLIS - FEASIBILITY STUDY

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STATUS 階段

SCALE 比例: A3 AS SHOWN
DIMENSION UNIT 尺寸單位: METRES

KEY PLAN 索引圖

PROJECT NO. 項目編號: 60438078
AGREEMENT NO. 協議編號: CE 11/2015 (HY)

SHEET TITLE 圖紙名稱

RAILWAY CONNECTION ALIGNMENT PLAN AND PROFILE - POSSIBLE SCHEME R1-1

SHEET 3 OF 5

SHEET NUMBER 圖紙編號

60438078/FR/FIGURE 6.4

Project Management Initials: Designer: Checked: Approved: ISO A1 594mm x 841mm

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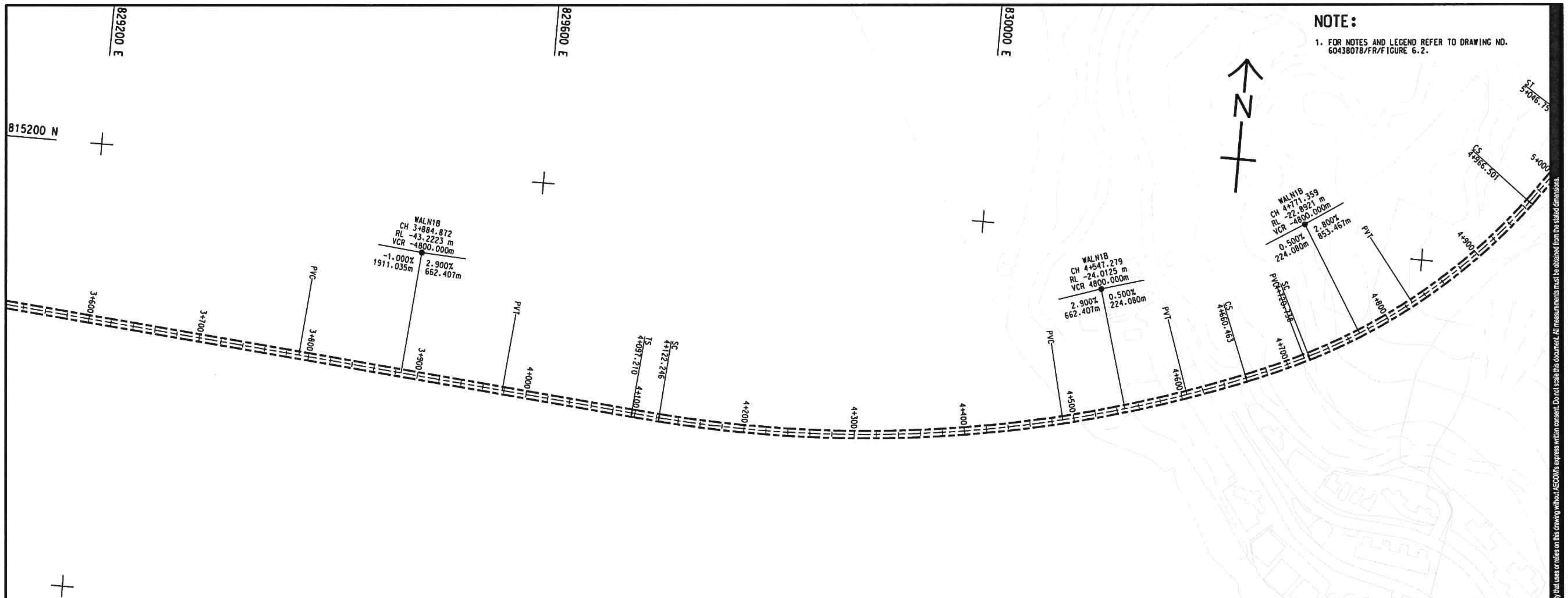
ISO A1 594mm x 841mm

Project Management Initials: Designer: Checked: Approved:

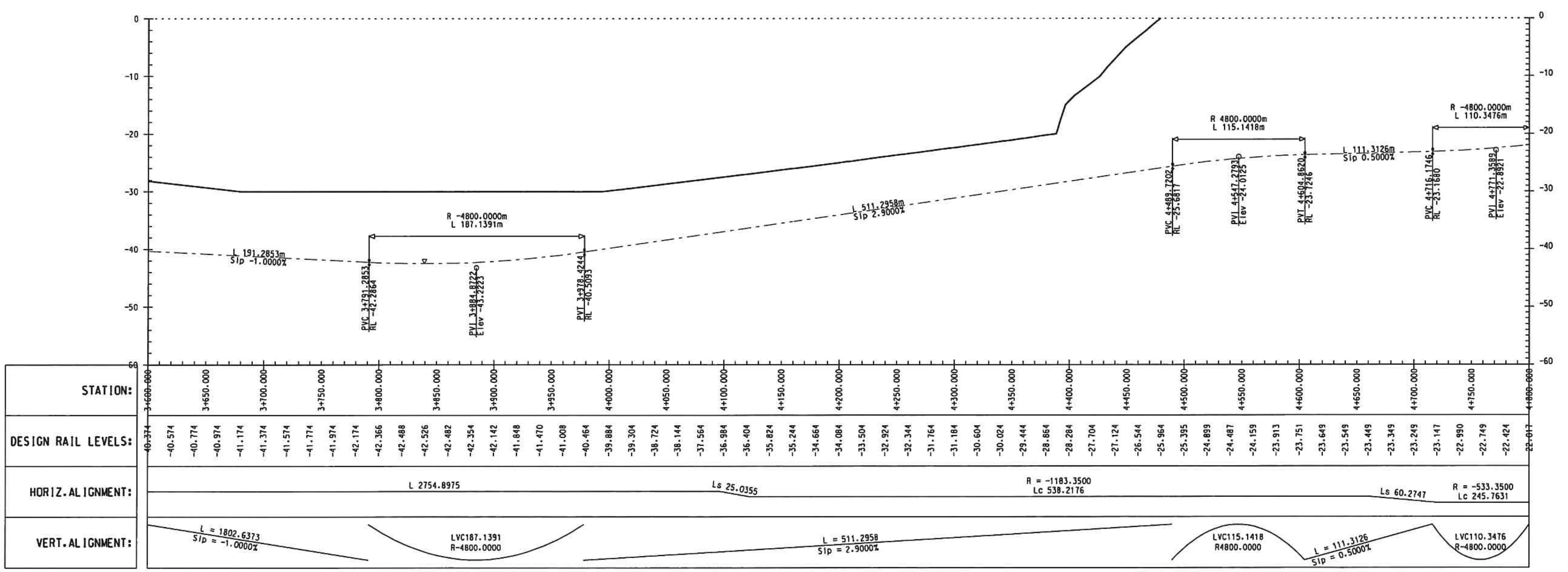
NOTE:

1. FOR NOTES AND LEGEND REFER TO DRAWING NO. 60438078/FR/FIGURE 6.2.



RAILWAY CONNECTION ALIGNMENT PLAN - POSSIBLE SCHEME R1-1

SCALE 1:4000



RAILWAY CONNECTION ALIGNMENT PROFILE - POSSIBLE SCHEME R1-1

SCALE 1:4000 (HOR.)
1:800 (VER.)

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AECOM

PROJECT 項目

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SCALE 比例: A3 AS SHOWN

DIMENSION UNIT 尺寸單位: METRES

KEY PLAN 索引圖

PROJECT NO. 項目編號: 60438078

AGREEMENT NO. 協議編號: CE 11/2015 (HY)

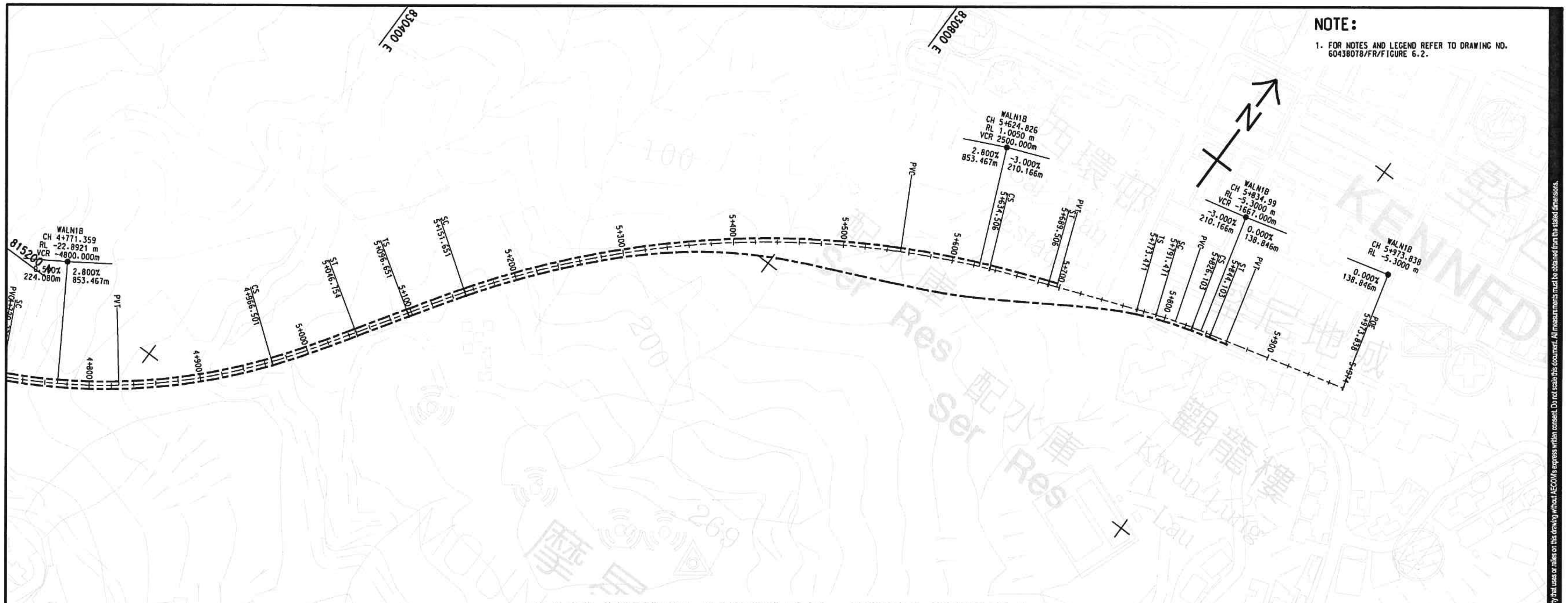
SHEET TITLE 圖紙名稱

RAILWAY CONNECTION ALIGNMENT PLAN AND PROFILE - POSSIBLE SCHEME R1-1

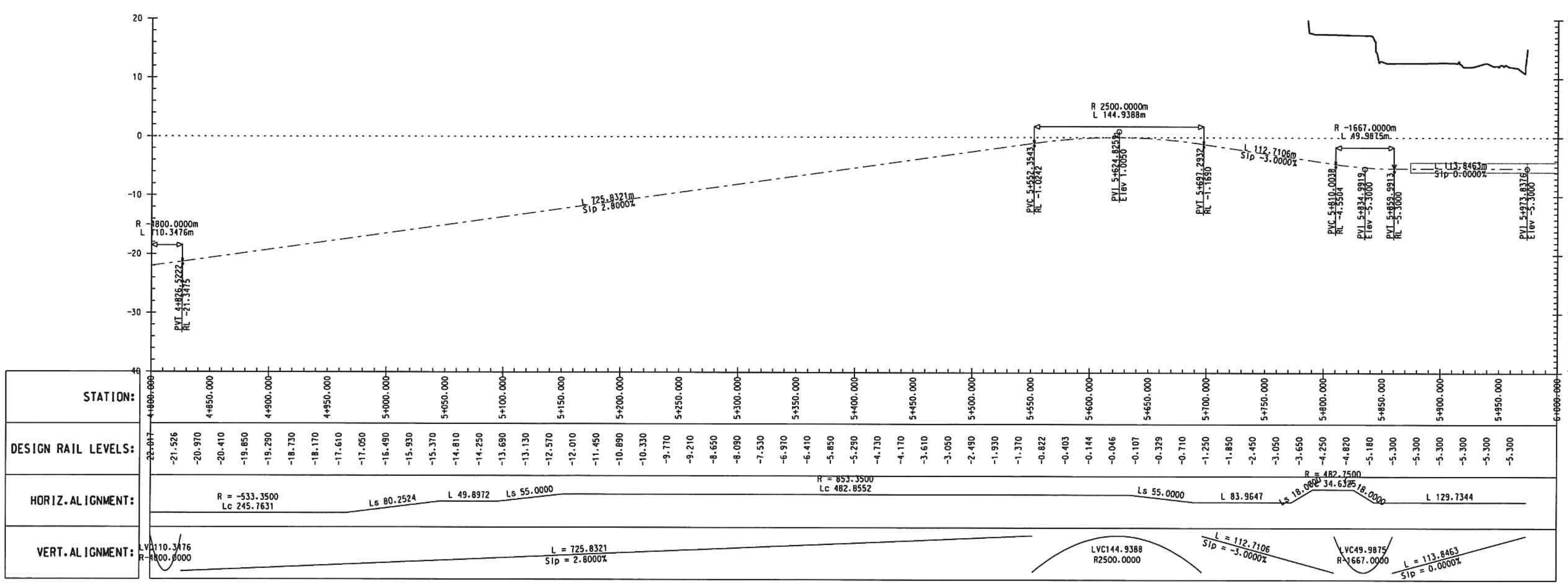
SHEET 4 OF 5

SHEET NUMBER 圖紙編號

60438078/FR/FIGURE 6.5



RAILWAY CONNECTION ALIGNMENT PLAN - POSSIBLE SCHEME R1-1
SCALE 1:4000



RAILWAY CONNECTION ALIGNMENT PROFILE - POSSIBLE SCHEME R1-1
SCALE 1:4000 (HOR.)
1:800 (VER.)

AECOM

PROJECT 項目

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ISSUE/REVISION 修訂

I/R 修訂	DATE 日期	DESCRIPTION 內容摘要	CHK. 審核

STATUS 階段

SCALE 比例	DIMENSION UNIT 尺寸單位
A3 AS SHOWN	METRES

KEY PLAN 索引圖

PROJECT NO. 項目編號	AGREEMENT NO. 協議編號
60438078	CE 11/2015 (HY)

SHEET TITLE 圖紙名稱

RAILWAY CONNECTION ALIGNMENT PLAN AND PROFILE - POSSIBLE SCHEME R1-1
SHEET 5 OF 5

SHEET NUMBER 圖紙編號

60438078/FR/FIGURE 6.6

Project Management Initials: Designer: Checked: Approved: ISO A1 594mm x 841mm

Plot File by: ZHANGWRS 2017/8/9

NOTES:

1. COORDINATES ARE RELATED TO HONG KONG METRIC GRID (1980).
2. DIMENSIONS AND CHAINAGE ARE IN METRES UNLESS OTHERWISE STATED.
3. THIS DRAWING TO BE READ IN CONJUNCTION WITH DRAWING NOS. 60438078/FR/FIGURE 6.8 TO 6.11.

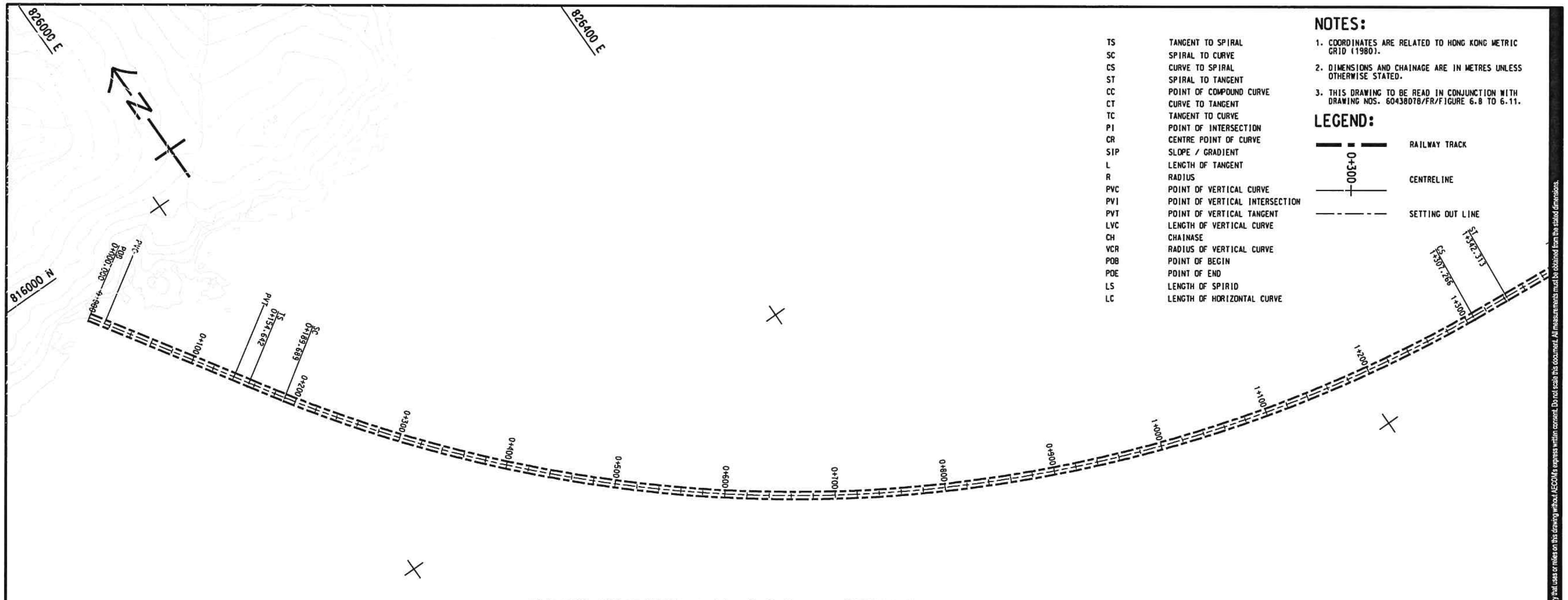
TS	TANGENT TO SPIRAL
SC	SPIRAL TO CURVE
CS	CURVE TO SPIRAL
ST	SPIRAL TO TANGENT
CC	POINT OF COMPOUND CURVE
CT	CURVE TO TANGENT
TC	TANGENT TO CURVE
PI	POINT OF INTERSECTION
CR	CENTRE POINT OF CURVE
SIP	SLOPE / GRADIENT
L	LENGTH OF TANGENT
R	RADIUS
PVC	POINT OF VERTICAL CURVE
PVI	POINT OF VERTICAL INTERSECTION
PVT	POINT OF VERTICAL TANGENT
LVC	LENGTH OF VERTICAL CURVE
CH	CHAINAGE
VCR	RADIUS OF VERTICAL CURVE
POB	POINT OF BEGIN
POE	POINT OF END
LS	LENGTH OF SPIRID
LC	LENGTH OF HORIZONTAL CURVE

LEGEND:

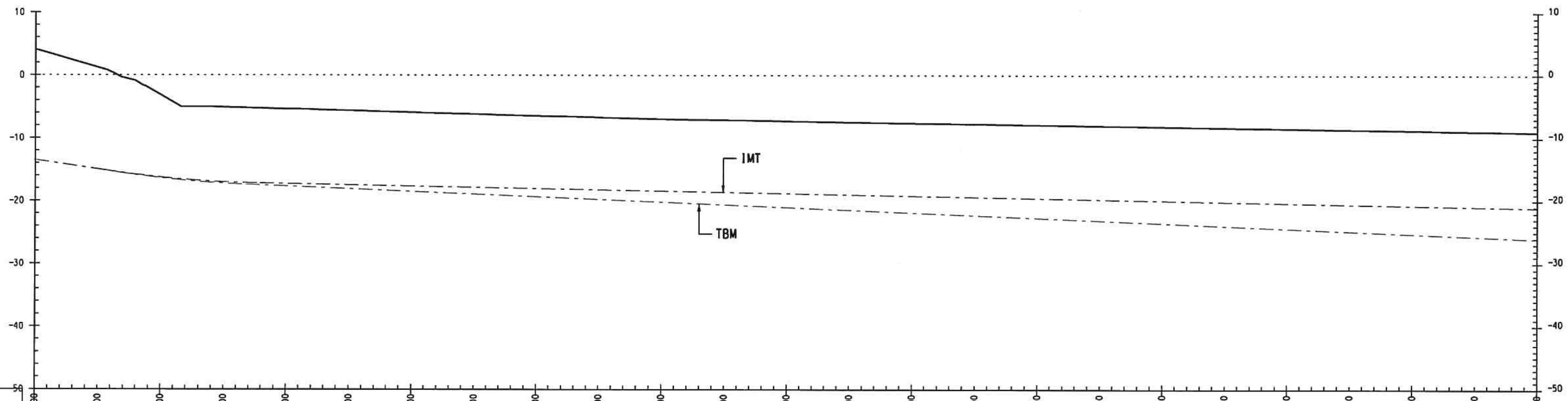
RAILWAY TRACK

0+300 CENTRELINE

SETTING OUT LINE



RAILWAY CONNECTION ALIGNMENT PLAN - POSSIBLE SCHEME R2-1
SCALE 1:4000



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DESIGN RAIL LEVELS: -13.518, -14.118, -14.718, -15.313, -15.843, -16.290, -16.654, -16.934, -17.131, -17.244, -17.321, -17.398, -17.474, -17.551, -17.627, -17.704, -17.780, -17.857, -17.934, -18.010, -18.087, -18.163, -18.240, -18.316, -18.393, -18.469, -18.546, -18.623, -18.699, -18.776, -18.852, -18.929, -19.005, -19.082, -19.159, -19.235, -19.312, -19.388, -19.465, -19.541, -19.618, -19.695, -19.771, -19.848, -19.924, -20.001, -20.077, -20.154, -20.231, -20.307, -20.384, -20.460, -20.537, -20.613, -20.690, -20.767, -20.843, -20.920, -20.996, -21.073, -21.149

HORIZ. ALIGNMENT: L 154.6421; Ls 35.0468; R = -1253.3500, Lc 1117.5770

VERT. ALIGNMENT: L = 53.3025, Sip = -3.0000%; LVC125.5590, R-4800.0000; L = 1780.1652, Sip = -0.3828%

RAILWAY CONNECTION ALIGNMENT PROFILE - POSSIBLE SCHEME R2-1
SCALE 1:4000 (HOR.)
1:800 (VER.)

Project Management Initials: Designer: Checked: Approved: ISO A1 594mm x 841mm

Plot File by: ZHANGWRS 2017/8/9
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AECOM

PROJECT 項目
TECHNICAL STUDY ON TRANSPORT INFRASTRUCTURE AT KENNEDY TOWN FOR CONNECTING TO EAST LANTAU METROPOLIS - FEASIBILITY STUDY

CLIENT 業主
CEDD 土木工程拓展署 Civil Engineering and Development Department

CONSULTANT 工程顧問公司
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SUB-CONSULTANTS 分判工程顧問公司

ISSUE/REVISION 修訂

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STATUS 階段

SCALE 比例: A3 AS SHOWN
DIMENSION UNIT 尺寸單位: METRES

KEY PLAN 索引圖

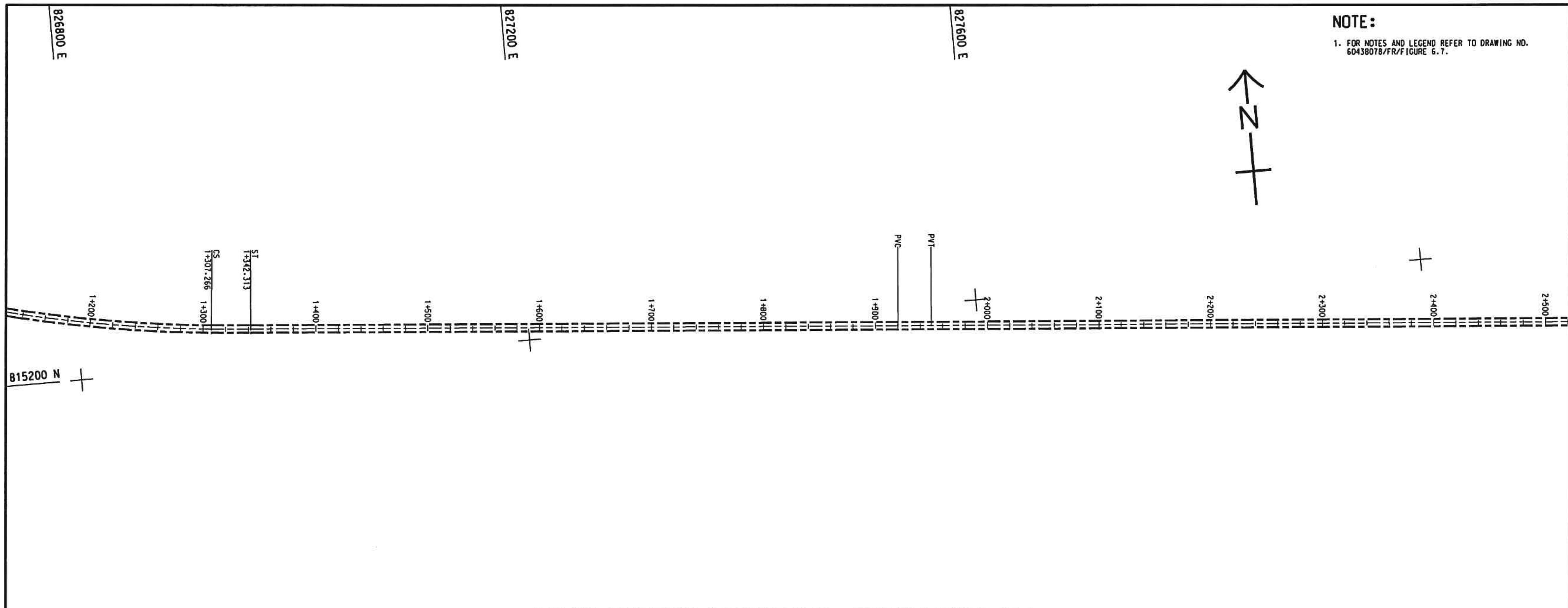
PROJECT NO. 項目編號: 60438078
AGREEMENT NO. 協議編號: CE 11/2015 (HY)

SHEET TITLE 圖紙名稱
RAILWAY CONNECTION ALIGNMENT PLAN AND PROFILE - POSSIBLE SCHEME R2-1
SHEET 1 OF 5

SHEET NUMBER 圖紙編號
60438078/FR/FIGURE 6.7

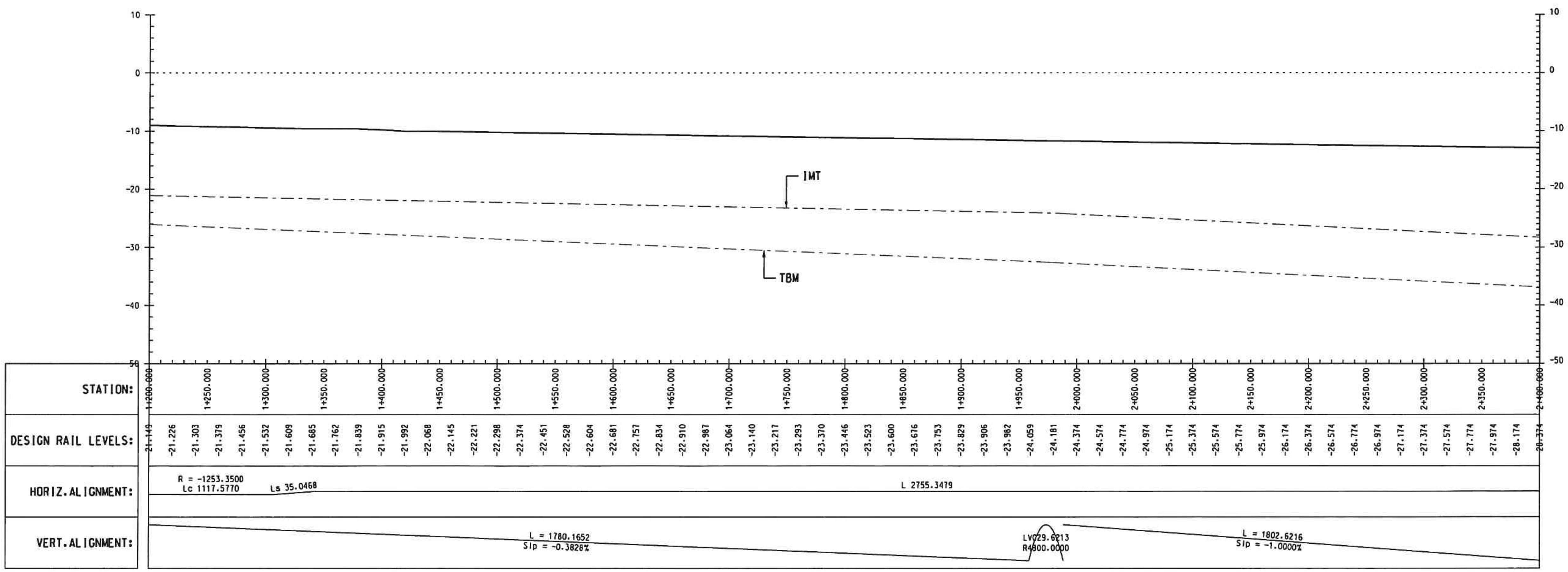
NOTE:

1. FOR NOTES AND LEGEND REFER TO DRAWING NO. 60438078/FR/FIGURE 6.7.



RAILWAY CONNECTION ALIGNMENT PLAN - POSSIBLE SCHEME R2-1

SCALE 1:4000



RAILWAY CONNECTION ALIGNMENT PROFILE - POSSIBLE SCHEME R2-1

SCALE 1:4000 (HOR.)
1:800 (VER.)

AECOM

PROJECT

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I/R	DATE	DESCRIPTION	CHK.

STATUS

SCALE: A3 AS SHOWN

DIMENSION UNIT: METRES

KEY PLAN

PROJECT NO.: 60438078

AGREEMENT NO.: CE 11/2015 (HY)

SHEET TITLE

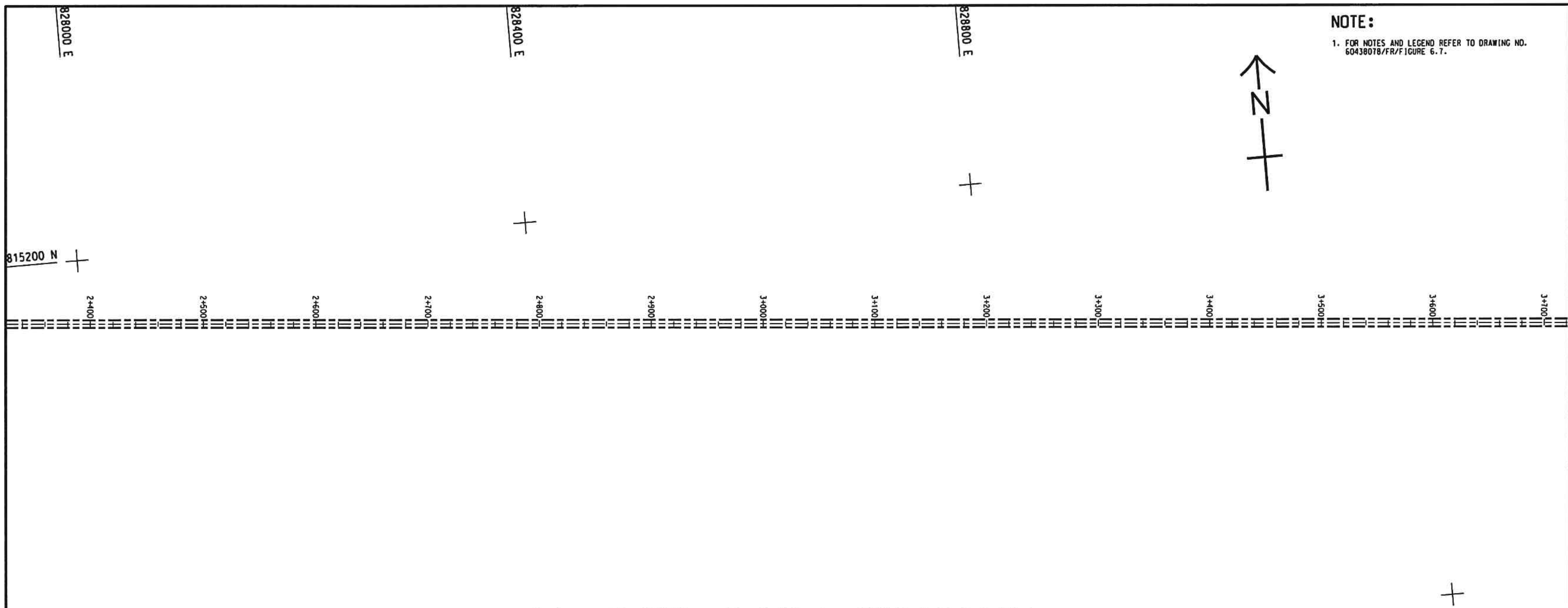
RAILWAY CONNECTION ALIGNMENT PLAN AND PROFILE - POSSIBLE SCHEME R2-1

SHEET 2 OF 5

SHEET NUMBER

60438078/FR/FIGURE 6.8

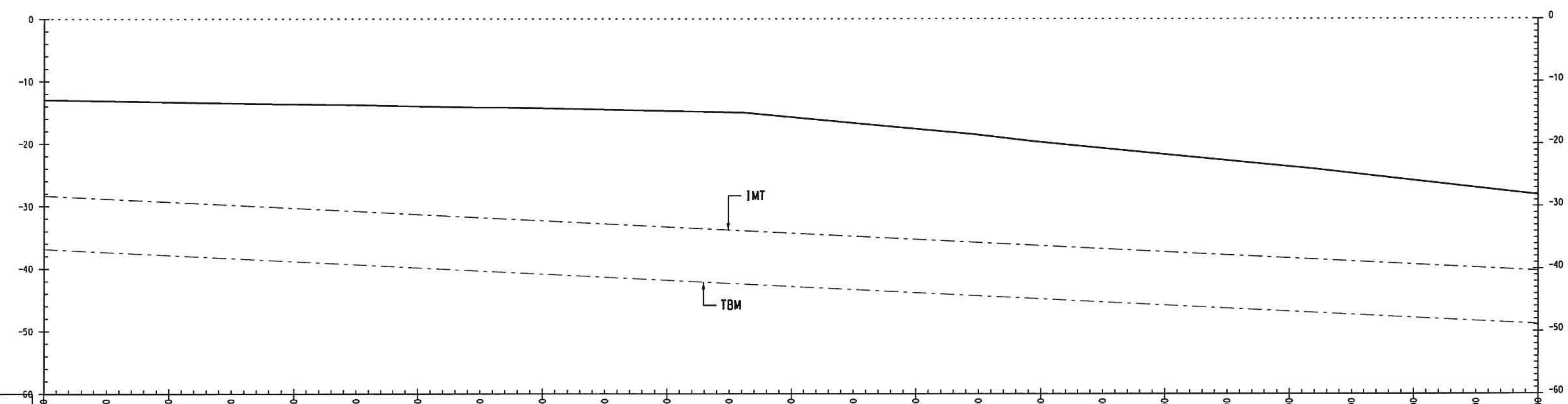
ISO A1 594mm x 841mm
Project Management Initials: Designer: Checked: Approved:
Plot File by: ZHANGWRS 2017/8/9
PATH: pw:\\HKSHT1VAP098.aecomonline.local:AECOM_DS02_AS\Documents\60438078 KT FS\CAD_PRODUCTION\DRAWING\REPORT\FR\FR_608.dgn



NOTE:

1. FOR NOTES AND LEGEND REFER TO DRAWING NO. 60438078/FR/FIGURE 6.7.

RAILWAY CONNECTION ALIGNMENT PLAN - POSSIBLE SCHEME R2-1
SCALE 1:4000



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DESIGN RAIL LEVELS:	-28.374, -28.574, -28.774, -28.974, -29.174, -29.374, -29.574, -29.774, -29.974, -30.174, -30.374, -30.574, -30.774, -30.974, -31.174, -31.374, -31.574, -31.774, -31.974, -32.174, -32.374, -32.574, -32.774, -32.974, -33.174, -33.374, -33.574, -33.774, -33.974, -34.174, -34.374, -34.574, -34.774, -34.974, -35.174, -35.374, -35.574, -35.774, -35.974, -36.174, -36.374, -36.574, -36.774, -36.974, -37.174, -37.374, -37.574, -37.774, -37.974, -38.174, -38.374, -38.574, -38.774, -38.974, -39.174, -39.374, -39.574, -39.774, -39.974, -40.174, -40.374
HORIZ. ALIGNMENT:	L 2755.3479
VERT. ALIGNMENT:	L = 1802.6216 Slp = -1.0000%

RAILWAY CONNECTION ALIGNMENT PROFILE - POSSIBLE SCHEME R2-1
SCALE 1:4000 (HOR.)
1:800 (VER.)

AECOM

PROJECT
項目

TECHNICAL STUDY ON TRANSPORT INFRASTRUCTURE AT KENNEDY TOWN FOR CONNECTING TO EAST LANTAU METROPOLIS - FEASIBILITY STUDY

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業主

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STATUS
階段

SCALE
比例
A3 AS SHOWN

DIMENSION UNIT
尺寸單位
METRES

KEY PLAN
索引圖

PROJECT NO.
項目編號
60438078

AGREEMENT NO.
協議編號
CE 11/2015 (HY)

SHEET TITLE
圖紙名稱

RAILWAY CONNECTION ALIGNMENT PLAN AND PROFILE - POSSIBLE SCHEME R2-1

SHEET 3 OF 5

SHEET NUMBER
圖紙編號
60438078/FR/FIGURE 6.9

ISO A1 594mm x 841mm
Approved:
Checked:
Designer:
Project Management Initials:

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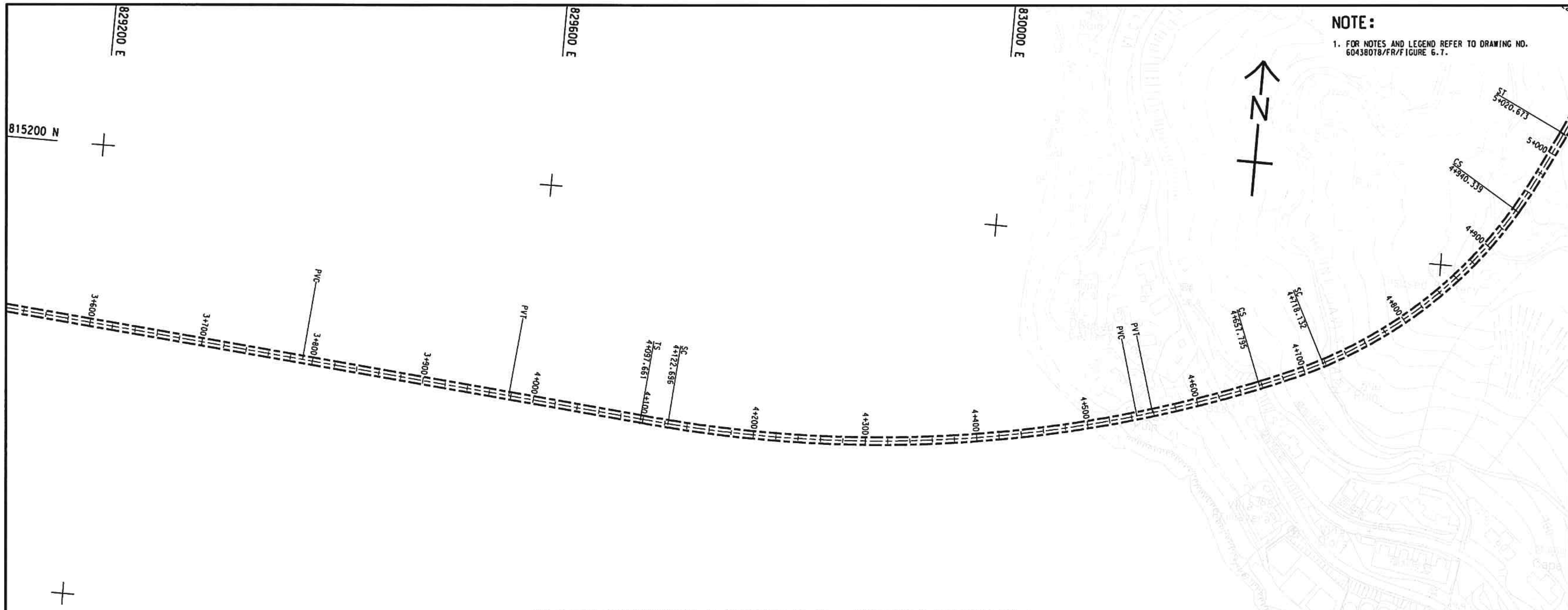
PATH: pw:\\HKSHT1VAP096.aecomonline.local\AECOM_DS02_AS\Documents\60438078 KT FS\CAD_PRODUCTION\DRAWING\REPORT\FR\FR_609.dgn

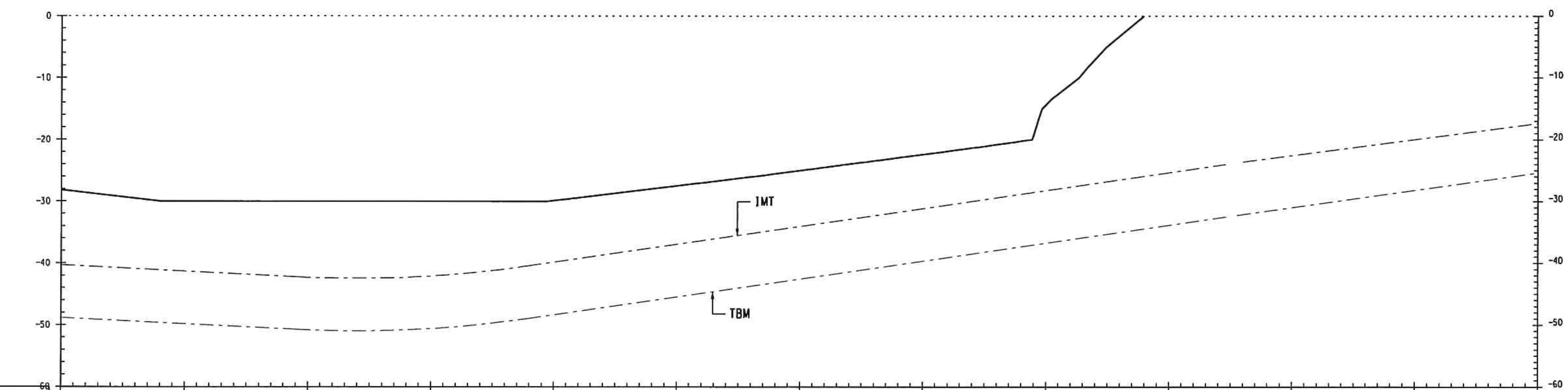
NOTE:

1. FOR NOTES AND LEGEND REFER TO DRAWING NO. 60438078/FR/FIGURE 6.7.



RAILWAY CONNECTION ALIGNMENT PLAN - POSSIBLE SCHEME R2-1

SCALE 1:4000



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DESIGN RAIL LEVELS: -40.374, -40.574, -40.774, -40.974, -41.174, -41.374, -41.574, -41.774, -41.974, -42.174, -42.366, -42.488, -42.526, -42.481, -42.353, -42.142, -41.847, -41.469, -41.008, -40.463, -39.883, -39.303, -38.723, -38.143, -37.563, -36.983, -36.403, -35.823, -35.243, -34.663, -34.083, -33.503, -32.923, -32.343, -31.763, -31.183, -30.603, -30.023, -29.443, -28.863, -28.283, -27.703, -27.123, -26.543, -25.963, -25.383, -24.803, -24.223, -23.664, -23.144, -22.624, -22.104, -21.584, -21.064, -20.544, -20.024, -19.504, -18.984, -18.464, -17.944, -17.424

HORIZ. ALIGNMENT: L 2755.3479; Ls 25.0355; R = -1183.3500 Lc 535.0993; Ls 60.3362; R = -403.3500 Lc 222.2075

VERT. ALIGNMENT: L = 1802.6216 Slp = -1.0000%; LVC187.1391 R-4800.0000; L = 567.4854 Slp = 2.9000%; LVC14.3837 R4800.0000; L = 848.7156 Slp = 2.6000%

RAILWAY CONNECTION ALIGNMENT PROFILE - POSSIBLE SCHEME R2-1

SCALE 1:4000 (HOR.)
1:800 (VER.)

AECOM

PROJECT 項目

TECHNICAL STUDY ON TRANSPORT INFRASTRUCTURE AT KENNEDY TOWN FOR CONNECTING TO EAST LANTAU METROPOLIS - FEASIBILITY STUDY

CLIENT 業主

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I/R 修訂	DATE 日期	DESCRIPTION 內容摘要	CHK. 審核

STATUS 階段

SCALE 比例: A3 AS SHOWN

DIMENSION UNIT 尺寸單位: METRES

KEY PLAN 索引圖

PROJECT NO. 項目編號: 60438078

AGREEMENT NO. 協議編號: CE 11/2015 (HY)

SHEET TITLE 圖紙名稱

RAILWAY CONNECTION ALIGNMENT PLAN AND PROFILE - POSSIBLE SCHEME R2-1

SHEET 4 OF 5

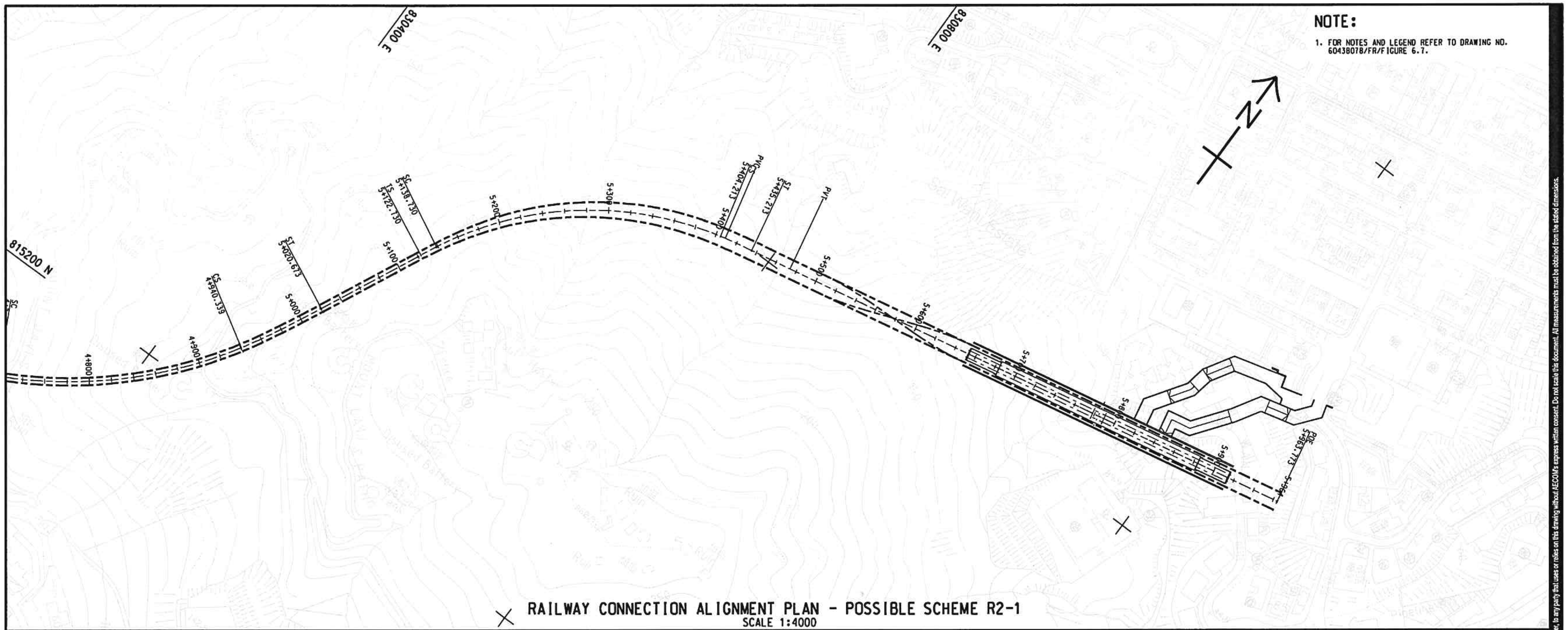
SHEET NUMBER 圖紙編號

60438078/RF/FIGURE 6.10

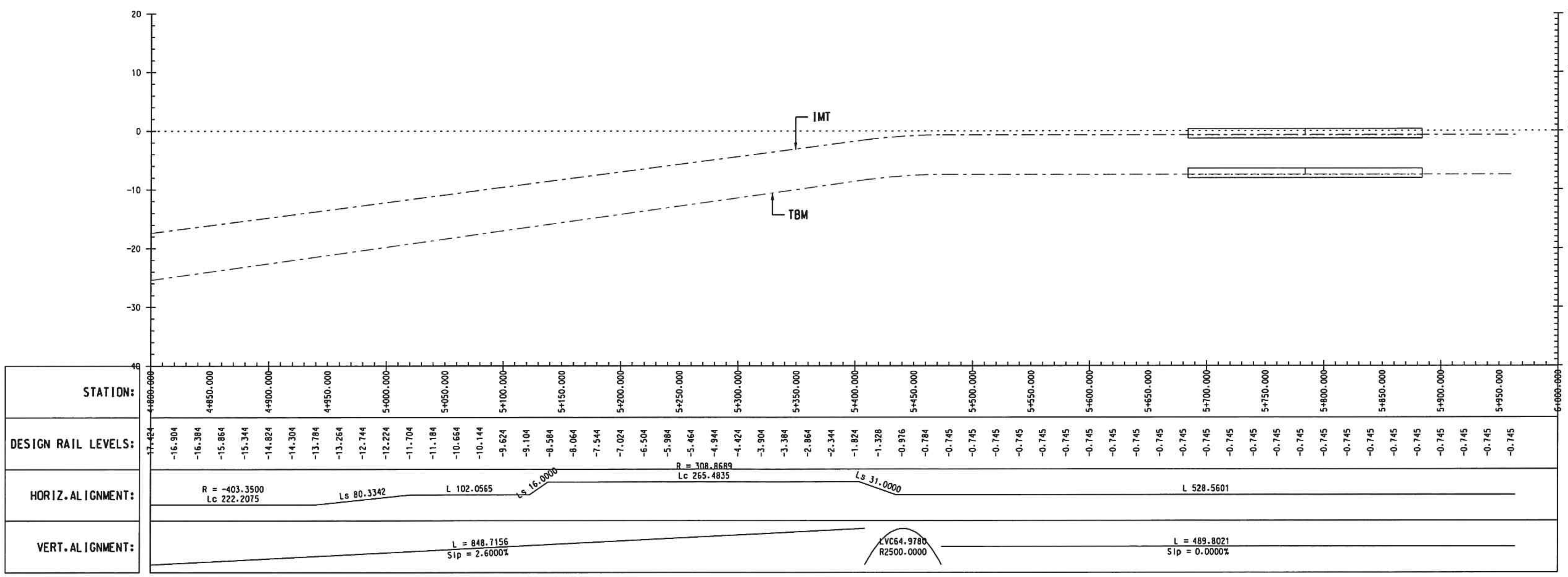
Plot File by: ZHANGWRS 2017/8/9
PATH: pw:\\HKSHTTVAP086.aecomonline.local:AECOM_DS02_AS\Documents\60438078 KT FS\CAD_PRODUCTION\DRAWING\REPORT\FR\FR_610.dgn

NOTE:

1. FOR NOTES AND LEGEND REFER TO DRAWING NO. 60438078/FR/FIGURE 6.7.



RAILWAY CONNECTION ALIGNMENT PLAN - POSSIBLE SCHEME R2-1
SCALE 1:4000



RAILWAY CONNECTION ALIGNMENT PROFILE - POSSIBLE SCHEME R2-1
SCALE 1:4000 (HOR.)
1:800 (VER.)

AECOM

PROJECT 項目
TECHNICAL STUDY ON TRANSPORT INFRASTRUCTURE AT KENNEDY TOWN FOR CONNECTING TO EAST LANTAU METROPOLIS - FEASIBILITY STUDY

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I/R	DATE 日期	DESCRIPTION 內容摘要	CHK.

STATUS

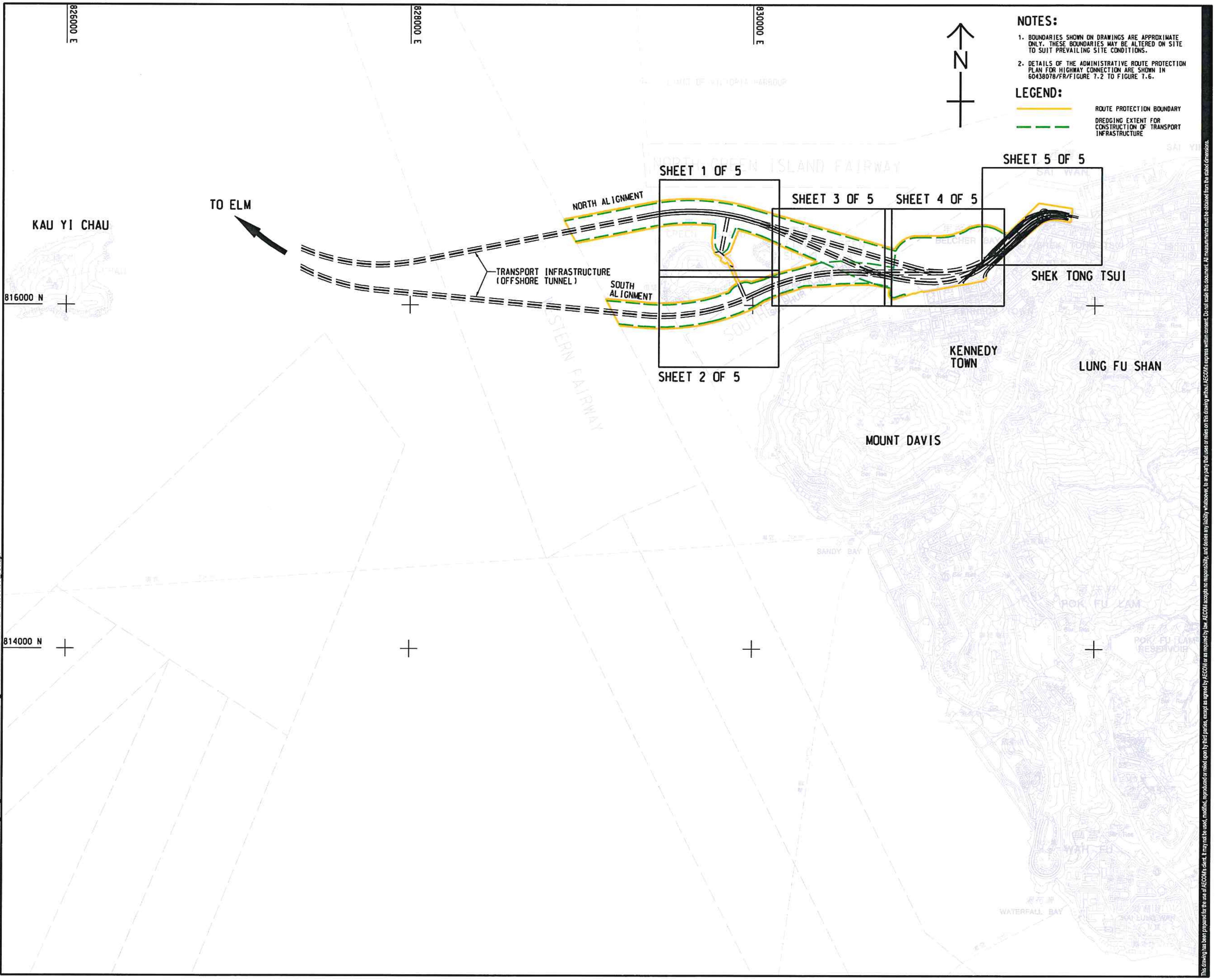
SCALE	DIMENSION UNIT
A3 AS SHOWN	METRES

KEY PLAN

PROJECT NO.	AGREEMENT NO.
60438078	CE 11/2015 (HY)

SHEET TITLE
RAILWAY CONNECTION ALIGNMENT PLAN AND PROFILE - POSSIBLE SCHEME R2-1
SHEET 5 OF 5

SHEET NUMBER
60438078/FR/FIGURE 6.11



NOTES:

1. BOUNDARIES SHOWN ON DRAWINGS ARE APPROXIMATE ONLY. THESE BOUNDARIES MAY BE ALTERED ON SITE TO SUIT PREVAILING SITE CONDITIONS.
2. DETAILS OF THE ADMINISTRATIVE ROUTE PROTECTION PLAN FOR HIGHWAY CONNECTION ARE SHOWN IN 60438078/FR/FIGURE 7.2 TO FIGURE 7.6.

LEGEND:

ROUTE PROTECTION BOUNDARY

DREDGING EXTENT FOR CONSTRUCTION OF TRANSPORT INFRASTRUCTURE

AECOM

PROJECT 項目

TECHNICAL STUDY ON TRANSPORT INFRASTRUCTURE AT KENNEDY TOWN FOR CONNECTING TO EAST LANTAU METROPOLIS - FEASIBILITY STUDY

CLIENT 業主

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STATUS 階段

SCALE 比例: A3 1 : 20000

DIMENSION UNIT 尺寸單位: METRES

KEY PLAN 索引圖

PROJECT NO. 項目編號: 60438078

AGREEMENT NO. 協議編號: CE 11/2015 (HY)

SHEET TITLE 圖紙名稱

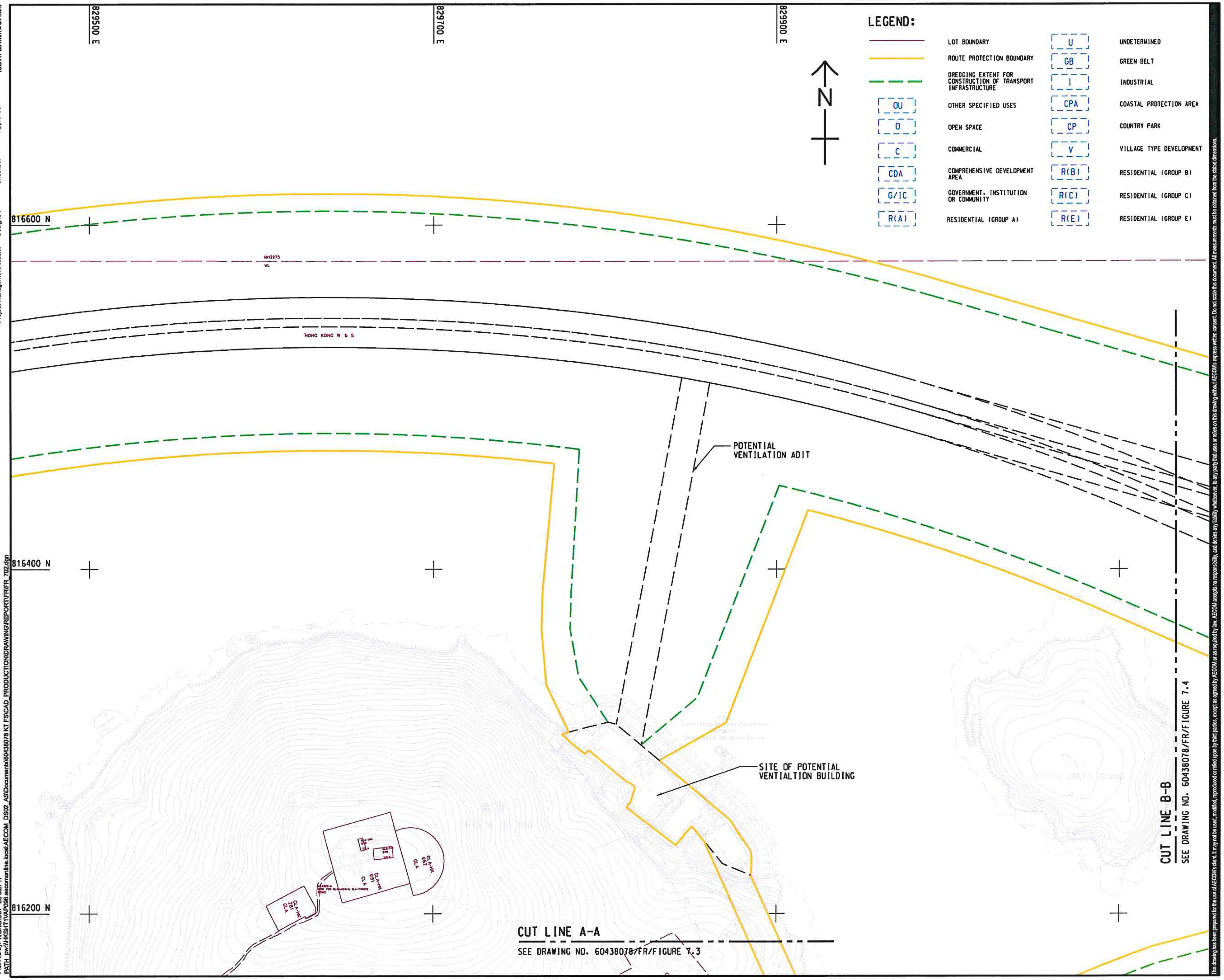
ADMINISTRATIVE ROUTE PROTECTION PLAN FOR HIGHWAY CONNECTION - KEY PLAN

SHEET NUMBER 圖紙編號

60438078/FR/FIGURE 7.1

Project Management Initials: Designer: Checked: Approved: ISO A1 594mm x 841mm

Plot File by: ZHANGWRS 2017/8/10



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PROJECT 項目

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SCALE 比例 A3 1 : 2000

DIMENSION UNIT 尺寸單位 METRES

KEY PLAN 索引圖

PROJECT NO. 項目編號 60438078

AGREEMENT NO. 協議編號 CE 11/2015 (HY)

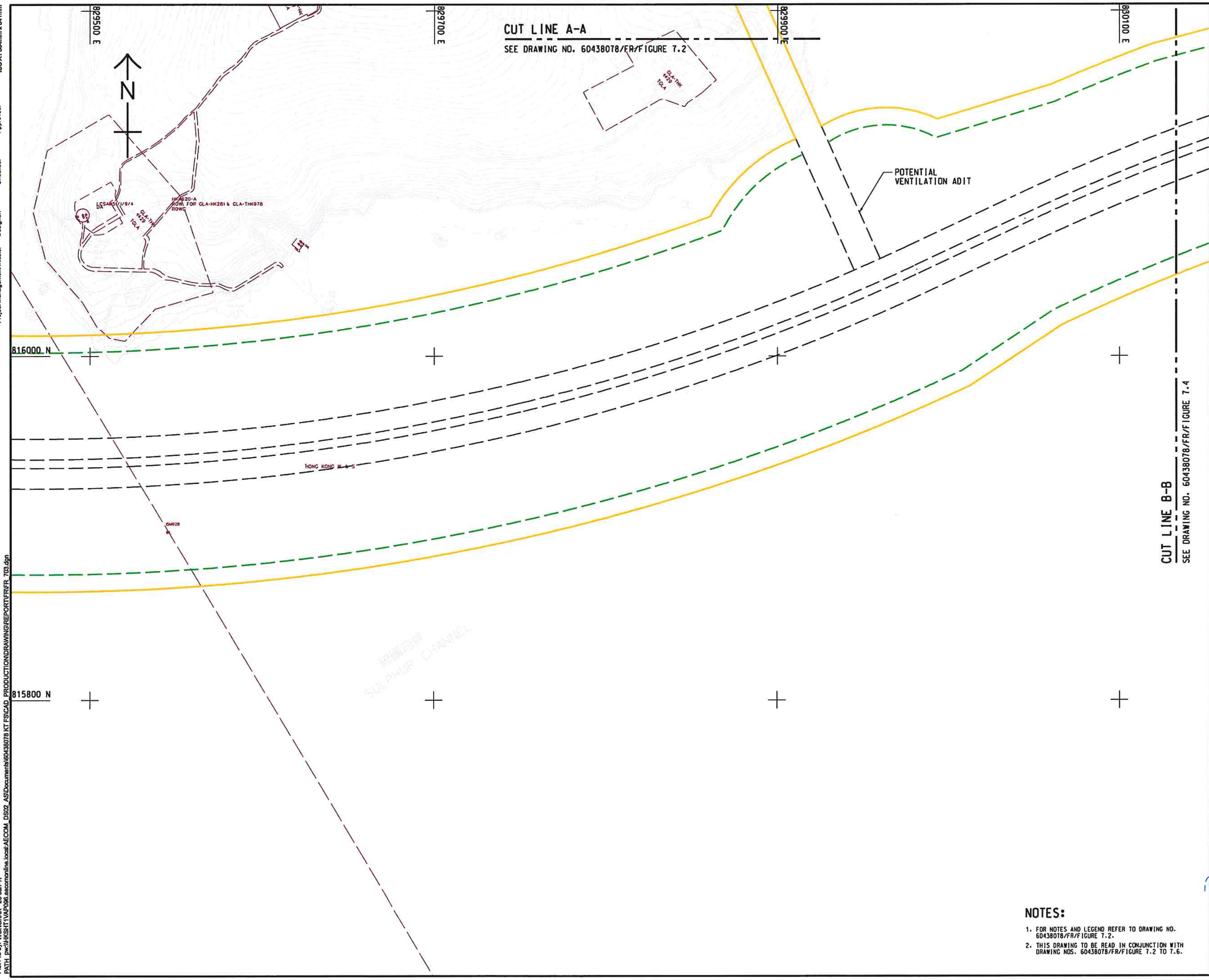
SHEET TITLE 圖紙名稱

ADMINISTRATIVE ROUTE PROTECTION PLAN FOR HIGHWAY CONNECTION

SHEET 1 OF 5

SHEET NUMBER 圖紙編號

60438078/FR/FIGURE 7.2



NOTES:

1. FOR NOTES AND LEGEND REFER TO DRAWING NO. 60438078/FR/FIGURE 7.2.
2. THIS DRAWING TO BE READ IN CONJUNCTION WITH DRAWING NOS. 60438078/FR/FIGURE 7.2 TO 7.6.

AECOM

PROJECT 項目

TECHNICAL STUDY ON TRANSPORT INFRASTRUCTURE AT KENNEDY TOWN FOR CONNECTING TO EAST LANTAU METROPOLIS - FEASIBILITY STUDY

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SCALE 比例: A3 1 : 2000

DIMENSION UNIT 尺寸單位: METRES

KEY PLAN 索引圖

PROJECT NO. 項目編號: 60438078

AGREEMENT NO. 協議編號: CE 11/2015 (HY)

SHEET TITLE 圖紙名稱

ADMINISTRATIVE ROUTE PROTECTION PLAN FOR HIGHWAY CONNECTION

SHEET 2 OF 5

SHEET NUMBER 圖紙編號

60438078/FR/FIGURE 7.3

ISO A1 594mm x 841mm

Approved: Checked: Designer: Project Management Initials:

Plot File by: WONGKK 28-Jan-17
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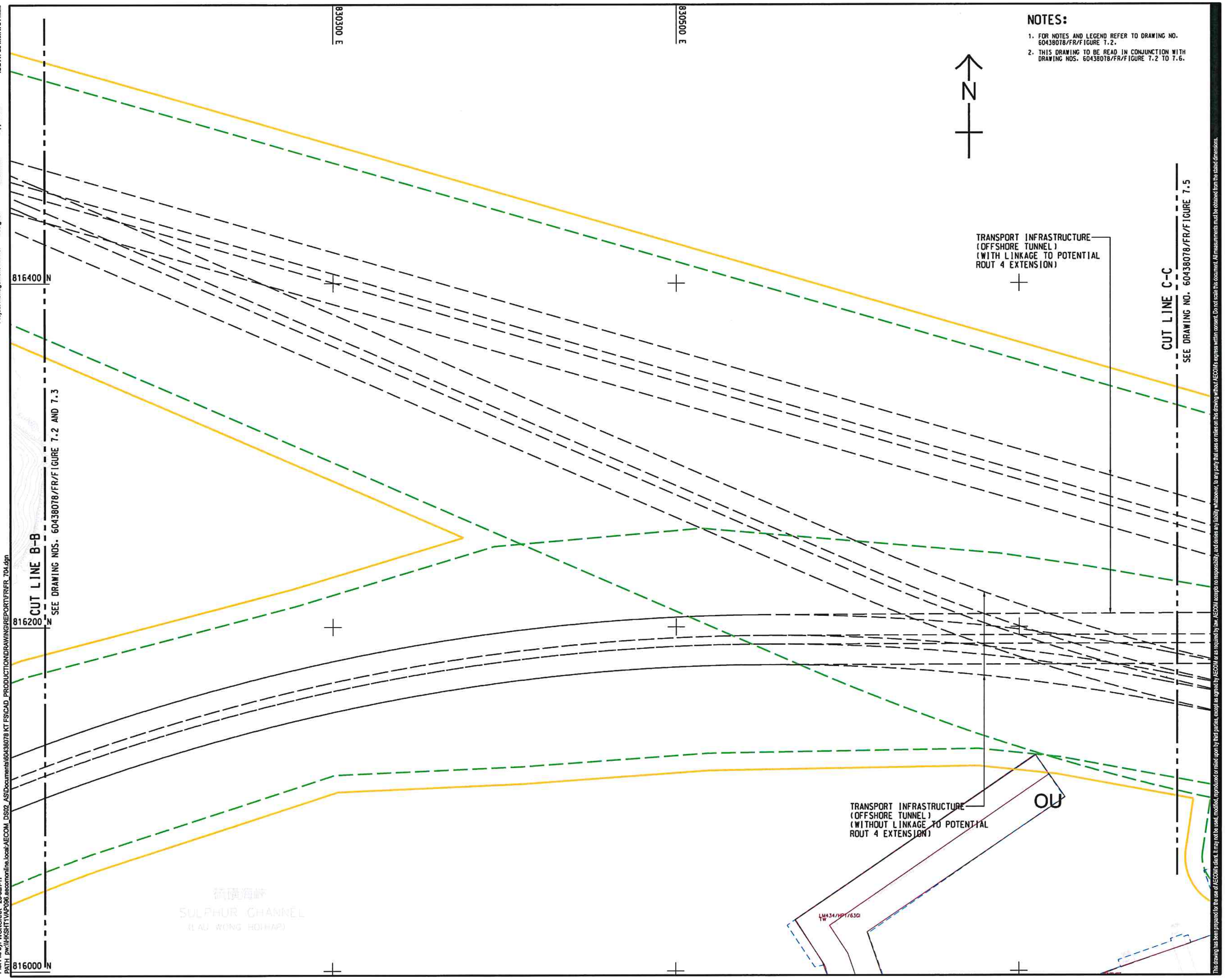

NOTES:

1. FOR NOTES AND LEGEND REFER TO DRAWING NO. 60438078/FR/FIGURE 7.2.
2. THIS DRAWING TO BE READ IN CONJUNCTION WITH DRAWING NOS. 60438078/FR/FIGURE 7.2 TO 7.6.

AECOM

PROJECT 項目

TECHNICAL STUDY ON TRANSPORT INFRASTRUCTURE AT KENNEDY TOWN FOR CONNECTING TO EAST LANTAU METROPOLIS - FEASIBILITY STUDY

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STATUS 階段

SCALE 比例: A3 1 : 2000
DIMENSION UNIT 尺寸單位: METRES

KEY PLAN 索引圖

PROJECT NO. 項目編號: 60438078
AGREEMENT NO. 協議編號: CE 11/2015 (HY)

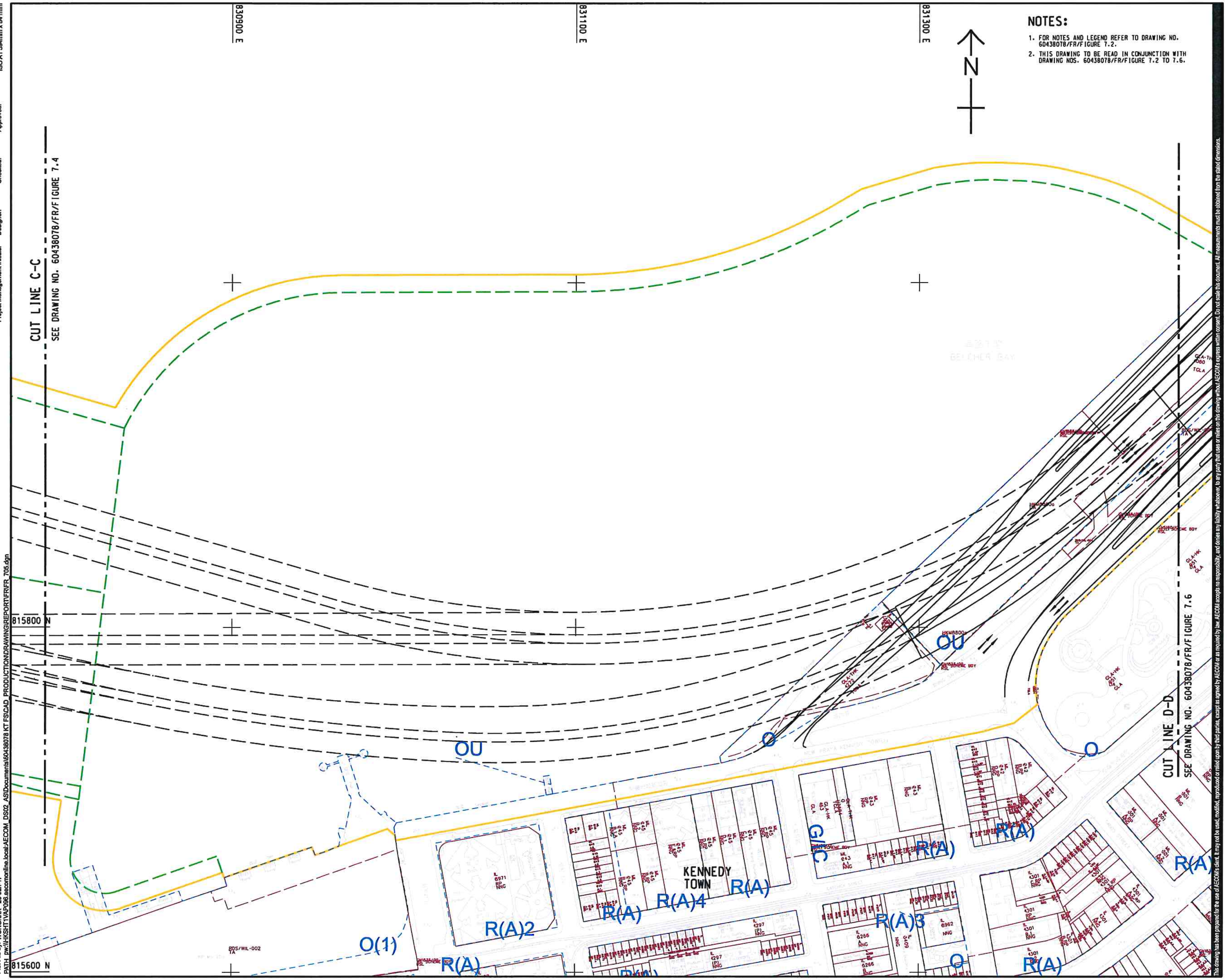
SHEET TITLE 圖紙名稱

ADMINISTRATIVE ROUTE PROTECTION PLAN FOR HIGHWAY CONNECTION

SHEET 3 OF 5

SHEET NUMBER 圖紙編號

60438078/FR/FIGURE 7.4



NOTES:

1. FOR NOTES AND LEGEND REFER TO DRAWING NO. 60438078/FR/FIGURE 7.2.
2. THIS DRAWING TO BE READ IN CONJUNCTION WITH DRAWING NOS. 60438078/FR/FIGURE 7.2 TO 7.6.

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PROJECT 項目

TECHNICAL STUDY ON TRANSPORT INFRASTRUCTURE AT KENNEDY TOWN FOR CONNECTING TO EAST LANTAU METROPOLIS - FEASIBILITY STUDY

CLIENT 業主

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CEDD Civil Engineering and Development Department

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STATUS 階段

SCALE 比例: A3 1 : 2000

DIMENSION UNIT 尺寸單位: METRES

KEY PLAN 索引圖

PROJECT NO. 項目編號: 60438078

AGREEMENT NO. 協議編號: CE 11/2015 (HY)

SHEET TITLE 圖紙名稱

ADMINISTRATIVE ROUTE PROTECTION PLAN FOR HIGHWAY CONNECTION

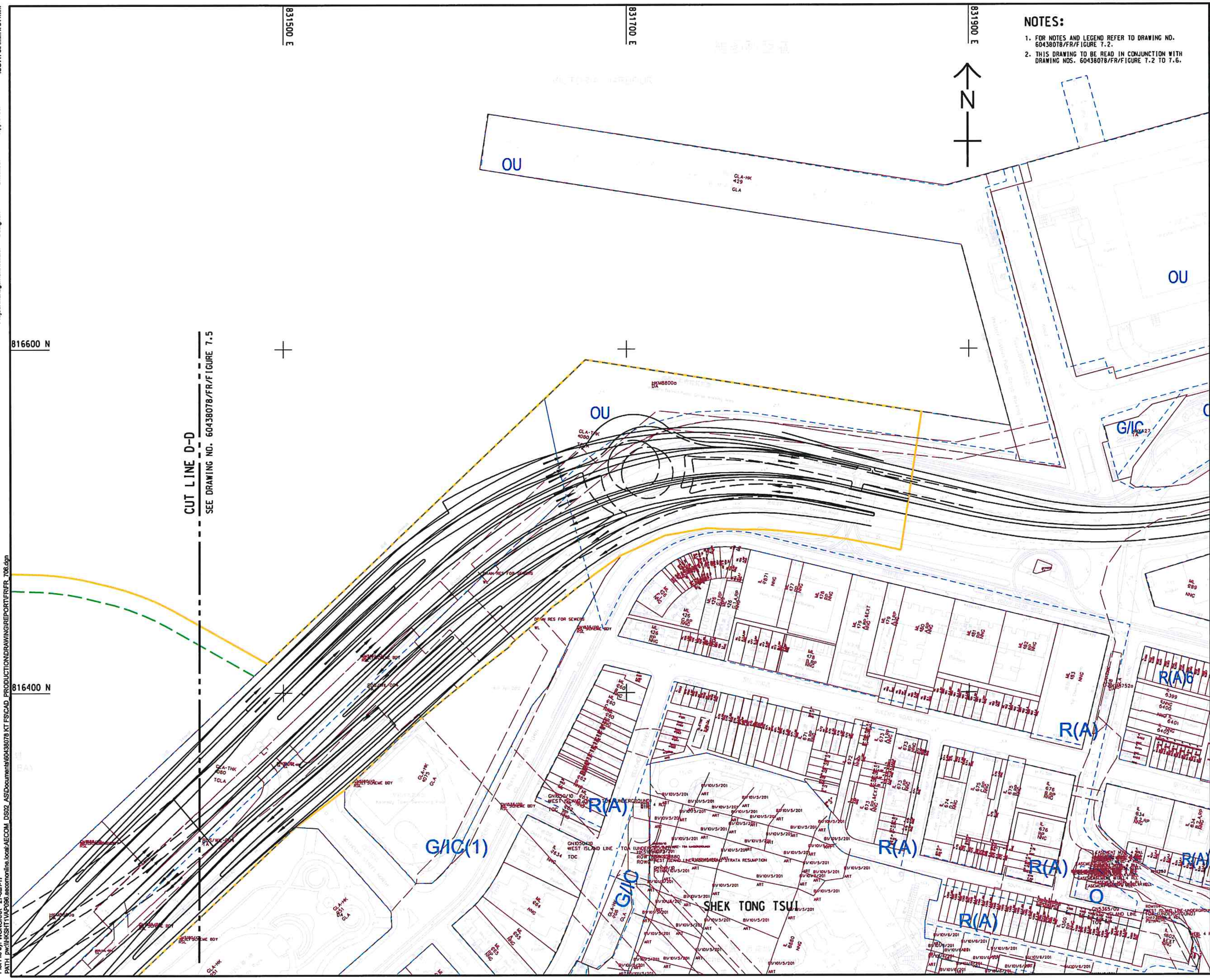
SHEET 4 OF 5

SHEET NUMBER 圖紙編號

60438078/FR/FIGURE 7.5

Project Management Initials: Designer: Checked: Approved: ISO A1 594mm x 841mm

Plot File by: WONGKK 28-Jan-17



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1. FOR NOTES AND LEGEND REFER TO DRAWING NO. 60438078/FR/FIGURE 7.2.
2. THIS DRAWING TO BE READ IN CONJUNCTION WITH DRAWING NOS. 60438078/FR/FIGURE 7.2 TO 7.6.

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PROJECT

TECHNICAL STUDY ON TRANSPORT INFRASTRUCTURE AT KENNEDY TOWN FOR CONNECTING TO EAST LANTAU METROPOLIS - FEASIBILITY STUDY

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SCALE: A3 1 : 2000

DIMENSION UNIT: METRES

KEY PLAN

PROJECT NO.: 60438078

AGREEMENT NO.: CE 11/2015 (HY)

SHEET TITLE

ADMINISTRATIVE ROUTE PROTECTION PLAN FOR HIGHWAY CONNECTION

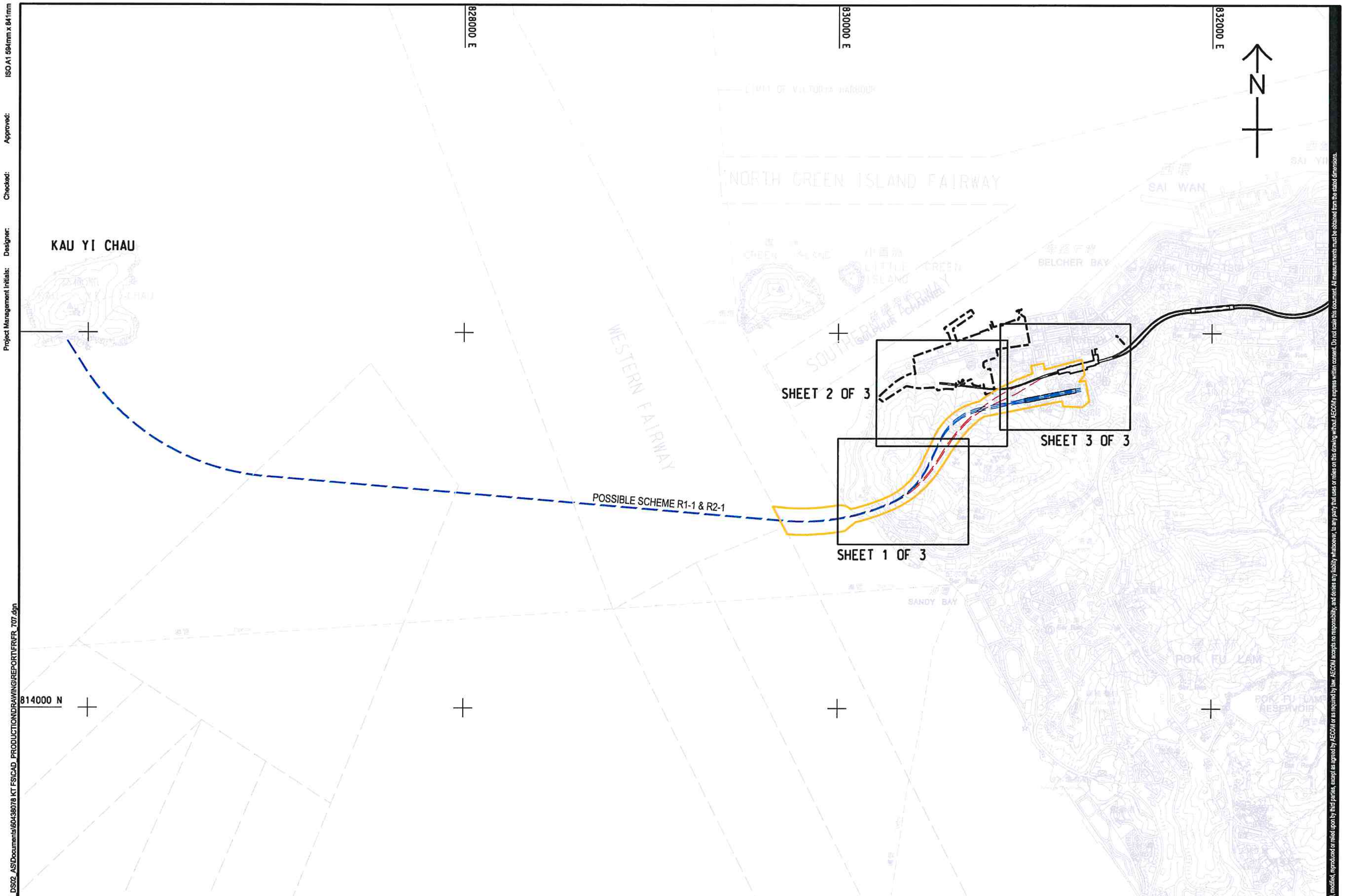
SHEET 5 OF 5

SHEET NUMBER

60438078/FR/FIGURE 7.6

ISO A1 594mm x 841mm Approved: Checked: Designer: Project Management initials:

Plot File by: WONGKK 27-Jan-17



NOTES:

1. BOUNDARIES SHOWN ON DRAWINGS ARE APPROXIMATE ONLY. THESE BOUNDARIES MAY BE ALTERED ON SITE TO SUIT PREVAILING SITE CONDITIONS.
2. DETAILS OF THE ADMINISTRATIVE ROUTE PROTECTION PLAN FOR RAILWAY CONNECTIONS ARE SHOWN IN 60438078/FR/FIGURE 7.8 TO FIGURE 7.10.

LEGEND:

- LAND USE REVIEW ON THE WESTERN PART OF KENNEDY TOWN
- POSSIBLE SCHEME R1-1 (EXTENSION OF EXISTING WIL)
- POSSIBLE SCHEME R2-1 (NEW RAILWAY LINE)
- ROUTE PROTECTION BOUNDARY

Project Management Initials: Designer: Checked: Approved: ISO A1 594mm x 841mm

Plot File by: WONGKKK 26-Jan-17
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PROJECT 項目

TECHNICAL STUDY ON TRANSPORT INFRASTRUCTURE AT KENNEDY TOWN FOR CONNECTING TO EAST LANTAU METROPOLIS - FEASIBILITY STUDY

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STATUS 階段

SCALE 比例: A3 1 : 20000

DIMENSION UNIT 尺寸單位: METRES

KEY PLAN 索引圖

PROJECT NO. 項目編號: 60438078

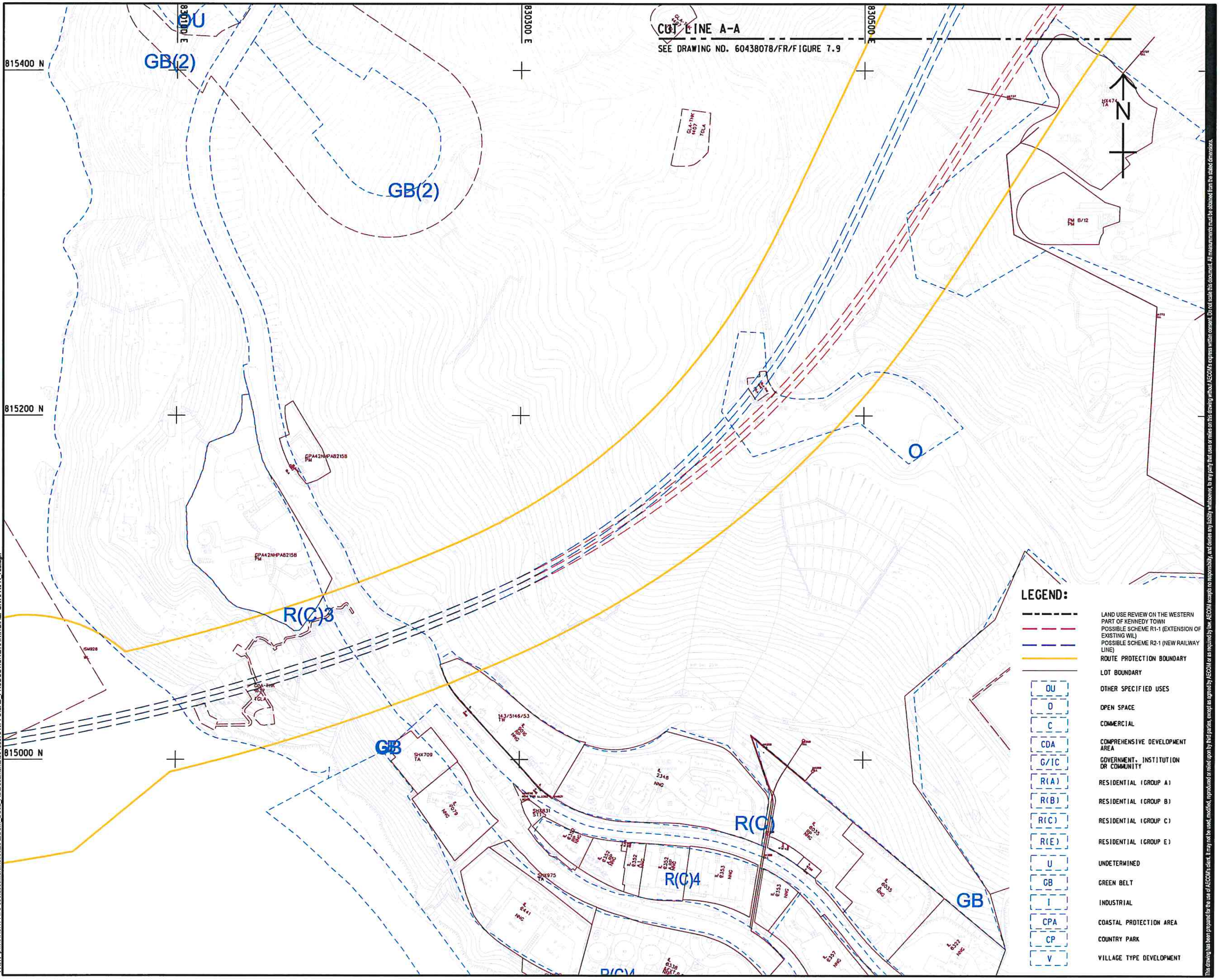
AGREEMENT NO. 協議編號: CE 11/2015 (HY)

SHEET TITLE 圖紙名稱

ADMINISTRATIVE ROUTE PROTECTION PLAN FOR RAILWAY CONNECTION - KEY PLAN

SHEET NUMBER 圖紙編號

60438078/FR/FIGURE 7.7



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PROJECT 項目

TECHNICAL STUDY ON TRANSPORT INFRASTRUCTURE AT KENNEDY TOWN FOR CONNECTING TO EAST LANTAU METROPOLIS - FEASIBILITY STUDY

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STATUS 階段

SCALE 比例 A3 1 : 2000

DIMENSION UNIT 尺寸單位 METRES

KEY PLAN 索引圖

PROJECT NO. 項目編號 60438078

AGREEMENT NO. 協議編號 CE 11/2015 (HY)

SHEET TITLE 圖紙名稱

ADMINISTRATIVE ROUTE PROTECTION PLAN FOR RAILWAY CONNECTION

SHEET 1 OF 3

SHEET NUMBER 圖紙編號

60438078/FR/FIGURE 7.8

ISO A1 594mm x 841mm
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Designer:
Project Management Initials:

Plot File by: WONGKK 28-Jan-17
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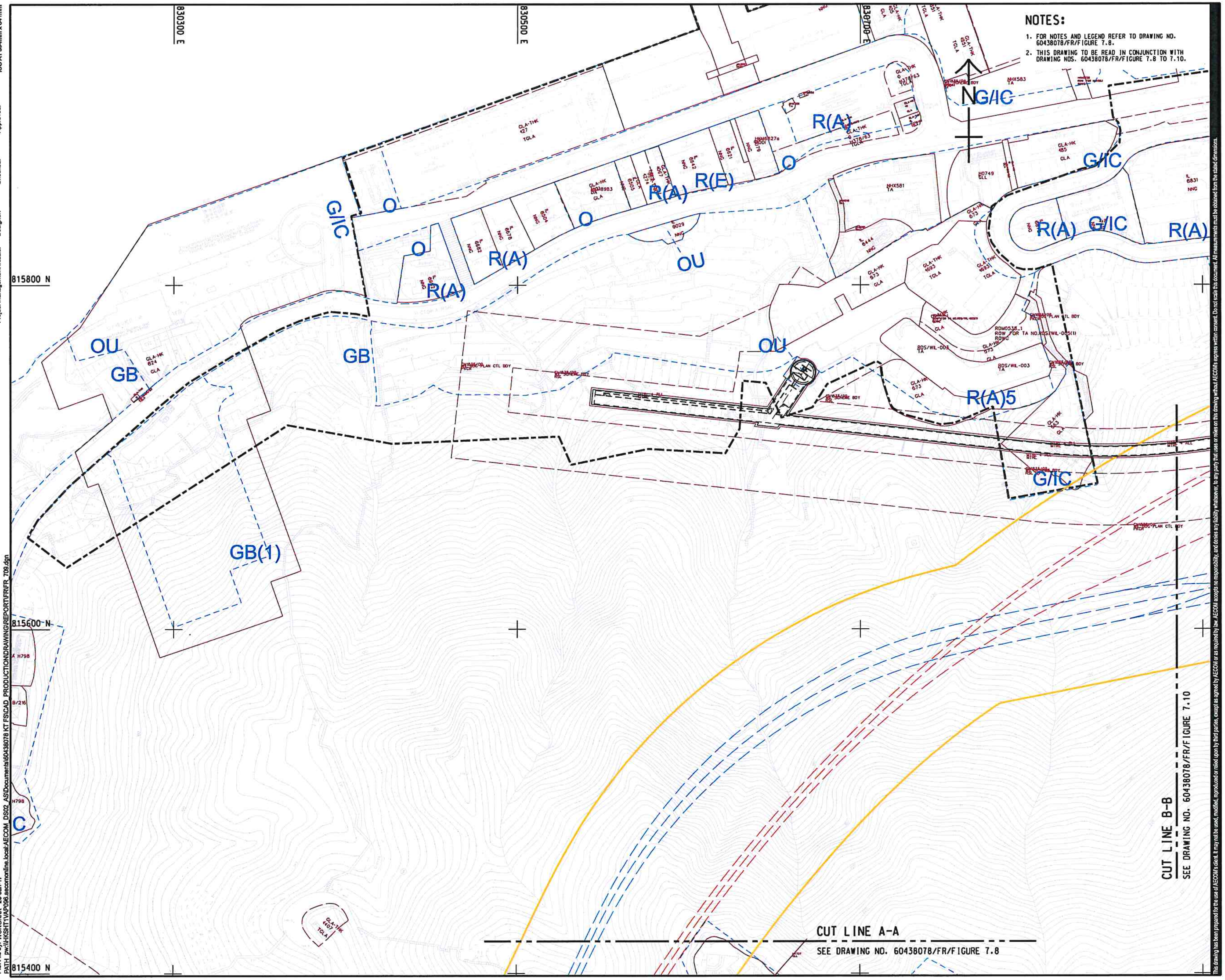

NOTES:

1. FOR NOTES AND LEGEND REFER TO DRAWING NO. 60438078/FR/FIGURE 7.8.
2. THIS DRAWING TO BE READ IN CONJUNCTION WITH DRAWING NOS. 60438078/FR/FIGURE 7.8 TO 7.10.

Project Management Initials: Designer: Checked: Approved: ISO A1 594mm x 841mm

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PROJECT 項目

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STATUS 階段

SCALE 比例	**DIMENSION UNIT** 尺寸單位
A3 1 : 2000	METRES

KEY PLAN 索引圖

PROJECT NO. 項目編號	**AGREEMENT NO.** 協議編號
60438078	CE 11/2015 (HY)

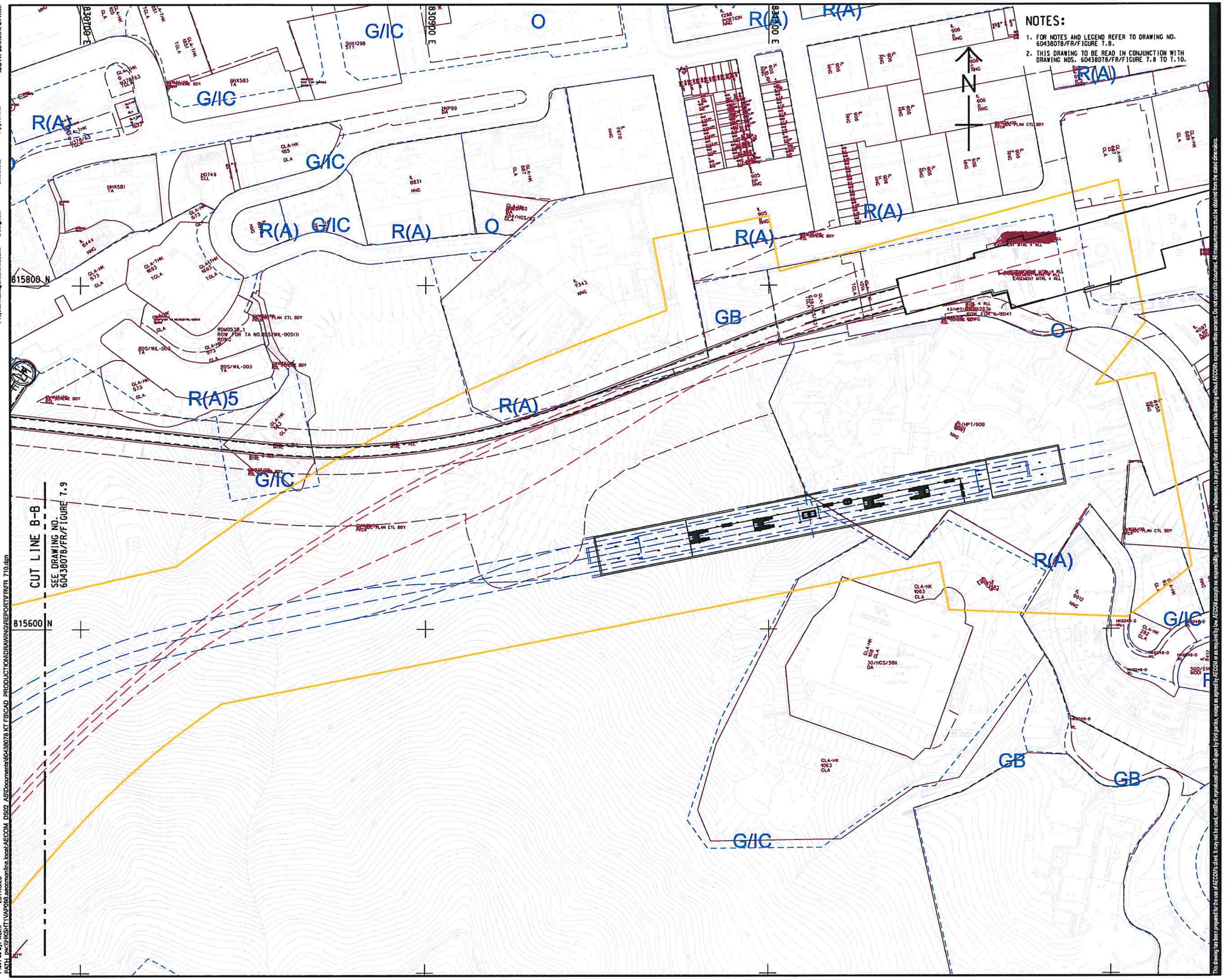
SHEET TITLE 圖紙名稱

ADMINISTRATIVE ROUTE PROTECTION PLAN FOR RAILWAY CONNECTION

SHEET 2 OF 3

SHEET NUMBER 圖紙編號

60438078/FR/FIGURE 7.9



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TECHNICAL STUDY ON TRANSPORT INFRASTRUCTURE AT KENNEDY TOWN FOR CONNECTING TO EAST LANTAU METROPOLIS - FEASIBILITY STUDY

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STATUS 階段

SCALE 比例	DIMENSION UNIT 尺寸單位
A3 1 : 2000	METRES

KEY PLAN 索引圖

PROJECT NO. 項目編號	AGREEMENT NO. 協議編號
60438078	CE 11/2015 (HY)

SHEET TITLE 圖紙名稱

ADMINISTRATIVE ROUTE PROTECTION PLAN FOR RAILWAY CONNECTION

SHEET 3 OF 3

SHEET NUMBER 圖紙編號

60438078/FR/FIGURE 7.10

ISO A1 594mm x 841mm   Approved: Checked: Designer: Project Management Initials:

Plot File by: wuml 2017/9/26

AFFECTED EXISTING LAND USES BY TRANSPORT INFRASTRUCTURE FOR HIGHWAY CONNECTION

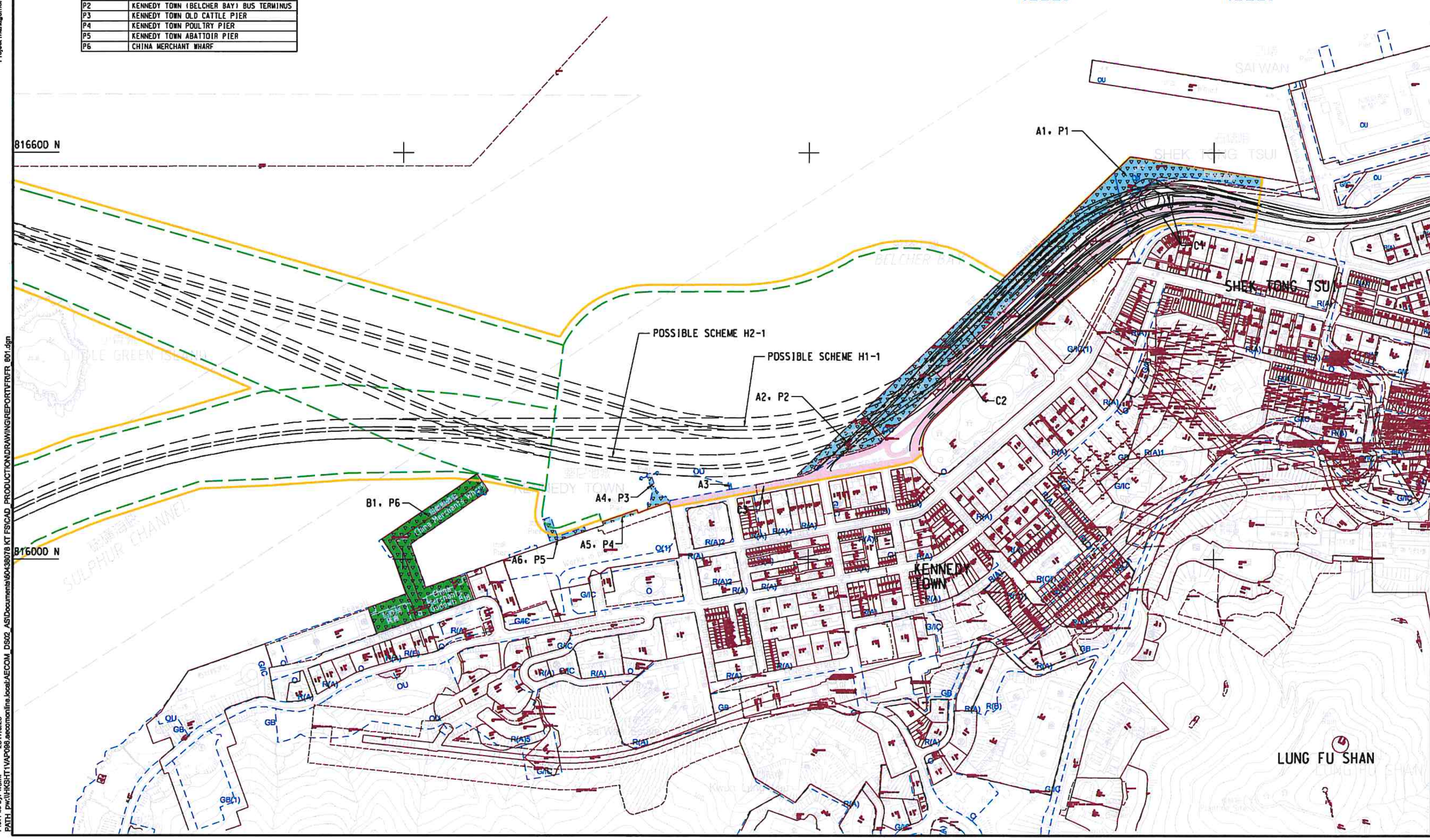
SITE NO.	EXISTING LAND USE
GOVERNMENT LAND ALLOCATIONS (GLAS)	
A1	WESTERN DISTRICT PCWA
A2	KENNEDY TOWN (BELCHER BAY) BUS TERMINUS
A3	DAVIS'S STREET PIER
A4	KENNEDY TOWNOLD CATTLE PIER
A5	KENNEDY TOWN POULTRY PIER
A6	KENNEDY TOWN ABATTOIR PIER
PRIVATE LANDS	
B1	CHINA MERCHANT WHARF
ROAD	
C1	CONNAUGHT ROAD WEST ELEVATED ROAD
C2	SHING SAI ROAD
C3	NEW PRAYA, KENNEDY TOWN

AFFECTED PLANNED LAND USES BY TRANSPORT INFRASTRUCTURE FOR HIGHWAY CONNECTION

SITE NO.	EXISTING LAND USE
P1	WESTERN DISTRICT PCWA
P2	KENNEDY TOWN (BELCHER BAY) BUS TERMINUS
P3	KENNEDY TOWN OLD CATTLE PIER
P4	KENNEDY TOWN POULTRY PIER
P5	KENNEDY TOWN ABATTOIR PIER
P6	CHINA MERCHANT WHARF

LEGEND:

	LOT BOUNDARY	G/IC	GOVERNMENT, INSTITUTION OR COMMUNITY
	POSSIBLE HIGHWAY OPTIONS	R(A)	RESIDENTIAL (GROUP A)
	ROUTE PROTECTION BOUNDARY	U	UNDETERMINED
	DREDGING EXTENT FOR CONSTRUCTION OF TRANSPORT INFRASTRUCTURE	GB	GREEN BELT
	AFFECTED GOVERNMENT LAND ALLOCATIONS	I	INDUSTRIAL
	AFFECTED PRIVATE LANDS	CPA	COASTAL PROTECTION AREA
	AFFECTED ROAD	CP	COUNTRY PARK
	AFFECTED PLANNED LAND USES	V	VILLAGE TYPE DEVELOPMENT
OU	OTHER SPECIFIED USES	R(B)	RESIDENTIAL (GROUP B)
O	OPEN SPACE	R(C)	RESIDENTIAL (GROUP C)
C	COMMERCIAL	R(E)	RESIDENTIAL (GROUP E)
CDA	COMPREHENSIVE DEVELOPMENT AREA		



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PROJECT

TECHNICAL STUDY ON TRANSPORT INFRASTRUCTURE AT KENNEDY TOWN FOR CONNECTING TO EAST LANTAU METROPOLIS - FEASIBILITY STUDY

CLIENT

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SCALE	DIMENSION UNIT
A3 1 : 6000	METRES

KEY PLAN

PROJECT NO.	AGREEMENT NO.
60438078	CE 11/2015 (HY)

SHEET TITLE

AFFECTED DEVELOPMENTS DUE TO THE TRANSPORT INFRASTRUCTURE FOR HIGHWAY CONNECTION

SHEET NUMBER

60438078/FR/FIGURE 8.1

ISO A1 594mm x 841mm
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Checked:
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Plot File by: wumt 2017/9/26

ISO A1 594mm x 841mm

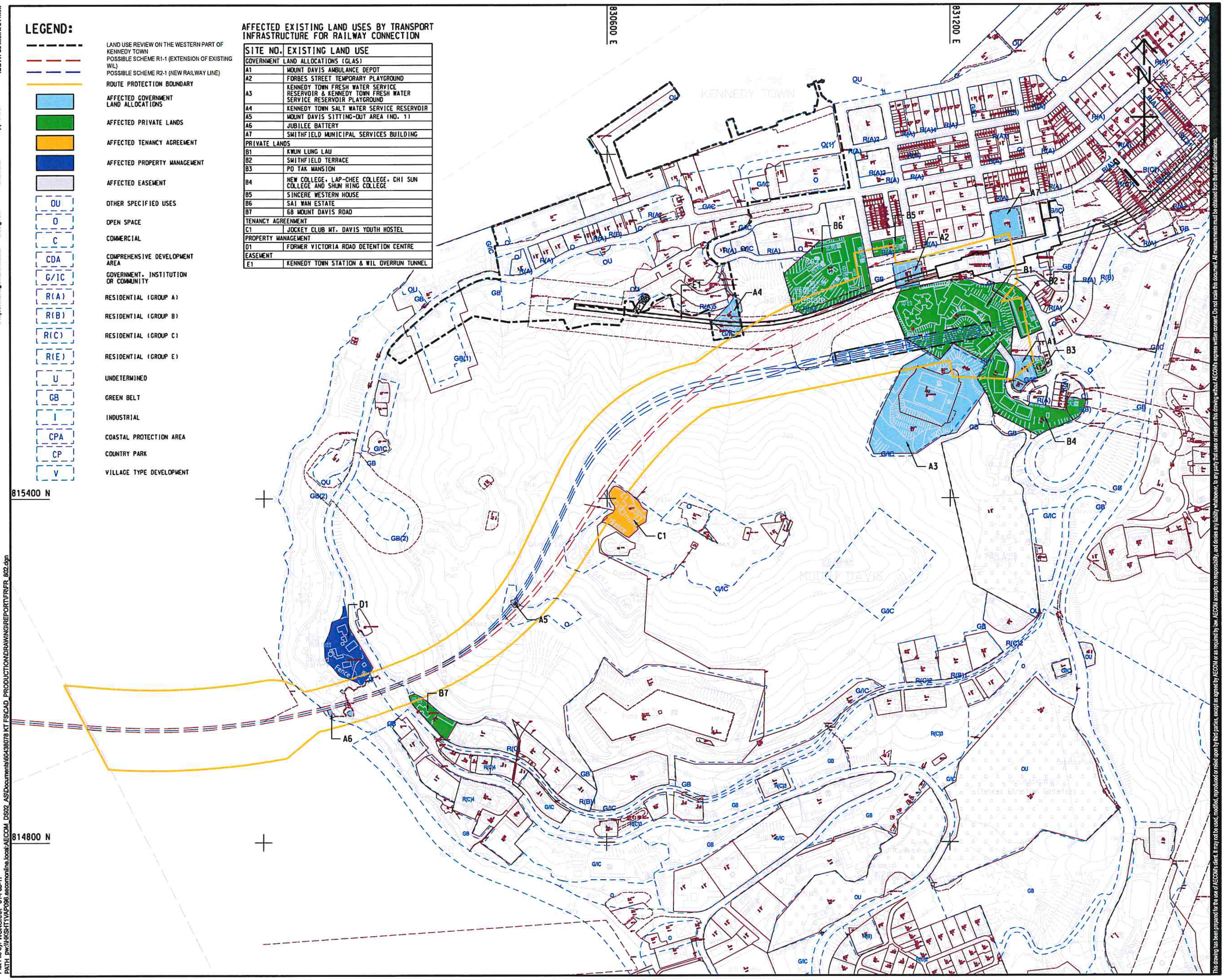
Project Management Initials: Designer: Checked: Approved:

LEGEND:

- LAND USE REVIEW ON THE WESTERN PART OF KENNEDY TOWN
- POSSIBLE SCHEME R1-1 (EXTENSION OF EXISTING WIL)
- POSSIBLE SCHEME R2-1 (NEW RAILWAY LINE)
- ROUTE PROTECTION BOUNDARY
- AFFECTED GOVERNMENT LAND ALLOCATIONS
- AFFECTED PRIVATE LANDS
- AFFECTED TENANCY AGREEMENT
- AFFECTED PROPERTY MANAGEMENT
- AFFECTED EASEMENT
- OU — OTHER SPECIFIED USES
- O — OPEN SPACE
- C — COMMERCIAL
- CDA — COMPREHENSIVE DEVELOPMENT AREA
- G/IC — GOVERNMENT, INSTITUTION OR COMMUNITY
- R(A) — RESIDENTIAL (GROUP A)
- R(B) — RESIDENTIAL (GROUP B)
- R(C) — RESIDENTIAL (GROUP C)
- R(E) — RESIDENTIAL (GROUP E)
- U — UNDETERMINED
- GB — GREEN BELT
- I — INDUSTRIAL
- CPA — COASTAL PROTECTION AREA
- CP — COUNTRY PARK
- V — VILLAGE TYPE DEVELOPMENT

AFFECTED EXISTING LAND USES BY TRANSPORT INFRASTRUCTURE FOR RAILWAY CONNECTION

SITE NO.	EXISTING LAND USE
GOVERNMENT LAND ALLOCATIONS (GLAS)	
A1	MOUNT DAVIS AMBULANCE DEPOT
A2	FORBES STREET TEMPORARY PLAYGROUND
A3	KENNEDY TOWN FRESH WATER SERVICE RESERVOIR & KENNEDY TOWN FRESH WATER SERVICE RESERVOIR PLAYGROUND
A4	KENNEDY TOWN SALT WATER SERVICE RESERVOIR
A5	MOUNT DAVIS SITTING-OUT AREA (NO. 1)
A6	JUBILEE BATTERY
A7	SMITHFIELD MUNICIPAL SERVICES BUILDING
PRIVATE LANDS	
B1	KWUN LUNG LAU
B2	SMITHFIELD TERRACE
B3	PO TAK MANSION
B4	NEW COLLEGE, LAP-CHEE COLLEGE, CHI SUN COLLEGE AND SHUN HING COLLEGE
B5	SINCERE WESTERN HOUSE
B6	SAI WAN ESTATE
B7	68 MOUNT DAVIS ROAD
TENANCY AGREEMENT	
C1	JOCKEY CLUB MT. DAVIS YOUTH HOSTEL
PROPERTY MANAGEMENT	
D1	FORMER VICTORIA ROAD DETENTION CENTRE
EASEMENT	
E1	KENNEDY TOWN STATION & WIL OVERRUN TUNNEL



Plot File by: WONGKK 01-Feb-17

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PROJECT 項目

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SCALE 比例: A3 1 : 6000

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KEY PLAN 索引圖

PROJECT NO. 項目編號: 60438078

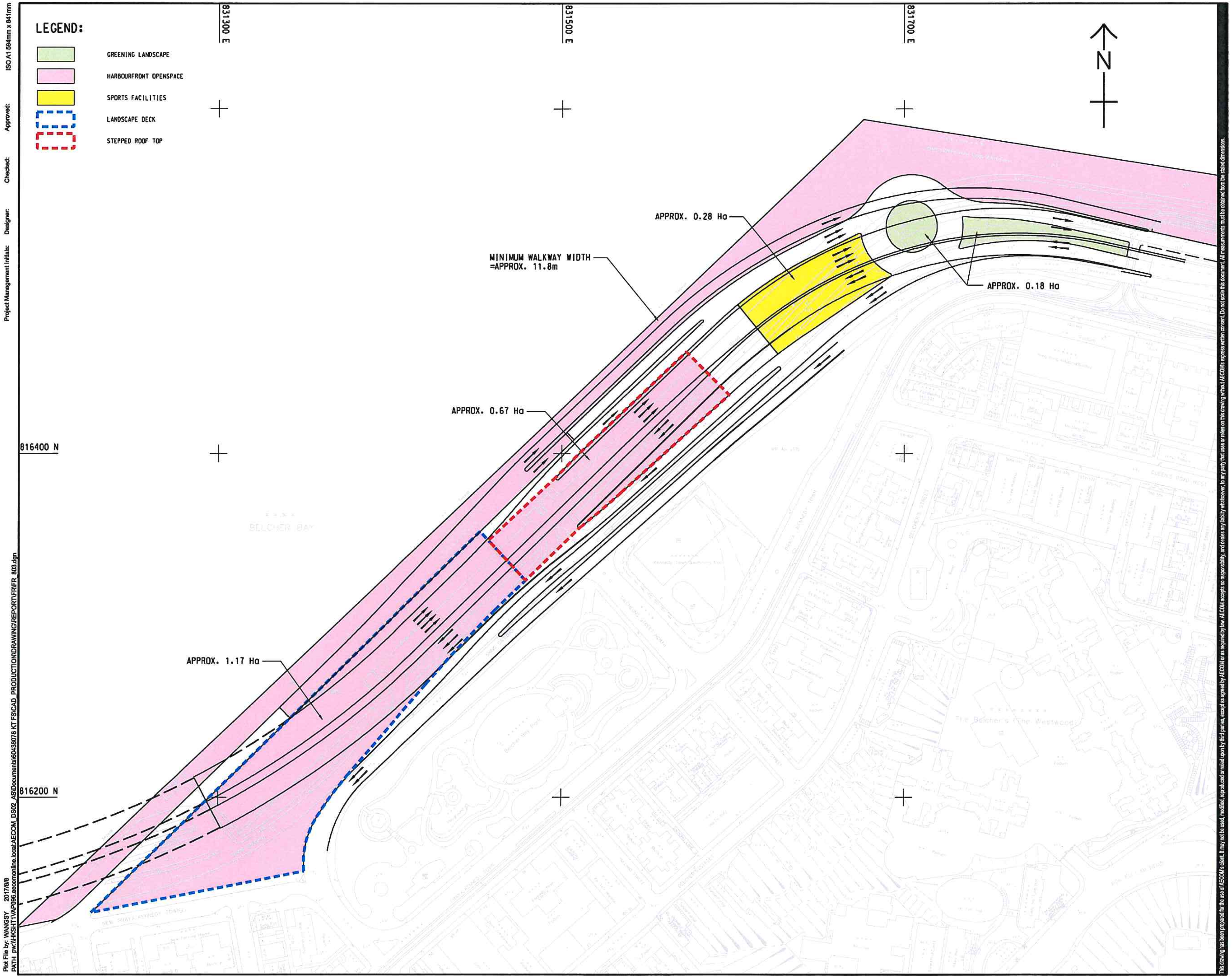
AGREEMENT NO. 協議編號: CE 11/2015 (HY)

SHEET TITLE 圖紙名稱

AFFECTED DEVELOPMENTS DUE TO THE TRANSPORT INFRASTRUCTURE FOR RAILWAY CONNECTION

SHEET NUMBER 圖紙編號

60438078/FR/FIGURE8.2



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SCALE: A3 1 : 2000

DIMENSION UNIT: METRES

KEY PLAN

PROJECT NO.: 60438078

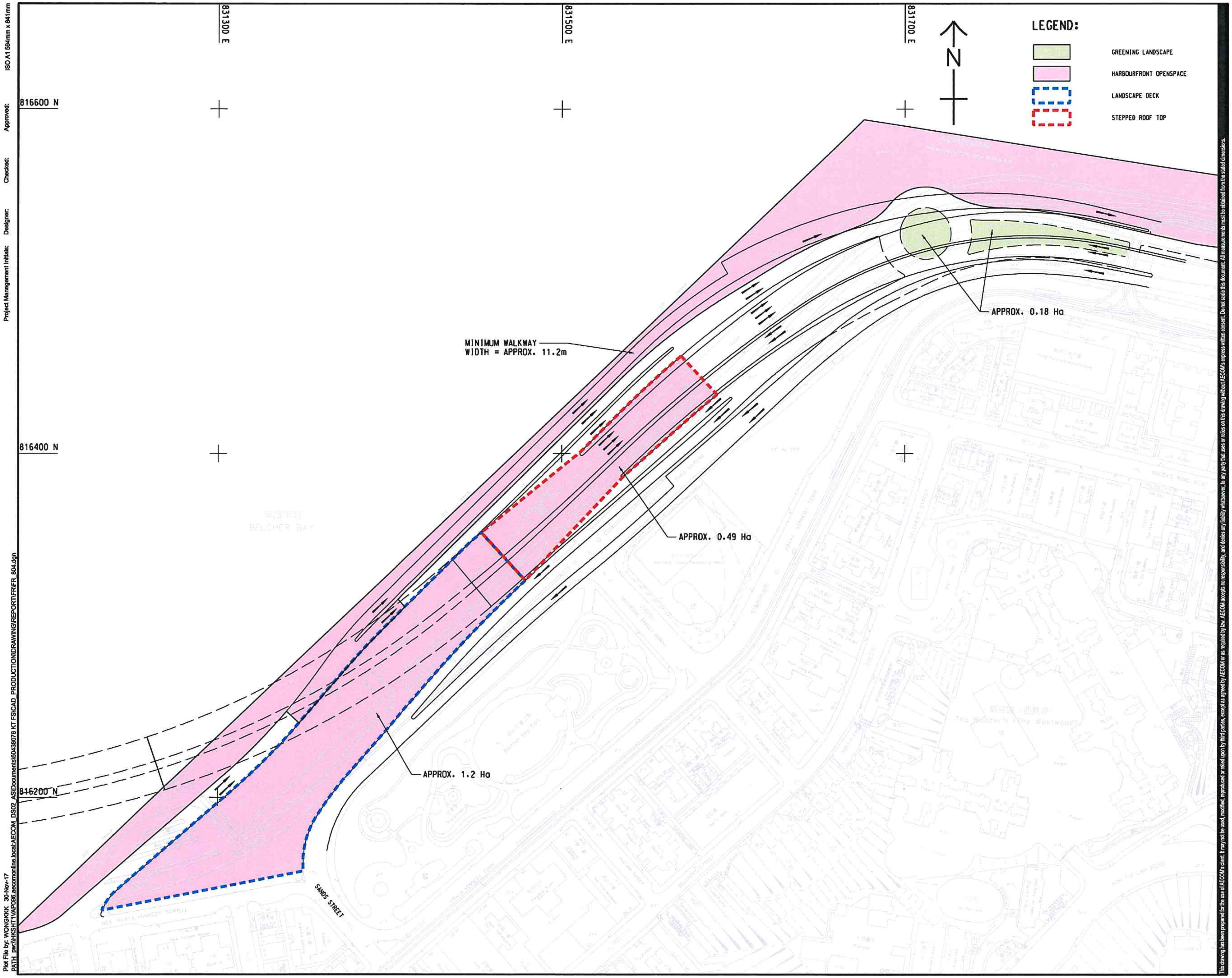
AGREEMENT NO.: CE 11/2015 (HY)

SHEET TITLE

POSSBILE HIGHWAY CONNECTION SCHEME W/O ROUTE 4 EXTENSION PCWA CONCEPTUAL PLAN

SHEET NUMBER

60438078/FR/FIGURE 8.3



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SCALE	DIMENSION UNIT
A3 1 : 2000	METRES

KEY PLAN

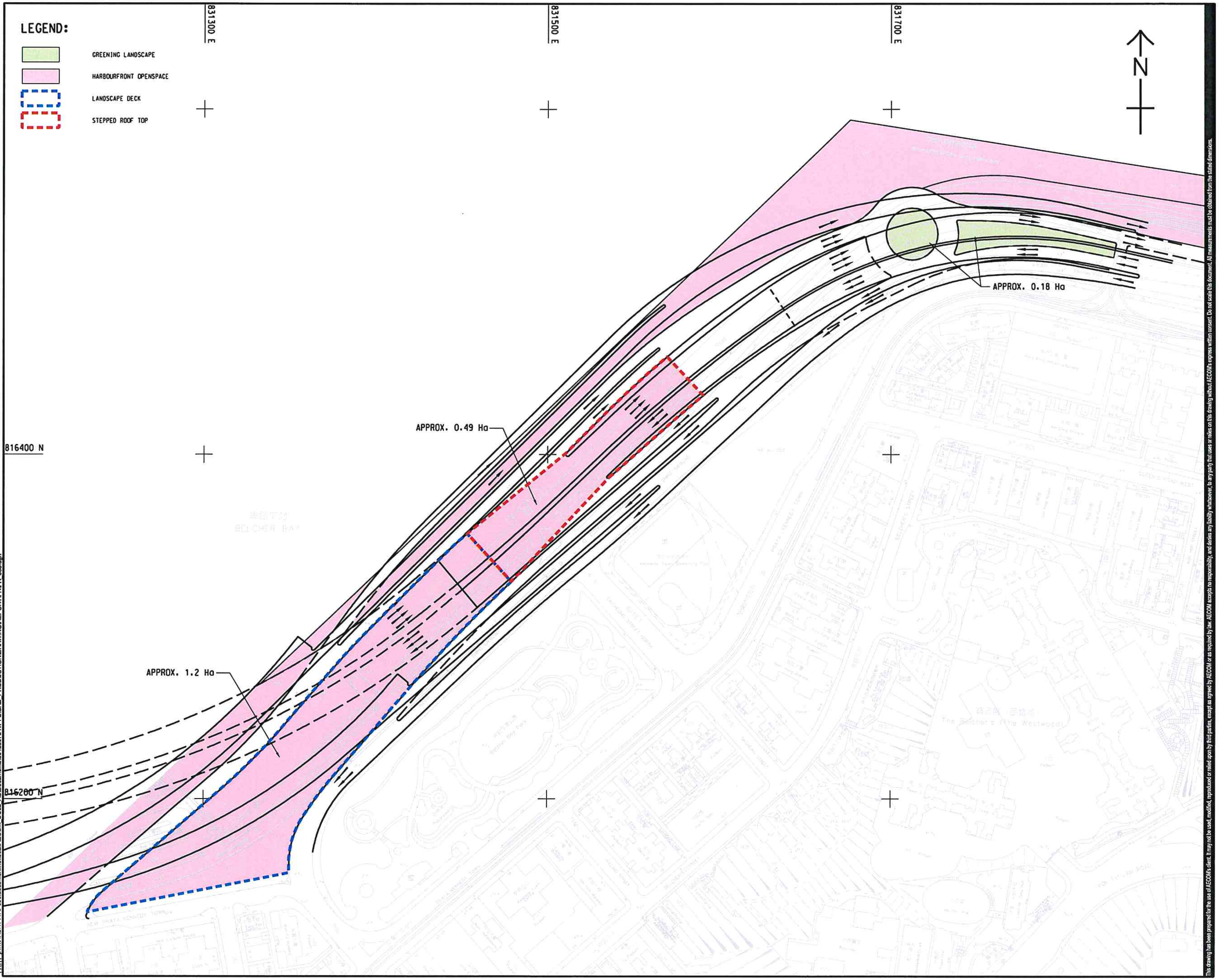
PROJECT NO.	AGREEMENT NO.
60438078	CE 11/2015 (HY)

SHEET TITLE

POSSBILE HIGHWAY CONNECTION SCHEME WITH ROUTE 4 EXTENSION PCWA CONCEPTUAL PLAN BEFORE IMPLEMENTATION OF ROUTE 4 EXTENSION

SHEET NUMBER

60438078/FR/FIGURE 8.4



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PROJECT 項目

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KEY PLAN 索引圖

PROJECT NO. 項目編號 60438078

AGREEMENT NO. 協議編號 CE 11/2015 (HY)

SHEET TITLE 圖紙名稱

POSSBILE HIGHWAY CONNECTION SCHEME WITH ROUTE 4 EXTENSION PCWA CONCEPTUAL PLAN AFTER IMPLEMENTATION OF ROUTE 4 EXTENSION

SHEET NUMBER 圖紙編號

60438078/FR/FIGURE 8.5

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Appendix A

Implication on Developments at Kennedy Town
Summary Tables

Agreement No. CE 11/2015 (HY)
Technical Study on Transport Infrastructure at Kennedy Town for Connecting to East Lantau Metropolis – Feasibility Study

Final Report - Appendix A
Implication on Developments at Kennedy Town Summary Tables

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