Form No. S12A
表格第 S12A 號

APPLICATION FOR AMENDMENT OF PLAN UNDER SECTION 12A OF THE TOWN PLANNING ORDINANCE (CAP. 131)

根據《城市規劃條例》(第131章)第12A條遞交的修訂圖則申請

Applicant who would like to publish the notice of application in local newspapers to meet one of the Town Planning Board's requirements of taking reasonable steps to obtain consent of or give notification to the current land owner, please refer to the following link regarding publishing the notice in the designated newspapers: https://www.tpb.gov.hk/en/plan_application/apply.html

申請人如欲在本地報章刊登申請通知，以採取城市規劃委員會就取得現行土地擁有人的同意或通知現行土地擁有人所指定的其中一項合理步驟，請瀏覽以下網址有關在指定的報章刊登通知：https://www.tpb.gov.hk/tc/plan_application/apply.html

2023年 12月 7 日

此文件在 _____ 收到，城市規劃委員會只會在收到所有必要的資料及文件後才正式確認收到申請的日期。

This document is received on 07 DEC 2023. The Town Planning Board will formally acknowledge the date of receipt of the application only upon receipt of all the required information and documents.

General Note and Annotation for the Form
填寫表格的一般指引及註解

\# "Current land owner" means any person whose name is registered in the Land Registry as that of an owner of the land to which the application relates, as at 6 weeks before the application is made
「現行土地擁有人」指在提出申請前六星期，其姓名或名稱已在土地註冊處註冊為該申請所關乎的土地的擁有人的人

& Please attach documentary proof 請夾附證明文件

^ Please insert number where appropriate 請在適當地方註明編號

Please fill "NA" for inapplicable item 請在不適用的項目填寫「不適用」

Please use separate sheets if the space provided is insufficient 如所提供的空間不足，請另頁說明

Please insert a「✔」at the appropriate box 請在適當的方格內上加上「✔」號

For Official Use Only 請勿填寫此欄	Application No. 申請編號	Y/SK-HC/7
	Date Received 收到日期	7 DEC 2023

1. The completed form and supporting documents (if any) should be sent to the Secretary, Town Planning Board (the Board), 15/F, North Point Government Offices, 333 Java Road, North Point, Hong Kong.
申請人須把填妥的申請表格及其他支持申請的文件 (倘有)，送交香港北角渣華道 333 號北角政府合署 15 樓城市規劃委員會(下稱「委員會」)秘書收。

2. Please read the "Guidance Notes" carefully before you fill in this form. The document can be downloaded from the Board's website at http://www.tpb.gov.hk/. It can also be obtained from the Secretariat of the Board at 15/F, North Point Government Offices, 333 Java Road, North Point, Hong Kong (Tel: 2231 4810 or 2231 4835), and the Planning Enquiry Counters of the Planning Department (Hotline: 2231 5000) (17/F, North Point Government Offices, 333 Java Road, North Point, Hong Kong and 14/F, Sha Tin Government Offices, 1 Sheung Wo Che Road, Sha Tin, New Territories).
請先細閱《申請須知》的資料單張，然後填寫此表格。該份文件可從委員會的網頁下載 (網址： http://www.tpb.gov.hk/)，亦可向委員會秘書處 (香港北角渣華道 333 號北角政府合署 15 樓 – 電話：2231 4810 或 2231 4835)及規劃署的規劃資料查詢處(熱線：2231 5000) (香港北角渣華道 333 號北角政府合署 17 樓及新界沙田上禾輋路 1 號沙田政府合署 14 樓)索取。

3. This form can be downloaded from the Board's website, and obtained from the Secretariat of the Board and the Planning Enquiry Counters of the Planning Department. The form should be typed or completed in block letters. The processing of the application may be refused if the required information or the required copies are incomplete.
此表格可從委員會的網頁下載，亦可向委員會秘書處及規劃署的規劃資料查詢處索取。申請人須以打印方式或以正楷填寫表格。如果申請人所提交的資料或文件副本不齊全，委員會可拒絕處理有關申請。

1. Name of Applicant 申請人姓名/名稱

(☐ Mr. 先生 / ☐ Mrs. 夫人 / ☐ Miss 小姐 / ☐ Ms. 女士 / ☑ Company 公司 / ☐ Organisation 機構)

Billion Vantage Investment Limited 澤億投資有限公司
Top Deluxe Limited 德統有限公司

2. Name of Authorised Agent (if applicable) 獲授權代理人姓名/名稱（如適用）

(☐ Mr. 先生 / ☐ Mrs. 夫人 / ☐ Miss 小姐 / ☐ Ms. 女士 / ☑ Company 公司 / ☐ Organisation 機構)

Arup Hong Kong Limited 奧雅納香港有限公司

3. Application Site 申請地點

(a)	Whether the application directly relates to any specific site? 申請是否直接與某地點有關？	Yes 是 ☑ No 否 ☐ （Please proceed to Part 4 請跳到第 4 部分填寫）
(b)	Full address/ location/ demarcation district and lot number (if applicable) 詳細地址／地點／丈量約份及地段號碼（如適用）	Lot Nos. 788 RP (Part), 789 RP (Part), 827 RP (Part), 828 RP (Part), 855 RP, 863 RP (Part), 865 RP (Part), 868 RP, 871, 872, 873, 874, 875 RP, 876 RP, 877 RP, 878 RP, 879 RP, 1939 RP, 1939 S.E, 1939 S.F, 1939 S.B ss.3, 1940 (Part), 1944 RP and 2189 (Part) in D.D. 244, and adjoining Government Land, Nam Pin Wai, Sai Kung
(c)	Site Area 申請地點面積	6,601 sq.m 平方米 ☑ About 約

(d) Area of Government land included (if any) 所包括的政府土地面積 (倘有)	521 .....sq.m 平方米 ☑ About 約
(e) Current use(s) 現時用途	Largely vacant with some existing trees. Central portion is occupied by an access road approved under planning application No. A/SK-HC/223 which is currently under construction. (If there are any Government, institution or community facilities, please illustrate on plan and specify the use and gross floor area) (如有任何政府、機構或社區設施，請在圖則上顯示，並註明用途及總樓面面積)

4. Eligibility of Applicant 申請人資格

The applicant 申請人 –

☑ (a) is a person whose name is registered in the Land Registry as that of the sole owner or one of the owners of any non-Government land within the application site, when this application is made[&] (if the applicant is the sole owner, there is no need to fill in Part 5).
(a) 是一名人士，其姓名或名稱於提出申請時已在土地註冊處註冊，該註冊顯示申請人為申請地點內任何非政府土地的唯一或其中一名擁有人[&](如申請人為唯一擁有人，不用填寫第 5 部分)。

☐ (b) is a person who has obtained consent to this application from at least one owner as defined in (a) above[&].
(b) 是一名人士，已獲得最少一名上述 (a) 所界定的擁有人同意這宗申請[&]。

☐ (c) is a person who has obtained consent to this application from the Director of Lands in relation to any government land within the application site[&].
(c) 是一名人士，就這宗申請地點內的任何政府土地，已獲得地政總署署長同意這宗申請[&]。

☐ (d) is a public officer.
(d) 是公職人員。

☐ (e) is a public body as defined by section 2 of the Prevention of Bribery Ordinance (Cap. 201).
(e) 是《防止賄賂條例》(第 201 章)第 2 條所界定的公共機構。

5. Statement on Consent from/Notification to "Current Land Owner"[#] 就「現行土地擁有人」[#]的同意/通知土地擁有人的陳述

(a) According to the record(s) of the Land Registry as at ..... (DD/MM/YYYY), this application involves a total of ..... "current land owner(s) "[#].
根據土地註冊處截至 ..... 年 ..... 月 ..... 日的記錄，這宗申請共牽涉 ..... 名「現行土地擁有人」[#]。

(b) The applicant 申請人 –

☐ has obtained consent(s) of ..... "current land owner(s)"[#].
已取得 ..... 名「現行土地擁有人」[#]的同意。

Details of consent of "current land owner(s)"[#] obtained 取得「現行土地擁有人」[#]同意的詳情

No. of 'Current Land Owner(s)' 「現行土地擁有人」數目	Lot number/address of premises as shown in the record of the Land Registry where consent(s) has/have been obtained 根據土地註冊處記錄已獲得同意的地段號碼／處所地址	Date of consent obtained (DD/MM/YYYY) 取得同意的日期 (日/月/年)

(Please use separate sheets if the space of any box above is insufficient. 如上列任何方格的空間不足，請另頁說明)

☐ has notified ..... "current land owner(s)"#
已通知 ..... 名「現行土地擁有人」#。

Details of the "current land owner(s)"# notified 已獲通知「現行土地擁有人」#的詳細資料		
No. of 'Current Land Owner(s)' 「現行土地擁有人」數目	Lot number/address of premises as shown in the record of the Land Registry where notification(s) has/have been given 根據土地註冊處記錄已發出通知的地段號碼／處所地址	Date of notification given (DD/MM/YYYY) 通知日期(日/月/年)

(Please use separate sheets if the space of any box above is insufficient. 如上列任何方格的空間不足，請另頁說明)

☑ has taken reasonable steps to obtain consent of or give notification to "current land owner(s):
已採取合理步驟以取得「現行土地擁有人的同意或向該人發給通知。詳情如下：

Reasonable Steps to Obtain Consent of "Current Land Owner(s)"# 取得「現行土地擁有人」# 的同意所採取的合理步驟

☐ sent request for consent to the "current land owner(s)"#& on _____ (DD/MM/YYYY)
於_____(日/月/年)向每一名「現行土地擁有人」#郵遞要求同意書&

Reasonable Steps to Give Notification to "Current Land Owner(s)"# 向「現行土地擁有人」# 發出通知所採取的合理步驟

☑ published notices in local newspapers& on 28/11/2023 (DD/MM/YYYY)
於 28/11/2023 (日/月/年)在指定報章就申請刊登一次通知&

☑ posted notice in a prominent position on or near application site/premises& on 16/11/2023 - 29/11/2023 (DD/MM/YYYY)
於16/11/2023 - 29/11/2023(日/月/年)在申請地點／申請處所或附近的顯明位置貼出關於該申請的通知&

☐ sent notice to relevant owners' corporation(s)/owners' committee(s)/mutual aid committee(s)/management office(s) or rural committee& on _____ (DD/MM/YYYY)
於_____(日/月/年)把通知寄往相關的業主立案法團/業主委員會/互助委員會或管理處，或有關的鄉事委員會&

Others 其他

☐ others (please specify)
其他（請指明）

_____

_____

_____

_____

Note: May insert more than one「✔」.
Information should be provided on the basis of each and every lot (if applicable) and premises (if any) in respect of the application.
註: 可在多於一個方格內加上「✔」號
申請人須就申請涉及的每一地段（倘適用）及處所（倘有）分別提供資料

6. Plan Proposed to be Amended 擬議修訂的圖則

(a)	Name and number of the related statutory plan(s) 有關法定圖則的名稱及編號	Approved Ho Chung Outline Zoning Plan No. S/SK-HC/11
(b)	Land use zone(s) involved (if applicable) 涉及的土地用途地帶(如適用)	"Green Belt" ("GB")

7. Proposed Amendments 擬議修訂

(a) Propose to rezone the application site to the following zone(s)/use(s)
(May insert more than one 「✔」) (Please illustrate the details on plan)
建議將申請地點的用途地帶改劃作下列地帶 / 用途
(可在多於一個方格內加上「✔」號) (請在圖則顯示詳情)

☐ Comprehensive Development Area [ ]
綜合發展區 [ ]

☑ Residential (Group ☐A/☐B/☑C/☐D/☐E) [1]
住宅 (☐甲類 / ☐乙類 / ☑丙類 / ☐丁類 / ☐戊類) [1]

☐ Agriculture [ ] 農業 [ ]

☐ Industrial (Group D) [ ] 工業 (丁類) [ ]

☐ Government, Institution or Community [ ]
政府、機構或社區 [ ]

☐ Recreation [ ] 康樂 [ ]

☐ Country Park [ ] 郊野公園 [ ]

☐ Conservation Area [ ] 自然保育區 [ ]

☐ Commercial [ ] 商業 [ ]

☐ Village Type Development [ ]
鄉村式發展 [ ]

☐ Industrial [ ] 工業 [ ]

☐ Open Storage [ ] 露天貯物 [ ]

☐ Open Space [ ] 休憩用地 [ ]

☐ Green Belt [ ] 綠化地帶 [ ]

☐ Coastal Protection Area [ ]
海岸保護區 [ ]

☐ Site of Special Scientific Interest [ ]
具特殊科學價值地點 [ ]

☐ Other Specified Uses (☐Business/☐Industrial Estate/☐Mixed Use/☐Rural Use/☐Petrol Filling Station/ ☐Others (please specify_____)) [ ]
其他指定用途 (☐商貿 / ☐工業邨 / ☐混合用途 / ☐鄉郊用途 / ☐加油站 / ☐ 其他 (請註明：_____)) [ ]

☐ Road 道路

☐ Others (please specify_____)
其他 (請註明：_____)

Please insert subzone in [ ] as appropriate.
請於[ ]內註明支區，如適用。

(b) Propose to amend the Notes of the Plan(s) 建議修訂圖則的《註釋》

☐ Covering Notes 《註釋》說明頁

☑ Notes of the zone applicable to the Site 適用於申請地點土地用途地帶的《註釋》

Details of the proposed amendment(s) to the Notes of the Plan, where appropriate, are as follows:
(Please use separate sheets if the space below is insufficient)
建議修訂圖則的《註釋》的詳情，如適用：
(如下列空間不足，請另頁說明)

Please refer to the attached Supporting Planning Statement for details of the Proposed Amendments

☑ Proposed Notes of Schedule of Uses of the zone attached
夾附對《 註釋 》的擬議修訂

8. Details of Proposed Amendment (if any) 擬議修訂詳情 (倘有)

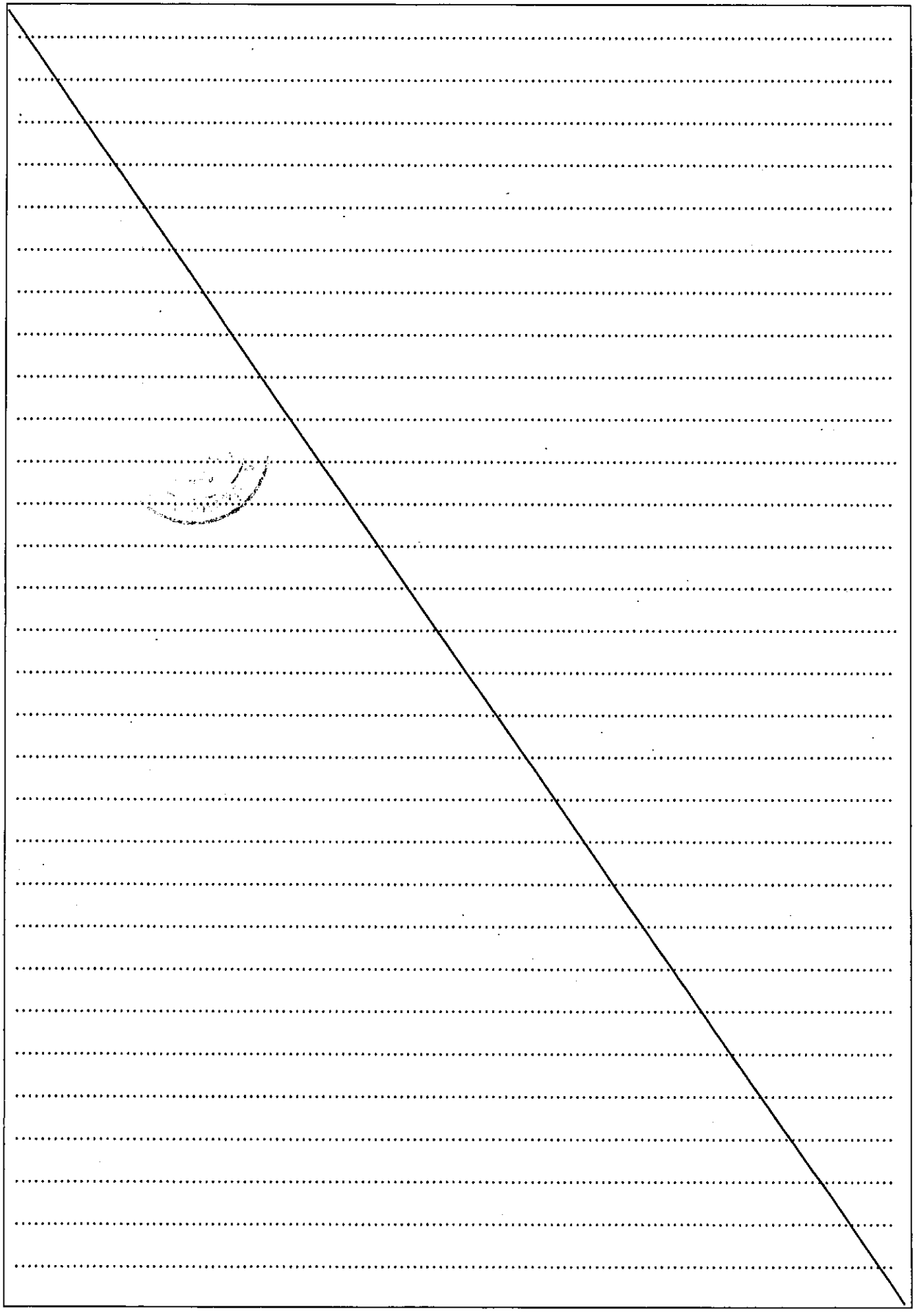
☑ Particulars of development are included in the **Appendix**.
附錄包括一個擬議發展的細節。

☐ No specific development proposal is included in this application.
這宗申請並不包括任何指定的擬議發展計劃。

9. Justifications 理由

The applicant is invited to provide justifications in support of the application. Use separate sheets if necessary.
現請申請人提供申請理由及支持其申請的資料。如有需要請另頁說明。

Please refer to the attached Supporting Planning Statement for justifications in support of the Application



10. Declaration 聲明

I hereby declare that the particulars given in this application are correct and true to the best of my knowledge and belief.
本人謹此聲明，本人就這宗申請提交的資料，據本人所知及所信，均屬真實無誤。

I hereby grant a permission to the Board to copy all the materials submitted in this application and/or to upload such materials to the Board's website for browsing and downloading by the public free-of-charge at the Board's discretion.
本人現准許委員會酌情將本人就此申請所提交的所有資料複製及/或上載至委員會網站，供公眾免費瀏覽或下載。

Signature 簽署 .....

☐ Applicant 申請人 / ☑ Authorised Agent 獲授權代理人

Yeung Wing Shan, Theresa
Name in Block Letters 姓名（請以正楷填寫）

Director
Position (if applicable) 職位 （如適用）

Professional Qualification(s) 專業資格

☐ Member 會員 / ☑ Fellow of 資深會員

☑ HKIP 香港規劃師學會 / ☐ HKIA 香港建築師學會 /
☐ HKIS 香港測量師學會 / ☐ HKIE 香港工程師學會 /
☐ HKILA 香港園境師學會/ ☐ HKIUD 香港城市設計學會
☐ RPP 註冊專業規劃師
Others 其他 ..... MRTPI

ARUP HONG KONG LIMITED *AH16* 香港有限公司

on behalf of 代表 Arup Hong Kong Limited

☑ Company 公司 / ☐ Organisation Name and Chop (if applicable) 機構名稱及蓋章（如適用）

Date 日期 30/11/2023 ..... (DD/MM/YYYY 日/月/年)

Remark 備註

The materials submitted in this application and the Board's decision on the application would be disclosed to the public. Such materials would also be uploaded to the Board's website for browsing and free downloading by the public where the Board considers appropriate.
委員會會向公眾披露申請人所遞交的申請資料和委員會對申請所作的決定。在委員會認為合適的情況下，有關申請資料亦會上載至委員會網頁供公眾免費瀏覽及下載。

Warning 警告

Any person who knowingly or wilfully makes any statement or furnish any information in connection with this application, which is false in any material particular, shall be liable to an offence under the Crimes Ordinance.
任何人在明知或故意的情況下，就這宗申請提出在任何要項上是虛假的陳述或資料，即屬違反《刑事罪行條例》。

Statement on Personal Data 個人資料的聲明

1. The personal data submitted to the Board in this application will be used by the Secretary of the Board and Government departments for the following purposes:
委員會就這宗申請所收到的個人資料會交給委員會秘書及政府部門，以根據《城市規劃條例》及相關的城市規劃委員會規劃指引的規定作以下用途：

   (a) the processing of this application which includes making available the name of the applicant for public inspection when making available this application for public inspection; and
   處理這宗申請，包括公布這宗申請供公眾查閱，同時公布申請人的姓名供公眾查閱；以及
   (b) facilitating communication between the applicant and the Secretary of the Board/Government departments.
   方便申請人與委員會秘書及政府部門之間進行聯絡。

2. The personal data provided by the applicant in this application may also be disclosed to other persons for the purposes mentioned in paragraph 1 above.
申請人就這宗申請提供的個人資料，或亦會向其他人士披露，以作上述第 1 段提及的用途。

3. An applicant has a right of access and correction with respect to his/her personal data as provided under the Personal Data (Privacy) Ordinance (Cap. 486). Request for personal data access and correction should be addressed to the Secretary of the Board at 15/F, North Point Government Offices, 333 Java Road, North Point, Hong Kong.
根據《個人資料(私隱)條例》(第 486 章)的規定，申請人有權查閱及更正其個人資料。如欲查閱及更正個人資料，應向委員會秘書提出有關要求，其地址為香港北角渣華道 333 號北角政府合署 15 樓。

APPLICATION FOR AMENDMENT OF PLAN UNDER SECTION 12A OF THE TOWN PLANNING ORDINANCE (CAP. 131)
根據城市規劃條例(第 131 章)第 12A 條遞交的修訂圖則申請

Development Proposal (only for indicative purpose)
擬議發展的發展計劃（只作指示用途）

1. Development Proposal 擬議發展計劃

(# Calculation is based on the Development Site Area)

☑ Proposed Gross floor area (GFA) 擬議總樓面面積	4,016# sq.m. 平方米	☑ About 約
☑ Proposed plot ratio 擬議地積比率	Not more than 0.75#	☐ About 約
☑ Proposed site coverage 擬議上蓋面積	Not more than 25# %	☐ About 約
☑ Proposed number of blocks 擬議座數	17 Houses	
☑ Proposed number of storeys of each block 每座建築物的擬議層數	3 storeys 層 ☐ include 包括 ..... storeys of basements 層地庫 ☐ exclude 不包括 ..... storeys of basements 層地庫	
☑ Proposed building height of each block 每座建築物的擬議高度	12 m 米	☑ About 約
	..... mPD 米(主水平基準上)	☐ About 約
☑ Domestic part 住用部分		
GFA 總樓面面積	4,016 sq.m. 平方米	☑ About 約
number of units 單位數目	17 Houses	
average unit size 單位平均面積	236.2 sq.m. 平方米	☑ About 約
estimated number of residents 估計住客數目	51	
	GFA 總樓面面積	
☐ Non-domestic part 非住用部分	..... sq.m.平方米	☐ About 約
☐ hotel 酒店	..... sq.m.平方米	☐ About 約
	(please specify the number of rooms 請註明房間數目: .....)	
☐ office 辦公室	..... sq.m.平方米	☐ About 約
☐ shop and services/eating place 商店及服務行業/食肆	..... sq.m.平方米	☐ About 約
☐ Government, institution or community facilities 政府、機構或社區設施	(please specify the use(s) and concerned land area(s)/GFA(s)) (請註明用途及有關的地面面積/總樓面面積)	
☐ other(s)其他	(please specify the use(s) and concerned land area(s)/GFA(s)) (請註明用途及有關的地面面積/總樓面面積)	
☑ Open space 休憩用地	(please specify land area(s)) (請註明面積)	
☑ private open space 私人休憩用地	51 sq.m.平方米	☑ Not less than 不少於
☐ public open space 公共休憩用地	..... sq.m.平方米	☐ Not less than 不少於

☑ Transport-related facilities 與運輸有關的設施

☑ parking spaces 停車位 (please specify type(s) and number(s)) (請註明種類及數目)

Private Car Parking Spaces 私家車車位	36*
Motorcycle Parking Spaces 電單車車位	1
Light Goods Vehicle Parking Spaces 輕型貨車泊車位	
Medium Goods Vehicle Parking Spaces 中型貨車泊車位	
Heavy Goods Vehicle Parking Spaces 重型貨車泊車位	
Others (Please Specify) 其他 (請列明)	

(* including 2 nos. visitor parking spaces, of which 1 also serves as accessible parking space)

☑ loading/unloading spaces 上落客貨車位 (please specify type(s) and number(s)) (請註明種類及數目)

Taxi Spaces 的士車位	
Coach Spaces 旅遊巴車位	
Light Goods Vehicle Spaces 輕型貨車車位	
Medium Goods Vehicle Spaces 中型貨車車位	
Heavy Goods Vehicle Spaces 重型貨車車位	1
Others (Please Specify) 其他 (請列明)	

☐ other transport-related facilities 其他與運輸有關的設施 (please specify type(s) and number(s)) (請註明種類及數目)

Use(s) of different floors (if applicable) 各樓層的用途(如適用)

[Block number] [座數]	[Floor(s)] [層數]	[Proposed use(s)] [擬議用途]
House Nos. H1-H17	G/F to 2/F	Houses

Proposed use(s) of uncovered area (if any) 露天地方(倘有)的擬議用途

Vehicular access road, clubhouse for residents, private open space, landscaped area, car parking spaces, motorcycle parking space, loading/ unloading bays, etc

Any vehicular access to the site? 是否有車路通往地盤?

Yes 是 ☑ There is an existing access. (please indicate the street name, where appropriate)
有一條現有車路。(請註明道路名稱(如適用))
an access road connecting to Wo Mei Hung Min Road approved under Planning Application No. A/SK-HC/223

☐ There is a proposed access. (please illustrate on plan and specify the width)
有一條擬議車路。(請在圖則顯示，並註明車路的闊度)

No 否 ☐

For Development involving columbarium use, please complete the table in the Annex to this Appendix.
如發展涉及靈灰安置所用途，請填妥於此附件後附錄的表格。

2. Impacts of Development Proposal 擬議發展計劃的影響

If necessary, please use separate sheets to indicate the proposed measures to minimise possible adverse impacts or give justifications/reasons for not providing such measures
如需要的話，請另頁註明可盡量減少可能出現不良影響的措施，否則請提供理據/理由。

Does the development proposal involve alteration of existing building? 擬議發展計劃是否包括現有建築物的改動?	Yes 是	☐ Please provide details 請提供詳情 ....
	No 否	☑
Does the development proposal involve the operation on the right? 擬議發展是否涉及右列的工程?	Yes 是	☑ (Please indicate on site plan the boundary of concerned land/pond(s), and particulars of stream diversion, the extent of filling of land/pond(s) and/or excavation of land) (請用地盤平面圖顯示有關土地／池塘界線，以及河道改道、填塘、填土及／或挖土的細節及/或範圍) ☐ Diversion of stream 河道改道 ☐ Filling of pond 填塘 Area of filling 填塘面積 ..... sq.m 平方米 ☐About 約 Depth of filling 填塘深度 ..... m 米 ☐About 約 ☑ Filling of land 填土 Area of filling 填土面積 ...1,140..... sq.m 平方米 ☑About 約 Depth of filling 填土厚度 ...2-3..... m 米 ☑About 約 ☑ Excavation of land 挖土 Area of excavation 挖土面積...2,870..... sq.m 平方米 ☑About 約 Depth of excavation 挖土深度 ...0.5-3.....m 米 ☑About 約 (Please refer to Attachment A for the potential extent of filling and excavation of land)
	No 否	☐

Would the development proposal cause any adverse impacts? 擬議發展計劃會否造成不良影響？			
On environment 對環境	Yes 會 ☐	No 不會 ☑
On traffic 對交通	Yes 會 ☐	No 不會 ☑
On water supply 對供水	Yes 會 ☐	No 不會 ☑
On drainage 對排水	Yes 會 ☐	No 不會 ☑
On slopes 對斜坡	Yes 會 ☐	No 不會 ☑
Affected by slopes 受斜坡影響	Yes 會 ☐	No 不會 ☑
Landscape Impact 構成景觀影響	Yes 會 ☐	No 不會 ☑
Tree Felling 砍伐樹木	Yes 會 ☐	No 不會 ☑
Visual Impact 構成視覺影響	Yes 會 ☐	No 不會 ☑
Others (Please Specify) 其他 (請列明)	Yes 會 ☐	No 不會 ☑
Sewage (No Adverse Impact)		
Archaeological (No Adverse Impact)		
Geotechnical (No Adverse Impact)		

Please state measure(s) to minimise the impact(s). For tree felling, please state the number, diameter at breast height and species of the affected trees (if possible)
請註明盡量減少影響的措施。如涉及砍伐樹木，請說明受影響樹木的數目、及胸高度的樹幹直徑及品種(倘可)

Please refer to Appendix B - Landscape Master Plan of the Supporting Planning Statement for the Tree Treatment Proposal

For Developments involving Columbarium Use, please also complete the following:
如發展涉及靈灰安置所用途，請另外填妥以下資料

Ash interment capacity 骨灰安放容量@

Maximum number of sets of ashes that may be interred in the niches
在龕位內最多可安放骨灰的數量 _____

Maximum number of sets of ashes that may be interred other than in niches
在非龕位的範圍內最多可安放骨灰的數量 _____

Total number of niches 龕位總數 _____

Total number of single niches
單人龕位總數 _____

Number of single niches (sold and occupied)
單人龕位數目 (已售並佔用) _____

Number of single niches (sold but unoccupied)
單人龕位數目 (已售但未佔用) _____

Number of single niches (residual for sale)
單人龕位數目 (待售) _____

Total number of double niches
雙人龕位總數 _____

Number of double niches (sold and fully occupied)
雙人龕位數目 (已售並全部佔用) _____

Number of double niches (sold and partially occupied)
雙人龕位數目 (已售並部分佔用) _____

Number of double niches (sold but unoccupied)
雙人龕位數目 (已售但未佔用) _____

Number of double niches (residual for sale)
雙人龕位數目 (待售) _____

Total no. of niches other than single or double niches (please specify type)
除單人及雙人龕位外的其他龕位總數 (請列明類別) _____

Number. of niches (sold and fully occupied)
龕位數目 (已售並全部佔用) _____

Number of niches (sold and partially occupied)
龕位數目 (已售並部分佔用) _____

Number of niches (sold but unoccupied)
龕位數目 (已售但未佔用) _____

Number of niches (residual for sale)
龕位數目 (待售) _____

Proposed operating hours 擬議營運時間 _____

_____

@ Ash interment capacity in relation to a columbarium means –
就靈灰安置所而言，骨灰安放容量指：
- the maximum number of containers of ashes that may be interred in each niche in the columbarium;
每個龕位內可安放的骨灰容器的最高數目;
- the maximum number of sets of ashes that may be interred other than in niches in any area in the columbarium; and
在該靈灰安置所並非龕位的範圍內，總共最多可安放多少份骨灰；以及
- the total number of sets of ashes that may be interred in the columbarium.
在該骨灰安置所內，總共最多可安放多少份骨灰。

Gist of Application 申請摘要

(Please provide details in both English and Chinese as far as possible. This part will be circulated to relevant consultees, uploaded to the Town Planning Board's Website for browsing and free downloading by the public and available at the Planning Enquiry Counters of the Planning Department for general information.)
(請盡量以英文及中文填寫。此部分將會發送予相關諮詢人士、上載至城市規劃委員會網頁供公眾免費瀏覽及下載及於規劃署規劃資料查詢處供一般參閱。)

Application No. 申請編號	(For Official Use Only) (請勿填寫此欄)
Location/address 位置／地址	西貢南邊圍丈量約份第 244 約地段第788號餘段（部分）、第789號餘段（部分）、第827號餘段（部分）、第828號餘段（部分）、第855號餘段、第863號餘段（部分）、第865號餘段（部分）、第868號餘段、第871號、第872號、第873號、第 874 號、第875號餘段、第876號餘段、第 877 號餘段、第 878 號餘段、第 879 號餘段、第 1939 號餘段、第 1939 號 E 分段、第 1939 號 F 分段、第 1939 號 B 分段第 3 小分段、第 1940 號（部分）、第 1944 號餘段、第 2189 號(部份)及毗連政府土地 Lot Nos. 788 RP (Part), 789 RP (Part), 827 RP (Part), 828 RP (Part), 855 RP, 863 RP (Part), 865 RP (Part), 868 RP, 871, 872, 873, 874, 875 RP, 876 RP, 877 RP, 878 RP, 879 RP, 1939 RP, 1939 S.E, 1939 S.F, 1939 S.B ss.3, 1940 (Part), 1944 RP and 2189 (Part) in D.D. 244, and adjoining Government Land, Nam Pin Wai, Sai Kung
Site area 地盤面積	6,601 sq. m 平方米 ☑ About 約 (includes Government land of 包括政府土地 521 sq. m 平方米 ☑ About 約)
Plan 圖則	Approved Ho Chung Outline Zoning Plan No. S/SK-HC/11 蠔涌分區計劃大綱核准圖編號 S/SK-HC/11
Zoning 地帶	"Green Belt" ("GB") 「綠化地帶」
Proposed Amendment(s) 擬議修訂	☐ Amend the Covering Notes of the Plan 修訂圖則《註釋》的說明頁 ☑ Amend the Notes of the zone applicable to the site 修訂適用於申請地點土地用途地帶的《註釋》 ☑ Rezone the application site from "Green Belt" ("GB") to "Residential (Group C)1" ("R(C)1") 把申請地點由「綠化地帶」地帶改劃為「住宅（丙類）1」

Development Parameters (for indicative purpose only) 發展參數(只作指示用途)

		sq.m 平方米	Plot Ratio 地積比率
(i) Gross floor area and/or plot ratio 總樓面面積及／或地積比率 (# Calculation is based on the Development Site Area 以地盤發展面積作計算)	Domestic 住用	4,016# ☑ About 約 ☐ Not more than 不多於	0.75# ☐ About 約 ☑ Not more than 不多於
	Non-domestic 非住用	☐ About 約 ☐ Not more than 不多於	☐ About 約 ☐ Not more than 不多於
(ii) No. of block 幢數	Domestic 住用	17 Houses 屋宇	
	~~Non-domestic~~ 非住用		
	Composite 綜合用途		

(iii)	Building height/No. of storeys 建築物高度／層數	Domestic 住用	12 m 米 ☑ (Not more than 不多於)
			mPD 米(主水平基準上) ☐ (Not more than 不多於)
			3 Storeys(s) 層 ☑ (Not more than 不多於) (☐*Include 包括*/☐ *Exclude 不包括* ☐ *Carport 停車間* ☐ *Basement 地庫* ☐ *Refuge Floor 防火層* ☐ *Podium 平台*)
		Non-domestic 非住用	m 米 ☐ (Not more than 不多於)
			mPD 米(主水平基準上) ☐ (Not more than 不多於)
			Storeys(s) 層 ☐ (Not more than 不多於) (☐*Include 包括*/☐ *Exclude 不包括* ☐ *Carport 停車間* ☐ *Basement 地庫* ☐ *Refuge Floor 防火層* ☐ *Podium 平台*)
		Composite 綜合用途	m 米 ☐ (Not more than 不多於)
			mPD 米(主水平基準上) ☐ (Not more than 不多於)
			Storeys(s) 層 ☐ (Not more than 不多於) (☐*Include 包括*/☐ *Exclude 不包括* ☐ *Carport 停車間* ☐ *Basement 地庫* ☐ *Refuge Floor 防火層* ☐ *Podium 平台*)
(iv)	Site coverage 上蓋面積	Not more than 不多於 25# % ☑ About 約 (# Calculation is based on the Development Site Area 以地盤發展面積作計算)	
(v)	No. of units 單位數目	17 Houses	
(vi)	Open space 休憩用地	Private 私人	51 sq.m 平方米 ☑ Not less than 不少於
		Public 公眾	sq.m 平方米 ☐ Not less than 不少於

(vii) No. of parking spaces and loading / unloading spaces 停車位及上落客貨車位數目	Total no. of vehicle parking spaces 停車位總數	37
	Private Car Parking Spaces 私家車車位	36*
	Motorcycle Parking Spaces 電單車車位	1
	Light Goods Vehicle Parking Spaces 輕型貨車泊車位	
	Medium Goods Vehicle Parking Spaces 中型貨車泊車位	
	Heavy Goods Vehicle Parking Spaces 重型貨車泊車位	
	Others (Please Specify) 其他 (請列明)	(* including 2 nos. visitor parking spaces, of which 1 also serves as accessible parking space)
	Total no. of vehicle loading/unloading bays/lay-bys 上落客貨車位／停車處總數	1
	Taxi Spaces 的士車位	
	Coach Spaces 旅遊巴車位	
	Light Goods Vehicle Spaces 輕型貨車車位	
	Medium Goods Vehicle Spaces 中型貨車位	
	Heavy Goods Vehicle Spaces 重型貨車車位	1
	Others (Please Specify) 其他 (請列明)	

Submitted Plans, Drawings and Documents 提交的圖則、繪圖及文件

	Chinese 中文	English 英文
Plans and Drawings 圖則及繪圖		
Master layout plan(s)/Layout plan(s) 總綱發展藍圖／布局設計圖	☐	☑
Block plan(s) 樓宇位置圖	☐	☐
Floor plan(s) 樓宇平面圖	☐	☐
Sectional plan(s) 截視圖	☐	☑
Elevation(s) 立視圖	☐	☐
Photomontage(s) showing the proposed development 顯示擬議發展的合成照片	☐	☑
Master landscape plan(s)/Landscape plan(s) 園境設計總圖／園境設計圖	☐	☑
Others (please specify) 其他（請註明）	☐	☐
Reports 報告書		
Planning Statement/Justifications 規劃綱領/理據	☐	☑
Environmental assessment (noise, air and/or water pollutions) 環境評估（噪音、空氣及／或水的污染）	☐	☐
Traffic impact assessment (on vehicles) 就車輛的交通影響評估	☐	☑
Traffic impact assessment (on pedestrians) 就行人的交通影響評估	☐	☐
Visual impact assessment 視覺影響評估	☐	☑
Landscape impact assessment 景觀影響評估	☐	☐
Tree Survey 樹木調查	☐	☑
Geotechnical impact assessment 土力影響評估	☐	☐
Drainage impact assessment 排水影響評估	☐	☑
Sewerage impact assessment 排污影響評估	☐	☑
Risk Assessment 風險評估	☐	☐
Others (please specify) 其他（請註明）	☐	☑

Landscape Master Plan; Archaeological Review Report; Geotechnical Planning Review Report

Note: May insert more than one「✔」. 註：可在多於一個方格內加上「✔」號

Note: The information in the Gist of Application above is provided by the applicant for easy reference of the general public. Under no circumstances will the Town Planning Board accept any liabilities for the use of the information nor any inaccuracies or discrepancies of the information provided. In case of doubt, reference should always be made to the submission of the applicant.

註： 上述申請摘要的資料是由申請人提供以方便市民大眾參考。對於所載資料在使用上的問題及文義上的歧異，城市規劃委員會概不負責。若有任何疑問，應查閱申請人提交的文件。

Application for Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131) to Rezone the Application Site from "Green Belt" to "Residential (Group C)1" for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung

Consolidated Set – Supporting Planning Statement with Final Technical Assessments & Further Information with Response-to-Comments Table

May 2024

Arup Hong Kong Ltd
Level 5 Festival Walk
80 Tat Chee Avenue
Kowloon Tong
Kowloon
Hong Kong
www.arup.com

ARUP

Annex A

Final Supporting Planning Statement with Final Technical Assessments

Application for Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131) to Rezone the Application Site from "Green Belt" to "Residential (Group C)1" for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung

Supporting Planning Statement

April 2024

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Hong Kong
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EXECUTIVE SUMMARY

This Supporting Planning Statement is submitted for the Proposed Amendment to the Approved Ho Chung Outline Zoning Plan No. S/SK-HC/11 (the "OZP") under Section 12A of the Town Planning Ordinance (Cap. 131), in support of the rezoning from "Green Belt" ("GB") zone to "Residential (Group C) 1" ("R(C) 1") zone at Various Lots in D.D.244 and Adjoining Government Land, Nam Pin Wai, Sai Kung (the "Application Site") to facilitate a Proposed House Development (the "Proposed Amendment").

With a site area of about 6,601m^2, the Application Site is located within a low-dense residential neighbourhood with an existing "R(C)1" site locating to its immediate west, where General Building Plan for developing 51 houses was approved by the Building Authority in January 2023. The Application Site is connected by an approved access road (approved under planning application No. A/SK-HC/223) which was intended to connect the adjoining "R(C)1" site to Wo Mei Hung Min Road. The construction work for the approved "R(C)1" site and its connecting access road have been commenced. It should be noted that the Application Site under this S12A application includes the approved access road and the 2 portions of land bisected by the access road.

The Application Site is currently largely vacant (except the approved access road which is currently under construction). Only limited trees with generally low amenity value can be found on the Application Site, which barely serve the intention of "GB" for "*defining the limits of urban and sub-urban development areas by natural features and to contain urban sprawl as well as to provide passive recreational outlets*". It should be noted that the Applicants owned majority part of the Application Site (about 76.8%, including the access road) and are keen to review the potential of the wasted land not serving "GB" function at the Application Site for residential development that is compatible with the surrounding context. This is also fully in-line with the Government's initiative to review suitable "GB" sites for housing development, locating "*in the fringe of built-up areas close to existing urban areas and new towns, and those vegetated areas with relatively less buffering effect and lower conservation value*".

It is therefore proposed to rezone the Application Site to the same "R(C)1" zone as the adjoining site, which is subject to a maximum plot ratio (PR) of 0.75, maximum site coverage (SC) of 37.5% as well as a maximum building height (BH) of 9m with 2 storeys over one storey of carport; or to a maximum PR of 0.75, maximum SC of 25% as well as a maximum BH of 12m with 3 storeys over one storey of carport.

An Indicative Scheme has been formulated in support of the Proposed Amendment, which consists of 17 nos of 3-storey houses with a PR of not more than 0.75, SC of not more than 25% and a BH of not more than 12m with 3 storeys. The Applicants proposed a phased development strategy to develop the Application Site in 2 phases (including 13 houses under Phase 1 owned by the Applicants, 4 houses under Remaining Phase owned by others).

The Proposed Amendment at the Application Site is considered fully justified based the following grounds:

- Rationalising Wasted Land Resources Not Serving "GB" Function for Housing Purpose;
- Not Compromising the Integrity and Function of the Wider "GB" Zone;
- In Line with the Government's Initiatives and Criteria of Reviewing Suitable "GB" zone for Housing Development;
- Ensuring Full Compatibility with Surrounding Context;
- Enhancing Landscape Amenity and Upgrading Local Environment;
- Adopting a Pragmatic Phasing Approach; and
- Inducing No Adverse Impacts to the Surroundings.

This Application has demonstrated Applicants' genuine intention and commitment in taking forward the Proposed Amendment at the Application Site. In light of the planning merits and justifications put forward in this Supporting Planning Statement, we sincerely seek the favourable consideration from the Town Planning Board to give its support to this Section 12A Application.

行政摘要

(內文如與英文版本有任何差異，應以英文版本為準)

本規劃綱領根據《城市規劃條例》（第 131 章）第 12A 條，就位於西貢南邊圍丈量約份第 244 約內多個地段和毗連政府土地（「申請地點」），擬議修訂蠔涌分區計劃大綱核准圖編號 S/SK-HC/11（「分區計劃大綱圖」），將申請地點由「綠化地帶」地帶改劃為「住宅（丙類）1」地帶，以作擬議屋宇發展（「擬議修訂」）。

申請地點的總地盤面積為約 6,601 平方米。申請地點位處一個主要以低密度住宅發展爲主的區域。申請地點的西面毗鄰「住宅（丙類）1」地帶，該地帶已於 2023 年 1 月獲得核准建築圖則，以興建 51 間屋宇。申請地點可透過一條連接毗鄰「住宅（丙類）1」地帶的連接道路（核准規劃申請編號 A/SK-HC/223）接駁至窩美紅棉路。現時毗鄰屋宇及許可的連接道路的地盤平整工程已展開。是次第 12A 條申請的申請地點包括這條連接道路及兩旁的土地。

現時，申請地點大部分的土地為空置（除了正進行工程的連接道路外）。申請地點內樹木的價值偏低，現況難以體現「綠化地帶」的規劃意向，即*「利用天然地理環境作為市區和近郊的發展區的界限，以抑制市區範圍的擴展，並提供土地作靜態康樂場地」*。申請人為申請地點內約 76.8% 私人土地（包括連接道路）的持有人，希望藉此機會審視申請地點的發展潛力及發展周邊地區相互協調的住宅發展。擬議修訂符合政府檢視「綠化地帶」發展潛力的評估標準，即*「位於已建設地區邊緣、鄰近現時市區和新市鎮、有植被但緩衝作用和保育價值相對較低的「綠化地帶」」*。

故此，擬議修訂建議將申請地點改劃為「住宅（丙類）1」地帶，最高地積比率為 0.75 倍，最大上蓋面積為 37.5% ，以及最高建築物高度為 9 米 (即一層開敞式停車間上加兩層) ；或最高地積比率為 0.75 倍，最大上蓋面積為 25% ，以及最高建築物高度為 12 米 (即一層開敞式停車間上加三層)。

申請人已制定一個指示性方案以支持擬議修訂，建議於申請地點興建 17 間 3 層高的屋宇，地積比率不多於 0.75，上蓋面積不多於 25%，建築物高度不超過 12 米。 申請人亦提議分期發展策略，當中包括由申請人擁有的第一期發展（13 間屋宇）及由其他私人地段組成的餘下階段發展（4 間屋宇）。

擬議修訂具有以下合理改劃理由：

- 理順荒廢多年亦未能體現「綠化地帶」的規劃意向的土地作住宅用途；
- 不影響廣大範圍內「綠化地帶」的完整性及作用；
- 符合政府檢視合適「綠化地帶」發展潛力的政策方針及評估標準；

- 確保與周邊的發展互相協調；
- 提升景觀美化價值及改善地區環境；
- 提供合適的分期發展策略；及
- 不會對周邊環境造成負面影響。

申請人對推進此擬議修訂持有誠懇和積極的態度。基於本規劃綱領所闡述的規劃增益和理據，我們懇請城市規劃委員會支持是次第 12A 條規劃申請。

1 Introduction

1.1.1 This Supporting Planning Statement is submitted to the Town Planning Board ("TPB") in support of a Planning Application under Section 12A of the Town Planning Ordinance (Cap. 131) for Proposed House Development ("the Proposed Amendment") at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung ("the Application Site").

1.1.2 The Applicants propose amendment to the Approved Ho Chung Outline Zoning Plan No. S/SK-HC/11 ("the OZP") by rezoning the Application Site from "Green Belt" ("GB") to the same "Residential (Group C)1" ("R(C)1") zone to the immediate west of the Application Site ("the Proposed Amendment") with a maximum plot ratio ("PR") of 0.75, a maximum site coverage ("SC") of 37.5% and a maximum building height ("BH") of 9m with 2 storeys over one storey of carport or with a maximum PR of 0.75, a maximum SC of 25% and a maximum BH of 12m with 3 storeys over one storey of carport, to facilitate a Proposed House Development at the Application Site.

1.1.3 The Application Site is located to the west of the New Hiram's Highway and is situated in a predominantly low-dense residential neighbourhood. Currently, majority part of the Application Site is vacant, except the approved access road (approved with conditions by the TPB under planning application No. A/SK-HC/223) connecting to the adjoining house development (with approved General Building Plan for 51 houses) which are both under construction. Only limited trees with generally low amenity value can be found on the Application Site, barely serving the intention of "GB" zone. Existing trees planted along the New Hiram's Highway, which forms part of the wider "GB" zone will be excluded from the Application Site and will not be affected.

1.1.4 In recent years, the Government has been reviewing development potential of suitable "GB" sites as part of the multi-pronged approach to increase housing supply. In the past 10 years (2013-2021), a total of 210 sites have been identified by the Government with potential for housing development and 140 of them have already been rezoned or allocated for housing development[1]. It should be noted that a 2.5ha site at about 650m to the south of the Application Site was recently rezoned from "GB" zone to "R(C)7" zone for private housing development on the Approved Tseng Lan Shue OZP No. S/SK-TLS/10 as initiated by the Government[2].

1.1.5 In-line with Government's initiative, the Applicants, being the landowners of majority of land within the Application Site bisected by the access road, see the opportunity to rationalise the long-wasted land

[1] Replies to initial written questions raised by Finance Committee Members in examining the Estimates of Expenditure 2021-22. Retrieved from https://www.devb.gov.hk/filemanager/en/content_1251/devb-pl-e.pdf
[2] Draft Tseng Lan Shue Outline Zoning Plan approved. Retrieved from https://www.info.gov.hk/gia/general/202305/05/P2023050500233.htm

that barely serves the function of "GB" for house development. The proposed development would be of a compatible scale with the surrounding and serves an opportunity to enhance the landscape amenity and living environment for the Nam Pin Wai neighbourhood.

1.1.6 An Indicative Scheme has been formulated to demonstrate the feasibility of the Proposed Amendment. The Indicative Scheme will provide a total of 17 additional houses with the same development intensity and would serve as a natural extension of the adjoining "R(C)1" zone.

1.1.7 This Supporting Planning Statement contains the sections below that are necessary to support this Planning Application to demonstrate its feasibility and suitability:

- Section 2 describes the context of the Application Site and its surrounding areas;
- Section 3 explains the planning context of the Application Site;
- Section 4 presents the Indicative Scheme at the Application Site;
- Section 5 summarises the amendment proposal to be incorporated into the Plan and Notes of the OZP;
- Section 6 highlights the planning justifications and planning merits in support of the Proposed Amendment; and
- Section 7 concludes the highlights and justifications of this Supporting Planning Statement.

2 Site Context

2.1 Location

2.1.1 The Application Site is located at various lots in D.D. 244 and adjoining Government Land in Nam Pin Wai, Sai Kung. Referring to **Figure 2.1**, the Application Site is situated between a "R(C)1" zone and the amenity slope of New Hiram's Highway zoned as "GB".

2.1.2 With a site area of about 6,601m^2, the Application Site comprises of an approved access road (about 1,246m^2) which is the subject of an approved S16 Planning Application (No. A/SK-HC/223), as well as land areas bisected by the approved access road to the north and south (**Figure 2.2** refers).

2.2 Land Status

2.2.1 The Application Site area is about 6,601m^2, which comprises of about 6,080m^2 (about 92.1%) of private lots and about 521m^2 (about 7.9%) of Government Land. Among the private lots, about 83.4% are solely owned by the Applicants (i.e. Sites A, B and C and majority part of the approved access road). The remaining 16.6% are third-party private lots locating at the southern portion of the Application Site. Please refer to **Figure 2.2** for the lot index plan.

2.2.2 Please also refer to **Table 2.1** below for the detailed landholding schedule.

Table 2.1 Landholding Schedule within the Application Site

Private Land Status (in D.D. 244) (About 6,080m^2 in total) (About 92.1% of Application Site)	
Lots fully acquired by the Applicants	877 RP 878 RP 879 RP 1939 RP 1939 S.B ss.3 1939 S.E 1939 S.F 1940 (Part) 1944 RP 2189 (Part)
Lots under third-party ownership	788 RP (Part) 789 RP (Part) 827 RP (Part) 828 RP (Part) 855 RP 863 RP (Part) 865 RP (Part) 868 RP

		871 872 873 874 875 RP 876 RP
Summary on Land Status		
Private Land	Lots fully acquired by the Applicants	About 5,073m^2 (76.8%)
	Lots under third-party ownership	About 1,007m^2 (15.3%)
Government Land		About 521m^2 (7.9%)
Total Application Site Area		About 6,601m^2

2.3 Existing Land Uses and Condition

2.3.1 Currently, the Application Site is mostly vacant except the approved access road under planning application No. A/SK-HC/223 which is under construction. A few trees in fair to poor condition with generally low amenity value are scattered along two sides of the approved access road and the northern periphery of the Application Site.

2.3.2 In terms of site topography, the approved access road is at a site level of about 19mPD, forming the highest point of the Site which gradually slopes downwards to its south (about 7mPD) and north (about 8mPD).

2.3.3 Please refer to **Figure 2.3** for the existing condition of the Application Site.

2.4 Surrounding Land Uses

2.4.1 The Application Site is situated in a predominantly residential neighbourhood in Nam Pin Wai area with existing and planned low-dense houses and village settlements:

- To the **immediate west** adjoining the Application Site is the always permitted 'House' development at "R(C)1" zone with an approved GBP for building 51 houses and an approved access road connecting to Wo Mei Hung Min Road. To the **further west** across the "R(C)1" zone are rural village houses under "V" zone.
- To the **immediate south** adjoining the Application Site is Wo Mei Hung Min Road, then the low-dense village clusters under "V" zone, including the Yosemite and the Royal Garden and other village type houses.
- To the **immediate east** of the Application Site is the New Hiram's Highway, including its noise barrier and amenity slope under the same "GB" zone as the Application Site. As observed from site

visit, there is a cluster of trees located right next to the Application Site within the same "GB" zone, serving as landscape buffer from the New Hiram's Highway. To the **further east** across the New Hiram's Highway is the Sai Kung Central Primary School under "Government, Institution or Community" ("G/IC") zone.

- To the **immediate northwest** of the Application Site is the low-dense village type house namely Villa Royale within the same "R(C)1" zone. To its **further north** across Nam Pin Wai Road are the rural village houses of Ho Chung New Village under the "V" zone and an area designated as "Comprehensive Development Area" ("CDA") zone subject to a maximum PR of 0.75, a maximum SC of 25% and a maximum BH of 12m with 3 storeys over one storey of carport. The northern part of the "CDA" zone is the subject of a planning application (No. A/SK-HC/124-2) for 26 nos of houses with 3 storeys over one storey basement allowed by the Town Planning Appeal Board on 16 July 2013. While the southern part is the subject of a planning application (No. A/SK-HC/340) for 8 nos. of houses with 3 storeys over one storey carport and 14 nos. of houses with 6 storeys over one storey carport approved on 9.6.2023.

2.4.2 Please refer to **Figure 2.4** for the surrounding uses of the Application Site.

2.5 Accessibility

2.5.1 The Application Site is accessible to the Wo Mei Hung Min Road via the approved access road serving the adjoining "R(C)1" development, which further connects to the New Hiram's Highway (a district distributor road) to other parts in Sai Kung, Kowloon East and Tseung Kwan O areas.

2.5.2 The Application Site is well-served by public transport services, including franchised bus and green minibus with stops within 50m walking distance. The public transport services (with routes 101M, 92, 292P, 96R, 1, 1A, 1S and 792M) right next to the Application Site provide convenient connection to Sai Kung town centre and other urban areas such as Causeway Bay, Mong Kok and Kwun Tong, etc.

3 Planning Context

3.1 Land Use Zoning

3.1.1 The Application Site falls within the "GB" zone under the Approved Ho Chung OZP No. S/SK-HC/11. It was partly designated as 'Road' and partly zoned "GB" on the Draft Ho Chung OZP No. S/SK-HC/1 gazetted on 20.5.1994. Subsequently, the whole Application Site was rezoned as "GB" on the Draft Ho Chung OZP No. S/SK-HC/6 gazetted on 2.7.2004.

3.1.2 According to the Notes of the OZP, the planning intention of the "GB" zone is "*primarily for defining the limits of urban and sub-urban development areas by natural features and to contain urban sprawl as well as to provide passive recreational outlets. There is a general presumption against development within this zone*".

3.1.3 The Explanatory Statement ("ES") further elaborates the planning intention of the subject "GB" zone is "*primarily for defining the limits of urban and sub-urban development areas by natural features, including foothills, lower hillslopes, spurs, isolated knolls, woodland, vegetated land and amenity areas at the urban fringe, and to contain urban sprawl as well as to provide passive recreational outlet and delineating roadside amenity areas.*"

3.1.4 It is also specified in the ES that "*part of the area under this zoning falls within the Ho Chung Site of Archaeological Interest. Relics dated to late Neolithic, Bronze Age and historic period were unearthed in the area… Prior consultation with the AMO of the LCSD should be made if any development, redevelopment or rezoning proposals might affect the above historic building or site of archaeological interest and their immediate environs*". Since the western part of the Application Site falls within the Ho Chung Site of Archaeological Interest (SAI), the Applicants conducted an Archaeological Review with proposed mitigation measures for the consideration of AMO to respect the requirement under the ES (**Appendix F** refers).

3.1.5 Please refer to **Figures 3.1a to 3.1d** for the extracts of the Notes and ES of the Ho Chung OZP.

3.2 Planning History

3.2.1 As discussed in **Section 2**, the Application Site includes an approved access road (about 1,246m^2) connecting the adjoining "R(C)1" site and Wo Mei Hung Min Road. The approved access road, located within "GB" zone, was the subject of a S16 Planning Application (No. A/SK-HC/223) for an ancillary road serving the always permitted 'House' development at the adjoining "R(C)1" zone, which was then approved with conditions by the TPB on 8 February 2013. Subsequently, the proposed access road was approved by the Building Authority as part

of the House development (51 houses) at the adjoining "R(C)1" site in January 2023. Construction work for both the proposed access road and 51 houses development has commenced.

3.2.2 In addition, part of the Application Site (Lots 865 RP, 868 RP, 871, 872, 873, 874, 875 RP & 876 RP in D.D. 244 and adjoining Government Land, mainly the land areas between Site A and Site B) were the subject of two previous S16 planning applications (Nos. A/SK-HC/252 and A/SK-HC/279) with same application site for temporary place of recreation, sports or culture, which were approved with conditions by the TPB on 13 May 2016 and 3 August 2018 respectively. Yet, both planning applications were revoked on 13 November 2016 and 3 July 2020 respectively, and no work has been commenced so far (**Diagram 3.1** refers).

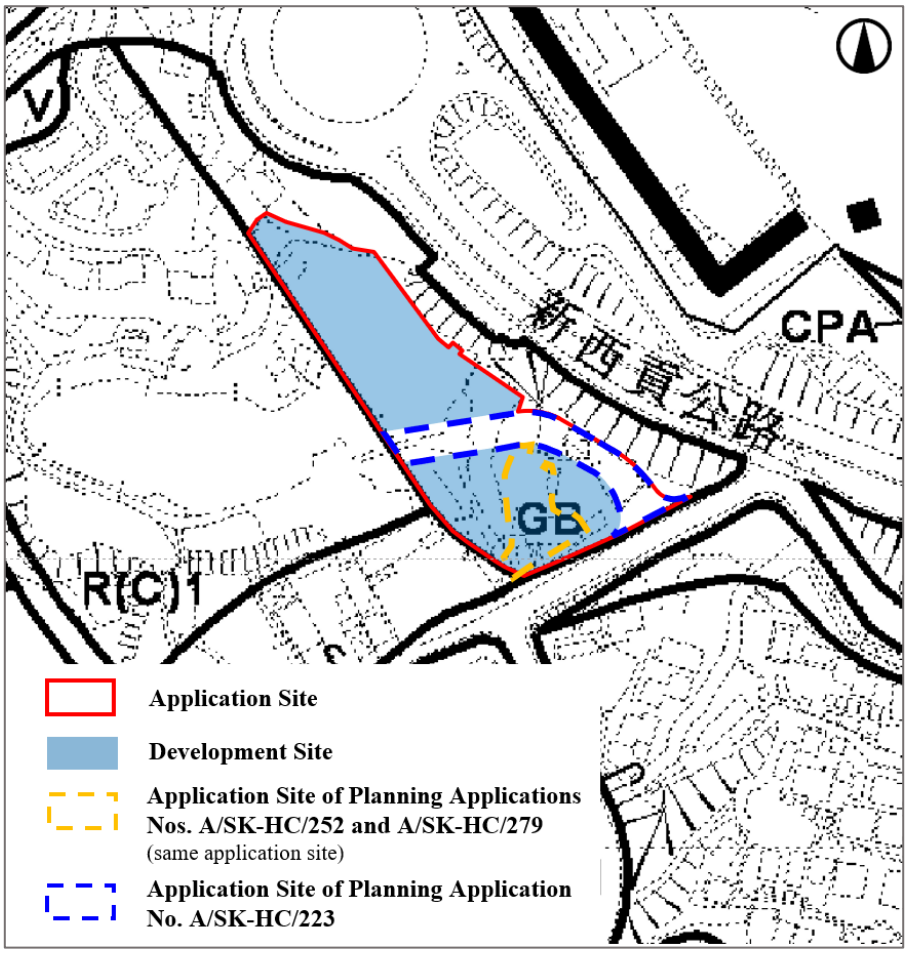


Diagram 3.1 Previous Planning Applications within the Application Site

3.3 Government's Multi-Pronged Approach to Increase Housing Supply

3.3.1 Housing shortage is one of the most pressing issues faced in Hong Kong in recent years and the Government has adopted a multi-pronged

approach in increasing land for housing supply including identifying new land for development. It was reaffirmed in the Policy Addresses from 2019 to 2022[3] that the Government will continue to review various land uses and rezone sites as appropriate for housing development. Reviewing and rezoning suitable "GB" sites for housing development has been one of the major measures.

3.3.2 Despite with a "*presumption against development*", the Government has taken steps to review different "GB" sites that covered the whole territory of Hong Kong for rezoning in two stages. According to the Legislative Council Paper for the Panel on Development in 2022[4], the Government will continue to recognise the rezoning of "GB" zones as an important source of housing land supply for their relatively lower ecological value, committing to 'a new round of review' of land zoned "GB" (Stage 3 "GB" Review refers). In the Stage 3 "GB" Review, it will target at "*sites with higher gradient and farther away from the built-up area but still with roads in the vicinity, covering even private land*". **Table 3.1** below summarises the key assessment criteria of different rounds of "GB" Reviews initiated by the Government:

Table 3.1 Key Assessment Criteria of "Green Belt" Reviews Initiated by the Government

Different Rounds of "GB" Review	Assessment Criteria
Stage 1 "GB" Review[5]	- devegetated, deserted or formed, and those that are closer to existing urban areas and new towns
Stage 2 "GB" Review[6]	- in the fringe of built-up areas close to existing urban areas and new towns, and those vegetated areas with relatively less buffering effect and lower conservation value
Stage 3 "GB" Review[7]	- sites with higher gradient and farther away from the built-up area but still with roads in the vicinity, covering even private land

[3] 2019 Policy Address (https://www.policyaddress.gov.hk/2019/eng/pdf/PA2019.pdf); 2020 Policy Address (https://www.policyaddress.gov.hk/2020/eng/policy.html); 2021 Policy Address (https://www.policyaddress.gov.hk/2021/eng/p93.html); 2022 Policy Address (https://www.policyaddress.gov.hk/2022/public/pdf/policy/policy-full_en.pdf)
[4] LC Paper No. CB(1)1395/20-21(01)
https://www.legco.gov.hk/yr20-21/english/panels/dev/papers/dev20211025cb1-1395-1-e.pdf
[5] LCQ10: Statistics on and rezoning of Green Belt sites
https://www.info.gov.hk/gia/general/201801/24/P2018012400288p.htm
[6] LCQ10: Statistics on and rezoning of Green Belt sites
https://www.info.gov.hk/gia/general/201801/24/P2018012400288p.htm
[7] 2021 Policy Address
https://www.devb.gov.hk/en/about_us/policy/2021-policy-address-supplement/policy-address-and-pa-supplement-initiatives/index.html

3.3.3 In the first two stages of "GB" reviews, 77 sites with potential for residential use have been shortlisted and 45 of them have been rezoned from "GB" to housing sites. Stage 3 of "GB" review was completed recently and has further identified about 255ha of "GB" land, with its first batch of rezoning targeted to be completed by 2024[8].

3.3.4 The Application Site, which has only a few trees with generally low landscape value and locates within an existing residential area with convenient transport infrastructure connecting to the Sai Kung town centre and other urban cores of Hong Kong, have met the criteria under the 3 stages of "GB" Reviews with potential for housing development.

3.4 Government's Effort in Identifying "GB" Site for Housing Development in the Surrounding Area

3.4.1 The Government's initiative to review suitable "GB" sites for housing development can also be found in the Sai Kung District and in the vicinity of the Application Site. At the time of this submission, a total of 6 "GB" sites in the Sai Kung area have already been rezoned by Government initiatives for private/ public housing development during the land reviews (**Table 3.1** below).

Table 3.1 Rezoning of "GB" Sites initiated by the Government in Sai Kung District for Housing Development[9] [10]

No.	Location	Site Area (in ha)	Rezoning Proposal and Development Restriction	No. of Flats	Status
1	The junction of Pik Sha Road and Clear Water Bay Road[11]	0.13	• To "R(C)10" • Maximum PR of 0.6 • Maximum SC of 30% • Maximum BH of 3 storeys (including carport)	4 (private)	Rezoning Completed
2	South of Chiu Shun Road, Tseung Kwan O[12]	0.46	• To "R(A)8" • Maximum PR of 6.5 • Maximum BH of 130mPD	600 (public)	Rezoning Completed
3	East of Movie City, Tseung Kwan O	2.26	• To "R(A)7" • Maximum PR of 6.5	2,900 (public)	Rezoning Completed

[8] LCQ8: Development planning for area around Ting Lai Road near Nam Hang Tsuen, Tai Po https://www.info.gov.hk/gia/general/202301/18/P2023011800376.htm?fontSize=1

[9] Task Force on Land Supply Paper No. 10/2017. Retrieved from https://www.devb.gov.hk/filemanager/en/content_1054/Paper_10_2017.pdf

[10] https://www.devb.gov.hk/filemanager/en/content_1251/devb-pl-e.pdf Replies to initial written questions raised by Finance Committee Members in examining the Estimates of Expenditure 2021-22. Retrieved from https://www.devb.gov.hk/filemanager/en/content_1251/devb-pl-e.pdf

[11] https://www.info.gov.hk/tpb/en/papers/RNTPC/486-rntpc_7-13.pdf RNTPC Paper No. 7/13. Retrieved from https://www.info.gov.hk/tpb/en/papers/RNTPC/486-rntpc_7-13.pdf

[12] RNTPC Paper No. 6/17. Retrieved from https://www.info.gov.hk/tpb/en/papers/papers.html

			• Maximum BH of 210mPD		
4	Northwest of Ying Yip Road, Tseung Kwan O	1.59	• To "R(A)7" • Maximum PR of 6.5 • Maximum BH of 170mPD	1,600 (public)	Rezoning Completed
5	West of Yau Yue Wan Village, Tseung Kwan O	2.95	• To "R(A)7" • Maximum PR of 6.5 • Maximum BH of 140mPD	2,700 (public)	Rezoning Completed
6	Ta Ku Ling, Tseng Lan Shue area[13]	2.55	• To "R(C)7" • Maximum GFA of 23,466m^2 (PR of about 0.92) • Maximum BH of 7 storeys (24m)	330 (private)	Rezoning Completed

3.4.2 Among the above rezoned sites within Sai Kung area, the site in Ta Ku Ling is within the vicinity of the Application Site. At about 650m of the Application Site, the Ta Ku Ling site was recently rezoned from "GB" to "R(C)7" for private housing development as one of the amendment items on the Draft Tseng Lan Shue OZP No. S/SK-TLS/9 which has been approved by the CE in C[14]. The Approved Tseng Lan Shue OZP No. S/SK-TLS/10 has been gazetted on 5 May 2023 [15](**Diagram 3.2** refers).

3.4.3 According to the TPB Paper No. 10861[16], the rezoned "GB" site has a site area of about 2.55ha and is intended for 14 nos of 7-storey private housing development with a maximum GFA of 23,466m^2 (equivalent to a PR of about 0.92). In terms of land use and development intensity, the site was considered compatible with the surrounding areas given that there are existing low-density residential developments and village houses nearby. The Application Site shares similar context with the rezoned "GB" site by locating within a predominantly low-dense neighbourhood.

[13] RNTPC Paper No. 1/22. Retrieved from https://www.info.gov.hk/tpb/en/papers/papers.html
[14] Minutes of 1280th Meeting of the Town Planning Board held on 2.9.2022. Retrieved from https://www.info.gov.hk/tpb/en/meetings/TPB/Minutes/m1280tpb_e.pdf
[15] Draft Tseng Lan Shue Outline Zoning Plan approved. Retrieved from https://www.info.gov.hk/gia/general/202305/05/P2023050500233.htm
[16] TPB Paper No. 10861 https://www.info.gov.hk/tpb/en/whats_new/Website_S_SK-TLS_9.html

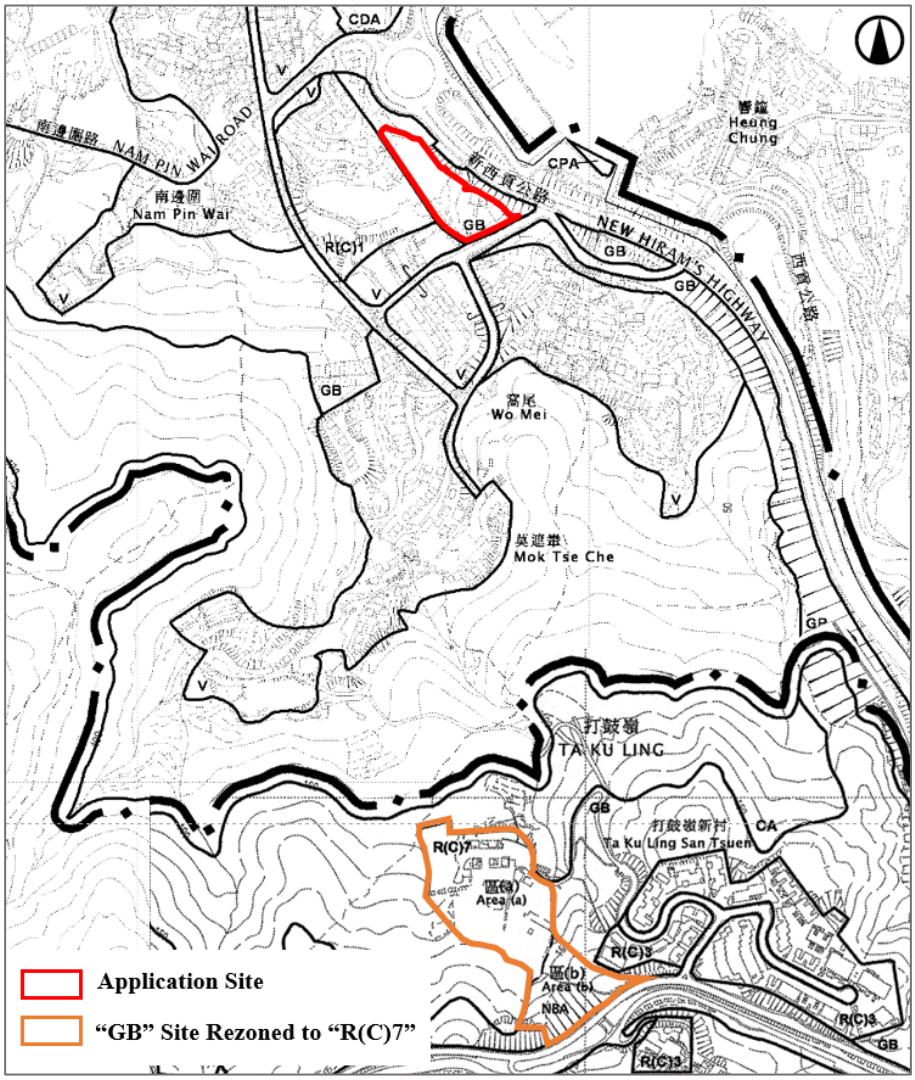


Diagram 3.2 Nearby "GB" Site in Tseng Lan Shue Area Rezoned to "R(C)7" for Housing Development

4 The Indicative Scheme

4.1 Reviewing Development Potential of the Long-wasted Land while Not Compromising the Integrity and Function of the Wider "GB" Zone

4.1.1 Located within an existing residential neighbourhood of Nam Pin Wai and in particular adjoining a "R(C)1" site under construction, the Application Site, largely vacant and with limited landscape value barely serves the planning intention of "GB" zone for defining limits of urban and sub-urban development, contain urban sprawl and provide passive recreational outlets. The Application Site has met the assessment criteria in the various stages of review conducted by the Government to identify suitable "GB" sites for housing development.

4.1.2 The Applicants owned a consolidated portion of private lots within the Application Site, which provide certainty for the Application Site to be released for suitable house development as a natural extension of the "R(C)"1 site and seamlessly integrate to the low-density residential neighbourhood.

4.1.3 At the same time, the Application Site has excluded the remaining "GB" zone locating along the New Hiram's Highway where dense tree cover serving as a landscape buffer from the major road can be found. This also ensure the wider "GB" network planned along the New Hiram's Highway on the OZP to remain intact.

4.2 General Planning and Design Principles

4.2.1 The general planning and design principles that guides the formulation of the Indicative Scheme are described below.

4.2.2 **Consolidating Fragmented Land Lots in this Underutilised Left-over Space Not Serving "GB" Function** – Currently, the Application Site is bisected by the approved access road into two left-over pieces to the north and south with sparse distribution of trees of generally low amenity value. The frequently observed pedestrian trespassing and waste dumping due to a lack of management also create safety concern and visual eye sores to the nearby residents. All these hindered the Application Site from serving the function of "GB" zone. The Applicants, owning about 76.8% of private lots in a consolidated manner, see an opportunity to review and rationalise these undermanaged left-over areas for suitable housing development to benefit society at large. Through a well-designed and managed house development, it is anticipated to bring an overall enhancement to the local residential area.

4.2.3 **Full Compatibility with the Surrounding Areas** – The Application Site is located within a low-dense neighbourhood and immediately adjoins an approved house development under the existing "R(C)1"

zone with a PR 0.75 and BH of 12m. Proposed Development at the Application Site should be fully compatible with the sub-urban character of Nam Pin Wai area and in particular intended to adopt the same development scale as the adjoining "R(C)1" site as a natural extension of house development at the Application Site.

4.2.4 **Pragmatic Phasing Approach in Response to the Land Ownership Pattern** – The layout of the Indicative Scheme has fully taken into account the existing land use pattern at the Application Site. Phase 1 development will be proposed on Sites A, B and C (Figure 2.2 refers) which are under Applicants' consolidated ownership and readily connected via the approved access road. During the scheme formulation process, the Applicants also recommend a feasible development layout for the Remaining Phase. By allocating GFA in each phase on a pro-rata basis and ensuring self-contained provision such as local open space and internal transport facilities, the Indicative Scheme will pay full respect to the development rights of the third-party owners at the Application Site. The Indicative Scheme will present a pragmatic phasing strategy to allow certainty in early implementation of Phase 1 development while providing incentive to spearhead the Remaining Phase development. All technical assessments have taken into account both Phase 1 and Remaining Phase development to ensure technical feasibility of the Proposed Amendment at the Application Site.

4.2.5 **Enhancing Landscape Amenity, Phasing out of Visual Eye Sores and Upgrading the Neighbourhood Environment** – As revealed in tree survey, existing vegetation at the Application Site is sparsely distributed and in fair to poor health conditions. Together with the lack of management, resulting in pedestrians trespassing and waste dumping for years, it creates environmental degradation and visual eye sores to the surrounding area. Future house development at the Application Site is committed to enhance the visual and landscape amenity with a dedicated landscape design concept and centralized management. The environmental and living quality of its surrounding communities is anticipated to be greatly improved.

4.2.6 **Minimising Potential Impacts to the Proposed Development on the Ho Chung Site of Archaeological Interest** – As the western part of the Application Site falls within the Ho Chung SAI (**Diagram 4.1**), in full respect with the ES of OZP, an Archaeological Review has been conducted and to recommend mitigation measures to ensure no adverse impacts to the SAI will be resulted with the proposed development at the Application Site.

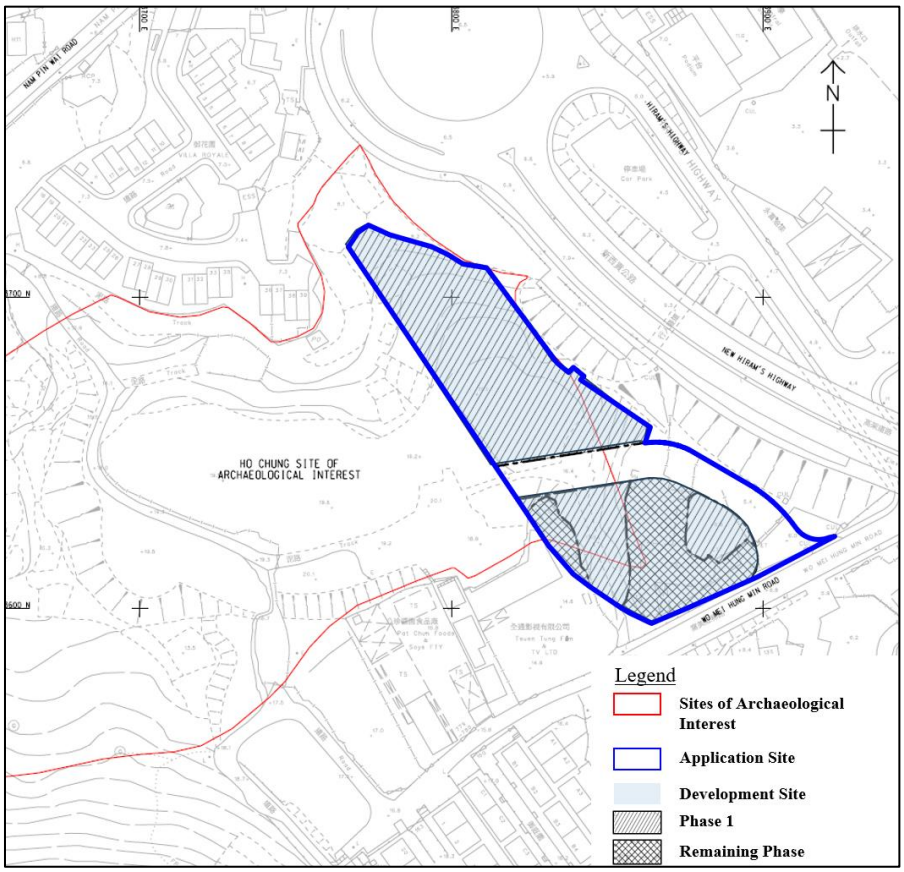


Diagram 4.1 Ho Chung Site of Archaeological Interest and the Application Site

4.2.7 Please refer to **Appendix A** for the Architectural Plans of the Indicative Scheme.

4.3 Key Development Parameters

4.3.1 As discussed in **Section 4.2.4**, the Applicants are fully aware of and respect the development rights of other private lots within the Application Site. Therefore, the Indicative Scheme will be developed in 2 self-contained phases, namely Phase 1 (including Sites A, B and C with consolidated ownership by the Applicants) and Phase 2 (including third-party lots and Government land) (**Diagram 4.2** refers).

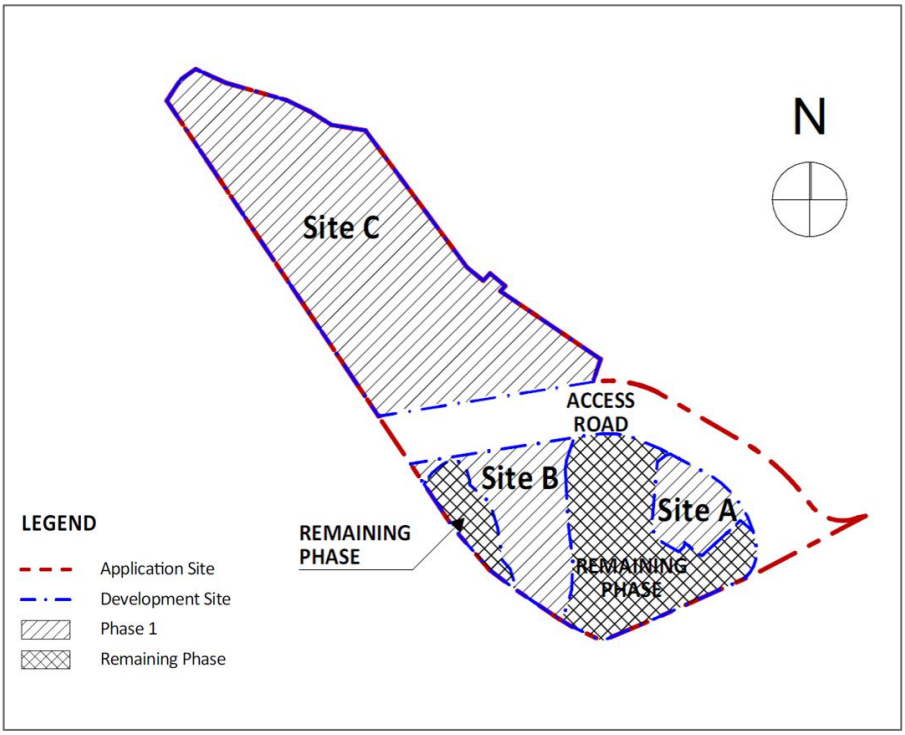


Diagram 4.2 Phasing Arrangement of the Indicative Scheme

4.3.2 Please refer to **Table 4.1** below for the key development parameters of the Indicative Scheme, and by their respective phases. It can be observed that an equivalent PR (0.75), BH (12m or 3 storeys), Site Coverage (not more than 25%) will be reserved for both Phase 1 and Remaining Phase of the Indicative Scheme. The Indicative Scheme also ensures that the provision of ancillary parking facilities and local open space provision to be self-contained within both the Phase 1 and Remaining Phase according to prevailing planning standards. By doing so, landowners of these other private lots are encouraged to develop the Remaining Phase at their own initiatives.

4.3.3 It is anticipated that Phase 1 development will be completed by year 2030. For technical assessment purpose, it is assumed that the entire Indicative Scheme, including both Phase 1 and the Remaining Phase, will be completed by year 2030.

Table 4.1 Key Development Parameters of the Indicative Scheme

Key Development Parameters		Indicative Scheme		
		Phase 1	**Remaining Phase**	**Total**
Application Site Area (About)		-	-	6,601m^2
Development Site Area Excluding the Access Road* (About)		4,020m^2	1,335m^2	5,355m^2
Domestic PR (Not more than)#		0.75	0.75	0.75
Domestic GFA (About)# &		3,015m^2	1,001m^2	4,016m^2
Building Height (About)		12m	12m	-
No. of Storeys		3	3	3
Site Coverage#		Not more than 25%	Not more than 25%	Not more than 25%
No. of Houses		13	4	17
Anticipated Population (about)^		39	12	51
Local Open Space		Not less than 39m^2	Not less than 12m^2	Not less than 51m^2
Parking Spaces	Private Car	26	8	34
	Visitors	2	-	2
	Motorcycle	1	0	1
Loading/ Unloading Bay		1	-	1

Notes:

* The area of the access road under the approved planning application No/ A/SK-HC/223 is about 1246m^2

\# Calculation is based on the Development Site Area which excludes the access road.

^ A Person Per Occupied Flat of 3.0 is assumed based on the average domestic household size of Pak Sha Wan District Council Constituency Area as reported in the 2021 Population Census by the Census and Statistics Department

& GFA of the proposed clubhouse provision is within 5% of the total domestic GFA and is therefore exempted from GFA calculation

4.4 Building Design of the Indicative Scheme

4.4.1 The building design of the Indicative Scheme has followed the general planning and design principles as set out in **Section 4.2**. The Indicative Scheme pays full respect to the existing low-dense residential context of the Nam Pin Wai area. The building designs of Phase 1 and Remaining Phase developments are as follows:

Phase 1

4.4.2 With a PR of 0.75, SC of 25% and BH of 12m with 3 storeys, Phase 1 development comprises three sites with Site B and C for houses development to the south and north of the approved access road; and Site A mainly serve as the ancillary clubhouse at the entrance of the Application Site. Under the Indicative Scheme, two houses are planned at Site B while eleven houses are planned at Site C, directly adjoins the

adjacent "R(C)1" site under construction. The interface issue has been taken into account by designating an internal access road with a hammerhead at the western portion of Site C, providing buffer with the "R(C)1" Site (Section AA of **Appendix A** refers). At the same time, houses at Site C will be effectively screened from the New Hiram's Highway by the existing tree cover outside the Application Site.

Remaining Phase

4.4.3 Lots under third-party ownership are planned to be developed under Remaining Phase. In view of the constrained site area of the lots to the east of Site B (under Phase 1), the proposed GFA of the Remaining Phase will be allocated to the larger land parcel sandwiched between Sites B and A, to accommodate four houses with a PR of 0.75, SC of 25% and BH of 12m with 3 storeys. The Remaining Phase will be self-contained and possess a separate vehicular access to the approved access road leading to Wo Mei Hung Min Road and New Hiram's Highway. It should be noted that the proposed layout of the Remaining Phase is for indicative purpose only and might be developed by the third-party owners by their own initiatives under the proposed development intensity.

Sensitive Design Layout

4.4.4 By adopting the same development intensity of the adjoining "R(C)1" zone, the Indicative Scheme under the Proposed Amendment will seamlessly blend in with the adjoining development and act as its natural extension. As shown on Section AA in **Appendix A**, the development scale of the proposed houses at the Application Site is fully compatible with the adjoining environ.

4.4.5 Noting that the Application Site is bounded by New Hiram's Highway to its east and Wo Mei Hung Min Road to its south, the Indicative Scheme adopted a sensible layout design by setting back 20m and 5m from the two roads such that the future residents at the Application Site will not be susceptible to adverse environmental impacts (**Diagram 4.3** refers).

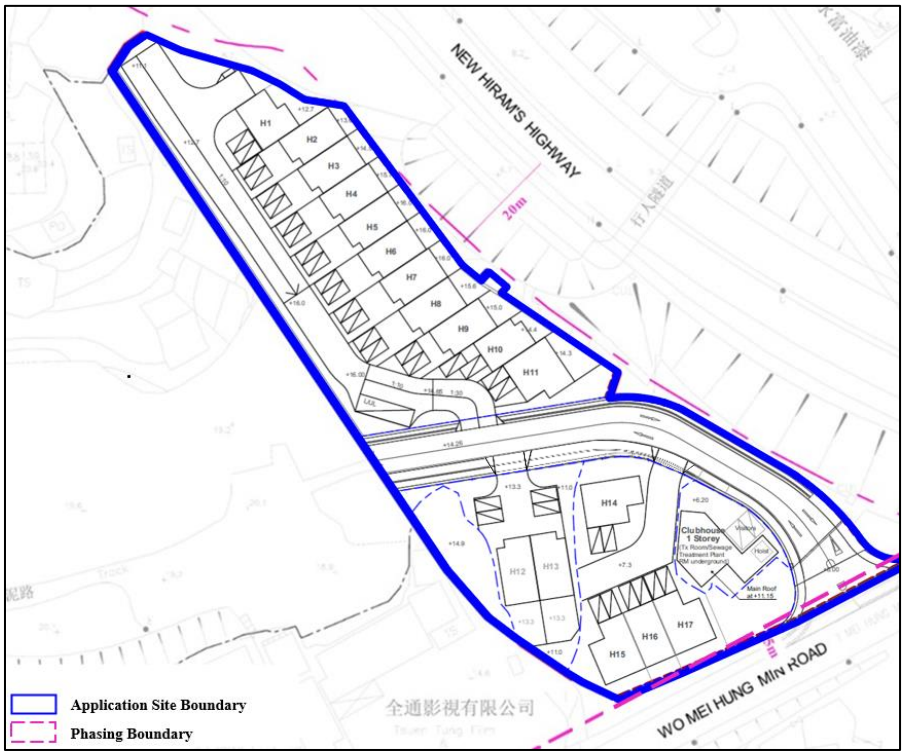


Diagram 4.3 Setback Distances from New Hiram's Highway and Wo Mei Hung Min Road

Compliance with Sustainable Building Design Guidelines (SBDG)

4.4.6 The Indicative Scheme fully adheres to the SBDG. For the building setback, the building disposition has taken into account of the setback from the centre line of Wo Mei Hung Min Road which complies with relevant SBDG requirement. It is noted that the proposed residential building blocks of height not exceeding 15m would be exempted from the building separation requirements. In terms of site coverage of greenery, both Phase 1 and Remaining Phase complies with the minimum requirement of providing 20% of the site area on a self-contained basis.

4.5 Landscape Design

Landscape Design Concept

4.5.1 The key landscape design concepts of the Indicative Scheme are as follows:

- Create a landscape design commensurate with the specific site conditions of the Application Site;
- Create a landscape character consistent with the overall design language and aesthetic of the architectural elements;

- Ensure the Proposed Development is sensitively integrated into the surrounding areas via appropriate interface treatments;
- Create suitable outdoor spaces for communal use of future residents; and
- Promote the use of indigenous plant species throughout the landscape and to introduce exotic ornamental species to feature areas.

4.5.2 With the above concepts, the landscape proposal of the Indicative Scheme includes the followings:

4.5.3 **Entrance Courtyard:** An entrance courtyard planted with flowering trees and shrubs is designed to enhance the arrival experience, aid orientation and create a welcoming atmosphere.

4.5.4 **Clubhouse Landscape Area**: The clubhouse is designed as a strong node and a visual landmark reference point within the development. It consists of hard and soft landscape areas for multi-function usage suitable for function/ event and recreation facilities.

4.5.5 **Private Garden:** A feature tree will be planted at each housing unit to reflect the overall character of the development and establish the individuality of the housing units.

4.5.6 **Avenue Tree Planting**: A combination of specimen trees and shrub planting will be provided along the EVA of the Proposed Development. This creates a lush tree planting avenue. Colour paving and patterns will be used to delineate the road bed and adjacent sidewalk to create an inviting environment upon which pedestrians will feel safe and comfortable. These measures are designed to enhance the character, vitality, amenity and safety of the Indicative Scheme.

Tree Preservation Proposal

4.5.7 Among 93 nos. of existing trees living in tree groups, 92 nos. of them are proposed to be felled (Phase 1: 78 nos. and Remaining Phase: 14 nos.) and 1 no. rare species *Aquilaria sinensis* living in Phase 1 is proposed to be transplanted.

4.5.8 Majority of existing trees proposed to be felled are in fair to poor condition, health and form with low amenity value, and possess defects such as dead branches, cavity, wood decay, wounds or seams and low in survival rate after transplanting. To replenish the loss of existing greenery, 92 nos. of new trees are proposed to be planted (Phase 1: 78 nos. and Remaining Phase: 14 nos.) in 1:1 compensation ratio in terms of quantity.

Open Space Provision

4.5.9 The Indicative Scheme is in accordance with the open space requirement in the Hong Kong Planning Standards and Guidelines (HKPSG), which requires 1m^2 local open space per person. As the total

estimated population for the Proposed Development is about 51 persons, therefore not less than 51m^2 of local open space will be provided. Both Phase 1 and Remaining Phase development are self-contained in terms of local open space provision.

Greenery Provision

4.5.10 The Indicative Scheme is also in full compliance with the requirement of PNAP APP-152 that an area of not less than 20% of the total greenery will be provided for both Phase 1 and Remaining Phase.

4.5.11 Please refer to **Appendix B - Landscape Master Plan** for more details.

4.6 Traffic Arrangement

Vehicular Access

4.6.1 The Application Site is located near the junction of Hiram's Highway/ Wo Mei Hung Min Road. At present, there is no proper vehicular access to the Application Site. As shown in the Indicative Scheme, an access road under the approved planning application No. A/SK-HC/223 will be formed connecting Wo Mei Hung Min Road, the Application Site and the adjoining "R(C)1" development. Hence, the Application Site will be connected to the Sai Kung town centre and urban areas in Kowloon and Hong Kong island via the approved access road which further links to Wo Mei Hung Min Road and New Hiram's Highway.

4.6.2 The access arrangement is shown in the Indicative Scheme in **Appendix A**.

Internal Transport Facilities

4.6.3 Each development phase of the Indicative Scheme will be self-contained in terms of internal transport facilities which are provided in accordance with requirement of the HKPSG. Please refer to the **Appendix C - Traffic Impact Assessment** for the details on the traffic and transport arrangement for the Indicative Scheme.

5 Amendment Proposal

5.1 Considerations for An Appropriate Zoning

5.1.1 In response to the Government's on-going initiative to identify suitable sites to aid housing development, and with the fact that the existing condition of the Application Site has not been serving the function of "GB" and is readily available for house development, an appropriate zoning in place for the Application Site is needed to realise the Indicative Scheme discussed in **Section 4**. The key factors contributing to an appropriate and hence, successful zoning is listed out in the following sub-sections.

5.2 Clear Planning Intention

5.2.1 The proposed zoning should carry a clear planning intention and development direction for the type of uses and development intensity on the Application Site. In the case of this Application Site, the zoning should clearly specify that the Application Site should predominately be used for low-dense house development.

5.3 Appropriate Zoning Control

5.3.1 The proposed zoning should have appropriate zoning control over the proposed use, scale and intensity by designating restrictions on the PR, SC and BH to guide the direction of the development towards the intended planning intention and to rationalise the bisected land pieces at the Application Site. Appropriate zoning control would also ensure that the Indicative Scheme will be compatible with the surroundings.

5.4 Appropriate Zoning Flexibility

5.4.1 Some kind of flexibility has to be allowed in the zoning to allow flexibility in creative and innovative design and proposals, which can tie in more closely to community aspirations and market demands, allowing diversity which contributes to social vibrancy.

5.5 The Proposed Amendment

5.5.1 In light of the discussion in the above Sections, this Planning Application proposes amendment to the Plan and Notes to the Approved Ho Chung OZP No. S/SK-HC/11 by rezoning the Application Site from "GB" zone to "R(C)1" zone with a development intensity fully compatible with the surrounding context for private housing use.

5.5.2 The Proposed Amendment will be responding to the overall policy direction of increasing housing supply through rezoning "GB" sites and has met suitable criteria in Stages 2 and 3 of "GB" reviews, viz. locating

in the fringe of built-up area close to existing urban areas and new towns, having low buffering effect and conservation value, as well as being well-served by existing road infrastructure in the vicinity.

5.5.3 The Applicants are intended to adopt the existing "R(C)1" zone and the development parameters and requirement as stipulated in its existing Notes and ES on the Application Site. By rezoning the Application Site to the same "R(C)1" zoning as its adjoining development, it could facilitate the natural integration of the two developments in a seamless manner, to provide additional private residential supply while at the same time not compromising compatibility with the adjoining environment.

5.5.4 The Proposed Amendment on the Plan is shown in **Figure 5.5a**. The Notes and ES of the current "R(C)1" zone to which the Application Site is proposed to be rezoned is illustrated in **Figures 5.5b to 5.5c** and **Figures 5.5d to 5.5e** respectively.

6 Planning Justifications

6.1 Rationalising Wasted Land Resources Not Serving "GB" Function for Housing Purpose

6.1.1 Despite being zoned as part of "GB" on the OZP for decades, the existing condition of the Application Site barely perform the function of "GB" for *defining limits of urban and sub-urban development*, *contain urban sprawl* and *provide passive recreational outlets*. Currently, majority of the Application Site has been left vacant with limited tree cover possessing defects and low amenity value. The lack of management also resulted in frequent pedestrian trespassing and waste dumping, causing environmental degradation and security issue to the wider residential neighbourhood of Nam Pin Wai.

6.1.2 On the other hand, as a piece of land adjoining built-up residential developments and well-served by public transport services, the vacated land of the Application Site is considered a wastage of scarce land resources that warrants a review for suitable development that is compatible with its surroundings.

6.1.3 Being the landowner of consolidated private lots within the Application Site, the Applicants are keen to rationalize this piece of wasted land immediately adjoining to an approved house development (the adjoining "R(C)1" site) and propose for house development with a similar scale under pragmatic development phases.

6.1.4 It should be noted that the boundary of the Application Site mainly includes the wasted land held by private lots, while retaining the existing dense tree cover along its eastern boundary as "GB" to minimize impact to the wider "GB" network along New Hiram's Highway.

6.2 Not Compromising the Integrity and Function of the Wider "GB" Zone

6.2.1 Despite the rezoning of the Application Site from "GB" to "R(C)1" will inevitably reduce the total area of "GB" at the local area of Nam Pin Wai, the overall planning intention "*primarily for defining the limits of urban and sub-urban development areas by natural features and to contain urban sprawl as well as to provide passive recreational outlets. There is a general presumption against development within this zone"* for the wider area will not be compromised with the Proposed Amendment.

6.2.2 As shown on **Figure 5.5a and Diagram 4.3**, it should be noted that the strip of "GB" zone of at least 20m-wide to the east of the Application Site, currently occupied by dense tree cover, will be retained on the OZP. The "GB" strip will continue to serve as a landscape/visual buffer between the New Hiram's Highway and the sub-urban residential area

of Nam Pin Wai, including the Indicative Scheme at the Application Site. It will continue to link up with the wider "GB" zone along the New Hiram's Highway to the south with a similar width serving similar functions.

6.2.3 As such, rezoning of the Application Site from "GB" to "R(C)1" zone will not affect the planning intention "GB" network along New Hiram's Highway. In turn, the Proposed Amendment will improve the local environment by replacing the existing under-managed land by a high-quality 'House' development with proper management and thoughtful designed landscape. Early implementation of the Indicative Scheme will provide an upgrade to the landscape and visual amenity of the local area while ensuring full compatibility with the surrounding developments by proposing suitable development intensity.

6.3 In Line with the Government's Initiatives and Criteria of Reviewing Suitable "GB" Zone for Housing Development

6.3.1 As outlined in **Section 3.3**, as part of the multi-pronged approach to increase land supply, the Government has been actively reviewing and exploring the development potential of sites that fall within "GB" zone.

6.3.2 Based on the criteria adopted in three rounds of "GB" Review by the Government, **Table 6.1** below summarizes the applicability of the Application Site, as a suitable "GB" site that warrants review for suitable land uses for housing purpose.

Table 6.1 Fulfilment of the Government's Assessment Criteria in Reviewing "GB" Sites

Assessment Criteria adopted in Three Rounds of "GB" Review	Fulfilment of the Application Site
Stage 1 "GB" Review devegetated, deserted or formed, and those that are closer to existing urban areas and new towns	✓ The Application Site is mostly vacant. Only a few trees in fair to poor condition with general low amenity value can be found. ✓ An approved access road (approved under No. A/SK-HC/223) is currently formed and under construction, cutting across the Application Site connecting to Wo Mei Hung Min Road.
Stage 2 "GB" Review in the fringe of built-up areas close to existing urban areas and new towns, and those vegetated areas with relatively less buffering effect and lower conservation value	✓ The Application Site is immediately adjoining an approved 51 house development under "R(C)1" zone which is under construction, and in a wider context within the low-dense sub-urban residential neighbourhood of Nam Pin Wai. ✓ The Application Site is conveniently connected to Wo Mei Hung Min Road via an approved access road (approved under No. A/SK-HC/223), which further connects to the New Hiram's Highway, conveniently connected to Kowloon and Sai Kung in 15mins. ✓ Based on tree survey, existing trees on the Application Site possess low conservation value. Majority of them are in fair too poor condition and possess defects such as dead branches, cavity, wood decay, wounds or seams. The existing condition of the Application Site is largely vacant land with no proper management. Pedestrian trespassing and waste dumping causes environmental degradation and security concerns.

Assessment Criteria adopted in Three Rounds of "GB" Review	**Fulfilment of the Application Site**
	✓ The Application Site has excluded the existing dense tree cover (about 20m) along the New Hiram Highways. The remaining "GB" strip will be adequate to serve as an effective landscape/visual buffer between the New Hiram's Highway and the sub-urban residential area of Nam Pin Wai, including the Indicative Scheme at the Application Site.
Stage 3 "GB" Review sites with higher gradient and farther away from the built-up area but still with roads in the vicinity, covering even private land	✓ The Application Site is sitting on a slopping topography. The Indicative Scheme demonstrates a sensitive design that response to the topography for suitable housing development. ✓ The Applicants already owned about 76.8% of private lots within the Application Site in a consolidated manner. Agreement to the Proposed Amendment will facilitate an early implementation of a central- managed house development at Phase 1 of the Application Site while offering drive to the Remaining Phase development, eventually bringing landscape and environmental upgrading to the area.

6.3.3 Besides, as detailed in **Section 3.4**, it is also noted that the Government has rezoned a total of 6 "GB" zones for residential purpose in the Sai Kung District, ranging from 0.13 to 2.95 ha, providing a total of 7,800 public housing units and 334 private housing units in the past 10 years. Among them, a site in Tseng Lan Shue (2.55ha), which locates at about 650m to the south of the Application Site possessing a similar sub-urban context, was recently rezoned to "R(C)7" with a maximum GFA of about 23,466m^2 (equivalent to a PR of about 0.92) and maximum BH of 7 storeys (24m) for 330 private housing units on the Approved Tseng Lan Shue OZP No. S/SL-TLS/10 gazetted on 5 May 2023[17] [18].

[17] Minutes of 1280th Meeting of the Town Planning Board held on 2.9.2022. Retrieved from https://www.info.gov.hk/tpb/en/meetings/TPB/Minutes/m1280tpb_e.pdf
[18] Draft Tseng Lan Shue Outline Zoning Plan approved. Retrieved from https://www.info.gov.hk/gia/general/202305/05/P2023050500233.htm

6.3.4 The Proposed Amendment under this Application, which is of a much smaller scale in terms of Site Area (about 6,601m^2), PR (about 0.75), BH (about 12m and 3 storeys) is therefore not unprecedented and a proactive response to the Government's on-going land supply initiatives.

6.4 Ensuring Full Compatibility with the Surrounding Context

6.4.1 As discussed in **Section 5**, the Proposed Amendment at the Application Site seeks for adopting the same "R(C)1" zoning as its adjoining approved house development. By adopting the same development restrictions (in terms of PR, SC and PR), and the fact that the Application Site (about 6,601m^2) is of much smaller scale than the original "R(C)1" zone (about 21,455m^2), the Proposed Amendment is considered a natural extension of the original "R(C)1" zone while fully compatible with the sub-urban residential context of the Nam Pin Wai area.

6.4.2 As demonstrated in Sections A-A, B-B, and C-C in **Appendix A**, the Proposed Amendment will be fully compatible with the low-dense living environment of Nam Pin Wai area and while at the same time not diminishing the function and integrity of the remaining "GB" zone on the OZP. **Appendix H** (Visual Impact Assessment) has also confirmed that the Proposed Amendment will not create adverse visual impacts to the surroundings and is considered compatible with the surrounding low-dense residential neighbourhood.

6.5 Enhancing Landscape Amenity and Upgrading Local Environment

6.5.1 Currently, the identified trees at the Application Site are generally in fair to poor condition with no rare species (except one *Aquilaria sinensis* which is proposed to be transplanted). The survey has concluded that the existing trees are of low amenity value.

6.5.2 Under the Indicative Scheme, the landscape environment of the Application Site will be greatly enhanced with sensible landscape design and the existing trees will be replaced by species with higher aesthetic value. The currently unmanaged environment within the Application Site will also be replaced by modern and contemporary well-designed house development. Hence, the Proposed Amendment is anticipated to enhance the landscape amenity and upgrade the living environment, thus benefitting the wider local community.

6.6 Adopting a Pragmatic Phasing Approach

6.6.1 The Indicative Scheme has presented a pragmatic phasing approach in response to the land ownership pattern within the Application Site. Phase 1 (Sites A, B, C) comprises of land lots solely owned by the

Applicants which is readily available for development, which provide incentives for private lot owners in the Remaining Phase to develop their land at their own initiatives.

6.6.2 As presented in the Indicative Scheme, each development phase will be self-contained in terms of development potential, local open space and internal transport facilities provision. The same development intensity is applied to both phases on a pro-rata basis such that the development rights of other private land owners will not be undermined.

6.6.3 Technical assessments submitted under this Application will include the entire Indicative Scheme, including both Phase 1 and Remaining Phases to ensure the feasibility of the Proposed Amendment at the Application Site.

6.7 Inducing No Adverse Technical Impacts

6.7.1 Various technical assessments have been conducted to demonstrate the feasibility of the Proposed Amendment. These include Landscape Master Plan (**Appendix B)**, Traffic Impact Assessment (**Appendix C**), Drainage Impact Assessment (**Appendix D**), Sewerage Impact Assessment (**Appendix E**), Archaeological Review Report (**Appendix F**), Geotechnical Planning Review Report (**Appendix G**), Visual Impact Assessment (**Appendix H**), Environmental Assessment Study (**Appendix I**), Quantitative Risk Assessment for High Pressure Town Gas Pipeline (**Appendix J**) and Water Demand Assessment (**Appendix K**). Findings of the technical assessment reveals that the Proposed Amendment will not generate adverse impact to the surrounding environment.

7 Conclusion

7.1.1 This Supporting Planning Statement is submitted under Section 12A of the TPO to seek approval for the Proposed Amendment to the Approved Ho Chung OZP No. S/SK-HC/11 by rezoning the Application Site from "GB" zone to "R(C)1" zone to facilitate a Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung.

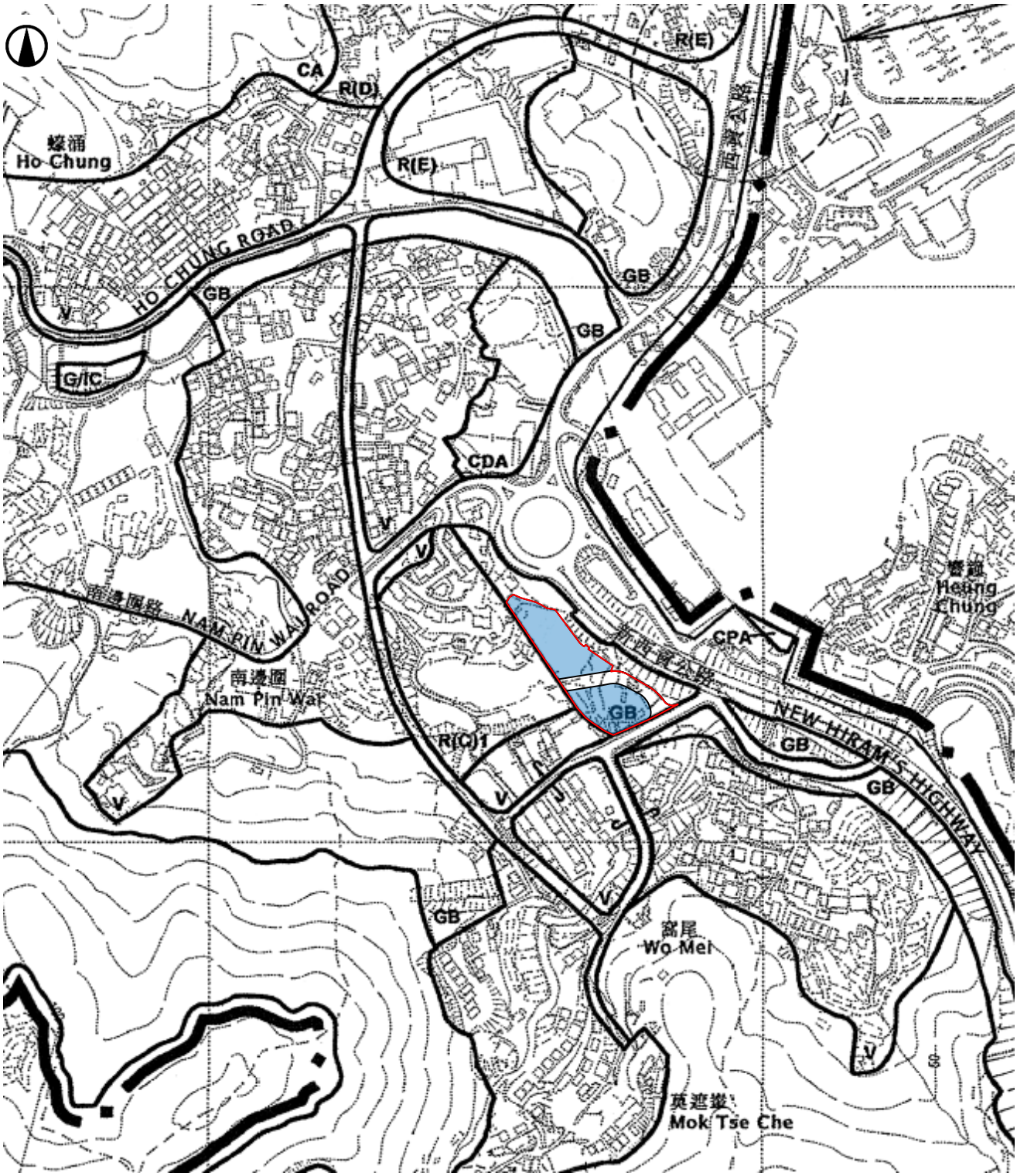
7.1.2 This Supporting Planning Statement has demonstrated the suitability and technical feasibility of the Proposed Amendment at the Application Site to the same "R(C)1" zone to its immediate west, which is subject to a maximum PR of 0.75, a maximum SC of 37.5% and a maximum BH of 9m with 2 storeys over one storey of carport or with a maximum PR of 0.75, a maximum SC of 25% and a maximum BH of 12m with 3 storeys over one storey of carport, to facilitate a Proposed House Development at the Application Site.

7.1.3 The Proposed Amendment seeks to rationalize the wasted land resources at the Application Site not effectively serving "GB" function for housing purpose. This is considered in-line with Government's on-going initiatives and criteria of reviewing suitable "GB" zones for housing development, while not compromising the integrity and function of the wider "GB" zone on the same OZP. By adopting the same development intensity and restriction as the adjoining approved house development, the Proposed Amendment is considered fully compatible with the sub-urban residential character of Nam Pin Wai. Agreement of the Proposed Amendment will provide certainty for a well-managed, modern house development with a sensitive landscape design, enhancing the landscape amenity for the local area.

7.1.4 It has been demonstrated in the technical assessments that the Proposed Amendment at the Application Site will not be generating adverse impact to the surroundings in terms of landscape, traffic, archaeological, drainage, sewerage and visual perspectives.

7.1.5 In view of the planning merits and justifications put forward in this Supporting Planning Statement, we sincerely seek the favourable consideration from the TPB to give support to this S12A Planning Application.

Figures



LEGEND

Application Site

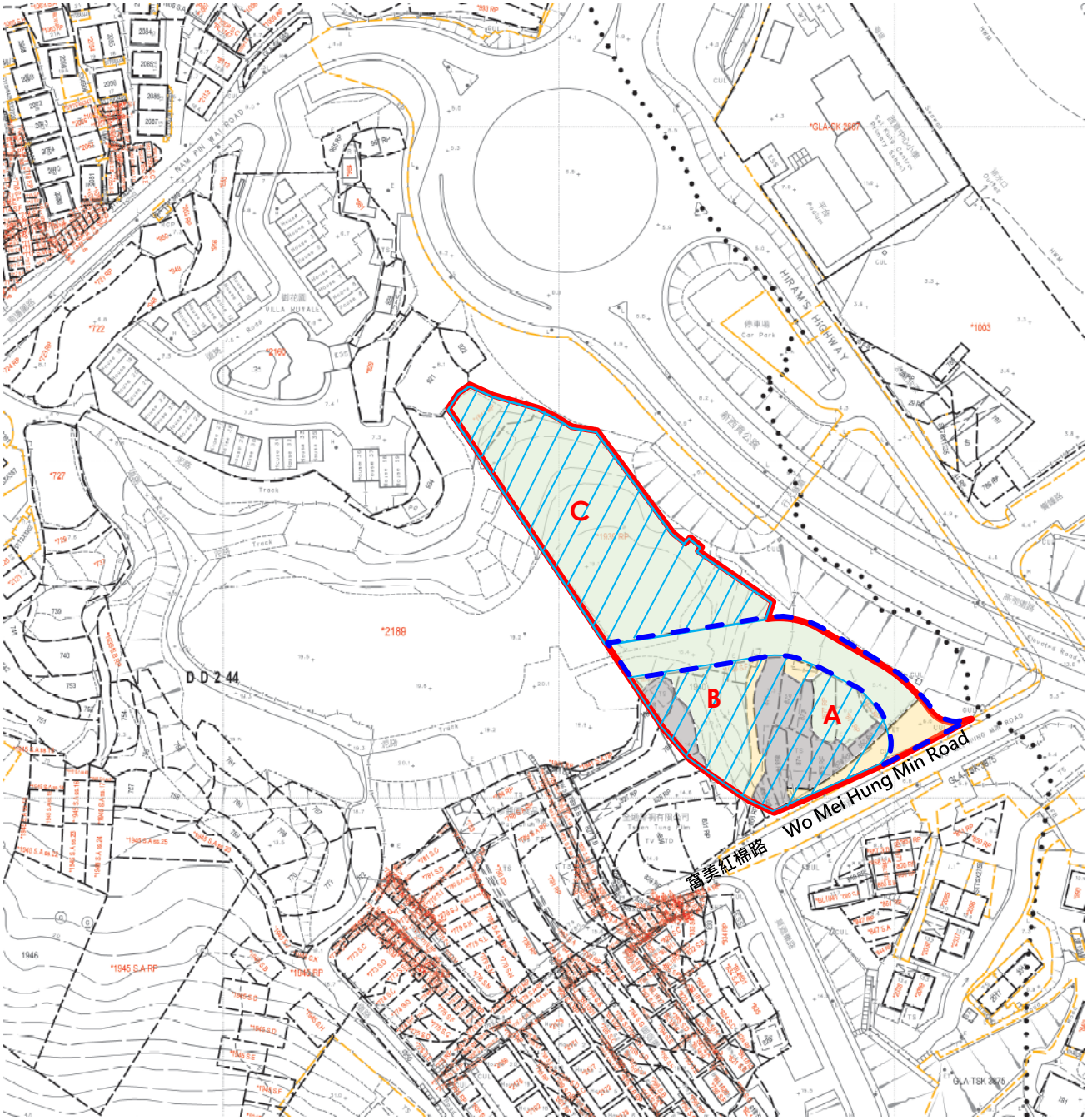
Development Site

ZONING

R(C)1	Residential (Group C)1
R(D)	Residential (Group D)
R(E)	Residential (Group E)
CDA	Comprehensive Development Area
G/IC	Government, Institution or Community
GB	Green Belt
V	Village Type Development
CA	Conservation Area
CPA	Coastal Protection Area

Figure No.	*Scale*	*Figure Title*
2.1	-	**Location Plan**
ARUP	*Date* May 2023	*Source* Extracted from the Approved Ho Chung Outline Zoning Plan (No. S/SK-HC/11)

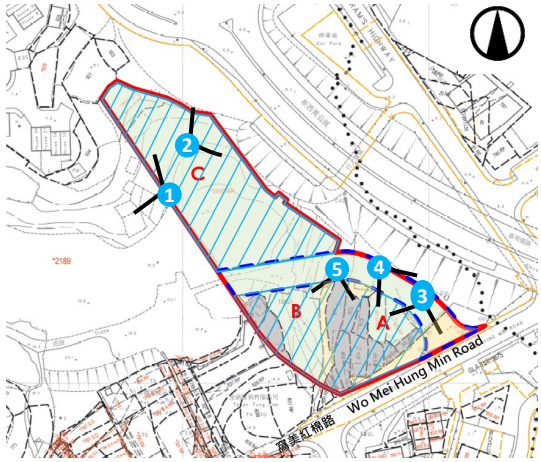
地段索引圖 LOT INDEX PLAN



LEGEND

- **Application Site**
- **Development Site**
- **Approved Access Road under Planning Application No. A/SK-HC/223**
- **Lots under the Applicants' ownership**
- **Lots under Third-Party Ownership**
- **Government Land**

Figure No.	*Scale*	*Figure Title*
2.2	-	**Lot Index Plan**
ARUP	*Date* August 2023	*Source* Lot Index Plan No. ags_S00000075159_0001



LEGEND

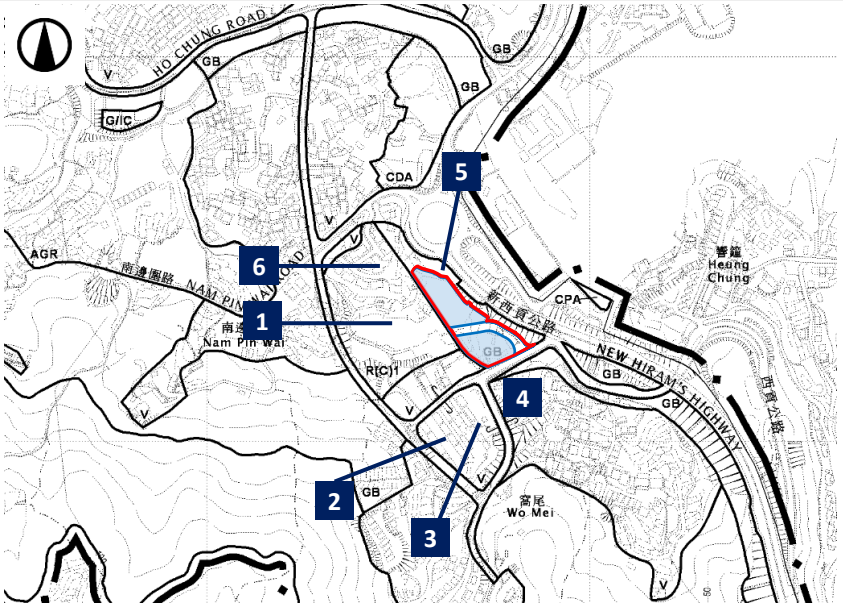
- Application Site
- Development Site
- Approved Access Road under Planning Application No. A/SK-HC/223
- Lots under the Applicants' ownership (Phase 1 development with Sites A, B and C)
- Lots under Third-Party Ownership (Remaining Phase)
- Government Land

Figure No.	*Scale*	*Figure Title*
2.3	-	**Existing Condition of the Application Site**
ARUP	*Date* May 2023	*Source* Photos taken in Jan 2023

LEGEND

Application Site

Development Site



1 House Development with Approved GBP at adjoining "R(C)1" Site

2 The Yosemite

3 The Royal Garden

4 Village Type Houses

5 Amenity Slope along New Hiram's Highway

6 Villa Royale

Figure No.	*Scale*	*Figure Title*
2.4	-	**Surrounding Condition of the Application Site**
ARUP	*Date* May 2023	*Source* Various

GREEN BELT

Column 1 Uses always permitted	Column 2 Uses that may be permitted with or without conditions on application to the Town Planning Board
Agricultural Use Barbecue Spot Government Use (Police Reporting Centre only) Nature Reserve Nature Trail On-Farm Domestic Structure Picnic Area Public Convenience Tent Camping Ground Wild Animals Protection Area	Animal Boarding Establishment Broadcasting, Television and/or Film Studio Burial Ground Cable Car Route and Terminal Building Columbarium (within a Religious Institution or extension of existing Columbarium only) Crematorium (within a Religious Institution or extension of existing Crematorium only) Field Study/Education/Visitor Centre Government Refuse Collection Point Government Use (not elsewhere specified) Helicopter Landing Pad Holiday Camp House (other than rebuilding of New Territories Exempted House or replacement of existing domestic building by New Territories Exempted House permitted under the covering Notes) Petrol Filling Station Place of Recreation, Sports or Culture Public Transport Terminus or Station Public Utility Installation Public Vehicle Park (excluding container vehicle) Radar, Telecommunications Electronic Microwave Repeater, Television and/or Radio Transmitter Installation Religious Institution Residential Institution Rural Committee/Village Office School Service Reservoir Social Welfare Facility Utility Installation for Private Project

(Please see next page)

Figure No.	*Scale*	*Figure Title*
3.1a	-	**Extracted Notes of the "GB" Zone Attached to the Ho Chung OZP (1 of 2)**
ARUP	*Date* May 2023	*Source* Extracted from the Approved Ho Chung Outline Zoning Plan (No. S/SK-HC/11)

GREEN BELT (Cont'd)

Planning Intention

The planning intention of this zone is primarily for defining the limits of urban and sub-urban development areas by natural features and to contain urban sprawl as well as to provide passive recreational outlets. There is a general presumption against development within this zone.

Remarks

Any filling of land/pond or excavation of land, including that to effect a change of use to any of those specified in Columns 1 and 2 above or the uses or developments always permitted under the covering Notes (except public works co-ordinated or implemented by Government, and maintenance, repair or rebuilding works), shall not be undertaken or continued on or after the date of the first publication in the Gazette of the notice of the interim development permission area plan without the permission from the Town Planning Board under section 16 of the Town Planning Ordinance.

Figure No.	*Scale*	*Figure Title*
3.1b	-	**Extracted Notes of the "GB" Zone Attached to the Ho Chung OZP (2 of 2)**
ARUP	*Date* May 2023	*Source* Extracted from the Approved Ho Chung Outline Zoning Plan (No. S/SK-HC/11)

9.8.1 The planning intention of this zone is primarily to retain and safeguard good quality agricultural land/farm/fish ponds for agricultural purposes, which is in line with the current agricultural policy of promoting modern, efficient, intensive, safe and environmentally acceptable farming on land for agricultural use or rural activities through statutory zoning. This zone is also intended to retain fallow arable land with good potential for rehabilitation for cultivation and other agricultural purposes.

9.8.2 Being well served by irrigation and servicing facilities, the agricultural land in Ho Chung valley is of "good" quality as classified by the Agriculture, Fisheries and Conservation Department.

9.8.3 The main farming activities in the area are the growing of vegetables, flowers and fruit trees. Rivers and streams provide the main source of water supply for irrigation. The area is only served by limited vehicular access via the sub-standard Ho Chung Road but it is largely accessible via footpaths.

9.8.4 As filling of land/pond may cause adverse drainage and environmental impacts on the adjacent areas, permission from the Board is required for such activities. However, filling of land specifically required under prior written instructions of Government department(s), or for the purposes of genuine agricultural practice including laying of soil not exceeding 1.2m in thickness for cultivation, and construction of agricultural structure with prior written approval from the Lands Department is exempted from the control.

9.8.5 Part of the area under this zoning falls within the Ho Chung Site of Archaeological Interest. Relics dated to late Neolithic, Bronze Age and historic periods were unearthed in the area. Details of the site of archaeological interest have been uploaded onto AMO's official website. Prior consultation with the AMO of the LCSD should be made if any development, redevelopment or rezoning proposals might affect the above site of archaeological interest and their immediate environs.

9. Green Belt ("GB") : Total Area 55.08 ha

9.9.1 The planning intention of this zone is primarily for defining the limits of urban and sub-urban development areas by natural features, including foothills, lower hillslopes, spurs, isolated knolls, woodland, vegetated land and amenity areas at the urban fringe, and to contain urban sprawl as well as to provide passive recreational outlet and delineating roadside amenity areas.

Figure No.	*Scale*	*Figure Title*	**Extracted Explanatory Statement of the "GB" Zone Attached to the Ho Chung OZP**
3.1c	-		
ARUP	*Date* May 2023	*Source*	Extracted from the Approved Ho Chung Outline Zoning Plan (No. S/SK-HC/11)

9.9.2 There is a general presumption against development within this zone. Development within this zone will be strictly controlled. Development proposals will be considered on individual merits taking into account the relevant Town Planning Board Guidelines.

9.9.3 As filling of land/pond and excavation of land may cause adverse drainage impacts on the adjacent areas and adverse impacts on the natural environment, permission from the Board is required for such activities.

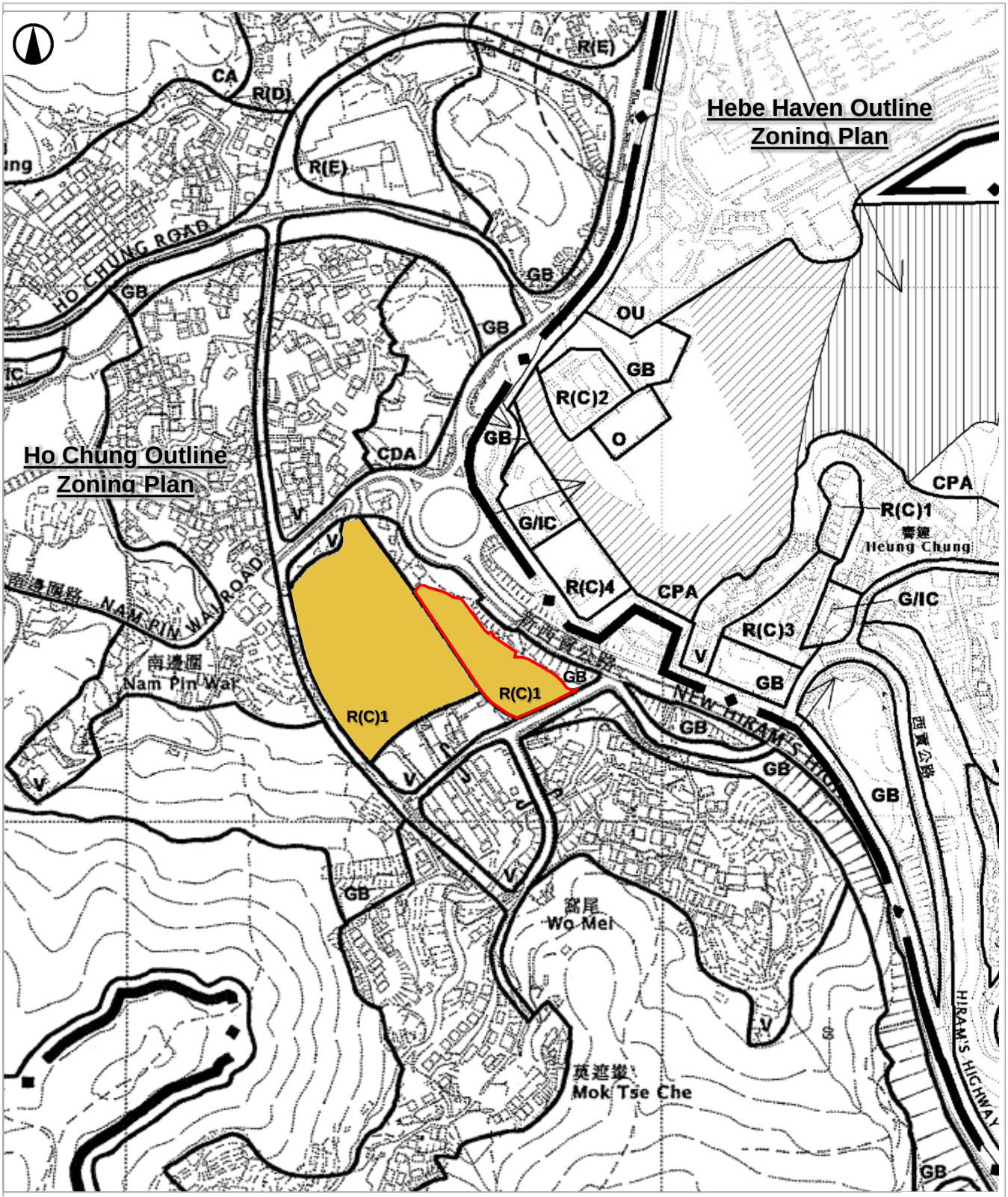
9.9.4 Part of the area under this zoning falls within the Ho Chung Site of Archaeological Interest. Relics dated to late Neolithic, Bronze Age and historic periods were unearthed in the area. The Che Kung Temple (Grade 1) at Ho Chung Road also falls within this zone. Details of the site of archaeological interest and historic building have been uploaded onto AMO's official website. Prior consultation with the AMO of the LCSD should be made if any development, redevelopment or rezoning proposals might affect the above historic building or sites of archaeological interest and their immediate environs.

10. Conservation Area ("CA") : Total area 138.31 ha

10.1.1 The planning intention of this zone is to protect and retain the existing natural landscape, ecological or topographical features of the area for conservation, educational and research purposes and to separate sensitive natural environment such as Site of Special Scientific Interest or Country Park from the adverse effects of development. Areas under this zone often constitute topographical features of woodland or vegetated areas of scenic value which should be protected from encroachment by development. There is a general presumption against development in this zone. In general, only developments that are needed to support the conservation of the existing natural landscape or scenic quality of the area or the development is an essential infrastructure project with overriding public interest may be permitted on application to the Board. These uses may include small scale field study centre, education centre and visitor centre, public convenience, park and garden which would have insignificant impact on environment and infrastructural provision.

10.1.2 This zone comprises the hillslopes dropping towards the valley floors of Ho Chung. It covers water catchment areas, steep terrains and footslopes which remain in a relatively natural state with vegetation and undisturbed woodland forming a spectacular and valuable scenic landscape. These areas include the foothills of Ma On Shan Country Park and Lower Hebe Hill.

Figure No.	*Scale*	*Figure Title*	**Extracted Explanatory Statement of the "GB" Zone Attached to the Ho Chung OZP**
3.1d	-		
ARUP	*Date* May 2023	*Source*	Extracted from the Approved Ho Chung Outline Zoning Plan (No. S/SK-HC/11)



LEGEND

- Application Site
- Outline Zoning Plan Boundary
- "Residential (Group C)1" ("R(C)1") Zone on the Ho Chung Outline Zoning Plan

ZONING

R(C)1	Residential (Group C)1
R(D)	Residential (Group D)
R(E)	Residential (Group E)
CDA	Comprehensive Development Area
G/IC	Government, Institution or Community
GB	Green Belt
V	Village Type Development
CA	Conservation Area
CPA	Coastal Protection Area

Figure No.	*Scale*	*Figure Title*
5.5a	-	**Proposed Amendments to the Approved Ho Chung Outline Zoning Plan No. S/SK-HC/11**
ARUP	*Date* May 2023	*Source* Extracted from the Approved Ho Chung Outline Zoning Plan (No. S/SK-HC/11) and Approved Hebe Haven Outline Zoning Plan (No. S/SK-HH/8)

RESIDENTIAL (GROUP C)

Column 1 Uses always permitted	Column 2 Uses that may be permitted with or without conditions on application to the Town Planning Board
Flat Government Use (Police Reporting Centre, Post Office only) House Utility Installation for Private Project	Ambulance Depot Eating Place Educational Institution Government Refuse Collection Point Government Use (not elsewhere specified) Institutional Use (not elsewhere specified) Library Place of Recreation, Sports or Culture Private Club Public Clinic Public Convenience Public Transport Terminus or Station Public Utility Installation Public Vehicle Park (excluding container vehicle) Recyclable Collection Centre Religious Institution Residential Institution Rural Committee/Village Office School Shop and Services Social Welfare Facility Training Centre

Planning Intention

This zone is intended primarily for low-rise, low-density residential developments where commercial uses serving the residential neighbourhood may be permitted on application to the Town Planning Board.

(Please see next page)

Figure No.	*Scale*	*Figure Title*	**Proposed Amendments to the Approved Ho Chung Outline Zoning Plan No. S/SK-HC/11 – Notes of the "R(C)" Zone**
5.5b	-		
ARUP	*Date* May 2023	*Source*	Extracted from the Approved Ho Chung Outline Zoning Plan (No. S/SK-HC/11)

RESIDENTIAL (GROUP C) (Cont'd)

Remarks

(a) On land designated "Residential (Group C)1", no new development, or addition, alteration and/or modification to or redevelopment of an existing building shall result in a total development and/or redevelopment in excess of a maximum plot ratio of 0.75, a maximum site coverage of 37.5% and a maximum building height of 9m with 2 storeys over one storey of carport or of a maximum plot ratio of 0.75, a maximum site coverage of 25% and a maximum building height of 12m with 3 storeys over one storey of carport, or the plot ratio, site coverage and height of the building which was in existence on the date of the first publication in the Gazette of the notice of the interim development permission area plan, whichever is the greater.

(b) On land designated "Residential (Group C)2", no new development, or addition, alteration and/or modification to or redevelopment of an existing building shall result in a total development and/or redevelopment in excess of a maximum plot ratio of 0.4, a maximum site coverage of 20% and a maximum building height of 9m with 2 storeys over one storey of carport, or the plot ratio, site coverage and height of the building which was in existence on the date of the first publication in the Gazette of the notice of the interim development permission area plan, whichever is the greater.

(c) Based on the individual merits of a development or redevelopment proposal, minor relaxation of the plot ratio, site coverage and building height restrictions stated in paragraphs (a) and (b) above may be considered by the Town Planning Board on application under section 16 of the Town Planning Ordinance.

(d) In determining the maximum plot ratio and site coverage for the purposes of paragraphs (a) and (b) above, any floor space that is constructed or intended for use solely as car park, loading/unloading bay, plant room and caretaker's office, or caretaker's quarters and recreational facilities for the use and benefit of all the owners or occupiers of the domestic building or domestic part of the building, provided such uses and facilities are ancillary and directly related to the development or redevelopment, may be disregarded.

Figure No.	*Scale*	*Figure Title*	**Proposed Amendments to the Approved Ho Chung Outline Zoning Plan No. S/SK-HC/11 – Notes of the "R(C)" Zone**
5.5c	-		
ARUP	*Date* May 2023	*Source*	Extracted from the Approved Ho Chung Outline Zoning Plan (No. S/SK-HC/11)

9.1.3 Development and redevelopment within this "CDA" site is subject to a maximum plot ratio (PR) of 0.75, a maximum site coverage (SC) of 25% and a maximum building height not exceeding 12m with 3 storeys over one storey of carport as stipulated in the Notes of the Plan. To provide flexibility for innovative design adapted to the characteristics of particular sites, minor relaxation of these restrictions may be considered by the Board through the planning permission system. Each proposal will be considered on its individual planning merits. The implementation of the "CDA" zone largely depends on private initiatives for land assembly. However, in view of the sizeable area of the site, phased development could be carried out provided that the intention for comprehensive redevelopment of the whole site would not be prejudiced.

9.1.4 Pursuant to section 4A(1) of the Ordinance, any development/ redevelopment proposal within this zone is subject to the approval of the Board by way of a planning application under section 16 of the Ordinance. A Master Layout Plan (MLP) should be submitted together with the relevant assessment reports and a landscape master plan as well as other materials as specified in the Notes of the Plan for the approval of the Board under section 4A(2) of the Ordinance. Development/redevelopment will be in accordance with an approved MLP and it should be ensured that the nature and scale of new development will be in keeping with the surrounding natural landscape and land-uses and will not exert pressure on the limited road and other infrastructural provisions in the Area. A copy of the approved MLP shall be made available for public inspection in the Land Registry pursuant to section 4A(3) of the Ordinance.

9.2 Residential (Group C) ("R(C)") : Total Area ~~*3.30*~~ ***3.96*** ha

9.2.1 The planning intention of this zone is primarily for low-rise, low-density residential developments where commercial uses serving the residential neighbourhood may be permitted on application to the Board, and to restrict the future developments within the prescribed development parameters.

9.2.2 This zone can be divided into two sub-areas:

(a) "R(C)1" - The residential development in this sub-area is subject to a maximum PR of 0.75, either with a maximum SC of 37.5% and a height not exceeding 9m with 2 storeys over one storey of carport, or with a maximum SC of 25% and a height not exceeding 12m with 3 storeys over one storey of carport.

This sub-area covers only ~~*one*~~ ***two*** ~~*site*~~ ***sites*** which ~~*is*~~ ***are*** located in ~~*the area*~~ ***areas*** sandwiched between Hiram's Highway and Nam Pin Wai Village.

Figure No.	*Scale*	*Figure Title*	**Proposed Amendments to the Approved Ho Chung Outline Zoning Plan No. S/SK-HC/11 – Explanatory Statement of the "R(C)" Zone**
5.5d	-		
ARUP	*Date* May 2023	*Source*	Extracted from the Approved Ho Chung Outline Zoning Plan (No. S/SK-HC/11)

The sub-area falls within the Ho Chung Site of Archaeological Interest. The Antiquities and Monuments Office (AMO) of the Leisure and Cultural Services Department (LCSD) should be consulted well in advance on any development or redevelopment proposals affecting this site of archaeological interest as well as their immediate environs.

(b) "R(C)2" – The residential development in this sub-area is subject to a maximum PR of 0.4, a maximum SC of 20% and a height not exceeding 9m with 2 storeys over one storey of carport.

This sub-area covers the area to the south-west of Hing Keng Shek which has mostly been developed into low-density residential houses. The site is only accessible via the sub- standard Hing Keng Shek Road.

9.2.3 The above sub-areas mainly reflect the existing character and development intensity. The development restrictions are mainly to conserve the existing character and intensity of the developments so as to blend in well with the surrounding natural environment and rural character as well as not to overload the limited infrastructural facilities, particularly the transport network in the Area.

9.2.4 Minor relaxation of the stated restrictions may be considered by the Board on application under section 16 of the Ordinance. This provision is to allow the Board to consider proposals for building layout and design which, while not strictly complying with the stated restrictions, meet the planning objectives. It is hoped to encourage imaginative designs which are adapted to the characteristics of particular sites, and overcome the need for stilting or allow for the conservation of environmentally important natural features or mature vegetation. Each proposal will be considered on its own merits.

9.2.5 Some scattered areas outside existing private residential lots within this zone may not be suitable for residential development. Their suitability for development or inclusion into adjoining lots for development would be assessed individually at the land administration stage based on their visual and amenity value, accessibility and geotechnical, environmental, infrastructural and traffic impacts.

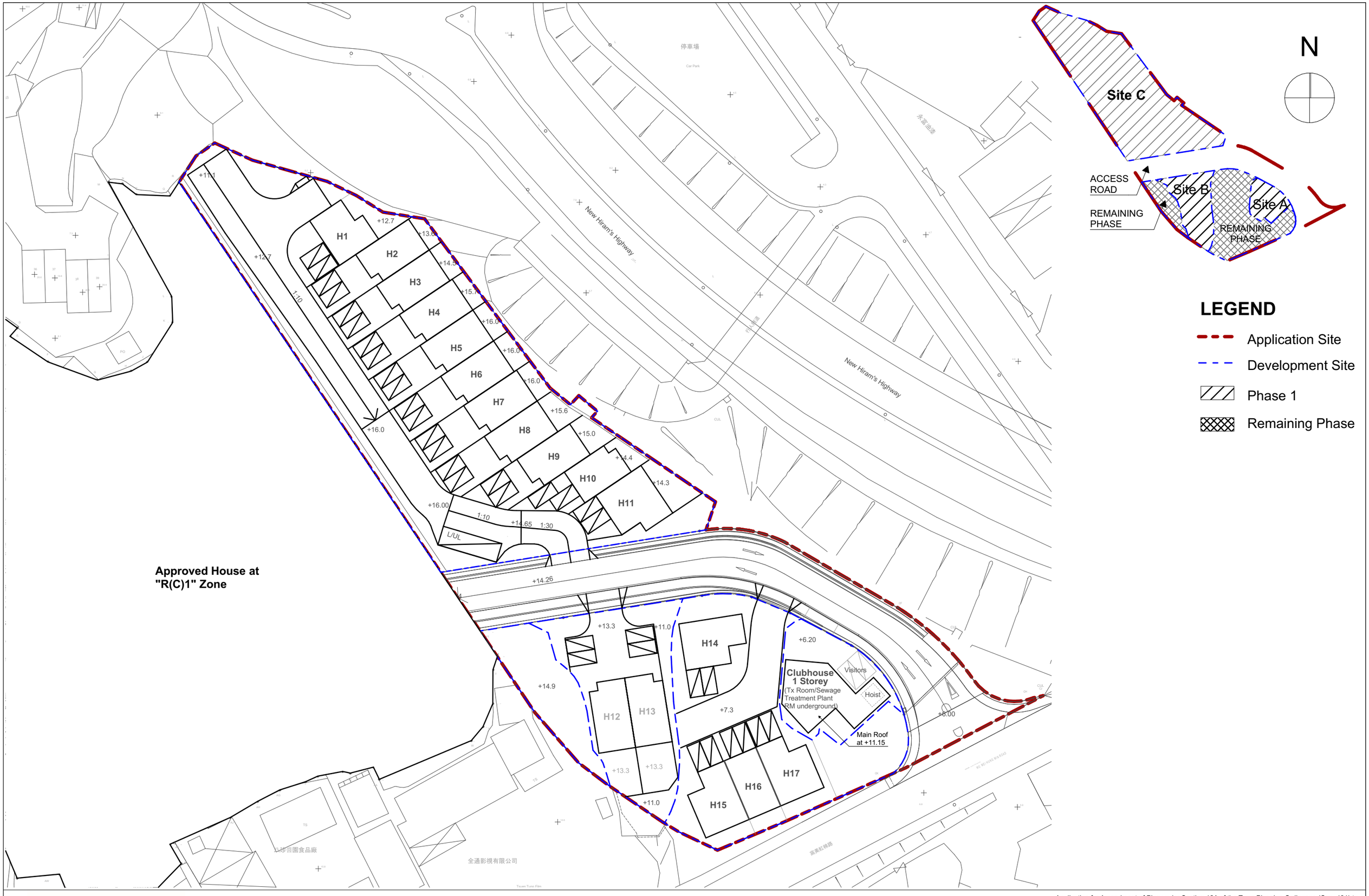
9.3 Residential (Group D) ("R(D)") : Total Area 6.78 ha

9.3.1 The planning intention of this zone is primarily for improvement and upgrading of existing temporary structures within the rural areas through redevelopment of existing temporary structures into permanent buildings. It is also intended for low-rise, low-density residential developments subject to planning permission from the Board. This is in

Figure No.	*Scale*	*Figure Title*	**Proposed Amendments to the Approved Ho Chung Outline Zoning Plan No. S/SK-HC/11 – Explanatory Statement of the "R(C)" Zone**
5.5e	-		
ARUP	*Date* May 2023	*Source*	Extracted from the Approved Ho Chung Outline Zoning Plan (No. S/SK-HC/11)

Appendix A

The Indicative Scheme



LWK +PARTNERS

Architectural Plan of the Indicative Scheme

Application for Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131) to Rezone the Application Site from "Green Belt" to "Residential (Group C)1" for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung

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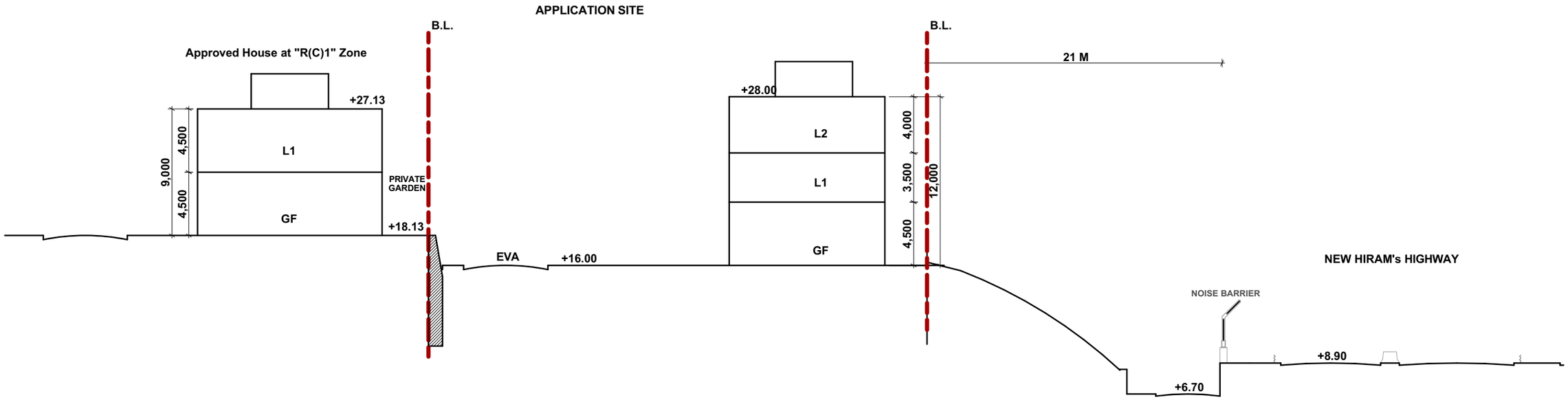
16/04/2024

LEGEND

- Application Site
- Development Site



LWK +PARTNERS

Section AA

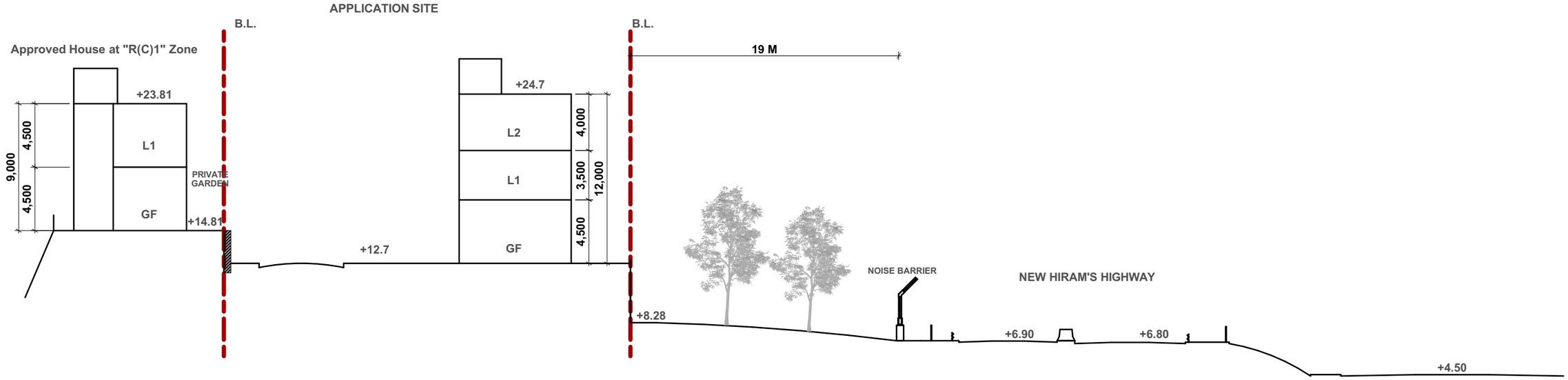
Application for Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131) to Rezone the Application Site from "Green Belt" to "Residential (Group C)1" for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung

1:300@A3

16/04/2024

LEGEND

- Application Site
- Development Site



LWK +PARTNERS

Section BB

Application for Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131) to Rezone the Application Site from "Green Belt" to "Residential (Group C)1" for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung

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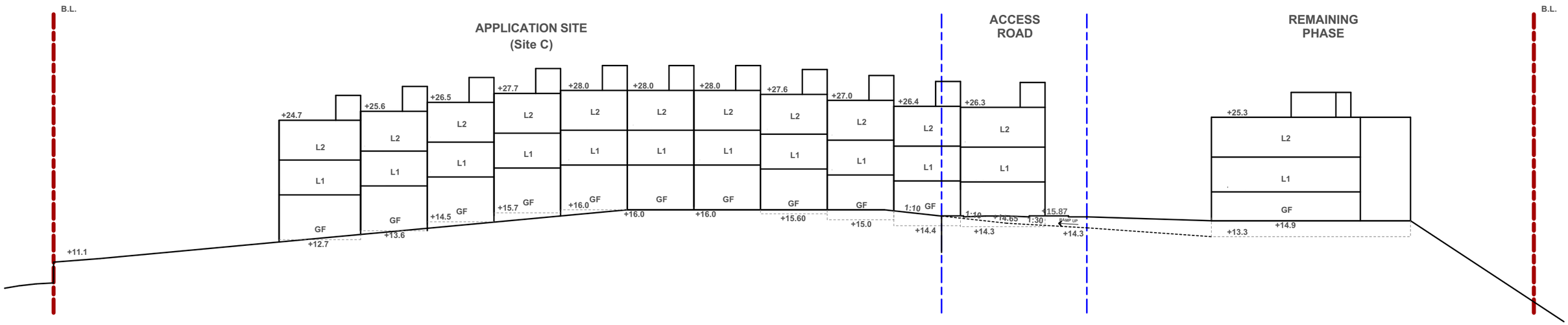
16/04/2024

LEGEND

- Application Site
- Development Site



LWK +PARTNERS

Section CC

Application for Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131) to Rezone the Application Site from "Green Belt" to "Residential (Group C)1" for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung

1:400@A3

16/04/2024

Appendix B

Landscape Master Plan

Application for Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131) to Rezone the Application Site from "Green Belt" to "Residential (Group C)1" for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung

LANDSCAPE MASTER PLAN SUBMISSION

May 2024

Landscape Government Submission Consultant
Signed by:

Landscape Architects Registration Board HKSAR
LARB
TEO Yee Shun
張義舜
R-101
香港園境師註冊管理局

Mr. Jason TEO, Registered Landscape Architect (R101)

Axxa Group Limited

axxa group

Table of Contents

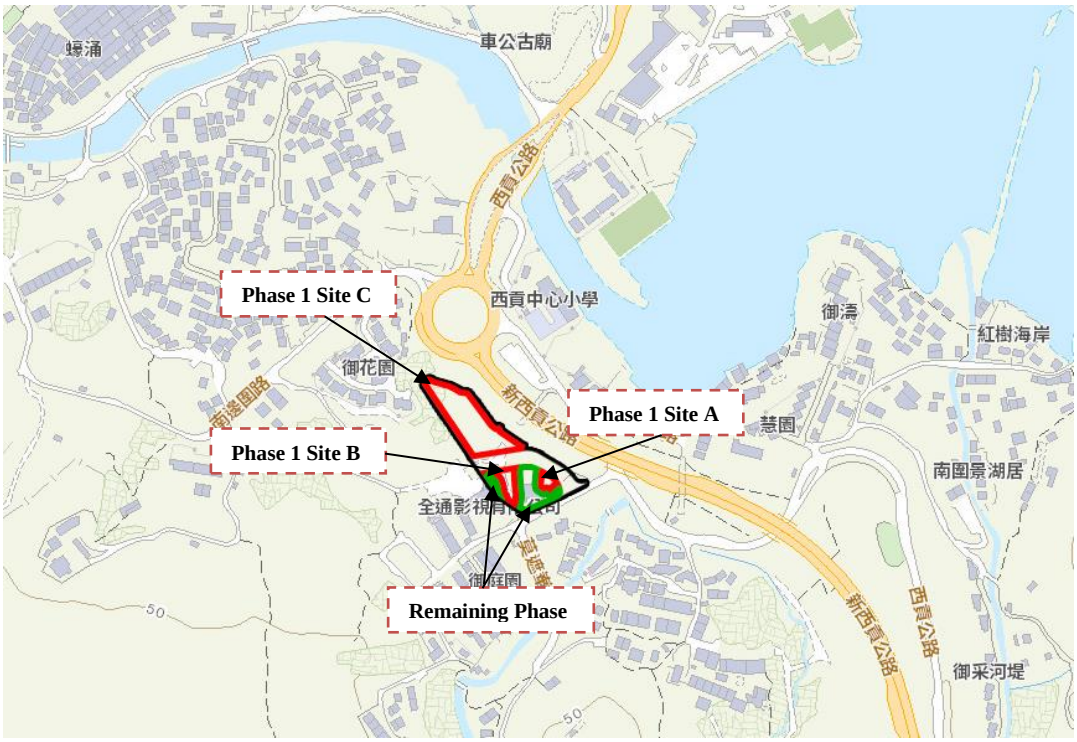
APPENDICES

1.0 INTRODUCTION

1.1 This Landscape Master Plan is submitted in support of Proposed Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131) for Proposed House Development at Various Lots in D.D. 244 and adjoining Government Land.

1.2 The Application Site, with an area of approximately 6,601m^2, is bounded by New Hiram's Highway to the east, Wo Mei Hung Min Road to the south and Villa Royale to the north. To its immediate west is a private residential development zoned as "R(C)1" Site. The Site is currently vacant with a few existing tree groups. The surrounding context is characterized by a mix of village houses, temporary structures, schools and low-rise residential developments such as Villa Royale and Dynasty Lodge. Refer to **Figure 1**.

Figure 1 Location Plan



2.0 GENERAL DESCRIPTION OF EXISTING TREE GROUPS

2.1 Based on the visual observation carried out in February 2021 and January 2023, it is estimated that approximate 99 nos. of living trees are growing in groups. The tree groups are located sporadically throughout the Application Site. For details, please refer to **Table 1**.

Table 1: Species Analysis of Existing Tree Groups

Location/ Tree Group Categories	Dominant Tree Species
Phase 1	
Site A • TGA (1 nos.)	*Ficus benjamina*
Site B • TGB-1 (10 nos.)	*Artocarpus heterophyllus* *Aquilaria sinensis* (1 no.) Dead tree (1 no.)
Site C • TGC (4 nos.)	*Macaranga tanarius var. tomentosa* Dead trees (2 no.)
• TGD (64 nos.)	*Mallotus paniculatus* Dead trees (5 nos.)
Access Road • TGE (6 nos.)	*Ficus benjamina*
Remaining Phase	
• TGB-2 (3 nos.)	*Sterculia lanceolata* *Araucaria cunninghamii* Dead tree (1 no.)
• TGB-3 (11 nos.)	*Ficus macrocarpa* *Michelia x alba*

2.2 Majority of existing trees are in *Fair* to *Poor* Condition, Health and Form with *Low* Amenity Value. With the exception of *Aquilaria sinensis* (1 no.) which is identified as rare species, there are **no** endangered tree species identified in the tree survey under the listing in 'Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586)'. Additionally, there is **no** rare and precious plants, OVT/ potential OVT, and **no** "Champion" tree observed within the site or its periphery during the survey. For details, please refer to Tree Treatment Schedule (Tree Group) **Appendix A**.

2.3 The locations of existing trees are illustrated on Tree Survey Plan in **Appendix C1**. Photographic Record of Existing Tree Groups is provided in **Appendix B**.

3.0 TREE TREATMENT PROPOSAL

3.1 Among 99 nos. of existing trees living in tree groups, 98 nos. of them are proposed to be felled (Phase 1: 78 nos., Remaining Phase: 14 nos., Access Road: 6 nos.) and 1 no. rare species *Aquilaria sinensis* living in Phase 1 is proposed to be transplanted. Majority of existing trees proposed to be felled are either dead trees or trees in fair to poor condition, health and form with low amenity value, with 9 nos. of dead tree which irreversibly damaged or natural deterioration and possess defects such as dead branches, cavity, wood decay, wounds or seams and low in survival rate after transplanting. To replenish the loss of existing greenery, 98 nos. of new trees are proposed to be planted (Phase 1: 78 nos., Remaining Phase: 14 nos., Access Road: 6 nos.) in 1:1 compensation ratio in terms of quantity.

3.2 Proposed treatment on existing tree groups is illustrated on Tree Treatment Plan in **Appendix C2** and Tree Planting Plan in **Appendix C3**. Photographic Record of Existing Tree Groups is provided in **Appendix B**. Refer to **Table 2**.

Table 2: Summary of Tree Treatment Proposal

Items	Current Scheme
Total No. of Existing Trees living in Tree Groups *Surveyed*	99 nos. (approx.)
- Phase 1	79 nos. (approx.)
- Remaining Phase	14 nos. (approx.)
- Access Road	6 nos. (approx.)
No. of Tree in Tree Group Proposed to be ***Transplanted***	1 no.
- Phase 1	1 no.
- Remaining Phase	0
- Access Road	0
Nos. of Trees in Tree Groups Proposed to be ***Felled***	98 nos. (approx.)
- Phase 1	78 nos. (approx.)
- Remaining Phase	14 nos. (approx.)
- Access Road	6 nos. (approx.)
Nos. of ***New Trees*** to be Planted	98 nos.
- Phase 1	78 nos.
- Remaining Phase	14 nos.
- Access Road	6 nos.

4.0 LANDSCAPE OBJECTIVES

4.1 The primary landscape objectives are:

- Create a landscape design commensurate with the specific site conditions of the Application Site;
- Create a landscape character consistent with the overall design language and aesthetic of the architectural elements;
- Ensure the Proposed Development is sensitively integrated into the surrounding areas via appropriate interface treatments;
- Create suitable outdoor spaces for communal use of future residents; and
- Promote the use of indigenous plant species throughout the landscape and to introduce exotic ornamental species to feature areas.

5.0 LANDSCAPE PROPOSAL

This section provides a broad description of the design, function and amenity provisions for the landscape components. Refer to **Appendices D** and **F** for details.

5.1 Proposed Development

The Proposed Development is divided into Phase 1 (Site A, B and C) and Remaining Phase. Phase 1 consists of 13 nos. of 3-storey houses with clubhouse and Remaining Phase consists of 4 nos. of 3-storey houses. It is designed as an integration of residential housing units and landscape elements arranged in linear form to create a natural environment.

5.2 General Landscape Area

The landscape framework includes the following:

(i) Entrance Courtyard
- Entrance Courtyard is designed to enhance the arrival experience and aid orientation. This entrance area will be planted with flowering trees and shrubs to create a welcoming atmosphere.

(ii) Clubhouse Landscape Area
- The clubhouse is designed as a strong node and a visual landmark reference point within the development. It consists of hard and soft landscape areas for multi-function usage suitable for function/ event and recreation facilities.

(iii) Private Garden
- A feature tree will be planted at each housing unit to reflect the overall character of the development and establish the individuality of the housing units.

(iv) Avenue Tree Planting
- A combination of specimen trees and shrub planting will be provided along the EVA of the Proposed Development. This creates a lush tree planting avenue. Colour paving and patterns will be used to delineate the road bed and adjacent sidewalk to create an inviting environment upon which pedestrians will feel safe and comfortable. These measures are designed to enhance the character, vitality, amenity and safety of the Proposed Development.

(v) Streetscape
- Despite site constraints, 6 nos. roadside trees are proposed along the approved access road under Planning Application No. A/SK-HC/223 with an aim to replenish loss of greenery due to felling of existing trees within the access road as well as creating a welcoming and pleasant streetscape environment. Planter beds with flowering shrubs and groundcovers are proposed for greenery enhancement.

5.3 Access Road/ Main Entry/ Streetscape

The Application Site is connected to New Hiram's Highway through the approved access road under Planning Application No. A/SK-HC/223 from Wo Mei Hung Min Road to the adjoining "R(C)1" residential development, which also connects Phase 1 (Site A, B and C) and Remaining Phase. =

5.4 Buffer/ Perimeter Planting

Buffer planting will be provided along the Application Site boundary to provide visual screening and soft transition to the surrounding environment.

6.0 HARD LANDSCAPE (PAVING MATERIALS/ FINISHES)

This section provides a description of the hardscape design together with general information on hardscape related aspects of the design.

6.1 Hard Landscape Materials

6.1.1 Hardscape materials and design are chosen for durability, sustainability, low maintenance, reasonable cost.

6.2 Landscape Lighting

6.2.1 The landscape lighting will be designed in accordance with the intended use of an area, such as seating areas or play areas and for the safety and security of pedestrian circulation.

6.3 Design Codes, Technical Standards & Safety Provision

6.3.1 Hard landscape design works shall be in compliance with the government ordinances, codes and regulations, and relevant international standards.

7.0 SOFT LANDSCAPE

This section provides a description of the soft landscape design and softscape elements together with general information on softscape related aspects of design, including irrigation and maintenance.

7.1 Plant Material Tables

7.1.1 The following list indicates the proposed combination of native and exotic tree species along with suitable ornamental evergreen and flowering species to strengthen the greening/ conservation. Carefully selected species will ensure maximum greening effect with minimum maintenance requirements. Over half of the proposed tree species are native tree species to ensure they will be beneficial to the existing ecology. Greening opportunity is maximized by planting of insect host plants, food plants for birds and nectar plants for nectar insects such as butterflies. Specimen trees of various sizes will be used in combination with ornamental shrub planting to create a year-round display.

7.1.2 The summary schedule of key plant material listed below is subject to further refinement and plant availability upon detail design stage. Refer to **Table 3A** and **3B** below:

Table 3A: Proposed Tree Species

Proposed Species	Chinese Name	Quantity/ Size
*Bischofia javanica**	秋楓	Quantity: 98 nos. Standard and Heavy Standard Size 3-7m High; 2-6m Spread, 2.5-6m Spacing DBH: 0.065-0.08m
*Celtis sinensis**	朴樹	
*Cinnamomum burmannii**	陰香	
*Cleistocalyx nervosum**	水翁	
*Cinnamomum camphora**	樟	
Jacaranda mimosifolia	藍花楹	
*Reevesia thyrsoidea**	梭羅樹	
*Sterculia lanceolata**	假蘋婆	
Tabebuia chrysantha	黃花風鈴木	

Remarks: * Native Tree Species Species that attract nectar insects such as butterflies

Table 3B: Proposed Shrubs and Groundcover Species

Botanical Name	Chinese Name	Height x Spread (mm)	Spacing (mm)	Remarks
Aglaia odorata	米仔蘭	600 x 500	400	
Bougainvillea spectabilis	簕杜鵑	600 x 600	500	
Codiaeum variegatum	灑金榕	400 x 400	300	
Ficus microcarpa var. crassifolia	圓葉榕	2500x1500	1800	Buffer planting
*Ixora chinensis**	龍船花	500 x 400	300	
*Juncus effusus**	燈心草	500 x 400	300	
*Melastoma dodecandrum**	地菥	300 x 300	250	
*Melastoma malabathricum**	野牡丹	500 x 400	300	
*Mussaenda pubescens**	玉葉金花	500 x 400	300	
*Nephrolepis auriculata**	腎蕨	300 x 300	250	
*Psychotria asiatica**	九節	500 x 400	300	
*Rhaphiolepis indica**	車輪梅	600 x 500	400	
*Rhododendron simsii**	紅杜鵑	500 x 400	300	
*Rhodomyrtus tomentosa**	桃金娘	600 x 500	400	
*Sarcandra glabra**	草珊瑚	500 x 400	300	
Ficus microcarpa var. crassifolia	圓葉榕	2500x 600dia.	500	Hedge planting (column form)

Remarks: * Native Tree Species Species that attract nectar insects such as butterflies

7.2 Open Space Provision

In accordance with the open space requirement in the Hong Kong Planning Standard and Guidelines, 1m^2 open space per person is required. As the anticipated population for the Proposed Development is 51 persons (Phase 1: 39 persons; Remaining Phase: 12 persons), therefore not less than 51m^2 of private open space (Phase 1: 39m^2; Remaining Phase: 12m^2) will be provided. Please refer to **Appendix E**.

7.3 Greenery Provision

In accordance with the requirement of PNAP APP-152, an area of not less than 20% of the total greenery will be provided for Phase 1 and Remaining Phase respectively.

7.4 Soil Depth and Drainage Provision for the Planted Area

7.4.1 The need for adequate soil depths to ensure proper plant growth is taken into account for all planting areas. The appropriate soil depths (approximate and excluding drainage layers) are:

- Trees: 1200mm
- Shrub: 600mm
- Lawn/ Groundcover: 300mm

7.5 Irrigation and Proposed Source of Water Supply

7.5.1 Water points (not more than 40m apart c/c) are located throughout the Application Site for irrigation.

8.0 CONCLUSION

To summarize, this Landscape Proposal is not incompatible with the planning intent and the surrounding environment. Among an approximate 99 nos. of trees growing in existing tree groups/ individual tree, 1no. of rare species *Aquilaria sinensis* is proposed to be transplanted within the Site, 98 nos. of existing trees are proposed to be felled. To replenish the loss of greenery, 98 nos. of new trees of higher aesthetic and ecological value are proposed to be planted. Meanwhile, not less than 51m^2 open space will be provided for an anticipated population of 51 persons and not less than 20% of greenery will be provided for Phase 1 and Remaining Phase respectively.

Appendix A

Tree Treatment Schedule (Tree Group)

A1 Phase 1

A2 Remaining Phase

A3 Access Road

Appendix A1 - Tree Treatment Schedule (Phase 1 - Tree Group)

Tree Group No.	Photo No.	Species		APPROX. NOS.	Tree Size			Proposed Treatment (Retain/Transplant/Fell)	Remarks[1] (Old and Valuable Tree (OVT), potentially registrable OVT, rare species, protected species, ecological and historical significance, etc.)
		Scientific Name	Chinese Name		Height (m)	DBH[2] (mm)	Crown Spread (m)		
TGD	6, 7, 8	*Alangium chinense*	八角楓	5	6 - 12	110 - 180	3 - 5	Fell : 64	
		Aporusa dioica	銀柴	4	6 - 12	90 - 180	1 - 5		
		Caryota maxima	魚尾葵	2	10	110 - 120	3		
		Caryota mitis	短穗魚尾葵	1	9	160	4		
		Cinnamomum burmannii	陰香	1	12	310	6		
		Cinnamomum camphora	樟	1	15	580	10		
		Cyclobalanopsis edithiae	華南青岡	1	12	350	7		
		Dimocarpus longan	龍眼	1	12	260	6		
		Endospermum chinense	黃桐	1	12	250	7		
		Firmiana simplex	梧桐	2	9 - 10	160	4 - 5		
		Litsea monopetala	假柿樹	2	8 - 11	110 - 130	4 - 5		
		Macaranga tanarius var. tomentosa	血桐	3	7 - 12	130 - 180	4 - 6		
		Machilus chekiangensis	浙江潤楠	2	9 - 12	150 - 170	4 - 6		
		Mallotus paniculatus	白楸	22	5 - 12	100 - 200	2 - 6		
		Schefflera heptaphylla	鴨腳木	3	7 - 10	85 - 180	2 - 5		
		Sinosideroxylon wightianum	鐵欖	2	10 - 12	170 - 210	6		
		Sterculia lanceolata	假蘋婆	4	1.8 - 10	110 - 190	0.5 - 5		
		Syzygium jambos	蒲桃	1	3	150	1		
		Syzygium levinei	山蒲桃	1	13	180	6		
		Dead tree	死樹	5	-	120 - 280	-		
			Subtotal	64					
TGC	5	*Macaranga tanarius var. tomentosa*	血桐	1	5	150	3	Fell : 4	
		Macaranga tanarius var. tomentosa (Dead Tree)	血桐 (死樹)	2	-	150-170	-		
		Mallotus paniculatus	白楸	1	5	170	4		
			Subtotal	4					

Tree Group No.	Photo No.	Species		APPROX. NOS.	Tree Size			Proposed Treatment (Retain/Transplant/Fell)	Remarks[1] (Old and Valuable Tree (OVT), potentially registrable OVT, rare species, protected species, ecological and historical significance, etc.)
		Scientific Name	Chinese Name		Height (m)	DBH[2] (mm)	Crown Spread (m)		
TGB-1	3	*Aquilaria sinensis (T70)*	土沉香	1	6	210	3	Transplant : 1	Aquilaria sinensis as rare species
		Artocarpus heterophyllus (syn. Artocarpus macrocarpon)	菠蘿蜜	4	7 - 10	180 - 410	4 - 5	Fell : 9	
		Citrus maxima	柚	1	11	240	6		
		Ficus hispida	對葉榕	1	7	220	3		
		Ficus variegata (syn. Ficus variegata var. chlorocarpa)	青果榕	1	18	430	10		
		Sterculia lanceolata	假蘋婆	1	9	240	4		
		Dead tree	死樹	1	-	160	-		
			Subtotal	10					
TGA	1	*Ficus benjamina*	垂葉榕	1	15	850	10	Fell : 1	
			Subtotal	1					

Summary Table

	Number of Tree(s)
Tree to be Retained	0
Tree to be Transplanted	1
Trees to be Felled	78
Total Number of Existing Tree(s)	79

[1] Please state whether the OVT, potentially registrable OVT, trees of rare or protected species, trees with ecological and historical significance, etc. within and/or adjacent to the site is likely to be affected by the proposed development.

[2] DBH of a tree refers to its diameter at breast height (i.e. measured at 1.3m above ground level).

Appendix A2 - Tree Treatment Schedule (Remaining Phase - Tree Group)

Tree Group No.	Photo No.	Species		APPROX. NOS.	Tree Size			Proposed Treatment (Retain/Transplant/Fell)	Remarks[1] (Old and Valuable Tree (OVT), potentially registrable OVT, rare species, protected species, ecological and historical significance, etc.)
		Scientific Name	Chinese Name		Height (m)	DBH[2] (mm)	Crown Spread (m)		
TGB-2	4	*Araucaria cunninghamii*	南洋杉	1	11	140	3	Fell : 4	
		Bauhinia x blakeana	洋紫荊	1	13	300	10		
		Dead tree	死樹	1	-	350	-		
			Subtotal	3					
TGB-3	2	*Roystonea regia*	王棕	1	11	160	3	Fell : 10	
		Ficus benjamina 'Variegata'	花葉垂榕	1	3	120	3		
		Ficus microcarpa	細葉榕	2	3-8	110-200	2-5		
		Ficus benjamina	垂葉榕	3	5-7	120-200	2-4		
		Michelia x alba	白蘭	2	10-11	120-130	4-5		
		Podocarpus macrophyllus	羅漢松	1	4	110	2		
		Yucca filamentosa	絲蘭	1	3	110	2		
			Subtotal	11					

Summary Table

	Number of Tree(s)
Tree to be Retained	0
Tree to be Transplanted	0
Trees to be Felled	14
Total Number of Existing Tree(s)	14

[1] Please state whether the OVT, potentially registrable OVT, trees of rare or protected species, trees with ecological and historical significance, etc. within and/or adjacent to the site is likely to be affected by the proposed development.

[2] DBH of a tree refers to its diameter at breast height (i.e. measured at 1.3m above ground level).

Appendix A3 - Tree Treatment Schedule (Access Road - Tree Group)

Tree Group No.	Photo No.	Species		APPROX. NOS.	Tree Size			Proposed Treatment (Retain/Transplant/Fell)	Remarks[1] (Old and Valuable Tree (OVT), potentially registrable OVT, rare species, protected species, ecological and historical significance, etc.)
		Scientific Name	Chinese Name		Height (m)	DBH[2] (mm)	Crown Spread (m)		
TGE	TGE	*Artocarpus heterophyllus*	菠羅蜜	1	6	130	4	Fell : 6	
		Ficus benjamina	垂葉榕	4	4-7	200-260	5-8		
		Pachira aquatica	瓜栗	1	6	110	4		
			Subtotal	6					

Summary Table

	Number of Tree(s)
Tree to be Retained	0
Tree to be Transplanted	0
Trees to be Felled	6
Total Number of Existing Tree(s)	6

[1] Please state whether the OVT, potentially registrable OVT, trees of rare or protected species, trees with ecological and historical significance, etc. within and/or adjacent to the site is likely to be affected by the proposed development.

[2] DBH of a tree refers to its diameter at breast height (i.e. measured at 1.3m above ground level).

Appendix B

Photographic Record of Existing Tree Groups

T70 (*Aquilaria sinensis* 土沉香)

Application for Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131) to Rezone the Application Site from "Green Belt" to "Residential (Group C)1" for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung

Tree Photographic Record

R-Retain T-Transplant F-Fell D-Dead Tree

View-1

View-2

View-3

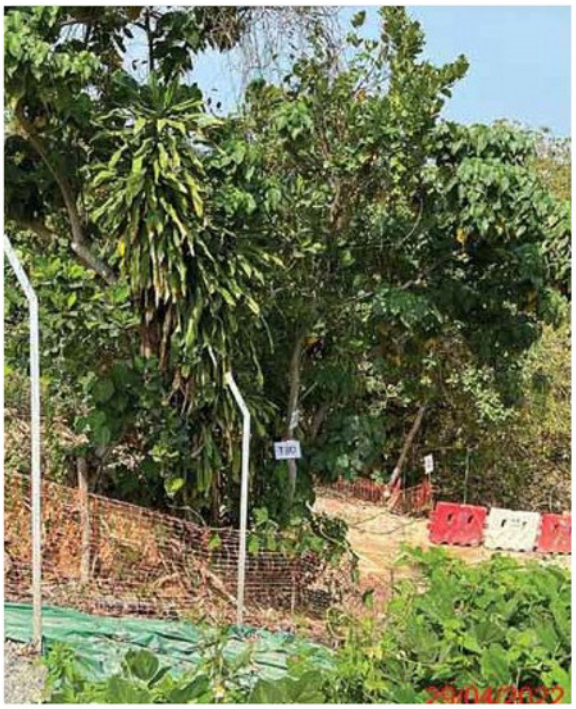
View-4

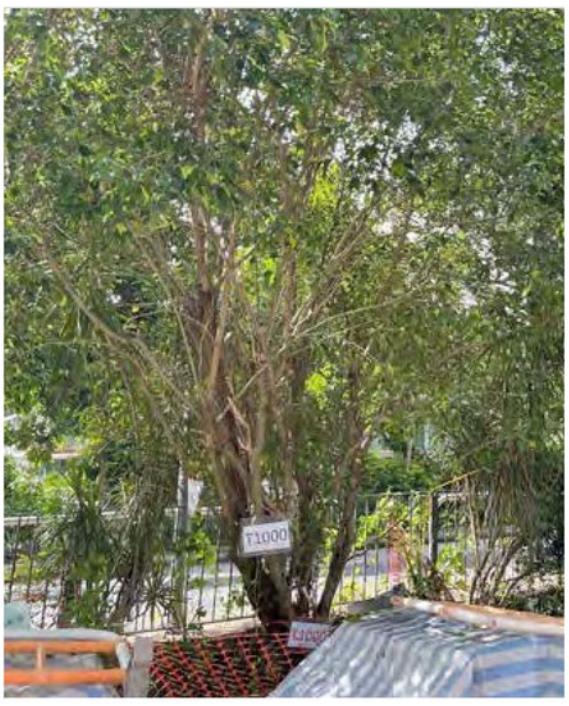
View-5

View-6

View-7

View-8





TGE

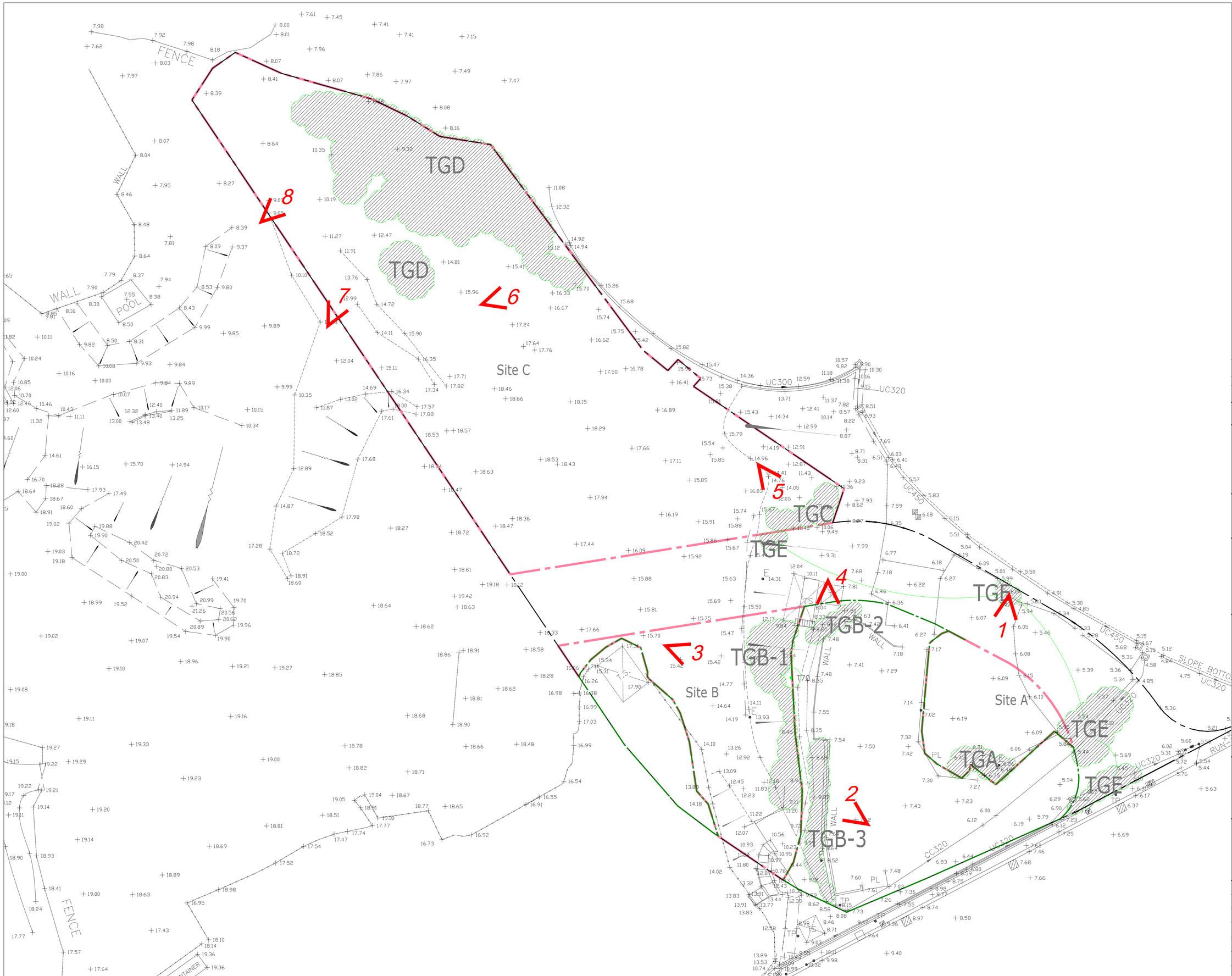
Appendix C

Drawings

C1 Tree Survey Plan

C2 Tree Treatment Plan

C3 Tree Planting Plan



LEGEND:

- APPLICATION SITE BOUNDARY
- PHASE 1
- REMAINING PHASE
- EXISTING TREE SURVEYED – PHASE 1 (1no.)
- EXISTING TREE GROUP SURVEYED – PHASE 1 (79nos. approx.) – REMAINING PHASE (14nos. approx.) – ACCESS ROAD (6nos. approx.)
- +17.0 EXISTING LEVEL

no.	description	date
A	GENERAL REVISION	15/01/24

REVISION

IT IS THE CONTRACTOR'S RESPONSIBILITY TO

- use figured dimension in preference to scalling
- verify all dimensions at the site
- report all discrepancies to the landscape architect and agree before proceeding
- determine location of all existing services prior to excavation

This drawing shall not be used for construction purposes unless signed by Landscape Architect

Date:

Approval:

axxa group
axxa group limited
UNIT 301-02, 3/F PLAZA 228,
No. 228 WAN CHAI ROAD, HONG KONG.
香港 灣仔 灣仔道 228號,
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PROJECT:
Application for Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131) to Rezone the Application Site from 'Green Belt' to 'Residential (Group C)1' for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung

DRAWING TITLE:
TREE SURVEY PLAN

Scale:	1:250 (A1) 1:500 (A3)
Date:	AUG 2023
Design:	CL
Drawn:	LS
Checked:	CL
Project No:	2020209

Drawing No.: TSP-01 REV. A

CAD Ref.: 2020209-S12A-TSP-01

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A1 841 x 594

LEGEND:

- APPLICATION SITE BOUNDARY
- PHASE 1
- REMAINING PHASE
- TREE PROPOSED TO BE TRANSPLANTED – PHASE 1 (1no.)
- TREE GROUP PROPOSED TO BE FELLED
  - PHASE 1 (78nos. approx.)
  - REMAINING PHASE (14nos. approx.)
  - ACCESS ROAD (6nos. approx.)
- +17.0 EXISTING LEVEL
- +16.0 PROPOSED LEVEL

no.	description	date
C	GENERAL REVISION	
B	GENERAL REVISION	15/01/24
A	GENERAL REVISION	16/11/23

REVISION

IT IS THE CONTRACTOR'S RESPONSIBILITY TO

- use figured dimension in preference to scalling
- verify all dimensions at the site
- report all discrepancies to the landscape architect and agree before proceeding
- determine location of all existing services prior to excavation

This drawing shall not be used for construction purposes unless signed by Landscape Architect

Date:

Approval:

axxa group
axxa group limited
UNIT 301-02, 3/F PLAZA 228,
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PROJECT:
Application for Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131) to Rezone the Application Site from 'Green Belt' to 'Residential (Group C)1' for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung

DRAWING TITLE:
TREE TREATMENT PLAN

Scale:	1:250 (A1) 1:500 (A3)
Date:	AUG 2023
Design:	CL
Drawn:	LS
Checked:	CL
Project No:	2020209

Drawing No.: TTP-01

REV. C

CAD Ref.: 2020209-S12A-TTP-01

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A1 841 x 594

LEGEND:

- APPLICATION SITE BOUNDARY
- PHASE 1
- REMAINING PHASE
- TREE PROPOSED TO BE TRANSPLANTED – PHASE 1 (1no.)
- PROPOSED NEW TREES
  - PHASE 1 (78nos.)
  - REMAINING PHASE (14nos.)
  - ACCESS ROAD (6nos.)
- +17.0 EXISTING LEVEL
- +16.0 PROPOSED LEVEL

no.	description	date
C	GENERAL REVISION	
B	GENERAL REVISION	15/01/24
A	GENERAL REVISION	16/11/23

REVISION

IT IS THE CONTRACTOR'S RESPONSIBILITY TO

- use figured dimension in preference to scalling
- verify all dimensions at the site
- report all discrepancies to the landscape architect and agree before proceeding
- determine location of all existing services prior to excavation

This drawing shall not be used for construction purposes unless signed by Landscape Architect

Date:

Approval:

axxa group

axxa group limited

UNIT 301-02, 3/F PLAZA 228,
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DRAWING TITLE:
TREE PLANTING PLAN

Scale:	1:250 (A1) 1:500 (A3)	Drawing No.:	TPP-01
Date:	AUG 2023		
Design:	CL		
Drawn:	LS		
Checked:	CL		REV. C
Project No:	2020209		

CAD Ref.: 2020209-S12A-TPP-01

Appendix D

Landscape Master Plan

LANDSCAPE COURTYARD
WITH SEATING AREA

SITE C

PROPOSED HEDGE
BUFFER PLANTING

+11.10

+12.70

H1

H2

H3

H4

H5

H6

H7

H8

H9

H10

H11

+16.00

PROPOSED
BUFFER PLANTING

+16.00

+14.65

LANDSCAPE GARDEN

APPROVED HOUSE AT
"R(C)1" ZONE

+14.26

SITE B

+13.30

H14

SITE A

+6.20

Clubhouse
(Tx Room/Sewage
Treatment Plant
RM underground)

+11.15

Hoist

+7.30

+6.00

PROPOSED
BUFFER PLANTING

+14.90

H12

H13

H15

H16

H17

+11.00

LANDSCAPE GARDEN
WITH SEATING AREA

CHILDREN'S PLAYGROUND
WITH SEATING AREA

WO MEI HUNG MIN ROAD

行人隧道

高架道路

Elevated Ro

Track

泥路

TS

CUL

N

0m 2m 5m 10m 20m

SCALE . 1:500 (A3)

LEGEND:

- APPLICATION SITE BOUNDARY
- DEVELOPMENT SITE PHASE 1 (SITE A + B + C)
- DEVELOPMENT SITE (REMAINING PHASE)
- PROPOSED HEDGE BUFFER PLANTING
- PROPOSED TRANSPLANTED TREE T70 (*Aquilaria sinensis*)
- PROPOSED NEW TREES (PHASE 1 - 78 nos.) (REMAINING PHASE - 14 nos.) (ACCESS ROAD - 6 nos.)
- EXISTING TREE OUTSIDE THE APPLICATION SITE
- PEDESTRIAN ACCESS
- PROPOSED LAWN
- PROPOSED SHRUBS AND GROUNDCOVERS
- PROPOSED GREEN ROOF
- PRIVATE GARDEN
- PROPOSED PAVING
- PROPOSED EVA/ACCESS ROAD
- +10.45 PROPOSED LEVELS
- VEHICULAR ACCESS

Application for Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131) to Rezone the Application Site from "Green Belt" to "Residential (Group C)1" for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung

Landscape Master Plan

Dwg. No. : 2020209-S12A-LMP-01c

Date : APR 2024
(A3-size)

axxa group

Appendix E

Private Open Space Demarcation Plan

LEGEND:

- APPLICATION SITE BOUNDARY
- DEVELOPMENT SITE PHASE 1 (SITE A + B + C)
- DEVELOPMENT SITE (REMAINING PHASE)
- PRIVATE OPEN SPACE PHASE 1 (not less than 39 sqm to be provided for the anticipated population of 39)
- PRIVATE OPEN SPACE REMAINING PHASE (not less than 12 sqm to be provided for the anticipated population of 12)

SITE C

H1
H2
H3
H4
H5
H6
H7
H8
H9
H10
H11

APPROVED HOUSE AT
"R(C)1" ZONE

SITE B

H12
H13
H14
H15
H16
H17

SITE A

Clubhouse
(Tx Room/Sewage Treatment Plant RM underground)

Hoist

行人隧道

高架道路
Elevated Rd

WO MEI HUNG MIN ROAD

泥路
Track

N

0m 2m 5m 10m 20m

SCALE . 1:500 (A3)

Application for Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131) to Rezone the Application Site from "Green Belt" to "Residential (Group C)1" for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung

Open Space Demarcation Plan

Dwg. No. : 2020209-S12A-OPD-01c

Date : APR 2024
(A3-size)

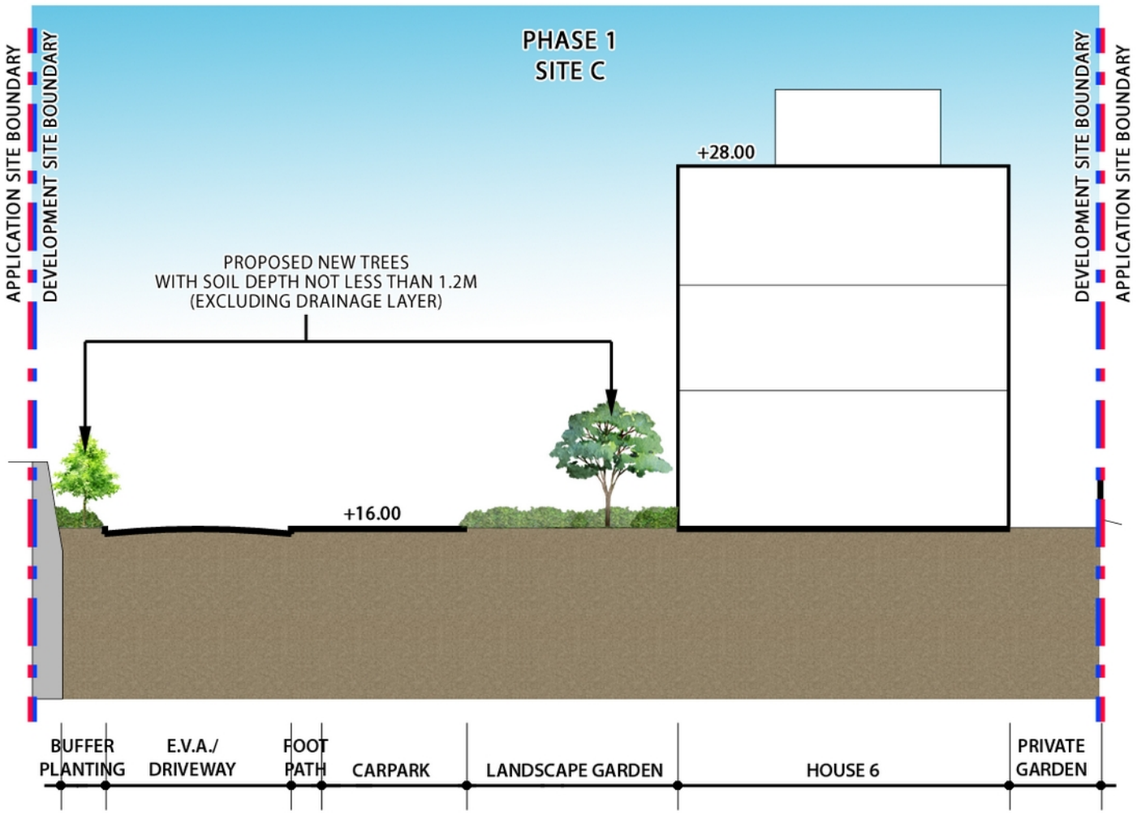
axxa group

Y:\0-Axxagroup Project 2020\2020209_Nam Pin Wai\Graphic Storage\3. Conceptual Design\2024-04-12 S12A-LMP\2020209-S12A-OPD-01c

Appendix F

Landscape Sections

KEYPLAN



0m 1m 2m 4m 8m

SCALE . 1:200 (A3)

Application for Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131) to Rezone the Application Site from "Green Belt" to "Residential (Group C)1" for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung

Landscape Section A-A

Dwg. No. : 2020209-S12A-SEC-01c

Date : APR 2024
(A3-size)

axxa group

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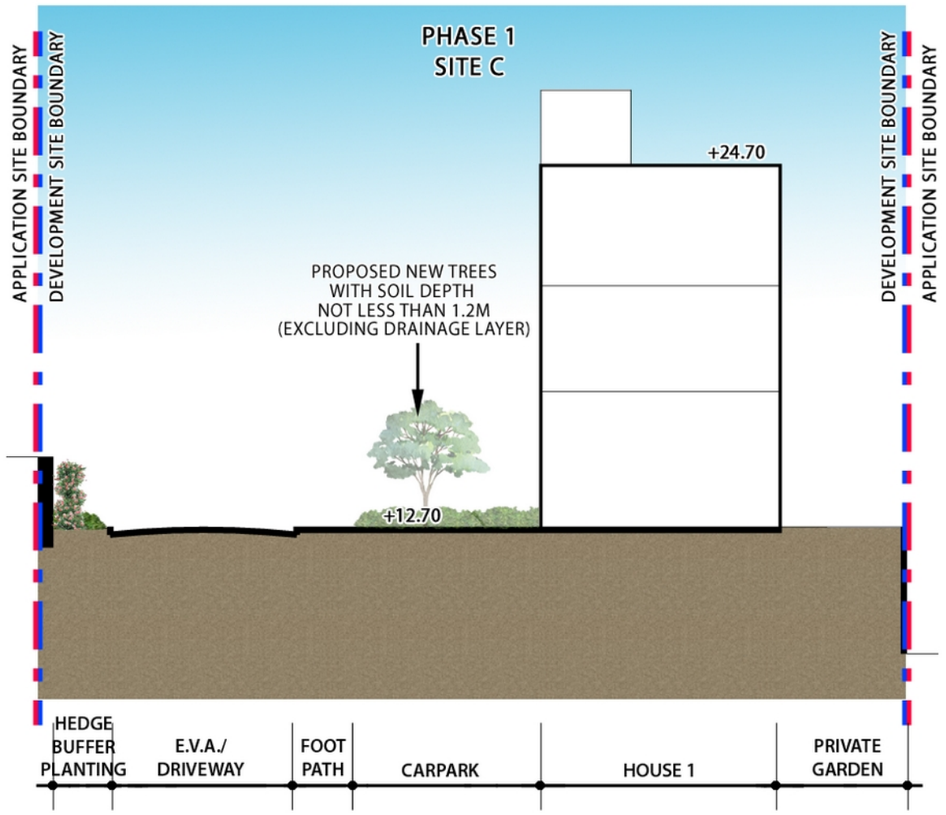
KEYPLAN



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Application for Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131) to Rezone the Application Site from "Green Belt" to "Residential (Group C)1" for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung

Landscape Section B-B

Dwg. No. : 2020209-S12A-SEC-02c

Date : APR 2024
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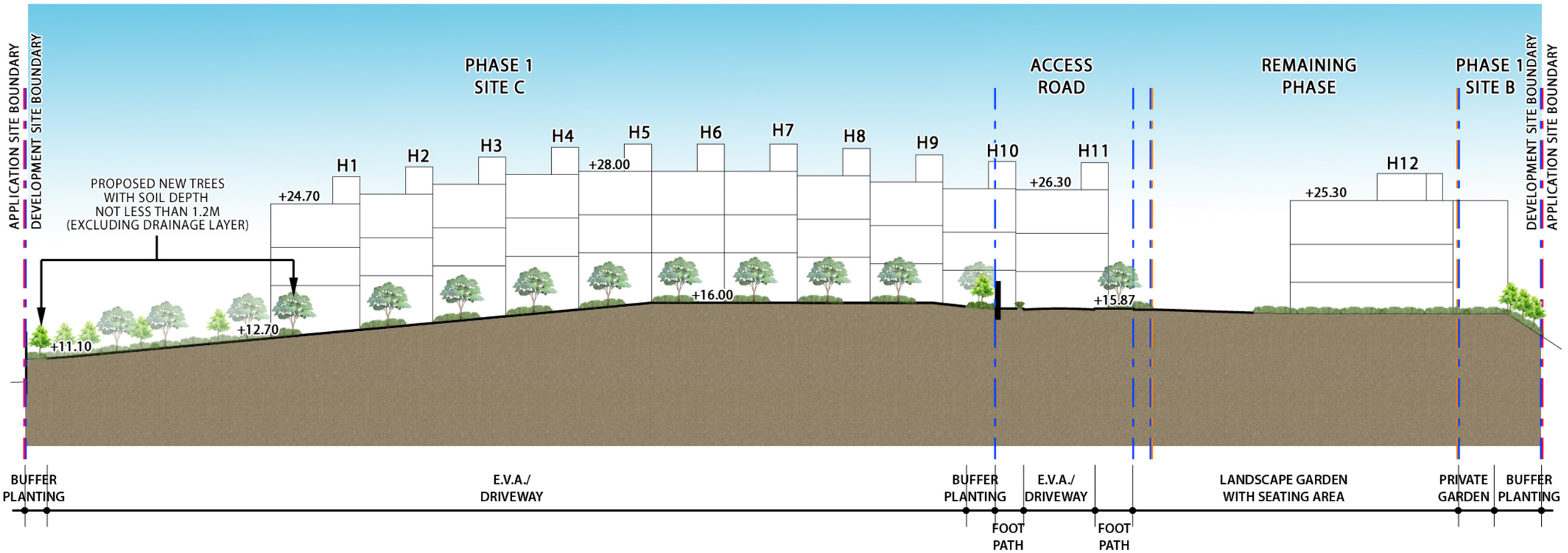


Application for Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131) to Rezone the Application Site from "Green Belt" to "Residential (Group C)1" for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung

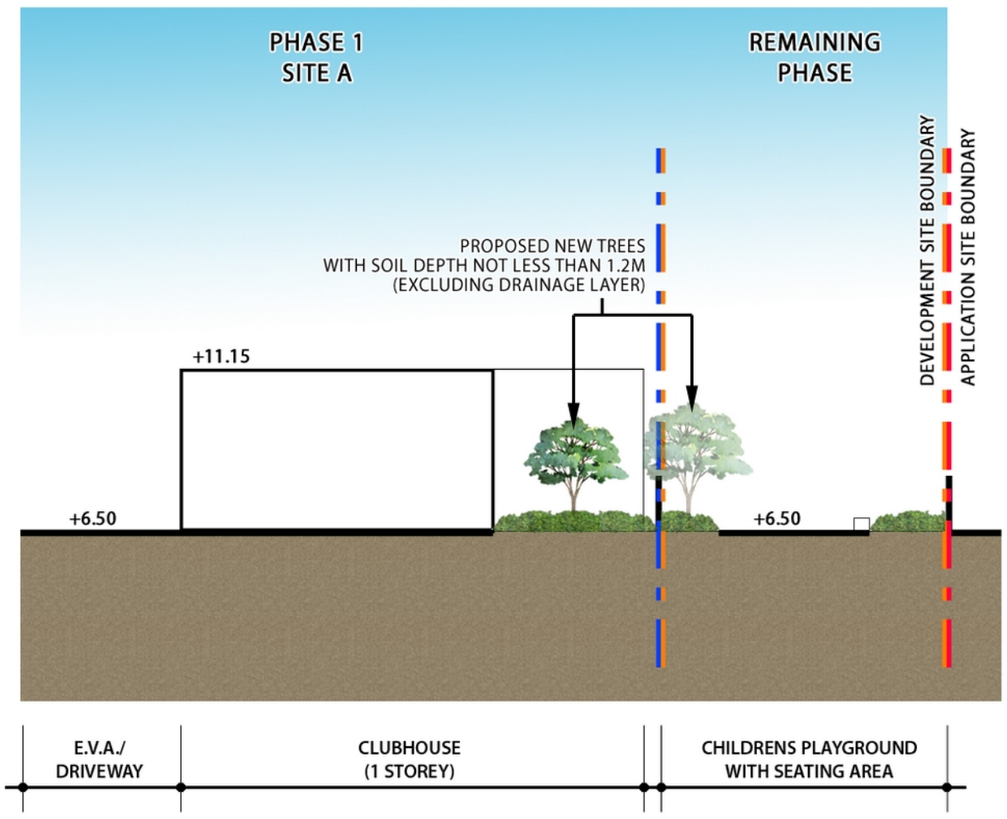
Landscape Section C-C

Dwg. No. : 2020209-S12A-SEC-03c

Date : APR 2024
(A3-size)

axxa group

KEYPLAN



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SCALE . 1:200 (A3)

Application for Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131) to Rezone the Application Site from "Green Belt" to "Residential (Group C)1" for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung

Landscape Section D-D

Dwg. No. : 2020209-S12A-SEC-04b

Date : APR 2024
(A3-size)

axxa group

Appendix C

Traffic Impact Assessment

DOCUMENT STATUS CONTROL RECORD

Application for Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131) to Rezone the Application Site from "Green Belt" to "Residential (Group C)1" for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung

Traffic Impact Assessment Report

Originating Organisation : LLA Consultancy Limited Unit 610, 6/F, Island Place Tower, 510 King's Road, North Point, Hong Kong	Prepared by: SKL	SKL	Date: 29 May 2024
	Approved by: SLN		Date: 29 May 2024
	Revision No.: -		Date of Issue: 29 May 2024

1 INTRODUCTION

1.1 Background

1.1.1 The applicants proposed to develop various lots in D.D. 244 and adjoining Government Land, Nam Pin Wai, Sai Kung, New Territories (hereinafter, referred to as "the Site") into a residential development.

1.1.2 The Site is currently zoned as "Green Belt" ("GB") on the Approved Ho Chung Outline Zoning Plan (OZP) No. S/SK-HC/11. It is the applicants' intention to request for rezoning of the Site to Residential (Group C)1 ("R(C)1") use which is intended for a house development. As the proposed uses is not under Column 1 and Column 2 uses, a Section 12A rezoning application is required for the proposal.

1.1.3 LLA Consultancy Limited was commissioned to carry out a traffic impact assessment study for the proposal to assess the potential traffic impact on its adjacent road network, in support of the planning application. This report presents the finding of the study.

1.2 Objectives

1.2.1 The objectives of the traffic impact assessment study are as follows:

- to review the existing traffic conditions in the surrounding road network;
- to estimate the potential traffic generation due to the proposed house development;
- to assess the future traffic situation in the surrounding road network;
- to appraise the potential traffic impact of the proposed house development; and
- to recommend the transport facilities provisions for the proposed house development.

2 THE PROPOSED DEVELOPMENT

2.1 The Site

2.1.1 As shown in **Figure 2.1**, The Site is located near the junction of Hiram's Highway/Wo Mei Hung Min Road with a development site area of about 5,355m^2 (excluding access road). The key parameters of the proposed house development are summarized in **Table 2.1**.

Table 2.1 Proposed Development Schedule

Components	Content		
	Phase 1	Remaining Phase	Total
Development Site Area (About) (m^2)	4,020 m^2	1,335 m^2	5,355 m^2
Domestic Gross Floor Area (About) (GFA)	3,015 m^2	1,001 m^2	4,016 m^2
Domestic Plot Ratio (About)	0.75	0.75	0.75
No. of House(s)	13	4	17

3 EXISTING TRAFFIC SITUATION

3.1 Existing Traffic Conditions

3.1.1 Wo Mei Hung Min Road serves as a local road connecting to Hiram's Highway. It is a single two-lane road with various local accesses for the low density development nearby.

3.1.2 Hiram's Highway is a major road in the eastern part of New Territories connecting Sai Kung with Clear Water Bay Road. Currently, the section of Hiram's Highway between its roundabout with New Hiram's Highway and Nam Wai Road is a single two-lane carriageway. It carried an AADT of 24,460 vehicles in 2021.

3.2 Traffic Count Survey

3.2.1 In order to assess the existing traffic conditions, a traffic count survey was carried out at the following locations in the vicinity of the Site on a 12 January 2023 (Thursday) during 07:30 – 09:30 and 17:30 – 19:30 and 7 October 2023 (Saturday) for the weekend peak hour period from 12:00 to 19:00. The locations of the surveyed junctions are presented in **Figure 3.1**.

- Hiram's Highway/New Hiram's Highway/Nam Pin Wai Road
- Hiram's Highway/Wo Mei Hung Min Road

3.2.2 The identified weekday AM, weekday PM and weekend peak hours were 07:30 – 08:30, 17:45 – 18:45 and 16:45 – 17:45, respectively and the surveyed traffic flows are presented in **Figure 3.2**.

3.3 Existing Junction Capacity Assessment

3.3.1 Based on the existing traffic flows, the performances of the key junctions during the peak hour were assessed. The results are summarized and presented in **Table 3.1** and the detailed junction capacity calculation sheets are attached in **Appendix A**.

Table 3.1 Existing Junction Performance

No.	Junction Location	Type/ Capacity Index(1)	Weekday AM Peak Hour	Weekday PM Peak Hour	Weekend Peak Hour
J1	Hiram's Highway/ New Hiram's Highway/ Nam Pin Wai Road	Roundabout/ DFC	0.63	0.52	0.51
J2	Hiram's Highway/ Wo Mei Hung Min Road	Priority/DFC	0.07	0.04	0.08

Note: (1) DFC = Design Flow to Capacity ratio for priority junction and roundabout.

3.3.2 It can be seen from **Table 3.1** that the concerned junctions are operating satisfactorily during the weekday AM, weekday PM and weekend peak hours.

3.4 Existing Link Capacity Assessment

3.4.1 The Volume to Capacity (V/C) Ratios of Hiram's Highway and New Hiram's Highway were assessed and the results are presented in **Table 3.2**.

Table 3.2 Link Capacity Assessment

Direction	Bound	Capacity (pcu/hr) (1)	Traffic Flow (pcu/hr)			V/C Ratio		
			Weekday		Week-end	Weekday		Week-end
			AM	PM		AM	PM	
Hiram's Highway(2)	NB	3,120	1,087	1,244	1,190	0.35	0.40	0.38
	SB	3,120	1,402	1,040	1,026	0.45	0.33	0.33
Hiram's Highway(3)	EB	1,140	208	273	292	0.18	0.24	0.26
	WB	1,140	47	69	58	0.04	0.06	0.05
New Hiram's Highway(4)	EB	3,120	1,225	874	877	0.39	0.28	0.28
	WB	3,120	997	1,245	1,216	0.32	0.40	0.39

Note: (1) Capacity refers to TPDM Vol.2 Ch. 2.4. The capacity for each bound of a 7.3m wide single-2-lane carriageway is 850 veh/hr. A factor of 1.2 (based on the traffic count survey result) is adopted to convert the capacity from veh/hr to pcu/hr.
(2) The section between Ho Chung Road and New Hiram's Highway.
(3) The section between New Hiram's Highway and Wo Mei Hung Min Road
(4) The section between Hiram's Highway and Clear Water Bay Road.

3.4.2 As shown in **Table 3.2**, the concerned road sections are operating with spare capacity during AM and PM hours.

3.5 Public Transport Services

3.5.1 At present, there are franchised bus and green minibus routes travelling along Hiram's Highway and the details of these routes are shown in **Table 3.3** and **Figure 3.3**.

Table 3.3 Existing Franchised Bus and Green Minibus Routes

Mode	Route No.	Terminating Points	Frequency (min)
Bus	92	Sai Kung – Diamond Hill Station	12 – 25
	96R	Diamond Hill Station – Wong Shek Pier (Sat, Sun & PH only)	20 – 30
	292P	Sai Kung to Kwun Tong	1 trip per day
	792M	Tseung Kwan O Station – Sai Kung	15 – 25
GMB	1	Sai Kung – Kowloon Bay (Telford Gardens)	8 – 20
	1A	Sai Kung – Choi Hung (San Po Kong)	4
	1S	Sai Kung – Choi Hung (San Po Kong) (Overnight Services)	10 – 15
	12	Sai Kung – Po Lam	10 – 15
	101M	Sai Kung – Hang Hau Station	3 – 30

3.5.2 An on-site observation was carried out to identify the occupancy of the franchised bus services in the AM peak hour and the results are summarized in **Table 3.4**.

Table 3.4 Occupancy of Existing Franchised Bus Services during AM Peak Hour

Route No.	Observed Vehicular Trips	Passenger Capacity (1)	Passengers on Bus upon Arrival	Total No. of passengers		Passengers on Bus upon Leave	Occupancy
				Boarding	Alighting		
		[a]	[b]	[c]	[d]	[e] = [b]+[c]-[d]	[f] = [e] / [a]
Sai Kung Bound							
Bus 92	3	360	160	45	2	203	56%
Bus 792M	3	360	90	9	0	99	28%
Total	**6**	**720**	**250**	**54**	**2**	**302**	**42%**
Kowloon Bound							
Bus 92	3	360	130	0	27	103	29%
Bus 792M	3	360	140	1	27	114	32%
Total	**6**	**720**	**270**	**1**	**54**	**217**	**30%**

Note: (1) Assume the capacity of each franchised bus is 120 pax.

4 FUTURE TRAFFIC SITUATION

4.1 Design Year

4.1.1 It is anticipated that the proposed house development will be operation by 2030. To consider 3 years after the planned completion of the proposed house development, a design year of 2033 will be adopted in this study.

4.2 Traffic Forecast

Annual Traffic Census (ATC) – Historical Data

4.2.1 In order to establish the traffic growth rate in the vicinity of the Site, reference was made to the 2016 to 2021 Annual Traffic Census Reports published by Transport Department, reporting on the annual average daily traffic (AADT) flows at the counting stations in the territory. The details of the counting stations in the study area and the corresponding counts are shown in **Table 4.1**.

Table 4.1 Annual Traffic Census Data

Stn. No.	Road Section			AADT(1)						Avg Growth %
	Road	From	To	2016	2017	2018	2019	2020	2021	
5017	Clear Water Bay Road	Anderson Road	Hiram's Highway	29,370	26,910 (-8.4%)	28,450 (5.7%)	28,980 (1.9%)	28,900 (-0.3%)	29,100 (0.7%)	-0.2%
5466	Clear Water Bay Road	Hang Hau Road	Hiram's Highway	18,770	18,650 (-0.6%)	18,950 (1.6%)	20,240 (6.8%)	19,110 (-5.6%)	20,020 (4.8%)	1.3%
6055	Hiram's Highway	Clear Water Bay Road	Po Tung Road	25,610	24,050 (-6.1%)	24,450 (1.7%)	24,280 (-0.7%)	23,360 (-3.8%)	24,460 (4.7%)	-0.9%
			Total	**73,750**	**69,610 (-5.6%)**	**71,850 (3.2%)**	**73,500 (2.3%)**	**71,370 (-2.9%)**	**73,580 (3.1%)**	**-0.8%**

Note: (1) Figures in bracket indicated the % increase between two years.

4.2.2 **Table 4.1** shows that the AADT at the concerned ATC stations has an overall annual growth of negative 0.8% in between the years of 2016 and 2021.

Territorial Population and Employment Data Matrix (TPEDM – Projection Data)

4.2.3 Reference was also made to the 2019 – based TPEDM data published by the Planning Department. The population and employment data of year 2019 and 2031 are summarized in **Table 4.2**.

Table 4.2 Population and Employment Data in Southeast New Territories District

Year	2019	2026	2031
Population	68,900	65,800	59,750
Employment	27,250	27,750	28,100
Total	96,150	93,550	87,850
	Average Growth %	-0.39% (2019 to 2026)	-1.25% (2026 to 2031)

4.2.4 As shown in **Table 4.2**, the average annual growth rates for both population and employment are negative. Based on the ATC historical data in **Table 4.1** and the TPEDM projection data in **Table 4.2**, a nominal growth rate of +1.0% will be adopted for the subsequent traffic forecasting.

4.3 Traffic Generation of the Proposed House Development

4.3.1 Reference was also made to the latest set of traffic generation and attraction rates documented in Chapter 3 "Transport Considerations of Town Plans" of the TPDM, for the estimation of the traffic generated by proposed house development. The traffic generation and attraction numbers were shown in **Table 4.3**.

Table 4.3 Traffic Generation of the Proposed House Development

Use	Unit / Content	Weekday AM Peak			Weekday PM Peak			Weekend Peak		
		Gen.	Att.	Total	Gen.	Att.	Total	Gen.	Att.	Total
Adopted Trip Rates(1)										
Residential – 240m^2 (2)	pcu/hr/flat	0.3012	0.2189	-	0.2235	0.3234	-	0.2235	0.3234	-
Traffic Generation/Attraction										
Proposed House Development	17 flats	6	4	10	4	6	10	4	6	10

Notes: Gen. – Generation; Att. - Attraction
(1) Mean trip rates from TPDM are adopted.
(2) The trip rates for PM peak hour are adopted for Weekend peak hour.

4.3.2 In view of the above, the proposed house development would generate two-way traffic flows of 10 pcu/hr in weekday AM peak hour, weekday PM peak hour and weekend peak hour, respectively. The traffic distribution is shown diagrammatically in **Figure 4.1**.

4.4 Planned/Committed Developments

4.4.1 To estimate the future traffic flows generated and attracted by the nearby planned/committed developments, updated information has been obtained from available information regarding the planned and approved developments in the vicinity of the proposed development site, the details of these developments are listed in **Table 4.4**.

Table 4.4 Planned/Committed Developments

Location	Use	Development Parameters
Various Lot in D.D. 210, Ho Chung	Residential	2,422 m^2 GFA (15 flats)
Lot 1003 in D.D. 214, Ho Chung	Residential	5,344 m^2 GFA (90 flats)
Lot 2189 in D.D. 244, Nam Pin Wai	Residential	8,320 m^2 GFA (139 flats)
Various Lots in D.D. 244 and Adjoining Government Land, Ho Chung, Sai Kung	Residential	13,719 m^2 GFA (58 flats)

4.4.2 Reference is made to Volume 1 of the TPDM published by the TD on the trip rates of the foregoing developments to estimate their traffic generation and attraction. The total traffic generation and attraction by these adjacent planned/committed developments are summarized in **Table 4.5**.

Table 4.5 Traffic Generation of the Planned and Approved Developments

Use	Use / Content	AM Peak Hour			PM Peak Hour			Weekend Peak Hour (1)		
		Gen.	Att.	Total	Gen.	Att.	Total	Gen.	Att.	Total
Adopted TPDM Mean Trip Rates										
Residential – 60m^2	pcu/hr/flat	0.0718	0.0425	-	0.0286	0.0370	-	0.0286	0.0370	-
Residential – 180m^2	pcu/hr/flat	0.2772	0.1769	-	0.1635	0.2394	-	0.1635	0.2394	-
Residential – 240m^2	pcu/hr/flat	0.3012	0.2189	-	0.2235	0.3234	-	0.2235	0.3234	-
Traffic Generation										
Site A	15 flats	5	3	8	3	4	7	3	4	7
Site B	90 flats	7	4	11	3	4	7	3	4	7
Site C	139 flats	10	6	16	4	6	10	4	6	10
Site D	58 flats	18	13	31	13	19	32	13	19	32
Total		**40**	**26**	**66**	**23**	**33**	**56**	**23**	**33**	**56**

Note: Gen. – Generation; Att. – Attraction.
(1) The trip rates for PM peak hour are adopted for weekend peak hour.

4.4.3 As shown in **Table 4.5**, the planned/committed developments will generate a total two-way traffic of 66, 56 and 56 pcu/hr during weekday AM, weekday PM peak hour and weekend peak hour respectively. The estimated traffic generation will be assumed to be travelling in the local road network in the same proportions as the existing traffic demands when traffic forecast is prepared in this Study.

4.5 Reference and Design Flows

4.5.1 The 2033 Reference Flows, i.e. the traffic flows in the vicinity without the proposed house development, were estimated based on the following equation.

2033 Reference Flows = 2023 Existing Traffic Flows x $(1 + 1.0\%)^{10}$ + Traffic Flows Generated by the Planned/Committed Development

4.5.2 The 2033 Design Flows, i.e. the traffic flows in the local road network with the traffic generated by the proposed house development, were estimated based on the following equation:

2033 Design Flows = 2033 Reference Flows + Traffic Flows Generated by the Proposed House Development

4.5.3 The 2033 Reference and Design Flows are shown in **Figure 4.2** and **Figure 4.3**, respectively.

4.6 Junction Capacity Assessment

4.6.1 Assessments of the junction performance were based on the reference and design flows for the year 2033. The results are summarized and presented in **Table 4.6** and detailed junction capacity calculation sheets are presented in **Appendix B**.

Table 4.6 Junction Capacity Assessment for Design Year 2033

Jun. No.	Junction	Type/ Capacity Index(1)	2033 Reference			2033 Design		
			AM	PM	Week-end	AM	PM	Week-end
J1	Hiram's Highway/ New Hiram's Highway/ Nam Pin Wai Road	Roundabout / DFC	0.71	0.59	0.58	0.71	0.59	0.58
J2	Hiram's Highway/ Wo Mei Hung Min Road	Priority/DFC	0.10	0.05	0.10	0.11	0.06	0.11

Note: (1) DFC = Design Flow to Capacity ratio for priority junction and roundabout.

4.6.2 As shown in **Table 4.6**, all concerned junctions will operate with capacities in future scenarios. Therefore, the additional traffic generated by the proposed house development is not anticipated to induce significant traffic impact onto the adjacent junctions.

4.7 Link Capacity Assessment

4.7.1 The V/C Ratios of Hiram's Highway, New Hiram's Highway and the future access road were assessed and the results are presented in **Table 4.7**.

Table 4.7 Year 2033 Link Capacity Assessments

Direction	Bound	Capacity (pcu/hr) (1)	Traffic Flow (pcu/hr)			V/C Ratio		
			Weekday		Week-end	Weekday		Week-end
			AM	PM		AM	PM	
2033 Reference Scenario								
Hiram's Highway(2)	NB	3,120	1,205	1,375	1,316	0.39	0.44	0.42
	SB	3,120	1,555	1,155	1,140	0.50	0.37	0.37
Hiram's Highway(3)	EB	1,140	236	308	329	0.21	0.27	0.29
	WB	1,140	60	80	68	0.05	0.07	0.06
New Hiram's Highway(4)	EB	3,120	1,379	984	988	0.44	0.32	0.32
	WB	3,120	1,122	1,402	1,371	0.36	0.45	0.44
Future Access Road	2-way	120	16	10	10	0.13	0.08	0.08
2033 Design Scenario								
Hiram's Highway(2)	NB	3,120	1,206	1,375	1,316	0.39	0.44	0.42
	SB	3,120	1,555	1,156	1,141	0.50	0.37	0.37
Hiram's Highway(3)	EB	1,140	240	314	335	0.21	0.28	0.29
	WB	1,140	61	80	68	0.05	0.07	0.06
New Hiram's Highway(4)	EB	3,120	1,379	984	988	0.44	0.32	0.32
	WB	3,120	1,126	1,407	1,376	0.36	0.45	0.44
Future Access Road	2-way	120	26	20	20	0.22	0.17	0.17

Note: (1) Capacity refers to TPDM Vol.2 Ch. 2.4. The capacity for each bound of a 7.3m wide single-2-lane carriageway is 850 veh/hr. A factor of 1.2 (based on the traffic count survey result) is adopted to convert the capacity from veh/hr to pcu/hr.
(2) The section between Ho Chung Road and New Hiram's Highway.

(3) The section between New Hiram's Highway and Wo Mei Hung Min Road
(4) The section between Hiram's Highway and Clear Water Bay Road.

4.7.2 As shown in **Table 4.7**, all the concerned road sections will operate with capacity during AM and PM hours in both reference and design scenarios.

4.8 Review of Public Transport Facilities

4.8.1 Based on the tentative flat mix, the overall population of the proposed development is about 51. Reference has been made to the published "Travel Characteristics Survey (TCS) 2011 Final Report". According to the Report, the daily mechanized trip rate per population is 1.83 trips (two-way) and the morning peak hour accounted for about 12% of the daily trips for the two-way trips. It is assumed that 90% of the trips are in outbound direction in the AM peak hour. Based on the above and most of residents would use public transport services, the estimated public transport demand of the proposed development in outbound direction in AM peak hour is about 11 pax/hr (i.e. 51 x 1.83 x 0.12 x 0.9).

4.8.2 The public transport demand induced by the planned developments mentioned in **Section 4.4** is also considered. According to "Hong Kong Annual Digest of Statistics" published by the Census and Statistic Department, the average household size for the territory in year 2022 is 2.7, this figure is adopted for estimating the population of these developments. By following the methodology described in the aforesaid paragraph, the estimated public transport demand of the planned developments in outbound direction in AM peak hour is about 162 pax/hr (i.e. (15+90+139+58) x 2.7 x 1.83 x 0.12 x 0.9).

4.8.3 Based on the existing public transport vacancy (as estimated in **Table 3.4**) and the above projected demand, the existing bus services will still operate with capacity after accommodating the future demand induced by the proposed development and the planned developments.

5 INTERNAL TRANSPORT FACILITIES

5.1 Access Arrangement

5.1.1 At present, there is no proper vehicular access to the Site. An access road will be formed connecting Wo Mei Hung Min Road and the access road to Villa Royale. The proposed vehicular access will be located along this access road. The access arrangement is presented in the master layout plan enclosed in **Appendix C**.

5.2 Internal Transport Facilities

5.2.1 The internal transport facilities to serve the proposed house development will be provided in accordance with the Hong Kong Planning Standards and Guidelines (HKPSG). The required and the proposed provisions for the proposed house development are shown in **Table 5.1**.

Table 5.1 Proposed Parking Provisions

<table>
<tr><th>Type</th><th colspan="6">HKPSG's Requirements</th><th>Required Provision</th><th>Proposed Provision</th></tr>
<tr><td colspan="9">Proposed House Development (17 Houses)</td></tr>
<tr><td rowspan="4">Car Parking Space</td><td colspan="6">For Residents
Parking Requirements = GPS x R1 x R2 x R3 where</td><td rowspan="4">23 – 39

–</td><td rowspan="4">34

2</td></tr>
<tr><td>Unit Size</td><td>No. of Unit</td><td>GPS</td><td>R1</td><td>R2</td><td>R3</td></tr>
<tr><td>FS > 160 m^2</td><td>17</td><td>1 space per 4 – 7 units</td><td>7.0</td><td>1</td><td>1.3</td></tr>
<tr><td colspan="6">For Visitors
private residential developments with 75 units or less per block, the visitor car parking provision will be determined by TD on a case-by-case basis.</td></tr>
<tr><td></td><td colspan="6">TOTAL CAR PARKING</td><td>23 – 39</td><td>36 (1)</td></tr>
<tr><td>Motorcycle Parking Space</td><td colspan="6">1 space per 100 - 150 flats</td><td>1</td><td>1</td></tr>
<tr><td>Loading / Unloading Bay</td><td colspan="6">1 bay per residential block</td><td>1</td><td>1</td></tr>
</table>

Note: (1) including 1 accessible car parking spaces for 1 – 50 total car parking spaces.

5.2.2 Based on **Table 5.1**, a total of total of 36 car parking spaces (34 for residents and 2 for visitors, including 0 disable car parking space), 1 loading/unloading bay will be provided to fulfil the requirements of the HKPSG. **Table 5.2** lists out the dimensions required for each type of spaces to follow and the master layout plan is enclosed in **Appendix C**.

Table 5.2 Summary of Overall Transport Facilities Provision

Facilities	Dimensions	Proposed Provision		
		Phase 1	Remaining Phase	Total
Car Parking Space	2.5m (W) x 5.0m (L) x 2.4m (H)	28	8	36
Motorcycle Park Space	1.0m (W) x 2.4m (L) x 2.4m (H)	1	0	1
Goods Vehicle Loading / Unloading Bay	HGV: 3.5m (W) x 11.0m (L) x 4.7m (H)	1	0	1

5.3 Swept path Analysis

5.3.1 To ensure smooth manoeuvring of the parking area, swept path analysis was conducted to demonstrate that adequate space is provided for the vehicles for manoeuvring and presented in **Figures SP-01 – SP-04**.

6 SUMMARY AND CONCLUSION

6.1 Summary

6.1.1 The applicant proposed to develop various lots in D.D. 244, Nam Pin Wai, Sai Kung, New Territories into a house development.

6.1.2 The Site is currently zoned as "Green Belt" ("GB") on the Approved Ho Chung Outline Zoning Plan (OZP) No. S/SK-HC/11. It is the applicant's intention to request for rezoning of the Site to Residential (Group C)1 ("R(C)1") use which is intended for a house development. As the proposed uses is not under Column 1 and Column 2 uses, a Section 12A rezoning application is required for the proposal.

6.1.3 Traffic count surveys were carried out on 12 January 2023 (Thursday) during 07:30 – 09:30 and 17:30 – 19:30 and 7 October 2023 (Saturday) for the weekend peak hour period from 12:00 to 19:00. The identified weekday AM, weekday PM and weekend peak hours were 07:30 – 08:30, 17:45 – 18:45 and 16:45 – 17:45, respectively. Junction capacity assessment based on the observed flows shows that all concerned junctions are performing satisfactorily during the weekday AM, weekday PM and weekend peak hours.

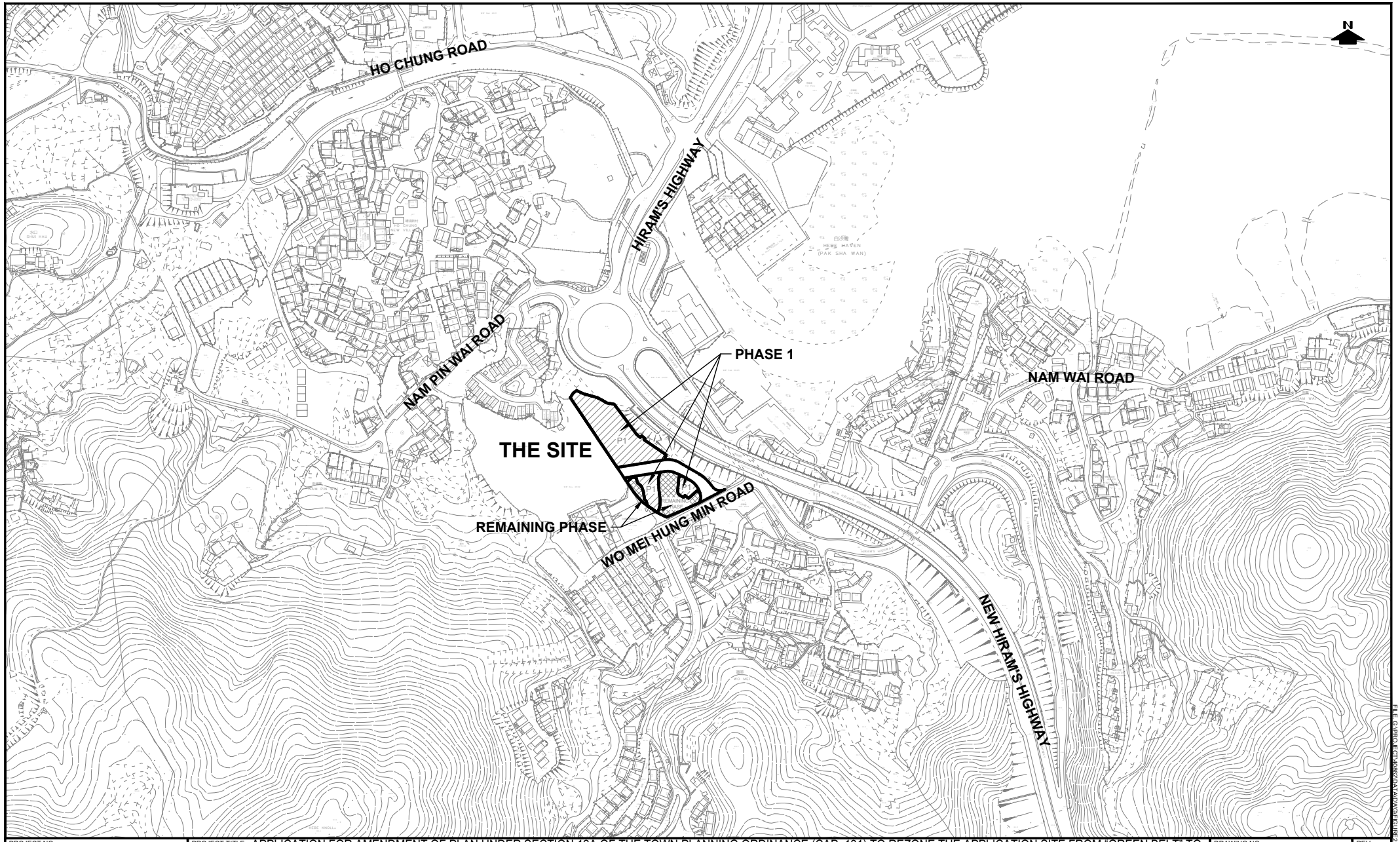
6.1.4 The proposed house development would generate two-way traffic flows of 10 pcu/hr in weekday AM peak hour, weekday PM peak hour and weekend peak hour, respectively. By assigning the additional development traffic to the 2033 Reference Flows, the 2033 Design Flows were obtained.

6.1.5 Junction and link capacity assessments were carried out at the key junctions and road links in the vicinity for the year 2033. The results have indicated that all junctions and road links will operate satisfactorily for both reference and design scenarios. Therefore, it is anticipated that the proposed house development will not induce significant traffic impact to the surrounding road network.

6.1.6 The internal transport facilities of the proposed house development will be provided in accordance with the recommendations in the HKPSG. The proposed house development will provide a total of 36 car parking spaces (34 for residents and 2 for visitors), 1 motorcycle parking space and 1 loading/unloading bay.

6.2 Conclusion

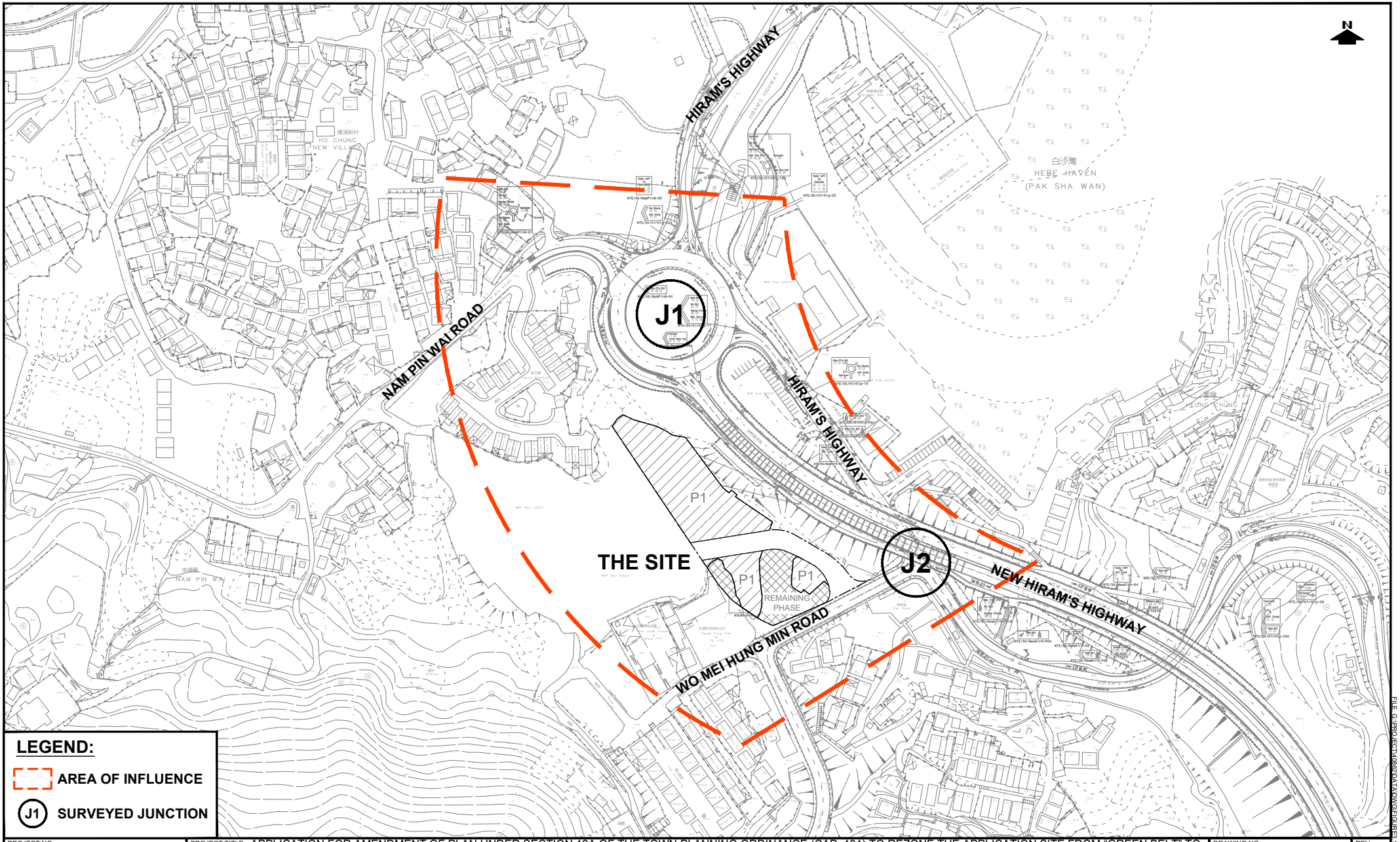
6.2.1 From the assessment results, it can be concluded that the proposed house development will not induce significant traffic impact on the surrounding road network and the development proposal is considered acceptable from traffic engineering point of view.



PROJECT NO. 40862	PROJECT TITLE APPLICATION FOR AMENDMENT OF PLAN UNDER SECTION 12A OF THE TOWN PLANNING ORDINANCE (CAP. 131) TO REZONE THE APPLICATION SITE FROM "GREEN BELT" TO "RESIDENTIAL (GROUP C)1" FOR PROPOSED HOUSE DEVELOPMENT AT VARIOUS LOTS IN D.D. 244 AND ADJOINING GOVERNMENT LAND, NAM PIN WAI, SAI KUNG	DRAWING NO. FIGURE 2.1	REV. ·
DESIGNED SKL / DATE MAY 2023	DRAWING TITLE		
DRAWN CLL / SCALE 1:5000	LOCATION PLAN		
CHECKED SLN		LLA 顧問有限公司 Consultancy Limited	

FILE: G:\PROJECT\40862\DATA\DWG\FIGURE2.1.DWG PLOT SCALE : 1 = 1

FILE: G:\PROJECT\40862\DATA\DWG\FIGURE2.1.DWG PLOT SCALE : 1 = 1



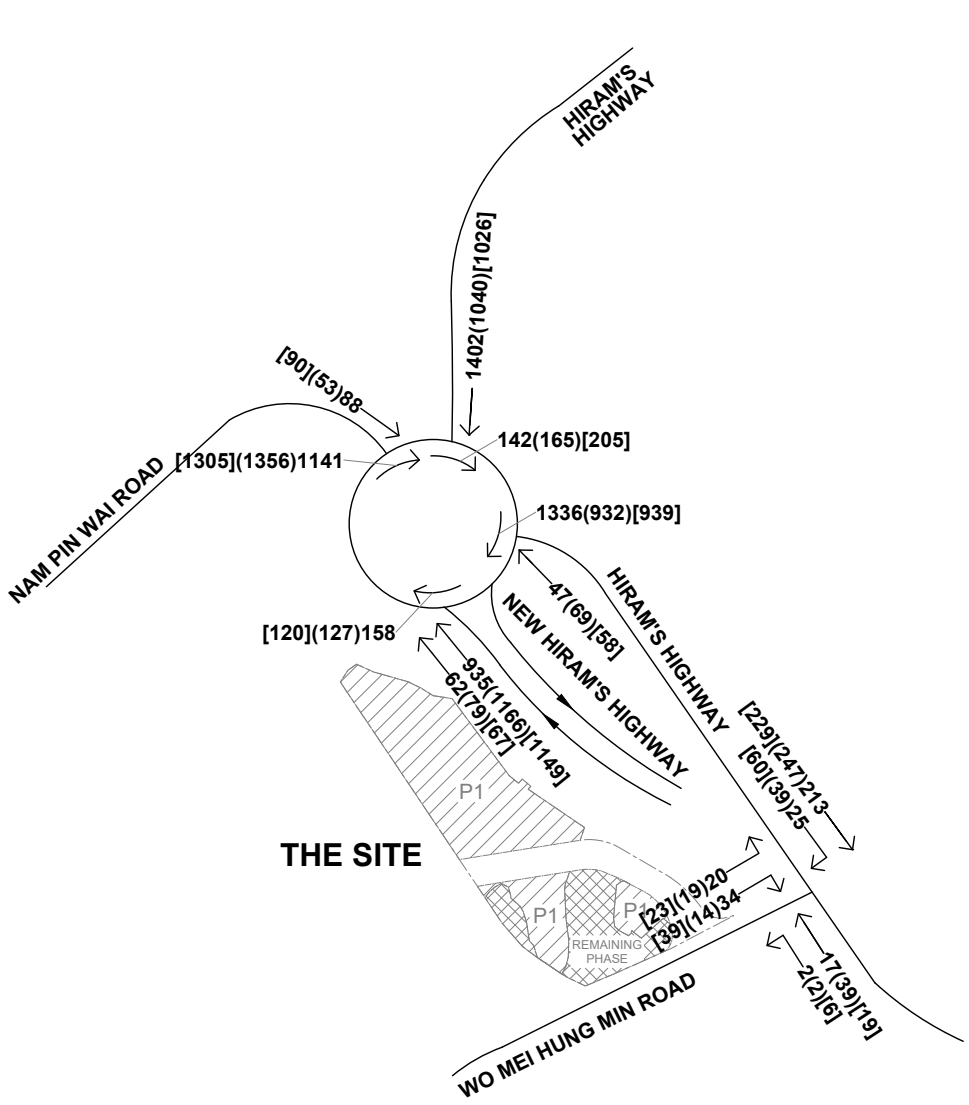
LEGEND:

- AREA OF INFLUENCE
- J1 SURVEYED JUNCTION

PROJECT NO. 40862	PROJECT TITLE APPLICATION FOR AMENDMENT OF PLAN UNDER SECTION 12A OF THE TOWN PLANNING ORDINANCE (CAP. 131) TO REZONE THE APPLICATION SITE FROM "GREEN BELT" TO "RESIDENTIAL (GROUP C)1" FOR PROPOSED HOUSE DEVELOPMENT AT VARIOUS LOTS IN D.D. 244 AND ADJOINING GOVERNMENT LAND, NAM PIN WAI, SAI KUNG	DRAWING NO. FIGURE 3.1	REV. ·
DESIGNED SKL / DATE MAY 2023	DRAWING TITLE LOCATION OF SURVEYED JUNCTIONS AND AREA OF INFLUENCE	LLA 顧問有限公司 Consultancy Limited	
DRAWN CLL / SCALE 1:3000			
CHECKED SLN			

FILE: G:\PROJECT\40862\DATA\DWG\FIGURE3.1.DWG PLOT SCALE : 1 = 1

FILE: G:\PROJECT\40862\DATA\DWG\FIGURE3.1.DWG PLOT SCALE : 1 = 1



LEGEND:

312 (158) [616] ← WEEKEND PEAK PCU

WEEKDAY PM PEAK PCU

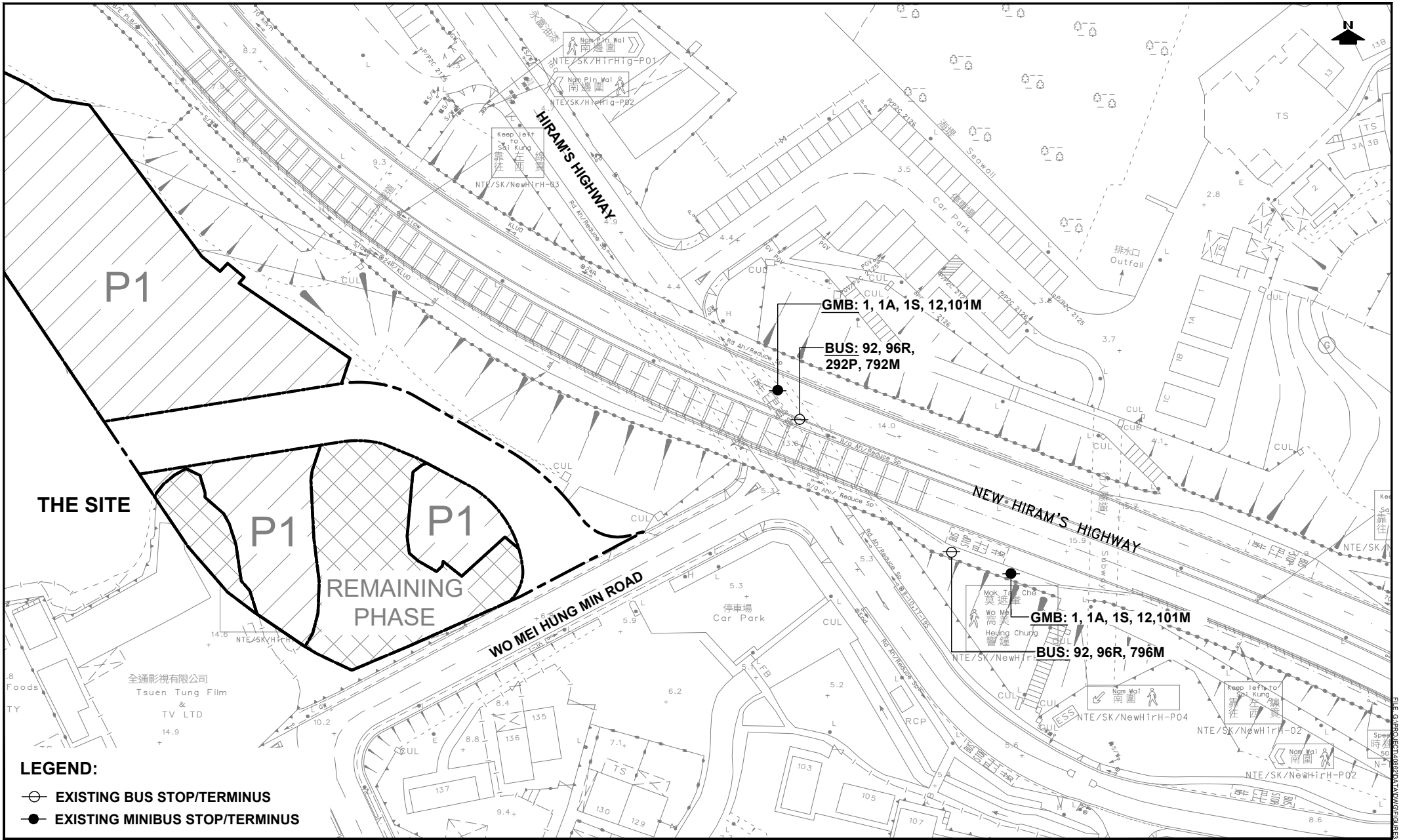
WEEKDAY AM PEAK PCU

NOTE:

1, ALL TRAFFIC FLOWS ARE IN PCU/HOUR
2. MINOR ROADS ARE NOT SHOWN FOR CLARITY

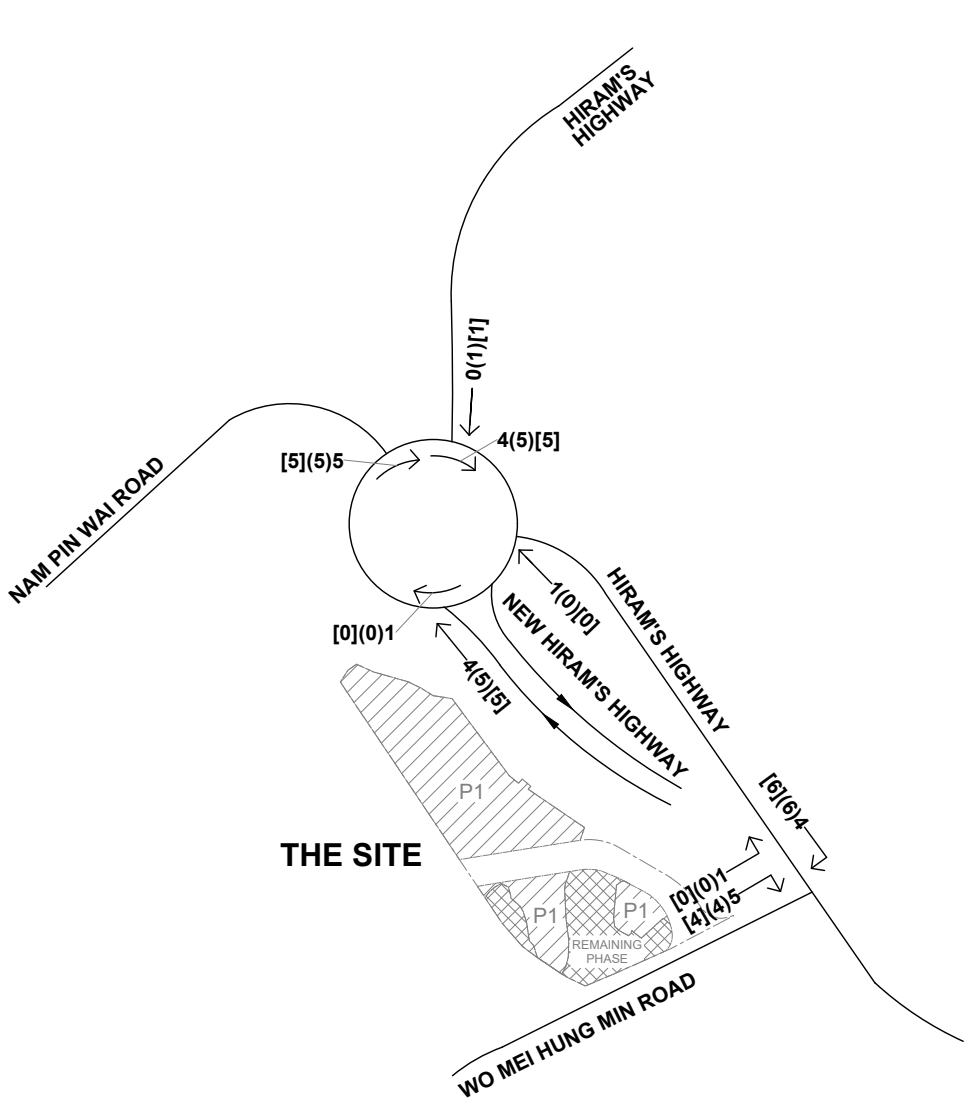
PROJECT NO. 40862	PROJECT TITLE APPLICATION FOR AMENDMENT OF PLAN UNDER SECTION 12A OF THE TOWN PLANNING ORDINANCE (CAP. 131) TO REZONE THE APPLICATION SITE FROM "GREEN BELT" TO "RESIDENTIAL (GROUP C)1" FOR PROPOSED HOUSE DEVELOPMENT AT VARIOUS LOTS IN D.D. 244 AND ADJOINING GOVERNMENT LAND, NAM PIN WAI, SAI KUNG	DRAWING NO. FIGURE 3.2	REV. A
DESIGNED SKL / DATE OCT 2023	DRAWING TITLE 2023 OBSERVED TRAFFIC FLOWS	LLA 顧問有限公司 Consultancy Limited	
DRAWN CLL / SCALE N.T.S.			
CHECKED SLN			

FILE: G:\PROJECT\40862\DATA\DWG\FIGURE3.2A.DWG PLOT SCALE : 1 = 1



PROJECT NO. 40862	PROJECT TITLE APPLICATION FOR AMENDMENT OF PLAN UNDER SECTION 12A OF THE TOWN PLANNING ORDINANCE (CAP. 131) TO REZONE THE APPLICATION SITE FROM "GREEN BELT" TO "RESIDENTIAL (GROUP C)1" FOR PROPOSED HOUSE DEVELOPMENT AT VARIOUS LOTS IN D.D. 244 AND ADJOINING GOVERNMENT LAND, NAM PIN WAI, SAI KUNG	DRAWING NO. FIGURE 3.3	REV. ·
DESIGNED SKL / DATE MAY 2023	DRAWING TITLE PUBLIC TRANSPORT FACILITIES	LLA 顧問有限公司 Consultancy Limited	
DRAWN CLL / SCALE 1:1000			
CHECKED SLN			

FILE: G:\PROJECT\40862\DATA\DWG\FIGURE3.3.DWG PLOT SCALE : 1 = 1



LEGEND:

312 (158) [616] ← WEEKEND PEAK PCU

WEEKDAY PM PEAK PCU

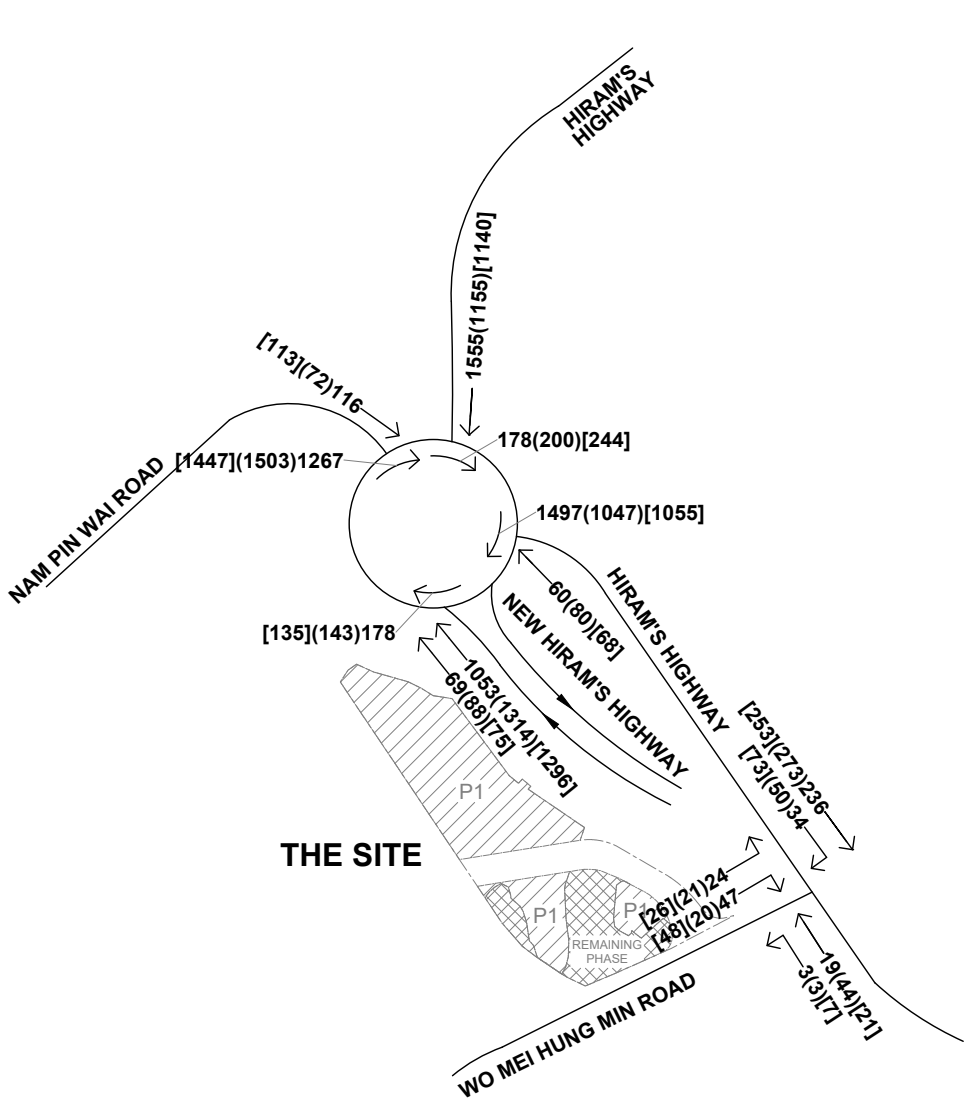
WEEKDAY AM PEAK PCU

NOTE:

1, ALL TRAFFIC FLOWS ARE IN PCU/HOUR
2. MINOR ROADS ARE NOT SHOWN FOR CLARITY

PROJECT NO. 40862	PROJECT TITLE APPLICATION FOR AMENDMENT OF PLAN UNDER SECTION 12A OF THE TOWN PLANNING ORDINANCE (CAP. 131) TO REZONE THE APPLICATION SITE FROM "GREEN BELT" TO "RESIDENTIAL (GROUP C)1" FOR PROPOSED HOUSE DEVELOPMENT AT VARIOUS LOTS IN D.D. 244 AND ADJOINING GOVERNMENT LAND, NAM PIN WAI, SAI KUNG	DRAWING NO. FIGURE 4.1	REV. A
DESIGNED SKL / DATE OCT 2023	DRAWING TITLE DEVELOPMENT TRAFFIC FLOWS		
DRAWN CLL / SCALE N.T.S.			
CHECKED SLN		LLA 顧問有限公司 Consultancy Limited	

FILE: G:\PROJECT\40862\DATA\DWG\FIGURE4.1A.DWG PLOT SCALE : 1 = 1



LEGEND:

312 (158) [616] ← WEEKEND PEAK PCU

WEEKDAY PM PEAK PCU

WEEKDAY AM PEAK PCU

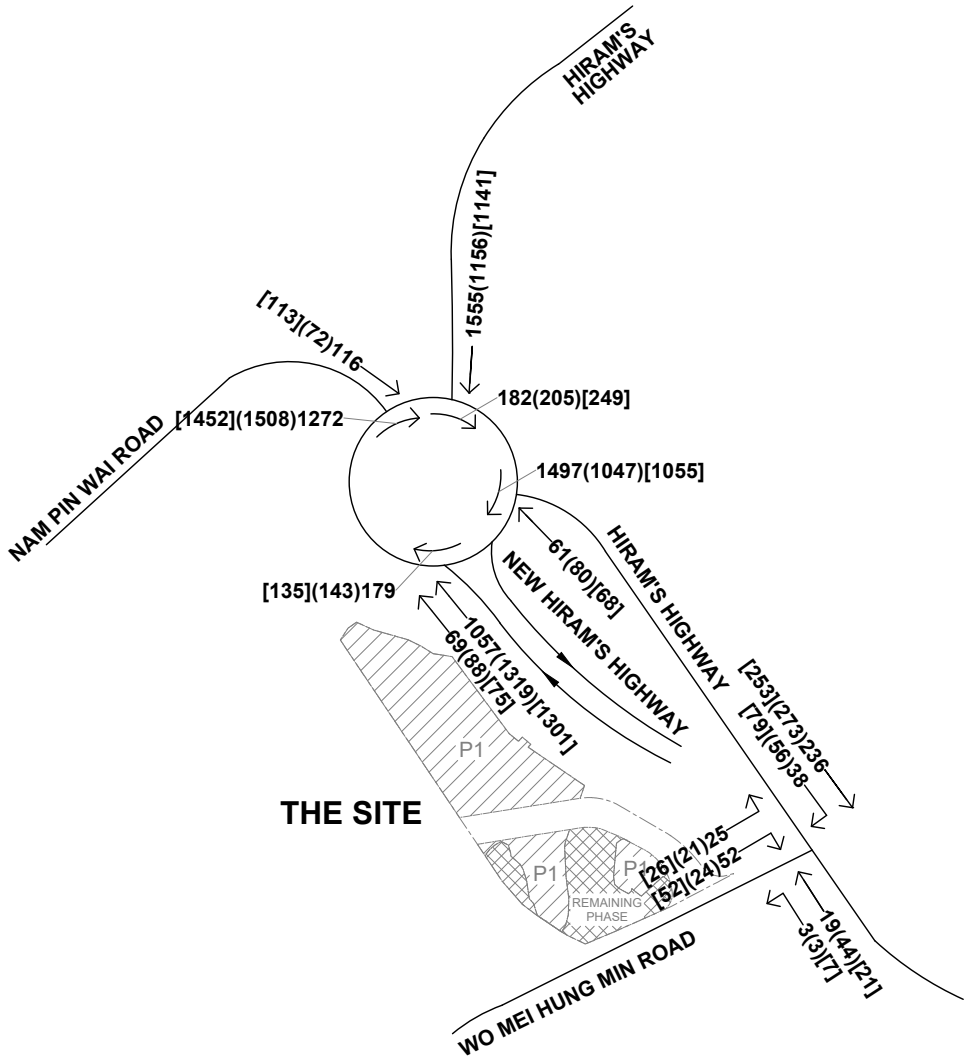
NOTE:

1, ALL TRAFFIC FLOWS ARE IN PCU/HOUR
2. MINOR ROADS ARE NOT SHOWN FOR CLARITY

PROJECT NO. 40862	PROJECT TITLE APPLICATION FOR AMENDMENT OF PLAN UNDER SECTION 12A OF THE TOWN PLANNING ORDINANCE (CAP. 131) TO REZONE THE APPLICATION SITE FROM "GREEN BELT" TO "RESIDENTIAL (GROUP C)1" FOR PROPOSED HOUSE DEVELOPMENT AT VARIOUS LOTS IN D.D. 244 AND ADJOINING GOVERNMENT LAND, NAM PIN WAI, SAI KUNG	DRAWING NO. FIGURE 4.2	REV. A
DESIGNED SKL / DATE OCT 2023	DRAWING TITLE 2033 REFERENCE TRAFFIC FLOWS	LLA 顧問有限公司 Consultancy Limited	
DRAWN CLL / SCALE N.T.S.			
CHECKED SLN			

FILE: G:\PROJECT\40862\DATA\DWG\FIGURE4.2A.DWG PLOT SCALE : 1 = 1

FILE: G:\PROJECT\40862\DATA\DWG\FIGURE4.2A.DWG PLOT SCALE : 1 = 1



LEGEND:

312 (158) [616] ← WEEKEND PEAK PCU

WEEKDAY PM PEAK PCU

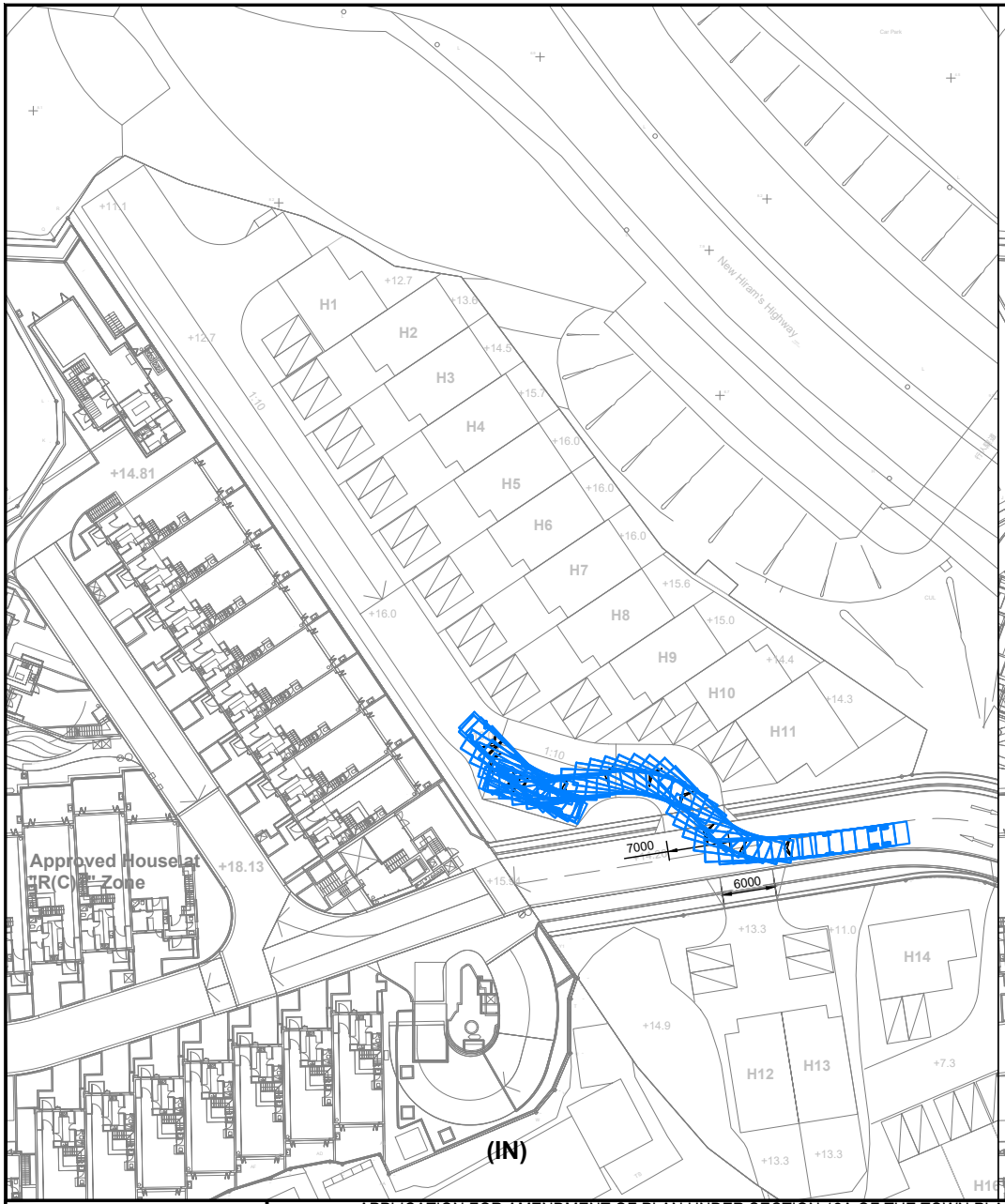
WEEKDAY AM PEAK PCU

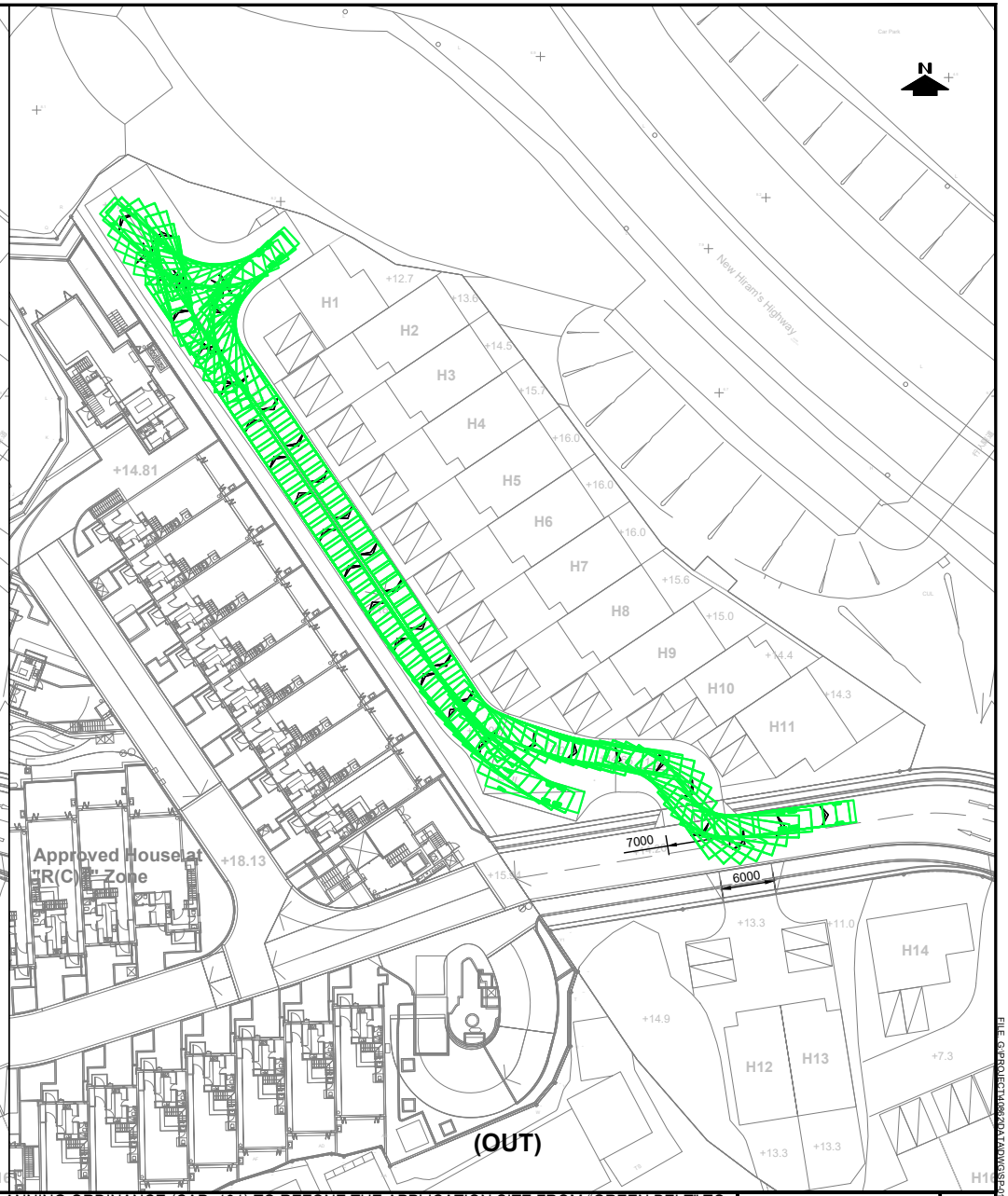
NOTE:

1, ALL TRAFFIC FLOWS ARE IN PCU/HOUR
2. MINOR ROADS ARE NOT SHOWN FOR CLARITY

PROJECT NO. 40862	PROJECT TITLE APPLICATION FOR AMENDMENT OF PLAN UNDER SECTION 12A OF THE TOWN PLANNING ORDINANCE (CAP. 131) TO REZONE THE APPLICATION SITE FROM "GREEN BELT" TO "RESIDENTIAL (GROUP C)1" FOR PROPOSED HOUSE DEVELOPMENT AT VARIOUS LOTS IN D.D. 244 AND ADJOINING GOVERNMENT LAND, NAM PIN WAI, SAI KUNG	DRAWING NO. FIGURE 4.3	REV. A
DESIGNED SKL / DATE OCT 2023	DRAWING TITLE 2033 DESIGN TRAFFIC FLOWS	LLA 顧問有限公司 Consultancy Limited	
DRAWN CLL / SCALE N.T.S.			
CHECKED SLN			

FILE: G:\PROJECT\40862\DATA\DWG\FIGURE4.3A.DWG PLOT SCALE : 1 = 1





PROJECT NO. 40862	PROJECT TITLE APPLICATION FOR AMENDMENT OF PLAN UNDER SECTION 12A OF THE TOWN PLANNING ORDINANCE (CAP. 131) TO REZONE THE APPLICATION SITE FROM "GREEN BELT" TO "RESIDENTIAL (GROUP C)1" FOR PROPOSED HOUSE DEVELOPMENT AT VARIOUS LOTS IN D.D. 244 AND ADJOINING GOVERNMENT LAND, NAM PIN WAI, SAI KUNG	DRAWING NO. SP-01	REV. B
DESIGNED SKL / DRAWN CLL / CHECKED SLN	DATE MAR 2024 / SCALE 1:800	DRAWING TITLE **SWEPT PATH ANALYSIS - HGV**	LLA 顧問有限公司 Consultancy Limited

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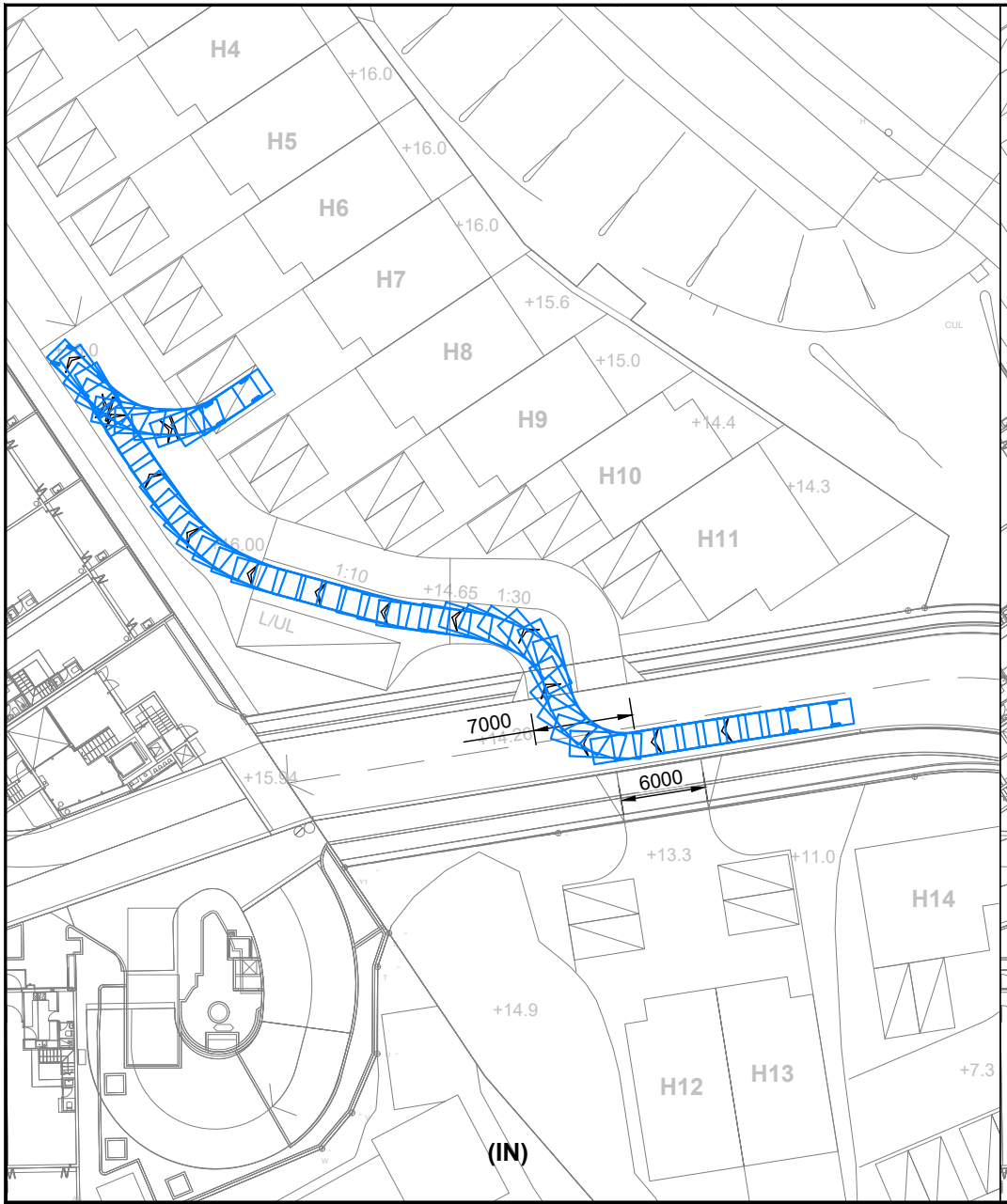

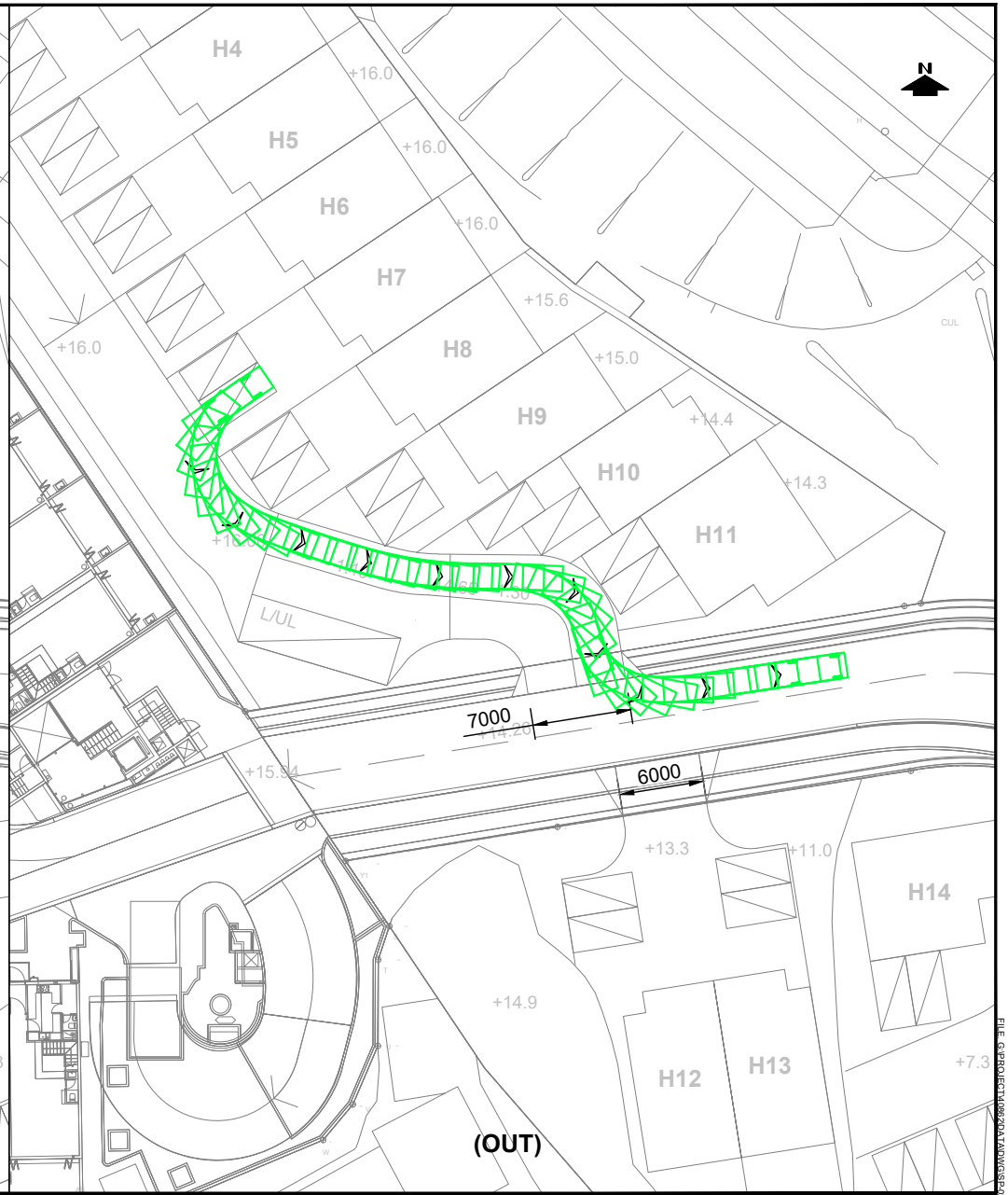

PROJECT NO. 40862	PROJECT TITLE APPLICATION FOR AMENDMENT OF PLAN UNDER SECTION 12A OF THE TOWN PLANNING ORDINANCE (CAP. 131) TO REZONE THE APPLICATION SITE FROM "GREEN BELT" TO "RESIDENTIAL (GROUP C)1" FOR PROPOSED HOUSE DEVELOPMENT AT VARIOUS LOTS IN D.D. 244 AND ADJOINING GOVERNMENT LAND, NAM PIN WAI, SAI KUNG	DRAWING NO. SP-02	REV. B
DESIGNED SKL / DRAWN CLL / CHECKED SLN	DATE MAR 2024 / SCALE 1:500	DRAWING TITLE **SWEPT PATH ANALYSIS - PRIVATE CAR**	LLA 顧問有限公司 Consultancy Limited

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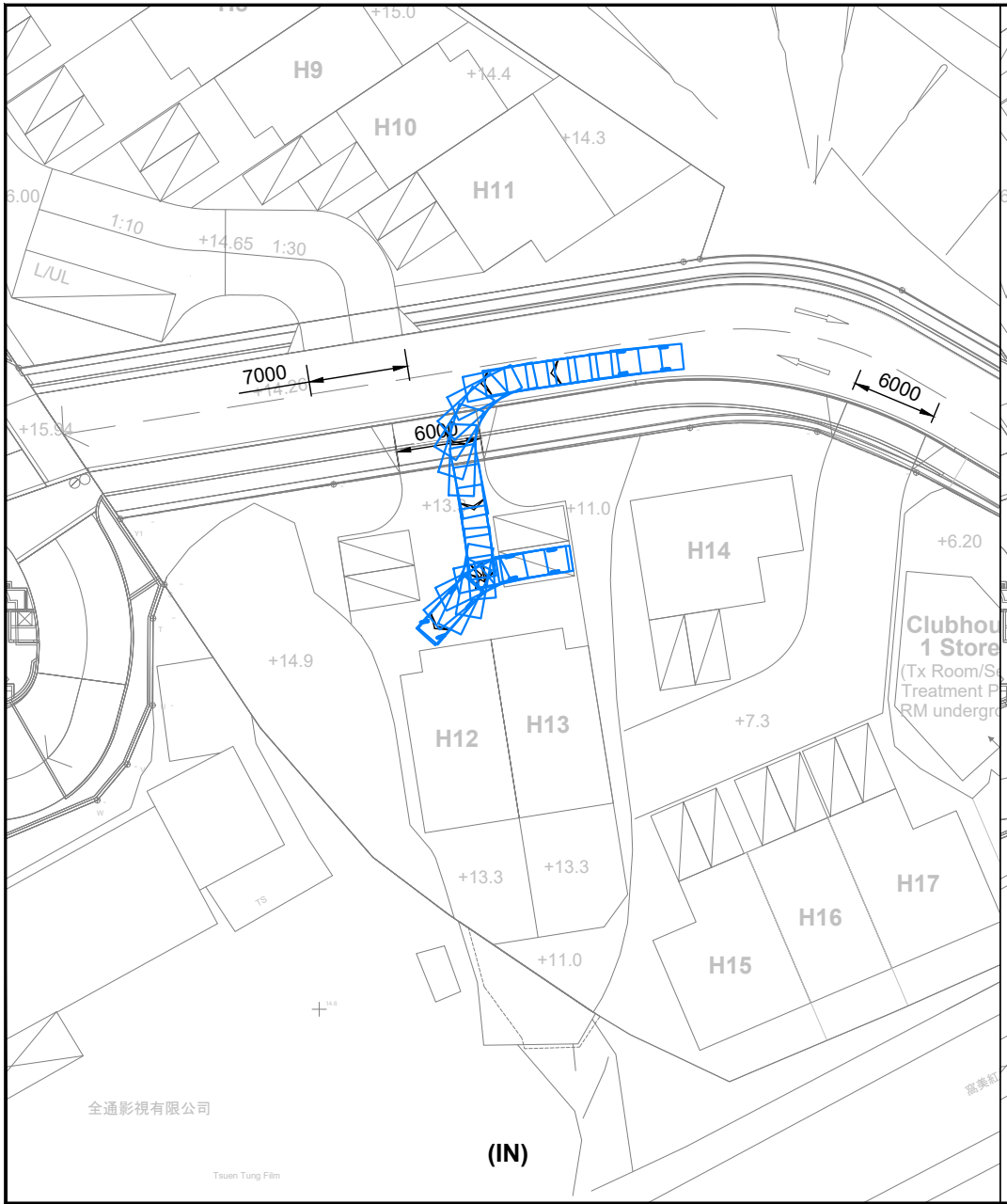
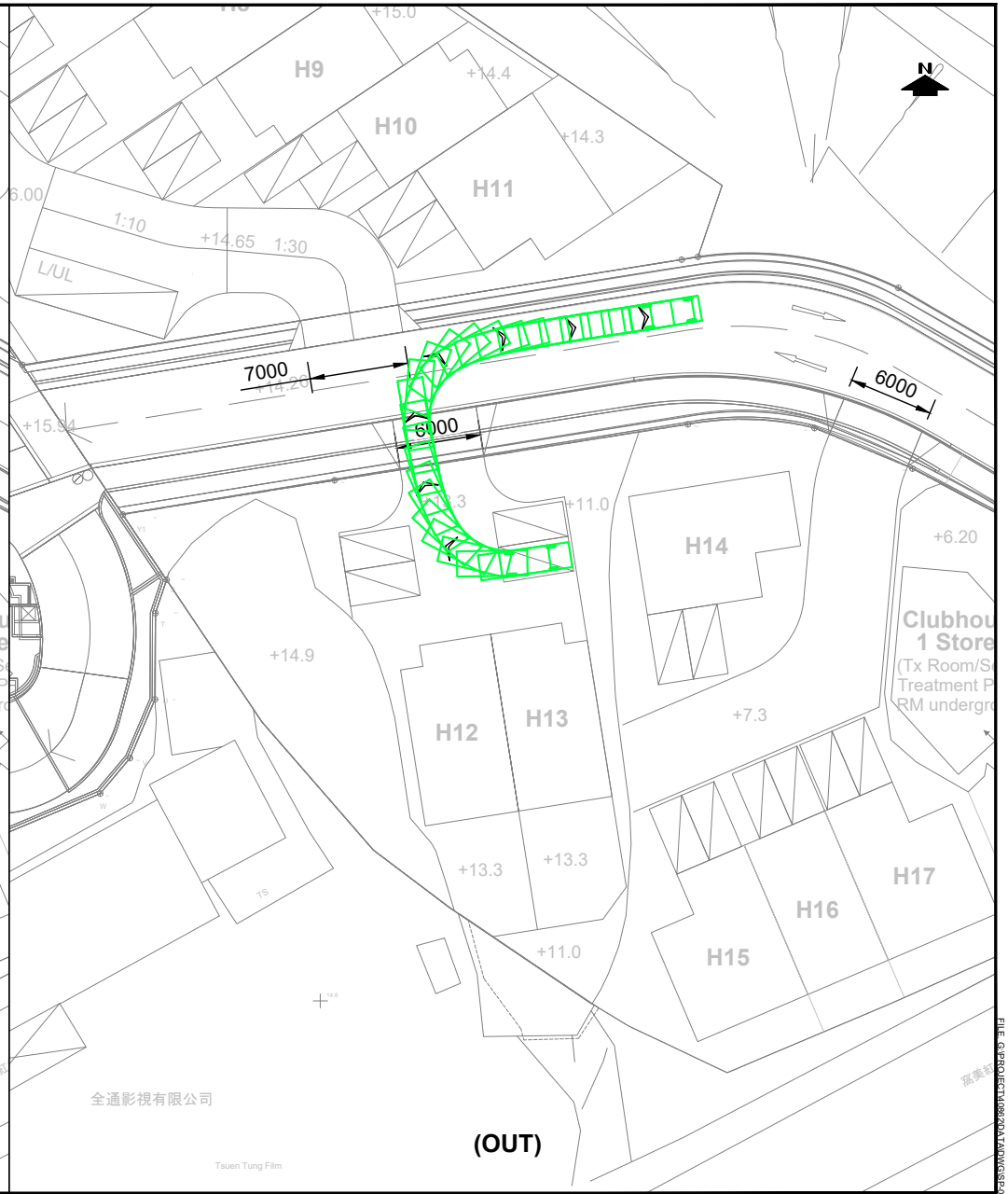


(IN)



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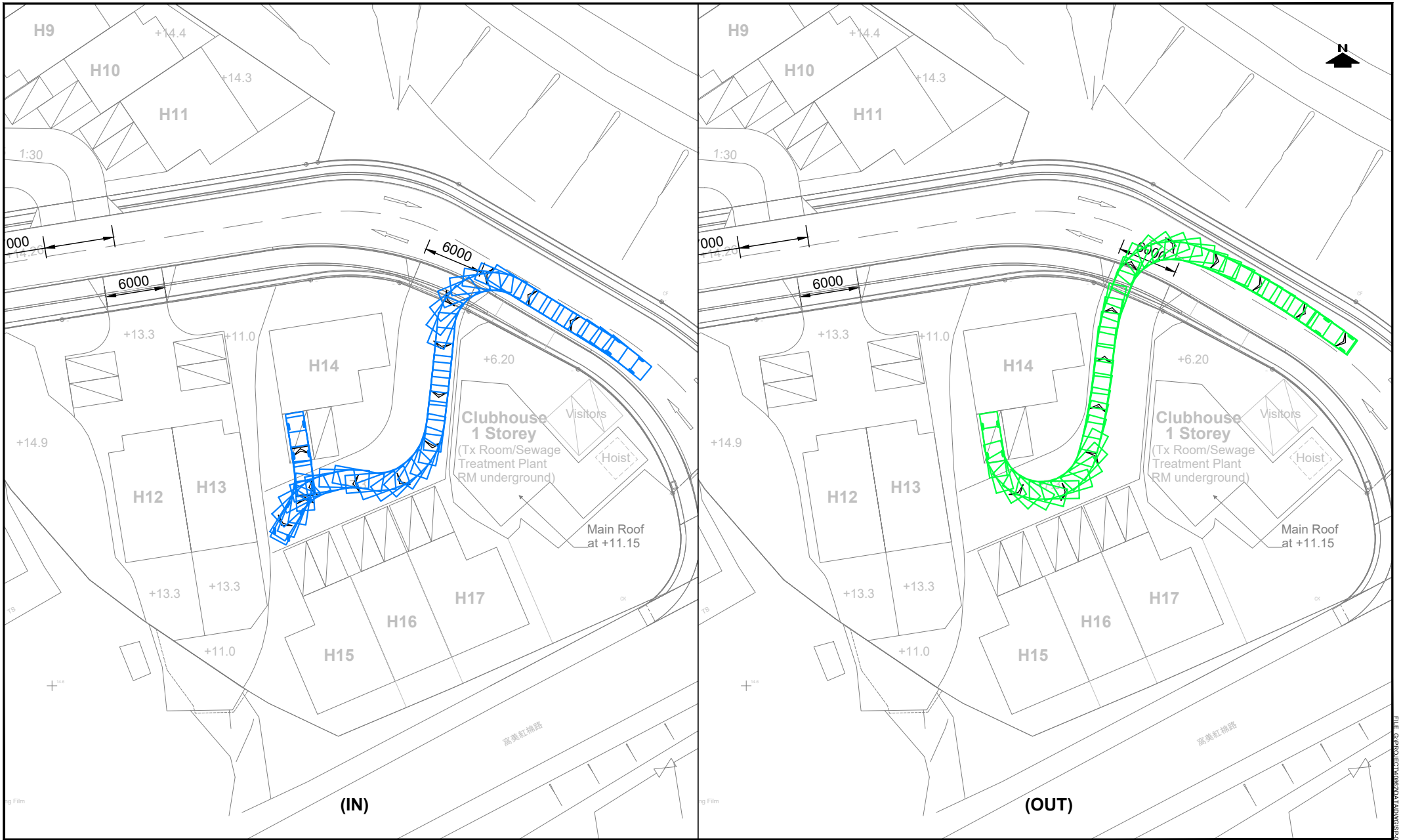
PROJECT NO. 40862	PROJECT TITLE APPLICATION FOR AMENDMENT OF PLAN UNDER SECTION 12A OF THE TOWN PLANNING ORDINANCE (CAP. 131) TO REZONE THE APPLICATION SITE FROM "GREEN BELT" TO "RESIDENTIAL (GROUP C)1" FOR PROPOSED HOUSE DEVELOPMENT AT VARIOUS LOTS IN D.D. 244 AND ADJOINING GOVERNMENT LAND, NAM PIN WAI, SAI KUNG	DRAWING NO. SP-03	REV. B
DESIGNED SKL / DATE MAR 2024	DRAWING TITLE **SWEPT PATH ANALYSIS - PRIVATE CAR**	LLA 顧問有限公司 Consultancy Limited	
DRAWN CLL / SCALE 1:500			
CHECKED SLN			

FILE: G:\PROJECT\40862\DATA\DWG\SP-03B.DWG PLOT SCALE : 1 = 1

FILE: G:\PROJECT\40862\DATA\DWG\SP-03B.DWG PLOT SCALE : 1 = 1



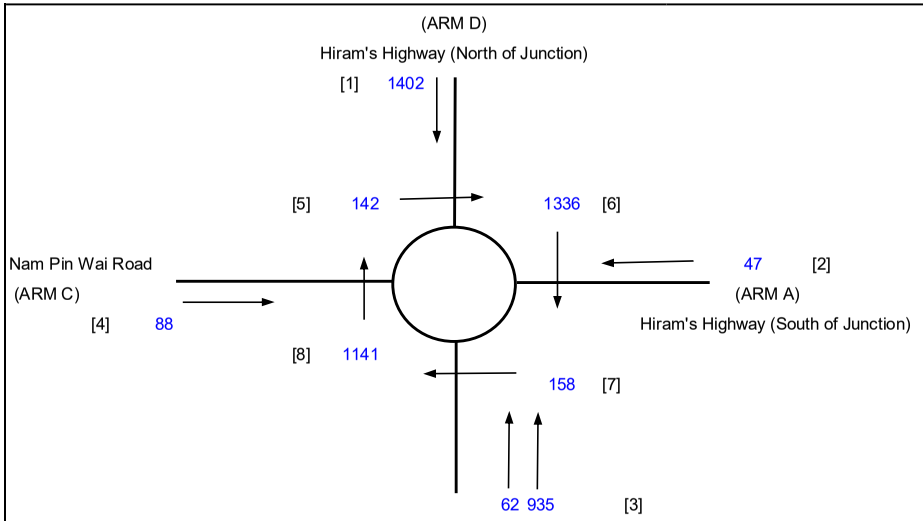
PROJECT NO. 40862	PROJECT TITLE APPLICATION FOR AMENDMENT OF PLAN UNDER SECTION 12A OF THE TOWN PLANNING ORDINANCE (CAP. 131) TO REZONE THE APPLICATION SITE FROM "GREEN BELT" TO "RESIDENTIAL (GROUP C)1" FOR PROPOSED HOUSE DEVELOPMENT AT VARIOUS LOTS IN D.D. 244 AND ADJOINING GOVERNMENT LAND, NAM PIN WAI, SAI KUNG	DRAWING NO. SP-04	REV. B
DESIGNED SKL / DRAWN CLL / CHECKED SLN	DATE MAR 2024 / SCALE 1:500	DRAWING TITLE **SWEPT PATH ANALYSIS - PRIVATE CAR**	LLA 顧問有限公司 Consultancy Limited

FILE: G:\PROJECT\40862\DATA\DWG\SP-04B.DWG PLOT SCALE : 1 = 1

Appendix A

Junction Capacity Assessment – Existing Scenario

LLA CONSULTANCY LIMITED	ROUNDABOUT CALCULATION			INITIALS	DATE
Application for Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131) to Rezone the Application Site from "Green Belt" to "Residential (Group C)1" for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung	**2023 Existing AM**	PROJECT NO.: 40862	PREPARED BY:	SKL	Oct-23
		FILENAME : J1_HH_NHH.xlsx	CHECKED BY:	SLN	Oct-23
J1 Hiram's Highway/ New Hiram's Highway/ Nam Pin Wai Road		REFERENCE NO.:	REVIEWED BY:	SLN	Oct-23



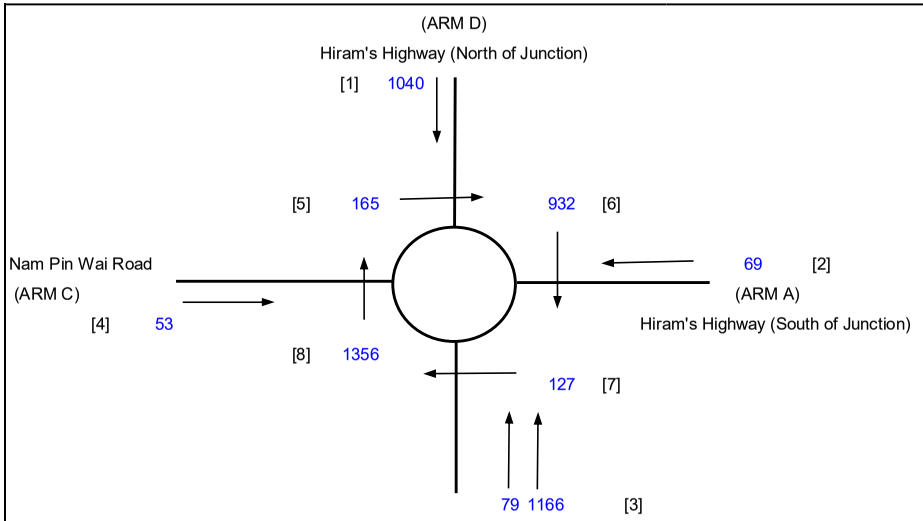
* Schematic diagram only

ARM			A	B	C	D
INPUT PARAMETERS:						
V	=	Approach half width (m)	3.70	7.40	4.30	7.70
E	=	Entry width (m)	7.30	11.00	7.30	7.80
L	=	Effective length of flare (m)	11.00	1.00	20.00	1.00
R	=	Entry radius (m)	15.00	55.00	23.00	18.00
D	=	Inscribed circle diameter (m)	78.00	78.00	78.00	78.00
A	=	Entry angle (degree)	32.00	40.00	50.00	36.00
Q	=	Entry flow (pcu/h)	47	935	88	1402
Qc	=	Circulating flow across entry (pcu/h)	1336	158	1141	142
OUTPUT PARAMETERS:						
S	=	Sharpness of flare = 1.6(E-V)/L	0.52	5.76	0.24	0.16
K	=	1-0.00347(A-30)-0.978(1/R-0.05)	0.98	1.00	0.94	0.97
X2	=	V + ((E-V)/(1+2S))	5.46	7.69	6.33	7.78
M	=	EXP((D-60)/10)	6.05	6.05	6.05	6.05
F	=	303*X2	1654	2329	1917	2356
Td	=	1+(0.5/(1+M))	1.07	1.07	1.07	1.07
Fc	=	0.21*Td(1+0.2*X2)	0.47	0.57	0.51	0.57
Qe	=	K(F-Fc*Qc)	1002	2231	1252	2215
DFC	=	Design flow/Capacity = Q/Qe	0.05	0.42	0.07	0.63

Total In Sum = 2472 PCU

DFC of Critical Approach = 0.63

LLA CONSULTANCY LIMITED	ROUNDABOUT CALCULATION			INITIALS	DATE
Application for Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131) to Rezone the Application Site from "Green Belt" to "Residential (Group C)1" for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung	**2023 Existing PM**	PROJECT NO.: 40862	PREPARED BY:	SKL	Oct-23
		FILENAME : J1_HH_NHH.xlsx	CHECKED BY:	SLN	Oct-23
J1 Hiram's Highway/ New Hiram's Highway/ Nam Pin Wai Road		REFERENCE NO.:	REVIEWED BY:	SLN	Oct-23



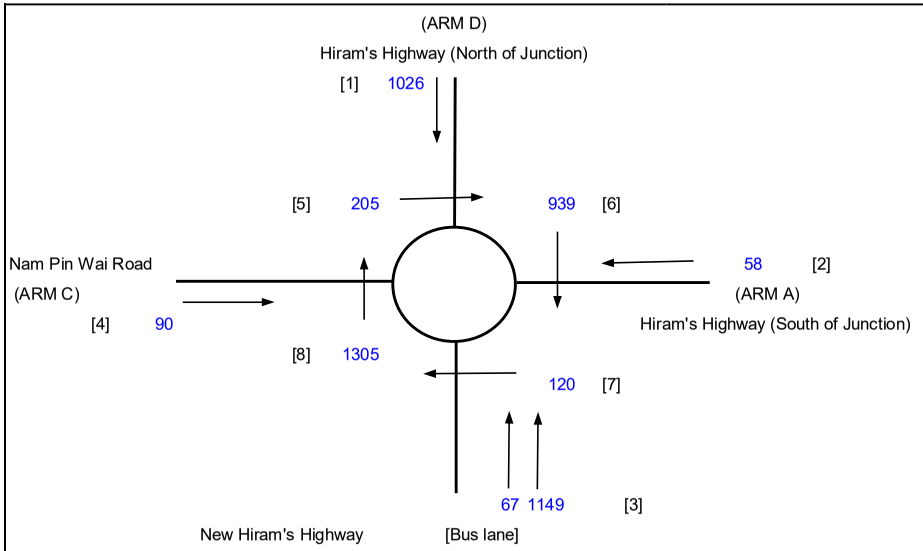
* Schematic diagram only

ARM			A	B	C	D
INPUT PARAMETERS:						
V	=	Approach half width (m)	3.70	7.40	4.30	7.70
E	=	Entry width (m)	7.30	11.00	7.30	7.80
L	=	Effective length of flare (m)	11.00	1.00	20.00	1.00
R	=	Entry radius (m)	15.00	55.00	23.00	18.00
D	=	Inscribed circle diameter (m)	78.00	78.00	78.00	78.00
A	=	Entry angle (degree)	32.00	40.00	50.00	36.00
Q	=	Entry flow (pcu/h)	69	1166	53	1040
Qc	=	Circulating flow across entry (pcu/h)	932	127	1356	165
OUTPUT PARAMETERS:						
S	=	Sharpness of flare = 1.6(E-V)/L	0.52	5.76	0.24	0.16
K	=	1-0.00347(A-30)-0.978(1/R-0.05)	0.98	1.00	0.94	0.97
X2	=	V + ((E-V)/(1+2S))	5.46	7.69	6.33	7.78
M	=	EXP((D-60)/10)	6.05	6.05	6.05	6.05
F	=	303*X2	1654	2329	1917	2356
Td	=	1+(0.5/(1+M))	1.07	1.07	1.07	1.07
Fc	=	0.21*Td(1+0.2*X2)	0.47	0.57	0.51	0.57
Qe	=	K(F-Fc*Qc)	1187	2249	1149	2202
DFC	=	Design flow/Capacity = Q/Qe	0.06	0.52	0.05	0.47

Total In Sum = 2328 PCU

DFC of Critical Approach = 0.52

LLA CONSULTANCY LIMITED	ROUNDABOUT CALCULATION				INITIALS	DATE
Application for Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131) to Rezone the Application Site from "Green Belt" to "Residential (Group C)1" for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung	**2023 Existing Weekend**	PROJECT NO.:	40862	PREPARED BY:	SKL	Oct-23
		FILENAME :	J1_HH_NHH.xlsx	CHECKED BY:	SLN	Oct-23
J1 Hiram's Highway/ New Hiram's Highway/ Nam Pin Wai Road		REFERENCE NO.:		REVIEWED BY:	SLN	Oct-23



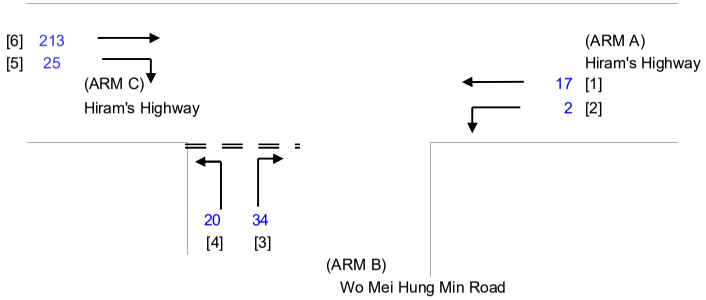
* Schematic diagram only

ARM			A	B	C	D
INPUT PARAMETERS:						
V	=	Approach half width (m)	3.70	7.40	4.30	7.70
E	=	Entry width (m)	7.30	11.00	7.30	7.80
L	=	Effective length of flare (m)	11.00	1.00	20.00	1.00
R	=	Entry radius (m)	15.00	55.00	23.00	18.00
D	=	Inscribed circle diameter (m)	78.00	78.00	78.00	78.00
A	=	Entry angle (degree)	32.00	40.00	50.00	36.00
Q	=	Entry flow (pcu/h)	58	1149	90	1026
Qc	=	Circulating flow across entry (pcu/h)	939	120	1305	205
OUTPUT PARAMETERS:						
S	=	Sharpness of flare = 1.6(E-V)/L	0.52	5.76	0.24	0.16
K	=	1-0.00347(A-30)-0.978(1/R-0.05)	0.98	1.00	0.94	0.97
X2	=	V + ((E-V)/(1+2S))	5.46	7.69	6.33	7.78
M	=	EXP((D-60)/10)	6.05	6.05	6.05	6.05
F	=	303*X2	1654	2329	1917	2356
Td	=	1+(0.5/(1+M))	1.07	1.07	1.07	1.07
Fc	=	0.21*Td(1+0.2*X2)	0.47	0.57	0.51	0.57
Qe	=	K(F-Fc*Qc)	1184	2253	1173	2179
DFC	=	Design flow/Capacity = Q/Qe	0.05	0.51	0.08	0.47

Total In Sum = 2323 PCU

DFC of Critical Approach = 0.51

LLA CONSULTANCY LIMITED	PRIORITY JUNCTION CALCULATION			INITIALS	DATE
Application for Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131) to Rezone the Application Site from "Green Belt" to "Residential (Group C)1" for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land,	**2023 Existing AM**	PROJECT NO.: 40862	PREPARED BY:	SKL	Oct-23
		FILENAME : J2_HH_WMH	CHECKED BY:	SLN	Oct-23
J2 Hiram's Highway/ Wo Mei Hung Min Road		REFERENCE NO.:	REVIEWED BY:	SLN	Oct-23



NOTES : (GEOMETRIC INPUT DATA)

W	=	MAJOR ROAD WIDTH
W cr	=	CENTRAL RESERVE WIDTH
W b-a	=	LANE WIDTH AVAILABLE TO VEHICLE WAITING IN STREAM b-a
W b-c	=	LANE WIDTH AVAILABLE TO VEHICLE WAITING IN STREAM b-c
W c-b	=	LANE WIDTH AVAILABLE TO VEHICLE WAITING IN STREAM c-b
Vl b-a	=	VISIBILITY TO THE LEFT FOR VEHICLES WAITING IN STREAM b-a
Vr b-a	=	VISIBILITY TO THE RIGHT FOR VEHICLES WAITING IN STREAM b-a
Vr b-c	=	VISIBILITY TO THE RIGHT FOR VEHICLES WAITING IN STREAM b-c
Vr c-b	=	VISIBILITY TO THE RIGHT FOR VEHICLES WAITING IN STREAM c-b
D	=	STREAM-SPECIFIC B-A
E	=	STREAM-SPECIFIC B-C
F	=	STREAM-SPECIFIC C-B
Y	=	(1-0.0345W)

GEOMETRIC DETAILS:

MAJOR ROAD (ARM A)

W	=	7.3	(metres)
W cr	=	0.0	(metres)
q a-b	=	2	(pcu/hr)
q a-c	=	17	(pcu/hr)

MAJOR ROAD (ARM C)

W c-b	=	7.3	(metres)
Vr c-b	=	50	(metres)
q c-a	=	213	(pcu/hr)
q c-b	=	25	(pcu/hr)

MINOR ROAD (ARM B)

W b-a	=	3.7	(metres)
W b-c	=	3.7	(metres)
Vl b-a	=	30	(metres)
Vr b-a	=	50	(metres)
Vr b-c	=	50	(metres)
q b-a	=	34	(pcu/hr)
q b-c	=	20	(pcu/hr)

GEOMETRIC FACTORS :

D	=	0.8695
E	=	0.9370
F	=	1.2585
Y	=	0.7482
F for (Qb-ac)	=	0.3704

THE CAPACITY OF MOVEMENT :

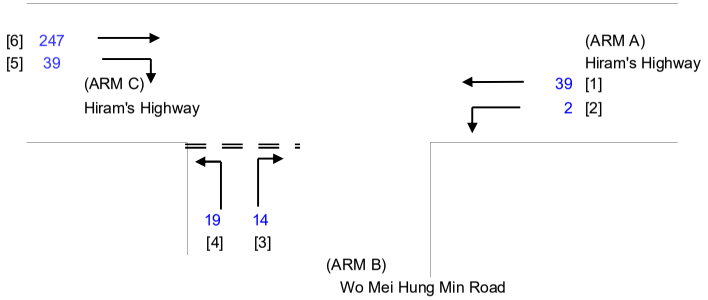
Q b-a	=	501		
Q b-c	=	694	Q b-c (O) =	682
Q c-b	=	931		
Q b-ac	=	559		
TOTAL FLOW	=	311	(PCU/HR)	

COMPARISION OF DESIGN FLOW TO CAPACITY:

DFC b-a	=	0.0679
DFC b-c	=	0.0288
DFC c-b	=	0.0269
DFC b-c (share lane)	=	0.0358

CRITICAL DFC = 0.07

LLA CONSULTANCY LIMITED	PRIORITY JUNCTION CALCULATION			INITIALS	DATE
Application for Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131) to Rezone the Application Site from "Green Belt" to "Residential (Group C)1" for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land,	**2023 Existing PM**	PROJECT NO.: 40862	PREPARED BY:	SKL	Oct-23
		FILENAME : J2_HH_WMH	CHECKED BY:	SLN	Oct-23
J2 Hiram's Highway/ Wo Mei Hung Min Road		REFERENCE NO.:	REVIEWED BY:	SLN	Oct-23



NOTES : (GEOMETRIC INPUT DATA)

W	=	MAJOR ROAD WIDTH
W cr	=	CENTRAL RESERVE WIDTH
W b-a	=	LANE WIDTH AVAILABLE TO VEHICLE WAITING IN STREAM b-a
W b-c	=	LANE WIDTH AVAILABLE TO VEHICLE WAITING IN STREAM b-c
W c-b	=	LANE WIDTH AVAILABLE TO VEHICLE WAITING IN STREAM c-b
Vl b-a	=	VISIBILITY TO THE LEFT FOR VEHICLES WAITING IN STREAM b-a
Vr b-a	=	VISIBILITY TO THE RIGHT FOR VEHICLES WAITING IN STREAM b-a
Vr b-c	=	VISIBILITY TO THE RIGHT FOR VEHICLES WAITING IN STREAM b-c
Vr c-b	=	VISIBILITY TO THE RIGHT FOR VEHICLES WAITING IN STREAM c-b
D	=	STREAM-SPECIFIC B-A
E	=	STREAM-SPECIFIC B-C
F	=	STREAM-SPECIFIC C-B
Y	=	(1-0.0345W)

GEOMETRIC DETAILS:

MAJOR ROAD (ARM A)

W	=	7.3	(metres)
W cr	=	0.0	(metres)
q a-b	=	2	(pcu/hr)
q a-c	=	39	(pcu/hr)

MAJOR ROAD (ARM C)

W c-b	=	7.3	(metres)
Vr c-b	=	50	(metres)
q c-a	=	247	(pcu/hr)
q c-b	=	39	(pcu/hr)

MINOR ROAD (ARM B)

W b-a	=	3.7	(metres)
W b-c	=	3.7	(metres)
Vl b-a	=	30	(metres)
Vr b-a	=	50	(metres)
Vr b-c	=	50	(metres)
q b-a	=	14	(pcu/hr)
q b-c	=	19	(pcu/hr)

GEOMETRIC FACTORS :

D	=	0.8695
E	=	0.9370
F	=	1.2585
Y	=	0.7482
F for (Qb-ac)	=	0.5758

THE CAPACITY OF MOVEMENT :

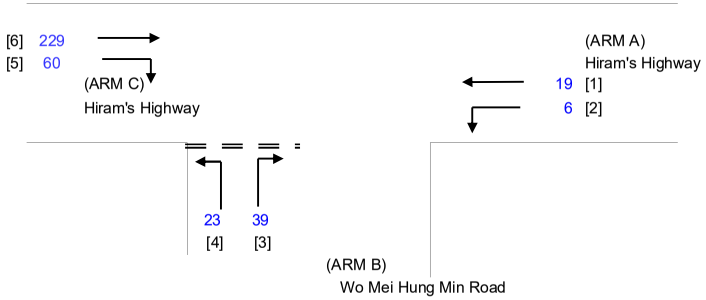
Q b-a	=	486			
Q b-c	=	688	Q b-c (O) =	683	
Q c-b	=	924			
Q b-ac	=	585			
TOTAL FLOW	=	360	(PCU/HR)		

COMPARISION OF DESIGN FLOW TO CAPACITY:

DFC b-a	=	0.0288
DFC b-c	=	0.0276
DFC c-b	=	0.0422
DFC b-c (share lane)	=	0.0325

CRITICAL DFC = 0.04

LLA CONSULTANCY LIMITED	PRIORITY JUNCTION CALCULATION			INITIALS	DATE
Application for Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131) to Rezone the Application Site from "Green Belt" to "Residential (Group C)1" for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land,	**2023 Existing Weekend**	PROJECT NO.: 40862	PREPARED BY:	SKL	Oct-23
		FILENAME : J2_HH_WMH	CHECKED BY:	SLN	Oct-23
J2 Hiram's Highway/ Wo Mei Hung Min Road		REFERENCE NO.:	REVIEWED BY:	SLN	Oct-23



NOTES : (GEOMETRIC INPUT DATA)

W	=	MAJOR ROAD WIDTH
W cr	=	CENTRAL RESERVE WIDTH
W b-a	=	LANE WIDTH AVAILABLE TO VEHICLE WAITING IN STREAM b-a
W b-c	=	LANE WIDTH AVAILABLE TO VEHICLE WAITING IN STREAM b-c
W c-b	=	LANE WIDTH AVAILABLE TO VEHICLE WAITING IN STREAM c-b
Vl b-a	=	VISIBILITY TO THE LEFT FOR VEHICLES WAITING IN STREAM b-a
Vr b-a	=	VISIBILITY TO THE RIGHT FOR VEHICLES WAITING IN STREAM b-a
Vr b-c	=	VISIBILITY TO THE RIGHT FOR VEHICLES WAITING IN STREAM b-c
Vr c-b	=	VISIBILITY TO THE RIGHT FOR VEHICLES WAITING IN STREAM c-b
D	=	STREAM-SPECIFIC B-A
E	=	STREAM-SPECIFIC B-C
F	=	STREAM-SPECIFIC C-B
Y	=	(1-0.0345W)

GEOMETRIC DETAILS:

MAJOR ROAD (ARM A)

W	=	7.3	(metres)
W cr	=	0.0	(metres)
q a-b	=	6	(pcu/hr)
q a-c	=	19	(pcu/hr)

MAJOR ROAD (ARM C)

W c-b	=	7.3	(metres)
Vr c-b	=	50	(metres)
q c-a	=	229	(pcu/hr)
q c-b	=	60	(pcu/hr)

MINOR ROAD (ARM B)

W b-a	=	3.7	(metres)
W b-c	=	3.7	(metres)
Vl b-a	=	30	(metres)
Vr b-a	=	50	(metres)
Vr b-c	=	50	(metres)
q b-a	=	39	(pcu/hr)
q b-c	=	23	(pcu/hr)

GEOMETRIC FACTORS :

D	=	0.8695
E	=	0.9370
F	=	1.2585
Y	=	0.7482
F for (Qb-ac)	=	0.3710

THE CAPACITY OF MOVEMENT :

Q b-a	=	486		
Q b-c	=	693	Q b-c (O) =	679
Q c-b	=	929		
Q b-ac	=	547		
TOTAL FLOW	=	376	(PCU/HR)	

COMPARISION OF DESIGN FLOW TO CAPACITY:

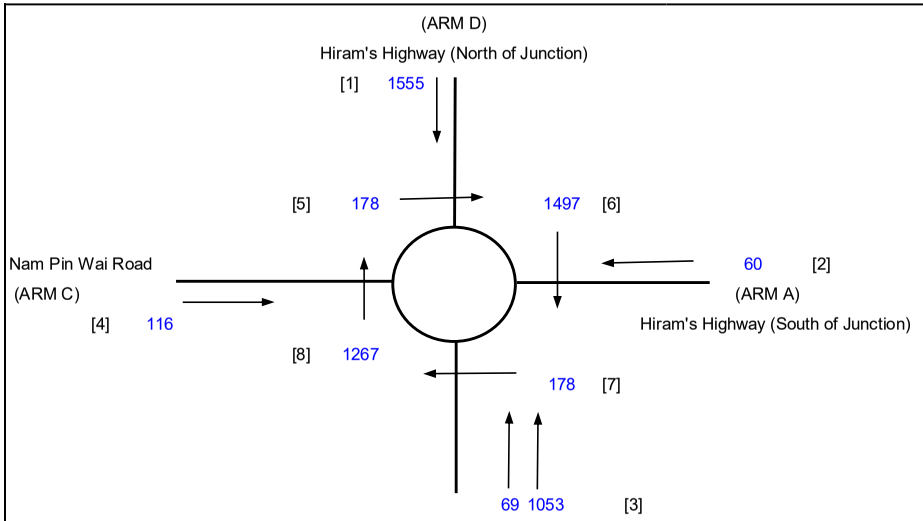
DFC b-a	=	0.0802
DFC b-c	=	0.0332
DFC c-b	=	0.0646
DFC b-c (share lane)	=	0.0421

CRITICAL DFC = 0.08

Appendix B

Junction Capacity Assessment – Reference & Design Scenarios

LLA CONSULTANCY LIMITED	ROUNDABOUT CALCULATION			INITIALS	DATE
Application for Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131) to Rezone the Application Site from "Green Belt" to "Residential (Group C)1" for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung	**2033 Reference AM**	PROJECT NO.: 40862	PREPARED BY:	SKL	Oct-23
		FILENAME : J1_HH_NHH.xlsx	CHECKED BY:	SLN	Oct-23
J1 Hiram's Highway/ New Hiram's Highway/ Nam Pin Wai Road		REFERENCE NO.:	REVIEWED BY:	SLN	Oct-23



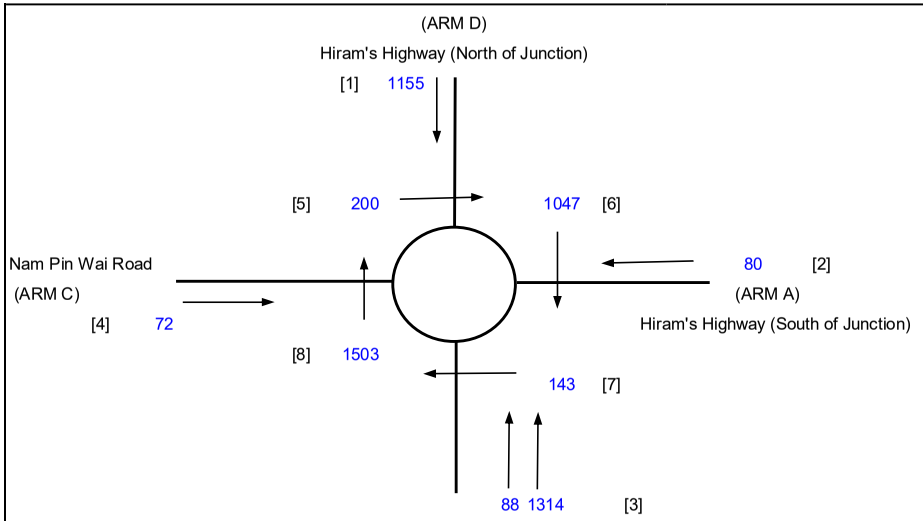
* Schematic diagram only

ARM			A	B	C	D
INPUT PARAMETERS:						
V	=	Approach half width (m)	3.70	7.40	4.30	7.70
E	=	Entry width (m)	7.30	11.00	7.30	7.80
L	=	Effective length of flare (m)	11.00	1.00	20.00	1.00
R	=	Entry radius (m)	15.00	55.00	23.00	18.00
D	=	Inscribed circle diameter (m)	78.00	78.00	78.00	78.00
A	=	Entry angle (degree)	32.00	40.00	50.00	36.00
Q	=	Entry flow (pcu/h)	60	1053	116	1555
Qc	=	Circulating flow across entry (pcu/h)	1497	178	1267	178
OUTPUT PARAMETERS:						
S	=	Sharpness of flare = 1.6(E-V)/L	0.52	5.76	0.24	0.16
K	=	1-0.00347(A-30)-0.978(1/R-0.05)	0.98	1.00	0.94	0.97
X2	=	V + ((E-V)/(1+2S))	5.46	7.69	6.33	7.78
M	=	EXP((D-60)/10)	6.05	6.05	6.05	6.05
F	=	303*X2	1654	2329	1917	2356
Td	=	1+(0.5/(1+M))	1.07	1.07	1.07	1.07
Fc	=	0.21*Td(1+0.2*X2)	0.47	0.57	0.51	0.57
Qe	=	K(F-Fc*Qc)	928	2220	1191	2195
DFC	=	Design flow/Capacity = Q/Qe	0.06	0.47	0.10	0.71

Total In Sum = 2784 PCU

DFC of Critical Approach = 0.71

LLA CONSULTANCY LIMITED	ROUNDABOUT CALCULATION			INITIALS	DATE
Application for Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131) to Rezone the Application Site from "Green Belt" to "Residential (Group C)1" for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung	**2033 Reference PM**	PROJECT NO.: 40862	PREPARED BY:	SKL	Oct-23
		FILENAME : J1_HH_NHH.xlsx	CHECKED BY:	SLN	Oct-23
J1 Hiram's Highway/ New Hiram's Highway/ Nam Pin Wai Road		REFERENCE NO.:	REVIEWED BY:	SLN	Oct-23



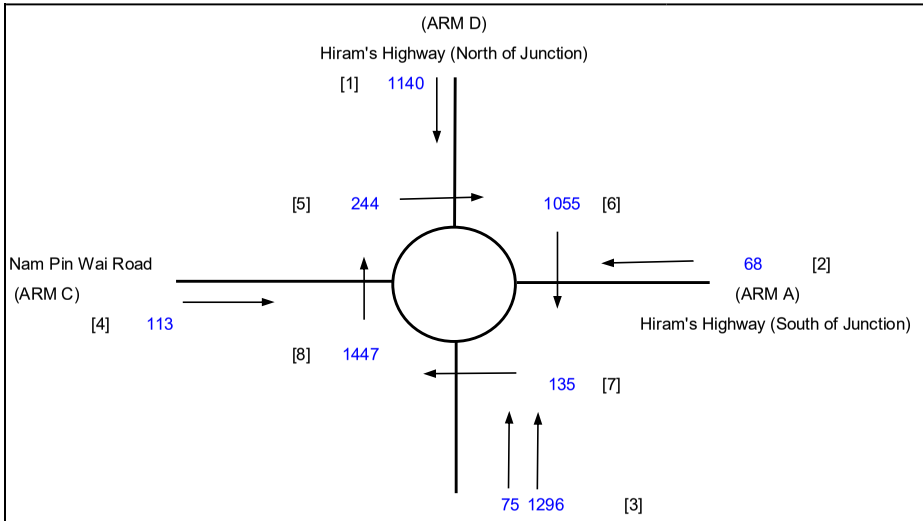
* Schematic diagram only

ARM			A	B	C	D
INPUT PARAMETERS:						
V	=	Approach half width (m)	3.70	7.40	4.30	7.70
E	=	Entry width (m)	7.30	11.00	7.30	7.80
L	=	Effective length of flare (m)	11.00	1.00	20.00	1.00
R	=	Entry radius (m)	15.00	55.00	23.00	18.00
D	=	Inscribed circle diameter (m)	78.00	78.00	78.00	78.00
A	=	Entry angle (degree)	32.00	40.00	50.00	36.00
Q	=	Entry flow (pcu/h)	80	1314	72	1155
Qc	=	Circulating flow across entry (pcu/h)	1047	143	1503	200
OUTPUT PARAMETERS:						
S	=	Sharpness of flare = 1.6(E-V)/L	0.52	5.76	0.24	0.16
K	=	1-0.00347(A-30)-0.978(1/R-0.05)	0.98	1.00	0.94	0.97
X2	=	V + ((E-V)/(1+2S))	5.46	7.69	6.33	7.78
M	=	EXP((D-60)/10)	6.05	6.05	6.05	6.05
F	=	303*X2	1654	2329	1917	2356
Td	=	1+(0.5/(1+M))	1.07	1.07	1.07	1.07
Fc	=	0.21*Td(1+0.2*X2)	0.47	0.57	0.51	0.57
Qe	=	K(F-Fc*Qc)	1134	2240	1079	2182
DFC	=	Design flow/Capacity = Q/Qe	0.07	0.59	0.07	0.53

Total In Sum = 2621 PCU

DFC of Critical Approach = 0.59

LLA CONSULTANCY LIMITED	ROUNDABOUT CALCULATION			INITIALS	DATE
Application for Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131) to Rezone the Application Site from "Green Belt" to "Residential (Group C)1" for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung	**2033 Reference Weekend**	PROJECT NO.: 40862	PREPARED BY:	SKL	Oct-23
		FILENAME : J1_HH_NHH.xlsx	CHECKED BY:	SLN	Oct-23
J1 Hiram's Highway/ New Hiram's Highway/ Nam Pin Wai Road		REFERENCE NO.:	REVIEWED BY:	SLN	Oct-23



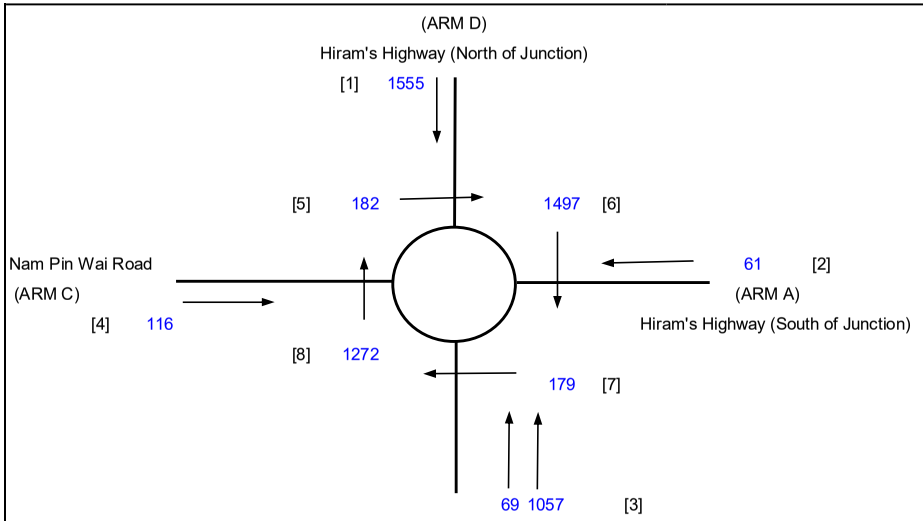
* Schematic diagram only

ARM			A	B	C	D
INPUT PARAMETERS:						
V	=	Approach half width (m)	3.70	7.40	4.30	7.70
E	=	Entry width (m)	7.30	11.00	7.30	7.80
L	=	Effective length of flare (m)	11.00	1.00	20.00	1.00
R	=	Entry radius (m)	15.00	55.00	23.00	18.00
D	=	Inscribed circle diameter (m)	78.00	78.00	78.00	78.00
A	=	Entry angle (degree)	32.00	40.00	50.00	36.00
Q	=	Entry flow (pcu/h)	68	1296	113	1140
Qc	=	Circulating flow across entry (pcu/h)	1055	135	1447	244
OUTPUT PARAMETERS:						
S	=	Sharpness of flare = 1.6(E-V)/L	0.52	5.76	0.24	0.16
K	=	1-0.00347(A-30)-0.978(1/R-0.05)	0.98	1.00	0.94	0.97
X2	=	V + ((E-V)/(1+2S))	5.46	7.69	6.33	7.78
M	=	EXP((D-60)/10)	6.05	6.05	6.05	6.05
F	=	303*X2	1654	2329	1917	2356
Td	=	1+(0.5/(1+M))	1.07	1.07	1.07	1.07
Fc	=	0.21*Td(1+0.2*X2)	0.47	0.57	0.51	0.57
Qe	=	K(F-Fc*Qc)	1131	2244	1106	2158
DFC	=	Design flow/Capacity = Q/Qe	0.06	0.58	0.10	0.53

Total In Sum = 2617 PCU

DFC of Critical Approach = 0.58

LLA CONSULTANCY LIMITED	ROUNDABOUT CALCULATION			INITIALS	DATE
Application for Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131) to Rezone the Application Site from "Green Belt" to "Residential (Group C)1" for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung	**2033 Design AM**	PROJECT NO.: 40862	PREPARED BY:	SKL	Oct-23
		FILENAME : J1_HH_NHH.xlsx	CHECKED BY:	SLN	Oct-23
J1 Hiram's Highway/ New Hiram's Highway/ Nam Pin Wai Road		REFERENCE NO.:	REVIEWED BY:	SLN	Oct-23



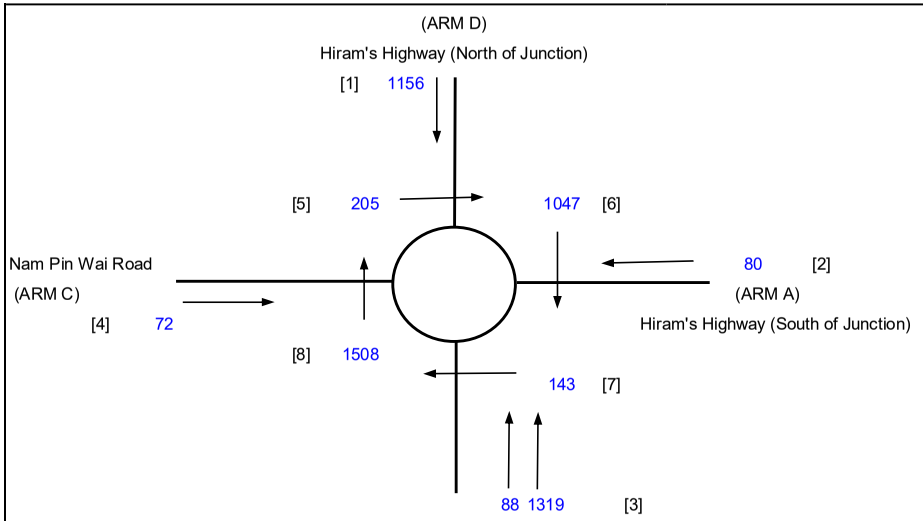
* Schematic diagram only

ARM			A	B	C	D
INPUT PARAMETERS:						
V	=	Approach half width (m)	3.70	7.40	4.30	7.70
E	=	Entry width (m)	7.30	11.00	7.30	7.80
L	=	Effective length of flare (m)	11.00	1.00	20.00	1.00
R	=	Entry radius (m)	15.00	55.00	23.00	18.00
D	=	Inscribed circle diameter (m)	78.00	78.00	78.00	78.00
A	=	Entry angle (degree)	32.00	40.00	50.00	36.00
Q	=	Entry flow (pcu/h)	61	1057	116	1555
Qc	=	Circulating flow across entry (pcu/h)	1497	179	1272	182
OUTPUT PARAMETERS:						
S	=	Sharpness of flare = 1.6(E-V)/L	0.52	5.76	0.24	0.16
K	=	1-0.00347(A-30)-0.978(1/R-0.05)	0.98	1.00	0.94	0.97
X2	=	V + ((E-V)/(1+2S))	5.46	7.69	6.33	7.78
M	=	EXP((D-60)/10)	6.05	6.05	6.05	6.05
F	=	303*X2	1654	2329	1917	2356
Td	=	1+(0.5/(1+M))	1.07	1.07	1.07	1.07
Fc	=	0.21*Td(1+0.2*X2)	0.47	0.57	0.51	0.57
Qe	=	K(F-Fc*Qc)	928	2219	1189	2192
DFC	=	Design flow/Capacity = Q/Qe	0.07	0.48	0.10	0.71

Total In Sum = 2789 PCU

DFC of Critical Approach = 0.71

LLA CONSULTANCY LIMITED	ROUNDABOUT CALCULATION			INITIALS	DATE
Application for Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131) to Rezone the Application Site from "Green Belt" to "Residential (Group C)1" for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung	**2033 Design PM**	PROJECT NO.: 40862	PREPARED BY:	SKL	Oct-23
		FILENAME : J1_HH_NHH.xlsx	CHECKED BY:	SLN	Oct-23
J1 Hiram's Highway/ New Hiram's Highway/ Nam Pin Wai Road		REFERENCE NO.:	REVIEWED BY:	SLN	Oct-23



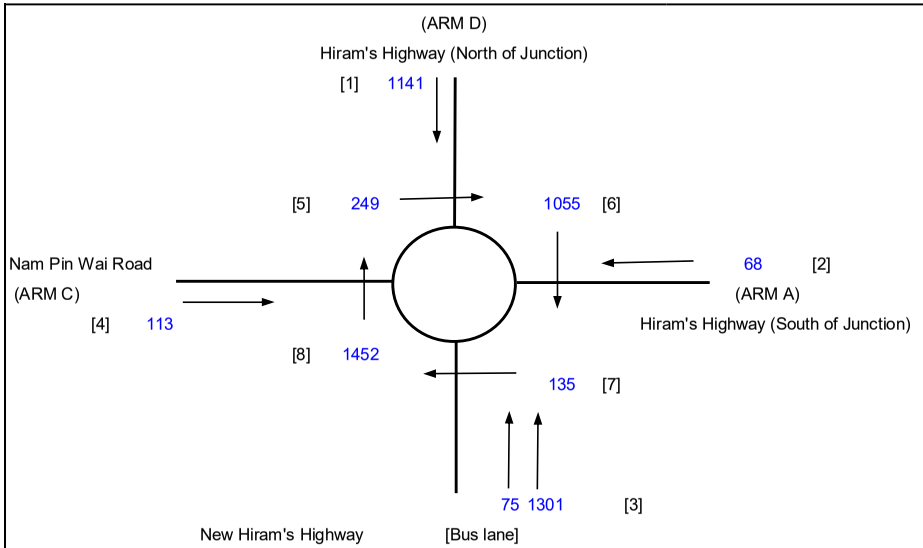
* Schematic diagram only

ARM			A	B	C	D
INPUT PARAMETERS:						
V	=	Approach half width (m)	3.70	7.40	4.30	7.70
E	=	Entry width (m)	7.30	11.00	7.30	7.80
L	=	Effective length of flare (m)	11.00	1.00	20.00	1.00
R	=	Entry radius (m)	15.00	55.00	23.00	18.00
D	=	Inscribed circle diameter (m)	78.00	78.00	78.00	78.00
A	=	Entry angle (degree)	32.00	40.00	50.00	36.00
Q	=	Entry flow (pcu/h)	80	1319	72	1156
Qc	=	Circulating flow across entry (pcu/h)	1047	143	1508	205
OUTPUT PARAMETERS:						
S	=	Sharpness of flare = 1.6(E-V)/L	0.52	5.76	0.24	0.16
K	=	1-0.00347(A-30)-0.978(1/R-0.05)	0.98	1.00	0.94	0.97
X2	=	V + ((E-V)/(1+2S))	5.46	7.69	6.33	7.78
M	=	EXP((D-60)/10)	6.05	6.05	6.05	6.05
F	=	303*X2	1654	2329	1917	2356
Td	=	1+(0.5/(1+M))	1.07	1.07	1.07	1.07
Fc	=	0.21*Td(1+0.2*X2)	0.47	0.57	0.51	0.57
Qe	=	K(F-Fc*Qc)	1134	2240	1076	2179
DFC	=	Design flow/Capacity = Q/Qe	0.07	0.59	0.07	0.53

Total In Sum = 2627 PCU

DFC of Critical Approach = 0.59

LLA CONSULTANCY LIMITED	ROUNDABOUT CALCULATION				INITIALS	DATE
Application for Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131) to Rezone the Application Site from "Green Belt" to "Residential (Group C)1" for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung	**2033 Design Weekend**	PROJECT NO.:	40862	PREPARED BY:	SKL	Oct-23
		FILENAME :	J1_HH_NHH.xlsx	CHECKED BY:	SLN	Oct-23
J1 Hiram's Highway/ New Hiram's Highway/ Nam Pin Wai Road		REFERENCE NO.:		REVIEWED BY:	SLN	Oct-23



* Schematic diagram only

ARM			A	B	C	D
INPUT PARAMETERS:						
V	=	Approach half width (m)	3.70	7.40	4.30	7.70
E	=	Entry width (m)	7.30	11.00	7.30	7.80
L	=	Effective length of flare (m)	11.00	1.00	20.00	1.00
R	=	Entry radius (m)	15.00	55.00	23.00	18.00
D	=	Inscribed circle diameter (m)	78.00	78.00	78.00	78.00
A	=	Entry angle (degree)	32.00	40.00	50.00	36.00
Q	=	Entry flow (pcu/h)	68	1301	113	1141
Qc	=	Circulating flow across entry (pcu/h)	1055	135	1452	249
OUTPUT PARAMETERS:						
S	=	Sharpness of flare = 1.6(E-V)/L	0.52	5.76	0.24	0.16
K	=	1-0.00347(A-30)-0.978(1/R-0.05)	0.98	1.00	0.94	0.97
X2	=	V + ((E-V)/(1+2S))	5.46	7.69	6.33	7.78
M	=	EXP((D-60)/10)	6.05	6.05	6.05	6.05
F	=	303*X2	1654	2329	1917	2356
Td	=	1+(0.5/(1+M))	1.07	1.07	1.07	1.07
Fc	=	0.21*Td(1+0.2*X2)	0.47	0.57	0.51	0.57
Qe	=	K(F-Fc*Qc)	1131	2244	1103	2155
DFC	=	Design flow/Capacity = Q/Qe	0.06	0.58	0.10	0.53

Total In Sum = 2623 PCU

DFC of Critical Approach = 0.58

LLA CONSULTANCY LIMITED	PRIORITY JUNCTION CALCULATION			INITIALS	DATE
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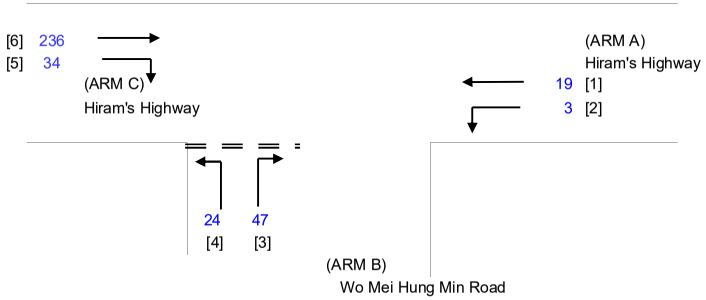
		FILENAME : J2_HH_WMH	CHECKED BY:	SLN	Oct-23
J2 Hiram's Highway/ Wo Mei Hung Min Road		REFERENCE NO.:	REVIEWED BY:	SLN	Oct-23



NOTES : (GEOMETRIC INPUT DATA)

W	=	MAJOR ROAD WIDTH
W cr	=	CENTRAL RESERVE WIDTH
W b-a	=	LANE WIDTH AVAILABLE TO VEHICLE WAITING IN STREAM b-a
W b-c	=	LANE WIDTH AVAILABLE TO VEHICLE WAITING IN STREAM b-c
W c-b	=	LANE WIDTH AVAILABLE TO VEHICLE WAITING IN STREAM c-b
Vl b-a	=	VISIBILITY TO THE LEFT FOR VEHICLES WAITING IN STREAM b-a
Vr b-a	=	VISIBILITY TO THE RIGHT FOR VEHICLES WAITING IN STREAM b-a
Vr b-c	=	VISIBILITY TO THE RIGHT FOR VEHICLES WAITING IN STREAM b-c
Vr c-b	=	VISIBILITY TO THE RIGHT FOR VEHICLES WAITING IN STREAM c-b
D	=	STREAM-SPECIFIC B-A
E	=	STREAM-SPECIFIC B-C
F	=	STREAM-SPECIFIC C-B
Y	=	(1-0.0345W)

GEOMETRIC DETAILS:

MAJOR ROAD (ARM A)

W	=	7.3	(metres)
W cr	=	0.0	(metres)
q a-b	=	3	(pcu/hr)
q a-c	=	19	(pcu/hr)

MAJOR ROAD (ARM C)

W c-b	=	7.3	(metres)
Vr c-b	=	50	(metres)
q c-a	=	236	(pcu/hr)
q c-b	=	34	(pcu/hr)

MINOR ROAD (ARM B)

W b-a	=	3.7	(metres)
W b-c	=	3.7	(metres)
Vl b-a	=	30	(metres)
Vr b-a	=	50	(metres)
Vr b-c	=	50	(metres)
q b-a	=	47	(pcu/hr)
q b-c	=	24	(pcu/hr)

GEOMETRIC FACTORS :

D	=	0.8695
E	=	0.9370
F	=	1.2585
Y	=	0.7482
F for (Qb-ac)	=	0.3380

THE CAPACITY OF MOVEMENT :

Q b-a	=	494		
Q b-c	=	693	Q b-c (O) =	677
Q c-b	=	930		
Q b-ac	=	547		
TOTAL FLOW	=	363	(PCU/HR)	

COMPARISION OF DESIGN FLOW TO CAPACITY:

DFC b-a	=	0.0951
DFC b-c	=	0.0346
DFC c-b	=	0.0366
DFC b-c (share lane)	=	0.0439

CRITICAL DFC = 0.10

LLA CONSULTANCY LIMITED	PRIORITY JUNCTION CALCULATION			INITIALS	DATE
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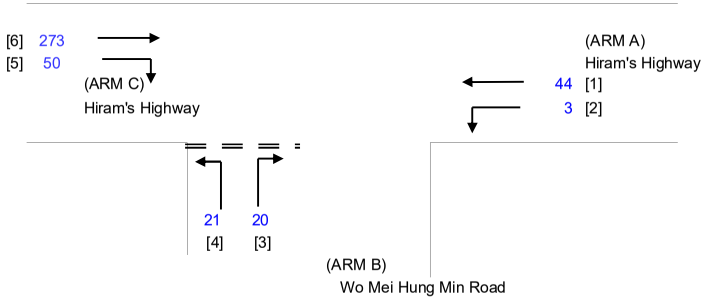
		FILENAME : J2_HH_WMH	CHECKED BY:	SLN	Oct-23
J2 Hiram's Highway/ Wo Mei Hung Min Road		REFERENCE NO.:	REVIEWED BY:	SLN	Oct-23



NOTES : (GEOMETRIC INPUT DATA)

W	=	MAJOR ROAD WIDTH
W cr	=	CENTRAL RESERVE WIDTH
W b-a	=	LANE WIDTH AVAILABLE TO VEHICLE WAITING IN STREAM b-a
W b-c	=	LANE WIDTH AVAILABLE TO VEHICLE WAITING IN STREAM b-c
W c-b	=	LANE WIDTH AVAILABLE TO VEHICLE WAITING IN STREAM c-b
Vl b-a	=	VISIBILITY TO THE LEFT FOR VEHICLES WAITING IN STREAM b-a
Vr b-a	=	VISIBILITY TO THE RIGHT FOR VEHICLES WAITING IN STREAM b-a
Vr b-c	=	VISIBILITY TO THE RIGHT FOR VEHICLES WAITING IN STREAM b-c
Vr c-b	=	VISIBILITY TO THE RIGHT FOR VEHICLES WAITING IN STREAM c-b
D	=	STREAM-SPECIFIC B-A
E	=	STREAM-SPECIFIC B-C
F	=	STREAM-SPECIFIC C-B
Y	=	(1-0.0345W)

GEOMETRIC DETAILS:

MAJOR ROAD (ARM A)

W	=	7.3	(metres)
W cr	=	0.0	(metres)
q a-b	=	3	(pcu/hr)
q a-c	=	44	(pcu/hr)

MAJOR ROAD (ARM C)

W c-b	=	7.3	(metres)
Vr c-b	=	50	(metres)
q c-a	=	273	(pcu/hr)
q c-b	=	50	(pcu/hr)

MINOR ROAD (ARM B)

W b-a	=	3.7	(metres)
W b-c	=	3.7	(metres)
Vl b-a	=	30	(metres)
Vr b-a	=	50	(metres)
Vr b-c	=	50	(metres)
q b-a	=	20	(pcu/hr)
q b-c	=	21	(pcu/hr)

GEOMETRIC FACTORS :

D	=	0.8695
E	=	0.9370
F	=	1.2585
Y	=	0.7482
F for (Qb-ac)	=	0.5122

THE CAPACITY OF MOVEMENT :

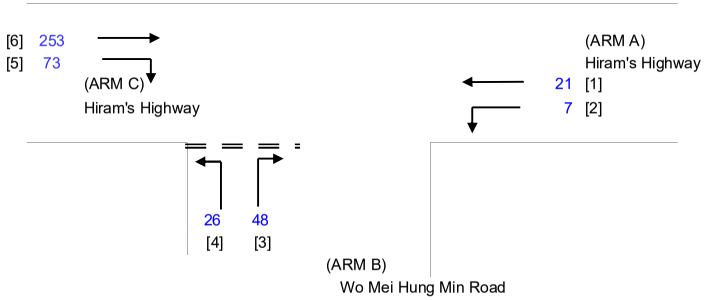
Q b-a	=	477		
Q b-c	=	687	Q b-c (O) =	680
Q c-b	=	921		
Q b-ac	=	566		
TOTAL FLOW	=	411	(PCU/HR)	

COMPARISION OF DESIGN FLOW TO CAPACITY:

DFC b-a	=	0.0419
DFC b-c	=	0.0306
DFC c-b	=	0.0543
DFC b-c (share lane)	=	0.0371

CRITICAL DFC = 0.05

LLA CONSULTANCY LIMITED	PRIORITY JUNCTION CALCULATION			INITIALS	DATE
Application for Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131) to Rezone the Application Site from "Green Belt" to "Residential (Group C)1" for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land,	**2033 Reference Weekend**	PROJECT NO.: 40862	PREPARED BY:	SKL	Oct-23
		FILENAME : J2_HH_WMH	CHECKED BY:	SLN	Oct-23
J2 Hiram's Highway/ Wo Mei Hung Min Road		REFERENCE NO.:	REVIEWED BY:	SLN	Oct-23



NOTES : (GEOMETRIC INPUT DATA)

W	=	MAJOR ROAD WIDTH
W cr	=	CENTRAL RESERVE WIDTH
W b-a	=	LANE WIDTH AVAILABLE TO VEHICLE WAITING IN STREAM b-a
W b-c	=	LANE WIDTH AVAILABLE TO VEHICLE WAITING IN STREAM b-c
W c-b	=	LANE WIDTH AVAILABLE TO VEHICLE WAITING IN STREAM c-b
Vl b-a	=	VISIBILITY TO THE LEFT FOR VEHICLES WAITING IN STREAM b-a
Vr b-a	=	VISIBILITY TO THE RIGHT FOR VEHICLES WAITING IN STREAM b-a
Vr b-c	=	VISIBILITY TO THE RIGHT FOR VEHICLES WAITING IN STREAM b-c
Vr c-b	=	VISIBILITY TO THE RIGHT FOR VEHICLES WAITING IN STREAM c-b
D	=	STREAM-SPECIFIC B-A
E	=	STREAM-SPECIFIC B-C
F	=	STREAM-SPECIFIC C-B
Y	=	(1-0.0345W)

GEOMETRIC DETAILS:

MAJOR ROAD (ARM A)

W	=	7.3	(metres)
W cr	=	0.0	(metres)
q a-b	=	7	(pcu/hr)
q a-c	=	21	(pcu/hr)

MAJOR ROAD (ARM C)

W c-b	=	7.3	(metres)
Vr c-b	=	50	(metres)
q c-a	=	253	(pcu/hr)
q c-b	=	73	(pcu/hr)

MINOR ROAD (ARM B)

W b-a	=	3.7	(metres)
W b-c	=	3.7	(metres)
Vl b-a	=	30	(metres)
Vr b-a	=	50	(metres)
Vr b-c	=	50	(metres)
q b-a	=	48	(pcu/hr)
q b-c	=	26	(pcu/hr)

GEOMETRIC FACTORS :

D	=	0.8695
E	=	0.9370
F	=	1.2585
Y	=	0.7482
F for (Qb-ac)	=	0.3514

THE CAPACITY OF MOVEMENT :

Q b-a	=	477		
Q b-c	=	692	Q b-c (O) =	675
Q c-b	=	928		
Q b-ac	=	535		
TOTAL FLOW	=	428	(PCU/HR)	

COMPARISION OF DESIGN FLOW TO CAPACITY:

DFC b-a	=	0.1006
DFC b-c	=	0.0376
DFC c-b	=	0.0787
DFC b-c (share lane)	=	0.0486

CRITICAL DFC = 0.10

LLA CONSULTANCY LIMITED	PRIORITY JUNCTION CALCULATION			INITIALS	DATE
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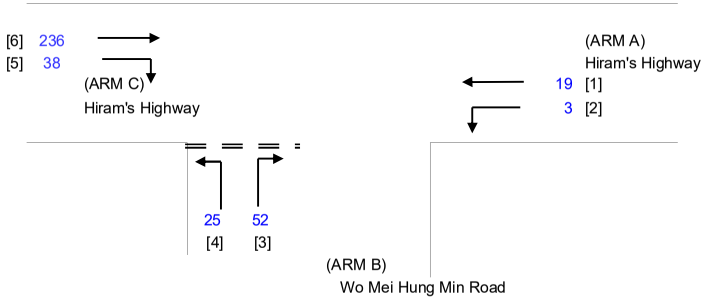


NOTES : (GEOMETRIC INPUT DATA)

W	=	MAJOR ROAD WIDTH
W cr	=	CENTRAL RESERVE WIDTH
W b-a	=	LANE WIDTH AVAILABLE TO VEHICLE WAITING IN STREAM b-a
W b-c	=	LANE WIDTH AVAILABLE TO VEHICLE WAITING IN STREAM b-c
W c-b	=	LANE WIDTH AVAILABLE TO VEHICLE WAITING IN STREAM c-b
Vl b-a	=	VISIBILITY TO THE LEFT FOR VEHICLES WAITING IN STREAM b-a
Vr b-a	=	VISIBILITY TO THE RIGHT FOR VEHICLES WAITING IN STREAM b-a
Vr b-c	=	VISIBILITY TO THE RIGHT FOR VEHICLES WAITING IN STREAM b-c
Vr c-b	=	VISIBILITY TO THE RIGHT FOR VEHICLES WAITING IN STREAM c-b
D	=	STREAM-SPECIFIC B-A
E	=	STREAM-SPECIFIC B-C
F	=	STREAM-SPECIFIC C-B
Y	=	(1-0.0345W)

GEOMETRIC DETAILS:

MAJOR ROAD (ARM A)

W	=	7.3	(metres)
W cr	=	0.0	(metres)
q a-b	=	3	(pcu/hr)
q a-c	=	19	(pcu/hr)

MAJOR ROAD (ARM C)

W c-b	=	7.3	(metres)
Vr c-b	=	50	(metres)
q c-a	=	236	(pcu/hr)
q c-b	=	38	(pcu/hr)

MINOR ROAD (ARM B)

W b-a	=	3.7	(metres)
W b-c	=	3.7	(metres)
Vl b-a	=	30	(metres)
Vr b-a	=	50	(metres)
Vr b-c	=	50	(metres)
q b-a	=	52	(pcu/hr)
q b-c	=	25	(pcu/hr)

GEOMETRIC FACTORS :

D	=	0.8695
E	=	0.9370
F	=	1.2585
Y	=	0.7482
F for (Qb-ac)	=	0.3247

THE CAPACITY OF MOVEMENT :

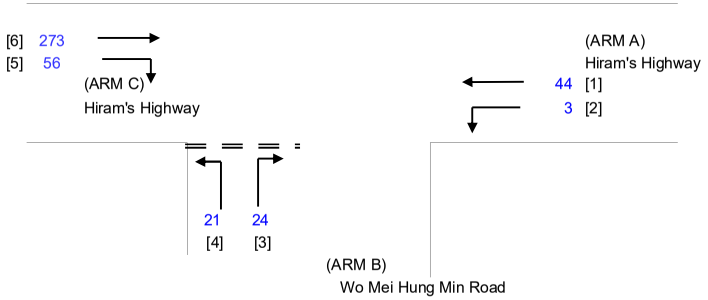
Q b-a	=	492			
Q b-c	=	693	Q b-c (O) =	675	
Q c-b	=	930			
Q b-ac	=	543			
TOTAL FLOW	=	373	(PCU/HR)		

COMPARISION OF DESIGN FLOW TO CAPACITY:

DFC b-a	=	0.1057
DFC b-c	=	0.0361
DFC c-b	=	0.0409
DFC b-c (share lane)	=	0.0460

CRITICAL DFC = 0.11

LLA CONSULTANCY LIMITED	PRIORITY JUNCTION CALCULATION			INITIALS	DATE
Application for Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131) to Rezone the Application Site from "Green Belt" to "Residential (Group C)1" for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land,	**2033 Design PM**	PROJECT NO.: 40862	PREPARED BY:	SKL	Oct-23
		FILENAME : J2_HH_WMH	CHECKED BY:	SLN	Oct-23
J2 Hiram's Highway/ Wo Mei Hung Min Road		REFERENCE NO.:	REVIEWED BY:	SLN	Oct-23



NOTES : (GEOMETRIC INPUT DATA)

W	=	MAJOR ROAD WIDTH
W cr	=	CENTRAL RESERVE WIDTH
W b-a	=	LANE WIDTH AVAILABLE TO VEHICLE WAITING IN STREAM b-a
W b-c	=	LANE WIDTH AVAILABLE TO VEHICLE WAITING IN STREAM b-c
W c-b	=	LANE WIDTH AVAILABLE TO VEHICLE WAITING IN STREAM c-b
Vl b-a	=	VISIBILITY TO THE LEFT FOR VEHICLES WAITING IN STREAM b-a
Vr b-a	=	VISIBILITY TO THE RIGHT FOR VEHICLES WAITING IN STREAM b-a
Vr b-c	=	VISIBILITY TO THE RIGHT FOR VEHICLES WAITING IN STREAM b-c
Vr c-b	=	VISIBILITY TO THE RIGHT FOR VEHICLES WAITING IN STREAM c-b
D	=	STREAM-SPECIFIC B-A
E	=	STREAM-SPECIFIC B-C
F	=	STREAM-SPECIFIC C-B
Y	=	(1-0.0345W)

GEOMETRIC DETAILS:

MAJOR ROAD (ARM A)

W	=	7.3	(metres)
W cr	=	0.0	(metres)
q a-b	=	3	(pcu/hr)
q a-c	=	44	(pcu/hr)

MAJOR ROAD (ARM C)

W c-b	=	7.3	(metres)
Vr c-b	=	50	(metres)
q c-a	=	273	(pcu/hr)
q c-b	=	56	(pcu/hr)

MINOR ROAD (ARM B)

W b-a	=	3.7	(metres)
W b-c	=	3.7	(metres)
Vl b-a	=	30	(metres)
Vr b-a	=	50	(metres)
Vr b-c	=	50	(metres)
q b-a	=	24	(pcu/hr)
q b-c	=	21	(pcu/hr)

GEOMETRIC FACTORS :

D	=	0.8695
E	=	0.9370
F	=	1.2585
Y	=	0.7482
F for (Qb-ac)	=	0.4667

THE CAPACITY OF MOVEMENT :

Q b-a	=	475		
Q b-c	=	687	Q b-c (O) =	678
Q c-b	=	921		
Q b-ac	=	555		
TOTAL FLOW	=	421	(PCU/HR)	

COMPARISION OF DESIGN FLOW TO CAPACITY:

DFC b-a	=	0.0505
DFC b-c	=	0.0306
DFC c-b	=	0.0608
DFC b-c (share lane)	=	0.0378

CRITICAL DFC = 0.06

LLA CONSULTANCY LIMITED	PRIORITY JUNCTION CALCULATION			INITIALS	DATE
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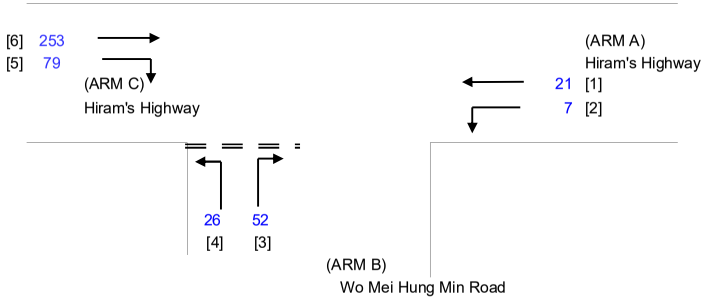
J2 Hiram's Highway/ Wo Mei Hung Min Road		REFERENCE NO.:	REVIEWED BY:	SLN	Oct-23



NOTES : (GEOMETRIC INPUT DATA)

W	=	MAJOR ROAD WIDTH
W cr	=	CENTRAL RESERVE WIDTH
W b-a	=	LANE WIDTH AVAILABLE TO VEHICLE WAITING IN STREAM b-a
W b-c	=	LANE WIDTH AVAILABLE TO VEHICLE WAITING IN STREAM b-c
W c-b	=	LANE WIDTH AVAILABLE TO VEHICLE WAITING IN STREAM c-b
Vl b-a	=	VISIBILITY TO THE LEFT FOR VEHICLES WAITING IN STREAM b-a
Vr b-a	=	VISIBILITY TO THE RIGHT FOR VEHICLES WAITING IN STREAM b-a
Vr b-c	=	VISIBILITY TO THE RIGHT FOR VEHICLES WAITING IN STREAM b-c
Vr c-b	=	VISIBILITY TO THE RIGHT FOR VEHICLES WAITING IN STREAM c-b
D	=	STREAM-SPECIFIC B-A
E	=	STREAM-SPECIFIC B-C
F	=	STREAM-SPECIFIC C-B
Y	=	(1-0.0345W)

GEOMETRIC DETAILS:

MAJOR ROAD (ARM A)

W	=	7.3	(metres)
W cr	=	0.0	(metres)
q a-b	=	7	(pcu/hr)
q a-c	=	21	(pcu/hr)

MAJOR ROAD (ARM C)

W c-b	=	7.3	(metres)
Vr c-b	=	50	(metres)
q c-a	=	253	(pcu/hr)
q c-b	=	79	(pcu/hr)

MINOR ROAD (ARM B)

W b-a	=	3.7	(metres)
W b-c	=	3.7	(metres)
Vl b-a	=	30	(metres)
Vr b-a	=	50	(metres)
Vr b-c	=	50	(metres)
q b-a	=	52	(pcu/hr)
q b-c	=	26	(pcu/hr)

GEOMETRIC FACTORS :

D	=	0.8695
E	=	0.9370
F	=	1.2585
Y	=	0.7482
F for (Qb-ac)	=	0.3333

THE CAPACITY OF MOVEMENT :

Q b-a	=	475		
Q b-c	=	692	Q b-c (O) =	673
Q c-b	=	928		
Q b-ac	=	530		
TOTAL FLOW	=	438	(PCU/HR)	

COMPARISION OF DESIGN FLOW TO CAPACITY:

DFC b-a	=	0.1095
DFC b-c	=	0.0376
DFC c-b	=	0.0851
DFC b-c (share lane)	=	0.0490

CRITICAL DFC = 0.11

Appendix C

Master Layout Plan

LWK +PARTNERS

Architectural Plan of the Indicative Scheme

Application for Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131) to Rezone the Application Site from "Green Belt" to "Residential (Group C)1" for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung

1:600@A3

11/14/2023

Appendix D

Drainage Impact Assessment

ARUP

Application for Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131) to Rezone the Application Site from "Green Belt" to "Residential (Group C)1" for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung

Drainage Impact Assessment

Reference:

2 | 23 January 2024

Job number 282344

Arup Hong Kong Limited
Level 5 Festival Walk
80 Tat Chee Avenue
Kowloon Tong
Kowloon
Hong Kong
arup.com

Contents

Appendices

1. Introduction

1.1 Background

Arup Hong Kong Limited was commissioned to conduct a Drainage Impact Assessment (DIA) to support the Section 12A Planning Application for Proposed House Development at Various Lots in D.D. 244, Nam Pin Wai, Sai Kung. The Application Site is located within a "Green Belt" ("GB") zone on the Approved Ho Chung Outline Zoning Plan No. S/SK-HC/11.

1.2 Objective

The objective of this report is to provide an assessment of the impact of storm water flow generation as a result of the proposed house development at the Application Site on the connecting public drainage system adjacent to the Application Site and to propose mitigation measures as necessary such that the Application Site will not impose any adverse drainage impacts in areas upstream of, adjacent to, and downstream of the Application Site.

1.3 Reference Materials

In evaluating the drainage impact arising from the Proposed Development, the following sources of information have been specifically referred to:

- Stormwater Drainage Manual Fifth Edition, January 2018
- Stormwater Drainage Manual – Corrigendum No. 1/2022
- DSD's Advice Note No. 1 – Application of the Drainage Impact Assessment Process to Private Sector Projects; and
- Drainage Record Plans obtained from the GeoInfo Map services of the Lands Department (https://www.map.gov.hk/gm/?lg=en)

2. The Project Outlines

2.1 The Proposed Development

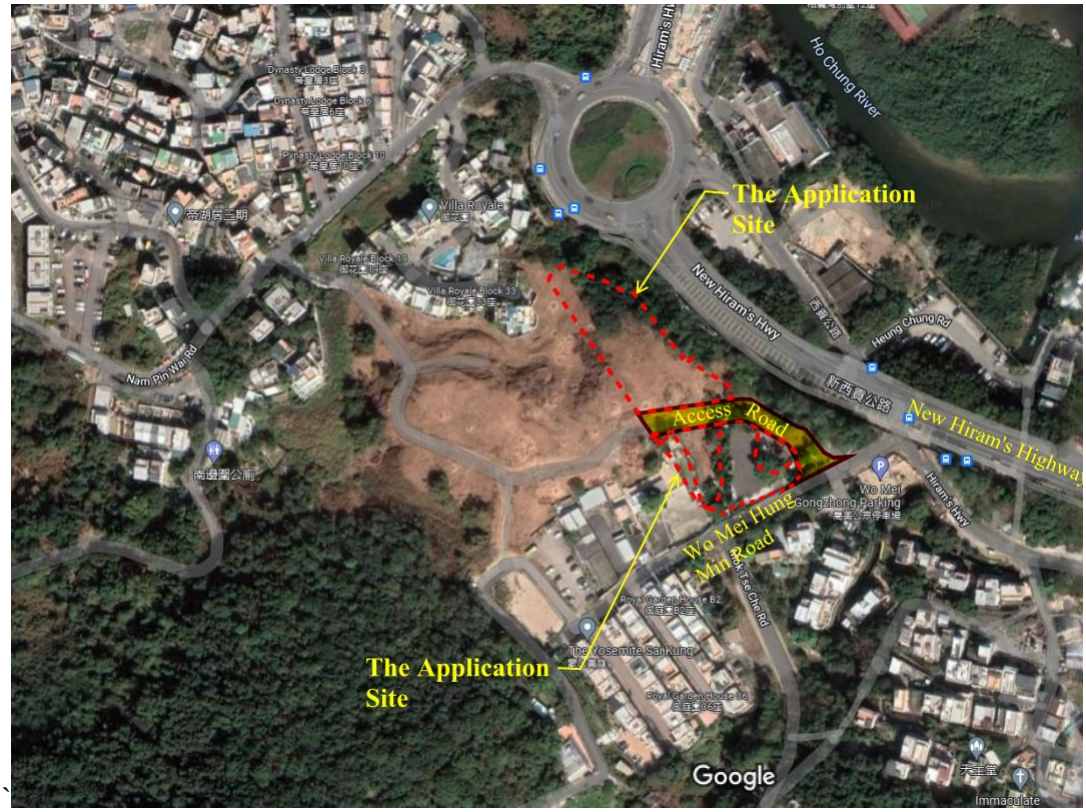
Master Layout Plan showing the proposed development is attached in **Appendix A – Plan 1**. **Table 1** showing the Proposed Development parameters is shown in table below:

Proposed Development	**Site Particulars**	
Project	Application for Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131) to Rezone the Application Site from "Green Belt" to "Residential (Group C)1" for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung	
Location	Nam Pin Wai Sai Kung	
Land Use Zoning	"Green Belt" ("GB")	
Development Site Area excluding Access Road	About 5,355m^2	
% of Hard-paved Area / Unpaved Area	Existing Site Hard-paved Area = 0%	Proposed Development Hard-paved Area = 100%

	Unpaved Area = 100%	Unpaved Area = 0%

Table 1 Recommended Design Return Period

Below is an aerial photograph of the Application Site.



2.2 Project Interface

There is another Drainage Impact Assessment for Residential Development at Lot Nos. 738, 877 (Portion), 878 (Portion), 879 RP (Portion), 887, 931, 932, 1939 sA, 1939 sB (Portion), 1939 sC, 1939 RP (Portion), 1941 sA (Portion), 1942, 1943, 1944 sA, 1945 sI and adjoining Government Land in DD 244 at Nam Pin Wai, Sai Kung, N. T. (New Lot to Be Lot 2189 in DD 244), carried out for the adjoining upstream "R(C)1" Site at the west of the Application Site. This approved DIA report of "R(C)1" should be considered as a separate submission.

3. Assessment Methodology

3.1 Design Criteria

The design criteria for this DIA are based on the Stormwater Drainage Manual (SDM) Table 10 of the SDM. The recommended design return periods for the various drainage system are shown in below **Table 2**.

Description	Design Return Period
Intensively Used Agricultural Land	2 to 5 years
Village Drainage including Internal Drainage System under a polder scheme	10 years
Main Rural Catchment Drainage Channel	50 years

Urban Drainage Trunk System	200 years
Urban Drainage Branch System	50 years

Table 2 Recommended Design Return Period

The proposed drainage system within/outside the development is classified as village (rural) drainage system, hence 10-year flood level return period is adopted as the design criteria.

3.1.1 Determination of Flood Level

The design criteria for flood level depends on the combination of rainstorm event and tidal level under different return period. The flood level is selected referring to SDM Table 11, shown in below **Table 3**:

Flood Level Return Period Scenarios	Rainfall Return Period	Sea Level Return Period
10-years A (10A)	10	2
10-years B (10B)	2	10

Table 3 Determination of Flood Level

3.1.2 Roughness

The Colebrook-White roughness (ks) adopted for concrete pipe is 0.6mm.

3.1.3 Freeboard

Referring to Section 6.5 of SDM, a 300mm minimum freeboard margin of safety is recommended to account for inaccuracies in flood level computations. Therefore, a 300mm freeboard is recommended.

3.1.4 Climate Change

Climate change is taken into account in drainage system capacity check calculation. 11.1% Rainfall intensity increase for mid 21st century (2041-2060) is included referring to SDM, Table 28.

3.1.5 Sea Level Rise

Climate change is taken into account in drainage system back water analysis calculation. 0.20m Sea level rise for mid 21st century (2050) is included referring to SDM, Table 29.

3.1.6 Storm Surge Increase

Climate change is taken into account in drainage system back water analysis calculation. Storm surge increase for mid 21st century (2050) is included referring to SDM, Table 30a.

3.1.7 Design Allowance

Design allowance is taken into account in drainage system back water analysis calculation. Design allowance for mid 21st century (2050) is included referring to SDM, Appendix 2.

4. Existing Drainage

4.1 Existing Drainage Network

The Application Site is divided into 5 nos. of individual parcels which are next to the planned access road to be constructed under the residential development in R(C)1 zone. There is a proposed 825ø stormwater drain to be laid along the R(C)1 access road to collect the surface runoff from R(C)1 site and will be connected to an existing triple 1800ø pipe and finally discharge to Pak Sha Wan via an

existing twin cell box culvert (2 x 2m x 2m) according to the approved R(C)1 Residential Development DIA.

Surface run-off from the Application Site will be collected by a separate new drainage system to be constructed by the Applicant other than the proposed 825ø stormwater drain to be constructed along the R(C)1 access road by R(C)1 Residential Development and finally discharges to Ho Chung River directly.

5. Drainage Impact Assessment for the Proposed Development

5.1 Catchment Area Changes

Comparing the existing and the proposed catchment area, it can be found that the proposed house development will be assumed fully paved for conservative analysis.

The catchment area change is summarized in **Table 4** and **Table 5** below:

	Existing Catchment Area		**Proposed Catchment Area**	
	Hard-paved	Unpaved	Hard-paved	Unpaved
Surface run-off discharges to the proposed 525ø	0	Site A, Site B, Site C and the Remaining Phase	Site A, Site B, Site C and the Remaining Phase	0

Table 4 Summary of Catchment Area Change

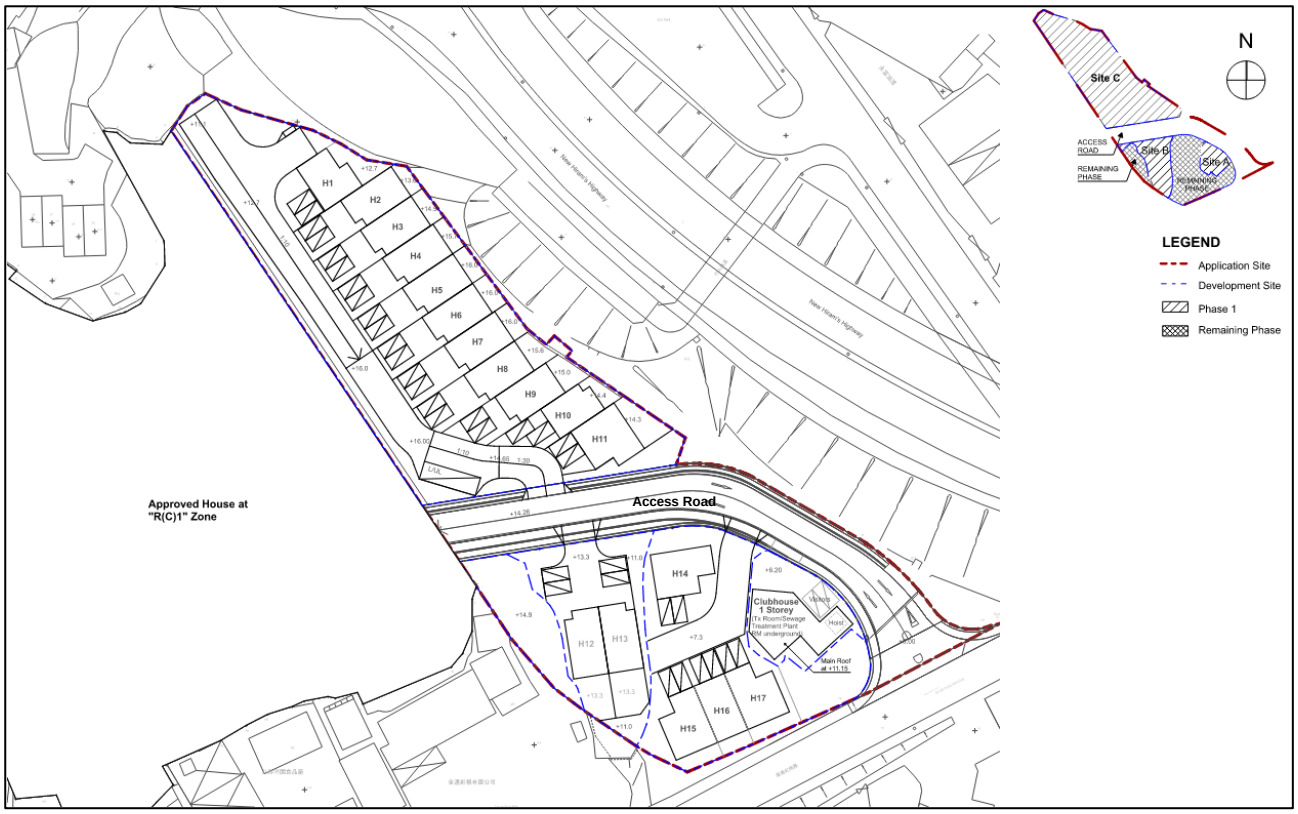


Figure 4-1 Catchment Plan

Catchment Area Distribution			
Catchment Area	Area (m^2)		
	paved	natural slope	grassland
Site A+B+C (About)	4,020	0	0
Remaining Site (About)	1,335	0	0
Access Road under Approved Planning Application No. A/SK-HC/223 (About)	1246	0	0

Table 5 Summary of Catchment Area Distribution for Proposed Development and the Adjacent developments

5.2 Assessment Result

The peak runoff generated from the proposed development is 0.28m^3/s under 10-year return period. Surface run-off from the Application Site will be collected by a separate new drainage system of 375ø to 525ø to be constructed by the Applicant along the R(C)1 access road and finally discharges to Ho Chung River directly (see **Appendix A** – **Plan 2** and **3**).

The proposed stormwater drainage system is aligned within a single lane as shown in drawing in **Appendix A – Plan 2** and **3** to avoid difficulty in approval and implementation of TTA. It is observed that the existing ground level of the public carpark is too low for catering the design tidal level and therefore the design manhole cover level of the proposed manhole SMH-M4a located at the amenity area in Heung Chung public carpark will be raised to +4.00, around 300mm above the ground. The proposed manhole SMH-M4a is located away from the dripline of the existing tree and will be located at the back of the parking space which will not affect the departure of driver/passenger from the vehicle. Consent from relevant departments regarding the proposed upstand design of manhole SMH-M4a from safety point of view will be seek. To facilitate the future maintenance works at any time and at high tide, installation of stoplog will be provided within manhole in the detailed design of proposed manhole SMH-M4a for submission to DSD for comment prior to the commencement of the works.

The assessment result of adopting a proposed 375ø to 525ø stormwater drain has been appended in **Table A** of **Appendix B**. Referring to the backwater checking, by adopting a proposed 375ø to 525ø stormwater drain along Wo Mei Hung Min Road and Hiram's Road, 300mm freeboard can be achieved.

Assessment for the downstream discharge to Ho Chung River for 50-year design return period is conducted in **Table B** of **Appendix B** and read in conjunction with **Plan 4** of **Appendix A**. The result shows that there is negligible impact to Ho Chung River as there is only insignificant increase in peak flow of about 0.08% after development of the Application Site.

Considering the assessment result and the conservative approach adopted in estimation of the freeboard, there will be negligible impact on the existing drainage system as a result of the proposed house development.

5.3 Flooding Susceptibility

The proposed site ground level is varying from around +6.0mPD to + 16.0mPD which is much higher than the design extreme sea level of 1 in 200 return period which is +4.19mPD referring to DSD Storm Drainage Manual Table 8. On the other hand, there is no record of flood blackspot found for the Application Site or adjacent area. In general, foreseeing there is slim chance of the Application Site been affected by backwater effect under extreme weather.

5.4 Maintenance Responsibility

The management and maintenance responsibilities for the proposed 375ø to 525ø inside the Application site will be maintained by the developer or the management of the development after completion. The proposed drainage system of 525ø outside the Application Site will be handed over to DSD upon completion of the construction works.

5.5 An Outline of the Changes to the Drainage Characteristics and Potential Drainage Impacts Which Might Arise from the Proposed Project

According to the topographical survey included in **Appendix C**, the Application Site is at high point in the central region of the site that grades down in all directions with overland flows towards existing surface channel outside the Application Site. The proposed development will keep all the existing ground levels or drainage or land use adjacent to but outside the project site intact and they will be unaffected by the proposed development.

During construction, the Application Site should be fenced off by hoarding boards with temporary drainage, comprising perimeter channels and catchpits with desilting trap, towards the existing surface channel outside site following the existing catchment overland flow paths. No change to the drainage path during construction but after the completion of the proposed drainage in Wo Mei Hung Min Road, the drainage path of the Application Site after completion will be altered by discharging to the newly proposed drainage system in Wo Mei Hung Min Road.

No potential adverse impact and impact on the land users which might arise as a result of changes to the drainage characteristics caused by the proposed development. As all the existing ground levels or drainage or land use adjacent to but outside the project site will kept intact. The Application Site drainage will be discharge to the new stormwater drainage system in Wo Mei Hung Min Road directly.

5.6 Details of Proposed Temporary Drainage System

The existing catchment of the Application Site and the proposed temporary drainage system during construction period with hydraulic capacity checking is included in **Appendix C**. During construction, the Application Site should be fenced off by hoarding boards with temporary drainage, comprising perimeter channels and catchpits with desilting trap, towards the existing surface channel outside site following the existing catchment overland flow paths.

The temporary drainage should be designed in accordance with standards and recommendations established in DSD Stormwater Drainage Manual (SDM), DSD Technical Circular No. 14/2000 – Temporary Flow Diversions and Temporary Works Affecting Capacity in Stormwater Drainage System, and DSD Practice Note No. 1/2004 – Design Rainfall Depth for Temporary Works within the Dry Season.

Proper measures shall be taken to maintain the existing drainage characteristic of the catchment areas and to minimize drainage impacts associated with the construction works. The principal drainage impacts which are associated with construction of the works have been identified as follows:

- Erosion of ground material;
- Sediment transportation to existing downstream drainage system, and
- Obstruction to drainage systems.

Excavated slopes for the Application Site shall be well-compacted and protected to prevent any loose material being washed out during rainfall. Temporary protection may be in the form of placing layers of granular material and rockfill material or hard surface cover on the sloping faces of channel or tarpaulin covering.

Regular inspection shall be carried out to ensure integrity of the works. These inspections shall cover works under construction as well as the existing area in the vicinity of the Application Site.

No excavated materials should be left on site. If it is not possible to transport away the excavated material within the same day, the material should be covered by tarpaulin/impervious sheets. Measures shall be taken

to ensure that runoff from the Application Site is managed so that silts and other pollution are properly intercepted.

In the event of extreme weather including landslip warning, issuance of amber/red/black rainstorm warning signal, Typhoon Signal No. 3 or above and the like, site inspections shall be carried out by the contractor's emergency team as deemed practical and safe before and after the events to ascertain if there has been any siltation or erosion. If it is determined that any unacceptable siltation or erosion has occurred, the contractor shall rectify it immediately.

Silt removal facilities, channels and manholes should be checked and maintained to ensure satisfactory working conditions. The deposited silt and grit should be removed regularly, at the onset of and after each rainstorm to ensure that these facilities are functioning properly at all times.

As the preliminary temporary drainage scheme and monitoring requirements included in this submission are subject to changes based on actual site constraints encountered on site and the method statement for each phase of construction works. As such, a detailed temporary drainage management plan, including but not limited to the proposed temporary drainage plan, associated hydraulic calculation, method statement for each phase of works, and the monitoring requirement and programme which should be endorsed by AP of the project should be submitted to DSD for agreement prior to the commencement of the works.

5.7 Details of Monitoring Requirement During Construction Stage

The contractor should include below drainage monitoring requirements during construction stage for agreement with RSS and DSD:

- Monitoring points should be set at catchpits, inlets to existing channels, manholes etc of the temporary drainage system and the existing drainage system in the vicinity of the Application Site;
- Drainage performance requirement: (i.e. no blockage, no flooding, no damage of drainage system; no mud/silty water discharge to monitoring points);
- General inspection should be carried out by contractor for the temporary drainage system (i.e. sump pit, sedimentation tank, wastewater treatment facilities and surface channel etc.) within the site and the existing drainage facilities in the vicinity of the Application Site;
- Monitoring frequency at monitoring points: Weekly basis & appropriate time after lowering of amber/red/black rainstorm warning signal and typhoon signal no. 3 or above hoisted by Hong Kong Observatory;
- Requirement of Remedial works: Timely complete the remedial works if non-conformity found after inspection, to ensure the drainage performance during construction;
- Provide an inspection checklist and rectification record (certified by the RSS with signature) together with the site photos at the monitoring points; and
- Keep the monitoring record and rectification record properly and submit to DSD upon requested.

6. Conclusion

This DIA has been prepared to assess the potential drainage impact as a result of the proposed house development.

Surface run-off from the Application Site will be collected by a separate new drainage system of 375ø to 525ø to be constructed by the Applicant along the R(C)1 access road and finally discharges to Ho Chung River directly.

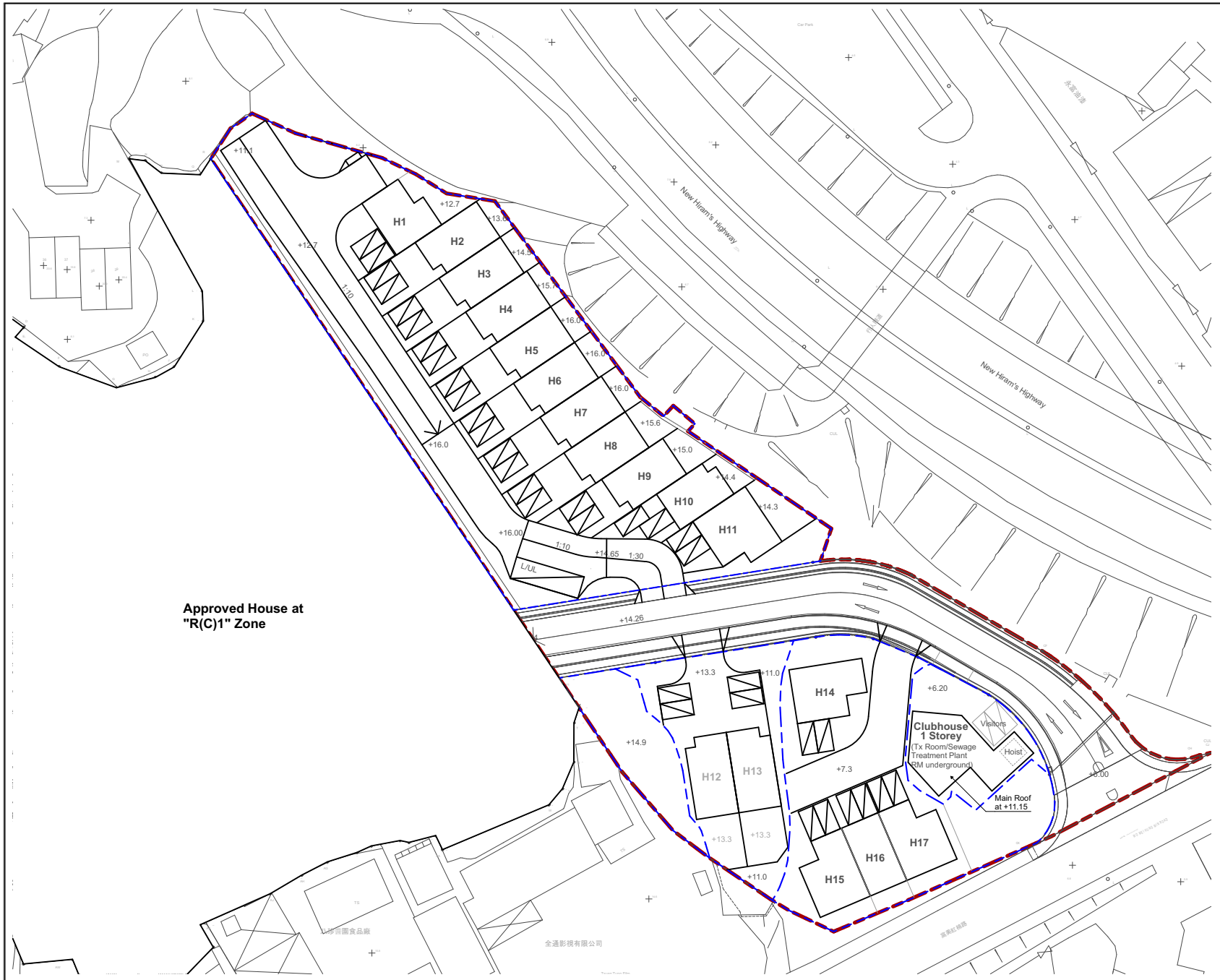
10-year design return period of design criteria is adopted for the impact assessment on the proposed stormwater drain. Based on the hydraulic assessment, the proposed drainage system has sufficient capacity for the proposed house development.

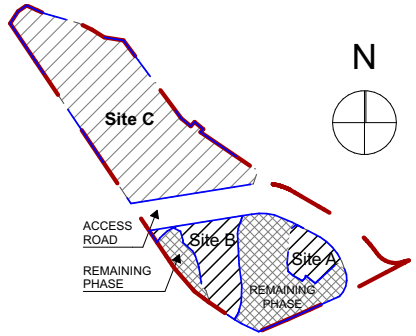
Regarding the proposed upstand design of manhole SMH-M4a located at the amenity area in Heung Chung public carpark, consent from relevant departments from safety point of view will be seek. To facilitate the future maintenance works at any time and at high tide, installation of stoplog will be provided within the proposed manhole SMH-M4a in the detailed design for submission to DSD for comment prior to the commencement of the works. A flap valve is also proposed at the downstream to prevent backwater effect for mitigation measure.

In conclusion, no adverse drainage impact is expected to the surrounding drainage system arising from the proposed development and the proposed drainage system has sufficient capacity to convey the additional surface runoff arising from the proposed development.

Appendix A

Plan





LEGEND

- Application Site
- Development Site
- Phase 1
- Remaining Phase

MARK	DATE	BY	REV.
-	26/01/2023	IP	F

JOB TITLE

Application for Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131) to Rezone the Application Site from "Green Belt" to "Residential (Group C)1" for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung

DRAWING TITLE

Master Layout Plan

DRAWING STATUS

FOR INFORMATION

ARUP

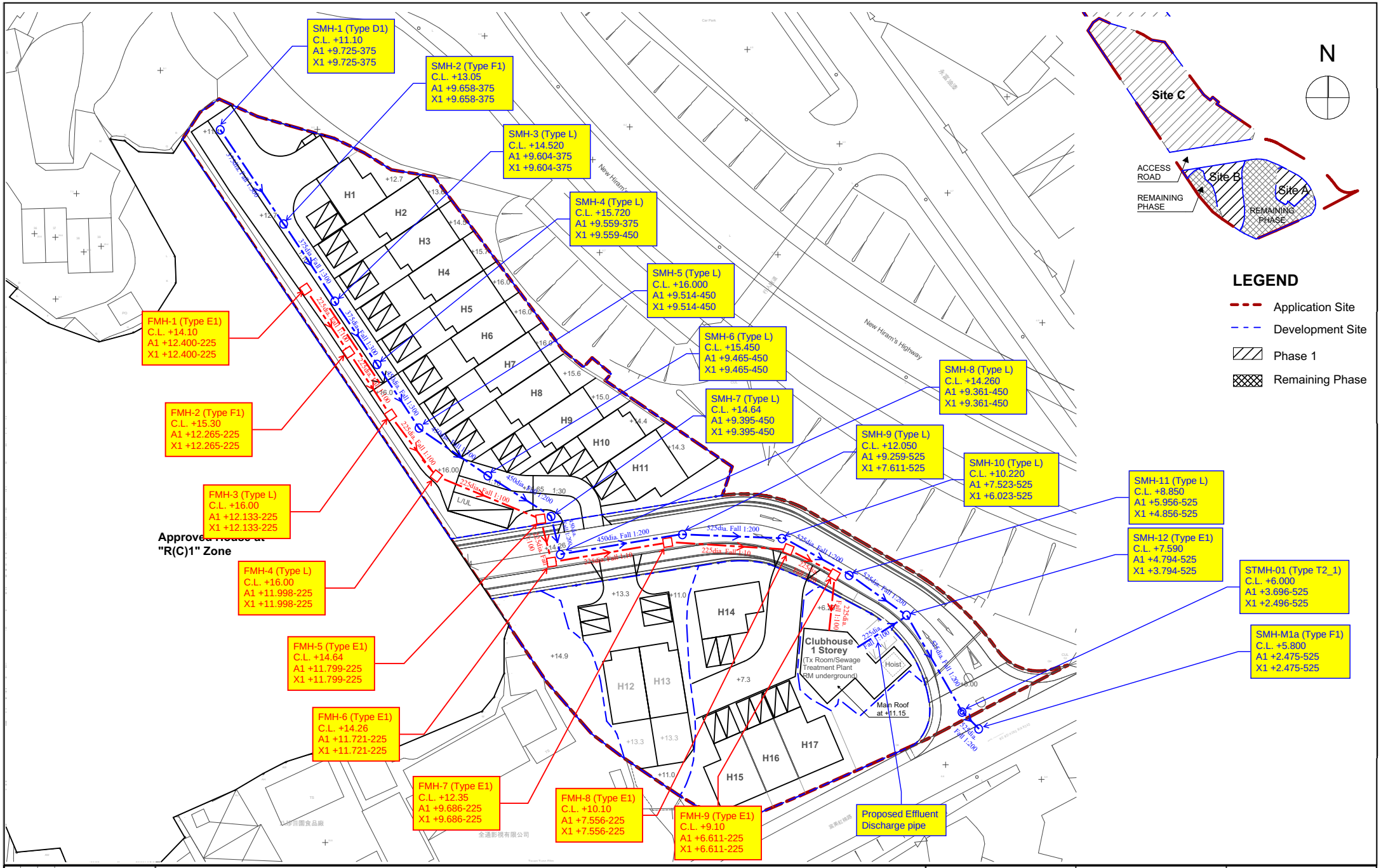
SCALE 1:600@A3

DRN. IP DATE 17/1/2023 CHD. CC PASSED. CC

JOB NO. 282344

DRAWING NO. PLAN 1

REV.



MARK	DATE	BY	REV.
-	26/01/2023	IP	F

JOB TITLE

Application for Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131) to Rezone the Application Site from "Green Belt" to "Residential (Group C)1" for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung

DRAWING TITLE

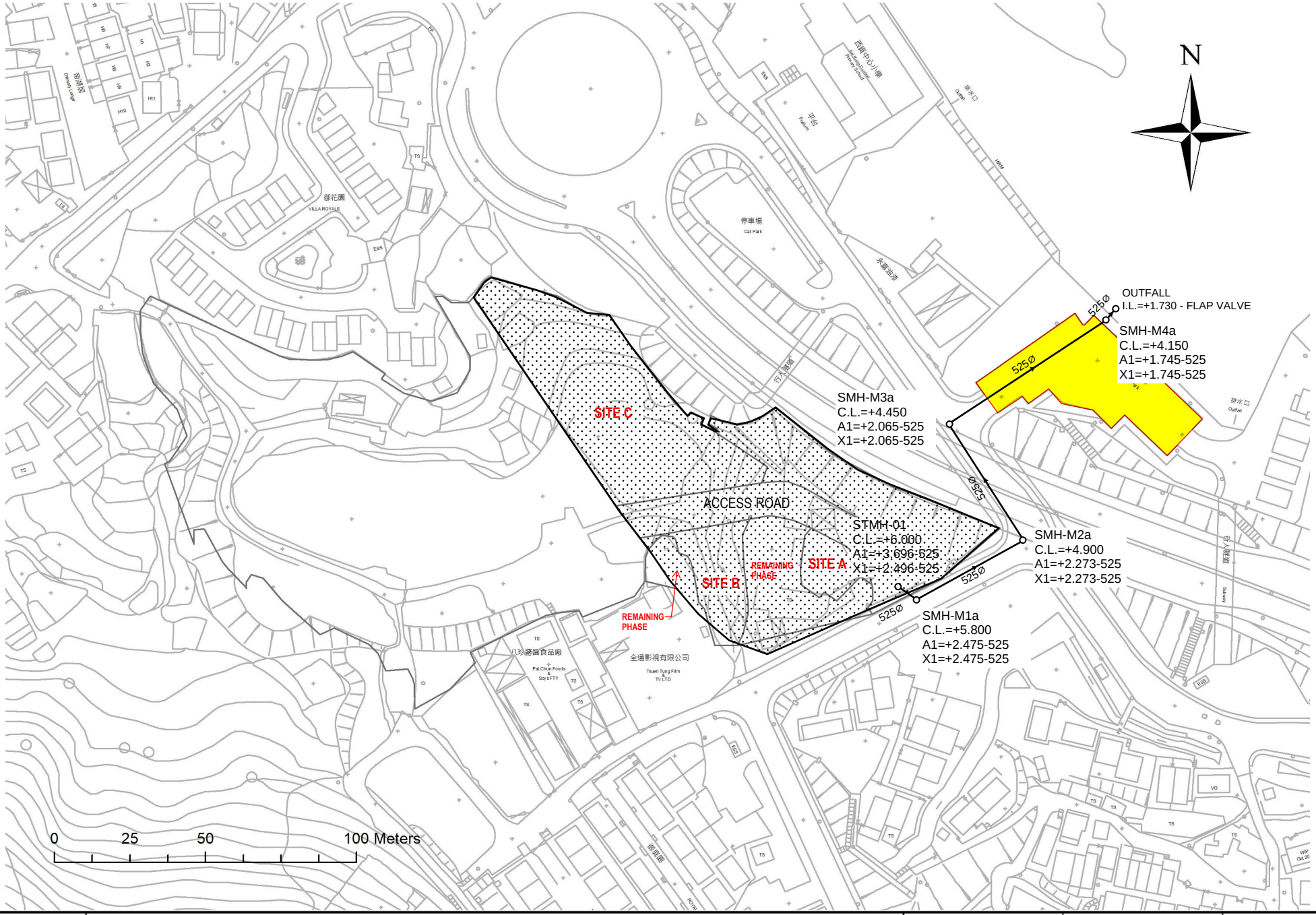
Proposed Drainage and Sewerage Layout within Site

DRAWING STATUS

FOR INFORMATION

ARUP

SCALE	1:600@A3		
DRN. IP	DATE 17/1/2023	CHD. CC	PASSED. CC
JOB NO. 282344	DRAWING NO. PLAN 2		REV.



NOTE:
THE PROPOSED DRAINAGE ALIGNMENTS SHOWN IN THE DRAWINGS ARE INDICATIVE ONLY. THE EXACT ALIGNMENTS SHALL BE DETERMINED ON SITE AND AFGREED BY THE PROJECT MANAGER AND HIS REPRESENTATIVE.

LEGEND:

PROPOSED CATCHMENT AREA

PROPOSED DRAINAGE MANHOLE

1050Ø PROPOSED STORMWATER DRAIN

MARK	DATE	BY	REV.
-	26/1/2022	IP	F

JOB TITLE
Application for Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131) to Rezone the Application Site from "Green Belt" to "Residential (Group C)1" for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung

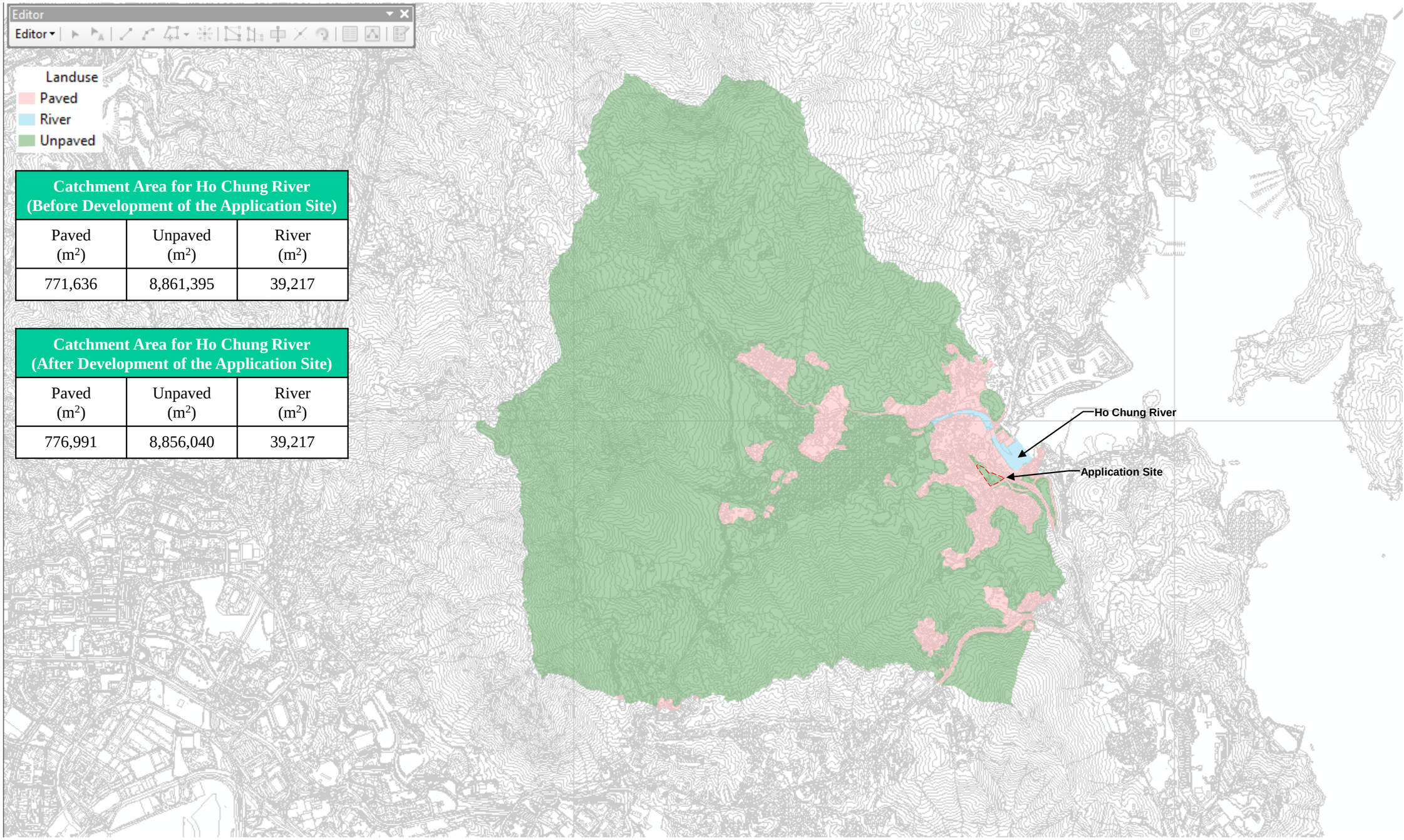
DRAWING TITLE
Proposed Drainage Layout Plan outside Site

DRAWING STATUS
FOR INFORMATION

ARUP

SCALE	AS SHOWN		
DRN. IP	DATE	CHD. CC	PASSED. CC

JOB NO.	DRAWING NO.	REV.
282344	PLAN 3	



Catchment Area for Ho Chung River (Before Development of the Application Site)		
Paved (m^2)	Unpaved (m^2)	River (m^2)
771,636	8,861,395	39,217

Catchment Area for Ho Chung River (After Development of the Application Site)		
Paved (m^2)	Unpaved (m^2)	River (m^2)
776,991	8,856,040	39,217

Catchment and Landuse for Ho Chung River

Plan 4

Appendix B

Calculation

Table A - Backwater Checking of the proposed drainage system after completion of the Proposed Development

Proposed Stormwater Drain (10 year rain + 2 year sea level)

Location		Sub-Catchment Reference	Catchment Area						Drainage Character									Hydraulic parameter		Time			(i) Extreme mean intensity 10-year	Peak Runoff	Full Bore Capacity	Full Bore Velocity	Mean Velocity	k (entry)	k (exit)	H (entry)	H (exit)	Re (Reynold number)	1/f^(1/2)	f (friction ceof)	H (friction)	Total H	Water level	Free board	Percentage of Pipe Utilization
US	DS		Impermeable		Permeable		Total		Drainage Shape	Drainage size			Ground level		Invert level		Slope			t_e	t_f	t_c																
			Sub-Catchment (m^2)	Accumulative Area (m^2)	Sub-Catchment (m^2)	Accumulative Area (m^2)	Sub-Catchment (m^2)	Accumulative Area (m^2)		width (mm)	height (mm)	length (m)	USG (mPD)	DSG (mPD)	US (mPD)	DS (mPD)	(S_f)	cross area (A) (m^2)	Pipe Dia. (D) (m)	(min)	(min)	(min)	(mm/h)	(m^3/s)	(m^3/s)	(m/s)	(m/s)			(m)	(m)				(m)	(m)	(mPD)	(m)	(%)
SMH-1	SMH-2	SITE C	619	619	0	0	619	619	375DIA.	375	375	20.2	11.100	12.720	9.725	9.658	0.003	0.11	0.375	5.00	0.32	5.32	225.84	0.035	0.115	1.041	0.316	0.500	1.000	0.003	0.005	9.9E+04	6.421	0.02426	0.0067	0.014	9.991	1.1	30.4%
SMH-2	SMH-3		446	1,065	0	0	446	1,065	375DIA.	375	375	16.2	12.720	14.360	9.658	9.604	0.003	0.11	0.375	5.32	0.26	5.58	223.12	0.059	0.115	1.041	0.538	0.500	1.000	0.007	0.015	1.7E+05	6.524	0.02350	0.0149	0.037	9.976	2.7	51.7%
SMH-3	SMH-4		459	1,524	0	0	459	1,524	375DIA.	375	375	13.4	14.360	15.680	9.604	9.559	0.003	0.11	0.375	5.58	0.21	5.80	220.94	0.084	0.115	1.041	0.762	0.500	1.000	0.015	0.030	2.4E+05	6.574	0.02314	0.0245	0.069	9.939	4.4	73.2%
SMH-4	SMH-5		466	1,990	0	0	466	1,990	450DIA.	450	450	13.5	15.680	16.000	9.559	9.514	0.003	0.16	0.450	5.80	0.19	5.99	219.06	0.109	0.186	1.169	0.685	0.500	1.000	0.012	0.024	2.6E+05	6.715	0.02218	0.0159	0.052	9.870	5.8	58.7%
SMH-5	SMH-6		516	2,506	0	0	516	2,506	450DIA.	450	450	14.6	16.000	15.000	9.514	9.465	0.003	0.16	0.450	5.99	0.21	6.20	217.08	0.136	0.186	1.169	0.855	0.500	1.000	0.019	0.037	3.2E+05	6.743	0.02199	0.0266	0.083	9.819	6.2	73.2%
SMH-6	SMH-7		570	3,076	0	0	570	3,076	450DIA.	450	450	14.2	15.000	14.400	9.465	9.395	0.005	0.16	0.450	6.20	0.16	6.36	215.56	0.166	0.228	1.434	1.042	0.500	1.000	0.028	0.055	3.9E+05	6.765	0.02185	0.0381	0.121	9.736	5.3	72.7%
SMH-7	SMH-8	-	0	3,076	0	0	0	3,076	450DIA.	450	450	6.8	14.400	14.260	9.395	9.361	0.005	0.16	0.450	6.36	0.08	6.44	214.84	0.165	0.228	1.434	1.039	0.500	1.000	0.027	0.055	3.9E+05	6.765	0.02185	0.0181	0.101	9.615	4.8	72.4%
SMH-8	SMH-9	Remaining Area	216	3,292	0	0	216	3,292	450DIA.	450	450	20.3	14.260	12.050	9.361	9.259	0.005	0.16	0.450	6.44	0.24	6.68	212.74	0.175	0.228	1.434	1.101	0.500	1.000	0.031	0.062	4.1E+05	6.770	0.02182	0.0609	0.154	9.514	4.7	76.8%
SMH-9	SMH-10	SITE B	637	3,929	0	0	637	3,929	525DIA.	525	525	17.6	12.050	10.220	7.611	7.523	0.005	0.22	0.525	6.68	0.19	6.86	211.15	0.207	0.342	1.580	0.958	0.500	1.000	0.023	0.047	4.2E+05	6.888	0.02108	0.0330	0.103	7.714	4.3	60.6%
SMH-10	SMH-11	Remaining Area	1,110	5,039	0	0	1,110	5,039	525DIA.	525	525	13.4	10.220	8.850	6.023	5.956	0.005	0.22	0.525	6.86	0.14	7.00	209.97	0.265	0.342	1.580	1.222	0.500	1.000	0.038	0.076	5.3E+05	6.912	0.02093	0.0406	0.155	6.178	4.0	77.3%
SMH-11	SMH-12	SITE A	315	5,354	0	0	315	5,354	525DIA.	525	525	12.4	8.850	7.590	4.856	4.794	0.005	0.22	0.525	7.00	0.13	7.13	208.89	0.280	0.342	1.580	1.292	0.500	1.000	0.043	0.085	5.7E+05	6.917	0.02090	0.0420	0.170	5.026	3.8	81.7%
SMH-12	STMH-01	-	0	5,354	0	0	0	5,354	525DIA.	525	525	19.5	7.590	6.000	3.794	3.696	0.005	0.22	0.525	7.13	0.21	7.34	207.23	0.277	0.342	1.580	1.281	0.500	1.000	0.042	0.084	5.6E+05	6.917	0.02090	0.0651	0.191	4.342	3.2	81.1%
STMH-01	SMH-M1a	-	0	5,354	0	0	0	5,354	525DIA.	525	525	4.3	6.000	5.800	2.496	2.475	0.005	0.22	0.525	7.34	0.04	7.39	206.88	0.277	0.342	1.580	1.279	0.500	1.000	0.042	0.083	5.6E+05	6.916	0.02090	0.0141	0.139	4.152	1.8	80.9%
SMH-M1a	SMH-M2a	-	0	5,354	0	0	0	5,354	525DIA.	525	525	40.5	5.800	4.900	2.475	2.273	0.005	0.22	0.525	7.39	0.43	7.81	203.60	0.273	0.342	1.580	1.259	0.500	1.000	0.040	0.081	5.5E+05	6.915	0.02091	0.1303	0.251	4.012	1.8	79.7%
SMH-M2a	SMH-M3a	-	0	5,354	0	0	0	5,354	525DIA.	525	525	41.5	4.900	4.500	2.273	2.065	0.005	0.22	0.525	7.81	0.44	8.25	200.42	0.268	0.342	1.580	1.239	0.500	1.000	0.039	0.078	5.4E+05	6.914	0.02092	0.1294	0.247	3.761	1.1	78.4%
SMH-M3a	SMH-M4a	-	0	5,354	0	0	0	5,354	525DIA.	525	525	64.0	4.500	4.000	2.065	1.745	0.005	0.22	0.525	8.25	0.68	8.93	195.85	0.262	0.342	1.580	1.211	0.500	1.000	0.037	0.075	5.3E+05	6.912	0.02093	0.1907	0.303	3.514	1.0	76.6%
SMH-M4a	OUTFALL	-	0	5,138	0	0	0	5,354	525DIA.	525	525	3.0	4.000	4.000	1.745	1.730	0.005	0.22	0.525	8.93	0.03	8.96	195.64	0.251	0.342	1.580	1.161	0.500	1.000	0.034	0.069	5.1E+05	6.908	0.02096	0.0082	0.111	3.211	0.8	73.5%

2.820 2-year sea level at North Point
3.100 Climate Change end 21st Century

Proposed Stormwater Drain (2 year rain + 10 year sea level)

Location		Sub-Catchment Reference	Catchment Area						Drainage Character									Hydraulic parameter		Time			(i) Extreme mean intensity 2-year	Peak Runoff	Full Bore Capacity	Full Bore Velocity	Mean Velocity	k (entry)	k (exit)	H (entry)	H (exit)	Re (Reynold number)	1/f^(1/2)	f (friction ceof)	H (friction)	Total H	Water level	Free board	Percentage of Pipe Utilization
US	DS		Impermeable		Permeable		Total		Drainage Shape	Drainage size			Ground level		Invert level		Slope			t_e	t_f	t_c																
			Sub-Catchment (m^2)	Accumulative Area (m^2)	Sub-Catchment (m^2)	Accumulative Area (m^2)	Sub-Catchment (m^2)	Accumulative Area (m^2)		width (mm)	height (mm)	length (m)	USG (mPD)	DSG (mPD)	US (mPD)	DS (mPD)	(S_f)	cross area (A) (m^2)	Pipe Dia. (D) (m)	(min)	(min)	(min)	(mm/h)	(m^3/s)	(m^3/s)	(m/s)	(m/s)			(m)	(m)				(m)	(m)	(mPD)	(m)	(%)
SMH-1	SMH-2	SITE C	619	619	0	0	619	619	375DIA.	375	375	20.2	11.100	12.720	9.725	9.658	0.003	0.11	0.375	5.00	0.32	5.32	181.83	0.028	0.115	1.041	0.255	0.500	1.000	0.002	0.003	8.0E+04	6.367	0.02467	0.0044	0.009	9.767	1.33	24.5%
SMH-2	SMH-3		446	1,065	0	0	446	1,065	375DIA.	375	375	16.2	12.720	14.360	9.658	9.604	0.003	0.11	0.375	5.32	0.26	5.58	179.45	0.048	0.115	1.041	0.433	0.500	1.000	0.005	0.010	1.4E+05	6.486	0.02377	0.0098	0.024	9.758	2.96	41.6%
SMH-3	SMH-4		459	1,524	0	0	459	1,524	375DIA.	375	375	13.4	14.360	15.680	9.604	9.559	0.003	0.11	0.375	5.58	0.21	5.80	177.54	0.068	0.115	1.041	0.613	0.500	1.000	0.010	0.019	1.9E+05	6.544	0.02335	0.0160	0.045	9.734	4.63	58.9%
SMH-4	SMH-5		466	1,990	0	0	466	1,990	450DIA.	450	450	13.5	15.680	16.000	9.559	9.514	0.003	0.16	0.450	5.80	0.19	5.99	175.89	0.088	0.186	1.169	0.550	0.500	1.000	0.008	0.015	2.1E+05	6.682	0.02239	0.0104	0.034	9.689	5.99	47.1%
SMH-5	SMH-6		516	2,506	0	0	516	2,506	450DIA.	450	450	14.6	16.000	15.000	9.514	9.465	0.003	0.16	0.450	5.99	0.21	6.20	174.15	0.109	0.186	1.169	0.686	0.500	1.000	0.012	0.024	2.6E+05	6.715	0.02217	0.0173	0.053	9.655	6.34	58.7%
SMH-6	SMH-7		570	3,076	0	0	570	3,076	450DIA.	450	450	14.2	15.000	14.400	9.465	9.395	0.005	0.16	0.450	6.20	0.16	6.36	172.81	0.133	0.228	1.434	0.836	0.500	1.000	0.018	0.036	3.1E+05	6.741	0.02201	0.0247	0.078	9.602	5.40	58.3%
SMH-7	SMH-8	-	0	3,076	0	0	0	3,076	450DIA.	450	450	6.8	14.400	14.260	9.395	9.361	0.005	0.16	0.450	6.36	0.08	6.44	172.18	0.132	0.228	1.434	0.832	0.500	1.000	0.018	0.035	3.1E+05	6.740	0.02201	0.0117	0.065	9.524	4.88	58.1%
SMH-8	SMH-9	Remaining Area	216	3,292	0	0	216	3,292	450DIA.	450	450	20.3	14.260	12.050	9.361	9.259	0.005	0.16	0.450	6.44	0.24	6.68	170.33	0.140	0.228	1.434	0.881	0.500	1.000	0.020	0.040	3.3E+05	6.747	0.02197	0.0393	0.099	9.459	4.80	61.5%
SMH-9	SMH-10	SITE B	637	3,929	0	0	637	3,929	525DIA.	525	525	17.6	12.050	10.220	7.611	7.523	0.005	0.22	0.525	6.68	0.19	6.86	168.92	0.166	0.342	1.580	0.766	0.500	1.000	0.015	0.030	3.4E+05	6.862	0.02124	0.0213	0.066	7.677	4.37	48.5%
SMH-10	SMH-11	Remaining Area	1,110	5,039	0	0	1,110	5,039	525DIA.	525	525	13.4	10.220	8.850	6.023	5.956	0.005	0.22	0.525	6.86	0.14	7.00	167.87	0.211	0.342	1.580	0.977	0.500	1.000	0.024	0.049	4.3E+05	6.890	0.02106	0.0261	0.099	6.122	4.10	61.8%
SMH-11	SMH-12	SITE A	315	5,354	0	0	315	5,354	525DIA.	525	525	12.4	8.850	7.590	4.856	4.794	0.005	0.22	0.525	7.00	0.13	7.13	166.92	0.223	0.342	1.580	1.032	0.500	1.000	0.027	0.054	4.5E+05	6.896	0.02103	0.0270	0.108	4.964	3.89	65.3%
SMH-12	STMH-01	-	0	5,354	0	0	0	5,354	525DIA.	525	525	19.5	7.590	6.000	3.794	3.696	0.005	0.22	0.525	7.13	0.21	7.34	165.45	0.221	0.342	1.580	1.023	0.500	1.000	0.027	0.053	4.5E+05	6.895	0.02103	0.0417	0.122	4.289	3.30	64.7%
STMH-01	SMH-M1a	-	0	5,354	0	0	0	5,354	525DIA.	525	525	4.3	6.000	5.800	2.496	2.475	0.005	0.22	0.525	7.34	0.04	7.39	165.13	0.221	0.342	1.580	1.021	0.500	1.000	0.027	0.053	4.5E+05	6.895	0.02104	0.0090	0.089	4.167	1.83	64.6%
SMH-M1a	SMH-M2a	-	0	5,354	0	0	0	5,354	525DIA.	525	525	40.5	5.800	4.900	2.475	2.273	0.005	0.22	0.525	7.39	0.43	7.81	162.22	0.217	0.342	1.580	1.003	0.500	1.000	0.026	0.051	4.4E+05	6.893	0.02105	0.0833	0.160	4.078	1.72	63.5%
SMH-M2a	SMH-M3a	-	0	5,354	0	0	0	5,354	525DIA.	525	525	41.5	4.900	4.500	2.273	2.065	0.005	0.22	0.525	7.81	0.44	8.25	159.39	0.213	0.342	1.580	0.986	0.500	1.000	0.025	0.050	4.3E+05	6.891	0.02106	0.0824	0.157	3.918	0.98	62.4%
SMH-M3a	SMH-M4a	-	0	5,354	0	0	0	5,354	525DIA.	525	525	64.0	4.500	4.000	2.065	1.745	0.005	0.22	0.525	8.25	0.68	8.93	155.30	0.208	0.342	1.580	0.960	0.500	1.000	0.023	0.047	4.2E+05	6.888	0.02108	0.1207	0.191	3.761	0.74	60.8%
SMH-M4a	OUTFALL	-	0	5,138	0	0	0	5,354	525DIA.	525	525	3.0	4.000	4.000	1.745	1.730	0.005	0.22	0.525	8.93	0.03	8.96	155.12	0.199	0.342	1.580	0.920	0.500	1.000	0.022	0.043	4.0E+05	6.884	0.02110	0.0052	0.070	3.570	0.43	58.2%

3.200 10-year sea level at North Point
3.500 Climate Change end 21st Century

Notes:

Rational Method is adopted for the peak runoff estimate i.e. Qp = 0.278 C I A.
The time of entry (te) is assumed to be 5.0 minutes.
The Colebrook White's Equation was used for hydraulic analysis of the drainage system.
The roughness value (ks) of 0.6mm has been taken in the hydraulic calculation for concrete pipes.
The runoff coefficient of 0.90 for paved area and 0.35 for unpaved area has been adopted.
The inlet and outlet headloss coefficients of 0.5 and 1.0 respectively for the drainage system have been assumed in the hydraulic calculations.
Sea level rise due to climate change refers to Table 29 of 0.20m for mid 21st century.
Storm surge increase in mid 21st century refer to Table 30a.
Rainfall increase due to climate change refers to Table 28 of 11.1% for mid 21st century.
Design allowance refer to Appendix 2 for mid 21st century.

Table B - Assessment for Downstream Discharge to Ho Chung River

A) Design Parameters :

Runoff

Runoff Coeff., C	=	0.90	(Paved)
	=	0.35	(Unpaved)
	=	1.00	(River)
Return Period	=	50 years	
Rainfall Intensity, $I = a / (Tc + b)^c$		50-year	(Gumbel solution)
where :	a =	451.3	(Table 3a, Stormwater Drainage Manual)
	b =	2.46	
	c =	0.337	
Peak Runoff ,Q_p	=	0.278 C I A	
Rainfall Increase due to Climate Change	=	11.1%	(Mid 21st Century, Table 28)

Catchment Area (m^2)					
Before Development			After Development		
Paved	Unpaved	River	Paved	Unpaved	River
771,636	8,861,395	39,217	776,991	8,856,040	39,217
Total	9,672,248		Total	9,672,248	

Downstream Discharge to Ho Chung River

Before Development							After Development							Percentage of Increase
Catchment				Time of Concentration	Intensity	Peak Runoff	Catchment				Time of Concentration	Intensity	Peak Runoff	
Paved (m^2)	Unpaved (m^2)	River (m^2)	Effective Area (m^2)	(min.)	(mm/hr)	(m^3/s)	Paved (m^2)	Unpaved (m^2)	River (m^2)	Effective Area (m^2)	(min.)	(mm/hr)	(m^3/s)	(%)
771,636	8,861,395	39,217	3,835,178	5	254.72	271.36	776,991	8,856,040	39,217	3,838,123	5	254.72	271.57	0.08%

Appendix C

Temporary Drainage During Construction Stage

Existing 300UC

Existing 300UC

Existing 300UC

200 sq m

G4

G3

2,526 sq m

G1

875 sq m

324 sq m

G2

99 sq m

F2

Existing 300UC

Existing 300UC

Existing 450UC

1,754 sq m

F1

955 sq m

E4

E1

573 sq m

E2

684 sq m

E3

625 sq m

NEW HIRAM'S HIGHWAY

WO MEI HUNG MIN ROAD

WOK TSE CHE ROAD

PAT CHAN FOOD & SOYS FACTORY

VILLA ROYALE

SB

ST

EXISTING CATCHMENT PLAN

LEGEND:

- ARTIFICIAL SLOPE
- CHANNEL WITH FLOW DIRECTION (UP) SIDE OF CHANNEL
- STEP CHANNEL WITH FLOW DIRECTION (UP) SIDE OF STEP CHANNEL
- BOUNDARY LINE & BOUNDARY POINT
- GATE
- PERMANENT BUILDING AND CANOPY
- TREE WITH TREE NO.
- VERTICAL MASONRY / CUTTING
- GRAVE
- CONTOURS
- TEMPORARY STRUCTURE
- PILLAR BOX
- HAND RAILING
- HOARDING
- KERB LINE
- SLOPE TOP
- SLOPE BOTTOM
- FENCE
- BARRIERS
- BENCH
- ELECTRIC POLE
- SIGN BOARD
- SIGN POLE
- LAMP POST
- TELEPHONE POLE
- TRAFFIC LIGHT
- FIRE HYDRANT
- PARKING METER
- BOLLARD AT ROAD
- GULLY
- GRATING
- VALVE FIRE
- VALVE GAS
- VALVE WATER WORKS
- MANHOLE
- MANHOLE, ATC
- MANHOLE, CABLE TV
- MANHOLE, ELECTRIC & MECHANICAL SERVICES DEPARTMENT
- MANHOLE, PCCW-HKT TELEPHONE LIMITED
- MANHOLE, DRAINAGE SERVICES DEPARTMENT
- MANHOLE, HUTCHISON COMMUNICATION LIMITED
- MANHOLE, HUTCHISON GLOBAL CROSSING LIMITED BROADBAND
- CATCH PIT
- MANHOLE, FOUL WATER/SEWER
- MANHOLE, STORM WATER
- MANHOLE, PACIFIC CENTURY CABLE & WIRELESS
- MANHOLE, NEW WORLD TELEPHONE
- MANHOLE, CLP POWER
- MANHOLE, WHAFT T & T
- MANHOLE, TOWNGAS TELECOM

ABBREVIATION:

BD	BOULDER
BE	BERM
BS	BOUNDARY STONE
CUL	CULVERT
CO	COLUMN
CONC	CONCRETE
EB	ELECTIC BOX
END	END OF OBJECT
FB	FLOWER BED
FP	FOOTPATH
IL	INVERT LEVEL
NU	NULLAH
OH	OVERHANG
PL	PLATFORM
PO	POND
PZ	PIEZOMETER TUBE
RP	RAMP
RU	RUIN
SS	SHRINE
VB	VEHICLE BARRIERS
WE	WELL
WIP	WORK IN PROGRESS
WT	WATER TANK

HONG KONG METRIC GRID
PRINCIPAL DATUM HONG KONG
ALL UNITS IN METRES

NOTE
ALL SPOT LEVEL POSITIONS ARE THE DECIMAL POINT OR A CROSS

DATE OF SURVEY: NOVEMBER 2014

REVISION	DATE	DESCRIPTION
INITIAL	05/12/2014	---

Topographical Survey
Lot 2189 in DD244, Sai Kung
New Territories

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PRELIMINARY

(27/02/2015)
JESSICA LEUNG MANG MANG RPS(LS)
CHARTERED SURVEYOR

PLAN NO. 8877/01

Existing 300UC
CP-6
Existing 300UC
Existing 300UC
CP-5
225UC
225SC
C1
1,919.11 sq m
NEW HIRAM'S HIGHWAY
Existing 300UC
Existing 300UC
B1
1,147.45 sq m
Existing 450UC
CP-4
225SC
225UC
CP-1
A2
311.85 sq m
225UC
662.23 sq m
CP-2
A1
CP-3
WO MEI HUNG MIN ROAD
MOK TSE CHE ROAD
PAT CHAN FOOD & SOYS FACTORY
VILLA ROYALE
SB
ST
225UC
Proposed 225 Wide Temporary Site Formation Channel
Proposed Catchpit with Trap for Temporary Site Formation Drainage

PROPOSED TEMPORARY DRAINAGE DURING CONSTRUCTION STAGE

LEGEND:

- ARTIFICIAL SLOPE
- CHANNEL WITH FLOW DIRECTION 0.00 WIDE OF CHANNEL
- STEP CHANNEL WITH FLOW DIRECTION 0.00 WIDE OF STEP CHANNEL
- BOUNDARY LINE & BOUNDARY POINT
- GATE
- PERMANENT BUILDING AND CANOPY
- TREE WITH TREE NO.
- VERTICAL MASONRY / CUTTING
- GRAVE
- CONTOURS
- TS TEMPORARY STRUCTURE
- PB PILLAR BOX
- HR HAND RAILING
- HO HOARDING
- KL KERB LINE
- ST SLOPE TOP
- SB SLOPE BOTTOM
- FX FENCE
- BARRIERS
- BEN BENCH
- E ELECTRIC POLE
- SB SIGN BOARD
- SP SIGN POLE
- L LAMP POST
- TP TELEPHONE POLE
- TL TRAFFIC LIGHT
- H FIRE HYDRANT
- PM PARKING METER
- BOLLARD AT ROAD
- GULLY
- GRATING
- VALVE FIRE
- VALVE GAS
- VALVE WATER WORKS
- MANHOLE
- ATC MANHOLE, ATC
- CATV MANHOLE, CABLE TV
- E&M MANHOLE, ELECTRIC & MECHANICAL SERVICES DEPARTMENT
- HKT MANHOLE, PCCW-HKT TELEPHONE LIMITED
- DSD MANHOLE, DRAINAGE SERVICES DEPARTMENT
- HDL MANHOLE, HUTCHISON COMMUNICATION LIMITED
- HBC MANHOLE, HUTCHISON GLOBAL CROSSING LIMITED BROADBAND
- CI CATCH PIT
- MF MANHOLE, FOUL WATER/SEWER
- MS MANHOLE, STORM WATER
- PCW MANHOLE, PACIFIC CENTURY CABLE & WIRELESS
- NWT MANHOLE, NEW WORLD TELEPHONE
- CLP MANHOLE, CLP POWER
- WHL MANHOLE, WHAFT T & T
- TGT MANHOLE, TOWNGAS TELECOM

ABBREVIATION:

BD	BOULDER
BE	BERM
BS	BOUNDARY STONE
CUL	CULVERT
CO	COLUMN
CONC	CONCRETE
EB	ELECTIC BOX
END	END OF OBJECT
FB	FLOWER BED
FP	FOOTPATH
IL	INVERT LEVEL
NU	NULLAH
OH	OVERHANG
PL	PLATFORM
PO	POND
PZ	PIEZOMETER TUBE
RP	RAMP
RU	RUIN
SS	SHRINE
VB	VEHICLE BARRIERS
WE	WELL
WIP	WORK IN PROGRESS
WT	WATER TANK

HONG KONG METRIC GRID
PRINCIPAL DATUM HONG KONG
ALL UNITS IN METRES

NOTE
ALL SPOT LEVEL POSITIONS ARE THE DECIMAL POINT OR X CROSS

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PRELIMINARY
(27/02/2015)
JESSICA LEUNG MRICS MHKIS RPS(LS)
CHARTERED SURVEYOR

PLAN NO. 8877/01

TABLE 1 Temporary Drainage Design During Construction Stage

Runoff Coeff., C = 0.35 (Unpaved)
= 0.95 (Paved)

Return Period = 10 years

Rainfall Intensity, $I = a / (Tc + b)^c$ 10-year (Gumbel solution)
where : a = 471.9 (Table 3a, Stormwater Drainage Manual)
b = 3.02
c = 0.397

Time of Concentration,To = 2.0 min

Rainfall Increase due to Climate Change = 16.00% (End 21st Century, Table 28)

By Colebrook-White Equation

$$\overline{V} = -\sqrt{32gRS_f}\,\log\left[\frac{k_s}{14.8R} + \frac{1.255\nu}{R\sqrt{32gRS_f}}\right]$$

where ks is equivalent roughness with value equals 1.5mm for channels
ν is kinematic viscosity of fluid = 1.14 x 10-6 m2/s and g is the gravity = 9.81m/s2
V is the velocity, R is the hydraulic radius of the drain and S is the gradient of the drain

Proposed Temporary Drainage Design

Manhole/Catchpit Ref		Contributing	Area (m^2)			T_o	T_f	T_c	I	Peak Flow,	Existing / Proposed Stepped Channel and Drain															
Upstream Manhole/ Catchpit	Downstream Manhole/ Catchpit	Catchment Ref.	Unpaved	Paved	Factored Area A, (m^2)	(min.)	(min.)	(min.)	(mm/hr)	Q (m^3/s)	Channel / Drain	Width (mm)	Depth (mm)	Wetted Area A (m^2)	Wetted Perimeter P (m)	Hydraulic Radius R (m)	Length (m)	UP_GL (mPD)	DN_GL (mPD)	UP_INV (mPD)	DN_INV (mPD)	Gradient (S)	VEL (m/s)	CAP (m^3/s)	F/C (%)	Adequate Capacity?
U/S U/C	CP-1	A1	662	0	232	1.00	0.23	1.23	308.10	0.020	225UC	225	225	0.045	0.578	0.08	43.1	11.000	9.000	10.775	8.775	0.046	3.07	0.139	14%	Y
CP-1	CP-2	A1 + A2	974	0	341	1.23	0.19	1.43	302.71	0.029	225UC	225	225	0.045	0.578	0.08	45.8	9.000	5.500	8.775	5.275	0.076	3.95	0.178	16%	Y
CP-2	CP-3	A1 + A2	974	0	341	1.43	0.09	1.52	300.30	0.028	225UC	225	225	0.045	0.578	0.08	16.1	5.500	4.800	5.275	4.575	0.043	2.98	0.134	21%	Y
U/S U/C	CP-4	B1	1147	0	402	1.00	0.17	1.17	309.85	0.035	225SC	225	225	0.045	0.578	0.08	52.0	18.000	9.000	17.775	8.775	0.173	5.00	0.226	15%	Y
U/S U/C	CP-4	B1	1147	0	402	1.00	0.13	1.13	311.24	0.035	225SC	225	225	0.045	0.578	0.08	37.9	16.000	9.000	15.775	8.775	0.185	5.00	0.226	15%	Y
CP-4	EX OUTFALL	B1	1147	0	402	1.17	0.03	1.20	309.07	0.034	22SUC	225	225	0.045	0.578	0.08	8.0	9.000	7.000	8.775	6.775	0.251	5.00	0.226	15%	Y
U/S U/C	CP-5	C1	1919	0	672	1.00	0.06	1.06	313.12	0.058	22SUC	225	225	0.045	0.578	0.08	8.4	8.400	8.200	8.175	7.975	0.024	2.20	0.099	59%	Y
U/S U/C	CP-5	C1	1919	0	672	1.00	0.27	1.27	307.00	0.057	22SUC	225	225	0.045	0.578	0.08	75.1	16.000	8.200	15.775	7.975	0.104	4.60	0.208	28%	Y
CP-5	CP-6	C1	1919	0	672	1.06	0.10	1.16	310.17	0.058	22SUC	225	225	0.045	0.578	0.08	17.1	8.200	7.500	7.975	7.275	0.041	2.89	0.130	44%	Y

Existing Drainage Checking

Manhole/Catchpit Ref		Contributing	Area (m^2)			T_o	T_f	T_c	I	Peak Flow,	Existing / Proposed Stepped Channel and Drain															
Upstream Manhole/ Catchpit	Downstream Manhole/ Catchpit	Catchment Ref.	Unpaved	Paved	Factored Area A, (m^2)	(min.)	(min.)	(min.)	(mm/hr)	Q (m^3/s)	Channel / Drain	Width (mm)	Depth (mm)	Wetted Area A (m^2)	Wetted Perimeter P (m)	Hydraulic Radius R (m)	Length (m)	UP_GL (mPD)	DN_GL (mPD)	UP_INV (mPD)	DN_INV (mPD)	Gradient (S)	VEL (m/s)	CAP (m^3/s)	F/C (%)	Adequate Capacity?
Existing 450UC		E1, E2, E3, E4	2837	0	993	1.00	0.28	1.28	306.86	0.085	450UC	450	450	0.181	1.157	0.16	38.0	5.400	5.000	4.950	4.550	0.011	2.28	0.413	20%	Y
Existing 300UC		F1, F2	1853	0	649	1.00	0.09	1.09	312.41	0.056	300UC	300	300	0.080	0.771	0.10	9.0	8.000	8.000	7.700	7.610	0.010	1.72	0.138	41%	Y
Existing 300UC		G1, G2, G3, G4	3785	0	1325	1.00	0.20	1.20	309.13	0.114	300UC	300	300	0.080	0.771	0.10	36.2	8.000	4.800	7.300	6.160	0.031	3.05	0.245	46%	Y

Appendix E

Sewerage Impact Assessment

ARUP

Application for Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131) to Rezone the Application Site from "Green Belt" to "Residential (Group C)1" for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung

Sewerage Impact Assessment

Reference:

2 | 9 January 2024

Job number 282344

Arup Hong Kong Limited
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Contents

Appendices

1. Introduction

1.1 Background

Arup Hong Kong Limited was commissioned to conduct a Sewerage Impact Assessment (SIA) to support the Section 12A Planning Application for Proposed House Development at Various Lots in D.D. 244, Nam Pin Wai, Sai Kung.

The Application Site is located within a "Green Belt" ("GB") zone on the Approved Ho Chung Outline Zoning Plan No. S/SK-HC/11.

1.2 Objective

The objective of this report is to provide an assessment of the impact of wastewater flow generation as a result of the Proposed Development at the Application Site on the connecting the existing public sewerage system and to propose mitigation measures (if any).

1.3 Reference Materials

In evaluating the sewerage impact arising from the Proposed Development, the following sources of information have been specifically referred to:

- Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning (Version 1.0) - Report No.: EPD/TP 1/05 issued by Environmental Protection Department (EPD);
- Sewerage Manual – Key Planning Issues and Gravity Collection System (Third Edition) issued by Drainage Services Department in May 2013;
- Employment density shall refer to Commercial and Industrial Floor Space Utilization Survey published by PlanD; and
- Drainage Record Plans obtained from the GeoInfo Map services of the Lands Department (https://www.map.gov.hk/gm/?lg=en)

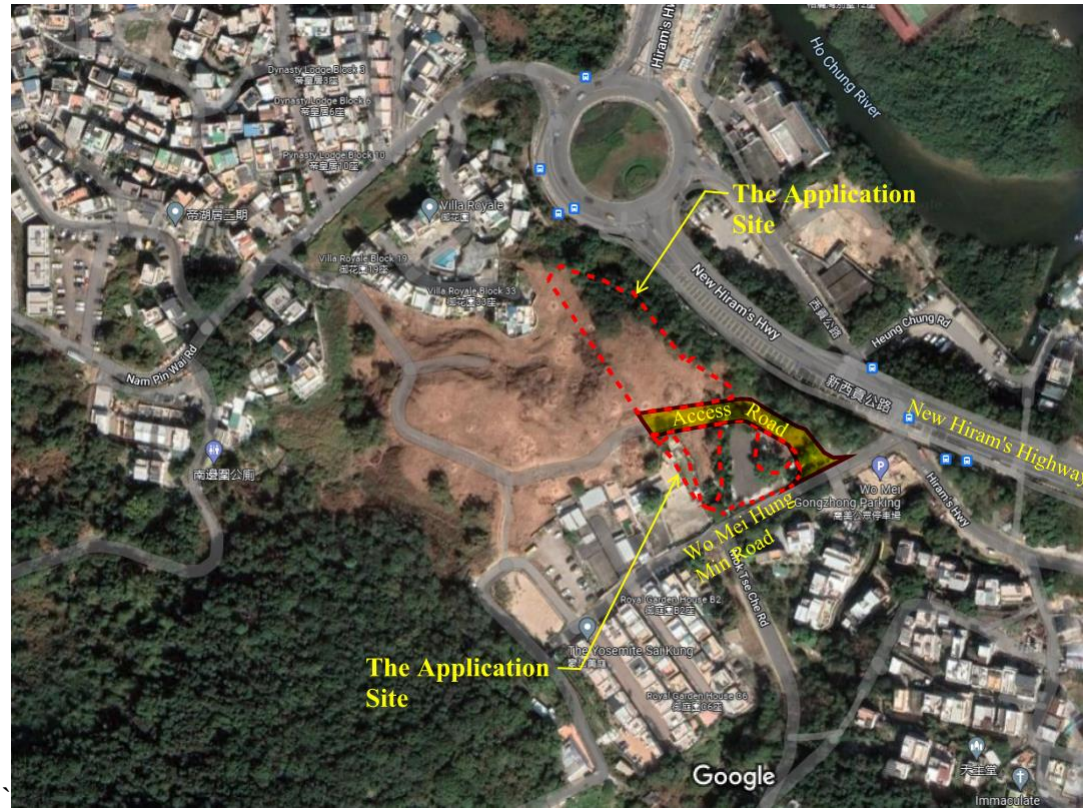
2. The Proposed Development

Master Layout Plan showing the proposed development is attached in **Appendix A – Plan 1**. A table showing the Proposed Development parameters is shown in table below:

Proposed Development	**Site Particulars**
Project	Application for Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131) to Rezone the Application Site from "Green Belt" to "Residential (Group C)1" for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung
Location	Nam Pin Wai Sai Kung
Land Use Zoning	"Green Belt" ("GB")
Development Site Area excluding Access Road (About)	5,355m^2
Domestic GFA (About)	4,016m^2

No. of House	17
Clubhouse GFA (About)	151 m^2

Below is an aerial photograph of the Application Site.



3. Sewerage Impact Assessment for the Proposed Development

3.1 Existing Sewerage Network

There is no existing public sewer in the vicinity of the Application Site as per Drainage Record Plan obtained from the GeoInfo Map services of the Lands Department.

3.2 Population of Proposed Development

The prediction for the Proposed Development sewage generation has been based on the information extracted from the development schedule in **Section 2** above. The quantity of sewage generated by the Proposed Development depends on the number of population with unit flow factor of Private R3 development.

For easy reference, a table showing the sewage generation of the Proposed Development is calculated based on the guideline set in EPD Guideline for Estimating Sewage Flows for planning catchment level sewage infrastructure, Guidelines for the Design of Small Sewage Treatment Plants and is shown in **Appendix B** – **Table T1** and summarized in below table.

Proposed Development	Parameters
Domestic GFA (About)	4,016
No. of Houses	17
No. of Residents	51
Unit Flow Factor (m^3/person/day) for Private R3	0.37
Average Dry Weather Flow for Residents (m^3/day)	18.87
Clubhouse GFA (m^2) (About)	151
Number of Employee	8
Unit Flow Factor for Restaurant (m^3/person/day)	1.58
Average Dry Weather Flow for Clubhouse (m^3/day)	12.64
Total Average Dry Weather Flow (m^3/day)	31.51
Contributing Population	117
Global Peaking Factor for Private Sewage Treatment Works	6.0
Global Peaking Factor (excluding stormwater allowance) for Private Sewerage System within the Subject Site	6.0
Peak Flow for Sewage Treatment Works (L/s)	2.19
Peak Flow for Gravity Sewer (L/s)	2.19

3.3 Private Sewage Treatment Plant

In view of the lack of a public sewerage system in the vicinity of the Application Site, it is proposed to provide a private sewage treatment plant with treatment level reaching the secondary level plus disinfection as an alternative option and dispose treated effluent of a standard acceptable to EPD to the proposed drainage system along the access road. Design of the private sewage treatment plant will make reference to the "Guidelines for the Design of Small Sewage Treatment Plants (the Guidelines)" published by the EPD. A tentative location for the private sewage treatment plant is shown on the Master Layout Plan and is subject to detailed site planning. It is considered to be an acceptable alternative option prior to any future improvement to sewage infrastructure in the vicinity of the Application Site. The private sewage treatment plant should be designed in such a way that it is capable of handling the daily and peak sewage flow arising from the proposed development. Should public sewerage be available in future, we would modify the sewerage system to facilitate the sewerage connection subject to submission of a separate Sewerage Impact Assessment to EPD and DSD for approval prior to the connection.

Adopting the peaking factor of 6 in Table T-5 of EPD Report No. EPD/TP 1/05, the peak flow for sewers from the proposed development is estimated as 2.19 l/s. A 225mm diameter sewer of 1 in 100 minimum gradient is sufficient to convey the sewage from the proposed development to the private sewage treatment plant and the treated effluent from the private treatment plant to the proposed drainage along the future access road. **Appendix B** – **Table T2** shows the capacity checking of the proposed sewer from the proposed development to the private sewage treatment plant with the proposed sewerage plan shown in **Appendix A – Plan 2**.

As regards the standard of acceptance of the treated effluent to minimize pollution, Table 7 of the "Technical Memorandum Standards for Effluent Discharged into Drainage and Sewerage Systems, Inland and Coastal

Waters" for Port Shelter Area shall be followed. EPD will be consulted on the treatment proposals during the detailed site planning and the discharged effluent standard required.

4. Conclusion

In view of the lack of a public sewerage system in the vicinity of the Application Site, it is proposed to provide a private sewage treatment plant with treatment level reaching the secondary level plus disinfection as an alternative option and dispose treated effluent of a standard acceptable to EPD to the proposed drainage system along the access road.

Design of the private sewage treatment plant will make reference to the "Guidelines for the Design of Small Sewage Treatment Plants (the Guidelines)" published by the EPD.

The private sewage treatment plant should be designed in such a way that it is capable of handling the daily and peak sewage flow arising from the proposed development. Should public sewerage be available in future, we would modify the sewerage system to facilitate the sewerage connection subject to submission of a separate Sewerage Impact Assessment to EPD and DSD for approval prior to the connection.

As regards the standard of acceptance of the treated effluent to minimize pollution, Table 7 of the "Technical Memorandum Standards for Effluent Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters" for Port Shelter Area shall be followed. EPD will be consulted on the treatment proposals during the detailed site planning and the discharged effluent standard required.

Appendix A

Plan

LEGEND

- Application Site
- Development Site
- Phase 1
- Remaining Phase

MARK	DATE	BY	REV.
-	26/01/2023	IP	F

JOB TITLE

Application for Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131) to Rezone the Application Site from "Green Belt" to "Residential (Group C)1" for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung

DRAWING TITLE

Master Layout Plan

DRAWING STATUS

FOR INFORMATION

ARUP

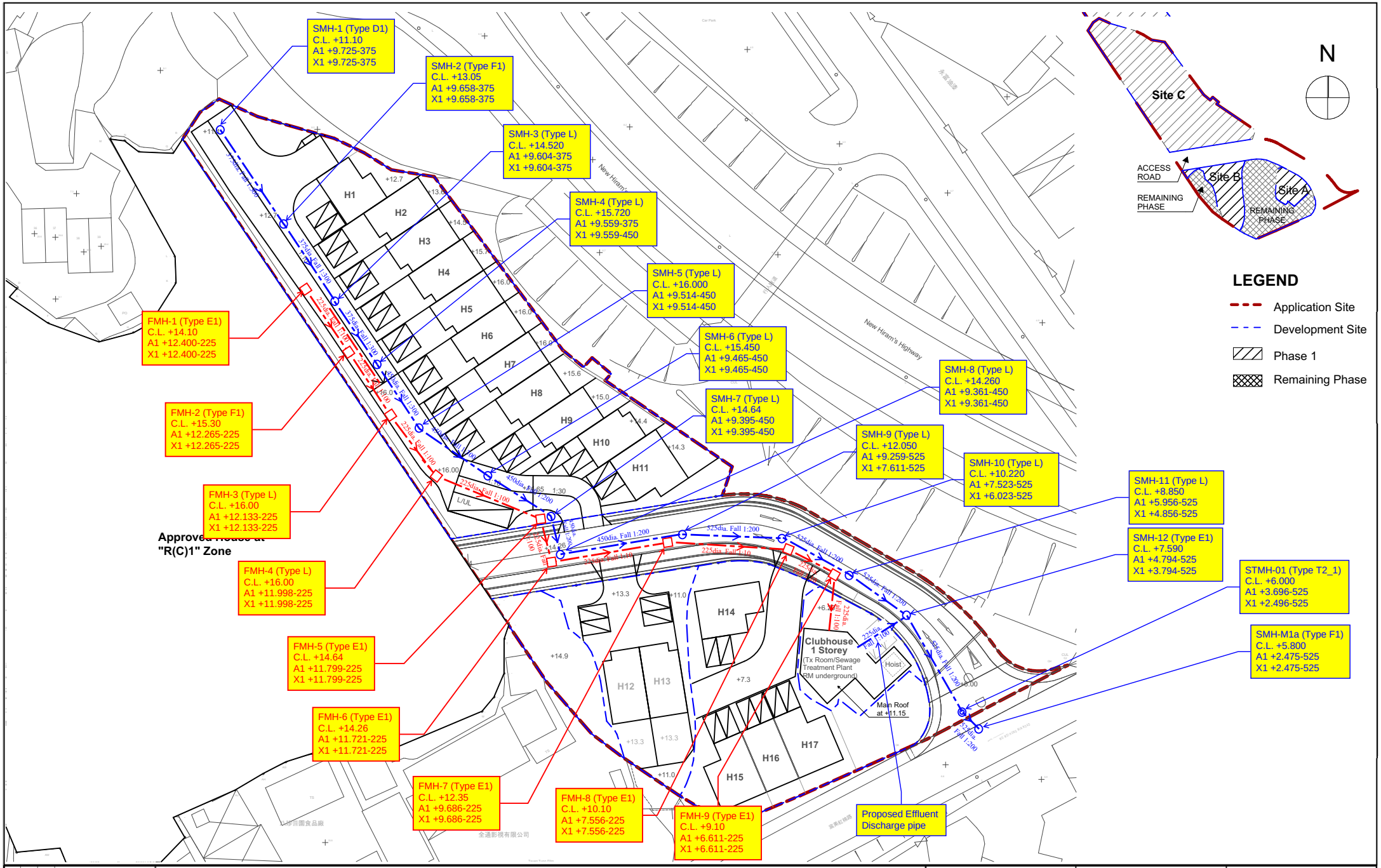
SCALE 1:600@A3

DRN. IP DATE 17/1/2023 CHD. CC PASSED. CC

JOB NO. 282344

DRAWING NO. PLAN 1

REV.



JOB TITLE	Application for Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131) to Rezone the Application Site from "Green Belt" to "Residential (Group C)1" for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung	DRAWING TITLE	Proposed Drainage and Sewerage Layout within Site
DRAWING STATUS	FOR INFORMATION	JOB NO.	282344
DRAWING NO.	PLAN 2	REV.	

ARUP

SCALE 1:600@A3 | DRN. IP | DATE 17/1/2023 | CHD. CC | PASSED. CC

MARK | DATE | BY | REV.
- | 28/2/2023 | IP | F

Appendix B

Calculation

TABLE B1
Estimation of Sewage Flows Estimation for Proposed Development

Design Code
1. Based on EPD Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning.
2. Guidelines for the Design of Small Sewage Treatment Plants.

Design Assumption:
Global Peaking Factor, P (Including Stormwater Allowance) as per Table T-5
Global Unit Flow Factors as per Tables T-2 and T-3
Catchment Inflow Factor for Sai Kung (PCIF = 1.30) as per Table T-4

Development Schedule

Sewage Flow Estimates	Estimation	Remark
Proposed Development		
Domestic		
Number of Houses	17	Based on Development Schedule
Number of Residents (3 persons for house)	51	
Unit flow factor (m^3/person/day)	0.37	Table T-1 of GESF - Private R3
ADWF (m^3/day)	18.87	
Clubhouse		
GFA (m^2)	151	Based on Development Schedule
Worker Density (Number of Worker per 100m^2 GFA)	5.1	Restaurant
Number of Employee	8	
Unit flow factor (m^3/person/day)	1.58	Table T-2 of GESF - J10 Restaurant and Hotel
ADWF (m^3/day)	12.64	
Total ADWF (m^3/day)	31.51	
Contributing Population	117	
Global Peaking Factor for Sewage Treatment Works	6	Para 3.3 of the "Guidelines for the Design of Small Sewage Treatment Plants"
Global Peaking Factor (excluding stormwater allowance) for Sewers	6	Table T-5 of GESF
Peak Flow (L/s) for Sewage Treatment Works	2.19	
Peak Flow (L/s) for Gravity Sewers	2.19	

Notes:
Employment density shall refer to Commercial and Industrial Floor Space Utilization Survey published by PlanD.
Restaurant = 5.1 employee per 100m^2 of GFA

Table B2 - Capacity Performance of Proposed Sewer

Notes:
(1) Calculate by Colebrook-White Equation

$$\overline{V} = -\sqrt{32gRS_f}\,\log\left[\frac{k_s}{14.8R} + \frac{1.255\nu}{R\sqrt{32gRS_f}}\right]$$

where ks is roughness value is 3mm for sewer.
ν is kinematic viscosity of fluid = 1.14 x 10-6 m2/s and g is the gravity = 9.81m/s2
V is the velocity, D is the diameter of the sewer and S is the gradient of the sewer.

Abbreviation:

UP_MAN	Upstream Manhole	CON_POP	Contributing Population	DN_GL	Downstream Ground Level	CAP	Peak Pipe Capacity
DN_MAN	Downstream Manhole	DIA	Diameter	UP_INV	Upstream Invert Level	F/C	Peak Flow/Capacity
ADWF	Average Dry Weather Flow	LEN	Length	DN_INV	Downstream Invert Level		
ACC_ADWF	Accumulated Average Dry Weather Flow	UP_GL	Upstream Ground Level	VEL	Peak Pipe Velocity		

Proposed Development

Manhole		Catchment	CON_POP	PEAKING FACTOR	ACC_ADWF	Peak Flow	Proposd Sewer										
UP_MAN No.	DN_MAN No.				(L/s)	(L/s)	DIA (D) (mm)	LEN (m)	UP_GL (mPD)	DN_GL (mPD)	UP_INV (mPD)	DN_INV (mPD)	Gradient (S)	VEL (m/s)	CAP (L/s)	F/C (%)	Adequate Capacity?
FMH-1	FMH-2	Proposed Development	117	6	0.36	2.19	225	13.5	13.90	15.30	12.400	12.265	100	1.02	40.68	5.4%	YES
FMH-2	FMH-3		117	6	0.36	2.19	225	13.2	15.30	16.00	12.265	12.133	100	1.02	40.68	5.4%	YES
FMH-3	FMH-4		117	6	0.36	2.19	225	13.5	16.00	15.60	12.133	11.998	100	1.02	40.68	5.4%	YES
FMH-4	FMH-5		117	6	0.36	2.19	225	19.9	15.60	14.40	11.998	11.799	100	1.02	40.68	5.4%	YES
FMH-5	FMH-6		117	6	0.36	2.19	225	7.8	14.40	14.26	11.799	11.721	100	1.02	40.68	5.4%	YES
FMH-6	FMH-7		117	6	0.36	2.19	225	20.4	14.26	12.35	11.721	9.686	10	3.24	128.90	1.7%	YES
FMH-7	FMH-8		117	6	0.36	2.19	225	21.3	12.35	10.10	9.686	7.556	10	3.24	128.90	1.7%	YES
FMH-8	FMH-9		117	6	0.36	2.19	225	9.5	10.10	9.10	7.556	6.611	10	3.24	128.90	1.7%	YES
FMH-9	On-site Sewage Treatment Plant		117	6	0.36	2.19	225	10.2	9.10	9.10	6.611	6.509	100	1.02	40.68	5.4%	YES

Appendix F

Archaeological Baseline Review Report

Application for Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131) to Rezone the Application Site from "Green Belt" to "Residential (Group C)1" for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung
Archaeological Review Consultancy

Archaeological Baseline Review Report

May 2024

Version: 5	Date: 21 May 2024

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1 INTRODUCTION

1.1 Project Background

1.1.1 The Project Proponent is preparing to the Town Planning Board a Planning Application under Section 12A of the Town Planning Ordinance (Cap. 131) for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung.

1.1.2 The Application Site is located to the west of the New Hiram's Highway and is situated in a predominantly low-dense residential neighbourhood (**Figure 1** refers). Currently, majority part of the Application Site is vacant, except the approved access road (approved with conditions by the TPB under planning application No. A/SK-HC/223) connecting to the adjoining house development (with approved General Building Plan for 51 houses) which are both under construction.

1.1.3 AECOM is employed to carry out this Archaeological Review Consultancy to review potential impacts on archaeological resources within the Application Site and recommend mitigation measures if adverse impact arises in supporting the abovementioned Section 12A Application.

1.2 Structure of the Report

1.2.1 Following this introductory section, the structure of this Archaeological Review Report is set out as follows:

- Section 2 states the aims and objective, set the methodology, and mentions relevant legislations, standards and guidelines of this archaeological review;
- Section 3 establishes the baseline of the Application Site;
- Section 4 presents the field scanning results;
- Section 5 discusses the archaeological potential of the Application Site;
- Section 6 recommends mitigation measures of any adverse impacts to the archaeology at the Application Site;
- Section 7 concludes the findings of this report; and
- Section 8 lists the bibliography and glossary of this report.

2 APPLICATION SITE, AIMS AND OBJECTIVES, METHODOLOGY AND RELEVANT CULTURAL HERITAGE LEGISLATIONS

2.1 Application Site

2.1.1 The Application Site is located Lot D. D. 244 and adjoining Government Land on the western side of New Hiram's Highway near to the roundabout at Nam Pin Wai, Sai Kung (*Application Site* on **Figure 1** refers). It is bounded by the New Hiram's Highway to the east, Wo Mei Hung Min Road to the south, existing built-up area to the northwest (Villa Royale) and south (villages in Wo Mei).

2.2 Aims and Objectives

2.2.1 The aim of this archaeological review is:

i. To establish the up-to-date baseline conditions, especially to summarise the past archaeological findings of this area for a holistic understanding of the Application Site; and
ii. To assess the impact of the proposed works to the archaeology within the Application Site.

2.2.2 In order to achieve the aims of this archaeological review, the objectives are:

a. to conduct a baseline review through desktop research and field scanning of the Application Site;
b. to discuss the archaeological potentials within the Application Site;
c. to recommend mitigation measures should the development cause disturbance to the archaeology of the Application Site; and
d. to report findings in this Archaeological Review Report.

2.3 Methodology

2.3.1 Baseline review comprises of desktop research and field scanning.

2.3.2 Desktop research is done through understanding the geography, history, and archaeology of the Application Site at Nam Pin Wai. Information from available literature, maps and photographs are used to establish the fundamental archaeological condition of Nam Pin Wai through non-destructive means.

2.3.3 Field scanning identifies archaeological phenomena on site, noting particularly the topography and existing surface conditions without conducting destructive excavations. The field scanning could ascertain the desktop findings regarding the archaeology of the Application Site.

2.3.4 Impact assessment is conducted taking into accounts the results of the baseline review and the deduced archaeological potential at the Application Site. Mitigation measure is recommended if the proposed works would cause disturbance to the archaeology of the Application Site. The recommendation to be made is based on the significance of the archaeology.

2.4 Cultural Heritage Legislation, Standards and Guidelines

2.4.1 Legislation, standards and guidelines relevant to the consideration of archaeology under this baseline study includes the following:

- Antiquities and Monuments Ordinance (Cap. 53);

- Environmental Impact Assessment Ordinance (Cap. 499) and Technical Memorandum;
- Hong Kong Planning Standards and Guidelines;
- Guidelines for Cultural Heritage Impact Assessment.

Antiquities and Monuments Ordinance (Cap. 53)

2.4.2 The Antiquities and Monuments Ordinance provides the statutory framework for the preservation of objects of historical, archaeological and palaeontological interest.

2.4.3 The Ordinance contains the statutory procedures for the Declaration of Monuments. Under the Ordinance, monument means a place, building, site or structure which is declared to be a monument, historical building, archaeological or palaeontological site or structure because of its historical, archaeological or palaeontological significance under Section 3 of the Ordinance.

2.4.4 Under Section 6 and subject to Subsection (4) of the Ordinance, the following acts are prohibited in relation to certain monuments, except under permit granted by the Secretary for Development:

- To excavate, carry on building works, plant or fell trees or deposit earth or refuse on or in a proposed monument or monument; or
- To demolish, remove, obstruct, deface or interfere with a proposed monument or monument.

2.4.5 The discovery of an antiquity, as defined in the Ordinance, must be reported to the Antiquities Authority, or a designated person. The Ordinance also provides that, the ownership of every relic discovered in Hong Kong after the commencement of this Ordinance shall vest in the Government from the moment of discovery. The Authority on behalf of the Government may disclaim ownership of the relic.

2.4.6 No archaeological excavation can be carried out by any person, other than the Authority and the designated person, without a licence issued by the Authority. A licence will only be issued if the Authority is satisfied that the applicant has sufficient scientific training or experience to enable him to carry out the excavation and search satisfactorily, is able to conduct, or arrange for, a proper scientific study of any antiquities discovered as a result of the excavation and search, with sufficient staff and financial support.

Environmental Impact Assessment Ordinance (Cap. 499) and Technical Memorandum

2.4.7 The *Environmental Impact Assessment Ordinance and Technical Memorandum* stipulates that consideration must be given to issues associated with built heritage and archaeology as part of the EIA process. Schedule 1 Interpretation of the Environmental Impact Assessment Ordinance (EIAO) defines "Sites of Cultural Heritage" as "an antiquity or monument, whether being a place, building, site or structure or a relic, as defined in the Antiquities and Monuments Ordinance and any place, building, site, or structure or a relic identified by AMO to be of archaeological, historical or paleontological significance".

2.4.8 The *Technical Memorandum on Environmental Impact Assessment Process* (EIAO-TM) identifies a general presumption in the favour of the protection and conservation of all sites of cultural heritage and requires impacts upon sites of cultural heritage to be 'kept to the absolute minimum'. Annex 10 and 19 of the EIAO-TM outline criteria for evaluating the impacts on sites of cultural heritage and guidelines for impact assessment, respectively.

Hong Kong Planning Standards and Guidelines (March 2017 Edition)

2.4.9 The *Hong Kong Planning Standards and Guidelines* aim to protect Declared Monuments, historic buildings, Sites of Archaeological Interest and other heritage items including old street furniture, commemorative tablets, foundation stones, boundary stone, milestone, etc.

2.4.10 In addition, the preservation of Site of Archaeological Interest should be a priority in consideration. Where residual impacts are acceptable, ameliorative measures are carried out in order to incorporate the monument or recorded item and to conserve its heritage values and significance.

Guidelines for Cultural Heritage Impact Assessment

2.4.11 The Guidelines outline the technical requirements in assessing impact on archaeological and built heritage. The guidelines put preservation in totality as the first priority. Mitigation measure should be proposed in cases with identified impacts, and if this is not feasible due to site constraints or other factors, full justification must be provided.

3 BASELINE REVIEW OF THE APPLICATION SITE

3.1 Geographical and Geological Background

3.1.1 The Application Site is located at D. D. 244 and adjoining Government Land. It is situated at the south of Ho Chung River flood plain and the estuarine area of Ho Chung valley. Village settlements in proximity are Nam Wai at the east, Wo Mei at the south, Nam Pin Wai at the west, and Ho Chung at the north. Hills in proximity are the Hebe Knoll at the west and Mo Tse Che in the south. Nam Wai Site of Archaeological Interest and Ho Chung Site of Archaeological Interest are located at the east and the west of the Application Site respectively (**Figure 2**)[1].

3.1.2 The Application Site sits on a small hill slope at elevation between approximately +8mPD and +19mPD. It is adjacent to the alluvial flood plain at elevation between +4mPD and +12mPD. The superficial geological deposits of the Application Site and the adjacent Ho Chung River flood plain are mainly colluvial debris flow deposit (Qd) and alluvium (Qfa) (**Figure 3**)[2].

3.1.3 The Application Site and its surroundings were mainly farmland with a mixture of cultivation and paddy field in the early days. In the historical map of 1913, the Application Site and the surroundings, i.e. Ho Chung, Wo Mei Tsuen and Nam Wai were rice fields, with settlement recorded in Ho Chung (**Figure 4**)[3].

3.1.4 Records of the Application Site in 1950s to 1960s show that the land use of the area remained agricultural with limited industrial use. The farmland is observed in form of fields and terraced field on low lying flat lands and on hill sides in the aerial photo taken in 1956 (**Figure 5**)[4]. The Application Site was identified as cultivation and paddy fields, with part of it located at the Luen Tai Farm.

3.1.5 Factories were identified in the topographic map of 1959, including 2 preserved fruit factories to the east of the Application Site, a soy factory to the north, and a rubber cloth factory to the far northeast. Nam Pin Wai and Wo Mei Tsuen village settlements also were recorded (**Figure 6**)[5].

3.1.6 In the aerial photo of 1963, the Application Site was covered with vegetations surrounded by terraced fields (**Figure 7**)[6]. The surroundings had both agricultural, industrial, and residential activities.

3.1.7 In the topographic map of 1980, change of land use has been observed. While agricultural and industrial activities were still active with another factory and bakery recorded near Luen Tai Farm, residential development had started taking over the land use of the area. Village expansion was recorded in Nam Pin Wai at the west of the Application Site, while Berkeley Bay Villa was built at the north of the Application Site. Added to that, reclamation was recorded along the south of the Application Site at the other side of New Hiram's Highway, and at Pak Sha Wan (Hebe Haven), indicating the demand for land for development in the area. On the other hand, Immaculate Conception Chapel at Wo Mei Tsuen and Tsung Tsin Mission

[1] Survey and Mapping Office, Lands Department (2019). *Topographic Map in 2019 [map]. 1:4000. 11-NE-5A.* Survey and Mapping Office, Lands Department
[2] Geotechnical Engineering Office, Civil Engineering and Development Department (2012). *Hong Kong Geological Survey: Hong Kong and Kowloon Sheet 11, 1:20,000 [map]. HGM (S&S) Sheet 11.* Survey and Mapping Office, Lands Department.
[3] Great Britain War Office (1913). *Hong Kong and part of Leased Territory [Map]. 2.5 inches:1 mile. MAP G7940 1913.* National Library of Australia. Retrieved from http://nla.gov.au/nla.obj-233534102.
[4] Survey and Mapping Office, Lands Department (1956). *Digital Aerial Photo [photo]. 1:10020.167900 (ft). F21_554-0036.* Survey and Mapping Office, Lands Department.
[5] Survey and Mapping Office, Lands Department (1959). *Topographic Map in 1959 [map]. 1:1,200. 164-NW-D.* Survey and Mapping Office, Lands Department.
[6] Survey and Mapping Office, Lands Department (1963). *Digital Aerial Photo [photo]. 1:7800. 3900 (ft). 1963-8937.* Survey and Mapping Office, Lands Department.

of Hong Kong Wo Mei Church were recorded, which are related to the missionary history of the area (please refer to the Historical Background section). The Application Site was still mainly agricultural (**Figure 8**)[7].

3.1.8 In the aerial photo of 1993, while the surroundings remain largely greenery and, the higher ground of the current Application Site has seen obvious site disturbance (**Figure 9)**[8]. Site formation is visible on the aerial photo, which turned the location into an open storage space. On the other hand, the surrounding areas largely remains the same, with the exception that the previous cultivation fields seem to be largely abandoned.

3.1.9 In the topographic map of 2003, the area had turned from agricultural to residential, with limited industrial activities. Residential development at Nam Pin Wai, Wo Mei Village, Ho Chung New Village, Heung Chung, Pak Sha Wan (Hebe Haven) was recorded. For industrial activities, Pat Chun Foods & Soy Factory and Tsuen Tung Film & TV Limited were recorded at the east and south of the Application Site respectively. Pat Chun Foods & Soy Factory is probably the soy factory recorded the north of the Application Site in the topographic map in 1959, which has moved from the north of the nowadays Hiram's Highway's roundabout to the south of the Application Site. The factory at southeast has been turned into a car park. In terms of infrastructure, the construction of New Hiram's Highway and its roundabout was recorded. Nam Pin Wai Road was built. The Application Site was no longer a farmland. Part of it had become Glowell Garden (**Figure 10**)[9]. It is noteworthy that a grave is recorded at the Application Site until September 2013[10].

3.1.10 In the aerial photo of 2005, residential development continued, and Villa Royale was built at the north of the Application Site. The Application Site was primarily covered with vegetations, with a dumping area and some building structures at the south in which the slope and vegetations were likely altered (**Figure 11**)[11].

3.1.11 In the aerial photo of 2016, it is visible that the slope had been altered and the vegetations had been moved due to the archaeological excavation in September and October 2015 (**Figure 12**)[12].

3.1.12 In the topographic map of 2019, more new residential development was found in Wo Mei and Heung Chung at the east, and New Ho Chung Village at the north, including Royal Garden and The Yosemite at Wo Mei, Roseville Villas and Royal Bay at Heung Chung and Dynasty Lodge at Ho Chung. Villa Royale at the north of the Application Site was also built (**Figure 2**)[13].

3.1.13 There is possible hill slope change over the years due to development and land use changes, though no substantial elevation change is recorded at the Application Site and its surroundings (**Tables 3.1** and **3.2**). The topsoil and subsoil of the Application Site have potentially been altered/removed in previous agricultural activities, archaeological excavation as well the change in land use over time.

[7] Survey and Mapping Office, Lands Department (1980). *Topographic Map in 1980 [map]. 1:1000. 11-NE-5A.* Survey and Mapping Office, Lands Department.
[8] Survey and Mapping Office, Lands Department (1993). *Digital Aerial Photo [photo]. CN04611*. Survey and Mapping Office, ands Department.
[9] Survey and Mapping Office, Lands Department (2003). *Topographic Map in 2003 [map]. 1:1000. 11-NE-5A.* Survey and Mapping Office, Lands Department.
[10] Survey and Mapping Office, Lands Department (2013). *Topographic Map in 2013 [map]. 1:1000. 11-NE-5A.* Survey and Mapping Office, Lands Department.
[11] Survey and Mapping Office, Lands Department (2005). *Digital Aerial Photo [photo]. 1:5000. 2500 (ft). CW64568.* Survey and Mapping Office, Lands Department.
[12] Survey and Mapping Office, Lands Department (2016). *Digital Aerial Photo [photo]. 1:6000. 6000 (ft). CS62839.* Survey and Mapping Office, Lands Department.
[13] Survey and Mapping Office, Lands Department (2019). *Topographic Map in 2019 [map]. 1:4000. 11-NE-5A.* Survey and Mapping Office, Lands Department.

3.1.14 The geographical and geological background of the Application Site is summarized as **Table 3.1**, and the land use changes of the Application Site and its surroundings is summarized as **Table 3.2**.

Table 3.1 Summary of Geographical and Geological background

		Alluvial flood plain	**Colluvial hillslope**
Elevation	**1959**	+4mPD to +12mPD	+8mPD to +19mPD
	2003	+4mPD to +10mPD	+8mPD to +19mPD
	2019	+3mPD to +10mPD	+8mPD to +19mPD
Average gradient		2.1°	11.3° to 34°
Superficial Deposits		Colluvial debris flow deposit (Qd); Alluvium (Qa)	Colluvial debris flow deposit (Qd); Alluvium (Qa)
Solid Geology (Figure 3)[14]		Coarse ash crystal tuff (Krd_cat) Krc_e) Tuff breccia (Krd_tb) Eutaxitic fine ash vitric tuff (Krc_fvt) Tuffaceous sandstone and siltstone (Krc_st)	Coarse ash crystal tuff (Krd_cat) Krc_e)

[14] Geotechnical Engineering Office, Civil Engineering and Development Department (2012). *Hong Kong Geological Survey: Hong Kong and Kowloon Sheet 11, 1:20,000 [map]. HGM (S&S) Sheet 11.* Survey and Mapping Office, Lands Department.

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Table 3.2 Summary of Land Use Observations from Maps and Aerial Photos between 1866 and 2019

Location / Year	APPLICATION SITE	EAST OF THE APPLICATION SITE (NAM WAI)	SOUTH OF THE APPLICATION SITE (WO MEI)	WEST OF THE APPLICATION SITE (NAM PIN WAI)	NORTH OF THE APPLICATION SITE (HO CHUNG)
1866 Figure 13[15]	➢ Not specified	➢ Village settlement	➢ Village settlement	➢ Not specified	➢ Village settlement
1898 Figure 14[16]	➢ Not specified	➢ Village settlement	➢ Village settlement	➢ Not specified	➢ Village settlement
1913 Figure 4[17]	➢ Rice fields	➢ Rice fields ➢ Village settlement	➢ Rice fields ➢ Chinese settlement	➢ Rice fields ➢ Chinese settlement	➢ Rice fields ➢ Chinese settlement
1922 Figure 14[18]	➢ Not specified	➢ Village settlement	➢ Village settlement	➢ Village settlement	➢ Village settlement
1956 Figure 5[19]	➢ Vegetations ➢ Fields and terraced fields	➢ Vegetations ➢ Fields and terraced fields ➢ Village settlement	➢ Vegetations ➢ Fields and terraced fields ➢ Village settlement	➢ Vegetations ➢ Fields and terraced fields	➢ Fields and terraced fields
1959 Figure 6[20]	➢ Cultivation and paddy field, with part	➢ Cultivation and paddy fields	➢ Cultivation and paddy fields	➢ Cultivation and paddy fields	➢ Cultivation and paddy fields

[15] Brockhaus, F. A. & Volonteri, S. (1866). *Map of the San-On District, (Kwangtung Province) drawn from actual observations made by an Italian Missionary of the Propaganda in the course of his professional labors during a period of four years: being the first and only map hitherto published.* National Library of Australia. Retrieved from http://nla.gov.au/nla.obj-231220841.
[16] Land Registry Office. (1899). *Map of Hong Kong and of the Territory leased to Great Britain under the Convention between Great Britain and China signed at Peking, 1898 [map]. 1: 84480. ref HKRS207-12-51.* Retrieved from Hong Kong Public Records Office https://search.grs.gov.hk/en/search.xhtml?q=+HKRS207-12-51.
[17] Great Britain. War Office. (1913). *Hong Kong and part of Leased Territory [Map]. 2.5inches:1mile. MAP G7940 1913.* National Library of Australia. Retrieved from http://nla.gov.au/nla.obj-233534102.
[18] Great Britain. War Office. (1922). *The Colony of Hong Kong and New Territories [map]. 1:31,680. GSGS 2994.* The National Archives, Kew. Retrieved from http://discovery.nationalarchives.gov.uk/details/r/C3823350.
[19] Survey and Mapping Office, Lands Department (1956). *Digital Aerial Photo [photo]. 1:10020.167900 (ft). F21_554-0036.* Survey and Mapping Office, Lands Department.

Location / Year	APPLICATION SITE	EAST OF THE APPLICATION SITE (NAM WAI)	SOUTH OF THE APPLICATION SITE (WO MEI)	WEST OF THE APPLICATION SITE (NAM PIN WAI)	NORTH OF THE APPLICATION SITE (HO CHUNG)
	of it located at the Luen Tai Farm	➢ Village settlement ➢ 2 preserved fruit factories ➢ A fishpond	➢ Village settlement	➢ Village settlement	➢ Soy factory, rubber cloth factory
1963 Figure 7[21]	➢ Vegetations ➢ Terraced fields	➢ Cultivation and paddy fields ➢ Village settlement ➢ Factory	➢ Cultivation and paddy fields ➢ village settlement	➢ Cultivation and paddy fields ➢ Village settlement	➢ Cultivation and paddy fields ➢ Factory
1980 Figure 8[22]	➢ Cultivation	➢ Cultivation ➢ Heung Chung village settlement ➢ 2 Factories ➢ Football field ➢ Reclamation ➢ Tsung Tsin Mission of Hong Kong Wo Mei Church	➢ Cultivation ➢ Village settlement ➢ Factory and bakery recorded near Luen Tai Farm ➢ Immaculate Conception Chapel at Wo Mei Tsuen	➢ Cultivation ➢ Village settlement	➢ Cultivation ➢ Berkeley Bay Villa ➢ Factories ➢ Reclamation
1993 Figure 9[23]	➢ Site Formation on the upper hills	➢ Residential Developments	➢ Abandoned fields ➢ Village settlement	➢ Abandoned fields ➢ Village settlement	➢ Abandoned fields ➢ Ho Chung New Village
2003 Figure 10[24]	➢ Grave (till 2013 September)	➢ Heung Chung village settlement	➢ Village settlement ➢ Pat Chun Foods & Soy	➢ Village settlement	➢ Ho Chung New Village ➢ Pak Sha Wan (Hebe

[20] Survey and Mapping Office, Lands Department (1959). *Topographic Map in 1959 [map]. 1:1200. 164-NW-D.* Survey and Mapping Office, Lands Department.
[21] Survey and Mapping Office, Lands Department (1963). *Digital Aerial Photo [photo]. 1:7800. 3900 (ft). 1963-8937.* Survey and Mapping Office, Lands Department.
[22] Survey and Mapping Office, Lands Department (1980). *Topographic Map in 1980 [map]. 1:1000. 11-NE-5A.* Survey and Mapping Office, Lands Department.
[23] Survey and Mapping Office, Lands Department (1993). *Digital Aerial Photo [photo]. CN04611*. Survey and Mapping Office, ands Department.

Location / Year	APPLICATION SITE	EAST OF THE APPLICATION SITE (NAM WAI)	SOUTH OF THE APPLICATION SITE (WO MEI)	WEST OF THE APPLICATION SITE (NAM PIN WAI)	NORTH OF THE APPLICATION SITE (HO CHUNG)
	➢ Glowell Garden ➢ Temporary structure	➢ Berkeley Bay Villa ➢ New Hiram's Highway and its roundabout ➢ Sai Kung Central Primary School ➢ Winfield Paint Limited ➢ Red Wine Zone ➢ Ho Chung Football Field ➢ Reclamation ➢ Car Parks	Factory and Tsuen Tung Film & TV Limited		Haven) settlement ➢ Villa Royale/King's Park ➢ Dynasty Lodge ➢ Lee Kum Kee (Hong Kong) Limited ➢ Lee Seng Heng Fish's Gravy & Canning Factory Limited. ➢ Reclamation
2005 Figure 11[25]	➢ Vegetations ➢ Dumping area ➢ Temporary structure	➢ Residential development ➢ New Hiram's Highway and its roundabout	➢ Residential development	➢ Residential development	➢ Residential development ➢ Factories
2016 Figure 12[26]	➢ Vegetations ➢ Slope and vegetation alternation due to archaeological excavation	➢ Residential development	➢ Residential development	➢ Residential development	➢ Residential development
2019 Figure 2[27]	➢ Vegetations ➢ Temporary structure	➢ Residential development ➢ New Hiram's Highway and its roundabout	➢ Residential development	➢ Residential development	➢ Ho Chung New Village ➢ Pak Sha Wan (Hebe Haven) settlement

[24] Survey and Mapping Office, Lands Department (2003). *Topographic Map in 2003 [map]. 1:1000. 11-NE-5A*. Survey and Mapping Office, Lands Department.
[25] Survey and Mapping Office, Lands Department (2005). *Digital Aerial Photo [photo]. 1:5000. 2500 (ft). CW64568.* Survey and Mapping Office, Lands Department.
[26] Survey and Mapping Office, Lands Department (2016). *Digital Aerial Photo [photo]. 1:6000. 6000 (ft). CS62839.* Survey and Mapping Office, Lands Department.
[27] Survey and Mapping Office, Lands Department (2019). *Topographic Map in 2019 [map]. 1:4000. 11-NE-5A*. Survey and Mapping Office, Lands Department.

Location / Year	APPLICATION SITE	EAST OF THE APPLICATION SITE (NAM WAI)	SOUTH OF THE APPLICATION SITE (WO MEI)	WEST OF THE APPLICATION SITE (NAM PIN WAI)	NORTH OF THE APPLICATION SITE (HO CHUNG)
		➢ Sai Kung Central Primary School ➢ Red Wine Zone ➢ Ho Chung Football Field ➢ Reclamation ➢ Car Parks			➢ Villa Royale /King's Park ➢ Dynasty Lodge ➢ Reclamation

3.2 Historical Background

Early Historical Period/Qin to Yuan Dynasties (221 BC-AD1368)

3.2.1 Hong Kong is located at South China, where evidence of human activities is recorded in *Shiji* and *Hanshu*. According to *Shiji* and *Hanshu*, the *Yue* ethnic groups (also called the Hundreds of *Yue*), scattered around southern China and comprised tribes of various surnames. They were distinct from the *Han* ethnic group, who lived in central China, in terms of physical characteristics, language, and folklore. The *Yue* ethnic groups were later assimilated by the Han culture in the Qin dynasty (221-206 BC), when southern China became an administrative territory of China's central government[28].

3.2.2 Hong Kong has been part of China's administrative territory since the Qin dynasty (221-206 BC). In 208 BC, the *Nan Yue* (Southern Yue) State was established in Guangdong and Guangxi by military officials sent by the Qin (221-206 BC) court to conquer the *Yue* in the south. Following the collapse of Qin's political power in the north, the *Nan Yue* State later became a vassal state of the Han dynasty (206BC-AD220)[29].

3.2.3 During the Qin dynasty (221-206 BC), Guangdong was administered by the *Panyu* county. During Han to Eastern Jin dynasties (AD317-420), Hong Kong was administered by the *Bolou* county. From AD331 to AD756, Hong Kong was administered by the *Baoan* county. From AD757, through the Song dynasty (AD960-1279), to Yuan dynasty (AD1271-1368), Hong Kong was administered by the *Dongguan* county[30].

Ming to Qing Dynasties (AD1368-1912)

3.2.4 According to *Xin'an Gazetteer*, the present-day Hong Kong Island, Kowloon, and the New Territories (NT), were zoned under *Xin'an* county. During the 15th century, Hong Kong was administered by the *Dongguan* county. As marauding bandit and pirate attacks were prevalent at the coastal areas of the county, *Xin'an* county was set up in AD 1573 to reinforce coastal defence in southern coastal areas. Since then, Hong Kong was administered by the *Xin'an* county until the British occupation period, when Hong Kong was administered by the *Baoan* county[31].

3.2.5 In AD 1661, the Coastal Evacuation Order was enacted by the Qing Court to forbid support from the coastal villagers to the *Anti-Manchu* Taiwanese troops. Due to the enforcement of the Coastal Evacuation Order, coastal villagers, including the New Territories inhabitants, were forced to move 50 li (31. 05km) inland. Further inland retreatment was enacted in AD 1663 and AD 1664. The Coastal Evacuation Order was devastating to the coastal inhabitants. In AD 1669 villagers were allowed to return to inland New Territories following a request by *Zhou Youde* (the Governor-General of Guangdong and Guangxi) and *Wang Lairen* (Governor of Guangdong). However, it was until AD 1684 that the Coastal Evacuation Order was lifted officially[32]. As the Evacuation Order was implemented for more than 20 years, some villagers had settled in other areas, while some died during the evacuation. As such, not many of the original villagers had returned. Population dropped severely from 13,302 in 1594 to 3,912 in 1677 in the New Territories[33]. From AD 1662 to AD 1722, only 127 villages were rebuilt in Hong Kong[34]. As a result, Hakka people were encouraged to move to the New Territories during late 17th to early 18th centuries.

[28] 周佳榮 (2018) 。《香港通史-遠古至清代》。香港: 三聯書店。
[29] 司馬遷 (約公元前 91 年) 。《史記 卷 113 南越列傳》，載於維基文庫網頁 https://zh.wikisource.org/zh-hant/史記/卷 113。
[30] 舒懋官 (1819) 。《嘉慶新安縣誌》，載於 張一兵 2006 編 《深圳舊誌三種》。深圳，海天出版社。
[31] 蕭國健 (2006) 。《香港古代史》。香港: 中華書局。
[32] 蕭國健 (2006) 。《香港古代史》。香港: 中華書局。
[33] 蕭國健 (1986) 。《清初遷界前後香港之社會變遷》。台北: 台灣商務印書館。
[34] 蕭國健 (2006) 。《香港古代史》。香港: 中華書局。

Modern Period (post-1912)

3.2.6 Sai Kung was one of the main fishing ports in Hong Kong in the 19th century. Over time, Tanka people who lived on boat settled in the gulf areas of Sai Kung. The religious belief of the Tanka was reflected in the construction Tin Hau Temple in Po Tong Road in the 1910-1920s to worship Tin Hau, the sea goddess[35].

3.2.7 During the Japanese Occupation (1941-45), the Japanese Imperial troop had built Hiram's Highway, which was expanded by the British Colonial Government afterwards. At that time, Nam Pin Wai villagers were forced to build Hiram's Highway[36]. It is believed that the road was originally a local path. New Hiram's Highway was built in 2002, which involved the construction of viaducts and associated slope works[37].

3.2.8 Nam Pin Wai and the surrounding areas were mainly a mixture of cultivation and paddy fields in early to mid-20th century. Since the 1980s, the agricultural land use was gradually replaced by residential development. In particular, the Ho Chung Village has developed into two settlements over time, namely old Ho Chung Village and Ho Chung New Village, separated by the Ho Chung River. Since the introduction of the Small House Policy in 1972, male villagers and developers have built up most of the land with small houses[38].

Village Development

Nam Pin Wai

3.2.9 Nam Pin Wai is a small village built by the *Tse* clan who moved from Ho Chung in the 1900s due to the increase of the *Tse* population. They were farmers engaging in rice growing, poultry and pig rearing. The *Tse* clan first moved from *Dongguan* in the *Guangdong* province to Sha Kok Mei village in Sai Kung in late Ming dynasty[39]. Nam Pin Wai was *Tse* clan's first branch. After 1900s the second and third branches moved to Kap Pin Long and the fourth branch to a place between Nam Pin Wai and Kap Pin Long[40].

Ho Chung

3.2.10 Ho Chung were inhabited by the *Wans, Lais and Laus*. The *Wan* clan, whose distant ancestors originated in *Taiyuan* of *Shanxi* province. They moved to *Lingnan* in the 12th century. The *Lai* clan, who originated from *Ganzhou* and *Jiangxi* and migrated from *Bolou* and *Dongguan* in the late Ming dynasty[41]. Later in early Qing dynasty, the *Lau* clan also migrated to Ho Chung[42].

[35] Antiquities Advisory Board (2009). *Historic Building Appraisal,* Tin Hau Temple & Hip Tin Temple Po Tung Road, Sai Kung, N.T. https://www.aab.gov.hk/historicbuilding/en/1419_Appraisal_En.pdf.
[36] Antiquities Advisory Board (2010). *Historic Building Appraisal, Nos. 3, 4 & 5 Nam Pin Wai Tsuen, Sai Kung*. https://www.aab.gov.hk/historicbuilding/en/1286_Appraisal_En.pdf.
[37] Billion Vantage Investment Limited. (2016). *Sai Kung Nam Pin Wai Development – Archaeological Consultancy: Archaeological Investigations and Survey-cum-Excavation Report*. Hong Kong: AECOM.
[38] Legislative Council of the Hong Kong SAR (2016). *Small House Policy.* https://www.legco.gov.hk/research-publications/english/essentials-1516ise10-small-house-policy.htm.
[39] Antiquities Advisory Board (2010). *Historic Building Appraisal, Nos. 3, 4 & 5 Nam Pin Wai Tsuen, Sai Kung*. https://www.aab.gov.hk/historicbuilding/en/1286_Appraisal_En.pdf.
[40] Antiquities Advisory Board (2010). *Historic Building Appraisal, Tse Ancestral Hall Nos. 26-28 Kap Bin Long, Sai Kung.* https://www.aab.gov.hk/historicbuilding/en/1348_Appraisal_En.pdf.
[41] Antiquities Advisory Board (2010). *Historic Building Appraisal, Wan Ancestral Hall No. 147 Tai Po Tsai, Sai Kung.* https://www.aab.gov.hk/historicbuilding/en/1419_Appraisal_En.pdf.
[42] 蕭國健 (2006) 。《香港古代史》。香港: 中華書局。

Nam Wai

3.2.11 Nam Wai was believed to be built between 1829 and 1849 with Hakka ancestry migrated from eastern *Guangdong* during the coastal evacuation[43].

Wo Mei

3.2.12 Wo Mei was built by the Tse family a hundred years ago with ancestry originated from the *Dongguan* county[44].

3.2.13 Sai Kung was one of the earliest and most prominent Catholic preaching areas in Hong Kong since Qing dynasty. In 1864, the first missionary priest came to Sai Kung. Before the New Territories was leased to the British in 1898, Catholic missionaries had already been preaching extensively in Sai Kung[45]. The construction of Catholic churches has shown Catholic influence in Wo Mei. Tsung Tsin Mission of Hong Kong Wo Mei Church was built 1905 in the adjacent Nam Wai. Immaculate Conception Chapel was built in Wo Mei in 1930 to hold Sunday masses, marriages, and baptisms. It is believed that the *Tse* family in Wo Mei Tsuen has become Catholic since the 19th century[46]. During the Japanese Occupation from 1941 to 1945, missionary work was terminated[47].

[43] 劉智鵬、劉蜀永 (2007)。《方志中的古代香港 新安縣志 香港史料選》。香港: 三聯書店。
[44] 司馬龍 (2003)。《新界滄桑話鄉情》。香港：三聯書店。
[45] Chan, T. K. (2020). History: Sai Kung. *Hong Kong Jockey Club H. A. D Walk Project*. Retrieved from https://had18.huluhk.org/article-history.php?region=9&cate=1&lang=en.
[46] 司馬龍 (2003)。《新界滄桑話鄉情》。香港：三聯書店。
[47] Antiquities Advisory Board. (2010). *Historic Building Appraisal, St. Joseph's Chapel Yim Tim Tsai, Sai Kung, New Territories.* https://www.aab.gov.hk/historicbuilding/en/368_Appraisal_En.pdf.

3.3 Archaeological Background

3.3.1 The Application Site falls within the Ho Chung Site of Archaeological Interest (SAI). Some archaeological investigations and excavations were conducted near the Application Site. Their locations are shown on **Figure 16**and the major findings are summarized in **Table 3.3**.

Excavation Report on C Sector of Ho Chung Site, Sai Kung, Hong Kong[48] (HC1999)

3.3.2 A rescue excavation was carried out by the *Hunan Institute of Cultural Relics and Archaeology*, the *Guangxi Provincial Archaeological Team,* and the *Anthropology Department of Sun Yat-sen University* at C Sector of Ho Chung Site from May to July 1999, 20m to the northeast of the Application Site. The excavation area is on the alluvium, at the foot of the hill and behind the lagoon. Remnants of past human activities with an area approximately 200m^2 were discovered, centred at grids T16H and T17H, and spreading across grids T16F, T16G, T16I, T17F, T17G, T17I and T18F, with an elevation approximately between +4.1 and +4.3mPD (See **Figure 16** for significant finding area).

3.3.3 Thirty-three pieces of Neolithic polished stone tools were unearthed, including axes, adzes, bifacial axes and arrowheads. Other unearthed stone tools, including 68 pieces of percussion tools (stone picks and pounders), 7 pieces of ornaments, 39 pieces of grinders, 7 pieces of flake tools (pointers, scrapers and retouched flakes), 26 pieces of stone cores, 37 pieces of debitages, and hundreds of blanks and other lithic materials were found in situ. Moreover, 177 pieces of sand-gritted pottery sherds of cauldrons, stands and gratings dated to Middle and Late Neolithic period were also unearthed.

3.3.4 On the other hand, Tang-Song ceramic sherds and Ming-Qing porcelain sherds were also unearthed from the excavation.

3.3.5 The excavation concluded that the archaeological assemblage represented a stone processing site dated to the Middle and Late Neolithic period. Palynological and phytolith analysis on the soil samples indicated the humid climate in Neolithic period was favourable for clam harvesting industry. Products of the stone processing site could be the tools for clam harvesting industry.

Archaeological Investigation Report in Ho Chung Valley of Sai Kung, Hong Kong[49] (HCV1999)

3.3.6 To further investigate the archaeological potential of Ho Chung Site, an archaeological investigation was carried out by the *Anthropology Department of Sun Yat-sen University* at the Ho Chung Valley in August 1999. Field scanning, excavation of 11 test pits and drilling of 25 auger holes were conducted in five villages, including Nam Pin Wai, Pei Tau, Shui Hau, Tai Wo and Ho Chung, at the alluvial flood plains on the two sides of Ho Chung River. However, since the investigation areas of Pei Tau, Shui Hau, Tai Wo and Ho Chung were located far away from the Application Site, while only the investigation area of Nam Pin Wai was in close proximity to the Application Site, only the archaeological information of the investigation area of Nam Pin Wai is discussed.

3.3.7 The investigation area of Nam Pin Wai was located in between 90m and 260m to the west of the current Application Site. Two test pits (T1 and T2) were excavated at the flood plain in front of the village, while another test pit (T3) was at the slope to the south of the village. Five auger holes (A1, A2, A5, A6, A7) were drilled near T1 to T3. Auger holes A3 and A4 were drilled next to Ho Chung River near the flood plain. Auger holes A8, A9 and A10 were drilled at the foot and top of a small hill near the current Application Site. All test pits and auger

[48] Archaeological Team of Sun Yat-sen University (2000). *Excavation Report on C Sector of Ho Chung Site, Sai Kung, Hong Kong*. AMO archive.

[49] Archaeological Team of Sun Yat-sen University (2000). *Archaeological Investigation Report in Ho Chung Valley of Sai Kung*, *Hong Kong*. AMO archive.

holes were excavated or drilled until reaching the sterile layers and no archaeological materials were identified. The investigation concluded that the hilly area and low-lying flood plain in Nam Pin Wai were not suitable for ancient human settlement as there lacks any archaeological findings.

Excavation Report on West Sector of Ho Chung Site, Sai Kung, Hong Kong[50] (HC2000)

3.3.8 A rescue excavation was conducted at West Sector of Ho Chung Site prior to the commencement of a residential development. The excavation area was 30m to the northwest from the Application Site, situating at the alluvial flood plain. The excavation was conducted by the *Archaeological Team of Sun Yat-sen University* from November 2000 to February 2001, excavating 42 test pits.

3.3.9 A cultural layer of the Middle and Late Neolithic period was identified between rows number 9 and 12, in which the majority of artefacts were unearthed from grids T10I, T11H, T11J, T11K, T12H, T12J and T12K. Ten pieces of Neolithic polished stone tools were unearthed, including adzes, axes, and their blanks. Forty-four pieces of percussion tools were also unearthed, including stone picks, blanks of stone picks, stone drills, scrappers and chopper and chopping tools. Other unearthed stone tools included 39 pieces of grinding tools, 21 pieces of pounders and 41 pieces of raw stone tool materials including stone cores, debitages and lithics materials.

3.3.10 A layer unearthed with artefacts ranged between Tang-Song and Modern period was also identified to the north of the rescue excavation area in T10I, T11I, T12I and T13I. The artefacts unearthed in this layer included sherds of celadon porcelain plates, vases and bowls with some covered in ice-crackled glaze. Sherds of coarse porcelain basins, mortars, jars and urns were unearthed. A broken plough was also unearthed. Neolithic stone tools unearthed in this layer possibly moved upwards from the below layer due to agricultural activities at a later time. An isolated grey clay pottery sherd incised with lozenge pattern dated to Bronze Age was unearthed but no cultural layer of Bronze Age was identified. Furthermore, two colonial copper plated steel coins were yielded in this layer, including one incised with "Queen Victoria" dated to 1880 and the other with "George V and Emperor of India" dated to 1924. The colonial coins indicated this layer and any layer above were disturbed.

3.3.11 A disturbed layer unearthed with Ming-Qing artefacts was identified. Blue-and-white porcelain sherds of bowls, cups and vases and coarse porcelain basins, mortars, jars and urns were unearthed. Five stone ridges of paddy field dated to Ming-Qing period were also unearthed.

3.3.12 The excavation concluded that the artefacts unearthed in HC2000 were similar to those of HC1999 in terms of types and manufacturing techniques of artefacts, which indicated HC2000 was part of the stone processing site identified in HC1999.

Proposed Residential Development at Various Lots, D. D. 244, Nam Pin Wai, Sai Kung: Archaeological Investigation Works[51] (SKNPW2006)

3.3.13 An archaeological investigation was conducted in Nam Pin Wai commissioned by the Project Proponent in October 2006 to evaluate the archaeological potential and impacts due to the residential development. Field scanning, excavation of seven test pits (TP1 to TP7) and hand-drilling of 30 auger holes (AH1 to AH30) were conducted at a small hill to the east of the current Application Site. Auger hole AH 30 is located within the current Application Site.

[50] Archaeological Team of Sun Yat-sen University (2001). *Excavation Report on West Sector of Ho Chung Site, Sai Kung, Hong Kong*. AMO archive.
[51] Billion Vantage Investment Limited. (2007). *Proposed Residential Development at Various Lots, D. D. 244, Nam Pin Wai, Sai Kung: Archaeological Investigations Works.* Environmental Resources Management.

3.3.14 A stable[52] cultural layer of Late Neolithic period was found in TP7, with an elevation approximately +10mPD. Late Neolithic pottery sherds were unearthed. Two sherds of incised pattern coarseware, four sherds of corded coarseware and 30 sherds of undecorated coarseware were discovered. Late Neolithic stone tools were also unearthed, including six pebble tools (thought to be used as hammer, net weight and grinder), four stone flakes, one stone pick, one polished arrowhead, one whetstone and five unidentified stone tools. Furthermore, a stone core was found in TP6.

3.3.15 A cultural layer dated to Song dynasty was identified in TP6. Two pieces of ice-crackled glazed bowl sherds were unearthed which were from Southern China coastal kilns dated to Song dynasty. A dark grey pot sherd dated to Tang-Song period was found and two dark brown glazed pot sherds were also unearthed in TP6.

3.3.16 Ten pieces of blue-and-white bowl sherds, white bowl sherd, pot sherds and roof tile fragments were unearthed in TP4 and TP5. Three of the blue-and-white sherds were decorated with stamped floral pattern, which was a typical pattern of eastern Guangdong porcelain dated to the 18th to 19th centuries.

3.3.17 During field scanning, two celadon bowl sherds and a bowl sherd with incised pattern dated to Song dynasty were collected from the ground surface to the east of TP1. A Late Neolithic whetstone and a pebble stone were collected on the slope near TP7. No other artefacts were revealed in TP1 to TP3 and auger holes.

3.3.18 The investigation concluded that the extent of the Late Neolithic cultural layer might cover the area around TP7 at the valley of the slope terrace.

3.3.19 It is also noted that TP3, AH20, AH 24, AH25 and AH30 were conducted on the hilltop. However, their stratigraphy revealed that a modern filled soil layer on top of sterile, regolith soil. This suggest that the open storage works conducted in 1993 on the hilltop (**Figure 9** refers) has basically removed any original soil that might contain any archaeological material.

Sai Kung Nam Pin Wai Development – Archaeological Consultancy: Archaeological Investigations and Survey-cum-Excavation Report[53] (SKNPW2015)

3.3.20 Archaeological investigation works were conducted in Nam Pin Wai commissioned by the Project proponent from September to October 2015, to conduct a Survey-cum-Excavation at Zone A (slope) to preserve the archaeological materials by record as a mitigation measure proposed in SKNPW2006[54], and to conduct an archaeological investigation in Zones A (lowland), B and C. A total of eight test pits, 11 test squares and 16 auger holes were excavated. Test pits TP7 and 8, as well as auger holes AH13 to 16 are inside the current Application Site.

3.3.21 Stone tools and coarse pottery sherds were identified from secondary colluvial deposits (L3 and L4) at Zone A (slope). Most of the artefacts were unearthed in test squares TA2 and TB2 located at the flat platform of the valley, while some were unearthed in TB1 and TC2. The Late Neolithic stone tools unearthed in L3 and L4 included 104 modified stone tools (anvils, picks, points, roughouts, stone materials and debitages) and 72 polished stone tools (adzes, pounders and whetstones). Four scrappers, 25 grinders, a net weight, a broken polished tool and 11 unidentified tools were only found in L4 of TA2 and TB2. A roughout was also unearthed from L2 of test pit TP2.

[52] Later excavation in 2016 suggested that this layer is secondary deposit and thus not a stable layer.
[53] Billion Vantage Investment Limited. (2016). *Sai Kung Nam Pin Wai Development – Archaeological Consultancy: Archaeological Investigations and Survey-cum-Excavation Report*. AECOM.
[54] Billion Vantage Investment Limited. (2007). *Proposed Residential Development at Various Lots, D. D. 244, Nam Pin Wai, Sai Kung: Archaeological Investigations Works.* Environmental Resources Management.

3.3.22 Furthermore, a total of 62 coarse pottery sherds dated to Late Neolithic period were unearthed from L3 of TB1 and TC2 and L4 of TA2 and TB2 at Zone A (slope), including a sherd of the neck of a cauldron-like coarse pottery.

3.3.23 Two blue-and-white porcelain sherds dated to Qing dynasty and four brown-glazed ware sherds were unearthed in the disturbed modern layer (L1b) of TP2 and TP4 in Zone A (lowland) and Zone A (slope). Two celadon sherds with ice crackle dated to Song and Ming dynasty were unearthed in the modern terrace field soil (L2) of TP3. Moreover, a blue-and-white porcelain sherd and two brown glazed ceramic ware sherds were unearthed in L1b of TP2 in Zone A (lowland).

3.3.24 During field scanning, a sherd of celadon was identified in Zone A (lowland) and a blue-and-white bowl sherd decorated with chrysanthemum patterns dated to Qing dynasty was collected in Zone A (slope).

3.3.25 Two test pits (TP7 and TP8) and four auger holes (AH13 to AH16) were located within the current Application Site, all of which have reached the depths of at least 1 meter. TP8 contained two strata, a disturbed modern layer (L1b) and a sterile layer of colluvial deposit (L5), while TP7 had one more layer of modern ground surface (L2) between L1b and L5. AH13 had only one stratum of modern rubbish landfill soil (L1a). AH14 and AH16 had two strata with a modern terrace field soil layer (L2) underneath L1a. AH15 had four strata, L1a, L1b, L2 on the top of a colluvial deposit layer (L3). No artefacts or cultural layers were found in the test pits and auger holes.

3.3.26 The excavation concluded that there was not a stable cultural layer in Zone A (slope). As the stone tools and coarse pottery were mostly found at the valley and were heavily worn out due to soil movement, L3 and L4 were regarded as secondary deposits probably washed down from the hilltop. Zones A (lowland), B and C were concluded to have no archaeological potential as no cultural layer or *in situ* finding was identified.

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Table 3.3 Summary of the Findings of the Previous Archaeological Investigations

Excavations / Chronology	Alluvial Flood Plain			Colluvial Hillslope	
	HC1999	**HCV1999**	**HC2000**	**SKNPW2006**	**SKNPW2015**
Modern (Disturbed Layer)	N/A	N/A	Near Nam Pin Wai: • Ming-Qing blue-and-white porcelain sherds of bowls, cups and vases; • Ming-Qing coarse porcelain dishes, mortars, jars and urns; • Ming-Qing 5 sets of stone ridging of paddy field • Tang-Song sherds of celadon porcelain bowls with some covered in ice-crackled glaze, and sherds of coarse porcelain dishes, mortars, jars and urns; • 1 broken plough; • Neolithic stone tools • 1 isolated pottery sherd with lozenge pattern dated to Bronze Age • 2 colonial bronze coins	Nam Pin Wai: • 2 celadon bowl sherds and 1 bowl sherd with incised pattern dated Song dynasty; • 1 Late Neolithic whetstone and 1 pebble stone	Nam Pin Wai: • 1 sherd of celadon and 1 blue-and-white bowl sherd decorated with chrysanthemum dated to Qing dynasty found on ground surface • 2 blue-and-white porcelain sherd dated Qing dynasty and 4 brown-glazed ware sherds unearthed in landfill soil • 1 Late Neolithic roughouts and 2 celadon sherds with ice crackle dated to Song to Ming dynasty unearthed in terrace field soil
Ming-Qing	Near Nam Pin Wai: • Ming-Qing porcelain sherds	Pei Tau: • Ming Dynasty sherds of blue-and-white and celadon bowls, cups and jars; cloth-impressed tiles; pottery sherds of brown-glazed bowls, jars and urns • Remnants of masonry wall foundations of a house Ho Chung: • Ming Dynasty sherds of blue-and-white and qingbai porcelain bowls and dishes, glazed pottery sherds of pots and urn, as well as shells	N/A	Nam Pin Wai: • 10 pieces of blue-and-white bowl sherds, white bowl sherd, pot sherds and roof tile fragments (3 blue-and-white sherds with a typical pattern of Eastern Guangdong kilns dated 18th to 19th centuries)	N/A

	Alluvial Flood Plain			Colluvial Hillslope	
	HC1999	**HCV1999**	**HC2000**	**SKNPW2006**	**SKNPW2015**
Tang-Song	Near Nam Pin Wai: • Tang-Song ceramic sherds	Ho Chung: • Song dynasty sherds of white porcelain bowls and glazed pottery pots	N/A	Nam Pin Wai: • 2 pieces of ice-crackle glazed bowl sherds from Southern China coastal kilns dated Song dynasty; • 1 dark grey pot sherd dated Tang-Song period; • 2 dark brown glazed pot sherds	N/A
Neolithic	Near Nam Pin Wai: • 33 pieces of Middle to Late Neolithic polished stone tools (axes, adzes, bifacial axes and arrowheads); • 68 pieces of percussion tools (stone picks and pounders); • 7 pieces of ornaments; • 39 pieces of grinders; • 7 pieces of flake tools (pointers, scrapers and retouched flakes); • 26 pieces of stone cores; • 37 pieces of debitages; and hundreds of blanks and other lithic materials; • 177 pieces of sand-gritted pottery sherds of cauldrons, stands and gratings • Archaeological assemblage indicating a stone processing site	N/A	Near Nam Pin Wai: • 10 pieces of Middle to Late Neolithic polished stone tools (adzes, axes, and their blanks); • 44 pieces of percussion tools (stone picks, blanks of stone picks, stone drills, scrappers and chopper and chopping tools); • 39 pieces of grinding tools; • 21 pieces of pounders; • 41 pieces of raw stone tool materials (stone cores, debitages and lithics materials); • Archaeological assemblage indicating HC2000 was part of the stone processing site identified in HC1999	Nam Pin Wai: • Late Neolithic pottery sherds: 2 pieces of incised pattern coarse ware sherds, 4 pieces of corded coarse ware sherds and 30 pieces of un-decorated coarse ware sherds; • Late Neolithic stone tools: 6 pebble tools (hammer, net weight and grinder), 4 stone flakes, 1 stone pick, 1 polished arrowhead, 1 whetstone, 1 stone core and 5 unidentified stone tools	Nam Pin Wai: • 104 Late Neolithic stone tools modified stone tools (anvils, picks, points, roughouts, stone materials and debitages); • 72 Late Neolithic stone tools polished stone tools (adzes, pounders and whetstones); • 4 Late Neolithic scrappers, 25 grinders, a net weight, a broken polished tool and 11 unidentified tools; • 62 coarse pottery sherds, including a sherd of the neck of a cauldron-like coarse pottery dated Late Neolithic

4 FIELD SCANNING RESULTS

4.1 Scope of Field Scanning

4.1.1 Field evaluation in the form of surface scanning was undertaken by AECOM's in-house archaeological team in November 2020 in the Application Site. The aim of field evaluation was to ascertain if the Application Site has any archaeological potential. Scanning of the ground surface for archaeological material has been conducted with the aid of aerial photos and maps. Topography, surface conditions and existing site conditions are also noted during the field scanning. For the ease of discussion, the Application Site is subdivided into Zones 1, 2, 3, 4 ,5, Remaining Phrase and Ancillary Road as shown on **Figure 17**.

4.2 Field Scanning Results

4.2.1 The Application Site is on a hillslope to the west of New Hiram's Highway and north of Wo Mei Hung Min Road. The findings of surface scanning at each zone are discussed below.

Zone 1

4.2.2 Zone 1 is a flat land with the ground surface covered in black filled soil or concrete (**Appendix B: Photos 1.1** to **1.3**). The filled soil mainly contains vegetations. According to topographic maps of 1959 and 1980 (**Figure 6** and **Figure 8**), Zone 1 had once been the paddy fields. Afterwards, Zone 1 was modified with temporary structures as shown in topographic map of 2003 and aerial photo of 2005 (**Figure 10** and **Figure 11**) were erected. Remains of the demolished structures and construction waste, such as collapsed brick walls, concrete screeds and metal frames, are identified at the western side of Zone 1 (**Appendix B: Photo 1.4**). No archaeological material has been identified during the surface scanning at Zone 1.

Zone 2

4.2.3 Zone 2 is a hill slope with a T-shaped concrete pavement at the western part of Zone 2 (**Appendix B: Photo 2.1**) and a steep slope (34°) at the eastern part (**Appendix B: Photo 2. 2**). It is to the south of the planned ancillary road. Trees covers the steep slope and the area to the west of the concrete pavement. Currently the land is vacant. The concrete surface found in Zone 2 suggested it might have been part of the open storage the area, which also indicated that the Zone 2 has been flattened and soil removed.

4.2.4 The concrete pavement connects the hill slope in Zone 2 to track at the hilltop (**Appendix B: Photo 2.3**). According to the aerial photos in 1993 (**Figure 9**), the area has been site formed into open storage space. According to the topographic map in 2003 and aerial photo of 2005 (**Figure 10** and **Figure 11**), temporary structures were erected along the concrete pavement and dumping area was identified at Zone 2, but these structures were not observed during the field scanning.

4.2.5 Furthermore, profile of the hill slope could be observed from the steep slope at the eastern part of Zone 2. The concrete surface beneath a layer of wilted creeping plant is covering the yellowish-brown sandy soil of the hill slope (**Appendix B: Photo 2.4**).

4.2.6 The backfilled test pit TP7 of the SKNPW2015 excavations is identified at the concrete pavement (**Appendix B: Photo 2.5**). The surface scanning has not identified any archaeological remain at Zone 2. As Zone 2 overall has a similar landscape (flattened open storage space), it contains no archaeological potential due to disturbance by open storage construction.

Zone 3

4.2.7 Zone 3 is a hill slope with similar settings to Zone 2. It is separated from Zone 2 by a planned ancillary road between the zones. The concrete pavement from Zone 2 can still be seen on

the east of Zone 3 (**Appendix B: Photo 3.1**). The concrete pavement at Zone 3 is identified to be flatten open storage space. To the north of the concrete pavement, appeared to be vacant and covered with trees and vegetations. No archaeological remain was identified at Zone 3.

4.2.8 Zone 3 is inaccessible due to the dense vegetation. Observing from the southern edge of Zone 3, the hilltop is gently sloping from the west downwards to the east based on the contour of the same species of tall grasses covering the area (**Appendix B: Photos 4.1** to **4.3**).

4.2.9 However, based on aerial photos in 1993 (**Figure 9**), the area has been site formed into open storage space. It is therefore concluded that the site has low archaeological potential due to disturbance by open storage construction.

Zone 4

4.2.10 Zone 4 is a relatively flat hilltop covered in dense tall grasses of one metre tall. The concrete pavement surface at Zone 3 does not extend to Zone 4. According to the aerial map of 1993 (**Figure 9**), the eastern half of Zone 4 has been disturbed by the site formation. According to the topographic map of 2003 (**Figure 10**), a temporary structure was erected at the northwestern part of Zone 4.

4.2.11 In the light of the above, it is believed that the western side of Zone 4 would remain largely undisturbed by the site formation. However, surface materials can hardly be observed due to the dense tall grasses. The presence of archaeology in the western part of Zone 4 is therefore uncertain.

Zone 5

4.2.12 Zone 5 is a gentle hill slope (19°) covered in dense trees and tall grasses (**Appendix B: Photos 5.1** to **5.4**). Similar to Zone 4, Zone 5 is inaccessible due to the dense vegetation of the similar tall grasses. The contour of the grasses suggested that the topography is not levelled, with undulating surface. According to **Figure 5** to **Figure 8**, the hill slope was once the cultivation and paddy fields from 1956 to 1980. No noticeable urban structure or disturbance has been identified in Zone 5 from the historic topographic maps and aerial phots till the present. As such, Zone 5 may not be disturbed by urban developments. However, archaeological materials cannot be identified due to the on the dense vegetation. The presence of archaeology in Zone 5 is therefore uncertain.

Remaining Phase

4.2.13 The remaining phase areas are flat lands on both sides of Zone 2 bounded by the planned ancillary road and the Wo Mei Heung Min Road. According to **Figure 12**, The remaining phase area were used as open storages and temporary structures can be seen. The surface of these areas is covered with concrete. No archaeological material was identified.

Ancillary Road

4.2.14 The ancillary road is located to the north and east of Zone 1 and Zone 2. The covered area was previously used as open storage area (**Figure 8** to **Figure 12-12**). The ancillary road is covered with concrete. No archaeological material was identified.

5 ARCHAEOLOGICAL POTENTIAL

5.1 Determining Archaeological Potential of a Site

5.1.1 The issue on assessing archaeological potential lies with the fact that, unlike built heritage, the assessment is based on prediction instead of known elements. Therefore, some prediction criteria are required to conduct a scientific assessment.

5.1.2 This Section takes main reference from Hardesty & Little (2009)[55], as well considering the local legislations, standards and guidelines on cultural heritage impact assessments, in order to draft some useful criteria for a comprehensive assessment on the archaeological potential of the Application Site.

5.1.3 It should also be noted that the assessment of potential is also related to the significance of the archaeology of a site in the past.

Age

5.1.4 According to the Antiquities and Monuments Ordinance (Cap. 53):

a. **Antiquities** "*means a relic; and a place, building, site or structure erected, formed or built by human agency before the year 1800 and the ruins or remains of any such place, building, site or structure, whether or not the same has been modified, added to or restored after the year 1799*."
b. **Relic** "*means a movable object made, shaped, painted, carved, inscribed or otherwise created, manufactured, produced or modified by human agency before the year 1800, whether or not it has been modified, added to or restored after the year 1799; and fossil remains or impressions*."
c. **Supposed antiquity** "*means an object or site which may reasonably be supposed to be or to contain an antiquity*."

5.1.5 The essence of this legislation to protect of archaeological remains is subjected to a date earlier than the year 1800. The definition is based on a quantitative age instead of qualitative significance of the relics.

Context and Survivability

5.1.6 There is no universal definition for archaeological significance, but perhaps Bickford & Sullivan (1984)[56] has coined the term quite clearly. "*A site or resource is said to be scientifically significant when its further study may be expected to help answer questions. That is* ***scientific significance is defined as research potential***" (pp. 23-24, emphasis added). The backbone of any archaeological research potential, the information extracted from archaeological materials, would also has a dictating factor in research potentials.

5.1.7 The quality of information depends on if the archaeological materials discovered are in context, while the quantity depends on if they could survive in the environment after they were deposited. Both of which could greatly affect the information that could be extracted.

5.2 Criteria of Assessing of Archaeological Potential

5.2.1 The following criteria considered age, survivability and contexts in a quantifiable and qualifiable framework.

[55] Hardest, Donald L. & Little, Barbara J. (2009). *Assessing Site Significance (2nd Edition).* US: AltaMira Press.
[56] Bickford, A. and Sullivan, S. (1984). 'Assessing the research potential of historic sites', in Sullivan, S. & Bowdler, S. (eds.) *Site surveys and significance assessment in Australian archaeology*, Department of Prehistory, Research School of Pacific Studies, Australian National University, Canberra: 19-26.

Age of past archaeological findings

5.2.2 Survivability of archaeological materials tends to decrease with the increasing age of a site. However, it does not mean that ancientness deteriorates the quality of archaeological findings for a site. The discovery of old materials would contain more significance than younger ones in general. Note also that the age in concerns is relative and should be placed in the context of Hong Kong. Middle Neolithic Period is old in Hong Kong, but it is not in the greater context of the Chinese cultural region.

Quantities of written accounts

5.2.3 The older the site, the lesser written accounts and other documents are known about. However, past historical and archaeological research would also arise should important research interest (such as important discoveries or significant historic events) have been drawn to the site. The less is known about a site, the more significance it is if archaeological findings are yielded.

Abundance of physical remains

5.2.4 The more frequent human activities in producing the deposit of archaeological remains (e.g. rubbish dumps, settlement features, any consistent land use of the past on a site), the more artefact could have survived in the archaeological records. Isolated findings, on the other hand, could still imply human presence in a particular period, but it also implied such presence could be an isolated event instead of a consistent one.

5.2.5 Moreover, the spatial distribution of the archaeological remains would also provide insight to the archaeological phenomena of the area and provide useful information for the assessment of archaeological potential.

Taphonomy of the site

5.2.6 In any archaeological study, understanding the processes of how the materials transformed into archaeological record is important as the taphonomic sequence could affect the explanation of the materials at hand. Moreover, the soil type and the elevation of the soil in which archaeological findings were discovered in previous findings would also provide information for the assessment of archaeological potential.

Uniqueness of the archaeological findings

5.2.7 The rarer the archaeological findings are, the more insightful they would be to the understanding of past human society. If the context of such findings is limited to a few sites only, then the site is more significant to the archaeology of the region. However, repetitive findings similar to other sites could also contribute to a larger picture of archaeology in a region.

5.3 Assessment of Archaeological Potential of the Application Site

5.3.1 The Application Site is situated on the small hill, which is comprise of colluvium. On the other hand, the rescue excavation in 1999 and 2000 is situated on alluvial flood plain.

5.3.2 Based on past archaeological survey results, two distinct landscape types with different archaeological findings have been identified in and around the Ho Chung SAI (refers to **Table 5.1**), namely:

a. Alluvial flood plain; and
b. Colluvial hillslopes (the Application Site)

Table 5.1 Comparison of archaeological findings in different landscape near the Application Site at Nam Pin Wai

	Alluvial Flood Plain	Colluvial Hillslope
Age of past findings	***Middle to Late Neolithic*** - stone tools, sand-gritted pottery	***Late Neolithic*** - cluster of stone tools
	Song dynasty - Ceramics sherds	***Song dynasty*** - Ceramics sherds
	Qing dynasty - Ceramics sherds	***Qing dynasty*** - Ceramics sherds
Quantities of written accounts	- Two rescue excavation and one survey cover the alluvial flood plain	- One survey and one survey-cum-excavation cover the colluvial hillslope
Abundance of physical remains	***Late Neolithic*** - Polished stone tools (adzes, axes) - Percussion stone tools (picks, pounders, choppers, drills) - Flake tools (pointers, scrapers and retouched flakes) - Other Core tools (grinding tools, roughouts) - Ornaments (rings and slotted rings) - Debitage - Sand gritted pottery sherds of cauldrons, stands and gratings	***Late Neolithic*** - Broken Polished stone tools (adzes, pounders and whetstone, net weight) - Broken Percussion stone tools (anvils, picks) - Flake tools (points) - Debitage - Sand-gritted pottery sherds (neck of a cauldron-like vessel)
	Bronze Age - Gray hard clay pottery sherd with lozenge pattern	---
	Tang-Song - Ice-crackled glaze porcelain sherds (bowls) - Coarseware sherds (dishes, mortars, jars and urns)	***Tang-Song*** - Ice-crackle glazed porcelain sherds (bowl) - Dark grey pot sherd - Dark brown glazed pot sherds
	Ming-Qing - Blue and white porcelain sherds (bowls, cups and vases) - Coarseware sherds (dishes, mortars jars and urns) - Stone ridgings of paddy fields)	***Ming-Qing*** - Blue-and-white porcelain sherds (bowl) - White porcelain sherds
Taphonomy of the site	***Late Neolithic*** - Elevation: +4.1 to +5.0mPD - Deposit types: alluvial, primary deposit	***Late Neolithic*** - Elevation: +10.0 to +15.0mPD - Depth below ground surface: 1m - Deposit types: colluvial, secondary deposit
	Tang-Song - Elevation: +5.0 to +5.3mPD - Deposit types: alluvial, agricultural soil (disturbed)	***Tang-Song*** - Elevation: +8.6 to +8.8mPD - Depth below ground surface: 0.2m - Deposit types: colluvial, agricultural soil (disturbed)
	Ming-Qing - Elevation: +5.4 to +5.8mPD - Deposit types: alluvial, agricultural soil (disturbed)	***Ming-Qing*** - Elevation: +8.7 to +8.8mPD - Depth below ground surface: 0.1m - Deposit types: colluvial, agricultural soil (disturbed)
	Modern Period - Elevation: +6.0mPD	***Modern Period*** - Topsoil of agricultural fields since

	Alluvial Flood Plain	Colluvial Hillslope
	- Topsoil of agricultural fields since the 1950s - Known historical settlements in Nam Pin Wai and Nam Wai since Qing period in further west and east of the excavated areas with archaeological findings - Excavation conducted before the construction of the roundabout and the residential complexes	the 1950s - Known historical settlements in Nam Pin Wai and Nam Wai since Qing period in further west and east of the excavated areas with archaeological findings - Excavation conducted after the construction of open storage at the hilltop
Uniqueness of archaeological findings	***Late Neolithic*** - Complete stone implements with a wide range of tool kits that can be interpreted to be stone tools manufacturing industry	***Late Neolithic*** - Broken tools and sand-gritted pottery sherds in secondary deposit
	Tang-Song - Isolated ceramic sherds with undiagnostic feature in disturbed deposit	***Tang-Song*** - Isolated ceramic sherds with undiagnostic feature in disturbed deposit
	Ming-Qing - Isolated ceramic sherds with undiagnostic feature in disturbed deposit	***Ming-Qing*** - Isolated ceramic sherds with undiagnostic feature in disturbed deposit

5.3.3 Deposits on alluvial flood plain are *in situ,* where archaeological information can be extracted from undisturbed cultural layer with less biases by modern disturbance. Furthermore, the deposits contain artefacts that are more complete in form, more diverse in type with high quantity to provide insight to the archaeological phenomena (i.e., details of lithic industries and activity area). The context of such information can be interpreted through academic means to provide a holistic view about the past human society during the Late Neolithic period (as a site of lithics manufacturing).

5.3.4 On the other hand, deposits on colluvial hillslope were secondary deposits that were formed either by soil movement (in the stratum of the Late Neolithic period) or disturbance by modern agricultural activities (in the strata of Song/Qing dynasties). The disturbed nature limited the depth of the archaeological information that can be interpreted and/or extracted from them. Furthermore, findings from these deposits were mostly broken artefacts, in which the information is not sufficient to reconstruct the past human society.

5.3.5 In the light of the above, the archaeological potential at the colluvial hillslope of the Application Site is not as high as those areas from the alluvial flood plain (which is outside the Application Site).

5.4 Archaeological Potentials

Zone 1

5.4.1 The plot of Application Site to the south adjacent to the Wo Mei Hung Min Road (Zone 1) was part of the small hills that occupies most of the Application Site. Apparently, after the construction of the New Hiram's Highway, the original landscape has been cut flat due to construction needs, and some temporary structures have since then occupied this plot of land. Therefore, it would have major disturbance to the original soil, rendering the archaeology nil. Hence, the area contains no archaeological potential.

Zone 2

5.4.2 Excavation has been conducted to the north of Zone 2 during the SKNPW2015 archaeological investigation with two test pits (TP7 and TP8) and four auger holes (AH13 to AH16) in Zone C[57] (**Figure 18**refers). While it was believed that artefacts found in that investigation were transported by natural soil movement from the hilltop, the survey results from the test pits did not yield any archaeological materials. As there are only modern and sterile layers, and no artefacts or cultural layers were found in the test pits and auger holes, the survey report concluded that there is no archaeological potential as the area has been flattened by previous open storage construction. The remaining part of Zone 2 contains similar landscape and has no archaeological potential due to disturbance by open storage construction (**Figure 9** refers).

Zone 3

5.4.3 Zone 3 is located immediately north to the archaeological investigation in Zone C of SKNPW2015[58] (**Figure 18**refers). SKNPW2015 excavations of two test pits (TP7 and TP8) and four augur holes (AH13 to AH16) were conducted at the Ancillary Road nearby that yielded no archaeological remains. The stratigraphy of the concerned test pits and auger holes revealed that sterile regolith soil lies immediately beneath topsoil, with no layers that contained archaeological deposits in between. The field scanning study of that survey also yield no archaeological remains. Furthermore, the earlier SKNPW2006 survey conducted also four auger holes (AH20, AH24, AH25 and AH30) and one test pit (TP3) also revealed similar stratigraphy as SKNPW2015 (**sections 3.3.19** and **3.3.25** refer).

5.4.4 Both surveys suggest that the hilltop areas have been disturbed. Archaeological materials would be unlikely to remain *in situ*. It is therefore believed that the open storage construction happened on the hilltop in 1993 as seen on the aerial photo (**Figure 9** refers) have already removed any soil layers that might have contained archaeological deposit. Furthermore, the eastern side of Zone 3 is a steep slope (over 30° gradient) and is unlikely to retain any archaeological deposit due to soil movement. Hence, Zone 3 is expected to have low archaeological potential.

5.4.5 However, it has been suggested in the SKNPW2015 survey that the artefacts discovered on the hill slope was transported from the hilltop due to natural soil movement. Moreover, most of Zone 3 are currently located within the Ho Chung site of archaeological interest. The possibility in identifying archaeological finds should not be neglected.

Zone 4

5.4.6 The archaeological potential of areas to the north of Zone C of the SKNPW2015 (Zones 4 and 5 within the Application Site) might only be partly disturbed by the open storage development. In the SKNPW2015 archaeological investigation[59], artefacts were discovered at the foot of the hill. It was believed that those artefacts found in the investigation were transported by natural soil movement from the hilltop. Hence, these remains were secondary deposit from the hilltop. The archaeological potential in Zone 4 might be diminished due to possible soil movement probably landslide. Furthermore, the site formation seen on the aerial photo in 1993 (**Figure 9**) suggested that the eastern side of Zone 4 has been disturbed.

5.4.7 While it would be prudent to suggested that the archaeological potential, if any, would remain in the western side of the Zone 4 (**Figure 17** demarcated the *Disturbed Area within the Application Site* observed on the aerial photo in 1993), the eastern side falls also within the Ho Chung SAI and is on lower slopes, which might still have some archaeological materials (even though secondary) in nature. Thus, Zone 4 would have some archaeological potential.

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[57] Billion Vantage Investment Limited. (2016). *Sai Kung Nam Pin Wai Development – Archaeological Consultancy: Archaeological Investigations and Survey-cum-Excavation Report*. Hong Kong: AECOM.

[58] *Ibid*.

[59] Billion Vantage Investment Limited. (2016). *Sai Kung Nam Pin Wai Development – Archaeological Consultancy: Archaeological Investigations and Survey-cum-Excavation Report*. AECOM.

Zone 5

5.4.8 Zone 5 might not be disturbed by the open storage development. However, based on the SKNPW2015 archaeological investigation[60], artefacts were discovered at the foot of the hill as secondary deposit. It was believed that those artefacts found in the investigation were transported by natural soil movement from the hilltop. HC1999 archaeological excavation suggests that relatively significant findings were located at alluvium plains with lower elevation. Hence, the archaeological potential in Zone 5 might have archaeological potential.

Remaining Phase

5.4.9 The remaining phase areas have been disturbed when the areas were flattened during the construction of the open storage area. These areas are expected to have no archaeological potential.

Ancillary Road

5.4.10 The ancillary road area is within Zone C of SKNPW2015[61] (**Figure 18**refers). Excavations of two test pits (TP7 and TP8) and four augur holes (AH13 to AH16) were conducted and yielded no archaeological remains. It is believed that the ancillary road area has been disturbed when the area was flattened during the construction of the open storage area and the laying of concrete pavement. Hence, the ancillary road area has no archaeological potential.

60 *Ibid*.
61 *Ibid*.

6 RECOMMENDATION

6.1 Archaeological Works

6.1.1 According to **Section 5.4**, Zones 1 and 2, the Remaining Phase and Ancillary Road Works were concluded to have no archaeological potential. Zone 3 contains low archaeological potential due to modern disturbance on the hilltop as concluded in the SKNPW2015, as well as the ground disturbance due to the construction of the open storage space seen in the aerial photo of 1993 (**Figure 9** refers) at Zone 3. However, it has been suggested in the SKNPW2015 survey that the artefacts discovered on the hill slope was transported from the hilltop due to natural soil movement. Moreover, most of Zone 3 are currently located within the Ho Chung SAI. The possibility in identifying archaeological finds should not be neglected. Furthermore, Zone 4 was majorly concluded to have diminished archaeological potential due to possible soil movement, while the archaeological potential in Zone 5 may remain undisturbed.

6.1.2 In order to protect the archaeology within the Application Site, with consideration to the Application Site lies within the Ho Chung SAI, recommendation as follows:

1. An archaeological survey should be conducted before the commencement of any construction works within Zone 3 of the Application Site to confirm the low archaeological potential.
2. An archaeological survey-cum-excavation should be conducted before the commencement of any construction works within Zones 4 and 5 of the Application Site to preserve the archaeological resources by, including but not limited to, in situ preservation or by record (such as rescue excavation).

6.1.3 Archaeological survey at Zone 3 should aim to achieve the followings:

1. To compare the stratigraphic information obtained from the survey compared with previous archaeological surveys and relate how such information could enhance the understanding of the archaeology of the Application Site and Ho Chung SAI. In particular, to verify both the extend of the modern destruction within Zone 3, thus confirming low/no archaeological potential at Zone 3 within the *Area Archaeologically Unsurveyed within the Application Site and Ho Chung SAI* (**Figure 17** refers).
2. To recommend mitigation measures should adverse impacts arises. Mitigation measures could include, but not limited to, preservation (such as by record or *in situ*) before the commencement of any construction works and would be subjected to agreement with AMO and the project proponent.
3. To conduct the mitigation measures recommended by the archaeological survey, with agreement with AMO.

6.1.4 The archaeological survey-cum-excavation at Zones 4 and 5 should aim to achieve the followings:

1. To compare the stratigraphic information obtained from the survey compared with previous archaeological surveys and relate how such information could enhance the understanding of the archaeology of the Application Site and the Ho Chung SAI. In particular, to confirm no (or lack of) archaeological potential at Zones 4 and 5;
2. Particular focus of the archaeological survey-cum-excavation should be given to the *Area Archaeologically Unsurveyed within the Application Site and Ho Chung SAI* (**Figure 17** refers).
3. To verify if the archaeological materials discovered from such survey (if any) contain contextual information for the interpretation of past human societies;
4. To assess the impacts of the Proposed Residential Development to the archaeology within the Application Site; and
5. To recommend mitigation measures should adverse impacts arises.

6. To conduct the mitigation measures recommended by the archaeological survey, with agreement with AMO

6.1.5 Project proponent should engage a qualified archaeologist to obtain the *Licence to Excavate and Search for Antiquities* from the Antiquities Authority to carry out the archaeological survey at Zone 3 and the archaeological survey-cum-excavation at Zones 4 and 5, during which process an Archaeological Action Plan should be prepared to outline the scope and methodology of these archaeological works.

6.1.6 The archaeological survey-cum-excavation involves two parts: (a) archaeological survey), and (b) archaeological excavation. The archaeological survey should feed adequate information for items (1) to (6) mentioned in **Section 6.1.4** and presented in an interim report in due course. The archaeological excavation will be part of the mitigation measure (items (5) and (6) in **Section 6.1.4**). It should be proposed by the qualified archaeologist if the Proposed Residential Development has impact on the archaeology of the site.

7 CONCLUSION

7.1.1 The Project Proponent is preparing to the Town Planning Board a Planning Application under Section 12A of the Town Planning Ordinance (Cap. 131) for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung (**Figure 1**). AECOM is employed to carry out this Archaeological Review Consultancy to review potential impacts on archaeological resources within the Application Site and recommend mitigation measures if adverse impact arises.

7.1.2 Field evaluation in the form of surface scanning was undertaken by AECOM's in-house archaeological team in the Application Site. The aim of field evaluation was to ascertain if the Application Site has any archaeological potential. Scanning of the ground surface for archaeological material has been conducted with the aid of aerial photos and maps. Topography, surface conditions and existing site conditions are also noted during the field scanning. For the ease of discussion, the Application Site is subdivided into Zones 1, 2, 3, 4, 5, Remaining Phrase and Ancillary Road as shown on **Figure 17**.

7.1.3 The plot of Application Site to the south adjacent to the Wo Mei Hung Min Road (Zone 1) was part of the small hills that occupies most of the Application Site. Apparently, after the construction of the New Hiram's Highway, the original landscape has been cut flat due to construction needs, and some temporary structures have since then occupied this plot of land. Therefore, it would have major disturbance to the original soil, rendering the archaeology nil. Hence, the area contains no archaeological potential.

7.1.4 Part of Zone 2 has been excavated during the SKNPW2015 archaeological investigation with two test pits (TP7 and TP8) and four auger holes (AH13 to AH16) in Zone C[62]. While it was believed that artefacts found in that investigation were transported by natural soil movement from the hilltop, the survey results from test pits in Zone 2 has not yield any archaeological materials. As no artefacts or cultural layers were found in the test pits and auger holes, the report concluded that there is no archaeological potential as the area has been flattened by previous open storage construction. The remaining part of Zone 2 contains similar landscape and has no archaeological potential due to disturbance by open storage construction.

7.1.5 Zone 3 is located immediately north to the archaeological investigation in Zone C of SKNPW2015. It has been site formed in 1993. Excavations of two test pits (TP7 and TP8) and four augur holes (AH13 to AH16) were conducted. The excavations yielded no archaeological remains. The field scanning study of the survey also yield no archaeological remains. However, it has been suggested in the SKNPW2015 survey that the artefacts discovered on the hill slope was transported from the hilltop due to natural soil movement. Moreover, most of Zone 3 are currently located within the Ho Chung SAI. The possibility in identifying archaeological finds should not be neglected.

7.1.6 It is noted from field scanning that the areas to the north of Zone C (Zones 4 and 5 within the Application Site) might not be disturbed by the open storage development. In the SKNPW2015 archaeological investigation, artefacts were discovered at the foot of the hill as secondary deposit. It was believed that those artefacts found in the investigation were transported by natural soil movement from the hilltop. Hence, the archaeological potential in Zone 4 might be diminished due to possible soil movement.

7.1.7 Zone 5 might not be disturbed by the open storage development. However, based on the SKNPW2015 archaeological investigation, artefacts were discovered at the foot of the hill as secondary deposit. It was believed that those artefacts found in the investigation were transported by natural soil movement from the hilltop. Hence, the archaeological potential in Zone 5 might exist.

[62] Billion Vantage Investment Limited. (2016). *Sai Kung Nam Pin Wai Development – Archaeological Consultancy: Archaeological Investigations and Survey-cum-Excavation Report*. AECOM.

7.1.8 The remaining phase and ancillary road areas were likely to have been flattened and laid with concrete during the construction of open storage. No archaeological findings were yielded during the field scanning. Furthermore, archaeological investigation in SKNPW2015 yielded no archaeological remains within the ancillary road area. Hence, both remaining phase and ancillary road areas are expected to have no archaeological potential due to the disturbance by open storage construction.

7.1.9 In order to ascertain the archaeological significance of the Application Site, it is recommended that an archaeological survey at Zone 3 and an archaeological survey-cum-excavation at Zones 4 and 5 should be conducted before the commencement of any construction works within the Application Site that lies within Ho Chung Site of Archaeological Interest for this Proposed Residential Development at Nam Pin Wai Sai Kung (Green Belt Area).

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8.2 Glossary

Adze	錛
Anthropology Department of Sun Yat-sen University	中山大學人類學系
Anti-Manchu	反清
Arrowhead	鏃
Axe	斧
Bao'an	寶安
Basin	盆
Bifacial axe	雙扁斧
Blank	毛胚
Blue-and-white porcelain	青花瓷
Bolou	博羅
Brown glaze	醬釉
Cauldron	釜
Celadon porcelain	青瓷
Chopper and chopping tool	砍砸器
Cloth-impressed tile	布紋瓦
Coarse porcelain	粗瓷
Coastal Evacuation Order	遷界令
Cup	盞
Debitage	石廢片
Dongguan	東莞
Eastern Jin	東晉
Ganzhou	甘州
Governor-General of Guangdong and Guangxi	兩廣總督
Governor of Guangdong	廣東巡撫
Grating	爐箅
Grinder	粗磨石
Grinding tool	磨具
Guangdong	廣東
Guangxi	廣西
Guangxi Provincial Archaeological Team	廣西壯族自治區博物館考古隊
Hakka	客家
Han dynasty	漢朝
Hanshu	漢書
Hiram's Highway	西貢公路
Ho Chung	蠔涌

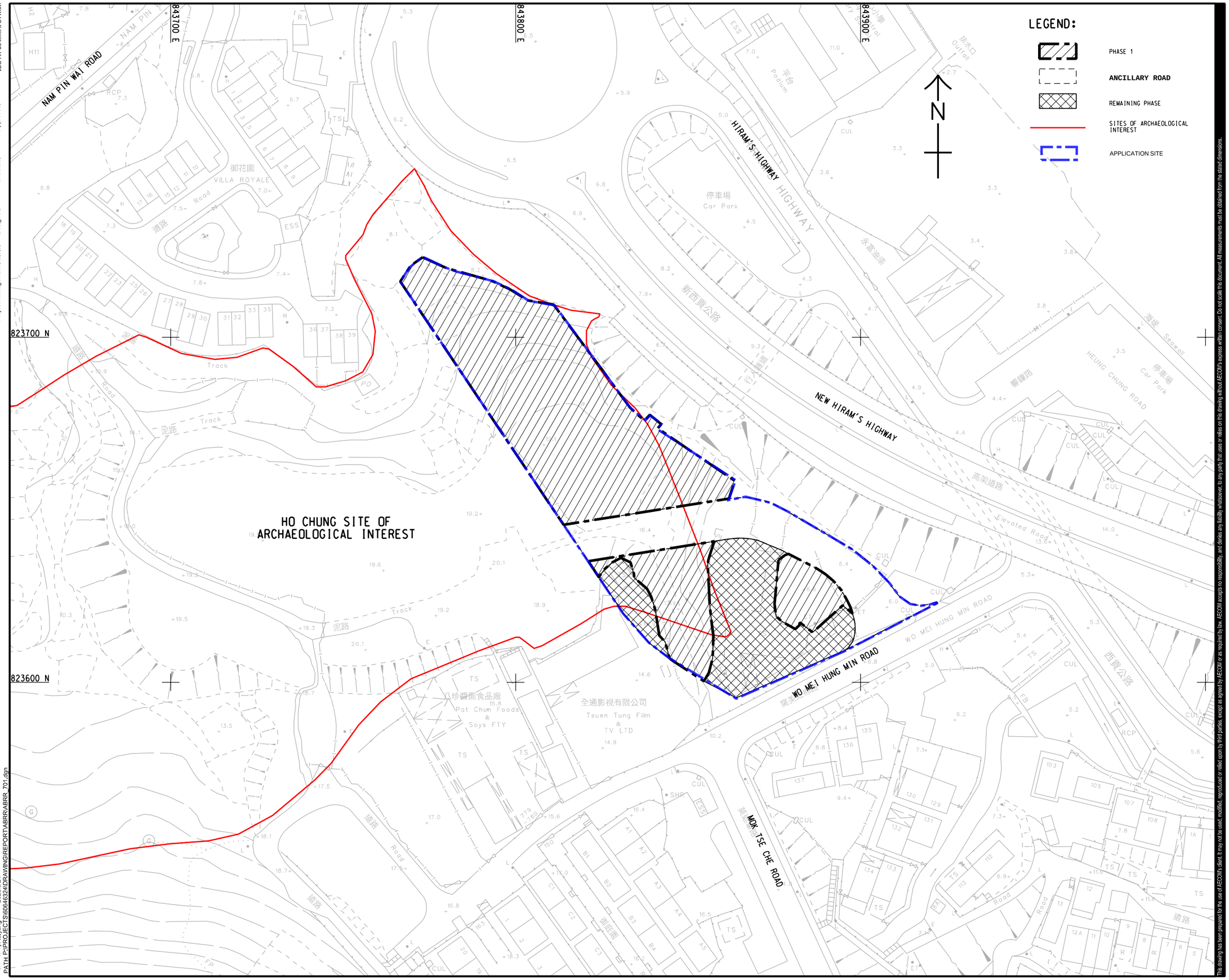
Hunan Institute of Cultural Relics and Archaeology	湖南省文物考古所
Ice-crackled	冰裂紋
Japanese Occupation	日佔時期
Jar	罐
Jiangxi	江西
Kap Pin Long	甲邊朗
Lai	黎
Lau	劉
Lee	李
Li	里
Lingnan	嶺南
Lozenge pattern	菱格紋
Marina Cove	匡湖居
Flake Tools	石片石器
Ming dynasty	明朝
Mortar	擂鉢
Nam Pin Wai	南邊圍
Nam Wai	南圍
New Hiram's Highway	新西貢公路
Panyu	番禺
Patra	鉢
Percussion stone tool	打製石器
Pick	啄
Plate	盤
Plow	犁頭
Pointer	尖狀器
Polished stone tool	磨製石器
Pot	壺
Pounder	錘
Qin dynasty	秦朝
Qing dynasty	清朝
Qingbai porcelain	青白瓷
Retouched flake	有加工石片
Sai Kung	西貢
Scraper	刮削器
Sha Kok Mei	沙角尾
Shanxi	山西

Shiji	史記
Song dynasty	宋朝
Stone core	石核
Stone drill	石鑽
Stone ridge	石圍埗
Taiyuan	太原
Tanka	蜑家
Tin Hau	天后
Tse	謝
Urn	缸
Vase	瓶
Wan	溫
Wang Lairen	王來任
Wo Mei	窩尾
Wong	黃
Xinan Gazetteer	新安縣誌
Yuan dynasty	元朝
Zhou Youde	周有德

APPENDIX A

Figures

List of Figures in Appendix A



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APPLICATION FOR AMENDMENT OF PLAN UNDER SECTION 12A OF THE TOWN PLANNING ORDINANCE (CAP. 131) TO REZONE THE APPLICATION SITE FROM "GREEN BELT" TO "RESIDENTIAL (GROUP C)1" FOR PROPOSED HOUSE DEVELOPMENT AT VARIOUS LOTS IN D.D. 244 AND ADJOINING GOVERNMENT LAND, NAM PIN WAI, SAI KUNG

CLIENT
業主

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HO CHUNG NEW VILLAGE

HEBE HAVEN
(PAK SHA WAN)

NAM PIN WAI ROAD

HIRAM'S HIGHWAY

WO MEI HUNG MIN ROAD

WO MOK TSE CHE ROAD

NEW HIRAM'S HIGHWAY

WO MEI

ATLAS

HO CHUNG SITE OF ARCHAEOLOGICAL INTEREST

NAM WAI SITE OF ARCHAEOLOGICAL INTEREST

N

LEGEND:

PHASE 1

ANCILLARY ROAD

REMAINING PHASE

SITES OF ARCHAEOLOGICAL INTEREST

AECOM

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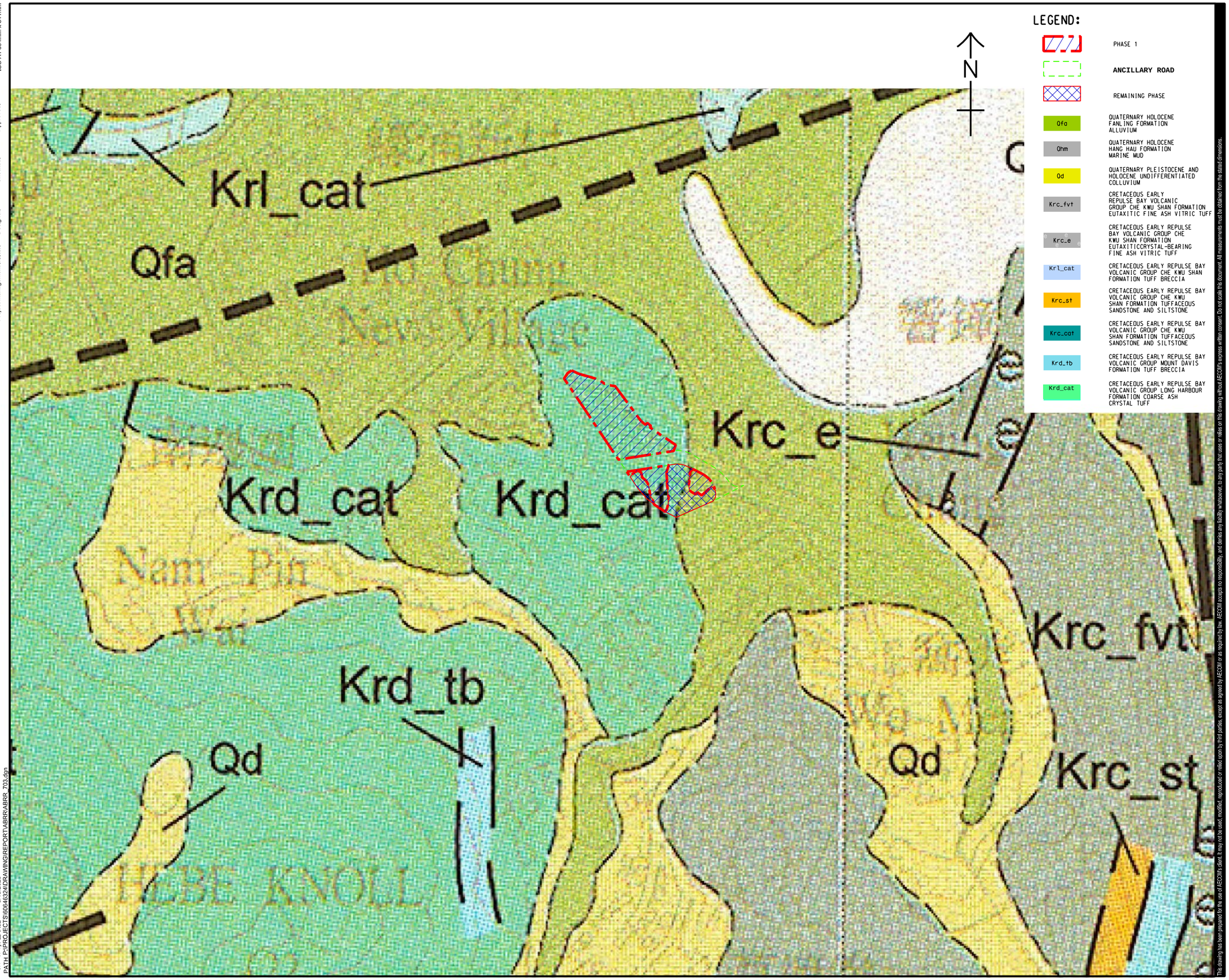

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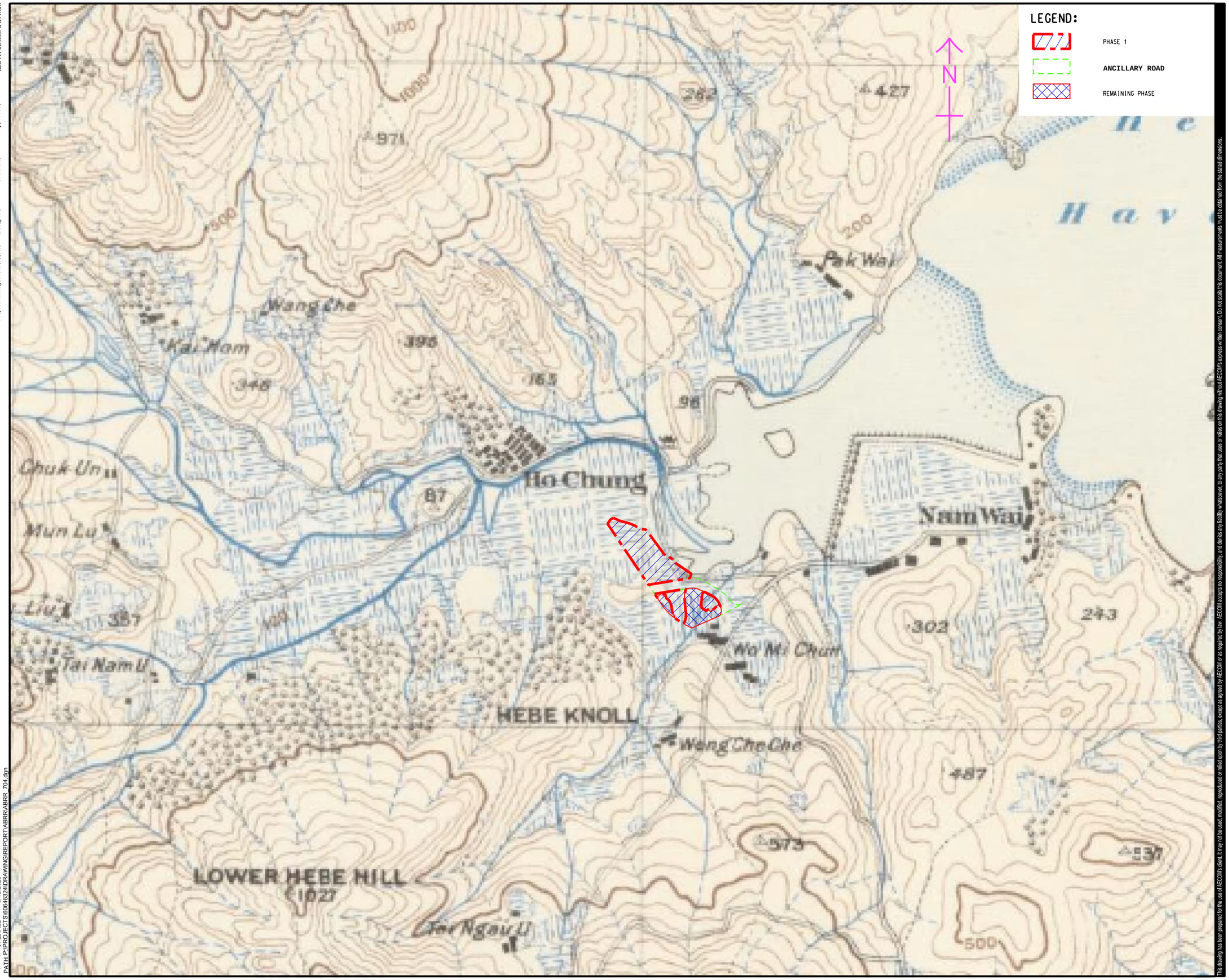

Plot File by: UANJ2 5/19/2023
PATH P:\PROJECTS\60646324\DRAWING\REPORT\ABRR\ABRR_704.dgn

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PROJECT
項目

APPLICATION FOR AMENDMENT OF PLAN UNDER SECTION 12A OF THE TOWN PLANNING ORDINANCE (CAP. 131) TO REZONE THE APPLICATION SITE FROM "GREEN BELT" TO "RESIDENTIAL (GROUP C)1" FOR PROPOSED HOUSE DEVELOPMENT AT VARIOUS LOTS IN D.D. 244 AND ADJOINING GOVERNMENT LAND, NAM PIN WAI, SAI KUNG

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STATUS
現狀

SCALE 比例
A3 1 : 4000

DIMENSION UNIT 尺寸單位
METRES

KEY PLAN
索引圖

PROJECT NO. 項目編號
60646324

AGREEMENT NO. 協議書

SHEET TITLE
圖紙名稱
MAP OF HONG KONG AND PART OF LEASED TERRITORY, 1913

SHEET NUMBER
圖紙編號
60646324/ABRR/FIGURE 4

AECOM

PROJECT
項目

APPLICATION FOR AMENDMENT OF PLAN UNDER SECTION 12A OF THE TOWN PLANNING ORDINANCE (CAP. 131) TO REZONE THE APPLICATION SITE FROM "GREEN BELT" TO "RESIDENTIAL (GROUP C)1" FOR PROPOSED HOUSE DEVELOPMENT AT VARIOUS LOTS IN D.D. 244 AND ADJOINING GOVERNMENT LAND, NAM PIN WAI, SAI KUNG

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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: 60646324

AGREEMENT NO. 合約編號

SHEET TITLE
圖紙名稱

AERIAL PHOTO OF THE APPLICATION SITE IN 1956

SHEET NUMBER
圖紙編號

60646324/ABRR/FIGURE 5

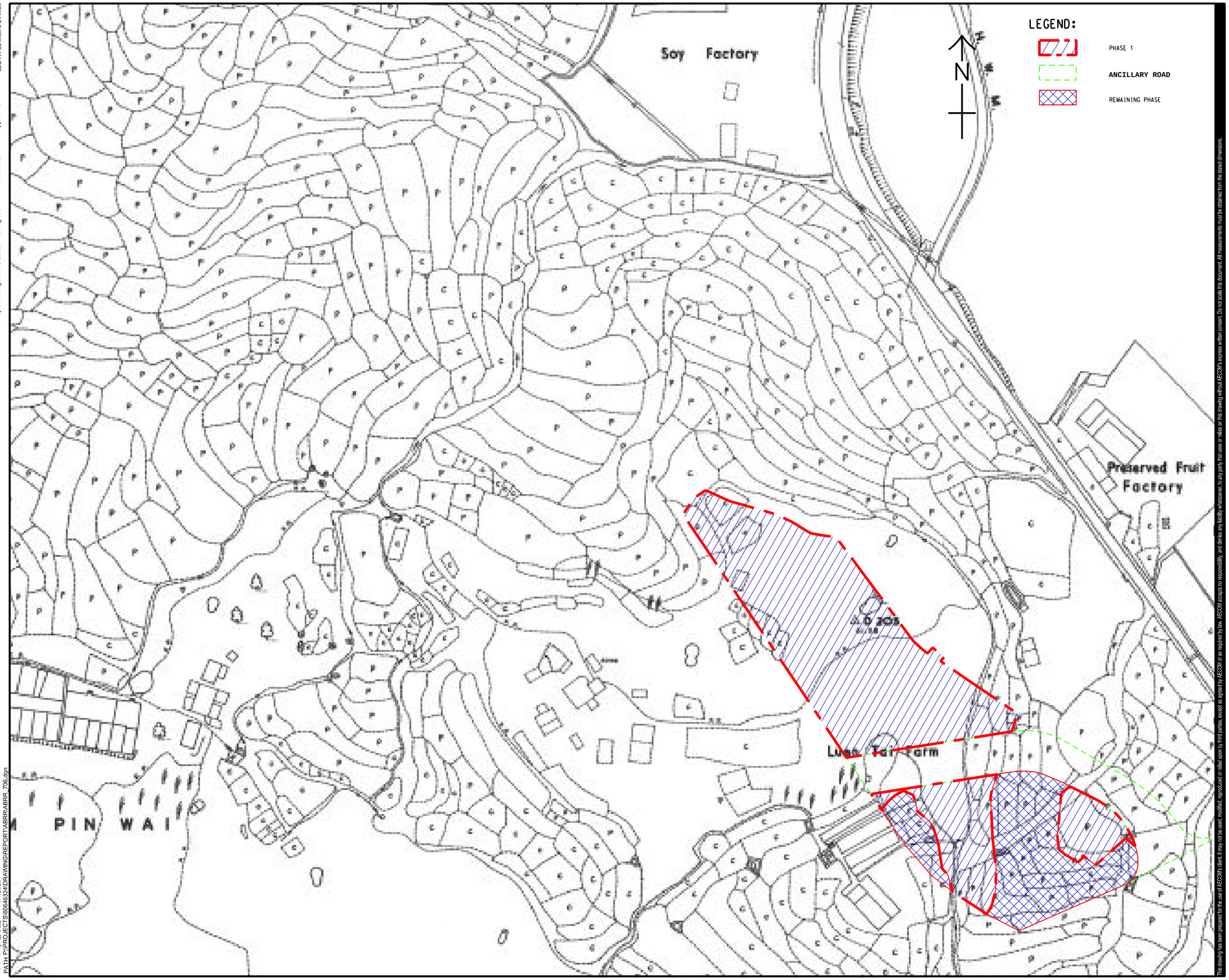
ISO A1 594mm x 841mm

Approved:

Checked:

Designer:

Project Management Initials:



Plot File by: LIANJ2 1/4/2023
PATH: P:\PROJECTS\60646324\DRAWING\REPORT\ABRR\ABRR_706.dgn

AECOM

PROJECT
項目

APPLICATION FOR AMENDMENT OF PLAN UNDER SECTION 12A OF THE TOWN PLANNING ORDINANCE (CAP. 131) TO REZONE THE APPLICATION SITE FROM "GREEN BELT" TO "RESIDENTIAL (GROUP C)1" FOR PROPOSED HOUSE DEVELOPMENT AT VARIOUS LOTS IN D.D. 244 AND ADJOINING GOVERNMENT LAND, NAM PIN WAI, SAI KUNG

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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
60646324

AGREEMENT NO. 協議編號

SHEET TITLE
圖紙名稱
TOPOGRAPHIC MAP OF
THE APPLICATION SITE IN 1959

SHEET NUMBER
圖紙編號
60646324/ABRR/FIGURE 6

ISO A1 594mm x 841mm

Approved:

Checked:

Designer:

Project Management Initials:

Plot File by: LIANJ2 5/19/2023
PATH: P:\PROJECTS\60646324\DRAWING\REPORT\ABRR\ABRR_707.dgn

AECOM

PROJECT
項目

APPLICATION FOR AMENDMENT OF PLAN UNDER SECTION 12A OF THE TOWN PLANNING ORDINANCE (CAP. 131) TO REZONE THE APPLICATION SITE FROM "GREEN BELT" TO "RESIDENTIAL (GROUP C)1" FOR PROPOSED HOUSE DEVELOPMENT AT VARIOUS LOTS IN D.D. 244 AND ADJOINING GOVERNMENT LAND, NAM PIN WAI, SAI KUNG

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階段

SCALE 比例: A3 1 : 4000

DIMENSION UNIT 尺寸單位: METRES

KEY PLAN
索引圖

PROJECT NO. 項目編號: 60646324

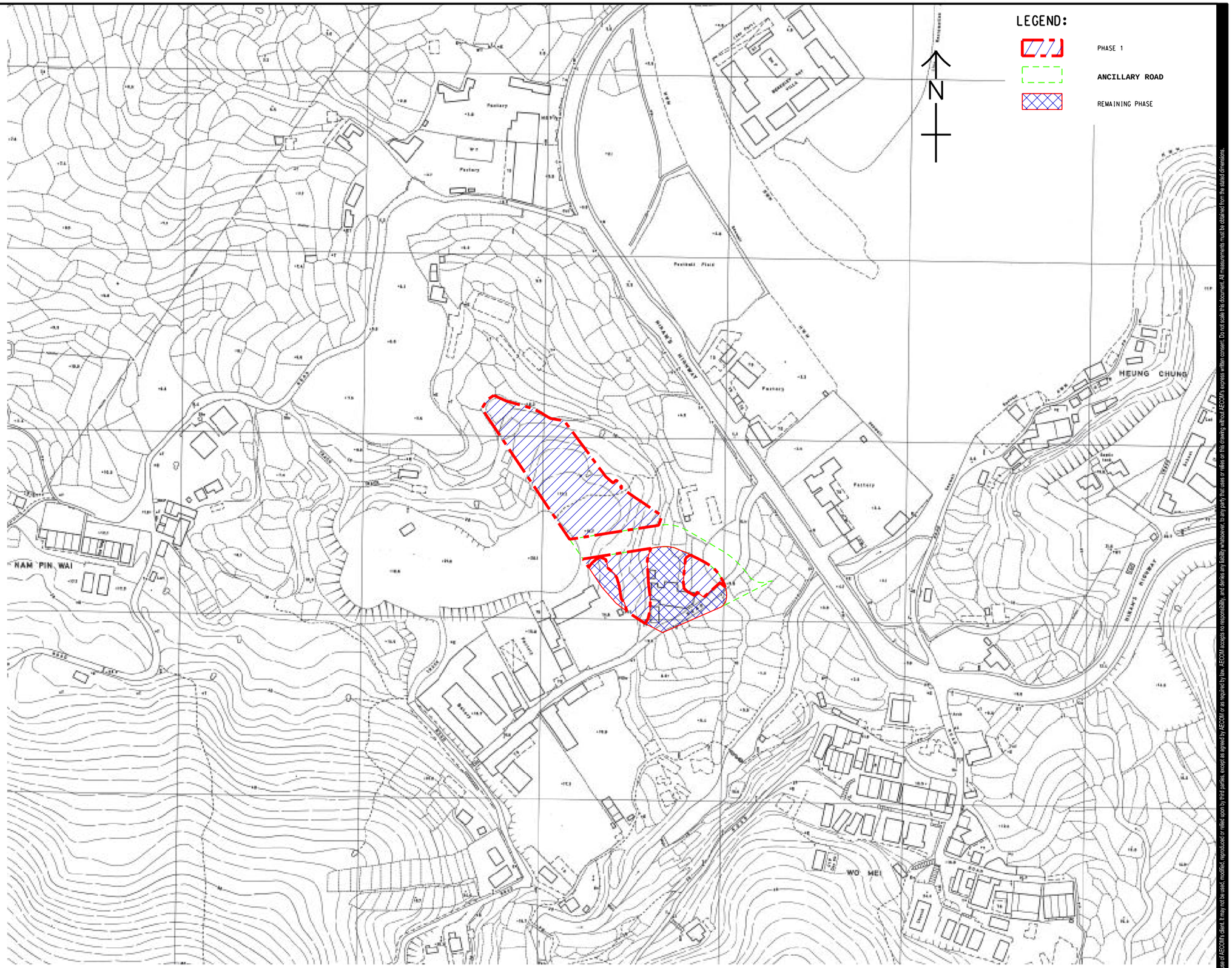
AGREEMENT NO. 協議號

SHEET TITLE
圖紙名稱

AERIAL PHOTO OF THE APPLICATION SITE IN 1963

SHEET NUMBER
圖紙編號

60646324/ABRR/FIGURE 7



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

Plot File by: LIANJ2 5/19/2023
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AECOM

PROJECT
項目

APPLICATION FOR AMENDMENT OF PLAN UNDER SECTION 12A OF THE TOWN PLANNING ORDINANCE (CAP. 131) TO REZONE THE APPLICATION SITE FROM "GREEN BELT" TO "RESIDENTIAL (GROUP C)1" FOR PROPOSED HOUSE DEVELOPMENT AT VARIOUS LOTS IN D.D. 244 AND ADJOINING GOVERNMENT LAND, NAM PIN WAI, SAI KUNG

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STATUS
狀況

SCALE 比例
A3 1 : 2000

DIMENSION UNIT 尺寸單位
METRES

KEY PLAN
索引圖

PROJECT NO. 項目編號
60646324

AGREEMENT NO. 協議編號

SHEET TITLE
圖紙名稱
TOPOGRAPHIC MAP OF THE APPLICATION SITE IN 1980

SHEET NUMBER
圖紙編號
60646324/ABRR/FIGURE 8

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

Plot File by: LIANJ2 3/13/2024
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項目

APPLICATION FOR AMENDMENT OF PLAN UNDER SECTION 12A OF THE TOWN PLANNING ORDINANCE (CAP. 131) TO REZONE THE APPLICATION SITE FROM "GREEN BELT" TO "RESIDENTIAL (GROUP C)1" FOR PROPOSED HOUSE DEVELOPMENT AT VARIOUS LOTS IN D.D. 244 AND ADJOINING GOVERNMENT LAND, NAM PIN WAI, SAI KUNG

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STATUS
階段

SCALE 比例 — **DIMENSION UNIT** 尺寸單位

KEY PLAN
索引圖

PROJECT NO. 項目編號 — **AGREEMENT NO.** 協議號

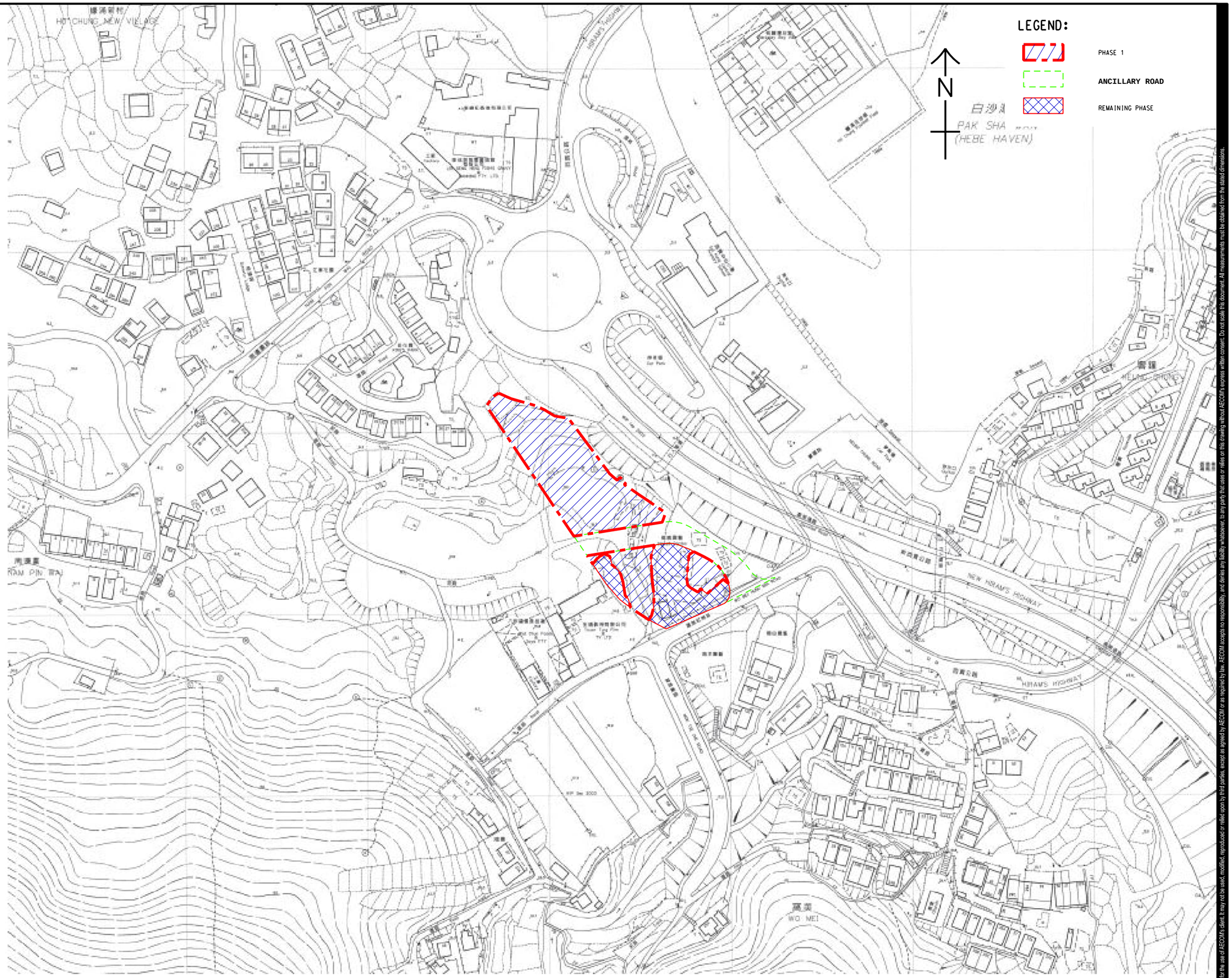
60646324

SHEET TITLE
圖紙名稱

AERIAL PHOTO OF THE APPLICATION SITE IN 1993

SHEET NUMBER
圖紙編號

60646324/ABRR/FIGURE 9



ISO A1 594mm x 841mm

Approved:

Checked:

Designer:

Project Management Initials:

Plot File by: LIANJ2 5/19/2023
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APPLICATION FOR AMENDMENT OF PLAN UNDER SECTION 12A OF THE TOWN PLANNING ORDINANCE (CAP. 131) TO REZONE THE APPLICATION SITE FROM "GREEN BELT" TO "RESIDENTIAL (GROUP C)1" FOR PROPOSED HOUSE DEVELOPMENT AT VARIOUS LOTS IN D.D. 244 AND ADJOINING GOVERNMENT LAND, NAM PIN WAI, SAI KUNG

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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
60646324

AGREEMENT NO. 協議書

SHEET TITLE
圖紙名稱
TOPOGRAPHIC MAP OF THE APPLICATION SITE IN 2003

SHEET NUMBER
圖紙編號
60646324/ABRR/FIGURE 10

ISO A1 594mm x 841mm

Approved:

Checked:

Designer:

Project Management Initials:

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APPLICATION FOR AMENDMENT OF PLAN UNDER SECTION 12A OF THE TOWN PLANNING ORDINANCE (CAP. 131) TO REZONE THE APPLICATION SITE FROM "GREEN BELT" TO "RESIDENTIAL (GROUP C)1" FOR PROPOSED HOUSE DEVELOPMENT AT VARIOUS LOTS IN D.D. 244 AND ADJOINING GOVERNMENT LAND, NAM PIN WAI, SAI KUNG

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STATUS
階段

SCALE 比例
A3 1 : 4000

DIMENSION UNIT 尺寸單位
METRES

KEY PLAN
索引圖

PROJECT NO. 項目編號
60646324

AGREEMENT NO.

SHEET TITLE
圖紙名稱
AERIAL PHOTO OF THE APPLICATION SITE IN 2005

SHEET NUMBER
圖紙編號
60646324/ABRR/FIGURE 11

ISO A1 594mm x 841mm

Approved:

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Designer:

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Plot File by: LIANU2 5/19/2023
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APPLICATION FOR AMENDMENT OF PLAN UNDER SECTION 12A OF THE TOWN PLANNING ORDINANCE (CAP. 131) TO REZONE THE APPLICATION SITE FROM "GREEN BELT" TO "RESIDENTIAL (GROUP C)1" FOR PROPOSED HOUSE DEVELOPMENT AT VARIOUS LOTS IN D.D. 244 AND ADJOINING GOVERNMENT LAND, NAM PIN WAI, SAI KUNG

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階段

SCALE 比例
A3 1 : 4000

DIMENSION UNIT 尺寸單位
METRES

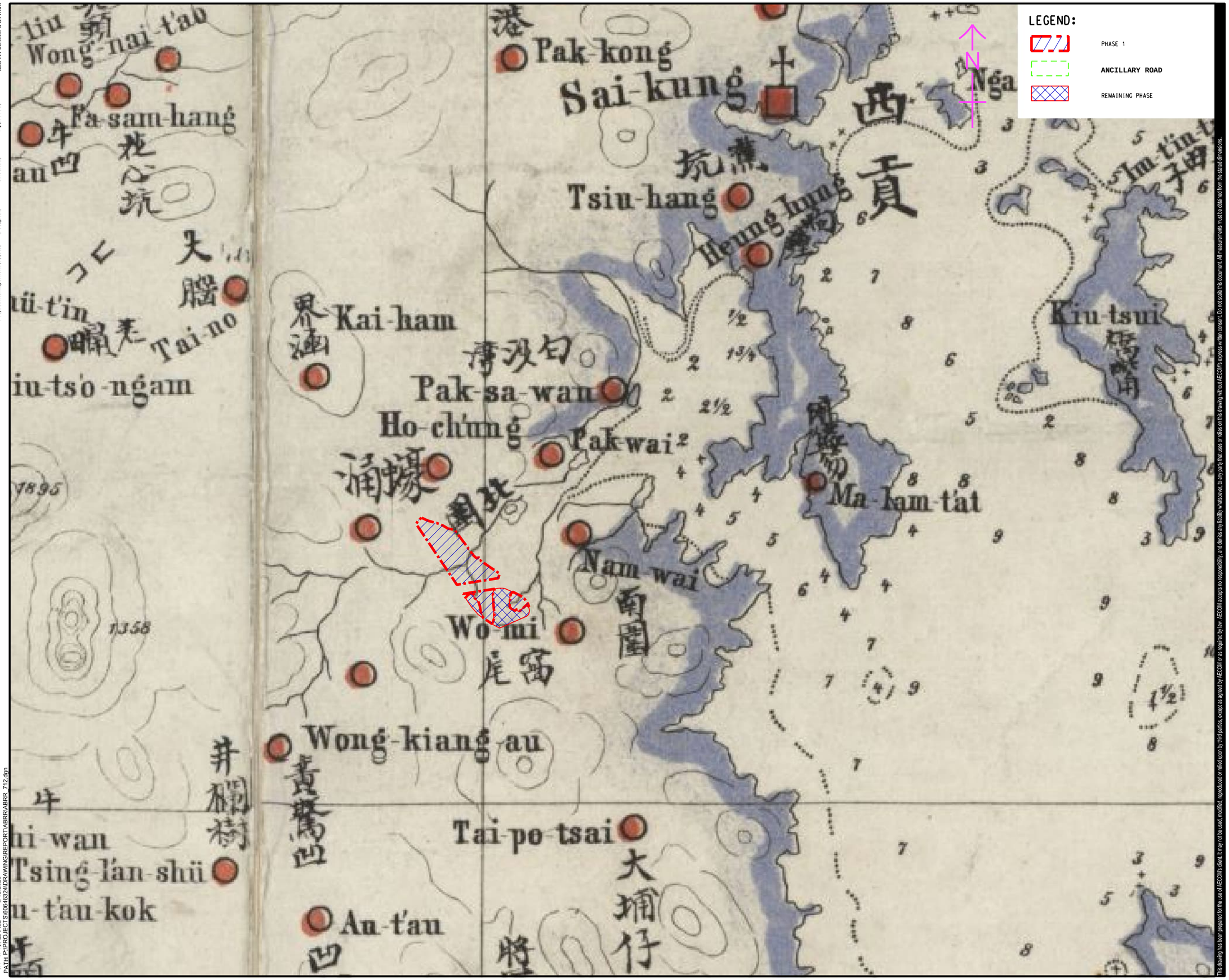
KEY PLAN
索引圖

PROJECT NO. 項目編號
60646324

AGREEMENT NO. 合約編號

SHEET TITLE
圖紙名稱
AERIAL PHOTO OF THE APPLICATION SITE IN 2016

SHEET NUMBER
圖紙編號
60646324/ABRR/FIGURE 12



ISO A1 594mm x 841mm

Approved:

Checked:

Designer:

Project Management Initials:

Plot File by: LIANJ2
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5/19/2023

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PROJECT
項目

APPLICATION FOR AMENDMENT OF PLAN UNDER SECTION 12A OF THE TOWN PLANNING ORDINANCE (CAP. 131) TO REZONE THE APPLICATION SITE FROM "GREEN BELT" TO "RESIDENTIAL (GROUP C)1" FOR PROPOSED HOUSE DEVELOPMENT AT VARIOUS LOTS IN D.D. 244 AND ADJOINING GOVERNMENT LAND, NAM PIN WAI, SAI KUNG

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STATUS
狀況

SCALE 比例
A3 1 : 4000

DIMENSION UNIT 尺寸單位
METRES

KEY PLAN
索引圖

PROJECT NO. 項目編號
60646324

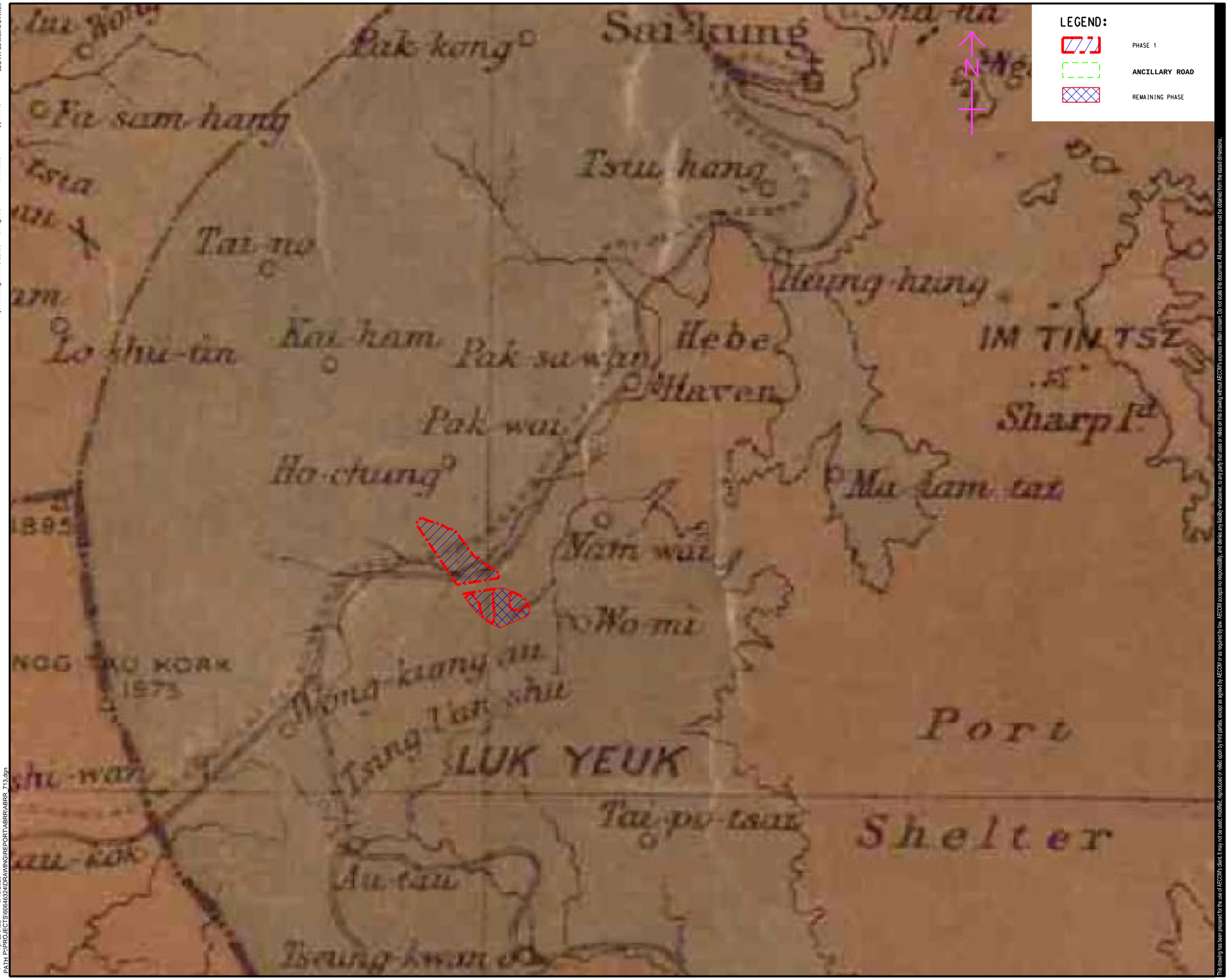
AGREEMENT NO. 合約編號

SHEET TITLE
圖紙名稱

MAP OF THE SAN-ON DISTRICT IN 1866

SHEET NUMBER
圖紙編號

60646324/ABRR/FIGURE 13



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

Plot File by: LIANJ2 5/19/2023
PATH: P:\PROJECTS\60646324\DRAWING\REPORT\ABRR\ABRR_713.dgn

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APPLICATION FOR AMENDMENT OF PLAN UNDER SECTION 12A OF THE TOWN PLANNING ORDINANCE (CAP. 131) TO REZONE THE APPLICATION SITE FROM "GREEN BELT" TO "RESIDENTIAL (GROUP C)1" FOR PROPOSED HOUSE DEVELOPMENT AT VARIOUS LOTS IN D.D. 244 AND ADJOINING GOVERNMENT LAND, NAM PIN WAI, SAI KUNG

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階段

SCALE 比例
A3 1 : 4000

DIMENSION UNIT 尺寸單位
METRES

KEY PLAN
索引圖

PROJECT NO. 項目編號
60646324

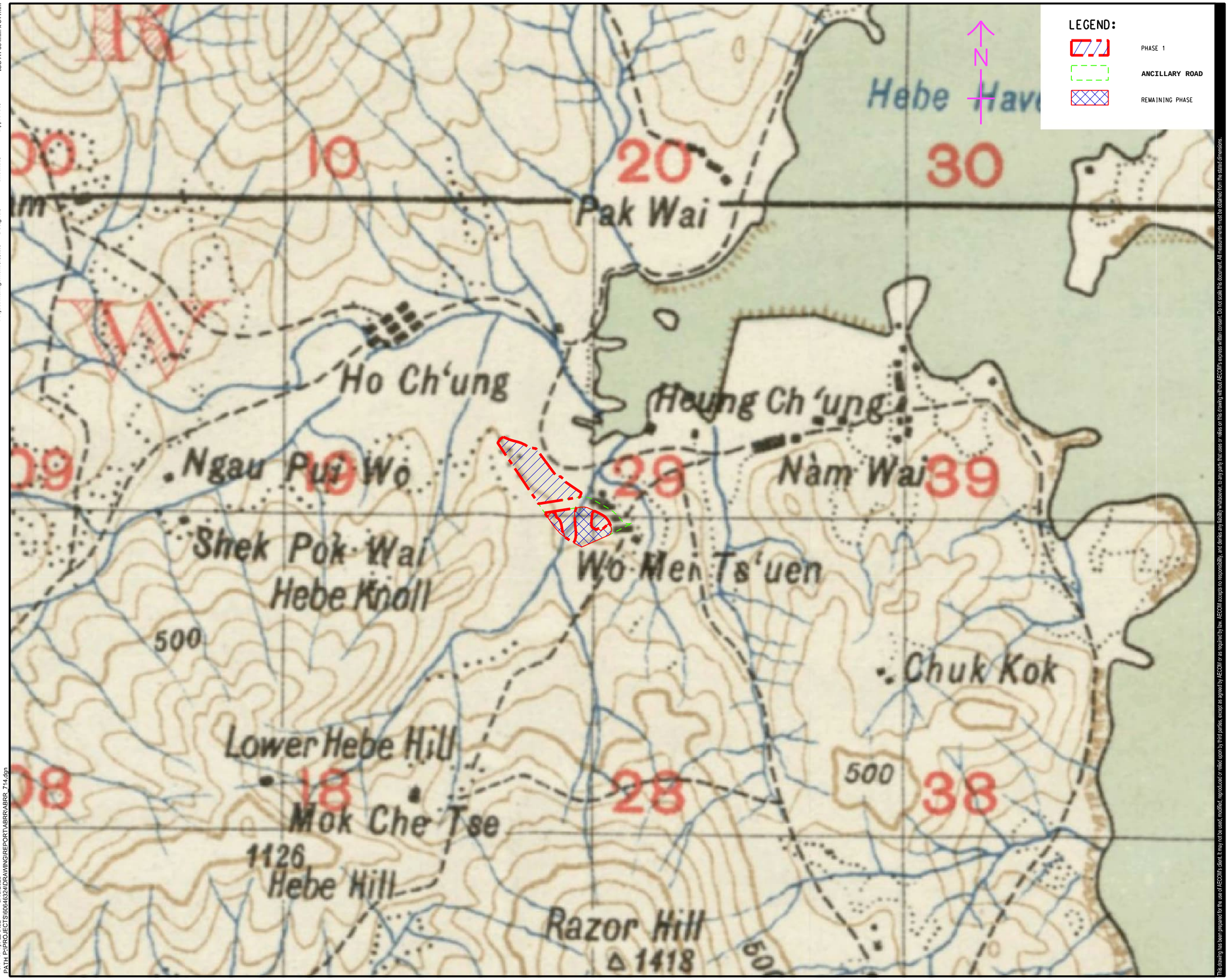
AGREEMENT NO. 合約編號

SHEET TITLE
圖紙名稱

MAP OF HONG KONG AND THE TERRITORY LEASED TO GREAT BRITAIN UNDER THE CONVENTION BETWEEN GREAT BRITAIN AND CHINA SIGNED AT BEIJING, 1898

SHEET NUMBER
圖紙編號

60646324/ABRR/FIGURE 14



ISO A1 594mm x 841mm

Approved:

Checked:

Designer:

Project Management Initials:

Plot File by: LIANJ2 5/19/2023
PATH: P:\PROJECTS\60646324\DRAWING\REPORT\ABRR\ABRR_714.dgn

AECOM

PROJECT
項目

APPLICATION FOR AMENDMENT OF PLAN UNDER SECTION 12A OF THE TOWN PLANNING ORDINANCE (CAP. 131) TO REZONE THE APPLICATION SITE FROM "GREEN BELT" TO "RESIDENTIAL (GROUP C)1" FOR PROPOSED HOUSE DEVELOPMENT AT VARIOUS LOTS IN D.D. 244 AND ADJOINING GOVERNMENT LAND, NAM PIN WAI, SAI KUNG

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STATUS
階段

SCALE 比例
A3 1 : 4000

DIMENSION UNIT 尺寸單位
METRES

KEY PLAN
索引圖

PROJECT NO. 項目編號
60646324

AGREEMENT NO. 協議號

SHEET TITLE
圖紙名稱
THE COLONY OF HONG KONG AND NEW TERRITORIES IN 1922

SHEET NUMBER
圖紙編號
60646324/ABRR/FIGURE 15

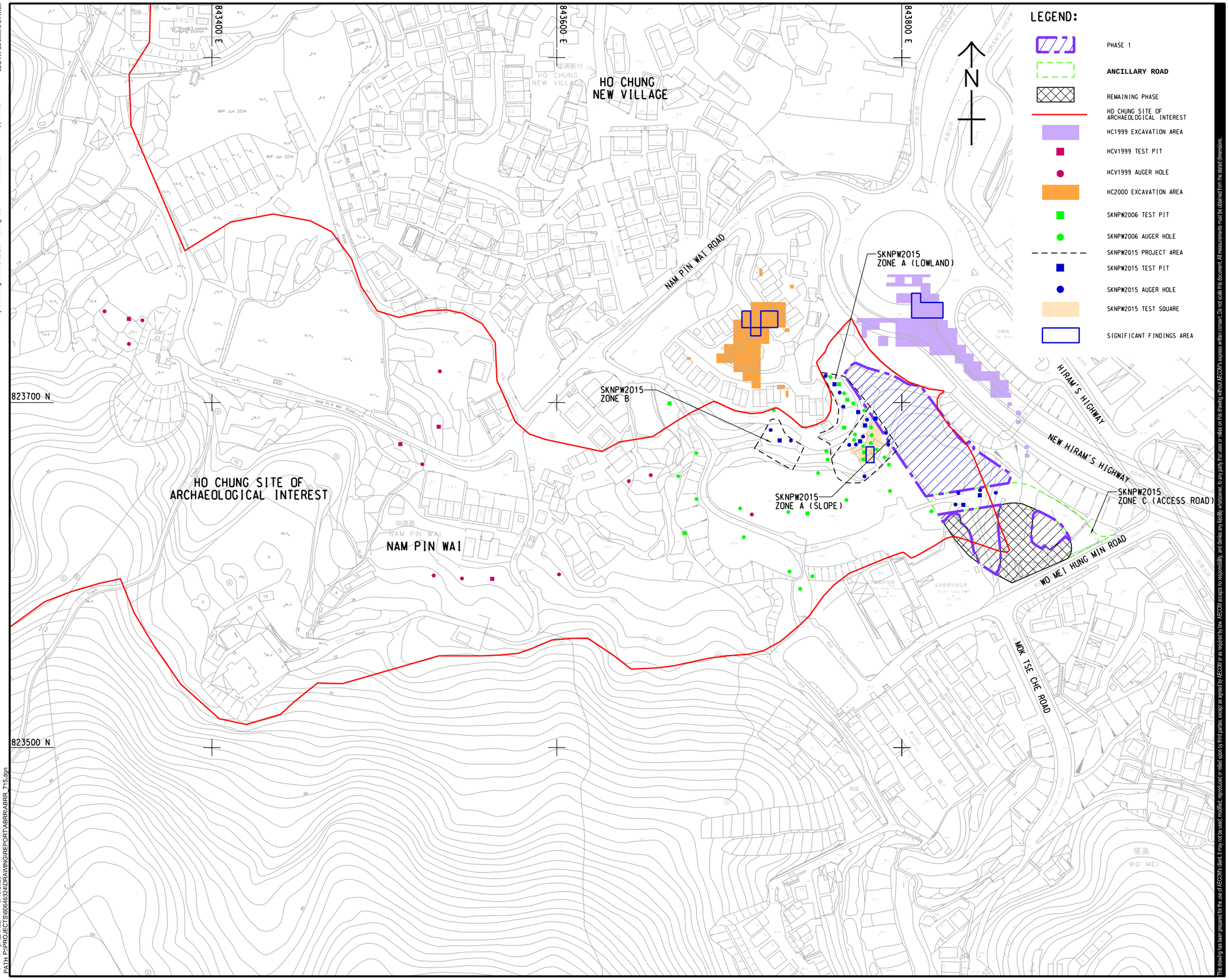
ISO A1 594mm x 841mm

Approved:

Checked:

Designer:

Project Management Initials:



Plot File by: LIANJ2 5/19/2023
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項目

APPLICATION FOR AMENDMENT OF PLAN UNDER SECTION 12A OF THE TOWN PLANNING ORDINANCE (CAP. 131) TO REZONE THE APPLICATION SITE FROM "GREEN BELT" TO "RESIDENTIAL (GROUP C)1" FOR PROPOSED HOUSE DEVELOPMENT AT VARIOUS LOTS IN D.D. 244 AND ADJOINING GOVERNMENT LAND, NAM PIN WAI, SAI KUNG

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階段

SCALE 比例
A3 1 : 2000

DIMENSION UNIT 尺寸單位
METRES

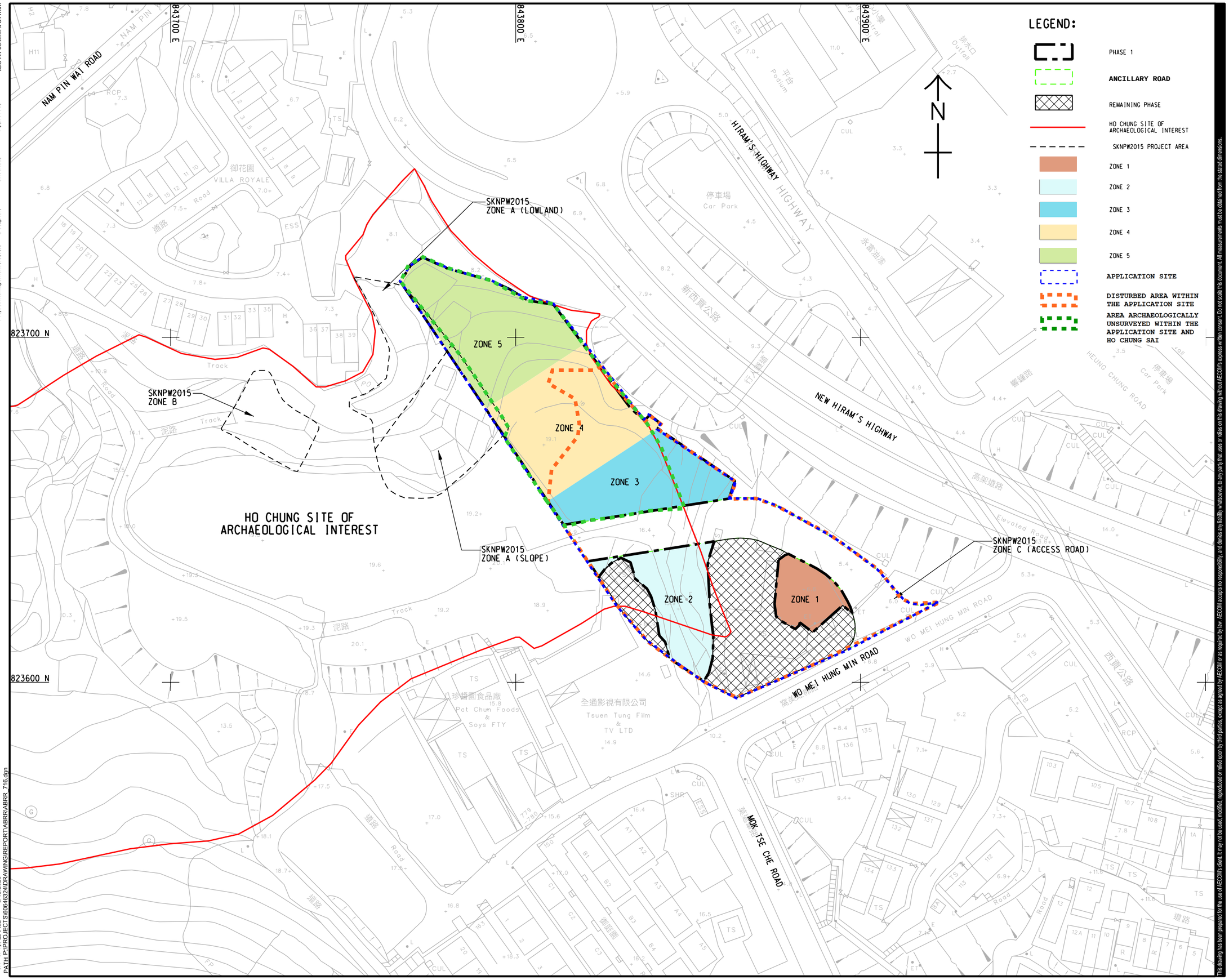
KEY PLAN
索引圖

PROJECT NO. 項目編號
60646324

AGREEMENT NO. 合約編號

SHEET TITLE
圖紙名稱
LOCATIONS OF PAST ARCHAEOLOGIAL WORKS

SHEET NUMBER
圖紙編號
60646324/ABRR/FIGURE 16



ISO A1 594mm x 841mm

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Designer:

Project Management Initials:

Plot File by: LIANJ2
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APPLICATION FOR AMENDMENT OF PLAN UNDER SECTION 12A OF THE TOWN PLANNING ORDINANCE (CAP. 131) TO REZONE THE APPLICATION SITE FROM "GREEN BELT" TO "RESIDENTIAL (GROUP C)1" FOR PROPOSED HOUSE DEVELOPMENT AT VARIOUS LOTS IN D.D. 244 AND ADJOINING GOVERNMENT LAND, NAM PIN WAI, SAI KUNG

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STATUS
狀況

SCALE 比例
A3 1 : 1000

DIMENSION UNIT 尺寸單位
METRES

KEY PLAN
索引圖

PROJECT NO. 項目編號
60646324

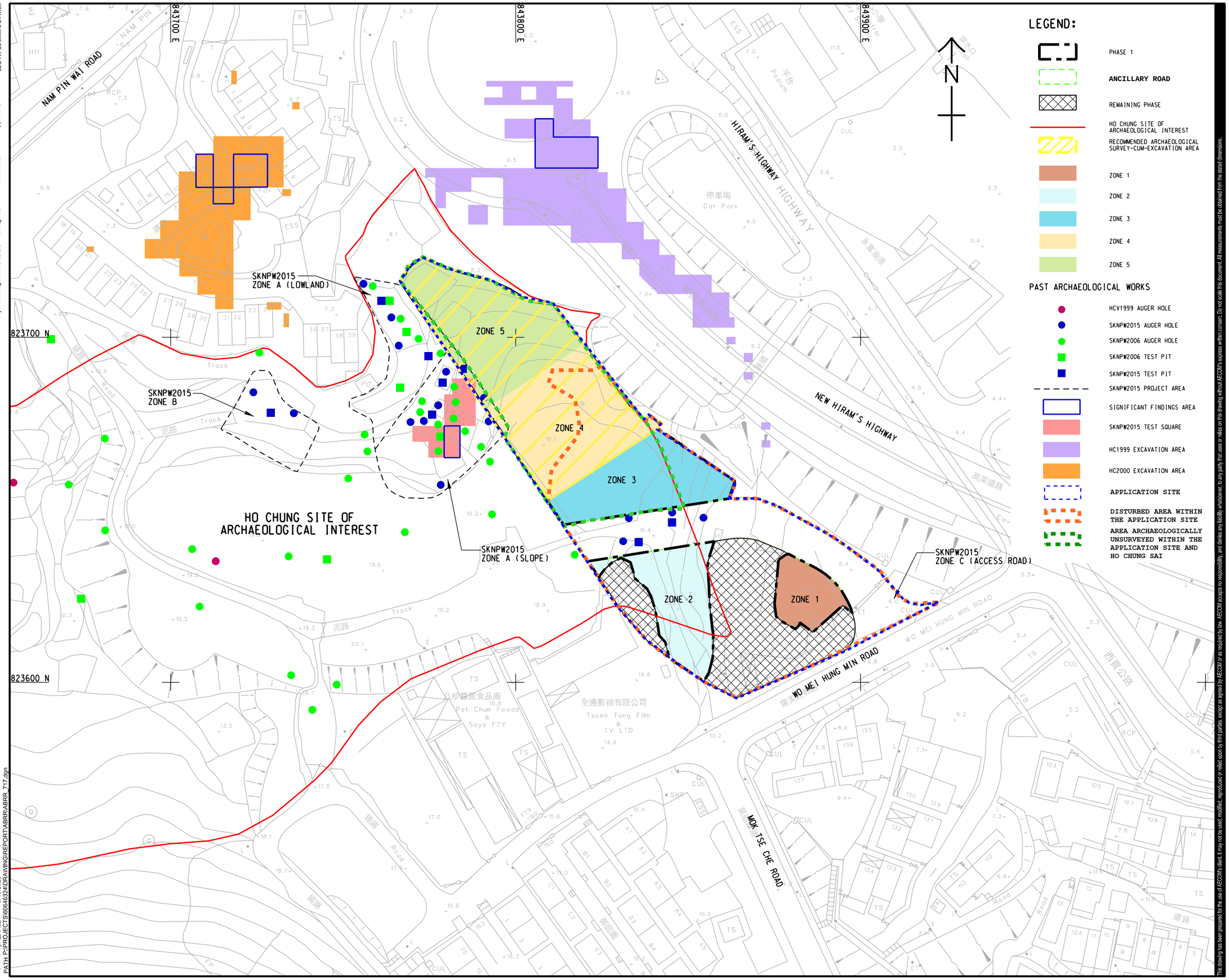
AGREEMENT NO. 協議編號

SHEET TITLE
圖紙名稱

ZONE 1 TO ZONE 5 OF THE APPLICATION SITE

SHEET NUMBER
圖紙編號

60646324/ABRR/FIGURE 17



ISO A1 594mm x 841mm

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APPLICATION FOR AMENDMENT OF PLAN UNDER SECTION 12A OF THE TOWN PLANNING ORDINANCE (CAP. 131) TO REZONE THE APPLICATION SITE FROM "GREEN BELT" TO "RESIDENTIAL (GROUP C)1" FOR PROPOSED HOUSE DEVELOPMENT AT VARIOUS LOTS IN D.D. 244 AND ADJOINING GOVERNMENT LAND, NAM PIN WAI, SAI KUNG

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狀況

SCALE 比例
A3 1 : 1000

DIMENSION UNIT 尺寸單位
METRES

KEY PLAN
索引圖

PROJECT NO. 項目編號
60646324

AGREEMENT NO. 合約編號

SHEET TITLE
圖紙名稱
AREA OF RECOMMENDED ARCHAEOLOGICAL SURVEY-CUM-EXCAVATION

SHEET NUMBER
圖紙編號
60646324/ABRR/FIGURE 18

APPENDIX B

Photographic Records of Field Scanning

Zone 1

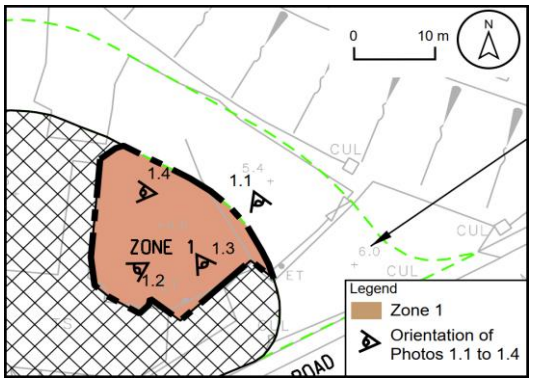


Photo 1.1 Filled Soil Ground at Eastern Zone 1 (Facing East)

Photo 1.2 Concrete Ground Surface in Zone 1

AECOM	Application for Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131) to Rezone the Application Site from "Green Belt" to "Residential (Group C)1" for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung	SCALE	N.T.S.	DATE	Jan 2023
		RECORD BY	JNIP		
	Photographic Records of Field Scan	JOB NO.	60646324	**Appendix B**	

Zone 1

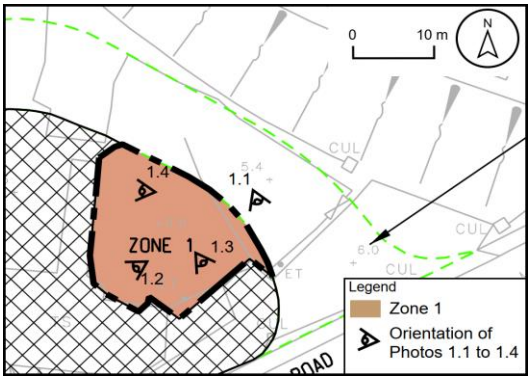


Photo 1.3 Southern Zone 1 (Facing Southeast)

Photo 1.4 Demolished Structures and Construction Waste in Zone 1 (Facing West)

AECOM	Application for Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131) to Rezone the Application Site from "Green Belt" to "Residential (Group C)1" for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung	SCALE	N.T.S.	DATE	Jan 2023
		RECORD BY	JNIP		
	Photographic Records of Field Scan	JOB NO.	60646324	**Appendix B**	

Zone 2

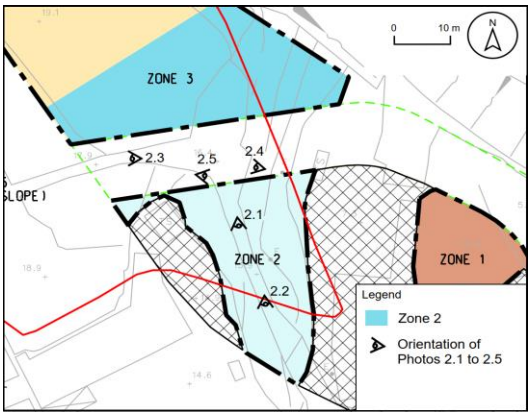


Photo 2.1 Concrete Pavement in Zone 2 (Facing South)

Photo 2.2 Steep Slope in Zone 2 (Facing South)

AECOM	Application for Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131) to Rezone the Application Site from "Green Belt" to "Residential (Group C)1" for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung	SCALE	N.T.S.	DATE	Jan 2023
		RECORD BY	JNIP		
	Photographic Records of Field Scan	JOB NO.	60646324	**Appendix B**	

Zone 2

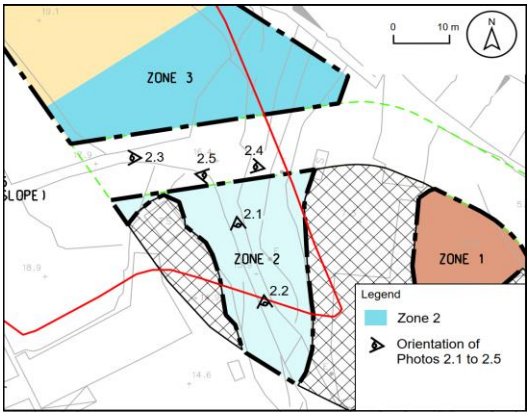


Photo 2.3 Concrete Pavement Connected to the Track at Hilltop (Facing West)

Photo 2.4 Profile of the Hill Slope in Zone 2

AECOM	Application for Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131) to Rezone the Application Site from "Green Belt" to "Residential (Group C)1" for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung	SCALE	N.T.S.	DATE	Jan 2023
		RECORD BY	JNIP		
	Photographic Records of Field Scan	JOB NO.	60646324	**Appendix B**	

Zone 2

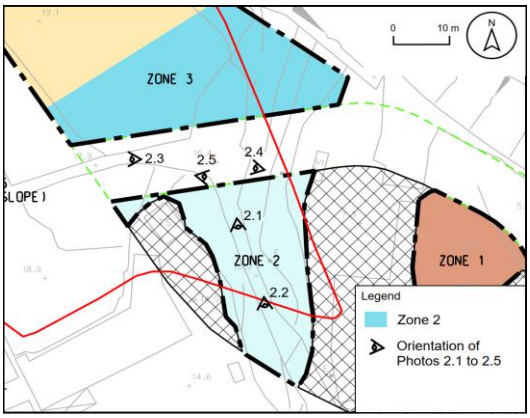


Photo 2.5 Backfilled Test Pit TP7 of the 2015 Archarological Survey (Facing East)

AECOM	Application for Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131) to Rezone the Application Site from "Green Belt" to "Residential (Group C)1" for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung	SCALE	N.T.S.	DATE	Jan 2023
		RECORD BY	JNIP		
	Photographic Records of Field Scan	JOB NO.	60646324	**Appendix B**	

Zone 3

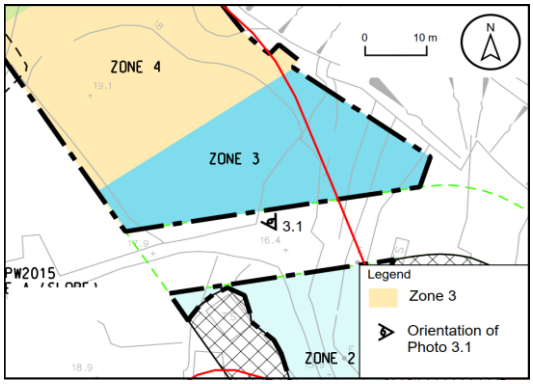


Photo 3.1 Concrete pavement and vegetation facing north

AECOM	Application for Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131) to Rezone the Application Site from "Green Belt" to "Residential (Group C)1" for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung	SCALE	N.T.S.	DATE	Jan 2023
		RECORD BY	JNIP		
	Photographic Records of Field Scan	JOB NO.	60646324	**Appendix B**	

Zone 4

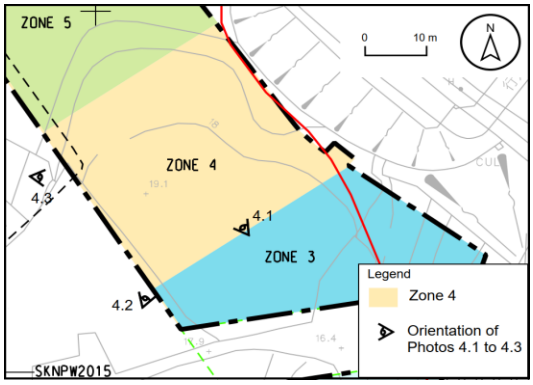


Photo 4.1 Hilltop Covered in Dense Tall Grass in Zone 4 (Facing Northwest)

Photo 4.2 Hilltop Covered in Dense Tall Grass in Zone 4 (Facing Northeast)

AECOM	Application for Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131) to Rezone the Application Site from "Green Belt" to "Residential (Group C)1" for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung	SCALE	N.T.S.	DATE	Jan 2023
		RECORD BY	JNIP		
	Photographic Records of Field Scan	JOB NO.	60646324	**Appendix B**	

Zone 4

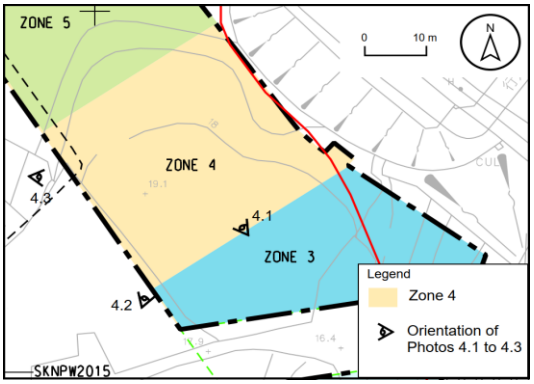


Photo 4.3 Northwestern Edge of Zone 4 (Facing East)

AECOM	Application for Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131) to Rezone the Application Site from "Green Belt" to "Residential (Group C)1" for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung	SCALE	N.T.S.	DATE	Jan 2023
		RECORD BY	JNIP		
	Photographic Records of Field Scan	JOB NO.	60646324	**Appendix B**	

Zone 5

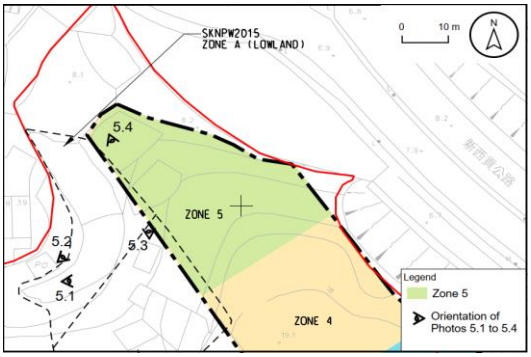


Photo 5.1 Western Edge of Zone 5 (Facing East)

Photo 5.2 Western Edge of Zone 5 (Facing Northeast)

AECOM	Application for Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131) to Rezone the Application Site from "Green Belt" to "Residential (Group C)1" for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung	SCALE	N.T.S.	DATE	Jan 2023
		RECORD BY	JNIP		
	Photographic Records of Field Scan	JOB NO.	60646324	**Appendix B**	

Zone 5

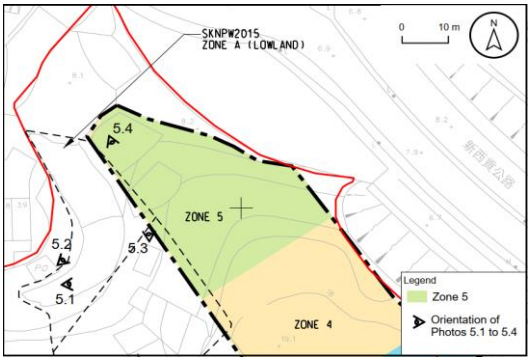


Photo 5.3 Western Edge of Zone 5 (Facing North)

Photo 5.4 Northern Edge of Zone 5 (Facing Southeast)

AECOM	Application for Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131) to Rezone the Application Site from "Green Belt" to "Residential (Group C)1" for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung	SCALE	N.T.S.	DATE	Jan 2023
		RECORD BY	JNIP		
	Photographic Records of Field Scan	JOB NO.	60646324	**Appendix B**	

Appendix G

Geotechnical Planning Review Report

Application for Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131) to Rezone the Application Site from "Green Belt" to "Residential (Group C) 1" for Proposed House Development

at

Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung

Geotechnical Planning Review Report

1st Submission

JMK Consulting Engineers Limited
May 2023

CONTENTS

FIGURES

APPENDIX

1. INTRODUCTION

Philip So & Associates Ltd was appointed to carry out Geotechnical Planning Review Report (GPRR) for the proposed residential development at various lots in D.D. 244 at Nam Pin Wai, Sai Kung (the Site).

This GPPR is made based on desk study and review of available documentary information and proposed development plan. The geology and site conditions are described. Potential geotechnical constraints are identified in the assessment.

2. THE SITE AND THE FEATURES

The Site is at Nam Pin Wai, Sai Kung. New Hiram's Highway is located at a distance about 25m at east of the Site. Site photos taken in February 2021 are presented in Appendix A (see Photos A of F). According to the available SIS records obtained from Geotechnical Engineering Office (GEO), there is a registered geotechnical feature no. 11NE-B/F186 partly lies within the southwestern of the Site and two registered geotechnical feature nos. 11NE-B/CR 924 and 11NE-B/FR 295 are located immediately outside the east of the Site boundary.

3. DESK STUDY

Desk study has been carried out to search and review the existing building records, previous ground investigation data and geotechnical study reports kept by the Geotechnical Information Unit (GIU) of Geotechnical Engineering Office (GEO) and the Buildings Department (BD).

Ground investigation was carried out at Feature No. 11NE-B/CR924 at distance about 6m at the east of the Site under the project, namely "Hiram's Highway Improvement Phase 3 : Improvement between Nam Wai and Ho Chung and Upgrading Local Access Roads", prepared by Gammon Construction Limited in June 1999. The borehole record (Drillhole No. ABH2) indicated that the site comprises colluvium overlying completely / highly decomposed tuff (C/HDT) (see Appendix D).

3.1 Geological Maps

The geology of the Study Area is shown on the Hong Kong Geological Survey (HKGS) Map Sheet 11 (Hong Kong & Kowloon), 1:20,000 - scale HGM20 series. The local geology of the Study Area is presented in Figure 3 and described below.

3.1.1 Solid Geology

The 1:20,000 scale geological maps indicated that regional area around the Site is underlain by coarse ash crystal tuff (Krd_cat) of the Mount Davis Formation.

3.1.2 Superficial Geology

Entire Site are surrounded by alluvium (Qfa).

3.1.3 Structural Geology

No fault or photolineament has been recorded within or in the vicinity of the site.

3.2 Enhanced Natural Terrain Landslide Inventory

In 1995, the GEO compiled the Natural Terrain Landslide Inventory (NTLI) from an interpretation of high - altitude (8,000ft and above) aerial photographs dated from 1945 to 1994 (King, 1999). In 2007, the GEO produced an Enhanced Natural Terrain Landslide Inventory (ENTLI) using low-altitude (8,000ft and below) aerial photographs to update the NTLI.

In accordance with GEO Report No. 138 (GEO, 2016), landslides are classed as either "Relict" or "Recent", depending on their appearance in aerial photographs. "Relict" landslides are defined as those where the main scarp is well-defined but vegetation has re-established on the scar on the earliest set of available aerial photographs. "Recent" landslides are defined as having occurred within the timespan of the aerial photograph coverage. These are typically identified as having a light tone on the aerial photographs and are bare of vegetation.

The ENTLI has recorded none relict / recent landslides within and in the vicinity of the Site.

3.3 Historical Landslide Catchment (HLC) Inventory

Historical Landslide Catchments (HLCs) have been defined by GEO based on the results of the ENTLI. According to the inventory, there is no HLC within the Site.

3.4 Large Landslide Study

The Large Landslide database was prepared by Scott Wilson (1999) for the GEO. Interpretation of landslide details with Map Sheet Ref No. 11-NE-A was conducted using the low altitude (3,900 ft.) 1963 aerial photographs to identify features thought to be landslides with source area greater than 20m wide. The database has no record of large landslides within or close to the Site.

3.5 Reported Landslide Incidents

The GEO landslide incidents database has no record of reported landslide incident within or in the vicinity of the Site.

4. IMPACTS OF PROPOSED WORKS ON EXISTING SLOPES AND RETAINING WALLS

Feature No. 11NE-B/F186 (Photos E and F)

Feature No. NE-B/F186 is located at the southwestern end of Site boundary. Sub-division nos. 1, 2 and 3 of the feature are lies within the Site while the rest are immediately outside the Site. According to the SIS record, the slope portion of the feature has a maximum eight about 8.0m with 110m long measured along its toe, and the average slope gradient is about 40 degrees to the horizontal.

Feature No. 11NE-B/FR295 (Photos G and H)

Feature No. 11NE-B/FR295 is located immediately outside the eastern site boundary and adjacent to the Feature No. 11NE-B/CR924 . According to the SIS record, the slope portion of the feature has a maximum height about 8.8m with 85m long measured along its toe, and the average slope gradient is about 30 degrees to the horizontal. The wall portion of the feature has a maximum height about 8.8m with 16.3m long measured along its toe, and the average wall face angle is about 90 degrees to the horizontal. Stability assessment was checked and accepted by GEO in 1998 under the project "Hiram's Highway Improvement Between Nam Wai and Ho Chung".

Feature No. 11NE-B/CR924 (Photos I and J)

Feature No. 11NE-B/CR924 is located immediately outside the northeastern site boundary. According to the SIS record, the slope portion of the feature has a maximum height about 3m with 50m long measured along its toe, and the average slope gradient is about 35 degrees to the horizontal. The wall portion of the feature has a maximum height about 5m with 50m long measured along its toe, and the average wall face angle is about 90 degrees to the horizontal. Stability assessment was checked and accepted by GEO in 1998 under the project "Hiram's Highway Improvement Between Nam Wai and Ho Chung".

Impacts of Proposed Works – Existing Features

The proposed development consists of gardening construction for clubhouse for Site A and 3-storery house for Site B & C.

The schematic geotechnical works for the proposed development – Option 1 are discussed below (Figure 5 & 6):-

Since Feature 11NE-B/CR924 & 11NE-B/FR295 are adjacent to the application site, the stability on the geotechnical feature shall be assessed in detail under a separate submission. Site formation works / slope upgrading works such as installation of soil nails works are proposed in the site formation design / slope upgrading design submission if the stability of such geotechnical features cannot fulfil the current engineering standards. In addition,

retaining walls are proposed to withstand the required platform under a site formation submission to the Buildings Department for approval.

Application Site A, B & C

No existing geotechnical feature is situated within Application Site A, B & C. The schematic geotechnical works for Site A, B & C consist of mainly soil cutting and formation permanent cut slope with 1.1mm high approximately in Site A, construction of retaining wall or mass wall with level platform and 3-srorey houses in both Site B and Site C. According to criteria for Feature Registration in the Appendix B of PNAP ADV-8 issued by Buildings Authorities, cut slopes, including any associated retaining walls and retaining walls greater than 3m high shall be registered as a Feature. As there is retaining wall over 3m high within Site C, it is considered that a geotechnical feature is proposed. Detail site formation proposal shall be submitted to Buildings Department for approval.

The preliminary design for site formation / slope upgrading works is given in Figure 7 to 9.

5. CONCLUSION

Based on the above discussion, it can be concluded that the proposed residential development is considered to be feasible from geotechnical point of view. The existing feature shall be upgraded to the current engineering standards if the stability of such geotechnical features are found below standards.

It is essential to search and review the background information of existing building, geotechnical feature and underground services within and in the vicinity of the site. Site investigation is proposed to reveal/confirm the subsoils and the ground regime within and in the vicinity of the site as well as to determine the engineering properties of subsoils and rock. The ground investigation field works should be preceded under supervision of suitably qualified engineers and technically competent persons conforming the requirements specified in the "Code of Practice for Site Supervision 2009" published by the BD.

For safety and cost effective, the foundation design and retaining wall stability assessment and excavation planning as well as the design of geotechnical structure should be based on geological horizons inferred from the ground investigation results, groundwater table interpreted from the piezometer / standpipe monitoring records and geotechnical parameters determined and adopted by field and laboratory testing.

A comprehensive precautionary monitoring program including settlement markers, tiling, vibration check points as well as groundwater observation wells shall be implemented to ensure demolition of foundation of existing buildings and substructure construction being carried out safety and soundly.

FIGURES

Figure 1

Site Location Plan

PAK SHA WAN
(HEBE HAVEN)

843380 E

843780

843980 E

823760 N

823560 N

LEGENDS:

APPLICATION SITE BOUNDARY

LOT BOUNDARY LINE

A PHOTO DIRECTION

EXTRACTED FROM 11NE-5A

APPLICATION FOR AMENDMENT OF PLAN UNDER SECTION 12A OF THE TOWN PLANNING ORDINANCE (CAP. 131) TO REZONE THE APPLICATION SITE FROM "GREEN BELT" TO "RESIDENTIAL (GROUP C) 1" FOR PROPOSED HOUSE DEVELOPMENT AT VARIOUS LOTS IN D.D.244 AND ADJOINING GOVERNMENT LAND, NAM PIN WAI, SAI KUNG.

SITE LOCATION PLAN	SCALE 1 : 1500	FIGURE 1	A

Figure 2

Lot Index Plan and Feature Location

NOTES : –

1. ALL LEVELS ARE IN METERS ABOVE P.D.
2. GRID LINES ARE IN H.K. METRIC GRID 1980.

LEGENDS :

- APPLICATION SITE BOUNDARY LINE
- LOT BOUNDARY LINE
- FEATURE BOUNDARY LINE

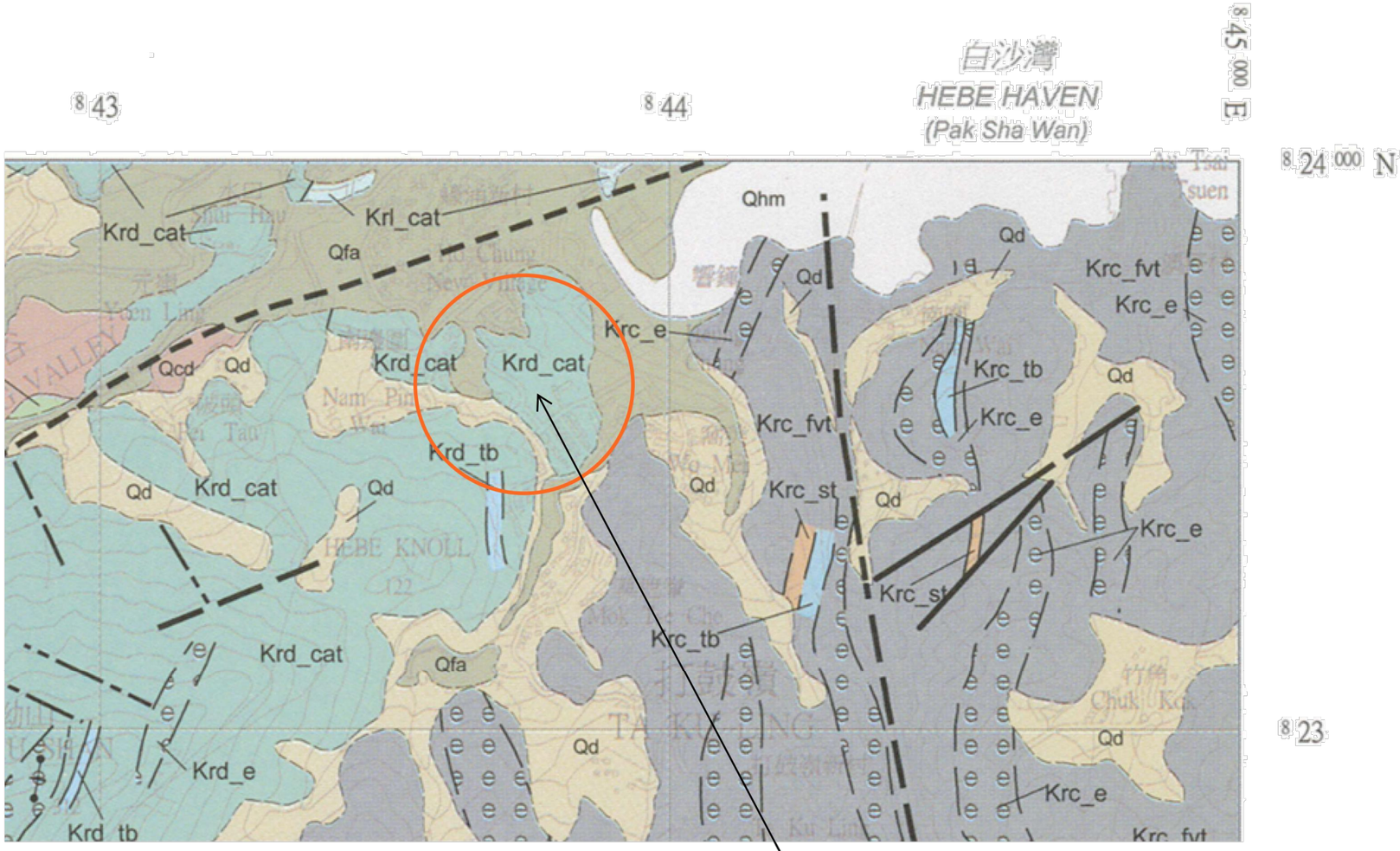
Villa Royale
R(C)1
R(C)4
GB
V
1944 RP
1939 RP
1939 S.E
1939 S.B ss.3
1940
1941 S.A RP
Lot 2189
877 RP
878 RP
870 RP
FEATURE NO. 11NE-B/CR924
FEATURE NO. 11NE-B/FR295
FEATURE NO. 11NE-B/F186
BAMBOO AREA
HIRAM'S HIGHWAY
MOK TSE CHE ROAD
823750 N
823650 N
823550 N
843700 E
843800 E
843900 E

APPLICATION FOR AMENDMENT OF PLAN UNDER SECTION 12A OF THE TOWN PLANNING ORDINANCE (CAP. 131) TO REZONE THE APPLICATION SITE FROM "GREEN BELT" TO "RESIDENTIAL (GROUP C) 1" FOR PROPOSED HOUSE DEVELOPMENT AT VARIOUS LOTS IN D.D.244 AND ADJOINING GOVERNMENT LAND, NAM PIN WAI, SAI KUNG.

LOT INDEX PLAN AND FEATURE LOCATION	SCALE 1 : 1000	FIGURE 2	A

Figure 3

Geological Map



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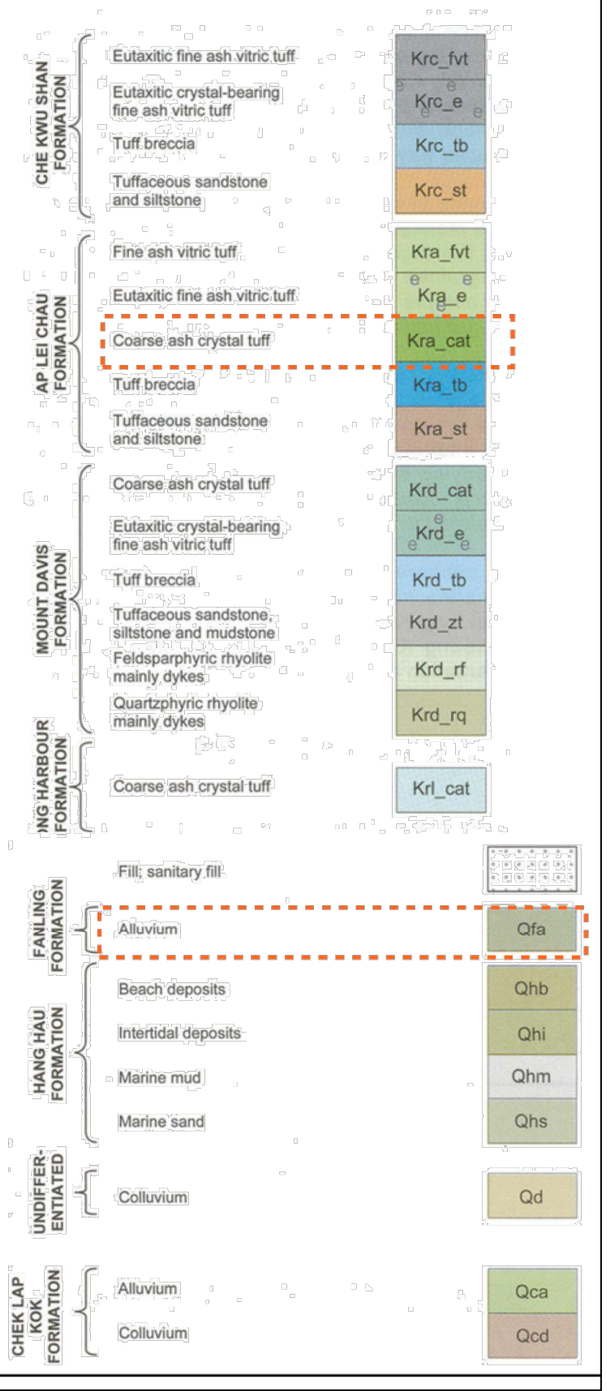
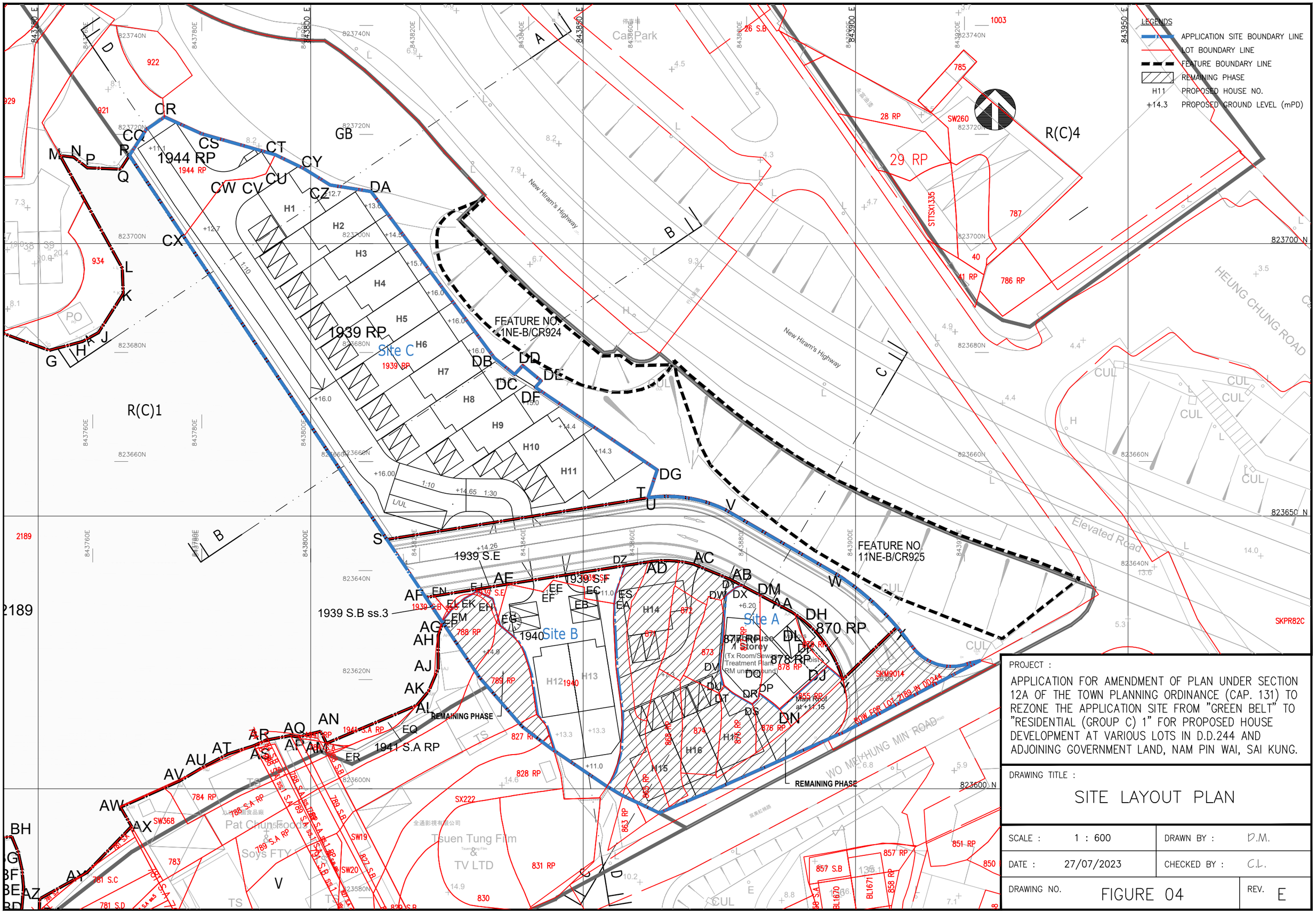


APPLICATION FOR AMENDMENT OF PLAN UNDER SECTION 12A OF THE TOWN PLANNING ORDINANCE (CAP. 131) TO REZONE THE APPLICATION SITE FROM "GREEN BELT" TO "RESIDENTIAL (GROUP C) 1" FOR PROPOSED HOUSE DEVELOPMENT AT VARIOUS LOTS IN D.D.244 AND ADJOINING GOVERNMENT LAND, NAM PIN WAI, SAI KUNG.

GEOLOGICAL MAP	SCALE N.T.S.	FIGURE 3	–

Figure 4

Site Layout Plan



PROJECT :

APPLICATION FOR AMENDMENT OF PLAN UNDER SECTION 12A OF THE TOWN PLANNING ORDINANCE (CAP. 131) TO REZONE THE APPLICATION SITE FROM "GREEN BELT" TO "RESIDENTIAL (GROUP C) 1" FOR PROPOSED HOUSE DEVELOPMENT AT VARIOUS LOTS IN D.D.244 AND ADJOINING GOVERNMENT LAND, NAM PIN WAI, SAI KUNG.

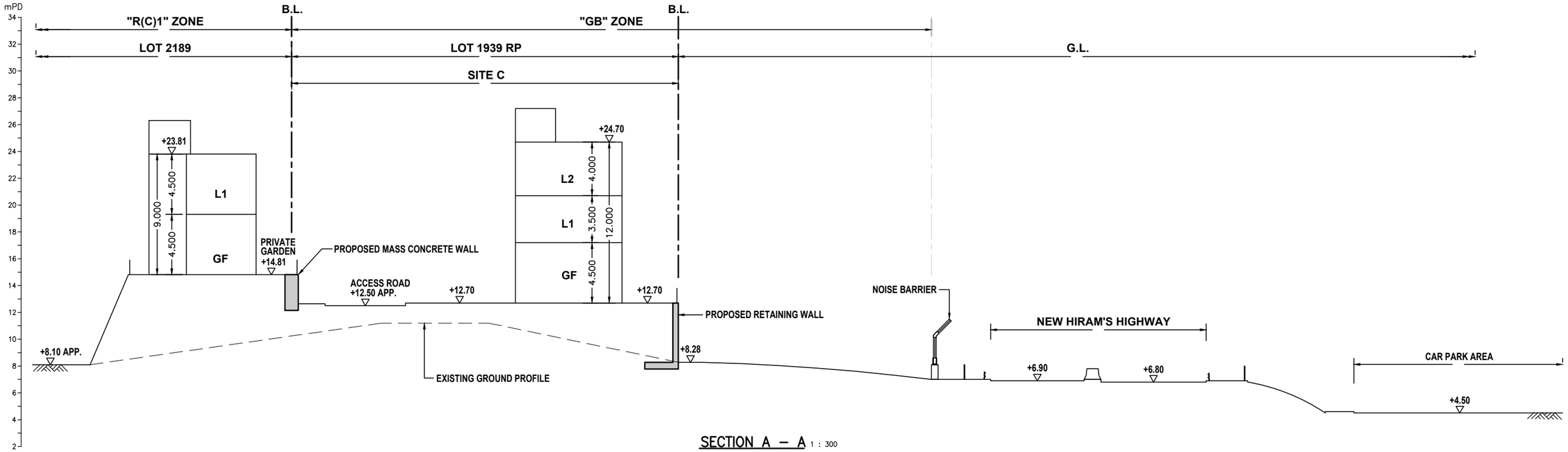
DRAWING TITLE :

SITE LAYOUT PLAN

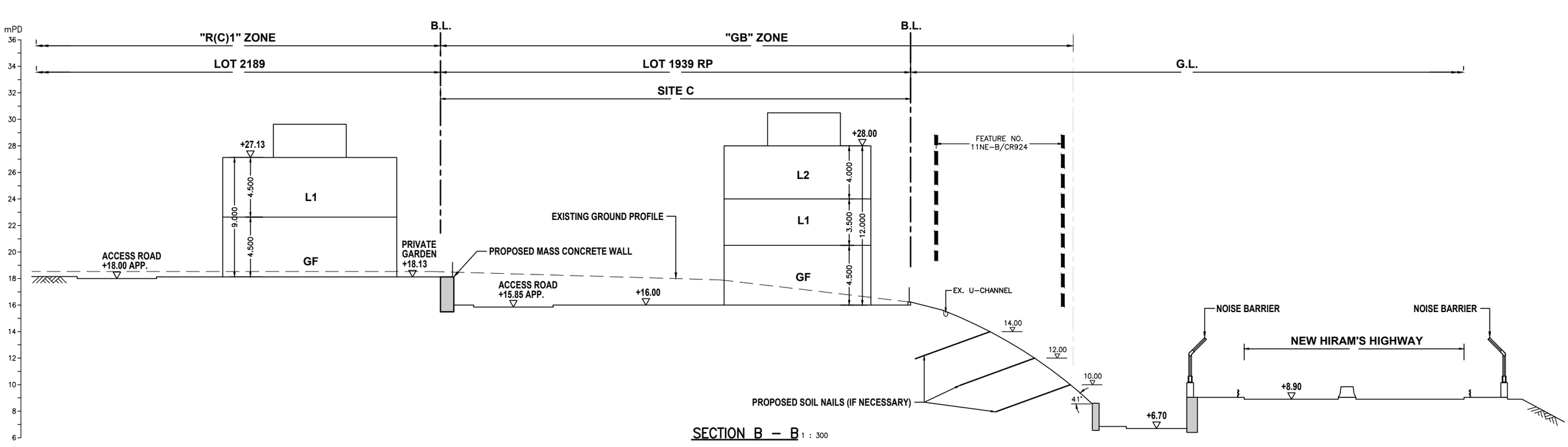
SCALE :	1 : 600	DRAWN BY :	D.M.
DATE :	27/07/2023	CHECKED BY :	C.L.
DRAWING NO.	FIGURE 04	REV.	E

Figure 5

Section A - A & B – B



SECTION A – A 1 : 300



SECTION B – B 1 : 300

PROJECT :

APPLICATION FOR AMENDMENT OF PLAN UNDER SECTION 12A OF THE TOWN PLANNING ORDINANCE (CAP. 131) TO REZONE THE APPLICATION SITE FROM "GREEN BELT" TO "RESIDENTIAL (GROUP C) 1" FOR PROPOSED HOUSE DEVELOPMENT AT VARIOUS LOTS IN D.D.244 AND ADJOINING GOVERNMENT LAND, NAM PIN WAI, SAI KUNG.

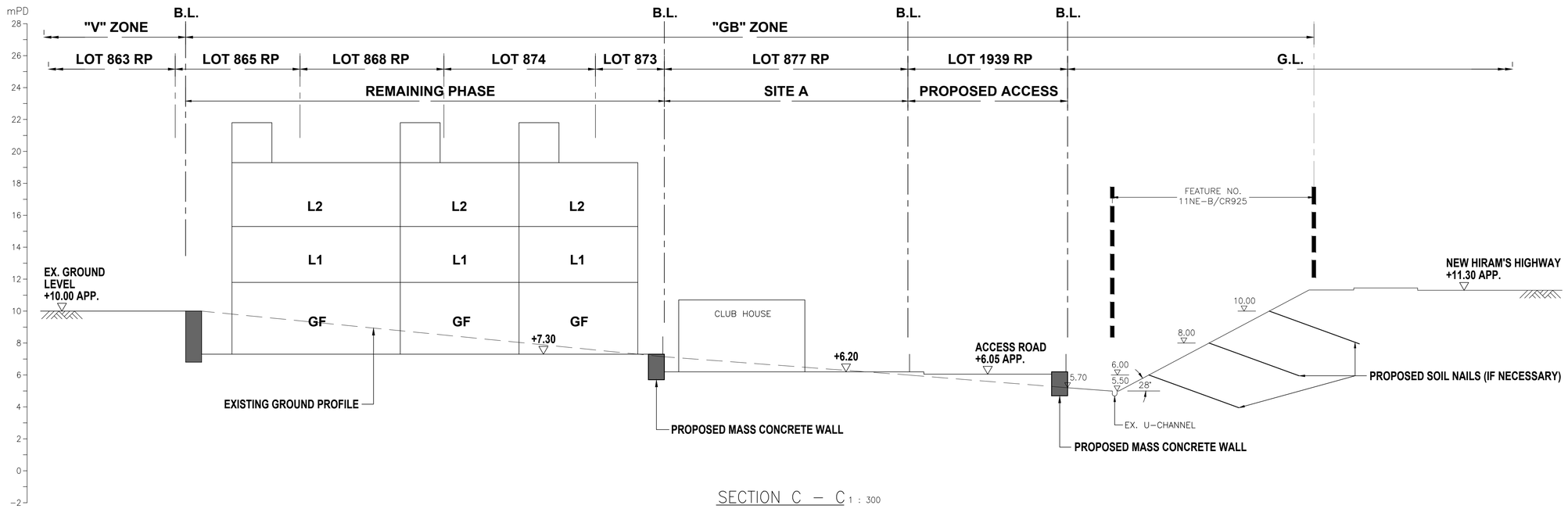
DRAWING TITLE :

SECTION A – A & B – B

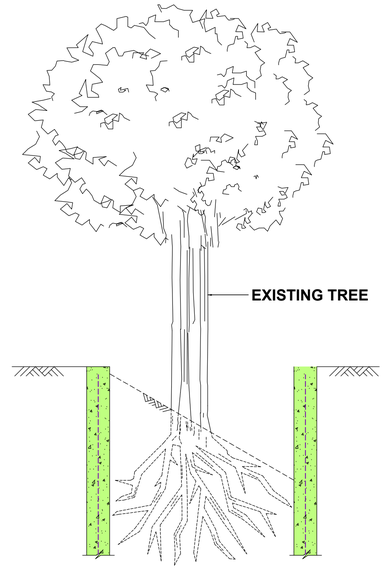
SCALE :	1 : 300	DRAWN BY :	D.M.
DATE :	27/07/2023	CHECKED BY :	C.L.
DRAWING NO.	FIGURE 05	REV.	E

Figure 6

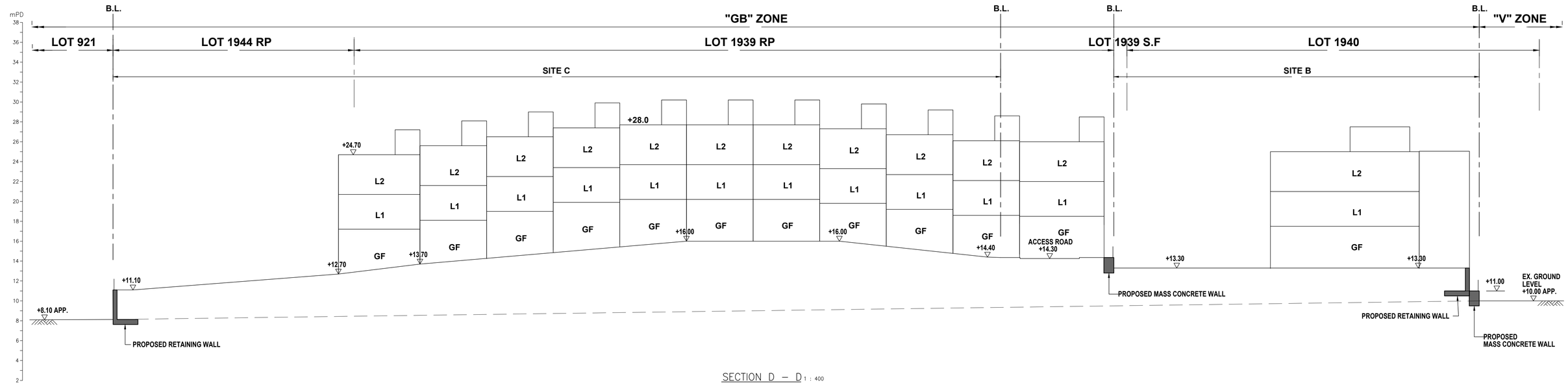
Section C - C & D – D and Details



SECTION C – C 1 : 300



TYPICAL TREE RING DETAILS
(N.T.S.)



SECTION D – D 1 : 400

PROJECT :

APPLICATION FOR AMENDMENT OF PLAN UNDER SECTION 12A OF THE TOWN PLANNING ORDINANCE (CAP. 131) TO REZONE THE APPLICATION SITE FROM "GREEN BELT" TO "RESIDENTIAL (GROUP C) 1" FOR PROPOSED HOUSE DEVELOPMENT AT VARIOUS LOTS IN D.D.244 AND ADJOINING GOVERNMENT LAND, NAM PIN WAI, SAI KUNG.

DRAWING TITLE :

SECTION C – C & D – D AND DETAILS

SCALE :	1 : 400	DRAWN BY :	D.M.
DATE :	16/04/2024	CHECKED BY :	C.L.
DRAWING NO.	FIGURE 06	REV.	E

APPENDIX

Appendix A

Photographs

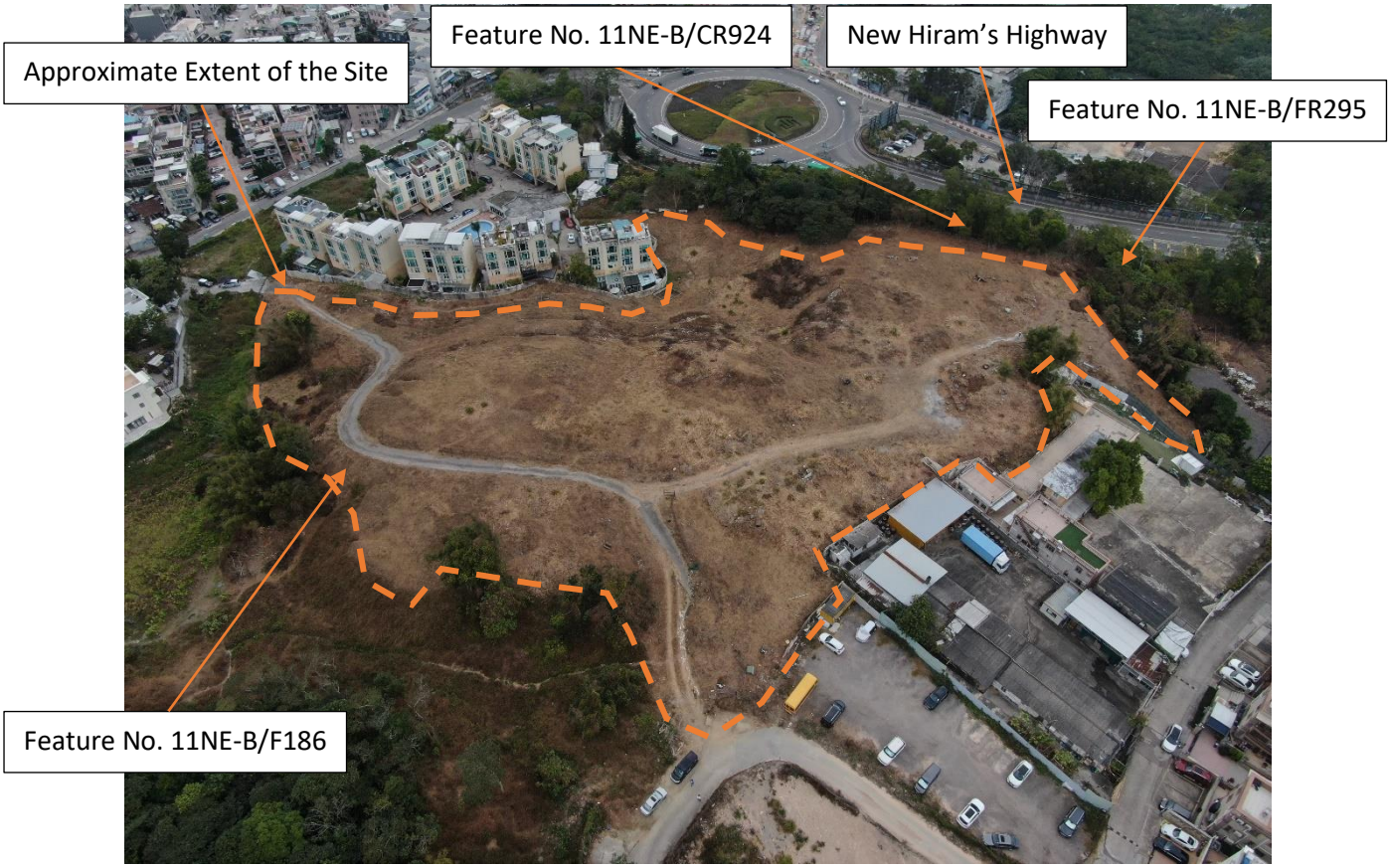


Photo A
General View of the Site, Looking North

Photo B
General View of the western portion of the Site, Looking Northeast

Photo C
Close View of the Northern End of the Site, Looking West

Photo D
Close View of the Southeastern End of the Site, Looking East

Photo E
General View of the Northern End of Feature No. 11NE-B/F186, Looking South

Photo F
General View of the Mid Portion of Feature No. 11NE-B/F186, Looking Northeast

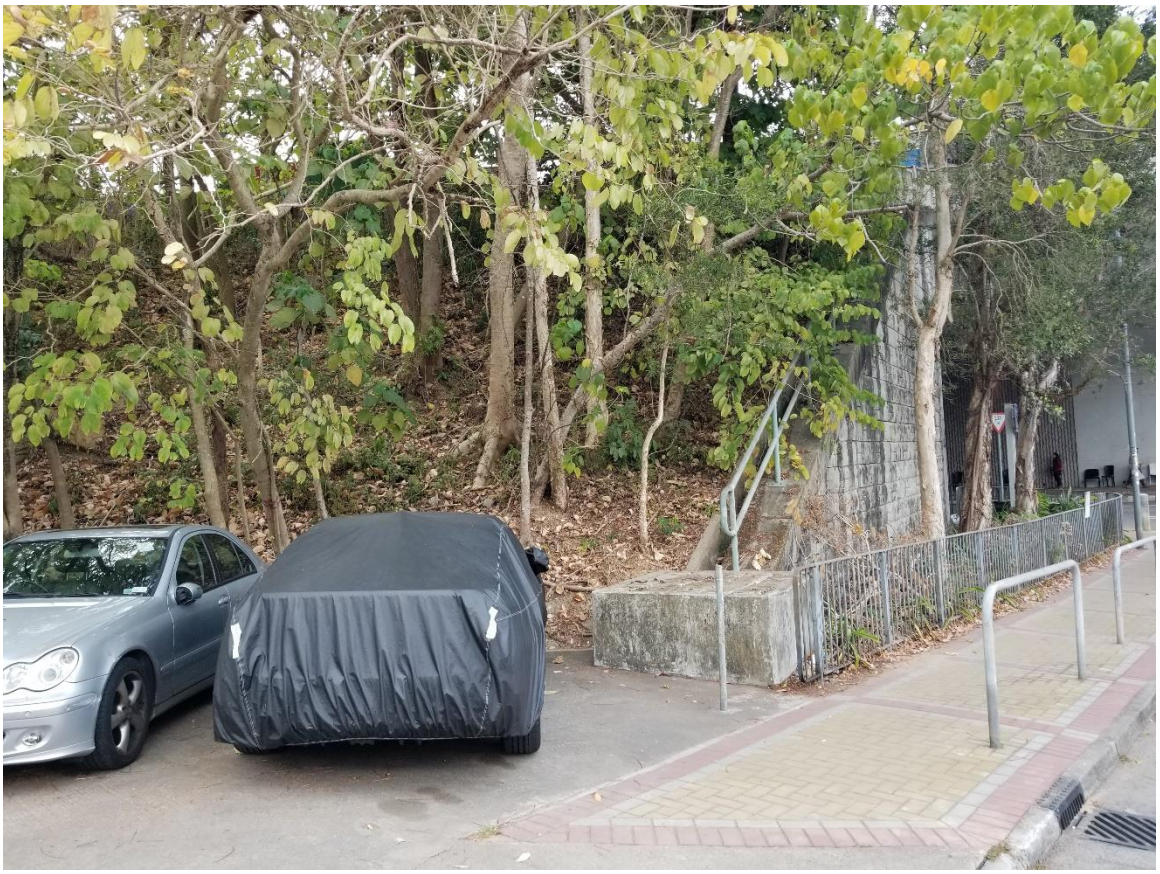


Photo G
General View of the Feature No. 11NE-B/FR 295, Looking North

Photo H
General View of the Feature No. 11NE-B/FR 295, Looking Southeast

Photo I
General View of the Feature No. 11NE-B/CR924, Looking southwest

Photo J
General View of the Feature No. 11NE-B/CR924, Looking Northwest

Appendix B

SIMAR Records

Slope Maintenance Responsibility Report (11NE-B/F186)	ESTATE MANAGEMENT SECTION LANDS DEPARTMENT

List of Slope Maintenance Responsibility Area(s)

1	**11NE-B/F186**		**Sub-Division**	1
	Location	SLOPE FALLS IN DD244 LOT1939A,1939B,1942,756,755,758,760,759,761,769&767 NEAR SPOT LEVEL 10.2		
	Responsible Lot/Party	DD244 Lot1939A	**Maintenance Agent**	Not Applicable
	Remarks	Slope information being reviewed.		
2	**11NE-B/F186**		**Sub-Division**	2
	Location	SLOPE FALLS IN DD244 LOT1939A,1939B,1942,756,755,758,760,759,761,769&767 NEAR SPOT LEVEL 10.2		
	Responsible Lot/Party	DD244 Lot1939B	**Maintenance Agent**	Not Applicable
	Remarks	Slope information being reviewed.		
3	**11NE-B/F186**		**Sub-Division**	3
	Location	SLOPE FALLS IN DD244 LOT1939A,1939B,1942,756,755,758,760,759,761,769&767 NEAR SPOT LEVEL 10.2		
	Responsible Lot/Party	DD244 Lot1942	**Maintenance Agent**	Not Applicable
	Remarks	Slope information being reviewed.		
4	**11NE-B/F186**		**Sub-Division**	4
	Location	SLOPE FALLS IN DD244 LOT1939A,1939B,1942,756,755,758,760,759,761,769&767 NEAR SPOT LEVEL 10.2		
	Responsible Lot/Party	DD244 Lot755	**Maintenance Agent**	Not Applicable
	Remarks	Slope information being reviewed.		
5	**11NE-B/F186**		**Sub-Division**	5
	Location	SLOPE FALLS IN DD244 LOT1939A,1939B,1942,756,755,758,760,759,761,769&767 NEAR SPOT LEVEL 10.2		
	Responsible Lot/Party	DD244 Lot756	**Maintenance Agent**	Not Applicable
	Remarks	Slope information being reviewed.		
6	**11NE-B/F186**		**Sub-Division**	6
	Location	SLOPE FALLS IN DD244 LOT1939A,1939B,1942,756,755,758,760,759,761,769&767 NEAR SPOT LEVEL 10.2		
	Responsible Lot/Party	DD244 Lot758	**Maintenance Agent**	Not Applicable
	Remarks	Slope information being reviewed.		
7	**11NE-B/F186**		**Sub-Division**	7
	Location	SLOPE FALLS IN DD244 LOT1939A,1939B,1942,756,755,758,760,759,761,769&767 NEAR SPOT LEVEL 10.2		
	Responsible Lot/Party	DD244 Lot760	**Maintenance Agent**	Not Applicable
	Remarks	Slope information being reviewed.		

8	**11NE-B/F186**		**Sub-Division**	8
	Location	SLOPE FALLS IN DD244 LOT1939A,1939B,1942,756,755,758,760,759,761,769&767 NEAR SPOT LEVEL 10.2		
	Responsible Lot/Party	DD244 Lot759	**Maintenance Agent**	Not Applicable
	Remarks	Slope information being reviewed.		

9	**11NE-B/F186**		**Sub-Division**	9
	Location	SLOPE FALLS IN DD244 LOT1939A,1939B,1942,756,755,758,760,759,761,769&767 NEAR SPOT LEVEL 10.2		
	Responsible Lot/Party	DD244 Lot761	**Maintenance Agent**	Not Applicable
	Remarks	Slope information being reviewed.		

10	**11NE-B/F186**		**Sub-Division**	10
	Location	SLOPE FALLS IN DD244 LOT1939A,1939B,1942,756,755,758,760,759,761,769&767 NEAR SPOT LEVEL 10.2		
	Responsible Lot/Party	DD244 Lot769	**Maintenance Agent**	Not Applicable
	Remarks	Slope information being reviewed.		

11	**11NE-B/F186**		**Sub-Division**	11
	Location	SLOPE FALLS IN DD244 LOT1939A,1939B,1942,756,755,758,760,759,761,769&767 NEAR SPOT LEVEL 10.2		
	Responsible Lot/Party	DD244 Lot767	**Maintenance Agent**	Not Applicable
	Remarks	Slope information being reviewed.		

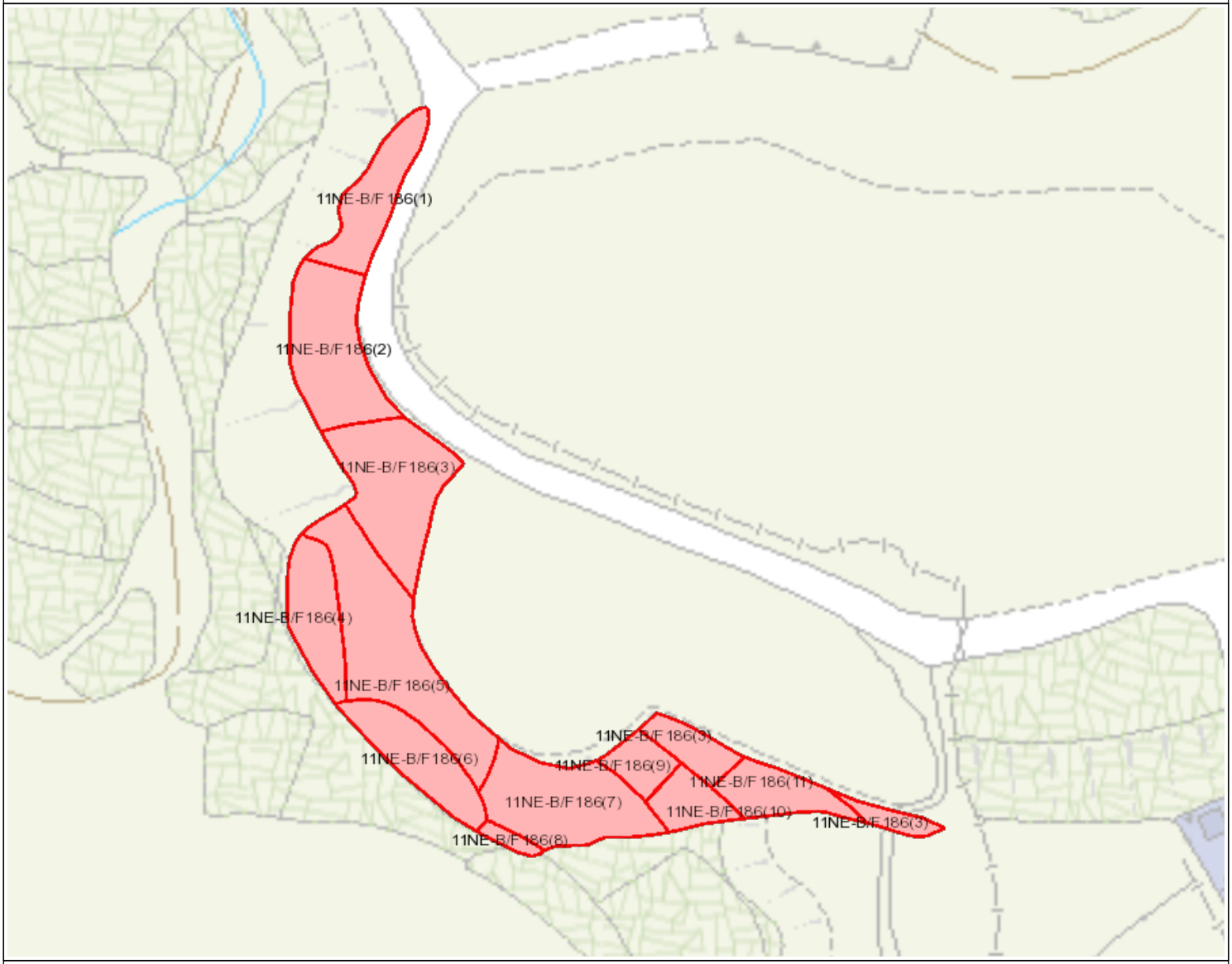
- End of Report -

Notes:

(i) The location plan in Annex is for identification purposes of slope(s) only.

(ii) The slope(s) as listed in the Slope Maintenance Responsibility Report may not be shown on the location plan in Annex.

Location Plan



Legend

- Slope Area(s)
- Search Location
- Slope(s) Maintained by Government
- Slope(s) Maintained by Private Party/Parties
- Slope(s) Maintained by Government and Private Party/Parties

ESTATE MANAGEMENT SECTION
LANDS DEPARTMENT

This Plan is **NOT TO SCALE** and intended for **IDENTIFICATION** only. All information shown on this plan **MUST** be verified by field survey.

Printed on: 20/02/2021

Slope Maintenance Responsibility Report (11NE-B/CR924)	**ESTATE MANAGEMENT SECTION** **LANDS DEPARTMENT**

List of Slope Maintenance Responsibility Area(s)

1	**11NE-B/CR924**		**Sub-Division**	Not Applicable
	Location	ADJOINING NEW HIRM'S HIGHWAY, OPPOSITE HEUNG CHUNG ROAD		
	Responsible Lot/Party	Highways Department	**Maintenance Agent**	Highways Department
	Remarks	For enquiries about the maintenance of this slope / sub-division of the slope, please contact the Maintenance Agent direct.		

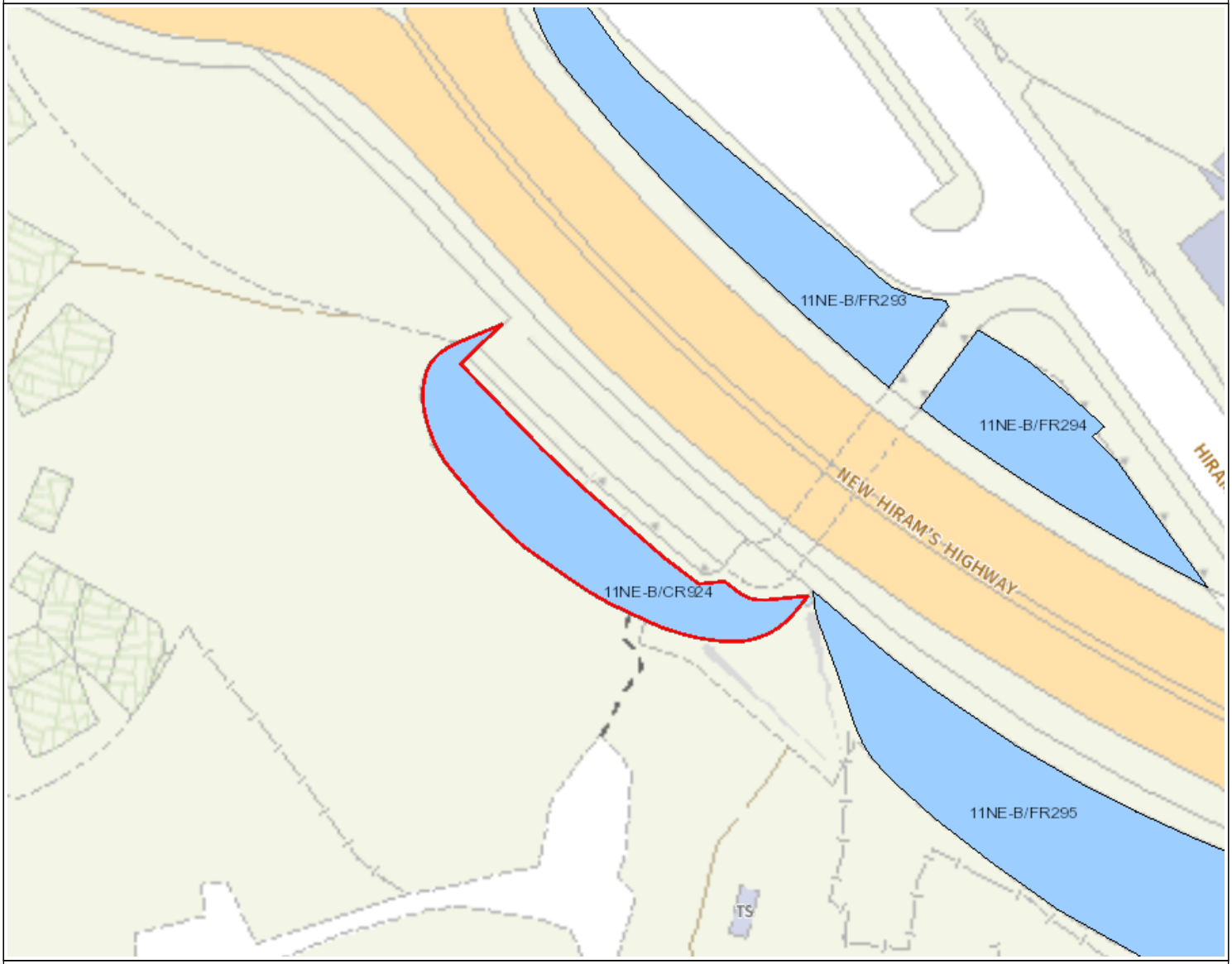
- End of Report -

Notes:

(i) The location plan in Annex is for identification purposes of slope(s) only.

(ii) The slope(s) as listed in the Slope Maintenance Responsibility Report may not be shown on the location plan in Annex.

Location Plan



Legend

- Slope Area(s)
- Search Location
- Slope(s) Maintained by Government
- Slope(s) Maintained by Private Party/Parties
- Slope(s) Maintained by Government and Private Party/Parties

ESTATE MANAGEMENT SECTION
LANDS DEPARTMENT

This Plan is **NOT TO SCALE** and intended for **IDENTIFICATION** only. All information shown on this plan **MUST** be verified by field survey.

Printed on: 13/02/2021

Slope Maintenance Responsibility Report (11NE-B/CR924)	**ESTATE MANAGEMENT SECTION** **LANDS DEPARTMENT**

List of Slope Maintenance Responsibility Area(s)

1	**11NE-B/CR924**		**Sub-Division**	Not Applicable
	Location	ADJOINING NEW HIRM'S HIGHWAY, OPPOSITE HEUNG CHUNG ROAD		
	Responsible Lot/Party	Highways Department	**Maintenance Agent**	Highways Department
	Remarks	For enquiries about the maintenance of this slope / sub-division of the slope, please contact the Maintenance Agent direct.		

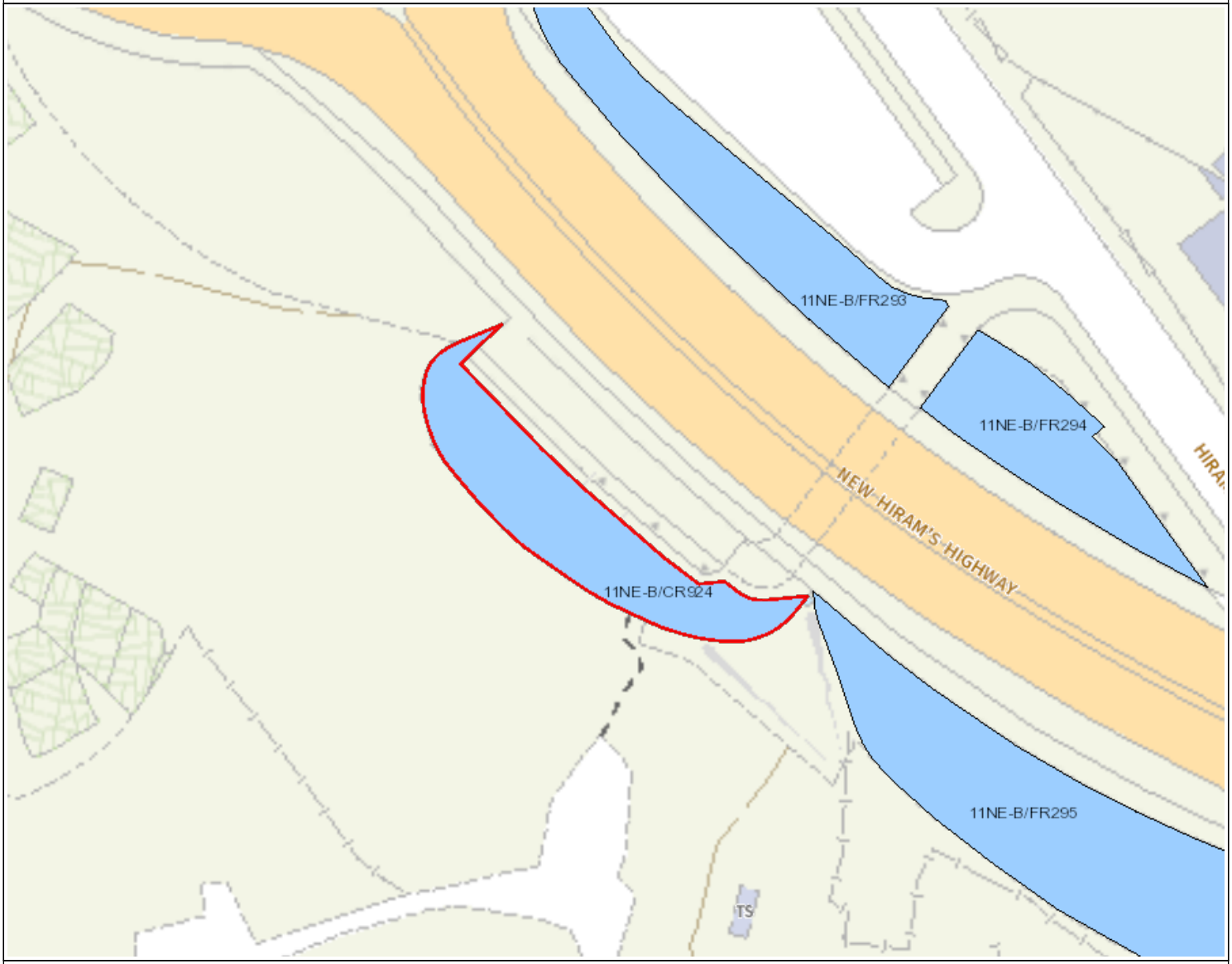
- End of Report -

Notes:

(i) The location plan in Annex is for identification purposes of slope(s) only.

(ii) The slope(s) as listed in the Slope Maintenance Responsibility Report may not be shown on the location plan in Annex.

Location Plan



Legend

- Slope Area(s)
- Search Location
- Slope(s) Maintained by Government
- Slope(s) Maintained by Private Party/Parties
- Slope(s) Maintained by Government and Private Party/Parties

ESTATE MANAGEMENT SECTION
LANDS DEPARTMENT

This Plan is **NOT TO SCALE** and intended for **IDENTIFICATION** only. All information shown on this plan **MUST** be verified by field survey.

Printed on: 13/02/2021

Appendix C

Slope Records Retrieved from CEDD

BASIC INFORMATION

Location:	80M SE OF INTERSECTION OF NAM PIN WA ROAD AND MOK TSE CHE NEW VILLAGE ROAD, SAI KUNG
Registration Date:	19-11-1997
Ranking Score (NPRS):	0 (Notional)
Date of Construction/ Modification:	Pre-1977
Data Source:	SIRST
Approximate Coordinates:	Easting : 843686 Northing : 823610

CONSEQUENCE-TO-LIFE CATEGORY

Facility at Crest:	Undeveloped green belt
Distance of Facility from Crest (m):	0
Facility at Toe:	Undeveloped green belt
Distance of Facility from Toe (m):	0
Consequence-to-life Category:	3
Remarks:	N/A

SLOPE PART

(1) Max. Height (m): 8 Length (m): 110 Average Angle (deg): 40

WALL PART

N/A

MAINTENANCE RESPONSIBILITY

(1) Sub Div.: 1 Private Feature Party: DD244 Lot1939A Agent: N/A Land Cat.: 1 Reason Code: 1 MR Endorsement Date: 05-01-1998
(2) Sub Div.: 2 Private Feature Party: DD244 Lot1939B Agent: N/A Land Cat.: 1 Reason Code: 1 MR Endorsement Date: 05-01-1998
(3) Sub Div.: 3 Private Feature Party: DD244 Lot1942 Agent: N/A Land Cat.: 1 Reason Code: 1 MR Endorsement Date: 05-01-1998
(4) Sub Div.: 4 Private Feature Party: DD244 Lot755 Agent: N/A Land Cat.: 1 Reason Code: 1 MR Endorsement Date: 05-01-1998
(5) Sub Div.: 5 Private Feature Party: DD244 Lot756 Agent: N/A Land Cat.: 1 Reason Code: 1 MR Endorsement Date: 05-01-1998
(6) Sub Div.: 6 Private Feature Party: DD244 Lot758 Agent: N/A Land Cat.: 1 Reason Code: 1 MR Endorsement Date: 05-01-1998
(7) Sub Div.: 7 Private Feature Party: DD244 Lot760 Agent: N/A Land Cat.: 1 Reason Code: 1 MR Endorsement Date: 05-01-1998
(8) Sub Div.: 8 Private Feature Party: DD244 Lot759 Agent: N/A Land Cat.: 1 Reason Code: 1 MR Endorsement Date: 05-01-1998
(9) Sub Div.: 9 Private Feature Party: DD244 Lot761 Agent: N/A Land Cat.: 1 Reason Code: 1 MR Endorsement Date: 05-01-1998
(10) Sub Div.: 10 Private Feature Party: DD244 Lot769 Agent: N/A Land Cat.: 1 Reason Code: 1 MR Endorsement Date: 05-01-1998
(11) Sub Div.: 11 Private Feature Party: DD244 Lot767 Agent: N/A Land Cat.: 1 Reason Code: 1 MR Endorsement Date: 05-01-1998

DETAILS OF SLOPE / RETAINING WALL

Date of Inspection: 03-03-1997
Data Source: SIRST
Slope Part Drainage: N/A

Wall Part Drainage: N/A

SLOPE PART

Slope Part (1)
Surface Protection (%): Bare: 1 Vegetated: 99 Chunam: 0 Shotcrete: 0 Other Cover: 0
Material Description: Material type: Soil Geology: N/A
Berm: No. of Berms: N/A Min. Berm Width (m): N/A
Weepholes: Size (mm): N/A Spacing (m): N/A

WALL PART

N/A

SERVICES

N/A

CHECKING STATUS INFORMATION

N/A

BACKGROUND INFORMATION

GIU Cell Ref.: 11NE5A4

Map Sheet Reference (1:1000): 11NE- 5A

Aerial Photos: 23146-7 (1978),

Nearest Rainguage Station (Station Number): Staff Quarter (Block C), Pik Uk Prison, Clearwater Bay(N08)

Data Collected On: 03-03-1997

Date of Construction, Subsequent Modification and Demolition: Modification: Constructed Before: 1978 After: 1977

Related Reports/Files or Documents:

File/Report: Development Ref. No.: GCMd 3/5/9301/89, 3/7/3 pt 2 f41-2,44-6,53,59,79
File/Report: Development Ref. No.: GCMd 3/5/9301/89, 3/7/3 pt 2 f41-2,44-6,53,59,79
File/Report: LA Ref. No.: GCMd 5/3/8 pt V f14,16,18,28
File/Report: LA Ref. No.: GCMd 5/3/8 pt V f14,16,18,28
File/Report: LA Ref. No.: GCMd 5/3/8 pt19 f62,75,88,128 pt 36 f78,79
File/Report: LA Ref. No.: GCMd 5/3/8 pt19 f62,75,88,128 pt 36 f78,79
File/Report: Previous Instability Ref. No.: GCMd 5/3/8 pt V f34,36,48, pt30 f5,8
File/Report: Previous Instability Ref. No.: GCMd 5/3/8 pt V f34,36,48, pt30 f5,8

Remarks: Public/Private Dep - GCMd 2/E1/11NE-B pt 2 case 26,27,29, pt 3 case 1

Follow Up Actions: N/A

DH-Order (To Be Confirmed with Buildings Department): None

Advisory Letter (To Be Confirmed with Buildings Department): None

LPMIS: None

ENHANCED MAINTENANCE INFORMATION

From Maintenance Department: (Last Updated Date: 17/12/2020)

STAGE 1 STUDY REPORT

Inspected On:
Weather:
District: ME

Section No: 1-1
Height(m):
Type of Toe Facility: Undeveloped green belt

Distance from Toe(m): 0
Type of Crest Facility: Undeveloped green belt

Distance from Crest(m): 0
Consequence Category:
Engineering Judgement:

Section No: 2-2
Type of Toe Facility:

Distance from Toe(m):
Type of Crest Facility:

Distance from Crest(m):
Consequence Category:
Engineering Judgement:

Sign of Seepage:

Criterion A satisfied:

Sign of Distress:

Criterion D satisfied:

Non-routine maintenance required:

Note:

Masonry wall/Masonry facing:

Note:

Consequence category (for critical section):

Observations: N/A

Emergency Action Required:

Action By: N/A

ACTION TO INITIATE PREVENTIVE WORKS

Criterion A/Criterion D: N/A

Action By: N/A

Further Study:

Action By: N/A

OTHER EXTERNAL ACTION

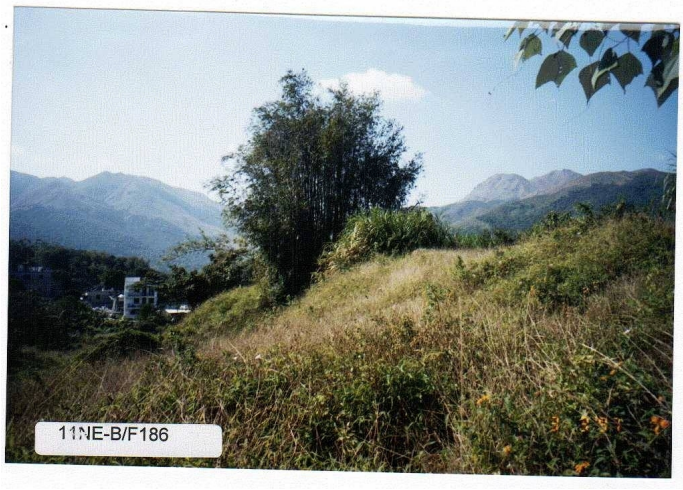
Check / repair Services:

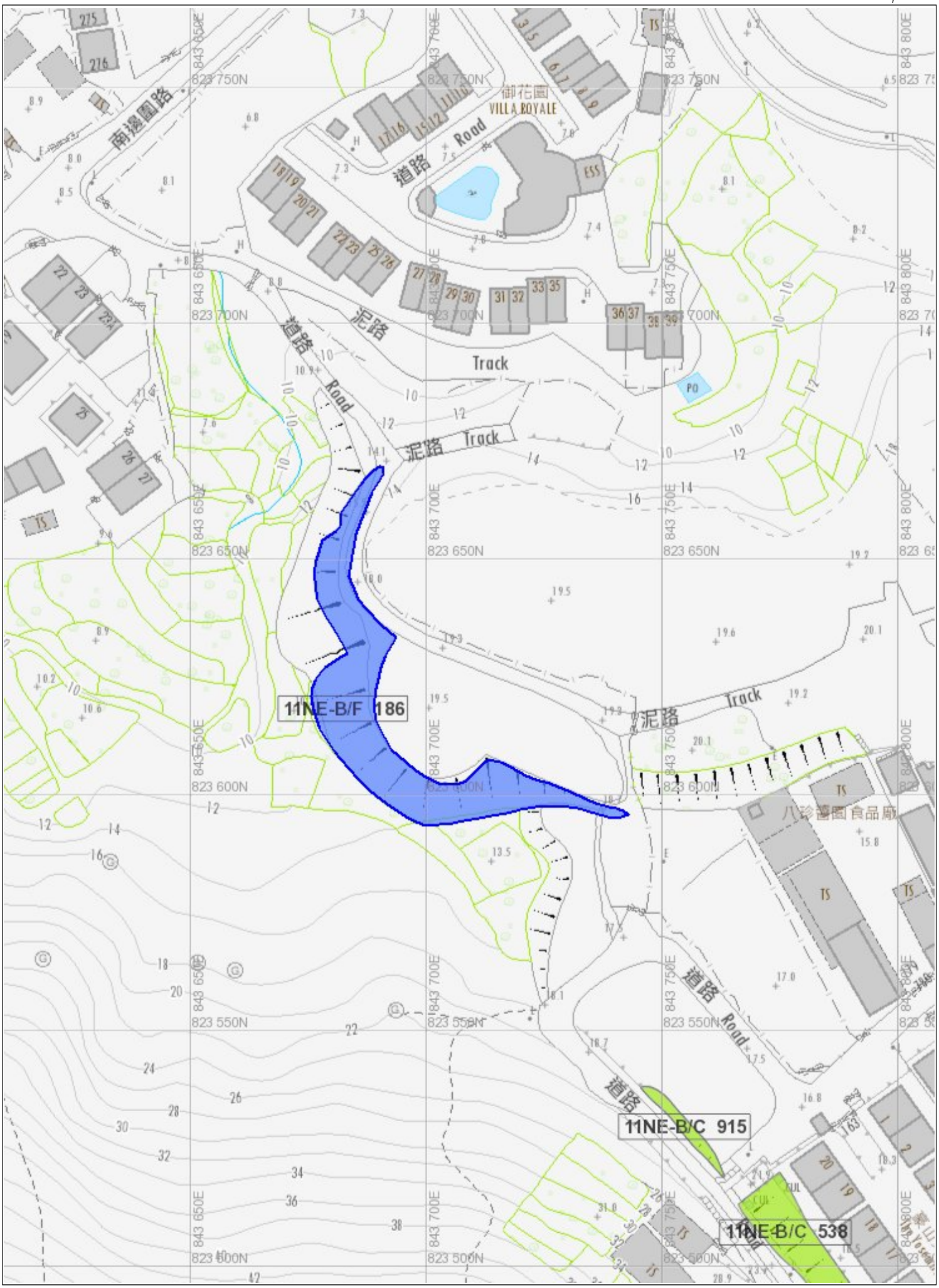
Action By: N/A

Non-routine Maintenance:

Action By: N/A

PHOTO




11NE-B/F 186
11NE-B/C 915
11NE-B/C 538
南邊圍路
御花園
VILLA ROYALE
道路 Road
泥路 Track
八珍邊圍食品廠
823 750N
823 700N
823 650N
823 600N
823 550N
843 650E
843 700E
843 750E
843 800E

BASIC INFORMATION

Location:	70m north of No. 130,Wo Mei, SK
Registration Date:	18-07-2002
Ranking Score (NPRS):	2 (EI)
Date of Construction/ Modification:	Post-1977
Data Source:	EI(HyD)
Approximate Coordinates:	Easting : 843901 Northing : 823645

CONSEQUENCE-TO-LIFE CATEGORY

Facility at Crest:	Road/footpath with heavy traffic density
Distance of Facility from Crest (m):	0
Facility at Toe:	Road/footpath with moderate traffic density
Distance of Facility from Toe (m):	0
Consequence-to-life Category:	2
Remarks:	N/A

SLOPE PART

(1) Max. Height (m): 8.8 Length (m): 85 Average Angle (deg): 30

WALL PART

(1) Max. Height (m): 8.8 Length (m): 16.3 Face Angle (deg): 90

MAINTENANCE RESPONSIBILITY

(1) Sub Div.: 0 Government Feature Party: HyD Agent: HyD Land Cat.: 5b(iii) Reason Code: 56 MR Endorsement Date: 23-01-2003

DETAILS OF SLOPE / RETAINING WALL

Date of Inspection: 07-11-2012

Data Source: EI(HyD)

Slope Part Drainage: (1) Position: Crest Size(mm): 300
(2) Position: Toe Size(mm): 450

Wall Part Drainage: (1) Position: Crest Size(mm): 300

SLOPE PART

Slope Part (1)
Surface Protection (%): Bare: 0 Vegetated: 100 Chunam: 0 Shotcrete: 0 Other Cover: 0
Material Description: Material type: Soil Geology: N/A
Berm: No. of Berms: N/A Min. Berm Width (m): N/A
Weepholes: Size (mm): N/A Spacing (m): N/A

WALL PART

Wall Part (1)
Type of Wall: Wall Material: Random rubble Wall Location: Retaining wall with level platform
Berm: No. of Berms: N/A Min. Berm Width (m): N/A
Weepholes: Size (mm): N/A Spacing (m): N/A

SERVICES

(1) Utilities Type: Cable Size(mm): 0 Location: Crest Remark: Size cannot be determined
(2) Utilities Type: Cable Size(mm): 0 Location: Toe Remark: Size cannot be determined
(3) Utilities Type: Electricity Size(mm): 0 Location: Crest Remark: Size cannot be determined
(4) Utilities Type: Electricity Size(mm): 0 Location: Toe Remark: Size cannot be determined
(5) Utilities Type: Gas Size(mm): 0 Location: Toe Remark: Size cannot be determined
(6) Utilities Type: Sewer/Drain Size(mm): 600 Location: Crest Remark: N/A
(7) Utilities Type: Water Main Size(mm): 80 Location: Toe Remark: N/A
(8) Utilities Type: Water Main Size(mm): 150 Location: Toe Remark: N/A
(9) Utilities Type: Water Main Size(mm): 250 Location: Crest Remark: N/A

CHECKING STATUS INFORMATION

Tagmark: 23117_0_4 Part: 0 Checking Status: No outstanding comments Checking Certificate No.: N/A

BACKGROUND INFORMATION

GIU Cell Ref.:	11NE5A-5
Map Sheet Reference (1:1000):	11NE- 5A
Aerial Photos:	ACW38788 (2002), CW38789 (2002)
Nearest Rainguage Station (Station Number):	Staff Quarter (Block C), Pik Uk Prison, Clearwater Bay(N08)
Data Collected On:	07-11-2012
Date of Construction, Subsequent Modification and Demolition:	Modification: Constructed Before: 2001 After: 2000
Related Reports/Files or Documents:	N/A
Remarks:	N/A
Follow Up Actions:	N/A

DH-Order (To Be Confirmed with Buildings Department): None

Advisory Letter (To Be Confirmed with Buildings Department): None

LPMIS: None

ENHANCED MAINTENANCE INFORMATION

From Maintenance Department: (Last Updated Date: 17/12/2020)

STAGE 1 STUDY REPORT

Inspected On:
Weather:
District: ME

Section No: 1-1
Height(m):
Type of Toe Facility: Road/footpath with moderate traffic density

Distance from Toe(m): 0
Type of Crest Facility: Road/footpath with heavy traffic density

Distance from Crest(m): 0
Consequence Category:
Engineering Judgement:

Section No: 2-2
Type of Toe Facility:

Distance from Toe(m):
Type of Crest Facility:

Distance from Crest(m):
Consequence Category:
Engineering Judgement:

Sign of Seepage:

Criterion A satisfied:

Sign of Distress:

Criterion D satisfied:

Non-routine maintenance required:

Note:

Masonry wall/Masonry facing:

Note:

Consequence category (for critical section):

Observations: N/A

Emergency Action Required:

Action By: N/A

ACTION TO INITIATE PREVENTIVE WORKS

Criterion A/Criterion D: N/A

Action By: N/A

Further Study:

Action By: N/A

OTHER EXTERNAL ACTION

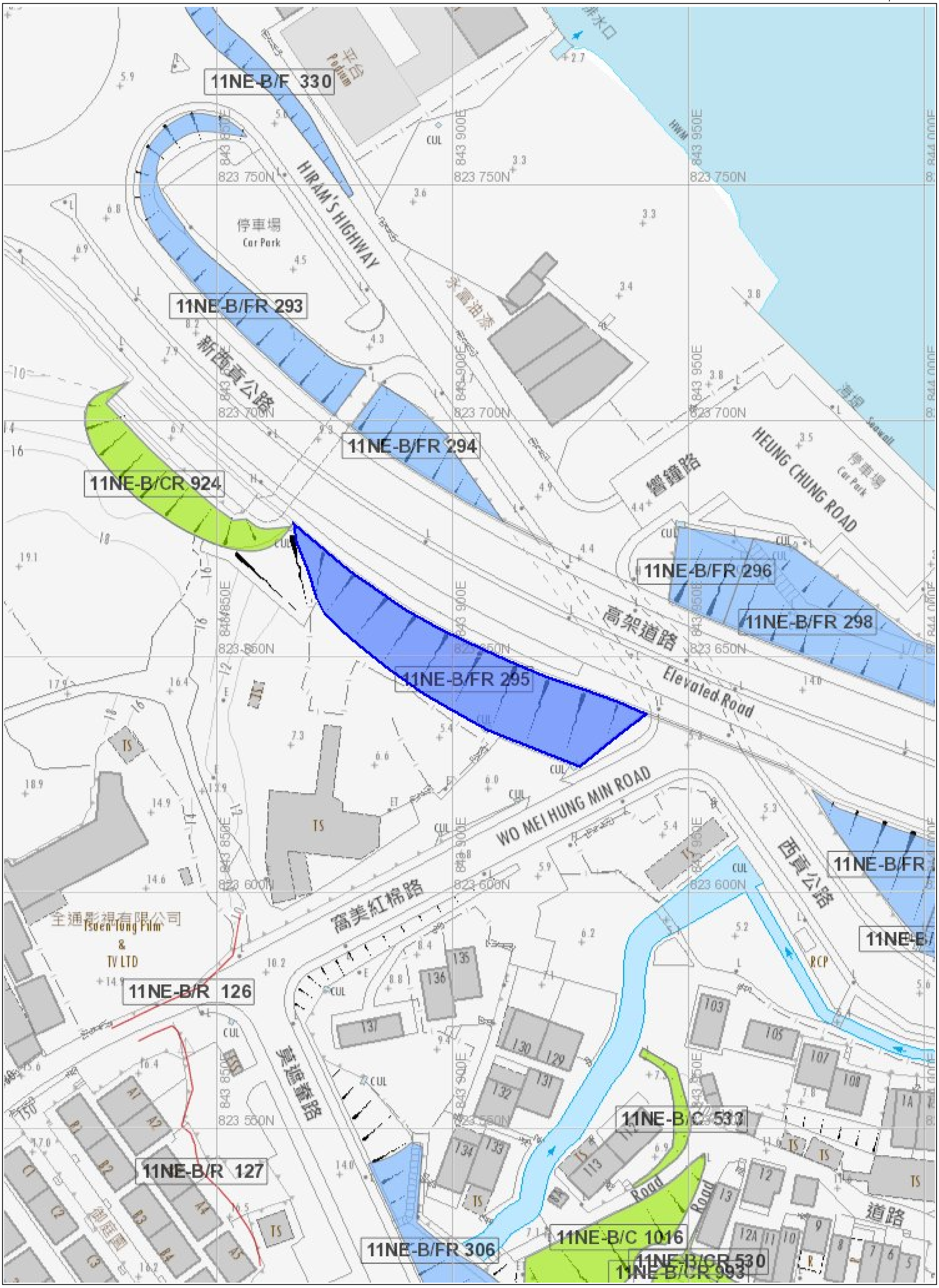
Check / repair Services:

Action By: N/A

Non-routine Maintenance:

Action By: N/A

PHOTO


11NE-B/F 330
11NE-B/FR 293
11NE-B/FR 294
11NE-B/CR 924
11NE-B/FR 296
11NE-B/FR 298
11NE-B/FR 295
11NE-B/R 126
11NE-B/R 127
11NE-B/FR 306
11NE-B/C 1016
11NE-B/C 533
11NE-B/CR 530
11NE-B/CR 993
HIRAM'S HIGHWAY
HEUNG CHUNG ROAD
Elevated Road
WO MEI HUNG MIN ROAD
停車場
Car Park
新西貢公路
響鐘路
高架道路
窩美紅棉路
西貢公路
全通影視有限公司
Tsuen Tung Film & TV LTD
823 750N
823 700N
823 650N
823 600N
823 550N
843 850E
843 900E
843 950E

BASIC INFORMATION

Location:	HIRAM'S HIGHWAY, SK
Registration Date:	28-05-2003
Ranking Score (NPRS):	1 (LPMit)
Date of Construction/ Modification:	Post-1977
Data Source:	EI(HyD)
Approximate Coordinates:	Easting : 843838 Northing : 823685

CONSEQUENCE-TO-LIFE CATEGORY

Facility at Crest:	Undeveloped green belt
Distance of Facility from Crest (m):	0
Facility at Toe:	Subway
Distance of Facility from Toe (m):	0
Consequence-to-life Category:	2
Remarks:	N/A

SLOPE PART

(1) Max. Height (m): 3 Length (m): 50 Average Angle (deg): 35

WALL PART

(1) Max. Height (m): 5 Length (m): 50 Face Angle (deg): 90
(1) Max. Height (m): 5 Length (m): 50 Face Angle (deg): 90

MAINTENANCE RESPONSIBILITY

(1) Sub Div.: 0 Government Feature Party: HyD Agent: HyD Land Cat.: 5b(iii) Reason Code: 56 MR Endorsement Date: 10-10-2003

DETAILS OF SLOPE / RETAINING WALL

Date of Inspection: 07-01-2015

Data Source: EI(HyD)

Slope Part Drainage: (1) Position: Crest Size(mm): 300
(2) Position: Toe Size(mm): 300

Wall Part Drainage: (1) Position: Crest Size(mm): 300

SLOPE PART

Slope Part (1)
Surface Protection (%): Bare: 0 Vegetated: 100 Chunam: 0 Shotcrete: 0 Other Cover: 0
Material Description: Material type: Soil Geology: N/A
Berm: No. of Berms: N/A Min. Berm Width (m): N/A
Weepholes: Size (mm): N/A Spacing (m): N/A

WALL PART

Wall Part (1)
Type of Wall: Wall Material: Concrete Wall Location: N/A
Berm: No. of Berms: N/A Min. Berm Width (m): N/A
Weepholes: Size (mm): N/A Spacing (m): N/A
Wall Part (2)
Type of Wall: Wall Material: Others Wall Location: N/A
Berm: No. of Berms: N/A Min. Berm Width (m): N/A
Weepholes: Size (mm): N/A Spacing (m): N/A

SERVICES

N/A

CHECKING STATUS INFORMATION

Tagmark: 23092_0_4 Part: 0 Checking Status: No outstanding comments Checking Certificate No.: N/A

BACKGROUND INFORMATION

GIU Cell Ref.:	11NE5A-5
Map Sheet Reference (1:1000):	11NE- 5A
Aerial Photos:	CW38788 (2002), CW38789 (2002)
Nearest Rainguage Station (Station Number):	Staff Quarter (Block C), Pik Uk Prison, Clearwater Bay(N08)
Data Collected On:	07-01-2015
Date of Construction, Subsequent Modification and Demolition:	Modification: Constructed Before: 2002 After: 2001
Related Reports/Files or Documents:	N/A
Remarks:	N/A
Follow Up Actions:	N/A

DH-Order (To Be Confirmed with Buildings Department): None

Advisory Letter (To Be Confirmed with Buildings Department): None

LPMIS: None

ENHANCED MAINTENANCE INFORMATION

From Maintenance Department: (Last Updated Date: 17/12/2020)

STAGE 1 STUDY REPORT

Inspected On: 20-01-2003
Weather: Mainly Fine
District: ME

Section No: 1-1
Height(m): H1 : 5 , H2 : 5
Type of Toe Facility: Subway

Distance from Toe(m): 0
Type of Crest Facility: Undeveloped green belt

Distance from Crest(m): 0
Consequence Category: 2
Engineering Judgement: P

Section No: 2-2
Type of Toe Facility: N/A

Distance from Toe(m): 0
Type of Crest Facility: N/A

Distance from Crest(m): 0
Consequence Category: 2
Engineering Judgement: P

Sign of Seepage:	Slope : No sign of seepage Wall : No sign of seepage
Criterion A satisfied:	N
Sign of Distress:	Slope : N/A Wall : N/A
Criterion D satisfied:	N
Non-routine maintenance required:	N
Note:	N/A
Masonry wall/Masonry facing:	Y
Note:	Sqaure rubble facing
Consequence category (for critical section):	2
Observations:	N/A
Emergency Action Required:	N
Action By:	N/A

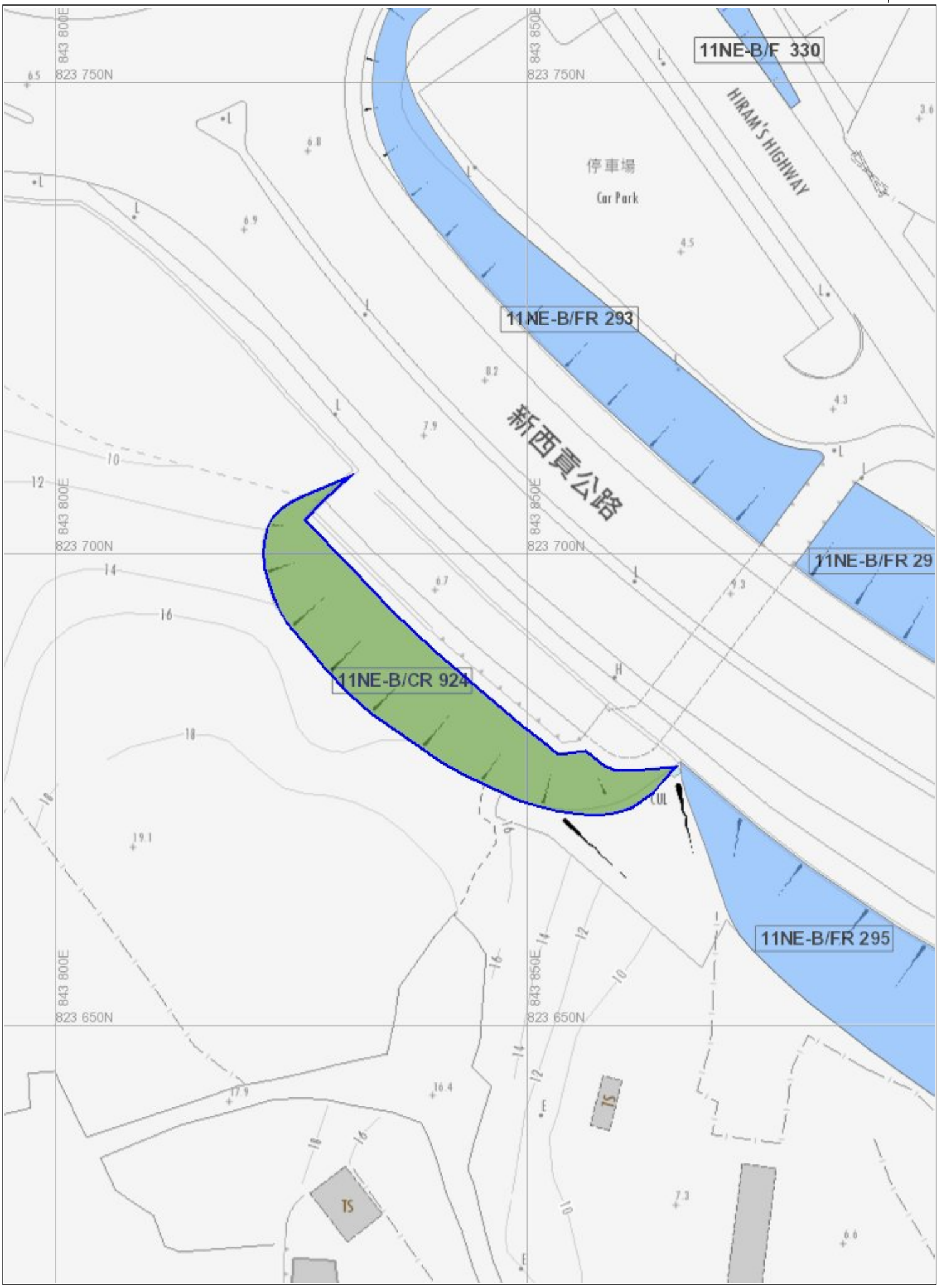
ACTION TO INITIATE PREVENTIVE WORKS

Criterion A/Criterion D:	N/A
Action By:	N/A
Further Study:	N
Action By:	N/A

OTHER EXTERNAL ACTION

Check / repair Services:	N
Action By:	N/A
Non-routine Maintenance:	N
Action By:	N/A

PHOTO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HIRAM'S HIGHWAY
停車場
Car Park
11NE-B/FR 293
新西貢公路
11NE-B/FR 29
11NE-B/CR 924
11NE-B/FR 295
843 800E
843 850E
823 750N
823 700N
823 650N
TS

Appendix D

Extraction of Previous GI Records Prepared by Gammon Construction Limited in June 1999

Gammon Construction Limited

Geotechnical Contracting Department

DRILLHOLE No. **ABH2**

SHEET 1 of 3

DRILLHOLE RECORD

PROJECT LOCATION	**Hiram's Highway Improvement Phase 3: Improvement between Nam Wai and Ho Chung and Upgrading Local Access Roads**		
METHOD **Rotary**	CO-ORDINATES E **843839.04** N **823683.01**	CONTRACT No. **HY/98/13**	
MACHINE & No. **20-087**		DATE from **01/06/1999** to **05/06/1999**	
FLUSHING MEDIUM **Water**	ORIENTATION **Vertical**	GROUND LEVEL **15.68** mPD	

Drilling Progress	Casing depth/size	Water Depth (m)	Water Recovery %	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Index	Tests	Samples No.	Type	Depth	Reduced Level	Depth (m)	Legend	Grade	Description
01/06/99	PX			100				1,2 2,3,3,3 N=11	1		0.50	15.68	0.00			Firm, brownish red, slightly fine to medium sandy clayey SILT. (COLLUVIUM)
									2		1.00					
									3							
									4		2.10					
									5							
									6		2.55					
				40					7		3.00					
									8							
								1,2 2,2,3,3 N=10	9		4.10					
									10		4.55					
01/06/99		3.20														
02/06/99		Dry		100					11		5.00					
									12			9.68	6.00			
								1,1 1,2,2,3 N=8	13		6.10					Firm, red mottled yellow, slightly fine to medium sandy SILT. (COLLUVIUM)
									14		6.55					
				100					15		7.00					
									16		8.00					
								2,3 4,4,5,6 N=19	17		8.10					
									18		8.55					
				100					19		9.00					
	PX 9.75								20			5.93	9.75			
	HX			80	0	0	NI				9.75 9.95	5.73	9.95		III	Extremely weak, light grey mottled yellowish

- Small disturbed sample
- Large disturbed sample
- SPT liner sample
- U76 undisturbed sample
- U100 undisturbed sample
- Mazier sample
- Piston sample
- Water sample
- Piezometer / standpipe tip
- Standard penetration test
- Pressuremeter Test
- Permeability test
- Impression packer test
- In-situ vane shear test

LOGGED **LRC**

DATE **09/06/1999**

CHECKED **LRC**

DATE **10/06/1999**

REMARKS

Piezometer installed at 15.17m depth.

Gammon Construction Limited

Geotechnical Contracting Department

DRILLHOLE No. **ABH2**

SHEET 2 of 3

DRILLHOLE RECORD

PROJECT LOCATION	**Hiram's Highway Improvement Phase 3: Improvement between Nam Wai and Ho Chung and Upgrading Local Access Roads**	
METHOD **Rotary**	CO-ORDINATES E **843839.04** N **823683.01**	CONTRACT No. **HY/98/13**
MACHINE & No. **20-087**		DATE from **01/06/1999** to **05/06/1999**
FLUSHING MEDIUM **Water**	ORIENTATION **Vertical**	GROUND LEVEL **15.68** mPD

Drilling Progress	Casing depth/size	Water Depth (m)	Water Recovery %	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Index	Tests	Samples No.	Type	Depth	Reduced Level 5.68	Depth (m) 10.00	Legend	Grade	Description
								3,4 7,10,10,11 N=38	21		10.10					and streaked black, completely decomposed, fine ash TUFF with iron and manganese stained relict joints. (Firm, fine sandy clayey SILT)
									22		10.55					9.75 - 9.95m : Moderately strong, moderately decomposed zone. Fractured. (Corestones)
				90					23		11.00					
				30	0	0	NI NR		24		11.55	4.13	11.55		III/IV	
										T2|O|		3.98	11.70		V	11.55-11.70m: Moderately weak to weak, grey stained orangish brown, moderately to highly decomposed zones. Fractured. (Corestones)
								3,5 7,9,13,14 N=43	25		12.05 12.10					
									26		12.55					
02/06/99		8.40							27		13.00					
03/06/99		10.80		100					28		13.55	2.13	13.55		III/IV	
				38	0	0	NI NR			T2|O|		1.95	13.73		V	13.55-13.73m: Moderately weak to weak, grey stained orangish brown, moderately to highly decomposed zones. Fractured. (Corestones)
								7,9 16,22,31,33 N=102	29		14.02 14.10					
									30		14.55					
03/06/99		6.50									14.85	0.83	14.85		III	
04/06/99		10.85		100	47	0	17.9			T2|O|	15.15					Moderately strong, grey stained orangish brown, moderately decomposed, fine ash TUFF with very closely spaced, narrow, rough planar, iron and manganese stained joints, dipping 0°-10°, 30°-40° and 50°-60°. Highly decomposed (3-4mm) around joint margins.
				71	25	0	NR			T2|O|		0.16	15.52		IV	
				88	54	35	>20			T2|O|	15.67	-0.07	15.75		III	
	HX 16.35						10.0 >20			T2|O|		-0.67	16.35		III	15.52-15.75m: No recovery. Inferred highly decomposed zone.
				98	91	52	12.9			T2|O|	16.35					Moderately strong, grey stained orangish brown, moderately decomposed, fine ash TUFF with very closely to closely spaced, locally medium spaced, extremely to very narrow, rough planar, iron and manganese stained and locally kaolin coated joints, dipping 10°-20°, 30°-40° and 50°-60°.
				100	70	70				T2|O|	16.93					
				100	95	26				T2|O|	17.26					
				88	88	49				T2|O|	17.64					
										T2|O|	18.32					
				100	72	52				T2|O|	18.57					
				99	89	77				T2|O|						
										T2|O|	19.64					
				96	83	0				T2|O|	19.88					

- Small disturbed sample
- Large disturbed sample
- SPT liner sample
- U76 undisturbed sample
- U100 undisturbed sample
- Mazier sample
- Piston sample
- Water sample
- Piezometer / standpipe tip
- Standard penetration test
- Pressuremeter Test
- Permeability test
- Impression packer test
- In-situ vane shear test

LOGGED **LRC**

DATE **09/06/1999**

CHECKED **LRC**

DATE **10/06/1999**

REMARKS

Gammon Construction Limited

Geotechnical Contracting Department

DRILLHOLE No. **ABH2**

SHEET 3 of 3

DRILLHOLE RECORD

PROJECT LOCATION	Hiram's Highway Improvement Phase 3: Improvement between Nam Wai and Ho Chung and Upgrading Local Access Roads	
METHOD **Rotary**	CO-ORDINATES E **843839.04** N **823683.01**	CONTRACT No. **HY/98/13**
MACHINE & No. **20-087**		DATE from **01/06/1999** to **05/06/1999**
FLUSHING MEDIUM **Water**	ORIENTATION **Vertical**	GROUND LEVEL **15.68** mPD

Drilling Progress	Casing depth/size	Water Depth (m)	Water Recovery %	Total core Recovery %	Solid core Recovery %	R.Q.D.	Fracture Index	Tests	Samples No. Type Depth	Reduced Level	Depth (m)	Legend	Grade	Description
				90	32	0	>20		T2101 20.28					As sheet 2 of 3 20.15-20.28m: Moderately weak, moderately decomposed zone.
				100	69	45	18.9		T2101 20.86					
				100	85	26			T2101 21.40					
04/06/99		8.50												
05/06/99		10.88		96	31	0			T2101 21.92					
				100	100	39	9.4		T2101					
05/06/99		7.50								-6.88	22.56			
														End of Investigation hole at 22.56m.

- Small disturbed sample
- Large disturbed sample
- SPT liner sample
- U76 undisturbed sample
- U100 undisturbed sample
- Mazier sample
- Piston sample
- Water sample
- Piezometer / standpipe tip
- Standard penetration test
- Pressuremeter Test
- Permeability test
- Impression packer test
- In-situ vane shear test

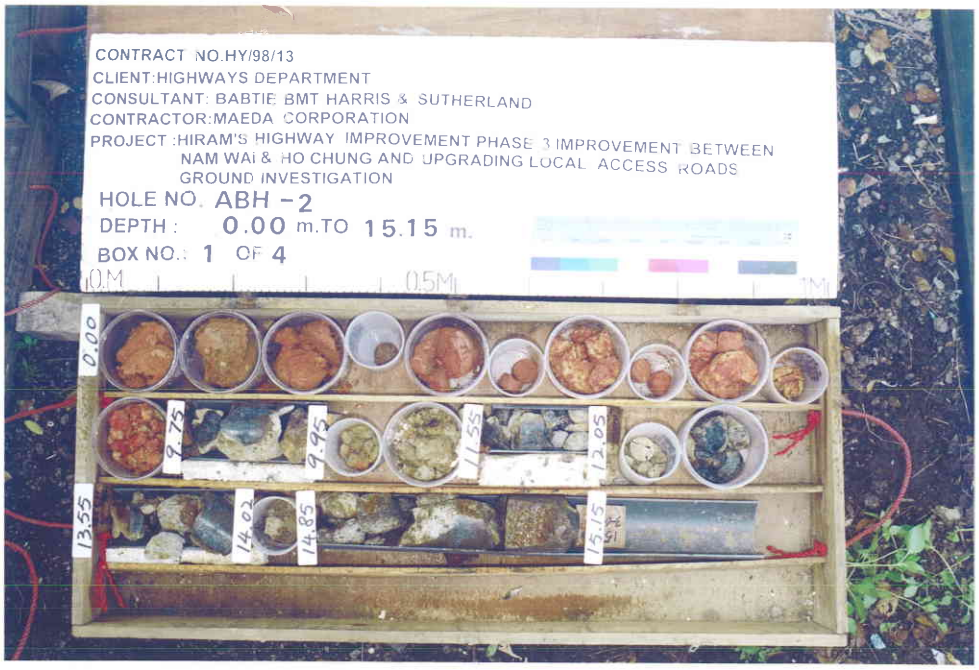
LOGGED **LRC**

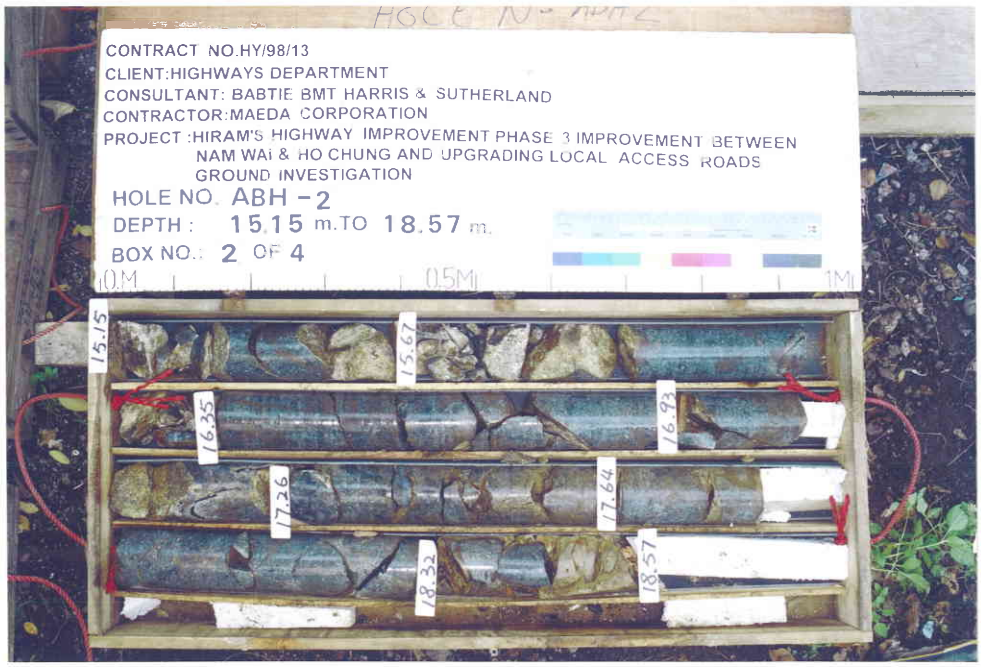
DATE **09/06/1999**

CHECKED **LRC**

DATE **10/06/1999**

REMARKS


CONTRACT NO.HY/98/13
CLIENT:HIGHWAYS DEPARTMENT
CONSULTANT: BABTIE BMT HARRIS & SUTHERLAND
CONTRACTOR:MAEDA CORPORATION
PROJECT :HIRAM'S HIGHWAY IMPROVEMENT PHASE 3 IMPROVEMENT BETWEEN NAM WAI & HO CHUNG AND UPGRADING LOCAL ACCESS ROADS GROUND INVESTIGATION
HOLE NO. ABH -2
DEPTH : 0.00 m.TO 15.15 m.
BOX NO.: 1 OF 4
0.00
9.75
9.95
11.55
12.05
13.55
14.02
14.85
15.15


CONTRACT NO.HY/98/13
CLIENT:HIGHWAYS DEPARTMENT
CONSULTANT: BABTIE BMT HARRIS & SUTHERLAND
CONTRACTOR:MAEDA CORPORATION
PROJECT :HIRAM'S HIGHWAY IMPROVEMENT PHASE 3 IMPROVEMENT BETWEEN NAM WAI & HO CHUNG AND UPGRADING LOCAL ACCESS ROADS GROUND INVESTIGATION
HOLE NO. ABH -2
DEPTH : 15.15 m.TO 18.57 m.
BOX NO.: 2 OF 4
15.15
15.67
16.35
16.93
17.26
17.64
18.32
18.57


CONTRACT NO.HY/98/13
CLIENT:HIGHWAYS DEPARTMENT
CONSULTANT: BABTIE BMT HARRIS & SUTHERLAND
CONTRACTOR:MAEDA CORPORATION
PROJECT :HIRAM'S HIGHWAY IMPROVEMENT PHASE 3 IMPROVEMENT BETWEEN NAM WAI & HO CHUNG AND UPGRADING LOCAL ACCESS ROADS GROUND INVESTIGATION
HOLE NO. ABH -2
DEPTH : 18.57 m.TO 21.92 m.
BOX NO.: 3 OF 4
18.57
19.64
19.88
20.38
20.96
21.40
21.92


CONTRACT NO.HY/98/13
CLIENT:HIGHWAYS DEPARTMENT
CONSULTANT: BABTIE BMT HARRIS & SUTHERLAND
CONTRACTOR:MAEDA CORPORATION
PROJECT :HIRAM'S HIGHWAY IMPROVEMENT PHASE 3 IMPROVEMENT BETWEEN NAM WAI & HO CHUNG AND UPGRADING LOCAL ACCESS ROADS
GROUND INVESTIGATION
HOLE NO. ABH -2
DEPTH : 21.92 m.TO 22.56 m.
BOX NO.: 4 OF 4
0.0M
0.5M
1M
21.92
22.56
END

Appendix H

Visual Impact Assessment

ARUP

Application for Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131) to Rezone the Application Site from "Green Belt" to "Residential (Group C)1" for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung

Visual Impact Assessment

Draft | Dec 2023

293595

Arup Hong Kong Limited
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80 Tat Chee Avenue
Kowloon Tong,
Kowloon
Hong Kong
arup.com

Contents

Figures

Tables

1 INTRODUCTION

1.1.1 This Visual Impact Assessment ("VIA") is prepared in support of the Proposed Amendment to the Approved Ho Chung Outline Zoning Plan No. S/SK-HC/11 (the "OZP") under Section 12A of the Town Planning Ordinance (Cap. 131), in support of the rezoning from "Green Belt" ("GB") zone to "Residential (Group C) 1" ("R(C) 1") zone at Various Lots in D.D.244 and Adjoining Government Land, Nam Pin Wai, Sai Kung (the "Application Site") to facilitate a Proposed House Development (the "Proposed Amendment").

1.1.2 The Application Site area is about 6,601m^2, which comprises of about 6,080m^2 (about 92.1%) of private lots and about 521m^2 (about 7.9%) of Government Land. Among the private lots, about 83.4% are solely owned by the Applicants (i.e. Sites A, B and C and majority part of the approved access road). The remaining 16.6% are third-party private lots locating at the southern portion of the Application Site.

1.1.3 Currently, the Application Site is mostly vacant except the approved access road under planning application No. A/SK-HC/223 which is under construction. A few trees in fair to poor condition with generally low amenity value are scattered along two sides of the approved access road and the northern periphery of the Application Site. An Indicative Scheme has been formulated to demonstrate the feasibility of the Proposed Amendment. The Indicative Scheme will provide a total of 17 additional houses with the same development intensity and would serve as a natural extension of the adjoining "R(C)1" zone.

1.1.4 Point (g) of paragraph 2.3 of the Town Planning Board Guidelines No. 41 ("TPB PG-No. 41") states that a VIA is required when "*the proposal may affect existing visually sensitive areas, visual amenities and visual resources on-site or off-site enjoyed by the public due to its nature, scale, location, visual prominence, design, relationship to the site context, etc.*" Accordingly, this VIA is prepared to evaluate the visual compatibility and degree of anticipated visual impacts of the Indicative Scheme on the Visually Sensitive Receivers ("VSRs") relevant to the Application Site according to the requirements listed under TPB PG-No. 41. Based on the evaluation, the VIA mainly comments on the visual acceptability of the **Indicative Scheme** against the **Planned Condition** (i.e. OZP complaint scenario plus approved/planned developments).

1.1.5 The outline for the VIA is set out below:

- **Section 2** outlines the visual context of the Application Site and its Surrounding Area;
- **Section 3** describes the main design principles for the Indicative Scheme;
- **Section 4** identifies the Assessment Area and provides an analysis of the viewing points ("VPs");
- **Section 5** assesses the visual impacts; and
- **Section 6** concludes the VIA.

2 VISUAL CONTEXT OF THE APPLICATION SITE AND ITS SURROUNDING AREA

2.1 Site Context and Existing Land Use

2.1.1 The Application Site is located at various lots in D.D. 244 and adjoining Government Land in Nam Pin Wai, Sai Kung. Referring to **Figure 1**, the Application Site is situated between a "R(C)1" zone and the amenity slope of New Hiram's Highway zoned as "GB".

2.1.2 With a site area of about 6,601m^2, the Application Site comprises of an approved access road (about 1,246m^2) which is the subject of an approved S16 Planning Application (No. A/SK-HC/223), as well as land areas bisected by the approved access road to the north and south.

2.1.3 In terms of site topography, the approved access road is at a site level of about 19mPD, forming the highest point of the Site which gradually slopes downwards to its south (about 7mPD) and north (about 8mPD).

2.2 Surrounding Context

2.2.1 The Application Site is situated in a predominantly residential neighbourhood in Nam Pin Wai area with existing and planned low-dense houses and village settlements: (**Figure 1** refers):

- To the **immediate west** adjoining the Application Site is the always permitted 'House' development at "R(C)1" zone with an approved GBP for building 51 houses and an approved access road connecting to Wo Mei Hung Min Road. To the **further west** across the "R(C)1" zone are rural village houses under "V" zone.
- To the **immediate south** adjoining the Application Site is Wo Mei Hung Min Road, then the low-dense village clusters under "V" zone, including the Yosemite and the Royal Garden and other village type houses.
- To the immediate east of the Application Site is the New Hiram's Highway, including its noise barrier and amenity slope under the same "GB" zone as the Application Site. As observed from site visit, there is a cluster of trees located right next to the Application Site within the same "GB" zone, serving as landscape buffer from the New Hiram's Highway. To the **further east** across the New Hiram's Highway is the Sai Kung Central Primary School under "Government, Institution or Community" ("G/IC") zone.
- To the **immediate northwest** of the Application Site is the low-dense village type house namely Villa Royale within the same "R(C)1" zone. To its **further north** across Nam Pin Wai Road are the rural village houses of Ho Chung New Village under the "V" zone and an area designated as "Comprehensive Development Area" ("CDA") zone subject to a maximum PR of 0.75, a maximum SC of 25% and a maximum BH of 12m with 3 storeys over one storey of carport. The northern part of the "CDA" zone is the subject of a planning application (No. A/SK-HC/124) for 28 nos. of 4-storey houses allowed by the Town Planning Appeal Board on 16 July 2013. While the southern part is the subject of a planning application (No. A/SK-HC/340) for 8 nos. of houses with 3 storeys over

one storey carport and 14 nos. of houses with 6 storeys over one storey carport approved on 9.6.2023.

2.2.2 Please refer to **Figure 1** for the surrounding context of the application site.

3 The Indicative Scheme

3.1 Introduction

3.1.1 The Indicative Scheme has been carefully designed having due regard to various site constraints such as multiple land ownership as well as technical considerations such existing trees, environmental and transport arrangement. The Indicative Scheme comprises of 17 houses with ancillary facilities such as clubhouse and local open space. Overall speaking, the Indicative Scheme will have a maximum PR of not more than 0.75, SC of not more than 25% and a BH of not more than 12m with 3 storeys over one storey of carport.

3.1.2 The general planning and design principles of the indicative development scheme shall refer to **Section 4** in the Supporting Planning Statement.

3.2 Proposed Key Development Parameters

3.2.1 The proposed key development parameters of the Indicative Scheme are summarised in **Table 3.1** below. Please also refer to **Appendix A** of the Supporting Planning Statement for the architectural plan of the Indicative Scheme.

Table 3.1 Proposed Key Development Parameters of the Indicative Scheme

Key Development Parameters		**Indicative Scheme**		
		Phase 1	**Remaining Phase**	**Total**
Application Site Area (About)		-	-	6,601m^2
Development Site Area Excluding the Access Road* (About)		4,020m^2	1,335m^2	5,355m^2
Domestic PR (About)#		0.75	0.75	0.75
Domestic GFA (About)# &		3,015m^2	1,001m^2	4,016m^2
Building Height (About)		12m	12m	-
No. of Storeys		3	3	3
Site Coverage#		Not more than 25%	Not more than 25%	Not more than 25%
No. of Houses		13	4	17
Anticipated Population (about)^		39	12	51
Local Open Space		Not less than 39m^2	Not less than 12m^2	Not less than 51m^2
Parking Spaces	Private Car	26	8	34
	Visitors	2	-	2
	Motorcycle	1	0	1
Loading/ Unloading Bay		1	-	1

Notes:

* The area of the access road under the approved planning application No/ A/SK-HC/223 is about 1246m^2.

Calculation is based on the Development Site Area which excludes the access road.

^ A Person Per Occupied Flat of 3.0 is assumed based on the average domestic household size of Pak Sha Wan District Council Constituency Area as reported in the 2021 Population Census by the Census and Statistics Department

& GFA of the proposed clubhouse provision is within 5% of the total domestic GFA and is therefore exempted from GFA calculation.

4 ASSESSMENT AREA AND SELECTION OF VIEWING POINTS

4.1 Assessment Area

4.1.1 According to the TPB PG-No. 41, the Assessment Area is defined by approximately three times of overall maximum BH of the subject development (28mPD – 16mPD site formation level), i.e. 12m. Thus, a radius of 36m (i.e. 12m × 3) from the boundary of the Application Site defines the boundary of the Assessment Area, within which key public viewing points ("VPs") are selected for assessment accordingly (**Figure 2** refers).

4.2 Selection of Viewing Points

4.2.1 When assessing the potential visual impacts of the Indicative Scheme, the classification of VPs is categorised as follows:

Table 4.1 Classification of VPs

Receivers	Main Activities	Sensitivity
Recreational	Those viewers who would view the Application Site while engaging in recreational activities	High
Residential	Those viewers who would view the Application Site from their residence.	High
Travellers	Those viewers who would view the Application Site from vehicles or on foot	Medium
Occupational	Those viewers who would view the Application Site from their workplaces	Low

4.2.2 A total of 6 VPs are considered to be mostly impacted by the Indicative Scheme at the Application Site (**Figure 2** refers). The evaluated short-range, medium-range and long-range VPs include:

4.2.3 **VP1: Footbridge across Hiram's Highway –** This VP is located at about 165m to the north of the Application Site. It is a public footbridge linking up two sides of Hiram's Highway. It allows the visual impact on pedestrians to be assessed at the medium-range street level. The nature of this VP is transient, and the visual sensitivity of this VP is considered **Medium**.

4.2.4 **VP2: Bus Stop along Hiram's Highway near Heung Chung Road** – This VP is located at a distance of about 40m to the southeast of the Application Site. There are bus and minibus stops providing transport services. This VP allows for the assessment of short-range visual impact on the nearby residents waiting for bus, passers-by and road users along this section of Hiram's Highway. The nature of this VP is transient. Considering the short viewing duration from most users, the visual sensitivity of this VP is considered **Medium**.

4.2.5 **VP3: Wo Mei Public Parking –** This VP is a public parking lot located at about 10m to the south of the Application Site. It is identified mainly for assessing short-range street-level visual impact on carpark users, passers-by and road users along Wo Mei Hung Min Road. The nature of this VP is transient. The visual sensitivity of this VP is considered **Medium**.

4.2.6 **VP4: Footpath outside Wo Mei Village Office –** This medium-range VP is located at located at the junction near Wo Mei Village Office and main entrance to Wo Mei Village and it is about 130m to the southeast of Application Site. This VP is selected to assess medium-range visual impact on villages and residents of Wo Mei Village, nearby residential developments and the officers of Wo Mei Village Office. The visual sensitivity of this VP is considered **High**.

4.2.7 **VP5: Footpath to the natural stream to the north of Mok Tse Che –** This VP is located at a distance of about 165m to the southwest of the Application Site. This medium-range VP is selected as it is one of the pedestrian routes linking up the village road to the west of Yosemite and Mok Tse Che Road. It represents views of villagers of Mok Tse Che Village and nearby residential developments such as the Yosemite. The visual sensitivity of this VP is considered **Medium** .

4.2.8 **VP6: Footpath along Nam Pin Wai Road –** This VP is located at a distance of about 150m to the southwest of the Application Site. This medium-range VP is selected as it is a local road linking up Ho Chung New Village and nearby residential developments such as Lodge and Villa Royale. It represents views of villagers and residents in Nam Pin Wai area. The visual sensitivity of this VP is considered **Medium**.

5 ASSESSMENT OF VISUAL IMPACT

5.1.1 This Section examines the visual impact of the Indicative Scheme by comparing it with the Planned Condition. Reference is made to TPB PG No. 41 and the following Table (**Table 5.1**) summarises the relevant appraisal aspects. The visual appraisal for the Indicative Scheme is carried out on the basis of 'visual composition', 'visual obstruction', 'effect on public viewers' and 'effect on visual resources'.

Table 5.1 Appraisal Aspects

Appraisal Aspects	**Major Considerations**
Visual Composition	Visual composition is the total visual effect of all the visual elements due to their variation in locations, massing, heights, dispositions, scales, forms, proportions and character vis-à-vis the overall visual backdrop. Visual composition may result in visual balance, compatibility, harmony, unity or contrast. The appraisal should have due regard to the overall visual context and character within the wider and local contexts.
Visual Obstruction	A development may cause views in its foreground or background to be intercepted or blocked. The appraisal should assess the degree of visual obstruction and loss of views or visual openness due to the proposed development from all key public viewing points within the assessment area.
Effect on Public Viewers	The effects of visual changes from key public viewing points with direct sightlines to the proposed development should be assessed and demonstrated in the VIA. The changes in views to the existing and future public viewers should be compared before and after the proposed development. The effects of the visual changes can be graded qualitatively in terms of magnitude as substantial, moderate, slight or negligible.
Effect on Visual Resources	The condition, quality and character of the assessment area may change positively or negatively as a result of a development. The applicant should appraise if the proposed development may improve or degrade the condition, quality and character of the assessment area and any on-site and off-site visual impact such as that on the visual resources, visual amenities, area of special character, natural and built heritage, sky view, streetscape, townscape and public realm related to the development.

5.1.2 TPB PG No. 41 sets out the classifications of visual impact and its associated description. The classifications are tabulated below to appraise the Overall Visual Resultant Impact of the Proposed development on the Visual Sensitive Receivers (Para. 4.11 of the HKPSG refers). This Section evaluates the visual impact of the Indicative Scheme as compared with the Planned Condition with the existing and planned developments in the surroundings.

Table 5.2 Classification of Overall Resultant Visual Impact

Classification of Overall Resultant Visual Impact	Description
Enhanced	If the proposed development in overall term will improve the visual quality and complement the visual character of its setting from most of the identified key public viewing points.
Partly Enhanced/Partly Adverse	If the proposed development will exhibit enhanced visual effects to some of the identified key public viewing points and at the same time, with or without mitigation measures, exhibit adverse visual effects to some other key public viewing points.
Negligible	If the proposed development will, with or without mitigation measures, in overall terms have insignificant visual effects to most of the identified key public viewing points, or the visual effects would be screened or filtered by other distracting visual elements in the assessment area.
Slightly Adverse	If the proposed development will, with or without mitigation measures, result in overall terms in some negative visual effects to most of the identified key public viewing points.
Moderately Adverse	If the proposed development will, with or without mitigation measures, result in overall terms in negative visual effects to most of the key identified key public viewing points.
Significantly Adverse	If the proposed development will in overall terms cause serious and detrimental visual effects to most of the identified key public viewing points even with mitigation measures.

VP1: Footbridge across Hiram's Highway (**Figure 3** refers)

5.1.3 This long-range VP located at Hiram's Highway representing the kinetic view of pedestrians who have a direct view towards the Application Site from the north. As the application site situates behind the existing cluster of trees and noise barrier, only the upper part of the proposed development will be visible under the Indicative Scheme.

5.1.4 **Effects on Visual Composition** – The visual composition from this VP under the existing condition comprises of Hiram's Highway and the roundabout in the foreground, Green Belt trees in the middle-ground, and Lower Hebe Hill and open sky in the background. Under the Indicative Scheme, a significant proportion of the proposed residential development will be screened by the retained trees of Green Belt, with only a small portion of the new development obscuring the hills. Furthermore, the Indicative Scheme would blend in with the approved house at adjoining 'R(C)1' zone due to their similar building height. Hence, the effects of the Indicative Scheme on visual composition are considered **negligible**.

5.1.5 **Effects on Visual Obstruction and Visual Permeability** – As shown on the photomontage, only a minor portion of the upper part of some proposed houses will be visible amid the vegetation on the amenity slope along the New Hiram's Highway, slightly impeding the visual permeability to the mountain backdrop. Yet, most of the building portion will be screened off by the cluster trees on the amenity slope. Furthermore, the Indicative Scheme would blend in with the approved house at adjoining "R(C)1" zone due to their similar

building height, serving as a natural extension. Therefore, the effects of the Indicative Scheme on visual obstruction are considered **negligible**.

5.1.6 **Effects on Public Viewers** – The Footbridge across Hiram's Highway is mainly for pedestrians with transient viewing duration who are less attentive to distant views towards the Application Site. Hence, the effects on public viewers are considered as **negligible**.

5.1.7 **Effects on Visual Elements/Resources** – The major visual resources of this VP comprise roadside plantation of roundabout in the foreground, the Green Belt trees and low-rise buildings in the middle-ground, and mountain and open sky in the background. Though the Indicative Scheme at the Application Site will obstruct a small portion of mountain view, it preserves the mature trees of the Green Belt along New Hiram's Highway, as well as the sky view at the background. The effects of the Indicative Scheme on visual resources are therefore **negligible** as compared with the Planned Condition.

5.1.8 Based on the above, the Indicative Scheme will bring **negligible** visual impact to the users of Footbridge across Hiram's Highway .

VP2: Bus Stop along Hiram's Highway near Heung Chung Road (**Figure 4** refers)

5.1.9 This short-range VP is located to the southeast of the Application Site at Heung Chung Road. It represents views of users at street level looking towards the Application Site. The southeastern part of proposed residential development at the Application Site will be partly visible, screened by retaining wall and existing tree clusters along Wo Mei Hung Min Road.

5.1.10 **Effects on Visual Composition** – The visual composition of this VP includes Wo Mei Hung Min Road and retaining wall with tree clusters in the foreground, roadside trees along Wo Mei Hung Min Road in the middle-ground, and Lower Hebe Hill and open sky in the background. With a distance of only about 40m, the Proposed Development will be inevitably visible due to the close viewing distance. However, the proposed mitigation measures such as screen planting and blockage of trees at the foreground will help the proposed development blend in with the existing visual composition. Therefore, the effects of the Indicative Scheme on visual composition will be **negligible**.

5.1.11 **Effects on Visual Obstruction and Visual Permeability** – The proposed houses developments of the Indicative Scheme are largely screened by the existing retaining wall and tree clusters along Wo Mei Hung Min Road. Only a small portion of proposed development will be visible and obstructing the roadside trees and small proportion of the mountain backdrop. However, mitigation measures such as screen planting helps the proposed house development at the Application Site to blend in the surrounding tree clusters. As such, the impact on visual obstruction to this VP can be considered **negligible**.

5.1.12 **Effects on Public Viewers** – From this VP, public viewers will be able to see a small proportion of the new developments at the Application Site. As this VP is transient in nature with the public viewers being oblivious to the visual difference in the background, **negligible** impacts on the public viewers will be resulted at this VP.

5.1.13 **Effects on Visual Elements/Resources** – The tree groups, mountain view and open sky are the key visual elements at this VP. Despite the Indicative Scheme will be partly visible, the mountain view and sky view are largely maintained. Hence, the overall visual condition and

character of the area will not be degraded by the Indicative Scheme at the Application Site, and a **negligible** impact is anticipated on visual elements/visual resources.

5.1.14 Overall, the visual impact of the Indicative Scheme to this VP is considered negligible.

VP3: Wo Mei Public Parking (**Figure 5 refers**)

5.1.15 This transient short-range VP is located to the south of the Application Site near Wo Mei Hung Min Road. It represents views of carpark users, pedestrians and road users at street level looking directly towards the Application Site. The southeastern part of the proposed development will be visible under the Indicative Scheme.

5.1.16 **Effects on Visual Composition** – The visual composition from this VP under the existing condition comprises Wo Mei Hung Min Road in the foreground, roadside tree clusters in the middle ground, and Lower Hebe Hill and open sky in the background. Under the Indicative Scheme, the proposed house development at the Application Site would blend in with tree clusters and the approved house at adjoining 'R(C)1' zone at the background. In addition, mitigation measures such screen planting will visually and effectively reduce the building mass of the proposed house development. Therefore, the effects of the Indicative Scheme on visual composition will be **negligible**.

5.1.17 **Effects on Visual Obstruction and Visual Permeability** – Visual permeability to the mountain backdrop will be impeded by the approved house at adjoining 'R(C)1' zone under the planned condition. Under Indicative Scheme, with a proximity of only about 10m, it is inevitable that Proposed Development would slightly obstruct the open sky view. However, the impact on visual obstruction can be mitigated with appropriate design mitigation measures such as screen planting which will visually reduce the building mass of the proposed house development. Therefore, the effects of the Indicative Scheme on visual obstruction are considered **slightly adverse**.

5.1.18 **Effects on Public Viewers** –From this VP, users of the car park and pedestrians will be able to see the Indicative Scheme directly. However, being a VP of highly transient in nature, the users will be focusing on activities like parking, driving and walking, so they will be relatively oblivious to the change in surrounding. Hence, the effects on public views are **negligible**.

5.1.19 **Effects on Visual Elements/Resources** – The major visual resources of this VP are the tree cluster in the foreground and sky view at the background. Despite the Indicative Scheme will be visible at the middle ground, it will be embedded with the new screen planting and approved house at adjoining 'R(C)1' zone in the Planned Condition. Thus, the Indicative Scheme will create **negligible** impact since no significant degradation are introduced to visual resource.

5.1.20 Based on the above, the Indicative Scheme will bring **negligible** visual impact to the carpark users and pedestrians at Wo Mei Public Parking given the transient nature of the VP.

VP 4: Footpath outside Wo Mei Village Office (**Figure 6** refers)

5.1.21 This short-range VP locates at the junction near Wo Mei Village Office and main entrance to Wo Mei Village and represents views of villagers and residents of Wo Mei Village and nearby residential developments with a direct view towards the Application Site. Under both Planned Condition and Indicative Scheme, the proposed residential development would be completely blocked by roadside plantation and barely visible to the public viewers.

5.1.22 **Effects on Visual Composition** – The visual composition from this VP under the existing condition comprises Hiram's Highway in the foreground, low-rise buildings and roadside plantation along Hiram's Highway and Wo Mei Hong Min Road in the middle ground, and mountains and open sky view in the background. Both Planned Condition and Indicative Scheme will be significantly screened off by the roadside plantation and would not be visible for the viewers. Therefore, the effects on visual composition to this VP is **negligible**.

5.1.23 **Effects on Visual Obstruction and Visual Permeability, Public Views and Visual Resources** – Both Planned Condition and Indicative Scheme will not be visible due to blockage of existing roadside plantation along Hiram's Highway and Wo Mei Hong Min Road. Therefore, effects on visual obstruction and visual permeability, public views and visual resources to this VP is **negligible**.

5.1.24 Based on the above, the Indicative Scheme will bring **negligible** visual impact to this VP.

VP 5: Footpath to the natural stream to the north of Mok Tse Che (**Figure 7** refers)

5.1.25 This medium-range VP is located to the southwest of the Application Site on a pedestrian route linking up the village road to the west of Yosemite and Mok Tse Che Road. It represents views of villagers of Mok Tse Che Village and nearby residential developments such as The Yosemite. The proposed house development is barely visible due to blockage of existing residential buildings of The Yosemite.

5.1.26 **Effects on Visual Composition** – The visual composition from this VP under the existing condition includes roadside plantation in the foreground, low-rise residential buildings of The Yosemite in the middle ground, and mountains and open sky as backdrop. Under both Planned Condition and Indicative Scheme, the proposed house development will be completely blocked by the existing residential buildings of The Yosemite in the middle ground. Therefore, the effects on visual composition to this VP is **negligible**.

5.1.27 **Effects on Visual Obstruction and Visual Permeability, Public Views and Visual Resources** – Both Planned Condition and Indicative Scheme will not be visible due to blockage of existing residential buildings of The Yosemite. Therefore, effects on visual obstruction and visual permeability, public views and visual resources to this VP is **negligible**.

5.1.28 Based on the above, the Indicative Scheme will bring **negligible** visual impact to this VP.

VP 6: Footpath along Nam Pin Wai Road (**Figure 8** refers)

5.1.29 This medium range VP is located to the northwest of the Application Site at the local road linking up Ho Chung New Village and nearby residential developments such as Dynasty Lodge and Villa Royale. It represents views of villagers and residents in Nam Pin Wai area.

The existing residential buildings including Villa Royale and the approved house at adjoining 'R(C)1' zone would completely block the views towards the proposed house development of Application Site.

5.1.30 **Effects on Visual Composition** – The visual composition from this VP under the existing condition includes roadside plantation and Nam Pin Wai Road at the foreground, low-rise residential buildings of Villa Royal in the middle ground and open sky and mountains as the backdrop. As the proposed development under both Planned Condition and Indicative Scheme would be completely screened off by the residential buildings of Villa Royal and approved house at adjoining 'R(C)1' zone, it would not be visible to the villagers and residents in Nam Pin Wai. Therefore, the effects on visual composition to this VP is **negligible**.

5.1.31 **Effects on Visual Obstruction and Visual Permeability, Public Views and Visual Resources** – As both Planned Condition and Indicative Scheme would be fully obstructed by the existing residential buildings of Villa Royal and approved house at adjoining 'R(C)1' zone. Therefore, effects on visual obstruction and visual permeability, public views and visual resources to this VP is **negligible**.

5.1.32 Based on the above, the Indicative Scheme will bring **negligible** visual impact to this VP.

5.1.33 A summarised assessment of the visual impacts of the Indicative Scheme is given in **Table 5.3**.

Table 5.3 Visual Impact Assessment Summary

VP	Visual Sensitivity	Appraisal Components				Conclusion
		Visual Composition	Visual Obstruction	Effect on Public Viewers	Effect on Visual Resources	
VP 1: Footbridge across Hiram's Highway	Medium	Negligible	Negligible	Negligible	Negligible	Negligible
VP 2: Bus Stop along Hiram's Highway near Heung Chung Road	Medium	Negligible	Negligible	Negligible	Negligible	Negligible
VP 3: Wo Mei Public Parking	Medium	Negligible	Slightly Adverse	Negligible	Negligible	Negligible
VP 4: Footpath outside Wo Mei Village Office	High	Negligible	Negligible	Negligible	Negligible	Negligible
VP 5: Footpath to the natural stream to the north of Mok Tse Che	Medium	Negligible	Negligible	Negligible	Negligible	Negligible
VP 6: Footpath along Nam Pin Wai Road	Medium	Negligible	Negligible	Negligible	Negligible	Negligible

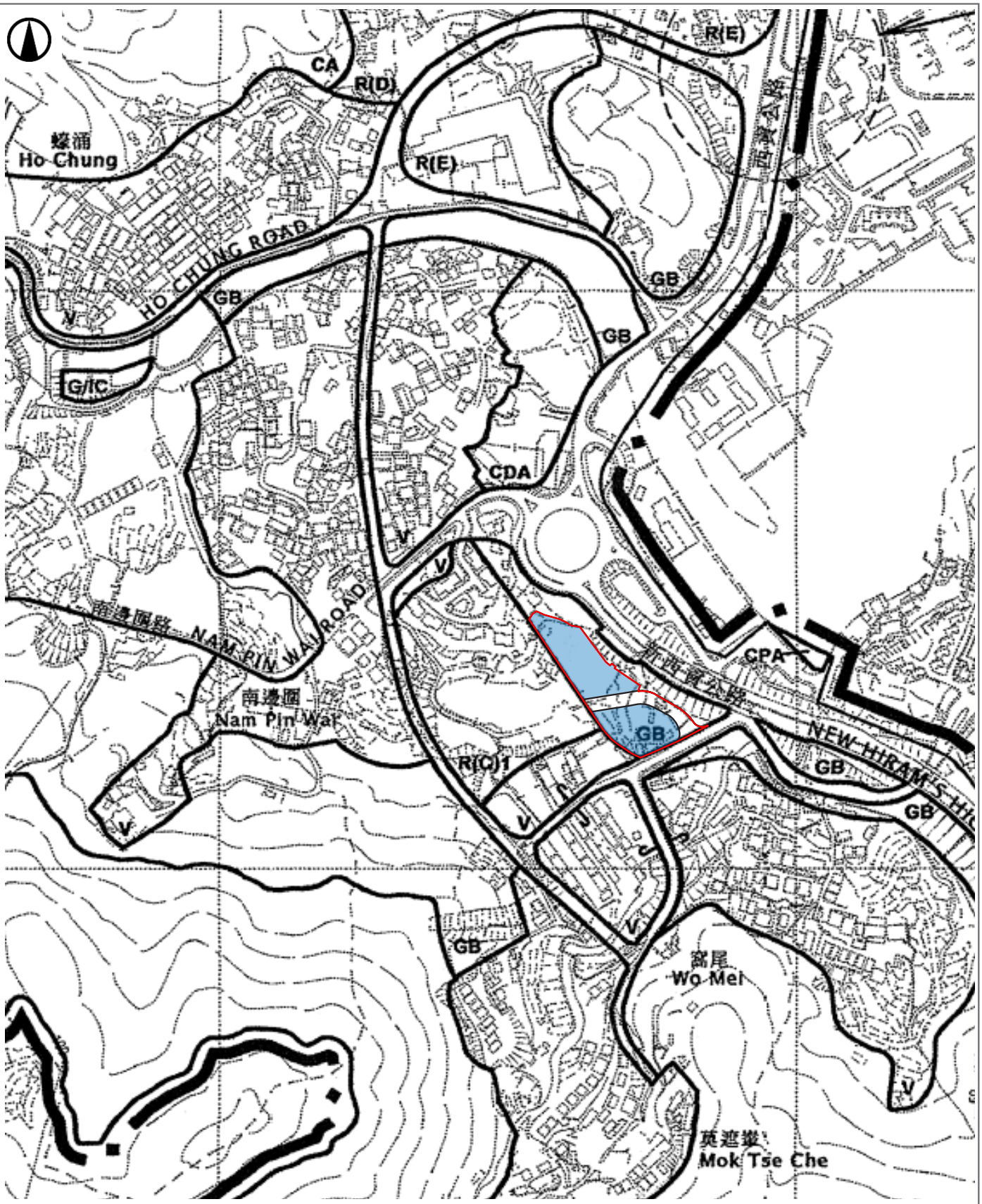
6 CONCLUSION

6.1.1 This VIA is prepared in support of the Planning Application for Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131), in support of the rezoning from "Green Belt" ("GB") zone to "Residential (Group C) 1" ("R(C) 1") zone at Various Lots in D.D.244 and Adjoining Government Land, Nam Pin Wai, Sai Kung to facilitate a Proposed House Development. A total of 17 houses will be delivered under the Indicative Scheme.

6.1.2 In this Visual Impact Assessment, a total of 6 VPs (including short, medium and long-range) have been assessed, which 6 of them are medium visual sensitivity. In short, all VPs are identified with negligible visual impact under the Indicative Scheme as compared with the Baseline Scheme.

6.1.3 In addition, design features incorporated into the Indicative Scheme, including the carefully designed building disposition/ layout to maximise the visual permeability, integrated landscape design to enhance the visual amenity of the area as well as the compatible scale and building density with the surrounding residential development, the Indicative Scheme contributes to enhance the visual quality of the area by replacing the underutilized Application Site by a well-managed and high quality residential development.

6.1.4 Based on the above, the Proposed Amendment demonstrated by the Indicative Scheme is considered to be fully acceptable from visual perspective.



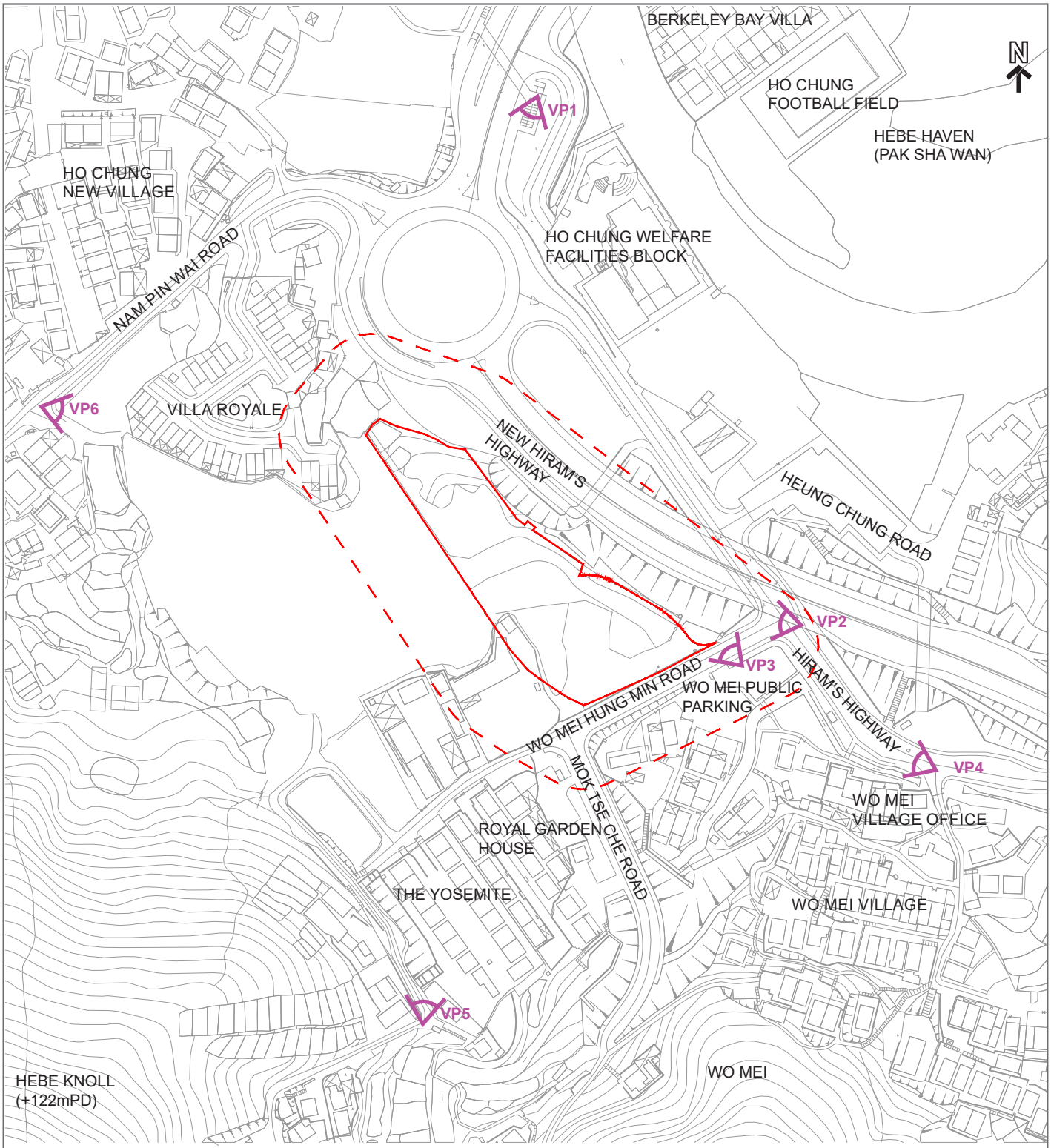
LEGEND

- Application Site
- Development Site

ZONING

R(C)1	Residential (Group C)1
R(D)	Residential (Group D)
R(E)	Residential (Group E)
CDA	Comprehensive Development Area
G/IC	Government, Institution or Communi
GB	Green Belt
V	Village Type Development
CA	Conservation Area
CPA	Coastal Protection Area

Figure No.	*Scale*	*Figure Title*	
Fig. 1	N.T.S.		Location Plan
ARUP	*Date* Jan 2024	*Source*	Extracted from the Approved Ho Chung Outline Zoning Plan (No. S/SK-HC/11)



LEGEND

- Application site
- Initial Assessment Area Boundary
  - 3H: BH (12m*3) = about 36m
- Proposed Viewpoints

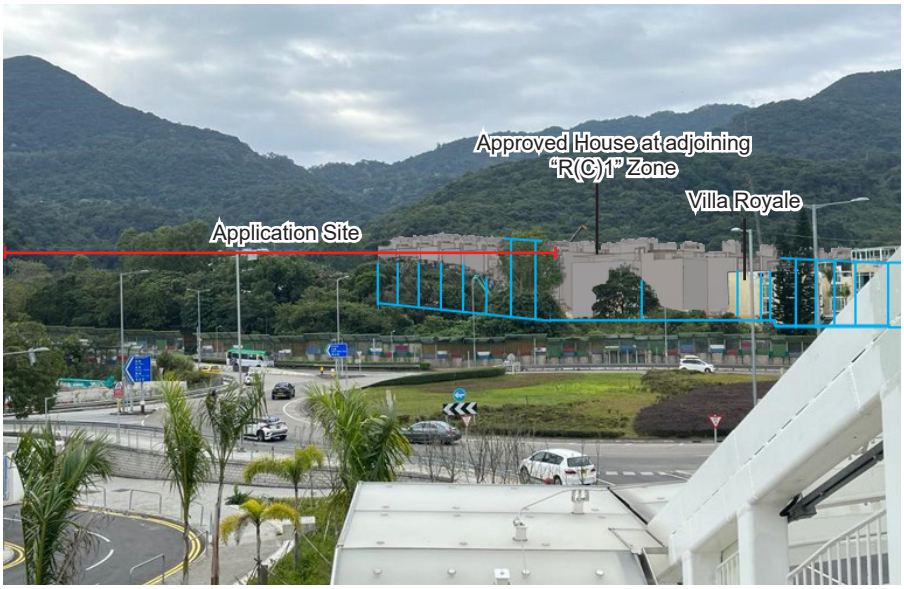
PROPOSED VIEWPOINT (VP)

VP1	Footbridge across Hiram's Highway
VP2	Bus Stop along Hiram's Highway near Heung Chung Road
VP3	Wo Mei Public Parking
VP4	Footpath outside Wo Mei Village Office
VP5	Footpath to the natural stream to the north of Mok Tse Che
VP6	Footpath along Nam Pin Wai Road

Figure No.	*Scale*	*Figure Title*
Fig. 2	1:2,000	Assessment Area and Location of Viewing Points
ARUP	*Date* Jan 2024	*Source* -

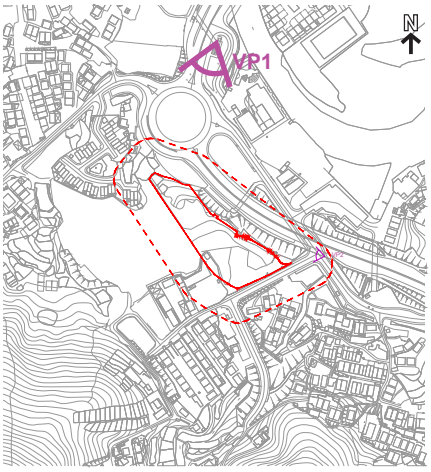
Existing Condition

Planned Condition



Indicative Scheme

Key Plan



Invisible Parts of Approved House at adjoining "R(C)1" Zone

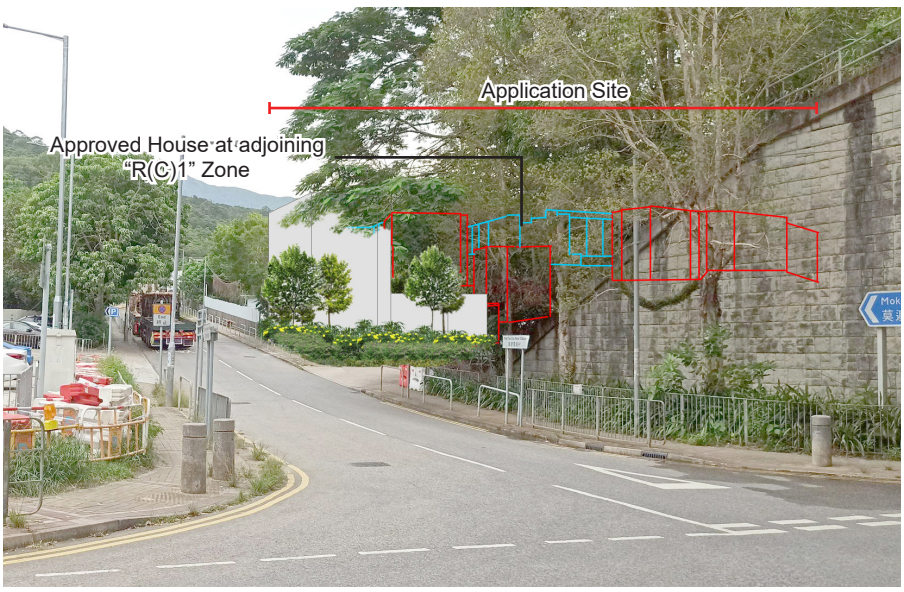
Invisible Parts of Proposed Development at Application Site

Figure No.	*Scale*	*Figure Title*
Fig. 3	N/A	Viewing Point 1 : Footbridge across Hiram's Highway
ARUP	*Date* Jan 2024	*Source* -

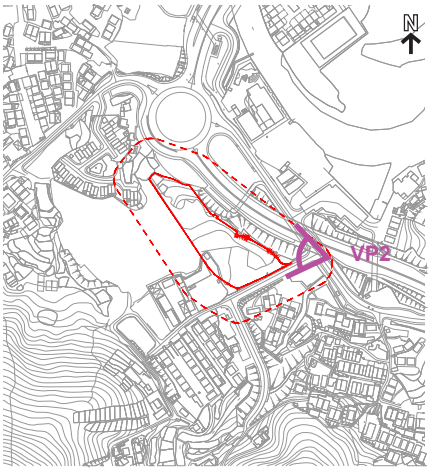
Existing Condition

Planned Condition

Indicative Scheme



Key Plan



LEGEND

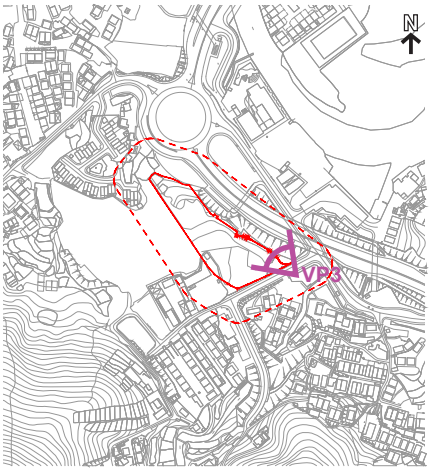
Invisible Parts of Approved House at adjoining "R(C)1" Zone

Invisible Parts of Proposed Development at Application Site

Figure No.	*Scale*	*Figure Title*	Viewing Point 2 : Bus Stop along Hiram's Highway near Heung Chung Road
Fig. 4	N/A		
ARUP	*Date*	*Source*	
	Jan 2024	-	

Existing Condition

Key Plan



Invisible Parts of Approved House at adjoining "R(C)1" Zone

Invisible Parts of Proposed Development at Application Site

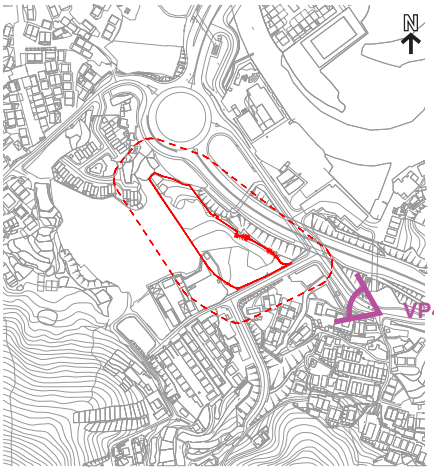
Planned Condition

Indicative Scheme

Figure No.	*Scale*	*Figure Title*
Fig. 5	N/A	Viewing Point 3 : Wo Mei Public Parking
ARUP	*Date* Jan 2024	*Source* -

Existing Condition

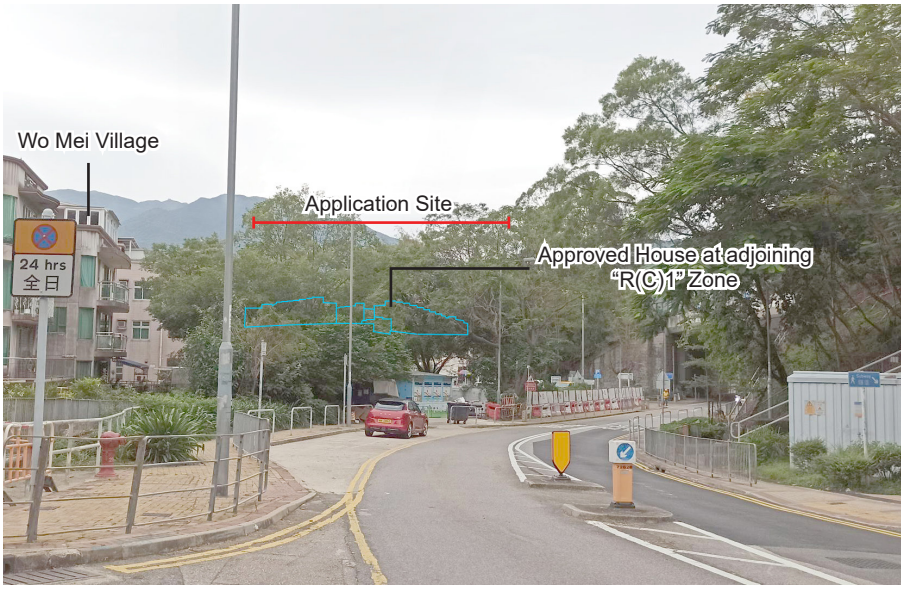
Key Plan



Invisible Parts of Approved House at adjoining "R(C)1" Zone

Invisible Parts of Proposed Development at Application Site

Planned Condition



Indicative Scheme

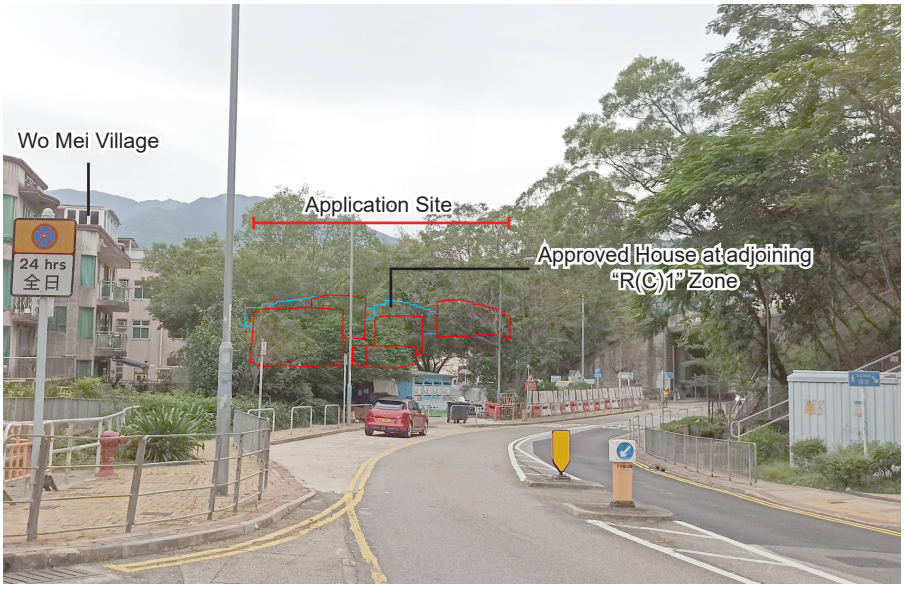
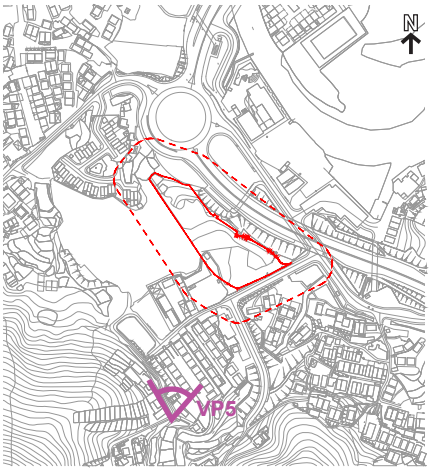


Figure No.	*Scale*	*Figure Title*
Fig. 6	N/A	Viewing Point 4 : Footpath outside Wo Mei Village Office
ARUP	*Date* Jan 2024	*Source* -

Existing Condition

Key Plan



Invisible Parts of Approved House at adjoining "R(C)1" Zone

Invisible Parts of Proposed Development at Application Site

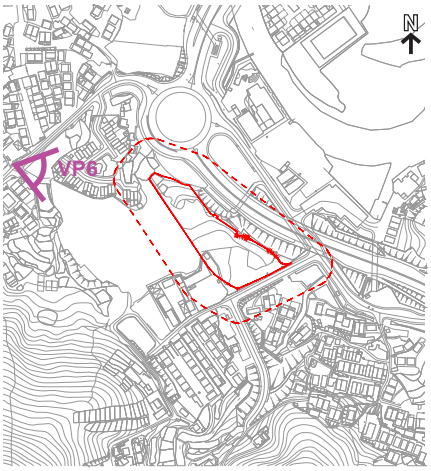
Planned Condition

Indicative Scheme

Figure No.	*Scale*	*Figure Title*	Viewing Point 5 : Footpath to the natural stream to the north of Mok Tse Che
Fig. 7	N/A		
ARUP	*Date* Jan 2024	*Source* -	

Existing Condition

Key Plan



Invisible Parts of Approved House at adjoining "R(C)1" Zone

Invisible Parts of Proposed Development at Application Site

Planned Condition

Indicative Scheme

Figure No.	Scale	Figure Title
Fig. 8	N/A	Viewing Point 6 : Footpath along Nam Pin Wai Road
ARUP	Date	Source
	Jan 2024	-

Appendix I

Environmental Assessment Study

Application for Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131) to Rezone the Application Site from "Green Belt" to "Residential (Group C)1" for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung

Environmental Assessment Study

REP-02-002

Job number 294065

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ARUP

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Master Layout Plan

Appendix 4.1

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Appendix 4.2

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Appendix 4.3

Predicted Road Traffic Noise Levels (Mitigated Scenario)

Appendix 8.1

Historical Aerial Photos

Appendix 8.2

Photo Record of Site Survey

Appendix 8.3

Site Walkover Checklist

Appendix 8.4

Relevant Correspondence with FSD

Appendix 8.5

Relevant Correspondence with EPD

Appendix 10.1

Details of the Proposed Onsite Sewage Treatment Plant

Executive Summary

This Environmental Assessment Study (EAS) was prepared in support of the Section 12A Planning Application for Proposed House Development at Various Lots in D.D.244 and Adjoining Government Land, Nam Pin Wai, Sai Kung, New Territories. The total area of the Application Site (the Site) is about 6,601m^2.

The Application Site is bounded by New Hiram's Highway to the east. Road traffic noise assessment has shown that with provision of the recommended acoustic windows (baffle type), all residential units will comply with the criterion of 70 dB(A) and a compliance rate of 100% could be achieved. Therefore, adverse road traffic noise impact is not anticipated.

Two potential fixed noise sources, including Pat Chun Foods & Soys Factory and Ho Chung Welfare Facilities Block have been identified within 300m assessment area of the Application Site. No noticeable fixed noise was perceived at the boundary of these potential fixed noise sources. Hence, potential fixed noise impact on the Proposed House Development is not anticipated.

For the planned fixed plant noise sources at the Planned Wo Mei Local Sewage Treatment Plant located to the east of the Application Site, acoustic measures such as enclosing all mechanical equipment inside building structure and use of silencers/acoustic louvers and acoustic doors will be incorporated in the design. For the planned fixed plant noise sources in the Proposed House Development, measures such as installing intakes/exhausts at facades facing away from nearby NSRs, and installation of silencers/acoustic louvres at the intakes/exhausts will be considered. With appropriate noise mitigation measures, adverse noise impact from these planned fixed plant noise sources is not anticipated.

The current scheme has allowed sufficient setback distances from the nearby roads to meet the minimum requirement as stipulated in HKPSG. Adverse vehicular emission impact is not anticipated.

Two chimneys at Pat Chun Foods & Soys Factory to the west of the Application Site are identified within 500m from the Application Site. No plume or other emissions were observed during the survey. No adverse air quality impact on the Proposed House Development is anticipated.

For the Planned Wo Mei Local Sewage Treatment Plant, deodorization unit using activated carbon or biotrickling filter or other equivalent odour removal techniques will be installed to remove odour. For the proposed local sewage treatment plant within the Proposed House Development, mitigation measures such as providing adequate ventilation and use of activated carbon filter at exhaust and odour removal system would be provided during operation. Therefore, adverse air quality or odour impact from these sewage treatment plants is not anticipated.

A preliminary land contamination site appraisal through desktop research and site survey has been conducted. Results indicate that land contamination within the Application Site is not anticipated.

Waste management implications due to construction and operational phases are not anticipated provided good practices are in place.

The internal stormwater drains will be properly connected to public drainage. Sewage generated from the Application Site will be conveyed by the internal sewerage system to the onsite STP and the treated effluents will be discharged into Ho Chung River. With good site management practices and mitigation measures, adverse water quality impacts due to construction and operational phases are not anticipated.

It is concluded that there are no adverse environmental impacts on the Application Site for the Proposed House Development at Various Lots in D.D.244 and Adjoining Government Land, Nam Pin Wai, Sai Kung, New Territories.

1 Introduction

1.1.1.1 This Environmental Assessment Study (EAS) was prepared in support of the Section 12A Planning Application for Proposed House Development at Various Lots in D.D.244 and Adjoining Government Land, Nam Pin Wai, Sai Kung, New Territories.

1.1.1.2 The Application Site, with a total site area of about 6,601m^2, is located at Nam Pin Wai in the Sai Kung District. In accordance with the Approved Ho Chung Outline Zoning Plan No. S/SK-HC/11, the current land use zoning of the Application Site is "Green Belt" ("GB").

1.1.1.3 This EAS is conducted to evaluate the potential environmental impacts on the Proposed House Development with respect to the guidance for environmental considerations provided in Chapter 9 – Environment of the Hong Kong Planning Standards & Guidelines (HKPSG). The major potential environmental impacts on the site include:

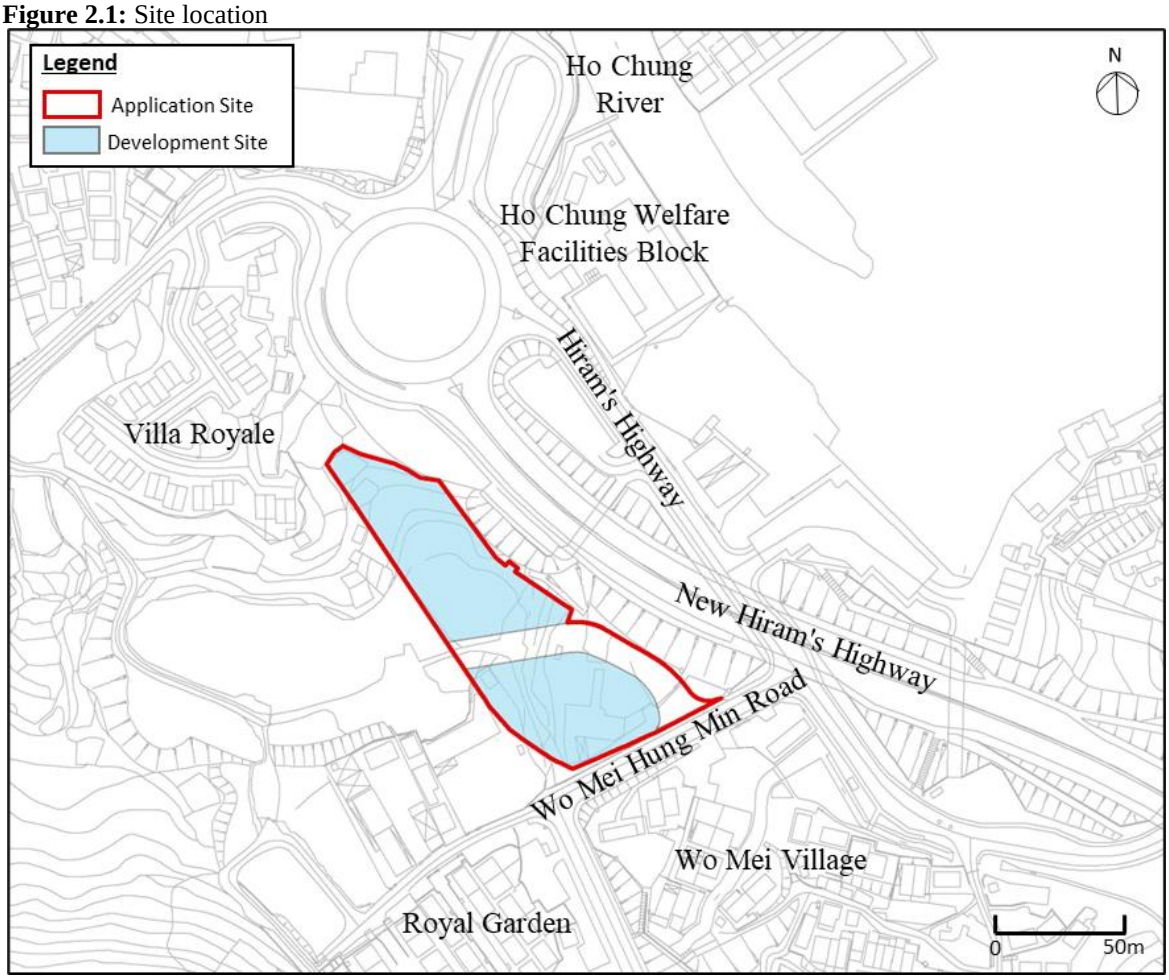
- traffic noise impact from the nearby road network; and
- air quality impact due to nearby road network and chimneys.

2 Site Location and Building Design

2.1 Site Location and Description

2.1.1.1 The Application Site is located to the west of the New Hiram's Highway and is situated in a predominantly low-dense residential neighbourhood. Currently, majority part of the Application Site is vacant, except the approved access road connecting to the adjoining house development which are both under construction. Only limited trees with generally low amenity value can be found on the Application Site. The adjoining housing development to the immediate west of the Application Site is a low-rise residential development under construction. Some other existing low-rise residential premises are surrounding the Application Site including Villa Royale, Royal Garden, Wo Mei Village, etc. Further to the northeast are Ho Chung Welfare Facilities Block and a mid-rise residential development under construction. The location of the Application Site and Development Site are illustrated in **Figure 2.1**.

Figure 2.1: Site location



2.1.1.2 In accordance with the Approved Ho Ching Outline Zoning Plan (OZP) No. S/SK-HC/11, the Application Site is currently zoned as "Green Belt" ("GB"). The areas in the vicinity

are mainly zoned as "Residential (Group C)1", "Residential (Group C)4", "Village Type Development" ("V"), "Government, Institution or Community" ("G/IC") and "Green Belt" ("GB").

2.2 Building Design

2.2.1.1 The Proposed House Development is divided into two phases: Phase 1 and Remaining Phase, which consists of 13 and 4 three-storey houses respectively. A one-storey standalone clubhouse is proposed to be situated close to the entrance of the Proposed House Development. A new Sewage Treatment Plant (STP) for support the Proposed House Development is planned at the underground level beneath the clubhouse. The tentative population intake year of the whole development is Year 2030.

2.2.1.2 The latest indicative scheme of the Proposed House Development is illustrated in **Appendix 2.1**. The internal layout plans are yet to be available at this planning application stage.

2.2.1.3 The key development parameters for the Application Site are given in **Table 2.1**. The layout plans and schematic section drawings are provided in the Planning Statement.

Table 2.1: Key development parameters for the Proposed House Development

		Parameters
Application Site Area		About 6,601 m^2
Development Site Area Excluding the Access Road [1]		About 5,355 m^2
Building Height & No. of Houses		
Phase 1	Building Height	12m
	No. of Storeys	3
	No. of Houses	13
Remaining Phase	Building Height	12m
	No. of Storeys	3
	No. of Houses	4
Target Completion Year		2030

Note:
[1] The area of the access road under the approved planning application no. A/SK-HC/223 is about 1246m^2.

2.3 EIAO Implication

2.3.1.1 The Proposed House Development site is a residential development with site area less than 50ha, and hence it does not fall into any Schedule 3 of EIAO. Besides, all works of the Proposed House Development will not encroach in an existing or gazetted proposed country park or special area, a conservation area, an existing or gazetted proposed marine park or marine reserve, a site of cultural heritage, and a site of special scientific interest. Therefore, the proposed works for the site do not fall into the category of Item Q.1 of Schedule 2 of EIAO and do not constitute a DP under EIAO.

3 Site Inspection

3.1.1.1 Site visit was carried out in January and November 2023. Photographs taken at the site and the neighbouring areas are given in **Photo 3.1** to **Photo 3.7** below.

3.1.1.2 The Application Site (**Photo 3.1**) is currently largely vacant with some existing trees. The site is mainly bounded by New Hiram's Highway (**Photo 3.2**) to the east and Wo Mei Hung Min Road (**Photo 3.3**) to the south. The site is surrounded by low-rise residential settlement and village houses to the north (i.e., Villa Royale (**Photo 3.4**) and Ho Chung New Village) and to the south (i.e., Royal Garden and Wo Mei Village (**Photo 3.5**)), and Ho Chung River (**Photo 3.6**) to the further northeast. Ho Chung Welfare Facilities Block (**Photo 3.7**), a Proposed Sewage Treatment Plant under construction and a mid-rise residential development under construction is located to northeast of the Application Site. A low-rise residential development under construction is located to the immediate west of the Application Site.

3.1.1.3 Based on site observation, the noise climate in the vicinity of the Application Site was dominated by road traffic noise from New Hiram's Highway and Hiram's Highway. No other significant noise was perceived at the Site.

Photo 3.1: Application Site	**Photo 3.2:** New Hiram's Highway
	
Photo 3.3: Wo Mei Hung Min Road	**Photo 3.4:** Villa Royale
	

Photo 3.5: Wo Mei Village	**Photo 3.6**: Ho Chung River
	

Photo 3.7: Ho Chung Welfare Facilities Block

4 Review of Road Traffic Noise Impact

4.1 Concerned Road Sections and Noise Sensitive Receivers

4.1.1.1 The noise climate in the vicinity of the Application Site was generally dominated by road traffic noise from New Hiram's Highway.

4.1.1.2 With reference to the HKPSG, Noise Sensitive Receivers (NSRs) shall include residential uses (all domestic premises including temporary housing accommodation), institutional uses (educational institutions including kindergarten, child care centres and all others where unaided voice communication is required), hotels, hostels, offices, places of public worship, courts of law, hospitals, clinics, convalescences, residential care homes for the elderly, amphitheatres, auditoria, libraries, performing arts centres and country parks. Based on the current development plan, the proposed residential towers, ancillary dormitories, R&D centre, data centre, commercial centre, kindergarten within the Application Site are regarded as NSRs.

4.2 Noise Criteria

4.2.1.1 In accordance with the HKPSG, the maximum permissible hourly road traffic noise levels at the external facades of different uses of NSRs for the Proposed House Development are summarized in **Table 4.1**. These criteria apply to premises relying on opened windows as a primary means for ventilation.

Table 4.1: Summary of noise criteria for road traffic noise

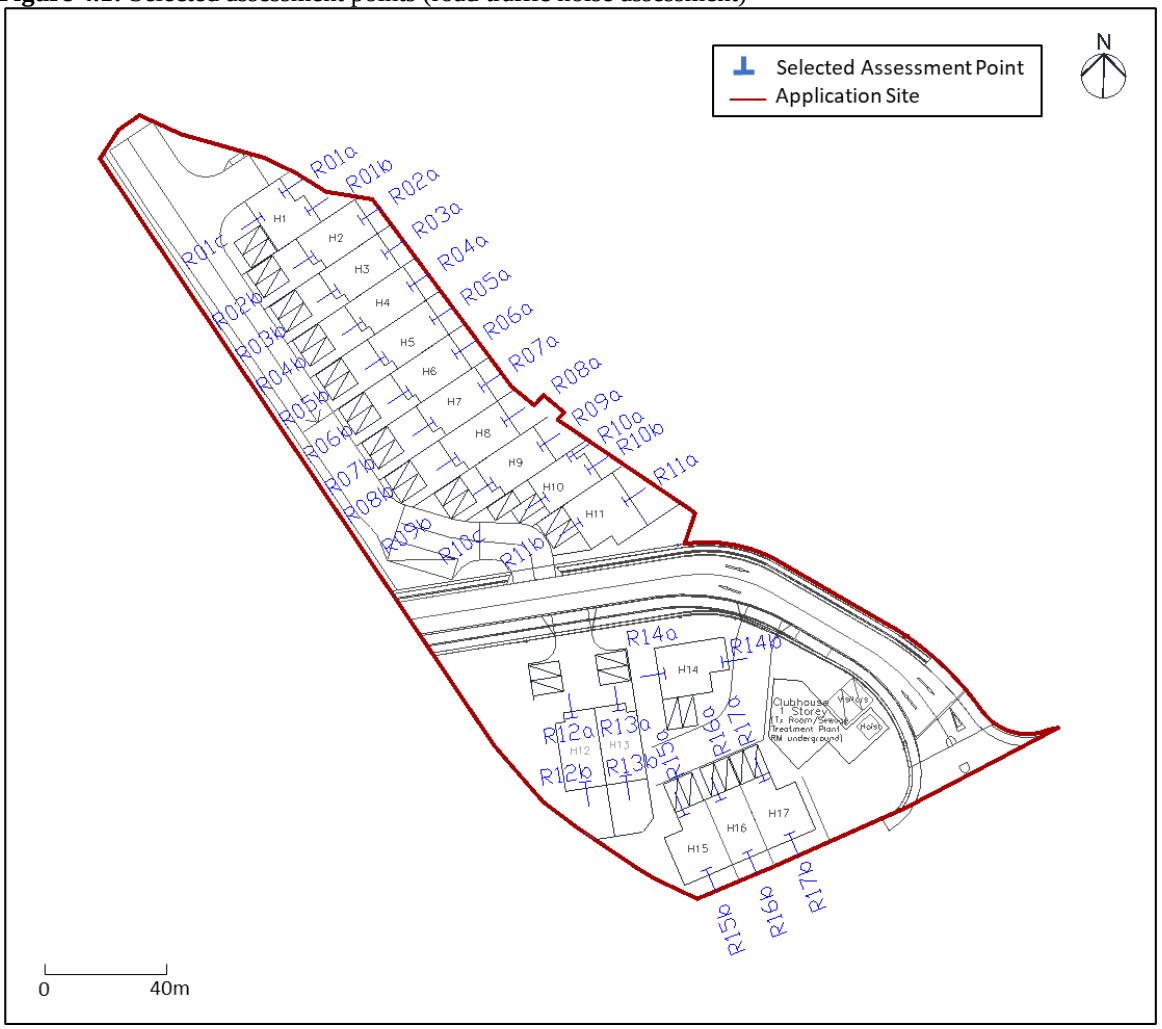
Proposed/Developments Facilities	Noise Sensitive Room with Openable Windows for Ventilation [1]	Uses	Noise Standards for Road Traffic Noise, $L_{10(1\ hour)}$ dB(A)
Residential Blocks	Residential Units	Domestic	70

Note:
[1] The type of facilities and use of noise sensitive rooms are generally determined with respect to with reference to Table 4.1 of HKPSG, unless otherwise specified. All sensitive rooms which rely on opened windows for ventilation are identified.

4.3 Noise Assessment Points

4.3.1.1 Noise assessment points have been assigned to the external facades of the proposed residential blocks as representative noise assessment points. The locations of the selected assessment points are illustrated in **Figures 4.1**.

Figure 4.1: Selected assessment points (road traffic noise assessment)



4.4 Assessment Methodology

4.4.1.1 Traffic noise levels at the facades of the selected assessment points have been predicted. The prediction is based on the maximum traffic projection within 15 years upon the population intake of the development and calculation method in accordance with the UK Department of the Transport "Calculation of Road Traffic Noise" (CRTN).

4.5 Traffic Flow Data for Assessment

4.5.1.1 As advised by the Traffic Consultant, the maximum traffic flow within 15 years upon population intake of the Proposed House Development will occur in Year 2045. Traffic Impact Assessment (TIA) including the methodology on the traffic forecast for the EAS has been submitted to Transport Department (TD) for endorsement. The endorsement from TD is given in **Appendix 4.1**. The traffic consultant had checked and confirmed the validity of the traffic data, which was derived based on the traffic forecast methodology submitted to TD.

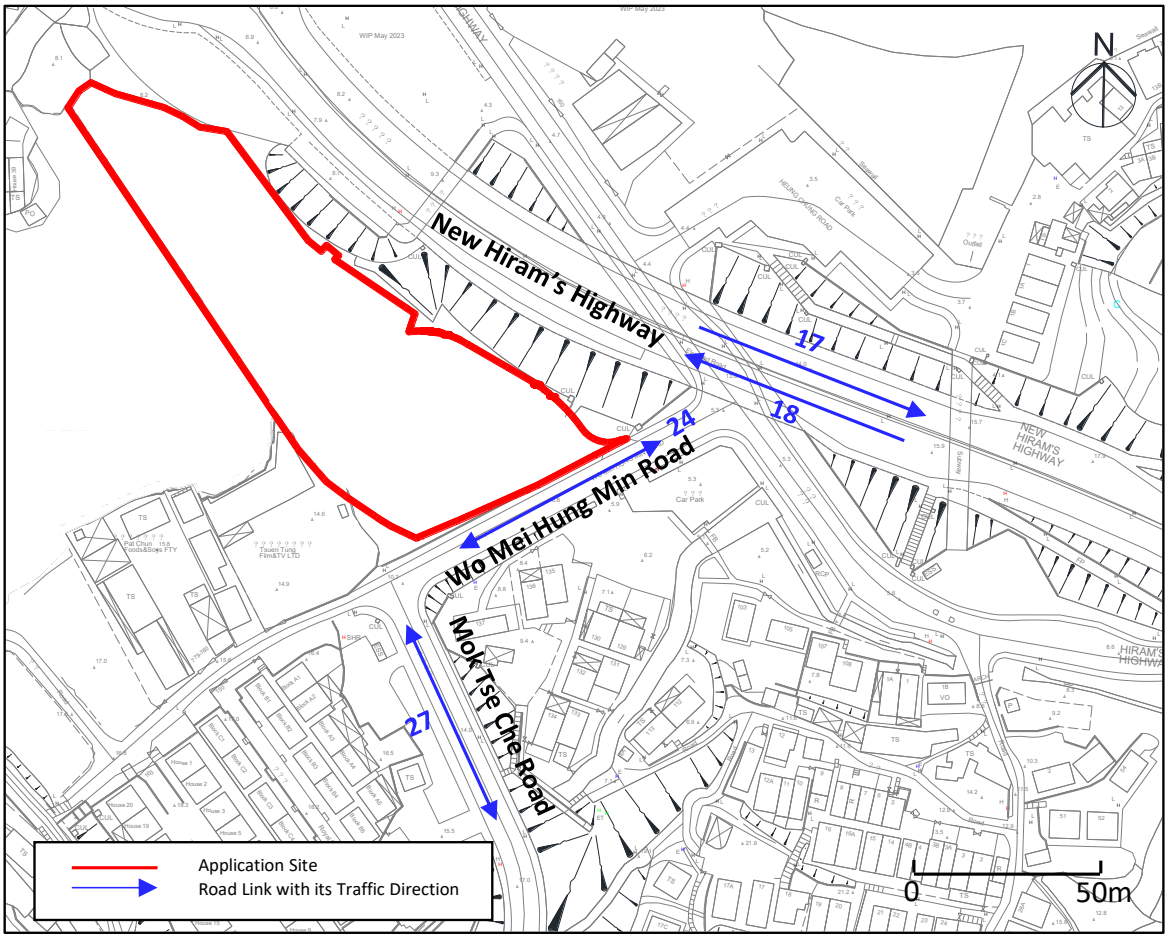
4.5.1.2 The traffic flow data for the major roads surrounding the Application Site have been reviewed and identified AM peak traffic data represented the worst-case scenario. They are presented in **Table 4.2** and **Figure 4.2**. Details are given in **Appendix 4.1**.

Table 4.2: Predicted peak hourly traffic flow on nearby roads

Road ID [1]	Road	Speed Limit (km/hr)	Year 2045	
			Traffic Flow (veh/hr)	% of Heavy Vehicles
17	New Hiram's Highway (EB)	70	1,400	13.0
18	New Hiram's Highway (WB)	50	1,150	24.0
24	Wo Mei Hung Min Road (22+23)	50	150	11.7
27	Mok Tse Che Road (25+26)	50	100	12.0

Note:
[1] Only nearby roads are shown in the table above. Hence, the Road ID is not in sequential order.

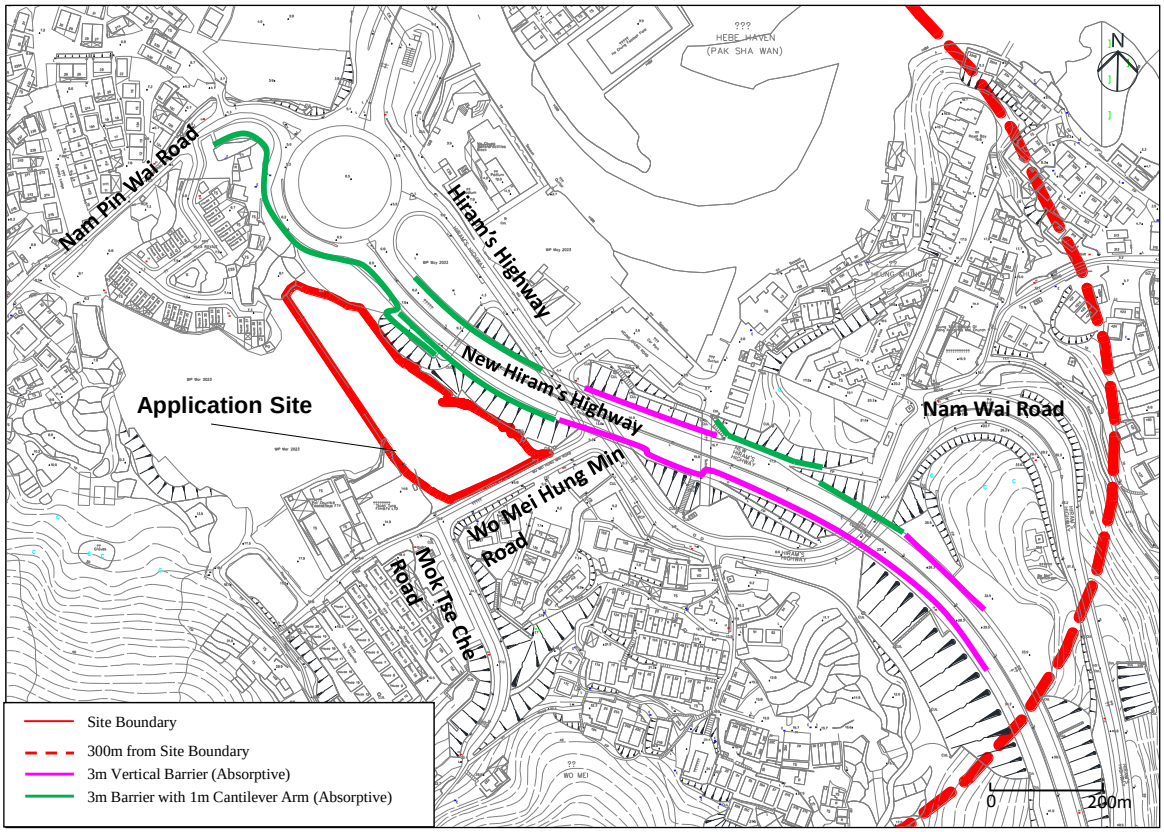
Figure 4.2: Roads in the vicinity of Application Site



4.6 At-source Road Traffic Noise Mitigation Measures

4.6.1.1 Combinations of cantilevered barriers and vertical barriers are currently in place along New Hiram's Highway. The locations of these existing barriers are illustrated in **Figure 4.3**. The existing at-source mitigation measures described above have been incorporated into the base scenario in the assessment.

Figure 4.3: Existing road traffic noise mitigation measures in vicinity of the Application Site



4.7 Optimised Building Design

4.7.1.1 Optimised building design and orientation have already been incorporated into the current layout scheme for the base scenario, as described below:

4.7.2 Building Block Design, Layout and Orientation

4.7.2.1 The current scheme is found to be the optimal option from the perspective of development efficiency, flat production, noise performance, scenery and angle of view, etc.

4.7.3 Building Setback

4.7.3.1 The Application Site is very small and has limited space available for building setback to reduce the noise impact effectively. Nonetheless, the building blocks have been deposited with optimised setback distance from New Hiram's Highway as far as practicable to minimise the traffic noise impact.

4.7.4 Balcony Wall Design

4.7.4.1 Due to security, safety and privacy reasons, side walls (in the height of 1.8m) and parapet wall (in the height of 1.1m) at the rear are provided at each house unit's private garden. These walls could minimize the direct line of sight to New Hiram's Highway, hence, to provide noise screening to openings facing New Hiram's Highway.

4.8 Assessment Results for Base Scenario

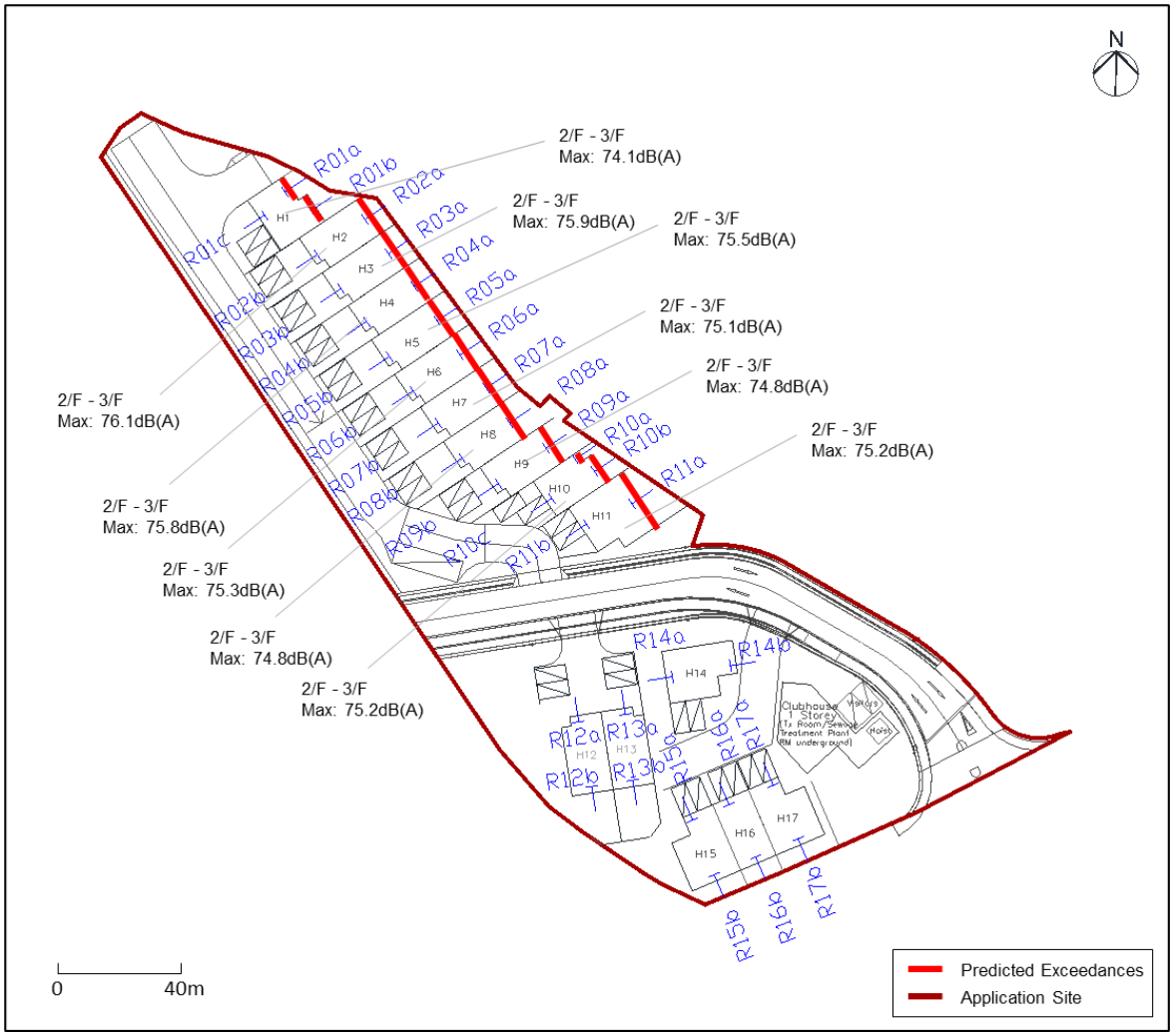
4.8.1.1 With the above optimised design, it is estimated that a total number of 11 houses will be exposed to the noise level in excess of the 70 dB(A) criterion and the overall compliance rate is 35.3%. Results of the road traffic noise assessments for the Proposed House Development are summarised in **Table 4.3**. Details are presented in **Appendix 4.2**.

Table 4.3: Road noise assessment results (Base Scenario)

Scenario	Total No. of Houses	No. of Houses Exceeding the Noise Criteria	Max. Predicted Noise Levels, dB(A)	Compliance Rate
Base Scenario	17	11	76.1	35.3%

4.8.1.2 Results indicate that the predicted exceedances are located on the northeastern facades directly facing New Hiram's Highway. The locations of exceedances are shown in **Figure 4.4** below.

Figure 4.4: Location of predicted exceedances



Note:

For modelling purpose, floors are labelled as 1/F, 2/F and 3/F, which identical to GF, L1 and L2 labelled in **Appendix 2.1** respectively.

4.9 Noise Mitigation Measures for Residential Block

4.9.1.1 Optimised building design has been adopted in the current scheme as described in the above sections. Other practicable noise mitigation measures have also been investigated and the findings are discussed as follows:

4.9.2 Boundary Wall / Barrier

4.9.2.1 Since the affected NSRs are found on 1/F and 2/F, barrier along the site boundary is not able to provide effective screening to the affected units.

4.9.3 Noise Shielding Building

4.9.3.1 The Application Site has limited space available for noise shielding building and hence will not be considered.

4.9.4 Acoustic Window Design (Baffle Design)

4.9.4.1 Based on the assessment results of base scenario, acoustic window (baffle type) is proposed as mitigation measure. The acoustic window is designed with two layers of window including push open window at outer layer and sliding window at inner layer. The opening and gap between the two layers of window allows sufficient air flow to satisfy ventilation requirement; while at the same time, direct transmitted noise to the room is obstructed by inner slide window and hence noise reduction could be achieved. In order to achieve the intended noise reduction, the sliding window should be behind the opened side-hung window while the fixed glazing should be kept close. Special locking device (e.g. allen key) would be installed to the fixed glazing at the outer layer for keeping them in the above setting. The fixed glazing at the outer layer needs not to be opened for ventilation. The schematic and sectional drawing of the proposed acoustic window (baffle type) is extracted from Practice Note on Application of Acoustic Windows (Baffle Type) in Planning Residential Developments against Road Traffic Noise Impact and shown in **Figure 4.5**. The locations of the proposed acoustic window (baffle type) are summarised in **Table 4.4** and indicated in **Figure 4.6**. On referencing to EPD's Practice Note on Application of Innovative Noise Mitigation Designs in Planning Private Residential Developments against Road Traffic Noise Impact (PN 5/23), noise attenuation by the acoustic window (baffle type) is taken as 6 dB(A) for this assessment considering the proposed acoustic window will be parallel to dominant line source.

4.9.4.2 According to the PN 5/23, while the noise attenuation of acoustic window (baffle type) would vary with room sizes and window opening size, the following ranges of variations would not affect the Relative Noise Reduction (RNR) of acoustic window (baffle type):

- Variations of room size within ±10%;
- Variations of floor-to-ceiling height within ±5%; and
- Variations of window opening size ±5%.

4.9.4.3 Should there be any variation on the room size, window opening size and configurations of acoustic window such as overlapping length or gap width, justifications with technical documents such as corrections, laboratory testing reports, in-situ measurement reports, etc. should be submitted to EPD for consideration. The principal and set-up of the laboratory and in-situ measurements should be agreed with EPD.

Table 4.4: Proposed locations of acoustic windows as mitigation measure for road traffic noise

Acoustic Window at NSR	Floor Requiring Acoustic Window
R01a	2/F - 3/F
R01b	2/F - 3/F
R02a	2/F - 3/F
R03a	2/F - 3/F
R04a	2/F - 3/F
R05a	2/F - 3/F
R06a	2/F - 3/F
R07a	2/F - 3/F
R08a	2/F - 3/F
R09a	2/F - 3/F
R10a	2/F - 3/F
R10b	2/F - 3/F
R11a	2/F - 3/F

Note:

For modelling purpose, floors are labelled as 1/F, 2/F and 3/F, which identical to GF, L1 and L2 labelled in **Appendix 2.1** respectively.

Figure 4.5: Schematic and sectional drawing of acoustic window

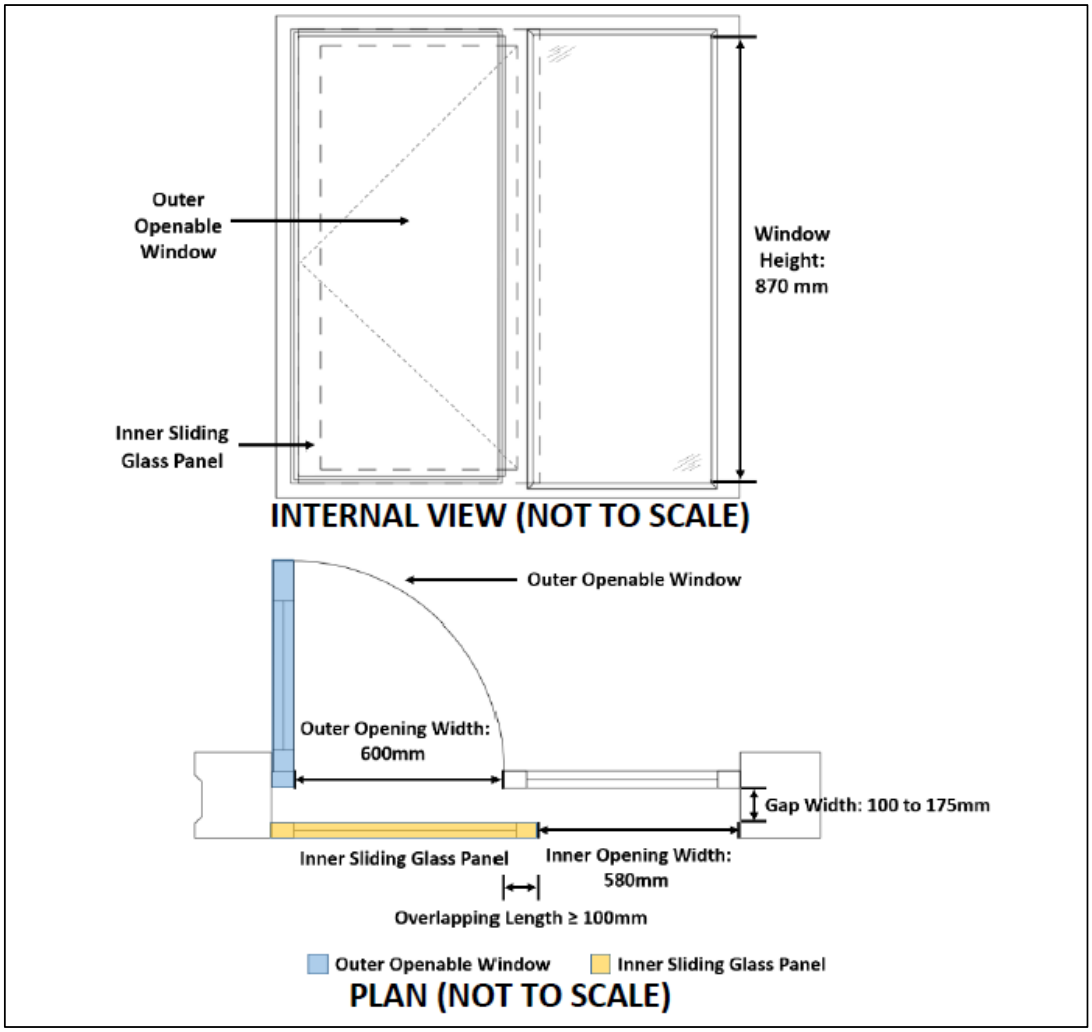
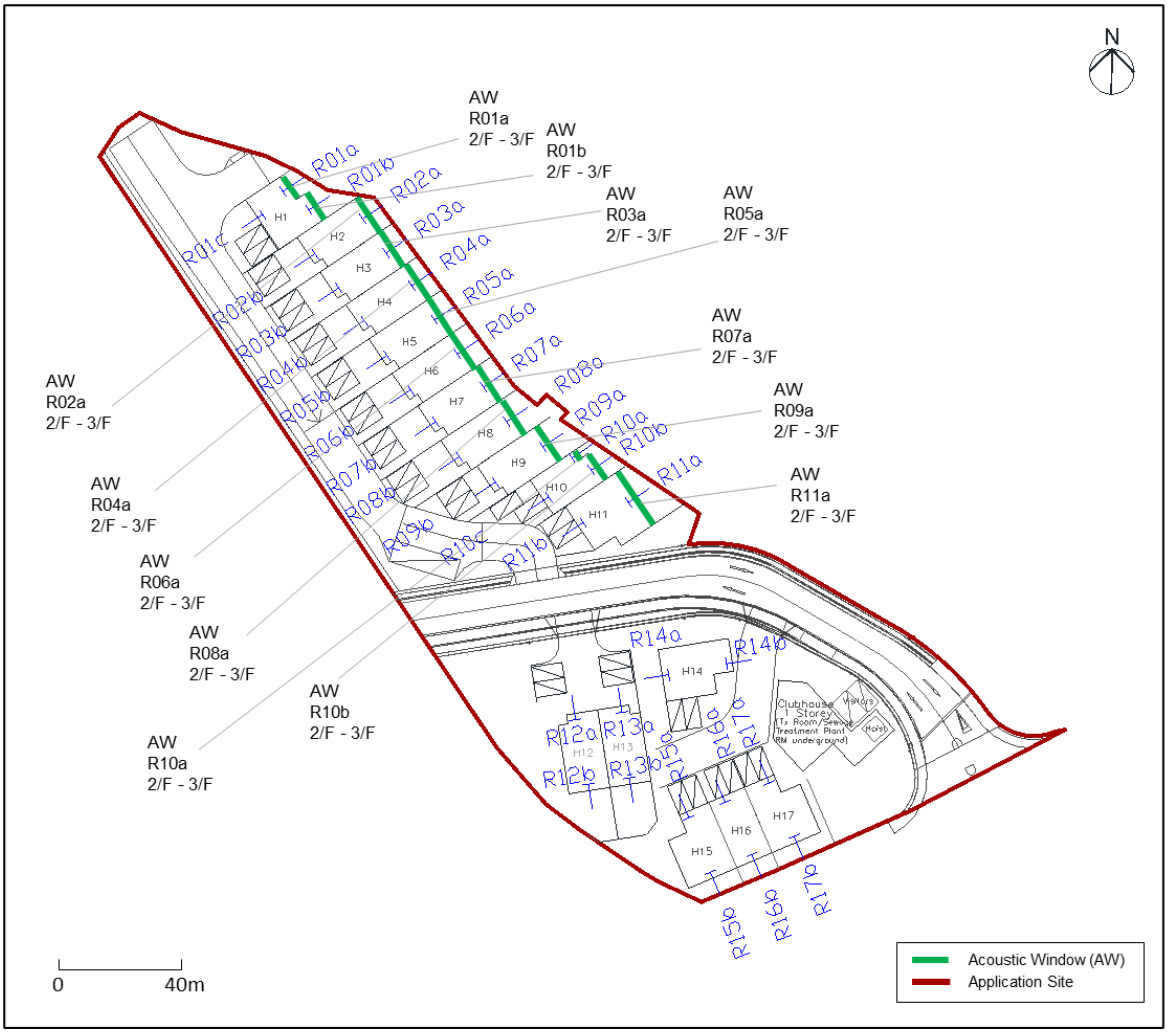


Figure 4.6: Proposed locations of acoustic window



Note:

For modelling purpose, floors are labelled as 1/F, 2/F and 3/F, which identical to GF, L1 and L2 labelled in **Appendix 2.1** respectively.

4.9.4.4 With the provision of the recommended acoustic windows (baffle type), all residential units will comply with the criterion of 70 dB(A) and a compliance rate of 100% could be achieved. Detailed results are attached in **Appendix 4.3**. Therefore, adverse road traffic noise impact is not anticipated.

5 Fixed Noise Assessment

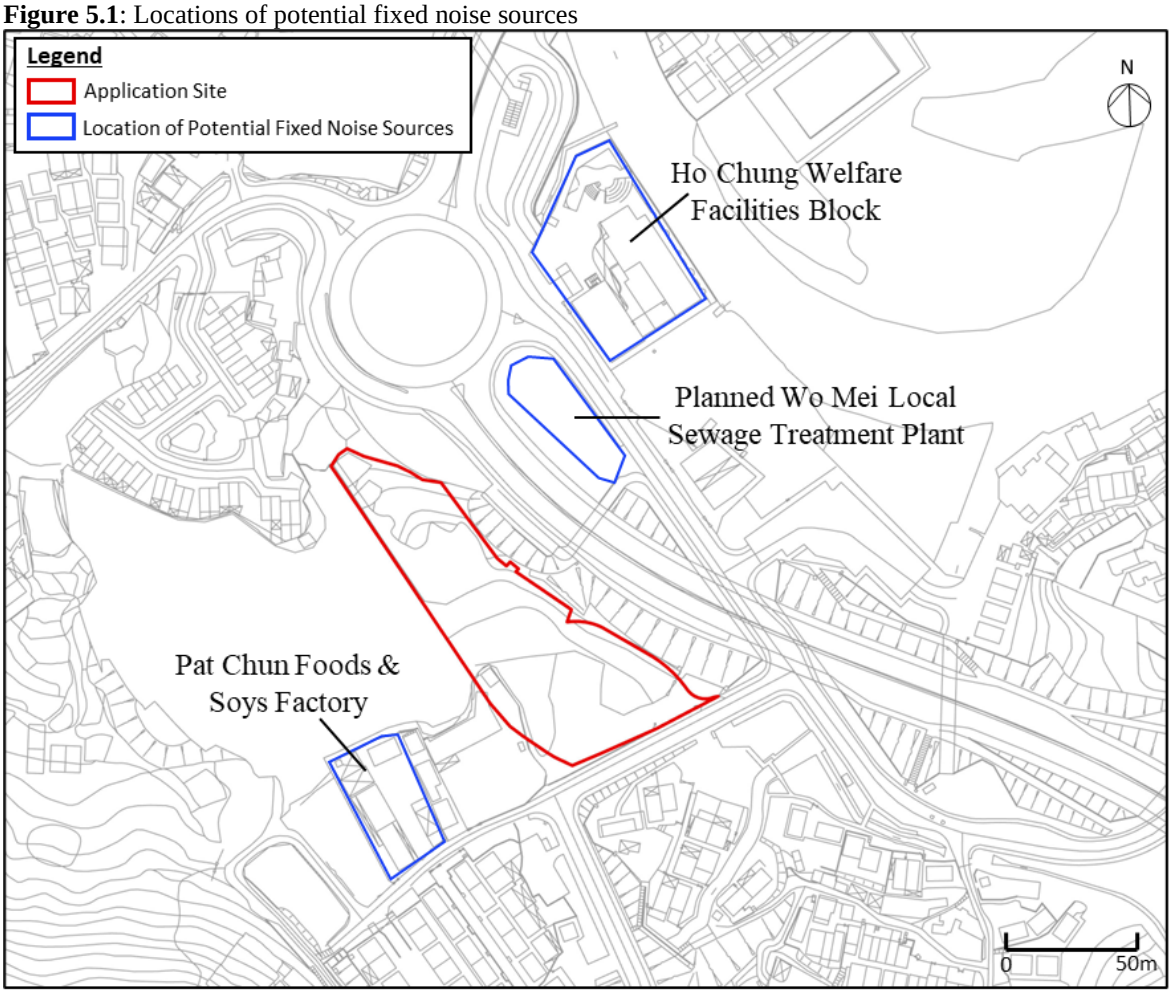
5.1 Review of Existing Fixed Noise Sources

5.1.1.1 Desktop study and site survey have been carried out in November 2023 to identify any potential fixed noise sources within 300m assessment area of the Application Site. **Figure 5.1** indicates the locations of the identified potential fixed noise sources. These include the existing Pat Chun Foods & Soys Factory to the southwest of the site and Ho Chung Welfare Facilities Block to the northeast of the site. All major and significant fixed noise sources which may have potential noise impact on the planned NSRs of the Proposed House Development have been identified and summarized in **Table 5.1**. Meanwhile, no major fixed noise sources are identified in Tsuen Tung Film & TV Ltd adjoining the site during the site survey.

Table 5.1: Summary of identified potential fixed noise sources

Name of Fixed Noise Source	Source
Pat Chun Foods & Soys Factory	• It is located at about 40m to the southwest of the Proposed House Development. Site access is not allowed. Based on site inspection, no noisy activity was observed and noise was not perceived at the boundary of the factory.
Ho Chung Welfare Facilities Block	• It is located at about 80m to the northeast of the Proposed House Development. Site access is not allowed. Based on the desktop study, no fixed plant is identified. No noticeable fixed noise was perceived at the boundary of the facilities block during the site inspection. Given the reason above, potential fixed noise impact on the Proposed House Development is not anticipated.

Figure 5.1: Locations of potential fixed noise sources



5.1.1.2 The existing noise climate is dominated by traffic noise during daytime and night-time. Based on site inspections, noise generated from the operation of Pat Chun Foods & Soys Factory and Ho Chung Welfare Facilities Block was not noticeable at the subject site. It is considered that adverse fixed plant noise impact on the Proposed House Development is not anticipated.

5.1.2 Review of Potential Fixed Plants Noise Impact Arising from the Planned Wo Mei Local Sewage Treatment Plant (STP)

5.1.2.1 **Figure 5.1** indicates the location of the Planned Wo Mei Local Sewage Treatment Plant (STP). Under Agreement No. CE 56/2012(DS), a Preliminary Environmental Review has been conducted and concluded that no noise impact is expected during operation of the STP. Acoustic measures such as enclosing all mechanical equipment inside the building structure, use of silencers / acoustic louvers and acoustic doors will be incorporated in the design of the STP. Therefore, adverse fixed plant noise impact from the Wo Mei local STP is not anticipated.

5.1.3 Review of Potential Fixed Plant Noise Impact Arising from the Proposed House Development

5.1.3.1 Fixed plants, including air-conditioning units, primary air-handling units and water pumps will be provided within the Proposed House Development. These fixed plants may have potential noise impact on the nearby NSRs. However, detailed information and specifications of these fixed plants are not available at the time of noise assessment. All fixed plants will be enclosed in the plant rooms with the intakes/exhausts located on the podium facades. It is suggested that the plant room intakes/exhausts should be installed at the facades facing away from the nearby existing NSRs such as The Yosemite, Royal Garden, and the adjacent planned residential development, and the planned NSRs within the Proposed House Development as far as practicable. If necessary, installation of silencers/acoustic louvres at the intakes/exhausts will be considered to further minimise the noise impact. The Contractor is required to carry out a noise commissioning test for the fixed plant sources before the operation of the Proposed House Development to ensure that the operational noise levels are in compliance with the relevant noise criteria stipulated in HKPSG and NCO.

5.1.3.2 With appropriate noise mitigation measures, adverse noise impact from the planned fixed plant noise sources due to the operation of the Proposed House Development is not anticipated.

6 Review of Construction Noise Impact

6.1 Legislation, Standards and Guidelines

6.1.1 General

6.1.1.1 The relevant legislation and associated guidance applicable to the present study for the assessment of noise impact include:

- Noise Control Ordinance (NCO) (Cap. 400);
- TM on Noise from Construction Work other than Percussive Piling (TM-GW);
- TM on Noise from Percussive Piling (TM-PP); and
- TM on Noise from Construction Work in Designated Areas (TM- DA).

6.1.2 Construction Noise Standards

6.1.2.1 There is no statutory noise limit for general construction works during daytime (i.e. 0700 to 1900 hours on any day not being a Sunday or general holiday) under the Noise Control Ordinance (NCO) and related Technical Memoranda (TMs) while the NCO provides statutory control of general construction works during restricted hours (i.e. 1900 to 0700 hours (of the next day) from Monday to Saturday and at any time on Sundays or general holidays). Nevertheless, ProPECC PN1/24 "Minimizing Noise from Construction Activities" stipulates criteria of 65 to 75dB(A) for daytime construction activities. **Table 6.1** below shows the criteria as stipulated in ProPECC PN1/24 "Minimizing Noise from Construction Activities".

Table 6.1: Noise standards for construction activities

Uses	Noise Standards[1], $L_{eq\ (30mins)}$
	0700-1900 hours on any day not being a Sunday or general Holiday
• All domestic premises, • Temporary housing accommodation, • Hostels • Convalescent homes, and • Homes for the aged	75
• Places of public worship, • Courts of law, and • Hospitals and medical clinics	70
• Educational institutions (including kindergartens and nurseries)	70 65 (During Examination)

Notes:
[1] The above standards apply to uses that rely on opened windows for ventilation.
[2] The standards shall be viewed as the maximum permissible noise levels assessed at 1m from the external façade.

6.2 Evaluation of Construction Phase Impact

6.2.1.1 Potential source of noise impact during construction phase would be construction noise generated from the use of Powered Mechanical Equipment (PME) for various construction activities. The key construction activities include site clearance, demolition, soil excavation for basement, piling works and superstructure works, which would involve the use of excavator, breaker, dump truck, etc.

6.2.1.2 The shortest horizontal separation distance between the site and the nearest NSR (i.e., Villa Royale House 39) is less than 20m. The Contractor would be required to implement the mitigation measures mentioned in ProPECC PN 1/24 "Minimizing Noise from Construction Activities" as good practices. By adopting appropriate mitigation measures and good site practices, the construction noise impact can be minimised.

6.3 Recommended Mitigation Measures

6.3.1.1 In accordance with ProPECC PN 1/24 "Minimizing Noise from Construction Activities", the following mitigation measures should be given wherever practicable:

- Implementation of good site practices to limit noise emissions at source;
- Use of Quality Powered Mechanical Equipment (QPME);
- Installation of temporary noise barriers, panels or enclosures around the site boundary;
- Siting noisy equipment, such as emergency generators, water pumps, as far as possible from the NSR; and
- Scheduling of work to avoid simultaneous operations of noisy equipment.

6.3.1.2 The above recommended practices would need to be implemented in worksite as good practices whenever possible. Reference shall also be made to EPD's recommended pollution control clauses for construction contracts. With the implementation of the recommended mitigation measures, no insurmountable construction noise impact is therefore anticipated.

7 Review of Potential Air Quality Impact

7.1 Vehicular Emissions

7.1.1.1 Hong Kong Planning Standards and Guidelines (HKPSG) provides environmental guidance for residential developments on air quality. The guidelines recommend the minimum buffer distance required for active and passive recreational uses.

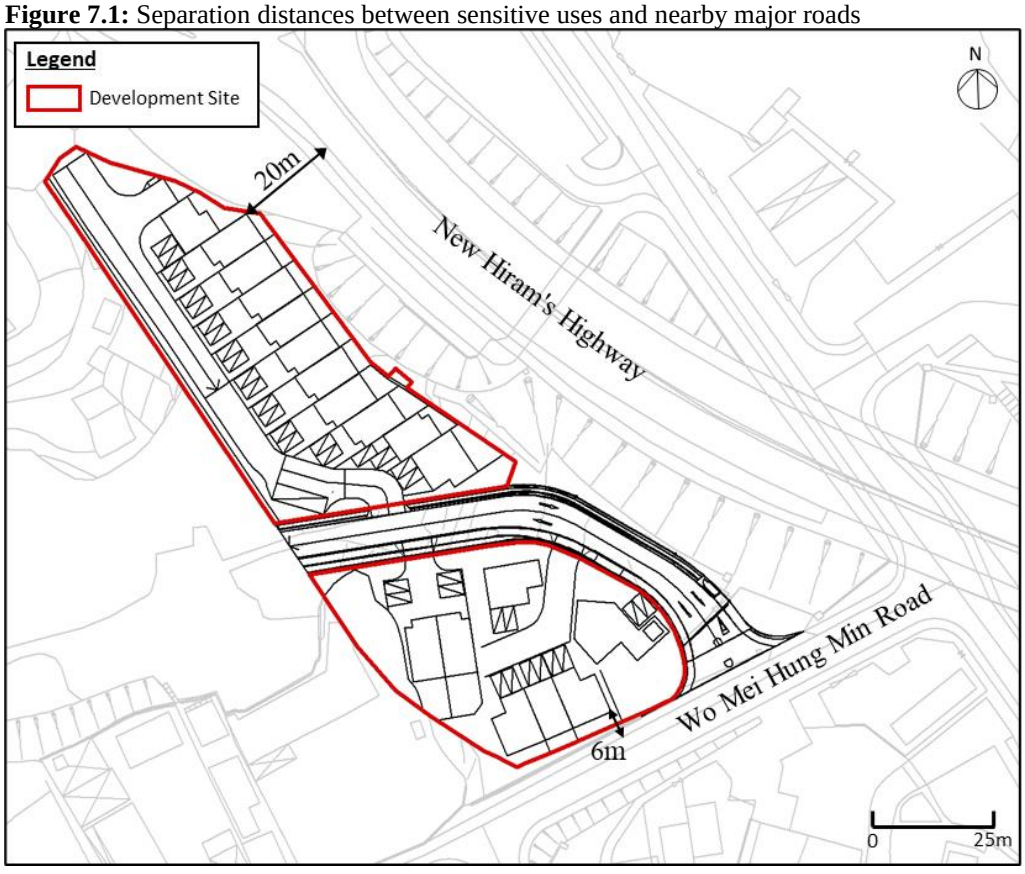
7.1.1.2 The buffer distances between the sensitive uses of the current development scheme and the surrounding major roads are summarized in **Table 7.1** and illustrated in **Figures 7.1** below. TD endorsement on road type classification of Wo Mei Hung Min Road is provided in **Appendix 4.1**.

Table 7.1: Separation distances between sensitive uses and nearby major roads

Name of Road	Type of Road [1]	HKPSG Recommended Setback Distance	Shortest Horizontal Setback Distance from the Nearest Air Sensitive Uses to Road Kerb
New Hiram's Highway	RR	>5m	~20m
Wo Mei Hung Min Road	LD	>5m	~6m

Note: [1] TD has classified Wo Mei Hung Min Road as feeder road. According to HKPSG Chapter 8, feeder road is a road type smaller than rural road (RR). Since the recommended setback distance for feeder road is not provided in HKPSG Chapter 9, the setback distance for feeder road is therefore referred to that for local road (LD) for conservative assessment.

Figure 7.1: Separation distances between sensitive uses and nearby major roads



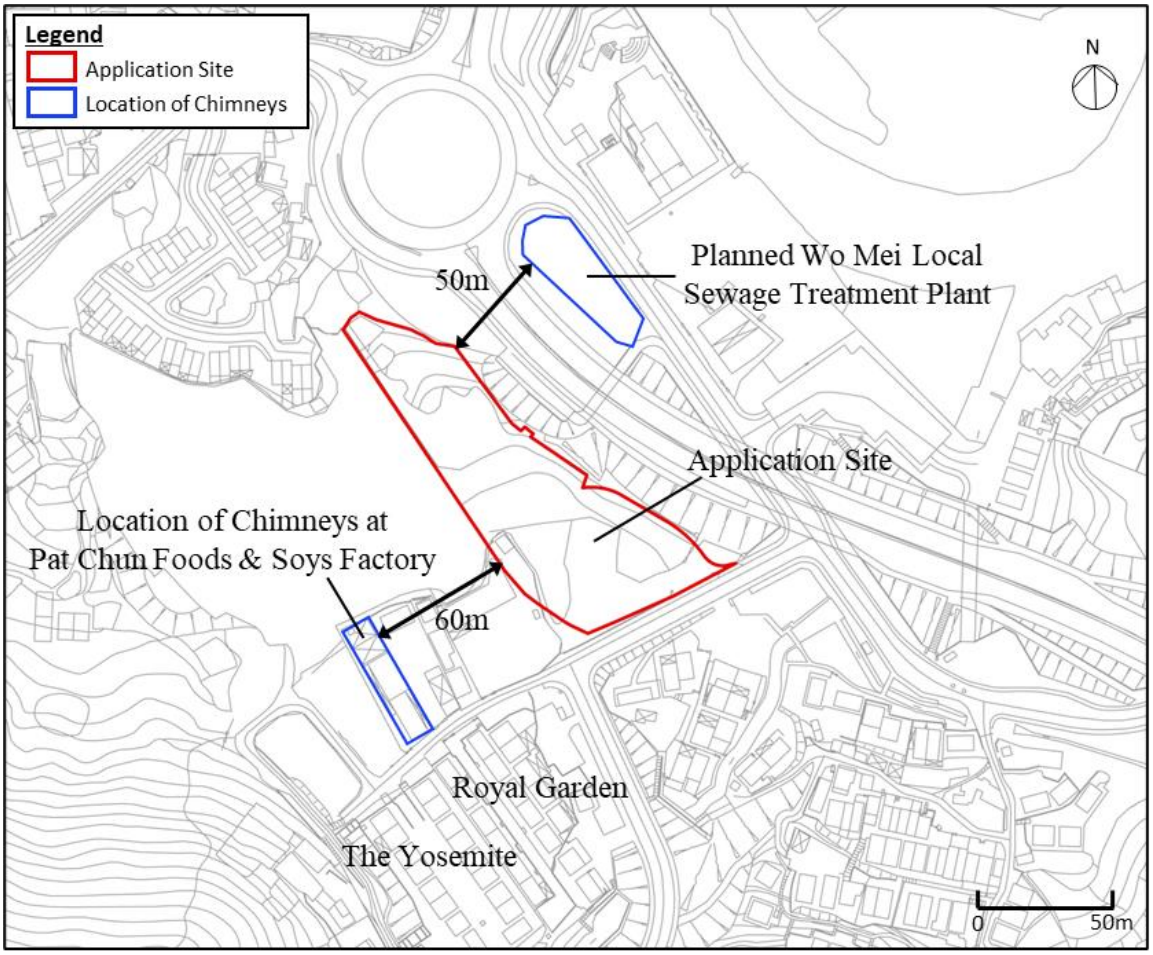
7.1.1.3 The internal road network within the Proposed House Development is private access road with security gate limited the access. Therefore, it is not regard as road system stated in Table 3.1 of the HKPSG and the buffer distance requirement is not applicable.

7.1.1.4 The current scheme can satisfy the setback distance requirements as stipulated in the HKPSG. No sensitive active and passive uses have been planned within the recommended buffer zone of 5m setback from road kerbs of New Hiram's Highway and Wo Mei Hung Min Road. Besides, no pedestrian area (i.e. seating place) have been planned within the recommended buffer zone. Adverse vehicular emission impact on the Proposed House Development is therefore not anticipated.

7.2 Chimney Emissions

7.2.1.1 A chimney survey was conducted on a walk-over basis within 500m from the site boundary where site access was allowed in November 2023. There are 2 chimneys identified at Pat Chun Foods & Soys Factory at Wo Mei Hung Min Road. No plume or other emissions were observed during the survey. The locations of the identified chimney are illustrated in **Figure 7.2**.

Figure 7.2: Location of the identified chimneys and the Planned Wo Mei Local STP

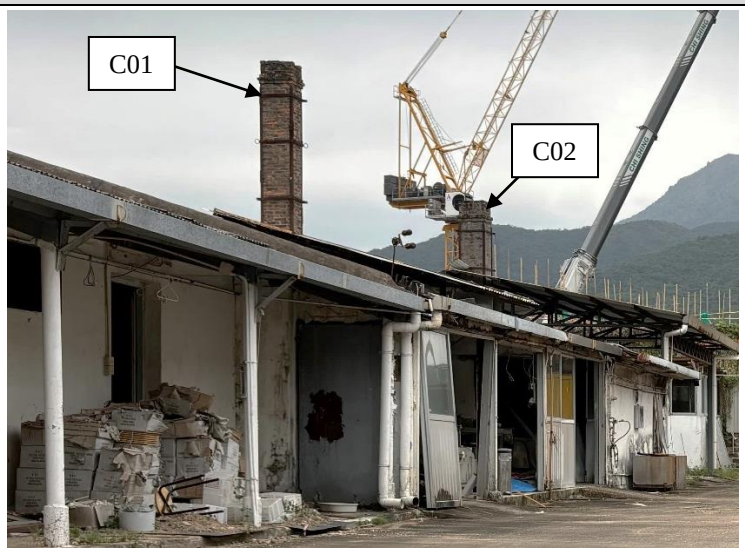


7.2.1.2 Distances between the chimneys and the Application Site boundary are summarized in **Table 7.2** and the photo record of the chimney is given in **Photo 7.1** below.

Table 7.2: Separation distances between sensitive uses and nearby major roads

Chimney ID	Location of Chimney	Shortest Horizontal Distance from Site Boundary to Chimney
C01	Pat Chun Foods & Soys Factory	~60m
C02	Pat Chun Foods & Soys Factory	~60m

Photo 7.1: Pat Chun Foods & Soys Factory (C01 and C02)



7.2.1.3 The operator of the Pat Chun Foods & Soys Factory has advised the Project Team that the chimneys are no longer in use and the site is currently for storage use only. Hence, no adverse chimney emission impact on the Proposed House Development is anticipated.

7.2.2 Review of Potential Air Quality Impact Arising from the Planned Wo Mei Local Sewage Treatment Plant (STP)

7.2.2.1 **Figure 7.2** indicates the location of the Planned Wo Mei Local Sewage Treatment Plant (STP). It is located around 50m from the Proposed House Development. Measures would be implemented to minimize any potential odour impacts including installation of deodorization unit using activated carbon or biotrickling filter or other equivalent odour removal techniques, all screenings and sludge will be properly stored and handled inside the STP building for further treatment and disposal offsite, and good housekeeping practices will be practiced during operation. The Preliminary Environmental Review for the planned Wo Mei STP under Agreement No. CE 56/2012(DS) has also concluded that its operation is not expected to generate air quality emission or odour nuisance as it is fully enclosed. Therefore, adverse air quality or odour impact from the Wo Mei local STP is not anticipated.

7.2.3 Review of Potential Air Quality Impact Arising from the Proposed Local Sewage Treatment Plant within the Proposed House Development

7.2.3.1 The Proposed House Development has proposed a local sewage treatment plant (STP) to support the development. According to the current design, the proposed STP would have a designed capacity of around 32 m^3/day ADWF. The proposed STP will be located at underground with full enclosure. The major process equipment (including screen and grit removal, and the associated washing facilities) of the proposed STP would be the odour sources to the nearby ASRs during operational phase. Mitigation measures including provision of deodorizing units of at least 99.5% odour removal efficiency, locating the exhaust vent as far away from sensitive receivers as possible, covering up of the major odour source, providing adequate ventilation, and full enclosure of trucks transporting the sludge, would be provided during operation. In order to avoid potential odour emissions from the decommissioning activities, the existing sewage pumping station and rising main will be flushed out and sludge will be pumped away before the start of decommissioning works. Hence, potential odour impact to the nearby planned and existing ASRs can be controlled.

8 Land Contamination Appraisal

8.1 Relevant Legislation, Standard and Guidelines

8.1.1.1 The relevant legislations, standards and guidelines applicable to the present study for the assessment of land contamination include:

- Guidance Note for Contaminated Land Assessment and Remediation, EPD, (Revised in April 2023);
- Practice Guide for Investigation and Remediation of Contaminated Land, EPD, 2011 (Revised in April 2023); and
- Guidance Manual for Use of Risked-based Remediation Goals for Contaminated Land Management, 2007 (Revised in April 2023).

8.2 Site Description

8.2.1.1 The Application Site is situated in Nam Pin Wai, Sai Kung, New Territories. The site is currently largely vacant with some existing trees. Surrounding the Application Site are Villa Royale to the north, Wo Mei Village to the south, New Hiram's Highway to the east, and a low-rise residential development under construction to the west. The location of Application Site is indicated in **Figure 2.1**.

8.3 Review of Aerial Photographs and Historical Land Uses

8.3.1.1 Selected historical aerial photographs between 1973 to 2022 (i.e. 1973, 1982, 1992, 2004, 2012 and 2023) have been reviewed to identify any past land uses which may have the potential for causing land contamination. The historical aerial photographs are given in **Appendix 8.1**. The key findings are summarised in **Table 8.1** below.

Table 8.1: Description of historical land uses

Year	Description
1973	• The Application Site was filled with vegetation. • Ho Chung River was observed to the northeast of the Application Site. • Village houses were observed to the southwest of the Application Site.
1982	• Village houses were observed to the north of the Application Site. • No other significant change in historical land use was observed as compared with that in Year 1973.
1992	• Some vegetation was cleared at the central part of the Application Site. • Some vegetation in the southeast part of the Application Site was replaced by agricultural land. • No other significant change in historical land use was observed as compared with

Year	Description
	that in Year 1982.
2004	• Village houses were observed at the south part of the Application Site, replacing agricultural land and vegetation. • New Hiram's Highway was observed to the east of the Application Site. • Villa Royale was observed to the north of the Application Site. • Wo Mei Village was observed to the south of the Application Site. • No other significant change in historical land use was observed as compared with that in Year 1992.
2012	• A small carpark was observed at the central part of the Application Site. • No significant change in historical land use was observed as compared with that in Year 2002.
2023	• Some vegetation at the central area of the Application Site was cleared for the Approved Access Road under Planning Application No. A/SK-HC/223 and the temporary works area for construction of the Access Road • Vegetation to the west of the Application Site was cleared. • No other significant change in historical land use was observed as compared with that in Year 2010.

8.4 Site Survey Findings

8.4.1.1 Site survey was conducted in January and November 2023 to identify any existing land uses within the Application Site and the adjoining sites which may have potential for causing land contamination. Photo record of the site survey is given in **Appendix 8.2** and the site walkover checklist is given in **Appendix 8.3**. Vegetation and temporary works area for construction of the Approved Access Road under Planning Application No. A/SK-HC/223 were observed within the Application Site. As identified in site survey, the temporary works area for the Approved Access Road is for site office use and no potential land contamination is anticipated. Village houses such as Villa Royale and Wo Mei Village and a low-rise residential development under construction are observed adjacent to the Application Site. Potential land contamination activities were not identified. By site observation, chemicals and dangerous goods (DGs) were not found within the site. No potential land contamination issue was observed during the site visits.

8.5 Relevant Information Request

8.5.1 Fire Services Department

8.5.1.1 Information request on any Dangerous Goods license registered, and any record of DGs spillage/leakage incidents within the Application Site have been sent to Fire Services Department (FSD). The correspondence with FSD is attached in **Appendix 8.4**.

8.5.1.2 Based on the reply from FSD, there are no records of Dangerous Goods license issued, fire incidents, and incidents of spillage/leakage of Dangerous Goods in the Application Site.

8.5.2 Environmental Protection Department

8.5.2.1 Information request on any Chemical Waste Producer (CWP) registered, and any record of chemical spillage/leakage incidents within the Application Site were made to Environmental Protection Department (EPD). The correspondence with EPD is attached in **Appendix 8.5**.

8.5.2.2 Based on the reply from EPD, there was no record of reported accident spillage or leakage of chemicals in the past five years. No valid and invalid registration record of chemical waste producer was found.

8.6 Identification of Potentially Contaminated Site

8.6.1.1 Review of desktop data and site visits have been conducted. In addition, as confirmed through site visits, potentially land contamination activities not observed within the Application Site. Chemicals/DGs and relevant spillages/incidents were not found within the Application Site. It is therefore concluded that land contamination is not anticipated in the Application Site.

9 Waste Management

9.1 Relevant Legislation, Standard and Guidelines

9.1.1.1 The relevant legislation, standards and guidelines applicable to the present study for the assessment of waste management implications include:

- Waste Disposal Ordinance (WDO) (Cap. 354) and subsidiary Regulations;
- Waste Disposal (Charges for Disposal of Construction Waste) Regulation (Cap. 354N);
- Waste Disposal (Chemical Waste) (General) Regulation (Cap. 354C);
- Land (Miscellaneous Provisions) Ordinance (Cap. 28); and
- Public Health and Municipal Services Ordinance (Cap. 132) - Public Cleansing and Prevention of Nuisances Regulation.

9.2 Evaluation of Constructional Phase Impact

9.2.1 Identification and Evaluation of Impact

9.2.1.1 During the construction phase, key construction activities which would potentially result in the generation of waste include minor site clearance including any temporary structure, piling works, soil excavation for basement and superstructure, etc. within the site area. These activities would result in the generation of wastes including both inert and non-inert construction and demolition (C&D) materials, chemical wastes and general refuse from on-site workforce.

9.2.1.2 However, in general, the handling and disposal of these materials and wastes will require proper management in order not to cause environmental impacts and nuisance. It is anticipated that there would not be any insurmountable impacts provided good site practices and other appropriate mitigation measures are implemented.

9.2.2 C&D Materials

9.2.2.1 Based on the preliminary design, it is estimated that about 6,000 m^3 of inert soft C&D materials (e.g. excavated soil, demolition C&D materials) and 2,000 m^3 non-inert C&D materials will be generated during the construction phase of the site clearance and site formation works. All C&D materials arising from the construction will be sorted on–site to recover the inert C&D materials as well as the reusable and recyclable materials.

9.2.2.2 Any surplus C&D materials will become the property of the Contractor once they are removed from the site. The Contractor will be responsible for devising a system to work

for on–site sorting of C&D materials and to promptly remove all sorted and processed material arising from the construction activities to optimise temporary stockpiling on–site. It is recommended that the system should include the identification of the source of generation, estimated quantity, arrangement for on–site sorting and/or collection, temporary storage areas, and frequency of collection by recycling contractors or frequency of removal off–site.

9.2.2.3 Disposal of C&D materials can be minimized through careful planning during the detailed design stage and with good site practice during construction. This includes the use of non–timber formwork and temporary works and on–site sorting of the C&D materials for reuse and recycling as far as practicable. Any remaining non-inert C&D waste will be disposed of to public landfills. For the inert C&D materials, it would be reused on–site as far as possible or else it would be delivered to public fill reception facilities. The opportunity of reusing excavated C&D materials would be investigated in the Waste Management Plan, which will be derived in later detailed design stage.

9.2.2.4 With the proper implementation of good construction site practice and recommended mitigation measures, the on-site handling, reuse, transportation and disposal of C&D materials would not cause adverse environmental impacts.

9.2.3 Chemical Waste

9.2.3.1 Chemical wastes likely to be generated from the construction activities and associated facilities may include:

- scrap batteries or spent acid/alkali from their maintenance;
- used paint, engine oils, hydraulic fluids and waste fuel;
- spent mineral oils/cleansing fluids from mechanical machinery; and
- spent solvents/solutions, some of which may be halogenated, from equipment cleansing activities.

9.2.3.2 Chemical wastes may pose environmental, health and safety hazards if not stored and disposed of in an appropriate manner as outlined in the Waste Disposal (Chemical Waste) (General) Regulation and the Code of Practice on the Packaging, Labelling and Storage of Chemical Waste. These hazards may include:

- toxic effects to workers;
- adverse effects on air, water and land from spills; and
- fire hazards.

9.2.3.3 It is difficult to quantify the amount of chemical waste as it will be highly dependent on the contractor's on–site maintenance practice the number of plant and vehicles utilized. Nevertheless, it is anticipated that the quantity of chemical wastes would be small and in

the order of few hundred kilograms/ few hundred litres per month. The estimated amount of chemical waste to be generated during construction phase is summarized in **Table 9.2**.

Table 9.2 Summary of chemical waste during construction phase

Waste type	Total amount generated
Scrap batteries	A few hundred kilograms per month
Spend hydraulic oil and waste fuel	A few hundred litres per month
Spent lubrication oil and cleaning fluids	
Spend solvent	

9.2.3.4 Suitable arrangements for the storage, handling, transport and disposal of chemical wastes shall be made in accordance with the Code of Practice on the Packaging, Labelling and Storage of Chemical Waste and Waste Disposal (Chemical Waste) (General) Regulation (Cap. 354C). Wherever possible opportunities should be taken to reuse and recycle materials. Given that the quantity of chemical wastes would be small and that the regulations as stipulated in the Code of Practice on the Packaging, Labelling and Storage of Chemical Waste and Cap. 354C would be strictly followed, adverse impacts brought by the generation of chemical waste is not anticipated.

9.2.4 General Refuse

9.2.4.1 The general refuse generated by the construction workforces mainly consists of food waste, aluminium cans and wastepaper. These general refuses will require off–site disposal. The number of workforce (clerical and workers) to be employed for the Proposed House Development is not available at this stage, but is anticipated not to be over 100 staff. Based on the generation rate of 0.65kg/person/day, the total refuse generated per day would be less than 65kg/day. Therefore, it is estimated that around 120 tonnes of general refuse would be generated during construction phase. The breakdown of estimated amount of general refuse to be generated during construction phase is summarised in **Table 9.3** below.

Table 9.3 Summary of general refuse during construction phase

Activities	Period	Daily Waste Generation (kg/day)	Total Amount Generated (tonne)
Construction phase	Approx. 5 years	> 65	> 120

9.2.4.2 Effective collection of site waste will be required to prevent waste materials being blown around by wind, flushed or leached into the marine environment, or creating an odour nuisance or pest and vermin problem. Waste storage areas shall be well maintained and cleaned regularly. In addition, disposal of waste at sites other than approved waste transfer or disposal facilities shall be prohibited.

9.2.4.3 With the implementation of good waste management practices at the site, adverse environmental impacts are not expected to arise from the storage handling and transportation of general refuse generated from the site.

9.3 Recommended Practices for Construction Phase

9.3.1.1 Good site practice to avoid or reduce potential adverse environmental impacts associated with handling, collection and disposal of waste are proposed. These recommendations are based on the waste management hierarchy principles. The waste management options considered to be most preferable have the least environmental impacts and are more sustainable in the long term. The hierarchy is as follows (the priority follows descending order):

- avoidance and minimization,
- separation of inert C&D materials, reusable and recyclable materials from other wastes,
- reuse of materials,
- recovery and recycling, and
- treatment and disposal.

9.3.1.2 Prior to the commencement of the construction works, the contractors should incorporate these recommendations into a Waste Management Plan to provide an overall framework for waste management and reduction. Recommended good site practice, waste reduction measures as well as the waste transportation, storage and collection are as follows:

9.3.2 Good Site Practices

9.3.2.1 Adverse waste management implications are not expected, provided that good site practices are strictly implemented. The following good site practices are recommended throughout the construction phase of the Proposed House Development:

9.3.2.2 Nomination of an approved personnel to be responsible for the implementation of good site practices, arrangements for collection and effective disposal to an appropriate facility of all wastes generated at the site;

- training of site personnel in proper waste management and chemical handling procedures;
- provision of sufficient waste disposal points and regular collection for disposal;
- separation of chemical wastes for special handling and appropriate treatment at the Chemical Waste Treatment Centre;
- regular cleaning and maintenance programme for drainage systems, sumps and oil interceptors;

- implementation of a recording system for the amount of wastes generated/recycled and disposal sites. and
- Waste Management Plan (WMP) should be prepared and implemented by the Contractor in accordance with the Building Department's "Practice Note for Authorized Persons and Registered Structural Engineers (PN for AP & RSE) No. 243". The WMP will be submitted to the Architect/Engineer for approval.

9.3.3 Waste Reduction Measures

9.3.3.1 The amount of waste generated can be significantly reduced through good management and control. Waste reduction is best achieved at the site planning and design phase, as well as by ensuring the implementation of good site practices when the works are in progress. Recommendations for achieving waste reduction include:

- on–site reuse of any material excavated as far as practicable;
- segregation and storage of different types of waste in different containers, skips or stockpiles to enhance reuse or recycling of material and their proper disposal;
- collection of aluminium cans and waste paper by individual collectors during construction should be encouraged. Separately labelled recycling bins should also be provided to segregate these wastes from other general refuse by the workforce;
- recycling of any unused chemicals and those with remaining functional capacity as far as possible;
- prevention of potential damage or contamination to the construction materials through proper storage and good site practices;
- planning and stocking of construction materials should be made carefully to minimise amount of waste generated and to avoid unnecessary generation of waste; and
- training on the importance of appropriate waste management procedures, including waste reduction, reuse and recycling should be provided to workers.

9.3.4 Storage, Collection and Transportation of Waste

9.3.4.1 Storage of waste on site may induce adverse environmental implications if not properly managed. The following recommendations should be implemented to minimise the impacts:

- waste such as soil should be handled and stored well to ensure secure containment;
- stockpiling area should be provided with covers and water spraying system to prevent materials from being washed away and to reduce wind–blown litter
- different locations should be designated to stockpile each material to enhance reuse.

9.3.4.2 With respect to the collection and transportation of waste from the construction works area to respective disposal sites, the following recommendations should be implemented to minimise the potential adverse environmental impacts:

- remove waste in timely manner;
- employ trucks with cover or enclosed containers for waste transportations;
- obtain relevant waste disposal permits from the appropriate authorities; and
- disposal of waste should be done at licensed waste disposal facilities.

9.3.4.3 In addition to the above measures, other specific mitigation measures on handling other specific waste generated from construction phase are recommended in the following subsections:

9.3.5 C&D Materials

9.3.5.1 Wherever practicable, C&D materials should be segregated from other wastes to avoid contamination and ensure acceptability at public filling areas or reclamation sites. The following mitigation measures should be implemented in handling the waste:

- maintain temporary stockpiles and reuse excavated fill material for backfilling and reinstatement;
- carry out on–site sorting;
- make provisions in the contract documents to allow and promote the use of recycled aggregates where appropriate; and
- implement a trip–ticket system for each works contract to ensure that the disposal of C&D materials are properly documented and verified.

9.3.5.2 In addition, disposal of the C&D materials onto any sensitive location such as agricultural land, etc. should be avoided. Disposal of C&D materials or any other wastes at unauthorized locations and sites other than approved waste transfer or disposal facilities shall be prohibited. To prevent fly-tipping, utilizing dump trucks equipped with real-time tracking and monitoring devices could be considered. Non-inert C&D waste will be disposed of to public landfills; while inert C&D materials would be disposed of at Public Fill Reception Facilities, if necessary, for beneficial reuse in other projects.

9.3.5.3 Standard formwork or pre–fabrication should be used as far as practicable in order to minimise the arising of C&D materials. The use of more durable formwork or plastic facing for the construction works should be considered. Metal hoarding should be used to enhance the possibility of recycling. The purchasing of construction materials should be carefully planned in order to avoid over ordering and wastage.

9.3.5.4 The contractor should recycle as much of the C&D materials as possible on–site. Public fill and C&D waste should be segregated and stored in different containers or skips to

enhance reuse or recycling of materials and their proper disposal. Where practicable, concrete and masonry can be crushed and used as fill. Steel reinforcement bar can be used by scrap steel mills. Different areas of the construction site should be considered for such segregation and storage.

9.3.5.5 According to the "Project Administrative Handbook Chapter 4, Section 4.1.3", for DPs, a Construction and Demolition Material Management Plan (C&DMMP) has to be submitted to the Public Fill Committee (PFC) for approval in case of C&D materials disposal exceeding 50,000m^3. For non–DPs, a C&DMMP has to be submitted to PFC for approval prior to commencement of the detailed design in case of generating surplus C&D materials in excess of 300,000 m^3 or requiring imported fill exceeding 300,000m^3. The C&DMMP should be vetted and endorsed by the departmental Vetting Committee before submitting to PFC for approval. Since the Proposed House Development is a non-DP and will generate less than 300,000m^3 C&D materials, a C&DMMP is not required under PAH. Nonetheless, the Project Proponent shall consult the Public Fill Committee of CEDD for the advisory outlet of the C&D materials.

9.3.6 Chemical Waste

9.3.6.1 For those processes that generate chemical wastes, the contractor shall identify any alternatives that generate reduced quantities or even no chemical wastes, or less dangerous types of chemical wastes.

9.3.6.2 If chemical wastes are produced at the construction site, the contractors should register with EPD as chemical waste producers. Chemical wastes should be handled in accordance with the Code of Practice on the Packaging, Handling and Storage of Chemical Wastes. Containers used for storage of chemical wastes should:

- be suitable for the substance they are holding, resistant to corrosion, maintained in a good condition, and securely closed;
- have a capacity of less than 450 L unless the specification has been approved by EPD; and
- display a label in English and Chinese in accordance with instructions prescribed in Schedule 2 of the Regulations.

9.3.6.3 The storage area for chemical wastes should:

- be clearly labelled and used solely for the storage of chemical wastes;
- be enclosed on at least 3 sides;
- has an impermeable floor and bunding, of capacity to accommodate 110% of the volume of the largest container or 20% by volume of the chemical wastes stored in the area, whichever is greatest;
- have adequate ventilation;

- be covered to prevent rainfall entering (water collected within the bund must be tested and disposed as chemical wastes, if necessary); and
- be arranged so that incompatible materials are adequately separated.

9.3.6.4 Disposal of chemical wastes should:

- be via a licensed waste collector; and
- be to a facility licensed to receive chemical wastes, such as the Chemical Waste Treatment Centre (CWTC) which also offers a chemical waste collection service and can supply the necessary storage containers; or
- be to a re–user of the waste, upon approval granted by EPD.

9.3.7 General Refuse

9.3.7.1 General refuse generated on–site should be stored in enclosed bins or compaction units separated from construction and chemical wastes. Recycling bins should also be provided to encourage recycling. A reputable waste collector should be employed by the contractor to remove general refuse from the site on a daily basis to separate from the construction and chemical wastes. General refuse collected each day shall only be carried away and disposed of at approved waste transfer or disposal facilities. Burning of refuse on construction sites or fly tipping is prohibited by law.

9.4 Evaluation of Operational Phase Impact

9.4.1 Identification and Evaluation of Impact

9.4.1.1 The operational phase of the Proposed House Development would generate municipal solid waste. With reference to the latest data from "Monitoring of Solid Waste in Hong Kong 2021" by EPD, the MSW disposal rate was 1.53 kg/person/day in Year 2021, and the recovery rate for recycling was 31% of the MSW generation. By calculation, the MSW generation rate, disposal rate and recycled rate were 2.22 kg/person/day, 1.53 kg/person/day and 0.69 kg/person/day in 2021 respectively. The estimated MSW based on planned residential and employment populations respectively is summarized in **Table 9.4**.

Table 9.4 Estimated quantities of MSW from planned Residential and Employment Population during operation phase

Estimated MSW from Residential Population (tpd)[1]			
Residential Population	**Generated[2]**	**Required Disposal [2]**	**Recycled [2]**
51	0.113	0.078	0.035

Note:
[1] tpd: tonne per day

[2] MSW disposal rate was 1.53 kg/person/day according to "Monitoring of Solid Waste in Hong Kong 2021" by EPD (https://www.wastereduction.gov.hk/sites/default/files/msw2021.pdf). By calculation, the MSW generation rate was 2.22kg/person/day. MSW recovery rate for recycling was 31% of the MSW generation. by calculation, the MSW recycling rate was 0.69kg/person/day.

9.4.1.2 A reputable waste collector should be employed to provide routine cleaning of the Proposed House Development to minimize odour, pest and litter impacts associated with the generation of general refuse. Recycling bins should also be provided to encourage recycling.

9.4.1.3 Screening and grits and dewater sludge will be generated from the operation of the on-site STP. It is estimated that insignificant amount of screening and grits and dewatered sludge would be generated during the operation phase of the Proposed House Development. Screening and grits generated will be transferred to closed containers before transportation and disposal at designated landfill sites. The collected dewater sludge shall be transported to the nearby public sewage treatment plants where anaerobic digestion systems are in place for energy recovery and waste reduction by designated sewage tankers for disposal. Disposal in landfills should be considered as a last resort.

9.4.1.4 With the implementation of the recommended mitigation measures for the handling, transportation and disposal of the identified waste, adverse residual waste management implications are not anticipated for the operational phase.

9.5 Recommended Practices for Operational Phase

9.5.1 Waste Collection and Disposal

9.5.1.1 An effective and efficient waste handling system is essential in order to minimize potential adverse environmental impacts during waste storage, collection and transport, such impacts may include odour if waste is not collected frequently; water quality if waste enters storm water drains; aesthetics and vermin problems if the waste storage area is not well maintained and cleaned regularly. The waste handling system may also facilitate materials recovery and recycling.

9.5.1.2 A refuse collection room would be installed at the ground floor for localized refuse collection and the waste would be transported to a refuse transfer station (RFS). To avoid potential odour nuisance during transport of waste, enclosed waste collection trucks should be used and the collection route and time should be properly planned. At least daily collection should be arranged by the waste collector.

9.5.2 Waste Recycling

9.5.2.1 In order to facilitate recycling, a 4-bin recycling system for paper, metals, plastics and glass should be adopted together with a general refuse bin. They should be placed in

prominent places to promote waste separation at source. All recyclable materials should be collected by recyclers. In addition, the feasibility of recycling other types of waste, such as fluorescent lamps & tubes, rechargeable batteries, food waste, etc shall be explored.

10 Water Quality Impact

10.1 Legislation, Standards and Guidelines

10.1.1.1 The relevant legislation, standards and guidelines applicable to the present study for the assessment of water quality impacts include:

- Water Pollution Control Ordinance (WPCO) (Cap. 358);
- Technical Memorandum - Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters (TM-DSS);
- Hong Kong Planning Standards and Guidelines (HKPSG);
- Practice Note for Professional Persons on Construction Site Drainage (ProPECC PN 2/23);
- Protection of Natural Streams/Rivers from Adverse Impacts Arising from Construction Works (ETWB TC(Works) No.5/2005); and
- Drainage Plans subject to Comment by the Environmental Protection Department (ProPECC PN 1/23).

10.1.1.2 The Application Site is located in the Port Shelter Water Control Zone (WCZ). The corresponding WQOs are provided in **Table 10.1**.

Table 10.1 Water Quality Objectives for Port Shelter Water Control Zone

Parameters	Objectives	Sub-Zone
Aesthetic appearance	(a) Waste discharges shall cause no objectionable odours or discolouration of the water.	Whole zone
	(b) Tarry residues, floating wood, articles made of glass, plastic, rubber or of any other substances should be absent.	Whole zone
	(c) Mineral oil should not be visible on the surface. Surfactants should not give rise to a lasting foam.	Whole zone
	(d) There should be no recognisable sewage-derived debris.	Whole zone
	(e) Floating, submerged and semi-submerged objects of a size likely to interfere with the free movement of vessels, or cause damage to vessels, should be absent.	Whole zone
	(f) Waste discharges shall not cause the water to Whole Zone contain substances which settle to form objectionable deposits.	Whole zone
Bacteria	(a) The level of *Escherichia coli* should not exceed 610 per 100mL, calculated as the geometric mean of all samples collected in one calendar year.	Secondary Contact Recreation Subzones and Fish Culture Subzones

Parameters	Objectives	Sub-Zone
	(b) The level of *Escherichia coli* should not exceed 180 per 100 mL, calculated as the geometric mean of all samples collected from March to October inclusive in one calendar year. Samples should be taken at least 3 times in a calendar month at intervals of between 3 and 14 days.	Bathing Beach Subzones
Colour	(a) Waste discharges shall not cause the colour of water to exceed 50 Hazen units.	Inland waters
Dissolved Oxygen	(a) Waste discharges shall not cause the level of dissolved oxygen to fall below 4 mg per litre for 90% of the sampling occasions during the year; values should be calculated as water column average (arithmetic mean of at least 3 measurements at 1 metre below surface, mid-depth and 1 metre above seabed). In addition, the concentration of dissolved oxygen should not be less than 2 milligrams per litre within 2 metres of the seabed for 90% of the sampling occasions during the year.	Marine waters except Fish Culture Subzones
	(b) The dissolved oxygen level should not be less than 5 milligrams per litre for 90% of the sampling occasions during the year; values should be calculated as water column average (arithmetic mean of at least 3 measurements at 1 metre below surface, mid-depth and 1 metre above seabed). In addition, the concentration of dissolved oxygen should not be less than 2 milligrams per litre within 2 metres of the seabed for 90% of the sampling occasions during the year.	Fish Culture Subzones
	(c) Waste discharges shall not cause the level of dissolved oxygen to be less than 4 milligrams per litre.	Inland waters
pH	(a) The pH of the water should be within the range of 6.5-8.5 units. In addition, waste discharges shall not cause the natural pH range to be extended by more than 0.2 units.	Marine waters excepting Bathing Beach Subzones
	(b) The pH of the water should be within the range of 6.0–9.0 units for 95% of samples. In addition, waste discharges shall not cause the natural pH range to be extended by more than 0.5 units.	Bathing Beach Subzones
	(c) Waste discharges shall not cause the pH of the water to exceed the range of 6.5–8.5 units.	Ho Chung (A) Subzone
	(d) The pH of the water should be within the range of 6.0–9.0 units.	Other inland waters
Temperature	(a) Waste discharges shall not cause the natural daily temperature range to change by more than 2.0 degrees Celsius.	Whole Zone
Salinity	(a) Waste discharges shall not cause the natural ambient salinity level to change by more than 10%	Whole Zone
Suspended solids	(a) Waste discharges shall neither cause the natural ambient level to be raised by 30% nor give rise to accumulation of suspended solids which may adversely affect aquatic communities.	Marine waters
	(b) Waste discharges shall not cause the annual median of	Inland waters

Parameters	Objectives	Sub-Zone
	suspended solids to exceed 25 mg per litre.	
Ammonia	(a) The ammonia nitrogen level should not be more than 0.021 mg per litre, calculated as the annual average (arithmetic mean), as unionised form.	Whole Zone
Nutrients	(a) Nutrients shall not be present in quantities sufficient to cause excessive or nuisance growth of algae or other aquatic plants.	Marine waters
	(b) Without limiting the generality of objective (a) above, the level of inorganic nitrogen should not exceed 0.1 mg per litre, expressed as annual water column average (arithmetic mean of at least 3 measurements at 1 m below surface, mid-depth and 1 m above seabed).	Marine waters
5 day biochemical oxygen demand	(a) Waste discharges shall not cause the 5-day biochemical oxygen demand to exceed 5 mg per litre.	Inland waters
Chemical oxygen demand	(a) Waste discharges shall not cause the chemical oxygen demand to exceed 30 milligrams per litre.	Inland waters
Dangerous substnaces	(a) Waste discharges shall not cause the concentration of dangerous substances in the water to attain such levels as to produce significant toxic effects in humans, fish or any other aquatic organisms, with due regard to biologically cumulative effects in food chains and to toxicant interactions with each other.	Whole Zone
	(b) Waste discharges of dangerous substances shall not put a risk to any designated beneficial uses of the aquatic environment.	Whole Zone
Phenol	(a) Phenols shall not be present in such quantities as to produce a specific odour, or in concentrations greater than 0.05 mg per litre as C_6H_5OH.	Bathing Beach Subzones
Turbidity	(a) No changes in turbidity or other factors arising from waste discharges shall reduce light transmission substantially from the normal level.	Bathing Beach Subzones

10.2 Description of the Environment

10.2.1.1 The Application Site falls within the Port Shelter WCZ and is located at the west of Port Shelter. The Application Site is located inland, therefore water quality impact to coastal water is not anticipated. This section presents the assessment of potential water quality impact associated with the construction and operation phases of the Proposed House Development. Recommendations for mitigation measures have been made, where necessary, to minimize the potential water quality impacts.

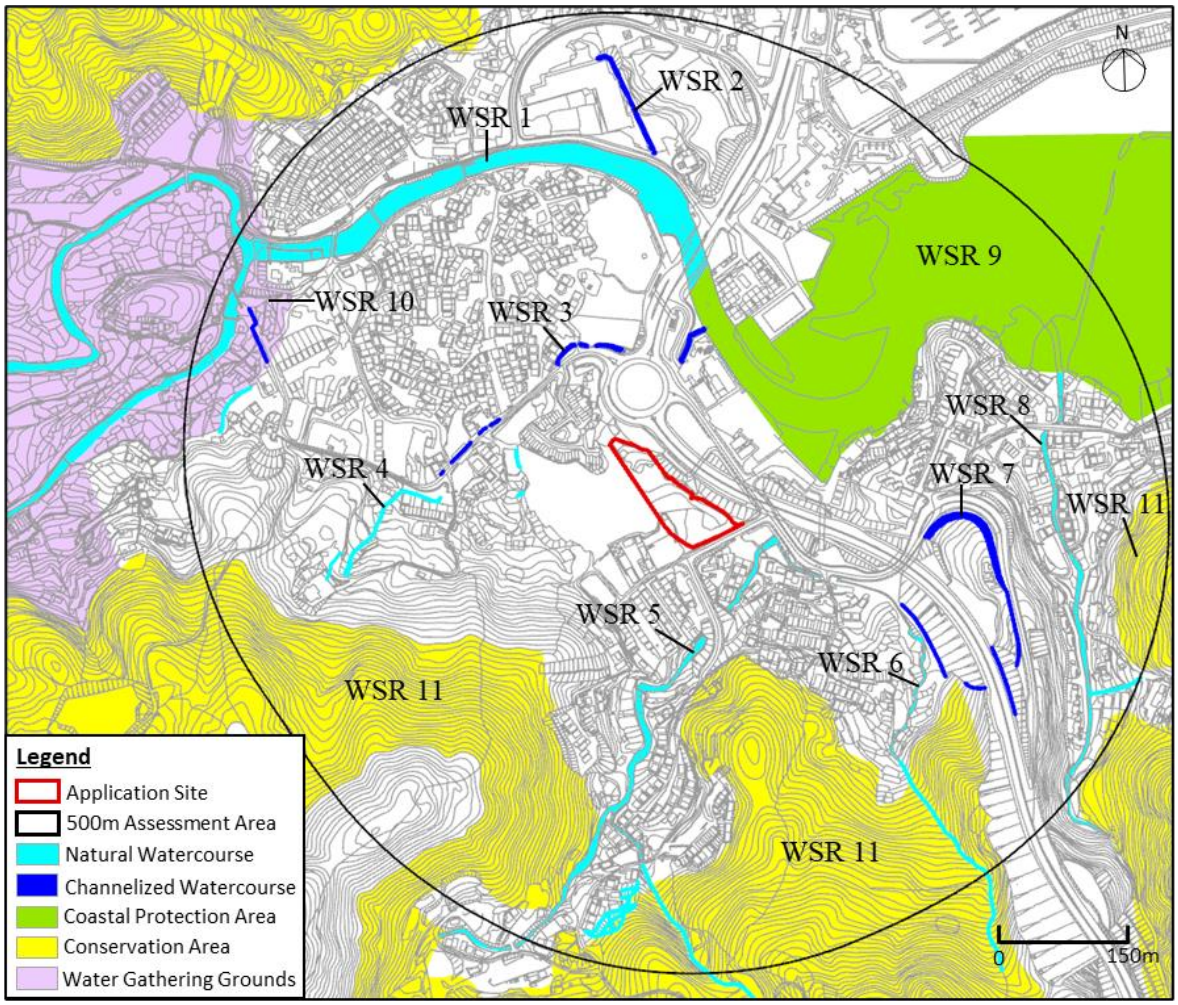
10.3 Water Sensitive Receivers

10.3.1.1 There are several Water Sensitive Receivers (WSRs) identified within 500m from the Application Site. These WSRs are listed in **Table 10.2** and presented in **Figure 10.1**.

Table 10.2: Water sensitive receivers

ID	WSRs	Status	Approx. Nearest Distance of WSR to the Application Site
WSR 1	Ho Chung River	Natural Watercourse	~100m
WSR 2	Along the east of Asia Television Limited at Ho Chung Road	Channelized Watercourse	~340m
WSR 3	Along Nam Pin Wai Road	Channelized Watercourse	~100m
WSR 4	Along Nam Pin Wai Village	Natural Watercourse	~110m
WSR 5	From Hebe Knoll running through Mok Tse Che Village and Wo Mei Village	Natural Watercourse	~35m
WSR 6	From Ta Ku Ling running through Wo Mei Village	Natural Watercourse	~130m
WSR 7	Along Hiram's Highway near Wo Mei Rest Garden	Channelized Watercourse	~210m
WSR 8	Running through Nam Wai Village and located to the east of WSR 7	Natural Watercourse	~360m
WSR 9	Coastal Protection Area near Ho Chung River	Coastal Protection Area	~100m
WSR 10	Water Gathering Grounds at Shui Hau	Water Gathering Grounds	~400m
WSR 11	Conservation Areas near Hebe Knoll and Ta Ku Ling	Conservation Area	~140m

Figure 10.1: Locations of water sensitive receivers



10.4 Construction Phase Impact Evaluation

10.4.1 Construction Site Runoff

10.4.1.1 During rainstorm events, construction site runoff would come from all over the works site. The surface runoff might be polluted by:

- Runoff and erosion from site surfaces, earth working areas and stockpiles;
- Wash water from dust suppression sprays and wheel washing facilities; and
- Chemicals spillage such as fuel, oil, solvents and lubricants from maintenance of construction machinery and equipment.

10.4.1.2 Construction runoff may cause physical, biological and chemical effects. The physical effects include potential blockage of drainage channels and increase of suspended solid levels in the receiving water bodies. Runoff containing significant amounts of concrete and cement–derived material may cause primary chemical effects such as increasing turbidity and discoloration, elevation in pH, and accretion of solids. A number of secondary effects may also result in toxic effects to water biota due to elevated pH values, and reduced

decay rates of faecal microorganisms and photosynthetic rate due to the decreased light penetration.

10.4.1.3 Construction site runoff could be carefully controlled and mitigated through the recommended mitigation measures outlined in **Section 10.4**. Construction site runoff impacts would therefore be reduced to satisfactory levels before discharges such that adverse water quality impact would not be anticipated.

10.4.2 Sewage from Workforce

10.4.2.1 Sewage effluents will arise from the sanitary facilities provided for the on–site construction workforce. The sewage is characterized by high levels of biochemical oxygen demand (BOD), ammonia, E. coli and oil / grease.

10.4.2.2 The sewage generated should be properly managed to minimize the adverse impact of odour and potential health risks to the workers by attracting pests and other disease vectors.

10.4.2.3 Adequate portable chemical toilets should be provided to ensure all sewage is properly collected. It is anticipated that no adverse environmental implications would arise if the chemical toilets are properly maintained and licensed collectors are employed for the collection and disposal of sewage on a regular basis.

10.5 Recommended Mitigation Measures for Construction Phase

10.5.1 Construction Site Runoff

10.5.1.1 In accordance with the Practice Note for Professional Persons on Construction Site Drainage (ProPECC PN 2/23) and the Technical Circular of Protection of Natural Streams/Rivers from Adverse Impacts Arising from Construction Works (ETWB TC(Works) No.5/2005), the proposed construction phase mitigation measures is given below.

- At the start of site establishment, perimeter cut–off drains to direct off–site water around the site should be constructed with internal drainage works and erosion and sedimentation control facilities implemented. Channels (both temporary and permanent drainage pipes and culverts), earth bunds or sand bag barriers should be provided on site to direct storm water to silt removal facilities. The design of the temporary on–site drainage system will be undertaken by the contractor prior to the commencement of construction.
- Diversion of natural storm water should be provided as far as possible. The design of temporary on–site drainage should prevent runoff going through site surface, construction machinery and equipment in order to avoid or minimize polluted runoff. Sedimentation tanks with sufficient capacity, constructed from pre–formed individual cells of approximately 6 to 8m^3 capacities, are recommended as a general mitigation measure which can be used for settling surface runoff prior to disposal. The system

capacity shall be flexible and able to handle multiple inputs from a variety of sources and suited to applications where the influent is pumped.

- The dikes or embankments for flood protection should be implemented around the boundaries of earthwork areas. Temporary ditches should be provided to facilitate the runoff discharge into an appropriate watercourse, through a silt/sediment trap. The silt/sediment traps should be incorporated in the permanent drainage channels to enhance deposition rates.
- The design of efficient silt removal facilities should be based on the guidelines in Appendix A1 of ProPECC PN 1/94. The detailed design of the sand/silt traps should be undertaken by the contractor prior to the commencement of construction.
- Construction works should be programmed to minimize surface excavation works during the rainy seasons (April to September). All exposed earth areas should be completed and vegetated as soon as possible after earthworks have been completed. If excavation of soil cannot be avoided during the rainy season, or at any time of year when rainstorms are likely, exposed slope surfaces should be covered by tarpaulin or other means.
- All drainage facilities and erosion and sediment control structures should be regularly inspected and maintained to ensure proper and efficient operation at all times and particularly following rainstorms. Deposited silt and grit should be removed regularly and disposed of by spreading evenly over stable, vegetated areas.
- Measures should be taken to minimise the ingress of site drainage into excavations. If the excavation of trenches in wet periods is necessary, it should be dug and backfilled in short sections wherever practicable. Water pumped out from trenches or foundation excavations should be discharged into storm drains via silt removal facilities.
- All open stockpiles of construction materials (for example, aggregates, sand and fill material) of more than $50m^3$ should be covered with tarpaulin or similar fabric during rainstorms. Measures should be taken to prevent the washing away of construction materials, soil, silt or debris into any drainage system.
- Manholes (including newly constructed ones) should always be adequately covered and temporarily sealed so as to prevent silt, construction materials or debris being washed into the drainage system and storm runoff being directed into foul sewers.
- Precautions should be taken at any time of year when rainstorms are likely, actions to be taken when a rainstorm is imminent or forecasted, and actions to be taken during or after rainstorms are summarised in Appendix A2 of ProPECC PN 1/94. Particular attention should be paid to the control of silty surface runoff during storm events.
- All vehicles and plant should be cleaned before leaving a construction site to ensure no earth, mud, debris and the like is deposited by them on roads. An adequately designed and sited wheel washing facilities should be provided at every construction site exit where practicable. Wash–water should have sand and silt settled out and removed at least on a weekly basis to ensure the continued efficiency of the process. The section of access road leading to, and exiting from, the wheel–wash bay to the public road should be paved with sufficient back fall toward the wheel–wash bay to prevent vehicle tracking of soil and silty water to public roads and drains.
- Oil interceptors should be provided in the drainage system downstream of any oil/fuel pollution sources. The oil interceptors should be emptied and cleaned regularly to prevent the release of oil and grease into the storm water drainage system after accidental spillage. A bypass should be provided for the oil interceptors to prevent flushing during heavy rain.

- Construction solid waste, debris and rubbish on site should be collected, handled and disposed of properly to avoid water quality impacts.
- All fuel tanks and storage areas should be provided with locks and sited on sealed areas, within bunds of a capacity equal to 110% of the storage capacity of the largest tank to prevent spilled fuel oils from reaching water sensitive receivers nearby.
- Temporary sewerage system should be designed and installed to collect wastewater and prevent it from entering rivers and streams.
- Proper locations well away from rivers/streams for temporary storage of materials (e.g. equipment, filling materials, chemicals and fuel) and temporary stockpile of construction debris and spoil should be identified before commencement of the works.
- Stockpiling of construction materials, if necessary, should be properly covered and located away from any natural stream/river.
- Construction debris and spoil should be covered up and/or properly disposed of as soon as possible to avoid being washed into nearby rivers/streams by rain.
- Construction effluent, site run-off and sewage should be properly collected and/or treated. Wastewater from a construction site should be managed with the following approach in descending order: (i) minimisation of wastewater generation; (ii) reuse and recycle; (iii) treatment. Proper locations for discharge outlets of wastewater treatment facilities well away from the natural streams/rivers should be identified.
- Supervisory staff should be assigned to station on site to closely supervise and monitor the works.

10.5.1.2 By adopting the above mitigation measures with best management practices, it is anticipated that the impacts of construction site runoff from the construction site will be reduced to satisfactory levels before discharges. The details of best management practices will be highly dependent to actual site condition and the Contractor shall apply for a discharge license under WPCO.

10.5.2 Sewage from Workforce

10.5.2.1 Sufficient portable chemical toilets and sewage holding tanks should be provided for handling the construction sewage generated by the workforce. A licensed contractor should be employed to provide appropriate and adequate portable toilets to cater employed populations and be responsible for appropriate disposal and maintenance.

10.5.2.2 Notices should be posted at conspicuous locations to remind the workers not to discharge any sewage or wastewater into the nearby environment during the construction phase. Regular environmental audit on the construction site should be conducted in order to provide an effective control of any malpractices and achieve continual improvement of environmental performance on site.

10.6 Operational Phase Impact Evaluation and Recommended Mitigation Measures

10.6.1 Runoff from the Development

10.6.1.1 The Proposed House Development will lead to an increase in area of impermeable surfaces and hence the peak surface runoff rates. Besides, vehicle dust, tyre scraps and oils might be washed away from the road surface to the nearby water courses by surface runoff or road surface cleaning. Subject to detailed design and requirement of relevant government departments, the capacities of road drainage system shall cater the runoff from 50 year-return-period rainstorm. Proper drainage systems with silt traps and oil interceptors should be installed and connected to the existing drainage system. The design of road gullies with silt traps should be incorporated in the detailed design stage.

10.6.1.2 Runoff will be controlled by best management practice. Runoff will be intercepted by properly designed and managed silt traps at appropriate spacings so that common roadside debris, refuse and fallen leaves etc. can be captured before allowing the runoff to drain into watercourses. At the outlets to watercourses, the Project Proponent or the delegated operation parties should manage the road/open area cleaning prior to the occurrence of a storm. Moreover, it is recommended each of the cleaning events should be carried out during low traffic flow period, preferably using either manual methods or mechanical means such as vacuum sweeper/truck equipped with side broom to sweep road sludge and debris into the suction nozzle to increase the removal efficiency of pollutants. The collected pollutants will be tankered away for off-site disposal at landfill sites. After the removal of the pollutants, the pollution levels from stormwater would be much reduced.

10.6.1.3 The Professional Persons Environmental Consultative Committee Practice Note 1/23 Drainage Plans subject to Comment by the Environmental Protection Department (ProPECC PN 1/23), also provides guidelines and practices for handling, treatment and disposal of various effluent discharges to stormwater drains and foul sewers. The design of site drainage and disposal of site effluents generated within the Proposed House Development area should follow the relevant guidelines and practices as given in the ProPECC PN 1/23.

10.6.2 Sewage from the Development

10.6.2.1 As mentioned above, the Proposed House Development will be properly sewered and adverse water quality impact is not anticipated. A separate Sewerage Impact Assessment has been conducted to assess the impact of sewage generation as a result of the Proposed House Development. According to the current design, the proposed onsite STP would have a designed capacity of around 32 m^3/day ADWF. The proposed STP shall follow the "Guidelines for the Design of Small Sewage Treatment Plants" published by the EPD and

discharge license under Water Pollution Control Ordinance would be obtained for the discharge of the treated effluent. Details of mitigation measures, if necessary, shall be referred to the Sewerage Impact Assessment.

10.6.2.2 Sewage generated from the Application Site will be conveyed by the internal sewerage system to the onsite STP with treatment level reaching the secondary level plus disinfection for treatment. Subject to the subsequent detailed design by specialist contractor, package Membrane Bioreactor (MBR) sewage treatment plant with UV disinfection or equivalent could be utilised. The on-site STP will be located in underground plant room underneath the clubhouse. The treated effluents will be discharged to Ho Chung River via the stormwater drain along Wo Mei Hung Min Road and Hiram's Road. Details of the onsite STP shall be referred to **Appendix 10.1**. Standards of treated effluent discharge should follow the "Standards for Effluents Discharged into Inland Waters" in the "Technical Memorandum Standards for Effluent Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters". The contingency arrangement in the event of operation failure of the STP will include tankering away of untreated sewage. Hence, no adverse water quality impact is anticipated during normal operations.

10.6.2.3 Contingency measures including standby power supply, alarms, storage tank and tankering away of untreated sewage shall be allowed to prevent discharge of treated or untreated sewage effluent in emergency situation (e.g. pump failure, electricity cut off, pipe bursting, etc). Contingency measures shall be documented in a contingency plan to be prepared by the operator of the STP. The contingency plan shall cover situations when the STP is out of service, and shall be implemented throughout operation of the onsite STP.

11 Conclusion

11.1.1.1 An Environmental Assessment Study has been conducted to support the Section 12A Planning Application for Proposed House Development at Various Lots in D.D.244 and Adjoining Government Land, Nam Pin Wai, Sai Kung, New Territories.

11.1.1.2 The Application Site is bounded by New Hiram's Highway to the east. Road traffic noise assessment has shown that with provision of the recommended acoustic windows (baffle type), all residential units will comply with the criterion of 70 dB(A) and a compliance rate of 100% could be achieved. Therefore, adverse road traffic noise impact is not anticipated.

11.1.1.3 Two potential fixed noise sources, including Pat Chun Foods & Soys Factory and Ho Chung Welfare Facilities Block, have been identified within 300m assessment area of the Application Site. Based on site inspection, no noticeable fixed noise was perceived at the boundary of these potential fixed noise sources. Given the reason above, potential fixed noise impact on the noise sensitive uses of the Proposed House Development is not anticipated.

11.1.1.4 For the planned fixed plant noise sources at the Planned Wo Mei Local Sewage Treatment Plant and within the Proposed House Development, acoustic measures such as use of silencers / acoustic louvers and acoustic doors will be incorporated in the design. With appropriate noise mitigation measures, adverse noise impact from these planned fixed plant noise sources is not anticipated.

11.1.1.5 The current design scheme has allowed sufficient setback from the surrounding roads to meet the minimum requirement as stipulated in the HKPSG. Hence, potential vehicular emission impact is not anticipated.

11.1.1.6 Two chimneys at Pat Chun Foods & Soys Factory to the west of the Application Site are identified within 500m from the Application Site. No plume or other emissions were observed during the survey. Adverse air quality impact due to chimney emission is not anticipated.

11.1.1.7 For the Planned Wo Mei Local Sewage Treatment Plant and the proposed local sewage treatment plant within the Proposed House Development, measures such as use of activated carbon filter at exhaust and odour removal system would be provided. Adverse odour impact from these sewage treatment plants is not anticipated.

11.1.1.8 A preliminary land contamination site appraisal through desktop review and site survey has been conducted to review any past and existing land uses within and adjoining the

Application Site. It is found that there is no potential of land contamination within and adjoining the Application Site.

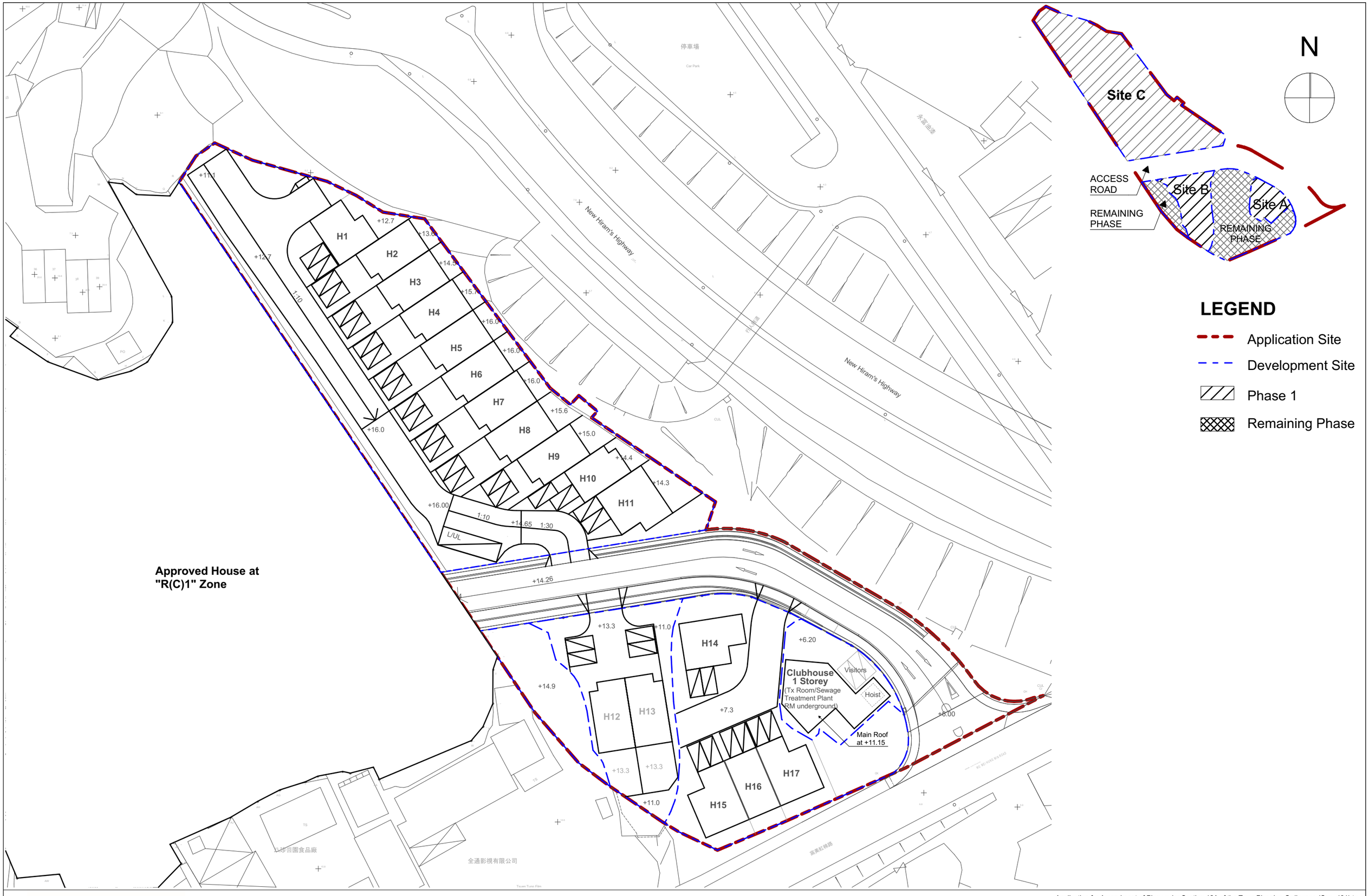
11.1.1.9 For waste management, implications due to construction and operational phases are not anticipated provided good practices are in place.

11.1.1.10 The internal stormwater drains will be properly connected to public drainage. Sewage generated from the Application Site will be conveyed by the internal sewerage system to the onsite STP and the treated effluents will be discharged into Ho Chung River. With good site management practices and mitigation measures, adverse water quality impacts due to construction and operational phases are not anticipated.

11.1.1.11 It is concluded that there are no insurmountable environmental impacts on the Proposed House Development at Various Lots in D.D.244 and Adjoining Government Land, Nam Pin Wai, Sai Kung, New Territories.

Appendix 2.1

Master Layout Plan



LWK +PARTNERS

Architectural Plan of the Indicative Scheme

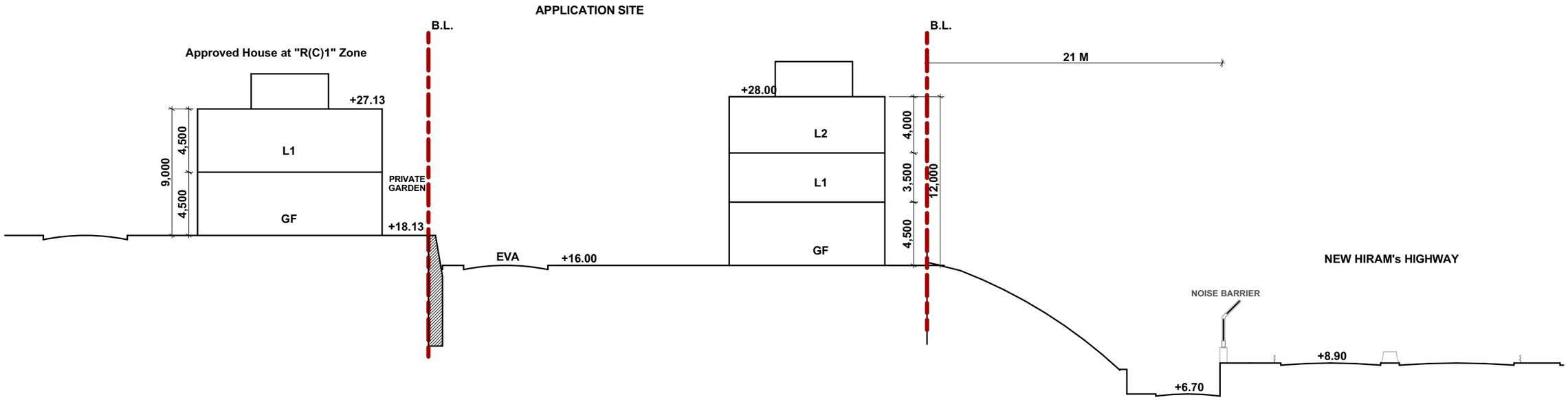
Application for Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131) to Rezone the Application Site from "Green Belt" to "Residential (Group C)1" for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung

1:600@A3

16/04/2024

LEGEND

- Application Site
- Development Site



LWK +PARTNERS

Section AA

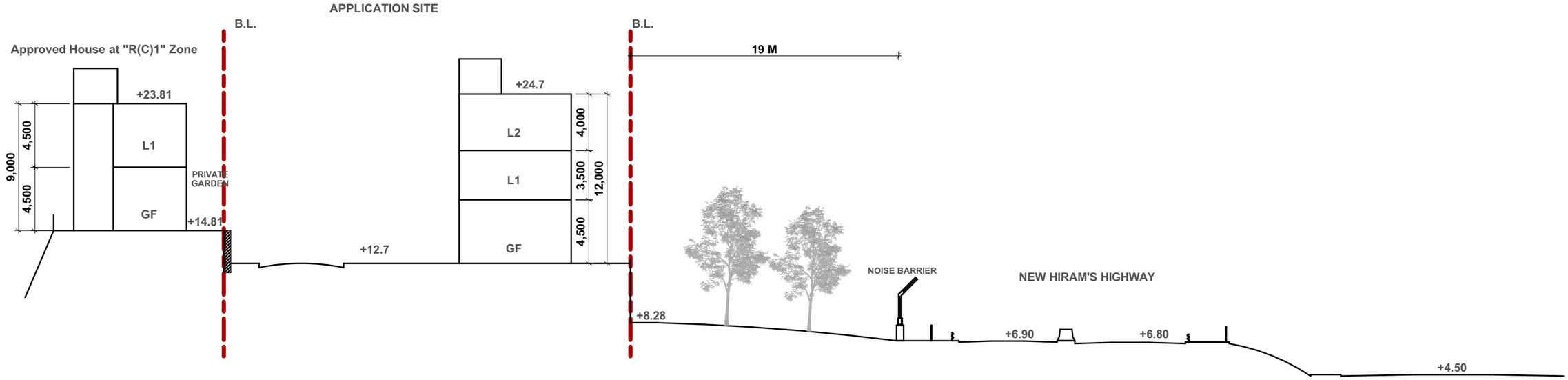
Application for Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131) to Rezone the Application Site from "Green Belt" to "Residential (Group C)1" for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung

1:300@A3

16/04/2024

LEGEND

- Application Site
- Development Site



LWK +PARTNERS

Section BB

Application for Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131) to Rezone the Application Site from "Green Belt" to "Residential (Group C)1" for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung

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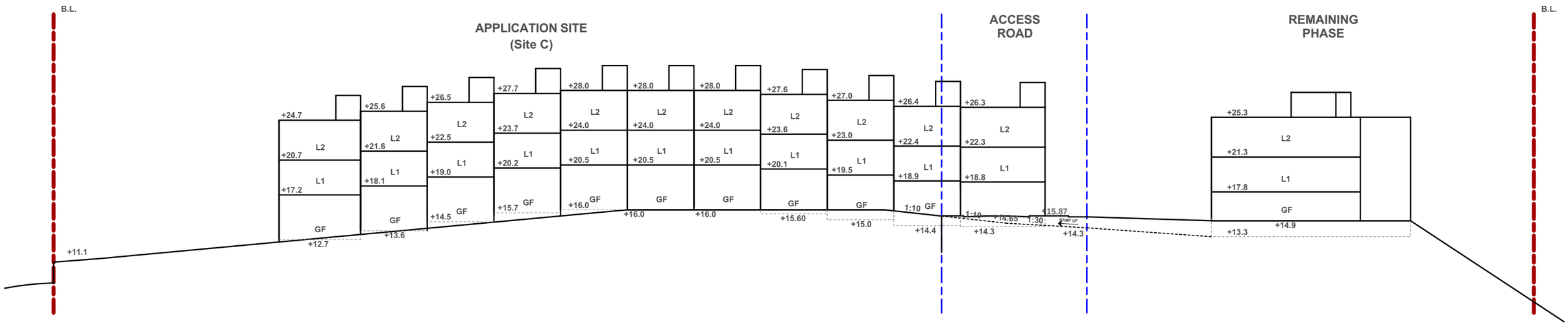
16/04/2024

LEGEND

- Application Site
- Development Site



LWK +PARTNERS

Section CC

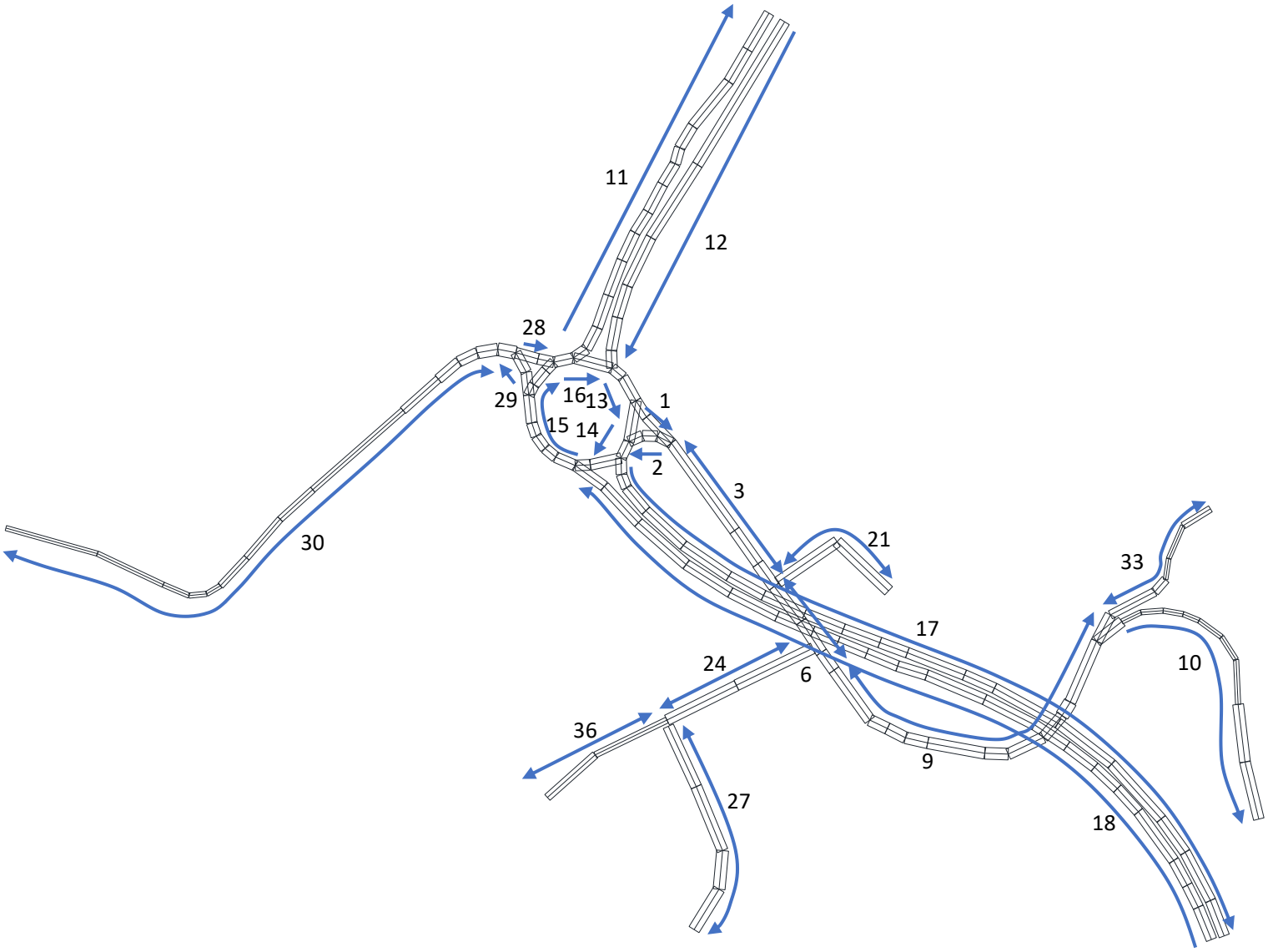
Application for Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131) to Rezone the Application Site from "Green Belt" to "Residential (Group C)1" for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung

1:400@A3

16/04/2024

Appendix 4.1

Traffic Forecast for
Assessment Year 2045


11
12
28
29
16
13
1
15
14
2
3
30
21
33
17
10
24
6
36
9
27
18

Road Name	Link ID	Speed Limit	2045 AM	
			Total Veh	HV%
Hiram's Highway (EB)	1	50	150	58.0
Hiram's Highway (WB)	2	50	100	10.0
Hiram's Highway (1+2)	3	50	250	38.8
Hiram's Highway (EB)	4	50	200	49.0
Hiram's Highway (WB)	5	50	50	10.0
Hiram's Highway (4+5)	6	50	250	41.2
Hiram's Highway (EB)	7	50	200	44.0
Hiram's Highway (WB)	8	50	50	13.0
Hiram's Highway (7+8)	9	50	250	37.8
Hiram's Highway (SB)	10	50	100	49.0
Hiram's Highway (NB)	11	50	1250	24.0
Hiram's Highway (SB)	12	50	1500	20.0
Hiram's Highway (SB)	13	50	1300	22.0
Hiram's Highway (WB)	14	50	1400	14.0
Hiram's Highway (NB)	15	50	1200	23.0
Hiram's Highway (EB)	16	50	1150	22.0
New Hiram's Highway (EB)	17	70	1400	13.0
New Hiram's Highway (WB)	18	50	1150	24.0
Heung Chung Road (19+20)	21	50	100	18.0
Wo Mei Hung Min Road (22+23)	24	50	150	11.7
Mok Tse Che Road (25+26)	27	50	100	12.0
Nam Pin Wai Road (EB)	28	50	150	9.0
Nam Pin Wai Road (WB)	29	50	50	29.0
Nam Pin Wai Road (28+29)	30	50	200	14.0
Nam Wai Road (31+32)	33	50	100	12.5
Wo Mei Hung Min Road (34+35)	36	50	100	12.5

By Fax and by Post
2831 0003

運輸署
Transport Department

本署檔案 Our Ref. : (NPLJN) in TD NR157/161/SKDD-244
來函檔號 Your Ref. : 40862/L47660/SLN/SKL/amw
電 話 Tel. : 2399 2224
圖文傳真 Fax : 2381 3799
電 郵 Email : j_boedihardjo@td.gov.hk

19 December 2023

LLA Consultantcy Limited
Unit 610, 6/F., Island Place Tower,
510 King's Road, North Point, Hong Kong
(Attn.: S L Ng)

Dear Sir/Madam,

Application for Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131) to Rezone the Application Site from "Green Belt" to "Residential (Group C)1" for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung
- 2045 Traffic Forecast for Environmental Assessment

We refer to your above quoted letter dated 13 December 2023 regarding the captioned subject and have no adverse comment.

2. Please note that Noise Impact Assessment is not under our purview. We are not in a position to provide comments on the traffic figures tailor-made for the environmental assessment study.

3. Notwithstanding the above, we have no objection in principle to the methodology of traffic forecast provided that the methodology is consistent with the TIA Report submitted in the project.

Yours faithfully,

(BOEDIHARDJO, Johnathan)
for Commissioner for Transport

c.c.
DPO/SK&Is, PlanD Fax: 2367 2976

From: Johnathan Ding Chian BOEDIHARDJO
To: Steven Lui
Cc: S L Ng; Chi Wai KO
Subject: Re: Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung - Road Classification
Date: Thursday, December 14, 2023 12:13:50 PM

Dear Steven,

I refer to your email dated 13.12.2023. I have no comment on the road classification of Wo Mei Hung Min Road as feeder road.

Regards,
Johnathan BOEDIHARDJO
E/SK, TE/NTE, TD
Tel: 2399 2224

From: Steven Lui <steven@lla.com.hk>
To: "J_boedihardjo@td.gov.hk" <J_boedihardjo@td.gov.hk>
Cc: S L Ng <slng@lla.com.hk>
Date: 13/12/2023 04:15 PM
Subject: Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung - Road Classification

---

Dear Mr. BOEDIHARDJO ,

We are the traffic consultant for the captioned (please see attached for the site location).

We would like to seek your confirmation on the road type of the following road section in the vicinity of the Site, solely for environmental assessment use:

1. Wo Mei Hung Min Road (Feeder Road)

Justifications are provided as below:

1. Wo Mei Hung Min Road

According to TPDM, it states that feeder roads are roads connecting villages or more remote settlements to Rural Roads.
Please note that Wo Mei Hung Min Road links local development, like Royal Garden, to Hiram's Highway which is classified as "Rural Road" under Annual Traffic Census 2022 (Station No.6055).
As a result, Wo Mei Hung Min Road can be considered to classify as a "Feeder Road" matching with the definition in the TPDM.

We would be pleased if you could consider and provide your comment on the above.

Should you have any query or require any additional information, please feel free to contact

our Mr. S L Ng or the undersigned at 2831 9191.

Thanks & Regards
Steven Lui

LLA Consultancy Ltd.
Unit 610, 6/F., Island Place Tower,
510 King's Road, North Point, Hong Kong
Tel : (852) 2831 9191 Fax : (852) 2831 0003
Web Site : http://www.lla.com.hk
Email : steven@lla.com.hk
Company Email : lla@lla.com.hk[attachment "FIGURE2.1-A4.pdf" deleted by Johnathan Ding Chian BOEDIHARDJO/TD/HKSARG]

Appendix 4.2

Predicted Road Traffic Noise Levels
(Base Scenario)

Floor	R01a	R01b	R01c	R02a	R02b	R03a	R03b	R04a	R04b	R05a	R05b	R06a	R06b	R07a	R07b	R08a	R08b	R09a	R09b
3	74.1	73.4	50.7	76.1	49.0	75.9	50.2	75.8	50.7	75.5	51.4	75.3	51.2	75.1	51.4	74.8	51.9	74.8	52.3
2	73.1	72.4	50.0	75.3	47.0	75.2	48.5	75.3	49.0	75.0	49.9	74.6	50.0	74.4	50.1	74.0	50.4	73.9	50.3
1	66.6	66.0	49.0	69.0	45.7	68.5	47.5	68.6	48.0	68.0	49.0	67.6	49.3	67.6	49.4	65.8	49.6	66.3	49.2
Max	74.1	73.4	50.7	76.1	49.0	75.9	50.2	75.8	50.7	75.5	51.4	75.3	51.2	75.1	51.4	74.8	51.9	74.8	52.3
Min	66.6	66.0	49.0	69.0	45.7	68.5	47.5	68.6	48.0	68.0	49.0	67.6	49.3	67.6	49.4	65.8	49.6	66.3	49.2

# Total Houses	17
Exceedance	11
Compliance Rate	35.3%

Noise sensitive receivers with exceedance (≥70.5 dB(A))

For modelling purpose, floors are labelled as 1/F, 2/F and 3/F, which identical to GF, L1 and L2 labelled in **Appendix 2.1** respectively.

Floor	R10a	R10b	R10c	R11a	R11b	R12a	R12b	R13a	R13b	R14a	R14b	R15a	R15b	R16a	R16b	R17a	R17b
3	75.1	75.2	49.1	75.2	49.1	63.5	64.3	67.0	65.1	54.0	67.2	60.6	69.6	60.2	69.6	65.2	69.6
2	74.0	74.1	47.9	73.9	47.5	60.2	63.0	64.2	63.7	51.8	65.0	59.5	70.0	58.3	70.0	63.6	70.1
1	66.2	67.4	47.1	67.1	46.5	56.9	55.7	61.1	56.9	50.6	62.5	58.3	62.6	55.7	62.1	61.4	62.2
Max	75.1	75.2	49.1	75.2	49.1	63.5	64.3	67.0	65.1	54.0	67.2	60.6	70.0	60.2	70.0	65.2	70.1
Min	66.2	67.4	47.1	67.1	46.5	56.9	55.7	61.1	56.9	50.6	62.5	58.3	62.6	55.7	62.1	61.4	62.2

Noise sensitive receivers with exceedance (≥70.5 dB(A))

For modelling purpose, floors are labelled as 1/F, 2/F and 3/F, which identical to GF, L1 and L2 labelled in **Appendix 2.1** respectively.

294065-04 Nam Pin Wai EAS Study - Road Traffic Noise Assessment (Base Scenario)

Floor	R01max	R02max	R03max	R04max	R05max	R06max	R07max	R08max	R09max	R10max	R11max	R12max	R13max	R14max	R15max	R16max	R17max
3	74.1	76.1	75.9	75.8	75.5	75.3	75.1	74.8	74.8	75.2	75.2	64.3	67.0	67.2	69.6	69.6	69.6
2	73.1	75.3	75.2	75.3	75.0	74.6	74.4	74.0	73.9	74.1	73.9	63.0	64.2	65.0	70.0	70.0	70.1
1	66.6	69.0	68.5	68.6	68.0	67.6	67.6	65.8	66.3	67.4	67.1	56.9	61.1	62.5	62.6	62.1	62.2
Max	74.1	76.1	75.9	75.8	75.5	75.3	75.1	74.8	74.8	75.2	75.2	64.3	67.0	67.2	70.0	70.0	70.1
Min	66.6	69.0	68.5	68.6	68.0	67.6	67.6	65.8	66.3	67.4	67.1	56.9	61.1	62.5	62.6	62.1	62.2

Noise sensitive receivers with exceedance (≥70.5 dB(A))

For modelling purpose, floors are labelled as 1/F, 2/F and 3/F, which identical to GF, L1 and L2 labelled in **Appendix 2.1** respectively.

Appendix 4.3

Predicted Road Traffic Noise Levels
(Mitigated Scenario)

294065-04 Nam Pin Wai EAS Study - Road Traffic Noise Assessment (Mitigated Scenario)

Floor	R01a	R01b	R01c	R02a	R02b	R03a	R03b	R04a	R04b	R05a	R05b	R06a	R06b	R07a	R07b	R08a	R08b	R09a	R09b
3	68.1	67.4	50.7	70.1	49.0	69.9	50.2	69.8	50.7	69.5	51.4	69.3	51.2	69.1	51.4	68.8	51.9	68.8	52.3
2	67.1	66.4	50.0	69.3	47.0	69.2	48.5	69.3	49.0	69.0	49.9	68.6	50.0	68.4	50.1	68.0	50.4	67.9	50.3
1	66.6	66.0	49.0	69.0	45.7	68.5	47.5	68.6	48.0	68.0	49.0	67.6	49.3	67.6	49.4	65.8	49.6	66.3	49.2
Max	68.1	67.4	50.7	70.1	49.0	69.9	50.2	69.8	50.7	69.5	51.4	69.3	51.2	69.1	51.4	68.8	51.9	68.8	52.3
Min	66.6	66.0	49.0	69.0	45.7	68.5	47.5	68.6	48.0	68.0	49.0	67.6	49.3	67.6	49.4	65.8	49.6	66.3	49.2

# Total Houses	17
Exceedance	0
Compliance Rate	100.0%

Noise sensitive receivers applied with acoustic window (Baffle Design)

For modelling purpose, floors are labelled as 1/F, 2/F and 3/F, which identical to GF, L1 and L2 labelled in **Appendix 2.1** respectively.

Floor	R10a	R10b	R10c	R11a	R11b	R12a	R12b	R13a	R13b	R14a	R14b	R15a	R15b	R16a	R16b	R17a	R17b
3	69.1	69.2	49.1	69.2	49.1	63.5	64.3	67.0	65.1	54.0	67.2	60.6	69.6	60.2	69.6	65.2	69.6
2	68.0	68.1	47.9	67.9	47.5	60.2	63.0	64.2	63.7	51.8	65.0	59.5	70.0	58.3	70.0	63.6	70.1
1	66.2	67.4	47.1	67.1	46.5	56.9	55.7	61.1	56.9	50.6	62.5	58.3	62.6	55.7	62.1	61.4	62.2
Max	69.1	69.2	49.1	69.2	49.1	63.5	64.3	67.0	65.1	54.0	67.2	60.6	70.0	60.2	70.0	65.2	70.1
Min	66.2	67.4	47.1	67.1	46.5	56.9	55.7	61.1	56.9	50.6	62.5	58.3	62.6	55.7	62.1	61.4	62.2

Noise sensitive receivers applied with acoustic window (Baffle Design)

For modelling purpose, floors are labelled as 1/F, 2/F and 3/F, which identical to GF, L1 and L2 labelled in **Appendix 2.1** respectively.

Floor	R01max	R02max	R03max	R04max	R05max	R06max	R07max	R08max	R09max	R10max	R11max	R12max	R13max	R14max	R15max	R16max	R17max
3	68.1	70.1	69.9	69.8	69.5	69.3	69.1	68.8	68.8	69.2	69.2	64.3	67.0	67.2	69.6	69.6	69.6
2	67.1	69.3	69.2	69.3	69.0	68.6	68.4	68.0	67.9	68.1	67.9	63.0	64.2	65.0	70.0	70.0	70.1
1	66.6	69.0	68.5	68.6	68.0	67.6	67.6	65.8	66.3	67.4	67.1	56.9	61.1	62.5	62.6	62.1	62.2
Max	68.1	70.1	69.9	69.8	69.5	69.3	69.1	68.8	68.8	69.2	69.2	64.3	67.0	67.2	70.0	70.0	70.1
Min	66.6	69.0	68.5	68.6	68.0	67.6	67.6	65.8	66.3	67.4	67.1	56.9	61.1	62.5	62.6	62.1	62.2

Noise sensitive receivers applied with acoustic window (Baffle Design)

For modelling purpose, floors are labelled as 1/F, 2/F and 3/F, which identical to GF, L1 and L2 labelled in **Appendix 2.1** respectively.

Appendix 8.1

Historical Aerial Photos

HISTORICAL AERIAL PHOTO - YEAR 1973

Printed by : 20/12/2023
Filename : \\global\EastAsia\HKG\Group\CIENV\env\project\294065\13 Drawing Deliverables\report\Draft EA Report\Appendix\Appendix 8.1 - Historical Aerial Photo - Year 1973.dgn

HISTORICAL AERIAL PHOTO - YEAR 1982

Printed by : 20/12/2023
Filename : \\global\EastAsia\HKG\Group\CIENV\env\project\294065\13 Drawing Deliverables\report\Draft EA Report\Appendix\Appendix 8.1 - Historical Aerial Photo - Year 1982.dgn

HISTORICAL AERIAL PHOTO - YEAR 1992

Printed by : 20/12/2023
Filename : \\global\EastAsia\HKG\Group\CIENV\env\project\294065\13 Drawing Deliverables\report\Draft EA Report\Appendix\Appendix 8.1 - Historical Aerial Photo - Year 1992.dgn

HISTORICAL AERIAL PHOTO - YEAR 2004

Printed by : 20/12/2023
Filename : \\global\EastAsia\HKG\Group\CIENV\env\project\294065\13 Drawing Deliverables\report\Draft EA Report\Appendix\Appendix 8.1 - Historical Aerial Photo - Year 2004.dgn

HISTORICAL AERIAL PHOTO - YEAR 2012

Printed by : 20/12/2023
Filename : \\global\EastAsia\HKG\Group\CIENV\env\project\294065\13 Drawing Deliverables\report\Draft EA Report\Appendix\Appendix 8.1 - Historical Aerial Photo - Year 2012.dgn

HISTORICAL AERIAL PHOTO - YEAR 2023

Printed by : $DATE$
Filename : $FILE$

Appendix 8.2

Photo Record of Site Survey

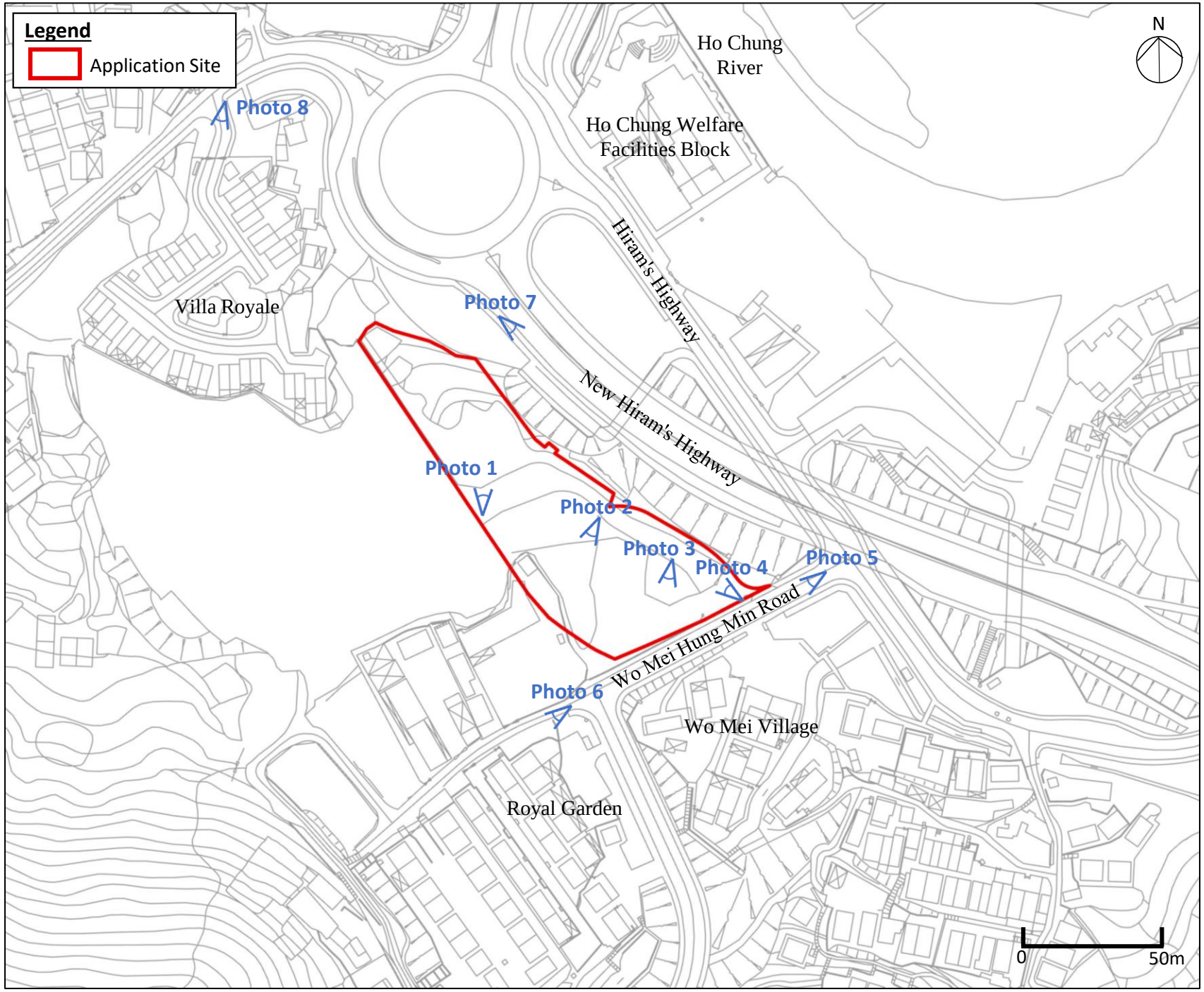

Legend
Application Site
N
Ho Chung River
Photo 8
Ho Chung Welfare Facilities Block
Hiram's Highway
Villa Royale
Photo 7
New Hiram's Highway
Photo 1
Photo 2
Photo 3
Photo 4
Photo 5
Wo Mei Hung Min Road
Photo 6
Wo Mei Village
Royal Garden
0
50m

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

Photo 6

Photo 7

Photo 8

Appendix 8.3

Site Walkover Checklist

1) GENERAL SITE DETAILS	
Site Owner/ Client	Top Deluxe Limited
Property Address	Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung
Person Conducting the Questionnaire (name & position)	Stevie Law, Assistant Consultant
Authorised Owner/ Client Representative (if applicable) (name, position & telephone)	Top Deluxe Limited

2) ACTIVITIES	
Briefly describe activities carried out on site, including types of products/chemicals/materials handled. **Obtain a flow schematic if possible.**	Temporary works area for construction of access road
Number of employees:	N/A
- Full-time:	N/A
- Part-time:	N/A
- Temporary/Seasonal:	N/A
Maximum no. of people on site at any time:	N/A
Typical hours of operation:	N/A
Number of shifts:	N/A
Days per week:	N/A
Weeks per year:	N/A
Scheduled plant shut-down:	N/A
Detail the main sources of energy at the site:	
Gas (Yes/No)	N/A
Electricity (Yes/No)	N/A
Coal (Yes/No)	N/A
Oil (Yes/No)	N/A
Other (Yes/No)	N/A

3) SITE DESCRIPTION	
This section is intended to gather information on site setting and environmental receptors on, adjacent or close to the site.	
What is the total site area (m^2):	6601
What area of the site is covered by buildings (%):	0%
Please list all current and previous owners/occupiers if possible.	Top Deluxe Limited
Is a site plan available? (Yes/No) If yes, please attach.	No
Are there any other parties on site as tenants or sub-tenants? (Yes/No) If yes, identify those parties.	No
Describe surrounding land use (residential, industrial, rural, etc.) and identify neighbouring facilities and types of industry.	
North:	Villa Royale
South:	Wo Mei Hung Min Road
East:	New Hiram's Highway
West:	A low-rise residential development under construction
Describe the topography of the area (flat terrain, rolling hills, mountains, by a large body of water, vegetation, etc.).	Generally flat terrain with some slope
State the size and location of the nearest residential communities.	Villa Royale at the North of the site
Are there any sensitive habitats nearby, such as nature reserves, parks, wetlands, or sites of special scientific interest?	No

4) QUESTIONNAIRE WITH EXISTING/ PREVIOUS SITE OWNER OR OCCUPIER		
	Yes/No	**Notes**
1. What are the main activities/operations at the above address?	N/A	Temporary works area for construction of access road
2. How long have you been occupying the site?	N/A	-
3. Were you the first occupant on site? (If yes, what was the usage of the site prior to occupancy.)	N/A	-
4. Prior to your occupancy, who occupied the site?	N/A	No information
5. What were the main activities/operations during their occupancy?	N/A	No information
6. Have there been any major changes in operations carried out at the site in the last 10 years?	N/A	No information
7. Have any polluting activities been carried out in the vicinity of the site in the past?	N/A	No information
8. To the best of your knowledge, has the site ever been used as a petrol filling station/car service garage?	N/A	-
9. Are there any boreholes/wells or natural springs either on the site or in the surrounding area?	N/A	-
10. Do you have any registered hazardous installations as defined under relevant ordinances? (If yes, please provide details.)	N/A	-
11. Are any chemicals used in your daily operations? (If yes, please provide details.)	N/A	-
- Where do you store these chemicals?	N/A	-
12. Material inventory lists, including quantities and locations available? (If yes, how often are these inventories updated?)	N/A	-
13. Has the facility produced a separate hazardous substance inventory?	N/A	-
14. Have there ever been any incidents or accidents (e.g. spills, fires, injuries, etc.) involving any of these materials? (If yes, please provide details.)	N/A	-
15. How are materials received (e.g. rail, truck, etc.) and stored on site (e.g. drums, tanks, carboys, bays, silos, cisterns, vaults and cylinders)?	N/A	-

4) QUESTIONNAIRE WITH EXISTING/ PREVIOUS SITE OWNER OR OCCUPIER (CONTINUED)		
	Yes/No	**Notes**
16. Do you have any underground storage tanks? (If yes, please provide details.)	N/A	-
- How many underground storage tanks do you have on site?		
- What are the tanks constructed of?		
- What are the contents of these tanks?		
- Are the pipelines above or below ground?		
- If the pipelines are below ground, has any leak and integrity testing been performed?		
- Have there been any spills associated with these tanks?		
17. Are there any disused underground storage tanks?	N/A	-
18. Do you have regular check for any spillage and monitoring of chemicals handled? (If yes, please provide details.)	N/A	-
19. How are the wastes disposed of?	N/A	-
20. Have you ever received any notices of violation of environmental regulations or received public complains? (If yes, please provide details.)	N/A	-
21. Have any spills occurred on site? (If yes, please provide details)	N/A	-
- When did the spill occur?		
- What were the substances spilled?		
- What was the quantity of material spilled?		
- Did you notify the relevant departments of the spill?		
- What were the actions taken to clean up the spill?		
- What were the areas affected?		
22. Do you have any records of major renovation of your site or re-arrangement of underground utilities, pipe work/underground tanks? (If yes, please provide details.)	N/A	-
23. Have disused underground tanks been removed or otherwise secured (e.g. concrete, sand, etc.)?	N/A	-
24. Are there any known contaminations on site? (If yes, please provide details.)	N/A	-
25. Has the site ever been remediated? (If yes, please provide details.)	N/A	-

5) SITE SURVEY INFORMATION	
1. Date of Survey:	27/01/2023 & 08/11/2023

6) OBSERVATIONS		
	Yes/No	**Notes**
1. Are chemical storage areas provided with secondary containment (i.e. bund walls and floors)?	N/A	N/A
2. What are the conditions of the bund walls and floors?	N/A	N/A
3. Are any surface water drains located near to drum storage and unloading areas?	No	N/A
4. Are any solid or liquid waste (other than wastewater) generated at the site? (If yes, please provide details.)	No	N/A
5. Is there a storage site for the wastes?	No	N/A
6. Is there an on-site landfill?	No	N/A
7. Were any stressed vegetation noted on site during the site reconnaissance? (If yes, please indicate location and approximate size.)	No	N/A
8. Were any stained surfaces noted on-site during the site reconnaissance? (If yes, please provide details.)	No	N/A
9. Are there any potential off-site sources of contamination?	No	N/A
10. Does the site have any equipment which might contain polychlorinated biphenyls (PCBs)?	No	N/A
11. Are there any sumps, effluent pits, interceptors or lagoons on site?	No	N/A
12. Any noticeable odours during site walkover?	No	N/A
13. Are any of the following chemicals used on site: fuels, lubricating oils, hydraulic fluids, cleaning solvents, used chemical solutions, acids, anti-corrosive paints, thinners, coal, ash, oily tanks and bilge sludge, metal wastes, wood preservatives, and polyurethane foam?	No	N/A

Appendix 8.4

Relevant Correspondence with FSD

消 防 處
香港九龍尖沙咀東部康莊道 1 號
消防總部大廈

FIRE SERVICES DEPARTMENT
FIRE SERVICES HEADQUARTERS BUILDING,
No.1 Hong Chong Road,
Tsim Sha Tsui East, Kowloon,
Hong Kong.

本處檔號 **OUR REF.** : (158) in FSD GR 6-5/4 R Pt. 50
來函檔號 **YOUR REF.** : 294065/00/L002/WSTY/CKJL/JS/sl/05190
電子郵件 **E-mail** : hkfsdenq@hkfsd.gov.hk
圖文傳真 **FAX NO.** : 2988 1196
電　　話 **TEL NO.** : 2733 7570

28 December 2023

CON | Date | By | ARUP
Job no. 294065100
File no. | File original: Yes / No
Registration no. 05943
Received - 5 JAN 2024
Initials | WTL | WSTY | MYN | LCKJL
Action | Info. | Copy | Archive | Dis. | Scan

ARUP
Level 5, Festival Walk,
80 Tat Chee Avenue,
Kowloon Tong, Kowloon
(Attn: Ms. Theresa YEUNG, Director)

Dear Ms. YEUNG,

Environmental Assessment Study for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung
Request for Information of Dangerous Goods & Incident Records

I refer to your letter of 13.12.2023 regarding the captioned request and reply below in response to your questions:-

Please be advised that neither records of dangerous goods license, fire incidents nor incidents of spillage / leakage of dangerous goods were found in connection with the given conditions of your request at the subject location.

If you have further questions, please feel free to contact the undersigned.

Yours sincerely,

(LAI Kin-man)
for Director of Fire Services

Appendix 8.5

Relevant Correspondence with EPD

本署檔號
OUR REF: EP640/G1/2 PT.III
來函檔號
YOUR REF:
電　話
TEL. NO.: 2117 7531
圖文傳真
FAX NO : 2756 8588
電子郵件
E-MAIL: chhung@epd.gov.hk
網　址
HOMEPAGE: http://www.epd.gov.hk

Environmental Protection Department
Environmental Compliance Division
Regional Office (East)

5th Floor, Nan Fung Commercial Centre,
19 Lam Lok Street, Kowloon Bay,
Kowloon, Hong Kong.

環境保護署
環保法規管理科
區域辦事處(東)
香港九龍九龍灣臨樂街
十九號南豐商業中心五樓

ARUP 087

Job No.	294065/00
Register No.	05930
Received	19 Dec 2023

Initial	WTL	WSTY	MYNL	CKJL		
Action						
Info						
Copy						

By Post and Fax (2268 3954)
18 December 2023

Arup Hong Kong Limited
Level 5, Festival Walk
80 Tat Chee Avenue, Kowloon Tong, Kowloon, Hong Kong
(Attn. : Theresa YEUNG, Director)

Dear Sir/ Madam,

Re: Environmental Assessment Study for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung
Request for Information of Chemical Waste Producers Registration and Chemical Spillage Accident Records

I refer to your letter dated 13.12.2023 requesting below information for the captioned site in Sai Kung district

- The records of Chemical Waste Producers Registration of the area within the Site Boundary and;
- Past and present chemical spillage / leakage records of the area within the Site Boundary.

2. According to our office record, there is no relevant record within the project site stated in your letter ref. 294065/00/L001/WSTY/CKJL/JS/sl/05189. You are reminded that this information is not exhaustive and you are advised to check with other concerned parties / authorities responsible for handling chemical leakage / spillage incidents. You may also consider taking samples for your study of land contamination, if necessary.

3. If you have any enquiry, please contact the undersigned.

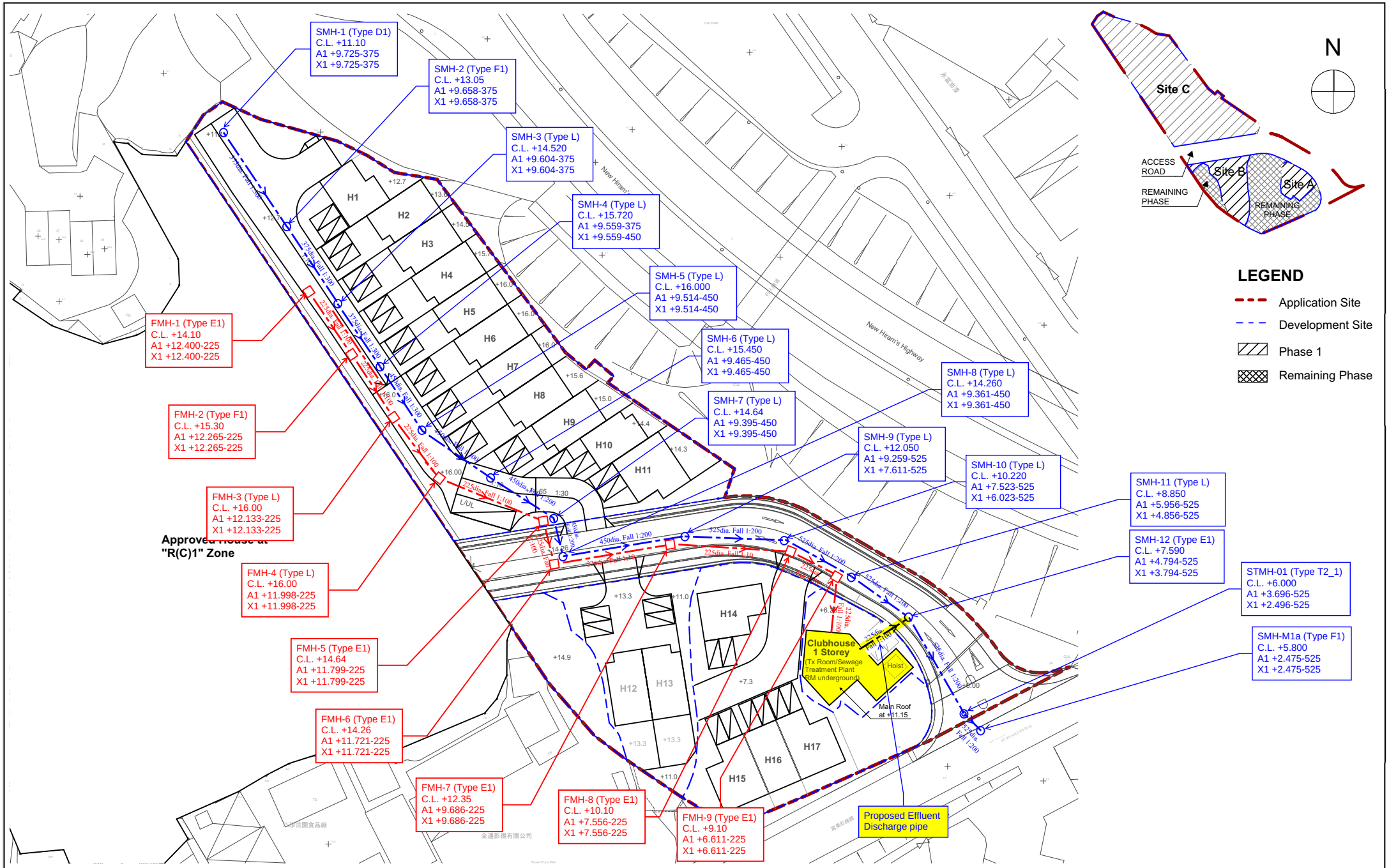
Yours faithfully,

Jack Hung

(Jack C.H. HUNG)
Regional Office (East)
Environmental Protection Department

Appendix 10.1

Details of the Proposed Onsite Sewage Treatment Plant



MARK	DATE	BY	REV.
-	26/01/2023	IP	F

JOB TITLE

Application for Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131) to Rezone the Application Site from "Green Belt" to "Residential (Group C)1" for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung

DRAWING TITLE

Proposed Drainage and Sewerage Layout within Site

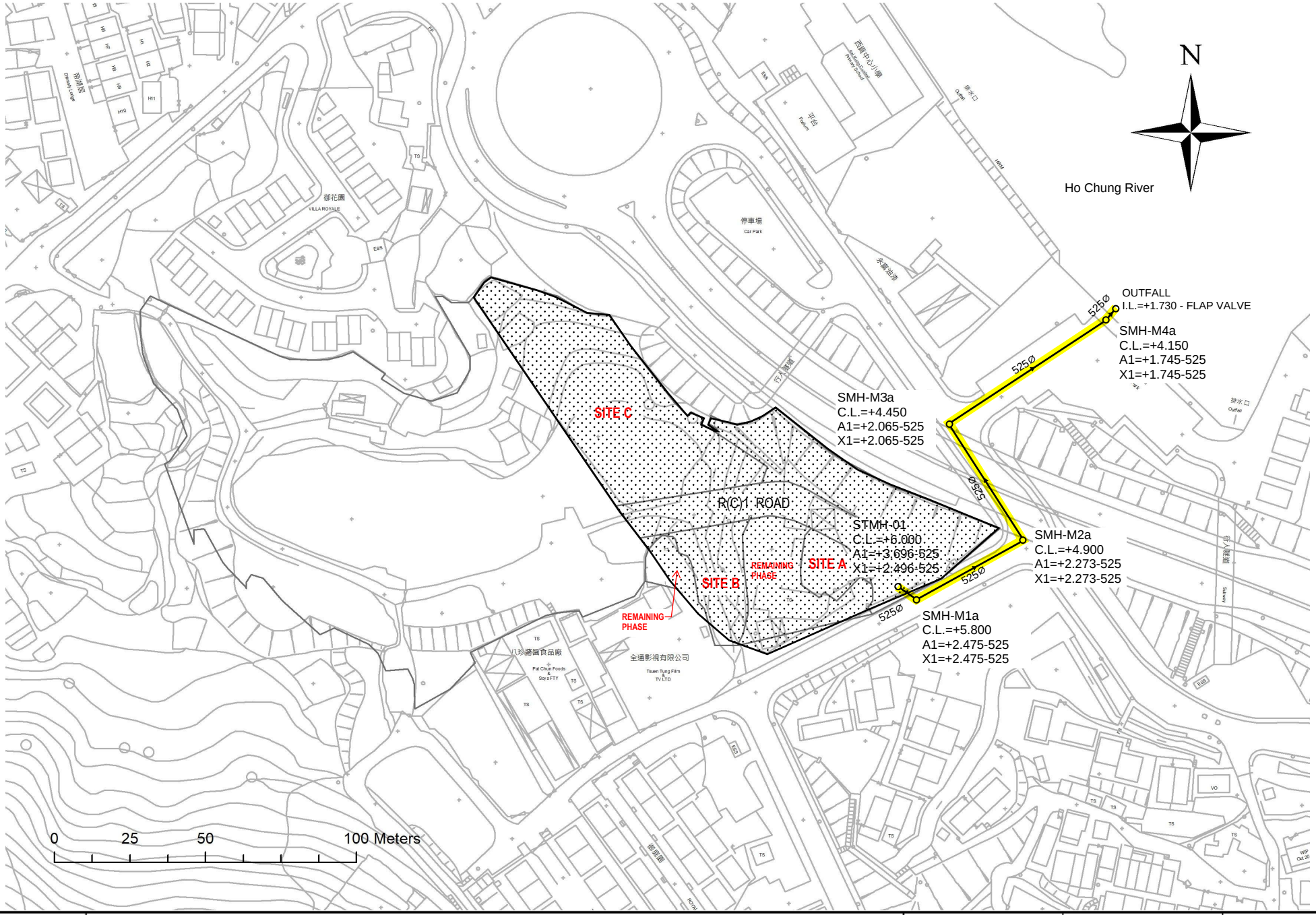
DRAWING STATUS

FOR INFORMATION

ARUP

SCALE	1:600@A3		
DRN. IP	DATE 17/1/2023	CHD. CC	PASSED. CC

JOB NO.	DRAWING NO.	REV.
282344	PLAN 1	



NOTE:
THE PROPOSED DRAINAGE ALIGNMENTS SHOWN IN THE DRAWINGS ARE INDICATIVE ONLY. THE EXACT ALIGNMENTS SHALL BE DETERMINED ON SITE AND AFGREED BY THE PROJECT MANAGER AND HIS REPRESENTATIVE.

LEGEND:

PROPOSED CATCHMENT AREA

PROPOSED DRAINAGE MANHOLE

1050Ø PROPOSED STORMWATER DRAIN

JOB TITLE
Application for Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131) to Rezone the Application Site from "Green Belt" to "Residential (Group C)1" for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung

DRAWING TITLE
Proposed Drainage Layout Plan outside Site

DRAWING STATUS
FOR INFORMATION

ARUP

SCALE AS SHOWN
DRN. IP DATE CHD. CC PASSED. CC

JOB NO. 282344
DRAWING NO. PLAN 2
REV.

MARK	DATE	BY	REV.
-	25/11/2022	IP	F

Appendix J

Quantitative Risk Assessment for High Pressure Gas Pipeline

Application for Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131) to Rezone the Application Site from "Green Belt" to "Residential (Group C)1" for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung

Quantitative Risk Assessment for High Pressure Town Gas Pipeline

Job number 294065

Ove Arup & Partners Hong Kong Ltd
Level 5 Festival Walk
80 Tat Chee Avenue
Kowloon Tong
Kowloon
Hong Kong
www.arup.com

ARUP

Contents

Appendices

Appendix A
Reply from The Hong Kong and China Gas Company Limited

Appendix B
Population Data Adopted

Appendix C
Failure Frequencies

Appendix D
Input Parameters and Consequence Results

1 Introduction

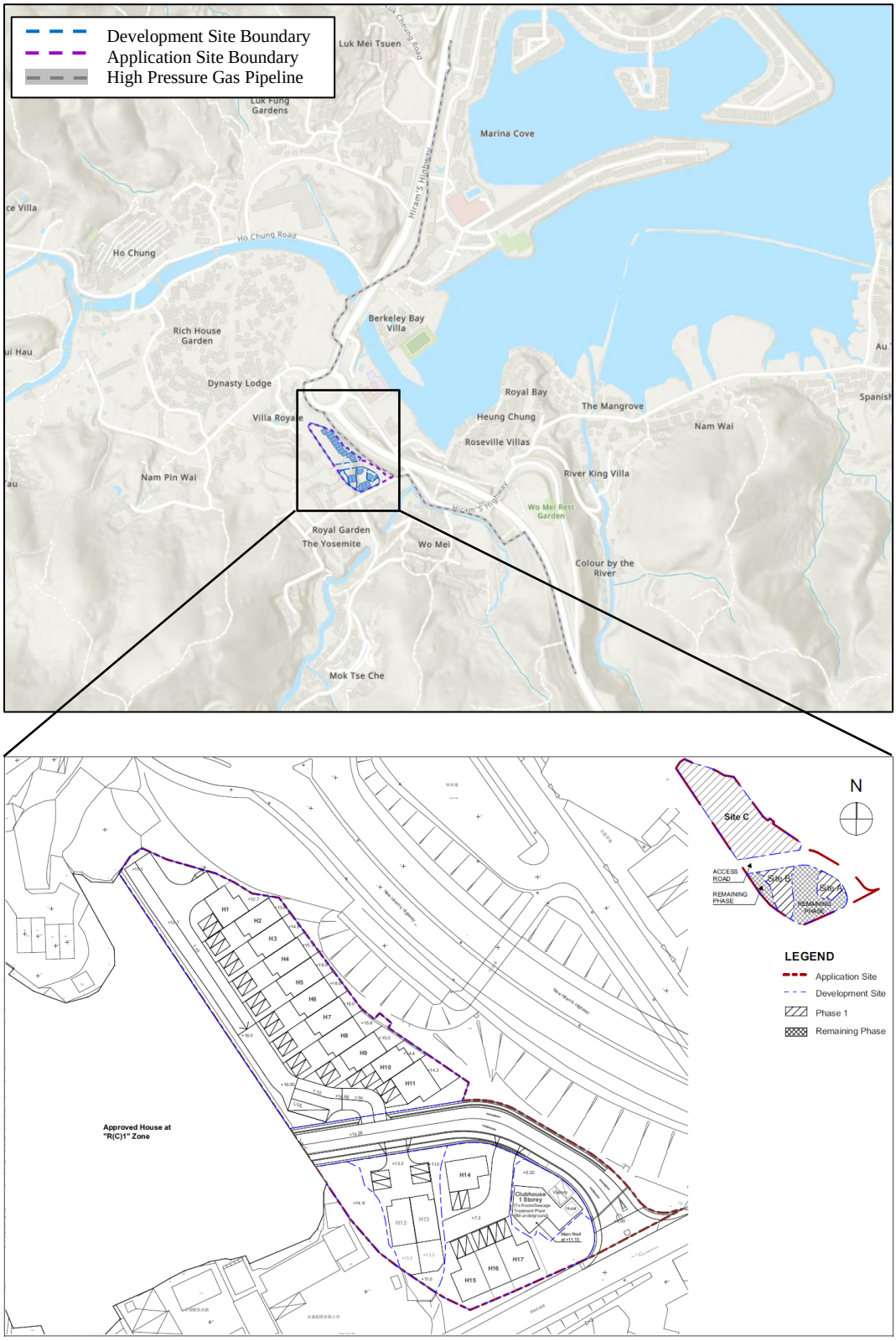
1.1 Background

1.1.1.1 This Quantitative Risk Assessment (QRA) report is prepared in support of the Application for Amendment of Plan Under Section 12A (the "Proposed Amendment") of the Town Planning Ordinance (Cap. 131) to the Approved Ho Chung Outline Zoning Plan (OZP) No. S/SK-HC/11 by rezoning the Application Site from "Green Belt" ("GB") to the same "Residential (Group C)1" ("R(C)1") zone to the immediate west of the Application Site ("the Proposed Amendment").

1.1.1.2 The Application Site is about 6,601m^2, and is located to the west of the New Hiram's Highway. The Application Site is situated in a predominantly residential neighbourhood in Nam Pin Wai area with existing and planned low-dense houses and village settlements. The Application Site is accessible to the Wo Mei Hung Min Road via the approved access road serving the adjoining "R(C)1" development, which further connects to the New Hiram's Highway (a district distributor road) to other parts in Sai Kung, Kowloon East and Tseung Kwan O areas. According to the Approved Ho Chung OZP No. S/SK-HC/11, the Application Site is currently zoned as "GB".

1.1.1.3 The Development Site area of about 5,355m^2 is proposed and defined after excluding the access road located at the central part of the Application Site. A high pressure gas pipeline was identified running along Hiram's highway which is located at the east of the Proposed House Development. **Figure 1.1** shows the location of the Proposed House Development, the high pressure gas pipeline and the master layout plan of the Proposed House Development.

Figure 1.1 Master Layout Plan of the Proposed House Development in Sai Kung



1.2 Objectives of the Study

1.2.1.1 The objective of this report is to conduct a QRA to assess the risks posed by the existing high pressure gas pipeline and any gas installations in the vicinity of the Proposed House Development. Subject to the modelling results, recommendations for mitigation measures, protection works, and other measures and works to be carried out within the Proposed House Development will be proposed to ensure that the risks posed by the high pressure gas pipeline and any gas installations in the vicinity of the Proposed House Development would comply with the risk guidelines as described in Section 4.4, Chapter 12 of the Hong Kong Planning Standards and Guidelines (HKPSG).

1.3 Scope of Work

1.3.1.1 The scope of work for the QRA includes:

- Identifying all potential hazards-to-life, including the population of the Proposed House Development, due to the high pressure gas pipeline.
- Undertaking a hazard assessment to quantify the risk level and to recommend risk mitigation measures to comply with the "risk guidelines in HKPSG".

1.4 Structure of Report

1.4.1.1 The structure of this quantitative risk assessment report is as follows:

Section 1 Provides the background, objectives, and scope of this study

Section 2 Provides the background information of the Proposed House Development and the high pressure gas pipeline.

Section 3 States the legislation, standards and guidelines;

Section 4 Summarizes the population and meteorological data;

Section 5 Identifies the hazard scenarios and provides the frequency analysis

Section 6 Provides the consequence analysis

Section 7 Evaluates the individual risk and societal risk

Section 8 Summarizes the findings

Section 9 Lists the references adopted in this study

2 Background Information

2.1 High Pressure Town Gas Pipeline

2.1.1.1 The Hong Kong and China Gas Limited (HKCG) operates a town gas high pressure gas pipeline near to the Proposed House Development which follows the alignment of Hiram's Highway in Sai Kung. **Figure 2.1** shows the alignment of the pipeline. The closest distance of the pipeline to the site boundary of the Proposed House Development is around 10 – 15m. **Table 2.1** lists the summary of the high pressure gas pipeline technical specification based on communication with HKCG and the reply from HKCG is shown in **Appendix A**.

Figure 2.1 Alignment of the pipeline

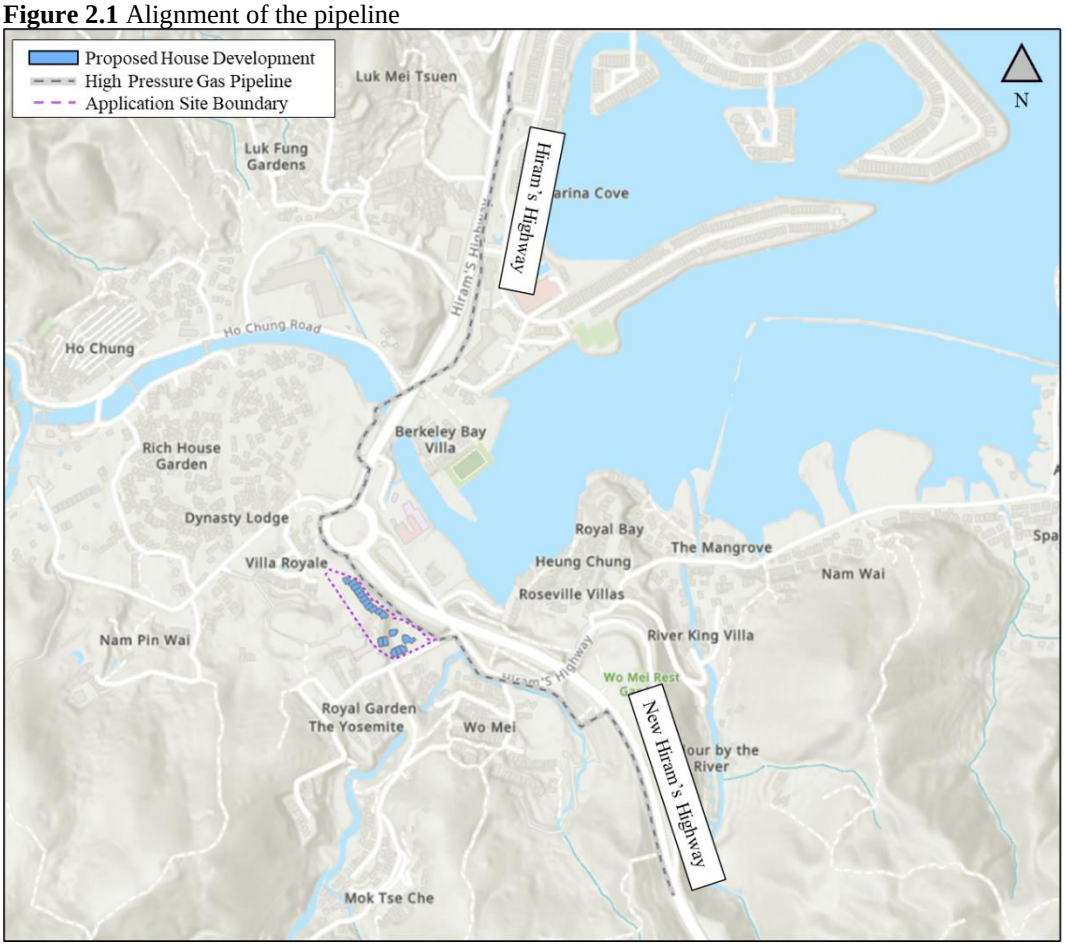


Table 2.1 Technical specification of town gas high pressure pipeline

Parameter	Specification
Pipe Diameter (Nominal)	750 mm
Pipe Wall Thickness	12.7mm
Design Pressure	35 barg
Maximum Operation Pressure	35 barg
Hydraulic Test Pressure	900 psi
Pipe Material	Steel
Minimum Depth	1.lm

Parameter	Specification
Material Grading (Pipe/ Fitting)	API 5L X 52
Jointing Method	Butt Welding
Welding Specification	Welding complied with BS4515 & BGC/PS/P2

2.2 Town Gas Composition

2.2.1.1

Town gas is a mixture of hydrogen, methane, carbon monoxide and carbon dioxides. In Hong Kong, 98% of town gas is produced at the plant located in Tai Po and the rest is produced at the plant located in Ma Tau Kok. The composition of town gas is provided in **Table 2.2**. Town gas, produced from natural gas (60%), naphtha (39%) and landfill gas (1%), is the final product of the gas works. It is a clean, safe and reliable gaseous fuel. With about half the density of air, it rises and will dissipate in the air if leakage occurs. It has neither colour nor odour. Therefore, odouriser has been added to the gas such that it can easily be detected.

Table 2.2 Town gas composition and properties

Parameter	Specification
Hydrogen	49.0% (vol)
Methane	28.5% (vol)
Carbon Dioxide	19.5% (vol)
Carbon Monoxide	3.0% (vol)
Wobbe Index	24
Weaver Flame Speed	35

Notes:

[1] Reference: Section 3.9.2 of EMSD's Guidance Note on Quantitative Risk Assessment Study for High Pressure Town Gas Installations in Hong Kong.

3 Legislation, Standard and Guideline

3.1.1.1 The high pressure town gas pipeline is classified as Notifiable Gas Installation (NGI) instead under the Gas Safety Ordinance Cap. 51. Hence, a Quantitative Risk Assessment (QRA) report is required to assess the potential risk impact of the high pressure gas pipelines on the populations in their vicinity including the Proposed House Development and ascertain that the risk level is acceptable with the Government Risk Guidelines referred to in Section 3.11 of the EMSD's Guidance Note on Quantitative Risk Assessment Study for High Pressure Town Gas Installations in Hong Kong (GN).

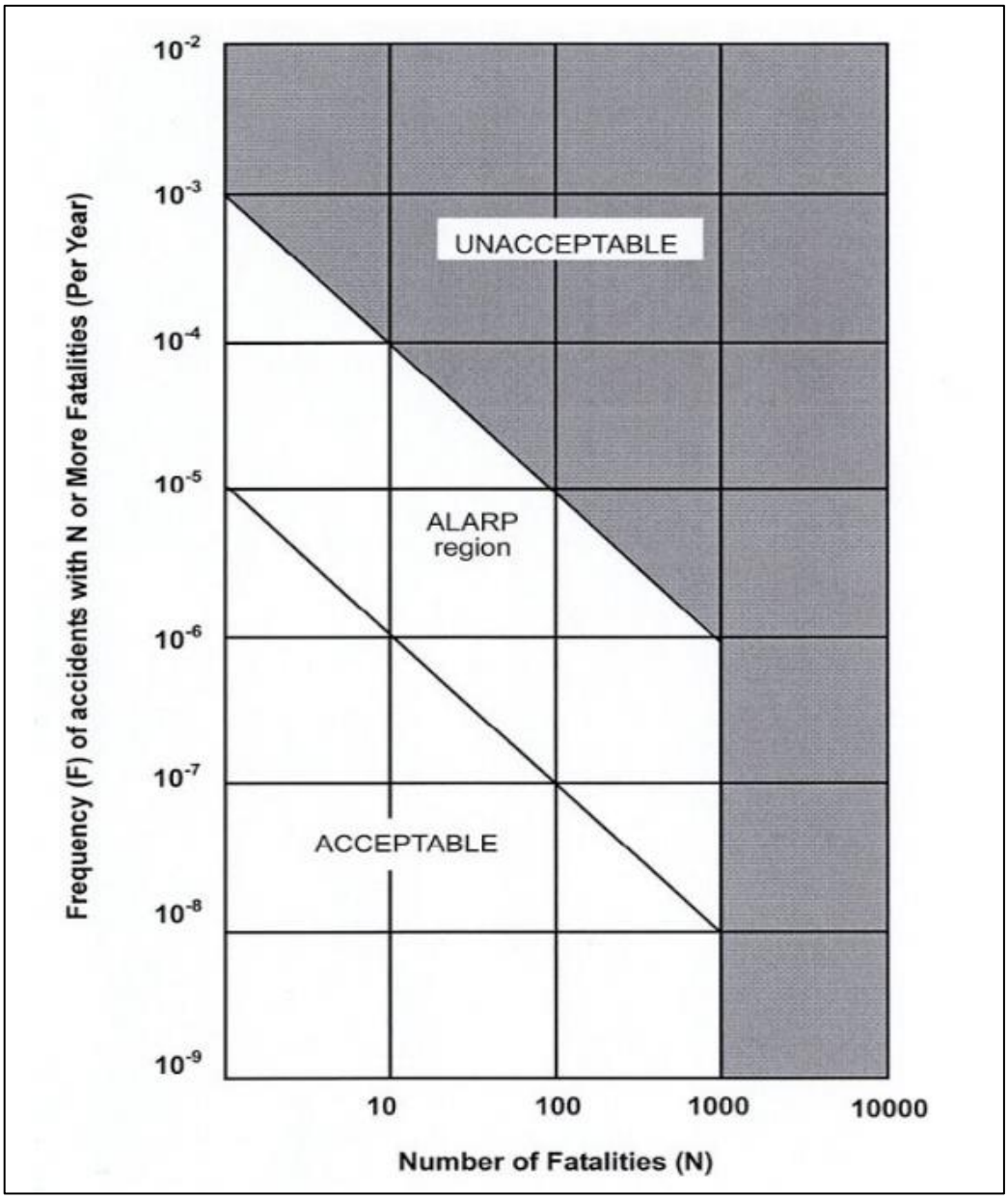
3.2 Quantitative Risk Assessment Study for High Pressure Town Gas Installations in Hong Kong

3.2.1.1 In accordance with the GN, a set of Risk Guidelines (RG) has been adopted by CCPHI to assess the off-site risk levels of PHIs. These guidelines are expressed in terms of individual and societal risks as shown in **Table 3.1**.

Table 3.1 Criteria for individual and societal risks

Risk	Description
Individual Risk	It is the predicted increase in the chance of death per year to an individual who lives or works near to a PHI. Maximum level of off-site individual risk associated with PHIs should not exceed 1 in 100,000 per year i.e. $1x10^{-5}$/year.
Societal Risk	It expresses the risks to the whole population living near a PHI. With the population increases, the societal risk will be increased. The societal RG is presented graphically in **Figure 3.1**. It is expressed in terms of lines plotting the cumulative frequency (F) of N or more deaths in the population from incidents at the installation. Two F-N risk lines are used in the RG that mark "acceptable" or "unacceptable" societal risks. The intermediate region indicates the acceptability of societal risk is borderline and should be reduced to a level which is "as low as is reasonably practicable" (ALARP). It seeks to ensure that all practicable and cost effective measures that can reduce risk will be considered.

Figure 3.1 Hong Kong Societal Risk Criteria



3.3 Guidance Note on Quantitative Risk Assessment Study for High Pressure Town Gas Installations in Hong Kong

3.3.1.1 Guidance Note on Quantitative Risk Assessment Study for High Pressure Town Gas Installations in Hong Kong (GN) covers the methodology of QRA for high pressure town gas installation including high pressure gas pipelines, high pressure town gas regulating station (offtake and/or pigging station) with high pressure gas pipelines connected.

4 Population and Meteorological Data

4.1 Assessment Year

4.1.1.1 By considering the construction and operational stage for this Proposed House Development, as the number of workers for construction phase is assumed to be less than 100 people which is more than the number of population intake, i.e. around 51 people, for this Proposed House Development, the QRA for both phases would be assessed.

4.1.1.2 Based on the current tentative implementation programme, population intake will be in Year 2030. The next TPEDM year, i.e. Year 2031, has been taken as the assessment year for a conservative assessment.

4.2 Study Zone

4.2.1.1 In accordance with GN, the Study Zone (SZ) for this Proposed House Development is the area covering 200 metres from the highest risk of 1.6km high pressure gas pipelines section. The SZ is shown in **Figure 4.1**.

Figure 4.1 Study Zone

4.3 Population Data

4.3.1 Time Variation Mode

The time variation mode reflects the variations of population in each location during working days, peak traffic hour, weekend and night. Detailed description and frequency per year for each time variation mode is presented in **Table 4.1**.

Table 4.1 Definition of time variation mode

Time Variation Mode (TM)	Description	Period	Weighting per week	Frequency per year
TM 1	Weekday Day	Monday to Friday (09:00 to 18:00)	45 hours	0.268
TM 2	Peak Traffic Hours	Monday to Sunday (07:00 to 09:00 and 18:00 to 20:00)	28 hours	0.167
TM 3	Weekend Day	Sunday and Sunday (09:00 to 18:00)	18 hours	0.107
TM 4	Night	Monday to Sunday (20:00 to 07:00)	77 hours	0.458

Notes:
[1] The frequency per year for each time variation mode is calculated as follows:
For example TM1, assuming the week day represents a period from Monday to Friday (09:00 to 18:00), frequency per year = 45 / (24*7) = 0.268

4.3.2 Offsite-population

4.3.2.1 The sources of data and assumption of offsite population data adopted in this study are based on the following sources. The detail of population data by population type is shown in **Appendix B**. **Appendix B** also illustrates the projected number of population and population distribution of the surroundings.

- Planning Department;
- Transport Consultant; and
- Census and Statistics Department; etc.

4.3.2.2 The off-site population in the vicinity of the town gas high pressure gas pipeline has then been projected according to 2019 - based Territorial Population and Employment Data Matrix (2019 – based TPEDM)[1]. According to 2019 – based on TPEDM, population of Southeast New Territories in Year 2019 is 68,900 while in Year 2031 is 59,750, as the result, population growth rate is about -1.18% per year. As the population growth for Southeast New Territories is negative, zero growth rate has been adopted for the population projection to the assessment year for conservative approach.

[1] Planning Department (2021), 2019 - based Territorial Population and Employment Data Matrix (https://www.pland.gov.hk/pland_en/info_serv/statistic/tpedm19.html)

4.3.2.3 The traffic flow adopted in this assessment is the highest traffic flow within 15 years from the population intake and the population per vehicle is according to Station 5017 from the Annual Traffic Censes 2022. The vehicle speed adopted in this study is 50km/hr.

4.3.2.4 The number of population, population density and assumptions adopted in this assessment are illustrated in **Appendix B**.

4.3.3 Time Modes and Occupancy

4.3.3.1 Since population varies in different time periods, the assessment considers 2 categories of days (weekdays and weekends) and 4 time periods for each day (am peak traffic hours, day, pm peak traffic hour and night) as discussed in **Section 4.3.1**. **Table 4.2** shows the temporal population distribution. The indoor ratios for different types of uses are shown in **Table 4.3**.

Table 4.2 Temporal population distribution factor

Type	Weekday Day	Peak Traffic Hour	Weekend Day	Night
Residential	20%	50%	80%	100%
Educational	100%	10%	55%	0%
Road population	100%	100%	100%	20%
Temple	50%	10%	100%	0%
Recreational	70%	10%	100%	0%
Commercial / Administration	100%	10%	100%	10%
Industry	100%	10%	55%	10%
Open Storage	100%	1%	51%	0%
Car Park / Open Space	70%	100%	70%	10%
Government, Institution or Community	100%	10%	55%	10%
Pedestrian population	100%	100%	100%	100%
Construction site	100%	100%	0%	0%

Note:
[1] Reference is made to an approved EIA study on Operation of the Existing Tai Lam Explosives Magazine at Tai Shu Ha, Yuen Long for Liantang / Heung Yuen Wai Boundary Control Point Project (AEIAR-193/2015), which is in the same district.
[2] Reference is made to an approved EIA study on Hong Kong Section of Guangzhou – Shenzhen – Hong Kong Express Rail Link.

Table 4.3 Indoor ratio for different types of uses

Type	Indoor Ratio
Residential / Commercial / Administration / Industrial / Open Storage / Government Institution or Community / Recreational	0.95
Educational	0.9
Temple	0.5
Open Space / Car Park / Road population / Construction Site	0

Note:
[1] Reference is made to an approved EIA study on Operation of the Existing Tai Lam Explosives Magazine at Tai Shu Ha, Yuen Long for Liantang / Heung Yuen Wai Boundary Control Point Project (AEIAR-193/2015), which is in the same district.

4.3.4 Protection Factors

Indoor Protection

4.3.4.1.1 Protection for indoor population against all fire events (fireball, jet fire and flash fire) is also considered. It is anticipated that only people in the residential unit facing the fire event are fully exposed to the fire zone and radiation hazards, though they are partially protected by walls and closed windows. Residents at the back of the building or of the buildings behind the one facing the fire are to a large degree shielded from the fire effects.

4.3.4.1.2 In accordance with the GN, it is assumed that 90% protection factor is applied for the people indoors for the jet fire and flash fire while 50% protection factor is applied for the people indoors for the fireball.

4.4 Meteorological Conditions

4.4.1.1 Meteorological conditions would affect the dispersion of Towngas. Weather data from the most recent years (Year 2018 to 2022) in HKO Sai Kung Park weather station was adopted and rationalized into 6 categories to represent the range of weather conditions at the site. These categories are classified according to TNO (purple book) (**Table 4.4a**). The probability of occurrence for each combination of wind speed (WS), wind direction (WD) and stability class (PS) are provided in **Table 4.4b** and **Table 4.4c**.

Table 4.4a Allocation of wind observations into six weather classes

Wind Speed	A	B	B/C	C	C/D	D	E	F
< 2.5 ms^{-1}	B medium			D low			F low	
2.5 - 6 ms^{-1}				D medium			E medium	
> 6 ms^{-1}				D high				

Table 4.4b Meteorological data at daytime

WD	2.5B	1.5D	4.5D	7.5D	3E	1F	Total
0°	2.20%	0.81%	4.13%	1.90%	0.53%	1.44%	11.00%
30°	4.01%	1.46%	4.87%	2.47%	0.31%	1.23%	14.35%
60°	2.08%	1.12%	3.45%	2.19%	0.20%	0.84%	9.87%
90°	4.29%	0.97%	4.81%	1.11%	0.30%	0.73%	12.21%
120°	3.90%	0.86%	1.31%	0.26%	0.11%	0.83%	7.27%
150°	6.37%	0.85%	3.98%	1.92%	0.08%	0.60%	13.80%
180°	13.05%	1.81%	4.33%	0.89%	0.15%	0.98%	21.23%
210°	2.26%	1.08%	0.40%	0.00%	0.03%	1.07%	4.85%
240°	0.74%	0.43%	0.18%	0.01%	0.01%	0.60%	1.98%
270°	0.29%	0.20%	0.09%	0.00%	0.02%	0.40%	1.01%
300°	0.22%	0.17%	0.05%	0.01%	0.01%	0.37%	0.82%
330°	0.23%	0.25%	0.27%	0.01%	0.06%	0.77%	1.60%
Total	39.64%	10.02%	27.86%	10.79%	1.82%	9.86%	100.00%

Table 4.4c Meteorological data at nigh-time

WD	0	1D	4D	7.5D	3E	1F	Total
0°	0.00%	0.44%	4.70%	2.26%	2.24%	12.31%	21.95%
30°	0.00%	0.33%	3.43%	1.04%	1.03%	6.07%	11.90%
60°	0.00%	0.18%	4.51%	2.09%	1.64%	4.46%	12.87%
90°	0.00%	0.14%	4.12%	0.71%	1.22%	3.24%	9.42%
120°	0.00%	0.09%	1.26%	0.28%	0.59%	2.30%	4.51%
150°	0.00%	0.05%	1.30%	0.42%	0.41%	1.98%	4.16%
180°	0.00%	0.12%	1.94%	0.12%	0.99%	4.61%	7.78%
210°	0.00%	0.07%	0.30%	0.00%	0.45%	7.10%	7.92%
240°	0.00%	0.06%	0.13%	0.00%	0.12%	4.52%	4.84%
270°	0.00%	0.09%	0.07%	0.00%	0.04%	3.30%	3.51%
300°	0.00%	0.10%	0.06%	0.01%	0.05%	3.61%	3.83%
330°	0.00%	0.23%	0.24%	0.03%	0.25%	6.58%	7.32%
Total	0.00%	1.89%	22.06%	6.95%	9.02%	60.08%	100.00%

5 Hazard Identification and Frequency Analysis

5.1 Hazard Identification

5.1.1.1 The main hazard from the high pressure gas pipeline is due to the loss of containment, which leads to gas leak, fire explosion and toxicity. Town gas is flammable / explosive due to the presence of methane, hydrogen and carbon monoxide.

5.1.1.2 Release in large quantity, if ignited immediately, will produce a fireball. Initially the gas concentration in the mixture will be above the Upper Flammable Limit (UFL). As burning occurs around the edges of the release, this will entrain more air into the mixture and more combustion will take place. The process accelerates until the mixture rises above the ground as a ball of fire.

5.1.1.3 If not ignited immediately, the gas will disperse and dilute. When the gas concentration is between Lower Flammability Limit (LFL) and Upper Flammable Limit (UFL), presence of an ignition source in entire length of the gas cloud movement path may result in a flash fire. In case of continuous release, fire is flashed back to the release source and leads to a jet fire.

5.1.1.4 For continuous releases, immediate ignition will produce a long vigorous jet flame from the point of release.

5.1.1.5 For all sizes of release, town gas will have a toxic effect on nearby population sites if there is no source of ignition and allowed to disperse.

5.1.1.6 Possible hazardous scenarios associated with the operation of the HP underground town gas transmission pipelines are the loss of containment leading to a gas leak, fire explosion and toxicity.

5.2 Pipeline Failure Frequency

5.2.1.1 According to the GN, failure frequency of an underground town gas high pressure pipeline is 1 $\times 10^{-5}$ /km /year. Hole size distribution and its proportion for the pipeline is extracted from the GN and shown in **Table 5.1**. Based on the total failure frequency and **Table 5.1**, the calculated failure frequencies of different hole size leakage and rupture are shown in **Appendix C**.

Table 5.1 Hole size distribution for underground gas pipeline

Category	Hole Size	Proportion
Rupture	Full bore (600mm)	1%
Puncture	100mm	19%
Hole	50mm	30%
Leak	25mm	30%
	10 mm	20%

6 Consequence Analysis

6.1 Hazard Outcome

6.1.1.1 The consequence of town gas release could result in the following hazardous outcomes:

- Fireball;
- Jet fire;
- Flash fire; and
- Toxic gas dispersion

6.2 Source Modelling

6.2.1 Orientation of Release

6.2.1.1 The consequences of town gas release following a pipeline failure are dependent on the release rate and the orientation of release. A common assumption is made to model the orientation of release. Failures that occur on top half portion of the pipeline will result in vertical jet releases (unobstructed) whereas failures that occur on bottom half portion of the pipelines will result in inclined jet releases (obstructed). The unobstructed vertical releases would be governed by momentum jet dispersion / momentum jet fires.

6.2.1.2 The assumption that the orientation of release would be 50% unobstructed and vertical, and 50% obstructed and governed by buoyant plume rise followed by Gaussian dispersion, is assumed to be valid for failure events with hole sizes same as or smaller than 100mm. This assumption is of the release may not be relevant for large failures such as those from full bore failure. Large failures such as ruptures are more likely to result in an upward release following the displacement of any earth cover. In the case of full bore ruptures, it is assumed that 100% of the release would be unobstructed. This assumption is also the same as GN.

6.2.2 Ignition of Release

6.2.2.1 A full bore rupture will be characterized by a very high initial rate followed by a rapid drop. This can cause a larger crater with a significant amount of earth cover being removed. Immediate ignition of such releases may result in a fireball followed by a jet fire. Since the fireball is transient while jet fire continues for a long time, the effect of a jet fire from a rupture area are as significant or have greater damage potential than those compared to fireball effects.

6.2.2.2 For all other release cases, immediate ignition would result in a jet fire. Ignition of release from the top of the pipeline will give rise to a vertical jet flame. It is also likely that releases from the top may be slightly

inclined, such that it may cause damage as a result of direct impingement on structures, buildings and persons in the vicinity

6.2.2.3 The ignition probability for the high pressure gas pipeline release adopted are summarized in Table 6.1 which is made reference to the GN.

Table 6.1 Ignition probability for high pressure town gas pipeline release

Leak size	Immediate Ignition[1]	Delayed Ignition [2]
Minor (<1 kg/s)	0.01	0.4*(1-immediatie ignition probability)
Major (1 to 50 kg/s)	0.07	
Massive (>50 kg/s)	0.30	

6.2.3 Point Sources

6.2.3.1 No major point source is identified in the vicinity of the HP pipeline.

6.2.4 Line Sources

6.2.4.1 Roads are defined as the line sources in *Safeti*. The following assumptions are applied to estimate the presence factor of the line sources and the ignition probability in accordingly with the GN.

(a) Ignition probabilities of 0.4 per vehicle;

(b) Vehicle speed is assumed as 50 km/hr; and

(c) Traffic density is based on the projected traffic flow shown in **Table 6.2**.

Table 6.2 Summary of road ignition sources

Line Source	Peak Traffic Flow (veh / hr)
New Hiram's Highway	2550
Hiram's Highway	2750

6.3 Consequence Modelling

6.3.1.1 The consequence analysis result is determined by *DNV Safeti*. The input parameters and consequence results of fireball, jet fire, flash fire and toxic release are shown in **Appendix D**. Details are discussed in the following sections.

6.3.2 Fireball Effect

6.3.2.1 Immediate ignition of release caused by a rupture in the pipeline may give rise to a fireball. The consequence analysis for fireball scenario was conducted *DNV Safeti*. In accordance with Carter (1991), the size of fireball can be determined at each time step the quantity of fuel that can be consumed in a fireball with the same burning time as the time

since the start of the release. The mass of the fireball is determined by equating these two values. The PHAST model was thus adopted to calculate at each time step the quantity of fuel that can be consumed in a fireball. The mass and duration of fireball is estimated to be 21,800 kg and 11.4s respectively.

6.3.2.2 The fatality rate for thermal radiation is determined from the built-in Probit of *DNV Safeti*:

$$Y = -36.38 + 2.56\ln L$$

where:

Y is the probit;
L is the thermal load = $tI^{4/3}$;
t is the exposure time, second
I is the thermal radiation intensity, kW/m^2.

6.3.2.3 The radiation level corresponding to 1% and 99% fatality is estimated as 12.5kW/m^2 and 37.5kW/m^2 for an exposure time of 20s.

6.3.3 Jet Fire Effect

6.3.3.1 Jet fires will result from ignited releases of pressurized flammable gas or superheated/ pressurized liquid and modelled by DNV Safeti. The momentum of the release carries the materials forward in form of a long plume entraining air to give a flammable mixture. Combustion in a jet fire occurs in the form of a strong turbulent diffusion flame that is strongly influenced by the momentum of the release.

6.3.3.2 Since the release is transient, the release rate to be considered for evaluation of the effects of jet flame will be based on HSE Contract Research Report No. 82/1994. According to the report, for a full bore rupture, the gas flow will reduce to 1/4 of the initial rate for a further hour after the first 30s release. The release rate and consequently the effects of jet fire will ultimately depend on how quickly isolation can be achieved.

6.3.3.3 The fatality rate for thermal radiation is determined from the built-in Probit of *DNV Safeti*:

$$Y = -36.38 + 2.56\ln L$$

where:

Y is the probit;
L is the thermal load = $tI^{4/3}$;
t is the exposure time, second
I is the thermal radiation intensity, kW/m^2.

6.3.3.4 The radiation level corresponding to 1% and 99% fatality is estimated as 12.5kW/m^2 and 37.5kW/m^2 for an exposure time of 20s.

6.3.4 Flash Fire

6.3.4.1 As town gas is pressurized in the transmission network, it is heavier than air at the initial release stage. While the gas expands, it rises rapidly due to the buoyancy nature of the gas under atmospheric conditions. It will propagate and be diluted as a result of air entrainment with the influence of wind.

6.3.4.2 The principal hazard arising from a cloud of dispersing town gas is the delayed ignition of the flammable cloud that cause a flame to flash back to the release location and develop into a stable jet or crater fire.

6.3.4.3 Large scale experiments on the dispersion and ignition of flammable gas clouds show that ignition is unlikely when the average concentration is below the Lower Flammable Limit (LFL) or above the Upper Flammable Limit (UFL). The hazard distance is calculated by the Unified Dispersion Model (UDM) in the *DNV Safeti*. It estimates the profile of a dispersing cloud in segments according to properties of propagating cloud.

6.3.4.4 The fatality rate for flash fires is considered as 100% for persons within the cloud envelope.

6.3.5 Toxic Gas Dispersion

6.3.5.1 Town gas contains carbon monoxide (CO) which is a toxic chemical asphyxiant. When a person is exposed to carbon dioxide, it will prevent the delivery or absorption of oxygen within the body by combining with haemoglobin in the blood. A person exposing to concentrations of 20 to 30% of carbon monoxide will result in unconsciousness and convulsions within 1 minute.

6.3.5.2 Therefore, Town gas has been odourised with Tetrahydrothiophene (THT). As such, population under the exposure of town gas is warned olfactorily, allowing the affected individuals to react and escape from the exposure of Town gas. It is expected that there is a sufficient interval between the start of the exposure and the onset of incapacitation. Therefore, it is practicable that people would have a high success rate in escaping from the affected area.

6.3.5.3 Since town gas is lighter than air, the release will disperse upwards under normal wind conditions until its concentration equilibrates with the surrounding air, where it is then free to move in any direction. Assuming no immediate ignition has occurred, the surrounding population of the HP underground town gas transmission pipelines is unlikely to be fully exposed to the emerging gas cloud. As the gas cloud continues to disperse, its CO2 and CO concentration will begin to dilute, reducing its toxicity significantly over time.

6.3.5.4 The following probit equation for CO, from the built-in database of *DNV Safeti*, is applied to the risk model,

$$Pr = -7.21 + \ln(Ct)$$

where

C is gas concentration in ppm, and t is the exposure time in minute.

6.3.6 Vapour Cloud Explosion

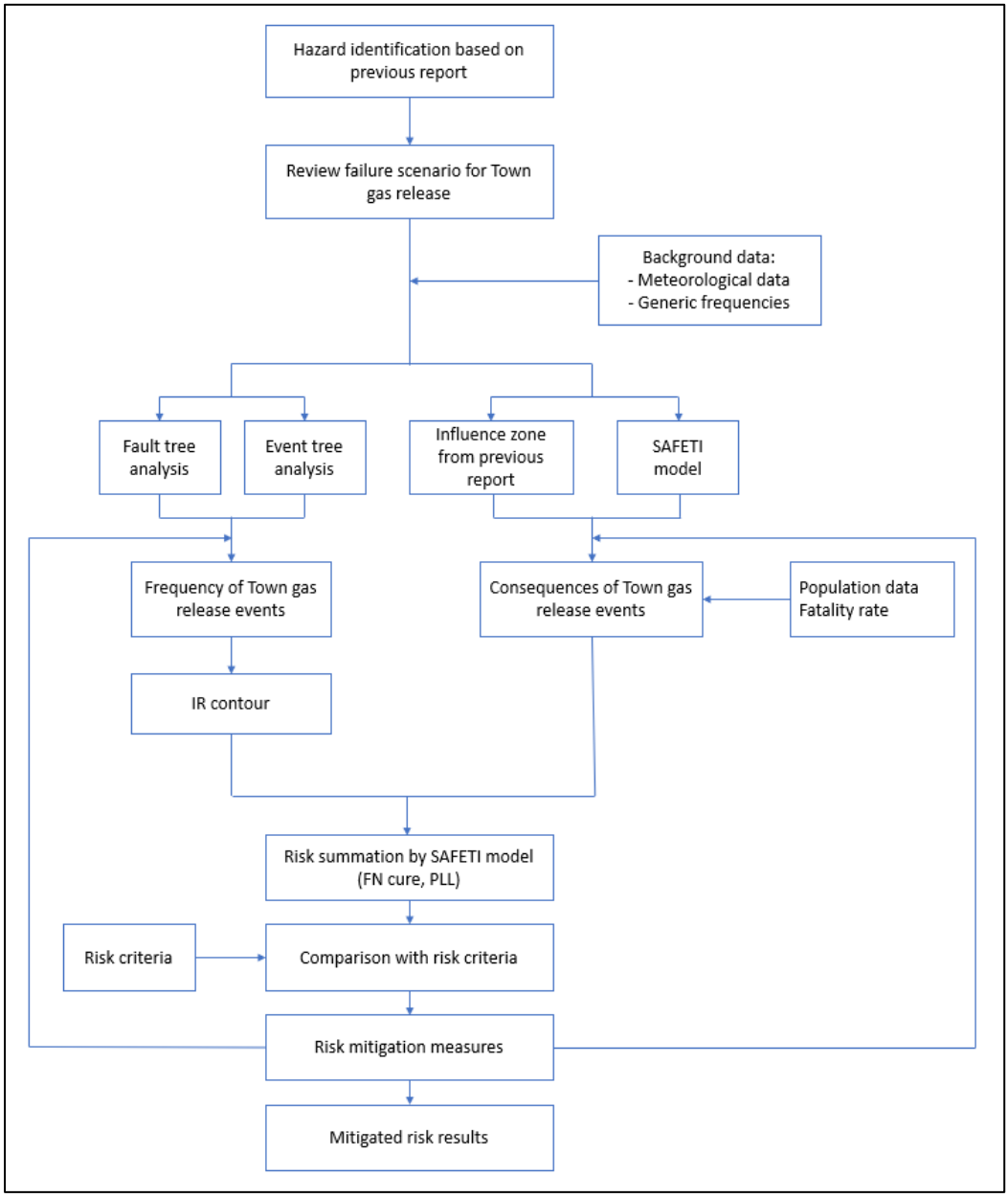
6.3.6.1 To achieve vapour cloud explosion (VCE), a dispersing vapour cloud must accumulate in a confined and/or congested area and subsequently be ignited. The potential for VCE is not considered significant for a buoyant gas plume, like towngas, and thus will not be further considered in this study.

7 Quantitative Risk Assessment

7.1 General Approach

7.1.1.1 A Quantitative Risk Assessment (QRA) is conducted through a process including hazard identification, frequency analysis, consequence modelling and risk summation. The general process of the QRA is shown in **Figure 7.1**.

Figure 7.1 Flowchart of the QRA Process



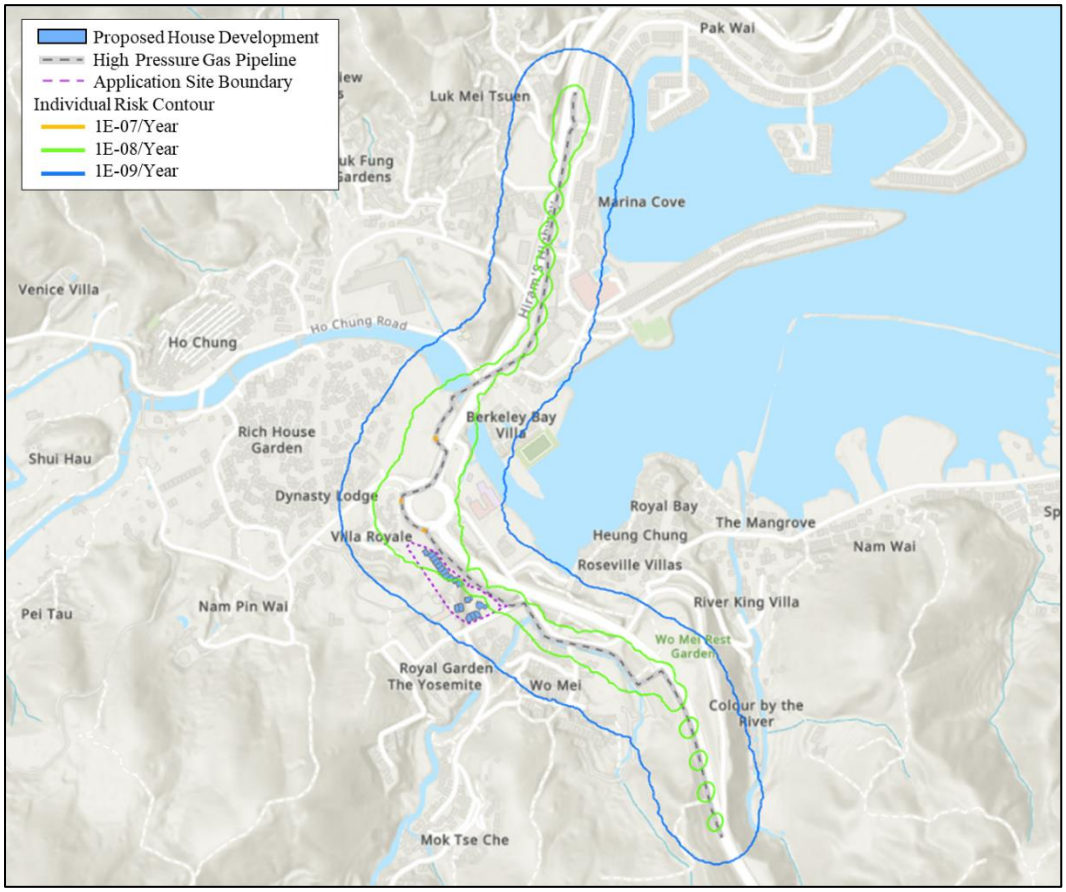
7.1.1.2 Safeti model by DNV GL was developed to undertake risk summation.

7.2 Risk Assessment

7.2.1 Individual Risk

7.2.1.1 The individual risk levels are calculated for a hypothetical person spending 100% of their time outdoors in the study area. Individual risk is independent of the surrounding population levels. The individual risk due to the high pressure gas pipeline is shown in **Figure 7.2**. The maximum level of off-site individual risk associated with the pipelines does not exceed the criterion of 1×10^{-5} per year.

Figure 7.2 Individual Risk Contour for High Pressure Gas Pipeline



7.2.2 Societal Risk

7.2.2.1 The societal risk is expressed in the form of an F-N curve which represents the cumulative frequency (F) of all outcomes leading to N or more fatalities. The F-N curve of the following scenarios are shown in **Figure 7.3** and their F-N pairs are tabulated in **Table 7.1**.

- Base case: Background population, excluding the Proposed House Development ;
- Construction phase case: Base case + population of the construction site of the Proposed House Development; and
- Overall risk case: Base case + Proposed House Development .

Figure 7.3 Societal Risk of Different Cases

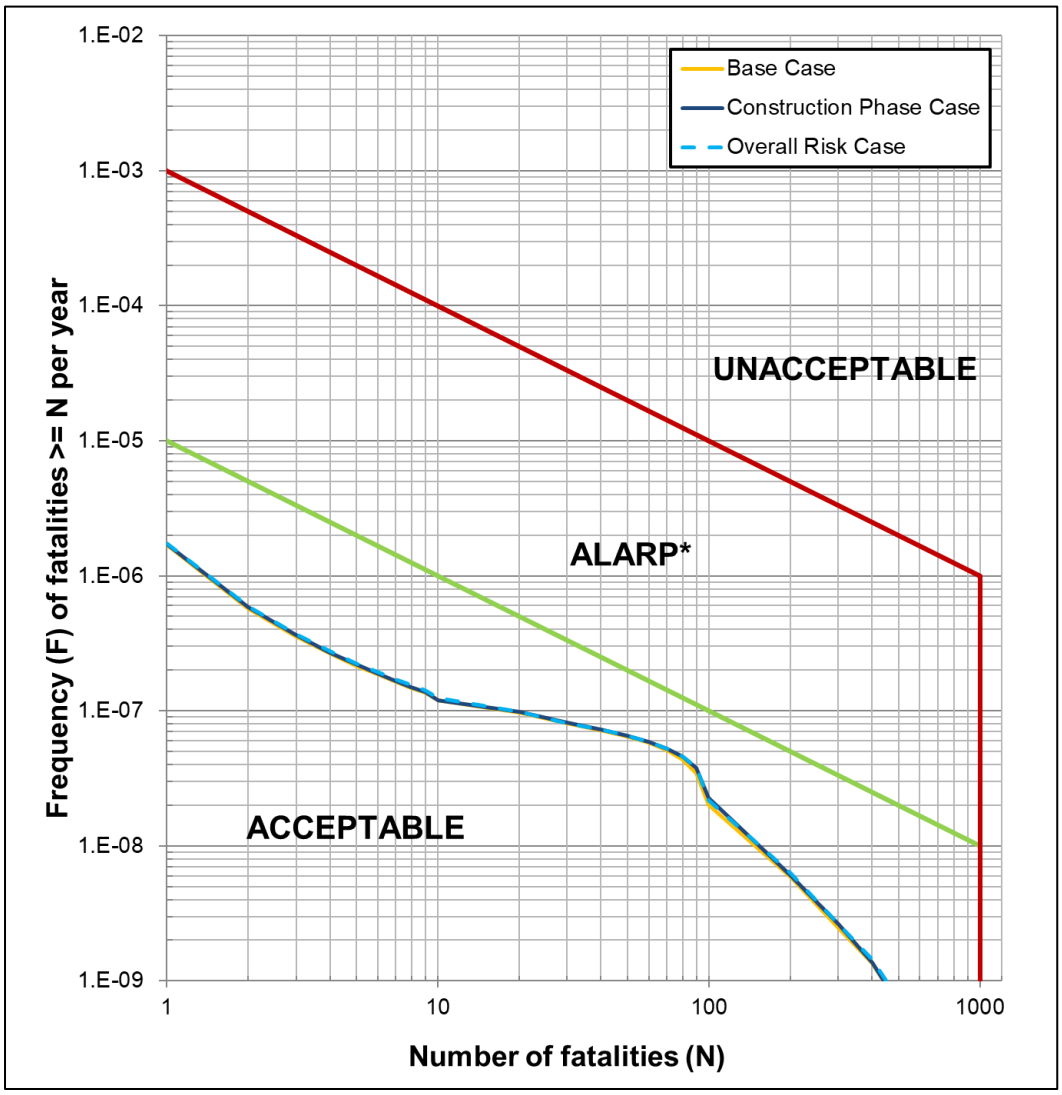


Table 7.1 FN values for Different Scenarios

No. of Fatalities	Base Case	Construction Phase Case	Overall Risk Case
1	1.70E-06	1.72E-06	1.73E-06
2	5.72E-07	5.85E-07	5.91E-07
3	3.55E-07	3.63E-07	3.70E-07
4	2.65E-07	2.71E-07	2.76E-07
5	2.15E-07	2.20E-07	2.25E-07
6	1.86E-07	1.89E-07	1.94E-07
7	1.64E-07	1.67E-07	1.71E-07
8	1.48E-07	1.50E-07	1.55E-07
9	1.37E-07	1.38E-07	1.43E-07
10	1.19E-07	1.20E-07	1.24E-07
20	9.63E-08	9.76E-08	9.83E-08
30	8.04E-08	8.17E-08	8.12E-08
40	7.17E-08	7.24E-08	7.28E-08
50	6.44E-08	6.52E-08	6.56E-08
60	5.80E-08	5.89E-08	5.92E-08
70	5.10E-08	5.21E-08	5.24E-08
80	4.36E-08	4.58E-08	4.60E-08
90	3.45E-08	3.79E-08	3.80E-08
100	2.00E-08	2.25E-08	2.19E-08
200	5.88E-09	6.02E-09	6.23E-09
300	2.46E-09	2.62E-09	2.63E-09
400	1.34E-09	1.37E-09	1.44E-09
500	6.69E-10	6.72E-10	7.33E-10

7.2.2.2 The F-N pairs show that the risks posed by the high pressure gas pipeline on the residents of the Proposed House Development are within Acceptable Region. Hence, no mitigation measure is proposed.

7.2.3 Potential Loss of Life

7.2.3.1 The Potential Loss of Life (PLL) value is the summation of the product of each F-N pair. The PLL values for different scenarios of the Proposed House Development are shown in **Table 7.2.**

Table 7.2 Breakdown of PLL values for Different Scenarios

Scenarios	Base case		Construction Phase Case		Overall risk case	
	PLL (per year)	% of Total PLL	PLL (per year)	% of Total PLL	PLL (per year)	% of Total PLL
Fireball	4.69E-06	40%	4.84E-06	40%	4.82E-06	40%
Jetfire-Pipeline (10mm)	1.09E-11	0%	1.10E-11	0%	1.09E-11	0%
Jetfire-Pipeline (25mm)	1.01E-09	0%	1.03E-09	0%	1.05E-09	0%
Jetfire-Pipeline (50mm)	8.38E-09	0%	8.59E-09	0%	9.75E-09	0%
Jetfire-Pipeline (100mm)	4.20E-08	0%	4.29E-08	0%	4.85E-08	0%
Toxicity	4.77E-07	4%	5.10E-07	4%	4.87E-07	4%
Flashfire-Pipeline (10mm)	2.30E-08	0%	2.30E-08	0%	2.30E-08	0%
Flashfire-Pipeline (25mm)	4.31E-07	4%	4.32E-07	4%	4.31E-07	3%
Flashfire-Pipeline (50mm)	8.15E-07	7%	8.26E-07	7%	8.27E-07	7%

Scenarios	Base case		Construction Phase Case		Overall risk case	
	PLL (per year)	% of Total PLL	PLL (per year)	% of Total PLL	PLL (per year)	% of Total PLL
Flashfire-Pipeline (100mm)	1.67E-06	14%	1.72E-06	14%	1.79E-06	15%
Flashfire-Pipeline (Rupture)	3.57E-06	31%	3.68E-06	30%	3.73E-06	31%
Total	*1.17E-05*	*100%*	*1.21E-05*	*100%*	*1.22E-05*	*100%*

8 Conclusion

8.1.1.1 A Quantitative Risk Assessment (QRA) of the risk associated with the HKCG high pressure town gas pipeline has been conducted. The assessment was conducted with the consideration of current technical specifications of the high pressure gas pipeline.

8.1.1.2 The societal risk expressed in the form of FN curves for both construction and operational phase lies within the "Acceptable" region of Hong Kong Risk Guidelines. The tolerable risk is mainly due to the background population instead of the population induced by the Proposed House Development . The maximum offsite individual risk is found to comply with Risk Guidelines for Hong Kong. No specific mitigation measure is therefore required.

8.1.1.3 By comparing the current results with the result without the construction of the Proposed House Development, it shows that the risk induced by the Proposed House Development is insignificant.

9 References

[1] Electrical and Mechanical Services Department, Guidance Note on Quantitative Risk Assessment Study for High Pressure Town Gas Installations in Hong Kong

[2] 2021 Census data: https://www.census2021.gov.hk/en/index.html

[3] Centamap website: http://hk.centamap.com/gc/home.aspx

[4] School database website: https://www.schooland.hk/

[5] Education Bureau, Student Enrolment Statistics, 2021/22

[6] XRL EIA, Hong Kong Section of Guangzhou - Shenzhen - Hong Kong Express Rail Link, Appendix 13 Hazard to Life Assessment

[7] SIL(E) EIA, South Island Line (East) – EIA Study, 2010

[8] MOS EIA, EIA Study of East Rail Extensions - Tai Wai to Ma On Shan, 2000

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[10] EIA study of Sha Tin Cavern Sewage Treatment Works, 2016

[11] TNO, Guideline for Quantitative Risk Assessment, "Purple Book" CPR18E Part 1: Establishments, Ed. Uijt de Haag P.A.M., and Ale, B.J.M., National Institute of Public Health and Environment (RIVM), den Hague, The Netherlands, 2005

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[13] Planning Department, Hong Kong Planning Standards and Guidelines (HKPSG)

[14] Planning Department, 2019 - based Territorial Population and Employment Data Matrix (TPEDM)

[15] Buildings Department, Code of Practice for Fire Safety in Buildings 2011 (version Oct 2015)

[16] EIA study of Operation of the Existing Tai Lam Explosives Magazine at Tai Shu Ha, Yuen Long for Liantang / Heung Yuen Wai Boundary Control Point Project, 2015

[17] Carter, D. A. (1991). Aspects of risk assessment for hazardous pipelines containing flammable substances. *Journal of Loss Prevention in the Process Industries*, *4*(2), 68-72.

Appendix A

Reply from The Hong Kong and China Gas Limited

香港中華煤氣有限公司
The Hong Kong and China Gas Company Limited

環保生活每一天
Go Green Every Day

28 December 2023

Your ref:
Our ref: SM/a02/23/00229/MS

Ms. Jane Lau
Arup
Level 5, Festival Walk
80 Tat Chee Avenue
Kowloon Tong, KLN

Dear Ms. Lau

Proposed Housing Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung
Request for Information on High Pressure Gas Pipeline and Offtake stations/ Regulation Stations

Reference is made to your email on 13 December 2023 in relation to the captioned subject.

A copy of technical information and drawings of the existing High Pressure 750mm along Hiram's Highway in the concerned area are enclosed for your action.

You are advised to provide our Company a copy of the Quantitative Risk Assessment report for review and comment.

Should you have any further enquiry, please feel free to contact Ms. Mandy Sin at 9803 8817 or me at 2765 5622.

Thank you for your kind attention.

Yours sincerely

Jacqueline T Y Hui
Senior System Maintenance Manager

JH/MS/wl

Encl.

System Maintenance Section
Transmission Operation Department
4/F, 100 Tokwawan Road, Kowloon
Tel: 2765 5622
Fax: 2392 7801
E-mail: ty.hui@towngas.com

Technical Specification for the existing HPTGP running along Hiram's Highway

Parameter	Specification
Pipe Diameter (Nominal)	750mm
Pipe wall thickness	12.7mm
Design Pressure	35 barg
Maximum Operating Pressure	35 barg
Hydraulic Test Pressure	900 psi
Pipe Material	Steel
External Coating	3000 microns 3 layers polyethlyene coating
Internal Coating	50 micron Two Pack Epoxy
Year of Construction	2004-2007
Backfilling Material	Surrounded by 150mm Thick Zone 2 fresh sand
Cathodic Protection	Cathodic Protection System - Sacrificial Anode at about 300 m Interval
Minimum Depth	1.1m
Material Grading (Pipe/ Fitting)	API 5L X52
Jointing Method	Butt Welding
Welding Specification	Welding complied with BS 4515 & BGC/PS/P2
Non-Destructive Test of Jointing	100% X-Ray
Isolation Valves	Upstream: BV30228 Ta Ho Tun Road Valve near the site boundary: BV30227 New Hiram's Highway Downstream: BV30235 Clear Water Bay Road
Pipe Length between upstream and downstream isolation valves	5.6km

Appendix B

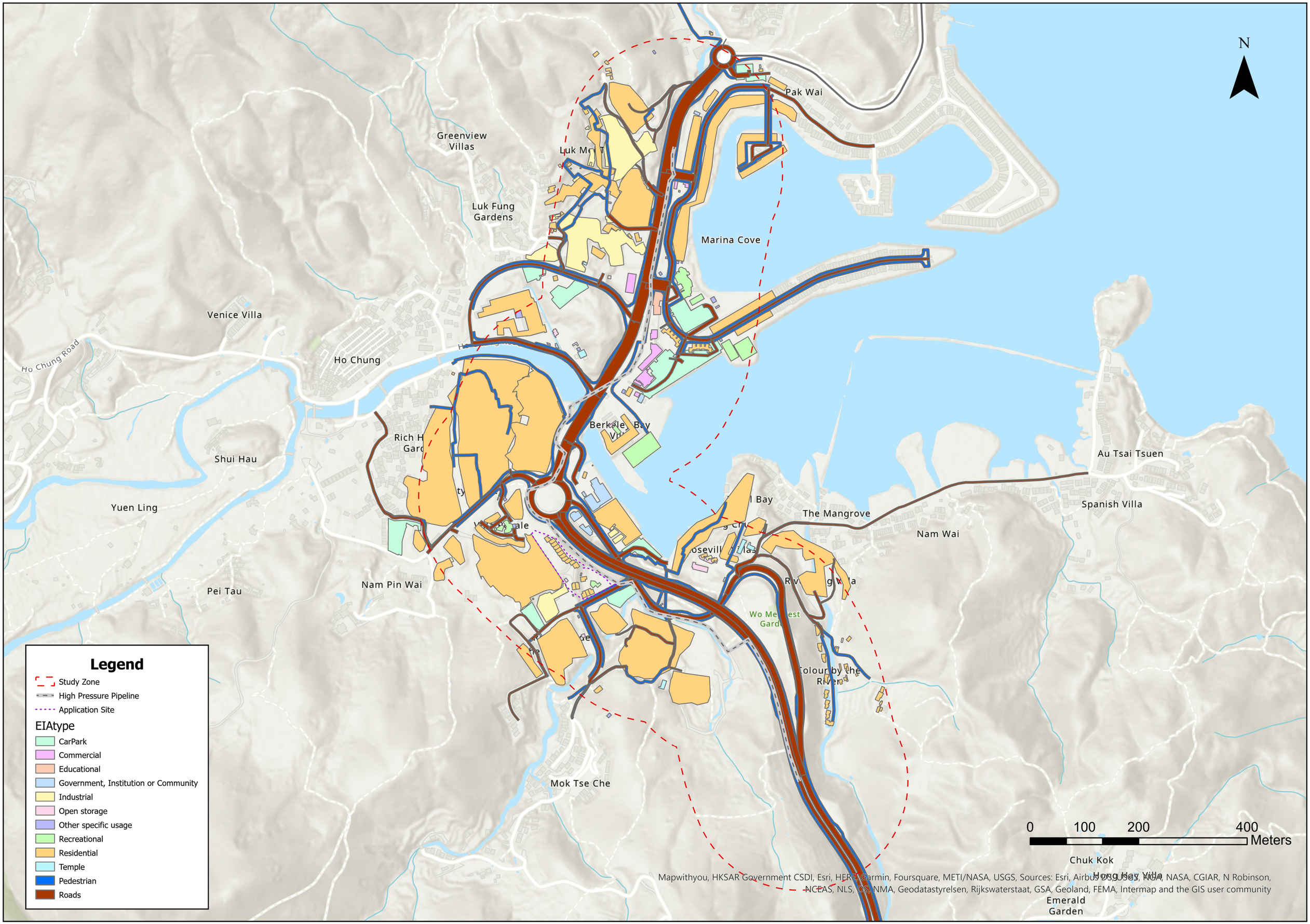
Population Data Adopted

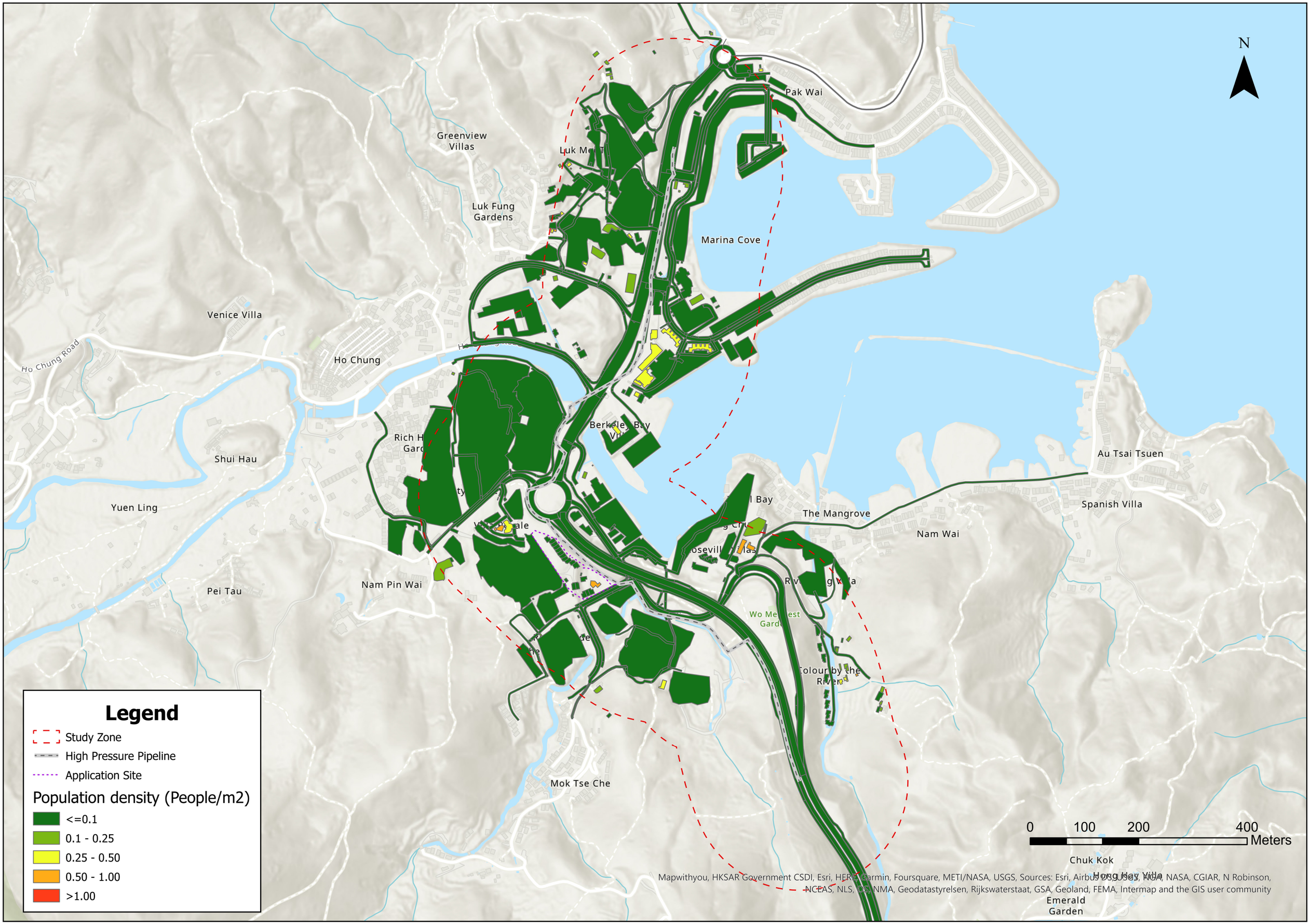
Table 1. Population Assumption

Population Type	Reference
Residential	• Year 2021 Census was adopted, a population of 3.5 per unit in Tertiary Planning Unit 823 is assumed according to the census information. Same assumption is adopted for the population within Sai Kung Central District Council Constituency Area for conservative approach. • For most of the high-rise buildings, the total number of units are made reference to Centamap website. • For population in village house, it is assumed that each floor has one household. The population of each village house is determined by multiplying the number of floors with the average domestic household size.
Educational	• School within the CZ are listed as below: - The Woodland Sai Kung Pre-school • The schools’ population is estimated according to the information from school database website (https://www.schooland.hk/), and school official websites.
Road traffic population	• Road traffic is based on the information provided by Traffic Consultant. • The estimated population is determined by the sum of vehicle type composition at the nearest Annual Traffic Census Station Core Station 5017 multiply by the persons per vehicle (occupancy).
Temple [1]	• Population estimation based on the size of the temple: Large Size: 100 people Medium Size: 50 people Small Size: 10 people
Recreational / Open Space [1]	• Population estimation based on the size and the purpose of the entertainment ground: Large Size: 200 people Medium Size: 100 people Small Size: 50 people Very Small Size: 10 people
Office (Administration) / Commercial /	• Population is determined by assuming 9 m^2 GFA/ person according to Code of Practice for Fire Safety in Buildings 2011 (version Oct 2015) (Class 4a, Offices)
Industry	• Population is determined by assuming 300 workers/ha for Rural-Based Industrial Use (RI) according to HKPSG (Ch5, Table 2)
Open Storage	• Population is determined by assuming 700 m^2/worker for Warehouse according to HKPSG (Ch5, Table 2)
Car Park	• It is assumed that each parking space has 0.2 people. If the number of parking space is not provided, the number of parking space is determined by dividing the area of the car park with the typical parking area of private cars which its length and width are 5m and 2.5m respectively.
Government, Institution or Community	• Population estimation based on the purpose of the station [1]: Central Refuse Station: 5 people Refuse Collection Point: 2 people Sewage Treatment works / Toilet / Electric sub-station / pumping station: No people The population apart from government station is estimated according to the information from their official websites

Population Type	Reference
Pedestrian	• Population estimation is based on number of people in Nam Pin Wai Road, Luk Mei Tsuen Road, Hiram’s Highway, New Hiram’s Highway and Nam Wai Road. • Population density at difference area listed as below: Nam Wai Road: 0.00328 person/m^2 Near Planned Development Area (i.e. New Hiram’s Highway): 0.00821 person/m^2 Ho Chung New Village(i.e. Nam Pin Wai Road): 0.00482 person/m^2 Marina Cove (i.e. Hiram’s Highway): 0.01328 person/m^2 Near Industrial Area (i.e. Luk Mei Tsuen Road): 0.00330 person/m^2

Notes: Reference is made to an approved EIA Study on Hong Kong Section of Guangzhou – Shenzhen – Hong Kong Express Rail Link.


N
Pak Wai
Greenview Villas
Luk Fung Gardens
Marina Cove
Venice Villa
Ho Chung Road
Ho Chung
Shui Hau
Yuen Ling
Pei Tau
Nam Pin Wai
Mok Tse Che
The Mangrove
Nam Wai
Spanish Villa
Au Tsai Tsuen
Chuk Kok
Emerald Garden
Legend
Study Zone
High Pressure Pipeline
Application Site
EIAtype
CarPark
Commercial
Educational
Government, Institution or Community
Industrial
Open storage
Other specific usage
Recreational
Residential
Temple
Pedestrian
Roads
0
100
200
400
Meters
Mapwithyou, HKSAR Government CSDI, Esri, HERE, Garmin, Foursquare, METI/NASA, USGS, Sources: Esri, Airbus DS, USGS, NGA, NASA, CGIAR, N Robinson, NCEAS, NLS, OS, NMA, Geodatastyrelsen, Rijkswaterstaat, GSA, Geoland, FEMA, Intermap and the GIS user community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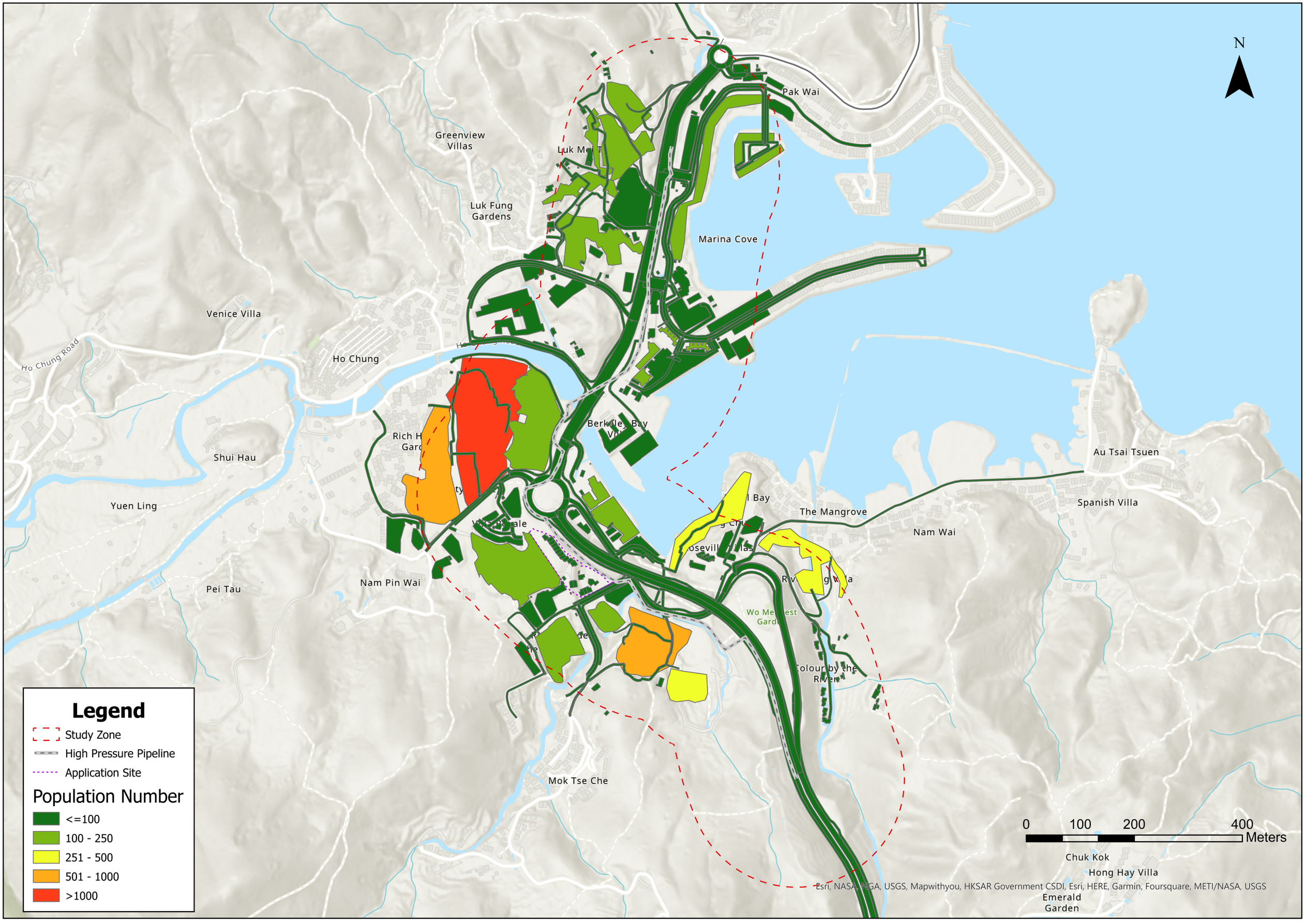
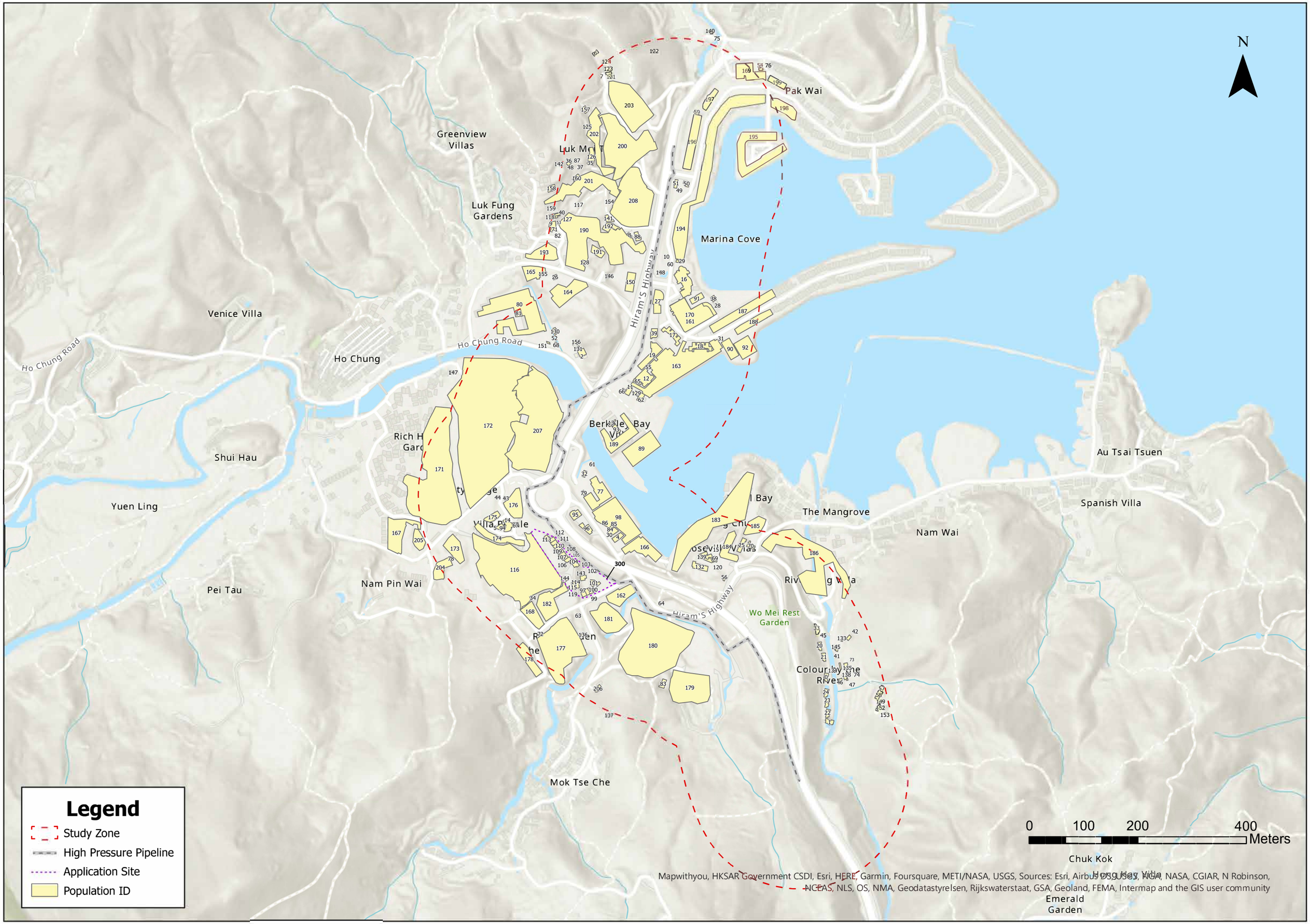
Pak Wai
Greenview Villas
Luk Fung Gardens
Marina Cove
Venice Villa
Ho Chung Road
Ho Chung
Shui Hau
Yuen Ling
Pei Tau
Nam Pin Wai
Mok Tse Che
Au Tsai Tsuen
Spanish Villa
The Mangrove
Nam Wai
Chuk Kok
Emerald Garden
Legend
Study Zone
High Pressure Pipeline
Application Site
Population density (People/m2)
<=0.1
0.1 - 0.25
0.25 - 0.50
0.50 - 1.00
>1.00
0
100
200
400
Meters
Mapwithyou, HKSAR Government CSDI, Esri, HERE, Garmin, Foursquare, METI/NASA, USGS, Sources: Esri, Airbus DS, USGS, NGA, NASA, CGIAR, N Robinson, NCEAS, NLS, OS, NMA, Geodatastyrelsen, Rijkswaterstaat, GSA, Geoland, FEMA, Intermap and the GIS user community


N
Pak Wai
Greenview Villas
Luk Fung Gardens
Marina Cove
Venice Villa
Ho Chung Road
Ho Chung
Berkeley Bay
Shui Hau
Au Tsai Tsuen
Yuen Ling
The Mangrove
Spanish Villa
Nam Wai
Nam Pin Wai
Pei Tau
Mok Tse Che
Chuk Kok
Hong Hay Villa
Emerald Garden
Legend
Study Zone
High Pressure Pipeline
Application Site
Population Number
<=100
100 - 250
251 - 500
501 - 1000
>1000
0
100
200
400
Meters
Esri, NASA, NGA, USGS, Mapwithyou, HKSAR Government CSDI, Esri, HERE, Garmin, Foursquare, METI/NASA, USGS


N
Pak Wai
Greenview Villas
Luk Fung Gardens
Marina Cove
Hiram's Highway
Venice Villa
Ho Chung Road
Ho Chung
Shui Hau
Yuen Ling
Rich H
Garc
Berkeley Bay
Vill
Villa Pacific
Nam Pin Wai
Pei Tau
Mok Tse Che
The Mangrove
Nam Wai
Spanish Villa
Au Tsai Tsuen
Wo Mei Rest Garden
Colourful Riviera
Chuk Kok
Emerald Garden
Legend
Study Zone
High Pressure Pipeline
Application Site
Population ID
0
100
200
400
Meters
Mapwithyou, HKSAR Government CSDI, Esri, HERE, Garmin, Foursquare, METI/NASA, USGS, Sources: Esri, Airbus DS, USGS, NGA, NASA, CGIAR, N Robinson, NCEAS, NLS, OS, NMA, Geodatastyrelsen, Rijkswaterstaat, GSA, Geoland, FEMA, Intermap and the GIS user community

Population Data

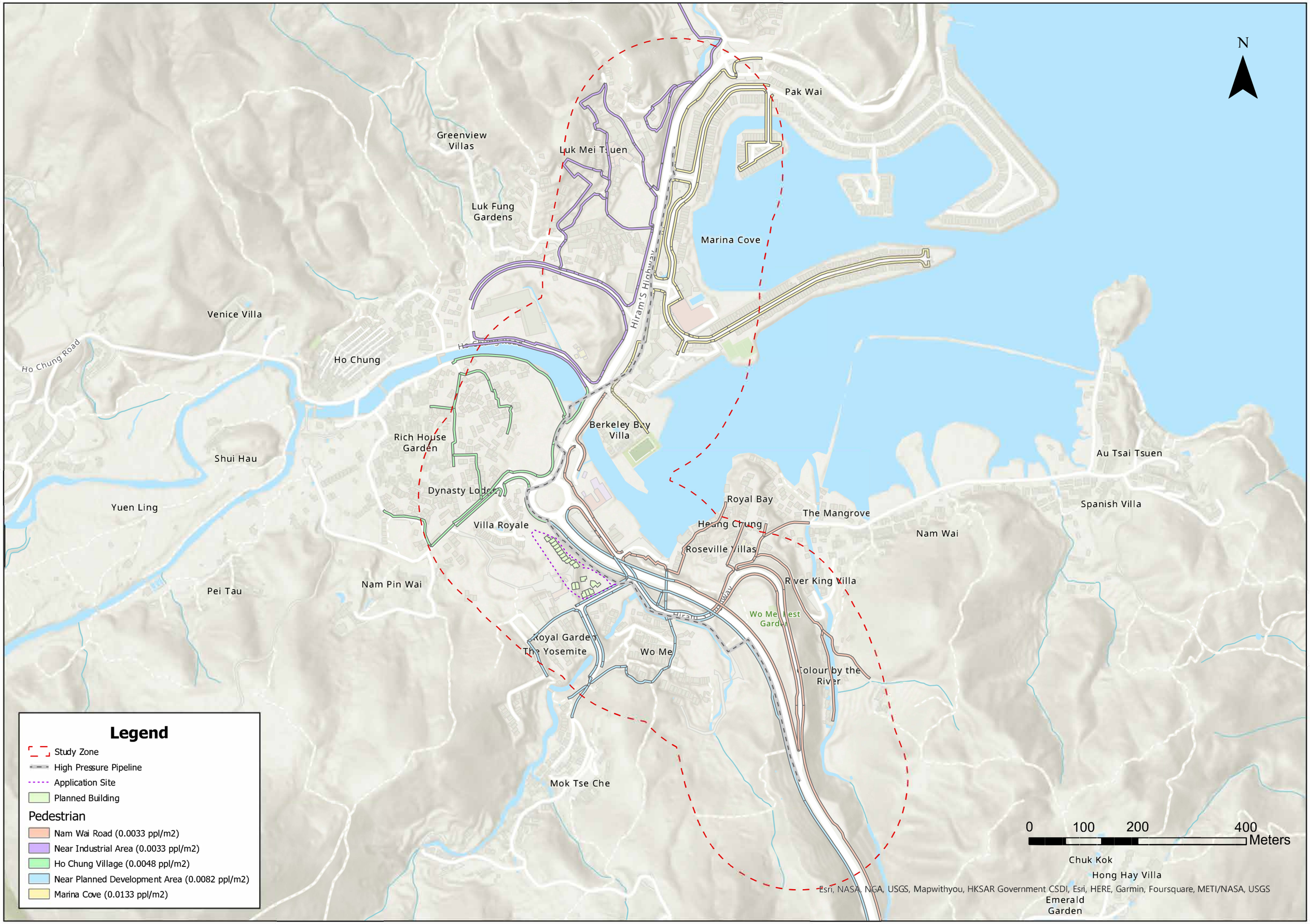
ID	Name	Type	Floor	Unit	Projected Population	Population Density
0	Colour by the River House 3	Residential	1	1	4	0.0409
1	Colour by the River House 7	Residential	1	1	4	0.0329
2	Ho Chung Che Kung Temple	Temple	1	1	10	0.0625
3	Roseville Villas Block 1	Residential	1	1	4	0.0589
4	Winfield Paint LTD	Industrial	1	1	6	0.0332
5	Villa Royale Club House	Recreational	1	1	10	0.5761
6	Residential Area Near Luk Cheung Road	Residential	3	3	11	0.1721
7	Residential Area Near Luk Cheung Road	Residential	3	3	11	0.2455
8	Residential Area Near Wing Tai Hin	Residential	3	3	11	0.2748
9	Residential Area Near Luk Fung Garden	Residential	3	3	11	0.0826
10		Other specific usage	1	1	0	0.0000
11	Residential Area Near Marina Cove Shopping Centre	Residential	3	3	11	0.0785
12		Commercial	1	1	167	0.2873
13	Open Storage	Open storage	1	1	1	0.0191
14	Villa Royale Club House	Recreational	1	1	100	0.3807
15	Roseville Villas Block 2	Industrial	1	1	3	0.0440
16	Club Marina Cove	Recreational	1	1	100	0.0902
17	Panoramic Rise	Residential	6	36	126	0.3250
18	Diaramic Rise	Residential	6	36	126	0.3153
19	Marina Cove Shopping Centre	Commercial	1	1	212	0.2879
20	Colour by the River House 1	Residential	1	1	4	0.0409
21	Colour by the River House 2	Residential	1	1	4	0.0409
22	Colour by the River House 6	Residential	1	1	4	0.0395
23	Colour by the River House 5	Residential	1	1	4	0.0395
24	Colour by the River House 4	Residential	1	1	4	0.0395
25	Wo Mei Tsung Tsin Church	Temple	2	2	100	0.5029
26	Residential Area Near Ho Chung North Road Carpark	Residential	3	3	11	0.1650
27	The Woodland Sai Kung Pre-school	Educational	1	1	40	0.0653
28		Other specific usage	1	1	0	0.0000
29		Other specific usage	1	1	0	0.0000
30	Winfield Paint LTD	Industrial	1	1	6	0.0358
31		Other specific usage	1	1	0	0.0000
32	Residential Area Near Haven of Hope Christian Association Ho Chung Welfare Facilities Building	Residential	3	3	11	0.1617
33	Colour By The River House 1	Residential	3	3	11	0.0990
34	Pump House	Government, Institution or Community	1	1	0	0.0000
35	Industrial Area	Industrial	1	1	1	0.0414
36	Residential Area Near Greenview Villas	Residential	3	3	11	1.2988
37	Residential Area Near Greenview Villas	Residential	3	3	11	2.1909
38		Other specific usage	1	1	0	0.0000
39		Commercial	1	1	59	0.2901
40	Residential Area Near Greenview Villas	Residential	3	3	11	0.4085
41	Residential Area Near Colour By the River	Residential	1	1	4	0.1143
42	Residential Area Near Colour By the River	Residential	3	3	11	0.2292
43		Other specific usage	1	1	0	0.0000
44		Other specific usage	1	1	0	0.0000
45	Residential Area Near Colour By the River	Residential	3	3	11	2.4735
46	Residential Area Near Colour By the River	Residential	3	3	11	0.2585

ID	Name	Type	Floor	Unit	Projected Population	Population Density
47	Residential Area Near Colour By the River	Residential	3	3	11	0.3056
48	Residential Area Near Greenview Villas	Residential	3	3	11	2.1360
49		Other specific usage	1	1	0	0.0000
50	Office	Commercial	1	1	9	0.1120
51	Office	Commercial	1	1	10	0.1184
52		Other specific usage	1	1	0	0.0000
53	Industrial Area	Industrial	1	1	3	0.0321
54	Public Toilet	Government, Institution or Community	1	1	0	0.0000
55	Public Toilet	Commercial	1	1	9	0.2922
56	Public Toilet	Government, Institution or Community	1	1	0	0.0000
57	Residential Area Near Colour By the River	Residential	3	3	11	0.1821
58	Residential Area Near Colour By the River	Residential	3	3	11	0.0802
59	Electric Substation	Government, Institution or Community	1	1	0	0.0000
60		Other specific usage	1	1	0	0.0000
61		Other specific usage	1	1	0	0.0000
62	Electric Substation	Government, Institution or Community	1	1	0	0.0000
63		Other specific usage	1	1	0	0.0000
64		Other specific usage	1	1	0	0.0000
65		Commercial	1	1	23	0.2979
66		Other specific usage	1	1	0	0.0000
67		Other specific usage	1	1	0	0.0000
68	Electric Substation	Government, Institution or Community	1	1	0	0.0000
69	Roseville Villas Block 3	Residential	1	1	4	0.0603
70	Wo Mei Tsung Tsin Church	Temple	2	2	100	0.8766
71	Residential Area Near Greenview Villas	Residential	3	3	11	0.5967
72		Other specific usage	1	1	0	0.0000
73	Residential Area Near Colour By the River	Residential	3	3	11	0.2342
74	Residential Area Near Colour By the River	Residential	3	3	11	0.6668
75	Residential Area Near Hing Keng Shek Road	Residential	1	1	4	0.1771
76	Residential Area Near Pak Wai	Residential	3	3	11	0.3262
77	Sai Kung Central Primary School	Government, Institution or Community	1	1	0	0.0000
78	Industrial Area	Industrial	1	1	2	0.0504
79	Electric Substation	Government, Institution or Community	1	1	0	0.0000
80	A/SK-HC/131 Planned Area	Residential	2	19	70	0.0132
81		Other specific usage	1	1	0	0.0000
82	Residential Area Near Greenview Villas	Residential	3	3	11	0.4118
83	Immaculate Conception Chapel	Temple	2	2	50	0.3914
84	Industrial Area	Industrial	1	1	1	0.1832
85	Industrial Area	Industrial	1	1	1	0.0607
86	Industrial Area	Industrial	1	1	1	0.0312
87	Residential Area Near Greenview Villas	Residential	3	3	11	0.2589
88	Residential Area Near Luk Mei Tsuen Road	Residential	1	1	4	0.0299
89	Soccer Pit	Recreational	1	1	50	0.0224
90	Tennis Court	Recreational	1	1	10	0.0159
91	Swimming Pool	Recreational	1	1	50	0.1893
92	Tennis Court	Recreational	1	1	10	0.0097
93	Swimming Pool	Recreational	1	1	50	0.4112
94	Swimming Pool	Recreational	1	1	10	0.1022
95	Planned Public Untility Installation	Government, Institution or Community	1	1	0	0.0000

ID	Name	Type	Floor	Unit	Projected Population	Population Density
96	Planned Public Untility Installation	Government, Institution or Community	1	1	0	0.0000
97	Planned Development House 15	Residential	3	1	4	0.0457
98	DD214 1003 Planned Development	Residential	6	40	140	0.0417
99	Planned Development House 16	Residential	3	1	4	0.0560
100	Planned Development House 17	Residential	3	1	4	0.0456
101	Planned Development Clubhouse	Recreational	3	1	200	1.3292
102	Planned Development House 14	Residential	3	1	4	0.0457
103	Planned Development House 11	Residential	3	1	4	0.0423
104	Planned Development House 10	Residential	3	1	4	0.0614
105	Planned Development House 9	Residential	3	1	4	0.0536
106	Planned Development House 8	Residential	3	1	4	0.0536
107	Planned Development House 7	Residential	3	1	4	0.0536
108	Planned Development House 6	Residential	3	1	4	0.0536
109	Planned Development House 5	Residential	3	1	4	0.0536
110	Planned Development House 4	Residential	3	1	4	0.0536
111	Planned Development House 3	Residential	3	1	4	0.0536
112	Planned Development House 2	Residential	3	1	4	0.0536
113	Planned Development House 1	Residential	3	1	4	0.0535
114	Planned Development House 13	Residential	3	1	4	0.0484
115	Planned Development House 12	Residential	3	1	4	0.0484
116	A/DPA/SK-HC/30 Planned Area	Residential	3	51	179	0.0141
117	Residential Area Near Greenview Villas	Residential	1	1	4	0.7486
118	Industrial Area	Industrial	1	1	1	0.0794
119	Open Storage	Open storage	1	1	1	0.1433
120	Open Storage	Open storage	1	1	1	0.0081
121	Residential Area Near Luk Cheung Road	Residential	1	1	4	0.1518
122		Other specific usage	1	1	0	0.0000
123	Residential Area Near Luk Cheung Road	Residential	1	1	4	0.0612
124	Residential Area Near Luk Cheung Road	Residential	1	1	4	0.1011
125	Industrial Area	Industrial	1	1	1	0.0307
126	Industrial Area	Industrial	1	1	9	0.0311
127	Industrial Area	Industrial	1	1	1	0.0439
128	Grand Marshal Temple	Temple	1	1	10	0.3116
129		Commercial	1	1	20	0.2957
130	Open Storage	Open storage	1	1	1	0.0107
131		Other specific usage	1	1	0	0.0000
132	Open Storage	Open storage	1	1	1	0.0034
133	Open Storage	Open storage	1	1	1	0.0433
134	Residential Area Near Colour By the River	Residential	1	1	4	0.1290
135	Residential Area Near Colour By the River	Residential	1	1	4	0.1307
136	Open Storage	Open storage	1	1	1	0.0265
137		Other specific usage	1	1	0	0.0000
138	Residential Area Near Colour By the River	Residential	1	1	4	0.2354
139	Open Storage	Open storage	1	1	1	0.0190
140	Open Storage	Open storage	1	1	1	0.0807
141	Industrial Area	Industrial	1	1	4	0.0301
142	Residential Area Near Greenview Villas	Residential	1	1	4	0.1671
143		Other specific usage	1	1	0	0.0000
144	Open Storage	Open storage	1	1	1	0.0327

ID	Name	Type	Floor	Unit	Projected Population	Population Density
145	Open Storage	Open storage	1	1	1	0.0343
146	Open Storage	Open storage	1	1	1	0.0317
147	Residential Area Near Ho Chung New Village	Residential	1	1	4	0.1969
148		Other specific usage	1	1	0	0.0000
149	Residential Area Near Colour By the River	Residential	1	1	4	0.1524
150	Kin Hing Plant Nursery Engineering Office	Commercial	1	1	59	0.1117
151		Other specific usage	1	1	0	0.0000
152	Residential Area Near Colour By the River	Residential	1	1	4	0.1469
153	Residential Area Near Colour By the River	Residential	1	1	4	0.0743
154	Residential Area Near Luk Mei Tsuen Road	Residential	1	1	4	0.2920
155	Open Storage	Open storage	1	1	1	0.0518
156	Open Storage	Open storage	1	1	1	0.0269
157	Residential Area Near Greenview Villas	Residential	1	1	4	0.0441
158	Residential Area Near Greenview Villas	Residential	1	1	4	0.0314
159	Industrial Area	Industrial	1	1	1	0.0301
160	Industrial Area	Industrial	1	1	3	0.0375
161	Marina Cove Outdoor Car Park	CarPark	1	1	45	0.0161
162	Wo Mei Public Parking	CarPark	1	1	19	0.0163
163	Marina Cove Car Park	CarPark	1	1	97	0.0161
164	Carpark	CarPark	1	1	29	0.0164
165	LM Auto Carpark	CarPark	1	1	13	0.0160
166	Heung Chung Road Carpark	CarPark	1	1	25	0.0162
167	Carpark	CarPark	1	1	32	0.0162
168	Carpark	CarPark	1	1	17	0.0169
169	Pak Wai Village Carpark	CarPark	1	1	20	0.0163
170	Marina Cove Outdoor Car Park	CarPark	1	1	43	0.0162
171	Residential Area Near Ho Chung New Village	Residential	3	211	739	0.0547
172	Residential Area Near Ho Chung New Village	Residential	3	344	1204	0.0461
173	Residential Area Near Villa Royale	Residential	3	19	67	0.0612
174	Villa Royale	Residential	1	20	70	0.0645
175	Residential Area Near Villa Royale	Residential	1	7	25	0.0790
176	Residential Area Near Villa Royale	Residential	3	21	74	0.0580
177	Royal Garden	Residential	3	64	224	0.0375
178	Residential Area Near Royal Garden	Residential	3	16	56	0.0547
179	Residential Area Near Mok Tse Che Road	Residential	3	94	329	0.0846
180	Residential Area Near Mok Tse Che Road	Residential	3	195	683	0.0608
181	Residential Area Near Wo Mei Public Parking	Residential	3	40	140	0.0611
182	Industrial Area	Industrial	1	9	55	0.0305
183	Residential Area Near Greenville	Residential	3	105	368	0.0521
184	Roseville Villas	Residential	3	12	42	0.0434
185	Residential Area Near Nam Wai Road	Residential	3	26	91	0.1040
186	King River Villa	Residential	3	89	312	0.0462
187	Marina Cove	Residential	1	24	84	0.0418
188	Marina Cove	Residential	1	13	46	0.0497
189	Berkeley Bay Villa	Residential	1	17	60	0.0358
190	Industrial Area	Industrial	1	44	234	0.0300
191	Residential Area Near Luk Mei Tsuen Road	Residential	3	10	35	0.1065
192	Residential Area Near Luk Mei Tsuen Industrial Area	Residential	1	9	32	0.1094
193	Industrial Area	Industrial	1	5	36	0.0303

ID	Name	Type	Floor	Unit	Projected Population	Population Density
194	Marina Cove	Residential	1	58	203	0.0290
195	Marina Cove	Residential	1	33	116	0.0364
196	Marina Cove	Residential	1	18	63	0.0392
197	Marine Cove	Residential	1	5	18	0.0398
198	Marine Cove	Residential	1	7	25	0.0257
199	Residential Area Near Pak Wai	Residential	1	5	18	0.0486
200	Industrial Area	Industrial	1	18	190	0.0300
201	Residential Area Near Luk Mei Lane	Residential	3	30	105	0.0339
202	Residential Area Near Luk Mei Lane	Residential	3	42	147	0.0780
203	Residential Area Near Luk Cheung Road	Residential	3	31	109	0.0252
204	Residential Area Near Villa Royale	Residential	3	24	84	0.1050
205	Dynasty Lodge	Residential	3	13	46	0.0759
206	Residential Area Near Mok Tse Che Road	Residential	3	6	21	0.1795
207	A/SK-HC/340 Planned Area	Residential	6	48	168	0.0132
208	A/SK-HC/316 Planned Area	Residential	3	15	53	0.0089
300	Construction Site of Planned Development	Construction Site	1	1	100	0.0152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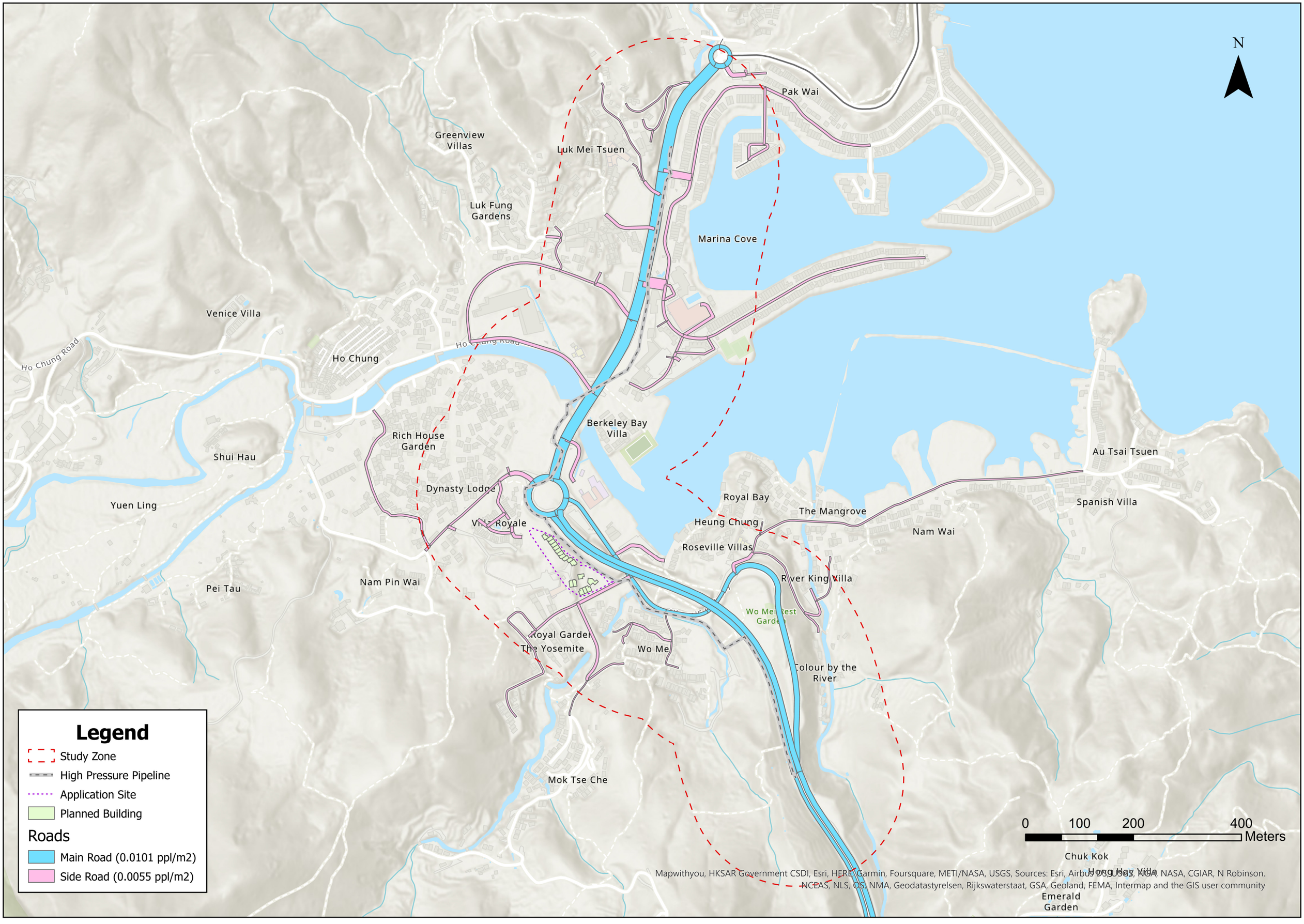
Pak Wai
Greenview Villas
Luk Mei Tsuen
Luk Fung Gardens
Marina Cove
Hiram's Highway
Venice Villa
Ho Chung Road
Ho Chung
Rich House Garden
Berkeley Bay Villa
Au Tsai Tsuen
Shui Hau
Dynasty Lodge
Royal Bay
The Mangrove
Spanish Villa
Yuen Ling
Villa Royale
Heung Chung
Nam Wai
Roseville Villas
River King Villa
Nam Pin Wai
Pei Tau
Wo Me Nest Garden
Royal Garden
The Yosemite
Wo Me
Colour by the River
Mok Tse Che
Chuk Kok
Hong Hay Villa
Emerald Garden
0
100
200
400
Meters
Esri, NASA, NGA, USGS, Mapwithyou, HKSAR Government CSDI, Esri, HERE, Garmin, Foursquare, METI/NASA, USGS
Legend
Study Zone
High Pressure Pipeline
Application Site
Planned Building
Pedestrian
Nam Wai Road (0.0033 ppl/m2)
Near Industrial Area (0.0033 ppl/m2)
Ho Chung Village (0.0048 ppl/m2)
Near Planned Development Area (0.0082 ppl/m2)
Marina Cove (0.0133 ppl/m2)


N
Pak Wai
Greenview Villas
Luk Mei Tsuen
Luk Fung Gardens
Marina Cove
Venice Villa
Ho Chung Road
Ho Chung
Rich House Garden
Berkeley Bay Villa
Au Tsai Tsuen
Shui Hau
Dynasty Lodge
Yuen Ling
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The Mangrove
Heung Chung
Spanish Villa
Nam Wai
Roseville Villas
Nam Pin Wai
Pei Tau
River King Villa
Royal Garden
The Yosemite
Colour by the River
Mok Tse Che
Chuk Kok
Emerald Garden
Legend
Study Zone
High Pressure Pipeline
Application Site
Planned Building
Roads
Main Road (0.0101 ppl/m2)
Side Road (0.0055 ppl/m2)
0
100
200
400
Meters
Mapwithyou, HKSAR Government CSDI, Esri, HERE, Garmin, Foursquare, METI/NASA, USGS, Sources: Esri, Airbus DS, USGS, NGA, NASA, CGIAR, N Robinson, NCEAS, NLS, OS, NMA, Geodatastyrelsen, Rijkswaterstaat, GSA, Geoland, FEMA, Intermap and the GIS user community

5017 - Clear Water Bay Rd (from On Sau Road to Hiram's Highway)

Design Speed 50 km/hr

	East Bound	West Bound	Total
A.A.D.T	13800	13920	27720
AM Peak Hour	720	1070	1790
% of vehicle at AM Peak			

Weighted average 3.1455 ppl/veh

	MC	PC	Taxi	PrivateLB	PLB	LGV	HGV	Non-Fr. Bus	SD	DD
0800-0900 Peak Hour	Motor cycle	Private Car	Taxi	Private LB	PLB	Light Goods vehicle	M&H Goods vehicle	Non Fr. Bus	Fr. Bus (SD)	Fr. Bus (DD)
Pro (%)	6.9	58.9	9.4	0.6	5.7	14.1	1.8	1.5	0	1.2
Ocp	1.1	1.3	2	3.5	16.4	1.8	1.5	24.3	0	42.9

TPEDM 2019

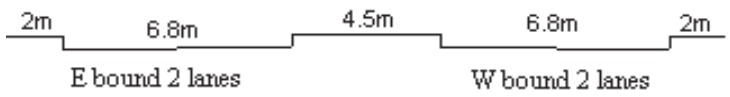
Year	**2019**		**2026**		**2031**	
	Population	Employment	Population	Employment	Population	Employment
Summary By Sub-Region:						
Southeast New Territories	68900	27250	65800	27750	59750	28100

Growth rate: **-1.18** %

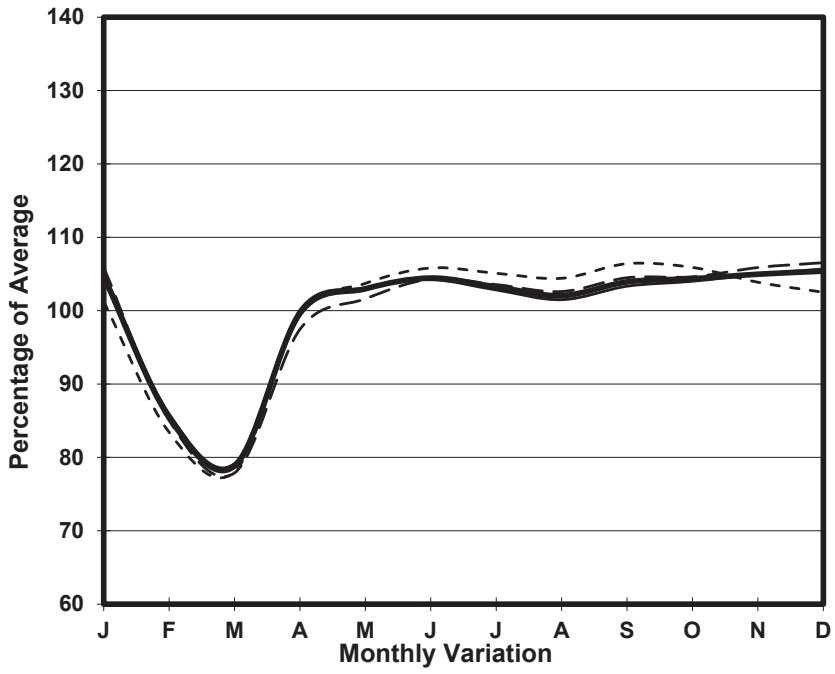
YEAR 2022

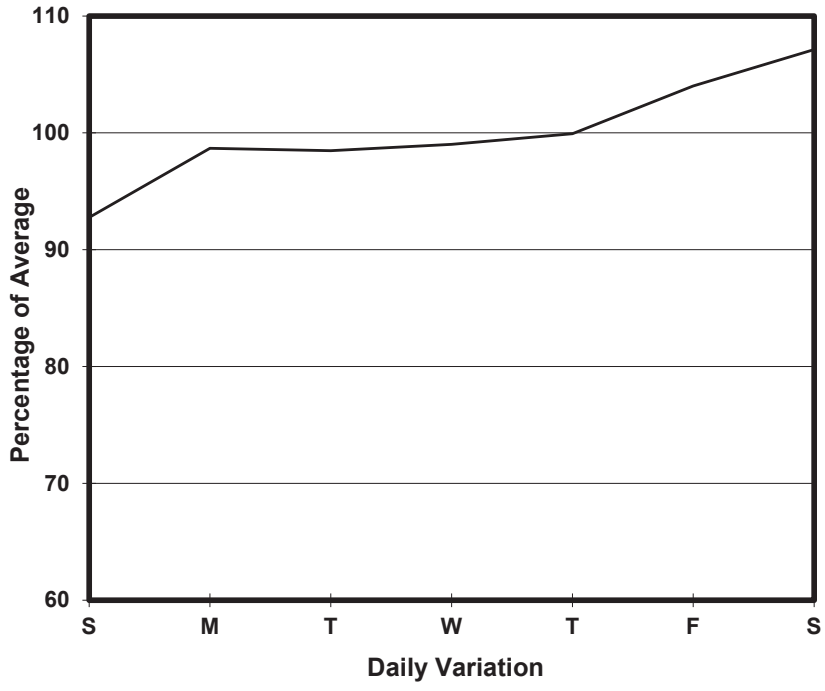
LINK CLEAR WATER BAY RD (from ON SAU RD to HIRAM'S HIGHWAY)

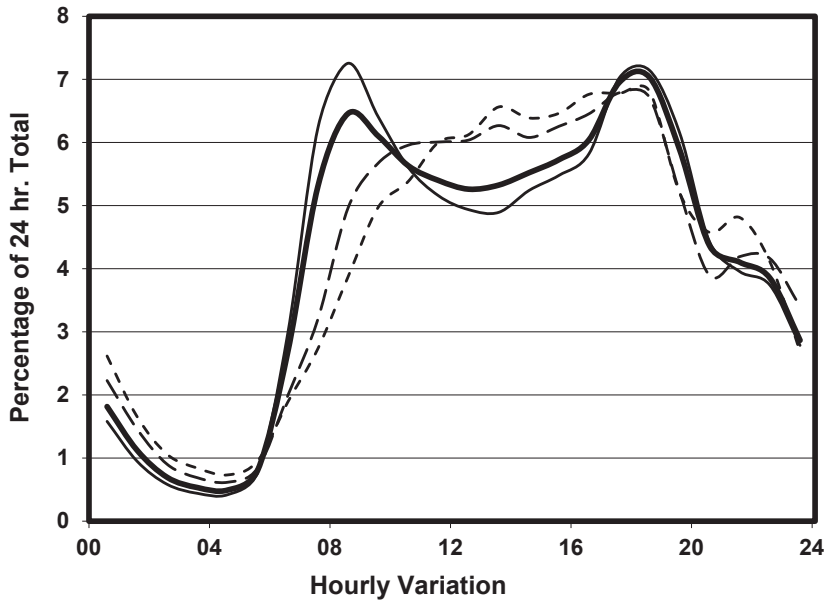
CORE STATION 5017
ROAD NETWORK MAJOR
ROAD TYPE RURAL ROAD

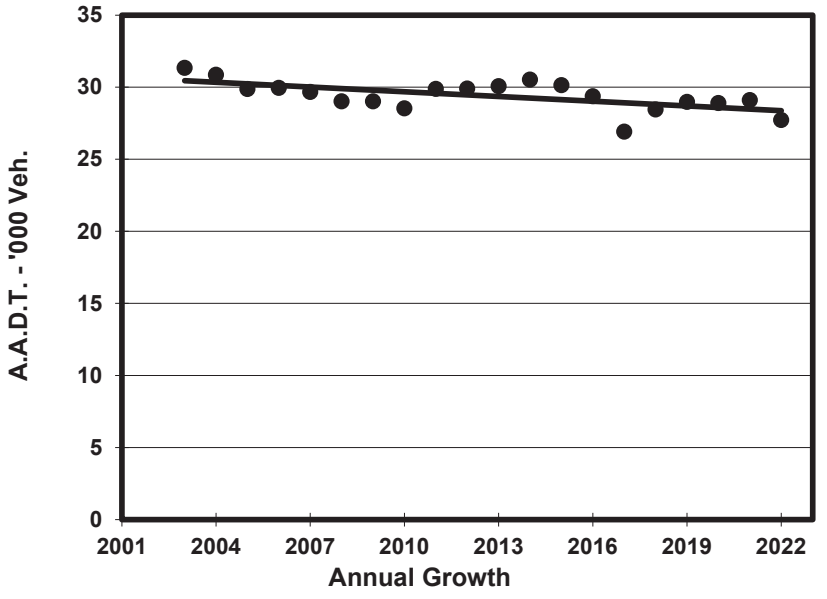


1. TRAFFIC FLOW VARIATION AND GROWTH









All day Mon.- Fri. Sat. Sun.

2. TRAFFIC CHARACTERISTICS (BY DIRECTION)

Parameter	All - Day	Mon. - Fri.	Sat.	Sun.
EAST BOUND				
A.A.D.T.	13800	13840	14780	12960
R 12 / 24 - %	66.5	66.1	67.5	67.5
R 16 / 24 - %	88.7	89.4	87.2	87
AM Peak Hour	0800-0900	0800-0900	0900-1000	0900-1000
One-way flow at AM peak hour	720	780	740	590
T - % (AM)	-	5.9	-	-
PM Peak Hour	1800-1900	1800-1900	1800-1900	1600-1700
One-way flow at PM peak hour	1050	1130	970	880
T - % (PM)	-	2.7	-	-
Prop.of commercial vehicles - 16 hr.	-	5	-	-
WEST BOUND				
A.A.D.T.	13920	13980	15070	12860
R 12 / 24 - %	75	76.3	73.3	70.3
R 16 / 24 - %	89.2	89.6	88.5	88.2
AM Peak Hour	0800-0900	0800-0900	0900-1000	0900-1000
One-way flow at AM peak hour	1070	1240	950	700
T - % (AM)	-	3.1	-	-
PM Peak Hour	1700-1800	1700-1800	1700-1800	1800-1900
One-way flow at PM peak hour	1000	1010	1070	980
T - % (PM)	-	4	-	-
Prop.of commercial vehicles - 16 hr.	-	4	-	-

3. OTHER INFORMATION AND COMMENT

4. Vehicle classification and occupancy - Monday to Friday

Time		Class of vehicle									
		Motor Cycle	Private Car	Taxi	Private LB	PLB	Goods veh.		Non Fr. Bus	Fr. Bus	
							Light	M & H		SD	DD
0700-0800	Pro	5.5	66.3	7.6	1.3	6.9	8.4	1.3	1.7	0.0	0.9
	Ocp	1.2	1.5	1.8	6.4	17.2	1.4	1.0	16.3	0.0	44.5
0800-0900	Pro	6.9	58.9	9.4	0.6	5.7	14.1	1.8	1.5	0.0	1.2
Peak hour	Ocp	1.1	1.3	2.0	3.5	16.4	1.8	1.5	24.3	0.0	42.9
0900-1000	Pro	2.7	62.2	10.2	0.2	6.2	11.8	3.8	2.0	0.0	1.0
	Ocp	1.1	1.4	2.0	1.0	16.8	1.5	1.1	5.5	0.0	38.0
1000-1100	Pro	4.3	52.4	10.7	1.0	8.1	18.6	2.9	1.2	0.0	1.0
	Ocp	1.0	1.4	1.9	2.8	13.5	1.4	1.1	1.4	0.0	37.3
1100-1200	Pro	3.0	54.0	10.0	1.9	7.8	17.8	2.4	1.9	0.0	1.1
	Ocp	1.0	1.5	2.1	1.4	11.7	1.4	1.0	1.0	0.0	40.1
1200-1300	Pro	2.6	51.7	11.8	1.8	9.0	18.8	2.1	1.0	0.0	1.3
	Ocp	1.2	1.3	1.9	6.4	11.1	1.5	1.3	20.5	0.0	32.3
1300-1400	Pro	4.9	50.4	12.6	1.5	6.7	19.0	3.1	0.5	0.0	1.2
	Ocp	1.1	1.5	1.8	9.3	12.5	1.7	1.2	3.0	0.0	41.3
1400-1500	Pro	4.3	48.4	13.3	1.7	5.8	18.6	4.6	1.7	0.0	1.5
	Ocp	1.1	1.4	1.9	1.7	14.2	1.4	1.3	1.5	0.0	31.4
1500-1600	Pro	5.1	52.5	12.5	1.4	6.0	16.1	4.3	0.7	0.0	1.2
	Ocp	1.0	1.3	2.0	4.0	14.8	1.5	1.4	8.0	0.0	36.9
1600-1700	Pro	2.0	56.0	16.6	1.1	6.1	13.4	2.9	0.7	0.0	1.2
	Ocp	1.1	1.4	1.6	2.0	14.7	1.6	1.4	14.7	0.0	50.9
1700-1800	Pro	8.6	56.7	9.9	1.8	5.4	13.5	1.0	2.0	0.0	1.1
	Ocp	1.1	1.5	2.0	2.0	17.4	1.4	1.0	2.6	0.0	51.6
1800-1900	Pro	5.2	67.7	9.2	0.0	6.5	7.7	1.0	1.5	0.0	1.2
	Ocp	1.1	1.5	2.1	0.0	18.4	1.1	1.0	33.6	0.0	51.4
1900-2000	Pro	9.7	61.5	10.8	0.0	8.2	7.1	1.1	0.4	0.0	1.2
	Ocp	1.1	1.4	1.9	0.0	13.5	1.5	1.2	6.5	0.0	39.1
2000-2100	Pro	5.9	60.7	18.4	0.0	7.4	5.0	0.6	0.6	0.0	1.4
	Ocp	1.2	1.3	1.9	0.0	11.2	1.5	2.0	3.5	0.0	18.8
2100-2200	Pro	3.8	60.5	18.1	0.0	8.5	6.5	0.3	1.0	0.0	1.2
	Ocp	1.2	1.5	1.9	0.0	13.3	1.3	1.0	1.3	0.0	19.6
2200-2300	Pro	4.9	59.5	18.8	0.0	6.8	8.0	0.0	0.6	0.0	1.4
	Ocp	1.3	1.6	1.9	0.0	12.0	1.5	0.0	2.5	0.0	23.6
16 hours	Pro	5.1	58.0	12.0	0.9	6.8	12.8	2.1	1.2	0.0	1.2
	Ocp	1.1	1.4	1.9	3.9	14.4	1.5	1.2	10.8	0.0	38.5

Legend: Pro. Proportion of vehicles in % (Sum may not add up to 100% due to figure rounding)*
Ocp. Average occupancy of vehicles including both driver and passengers*
M&H Medium and Heavy
* All traffic data are collected from combined bounds

Appendix C

Failure Frequencies

Failure	Hole Size	Orientation	Immediate Ignition	Delayed Ignition	Consequence	Proportion	Event Frequency
1.00E-05	Leak - 100 mm	Vertical	Yes		Vertical Jet Fire	0.0067	6.65E-08
	0.19	0.5	0.07				
			No	Yes	Flash Fire	0.0329	3.29E-07
			0.93	0.372			
				No	Toxic Release	0.0555	5.55E-07
				0.628			
		Inclined	Yes		Inclined Jet Fire	0.0067	6.65E-08
		0.5	0.07				
			No	Yes	Flash Fire	0.0329	3.29E-07
			0.93	0.372			
				No	Toxic Release	0.0555	5.55E-07
				0.628			
	Leak - 50 mm	Vertical	Yes		Vertical Jet Fire	0.0105	1.05E-07
	0.30	0.5	0.07				
			No	Yes	Flash Fire	0.0519	5.19E-07
			0.93	0.372			
				No	Toxic Release	0.0876	8.76E-07
				0.628			
		Inclined	Yes		Inclined Jet Fire	0.0105	1.05E-07
		0.5	0.07				
			No	Yes	Flash Fire	0.0519	5.19E-07
			0.93	0.372			
				No	Toxic Release	0.0876	8.76E-07
				0.628			
	Leak -25 mm	Vertical	Yes		Vertical Jet Fire	0.0105	1.05E-07
	0.30	0.5	0.07				
			No	Yes	Flash Fire	0.0519	5.19E-07
			0.93	0.372			
				No	Toxic Release	0.0876	8.76E-07
				0.628			
		Inclined	Yes		Inclined Jet Fire	0.0105	1.05E-07
		0.5	0.07				
			No	Yes	Flash Fire	0.0519	5.19E-07
			0.93	0.372			
				No	Toxic Release	0.0876	8.76E-07
				0.628			
	Leak -10 mm	Vertical	Yes		Vertical Jet Fire	0.0010	1.00E-08
	0.20	0.5	0.01				
			No	Yes	Flash Fire	0.0392	3.92E-07
			0.99	0.396			
				No	Toxic Release	0.0598	5.98E-07
				0.604			
		Inclined	Yes		Inclined Jet Fire	0.0010	1.00E-08
		0.5	0.01				
			No	Yes	Flash Fire	0.0392	3.92E-07
			0.99	0.396			
				No	Toxic Release	0.0598	5.98E-07
				0.604			
	Full Bore		Yes		Fireball	0.0030	3.00E-08
	0.01		0.3				
			No	Yes	Flash Fire	0.0020	1.96E-08
			0.7	0.28			
				No	Toxic Release	0.0050	5.04E-08
				0.72			

Appendix D

Input Parameters and
Consequence Results

Audit Number: 74777
Date: 12/7/2023 Time: 12:01 PM

Input Report

Workspace: NPW_Safeti_pipeline_20231207_consequence data

Study

Study
NPW_Safeti_pipeline_20231207_consequence data

Tab	Group	Field	Value	Units
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Concrete, no bund	
Toxic parameters	Indoor toxic calculations	Specify the downwind building type	Unselected	
		Building type (downwind building type)	Buildings\Building type	
Dispersion	Distances of interest	Distances of interest		m

Scenario group

Scenario group
NPW_Safeti_pipeline_20231207_consequence data\Study\Underground Pipeline

Tab	Group	Field	Value	Units
Scenario group	Sum of probabilities for the scenario group	Probability	1.0032	fraction

CO Toxicity Vertical

Pressure vessel
NPW_Safeti_pipeline_20231207_consequence data\Study\Underground Pipeline\Scenario group

Tab	Group	Field	Value	Units
Material	Material	Material	CARBON MONOXIDE	
		Specify volume inventory?	No	
		Mass inventory	26403	kg
		Volume inventory	650.826	m3
		Material to track	CARBON MONOXIDE	
		Type of risk effects to model	Toxic and flammable	
	Phase	Specified condition	Pressure/temperature	

Tab	Group	Field	Value	Units
		Temperature	25	degC
		Pressure (gauge)	35	bar
		Fluid state	Vapour	
		Liquid mole fraction	0	fraction
Risk	Type of risk effects to model	Jet fire modelling for horizontal releases	Horizontal jet only	
		Reduce risks for mounded / underground tanks	No	
	Non-ignition probabilities	Specify probability of non-ignition	Calculate non-ignition probability	
		Non-ignition probability		fraction
	Immediate ignition probabilities	Probability of immediate ignition	Stationary - use material reactivity	
		Immediate ignition probability		fraction
	Delayed ignition probabilities	Specify minimum probability of delayed ignition	Calculate minimum probability of delayed ignition	
		Minimum probability of delayed ignition		fraction
		Specify conditional explosion probability	Calculate conditional probability	
		Conditional explosion probability		fraction
	Cox-Lees-Ang and UKOOA ignition modelling	Fraction of ignition probability for immediate ignition	0.3	
		Release type for CLA / UKOOA		
Scenario	Pipe dimensions	Pipe length		m
	Release location	Elevation	0	m
		Tank head	0	m
	Direction	Outdoor release direction	Angled from horizontal impinged	
		Outdoor release angle	90	deg
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Disallow liquid phase change only (metastable liquid)	
	Droplet break-up mechanism	Droplet break-up mechanism - instantaneous	Use flashing correlation	
		Droplet break-up mechanism - continuous	Do not force correlation	
Short pipe	Pipe characteristics	Pipe roughness	0.045	mm
	Frequencies	Frequency of bends in pipe	0	/m
		Frequency of couplings in pipe	0	/m
		Frequency of junctions in pipe	0	/m

Tab	Group	Field	Value	Units
	Frequencies of valves	Frequency of excess flow valves	0	/m
		Frequency of non-return valves	0	/m
		Frequency of shut-off valves	0	/m
	Velocity head losses	Excess flow valve velocity head losses	0	
		Non-return valve velocity head losses	0	
		Shut-off valve velocity head losses	0	
Time varying releases	Modelling of time-varying leaks and line ruptures	Vacuum relief valve	Operating	
		Vacuum relief valve set point	0	bar
	Inventory data for time-varying releases	Tank volume	650.826	m3
		Tank vapour volume	650.826	m3
		Tank liquid volume	0	m3
		Tank liquid level	0	m
		Maximum vapour release height		m
		Minimum mass inventory	0.1	kg
		Maximum mass inventory	1E+09	kg
	Safety system modelling for time-varying releases	Safety system modelling (isolation and blowdown)	No	
Dispersion	Dispersion scope	Concentration of interest	1200	ppm
		Averaging time for concentration of interest	Toxic	
		Specify user-defined averaging time	No	
		User defined averaging time		s
	Distances of interest	Distances of interest		m
	Averaging time for reports	ERPG [1 hr]	No	
		IDLH [30 mins]	No	
		STEL [15 mins]	No	
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Concrete, no bund	
	Building definition	Release building		
		In-building release?	Outdoor	
		Building wake effect	None	
		Wind or release angle from North	0	deg
		Handling of droplets	Trapped	

Tab	Group	Field	Value	Units
		Indoor mass modification factor	3	
Toxic parameters	Indoor toxic calculations	Specify the downwind building type	Unselected	
		Building type (downwind building type)	Buildings\Building type	
	Exposure time data	Set averaging time equal to exposure time	Use a fixed averaging time	
		Cut-off fraction of toxic load for exposure time calculation	0.05	fraction
		Cut-off concentration for exposure time calculations	0	fraction
	Toxic contours	Number of toxic levels	1	
		Dose levels	1.3E+07	
		Probit levels	3	
		Lethality levels	0.1	fraction
	Threshold concentration (N.B. Concentrations based on mixture rather than toxic component(s))	Threshold concentration	1E+06	ppm
		Minimum fatality if threshold concentration reached	0	fraction
Explosion parameters	Explosion method (Consequence calculations only)	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	Yes	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	4, 12.5, 37.5	kW/m2
		Probit levels	2.73, 3.72, 7.5	
		Dose levels	1.27E+06, 5.8E+06, 2.51E+07	
		Lethality levels	0.0001, 0.01, 0.99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726.85	degC

Tab	Group	Field	Value	Units
Jet fire	Jet fire method	Jet fire method	Cone model	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	4, 12.5, 37.5	kW/m2
		Probit levels	2.73, 3.72, 7.5	
		Dose levels	1.27E+06, 5.8E+06, 2.51E+07	
		Lethality levels	0.01, 0.1, 0.99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	20	s
	Cone model data	Horizontal options	Use standard method	
		Correlation	Recommended	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	4, 12.5, 37.5	kW/m2
		Probit levels	2.73, 3.72, 7.5	
		Dose levels	1.27E+06, 5.8E+06, 2.51E+07	
		Lethality levels	0.01, 0.1, 0.99	fraction
	Parameters	Radiative fraction for general fires	0.4	fraction
		Pool fire maximum exposure duration	20	s

0.023 kg/s Release Rate

User defined source
NPW_Safeti_pipeline_20231207_consequence data\Study\Underground Pipeline\Scenario group\CO Toxicity Vertical

Tab	Group	Field	Value	Units
Scenario	Release scenario	Release scenario	Leak	

Tab	Group	Field	Value	Units
		The number of release observers	2	
	Release observers	Release time	0, 1800	s
		Release phase	Vapour, Vapour	
		Mass flow	0.023, 0.023	kg/s
		Final velocity	330, 330	m/s
		Final temperature	25, 25	degC
		Liquid fraction	0, 0	fraction
		Droplet diameter		um
		Pool radius		m
		Pre-dilution air rate	0, 0	kg/s
		Downstream calculation status	No errors detected	
	Release location	Elevation	0	m
		Tank head	0	m
	Direction	Outdoor release direction	Angled from horizontal impinged	
		Outdoor release angle	90	deg
	Fireball emissive power	Use vessel burst pressure	No	
		Vessel burst pressure - gauge		bar
	Jet fire Miller model hole size	Orifice diameter	0	mm
Risk	Event probability (probability of this event compared with others in this group)	Event probability	0.0598	fraction
	Type of risk effects to model	Reduce risks for mounded / underground tanks	No	
	Non-ignition probabilities	Specify probability of non-ignition	Calculate non-ignition probability	
		Non-ignition probability		fraction
	Immediate ignition probabilities	Probability of immediate ignition	Stationary - use material reactivity	
		Immediate ignition probability		fraction
	Delayed ignition probabilities	Specify minimum probability of delayed ignition	Calculate minimum probability of delayed ignition	
		Minimum probability of delayed ignition		fraction
		Specify conditional explosion probability	Calculate conditional probability	
		Conditional explosion probability		fraction
	Cox-Lees-Ang and UKOOA ignition modelling	Release type for CLA / UKOOA		
Material	Material	Material characteristics	Toxic and flammable	
		Material to track	CARBON MONOXIDE	
		Type of risk effects to model	Toxic and flammable	

| Tab | Group | Field | Value | Units |

Dispersion	Dispersion scope	Concentration of interest	1200	ppm
		Averaging time for concentration of interest	Toxic	
		Specify user-defined averaging time	No	
		User defined averaging time		s
	Distances of interest	Distances of interest		m
	Averaging time for reports	ERPG [1 hr]	No	
		IDLH [30 mins]	No	
		STEL [15 mins]	No	
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Concrete, no bund	
Toxic parameters	Indoor toxic calculations	Specify the downwind building type	Unselected	
		Building type (downwind building type)	Buildings\Building type	
	Exposure time data	Set averaging time equal to exposure time	Use a fixed averaging time	
		Cut-off fraction of toxic load for exposure time calculation	0.05	fraction
		Cut-off concentration for exposure time calculations	0	fraction
	Toxic contours	Number of toxic levels	1	
		Dose levels	1.3E+07	
		Probit levels	3	
		Lethality levels	0.1	fraction
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	Yes	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	4, 12.5, 37.5	kW/m2
		Probit levels	2.73, 3.72, 7.5	
		Dose levels	1.27E+06, 5.8E+06, 2.51E+07	
		Lethality levels	0.0001, 0.01, 0.99	fraction
	Parameters	Mass modification factor	3	
Tab	**Group**	**Field**	**Value**	**Units**
		Fireball maximum exposure duration	30	s

	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726.85	degC
Jet fire	Jet fire method	Jet fire method	Cone model	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	4, 12.5, 37.5	kW/m2
		Probit levels	2.73, 3.72, 7.5	
		Dose levels	1.27E+06, 5.8E+06, 2.51E+07	
		Lethality levels	0.01, 0.1, 0.99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	20	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	4, 12.5, 37.5	kW/m2
		Probit levels	2.73, 3.72, 7.5	
		Dose levels	1.27E+06, 5.8E+06, 2.51E+07	
		Lethality levels	0.01, 0.1, 0.99	fraction
	Parameters	Radiative fraction for general fires	0.4	fraction
		Pool fire maximum exposure duration	20	s

0.144 kg/s Release Rate

User defined source

NPW_Safeti_pipeline_20231207_consequence data\Study\Underground Pipeline\Scenario group\CO Toxicity Vertical

Tab	Group	Field	Value	Units
Scenario	Release scenario	Release scenario	Leak	
		The number of release observers	2	
	Release observers	Release time	0, 1800	s
		Release phase	Vapour, Vapour	
		Mass flow	0.144, 0.144	kg/s
		Final velocity	330, 330	m/s
		Final temperature	25, 25	degC
		Liquid fraction	0, 0	fraction
		Droplet diameter		um
		Pool radius		m
		Pre-dilution air rate	0, 0	kg/s
		Downstream calculation status	No errors detected	
	Release location	Elevation	0	m
		Tank head	0	m
	Direction	Outdoor release direction	Angled from horizontal impinged	
		Outdoor release angle	90	deg
	Fireball emissive power	Use vessel burst pressure	No	
		Vessel burst pressure - gauge		bar
	Jet fire Miller model hole size	Orifice diameter	0	mm
Risk	Event probability (probability of this event compared with others in this group)	Event probability	0.0876	fraction
	Type of risk effects to model	Reduce risks for mounded / underground tanks	No	
	Non-ignition probabilities	Specify probability of non-ignition	Calculate non-ignition probability	
		Non-ignition probability		fraction
	Immediate ignition probabilities	Probability of immediate ignition	Stationary - use material reactivity	
		Immediate ignition probability		fraction
	Delayed ignition probabilities	Specify minimum probability of delayed ignition	Calculate minimum probability of delayed ignition	
		Minimum probability of delayed ignition		fraction
		Specify conditional explosion probability	Calculate conditional probability	
		Conditional explosion probability		fraction

Tab	Group	Field	Value	Units

	Cox-Lees-Ang and UKOOA ignition modelling	Release type for CLA / UKOOA		
Material	Material	Material characteristics	Toxic and flammable	
		Material to track	CARBON MONOXIDE	
		Type of risk effects to model	Toxic and flammable	
Dispersion	Dispersion scope	Concentration of interest	1200	ppm
		Averaging time for concentration of interest	Toxic	
		Specify user-defined averaging time	No	
		User defined averaging time		s
	Distances of interest	Distances of interest		m
	Averaging time for reports	ERPG [1 hr]	No	
		IDLH [30 mins]	No	
		STEL [15 mins]	No	
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Concrete, no bund	
Toxic parameters	Indoor toxic calculations	Specify the downwind building type	Unselected	
		Building type (downwind building type)	Buildings\Building type	
	Exposure time data	Set averaging time equal to exposure time	Use a fixed averaging time	
		Cut-off fraction of toxic load for exposure time calculation	0.05	fraction
		Cut-off concentration for exposure time calculations	0	fraction
	Toxic contours	Number of toxic levels	1	
		Dose levels	1.3E+07	
		Probit levels	3	
		Lethality levels	0.1	fraction
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	Yes	
	Radiation levels	Number of input radiation levels	3	
Tab	**Group**	**Field**	**Value**	**Units**
		Intensity levels	4, 12.5, 37.5	kW/m2

		Probit levels	2.73, 3.72, 7.5	
		Dose levels	1.27E+06, 5.8E+06, 2.51E+07	
		Lethality levels	0.0001, 0.01, 0.99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726.85	degC
Jet fire	Jet fire method	Jet fire method	Cone model	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	4, 12.5, 37.5	kW/m2
		Probit levels	2.73, 3.72, 7.5	
		Dose levels	1.27E+06, 5.8E+06, 2.51E+07	
		Lethality levels	0.01, 0.1, 0.99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	20	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	4, 12.5, 37.5	kW/m2
		Probit levels	2.73, 3.72, 7.5	
		Dose levels	1.27E+06, 5.8E+06, 2.51E+07	
		Lethality levels	0.01, 0.1, 0.99	fraction
	Parameters	Radiative fraction for general fires	0.4	fraction
		Pool fire maximum exposure duration	20	s

0.576 kg/s Release Rate

User defined source
NPW_Safeti_pipeline_20231207_consequence data\Study\Underground Pipeline\Scenario group\CO Toxicity Vertical

Tab	Group	Field	Value	Units
Scenario	Release scenario	Release scenario	Leak	
		The number of release observers	2	
	Release observers	Release time	0, 1800	s
		Release phase	Vapour, Vapour	
		Mass flow	0.576, 0.576	kg/s
		Final velocity	330, 330	m/s
		Final temperature	25, 25	degC
		Liquid fraction	0, 0	fraction
		Droplet diameter		um
		Pool radius		m
		Pre-dilution air rate	0, 0	kg/s
		Downstream calculation status	No errors detected	
	Release location	Elevation	0	m
		Tank head	0	m
	Direction	Outdoor release direction	Angled from horizontal impinged	
		Outdoor release angle	90	deg
	Fireball emissive power	Use vessel burst pressure	No	
		Vessel burst pressure - gauge		bar
	Jet fire Miller model hole size	Orifice diameter	0	mm
Risk	Event probability (probability of this event compared with others in this group)	Event probability	0.0876	fraction
	Type of risk effects to model	Reduce risks for mounded / underground tanks	No	
	Non-ignition probabilities	Specify probability of non-ignition	Calculate non-ignition probability	
		Non-ignition probability		fraction
	Immediate ignition probabilities	Probability of immediate ignition	Stationary - use material reactivity	
		Immediate ignition probability		fraction
	Delayed ignition probabilities	Specify minimum probability of delayed ignition	Calculate minimum probability of delayed ignition	
		Minimum probability of delayed ignition		fraction
		Specify conditional explosion probability	Calculate conditional probability	
		Conditional explosion probability		fraction

Tab	Group	Field	Value	Units
	Cox-Lees-Ang and UKOOA ignition modelling	Release type for CLA / UKOOA		
Material	Material	Material characteristics	Toxic and flammable	

		Material to track	CARBON MONOXIDE	
		Type of risk effects to model	Toxic and flammable	
Dispersion	Dispersion scope	Concentration of interest	3696	ppm
		Averaging time for concentration of interest	Toxic	
		Specify user-defined averaging time	No	
		User defined averaging time		s
	Distances of interest	Distances of interest		m
	Averaging time for reports	ERPG [1 hr]	No	
		IDLH [30 mins]	No	
		STEL [15 mins]	No	
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Concrete, no bund	
Toxic parameters	Indoor toxic calculations	Specify the downwind building type	Unselected	
		Building type (downwind building type)	Buildings\Building type	
	Exposure time data	Set averaging time equal to exposure time	Use a fixed averaging time	
		Cut-off fraction of toxic load for exposure time calculation	0.05	fraction
		Cut-off concentration for exposure time calculations	0	fraction
	Toxic contours	Number of toxic levels	1	
		Dose levels	1.3E+07	
		Probit levels	3	
		Lethality levels	0.1	fraction
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	Yes	
	Radiation levels	Number of input radiation levels	3	

Tab	Group	Field	Value	Units
		Intensity levels	4, 12.5, 37.5	kW/m2
		Probit levels	2.73, 3.72, 7.5	
		Dose levels	1.27E+06, 5.8E+06, 2.51E+07	
		Lethality levels	0.0001, 0.01, 0.99	fraction

	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726.85	degC
Jet fire	Jet fire method	Jet fire method	Cone model	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	4, 12.5, 37.5	kW/m2
		Probit levels	2.73, 3.72, 7.5	
		Dose levels	1.27E+06, 5.8E+06, 2.51E+07	
		Lethality levels	0.01, 0.1, 0.99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	20	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	4, 12.5, 37.5	kW/m2
		Probit levels	2.73, 3.72, 7.5	
		Dose levels	1.27E+06, 5.8E+06, 2.51E+07	
		Lethality levels	0.01, 0.1, 0.99	fraction
	Parameters	Radiative fraction for general fires	0.4	fraction
		Pool fire maximum exposure duration	20	s

2.3 kg/s Release Rate

User defined source
NPW_Safeti_pipeline_20231207_consequence data\Study\Underground Pipeline\Scenario group\CO Toxicity Vertical

Tab	Group	Field	Value	Units
Scenario	Release scenario	Release scenario	Leak	
		The number of release observers	2	
	Release observers	Release time	0, 1800	s
		Release phase	Vapour, Vapour	
		Mass flow	2.3, 2.3	kg/s
		Final velocity	330, 330	m/s
		Final temperature	25, 25	degC
		Liquid fraction	0, 0	fraction
		Droplet diameter		um
		Pool radius	0.5, 0.5	m
		Pre-dilution air rate	0, 0	kg/s
		Downstream calculation status	No errors detected	
	Release location	Elevation	0	m
		Tank head	0	m
	Direction	Outdoor release direction	Angled from horizontal impinged	
		Outdoor release angle	90	deg
	Fireball emissive power	Use vessel burst pressure	No	
		Vessel burst pressure - gauge		bar
	Jet fire Miller model hole size	Orifice diameter	0	mm
Risk	Event probability (probability of this event compared with others in this group)	Event probability	0.0555	fraction
	Type of risk effects to model	Reduce risks for mounded / underground tanks	No	
	Non-ignition probabilities	Specify probability of non-ignition	Calculate non-ignition probability	
		Non-ignition probability		fraction
	Immediate ignition probabilities	Probability of immediate ignition	Stationary - use material reactivity	
		Immediate ignition probability		fraction
	Delayed ignition probabilities	Specify minimum probability of delayed ignition	Calculate minimum probability of delayed ignition	
		Minimum probability of delayed ignition		fraction
		Specify conditional explosion probability	Calculate conditional probability	
		Conditional explosion probability		fraction

Tab	Group	Field	Value	Units
	Cox-Lees-Ang and UKOOA ignition modelling	Release type for CLA / UKOOA		
Material	Material	Material characteristics	Toxic and flammable	
		Material to track	CARBON MONOXIDE	
		Type of risk effects to model	Toxic and flammable	
Dispersion	Dispersion scope	Concentration of interest	3696	ppm
		Averaging time for concentration of interest	Toxic	
		Specify user-defined averaging time	No	
		User defined averaging time		s
	Distances of interest	Distances of interest		m
	Averaging time for reports	ERPG [1 hr]	No	
		IDLH [30 mins]	No	
		STEL [15 mins]	No	
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Concrete, no bund	
Toxic parameters	Indoor toxic calculations	Specify the downwind building type	Unselected	
		Building type (downwind building type)	Buildings\Building type	
	Exposure time data	Set averaging time equal to exposure time	Use a fixed averaging time	
		Cut-off fraction of toxic load for exposure time calculation	0.05	fraction
		Cut-off concentration for exposure time calculations	0	fraction
	Toxic contours	Number of toxic levels	1	
		Dose levels	1.3E+07	
		Probit levels	3	
		Lethality levels	0.1	fraction
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	Yes	
	Radiation levels	Number of input radiation levels	3	
Tab	Group	Field	Value	Units

		Intensity levels	4, 12.5, 37.5	kW/m2
		Probit levels	2.73, 3.72, 7.5	
		Dose levels	1.27E+06, 5.8E+06, 2.51E+07	
		Lethality levels	0.0001, 0.01, 0.99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726.85	degC
Jet fire	Jet fire method	Jet fire method	Cone model	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	4, 12.5, 37.5	kW/m2
		Probit levels	2.73, 3.72, 7.5	
		Dose levels	1.27E+06, 5.8E+06, 2.51E+07	
		Lethality levels	0.01, 0.1, 0.99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	20	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	4, 12.5, 37.5	kW/m2
		Probit levels	2.73, 3.72, 7.5	
		Dose levels	1.27E+06, 5.8E+06, 2.51E+07	
		Lethality levels	0.01, 0.1, 0.99	fraction
	Parameters	Radiative fraction for general fires	0.4	fraction
		Pool fire maximum exposure duration	20	s

20.72 kg/s Release Rate_No direction

User defined source
NPW_Safeti_pipeline_20231207_consequence data\Study\Underground Pipeline\Scenario group\CO Toxicity Vertical

Tab	Group	Field	Value	Units
Scenario	Release scenario	Release scenario	Catastrophic rupture	
		The number of release observers	1	
	Release observers	Release time	0	s
		Release phase	Vapour	
		Mass flow	26403	kg/s
		Final velocity	330	m/s
		Final temperature	25	degC
		Liquid fraction	0	fraction
		Droplet diameter		um
		Pool radius		m
		Pre-dilution air rate	0	kg/s
		Downstream calculation status	No errors detected	
	Release location	Elevation	0	m
		Tank head	0	m
	Direction	Outdoor release direction	Angled from horizontal impinged	
		Outdoor release angle	90	deg
	Fireball emissive power	Use vessel burst pressure	No	
		Vessel burst pressure - gauge		bar
	Jet fire Miller model hole size	Orifice diameter	0	mm
Risk	Event probability (probability of this event compared with others in this group)	Event probability	0.005	fraction
	Type of risk effects to model	Reduce risks for mounded / underground tanks	No	
	Non-ignition probabilities	Specify probability of non-ignition	Calculate non-ignition probability	
		Non-ignition probability		fraction
	Immediate ignition probabilities	Probability of immediate ignition	Stationary - use material reactivity	
		Immediate ignition probability		fraction
	Delayed ignition probabilities	Specify minimum probability of delayed ignition	Calculate minimum probability of delayed ignition	
		Minimum probability of delayed ignition		fraction
		Specify conditional explosion probability	Calculate conditional probability	
		Conditional explosion probability		fraction

Tab	Group	Field	Value	Units
	Cox-Lees-Ang and UKOOA ignition modelling	Release type for CLA / UKOOA		
Material	Material	Material characteristics	Toxic and flammable	
		Material to track	CARBON MONOXIDE	
		Type of risk effects to model	Toxic and flammable	
Dispersion	Dispersion scope	Concentration of interest	3696	ppm
		Averaging time for concentration of interest	Toxic	
		Specify user-defined averaging time	No	
		User defined averaging time		s
	Distances of interest	Distances of interest		m
	Averaging time for reports	ERPG [1 hr]	No	
		IDLH [30 mins]	No	
		STEL [15 mins]	No	
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Concrete, no bund	
Toxic parameters	Indoor toxic calculations	Specify the downwind building type	Unselected	
		Building type (downwind building type)	Buildings\Building type	
	Exposure time data	Set averaging time equal to exposure time	Use a fixed averaging time	
		Cut-off fraction of toxic load for exposure time calculation	0.05	fraction
		Cut-off concentration for exposure time calculations	0	fraction
	Toxic contours	Number of toxic levels	1	
		Dose levels	1.3E+07	
		Probit levels	3	
		Lethality levels	0.1	fraction
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	Yes	
	Radiation levels	Number of input radiation levels	3	
Tab	Group	Field	Value	Units

		Intensity levels	4, 12.5, 37.5	kW/m2
		Probit levels	2.73, 3.72, 7.5	
		Dose levels	1.27E+06, 5.8E+06, 2.51E+07	
		Lethality levels	0.0001, 0.01, 0.99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726.85	degC
Jet fire	Jet fire method	Jet fire method	Cone model	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	4, 12.5, 37.5	kW/m2
		Probit levels	2.73, 3.72, 7.5	
		Dose levels	1.27E+06, 5.8E+06, 2.51E+07	
		Lethality levels	0.01, 0.1, 0.99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	20	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	4, 12.5, 37.5	kW/m2
		Probit levels	2.73, 3.72, 7.5	
		Dose levels	1.27E+06, 5.8E+06, 2.51E+07	
		Lethality levels	0.01, 0.1, 0.99	fraction
	Parameters	Radiative fraction for general fires	0.4	fraction
		Pool fire maximum exposure duration	20	s

CO Toxicity Inclined

Pressure vessel
NPW_Safeti_pipeline_20231207_consequence data\Study\Underground Pipeline\Scenario group

Tab	Group	Field	Value	Units
Material	Material	Material	CARBON MONOXIDE	
		Specify volume inventory?	No	
		Mass inventory	26403	kg
		Volume inventory	650.826	m3
		Material to track	CARBON MONOXIDE	
		Type of risk effects to model	Toxic and flammable	
	Phase	Specified condition	Pressure/temperature	
		Temperature	25	degC
		Pressure (gauge)	35	bar
		Fluid state	Vapour	
		Liquid mole fraction	0	fraction
Risk	Type of risk effects to model	Jet fire modelling for horizontal releases	Horizontal jet only	
		Reduce risks for mounded / underground tanks	No	
	Non-ignition probabilities	Specify probability of non-ignition	Calculate non-ignition probability	
		Non-ignition probability		fraction
	Immediate ignition probabilities	Probability of immediate ignition	Stationary - use material reactivity	
		Immediate ignition probability		fraction
	Delayed ignition probabilities	Specify minimum probability of delayed ignition	Calculate minimum probability of delayed ignition	
		Minimum probability of delayed ignition		fraction
		Specify conditional explosion probability	Calculate conditional probability	
		Conditional explosion probability		fraction
	Cox-Lees-Ang and UKOOA ignition modelling	Fraction of ignition probability for immediate ignition	0.3	
		Release type for CLA / UKOOA		
Scenario	Pipe dimensions	Pipe length		m
	Release location	Elevation	1	m
		Tank head	0	m
	Direction	Outdoor release direction	Angled from horizontal impinged	
Tab	**Group**	**Field**	**Value**	**Units**

		Outdoor release angle	45	deg
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Disallow liquid phase change only (metastable liquid)	
	Droplet break-up mechanism	Droplet break-up mechanism - instantaneous	Use flashing correlation	
		Droplet break-up mechanism - continuous	Do not force correlation	
Short pipe	Pipe characteristics	Pipe roughness	0.045	mm
	Frequencies	Frequency of bends in pipe	0	/m
		Frequency of couplings in pipe	0	/m
		Frequency of junctions in pipe	0	/m
	Frequencies of valves	Frequency of excess flow valves	0	/m
		Frequency of non-return valves	0	/m
		Frequency of shut-off valves	0	/m
	Velocity head losses	Excess flow valve velocity head losses	0	
		Non-return valve velocity head losses	0	
		Shut-off valve velocity head losses	0	
Time varying releases	Modelling of time-varying leaks and line ruptures	Vacuum relief valve	Operating	
		Vacuum relief valve set point	0	bar
	Inventory data for time-varying releases	Tank volume	650.826	m3
		Tank vapour volume	650.826	m3
		Tank liquid volume	0	m3
		Tank liquid level	0	m
		Maximum vapour release height		m
		Minimum mass inventory	0	kg
		Maximum mass inventory	1E+09	kg
	Safety system modelling for time-varying releases	Safety system modelling (isolation and blowdown)	No	
Dispersion	Dispersion scope	Concentration of interest	3696	ppm
		Averaging time for concentration of interest	Toxic	
		Specify user-defined averaging time	No	
		User defined averaging time		s
	Distances of interest	Distances of interest		m

Tab	Group	Field	Value	Units

	Averaging time for reports	ERPG [1 hr]	No	
		IDLH [30 mins]	No	
		STEL [15 mins]	No	
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Concrete, no bund	
	Building definition	Release building		
		In-building release?	Outdoor	
		Building wake effect	None	
		Wind or release angle from North	0	deg
		Handling of droplets	Trapped	
		Indoor mass modification factor	3	
Toxic parameters	Indoor toxic calculations	Specify the downwind building type	Unselected	
		Building type (downwind building type)	Buildings\Building type	
	Exposure time data	Set averaging time equal to exposure time	Use a fixed averaging time	
		Cut-off fraction of toxic load for exposure time calculation	0.05	fraction
		Cut-off concentration for exposure time calculations	0	fraction
	Toxic contours	Number of toxic levels	1	
		Dose levels	1.3E+07	
		Probit levels	3	
		Lethality levels	0.1	fraction
	Threshold concentration (N.B. Concentrations based on mixture rather than toxic component(s))	Threshold concentration	1E+06	ppm
		Minimum fatality if threshold concentration reached	0	fraction
Explosion parameters	Explosion method (Consequence calculations only)	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
Tab	**Group**	**Field**	**Value**	**Units**

		Calculate lethality	Yes	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	4, 12.5, 37.5	kW/m2
		Probit levels	2.73, 3.72, 7.5	
		Dose levels	1.27E+06, 5.8E+06, 2.51E+07	
		Lethality levels	0.0001, 0.01, 0.99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726.85	degC
Jet fire	Jet fire method	Jet fire method	Cone model	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	4, 12.5, 37.5	kW/m2
		Probit levels	2.73, 3.72, 7.5	
		Dose levels	1.27E+06, 5.8E+06, 2.51E+07	
		Lethality levels	0.01, 0.1, 0.99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	20	s
	Cone model data	Horizontal options	Use standard method	
		Correlation	Recommended	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	4, 12.5, 37.5	kW/m2
		Probit levels	2.73, 3.72, 7.5	
		Dose levels	1.27E+06, 5.8E+06, 2.51E+07	
		Lethality levels	0.01, 0.1, 0.99	fraction
	Parameters	Radiative fraction for general fires	0.4	fraction

Tab	Group	Field	Value	Units

Pool fire maximum exposure duration	20		s

0.023 kg/s Release Rate

User defined source
NPW_Safeti_pipeline_20231207_consequence data\Study\Underground Pipeline\Scenario group\CO Toxicity Inclined

Tab	Group	Field	Value	Units
Scenario	Release scenario	Release scenario	Leak	
		The number of release observers	2	
	Release observers	Release time	0, 1800	s
		Release phase	Vapour, Vapour	
		Mass flow	0.023, 0.023	kg/s
		Final velocity	330, 330	m/s
		Final temperature	25, 25	degC
		Liquid fraction	0, 0	fraction
		Droplet diameter		um
		Pool radius		m
		Pre-dilution air rate	0, 0	kg/s
		Downstream calculation status	No errors detected	
	Release location	Elevation	0	m
		Tank head	0	m
	Direction	Outdoor release direction	Angled from horizontal impinged	
		Outdoor release angle	90	deg
	Fireball emissive power	Use vessel burst pressure	No	
		Vessel burst pressure - gauge		bar
	Jet fire Miller model hole size	Orifice diameter	0	mm
Risk	Event probability (probability of this event compared with others in this group)	Event probability	0.0598	fraction
	Type of risk effects to model	Reduce risks for mounded / underground tanks	No	
	Non-ignition probabilities	Specify probability of non-ignition	Calculate non-ignition probability	
		Non-ignition probability		fraction
	Immediate ignition probabilities	Probability of immediate ignition	Stationary - use material reactivity	
		Immediate ignition probability		fraction

Tab	Group	Field	Value	Units
	Delayed ignition probabilities	Specify minimum probability of delayed ignition	Calculate minimum probability of delayed ignition	
		Minimum probability of delayed ignition		fraction
		Specify conditional explosion probability	Calculate conditional probability	
		Conditional explosion probability		fraction
	Cox-Lees-Ang and UKOOA ignition modelling	Release type for CLA / UKOOA		
Material	Material	Material characteristics	Toxic and flammable	
		Material to track	CARBON MONOXIDE	
		Type of risk effects to model	Toxic and flammable	
Dispersion	Dispersion scope	Concentration of interest	3696	ppm
		Averaging time for concentration of interest	Toxic	
		Specify user-defined averaging time	No	
		User defined averaging time		s
	Distances of interest	Distances of interest		m
	Averaging time for reports	ERPG [1 hr]	No	
		IDLH [30 mins]	No	
		STEL [15 mins]	No	
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Concrete, no bund	
Toxic parameters	Indoor toxic calculations	Specify the downwind building type	Unselected	
		Building type (downwind building type)	Buildings\Building type	
	Exposure time data	Set averaging time equal to exposure time	Use a fixed averaging time	
		Cut-off fraction of toxic load for exposure time calculation	0.05	fraction
		Cut-off concentration for exposure time calculations	0	fraction
	Toxic contours	Number of toxic levels	1	
		Dose levels	1.3E+07	
		Probit levels	3	
		Lethality levels	0.1	fraction
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m

| Tab | Group | Field | Value | Units |

	Vapour liquid method	Use explosion mass modification factor	Yes	

		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	Yes	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	4, 12.5, 37.5	kW/m2
		Probit levels	2.73, 3.72, 7.5	
		Dose levels	1.27E+06, 5.8E+06, 2.51E+07	
		Lethality levels	0.0001, 0.01, 0.99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726.85	degC
Jet fire	Jet fire method	Jet fire method	Cone model	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	4, 12.5, 37.5	kW/m2
		Probit levels	2.73, 3.72, 7.5	
		Dose levels	1.27E+06, 5.8E+06, 2.51E+07	
		Lethality levels	0.01, 0.1, 0.99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	20	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	4, 12.5, 37.5	kW/m2
Tab	**Group**	**Field**	**Value**	**Units**
		Probit levels	2.73, 3.72, 7.5	

		Dose levels	1.27E+06, 5.8E+06, 2.51E+07	
		Lethality levels	0.01, 0.1, 0.99	fraction
	Parameters	Radiative fraction for general fires	0.4	fraction
		Pool fire maximum exposure duration	20	s

0.144 kg/s Release Rate

User defined source
NPW_Safeti_pipeline_20231207_consequence data\Study\Underground Pipeline\Scenario group\CO Toxicity Inclined

Tab	Group	Field	Value	Units
Scenario	Release scenario	Release scenario	Leak	
		The number of release observers	2	
	Release observers	Release time	0, 1800	s
		Release phase	Vapour, Vapour	
		Mass flow	0.144, 0.144	kg/s
		Final velocity	330, 330	m/s
		Final temperature	25, 25	degC
		Liquid fraction	0, 0	fraction
		Droplet diameter		um
		Pool radius		m
		Pre-dilution air rate	0, 0	kg/s
		Downstream calculation status	No errors detected	
	Release location	Elevation	0	m
		Tank head	0	m
	Direction	Outdoor release direction	Angled from horizontal impinged	
		Outdoor release angle	90	deg
	Fireball emissive power	Use vessel burst pressure	No	
		Vessel burst pressure - gauge		bar
	Jet fire Miller model hole size	Orifice diameter	0	mm
Risk	Event probability (probability of this event compared with others in this group)	Event probability	0.0876	fraction
	Type of risk effects to model	Reduce risks for mounded / underground tanks	No	
	Non-ignition probabilities	Specify probability of non-ignition	Calculate non-ignition probability	
Tab	**Group**	**Field**	**Value**	**Units**
		Non-ignition probability		fraction
	Immediate ignition probabilities	Probability of immediate ignition	Stationary - use material reactivity	

		Immediate ignition probability		fraction
	Delayed ignition probabilities	Specify minimum probability of delayed ignition	Calculate minimum probability of delayed ignition	
		Minimum probability of delayed ignition		fraction
		Specify conditional explosion probability	Calculate conditional probability	
		Conditional explosion probability		fraction
	Cox-Lees-Ang and UKOOA ignition modelling	Release type for CLA / UKOOA		
Material	Material	Material characteristics	Toxic and flammable	
		Material to track	CARBON MONOXIDE	
		Type of risk effects to model	Toxic and flammable	
Dispersion	Dispersion scope	Concentration of interest	1200	ppm
		Averaging time for concentration of interest	Toxic	
		Specify user-defined averaging time	No	
		User defined averaging time		s
	Distances of interest	Distances of interest		m
	Averaging time for reports	ERPG [1 hr]	No	
		IDLH [30 mins]	No	
		STEL [15 mins]	No	
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Concrete, no bund	
Toxic parameters	Indoor toxic calculations	Specify the downwind building type	Unselected	
		Building type (downwind building type)	Buildings\Building type	
	Exposure time data	Set averaging time equal to exposure time	Use a fixed averaging time	
		Cut-off fraction of toxic load for exposure time calculation	0.05	fraction
		Cut-off concentration for exposure time calculations	0	fraction
	Toxic contours	Number of toxic levels	1	
		Dose levels	1.3E+07	
		Probit levels	3	
		Lethality levels	0.1	fraction
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	

Tab	Group	Field	Value	Units
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	

		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	Yes	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	4, 12.5, 37.5	kW/m2
		Probit levels	2.73, 3.72, 7.5	
		Dose levels	1.27E+06, 5.8E+06, 2.51E+07	
		Lethality levels	0.0001, 0.01, 0.99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726.85	degC
Jet fire	Jet fire method	Jet fire method	Cone model	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	4, 12.5, 37.5	kW/m2
		Probit levels	2.73, 3.72, 7.5	
		Dose levels	1.27E+06, 5.8E+06, 2.51E+07	
		Lethality levels	0.01, 0.1, 0.99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	20	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	

Tab	Group	Field	Value	Units
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	4, 12.5, 37.5	kW/m2
		Probit levels	2.73, 3.72, 7.5	

		Dose levels	1.27E+06, 5.8E+06, 2.51E+07	
		Lethality levels	0.01, 0.1, 0.99	fraction
	Parameters	Radiative fraction for general fires	0.4	fraction
		Pool fire maximum exposure duration	20	s

0.576 kg/s Release Rate

User defined source
NPW_Safeti_pipeline_20231207_consequence data\Study\Underground Pipeline\Scenario group\CO Toxicity Inclined

Tab	Group	Field	Value	Units
Scenario	Release scenario	Release scenario	Leak	
		The number of release observers	2	
	Release observers	Release time	0, 1800	s
		Release phase	Vapour, Vapour	
		Mass flow	0.576, 0.576	kg/s
		Final velocity	330, 330	m/s
		Final temperature	25, 25	degC
		Liquid fraction	0, 0	fraction
		Droplet diameter		um
		Pool radius		m
		Pre-dilution air rate	0, 0	kg/s
		Downstream calculation status	No errors detected	
	Release location	Elevation	0	m
		Tank head	0	m
	Direction	Outdoor release direction	Angled from horizontal impinged	
		Outdoor release angle	45	deg
	Fireball emissive power	Use vessel burst pressure	No	
		Vessel burst pressure - gauge		bar
	Jet fire Miller model hole size	Orifice diameter	0	mm
Risk	Event probability (probability of this event compared with others in this group)	Event probability	0.0876	fraction
	Type of risk effects to model	Reduce risks for mounded / underground tanks	No	
Tab	**Group**	**Field**	**Value**	**Units**
	Non-ignition probabilities	Specify probability of non-ignition	Calculate non-ignition probability	
		Non-ignition probability		fraction
	Immediate ignition probabilities	Probability of immediate ignition	Stationary - use material reactivity	

		Immediate ignition probability		fraction
	Delayed ignition probabilities	Specify minimum probability of delayed ignition	Calculate minimum probability of delayed ignition	
		Minimum probability of delayed ignition		fraction
		Specify conditional explosion probability	Calculate conditional probability	
		Conditional explosion probability		fraction
	Cox-Lees-Ang and UKOOA ignition modelling	Release type for CLA / UKOOA		
Material	Material	Material characteristics	Toxic and flammable	
		Material to track	CARBON MONOXIDE	
		Type of risk effects to model	Toxic and flammable	
Dispersion	Dispersion scope	Concentration of interest	3696	ppm
		Averaging time for concentration of interest	Toxic	
		Specify user-defined averaging time	No	
		User defined averaging time		s
	Distances of interest	Distances of interest		m
	Averaging time for reports	ERPG [1 hr]	No	
		IDLH [30 mins]	No	
		STEL [15 mins]	No	
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Concrete, no bund	
Toxic parameters	Indoor toxic calculations	Specify the downwind building type	Unselected	
		Building type (downwind building type)	Buildings\Building type	
	Exposure time data	Set averaging time equal to exposure time	Use a fixed averaging time	
		Cut-off fraction of toxic load for exposure time calculation	0.05	fraction
		Cut-off concentration for exposure time calculations	0	fraction
	Toxic contours	Number of toxic levels	1	
		Dose levels	1.3E+07	
		Probit levels	3	
Tab	**Group**	**Field**	**Value**	**Units**
		Lethality levels	0.1	fraction
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	

		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	Yes	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	4, 12.5, 37.5	kW/m2
		Probit levels	2.73, 3.72, 7.5	
		Dose levels	1.27E+06, 5.8E+06, 2.51E+07	
		Lethality levels	0.0001, 0.01, 0.99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726.85	degC
Jet fire	Jet fire method	Jet fire method	Cone model	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	4, 12.5, 37.5	kW/m2
		Probit levels	2.73, 3.72, 7.5	
		Dose levels	1.27E+06, 5.8E+06, 2.51E+07	
		Lethality levels	0.01, 0.1, 0.99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	20	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	

Tab	Group	Field	Value	Units
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	4, 12.5, 37.5	kW/m2
		Probit levels	2.73, 3.72, 7.5	

		Dose levels	1.27E+06, 5.8E+06, 2.51E+07	
		Lethality levels	0.01, 0.1, 0.99	fraction
	Parameters	Radiative fraction for general fires	0.4	fraction
		Pool fire maximum exposure duration	20	s

2.3 kg/s Release Rate

User defined source
NPW_Safeti_pipeline_20231207_consequence data\Study\Underground Pipeline\Scenario group\CO Toxicity Inclined

Tab	Group	Field	Value	Units
Scenario	Release scenario	Release scenario	Leak	
		The number of release observers	2	
	Release observers	Release time	0, 1800	s
		Release phase	Vapour, Vapour	
		Mass flow	2.3, 2.3	kg/s
		Final velocity	330, 330	m/s
		Final temperature	25, 25	degC
		Liquid fraction	0, 0	fraction
		Droplet diameter		um
		Pool radius	0.5, 0.5	m
		Pre-dilution air rate	0, 0	kg/s
		Downstream calculation status	No errors detected	
	Release location	Elevation	0	m
		Tank head	0	m
	Direction	Outdoor release direction	Angled from horizontal impinged	
		Outdoor release angle	45	deg
	Fireball emissive power	Use vessel burst pressure	No	
		Vessel burst pressure - gauge		bar
	Jet fire Miller model hole size	Orifice diameter	0	mm
Risk	Event probability (probability of this event compared with others in this group)	Event probability	0.0555	fraction
Tab	**Group**	**Field**	**Value**	**Units**
	Type of risk effects to model	Reduce risks for mounded / underground tanks	No	
	Non-ignition probabilities	Specify probability of non-ignition	Calculate non-ignition probability	
		Non-ignition probability		fraction
	Immediate ignition probabilities	Probability of immediate ignition	Stationary - use material reactivity	

		Immediate ignition probability		fraction
	Delayed ignition probabilities	Specify minimum probability of delayed ignition	Calculate minimum probability of delayed ignition	
		Minimum probability of delayed ignition		fraction
		Specify conditional explosion probability	Calculate conditional probability	
		Conditional explosion probability		fraction
	Cox-Lees-Ang and UKOOA ignition modelling	Release type for CLA / UKOOA		
Material	Material	Material characteristics	Toxic and flammable	
		Material to track	CARBON MONOXIDE	
		Type of risk effects to model	Toxic and flammable	
Dispersion	Dispersion scope	Concentration of interest	3696	ppm
		Averaging time for concentration of interest	Toxic	
		Specify user-defined averaging time	No	
		User defined averaging time		s
	Distances of interest	Distances of interest		m
	Averaging time for reports	ERPG [1 hr]	No	
		IDLH [30 mins]	No	
		STEL [15 mins]	No	
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Concrete, no bund	
Toxic parameters	Indoor toxic calculations	Specify the downwind building type	Unselected	
		Building type (downwind building type)	Buildings\Building type	
	Exposure time data	Set averaging time equal to exposure time	Use a fixed averaging time	
		Cut-off fraction of toxic load for exposure time calculation	0.05	fraction
		Cut-off concentration for exposure time calculations	0	fraction
	Toxic contours	Number of toxic levels	1	
		Dose levels	1.3E+07	
Tab	**Group**	**Field**	**Value**	**Units**
		Probit levels	3	
		Lethality levels	0.1	fraction
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	

		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	Yes	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	4, 12.5, 37.5	kW/m2
		Probit levels	2.73, 3.72, 7.5	
		Dose levels	1.27E+06, 5.8E+06, 2.51E+07	
		Lethality levels	0.0001, 0.01, 0.99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726.85	degC
Jet fire	Jet fire method	Jet fire method	Cone model	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	4, 12.5, 37.5	kW/m2
		Probit levels	2.73, 3.72, 7.5	
		Dose levels	1.27E+06, 5.8E+06, 2.51E+07	
		Lethality levels	0.01, 0.1, 0.99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	20	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction

Tab	Group	Field	Value	Units
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	4, 12.5, 37.5	kW/m2
		Probit levels	2.73, 3.72, 7.5	

		Dose levels	1.27E+06, 5.8E+06, 2.51E+07	
		Lethality levels	0.01, 0.1, 0.99	fraction
	Parameters	Radiative fraction for general fires	0.4	fraction
		Pool fire maximum exposure duration	20	s

Underground Pipe Flashfire Vertical

Pressure vessel
NPW_Safeti_pipeline_20231207_consequence data\Study\Underground Pipeline\Scenario group

Tab	Group	Field	Value	Units
Material	Material	Material	TOWNGAS	
		Specify volume inventory?	No	
		Mass inventory	26403	kg
		Volume inventory	1351.68	m3
		Material to track	TOWNGAS	
		Type of risk effects to model	Flammable only	
	Phase	Specified condition	Pressure/temperature	
		Temperature	25	degC
		Pressure (gauge)	35	bar
		Fluid state	Vapour	
		Liquid mole fraction	0	fraction
Risk	Type of risk effects to model	Jet fire modelling for horizontal releases	Horizontal jet only	
		Reduce risks for mounded / underground tanks	Yes	
	Non-ignition probabilities	Specify probability of non-ignition	Calculate non-ignition probability	
		Non-ignition probability		fraction
	Immediate ignition probabilities	Probability of immediate ignition	Specify directly	
		Immediate ignition probability	0	fraction
	Delayed ignition probabilities	Specify minimum probability of delayed ignition	Use minimum probability of delayed ignition	
Tab	**Group**	**Field**	**Value**	**Units**
		Minimum probability of delayed ignition	1	fraction
		Specify conditional explosion probability	Calculate conditional probability	
		Conditional explosion probability		fraction
	Cox-Lees-Ang and UKOOA ignition	Fraction of ignition probability for	0.3	

	modelling	immediate ignition		
		Release type for CLA / UKOOA		
Scenario	Pipe dimensions	Pipe length		m
	Release location	Elevation	0	m
		Tank head	0	m
	Direction	Outdoor release direction	Angled from horizontal impinged	
		Outdoor release angle	90	deg
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Disallow liquid phase change only (metastable liquid)	
	Droplet break-up mechanism	Droplet break-up mechanism - instantaneous	Use flashing correlation	
		Droplet break-up mechanism - continuous	Do not force correlation	
Short pipe	Pipe characteristics	Pipe roughness	0.045	mm
	Frequencies	Frequency of bends in pipe	0	/m
		Frequency of couplings in pipe	0	/m
		Frequency of junctions in pipe	0	/m
	Frequencies of valves	Frequency of excess flow valves	0	/m
		Frequency of non-return valves	0	/m
		Frequency of shut-off valves	0	/m
	Velocity head losses	Excess flow valve velocity head losses	0	
		Non-return valve velocity head losses	0	
		Shut-off valve velocity head losses	0	
Time varying releases	Modelling of time-varying leaks and line ruptures	Vacuum relief valve	Operating	
		Vacuum relief valve set point	0	bar
	Inventory data for time-varying releases	Tank volume	1351.68	m3
		Tank vapour volume	1351.68	m3

Tab	Group	Field	Value	Units
		Tank liquid volume	0	m3
		Tank liquid level	0	m
		Maximum vapour release height		m
		Minimum mass inventory	0	kg
		Maximum mass inventory	1E+09	kg
	Safety system modelling for time-varying releases	Safety system modelling (isolation and blowdown)	No	

Dispersion	Dispersion scope	Concentration of interest	1200	ppm
		Averaging time for concentration of interest	Flammable	
		Specify user-defined averaging time	No	
		User defined averaging time		s
	Distances of interest	Distances of interest		m
	Averaging time for reports	ERPG [1 hr]	No	
		IDLH [30 mins]	No	
		STEL [15 mins]	No	
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Concrete, no bund	
	Building definition	Release building		
		In-building release?	Outdoor	
		Building wake effect	None	
		Wind or release angle from North	0	deg
		Handling of droplets	Trapped	
		Indoor mass modification factor	3	
Toxic parameters	Indoor toxic calculations	Specify the downwind building type	Unselected	
		Building type (downwind building type)	Buildings\Building type	
	Exposure time data	Set averaging time equal to exposure time	Use a fixed averaging time	
		Cut-off fraction of toxic load for exposure time calculation	0.05	fraction
		Cut-off concentration for exposure time calculations	0	fraction
	Toxic contours	Number of toxic levels	1	
		Dose levels	1.3E+07	
		Probit levels	3	
		Lethality levels	0.1	fraction
Tab	**Group**	**Field**	**Value**	**Units**
	Threshold concentration (N.B. Concentrations based on mixture rather than toxic component(s))	Threshold concentration	1E+06	ppm
		Minimum fatality if threshold concentration reached	0	fraction
Explosion parameters	Explosion method (Consequence calculations only)	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	

		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	Yes	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	4, 12.5, 37.5	kW/m2
		Probit levels	2.73, 3.72, 7.5	
		Dose levels	1.27E+06, 5.8E+06, 2.51E+07	
		Lethality levels	0.0001, 0.01, 0.99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726.85	degC
Jet fire	Jet fire method	Jet fire method	Cone model	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	4, 12.5, 37.5	kW/m2
		Probit levels	2.73, 3.72, 7.5	
		Dose levels	1.27E+06, 5.8E+06, 2.51E+07	
		Lethality levels	0.01, 0.1, 0.99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	20	s
	Cone model data	Horizontal options	Use standard method	
		Correlation	Recommended	

Tab	Group	Field	Value	Units
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	

	Radiation levels	Number of input radiation levels	3	
		Intensity levels	4, 12.5, 37.5	kW/m2
		Probit levels	2.73, 3.72, 7.5	
		Dose levels	1.27E+06, 5.8E+06, 2.51E+07	
		Lethality levels	0.01, 0.1, 0.99	fraction
	Parameters	Radiative fraction for general fires	0.4	fraction
		Pool fire maximum exposure duration	20	s

0.41 kg/s Release Rate

User defined source
NPW_Safeti_pipeline_20231207_consequence data\Study\Underground Pipeline\Scenario group\Underground Pipe Flashfire Vertical

Tab	Group	Field	Value	Units
Scenario	Release scenario	Release scenario	Leak	
		The number of release observers	2	
	Release observers	Release time	0, 1800	s
		Release phase	Vapour, Vapour	
		Mass flow	0.41, 0.41	kg/s
		Final velocity	330, 330	m/s
		Final temperature	25, 25	degC
		Liquid fraction	0, 0	fraction
		Droplet diameter		um
		Pool radius		m
		Pre-dilution air rate	0, 0	kg/s
		Downstream calculation status	No errors detected	
	Release location	Elevation	0	m
		Tank head	0	m
Tab	**Group**	**Field**	**Value**	**Units**
	Direction	Outdoor release direction	Angled from horizontal impinged	
		Outdoor release angle	90	deg
	Fireball emissive power	Use vessel burst pressure	No	
		Vessel burst pressure - gauge		bar
	Jet fire Miller model hole size	Orifice diameter	0	mm
Risk	Event probability (probability of this event compared with others in this group)	Event probability	0.0392	fraction
	Type of risk effects to model	Reduce risks for mounded / underground	Yes	

		tanks		
	Non-ignition probabilities	Specify probability of non-ignition	Calculate non-ignition probability	
		Non-ignition probability		fraction
	Immediate ignition probabilities	Probability of immediate ignition	Specify directly	
		Immediate ignition probability	0	fraction
	Delayed ignition probabilities	Specify minimum probability of delayed ignition	Use minimum probability of delayed ignition	
		Minimum probability of delayed ignition	1	fraction
		Specify conditional explosion probability	Calculate conditional probability	
		Conditional explosion probability		fraction
	Cox-Lees-Ang and UKOOA ignition modelling	Release type for CLA / UKOOA		
Material	Material	Material characteristics	Toxic and flammable	
		Material to track	TOWNGAS	
		Type of risk effects to model	Flammable only	
Dispersion	Dispersion scope	Concentration of interest	1200	ppm
		Averaging time for concentration of interest	Flammable	
		Specify user-defined averaging time	No	
		User defined averaging time		s
	Distances of interest	Distances of interest		m
	Averaging time for reports	ERPG [1 hr]	No	
		IDLH [30 mins]	No	
		STEL [15 mins]	No	
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Concrete, no bund	
Toxic parameters	Indoor toxic calculations	Specify the downwind building type	Unselected	
		Building type (downwind building type)	Buildings\Building type	
Tab	**Group**	**Field**	**Value**	**Units**
	Exposure time data	Set averaging time equal to exposure time	Use a fixed averaging time	
		Cut-off fraction of toxic load for exposure time calculation	0.05	fraction
		Cut-off concentration for exposure time calculations	0	fraction
	Toxic contours	Number of toxic levels	1	
		Dose levels	1.3E+07	
		Probit levels	3	
		Lethality levels	0.1	fraction

Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	Yes	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	4, 12.5, 37.5	kW/m2
		Probit levels	2.73, 3.72, 7.5	
		Dose levels	1.27E+06, 5.8E+06, 2.51E+07	
		Lethality levels	0.0001, 0.01, 0.99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726.85	degC
Jet fire	Jet fire method	Jet fire method	Cone model	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	4, 12.5, 37.5	kW/m2
		Probit levels	2.73, 3.72, 7.5	
		Dose levels	1.27E+06, 5.8E+06, 2.51E+07	
		Lethality levels	0.01, 0.1, 0.99	fraction
	Parameters	Rate modification factor	3	
Tab	**Group**	**Field**	**Value**	**Units**
		Jet fire maximum exposure duration	20	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	

		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	4, 12.5, 37.5	kW/m2
		Probit levels	2.73, 3.72, 7.5	
		Dose levels	1.27E+06, 5.8E+06, 2.51E+07	
		Lethality levels	0.01, 0.1, 0.99	fraction
	Parameters	Radiative fraction for general fires	0.4	fraction
		Pool fire maximum exposure duration	20	s

2.59 kg/s Release Rate

User defined source
NPW_Safeti_pipeline_20231207_consequence data\Study\Underground Pipeline\Scenario group\Underground Pipe Flashfire Vertical

Tab	Group	Field	Value	Units
Scenario	Release scenario	Release scenario	Leak	
		The number of release observers	2	
	Release observers	Release time	0, 1800	s
		Release phase	Vapour, Vapour	
		Mass flow	2.59, 2.59	kg/s
		Final velocity	330, 330	m/s
		Final temperature	25, 25	degC
		Liquid fraction	0, 0	fraction
		Droplet diameter		um
		Pool radius		m
		Pre-dilution air rate	0, 0	kg/s
		Downstream calculation status	No errors detected	
Tab	**Group**	**Field**	**Value**	**Units**
	Release location	Elevation	0	m
		Tank head	0	m
	Direction	Outdoor release direction	Angled from horizontal impinged	
		Outdoor release angle	90	deg
	Fireball emissive power	Use vessel burst pressure	No	
		Vessel burst pressure - gauge		bar
	Jet fire Miller model hole size	Orifice diameter	0	mm
Risk	Event probability (probability of this event compared with others in this group)	Event probability	0.0519	fraction

	Type of risk effects to model	Reduce risks for mounded / underground tanks	Yes	
	Non-ignition probabilities	Specify probability of non-ignition	Calculate non-ignition probability	
		Non-ignition probability		fraction
	Immediate ignition probabilities	Probability of immediate ignition	Specify directly	
		Immediate ignition probability	0	fraction
	Delayed ignition probabilities	Specify minimum probability of delayed ignition	Use minimum probability of delayed ignition	
		Minimum probability of delayed ignition	1	fraction
		Specify conditional explosion probability	Use conditional probability	
		Conditional explosion probability	1	fraction
	Cox-Lees-Ang and UKOOA ignition modelling	Release type for CLA / UKOOA		
Material	Material	Material characteristics	Toxic and flammable	
		Material to track	TOWNGAS	
		Type of risk effects to model	Flammable only	
Dispersion	Dispersion scope	Concentration of interest	1200	ppm
		Averaging time for concentration of interest	Flammable	
		Specify user-defined averaging time	No	
		User defined averaging time		s
	Distances of interest	Distances of interest		m
	Averaging time for reports	ERPG [1 hr]	No	
		IDLH [30 mins]	No	
		STEL [15 mins]	No	
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Concrete, no bund	

Tab	Group	Field	Value	Units
Toxic parameters	Indoor toxic calculations	Specify the downwind building type	Unselected	
		Building type (downwind building type)	Buildings\Building type	
	Exposure time data	Set averaging time equal to exposure time	Use a fixed averaging time	
		Cut-off fraction of toxic load for exposure time calculation	0.05	fraction
		Cut-off concentration for exposure time calculations	0	fraction
	Toxic contours	Number of toxic levels	1	
		Dose levels	1.3E+07	
		Probit levels	3	

		Lethality levels	0.1	fraction
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	Yes	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	4, 12.5, 37.5	kW/m2
		Probit levels	2.73, 3.72, 7.5	
		Dose levels	1.27E+06, 5.8E+06, 2.51E+07	
		Lethality levels	0.0001, 0.01, 0.99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726.85	degC
Jet fire	Jet fire method	Jet fire method	Cone model	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	4, 12.5, 37.5	kW/m2
		Probit levels	2.73, 3.72, 7.5	
		Dose levels	1.27E+06, 5.8E+06, 2.51E+07	
Tab	**Group**	**Field**	**Value**	**Units**
		Lethality levels	0.01, 0.1, 0.99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	20	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	

		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	4, 12.5, 37.5	kW/m2
		Probit levels	2.73, 3.72, 7.5	
		Dose levels	1.27E+06, 5.8E+06, 2.51E+07	
		Lethality levels	0.01, 0.1, 0.99	fraction
	Parameters	Radiative fraction for general fires	0.4	fraction
		Pool fire maximum exposure duration	20	s

10.36 kg/s Release Rate

User defined source
NPW_Safeti_pipeline_20231207_consequence data\Study\Underground Pipeline\Scenario group\Underground Pipe Flashfire Vertical

Tab	Group	Field	Value	Units
Scenario	Release scenario	Release scenario	Leak	
		The number of release observers	2	
	Release observers	Release time	0, 1800	s
		Release phase	Vapour, Vapour	
		Mass flow	10.36, 10.36	kg/s
		Final velocity	330, 330	m/s
		Final temperature	25, 25	degC
		Liquid fraction	0, 0	fraction
		Droplet diameter		um
		Pool radius		m
Tab	**Group**	**Field**	**Value**	**Units**
		Pre-dilution air rate	0, 0	kg/s
		Downstream calculation status	No errors detected	
	Release location	Elevation	0	m
		Tank head	0	m
	Direction	Outdoor release direction	Angled from horizontal impinged	
		Outdoor release angle	90	deg
	Fireball emissive power	Use vessel burst pressure	No	
		Vessel burst pressure - gauge		bar
	Jet fire Miller model hole size	Orifice diameter	0	mm
Risk	Event probability (probability of this event compared with others in	Event probability	0.0519	fraction

	this group)			
	Type of risk effects to model	Reduce risks for mounded / underground tanks	Yes	
	Non-ignition probabilities	Specify probability of non-ignition	Calculate non-ignition probability	
		Non-ignition probability		fraction
	Immediate ignition probabilities	Probability of immediate ignition	Specify directly	
		Immediate ignition probability	0	fraction
	Delayed ignition probabilities	Specify minimum probability of delayed ignition	Use minimum probability of delayed ignition	
		Minimum probability of delayed ignition	1	fraction
		Specify conditional explosion probability	Calculate conditional probability	
		Conditional explosion probability		fraction
	Cox-Lees-Ang and UKOOA ignition modelling	Release type for CLA / UKOOA		
Material	Material	Material characteristics	Toxic and flammable	
		Material to track	TOWNGAS	
		Type of risk effects to model	Flammable only	
Dispersion	Dispersion scope	Concentration of interest	1200	ppm
		Averaging time for concentration of interest	Flammable	
		Specify user-defined averaging time	No	
		User defined averaging time		s
	Distances of interest	Distances of interest		m
	Averaging time for reports	ERPG [1 hr]	No	
		IDLH [30 mins]	No	
		STEL [15 mins]	No	

Tab	Group	Field	Value	Units
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Concrete, no bund	
Toxic parameters	Indoor toxic calculations	Specify the downwind building type	Unselected	
		Building type (downwind building type)	Buildings\Building type	
	Exposure time data	Set averaging time equal to exposure time	Use a fixed averaging time	
		Cut-off fraction of toxic load for exposure time calculation	0.05	fraction
		Cut-off concentration for exposure time calculations	0	fraction
	Toxic contours	Number of toxic levels	1	
		Dose levels	1.3E+07	

		Probit levels	3	
		Lethality levels	0.1	fraction
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	Yes	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	4, 12.5, 37.5	kW/m2
		Probit levels	2.73, 3.72, 7.5	
		Dose levels	1.27E+06, 5.8E+06, 2.51E+07	
		Lethality levels	0.0001, 0.01, 0.99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726.85	degC
Jet fire	Jet fire method	Jet fire method	Cone model	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	4, 12.5, 37.5	kW/m2
Tab	**Group**	**Field**	**Value**	**Units**
		Probit levels	2.73, 3.72, 7.5	
		Dose levels	1.27E+06, 5.8E+06, 2.51E+07	
		Lethality levels	0.01, 0.1, 0.99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	20	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction

Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	4, 12.5, 37.5	kW/m2
		Probit levels	2.73, 3.72, 7.5	
		Dose levels	1.27E+06, 5.8E+06, 2.51E+07	
		Lethality levels	0.01, 0.1, 0.99	fraction
	Parameters	Radiative fraction for general fires	0.4	fraction
		Pool fire maximum exposure duration	20	s

41.4 kg/s Release rate

User defined source
NPW_Safeti_pipeline_20231207_consequence data\Study\Underground Pipeline\Scenario group\Underground Pipe Flashfire Vertical

Tab	Group	Field	Value	Units
Scenario	Release scenario	Release scenario	Leak	
	Release observers	The number of release observers	2	
		Release time	0, 1800	s
		Release phase	Vapour, Vapour	
		Mass flow	41.4, 41.4	kg/s
		Final velocity	330, 330	m/s
		Final temperature	25, 25	degC
		Liquid fraction	0, 0	fraction
Tab	**Group**	**Field**	**Value**	**Units**
		Droplet diameter	5, 5	um
		Pool radius		m
		Pre-dilution air rate	0, 0	kg/s
		Downstream calculation status	No errors detected	
	Release location	Elevation	0	m
		Tank head	0	m
	Direction	Outdoor release direction	Angled from horizontal	
		Outdoor release angle	45	deg
	Fireball emissive power	Use vessel burst pressure	No	
		Vessel burst pressure - gauge		bar
	Jet fire Miller model hole size	Orifice diameter	0	mm
Risk	Event probability (probability of	Event probability	0.0329	fraction

	this event compared with others in this group)			
	Type of risk effects to model	Reduce risks for mounded / underground tanks	Yes	
	Non-ignition probabilities	Specify probability of non-ignition	Calculate non-ignition probability	
		Non-ignition probability		fraction
	Immediate ignition probabilities	Probability of immediate ignition	Specify directly	
		Immediate ignition probability	0	fraction
	Delayed ignition probabilities	Specify minimum probability of delayed ignition	Use minimum probability of delayed ignition	
		Minimum probability of delayed ignition	1	fraction
		Specify conditional explosion probability	Calculate conditional probability	
		Conditional explosion probability		fraction
	Cox-Lees-Ang and UKOOA ignition modelling	Release type for CLA / UKOOA		
Material	Material	Material characteristics	Toxic and flammable	
		Material to track	TOWNGAS	
		Type of risk effects to model	Flammable only	
Dispersion	Dispersion scope	Concentration of interest	1200	ppm
		Averaging time for concentration of interest	Flammable	
		Specify user-defined averaging time	No	
		User defined averaging time	30	s
	Distances of interest	Distances of interest		m
	Averaging time for reports	ERPG [1 hr]	No	
Tab	**Group**	**Field**	**Value**	**Units**
		IDLH [30 mins]	No	
		STEL [15 mins]	No	
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Concrete, no bund	
Toxic parameters	Indoor toxic calculations	Specify the downwind building type	Unselected	
		Building type (downwind building type)	Buildings\Building type	
	Exposure time data	Set averaging time equal to exposure time	Use a fixed averaging time	
		Cut-off fraction of toxic load for exposure time calculation	0.05	fraction
		Cut-off concentration for exposure time calculations	0	fraction
	Toxic contours	Number of toxic levels	1	

		Dose levels	1.3E+07	
		Probit levels	3	
		Lethality levels	0.1	fraction
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	Yes	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	4, 12.5, 37.5	kW/m2
		Probit levels	2.73, 3.72, 7.5	
		Dose levels	1.27E+06, 5.8E+06, 2.51E+07	
		Lethality levels	0.0001, 0.01, 0.99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726.85	degC
Jet fire	Jet fire method	Jet fire method	Cone model	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	

Tab	Group	Field	Value	Units
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	4, 12.5, 37.5	kW/m2
		Probit levels	2.73, 3.72, 7.5	
		Dose levels	1.27E+06, 5.8E+06, 2.51E+07	
		Lethality levels	0.01, 0.1, 0.99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	20	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2

		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	4, 12.5, 37.5	kW/m2
		Probit levels	2.73, 3.72, 7.5	
		Dose levels	1.27E+06, 5.8E+06, 2.51E+07	
		Lethality levels	0.01, 0.1, 0.99	fraction
	Parameters	Radiative fraction for general fires	0.4	fraction
		Pool fire maximum exposure duration	20	s

372.95 kg/s Release rate_no direction

User defined source
NPW_Safeti_pipeline_20231207_consequence data\Study\Underground Pipeline\Scenario group\Underground Pipe Flashfire Vertical

Tab	Group	Field	Value	Units
Scenario	Release scenario	Release scenario	Catastrophic rupture	
		The number of release observers	1	
	Release observers	Release time	0	s
		Release phase	Vapour	
		Mass flow	26403	kg/s
		Final velocity	435.31	m/s
Tab	**Group**	**Field**	**Value**	**Units**
		Final temperature	25	degC
		Liquid fraction	0	fraction
		Droplet diameter	5	um
		Pool radius		m
		Pre-dilution air rate	0	kg/s
		Downstream calculation status	No errors detected	
	Release location	Elevation	0	m
		Tank head	0	m
	Direction	Outdoor release direction	Angled from horizontal impinged	
		Outdoor release angle	90	deg
	Fireball emissive power	Use vessel burst pressure	No	
		Vessel burst pressure - gauge		bar
	Jet fire Miller model hole size	Orifice diameter	0	mm

Risk	Event probability (probability of this event compared with others in this group)	Event probability	0.005	fraction
	Type of risk effects to model	Reduce risks for mounded / underground tanks	Yes	
	Non-ignition probabilities	Specify probability of non-ignition	Calculate non-ignition probability	
		Non-ignition probability		fraction
	Immediate ignition probabilities	Probability of immediate ignition	Specify directly	
		Immediate ignition probability	0	fraction
	Delayed ignition probabilities	Specify minimum probability of delayed ignition	Use minimum probability of delayed ignition	
		Minimum probability of delayed ignition	1	fraction
		Specify conditional explosion probability	Calculate conditional probability	
		Conditional explosion probability		fraction
	Cox-Lees-Ang and UKOOA ignition modelling	Release type for CLA / UKOOA		
Material	Material	Material characteristics	Toxic and flammable	
		Material to track	TOWNGAS	
		Type of risk effects to model	Flammable only	
Dispersion	Dispersion scope	Concentration of interest	1200	ppm
		Averaging time for concentration of interest	Flammable	
		Specify user-defined averaging time	No	
		User defined averaging time	30	s
Tab	**Group**	**Field**	**Value**	**Units**
	Distances of interest	Distances of interest		m
	Averaging time for reports	ERPG [1 hr]	No	
		IDLH [30 mins]	No	
		STEL [15 mins]	No	
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Concrete, no bund	
Toxic parameters	Indoor toxic calculations	Specify the downwind building type	Unselected	
		Building type (downwind building type)	Buildings\Building type	
	Exposure time data	Set averaging time equal to exposure time	Use a fixed averaging time	
		Cut-off fraction of toxic load for exposure time calculation	0.05	fraction
		Cut-off concentration for exposure time calculations	0	fraction

	Toxic contours	Number of toxic levels	1	
		Dose levels	1.3E+07	
		Probit levels	3	
		Lethality levels	0.1	fraction
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	Yes	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	4, 12.5, 37.5	kW/m2
		Probit levels	2.73, 3.72, 7.5	
		Dose levels	1.27E+06, 5.8E+06, 2.51E+07	
		Lethality levels	0.0001, 0.01, 0.99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726.85	degC
Jet fire	Jet fire method	Jet fire method	Cone model	
	Result types to calculate	Calculate probit	No	

Tab	Group	Field	Value	Units
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	4, 12.5, 37.5	kW/m2
		Probit levels	2.73, 3.72, 7.5	
		Dose levels	1.27E+06, 5.8E+06, 2.51E+07	
		Lethality levels	0.01, 0.1, 0.99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	20	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	

		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	4, 12.5, 37.5	kW/m2
		Probit levels	2.73, 3.72, 7.5	
		Dose levels	1.27E+06, 5.8E+06, 2.51E+07	
		Lethality levels	0.01, 0.1, 0.99	fraction
	Parameters	Radiative fraction for general fires	0.4	fraction
		Pool fire maximum exposure duration	20	s

Underground Pipe Flashfire Inclined

Pressure vessel
NPW_Safeti_pipeline_20231207_consequence data\Study\Underground Pipeline\Scenario group

Tab	Group	Field	Value	Units
Material	Material	Material	TOWNGAS	
		Specify volume inventory?	No	
		Mass inventory	26403	kg
		Volume inventory	1351.68	m3
Tab	**Group**	**Field**	**Value**	**Units**
		Material to track	TOWNGAS	
		Type of risk effects to model	Flammable only	
	Phase	Specified condition	Pressure/temperature	
		Temperature	25	degC
		Pressure (gauge)	35	bar
		Fluid state	Vapour	
		Liquid mole fraction	0	fraction
Risk	Type of risk effects to model	Jet fire modelling for horizontal releases	Horizontal jet only	
		Reduce risks for mounded / underground tanks	Yes	
	Non-ignition probabilities	Specify probability of non-ignition	Calculate non-ignition probability	
		Non-ignition probability		fraction
	Immediate ignition probabilities	Probability of immediate ignition	Specify directly	

		Immediate ignition probability	0	fraction
	Delayed ignition probabilities	Specify minimum probability of delayed ignition	Use minimum probability of delayed ignition	
		Minimum probability of delayed ignition	1	fraction
		Specify conditional explosion probability	Calculate conditional probability	
		Conditional explosion probability		fraction
	Cox-Lees-Ang and UKOOA ignition modelling	Fraction of ignition probability for immediate ignition	0.3	
		Release type for CLA / UKOOA		
Scenario	Pipe dimensions	Pipe length		m
	Release location	Elevation	0	m
		Tank head	0	m
	Direction	Outdoor release direction	Angled from horizontal impinged	
		Outdoor release angle	45	deg
Discharge parameters	Model settings	Atmospheric expansion method	DNV recommended	
		Phase change upstream of orifice?	Disallow liquid phase change only (metastable liquid)	
	Droplet break-up mechanism	Droplet break-up mechanism - instantaneous	Use flashing correlation	
		Droplet break-up mechanism - continuous	Do not force correlation	
Short pipe	Pipe characteristics	Pipe roughness	0.045	mm
	Frequencies	Frequency of bends in pipe	0	/m
Tab	**Group**	**Field**	**Value**	**Units**
		Frequency of couplings in pipe	0	/m
		Frequency of junctions in pipe	0	/m
	Frequencies of valves	Frequency of excess flow valves	0	/m
		Frequency of non-return valves	0	/m
		Frequency of shut-off valves	0	/m
	Velocity head losses	Excess flow valve velocity head losses	0	
		Non-return valve velocity head losses	0	
		Shut-off valve velocity head losses	0	
Time varying releases	Modelling of time-varying leaks and line ruptures	Vacuum relief valve	Operating	
		Vacuum relief valve set point	0	bar
	Inventory data for time-varying releases	Tank volume	1351.68	m3

		Tank vapour volume	1351.68	m3
		Tank liquid volume	0	m3
		Tank liquid level	0	m
		Maximum vapour release height		m
		Minimum mass inventory	0	kg
		Maximum mass inventory	1E+09	kg
	Safety system modelling for time-varying releases	Safety system modelling (isolation and blowdown)	No	
Dispersion	Dispersion scope	Concentration of interest	1200	ppm
		Averaging time for concentration of interest	Flammable	
		Specify user-defined averaging time	No	
		User defined averaging time		s
	Distances of interest	Distances of interest		m
	Averaging time for reports	ERPG [1 hr]	No	
		IDLH [30 mins]	No	
		STEL [15 mins]	No	
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Concrete, no bund	
	Building definition	Release building		
		In-building release?	Outdoor	
		Building wake effect	None	
Tab	**Group**	**Field**	**Value**	**Units**
		Wind or release angle from North	0	deg
		Handling of droplets	Trapped	
		Indoor mass modification factor	3	
Toxic parameters	Indoor toxic calculations	Specify the downwind building type	Unselected	
		Building type (downwind building type)	Buildings\Building type	
	Exposure time data	Set averaging time equal to exposure time	Use a fixed averaging time	
		Cut-off fraction of toxic load for exposure time calculation	0.05	fraction
		Cut-off concentration for exposure time calculations	0	fraction
	Toxic contours	Number of toxic levels	1	
		Dose levels	1.3E+07	
		Probit levels	3	
		Lethality levels	0.1	fraction

	Threshold concentration (N.B. Concentrations based on mixture rather than toxic component(s))	Threshold concentration	1E+06	ppm
		Minimum fatality if threshold concentration reached	0	fraction
Explosion parameters	Explosion method (Consequence calculations only)	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	Yes	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	4, 12.5, 37.5	kW/m2
		Probit levels	2.73, 3.72, 7.5	
		Dose levels	1.27E+06, 5.8E+06, 2.51E+07	
		Lethality levels	0.0001, 0.01, 0.99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s

Tab	Group	Field	Value	Units
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726.85	degC
Jet fire	Jet fire method	Jet fire method	Cone model	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	4, 12.5, 37.5	kW/m2
		Probit levels	2.73, 3.72, 7.5	
		Dose levels	1.27E+06, 5.8E+06, 2.51E+07	
		Lethality levels	0.01, 0.1, 0.99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	20	s
	Cone model data	Horizontal options	Use standard method	
		Correlation	Recommended	
		Flame-shape adjustment if grounded	Yes	

	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	4, 12.5, 37.5	kW/m2
		Probit levels	2.73, 3.72, 7.5	
		Dose levels	1.27E+06, 5.8E+06, 2.51E+07	
		Lethality levels	0.01, 0.1, 0.99	fraction
	Parameters	Radiative fraction for general fires	0.4	fraction
		Pool fire maximum exposure duration	20	s

0.41 kg/s Release Rate

User defined source

NPW_Safeti_pipeline_20231207_consequence data\Study\Underground Pipeline\Scenario group\Underground Pipe Flashfire Inclined

Tab	Group	Field	Value	Units
Scenario	Release scenario	Release scenario	Leak	
		The number of release observers	2	
	Release observers	Release time	0, 1800	s
		Release phase	Vapour, Vapour	
		Mass flow	0.41, 0.41	kg/s
		Final velocity	330, 330	m/s
		Final temperature	25, 25	degC
		Liquid fraction	0, 0	fraction
		Droplet diameter		um
		Pool radius		m
		Pre-dilution air rate	0, 0	kg/s
		Downstream calculation status	No errors detected	
	Release location	Elevation	0	m
		Tank head	0	m
	Direction	Outdoor release direction	Angled from horizontal impinged	
		Outdoor release angle	45	deg

	Fireball emissive power	Use vessel burst pressure	No	
		Vessel burst pressure - gauge		bar
	Jet fire Miller model hole size	Orifice diameter	0	mm
Risk	Event probability (probability of this event compared with others in this group)	Event probability	0.0392	fraction
	Type of risk effects to model	Reduce risks for mounded / underground tanks	Yes	
	Non-ignition probabilities	Specify probability of non-ignition	Calculate non-ignition probability	
		Non-ignition probability		fraction
	Immediate ignition probabilities	Probability of immediate ignition	Specify directly	
		Immediate ignition probability	0	fraction
	Delayed ignition probabilities	Specify minimum probability of delayed ignition	Use minimum probability of delayed ignition	
		Minimum probability of delayed ignition	1	fraction
		Specify conditional explosion probability	Calculate conditional probability	
		Conditional explosion probability		fraction
	Cox-Lees-Ang and UKOOA ignition modelling	Release type for CLA / UKOOA		
Material	Material	Material characteristics	Toxic and flammable	
		Material to track	TOWNGAS	

Tab	Group	Field	Value	Units
		Type of risk effects to model	Flammable only	
Dispersion	Dispersion scope	Concentration of interest	1200	ppm
		Averaging time for concentration of interest	Flammable	
		Specify user-defined averaging time	No	
		User defined averaging time		s
	Distances of interest	Distances of interest		m
	Averaging time for reports	ERPG [1 hr]	No	
		IDLH [30 mins]	No	
		STEL [15 mins]	No	
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Concrete, no bund	
Toxic parameters	Indoor toxic calculations	Specify the downwind building type	Unselected	
		Building type (downwind building type)	Buildings\Building type	
	Exposure time data	Set averaging time equal to exposure time	Use a fixed averaging time	
		Cut-off fraction of toxic load for exposure	0.05	fraction

		time calculation		
		Cut-off concentration for exposure time calculations	0	fraction
	Toxic contours	Number of toxic levels	1	
		Dose levels	1.3E+07	
		Probit levels	3	
		Lethality levels	0.1	fraction
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	Yes	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	4, 12.5, 37.5	kW/m2
		Probit levels	2.73, 3.72, 7.5	
		Dose levels	1.27E+06, 5.8E+06, 2.51E+07	
		Lethality levels	0.0001, 0.01, 0.99	fraction

Tab	Group	Field	Value	Units
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726.85	degC
Jet fire	Jet fire method	Jet fire method	Cone model	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	4, 12.5, 37.5	kW/m2
		Probit levels	2.73, 3.72, 7.5	
		Dose levels	1.27E+06, 5.8E+06, 2.51E+07	
		Lethality levels	0.01, 0.1, 0.99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	20	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	

		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	4, 12.5, 37.5	kW/m2
		Probit levels	2.73, 3.72, 7.5	
		Dose levels	1.27E+06, 5.8E+06, 2.51E+07	
		Lethality levels	0.01, 0.1, 0.99	fraction
	Parameters	Radiative fraction for general fires	0.4	fraction
		Pool fire maximum exposure duration	20	s

2.59 kg/s Release Rate

User defined source
NPW_Safeti_pipeline_20231207_consequence data\Study\Underground Pipeline\Scenario group\Underground Pipe Flashfire Inclined

Tab	Group	Field	Value	Units
Scenario	Release scenario	Release scenario	Leak	
		The number of release observers	2	
	Release observers	Release time	0, 1800	s
		Release phase	Vapour, Vapour	
		Mass flow	2.59, 2.59	kg/s
		Final velocity	435.31, 435.31	m/s
		Final temperature	25, 25	degC
		Liquid fraction	0, 0	fraction
		Droplet diameter		um
		Pool radius		m
		Pre-dilution air rate	0, 0	kg/s
		Downstream calculation status	No errors detected	

	Release location	Elevation	0	m
		Tank head	0	m
	Direction	Outdoor release direction	Angled from horizontal impinged	
		Outdoor release angle	45	deg
	Fireball emissive power	Use vessel burst pressure	No	
		Vessel burst pressure - gauge		bar
	Jet fire Miller model hole size	Orifice diameter	0	mm
Risk	Event probability (probability of this event compared with others in this group)	Event probability	0.0519	fraction
	Type of risk effects to model	Reduce risks for mounded / underground tanks	Yes	
	Non-ignition probabilities	Specify probability of non-ignition	Calculate non-ignition probability	
		Non-ignition probability		fraction
	Immediate ignition probabilities	Probability of immediate ignition	Specify directly	
		Immediate ignition probability	0	fraction
	Delayed ignition probabilities	Specify minimum probability of delayed ignition	Use minimum probability of delayed ignition	
		Minimum probability of delayed ignition	1	fraction
		Specify conditional explosion probability	Use conditional probability	
		Conditional explosion probability	1	fraction
Tab	**Group**	**Field**	**Value**	**Units**
	Cox-Lees-Ang and UKOOA ignition modelling	Release type for CLA / UKOOA		
Material	Material	Material characteristics	Toxic and flammable	
		Material to track	TOWNGAS	
		Type of risk effects to model	Flammable only	
Dispersion	Dispersion scope	Concentration of interest	1200	ppm
		Averaging time for concentration of interest	Flammable	
		Specify user-defined averaging time	No	
		User defined averaging time		s
	Distances of interest	Distances of interest		m
	Averaging time for reports	ERPG [1 hr]	No	
		IDLH [30 mins]	No	
		STEL [15 mins]	No	
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Concrete, no bund	
Toxic parameters	Indoor toxic calculations	Specify the downwind building type	Unselected	

		Building type (downwind building type)	Buildings\Building type	
	Exposure time data	Set averaging time equal to exposure time	Use a fixed averaging time	
		Cut-off fraction of toxic load for exposure time calculation	0.05	fraction
		Cut-off concentration for exposure time calculations	0	fraction
	Toxic contours	Number of toxic levels	1	
		Dose levels	1.3E+07	
		Probit levels	3	
		Lethality levels	0.1	fraction
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	Yes	
	Radiation levels	Number of input radiation levels	3	

Tab	Group	Field	Value	Units
		Intensity levels	4, 12.5, 37.5	kW/m2
		Probit levels	2.73, 3.72, 7.5	
		Dose levels	1.27E+06, 5.8E+06, 2.51E+07	
		Lethality levels	0.0001, 0.01, 0.99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726.85	degC
Jet fire	Jet fire method	Jet fire method	Cone model	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	4, 12.5, 37.5	kW/m2
		Probit levels	2.73, 3.72, 7.5	
		Dose levels	1.27E+06, 5.8E+06, 2.51E+07	
		Lethality levels	0.01, 0.1, 0.99	fraction

	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	20	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	4, 12.5, 37.5	kW/m2
		Probit levels	2.73, 3.72, 7.5	
		Dose levels	1.27E+06, 5.8E+06, 2.51E+07	
		Lethality levels	0.01, 0.1, 0.99	fraction
	Parameters	Radiative fraction for general fires	0.4	fraction
		Pool fire maximum exposure duration	20	s

10.36 kg/s Release Rate

User defined source
NPW_Safeti_pipeline_20231207_consequence data\Study\Underground Pipeline\Scenario group\Underground Pipe Flashfire Inclined

Tab	Group	Field	Value	Units
Scenario	Release scenario	Release scenario	Leak	
		The number of release observers	2	
	Release observers	Release time	0, 1800	s
		Release phase	Vapour, Vapour	
		Mass flow	10.36, 10.36	kg/s
		Final velocity	435.31, 435.31	m/s
		Final temperature	25, 25	degC
		Liquid fraction	0, 0	fraction
		Droplet diameter		um
		Pool radius		m
		Pre-dilution air rate	0, 0	kg/s
		Downstream calculation status	No errors detected	
	Release location	Elevation	0	m
		Tank head	0	m
	Direction	Outdoor release direction	Angled from horizontal impinged	
		Outdoor release angle	45	deg
	Fireball emissive power	Use vessel burst pressure	No	
		Vessel burst pressure - gauge		bar
	Jet fire Miller model hole size	Orifice diameter	0	mm
Risk	Event probability (probability of this event compared with others in this group)	Event probability	0.0519	fraction
	Type of risk effects to model	Reduce risks for mounded / underground tanks	Yes	
	Non-ignition probabilities	Specify probability of non-ignition	Calculate non-ignition probability	
		Non-ignition probability		fraction
	Immediate ignition probabilities	Probability of immediate ignition	Specify directly	
		Immediate ignition probability	0	fraction
	Delayed ignition probabilities	Specify minimum probability of delayed ignition	Use minimum probability of delayed ignition	
		Minimum probability of delayed ignition	1	fraction
		Specify conditional explosion probability	Calculate conditional probability	
		Conditional explosion probability		fraction

Tab	Group	Field	Value	Units
	Cox-Lees-Ang and UKOOA ignition modelling	Release type for CLA / UKOOA		
Material	Material	Material characteristics	Toxic and flammable	
		Material to track	TOWNGAS	
		Type of risk effects to model	Flammable only	
Dispersion	Dispersion scope	Concentration of interest	1200	ppm
		Averaging time for concentration of interest	Flammable	
		Specify user-defined averaging time	No	
		User defined averaging time		s
	Distances of interest	Distances of interest		m
	Averaging time for reports	ERPG [1 hr]	No	
		IDLH [30 mins]	No	
		STEL [15 mins]	No	
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Concrete, no bund	
Toxic parameters	Indoor toxic calculations	Specify the downwind building type	Unselected	
		Building type (downwind building type)	Buildings\Building type	
	Exposure time data	Set averaging time equal to exposure time	Use a fixed averaging time	
		Cut-off fraction of toxic load for exposure time calculation	0.05	fraction
		Cut-off concentration for exposure time calculations	0	fraction
	Toxic contours	Number of toxic levels	1	
		Dose levels	1.3E+07	
		Probit levels	3	
		Lethality levels	0.1	fraction
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	Yes	
	Radiation levels	Number of input radiation levels	3	
Tab	Group	Field	Value	Units

		Intensity levels	4, 12.5, 37.5	kW/m2
		Probit levels	2.73, 3.72, 7.5	
		Dose levels	1.27E+06, 5.8E+06, 2.51E+07	
		Lethality levels	0.0001, 0.01, 0.99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726.85	degC
Jet fire	Jet fire method	Jet fire method	Cone model	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	4, 12.5, 37.5	kW/m2
		Probit levels	2.73, 3.72, 7.5	
		Dose levels	1.27E+06, 5.8E+06, 2.51E+07	
		Lethality levels	0.01, 0.1, 0.99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	20	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	4, 12.5, 37.5	kW/m2
		Probit levels	2.73, 3.72, 7.5	
		Dose levels	1.27E+06, 5.8E+06, 2.51E+07	
		Lethality levels	0.01, 0.1, 0.99	fraction
	Parameters	Radiative fraction for general fires	0.4	fraction
		Pool fire maximum exposure duration	20	s

41.4 kg/s Release rate

User defined source
NPW_Safeti_pipeline_20231207_consequence data\Study\Underground Pipeline\Scenario group\Underground Pipe Flashfire Inclined

Tab	Group	Field	Value	Units
Scenario	Release scenario	Release scenario	Leak	
		The number of release observers	2	
	Release observers	Release time	0, 1800	s
		Release phase	Vapour, Vapour	
		Mass flow	41.4, 41.4	kg/s
		Final velocity	435.31, 435.31	m/s
		Final temperature	25, 25	degC
		Liquid fraction	0, 0	fraction
		Droplet diameter	5, 5	um
		Pool radius		m
		Pre-dilution air rate	0, 0	kg/s
		Downstream calculation status	No errors detected	
	Release location	Elevation	0	m
		Tank head	0	m
	Direction	Outdoor release direction	Angled from horizontal impinged	
		Outdoor release angle	45	deg
	Fireball emissive power	Use vessel burst pressure	No	
		Vessel burst pressure - gauge		bar
	Jet fire Miller model hole size	Orifice diameter	0	mm
Risk	Event probability (probability of this event compared with others in this group)	Event probability	0.0329	fraction
	Type of risk effects to model	Reduce risks for mounded / underground tanks	Yes	
	Non-ignition probabilities	Specify probability of non-ignition	Calculate non-ignition probability	
		Non-ignition probability		fraction
	Immediate ignition probabilities	Probability of immediate ignition	Specify directly	
		Immediate ignition probability	0	fraction
	Delayed ignition probabilities	Specify minimum probability of delayed ignition	Use minimum probability of delayed ignition	
		Minimum probability of delayed ignition	1	fraction
		Specify conditional explosion probability	Calculate conditional probability	
		Conditional explosion probability		fraction

Tab	Group	Field	Value	Units
	Cox-Lees-Ang and UKOOA ignition modelling	Release type for CLA / UKOOA		
Material	Material	Material characteristics	Toxic and flammable	
		Material to track	TOWNGAS	
		Type of risk effects to model	Flammable only	
Dispersion	Dispersion scope	Concentration of interest	1200	ppm
		Averaging time for concentration of interest	Flammable	
		Specify user-defined averaging time	No	
		User defined averaging time	30	s
	Distances of interest	Distances of interest		m
	Averaging time for reports	ERPG [1 hr]	No	
		IDLH [30 mins]	No	
		STEL [15 mins]	No	
Bund, building and terrain	Terrain and bund definition	Type of terrain for dispersion	Land	
		Type of pool substrate and bunds	Concrete, no bund	
Toxic parameters	Indoor toxic calculations	Specify the downwind building type	Unselected	
		Building type (downwind building type)	Buildings\Building type	
	Exposure time data	Set averaging time equal to exposure time	Use a fixed averaging time	
		Cut-off fraction of toxic load for exposure time calculation	0.05	fraction
		Cut-off concentration for exposure time calculations	0	fraction
	Toxic contours	Number of toxic levels	1	
		Dose levels	1.3E+07	
		Probit levels	3	
		Lethality levels	0.1	fraction
Explosion parameters	Explosion method	Explosion method	Multi-Energy: Uniform confined	
	Ignition	Supply late ignition location	No ignition location	
		Location of late ignition		m
	Vapour liquid method	Use explosion mass modification factor	Yes	
		Explosion mass modification factor	3	
Fireball	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	Yes	
	Radiation levels	Number of input radiation levels	3	
Tab	**Group**	**Field**	**Value**	**Units**

		Intensity levels	4, 12.5, 37.5	kW/m2
		Probit levels	2.73, 3.72, 7.5	
		Dose levels	1.27E+06, 5.8E+06, 2.51E+07	
		Lethality levels	0.0001, 0.01, 0.99	fraction
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	30	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726.85	degC
Jet fire	Jet fire method	Jet fire method	Cone model	
	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	4, 12.5, 37.5	kW/m2
		Probit levels	2.73, 3.72, 7.5	
		Dose levels	1.27E+06, 5.8E+06, 2.51E+07	
		Lethality levels	0.01, 0.1, 0.99	fraction
	Parameters	Rate modification factor	3	
		Jet fire maximum exposure duration	20	s
	Cone model data	Correlation	Recommended	
		Horizontal options	Use standard method	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
Pool fire	Result types to calculate	Calculate probit	No	
		Calculate dose	No	
		Calculate lethality	No	
	Radiation levels	Number of input radiation levels	3	
		Intensity levels	4, 12.5, 37.5	kW/m2
		Probit levels	2.73, 3.72, 7.5	
		Dose levels	1.27E+06, 5.8E+06, 2.51E+07	
		Lethality levels	0.01, 0.1, 0.99	fraction
	Parameters	Radiative fraction for general fires	0.4	fraction
		Pool fire maximum exposure duration	20	s

10mm leak (Jet Fire) vertical

Standalones
NPW_Safeti_pipeline_20231207_consequence data\Study\Underground Pipeline\Scenario group

Tab	Group	Field	Value
Material	Material	Material	TOWNGAS

10mm leak (Jet Fire) - Jet fire

Jet fire
NPW_Safeti_pipeline_20231207_consequence data\Study\Underground Pipeline\Scenario group\10mm leak (Jet Fire) vertical

Tab	Group	Field	Value	Units
Jet fire	Release location	Elevation of discharge point	0	m
	Jet fire model	Jet fire method	Cone model	
	Release orientation	Inclination of jet from horizontal	90	deg
		Jet direction	Vertical	
		Rotation about the z-axis (anti-clockwise from the east)	0	deg
	Release characteristics	Calculate jet velocity?	Given jet velocity	
		Mass discharge rate	0.41439	kg/s
		Two-phase release?	No	
		Post-expansion liquid fraction	0	fraction
		Post-expansion jet temperature	25	degC
		Jet velocity	330	m/s
		Expanded diameter	0.0536558	m
		Orifice diameter	0	mm
		Flame length	0	m
		Use flame length correlation?	Do not calculate flame length	
		Calculate the expanded diameter?	Calculate expanded diameter	
Risk	Event probability (probability of this event compared with others in this group)	Event probability	0.001	fraction
	Directional probabilities for risk	Directional probabilities for risk and 3D effects	Use wind rose probabilities	
Jet fire parameters	Radiation levels	Number of input radiation levels	5	
		Intensity levels	38.6, 26.5	kW/m2
	Cone model data	Horizontal options	Use standard method	
		Correlation	Recommended	

		Flame-shape adjustment if grounded	Yes	
Tab	**Group**	**Field**	**Value**	**Units**
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
	Exposure duration	Jet fire maximum exposure duration	20	s
Wind direction	Wind direction	Wind direction	270	deg
		Wind orientation about the z-axis (anti-clockwise from the East)	0	deg
Calculations	Type of results required	Radiation at a point	No	
		Radiation vs distance	No	
		Radiation ellipse	No	
		Radiation contours	Yes	
Radiation contours	Display	Chart type being plotted	Cross-section (YZ plane)	
	Contour footprint	Height above origin	2	m
	Contour side view	Distance along the y-axis	0	m
	Contour cross-section	Distance along the x-axis	0	m
	User-defined contour plane origin	X		m
		Y		m
		Z		m
	User-defined contour plane X axis	X		m
		Y		m
		Z		m
	User-defined contour plane Y axis	X		m
		Y		m
		Z		m

25mm leak (Jet Fire) - Jet fire

Jet fire
NPW_Safeti_pipeline_20231207_consequence data\Study\Underground Pipeline\Scenario group\10mm leak (Jet Fire) vertical

Tab	Group	Field	Value	Units
Jet fire	Release location	Elevation of discharge point	0	m
	Jet fire model	Jet fire method	Cone model	
	Release orientation	Inclination of jet from horizontal	90	deg
		Jet direction	Vertical	

		Rotation about the z-axis (anti-clockwise from the east)	0	deg
Tab	**Group**	**Field**	**Value**	**Units**
	Release characteristics	Calculate jet velocity?	Given jet velocity	
		Mass discharge rate	2.58991	kg/s
		Two-phase release?	No	
		Post-expansion liquid fraction	0	fraction
		Post-expansion jet temperature	25	degC
		Jet velocity	330	m/s
		Expanded diameter	0.134139	m
		Orifice diameter	0	mm
		Flame length	0	m
		Use flame length correlation?	Do not calculate flame length	
		Calculate the expanded diameter?	Calculate expanded diameter	
Risk	Event probability (probability of this event compared with others in this group)	Event probability	0.0105	fraction
	Directional probabilities for risk	Directional probabilities for risk and 3D effects	Use wind rose probabilities	
Jet fire parameters	Radiation levels	Number of input radiation levels	5	
		Intensity levels	38.6, 26.5	kW/m2
	Cone model data	Horizontal options	Use standard method	
		Correlation	Recommended	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
	Exposure duration	Jet fire maximum exposure duration	20	s
Wind direction	Wind direction	Wind direction	270	deg
		Wind orientation about the z-axis (anti-clockwise from the East)	0	deg
Calculations	Type of results required	Radiation at a point	No	
		Radiation vs distance	No	
		Radiation ellipse	No	
		Radiation contours	Yes	
Radiation contours	Display	Chart type being plotted	Cross-section (YZ plane)	
	Contour footprint	Height above origin		m
	Contour side view	Distance along the y-axis	0	m
Tab	**Group**	**Field**	**Value**	**Units**

	Contour cross-section	Distance along the x-axis	0	m
	User-defined contour plane origin	X		m
		Y		m
		Z		m
	User-defined contour plane X axis	X		m
		Y		m
		Z		m
	User-defined contour plane Y axis	X		m
		Y		m
		Z		m

50mm leak (Jet Fire) - Jet fire

Jet fire
NPW_Safeti_pipeline_20231207_consequence data\Study\Underground Pipeline\Scenario group\10mm leak (Jet Fire) vertical

Tab	Group	Field	Value	Units
Jet fire	Release location	Elevation of discharge point	0	m
	Jet fire model	Jet fire method	Cone model	
	Release orientation	Inclination of jet from horizontal	90	deg
		Jet direction	Vertical	
		Rotation about the z-axis (anti-clockwise from the east)	0	deg
	Release characteristics	Calculate jet velocity?	Given jet velocity	
		Mass discharge rate	10.3596	kg/s
		Two-phase release?	No	
		Post-expansion liquid fraction	0	fraction
		Post-expansion jet temperature	25	degC
		Jet velocity	330	m/s
		Expanded diameter	0.268277	m
		Orifice diameter	0	mm
		Flame length	0	m
		Use flame length correlation?	Do not calculate flame length	
		Calculate the expanded diameter?	Calculate expanded diameter	
Risk	Event probability (probability of this event compared with others in this group)	Event probability	0.0105	fraction
	Directional probabilities for risk	Directional probabilities for risk and 3D effects	Use wind rose probabilities	
Tab	**Group**	**Field**	**Value**	**Units**

Jet fire parameters	Radiation levels	Number of input radiation levels	5	
		Intensity levels	38.6, 26.5	kW/m2
	Cone model data	Horizontal options	Use standard method	
		Correlation	Recommended	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
	Exposure duration	Jet fire maximum exposure duration	20	s
Wind direction	Wind direction	Wind direction	270	deg
		Wind orientation about the z-axis (anti-clockwise from the East)	0	deg
Calculations	Type of results required	Radiation at a point	No	
		Radiation vs distance	No	
		Radiation ellipse	No	
		Radiation contours	Yes	
Radiation contours	Display	Chart type being plotted	Side view (XZ plane)	
	Contour footprint	Height above origin		m
	Contour side view	Distance along the y-axis	0	m
	Contour cross-section	Distance along the x-axis		m
	User-defined contour plane origin	X		m
		Y		m
		Z		m
	User-defined contour plane X axis	X		m
		Y		m
		Z		m
	User-defined contour plane Y axis	X		m
		Y		m
		Z		m

100mm leak (Jet Fire) - Jet fire

Jet fire
NPW_Safeti_pipeline_20231207_consequence data\Study\Underground Pipeline\Scenario group\10mm leak (Jet Fire) vertical

Tab	Group	Field	Value	Units
Jet fire	Release location	Elevation of discharge point	0	m

	Jet fire model	Jet fire method	Cone model	
	Release orientation	Inclination of jet from horizontal	90	deg
		Jet direction	Vertical	
		Rotation about the z-axis (anti-clockwise from the east)	0	deg
	Release characteristics	Calculate jet velocity?	Given jet velocity	
		Mass discharge rate	41.4	kg/s
		Two-phase release?	No	
		Post-expansion liquid fraction	0	fraction
		Post-expansion jet temperature	25	degC
		Jet velocity	330	m/s
		Expanded diameter	0.536305	m
		Orifice diameter	0	mm
		Flame length	0	m
		Use flame length correlation?	Do not calculate flame length	
		Calculate the expanded diameter?	Calculate expanded diameter	
Risk	Event probability (probability of this event compared with others in this group)	Event probability	0.0067	fraction
	Directional probabilities for risk	Directional probabilities for risk and 3D effects	Use wind rose probabilities	
Jet fire parameters	Radiation levels	Number of input radiation levels	5	
		Intensity levels	38.6, 26.5	kW/m2
	Cone model data	Horizontal options	Use standard method	
		Correlation	Recommended	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
	Exposure duration	Jet fire maximum exposure duration	20	s
Wind direction	Wind direction	Wind direction	270	deg
		Wind orientation about the z-axis (anti-clockwise from the East)	0	deg
Calculations	Type of results required	Radiation at a point	No	
		Radiation vs distance	No	
		Radiation ellipse	No	
Tab	**Group**	**Field**	**Value**	**Units**
		Radiation contours	Yes	
Radiation contours	Display	Chart type being plotted	Side view (XZ plane)	

	Contour footprint	Height above origin		m
	Contour side view	Distance along the y-axis	0	m
	Contour cross-section	Distance along the x-axis		m
	User-defined contour plane origin	X		m
		Y		m
		Z		m
	User-defined contour plane X axis	X		m
		Y		m
		Z		m
	User-defined contour plane Y axis	X		m
		Y		m
		Z		m

Full bore

Standalones
NPW_Safeti_pipeline_20231207_consequence data\Study\Underground Pipeline\Scenario group

Tab	Group	Field	Value
Material	Material	Material	TOWNGAS

Fireball

Fireball
NPW_Safeti_pipeline_20231207_consequence data\Study\Underground Pipeline\Scenario group\Full bore

Tab	Group	Field	Value	Units
Fireball	Released mass	Released mass	11000	kg
		Vapour mass fraction	1	fraction
	Burst pressure	Supply burst pressure - gauge	Yes	
		Burst pressure - gauge	35	bar
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame surface emissive power		kW/m2
	Flame shape definition	Fireball radius		m
Tab	**Group**	**Field**	**Value**	**Units**
		Fireball duration		s
		Use shape correlation	Use Correlation	

Risk	Event probability (probability of this event compared with others in this group)	Event probability	0.003	fraction
Fireball parameters	Radiation levels	Number of input radiation levels	3	
		Intensity levels	38.6, 26.5	kW/m2
	Parameters	Mass modification factor	3	
		Fireball maximum exposure duration	9.34	s
	Calculation method	Fireball model	Martinsen time varying	
		TNO model flame temperature	1726.85	degC
Calculations	Type of results required	Radiation at a point	No	
		Radiation vs distance	No	
		Radiation ellipse	No	
		Radiation contours	Yes	
Radiation contours	Display	Chart type being plotted	Side view (XZ plane)	
	Contour footprint	Height above origin		m
	Contour side view	Distance along the y-axis	0	m
	Contour cross-section	Distance along the x-axis	0	m
	User-defined contour plane origin	X		m
		Y		m
		Z		m
	User-defined contour plane X axis	X		m
		Y		m
		Z		m
	User-defined contour plane Y axis	X		m
		Y		m
		Z		m

Jet Fire inclined

Standalones
NPW_Safeti_pipeline_20231207_consequence data\Study\Underground Pipeline\Scenario group

Tab	Group	Field	Value
Material	Material	Material	TOWNGAS

10mm leak (Jet Fire) - Jet fire

Jet fire
NPW_Safeti_pipeline_20231207_consequence data\Study\Underground Pipeline\Scenario group\Jet Fire inclined

Tab	Group	Field	Value	Units
Jet fire	Release location	Elevation of discharge point	0	m
	Jet fire model	Jet fire method	Cone model	
	Release orientation	Inclination of jet from horizontal	45	deg
		Jet direction	Vertical	
		Rotation about the z-axis (anti-clockwise from the east)	0	deg
	Release characteristics	Calculate jet velocity?	Given jet velocity	
		Mass discharge rate	0.41439	kg/s
		Two-phase release?	No	
		Post-expansion liquid fraction	0	fraction
		Post-expansion jet temperature	25	degC
		Jet velocity	330	m/s
		Expanded diameter	0.0536558	m
		Orifice diameter	0	mm
		Flame length	0	m
		Use flame length correlation?	Do not calculate flame length	
		Calculate the expanded diameter?	Calculate expanded diameter	
Risk	Event probability (probability of this event compared with others in this group)	Event probability	0.001	fraction
	Directional probabilities for risk	Directional probabilities for risk and 3D effects	Use wind rose probabilities	
Jet fire parameters	Radiation levels	Number of input radiation levels	5	
		Intensity levels	38.6, 26.5	kW/m2
	Cone model data	Horizontal options	Use standard method	
		Correlation	Recommended	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
	Exposure duration	Jet fire maximum exposure duration	20	s
Wind direction	Wind direction	Wind direction	270	deg
		Wind orientation about the z-axis (anti-clockwise from the East)	0	deg

Tab	Group	Field	Value	Units
Calculations	Type of results required	Radiation at a point	No	
		Radiation vs distance	No	

		Radiation ellipse	No	
		Radiation contours	Yes	
Radiation contours	Display	Chart type being plotted	Cross-section (YZ plane)	
	Contour footprint	Height above origin	2	m
	Contour side view	Distance along the y-axis	0	m
	Contour cross-section	Distance along the x-axis	0	m
	User-defined contour plane origin	X		m
		Y		m
		Z		m
	User-defined contour plane X axis	X		m
		Y		m
		Z		m
	User-defined contour plane Y axis	X		m
		Y		m
		Z		m

25mm leak (Jet Fire) - Jet fire

Jet fire

NPW_Safeti_pipeline_20231207_consequence data\Study\Underground Pipeline\Scenario group\Jet Fire inclined

Tab	Group	Field	Value	Units
Jet fire	Release location	Elevation of discharge point	0	m
	Jet fire model	Jet fire method	Cone model	
	Release orientation	Inclination of jet from horizontal	45	deg
		Jet direction	Vertical	
		Rotation about the z-axis (anti-clockwise from the east)	0	deg
	Release characteristics	Calculate jet velocity?	Given jet velocity	
		Mass discharge rate	2.58991	kg/s
		Two-phase release?	No	
		Post-expansion liquid fraction	0	fraction
		Post-expansion jet temperature	25	degC
		Jet velocity	330	m/s
Tab	**Group**	**Field**	**Value**	**Units**
		Expanded diameter	0.134139	m
		Orifice diameter	0	mm
		Flame length	0	m

		Use flame length correlation?	Do not calculate flame length	
		Calculate the expanded diameter?	Calculate expanded diameter	
Risk	Event probability (probability of this event compared with others in this group)	Event probability	0.0105	fraction
	Directional probabilities for risk	Directional probabilities for risk and 3D effects	Use wind rose probabilities	
Jet fire parameters	Radiation levels	Number of input radiation levels	5	
		Intensity levels	38.6, 26.5	kW/m2
	Cone model data	Horizontal options	Use standard method	
		Correlation	Recommended	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
	Exposure duration	Jet fire maximum exposure duration	20	s
Wind direction	Wind direction	Wind direction	270	deg
		Wind orientation about the z-axis (anti-clockwise from the East)	0	deg
Calculations	Type of results required	Radiation at a point	No	
		Radiation vs distance	No	
		Radiation ellipse	No	
		Radiation contours	Yes	
Radiation contours	Display	Chart type being plotted	Cross-section (YZ plane)	
	Contour footprint	Height above origin		m
	Contour side view	Distance along the y-axis	0	m
	Contour cross-section	Distance along the x-axis	0	m
	User-defined contour plane origin	X		m
		Y		m
		Z		m
	User-defined contour plane X axis	X		m
		Y		m
		Z		m
	User-defined contour plane Y axis	X		m
Tab	**Group**	**Field**	**Value**	**Units**
		Y		m
		Z		m

50mm leak (Jet Fire) - Jet fire

Jet fire
NPW_Safeti_pipeline_20231207_consequence data\Study\Underground Pipeline\Scenario group\Jet Fire inclined

Tab	Group	Field	Value	Units
Jet fire	Release location	Elevation of discharge point	0	m
	Jet fire model	Jet fire method	Cone model	
	Release orientation	Inclination of jet from horizontal	45	deg
		Jet direction	Vertical	
		Rotation about the z-axis (anti-clockwise from the east)	0	deg
	Release characteristics	Calculate jet velocity?	Given jet velocity	
		Mass discharge rate	10.36	kg/s
		Two-phase release?	No	
		Post-expansion liquid fraction	0	fraction
		Post-expansion jet temperature	25	degC
		Jet velocity	330	m/s
		Expanded diameter	0.268282	m
		Orifice diameter	0	mm
		Flame length	0	m
		Use flame length correlation?	Do not calculate flame length	
		Calculate the expanded diameter?	Calculate expanded diameter	
Risk	Event probability (probability of this event compared with others in this group)	Event probability	0.0105	fraction
	Directional probabilities for risk	Directional probabilities for risk and 3D effects	Use wind rose probabilities	
Jet fire parameters	Radiation levels	Number of input radiation levels	5	
		Intensity levels	38.6, 26.5	kW/m2
	Cone model data	Horizontal options	Use standard method	
		Correlation	Recommended	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
Tab	**Group**	**Field**	**Value**	**Units**
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
	Exposure duration	Jet fire maximum exposure duration	20	s
Wind direction	Wind direction	Wind direction	270	deg

		Wind orientation about the z-axis (anti-clockwise from the East)	0	deg
Calculations	Type of results required	Radiation at a point	No	
		Radiation vs distance	No	
		Radiation ellipse	No	
		Radiation contours	Yes	
Radiation contours	Display	Chart type being plotted	Side view (XZ plane)	
	Contour footprint	Height above origin		m
	Contour side view	Distance along the y-axis	0	m
	Contour cross-section	Distance along the x-axis		m
	User-defined contour plane origin	X		m
		Y		m
		Z		m
	User-defined contour plane X axis	X		m
		Y		m
		Z		m
	User-defined contour plane Y axis	X		m
		Y		m
		Z		m

100mm leak (Jet Fire) - Jet fire

Jet fire
NPW_Safeti_pipeline_20231207_consequence data\Study\Underground Pipeline\Scenario group\Jet Fire inclined

Tab	Group	Field	Value	Units
Jet fire	Release location	Elevation of discharge point	0	m
	Jet fire model	Jet fire method	Cone model	
	Release orientation	Inclination of jet from horizontal	45	deg
		Jet direction	Vertical	
		Rotation about the z-axis (anti-clockwise from the east)	0	deg
	Release characteristics	Calculate jet velocity?	Given jet velocity	
Tab	**Group**	**Field**	**Value**	**Units**
		Mass discharge rate	41.4	kg/s
		Two-phase release?	No	
		Post-expansion liquid fraction	0	fraction
		Post-expansion jet temperature	25	degC

		Jet velocity	330	m/s
		Expanded diameter	0.536305	m
		Orifice diameter	0	mm
		Flame length	0	m
		Use flame length correlation?	Do not calculate flame length	
		Calculate the expanded diameter?	Calculate expanded diameter	
Risk	Event probability (probability of this event compared with others in this group)	Event probability	0.0067	fraction
	Directional probabilities for risk	Directional probabilities for risk and 3D effects	Use wind rose probabilities	
Jet fire parameters	Radiation levels	Number of input radiation levels	5	
		Intensity levels	38.6, 26.5	kW/m2
	Cone model data	Horizontal options	Use standard method	
		Correlation	Recommended	
		Flame-shape adjustment if grounded	Yes	
	Surface emissive power	Calculation method for surface emissive power	Calculate SEP	
		Flame emissive power		kW/m2
		Emissivity fraction		fraction
	Exposure duration	Jet fire maximum exposure duration	20	s
Wind direction	Wind direction	Wind direction	270	deg
		Wind orientation about the z-axis (anti-clockwise from the East)	0	deg
Calculations	Type of results required	Radiation at a point	No	
		Radiation vs distance	No	
		Radiation ellipse	No	
		Radiation contours	Yes	
Radiation contours	Display	Chart type being plotted	Side view (XZ plane)	
	Contour footprint	Height above origin		m
	Contour side view	Distance along the y-axis	0	m
	Contour cross-section	Distance along the x-axis		m
	User-defined contour plane origin	X		m
		Y		m
Tab	**Group**	**Field**	**Value**	**Units**
		Z		m
	User-defined contour plane X axis	X		m
		Y		m
		Z		m
	User-defined contour plane Y axis	X		m

		Y		m
		Z		m

Path	Scenario	Weather	Material	Material to track	Height of interest (coming from parameters) (m)	Averaging time (s)	Distance to LFL fraction (m)	Distance to LFL (m)	Distance to UFL (m)	Maximum distance (at height of interest) to LFL fraction (m)	Minimum distance (at height of interest) to LFL fraction (m)	Maximum width (at height of interest) to LFL fraction (m)	Downwind distance (at height of interest) to max width for LFL	Maximum distance (at height of interest) to LFL (m)	Minimum distance (at height of interest) to LFL) (m)	Maximum width (at height of interest) to LFL (m)	Downwind distance (at height of interest) to max width for LFL (m)	Maximum distance (at height of interest) to UFL (m)	Minimum distance (at height of interest) to UFL (m)	Maximum width (at height of interest) to UFL (m)	Downwind distance (at height of interest) to max width for UFL	Max flash fire distance for all heights (m)	Height at max flash fire distance for all heights (m)	Max flash fire width for all heights (m)	Downwind distance at max flash fire width for all heights (m)	Height at max flash fire width for all heights (m)	Min flash fire distance for all heights (m)	Height at min flash fire distance for all heights (m)	Max flash fire height (m)	Min flash fire height (m)	Max flash fire flammable mass (kg)	Max flash fire stoichiometric volume (m3)	Max flash fire depth (m)
Study\Underground Pip	0.023 kg/s Release Rate	1D	CARBON MONOXIDE	CARBON MONOXIDE	0	Flammable (18.75)	n/a	n/a	n/a													0.0806388	0.125873	0.0582019	0.0065209	0.125873		0.125873	0.346667	0	0.000142929	0.000400455	0.346667
Study\Underground Pip	0.023 kg/s Release Rate	4D	CARBON MONOXIDE	CARBON MONOXIDE	0	Flammable (18.75)	n/a	n/a	n/a													0.0982506	0.0358253	0.0361114	0.0037994	0.0358253		0.0358253	0.270584	0	0.000102199	0.00028634	0.270584
Study\Underground Pip	0.023 kg/s Release Rate	7.5D	CARBON MONOXIDE	CARBON MONOXIDE	0	Flammable (18.75)	n/a	n/a	n/a													0.0829406	0.0353722	0.0389879	0.00183534	0.0353722		0.0353722	0.188993	0	4.45611E-05	0.000124851	0.188993
Study\Underground Pip	0.023 kg/s Release Rate	3E	CARBON MONOXIDE	CARBON MONOXIDE	0	Flammable (18.75)	n/a	n/a	n/a													0.0985466	0.0884301	0.0515044	0.00249739	0.0884301		0.0884301	0.322277	0	0.000123165	0.000345081	0.322277
Study\Underground Pip	0.023 kg/s Release Rate	1F	CARBON MONOXIDE	CARBON MONOXIDE	0	Flammable (18.75)	n/a	n/a	n/a													0.0547587	0.185547	0.0666655	0.00357686	0.185547		0.185547	0.403798	0	0.000183669	0.000514601	0.403798
Study\Underground Pip	0.144 kg/s Release Rate	4D	CARBON MONOXIDE	CARBON MONOXIDE	0	Flammable (18.75)	n/a	n/a	n/a													0.0141614	0.223453	0.12099	0.0141614	0.223453		0.223453	0.49742	0	0.000385724	0.00108072	0.49742
Study\Underground Pip	0.144 kg/s Release Rate	7.5D	CARBON MONOXIDE	CARBON MONOXIDE	0	Flammable (18.75)	n/a	n/a	n/a													0.0407886	0.106083	0.0981998	0.0137392	0.106083		0.106083	0.378331	0	0.000707499	0.00198226	0.378331
Study\Underground Pip	0.576 kg/s Release Rate	1D	CARBON MONOXIDE	CARBON MONOXIDE	0	Flammable (18.75)	n/a	n/a	n/a													0.221774	1.76875	0.298982	0.0727129	1.50803		0.921412	1.9936	0.611077	0.0222313	0.0622873	0.620671
Study\Underground Pip	0.576 kg/s Release Rate	4D	CARBON MONOXIDE	CARBON MONOXIDE	0	Flammable (18.75)	n/a	n/a	n/a													0.258884	1.27698	0.298725	0.0788602	1.11847		0.431586	1.59163	0.0694558	0.0164282	0.0460282	0.724261
Study\Underground Pip	0.576 kg/s Release Rate	7.5D	CARBON MONOXIDE	CARBON MONOXIDE	0	Flammable (18.75)	n/a	n/a	n/a													0.309313	1.01502	0.294059	0.103976	0.87782		0.329023	1.2561	0.121882	0.0125437	0.0351446	0.573635
Study\Underground Pip	0.576 kg/s Release Rate	3E	CARBON MONOXIDE	CARBON MONOXIDE	0	Flammable (18.75)	n/a	n/a	n/a													0.237213	1.48361	0.300251	0.065985	1.30665		0.775766	1.86445	0.44412	0.0204923	0.0574149	0.761687
Study\Underground Pip	0.576 kg/s Release Rate	1F	CARBON MONOXIDE	CARBON MONOXIDE	0	Flammable (18.75)	n/a	n/a	n/a													0.213747	1.80047	0.299091	0.0467566	1.59375		1.18033	2.28621	0.938618	0.0271428	0.0760483	0.971489
Study\Underground Pip	2.3 kg/s Release Rate	1D	CARBON MONOXIDE	CARBON MONOXIDE	0	Flammable (18.75)	n/a	n/a	n/a													0.464722	3.55621	0.44303	0.330179	2.80351		1.83576	4.10339	0	0.175588	0.491959	4.10339
Study\Underground Pip	2.3 kg/s Release Rate	4D	CARBON MONOXIDE	CARBON MONOXIDE	0	Flammable (18.75)	n/a	n/a	n/a													0.553683	2.69278	0.488584	0.370084	2.18934		1.09856	3.08895	0	0.128081	0.358854	2.95674
Study\Underground Pip	2.3 kg/s Release Rate	7.5D	CARBON MONOXIDE	CARBON MONOXIDE	0	Flammable (18.75)	n/a	n/a	n/a													0.650397	2.10594	0.527107	0.405717	1.75625		0.567293	2.41967	0	0.0999431	0.280019	2.2382
Study\Underground Pip	2.3 kg/s Release Rate	3E	CARBON MONOXIDE	CARBON MONOXIDE	0	Flammable (18.75)	n/a	n/a	n/a													0.5097	3.0143	0.499475	0.332851	2.45059		1.51108	3.52121	0	0.157658	0.441724	3.48579
Study\Underground Pip	2.3 kg/s Release Rate	1F	CARBON MONOXIDE	CARBON MONOXIDE	0	Flammable (18.75)	n/a	n/a	n/a													0.453642	3.738	0.444763	0.351344	3.28588		2.26858	4.5103	0	0.207973	0.582696	4.5103
Study\Underground Pip	20.72 kg/s Release Rate	1D	CARBON MONOXIDE	CARBON MONOXIDE	0	Flammable (18.75)	29.8783	29.8783	11.0527	29.8783	-29.8479	59.7209	0.173285	29.8783	-29.8479	59.7209	0.173285	11.0527	-11.0527			29.8783	0	59.7209	-0.0788626	0	-29.8479	0	29.7956	0	17713.2	49628.6	29.7956
Study\Underground Pip	20.72 kg/s Release Rate	4D	CARBON MONOXIDE	CARBON MONOXIDE	0	Flammable (18.75)	29.9023	29.9023	11.0527	29.9023	-29.8251	59.7209	0.202752	29.9023	-29.8251	59.7209	0.202752	11.0527	-11.0527			29.9023	0	59.7209	-0.0493949	0	-29.8251	0	29.7956	0	17713.6	49629.7	29.7956
Study\Underground Pip	20.72 kg/s Release Rate	7.5D	CARBON MONOXIDE	CARBON MONOXIDE	0	Flammable (18.75)	29.9367	29.9367	11.0527	29.9367	-29.7942	59.7208	0.244006	29.9367	-29.7942	59.7208	0.244006	11.0527	-11.0527			29.9367	0	59.7208	-0.00814011	0	-29.7942	0	29.7956	0	17713.5	49629.4	29.7956
Study\Underground Pip	20.72 kg/s Release Rate	3E	CARBON MONOXIDE	CARBON MONOXIDE	0	Flammable (18.75)	29.8856	29.8856	11.0484	29.8856	-29.8127	59.6917	0.199668	29.8856	-29.8127	59.6917	0.199668	11.0484	-11.0484			29.8856	0	59.6917	-0.0513712	0	-29.8127	0	30.1602	0	17482.5	48982.2	30.1602
Study\Underground Pip	20.72 kg/s Release Rate	1F	CARBON MONOXIDE	CARBON MONOXIDE	0	Flammable (18.75)	29.8899	29.8899	11.0542	29.8899	-29.8438	59.7281	0.182758	29.8899	-29.8438	59.7281	0.182758	11.0542	-11.0542			29.8899	0	59.7281	-0.0696465	0	-29.8438	0	29.6682	0	17813.4	49909.2	29.6682
Study\Underground Pip	0.023 kg/s Release Rate	1D	CARBON MONOXIDE	CARBON MONOXIDE	0	Flammable (18.75)	n/a	n/a	n/a													0.0806388	0.125873	0.0582019	0.0065209	0.125873		0.125873	0.346667	0	0.000142929	0.000400455	0.346667
Study\Underground Pip	0.023 kg/s Release Rate	4D	CARBON MONOXIDE	CARBON MONOXIDE	0	Flammable (18.75)	n/a	n/a	n/a													0.0982506	0.0358253	0.0361114	0.0037994	0.0358253		0.0358253	0.270584	0	0.000102199	0.00028634	0.270584
Study\Underground Pip	0.023 kg/s Release Rate	7.5D	CARBON MONOXIDE	CARBON MONOXIDE	0	Flammable (18.75)	n/a	n/a	n/a													0.0829406	0.0353722	0.0389879	0.00183534	0.0353722		0.0353722	0.188993	0	4.45611E-05	0.000124851	0.188993
Study\Underground Pip	0.023 kg/s Release Rate	3E	CARBON MONOXIDE	CARBON MONOXIDE	0	Flammable (18.75)	n/a	n/a	n/a													0.0985466	0.0884301	0.0515044	0.00249739	0.0884301		0.0884301	0.322277	0	0.000123165	0.000345081	0.322277
Study\Underground Pip	0.023 kg/s Release Rate	1F	CARBON MONOXIDE	CARBON MONOXIDE	0	Flammable (18.75)	n/a	n/a	n/a													0.0547587	0.185547	0.0666655	0.00357686	0.185547		0.185547	0.403798	0	0.000183669	0.000514601	0.403798
Study\Underground Pip	0.144 kg/s Release Rate	4D	CARBON MONOXIDE	CARBON MONOXIDE	0	Flammable (18.75)	n/a	n/a	n/a													0.0141614	0.223453	0.12099	0.0141614	0.223453		0.223453	0.49742	0	0.000385724	0.00108072	0.49742
Study\Underground Pip	0.144 kg/s Release Rate	7.5D	CARBON MONOXIDE	CARBON MONOXIDE	0	Flammable (18.75)	n/a	n/a	n/a													0.0407886	0.106083	0.0981998	0.0137392	0.106083		0.106083	0.378331	0	0.000707499	0.00198226	0.378331
Study\Underground Pip	0.576 kg/s Release Rate	1D	CARBON MONOXIDE	CARBON MONOXIDE	0	Flammable (18.75)	0.103572	0.103572	0.0408645	0.103572	0.000975275	0.164611	0.0306569	0.103572	0.000975275	0.164611	0.0306569	0.0408645	0.00114334	0.0418808	0.0306569	1.36517	1.25366	0.292831	0.92748	0.926621	-0.0937999	0.0545071	1.38486	0	0.0217609	0.0609692	0.44799
Study\Underground Pip	0.576 kg/s Release Rate	4D	CARBON MONOXIDE	CARBON MONOXIDE	0	Flammable (18.75)	0.103812	0.103812	0.0408785	0.103812	0.000205318	0.174106	0.0131786	0.103812	0.000205318	0.174106	0.0131786	0.0408785	0.000342233	0.0617489	0.0131786	1.29268	1.1007	0.288495	0.853705	0.779662	0.000205318	0.137587	1.14641	0	0.0178548	0.0500254	0.438686
Study\Underground Pip	0.576 kg/s Release Rate	7.5D	CARBON MONOXIDE	CARBON MONOXIDE	0	Flammable (18.75)	0.104174	0.104174	0.040913	0.104174	0.000248226	0.177774	0.00466459	0.104174	0.000248226	0.177774	0.00466459	0.040913	0.000369976	0.066171	0.00466459	1.11485	0.833595	0.274763	0.723524	0.595425	-0.00321549	0.15878	0.918532	0	0.013706	0.0384012	0.400845
Study\Underground Pip	0.576 kg/s Release Rate	3E	CARBON MONOXIDE	CARBON MONOXIDE	0	Flammable (18.75)	0.100372	0.100372	0.0435385	0.100372	0.000327191	0.176085	0.00936932	0.100372	0.000327191	0.176085	0.00936932	0.0435385	0.000515689	0.0645944	0.00936932	1.17122	1.00677	0.29069	0.980718	0.906096	-0.0987808	0.0503387	1.11943	0	0.0191358	0.0536143	0.4306
Study\Underground Pip	0.576 kg/s Release Rate	1F	CARBON MONOXIDE	CARBON MONOXIDE	0	Flammable (18.75)	0.0974496	0.0974496	n/a	0.0974496	0.00291726	0.148951	0.0518699	0.0974496	0.00291726	0.148951	0.0518699					1.12191	0.988101	0.294528	0.941449	0.929978	-0.0810172	0.0581236	1.18208	0.0103319	0.0200888	0.0562843	0.504205
Study\Underground Pip	2.3 kg/s Release Rate	1D	CARBON MONOXIDE	CARBON MONOXIDE	0	Flammable (18.75)	0.20703	0.20703	0.0816583	0.20703	0.00147302	0.33231	0.0550255	0.20703	0.00147302	0.33231	0.0550255	0.0816583	0.00179774	0.0943586	0.0550255	2.86321	2.69627	0.497953	1.5556	1.56558	-0.0425974	0.0869764	2.69627	0	0.180019	0.504375	0.897048
Study\Underground Pip	2.3 kg/s Release Rate	4D	CARBON MONOXIDE	CARBON MONOXIDE	0	Flammable (18.75)	0.207684	0.207684	0.0816674	0.207684	0.000374863	0.350515	0.0225372	0.207684	0.000374863	0.350515	0.0225372	0.0816674	0.00064169	0.126781	0.0225372	2.4766	2.09588	0.50774	1.57318	1.46712	-0.104605	0.139726	2.24372	0	0.13929	0.390262	0.868046
Study\Underground Pip	2.3 kg/s Release Rate	7.5D	CARBON MONOXIDE	CARBON MONOXIDE	0	Flammable (18.75)	0.208644	0.208644	0.0817204	0.208644	0.000936129	0.34178	0.0405279	0.208644	0.000936129	0.34178	0.0405279	0.0817204	0.00116029	0.111879	0.0405279	2.19089	1.64464	0.500775	1.49174	1.23348	-0.139601	0.117474	1.7825	0	0.108997	0.305385	0.822515
Study\Underground Pip	2.3 kg/s Release Rate	3E	CARBON MONOXIDE	CARBON MONOXIDE	0	Flammable (18.75)	0.200798	0.200798	0.0869318	0.200798	0.0035778	0.354974	0.0124255	0.200798	0.0035778	0.354974	0.0124255	0.0869318	0.00393788	0.132541	0.0124255	2.2835	2.10529	0.482397	0.997204	0.935686	-0.0551887	0.155948	2.14511	0	0.149011	0.417496	0.956
Study\Underground Pip	2.3 kg/s Release Rate	1F	CARBON MONOXIDE	CARBON MONOXIDE	0	Flammable (18.75)	0.195067	0.195067	n/a	0.195067	0.00210049	0.304407	0.0971214	0.195067	0.00210049	0.304407	0.0971214					1.63811	1.48283	0.474208	0.903521	0.926766	0.00210049	0.0926766	1.67993	0	0.108971	0.305313	0.920225
Study\Underground Pip	0.41 kg/s Release Rate	1D	TOWNGAS	TOWNGAS	0	Flammable (18.75)	n/a	n/a	n/a													1.23105	4.06001	0.969117	0.70765	3.15965		1.92166	4.61887	0	0.128773	1.13423	4.18686
Study\Underground Pip	0.41 kg/s Release Rate	4D	TOWNGAS	TOWNGAS	0	Flammable (18.75)	n/a	n/a	n/a													1.46109	2.50894	0.952381	0.722582	1.8838		1.10239	2.80957	0	0.072141	0.635414	2.40417
Study\Underground Pip	0.41 kg/s Release Rate	7.5D	TOWNGAS	TOWNGAS	0	Flammable (18.75)	n/a	n/a	n/a													1.66631	1.72873	0.855499	1.03287	1.48297		0.438489	2.00808	0	0.0480169	0.42293	1.62491
Study\Underground Pip	0.41 kg/s Release Rate	3E	TOWNGAS	TOWNGAS	0	Flammable (18.75)	n/a	n/a	n/a													1.29201	3.06353	0.995828	0.760003	2.50807		1.48973	3.54257	0	0.0979458	0.862702	3.17443
Study\Underground Pip	0.41 kg/s Release Rate	1F	TOWNGAS	TOWNGAS	0	Flammable (18.75)	n/a	n/a	n/a													1.0438	4.53436	1.00425	0.638671	3.65434		2.64861	5.29369	0	0.161138	1.41929	5.16664
Study\Underground Pip	2.59 kg/s Release Rate	1D	TOWNGAS	TOWNGAS	0	Flammable (18.75)	n/a	n/a	n/a													3.02318	9.52426	2.37131	1.90199	7.85857		4.28922	10.9399	0	1.83703	16.1805	9.90619
Study\Underground Pip	2.59 kg/s Release Rate	4D	TOWNGAS	TOWNGAS	0	Flammable (18.75)	n/a	n/a	n/a													3.84939	5.95879	2.34301	1.71182	4.39227		2.19913	6.67048	0	1.05211	9.26696	5.36996
Study\Underground Pip	2.59 kg/s Release Rate	7.5D	TOWNGAS	TOWNGAS	0	Flammable (18.75)	n/a	n/a	n/a													4.44599	4.12256	2.08316	2.04774	3.29925		1.06454	4.75596	0	0.709518	6.2494	3.46552
Study\Underground Pip	2.59 kg/s Release Rate	3E	TOWNGAS	TOWNGAS	0	Flammable (18.75)	n/a	n/a	n/a													3.34017	6.84177	2.42768	1.6055	5.36381		3.33162	8.09153	0	1.30548	11.4986	6.94041
Study\Underground Pip	2.59 kg/s Release Rate	1F	TOWNGAS	TOWNGAS	0	Flammable (18.75)	n/a	n/a	n/a													2.46883	9.38673	2.36146	1.31952	7.41192		5.19026	11.8565	0	2.00583	17.6673	10.9373
Study\Underground Pip	10.36 kg/s Release Rate	1D	TOWNGAS	TOWNGAS	0	Flammable (18.75)	n/a	n/a	n/a													6.04999	18.8636	4.7305	3.15939	13.9237		8.08554	21.0268	0	13.2183	116.426	18.7764
Study\Underground Pip	10.36 kg/s Release Rate	4D	TOWNGAS	TOWNGAS	0	Flammable (18.75)	n/a	n/a	n/a													8.02529	10.1834	4.58055	3.41321	8.48651		3.11298	12.8741	0	7.67646	67.6139	10.0365
Study\Underground Pip	10.36 kg/s Release Rate	7.5D	TOWNGAS	TOWNGAS	0	Flammable (18.75)	n/a	n/a	n/a													9.44045	7.8524	4.00873	3.86898	6.19968		1.8613	9.11209	0	5.36162	47.2249	6.51276
Study\Underground Pip	10.36 kg/s Release Rate	3E	TOWNGAS	TOWNGAS	0	Flammable (18.75)	n/a	n/a	n/a													6.95712	11.0446	4.67068	3.33892	10.0703		5.8483	14.9742	0	9.19093	80.9533	12.8783
Study\Underground Pip	10.36 kg/s Release Rate	1F	TOWNGAS	TOWNGAS	0	Flammable (18.75)	n/a	n/a	n/a													5.12308	14.1353	4.40548	2.58495	13.2788		8.56793	20.5386	0	12.8338	113.039	19.9131
Study\Underground Pip	41.4 kg/s Release rate	1D	TOWNGAS	TOWNGAS	0	Flammable (18.75)	0.807673	0.807673	0.470119	0.807673	0.00984017	1.25721	0.124153	0.807673	0.00984017	1.25721	0.124153	0.470119	0.0129826	0.70825	0.124153	27.5724	22.8693	4.70565	17.7315	17.152	-0.221667	0.635259	26.0114	0	30.4826	268.489	8.96152
Study\Underground Pip	41.4 kg/s Release rate	4D	TOWNGAS	TOWNGAS	0	Flammable (18.75)	0.810059	0.810059	0.470602	0.810059	0.0213553	1.01427	0.452478	0.810059	0.0213553	1.01427	0.452478	0.470602	0.0238121	0.195035	0.452478	23.2121	18.2268	4.79906	14.6598	12.8921	-0.458338	0.444555	19.629	0	20.9629	184.641	7.95609
Study\Underground Pip	41.4 kg/s Release rate	7.5D	TOWNGAS	TOWNGAS	0	Flammable (18.75)	0.813653	0.813653	0.471349	0.813653	0.0156124	1.1217	0.346105	0.813653	0.0156124	1.1217	0.346105	0.471349	0.0177819	0.486673	0.346105	20.4441	13.7398	4.67973	12.1028	9.71838	-0.326741	0.335116	14.9125	0	15.073	132.762	6.81359
Study\Underground Pip	41.4 kg/s Release rate	3E	TOWNGAS	TOWNGAS	0	Flammable (18.75)	0.755987	0.755987	0.471255	0.755987	0.0233644	1.23616	0.182944	0.755987	0.0233644	1.23616	0.182944	0.471255	0.026692	0.681612	0.182944	21.758	18.505	4.0646	13.6457	12.6613	-0.361897	0.486973	19.4622	0	22.4318	197.578	8.89294
Study\Underground Pip	41.4 kg/s Release rate	1F	TOWNGAS	TOWNGAS	0	Flammable (18.75)	0.723336	0.723336	n/a	0.723336	0.031613	0.952078	0.495784	0.723336	0.031613	0.952078	0.495784					16.3387	15.0601	2.67119	9.72781	9.63848	-0.183667	0.602405	16.2929	0	17.7001	155.902	10.3272
Study\Underground Pip	372.95 kg/s Release rat	1D	TOWNGAS	TOWNGAS	0	Flammable (18.75)	50.185	50.185	25.5167	50.185	-49.7676	99.9277	0.47133	50.185	-49.7676	99.9277	0.47133	25.5167	-25.5167	51.0248	0.47133	50.185	0	99.9344	0.0386001	0	-49.7676	0	49.9113	0	19207.3	169177	49.9113
Study\Underground Pip	372.95 kg/s Release rat	4D	TOWNGAS	TOWNGAS	0	Flammable (18.75)	50.5822	50.5822	25.5167	50.5822	-49.4703	99.9275	0.82561	50.5822	-49.4703	99.9275	0.82561	25.5167	-25.5167	51.032	-0.193443	50.5822	0	99.9343	0.377694	0	-49.4703	0	49.9114	0	19207.5	169179	49.9114
Study\Underground Pip	372.95 kg/s Release rat	7.5D	TOWNGAS	TOWNGAS	0	Flammable (18.75)	51.2581	51.2581	25.5167	51.2581	-49.1052	99.9261	1.35954	51.2581	-49.1052	99.9261	1.35954	25.5167	-25.5167	51.029	0.337278	51.2581	0	99.9342	0.851259	0	-49.1052	0	49.9124	0	19207.4	169178	49.9124
Study\Underground Pip	372.95 kg/s Release rat	3E	TOWNGAS	TOWNGAS	0	Flammable (18.75)	50.4504	50.4504	25.5033	50.4504	-49.4915	99.8486	0.747842	50.4504	-49.4915	99.8486	0.747842	25.5033	-25.5032	51.0036	-0.270073	50.4504	0	99.8552	0.306818	0	-49.4915	0	50.7589	0	18913.1	166586	50.7589
Study\Underground Pip	372.95 kg/s Release rat	1F	TOWNGAS	TOWNGAS	0	Flammable (18.75)	50.2724	50.2724	25.5197	50.2724	-49.7027	99.9363	0.548788	50.2724	-49.7027	99.9363	0.548788	25.5197	-25.5196	51.0307	-0.469458	50.2724	0	99.9426	0.113858	0	-49.7027	0	49.7613	0	19262.3	169662	49.7613
Study\Underground Pip	0.41 kg/s Release Rate	1D	TOWNGAS	TOWNGAS	0	Flammable (18.75)	0.161205	0.161205	0.0936443	0.161205	0.00275553	0.215285	0.0772254	0.161205	0.00275553	0.215285	0.0772254	0.0936443	0.0032098	0.0808422	0.0772254	4.19605	3.3231	0.94327	2.90853	2.54119	-0.0888022	0.0977381	3.6328	0	0.146357	1.28911	1.60354
Study\Underground Pip	0.41 kg/s Release Rate	4D	TOWNGAS	TOWNGAS	0	Flammable (18.75)	0.162975	0.162975	0.0940192	0.162975	0.000737857	0.247474	0.0321362	0.162975	0.000737857	0.247474	0.0321362	0.0940192	0.00107051	0.137073	0.0321362	3.38127	2.02281	0.894756	2.02572	1.4834	-0.00757938	0.134854	2.25796	0	0.0829554	0.730667	1.22403
Study\Underground Pip	0.41 kg/s Release Rate	7.5D	TOWNGAS	TOWNGAS	0	Flammable (18.75)	0.166298	0.166298	0.0946789	0.166298	0.000248122	0.254581	0.0138469	0.166298	0.000248122	0.254581	0.0138469	0.0946789	0.00053149	0.145512	0.0138469	2.86118	1.31873	0.805597	1.68986	1.00224	-0.06711	0.105499	1.55516	0	0.0529011	0.465951	0.973127
Study\Underground Pip	0.41 kg/s Release Rate	3E	TOWNGAS	TOWNGAS	0	Flammable (18.75)	0.150579	0.150579	0.0940381	0.150579	0.00230164	0.212675	0.0816968	0.150579	0.00230164	0.212675	0.0816968	0.0940381	0.0027539	0.0731959	0.0816968	3.50074	2.49778	0.862046	2.40848	1.93377	-0.116081	0.0805735	2.71914	0	0.111543	0.982469	1.53926
Study\Underground Pip	0.41 kg/s Release Rate	1F	TOWNGAS	TOWNGAS	0	Flammable (18.75)	0.143456	0.143456	0.0935224	0.143456	0.00201154	0.225083	0.0698247	0.143456	0.00201154	0.225083	0.0698247	0.0935224	0.00283085	0.101457	0.0698247	3.09295	2.77197	0.577736	0.917798	0.88703	-0.013327	0.110879	3.02955	0	0.131019	1.15401	1.98424
Study\Underground Pip	2.59 kg/s Release Rate	1D	TOWNGAS	TOWNGAS	0	Flammable (18.75)	0.352647	0.352647	0.204927	0.352647	0.00442138	0.473888	0.166115	0.352647	0.00442138	0.473888	0.166115	0.204927	0.0054076	0.182128	0.166115	9.49239	8.00972	2.04935	6.10279	5.54519	-0.192173	0.205378	8.49835	0	1.64596	14.4975	3.50451
Study\Underground Pip	2.59 kg/s Release Rate	4D	TOWNGAS	TOWNGAS	0	Flammable (18.75)	0.355703	0.355703	0.20565	0.355703	0.00033801	0.521433	0.107224	0.355703	0.00033801	0.521433	0.107224	0.20565	0.00116533	0.269292	0.107224	7.85049	4.98482	1.97319	5.05348	3.7723	-0.0990848	0	5.44595	0	0.972298	8.56396	2.8442
Study\Underground Pip	2.59 kg/s Release Rate	7.5D	TOWNGAS	TOWNGAS	0	Flammable (18.75)	0.361042	0.361042	0.206831	0.361042	0.00199478	0.553858	0.0406002	0.361042	0.00199478	0.553858	0.0406002	0.206831	0.00264268	0.315493	0.0406002	6.77738	3.318	1.79321	3.98679	2.51363	-0.198929	0.201091	3.86097	0	0.641428	5.64967	2.26893
Study\Underground Pip	2.59 kg/s Release Rate	3E	TOWNGAS	TOWNGAS	0	Flammable (18.75)	0.329906	0.329906	0.205694	0.329906	0.00817993	0.562613	0.00987517	0.329906	0.00817993	0.562613	0.00987517	0.205694	0.00925035	0.3256	0.00987517	7.93326	5.75079	1.84855	4.99721	4.15335	-0.0832788	0	6.27407	0	1.22479	10.7879	3.40303
Study\Underground Pip	2.59 kg/s Release Rate	1F	TOWNGAS	TOWNGAS	0	Flammable (18.75)	0.314628	0.314628	0.204403	0.314628	0.00973211	0.51211	0.128049	0.314628	0.00973211	0.51211	0.128049	0.204403	0.011395	0.25811	0.128049	6.85378	6.07954	1.22736	4.06234	3.90828	-0.123213	0	6.58368	0	1.35757	11.9574	4.28939
Study\Underground Pip	10.36 kg/s Release Rate	1D	TOWNGAS	TOWNGAS	0	Flammable (18.75)	0.705315	0.705315	0.409907	0.705315	0.00859037	0.948476	0.331779	0.705315	0.00859037	0.948476	0.331779	0.409907	0.0105616	0.365343	0.331779	18.0412	11.392	3.97395	11.6371	10.6325	-0.255731	0.379733	16.3755	0	12.0395	106.043	6.85451
Study\Underground Pip	10.36 kg/s Release Rate	4D	TOWNGAS	TOWNGAS	0	Flammable (18.75)	0.712116	0.712116	0.411606	0.712116	7.74374E-05	1.07304	0.159878	0.712116	7.74374E-05	1.07304	0.159878	0.411606	0.00158505	0.585267	0.159878	15.3227	9.6302	3.83081	9.85879	7.22265	-0.288379	0.240755	10.5107	0	7.21104	63.5145	5.43313
Study\Underground Pip	10.36 kg/s Release Rate	7.5D	TOWNGAS	TOWNGAS	0	Flammable (18.75)	0.723121	0.723121	0.414284	0.723121	0.0113632	1.08966	0.12938	0.723121	0.0113632	1.08966	0.12938	0.414284	0.0127892	0.606711	0.12938	13.557	6.43299	3.47557	7.89561	4.86821	-0.28355	0.173865	7.41552	0	4.80249	42.3001	4.40675
Study\Underground Pip	10.36 kg/s Release Rate	3E	TOWNGAS	TOWNGAS	0	Flammable (18.75)	0.662078	0.662078	0.41154	0.662078	0.00825574	0.933944	0.355076	0.662078	0.00825574	0.933944	0.355076	0.41154	0.0102312	0.32823	0.355076	15.0826	10.6754	3.58931	9.71483	7.86609	-0.253547	0.280932	11.7515	0	8.61633	75.8922	6.44596
Study\Underground Pip	10.36 kg/s Release Rate	1F	TOWNGAS	TOWNGAS	0	Flammable (18.75)	0.631233	0.631233	0.408998	0.631233	0.0247667	1.0561	0.207982	0.631233	0.0247667	1.0561	0.207982	0.408998	0.0278437	0.564304	0.207982	12.9981	10.1895	2.44742	8.01003	7.54781	-0.342697	0.37739	12.3693	0	9.54748	84.0938	8.32285
Study\Underground Pip	41.4 kg/s Release rate	1D	TOWNGAS	TOWNGAS	0	Flammable (18.75)	1.43111	1.43111	0.818588	1.43111	0.0318879	2.00052	0.539688	1.43111	0.0318879	2.00052	0.539688	0.818588	0.0354964	0.940644	0.539688	33.2671	15.998	7.51432	21.2591	19.6339	-0.635112	0.727182	31.7645	0	85.3728	751.96	14.2331
Study\Underground Pip	41.4 kg/s Release rate	4D	TOWNGAS	TOWNGAS	0	Flammable (18.75)	1.44278	1.44278	0.820731	1.44278	0.025555	2.12475	0.355145	1.44278	0.025555	2.12475	0.355145	0.820731	0.0286658	1.14105	0.355145	29.4979	18.6296	7.37372	18.9256	13.7504	-0.679795	0.887125	20.2956	0	52.3409	461.016	10.4829
Study\Underground Pip	41.4 kg/s Release rate	7.5D	TOWNGAS	TOWNGAS	0	Flammable (18.75)	1.46292	1.46292	0.824392	1.46292	0.0204364	2.20758	0.177164	1.46292	0.0204364	2.20758	0.177164	0.824392	0.0230673	1.25402	0.177164	27.0157	12.6178	6.67682	15.9473	9.46338	-0.655202	0.630892	14.287	0	35.7233	314.649	8.31883
Study\Underground Pip	41.4 kg/s Release rate	3E	TOWNGAS	TOWNGAS	0	Flammable (18.75)	1.41459	1.41459	0.820806	1.41459	0.00652756	1.95794	0.611991	1.41459	0.00652756	1.95794	0.611991	0.820806	0.0102197	0.860302	0.611991	28.3552	13.6079	6.89894	18.1509	14.6159	-0.432562	0.503995	21.8651	0	58.9933	519.61	12.4314
Study\Underground Pip	41.4 kg/s Release rate	1F	TOWNGAS	TOWNGAS	0	Flammable (18.75)	1.53846	1.53846	0.815537	1.53846	0.00044607	2.14409	0.346563	1.53846	0.00044607	2.14409	0.346563	0.815537	0.00625454	1.17754	0.346563	24.4962	15.5724	4.82678	14.446	13.5412	-0.575756	0.677062	23.1118	0	65.514	577.045	16.0466

Path	Scenario	Weather	Material	Material to track	Height of interest (coming from parameters) (m)	Averaging time used for concentration of interest (s)	Maximum distance (at height of interest) to conc of interest (m)	Minimum distance (at height of interest) to conc of interest (m)	Maximum width (at height of interest) to conc of interest (m)	Downwind distance to max width (at height of interest) for conc of interest	Maximum distance (at height of interest) to ERPG1 (3600 s)	Minimum distance (at height of interest) to ERPG 1 (3600 s)	Maximum width (at height of interest) to ERPG1 (3600 s) (m)	Downwind distance (at height of interest) to max width for ERPG1	Maximum distance (at height of interest) to ERPG2 (3600 s)	Minimum distance (at height of interest) to ERPG2 (3600 s)	Maximum width (at height of interest) to ERPG2 (3600 s) (m)	Downwind distance to max width (at height of interest) for ERPG2 (3600 s)	Maximum distance (at height of interest) to ERPG3 (3600 s)	Minimum distance (at height of interest) to ERPG3 (3600 s)	Maximum width (at height of interest) to ERPG3 (3600 s) (m)	Downwind distance (at height of interest) to max width for ERPG3	Maximum distance (at height of interest) to IDLH of interest (1800	Minimum distance (at height of interest) to IDLH (1800 s) (m)	Maximum width (at height of interest) to IDLH (1800 s) (m)	Downwind distance (at height of interest) to max width for IDLH	Maximum distance (at height of interest) to STEL (900 s) (m)	Minimum distance (at height of interest) to STEL (900 s) (m)	Maximum width (at height of interest) to STEL (900 s) (m)	Downwind distance (at height of interest) to max width for STEL
Study\Underground Pip	20.72 kg/s Release Rate	1D	CARBON MONOXIDE	CARBON MONOXIDE	0	Toxic (60)	108.493	-89.9276	191.151	7.90654																				
Study\Underground Pip	20.72 kg/s Release Rate	4D	CARBON MONOXIDE	CARBON MONOXIDE	0	Toxic (60)	184.46	-84.4221	191.149	18.457																				
Study\Underground Pip	20.72 kg/s Release Rate	7.5D	CARBON MONOXIDE	CARBON MONOXIDE	0	Toxic (60)	321.439	-79.6968	191.145	37.2505																				
Study\Underground Pip	20.72 kg/s Release Rate	3E	CARBON MONOXIDE	CARBON MONOXIDE	0	Toxic (60)	174.591	-85.2526	190.935	16.1982																				
Study\Underground Pip	20.72 kg/s Release Rate	1F	CARBON MONOXIDE	CARBON MONOXIDE	0	Toxic (60)	133.948	-88.1478	191.151	12.3716																				
Study\Underground Pip	0.576 kg/s Release Rate	7.5D	CARBON MONOXIDE	CARBON MONOXIDE	0	Toxic (60)	0.195603	-0.00237684	0.16135	0.136773																				
Study\Underground Pip	2.3 kg/s Release Rate	7.5D	CARBON MONOXIDE	CARBON MONOXIDE	0	Toxic (60)	0.387225	0.0163331	0.252842	0.323073																				
Study\Underground Pip	0.41 kg/s Release Rate	7.5D	TOWNGAS	TOWNGAS	0	Toxic (60)																								
Study\Underground Pip	2.59 kg/s Release Rate	7.5D	TOWNGAS	TOWNGAS	0	Toxic (60)																								
Study\Underground Pip	372.95 kg/s Release rate	1D	TOWNGAS	TOWNGAS	0	Toxic (60)																								
Study\Underground Pip	372.95 kg/s Release rate	4D	TOWNGAS	TOWNGAS	0	Toxic (60)																								
Study\Underground Pip	372.95 kg/s Release rate	7.5D	TOWNGAS	TOWNGAS	0	Toxic (60)																								
Study\Underground Pip	372.95 kg/s Release rate	3E	TOWNGAS	TOWNGAS	0	Toxic (60)																								
Study\Underground Pip	372.95 kg/s Release rate	1F	TOWNGAS	TOWNGAS	0	Toxic (60)																								
Study\Underground Pip	0.41 kg/s Release Rate	4D	TOWNGAS	TOWNGAS	0	Toxic (60)																								
Study\Underground Pip	0.41 kg/s Release Rate	7.5D	TOWNGAS	TOWNGAS	0	Toxic (60)																								
Study\Underground Pip	2.59 kg/s Release Rate	7.5D	TOWNGAS	TOWNGAS	0	Toxic (60)																								
Study\Underground Pip	10.36 kg/s Release Rate	7.5D	TOWNGAS	TOWNGAS	0	Toxic (60)																								
Study\Underground Pip	41.4 kg/s Release rate	7.5D	TOWNGAS	TOWNGAS	0	Toxic (60)																								

Path	Scenario	Weather	Material	Height of interest (coming from parameters) (m)	Flame length (m)	Flame emissive power (kW/m2)	Jet fire radiation intensity level 1	Jet fire radiation intensity level 2	Jet fire radiation intensity level 3	Distance downwind to intensity level 1 (4 kW/m2) (m)	Distance downwind to intensity level 2 (12.5 kW/m2) (m)	Distance downwind to intensity level 3 (37.5 kW/m2) (m)	Ellipse area at intensity level 1 (4 kW/m2) (m2)	Ellipse area at intensity level 2 (12.5 kW/m2) (m2)	Ellipse area at intensity level 3 (37.5 kW/m2) (m2)	Ellipse half-length to intensity level 1 (4 kW/m2) (m)	Ellipse half-length to intensity level 2 (12.5 kW/m2) (m)	Ellipse half-length to intensity level 3 (37.5 kW/m2) (m)	Ellipse half-width to intensity level 1 (4 kW/m2) (m)	Ellipse half-width to intensity level 2 (12.5 kW/m2) (m)	Ellipse half-width to intensity level 3 (37.5 kW/m2) (m)	Ellipse centre downwind distance to intensity level 1 (4 kW/m2) (m)	Ellipse centre downwind distance to intensity level 2 (12.5 kW/m2)	Ellipse centre downwind distance to intensity level 3 (37.5 kW/m2)
Study\Underground Pip	0.023 kg/s Release Rate	1D	CARBON MONOXIDE	0	2.9708	10.6807	Parameter value	Parameter value	Parameter value	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Study\Underground Pip	0.023 kg/s Release Rate	4D	CARBON MONOXIDE	0	2.28809	14.4603	Parameter value	Parameter value	Parameter value	1.40797	n/a	n/a	0.376669	n/a	n/a	0.548006	n/a	n/a	0.218789	n/a	n/a	0.859962	n/a	n/a
Study\Underground Pip	0.023 kg/s Release Rate	7.5D	CARBON MONOXIDE	0	1.98875	17.8422	Parameter value	Parameter value	Parameter value	2.5355	2.20599	n/a	3.91052	0.720405	n/a	1.23183	0.745542	n/a	1.0105	0.307578	n/a	1.30367	1.46045	n/a
Study\Underground Pip	0.023 kg/s Release Rate	3E	CARBON MONOXIDE	0	2.4835	12.7926	Parameter value	Parameter value	Parameter value	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Study\Underground Pip	0.023 kg/s Release Rate	1F	CARBON MONOXIDE	0	2.9708	10.6807	Parameter value	Parameter value	Parameter value	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Study\Underground Pip	0.144 kg/s Release Rate	1D	CARBON MONOXIDE	0	6.55592	13.4477	Parameter value	Parameter value	Parameter value	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Study\Underground Pip	0.144 kg/s Release Rate	4D	CARBON MONOXIDE	0	5.04932	18.1669	Parameter value	Parameter value	Parameter value	2.74621	n/a	n/a	2.78795	n/a	n/a	1.27917	n/a	n/a	0.693755	n/a	n/a	1.46704	n/a	n/a
Study\Underground Pip	0.144 kg/s Release Rate	7.5D	CARBON MONOXIDE	0	4.38874	22.9308	Parameter value	Parameter value	Parameter value	5.30425	3.62273	n/a	19.8992	0.676631	n/a	2.63266	0.762954	n/a	2.40597	0.282295	n/a	2.67159	2.85977	n/a
Study\Underground Pip	0.144 kg/s Release Rate	3E	CARBON MONOXIDE	0	5.48056	16.043	Parameter value	Parameter value	Parameter value	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Study\Underground Pip	0.144 kg/s Release Rate	1F	CARBON MONOXIDE	0	6.55592	13.4477	Parameter value	Parameter value	Parameter value	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Study\Underground Pip	0.576 kg/s Release Rate	1D	CARBON MONOXIDE	0	11.8705	16.1047	Parameter value	Parameter value	Parameter value	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Study\Underground Pip	0.576 kg/s Release Rate	4D	CARBON MONOXIDE	0	9.14256	21.6539	Parameter value	Parameter value	Parameter value	5.28776	n/a	n/a	15.7949	n/a	n/a	2.69405	n/a	n/a	1.86621	n/a	n/a	2.5937	n/a	n/a
Study\Underground Pip	0.576 kg/s Release Rate	7.5D	CARBON MONOXIDE	0	7.94647	27.8046	Parameter value	Parameter value	Parameter value	8.68583	n/a	n/a	62.4583	n/a	n/a	4.41782	n/a	n/a	4.50021	n/a	n/a	4.26801	n/a	n/a
Study\Underground Pip	0.576 kg/s Release Rate	3E	CARBON MONOXIDE	0	9.92337	19.1727	Parameter value	Parameter value	Parameter value	0.942307	n/a	n/a	0.488114	n/a	n/a	0.31435	n/a	n/a	0.494262	n/a	n/a	0.627957	n/a	n/a
Study\Underground Pip	0.576 kg/s Release Rate	1F	CARBON MONOXIDE	0	11.8705	16.1047	Parameter value	Parameter value	Parameter value	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Study\Underground Pip	2.3 kg/s Release Rate	1D	CARBON MONOXIDE	0	21.4015	19.3649	Parameter value	Parameter value	Parameter value	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Study\Underground Pip	2.3 kg/s Release Rate	4D	CARBON MONOXIDE	0	16.4833	25.8827	Parameter value	Parameter value	Parameter value	10.3996	n/a	n/a	83.1969	n/a	n/a	5.7739	n/a	n/a	4.58657	n/a	n/a	4.62573	n/a	n/a
Study\Underground Pip	2.3 kg/s Release Rate	7.5D	CARBON MONOXIDE	0	14.3268	33.7763	Parameter value	Parameter value	Parameter value	15.5122	n/a	n/a	217.039	n/a	n/a	7.98867	n/a	n/a	8.64795	n/a	n/a	7.52351	n/a	n/a
Study\Underground Pip	2.3 kg/s Release Rate	3E	CARBON MONOXIDE	0	17.891	23.0382	Parameter value	Parameter value	Parameter value	4.3675	n/a	n/a	18.5612	n/a	n/a	2.6725	n/a	n/a	2.21075	n/a	n/a	1.695	n/a	n/a
Study\Underground Pip	2.3 kg/s Release Rate	1F	CARBON MONOXIDE	0	21.4015	19.3649	Parameter value	Parameter value	Parameter value	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Study\Underground Pip	0.023 kg/s Release Rate	1D	CARBON MONOXIDE	0	2.9708	10.6807	Parameter value	Parameter value	Parameter value	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Study\Underground Pip	0.023 kg/s Release Rate	4D	CARBON MONOXIDE	0	2.28809	14.4603	Parameter value	Parameter value	Parameter value	1.40797	n/a	n/a	0.376669	n/a	n/a	0.548006	n/a	n/a	0.218789	n/a	n/a	0.859962	n/a	n/a
Study\Underground Pip	0.023 kg/s Release Rate	7.5D	CARBON MONOXIDE	0	1.98875	17.8422	Parameter value	Parameter value	Parameter value	2.5355	2.20599	n/a	3.91052	0.720405	n/a	1.23183	0.745542	n/a	1.0105	0.307578	n/a	1.30367	1.46045	n/a
Study\Underground Pip	0.023 kg/s Release Rate	3E	CARBON MONOXIDE	0	2.4835	12.7926	Parameter value	Parameter value	Parameter value	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Study\Underground Pip	0.023 kg/s Release Rate	1F	CARBON MONOXIDE	0	2.9708	10.6807	Parameter value	Parameter value	Parameter value	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Study\Underground Pip	0.144 kg/s Release Rate	1D	CARBON MONOXIDE	0	6.55592	13.4477	Parameter value	Parameter value	Parameter value	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Study\Underground Pip	0.144 kg/s Release Rate	4D	CARBON MONOXIDE	0	5.04932	18.1669	Parameter value	Parameter value	Parameter value	2.74621	n/a	n/a	2.78795	n/a	n/a	1.27917	n/a	n/a	0.693755	n/a	n/a	1.46704	n/a	n/a
Study\Underground Pip	0.144 kg/s Release Rate	7.5D	CARBON MONOXIDE	0	4.38874	22.9308	Parameter value	Parameter value	Parameter value	5.30425	3.62273	n/a	19.8992	0.676631	n/a	2.63266	0.762954	n/a	2.40597	0.282295	n/a	2.67159	2.85977	n/a
Study\Underground Pip	0.144 kg/s Release Rate	3E	CARBON MONOXIDE	0	5.48056	16.043	Parameter value	Parameter value	Parameter value	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Study\Underground Pip	0.144 kg/s Release Rate	1F	CARBON MONOXIDE	0	6.55592	13.4477	Parameter value	Parameter value	Parameter value	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Study\Underground Pip	0.576 kg/s Release Rate	1D	CARBON MONOXIDE	0	15.1129	10.4174	Parameter value	Parameter value	Parameter value	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Study\Underground Pip	0.576 kg/s Release Rate	4D	CARBON MONOXIDE	0	11.6398	13.9626	Parameter value	Parameter value	Parameter value	7.56446	n/a	n/a	16.7683	n/a	n/a	3.43151	n/a	n/a	1.55544	n/a	n/a	4.13295	n/a	n/a
Study\Underground Pip	0.576 kg/s Release Rate	7.5D	CARBON MONOXIDE	0	10.117	17.5803	Parameter value	Parameter value	Parameter value	10.4815	n/a	n/a	64.0087	n/a	n/a	5.0927	n/a	n/a	4.00075	n/a	n/a	5.38883	n/a	n/a
Study\Underground Pip	0.576 kg/s Release Rate	3E	CARBON MONOXIDE	0	12.6339	12.4256	Parameter value	Parameter value	Parameter value	2.64443	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Study\Underground Pip	0.576 kg/s Release Rate	1F	CARBON MONOXIDE	0	15.1129	10.4174	Parameter value	Parameter value	Parameter value	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Study\Underground Pip	2.3 kg/s Release Rate	1D	CARBON MONOXIDE	0	27.2473	12.5722	Parameter value	Parameter value	Parameter value	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Study\Underground Pip	2.3 kg/s Release Rate	4D	CARBON MONOXIDE	0	20.9857	16.7524	Parameter value	Parameter value	Parameter value	13.7968	n/a	n/a	78.3877	n/a	n/a	6.53718	n/a	n/a	3.81687	n/a	n/a	7.25965	n/a	n/a
Study\Underground Pip	2.3 kg/s Release Rate	7.5D	CARBON MONOXIDE	0	18.2402	21.3662	Parameter value	Parameter value	Parameter value	18.4694	n/a	n/a	214.675	n/a	n/a	9.08254	n/a	n/a	7.52357	n/a	n/a	9.38689	n/a	n/a
Study\Underground Pip	2.3 kg/s Release Rate	3E	CARBON MONOXIDE	0	22.7779	14.9756	Parameter value	Parameter value	Parameter value	7.87552	n/a	n/a	18.8804	n/a	n/a	3.08228	n/a	n/a	1.9498	n/a	n/a	4.79325	n/a	n/a
Study\Underground Pip	2.3 kg/s Release Rate	1F	CARBON MONOXIDE	0	27.2473	12.5722	Parameter value	Parameter value	Parameter value	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Study\Underground Pip	0.41 kg/s Release Rate	1D	TOWNGAS	0	10.7582	40.4054	Parameter value	Parameter value	Parameter value	2.87683	n/a	n/a	8.28828	n/a	n/a	1.32	n/a	n/a	1.99866	n/a	n/a	1.5537	n/a	n/a
Study\Underground Pip	0.41 kg/s Release Rate	4D	TOWNGAS	0	8.28592	54.2351	Parameter value	Parameter value	Parameter value	9.40832	1.67629	n/a	100.994	n/a	n/a	5.10575	n/a	n/a	6.29629	n/a	n/a	4.30257	n/a	n/a
Study\Underground Pip	0.41 kg/s Release Rate	7.5D	TOWNGAS	0	7.2019	68.9186	Parameter value	Parameter value	Parameter value	11.2922	7.34982	n/a	131.804	37.3066	n/a	5.8803	3.66321	n/a	7.13477	3.2417	n/a	5.41192	3.68661	n/a
Study\Underground Pip	0.41 kg/s Release Rate	3E	TOWNGAS	0	8.99357	48.1003	Parameter value	Parameter value	Parameter value	8.29476	n/a	n/a	76.3844	n/a	n/a	4.67916	n/a	n/a	5.19621	n/a	n/a	3.6156	n/a	n/a
Study\Underground Pip	0.41 kg/s Release Rate	1F	TOWNGAS	0	10.7582	40.4054	Parameter value	Parameter value	Parameter value	2.87683	n/a	n/a	8.28828	n/a	n/a	1.32	n/a	n/a	1.99866	n/a	n/a	1.5537	n/a	n/a
Study\Underground Pip	2.59 kg/s Release Rate	1D	TOWNGAS	0	23.5496	51.8276	Parameter value	Parameter value	Parameter value	10.7489	n/a	n/a	212.478	n/a	n/a	8.12383	n/a	n/a	8.32537	n/a	n/a	2.6251	n/a	n/a
Study\Underground Pip	2.59 kg/s Release Rate	4D	TOWNGAS	0	18.1377	69.0727	Parameter value	Parameter value	Parameter value	21.8398	7.65375	n/a	707.89	38.1169	n/a	14.1735	4.23111	n/a	15.8979	2.86757	n/a	7.66631	3.42264	n/a
Study\Underground Pip	2.59 kg/s Release Rate	7.5D	TOWNGAS	0	15.7648	89.5712	Parameter value	Parameter value	Parameter value	24.8275	15.7627	n/a	788.161	196.333	n/a	14.2231	8.07096	n/a	17.6389	7.74315	n/a	10.6045	7.69177	n/a
Study\Underground Pip	2.59 kg/s Release Rate	3E	TOWNGAS	0	19.6868	61.6392	Parameter value	Parameter value	Parameter value	19.8369	2.21237	n/a	586.591	3.58841	n/a	13.4924	0.842683	n/a	13.8387	1.35546	n/a	6.34444	1.36969	n/a
Study\Underground Pip	2.59 kg/s Release Rate	1F	TOWNGAS	0	23.5496	51.8276	Parameter value	Parameter value	Parameter value	10.7489	n/a	n/a	212.478	n/a	n/a	8.12383	n/a	n/a	8.32537	n/a	n/a	2.6251	n/a	n/a
Study\Underground Pip	10.36 kg/s Release Rate	1D	TOWNGAS	0	42.2946	62.7422	Parameter value	Parameter value	Parameter value	25.3383	n/a	n/a	1301.48	n/a	n/a	20.5499	n/a	n/a	20.1593	n/a	n/a	4.78837	n/a	n/a
Study\Underground Pip	10.36 kg/s Release Rate	4D	TOWNGAS	0	32.575	83.1732	Parameter value	Parameter value	Parameter value	41.4503	17.0646	n/a	2929.99	251.449	n/a	29.3393	10.0485	n/a	31.7883	7.96524	n/a	12.111	7.01613	n/a
Study\Underground Pip	10.36 kg/s Release Rate	7.5D	TOWNGAS	0	28.3133	109.247	Parameter value	Parameter value	Parameter value	45.4149	28.3971	n/a	3191.65	716.781	n/a	29.1348	14.8762	n/a	34.8702	15.3372	n/a	16.2801	13.5209	n/a
Study\Underground Pip	10.36 kg/s Release Rate	3E	TOWNGAS	0	35.3571	74.6737	Parameter value	Parameter value	Parameter value	38.344	6.52047	n/a	2532.04	76.3373	n/a	28.1879	4.56909	n/a	28.593	5.3181	n/a	10.1561	1.95138	n/a
Study\Underground Pip	10.36 kg/s Release Rate	1F	TOWNGAS	0	42.2946	62.7422	Parameter value	Parameter value	Parameter value	25.3383	n/a	n/a	1301.48	n/a	n/a	20.5499	n/a	n/a	20.1593	n/a	n/a	4.78837	n/a	n/a
Study\Underground Pip	41.4 kg/s Release rate	1D	TOWNGAS	0	81.1461	63.9429	Parameter value	Parameter value	Parameter value	82.6538	n/a	n/a	5029.85	n/a	n/a	38.184	n/a	n/a	41.9299	n/a	n/a	44.4698	n/a	n/a
Study\Underground Pip	41.4 kg/s Release rate	4D	TOWNGAS	0	62.4982	90.5888	Parameter value	Parameter value	Parameter value	78.642	42.3067	n/a	6471.72	720.938	n/a	39.913	17.8855	n/a	51.6125	12.8306	n/a	38.7289	24.4213	n/a
Study\Underground Pip	41.4 kg/s Release rate	7.5D	TOWNGAS	0	54.3218	103.154	Parameter value	Parameter value	Parameter value	78.7259	50.1323	n/a	7741.64	1651.04	n/a	44.7308	24.0283	n/a	55.0904	21.8718	n/a	33.9951	26.104	n/a
Study\Underground Pip	41.4 kg/s Release rate	3E	TOWNGAS	0	67.8358	81.7367	Parameter value	Parameter value	Parameter value	80.3609	31.348	n/a	6101.1	167.198	n/a	39.4161	10.2675	n/a	49.2702	5.18343	n/a	40.9448	21.0806	n/a
Study\Underground Pip	41.4 kg/s Release rate	1F	TOWNGAS	0	81.1461	63.9429	Parameter value	Parameter value	Parameter value	82.6538	n/a	n/a	5029.85	n/a	n/a	38.184	n/a	n/a	41.9299	n/a	n/a	44.4698	n/a	n/a
Study\Underground Pip	0.41 kg/s Release Rate	1D	TOWNGAS	0	13.6968	26.061	Parameter value	Parameter value	Parameter value	9.49007	n/a	n/a	37.4149	n/a	n/a	4.0801	n/a	n/a	2.91893	n/a	n/a	5.40997	n/a	n/a
Study\Underground Pip	0.41 kg/s Release Rate	4D	TOWNGAS	0	10.5492	34.8734	Parameter value	Parameter value	Parameter value	11.5398	1.95603	n/a	113.613	0.112773	n/a	5.74867	0.404057	n/a	6.29085	0.0888408	n/a	5.79111	1.55197	n/a
Study\Underground Pip	0.41 kg/s Release Rate	7.5D	TOWNGAS	0	9.1691	43.5453	Parameter value	Parameter value	Parameter value	12.9334	9.01405	n/a	145.608	35.9254	n/a	6.47585	4.29874	n/a	7.15711	2.66018	n/a	6.45753	4.71531	n/a
Study\Underground Pip	0.41 kg/s Release Rate	3E	TOWNGAS	0	11.4502	31.0788	Parameter value	Parameter value	Parameter value	11.244	n/a	n/a	93.3114	n/a	n/a	5.53137	n/a	n/a	5.36973	n/a	n/a	5.71261	n/a	n/a
Study\Underground Pip	0.41 kg/s Release Rate	1F	TOWNGAS	0	13.6968	26.061	Parameter value	Parameter value	Parameter value	9.49007	n/a	n/a	37.4149	n/a	n/a	4.0801	n/a	n/a	2.91893	n/a	n/a	5.40997	n/a	n/a
Study\Underground Pip	2.59 kg/s Release Rate	1D	TOWNGAS	0	28.9767	36.8208	Parameter value	Parameter value	Parameter value	25.1172	n/a	n/a	378.832	n/a	n/a	11.4618	n/a	n/a	10.5207	n/a	n/a	13.6554	n/a	n/a
Study\Underground Pip	2.59 kg/s Release Rate	4D	TOWNGAS	0	22.3177	48.1861	Parameter value	Parameter value	Parameter value	25.3955	8.99969	n/a	629.738	25.192	n/a	13.1162	3.67435	n/a	15.2827	2.18239	n/a	12.2792	5.32535	n/a
Study\Underground Pip	2.59 kg/s Release Rate	7.5D	TOWNGAS	0	19.3979	59.9011	Parameter value	Parameter value	Parameter value	27.4907	18.4018	n/a	734.643	176.451	n/a	13.8475	8.85314	n/a	16.887	6.34421	n/a	13.6431	9.54865	n/a
Study\Underground Pip	2.59 kg/s Release Rate	3E	TOWNGAS	0	24.2237	44.0815	Parameter value	Parameter value	Parameter value	25.3887	n/a	n/a	557.822	n/a	n/a	12.7835	n/a	n/a	13.8898	n/a	n/a	12.6052	n/a	n/a
Study\Underground Pip	2.59 kg/s Release Rate	1F	TOWNGAS	0	28.9767	36.8208	Parameter value	Parameter value	Parameter value	25.1172	n/a	n/a	378.832	n/a	n/a	11.4618	n/a	n/a	10.5207	n/a	n/a	13.6554	n/a	n/a
Study\Underground Pip	10.36 kg/s Release Rate	1D	TOWNGAS	0	52.2037	44.5392	Parameter value	Parameter value	Parameter value	49.7845	n/a	n/a	1775.65	n/a	n/a	23.5966	n/a	n/a	23.9529	n/a	n/a	26.1879	n/a	n/a
Study\Underground Pip	10.36 kg/s Release Rate	4D	TOWNGAS	0	40.207	58.1997	Parameter value	Parameter value	Parameter value	47.6491	21.0762	n/a	2524.4	198.596	n/a	26.3162	9.91374	n/a	30.5341	6.3765	n/a	21.3329	11.1625	n/a
Study\Underground Pip	10.36 kg/s Release Rate	7.5D	TOWNGAS	0	34.9468	72.6303	Parameter value	Parameter value	Parameter value	49.3837	32.2155	n/a	2745.48	612.393	n/a	26.4297	15.7208	n/a	33.0656	12.3995	n/a	22.954	16.4947	n/a
Study\Underground Pip	10.36 kg/s Release Rate	3E	TOWNGAS	0	43.6408	53.3412	Parameter value	Parameter value	Parameter value	48.7486	15.2325	n/a	2299.3	58.0142	n/a	25.2673	5.61704	n/a	28.9659	3.28759	n/a	23.4813	9.61549	n/a
Study\Underground Pip	10.36 kg/s Release Rate	1F	TOWNGAS	0	52.2037	44.5392	Parameter value	Parameter value	Parameter value	49.7845	n/a	n/a	1775.65	n/a	n/a	23.5966	n/a	n/a	23.9529	n/a	n/a	26.1879	n/a	n/a
Study\Underground Pip	41.4 kg/s Release rate	1D	TOWNGAS	0	93.7185	54.0701	Parameter value	Parameter value	Parameter value	96.605	n/a	n/a	7776.42	n/a	n/a	47.9855	n/a	n/a	51.5846	n/a	n/a	48.6196	n/a	n/a
Study\Underground Pip	41.4 kg/s Release rate	4D	TOWNGAS	0	72.1814	70.6361	Parameter value	Parameter value	Parameter value	90.4381	49.3399	n/a	10259.1	1389.95	n/a	52.9066	24.8058	n/a	61.7235	17.836	n/a	37.5315	24.5341	n/a
Study\Underground Pip	41.4 kg/s Release rate	7.5D	TOWNGAS	0	62.7381	88.1877	Parameter value	Parameter value	Parameter value	89.9496	57.5671	n/a	10822.2	2284.78	n/a	53.1425	29.0258	n/a	64.8224	25.056	n/a	36.807	28.5413	n/a
Study\Underground Pip	41.4 kg/s Release rate	3E	TOWNGAS	0	78.3459	64.7932	Parameter value	Parameter value	Parameter value	92.9124	42.2613	n/a	9524.43	789.26	n/a	51.1436	19.3136	n/a	59.2787	13.0079	n/a	41.7688	22.9477	n/a
Study\Underground Pip	41.4 kg/s Release rate	1F	TOWNGAS	0	93.7185	54.0701	Parameter value	Parameter value	Parameter value	96.605	n/a	n/a	7776.42	n/a	n/a	47.9855	n/a	n/a	51.5846	n/a	n/a	48.6196	n/a	n/a
Study\Underground Pip	10mm leak (Jet Fire) - Je	1D	TOWNGAS		8.5438	58.5882	Parameter value	Parameter value	Parameter value	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Study\Underground Pip	10mm leak (Jet Fire) - Je	4D	TOWNGAS		6.58038	82.3902	Parameter value	Parameter value	Parameter value	6.07276	n/a	n/a	53.8178	n/a	n/a	4.05792	n/a	n/a	4.22155	n/a	n/a	2.01484	n/a	n/a
Study\Underground Pip	10mm leak (Jet Fire) - Je	7.5D	TOWNGAS		5.71949	93.5868	Parameter value	Parameter value	Parameter value	7.38039	3.25131	n/a	69.3055	5.45973	n/a	3.99731	1.5515	n/a	5.51887	1.12013	n/a	3.37864	1.69981	n/a
Study\Underground Pip	10mm leak (Jet Fire) - Je	3E	TOWNGAS		7.14237	74.4795	Parameter value	Parameter value	Parameter value	4.86288	n/a	n/a	22.9522	n/a	n/a	2.42995	n/a	n/a	3.00661	n/a	n/a	2.43293	n/a	n/a
Study\Underground Pip	10mm leak (Jet Fire) - Je	1F	TOWNGAS		8.5438	58.5882	Parameter value	Parameter value	Parameter value	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Study\Underground Pip	25mm leak (Jet Fire) - Je	1D	TOWNGAS		19.1278	71.3883	Parameter value	Parameter value	Parameter value	6.5114	n/a	n/a	32.8859	n/a	n/a	2.38245	n/a	n/a	4.39377	n/a	n/a	4.03774	n/a	n/a
Study\Underground Pip	25mm leak (Jet Fire) - Je	4D	TOWNGAS		14.7321	100.563	Parameter value	Parameter value	Parameter value	14.736	n/a	n/a	395.196	n/a	n/a	11.2651	n/a	n/a	11.1667	n/a	n/a	3.47082	n/a	n/a
Study\Underground Pip	25mm leak (Jet Fire) - Je	7.5D	TOWNGAS		12.8048	114.211	Parameter value	Parameter value	Parameter value	17.361	7.70273	n/a	529.017	42.1771	n/a	12.237	3.93582	n/a	13.7608	3.41108	n/a	5.12403	3.76691	n/a
Study\Underground Pip	25mm leak (Jet Fire) - Je	3E	TOWNGAS		15.9903	90.8895	Parameter value	Parameter value	Parameter value	12.5677	n/a	n/a	298.397	n/a	n/a	9.83078	n/a	n/a	9.66176	n/a	n/a	2.73691	n/a	n/a
Study\Underground Pip	25mm leak (Jet Fire) - Je	1F	TOWNGAS		19.1278	71.3883	Parameter value	Parameter value	Parameter value	6.5114	n/a	n/a	32.8859	n/a	n/a	2.38245	n/a	n/a	4.39377	n/a	n/a	4.03774	n/a	n/a
Study\Underground Pip	50mm leak (Jet Fire) - Je	1D	TOWNGAS		34.9994	83.7527	Parameter value	Parameter value	Parameter value	16.0767	n/a	n/a	617.507	n/a	n/a	13.8626	n/a	n/a	14.1791	n/a	n/a	2.21415	n/a	n/a
Study\Underground Pip	50mm leak (Jet Fire) - Je	4D	TOWNGAS		26.9563	118.01	Parameter value	Parameter value	Parameter value	28.8752	n/a	n/a	1707.98	n/a	n/a	23.4835	n/a	n/a	23.1511	n/a	n/a	5.39167	n/a	n/a
Study\Underground Pip	50mm leak (Jet Fire) - Je	7.5D	TOWNGAS		23.4297	134.011	Parameter value	Parameter value	Parameter value	33.2363	15.1648	n/a	2152.44	202.899	n/a	25.2054	8.25469	n/a	27.1823	7.82401	n/a	8.03087	6.9101	n/a
Study\Underground Pip	50mm leak (Jet Fire) - Je	3E	TOWNGAS		29.2585	106.66	Parameter value	Parameter value	Parameter value	25.4848	n/a	n/a	1395.05	n/a	n/a	21.2373	n/a	n/a	20.9094	n/a	n/a	4.24751	n/a	n/a
Study\Underground Pip	50mm leak (Jet Fire) - Je	1F	TOWNGAS		34.9994	83.7527	Parameter value	Parameter value	Parameter value	16.0767	n/a	n/a	617.507	n/a	n/a	13.8626	n/a	n/a	14.1791	n/a	n/a	2.21415	n/a	n/a
Study\Underground Pip	100mm leak (Jet Fire) - J	1D	TOWNGAS		63.7365	98.977	Parameter value	Parameter value	Parameter value	36.5398	n/a	n/a	3501.78	n/a	n/a	33.2722	n/a	n/a	33.501	n/a	n/a	3.2676	n/a	n/a
Study\Underground Pip	100mm leak (Jet Fire) - J	4D	TOWNGAS		49.0894	139.373	Parameter value	Parameter value	Parameter value	56.4911	12.1432	n/a	7166.51	139.825	n/a	48.1044	5.24659	n/a	47.4213	8.48315	n/a	8.38667	6.82764	n/a
Study\Underground Pip	100mm leak (Jet Fire) - J	7.5D	TOWNGAS		42.6672	158.345	Parameter value	Parameter value	Parameter value	63.6415	29.9985	n/a	8591.63	966.517	n/a	51.0444	17.5617	n/a	53.5769	17.5184	n/a	12.5971	12.4369	n/a
Study\Underground Pip	100mm leak (Jet Fire) - J	3E	TOWNGAS		53.2818	125.984	Parameter value	Parameter value	Parameter value	51.1878	n/a	n/a	6160.53	n/a	n/a	44.5541	n/a	n/a	44.013	n/a	n/a	6.63376	n/a	n/a
Study\Underground Pip	100mm leak (Jet Fire) - J	1F	TOWNGAS		63.7365	98.977	Parameter value	Parameter value	Parameter value	36.5398	n/a	n/a	3501.78	n/a	n/a	33.2722	n/a	n/a	33.501	n/a	n/a	3.2676	n/a	n/a
Study\Underground Pip	10mm leak (Jet Fire) - Je	1D	TOWNGAS		10.8775	37.413	Parameter value	Parameter value	Parameter value	8.98343	n/a	n/a	34.744	n/a	n/a	3.62835	n/a	n/a	3.04804	n/a	n/a	5.35508	n/a	n/a
Study\Underground Pip	10mm leak (Jet Fire) - Je	4D	TOWNGAS		8.37781	53.0249	Parameter value	Parameter value	Parameter value	9.40533	n/a	n/a	74.6361	n/a	n/a	4.49748	n/a	n/a	5.28238	n/a	n/a	4.90785	n/a	n/a
Study\Underground Pip	10mm leak (Jet Fire) - Je	7.5D	TOWNGAS		7.28177	60.5274	Parameter value	Parameter value	Parameter value	10.1523	6.86577	n/a	94.8593	20.8355	n/a	5.09756	3.02056	n/a	5.92335	2.19567	n/a	5.05472	3.84521	n/a
Study\Underground Pip	10mm leak (Jet Fire) - Je	3E	TOWNGAS		9.09331	47.8138	Parameter value	Parameter value	Parameter value	9.50918	n/a	n/a	66.1422	n/a	n/a	4.40396	n/a	n/a	4.78063	n/a	n/a	5.10522	n/a	n/a
Study\Underground Pip	10mm leak (Jet Fire) - Je	1F	TOWNGAS		10.8775	37.413	Parameter value	Parameter value	Parameter value	8.98343	n/a	n/a	34.744	n/a	n/a	3.62835	n/a	n/a	3.04804	n/a	n/a	5.35508	n/a	n/a
Study\Underground Pip	25mm leak (Jet Fire) - Je	1D	TOWNGAS		24.3526	45.7893	Parameter value	Parameter value	Parameter value	22.0398	n/a	n/a	273.197	n/a	n/a	9.56301	n/a	n/a	9.09352	n/a	n/a	12.4768	n/a	n/a
Study\Underground Pip	25mm leak (Jet Fire) - Je	4D	TOWNGAS		18.7562	64.9432	Parameter value	Parameter value	Parameter value	21.8702	7.76109	n/a	437.87	4.02822	n/a	10.6312	2.12342	n/a	13.1103	0.603847	n/a	11.239	5.63767	n/a
Study\Underground Pip	25mm leak (Jet Fire) - Je	7.5D	TOWNGAS		16.3024	74.034	Parameter value	Parameter value	Parameter value	22.7003	14.8253	n/a	517.197	99.0965	n/a	11.5046	5.88553	n/a	14.3098	5.35948	n/a	11.1957	8.93979	n/a
Study\Underground Pip	25mm leak (Jet Fire) - Je	3E	TOWNGAS		20.358	58.5689	Parameter value	Parameter value	Parameter value	22.2446	n/a	n/a	403.033	n/a	n/a	10.5346	n/a	n/a	12.1779	n/a	n/a	11.71	n/a	n/a
Study\Underground Pip	25mm leak (Jet Fire) - Je	1F	TOWNGAS		24.3526	45.7893	Parameter value	Parameter value	Parameter value	22.0398	n/a	n/a	273.197	n/a	n/a	9.56301	n/a	n/a	9.09352	n/a	n/a	12.4768	n/a	n/a
Study\Underground Pip	50mm leak (Jet Fire) - Je	1D	TOWNGAS		44.5603	53.9071	Parameter value	Parameter value	Parameter value	42.8257	n/a	n/a	1198.49	n/a	n/a	19.2485	n/a	n/a	19.8193	n/a	n/a	23.5772	n/a	n/a
Study\Underground Pip	50mm leak (Jet Fire) - Je	4D	TOWNGAS		34.32	76.4391	Parameter value	Parameter value	Parameter value	41.4607	19.8822	n/a	1673.8	107.06	n/a	20.4533	7.52335	n/a	26.049	4.52965	n/a	21.0074	12.3589	n/a
Study\Underground Pip	50mm leak (Jet Fire) - Je	7.5D	TOWNGAS		29.8301	87.0655	Parameter value	Parameter value	Parameter value	42.1607	27.0695	n/a	1914.93	423.947	n/a	21.8011	12.674	n/a	27.9592	10.6475	n/a	20.3595	14.3954	n/a
Study\Underground Pip	50mm leak (Jet Fire) - Je	3E	TOWNGAS		37.2511	68.9507	Parameter value	Parameter value	Parameter value	42.3143	n/a	n/a	1572.18	n/a	n/a	20.3584	n/a	n/a	24.5816	n/a	n/a	21.9559	n/a	n/a
Study\Underground Pip	50mm leak (Jet Fire) - Je	1F	TOWNGAS		44.5603	53.9071	Parameter value	Parameter value	Parameter value	42.8257	n/a	n/a	1198.49	n/a	n/a	19.2485	n/a	n/a	19.8193	n/a	n/a	23.5772	n/a	n/a
Study\Underground Pip	100mm leak (Jet Fire) - J	1D	TOWNGAS		81.1461	63.9429	Parameter value	Parameter value	Parameter value	82.6538	n/a	n/a	5029.85	n/a	n/a	38.184	n/a	n/a	41.9299	n/a	n/a	44.4698	n/a	n/a
Study\Underground Pip	100mm leak (Jet Fire) - J	4D	TOWNGAS		62.4982	90.5888	Parameter value	Parameter value	Parameter value	78.642	42.3067	n/a	6471.72	720.938	n/a	39.913	17.8855	n/a	51.6125	12.8306	n/a	38.7289	24.4213	n/a
Study\Underground Pip	100mm leak (Jet Fire) - J	7.5D	TOWNGAS		54.3218	103.154	Parameter value	Parameter value	Parameter value	78.7259	50.1323	n/a	7741.64	1651.04	n/a	44.7308	24.0283	n/a	55.0904	21.8718	n/a	33.9951	26.104	n/a
Study\Underground Pip	100mm leak (Jet Fire) - J	3E	TOWNGAS		67.8358	81.7367	Parameter value	Parameter value	Parameter value	80.3609	31.348	n/a	6101.1	167.198	n/a	39.4161	10.2675	n/a	49.2702	5.18343	n/a	40.9448	21.0806	n/a
Study\Underground Pip	100mm leak (Jet Fire) - J	1F	TOWNGAS		81.1461	63.9429	Parameter value	Parameter value	Parameter value	82.6538	n/a	n/a	5029.85	n/a	n/a	38.184	n/a	n/a	41.9299	n/a	n/a	44.4698	n/a	n/a

Path	Scenario	Weather	Material	Height of interest (coming from parameters) (m)	Actual flammable mass (kg)	Fireball diameter (m)	Flame emissive power (kW/m2)	Fireball radiation intensity level 1	Fireball radiation intensity level 2	Fireball radiation intensity level 3	Distance downwind to intensity level 1 (4 kW/m2) (m)	Distance downwind to intensity level 2 (12.5 kW/m2) (m)	Distance downwind to intensity level 3 (37.5 kW/m2) (m)	Ellipse half-length to intensity level 1 (4 kW/m2) (m)	Ellipse half-length to intensity level 2 (12.5 kW/m2) (m)	Ellipse half-length to intensity level 3 (37.5 kW/m2) (m)	Ellipse half-width to intensity level 1 (4 kW/m2) (m)	Ellipse half-width to intensity level 2 (12.5 kW/m2) (m)	Ellipse half-width to intensity level 3 (37.5 kW/m2) (m)	Ellipse centre downwind distance to intensity level 1 (4 kW/m2) (m)	Ellipse centre downwind distance to intensity level 2 (12.5 kW/m2)	Ellipse centre downwind distance to intensity level 3 (37.5 kW/m2)
Study\Underground Pip	20.72 kg/s Release Rate	1D	CARBON MONOXIDE	0	26403	172.708	36.2276	Parameter value	Parameter value	Parameter value	198.832	95.8477	n/a	198.832	95.8477	n/a	198.832	95.8477	n/a	0	0	n/a
Study\Underground Pip	20.72 kg/s Release Rate	4D	CARBON MONOXIDE	0	26403	172.708	36.2276	Parameter value	Parameter value	Parameter value	198.832	95.8477	n/a	198.832	95.8477	n/a	198.832	95.8477	n/a	0	0	n/a
Study\Underground Pip	20.72 kg/s Release Rate	7.5D	CARBON MONOXIDE	0	26403	172.708	36.2276	Parameter value	Parameter value	Parameter value	198.832	95.8477	n/a	198.832	95.8477	n/a	198.832	95.8477	n/a	0	0	n/a
Study\Underground Pip	20.72 kg/s Release Rate	3E	CARBON MONOXIDE	0	26403	172.708	36.2276	Parameter value	Parameter value	Parameter value	198.832	95.8477	n/a	198.832	95.8477	n/a	198.832	95.8477	n/a	0	0	n/a
Study\Underground Pip	20.72 kg/s Release Rate	1F	CARBON MONOXIDE	0	26403	172.708	36.2276	Parameter value	Parameter value	Parameter value	198.832	95.8477	n/a	198.832	95.8477	n/a	198.832	95.8477	n/a	0	0	n/a
Study\Underground Pip	372.95 kg/s Release rate	1D	TOWNGAS	0	26403	172.708	103.397	Parameter value	Parameter value	Parameter value	341.169	189.797	92.004	341.169	189.797	92.004	341.169	189.797	92.004	0	0	0
Study\Underground Pip	372.95 kg/s Release rate	4D	TOWNGAS	0	26403	172.708	103.397	Parameter value	Parameter value	Parameter value	341.169	189.797	92.004	341.169	189.797	92.004	341.169	189.797	92.004	0	0	0
Study\Underground Pip	372.95 kg/s Release rate	7.5D	TOWNGAS	0	26403	172.708	103.397	Parameter value	Parameter value	Parameter value	341.169	189.797	92.004	341.169	189.797	92.004	341.169	189.797	92.004	0	0	0
Study\Underground Pip	372.95 kg/s Release rate	3E	TOWNGAS	0	26403	172.708	103.397	Parameter value	Parameter value	Parameter value	341.169	189.797	92.004	341.169	189.797	92.004	341.169	189.797	92.004	0	0	0
Study\Underground Pip	372.95 kg/s Release rate	1F	TOWNGAS	0	26403	172.708	103.397	Parameter value	Parameter value	Parameter value	341.169	189.797	92.004	341.169	189.797	92.004	341.169	189.797	92.004	0	0	0
Study\Underground Pip	Fireball	1D	TOWNGAS			128.991	301.341															
Study\Underground Pip	Fireball	4D	TOWNGAS			128.991	301.341															
Study\Underground Pip	Fireball	7.5D	TOWNGAS			128.991	301.341															
Study\Underground Pip	Fireball	3E	TOWNGAS			128.991	301.341															
Study\Underground Pip	Fireball	1F	TOWNGAS			128.991	301.341															

Appendix K

Water Demand Assessment

ARUP

Application for Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131) to Rezone the Application Site from "Green Belt" to "Residential (Group C)1" for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung

Water Demand Assessment

Reference:

0 | 22 January 2024

Job number 282344

Arup Hong Kong Limited
Level 5 Festival Walk
80 Tat Chee Avenue
Kowloon Tong
Kowloon
Hong Kong
arup.com

Contents

Appendices

1. Introduction

1.1 Background

Arup Hong Kong Limited (Arup) was commissioned to carry out a Water Demand Assessment (WDA) report to support the Section 12A Planning Application for Proposed House Development at Various Lots in D.D. 244, Nam Pin Wai, Sai Kung. The Application Site is located within a "Green Belt" ("GB") zone on the Approved Ho Chung Outline Zoning Plan No. S/SK-HC/11. **Appendix A – Plan 1** shows the location of the Application Site.

The aerial photograph of the Application Site is shown in below **Figure 1.1**.

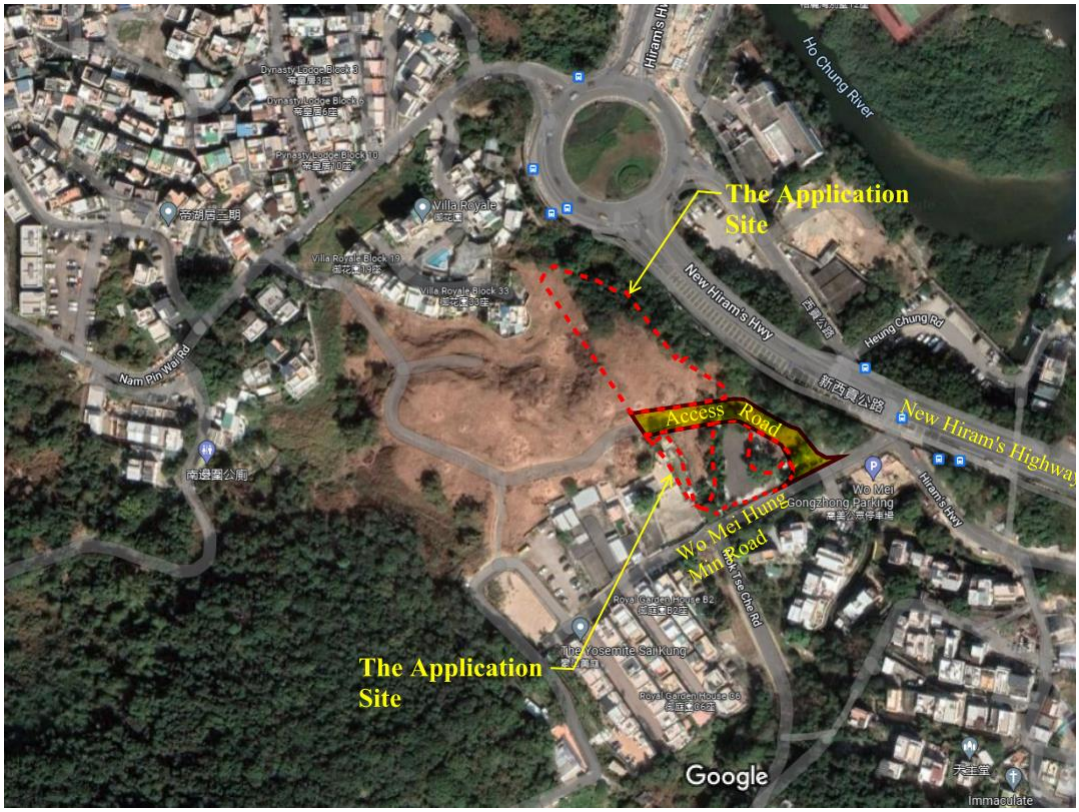


Figure 1.1 – Aerial Photograph of the Application Site (Extracted from Google Map dated 2023)

2. The Proposed Development

2.1 Proposed Master Layout Plan

Master Layout Plan showing the proposed development is attached in **Appendix A – Plan 1**. A table showing the Proposed Development parameters is shown in table below.

Proposed Development	Site Information
Project	Application for Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131) to Rezone the Application Site from "Green Belt" to "Residential (Group C)1" for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung
Site Location	Nam Pin Wai Sai Kung

Current Land Use Zoning	"Green Belt" ("GB")
Site Area	Approximately 5,355 sq.m
No. of House	17
Clubhouse GFA (About)	151 sq.m

3. Local Water Impact Assessment

3.1 Existing Waterworks

The information of the existing fresh water supply surrounding the Application Site has been provided by Water Supplies Department (WSD) as shown in **Appendix A**.

From the fresh water record plan, there is an existing fresh water of internal diameter of 150Ø laid along Wo Mei Hung Min Road adjacent to the Application Site.

There is no existing salt water main adjacent to the Application Site.

3.2 Water Supply Unit Demands

The estimation of the fresh water and salt water consumption for the proposed development for residential use is based on Table 1 and 2 of WSD Departmental Instruction No. 1309 (DI No. 1309).

The mean daily unit demand for the fresh water and salt water of the private housing – R3 are 390 litre/head/day and 70 litre/head/day. As Table 2 in DI No. 1309 indicated, an allowance 50 litre/head/day should be added for service trade use in Sai Kung on the fresh water demands for the residential classes. In addition, for clubhouse will allow 1580 litre/head/day for fresh water unit demand and 70 litre/head/day for salt water unit demand.

Peak flow rates in distribution mains

- Fresh water – 3 x mean daily demand
- Salt water – 2 x mean daily demand

A maximum flow velocity of less than 1.5 m/s under peak flow should be adopted for distribution mains.

3.3 Water Supply Demand Estimation

The total fresh and salt water demand of the proposed development are estimated according to the development parameters in paragraph 2.1 and the unit demands in paragraph 3.2. A summary table of the overall fresh water and salt water demand is presented in the table below.

Population Estimation:

- Residential – 3 x No. of House

Facilities	**No. of Units**	**Estimated Population**	**Class**	**Fresh Water**		**Salt Water**	
				Unit Demand (litre/head/day)	Daily Demand (m^3/day)	Unit Demand (litre/head/day)	Daily Demand (m^3/day)
Private Housing	17	51	R3	440 (390+50)	22.44	70	3.57
Club House	-	8	F&B	1,580	12.64	70	0.56
Irrigation	-	-	-	-	2.50	-	-

				Total Demand (m^3/day)	37.58	Total Demand (m^3/day)	4.13

The fresh water and salt water demand for the proposed development is approx. 37.58 m^3/day and 4.13 m^3/day respectively. Details of the assessment refer to **Table 1** of **Appendix B.**

3.4 Proposed Fresh Water Main Connection to the Proposed Distribution Main

According to the DI No. 1309, the required conveying capacity for the distribution main should be 3 times the mean daily demand. As per the calculation in paragraph 3.3, the peak flow of proposed development will be 112.74 m^3/day (i.e. 3 x 37.58 m^3/day) and the proposed fresh water supply main internal diameter is 40Ø, which gives the estimated peak flow velocity of 1.04 m/s that meets the WSD's requirement of not more than 1.5m/s for distribution main.

3.5 Proposed TMF Main Connection to the Proposed Distribution Main

According to the DI No. 1309, the required conveying capacity for the distribution main should be 2 times the mean daily demand. As per the calculation in paragraph 3.3, the peak flow of proposed development will be 8.26 m^3/day (i.e. 2 x 4.13 m^3/day) and the proposed TMF supply main internal diameter is 25Ø, which gives the estimated peak flow velocity of 0.19 m/s that meets the WSD's requirement of not more than 1.5m/s for distribution main.

3.6 Proposed Distribution Main Connection to the Existing System

Two numbers of fresh water supply points (one for fresh water and one for TMF) are proposed to be tee off from the existing fresh water main 150Ø laid along Wo Mei Hung Min Road (as shown in **Figure 3.1** and **Plan 2** of **Appendix A**). The existing 150Ø fresh water main should be capable of meeting the total daily fresh water and salt water demand from the proposed development as the total daily fresh water and salt water demand of the proposed development occupied 5.5% of the total capacity of the existing 150Ø fresh water main.

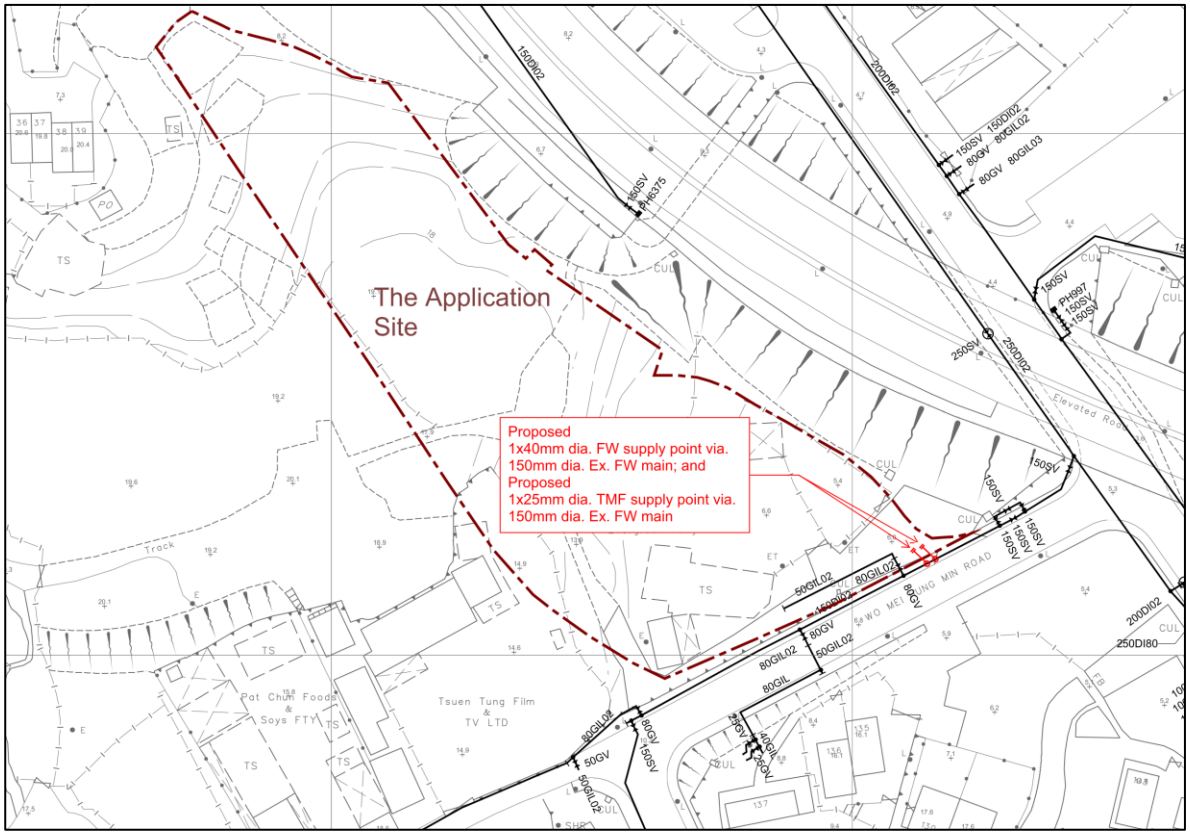


Figure 3.1 Proposed Fresh Water Main Connection Plan

4. Conclusion

The peak water demand from the proposed development at Nam Pin Wai Sai Kung is estimated.

Two numbers of fresh water supply points (1x40Ø for fresh water and 1x25Ø for TMF) are proposed to be tee off from the existing fresh water main 150Ø laid along Wo Mei Hung Min Road.

The existing 150Ø fresh water main should be capable of meeting the total daily fresh water and salt water demand from the proposed development as the total daily fresh water and salt water demand of the proposed development occupied 5.5% of the total capacity of the existing 150Ø fresh water main.

Appendix A

Plan

MARK	DATE	BY	REV.
-	26/1/2023	IP	F

JOB TITLE

Application for Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131) to Rezone the Application Site from "Green Belt" to "Residential (Group C)1" for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung

DRAWING TITLE

Master Layout Plan

DRAWING STATUS

FOR INFORMATION

ARUP

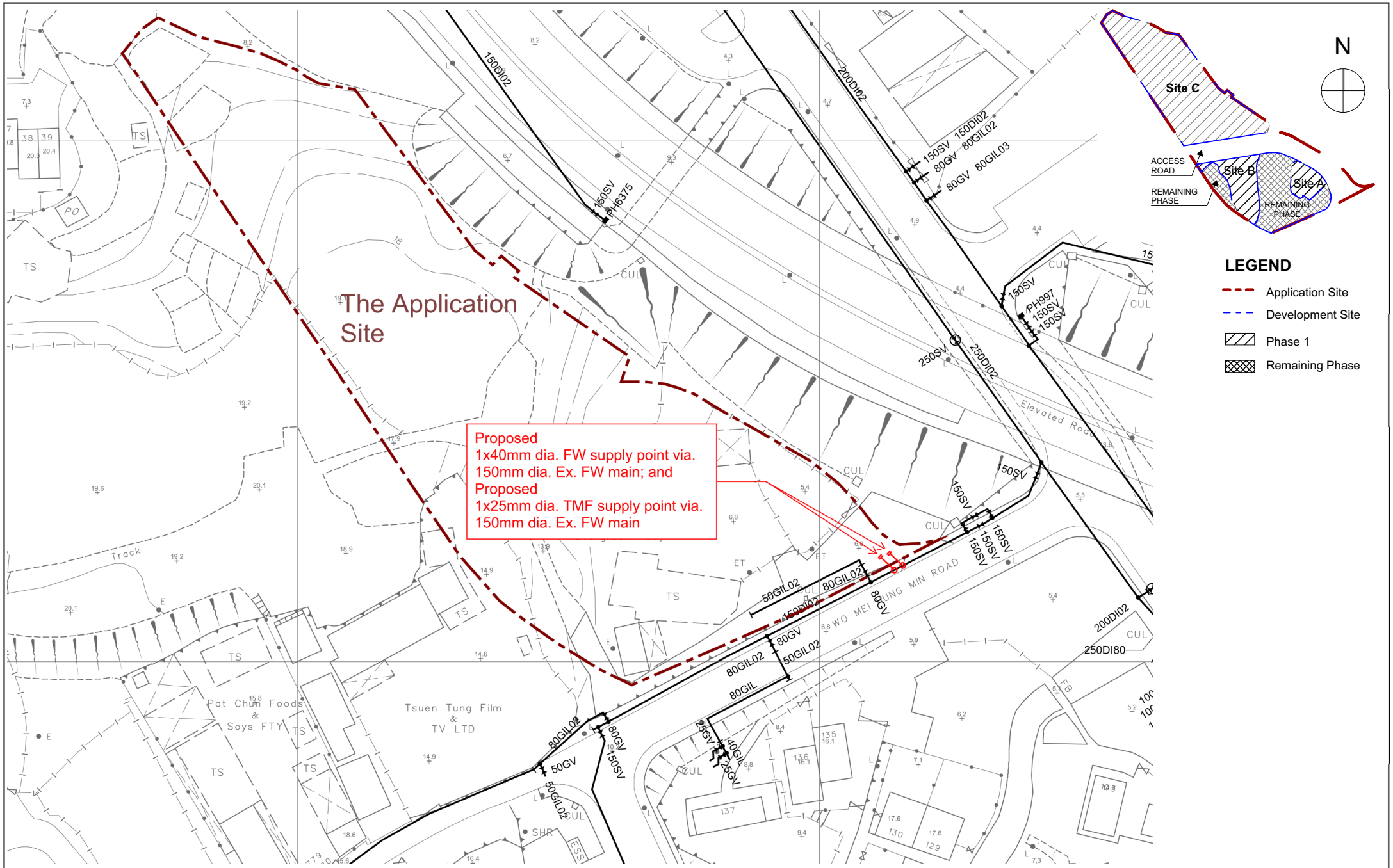
SCALE 1:600@A3

DRN. IP DATE 17/1/2023 CHD. CC PASSED. CC

JOB NO. 282344

DRAWING NO. PLAN 1

REV.



MARK	DATE	BY	REV.
-	25/1/2024	IP	F

JOB TITLE

Application for Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131) to Rezone the Application Site from "Green Belt" to "Residential (Group C)1" for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung

DRAWING TITLE

Proposed Fresh Water Main Connection Plan

DRAWING STATUS

FOR INFORMATION

ARUP

SCALE	N.T.S.		
DRN.	IP	DATE 25/1/2024 CHD.	CC PASSED. CC

JOB NO.	DRAWING NO.	REV.
282344	PLAN 2	

Appendix B

Calculation

ARUP

Job Title

Ove Arup & Partners HK Ltd.

Job No.	282344	Sheet No.	1	Rev.	0
Made by	Various	Date	2024/1/22	Checked	CC

Application for Amendment of Plan under Section 12A of the Town Planning Ordinance (Cap. 131) to Rezone the Application Site from "Green Belt" to "Residential (Group C)1" for Proposed House Development at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung

TABLE 1 - ESTIMATION OF WATER CONSUMPTION FOR PROPOSED RESIDENTIAL DEVELOPMENT

Unit Demand Assumption

Assumption

Based on Water Supplies Department DI No. 1309

Peak Flow Rates:

Fresh Water = 3 x mean daily demand

Salt Water = 2 x mean daily demand

Mean Daily Unit Demands given in Table 1 of DI No. 1309

	Fresh Water (l/h/d)	Salt Water (l/h/d)
Private Housing -R3	390	70
Unit daily demand for service trades at Sai Kung	50	
Clubhouse allow for fresh and salt water:	1580	70

Proposed Development		**Fresh Water**	**Salt Water**	
Private Housing - R3				
No. of Units		17	17	
Population	(3 x Total Unit No.)	51	51	
Unit Demand	(litre/head/day)	390	70	
Unit Demand for Service Trades at Sai Kung	(litre/head/day)	50	0	
Unit Demand considering service trade allowance	(litre/head/day)	440	70	
Daily Demand	(m^3/day)	22.44	3.57	
Peak Flow Factor		3	2	
Peak Flow Demand	(m^3/day)	67.32	7.14	
Clubhouse				
GFA	(m^2)	151	151	
Worker Density (No. of Worker per 100m^2)	(litre/head/day)	5.1	5.1	
Estimated Nos. of Employee		8	8	
Unit Demand	(litre/head/day)	1,580	70	(Freshwater demand adopted unit flow for Eating Place)
Daily Demand	(m^3/day)	12.64	0.56	
Peak Flow Factor		3	2	
Peak Flow Demand	(m^3/day)	37.92	1.12	
Landscape Irrigation				
Approximate Greenery Area	(m^2)	1,000		
Standard Manual Irrigation Rate	(litre/m^2/day)	2.50		
Daily Demand	(m^3/day)	2.50		
Peak Flow Factor		3		
Peak Flow Demand	(m^3/day)	7.50		
Sub - Total				
Daily Demand	(m^3/day)	37.58	4.13	
Peak Flow Demand	(m^3/day)	112.74	8.26	
Proposed Pipe ID	(mm)	**40**	**25**	(Proposed 1x40mm dia. FW connection and 1x25mm dia. TMF connectioin)
Pipe Flow Area	(m^2)	0.0013	0.0005	
Peak Flow Velocity	(m/s)	1.04	0.19	
Existing Water Main ID	(mm)	150		(Existing 150mm dia. FW main along Wo Mei Hung Min Road for 2 nos. supply points)
Pipe Flow Area	(m^2)	0.018		
Assumed Peak Flow Velocity	(m/s)	1.5		
Peak Flow Factor		3		
Capacity	(m^3/day)	763		
Percentage of Occupancy (%)		5.5%		

Notes:

Employment density shall refer to Commercial and Industrial Floor Space Utilization Survey published by PlanD.

Restaurant = 5.1 employee per 100m^2 of GFA

Annex B

Further Information (1) - Response-to-Comments Table and Supplementary Response-to-Comments Table for Comments Received from Antiquities and Monuments Office on 25 October 2023

Your ref Y/SK-HC/7
Our ref 294065/01/WSTY/MYNL/CKJL/05208

ARUP

By Hand

The Secretary
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11 January 2024

Dear Sir/Madam,

Application for Amendment of Plan
Under Section 12A of the Town Planning Ordinance (Cap. 131)
to Rezone the Application Site from "Green Belt" to "Residential (Group C)1"
for Proposed House Development at Various Lots in D.D. 244
and Adjoining Government Land, Nam Pin Wai, Sai Kung
(Planning Application No. Y/SK-HC/7)

Submission of Further Information

We refer to the comments received from various Government departments on 4, 8 and 9 January 2024 on the captioned Planning Application.

We are pleased to submit herewith a Response-to-Comments Table (**Attachment 1**) together with the relevant supporting documents (**Annexes A** to **D**) for your consideration.

The softcopy of the Further Information will be uploaded to the hyperlink provided by the Town Planning Board.

We sincerely seek for the favourable consideration from the Town Planning Board to approve the captioned S12A Planning Application.

Should you have any queries, please contact the undersigned or our Ms. Natalie LEUNG at 2268 3612 (email: natalie.leung@arup.com) or our Ms. Jane LAU at 2268 3893 (email: jane.lau@arup.com).

Yours faithfully,

Theresa YEUNG
Director

Encl. - **Attachment 1** – Response-to-Comments Table
- **Annexes A** to **D**

c.c. - Clients

Application for Amendment of Plan under Section 12A of the Town Planning Ordinance – Proposed Rezoning of the Application Site from "Green Belt" to "Residential (Group C)1" at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung, New Territories

Responses to Comments

Comments from Related Departments **Page No.**

Responses to Comments

No.	Comments	Responses
1.	**Antiquities and Monuments Office, dated 4 January 2024** It is noted that a pre-submission was made by the applicant prior to submitting the current application, Antiquities and Monuments Office's comment on the pre-submission was provided on 25.10.2023. Please provide a Response-to-Comment table for the sake of effective vetting.	Please refer to **Annex A** for the Response-to-Comment table for comments received from Antiquities and Monuments Office dated 25 October 2023.
2.	**Drainage Services Department, dated 9 January 2024** Sewerage Impact Assessment (SIA) Report 1. Please note that the proposed use and design of proposed on-site sewerage treatment plant should be subject to the views and agreement of EPD and any relevant statutory requirements. 2. Please be reminded that upon connection to the public sewerage network and decommissioning of the proposed interim on-site sewage treatment plant, the sewerage impact assessment may need to be reviewed and updated or a separate sewerage impact assessment may need to be conducted to assess the potential sewerage impact and/or identify necessary mitigation measures, if required. Please be also reminded to consult the EPD about the requirements.	Noted. Noted.
3.	**Electrical and Mechanical Services Department, dated 9 January 2024** Town Gas Safety 1. Please note that a high pressure underground town gas transmission pipeline (running along Hiram's Highway) in the vicinity of the proposed development at Nam Pin Wai. It is	Noted. A Quantitative Risk Assessment for High Pressure Town Gas Pipeline has been conducted for supporting the planning application. Please refer to **Annex B** for details.

No.	Comments	Responses
	anticipated that the proposed development will result in a significant increase in population in the vicinity of the above gas installations. A quantitative risk assessment would be required from the project proponent of the subject site to assess the potential risks associated with the gas installations, having considered the proposed development at the subject site.	
	2. The project proponent/consultant/works contractor shall therefore liaise with the Hong Kong and China Gas Company Limited in respect of the exact locations of existing or planned gas pipes/gas installations in the vicinity of the proposed sites and any required minimum set back distance away from them during the design and construction stages of development.	Noted.
	3. The project proponent/consultant/works contractor is required to observe the Electrical and Mechanical Services Department's requirements on the "Avoidance of Damage to Gas Pipes 2nd Edition" for reference. The webpage address is: https://www.emsd.gov.hk/filemanager/en/content_286/CoP_gas_pipes_2nd_(Eng).pdf	Noted.
4.	**Environmental Protection Department, Environmental Assessment Division, Territory South Group, Sai Kung & Tseung Kwan O, dated 8 January 2024** Comment on Sewerage Impact Assessment	
	1. Given the scale of the development, please adopt R3 Unit Flow Factor of 0.37m3/day.	R3 Unit Flow Factor of 0.37m^3/day is adopted in revised sewage calculation
	2. Table in Section 3.2, it is noted that the clubhouse ADWF is not tally with the	Table in Section 3.2 is revised. Please refer to the revised Sewerage Impact Assessment in **Annex C** for details.

Responses to Comments

No.	Comments	Responses
	number of employee (i.e., 8) and the restaurant UFF (i.e., 1.58m3/day);	
	3. For the design peak flow arriving at the on-site sewage treatment works, the consultant is advised to make reference to para. 3.3 of the "Guidelines for the Design of Small Sewage Treatment Plants" produced by EPD;	Para. 3.3 of the "Guidelines for the Design of Small Sewage Treatment Plants" is adopted in the revised calculation for design peak flow arriving at the on-site sewage treatment works. Please refer to the revised Sewerage Impact Assessment in **Annex C** for details.
	4. Please review the appropriateness of applying peaking factor with stormwater allowance on the private sewerage system within the subject site. The consultant is advised to make reference to para. 11.5 of the GESF;	Para. 11.5 of the GESF with peaking factor (excluding stormwater allowance) is adopted on the private sewerage system within the subject site. Please refer to the revised Sewerage Impact Assessment in **Annex C** for details.
	5. Further to the above, please review the total ADWF and the design peak flows for on-site sewage treatment works and the gravity sewers;	The total ADWF and the design peak flow for on-site sewage treatment works and the gravity sewers are revised. Please refer to the revised Sewerage Impact Assessment in **Annex C** for details.
	6. Please advise us whether there will be any swimming facilities within the subject site; and	There is no swimming facility within the subject site. Please refer to the revised Sewerage Impact Assessment in **Annex C** for details.
	7. Section 3.3, please be advised that the provision of public sewerage system in the vicinity of the subject site is not guaranteed. Should the project proponent/lot owners opt to make a private connection to the future public sewerage system, please appoint a professional consultant to prepare and submit a Sewerage Impact Assessment (SIA) to EPD and DSD for approval prior to the connection.	Noted.
	Other comments It is noted that the Applicant will supplement an Environmental Assessment for the subject application in Further Information. The Applicant is reminded to address our previous	

No.	Comments	Responses
	comment provided at pre-submission stage as provided below:-	
	1. The applicant should include an Environmental Assessment (EA) covering the assessment on air quality, noise, water quality, waste management and land contamination aspects to demonstrate the proposed development could meet with relevant HKPSG standards. The EA shall include but not limited to the following:-	Noted. An Environmental Assessment Study has been conducted for supporting the planning application. Please refer to **Annex D** for details.
	(i) A Noise Impact Assessment (NIA) incorporating traffic noise model, as appropriate, shall be prepared to demonstrate compliance with Ch.9 of HKPSG on noise planning perspective.	Noted. Quantitative road traffic noise assessment has been conducted and incorporated in the Environmental Assessment Study. Please refer to **Annex D** for details.
	(ii) Besides, the applicant should also evaluate the air quality impact arising from both construction and operation of the project to demonstrate the environmental acceptability of the proposed development. The assessment should demonstrate the compliance with the buffer distance requirements for road, chimney, and/or odour sources as stipulated in Ch.9 of HKPSG. The applicant should be reminded that road type information should be confirmed with TD. The applicant should assess if there is any chimney within 200m from the boundary of the development and ensure the validity of the chimney data by their own survey. If there are any errors subsequently found in their chimney data used, the assessment results may be invalidated. If the HKPSG requirements could not be fulfilled, quantitative cumulative impact assessment may be required to evaluate the potential air quality impact to confirm the compliance with prevailing AQOs criteria.	Noted. An air quality review has been included in the Environmental Assessment Study and ensure the compliance with HKPSG requirements. Please refer to **Annex D** for details.

Responses to Comments

No.	Comments	Responses
	(iii) The applicant should evaluate whether the potential water quality impact during construction and operation phase is anticipated and propose respective mitigation measures (e.g. ProPECC PN 1/94, ETWB TC(Works) No. 5/2005, ProPECC PN 5/93) as appropriate. The applicant shall comply with the requirements under Water Pollution Control Ordinance (Cap. 358), and adopt good housekeeping measures to prevent water quality pollution.	Noted. Water quality impact has been reviewed in the Environmental Assessment Study. Please refer to **Annex D** for details.

(Last Updated 10 January 2024)

Annex A of Further Information (1)

Supplementary Response-to-Comments Table for Comments Received from Antiquities and Monuments Office on 25 October 2023

Application for Amendment of Plan under Section 12A of the Town Planning Ordinance – Proposed Rezoning of the Application Site from "Green Belt" to "Residential (Group C)1" at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung, New Territories
Responses to Comments

Comments from Related Departments **Page No.**

COMMENTS FROM RELATED DEPARTMENTS

No.	Comments	Responses
1.	**Antiquities and Monuments Office, dated 25 October 2023** The comment of the Antiquities and Monuments Office ("AMO") from the heritage conservation perspective is as follows, please. Planning Statement	
	1) The majority of the Application Site falls within Ho Chung Site of Archaeological Interest ("SAI") and any proposed development within it will pose direct impact on it. Please review how the mitigation measures proposed could minimize the impact on archaeology and revise relevant sections where appropriate.	Noted. Please refer to Section 6.1 of the Archaeological Review Report in **Appendix F** of the Supporting Planning Statement for details of the proposed mitigation measures.
	2) Please indicate clearly the Application Site and the development site on Diagram 4.1.	Noted. Diagram 4.1 of the Supporting Planning Statement is revised.
	Archaeological Review Report General	
	3) Please define clearly the Study Area, and illustrate accurately on the plans the Study Area, Application Site and Ho Chung SAI.	The Study Area is illustrated in Figure 1, composed of Phase 1, Access Road and Remaining Phase. The Application Site is illustrated in Figure 17 as Recommended Archaeological Survey-Cum-Excavation Area. Ho Chung SAI is illustrated in Figure 2. Please refer to the Archaeological Review Report in **Appendix F** of the Supporting Planning Statement for details.
	Sections 1.1.1 and 1.1.2	
	4) Please clarify if the two sections are referring to the same planning application and supplement the planning application number(s) for avoiding confusion when the project background is mentioned.	Section 1 has been revised accordingly. Clarification has been made to tally with the current application under Section 12A. Please refer to the Archaeological Review Report in **Appendix F** of the Supporting Planning Statement for details.
	Section 1.1.3	

No.	Comments	Responses
	5) Please indicate clearly the source of "Archaeological Investigations and Survey-cum-Excavation (AISE) Report".	Please refer to response to comment no. (4) from your Department above. Furthermore, reference to necessary archaeological reports is made in the subsequent Sections 3.3.19 to 3.3.25. Please refer to the Archaeological Review Report in **Appendix F** of the Supporting Planning Statement for details.
	Section 1.1.4 and Figure 1	
	6) There is no "Zone A" in Figure 1. Please check and amend.	Section 1 has been revised to clarify the Project Background. Figure 1 is revised accordingly. Please note that "Zone A" is no longer referred in Section 1. Please refer to the Archaeological Review Report in **Appendix F** of the Supporting Planning Statement for details.
	Figure 15	
	7) Please indicate the investigation areas of Pei Tau and Ho Chung that mentioned in Sections 3.3.8 and 3.3.9 respectively.	After further review, Sections 3.3.8 to 3.3.10 mention areas in the Archaeological Investigation Report in Ho Chung Valley of Sai Kung (HCV1999) are too far away from the Application Site. They have been deleted to avoid confusion. Section 3.3.6 is revised to clarify the use of HCV1999 report. Please refer to the Archaeological Review Report in **Appendix F** of the Supporting Planning Statement for details.
	8) Please indicate the investigation areas of Shui Hau and Tai Wo that mentioned in Section 3.3.10	Please refer to response to comment no. (7) from your Department above.
	Section 4.1.1	
	9) Please clarify and revise where appropriate if the "Remaining Phase" and "Ancillary Road" that are within the Application site were also included for field scanning, investigation and study.	Please refer to Section 4.2.12 and 4.2.13 of the Archaeological Review Report in **Appendix F** of the Supporting Planning Statement.
	Section 4.2.8	

No.	Comments	Responses
	10) In this Section which discusses Zone 4, it is noted that Zone 3 is also mentioned, i.e. "Zone 3 is inaccessible due to the dense vegetation. Observing from the southern edge of Zone 3, the hilltop is gently sloping from the west downwards to the east based on the contour of the same species of tall grasses covering the area (Appendix B: Photos 4.1 to 4.3)." Please clarify which zone is the quote above referring to and revise as appropriate. It is important to check thoroughly the report to ensure accuracy as error of such would mislead us on the assessment of the report submitted by the consultant / contractor.	Noted.
	Section 5.4.4	
	11) Please provide reliable details and legible visuals of the "modern human activities" to support the claim that "the areas [Zone 4] might have been disturbed by modern human activities."	Section 5.4.4 and Section 5.4.5 revised. Please refer to the Archaeological Review Report in **Appendix F** of the Supporting Planning Statement for details.
	Sections 5.4.4 and 5.4.5	
	12) It is noted in the report that the result of the SKNPW2015 archaeological investigation in the area to the west and southwest of Zones 4 and 5 respectively was quoted, where artefacts were discovered at the foot of the hill and considered as secondary deposit possibly transported by natural soil movement from the hilltop. However, it is also noted that the report says, "the archaeological potential in Zone 4 might be diminished due to possible soil movement" and "the archaeological potential in Zone 5 might existed." Please elaborate why the assessment of the archaeological potential of the two zones are different.	Based on the archaeological investigation of SKNPW2015, relatively significant findings were found at the foot of the hill, which were identified as secondary deposit. It infers that such deposit might have been located at the hilltop and had swept away by soil movement, probably landslide. In the meantime, the hilltop areas have been disturbed by modern constructions of warehouses and concrete roads. Hence, since the terrain condition for both Zone 4 and Zone 5 comprised of are different, the assessments of the archaeological potential of the two zones are different. The concerned sections have been revised accordingly. Please refer to the Archaeological Review Report in **Appendix F** of the Supporting Planning Statement for details.
	Section 6	
	13) The report recommends an archaeological survey-cum-excavation at Zones 3 to 5	Section 6.1.1 is revised. Please refer to the Archaeological Review Report in **Appendix**

No.	Comments	Responses
	before commencement of the proposed construction works. Please elaborate the principles and rationale for the proposed mitigation measures as the archaeological potential of the three zones are different.	**F** of the Supporting Planning Statement for details.
	14) For Zone 3, the report concludes that the area is expected to have no archaeological potential, but an archaeological survey-cum-excavation is still recommended at its northern part, please provide justification.	Section 6.1.1 is revised. Please refer to the Archaeological Review Report in **Appendix F** of the Supporting Planning Statement for details.
	Section 7	
	15) Please revise the conclusion according to AMO's above comment where appropriate.	Section 7.1.6 and 7.1.9 are revised. Please refer to the Archaeological Review Report in **Appendix F** of the Supporting Planning Statement for details.

(Last updated on 10 January 2024)

Annex C

Further Information (2) - Response-to-Comments Table and Supplementary Response-to-Comments Table for Comments Received from Buildings Department and Lands Department on 11 October 2023

Your ref Y/SK-HC/7
Our ref 294065/01/WSTY/MYNL/CKJL/05220

ARUP

By Hand

The Secretary
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31 January 2024

Dear Sir/Madam,

Application for Amendment of Plan
Under Section 12A of the Town Planning Ordinance (Cap. 131)
to Rezone the Application Site from "Green Belt" to "Residential (Group C)1"
for Proposed House Development at Various Lots in D.D. 244
and Adjoining Government Land, Nam Pin Wai, Sai Kung
(Planning Application No. Y/SK-HC/7)

Submission of Further Information

We refer to the comments received from various Government departments between 29 December 2023 to 17 January 2024 on the captioned Planning Application.

We are pleased to submit herewith a Response-to-Comments Table (**Attachment 1**) together with the relevant supporting documents (**Annexes A** to **F**) for your consideration.

The softcopy of the Further Information will be uploaded to the hyperlink provided by the Town Planning Board.

We sincerely seek for the favourable consideration from the Town Planning Board to approve the captioned S12A Planning Application.

Should you have any queries, please contact the undersigned or our Ms. Natalie LEUNG at 2268 3612 (email: natalie.leung@arup.com) or our Ms. Jane LAU at 2268 3893 (email: jane.lau@arup.com).

Yours faithfully,

Theresa YEUNG
Director

Encl. - **Attachment 1** – Response-to-Comments Table
- **Annexes A** to **F**
c.c. - Clients

Application for Amendment of Plan under Section 12A of the Town Planning Ordinance – Proposed Rezoning of the Application Site from "Green Belt" to "Residential (Group C)1" at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung, New Territories
(Planning Application No. Y/SK-HC/7)
Responses to Comments

Comments from Related Departments **Page No.**

No.	Comments	Responses
1.	**Buildings Department, New Buildings Division 1, New Territories East (2) and Rail Section, dated 17 January 2024** Previous comments are still pertinent.	Noted. Please refer to **Annex A** for our previous response on comments received from Buildings Department dated 11 October 2023.
2.	**Drainage Services Department, dated 9 January 2024** <u>Drainage Impact Assessment (DIA) Report</u> 1. Section 3.1.4 - Please note that design allowance as required in SDM Corrigendum No. 1/2022 was not taken into account. Please update the calculation accordingly.	Since the study area is well-developed areas with built roads including Wo Mei Hung Min Road, New Hiram's Highway, Heung Chung Road. With reference to SDM Corrigendum No. 1/2022 Para (e), with consideration of the site constraints, it stated that it is more practical to consider the projection of rainfall increase and extreme sea level rise in mid 21st century with design allowance. Therefore, the mid 21st century with design allowance is adopted in our study. Please refer to **Annex B** for the revised DIA report for details.
	2. Table 4 - Please explain why the surface run-off discharges to the proposed 825mm pipe is the same for existing catchment and proposed catchment. The area figure should be provided in this table as well.	The adjoining "R(C)1" Site and the approved access road are currently under construction which is already a paved area. To avoid misunderstanding, information of adjacent "R(C)1" development has been deleted in Table 4. Please refer to **Annex B** for the revised DIA report for details.
	3. Section 5.2 - Assessment for the downstream discharge to Ho Chung River (which should be checked under 50-year design return period) is missing. Please supplement.	Ho Chung River checking is included and please refer to **Annex B** for the revised DIA report for details.
	4. Appendix B - The percentage of utilization for each pipe should be shown for checking.	The percentage of pipe utilization is shown in Appendix B of the revised DIA report in **Annex B**.
	5. General - To relieve the increasing pressure on the drainage system due to development	Noted.

No.	Comments	Responses
	and ensure sustainable development in Hong Kong in face of climate change, provision of blue-green drainage infrastructure according to Section 3.2.2 of DSD's Stormwater Drainage Manual is strongly encouraged to be incorporated in the development with a view to reducing the quantity as well as improving the quality of site runoff. In fact, similar concept is already embraced in the stormwater management section of BEAM Plus Neighborhood in which credits will be granted for promotion of infiltration and provision of temporary storage. In view of the above, the project office is recommended to explore further appropriate blue-green drainage infrastructure for incorporation in this project. Please follow " TC(W) No. 9/2020 Blue-Green Drainage Infrastructure" issued by DEVB in July 2020 and the recently issued DSD guidelines for blue-green infrastructure including water harvesting, bioretention system and application of floodable area and drainage facility co-use in drainage management when carrying out the design.	
3.	**Electrical and Mechanical Services Department, dated 9 January 2024** Electricity Safety Please be advised that we have no particular comment on the document from electricity supply safety aspect. However, in the interests of public safety and ensuring the continuity of electricity supply, the parties concerned with planning, designing, organizing and supervising any activity near the underground cable or overhead line under the mentioned document should approach the electricity supplier (i.e. CLP Power) for the requisition of cable plans (and overhead line alignment drawings, where applicable) to find out whether there is any underground cable and/or overhead line within and/or in the vicinity of the concerned site.	Noted.

No.	Comments	Responses
	They should also be reminded to observe the Electricity Supply Lines (Protection) Regulation and the "Code of Practice on Working near Electricity Supply Lines" established under the Regulation when carrying out works in the vicinity of the electricity supply lines. We have no particular comment on the document as far as electricity supply safety is concerned.	Noted. Noted.
4.	**Lands Department, Lands Administration Office, District Lands Office, Sai Kung, dated 17 January 2024** The previous comments of this office are still valid. Regarding the proposed lease modification for Lot No. 2189 in D.D. 244 as mentioned previously, please be informed that the Modification Letter to effect the proposed lease modification was executed on 20.12.2023 and its registration to the Land Registry is being processed.	Noted. Please refer to **Annex A** for our previous response to comments received from Lands Department dated 11 October 2023.
5.	**Planning Department, District Planning Branch, Urban Design & Landscape Section, Urban Design Unit, dated 29 December 2023** **<u>Comments on Visual Impact Assessment (Appendix H)</u>** 1 Table 4.1 – It seems that residential visual sensitive receiver is missing in the table. Please review and supplement the discussions/ratings regarding visual sensitivity in Para. 4.2.3 to 4.2.8 and Table 5.3. 2 Para. 4.2.3 – VP1 should be considered as 'medium-range' viewpoint. 3 VP1 Photomontage – According to the Landscape Master Plan, the trees/vegetation within the northern part of the site will be felled and only those on the slope outside the site boundary would be visible in the photomontage. Please ensure the location and height of the vegetation illustrated in the	Noted. Please refer to Table 4.1, Para. 4.2.3 to 4.2.8 and Table 5.3 of the revised Visual Impact Assessment in **Annex C** for the update. Noted and revised accordingly. Please refer to the revised Visual Impact Assessment in **Annex C** for details. Noted and revised accordingly. Please refer to Figure 1 of the revised Visual Impact Assessment in **Annex C** for details.

No.	Comments	Responses
	photomontage are accurate, and review the discussion for VP1 accordingly.	
	4 VP2 and VP3 Photomontages – The proposed development appears to be shorter than 12m high in the photomontage. Please review its accuracy and the discussion accordingly.	Noted and revised accordingly. Please refer to Figures 2 and 3 of the revised Visual Impact Assessment in **Annex C** for details.
	5 Para. 5.1.3 to Para. 5.1.20 – Based on the photomontages provided, the proposed development would screen off part of the vegetation and mountain backdrop at VP1, as well as some vegetation at VP2 and VP3, resulting in obstruction of visual resources. Furthermore, subject to the photomontages for VP1 to VP3 to be rectified, the ratings for VP1 to VP3 are unlikely to be 'negligible'. Please review the relevant discussion at Section 5 and conclusion at Section 6 as well as Table 5.3.	The photomontages and visual appraisals of VPs 1 to 3 have been updated as appropriate. Please note that the Application Site is situated in a predominantly residential neighbourhood and immediately adjoining an approved house development under "R(C)1" zone. With the same proposed development density as the adjoining "R(C)1" zone, the Proposed Development will serve as a natural extension and blend in well with existing/planned sub-urban residential context. Also, any potential visual impacts could be adequately mitigated by mitigation measures such as the proposed new tree planting which further promoting the visual compatibility of the Proposed Development with the surroundings. For more details, please refer to relevant paragraphs in Section 5 of the revised Visual Impact Assessment in **Annex C**.
6.	**Planning Department, District Planning Branch, Urban Design & Landscape Section, Landscape Unit, dated 29 December 2023, dated 2 January 2024** Further to your submission for the planning application No. Y/SK-HC/7, please find comments regarding landscape aspect from our Landscape Unit, Urban Design & Landscape Section, Planning Department (Contact: Mr. Leo LAM (ALO/1, UD&L). Tel.: 3565 3956) below for your follow-up action. **<u>Landscape Observations and Comments</u>**	
	2. The application site is situated in an area of settled valleys landscape character predominated by low-dense houses, village	Noted.

No.	Comments	Responses
	settlement and tree groups at the northern and southeastern of the Site as observed from the aerial photo dated December 2022. Construction sites are observed at the immediate west "R(C)1" site for residential development of 51 houses. The proposed rezoning/ indicative scheme of 17 nos. 3-storey houses development is considered not incompatible with the surrounding landscape character.	
	3. With reference to the Supporting Planning Statement and the submitted Landscape Master Plan (Appendix B), it is noted that the Site is mostly vacant, and partly occupied by the construction of an approved access road under planning application No. A/SK-HC/223. Existing tree groups with appropriate 93 nos. trees are found within the application site, and 92 nos. trees are proposed to be felled (i.e. 79 nos. in Phase 1 and 14 nos. in Remaining Phase of the proposed development), while 1 no. of rare species Aquilaria sinensis is proposed to be transplanted within the Site. Greenery and open space of not less than 51m^2 including landscape courtyard, seating areas and children's playground will provided, and buffer planting as well as 92 nos. new standard and heavy standard trees will be planted in the development, which over half of the proposed tree species are native.	Noted.
	Comments from landscape planning perspective:	
	Application Form No.12A	
	a) Section 2 ─ Noting "no tree felling" was ticked in the application form which is not tally with the proposed tree treatment as shown in the submitted Landscape Master Plan (Appendix B) as well as Para. 4.5.7 of the Supporting Planning Statement. Please review the discrepancy.	Please be clarified that the concerned table in the Application Form refers to any potential adverse impacts arising from the Proposed Development. According to the Landscape Master Plan, existing greenery will not be unduly compromised on the basis that 98 nos. of new trees of higher ecological and aesthetic value will be planted to replenish removal of

No.	Comments	Responses
		98 nos. existing trees which are in poor health and form with low amenity value. With the principle of 1:1 replanting ratio in terms of quantity fulfilled, it is considered no net loss of greenery and not incompatible with the surrounding environment under the Proposed Development. In summary, there would be no adverse landscape and tree felling impact arising from the Proposed Development.
	Appendix B – Landscape Master Plan	
	b) Noting the approved access road under planning application No. A/SK-HC/223 is included within the rezoning site, and referring to the latest Landscape Proposal approved under approval condition (d) dated 29.03.2022, roadside planters and 21 new trees planting are proposed along the access road. Since the proposed access points of the proposed houses development would be likely in conflict with the access road's planters layout as observed from the Landscape Mater Plan (Dwg no. 2020209-S12A-LMP-01), the Applicant should provide relevant information in Para. 5.3 and 5.4, and clarify whether the 21 new trees planting under application No. A/SK-HC/223 would be affected by the proposed rezoning/ houses development. Planting areas for trees transplanting/ additional trees plantings should be allowed if any of the concerned proposed tree plantings are affected.	Please find our justification as follows and refer to Appendix A and C of the revised Landscape Master Plan in **Annex D**: 1. Under the Proposed Amendment, the Application Site including the approved access road under planning application no. A/SK-HC/223 will be rezoned from "Green Belt" to "Residential (Group C)1". With land-use planning point of view in mind, this Landscape Master Plan takes a more holistic approach on landscape and tree planting design to facilitate early and better utilization of the Site for future use. On this basis, the 21 nos. new trees which were approved to be planted along the access road under application no. A/SK-HC/223 are no longer seen as a standalone streetscape improvement but integrated as an inseparable part of the landscape planning in a more holistic manner. 2. Noting that UD&L Section may have concern on the loss of greenery due to felling of existing trees within approved access road, we would like to emphasise that 6 nos. affected existing trees within approved access road are proposed to be compensated by 6 nos. additional new trees. Based on total number of 98 nos. fell trees (including 6 nos. within approved access road), 98 nos. new trees are proposed for compensation. The replanting ratio is not less than 1:1 in

No.	Comments	Responses
		terms of quantity. For details, please refer to the revised Tree Assessment Schedule, Tree Survey Plan, Tree Treatment Plan and Tree Planting Plan in Appendix A and C of the revised Landscape Master Plan in **Annex D**. 3. In addition, all new trees are proposed to be planted strategically to complement existing slope vegetation immediately outside the Application Site to retain existing landscape character, as well as enhancing the overall landscape quality of the Proposed Development. 4. For trees along roadside of approved access road under planning application no. A/SK-HC/223, their location has been adjusted to suit the run-in and -out of the future road layout. If all 21 nos. new trees were fitted in the existing roadside planter and landscape area within Application Site, it would result in planting of much smaller size of trees with very tight growing space at the expense of landscape quality. Please note that 6 nos. new trees are the maximum number of roadside planting we can achieve after considering site constraints such as limited roadside planting space due to essential retaining wall structure and minimum width allowed for pedestrian walkway. 5. To enhance the biodiversity and ecological value of the Application Site, native trees and shrubs species that can attract nectar insects such as butterflies are proposed along access road as well as the landscape area within the Application Site. Please refer to Table 3A and Table 3B for reference. In conclusion, the Landscape Master Plan (please refer to **Annex D** for details**)** will not jeopardize the planning intention of approved access road application under planning application No. A/SK-HC/223 as

No.	Comments	Responses
		well as the current Proposed Amendment, as the commitment of greenery enhancement and planning for better landscape quality is unwavering.
	c) Tree Treatment Plan (Dwg. No.: TPP-01) ─ Our comment c(i) given on the pre-submission dated 11.09.2023 for the captioned is reiterated below for your consideration: "TGC and TGB-1 are observed not in conflict with proposed buildings as shown on Tree Treatment Plan (Dwg. No.: TPP-01), please review whether the concerned tree groups can be retained in situ."	Tree felling is only considered as the last resort in this Application. Please find our justification of proposed felling of Tree Groups "TGC" and "TGB-1"as follows: **TGC**: - "TGC" is in direct conflict with the proposed design level, i.e. 3.6m level difference between the existing and proposed levels, precluding any chance of tree retention. - Existing trees identified in "TGC" are common species such as *Macaranga tanarius var. tomentosa* 血桐 and *Mallotus paniculatus* 白楸 with low amenity value. They are in poor condition, health and form, and possess defects such as dead branches. Their chance of survival after tree transplanting is considered very low. **TGB-1:** - Existing trees in "TGB-1" are growing on steep slope with level difference ranging from 3m on southern side (between level +8.93 to +12.18) to 5m on northern side (between level +9.84 to +14.78). - Half of the "TGB-1" is in conflict with proposed layout in Site B, while another half would be affected by slope stabilization works.

No.	Comments	Responses
		- Except 1 no. of rare species *Aquilaria sinensis* 土沉香 identified in TGB-01 is proposed to be transplanted, almost all tree species in "TGB-1" are common species such as *Artocarpus heterophyllus* 菠蘿蜜 with low amenity value. They are in poor condition, health and form, and possess defects such as dead branches. Their chance of survival after tree transplanting is considered very low. To replenish the loss of greenery, **98** nos. of new trees of higher aesthetic value are proposed to be replanted in 1:1 in terms of quantity.
	Advisory Comments to the Applicant 4. The applicant is reminded that approval of s.12A application under Town Planning Ordinance does not imply approval of the site coverage of greenery requirements under APP PNAP-152 and/or under the lease. The site coverage of greenery calculation should be submitted separately to BD for approval. Similarly for any proposed tree preservation/removal scheme and compensatory planting proposal, the applicant should approach relevant authority direct to obtain necessary approval as appropriate.	Noted.
7.	**Water Supplies Department, Construction Division, dated 8 January 2024** **Major Comment on the Application/Main Reasons of Objection:** Nil. **Other Detailed Comments (if applicable):** 1. Existing water mains as shown in the attachment pass through the proposed application site and will be affected by the proposed installations. The	Noted. Noted.

No.	Comments	Responses
	grantee/applicant is required to divert the water mains found on site.	
	2. Existing water mains inside the proposed lot are needed to be diverted outside the site boundary of the proposed development to lie in Government land. A strip of land of minimum 1.5m in width should be provided for the diversion of the existing water mains. The cost of diversion of existing water mains upon request will have to be borne by the grantee/applicant; and the grantee/applicant shall submit all the relevant proposal to WSD for consideration and agreement before the works commence.	Noted.
	3. For those water mains in close vicinity to the application site where diversion is not required, the following conditions shall apply:	Noted.
	(a) Existing water mains are affected as indicated on the site plan and no development which requires resting of water mains will be allowed.	Noted.
	(b) Details of site formation work shall be submitted to the Director of Water Supplies for approval prior to commencement of works.	Noted.
	(c) No structures shall be built or materials stored within 1.5 metres from the centre line(s) of water main(s) shown on the plan. Free access shall be made available at all times for staff of the Director of Water Supplies or their contractor to carry out construction, inspection, operation, maintenance and repair works.	Noted.
	(d) No trees or shrubs with penetrating roots may be planted within the Waterworks Reserve or in the vicinity of the water main(s) shown on the plan. No change of existing site condition may be undertaken within the aforesaid area without the prior agreement of the Director of Water	Noted.

No.	Comments	Responses
	Supplies. Rigid root barriers may be required if the clear distance between the proposed tree and the pipe is 2.5 m or less, and the barrier must extend below the invert level of the pipe.	
	(e) No planting or obstruction of any kind except turfing shall be permitted within the space of 1.5 metres around the cover of any valve or within a distance of 1 metre from any hydrant outlet.	Noted.
	(f) Tree planting may be prohibited in the event that the Director of Water Supplies considers that there is any likelihood of damage being caused to water mains.	Noted.
	4. Landscape Master Plan and Supporting Planning Statement refer. We note that there will be total 17 nos. of houses, club house and landscape area proposed under the captioned planning application. However, the associated water demand (i.e. both fresh and flushing water) are missing. Therefore, please submit the necessary water demand assessment including, but not limited to, the uses of potable, flushing, irrigation and all other necessary uses to be required for the proposed development and the capacity checking of proposed and existing water mains concerned for our review.	Noted. A Water Demand Assessment has been conducted. Please refer to **Annex E** for details.
8.	**Transport Department, Traffic Engineering (NTE) Division, dated 2 January 2024** **<u>Section 4.4.1</u>** (a) Please state the traffic flows generated from planned / committed developments in the vicinity. **<u>Section 4.7</u>**	**Noted.** Please refer to Table 4.5 of the revised Traffic Impact Assessment report in **Annex F** for details.

No.	Comments	Responses
	(b) Please provide assessment on capacities of the access road.	Noted. Please refer to Section 4.7 of the revised Traffic Impact Assessment report in **Annex F** for details.
	Section 5	
	(c) Re. Appendix C, please indicate the width of run-in/out and include a legend for parking spaces and loading/unloading area.	Noted. Please refer to Appendix C of the revised Traffic Impact Assessment report in **Annex F** for details.
	(d) Re. Appendix C, it is noted that one loading/unloading area is provided in Site C only, please justify not providing loading/unloading area in Sites A and B.	In view of the small site area (About 300m^2 and 600m^2 for Site A and Site B, respectively) and irregular shape of Sites A and B, there is no sufficient space available for the manoeuvring of goods vehicle within these sites. Therefore, no loading/unloading area is provided within Sites A and B. Nevertheless, the goods vehicles for Sites A and B may use the loading/unloading area in Site C, if necessary.
	(e) Re. Section 5.3, please indicate the width of run-in/out in the swept path analysis.	Noted. Please refer to the swept paths of the revised Traffic Impact Assessment report in **Annex F** for details.
	(f) Re. Drawing No. SP-01, it is noted that the ingress and egress routes would encroach to opposite lanes. Please review.	Please note that the chance of having a goods vehicle for the Proposed Development is minimal. Nevertheless, management staff will provide assistance to ensure no vehicle is travelling along the access road before the goods vehicle leaving the Site.
	(g) Re. Drawing No. SP-03 and SP-04, it is noted that the ingress route would encroach to the opposite lane. Please review.	Please note that the ingress route would only encroach onto the opposite lane within the Site, management staff will provide assistance when vehicle entering the Site.
	Comments regarding public transport	
	Para 3.5.1	
	• …there are franchised bus and green minibus routes travelling…	Noted. Please refer to Para. 3.5.1 of the revised Traffic Impact Assessment report in **Annex F** for details.

No.	Comments	Responses
	Table 3.3	
	• 292P: Sai Kung to Kwun Tong	Noted. Please refer to Table 3.3 of the revised Traffic Impact Assessment report in **Annex F** for details.
	• GMB 101M: delete (via Sai Kung North PTI)	Noted. Please refer to Table 3.3 of the revised Traffic Impact Assessment report in **Annex F** for details.
	• Please advise the no. of trips generated and attracted	Please refer to Table 3.4 of revised Traffic Impact Assessment report in **Annex F** for the franchised bus trips during AM peak hour.
	• Please review the adequacy of the franchised bus services in accordance with guidelines of Bus Route Planning Programme (link as below). There are a number of new developments in Sai Kung rural area. The consultant shall take into account the overall impact on the PT services at Nam Pin Wai. https://www.td.gov.hk/filemanager/tc/util_uarticle_cp/sai%20kung%20-%20rpp%202023-24.pdf	Please note that the existing bus services carried only 519 passengers (302 [Sai Kung bound] +217 [Kowloon bound] = 519) during AM peak hour. There is a surplus of 921 capacity (1,440 – 519 = 921) which is sufficient to accommodate the passenger demand induced by the Proposed Development (11 pax/hr) and the nearby new developments (162 pax/hr). Please refer to **Section 3.5** and **Section 4.8** of the revised Traffic Impact Assessment report in **Annex F** for details.

(Last Updated 29 January 2024)

Annex A of Further Information (2)

Supplementary Response-to-Comments Table for Comments Received from Buildings Department and Lands Department on 11 October 2023

Application for Amendment of Plan under Section 12A of the Town Planning Ordinance – Proposed Rezoning of the Application Site from "Green Belt" to "Residential (Group C)1" at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung, New Territories
Responses to Comments

Comments from Related Departments **Page No.**

COMMENTS FROM RELATED DEPARTMENTS

No.	Comments	Responses
1.	**Buildings Department, dated 11 October 2023** I have no in-principle objection to the proposed re-zoning under the Buildings Ordinance (BO) subject to the following comments:-	
	1. Unless the proposed sites abut on a specified street complying with the requirements under Building (Planning) Regulations (B(P)R) 18A(3) and not less than 4.5m wide, the development intensity of the site should be determined by the Building Authority under B(P)R 19(3);	Please be advised that development site areas in the application abut the access road which is not less than 4.5m wide. The Access Road is deemed as a specified street under the definition of B(P)R 18A 3(a) (iv) where it is on land over which the owner of the site is expressly granted, a right of way exercisable at all times. Therefore under our understanding that the development intensity, site shall be in accordance with B(P)R 18A (1) regarding site classification. As for the area that has no access on plan into the access road, future arrangement in regards of access shall be reached as the lot ownership still have uncertainties, future action such as merging of lot are possible, subject to future GBP submission for the actual development potential under BO.
	2. Under B(P)R 5, all sites shall be provided with means of obtaining access thereto from a street;	Noted.
	3. Emergency vehicular access complying with B(P)R 41D shall be provided for all the buildings within the sites;	Noted.
	4. The application site has been subdivided into two separate sites by an access road within the adjacent lot, DD 244 Lot No. 2189. In this regard, the development parameters (i.e. P.R. & S.C.) and supporting facilities (e.g. RRF) of the two sites shall be considered separately under the BO.	Please be clarified that the current intent for Phase 1 development (shown in green in below diagram) with the access road as right of way will be submitted under the same GBP submission. As such, the development parameters (i.e. P.R. and S.C.) and supporting facilities (e.g. RRF) is intended to be considered as one whole site while the site area of the access road will be excluded from P.R. and S.C.. For the subsequent Remaining Phase (shown in orange in below diagram), noted that the P.R., S.C. and provision of supporting facilities shall be considered separately under separate GBP submission. As mentioned above, for the area that has no access on plan into the access road, future arrangement in regards of access shall be

No.	Comments	Responses
		reached as the lot ownership still have uncertainties, future action such as merging of lot are possible, subject to future GBP submission for the actual development potential under BO. 
	5. Detailed comments under the BO will be provided at the building plan submission stage.	Noted.
2.	**Lands Department, District Lands Office, Sai Kung, dated 11 October 2023** *Land Status of the Application Site* 1. The Application Site falls outside the village environs of Ho Chung. It comprises unleased and allocated Government land and 24 private lots, namely Lot Nos. 788 RP (Part), 789 RP (Part), 827 RP (Part), 828 RP (Part), 855 RP, 863 RP (Part), 865 RP (Part), 868 RP, 871, 872, 873, 874, 875 RP, 876 RP, 877 RP, 878 RP and 879 RP all in D.D. 244 (collectively "the Group 1 Lots") and Lot Nos. 1939 s.B ss.3, 1939 s.E, 1939 s.F, 1939 RP, 1940 (Part), 1944 RP and 2189 (part) all in D.D. 244 (collectively "the Group 2 Lots"). The land documents governing the private lots and the lot ownership are summarized as follow:-	Noted.
	(a) The Group 1 Lots are old schedule agricultural lots held under Block Government Lease and no building/structure is permitted. Among the Group 1 Lots, Lot Nos. 788 RP, 789 RP, 827 RP and 828 RP all in D.D. 244 are subject to a short term waiver No. SW46	Noted.

No.	Comments	Responses
	which permits the lots to be used for the purpose of factory buildings, quarters and open storage.	
	(b) Lot Nos. 1939 RP, 1939 s.B ss.3, 1939 s.E and 1939 s.F all in D.D. 244 are governed by New Grant No. 2846 that the sale conditions for these lots could not be traced by this office. Lot Nos. 1940 and 1944 both in D.D. 244 are governed by New Grant No. 2914 subject to G.N. 364 of 1934 as amended by G.N. 50 of 1940 and 106 of 1946. According to the government rent payroll records, these six lots are agricultural lots.	Noted.
	(c) Lot No. 2189 in D.D. 244 is held under the Conditions of Exchange dated 26.11.2019 and registered in the Land Registry as New Grant No. 22828 for private residential purposes and only the Pink Hatched Black Area ("PHBA") of this lot is involved in the Application Site. The lease modification application for permitting Lot Nos. 1939 RP and 1944 RP both in D.D. 244 together with any new lot(s) to be granted in the event of any in situ land exchange of these two lots to have vehicular and pedestrian access over the PHBA was approved by DLC on 22.4.2023.	Noted.
	(d) Regarding current ownership, the Group 2 Lots and Lot Nos. 877 RP, 878 RP and 879 RP all in D.D. 244 are owned by the Billion Vantage Investment Limited and its associated company Top Deluxe Limited (collectively "the Applicants"). These lots were involved in the withdrawn s.16 application No. A/SK-HC/338 for proposed recreational use and associated filling and excavation of land ancillary to the residential use in Lot No. 2189 in D.D. 244. The remaining lots of the Application Site are under different ownership.	Noted.
	The PHBA of Lot No. 2189 in D.D. 244	
	2. The PHBA of Lot No. 2189 in D.D. 244 ("Lot 2189") is subject to a planning permission approved with conditions by	Noted.

No.	Comments	Responses
	TPB on 8.2.2013 under Application No. A/SK-HC/223 for "Proposed House (Ancillary Road)" of Lot 2189. This planning intention has been reflected in the lease that the PHBA is designated as non-building area and restricted for the purposes of the vehicular and pedestrian access road to and from Lot 2189. According to DLC notes dated 4.6.2014 regarding the approved land exchange of Lot No. 2189 in D.D. 244, the PHBA shall not be countable for GFA and site coverage ("SC") calculation of Lot 2189 under lease after taking the advice of PlanD.	
	3. As noted from the Table 4.1 of the Supplementary Planning Statement, the PHBA is not taken into account in the GFA and site coverage calculations under the Indicative Scheme. Since incorporating the PHBA into the rezoning site and taking into account of the PHBA in PR/GFA/SC calculations for developments at the Application Site would not have any conflict with the existing lease conditions related to the PHBA, preliminarily I have no adverse comment on such proposal.	Noted.
	4. On the other hand, the PHBA is currently designated as the vehicular and pedestrian access road to and from Lot 2189 and to be formed as the sole access road of the development site under the Indicative Scheme. In view of this, advice from TD should be sought on whether the traffic capacity of the PHBA is adequate to cope with the additional traffic flow induced by the Indicative Development.	Noted. Please refer to the responses to TD's comments in Item 8 of the Responses-to-Comment Table in **Attachment 1**.
	Site Area	
	5. This office cannot verify the area of the Application Site at this stage. The Applicant should ensure all the area stated in the Supplementary Planning Statement are correct.	The area stated in the Supplementary Planning Statement is measured by AutoCAD and is considered to be accurate. Should there be any necessary changes in the site boundary upon land exchange application, a detailed survey of the site area will be carried out.
	Site of Archaeological Interest	

No.	Comments	Responses
	6. The Application Site falls within Ho Chung Site of Archaeological Interest. Comments from Antiquities and Monuments Office for the development proposal should be obtained.	Noted.
	Government Land Involved	
	7. Several pieces of Government land are proposed to be included in the development sites under the Indicative Scheme. The feasibility of such proposal would be considered by LandsD upon processing of the land exchange application for the proposed development.	Noted.
	8. If the subject application is approved by the Town Planning Board, the lot owners should apply for a land exchange to effect the proposal under the Indicative Scheme. The land owners are reminded that every application submitted to LandsD will be considered on its own merits by LandsD at its absolute discretion acting in its capacity as a landlord and there is no guarantee that the land exchange application will eventually be approved by LandsD. If the application for land exchange is approved by LandsD, it will be subject to such terms and conditions as may be imposed by LandsD at its absolute discretion, including payment or premium and administrative fee.	Noted.

(Last updated on 25 January 2024)

Annex D

Further Information (3) - Response-to-Comments Table

Your ref Y/SK-HC/7
Our ref 294065/01/WSTY/MYNL/CKJL/05226

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6 February 2024

Dear Sir/Madam,

Application for Amendment of Plan
Under Section 12A of the Town Planning Ordinance (Cap. 131)
to Rezone the Application Site from "Green Belt" to "Residential (Group C)1"
for Proposed House Development at Various Lots in D.D. 244
and Adjoining Government Land, Nam Pin Wai, Sai Kung
(Planning Application No. Y/SK-HC/7)

Submission of Further Information

We refer to the comments received from various Government departments on 25 and 26 January 2024 on the captioned Planning Application.

We are pleased to submit herewith a Response-to-Comments Table (**Attachment 1**) together with the relevant supporting documents (**Annexes A and B**) for your consideration. The softcopy of the Further Information will be uploaded to the hyperlink provided by the Town Planning Board.

We sincerely seek for the favourable consideration from the Town Planning Board to approve the captioned S12A Planning Application.

Should you have any queries, please contact the undersigned or our Ms. Natalie LEUNG at 2268 3612 (email: natalie.leung@arup.com) or our Ms. Jane LAU at 2268 3893 (email: jane.lau@arup.com).

Yours faithfully,

Theresa YEUNG
Director

Encl. - Attachment 1
- Annexes A and B
c.c. - Clients

Application for Amendment of Plan under Section 12A of the Town Planning Ordinance – Proposed Rezoning of the Application Site from "Green Belt" to "Residential (Group C)1" at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung, New Territories
(Planning Application No. Y/SK-HC/7)

Responses to Comments

Comments from Related Departments **Page No.**

Responses to Comments

No.	Comments	Responses
1.	**Development Bureau, Works Branch, Works Division 1, Commissioner for Heritage's Office, Antiquities and Monuments Office, Heritage Conservation Unit, Archaeology Sub-unit, dated 25 January 2024** **Archaeological Review Report** ***General comment***	
	1) While the R-to-C mentioned that revisions have been made to address the comments of AMO, it is also noted the comment of AMO given on 25.10.2023 were not fully addressed in this submission.	Noted.
	2) To respond to AMO's comment in the next submission, please be advised to provide R-to-C and highlight all revisions.	Noted.
	3) Please clarify the extent of "Application Site". It reads "The Application Site is illustrated in Figure 17 as Recommended Archaeological Survey-Cum-Excavation Area." in the R-to-C, which is misleading.	The extent of Application Site, which is composed of Phase 1, Access Road and the Remaining Phase, is illustrated in Figure 1 of the revised Archaeological Review Report in **Annex A**.
	4) Please be advised that AMO's comment no. (3) dated 25.10.2023 is still valid. It is recapitulated below to facilitate the following up by the applicant. "Please define clearly the Study Area, and illustrate accurately on the plans the Study Area, Application Site and Ho Chung SAI."	Please be clarified that "Study Area" is the same as "Application Site". To avoid misunderstanding, "Application Site" is used in the report, and "Study Area" is no longer used. The text and figures have been revised accordingly. Please refer to the revised Archaeological Review Report in **Annex A** for more details.
	The Study Area in Figure 1 and the Application Site in Figure 17 are not clearly indicated as mentioned in the R-to-C. You may wish to provide legends to ensure legibility.	Noted.
	5) We also note that some legends on the plans are not correct, e.g. in Figure 3, the legend for Krl_cat and Krd_cat are missing, and Krd_tb is duplicated. To avoid misunderstanding, the applicant is required to review, verify and confirm the contents of submissions so as to ensure that the next	Noted and **Figure 3** is revised. Please refer to the revised Archaeological Review Report in **Annex A** for more details.

Responses to Comments

No.	Comments	Responses
	submission is factually correct, consistent and relevant. ***Specific comment*** Section 2.1	
	6) Please illustrate the Study Area, Ho Chung SAI and Application Site on one plan, and clarify if the Study Area covers the entire Application Site. If not, please provide justification to support that this survey is suffice to address the archaeological issue of the entire Application Site. Section 4.1.1	Please refer to response to comment No. 4 in Item 1 of this Response-to-Comments table.
	7) The sectional title of 4.1 is "Scope of Field Scanning", please be advised that AMO's comment no. (9) dated 25.10.2023 is still valid. It is recapitulated below to facilitate the following up by the applicant. *"Please clarify and revise where appropriate if the "Remaining Phase" and "Ancillary Road" that are within the Application site were also included for field scanning, investigation and study."* Section 5.4.4	Noted. **Section 4.1.1** is revised to clarify the extent of the Application Site. Please refer to the revised Archaeological Review Report in **Annex A** for more details.
	8) No visual is provided. Please be advised that AMO's comment no. (11) dated 25.10.2023 is still valid. It is recapitulated below to facilitate the following up by the applicant. *"Please provide reliable details and legible visuals…"*	Noted. **Section 5.4.4** is revised that previous statement "…modern constructions of concrete pavement…" is deleted. Please refer to the revised Archaeological Review Report in **Annex A** for more details.
	9) We noted from the R-to-C that "the hilltop areas have been disturbed by modern constructions of warehouse and concrete roads." Please clarify whether Zone 4 has been disturbed by modern construction of warehouse or not as no such information is mentioned this section. Section 6.1.1	Please refer to response to comment No. 8 in Item 1 of this Response-to-Comments table.

Responses to Comments

No.	Comments	Responses
	10) We note that this section concludes that Zones 2 and 3 are of "low archaeological potential". This is contradicted with the "no archaeological potential" in these two zones as concluded in Sections 5.4.2, 5.4.3, 7.1.4 and 7.1.5. Please clarify and revise as appropriate.	**Section 6.1.1** is revised. Please refer to the revised Archaeological Review Report in **Annex A** for more details.
	11) It is noted that AMO's comment nos. (13) and (14) dated 25.10.2023 were not responded by the applicant as mentioned in the R-to-C. The comments are recapitulated below for the following up of the applicant.	
	(i) "The report recommends an archaeological survey-cum-excavation at Zones 3 to 5 before commencement of the proposed construction works. Please elaborate the principles and rationale for the proposed mitigation measures as the archaeological potential of the three zones are different."	After further review, no archaeological survey-cum-excavation is recommended at Zone 3 due to its no archaeological potential. **Section 6.1.1** and **Figure 17** are revised. Please refer to the revised Archaeological Review Report in **Annex A** for more details.
	(ii) "For Zone 3, the report concludes that the area is expected to have no archaeological potential, but an archaeological survey-cum-excavation is still recommended at its northern part, please provide justification."	Please refer to response to comment No. 11 (i) in Item 1 of this Response-to-Comments table.
	Section 7.1.1	
	12) Please review the relevancy of this paragraph to the subject application and revise as appropriate.	**Section 7.1.1** is revised. Please refer to the revised Archaeological Review Report in **Annex A** for more details.
	Section 7.1.6	
	13) The 2nd sentence reads "Based on desktop research, the areas might have been disturbed by modern construction.", please clarify what is "the areas" refer to and review if there is any inconsistency in Sections 7.1.6 and 7.1.7, and revise as appropriate.	**Section 7.1.6** is revised. Please refer to the revised Archaeological Review Report in **Annex A** for more details.

Responses to Comments

No.	Comments	Responses
	Section 7	
	14) Please be advised that AMO's comment no. (15) dated 25.10.2023 is still valid. It is recapitulated below to facilitate the following up by the applicant. *"Please revise the conclusion according to AMO's above comment where appropriate."*	Noted. Conclusion in Section 7 is revised. Please refer to the revised Archaeological Review Report in **Annex A** for more details.
	It is noted that there are still editorial errors in the report, e.g. the grammatical mistakes in Section 3.3.1, the incomplete sentence in Section 5.1.1 and so on. Please follow up as appropriate."	Noted. Section 5.1.1 is revised. Please refer to the revised Archaeological Review Report in **Annex A** for more details.
2.	**Electrical & Mechanical Services Department, Gas & General Legislation Branch, Gas Standards Division A, Gas Standards A3 Sub-division, dated 26 January 2024**	
	Town Gas Safety	
	1. Section 7.1.1.1 refers. Frequency of 'LPG' release events shall be renamed to 'towngas'.	Noted. Section 7.1.1 is revised accordingly. Please refer to the replacement pages to the revised Quantitative Risk Assessment for High Pressure Town Gas Pipeline in **Annex B** for more details.
	2. Section 8.1.1.1 refers. Please list the current safety measures imposed by HKCG on the high pressure gas pipeline in Section 5. Please elaborate on those factors contributing to your analysis results.	Please be clarified that there was a typo and the last sentence of Section 8.1.1.1 should read "*The assessment was conducted with the consideration of current technical specifications of the high pressure gas pipeline*." and it has been updated accordingly. Please refer to the replacement pages to the revised Quantitative Risk Assessment for High Pressure Town Gas Pipeline in **Annex B** for more details.
	3. Appendix B refers. Please seek comment from PlanD on the estimated population data within the Study Zone.	Please note that the report has been circulated for PlanD's review. The assumption of population, projected population for different building (indicated with specific ID) within the Study Zone and population of approved planning application are presented in Appendix B of the Quantitative Risk Assessment for High

Responses to Comments

No.	Comments	Responses
	4. Please provide the analysis result in Safeti format for our record. "	Pressure Town Gas Pipeline submitted on 11 January 2024 for detailed checking. Please note that the Safeti model has been provided separately to your Department via email dated 31 January 2024.

(Last Updated 2 February 2024)

Annex E

Further Information (4) - Response-to-Comments Table

Your ref TPB/Y/SK-HC/7
Our ref 294065/01/WSTY/MYNL/CKJL/05270

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The Secretary
Town Planning Board
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8 April 2024

Dear Sir/Madam,

Application for Amendment of Plan
Under Section 12A of the Town Planning Ordinance (Cap. 131)
to Rezone the Application Site from "Green Belt" to "Residential (Group C)1"
for Proposed House Development at Various Lots in D.D. 244
and Adjoining Government Land, Nam Pin Wai, Sai Kung
(Planning Application No. Y/SK-HC/7)

Submission of Further Information

We refer to the comments received from various Government departments on 7 March 2024 on the captioned Planning Application.

We are pleased to submit herewith a Response-to-Comments Table (**Attachment 1**) together with the relevant supporting documents (**Annexes A** and **B**) for your consideration.

The softcopy of the Further Information will be uploaded to the hyperlink provided by the Town Planning Board.

We sincerely seek for the favourable consideration from the Town Planning Board to approve the captioned S12A Planning Application.

Should you have any queries, please contact the undersigned or our Ms. Natalie LEUNG at 2268 3612 (email: natalie.leung@arup.com) or our Ms. Jane LAU at 2268 3893 (email: jane.lau@arup.com).

Yours faithfully,

Theresa YEUNG
Director

Encl. - **Attachment 1** – Response-to-Comments Table
- **Annexes A** and **B**

c.c. - Clients

Application for Amendment of Plan under Section 12A of the Town Planning Ordinance – Proposed Rezoning of the Application Site from "Green Belt" to "Residential (Group C)1" at Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung, New Territories
(Planning Application No. Y/SK-HC/7)

Responses to Comments

Comments from Related Departments **Page No.**

Responses to Comments

No.	Comments	Responses
1.	**Transport Department, NT Regional Office, Traffic Engineering (NTE) Division, Housing & Planning Section, dated 7 March 2024** **Section 5**	
	Re. Drawing No. SP-03 and SP-04, it is noted that the ingress route would encroach to the opposite lane. Please review the width of the vehicular access.	The width of the vehicular access of Sites A and B are reviewed. To allow for better vehicle manoeuvring, drop kerbs are incorporated for the vehicular accesses while the width of the vehicular accesses are remained unchanged. Please refer to the replacement pages to Appendix C and Drawing Nos. SP-03 and SP-04 of the revised Traffic Impact Assessment report in **Annex A**.
2.	**Development Bureau, Works Branch, Works Division 1, Commissioner for Heritage's Office, Antiquities and Monuments Office, Heritage Conservation Unit, Archaeology Sub-unit, dated 7 March 2024** **General Comment**	
	1) Please be reminded that AMO's comment no. (5) dated 23.1.2024 is still valid. It is recapitulated as follows:	
	"To avoid misunderstanding, the applicant is required to review, verify and confirm the contents of submissions so as to ensure that the next submission is factually correct, consistent and relevant."	Based on the newly acquired information on aerial photos of 1993, the report has been reviewed, verified and confirmed of its content so as to ensure this submission is factually correct, consistent and relevant. Please refer to **Annex B** for the revised Archaeological Baseline Review Report for details.
	We note that the current submission still contains imprecise information, irrelevances and inconsistencies. You are reminded to check through the entire report and revise as appropriate.	Noted.
	Specific Comment <u>R-to-C nos. 3 and 4</u>	

Responses to Comments

No.	Comments	Responses
	2) Please define the extent of the Application Site in the report for clarity and include in Section 2 as appropriate. Section 2.1.2	Section 2.1.1 is revised, with reference to the *Application Site* on Figure 1. Please refer to **Annex B** for the revised Archaeological Baseline Review Report for details.
	3) It states that an ancillary road, referred as "proposed works" within the Application Site is still under planning. Please review if this Section is update and relevant to the subject application, and revise as appropriate. Sections 4.2.7, 4.2.8, 5.4.3, 6.1.1 and 7.1.5	Section 2.1.2 is deleted to remove unclarity of the description. Please refer to section 2.1.1 and Figure 1 of the revised Archaeological Baseline Review Report in **Annex B** for the Application Site.
	4) According to the discussions on Zone 3 in these sections, in which inconsistencies are still found, please provide justification(s) for your conclusion that the site has "no archaeological potential". When clarifying / justifying your conclusion, please indicate the following parts within Zone 3 on a plan and review the archaeological potential and mitigation measure for this Zone, especially the areas within Ho Chung Site of Archaeological Interest ("SAI"), which are undisturbed and / or unsurveyed due to their inaccessibility for field scanning:	Section 3.1.8 has been added to review the newly acquired information regarding the aerial photo of 1993. Table 3.2 has been revised to add summary of land use observations based on the aerial photo of 1993. Section 4.2.4, 5.4.3 and 7.1.5 have been revised, and section 4.2.9 has been added based on the newly added information on Zone 3. Section 6.1.1 remains unchanged. Furthermore, sections 4.2.4 on Zone 2, section 4.2.10 and 4.2.11 on Zone 4 have been revised accordingly based on the newly added information. Section 5.5 has been deleted as it is irrelevant to the conclusion. Please refer to **Annex B** for the revised Archaeological Baseline Review Report for details.
	a) the part within Ho Chung SAI;	Figures 17 and 18 have been revised to add "Disturbed Area within the Application Site" and "Area Archaeologically Unsurveyed within the Application Site", where "Ho Chung SAI" has already been marked on those figures. Please refer to **Annex B** for the

No.	Comments	Responses
		revised Archaeological Baseline Review Report for details.
	b) the part disturbed by modern construction; and	Please refer to the response to comment 4a above.
	c) the non-surveyed area.	Please refer to the response to comment 4a above.
	Revise the relevant sections as appropriate.	Please refer to the response to comment 4a above.
	Sections 5.4.3, 6.1.1 and 7.1.5	
	5) Please clarify which part of Zone 3 is disturbed by the previous construction of the open storage. The three sections are described differently. Below are some of the examples: "Furthermore, part of Zone 3 is disturbed previously by the construction of the open storage" (Section 5.4.3) "Zone 2 and 3 contains no archaeological potential due to modern disturbance as concluded in the SKNPW2015" (Section 6.1.1) "the southern part of Zone 3 is disturbed previously by the construction of the open storage." (Section 7.1.5) As such, please review critically and revise as appropriate for clarity and accuracy.	Please be clarified that Zone 3 contains no archaeological potential. Aerial photo of 1993 is added as Figure 9 to supplement, with section 3.1.8 supplemented. Please refer to **Annex B** for the revised Archaeological Baseline Review Report for details. Please also refer to the response to comment 4 and 4a above.
	Section 7.1.2	
	6) Please revise the sentence "For the ease of discussion, the Application Site is subdivided into Zones 1, 2, 3, 4 and 5 as shown on Figure 16." as appropriate in order to tally with the extent of the Application Site defined in Section 4.1.1.	Sentence at section 7.1.2 revised as "For the ease of discussion, the Application Site is subdivided into Zones 1, 2, 3, 4**,~~and~~** 5**, Remaining Phase and Ancillary Road** as shown on Figure 16." (revision is marked by bold and strikethrough). Please refer to **Annex B** for the revised Archaeological Baseline Review Report for details.
	Section 7.1.9	
	7) Please revise the recommended mitigation measures, if necessary, according to AMO's above comment.	Section 7.1.9 has been revised, making reference to *Area Archaeologically*

Responses to Comments

No.	Comments	Responses
		Unsurveyed within the Application Site on Figure 17. In terms of mitigation measures, since Zone 3 lies within the Ho Chung SAI, an archaeological survey will be conducted in Zone 3 within the extend of the Ho Chung SAI will be recommended. Relevant sections have been revised to reflect this. Please refer to **Annex B** for the revised Archaeological Baseline Review Report for details. Beside the above revision, the following changes have been made. 1. Reference to the Technical Circular (Works) No. 1/2022 regarding Heritage Impact Assessment is removed. Section 2.4.11 is thus deleted. 2. Section 5.5 on Estimation of Stratigraphy at Zones 4 and 5 is removed as it is irrelevant to the analysis and recommendation of this report.

(Last Updated 5 April 2024)

Annex F

Further Information (5) - Response-to-Comments Table

Your ref TPB/Y/SK-HC/7
Our ref 294065/01/WSTY/MYNL/CKJL/05285

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The Secretary
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15 April 2024

Dear Sir/Madam,

Application for Amendment of Plan
Under Section 12A of the Town Planning Ordinance (Cap. 131)
to Rezone the Application Site from "Green Belt" to "Residential (Group C)1"
for Proposed House Development at Various Lots in D.D. 244
and Adjoining Government Land, Nam Pin Wai, Sai Kung
(Planning Application No. Y/SK-HC/7)

Submission of Further Information

We refer to the comments received from various Government departments from 6 February to 12 April 2024 on the captioned Planning Application.

We are pleased to submit herewith a Response-to-Comments Table (**Attachment 1**) together with the relevant supporting documents (**Annexes A** to **H**) for your consideration.

The softcopy of the Further Information will be uploaded to the hyperlink provided by the Town Planning Board.

We sincerely seek for the favourable consideration from the Town Planning Board to approve the captioned S12A Planning Application.

Should you have any queries, please contact the undersigned or our Ms. Natalie LEUNG at 2268 3612 (email: natalie.leung@arup.com) or our Ms. Jane LAU at 2268 3893 (email: jane.lau@arup.com).

Yours faithfully,

Theresa YEUNG
Director

Encl. - **Attachment 1** – Response-to-Comments Table
- **Annexes A** to **H**
c.c. - Clients

Proposed Rezoning of the Application Site from "Green Belt" to "Residential (Group C)1"
Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung, New Territories
(Planning Application No. Y/SK-HC/7)

Responses to Comments

Comments from Related Departments **Page No.**

Responses to Comments

No.	Comments	Responses
1.	**Environmental Protection Department, Environmental Assessment Division, Assessment and Noise Group, Noise Assessment & Exposure Information(2), dated 18 March and 12 April 2024**	
	Comment on Noise Planning Dated 12 April 2024: Road traffic noise	
	1. App.2.1: Discrepancies in mPD levels, i.e. "13.7 v.s. 13.6", "+16 v.s.+15.6" and "+14.65 v.s. +14.4", were noted in the drawing of Section CC.	Section CC in Appendix 2.1 is amended. Please refer to the revised Environmental Assessment Study in **Annex A** for details. Section CC in the Supporting Planning Statement and relevant technical assessment reports have also been updated accordingly. Please refer to **Annexes B to H** for the relevant replacement pages.
	Comments on Noise Planning Dated 18 March 2024: Road traffic noise	
	1. S.4.9.4.3: Apart from room size and window opening size, justifications with technical documents shall also be provided to EPD in case there is any variation on configurations of acoustic window such as overlapping length or gap width.	Noted and supplemented in S.4.9.4.3. Please refer to the revised Environmental Assessment Study in **Annex A** for details.
	2. App.2.1: Please provide detailed mPD levels for each floor in the drawing of Section CC.	Noted and supplemented in Appendix 2.1 – Section CC Drawing. Please refer to the revised Environmental Assessment Study in **Annex A** for details.
	3. S.4.5.1.1: R-t-C No. 14 mentioned that the traffic flow during AM Peak traffic hours can represent the worst-case scenario. Please state this in the FI/NIA.	Noted and supplemented in S.4.5.1.2. Please refer to the revised Environmental Assessment Study in **Annex A** for details.
	Fixed noise source 4. S.5.1: R-t-C No. 15 mentioned that no major fixed noise source associated with Tsuen Tung Film & TV Ltd adjoining the site is identified during the site survey conducted in Nov 2023. Please state this observation in S.5.1.	Noted and supplemented in S.5.1.1.1. Please refer to the revised Environmental Assessment Study in **Annex A** for details.

2.	**Environmental Protection Department, Water Quality Management Division, Water Quality Management Group, Water Quality Impact Assessment and Marine Refuse Management, dated 18 March and 3 April 2024**	
	Comment on Water Quality Dated 3 April 2024: Technical comment	
	1. R-to-C Point 2 & S10.6.2: It is noted that the treated effluent from the on-site STP will be ultimately discharged into Ho Chung River, please consider adopting 'Standards for Effluents Discharged into Inland Waters' under TM-DSS. Please amend relevant content as appropriate.	Noted. 'Standards for Effluents Discharged into Inland Waters' under TM-DSS for treated effluent discharge into Ho Chung River will be adopted and supplemented in Section 10.6.2.2. Please refer to the revised Environmental Assessment Study in **Annex A** for details.
	Comments on Water Quality Dated 18 March 2024: Technical comment	

	1. R-to-C Point 1(a): It is noted that a secondary level plus disinfection on-site STP is proposed to handle the sewage generated from the proposed development, please provide design manual and relevant details of the STP.	Details of the proposed onsite STP are supplemented in Appendix 10.1 and mentioned in S10.6.2.2. To achieve the standard of acceptance of the treated effluent discharged into the coastal waters of Tolo and Port Shelter Water Control Zones, the on-site STP, subject to subsequent detailed design by specialist contractor, there could be package MBR sewage treatment plant with UV disinfection or equivalent. The on-site STP will be located in underground plant room within the clubhouse building near site entrance as highlighted on Plan 1 of Appendix 10.1. The treated effluent will be discharged to the proposed 525mm diameter stormwater drain to be constructed by the project proponent with downstream connection to Ho Chung River as highlighted on Plans 1 and 2 of Appendix 10.1. The contingency arrangement in the event of operation failure of the on-site STP will be by tankering away of untreated sewage. Detailed design submission should follow the "Guidelines for the Design of Small Sewage Treatment Plants" published by EPD for approval by EPD. *(This response is superseded as a result of further liaison with EPD. Please refer to our latest response to Comment No. 1 from Water Quality Management Group dated 3 April 2024 above.)*

2. R-to-C Point 1(b): Please explain and provide the specific standards to be adopted for the effluents discharged according to TM-DSS.

As the estimated sewage flow (ADWF) from the proposed development during operation is around 32m^3/day, the standard of acceptance of the treated effluent discharged into the coastal waters of Tolo and Port Shelter Water Control Zones, Table 7 of the TM-DSS for flow rate $>$ 10 m^3/day and $\leqq$ 200m^3/day should be adopted. The specific standards to be adopted are extracted from TM-DSS as below and are supplemented as Table 10.3.

Flow rate (m^3/day) Determinand	$>$10 and $\leqq$200
pH (pH units)	6-9
Temperature (°C)	45
Colour (lovibond units) (25mm cell length)	1
Suspended solids	30
BOD	20
COD	80
Oil & Grease	20
Iron	10
Boron	4
Barium	4
Mercury	0.001
Cadmium	0.001
Other toxic metals individually	1
Total toxic metals	2
Cyanide	0.1
Phenols	0.5
Sulphide	5
Total residual chlorine	1
Total nitrogen	20
Total phosphorus	8
Surfactants (total)	15
E. coli (count/100ml)	1000

(This response is superseded as a result of further liaison with EPD. Please refer to our latest response to Comment No. 1 from Water Quality Management Group dated 3 April 2024 above.)

Other comment/observation

3. R-to-C Point 1(d): Please amend the sentence 'The contingency arrangement in the event of operation failure of the STP will include tankering away of untreated sewage.' and incorporate into S10.6.2.3 which is about contingency measures.

S10.6.2.2 is revised accordingly. The contingency arrangement of tankering away of untreated sewage is added in S10.6.2.3. Please refer to the revised Environmental Assessment Study in **Annex A** for details.

	4. S10.5.1.1: Please include measures under ETWB TC(Works) No.5/2005 in the bullet points.	Relevant measures under ETWB TC(Works) No.5/2005 have been supplemented. Please refer to the revised Environmental Assessment Study in **Annex A** for details.
3.	**Environmental Protection Department, Environmental Assessment Division, Territory South Group, Sai Kung & Tseung Kwan O, dated 6 and 20 February 2024**	
	Comment on Sewerage Impact Assessment Dated 20 February 2024: "Appendix B Table B1 Please clarify if the unit flow factor for 'Clubhouse' is 1.58 m3/day. According to Table T-2 'Unit Flow Factors of Commercial Flows and Student Flows' under 'Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning', unit flow factor for J10 'Restaurants & Hotels' is 1.50m3/day."	According to Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning Note (3) of Table T-2, the total unit flow generated from an employee in a particular trade is the sum of the unit flow factor of employee and the unit flow factor of commercial activities of a particular trade under consideration. Therefore, the adopted unit flow factor 1.58m^3/day for employee in clubhouse = 0.08m^3/day (commercial employee) + 1.50m^3/day (J10 Restaurant & Hotels).
	Comments on Water Quality Dated 6 February 2024: Technical comment 1. S10.6.2.2	
	(a) It is noted that a secondary level plus disinfection on-site STP is proposed to handle the sewage generated from the proposed development, please provide design manual and relevant details of the STP.	The design manual and relevant details of the STP will be submitted in later detailed design submission stage following the "Guidelines for the Design of Small Sewage Treatment Plants" published by EPD for approval by EPD. *(This response is superseded as a result of further liaison with EPD. Please refer to our latest response to Comment No. 1 from Water Quality Management Group dated 3 April 2024 above.)*

	(b) It is noted that treated effluent from the STP will be discharged to Ho Chung River via stormwater drain, please explain and provide the standards to be adopted for the effluents discharged according to TM-DSS.	As regards the standard of acceptance of the treated effluent to minimize pollution, Table 7 of the "Technical Memorandum Standards for Effluent Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters" for Port Shelter Area shall be followed. The above statement has been supplemented in S10.6.2.2. *(This response is superseded as a result of further liaison with EPD. Please refer to our latest response to Comment No. 1 from Water Quality Management Group dated 3 April 2024 above.)*
	(c) Please provide estimated sewage flow (ADWF) from the proposed development during operation.	The estimated sewage flow (ADWF) from the proposed development during operation is around 32 m^3/day. The information has been supplemented in S10.6.2.1. Please refer to the revised Environmental Assessment Study in **Annex A** for details.
	(d) Please clarify whether the contingency arrangement in the event of operation failure of the STP e.g. tanker away of untreated sewage. Please provide details of emergency by-pass of the proposed STP, if any and illustrate emergency by-pass in a figure.	The contingency arrangement in the event of operation failure of the STP will be by tanker away of untreated sewage. The above statement has been supplemented in S10.6.2.2. *(This response is superseded as a result of further liaison with EPD. Please refer to our latest response to Comment No. 3 from Water Quality Management Group dated 18 March 2024 above.)*
	2. S10.1.1.1 - Please include ProPECC PN1/23 'Drainage Plans subject to Comment by the Environmental Protection Department' and ETWB TC(Works) No.5/2005 'Protection of Natural Streams/rivers from Adverse Impacts arising from Construction Works'.	Amended accordingly. Please refer to the revised Environmental Assessment Study in **Annex A** for details.
	Other comment/observation	
	3. S10.1.1.2 Table 10.1	
	(a) Please review objective of 'Bacteria' item (b) and amend as appropriate.	S10.1.1.2 has been amended accordingly. Please refer to the revised Environmental Assessment Study in **Annex A** for details.

	(b) Water quality objectives for 'pH' are incorrect. Please amend as appropriate.	S10.1.1.2 has been amended accordingly. Please refer to the revised Environmental Assessment Study in **Annex A** for details.
	(c) Water quality objectives for 'Phenol' and 'Turbidity' are missing. Please add.	S10.1.1.2 has been amended accordingly. Please refer to the revised Environmental Assessment Study in **Annex A** for details.
	(d) Please critically review all water quality objectives according to 'Port Shelter Water Control Zone Statement of Water Quality Objectives (Cap. 358 sub. leg. O)'.	S10.1.1.2 has been amended accordingly. Please refer to the revised Environmental Assessment Study in **Annex A** for details.
	4. S10.3, Table 10.2 & Figure 10.1 - Please include mangrove (coastal protection area), conservation area, water gathering grounds as WSR. Reference can be made to EPD's Centralized Environmental Database.	The concerned discussion and figure have been amended accordingly. Please refer to the revised Environmental Assessment Study in **Annex A** for details.
	5. S10.5.1.1 - ProPECC PN1/94 has been superseded by PN2/23. Please review and update relevant content.	S10.5.1.1 has been amended accordingly. Please refer to the revised Environmental Assessment Study in **Annex A** for details.
	6. S10.5.1 - Please incorporate ETWB TC(Works) No.5/2005 as mitigation measures during construction phase of the proposed development.	S10.5.1 has been amended accordingly. Please refer to the revised Environmental Assessment Study in **Annex A** for details.
	7. S10.5.2.1 - Please amend to 'Sufficient portable chemical toilets and sewage holding tanks should be provided...'.	S10.5.2.1 has been amended accordingly. Please refer to the revised Environmental Assessment Study in **Annex A** for details.
	8. S10.6.1.3 - ProPECC PN5/93 has been superseded by PN1/23. Please review and update relevant content.	S10.6.1.3 has been amended accordingly. Please refer to the revised Environmental Assessment Study in **Annex A** for details.
	Comments on Noise Planning Dated 6 February 2024:	

	9. S.4.5.1.2 & App.4.1- The traffic flow data for Road IDs 17 & 18 in Table 4.2 do not tally with those in App.4.1. Please review thoroughly and make necessary amendment.	S.4.5.1.2 and App. 4.1 have been reviewed and revised accordingly. Please refer to the revised Environmental Assessment Study in **Annex A** for details.
	10. S.4.2 - The minimum predicted road traffic noise level for R12max should be 60.1 instead of 55.7.	Appendix 4.2 has been reviewed and revised accordingly. Please refer to the revised Environmental Assessment Study in **Annex A** for details.
	11. S.4.9.4.1 - EPD issued a new practice note for professional persons on application of INMD (Ref.: PN5/23). Reference could also be made to PN5/23 when assessing INMD as mitigation measures for road traffic noise.	Noted and the reference of PN5/23 has been supplemented in S4.9.4.1 and S4.9.4.2. Please refer to the revised Environmental Assessment Study in **Annex A** for details.
	12. S.4.9.4.3 - Apart from room size and window opening size, justifications with technical documents shall also be provided to EPD in case there is any variation on overlapping length or gap width.	According to the PN5/23 guideline, a minimum relative noise reduction (RNR) of 6 dB(A) is required. The noise exceedance level, which is currently at 76.1 dB(A), can be reduced to a level below the exceedance threshold through mitigation measures. *(This response is superseded as a result of further liaison with EPD. Please refer to our latest response to Comment No. 1 from Assessment and Noise Group dated 18 March 2024 above.)*
	13. App.2.1 - Detailed mPD levels for each floor are not provided in the elevation plans.	Please refer to the sectional drawing provided in the appendix of the revised Environmental Assessment Study in **Annex A** for details.
	14. App.4.1 - Only AM Peak traffic flow data are included in this submission. Please confirm AM Peak traffic hours can represent the worst-case scenario. There is inconsistent labeling of floors within the EA (i.e. GF, L1 & L2 vs 1/F, 2/F & 3/F) which may cause confusion.	Please note that the traffic flow and percentage of heavy vehicles have been reviewed and identified that AM peak traffic data represented the worst-case scenario. Footnotes are added in Figure 4.4 and 4.6, Table 4.4, Appendix 4.2 and 4.3 to indicate labelling of floors. Please refer to the revised Environmental Assessment Study in Annex A for details.
	15. S.5.1 - Please clarify why Tsuen Tung Film & TV Ltd adjoining the site is not identified as an existing fixed noise source for fixed noise sources impact assessment.	Site survey is conducted in November 2023. No major fixed noise source is identified and do not anticipate major contribution.

	16. S.6.1.2.1- EPD issued a new practice note for professional persons on minimizing noise from construction activities (Ref.: PN1/24). Reference should be made to PN1/24 for proposing quieter construction methods and equipment in construction works.	Noted and S.6.1.2.1 has been revised accordingly. Please refer to the revised Environmental Assessment Study in **Annex A** for details.
	Comments on Land Contamination and Waste Management Dated 6 February 2024:	
	Technical comment	
	17. S.8.4.1.1 - Temporary works area was identified. Please substantiate whether if potential polluting activities have been carried out in the temporary works area and evaluate whether land contamination issue would be expected.	As identified in the site survey, the temporary works area for the Approved Access Road under Planning Application No. A/SK-HC/223 is for site office use only and hence no potential land contamination is anticipated.
	Other comment/observation	
	18. S.9.1.1.1 - Please review if dumping sediment at sea is required for the project. If negative, please remove the Dumping at Sea Ordinance.	Dumping sediment at sea is not required for the Project and the Ordinance has been removed.
	19. S.9.3.5.2 - Please explore whether measures to prevent fly-tipping by utilizing dump trucks equipped with real-time tracking and monitoring devices could be considered. Besides, please also rectify the typo "while.inert" in this section.	The suggested measures of utilising dump trucks equipped with real-time tracking and monitoring devices to prevent fly-tipping has been added. Typo has been amended. Please refer to the revised Environmental Assessment Study in **Annex A** for details.
	Comments on Air Quality Dated 6 February 2024:	
	20. S.7.1.1.2 – Please revise the road type presented in table 7.1 as it is inconsistent with TD confirmation in Appendix 4.1. Please also supplement the substantiation for adopting the buffer distance for LD in this section.	As road type, feeder road, is not provided in HKPSG Chapter 9, buffer distance for feeder road is made reference to that for LD for conservative assessment. Footnote has been added in Table 7.1 to explain. Please refer to the revised Environmental Assessment Study in **Annex A** for details.

	21. S.7.2.1.2-S.7.2.1.2. – Please review whether the concerned Pat Chun Foods & Soys Factory is still operational and update the section accordingly. Besides, other existing residential development located in the vicinity of the chimney identified could not substantiate whether air quality impact would be anticipated, please review.	The operator of the Pat Chun Foods & Soys Factory has advised the Project Team that the chimneys are not in used and the site is for storage use only. Section on other existing residential development located near the chimneys has been removed.
	22. S.7.2.2.1 – Please review the location and separation distance of the planned Ho Chung STP from the boundary of the proposed development and review whether it would be relevant from potential air quality impact point of view.	The name of the planned Ho Chung STP has been amended to Wo Mei STP as discussed. Location of the planned Wo Mei STP is provided in Figure 7.2. Its separation distance from the Proposed Development, its odour mitigation measures and review on any potential air quality impacts have been supplemented in S.7.2.2.1. Please refer to the revised Environmental Assessment Study in **Annex A** for details.
	23. S.7.2.3.1 – Please clarify whether the proposed sewage plant would be located at ground level or underground with full enclosure. Please also clarify whether odour mitigation measures such as provision of deodorizing units of at least 99.5% odour removal efficiency; locating the exhaust vent as far away from sensitive receiver as possible would be implemented to minimise the potential odour impact.	The proposed sewage treatment plant will be located at underground which will be full enclosed. Odour mitigation measures such as provision of deodorizing units of at least 99.5% odour removal efficiency and locating the exhaust vent as far away from sensitive receivers as possible would be implemented to minimise the potential odour impact.
4.	**Transport Department, NT Regional Office, Traffic Engineering (NTE) Division, Housing & Planning Section, dated 7 March 2024** Section 5	

	Re. Drawing No. SP-03 and SP-04, it is noted that the ingress route would encroach to the opposite lane. Please review the width of the vehicular access.	The width of the vehicular access of Sites A and B are reviewed. To allow for better vehicle manoeuvring, drop kerbs are incorporated for the vehicular accesses while the width of the vehicular accesses are remained unchanged. Replacement pages to Appendix C and Drawing Nos. SP-03 and SP-04 of the Traffic Impact Assessment report have been submitted in the Further Information on 8 April 2024. The Architectural Plan of the Indicative Scheme of the Supporting Planning Statement and relevant technical assessment reports have also been updated accordingly. Please refer to **Annexes B to H** for the relevant replacement pages.

(Last Updated 18 April 2024)

Annex G

Further Information (6) - Response-to-Comments Table

Your ref TPB/Y/SK-HC/7
Our ref 294065/01/WSTY/MYNL/CKJL/05300

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The Secretary
Town Planning Board
15/F, North Point Government Offices
333 Java Road
North Point
Hong Kong

7 May 2024

Dear Sir/Madam,

Application for Amendment of Plan
Under Section 12A of the Town Planning Ordinance (Cap. 131)
to Rezone the Application Site from "Green Belt" to "Residential (Group C)1"
for Proposed House Development at Various Lots in D.D. 244
and Adjoining Government Land, Nam Pin Wai, Sai Kung
(Planning Application No. Y/SK-HC/7)

Submission of Further Information

We refer to the comments received from the Environmental Protection Department dated 29 April 2024 on the captioned Planning Application.

We are pleased to submit herewith a Response-to-Comments Table (**Attachment 1**) together with Replacement Pages of the Updated Environmental Assessment Study (**Annex A**) for your consideration.

The softcopy of the Further Information will be uploaded to the hyperlink provided by the Town Planning Board.

Please note that this submission only serves as technical clarification and has not involved changes in the scheme or findings of the Environmental Assessment Study, thus should be exempted from the recounting requirement. We sincerely seek for the favourable consideration from the Town Planning Board to approve the captioned S12A Planning Application.

Should you have any queries, please contact the undersigned or our Ms. Natalie LEUNG at 2268 3612 (email: natalie.leung@arup.com) or our Ms. Jane LAU at 2268 3893 (email: jane.lau@arup.com).

Yours faithfully,

Theresa YEUNG
Director

Encl. - **Attachment 1** – Response-to-Comments Table
- **Annex A**

c.c. - Clients

Proposed Rezoning of the Application Site from "Green Belt" to "Residential (Group C)1"
Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung, New Territories
(Planning Application No. Y/SK-HC/7)

Responses to Comments

Comments from Related Departments **Page No.**

Proposed Rezoning of the Application Site from "Green Belt" to "Residential (Group C)1"
Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung, New Territories
(Planning Application No. Y/SK-HC/7)

Responses to Comments

No.	Comments	Responses
1.	**Environmental Protection Department, Environmental Assessment Division, Territory South Group, Sai Kung & Tseung Kwan O, dated 29 April 2024**	
	Comment on Revised EA	
	1. (Executive summary-para.10, S.11.1.1.10) As public sewerage is not available in the vicinity of the subject site. Please revise the information accordingly.	Noted. Executive summary and Section 11.1.1.10 have been revised accordingly. Please refer to the replacement pages of the updated Environmental Assessment Study in **Annex A** for details.
	2. (Section 10.6.2.1) - It is noted that the proposed sewage treatment plant shall follow the "Guidelines for the Design of Small Sewage Treatment Plants" published by the EPD and discharge license under Water Pollution Control Ordinance would be obtained for the discharge of the treated effluent. Please update the following sentence as "Detailed design submission should follow the "Guidelines for the Design of Small Sewage Treatment Plants" published by the EPD for approval by EPD."	Noted. Section 10.6.2.1 has been revised as suggested. Please refer to the replacement pages of the updated Environmental Assessment Study in **Annex A** for details.
	3. (Section 2.3) - Please review and update the information presented in this section	Noted and Section 2.3 has been revised. Please refer to the replacement pages of the updated Environmental Assessment Study in **Annex A** for details.

(Last Updated 6 May 2024)

Annex H

Further Information (7) - Response-to-Comments Table

Your ref TPB/Y/SK-HC/7
Our ref 294065/01/WSTY/MYNL/CKJL/05309

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By Hand

The Secretary
Town Planning Board
15/F, North Point Government Offices
333 Java Road
North Point
Hong Kong

23 May 2024

Dear Sir/Madam,

Application for Amendment of Plan
Under Section 12A of the Town Planning Ordinance (Cap. 131)
to Rezone the Application Site from "Green Belt" to "Residential (Group C)1"
for Proposed House Development at Various Lots in D.D. 244
and Adjoining Government Land, Nam Pin Wai, Sai Kung
(Planning Application No. Y/SK-HC/7)

Submission of Further Information

We refer to the comments received from the Antiquities and Monuments Office dated 20 May 2024 on the captioned Planning Application.

We are pleased to submit herewith a Response-to-Comments Table (**Attachment 1**) together with Replacement Pages of the Updated Archaeological Baseline Review Report (**Annex A**) for your consideration.

The softcopy of the Further Information will be uploaded to the hyperlink provided by the Town Planning Board.

Please note that this submission only serves as technical clarification and has not involved changes in the scheme or findings of the Archaeological Baseline Review Report, thus should be exempted from the recounting requirement. We sincerely seek for the favourable consideration from the Town Planning Board to approve the captioned S12A Planning Application.

Should you have any queries, please contact the undersigned or our Ms. Natalie LEUNG at 2268 3612 (email: natalie.leung@arup.com) or our Ms. Jane LAU at 2268 3893 (email: jane.lau@arup.com).

Yours faithfully,

Theresa YEUNG
Director

Encl. - **Attachment 1** – Response-to-Comments Table
- **Annex A**

c.c. - Clients

Proposed Rezoning of the Application Site from "Green Belt" to "Residential (Group C)1"
Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung, New Territories
(Planning Application No. Y/SK-HC/7)

Responses to Comments

Comments from Related Departments **Page No.**

Proposed Rezoning of the Application Site from "Green Belt" to "Residential (Group C)1"
Various Lots in D.D. 244 and Adjoining Government Land, Nam Pin Wai, Sai Kung, New Territories
(Planning Application No. Y/SK-HC/7)

Responses to Comments

No.	Comments	Responses
1.	**Development Bureau, Works Branch, Works Division 1, Commissioner for Heritage's Office, Antiquities and Monuments Office, Heritage Conservation Unit, Archaeology Sub-unit, dated 20 May 2024**	
	Section 4.2.9 1. The newly supplemented aerial photo of 1993 shows the disturbance at Zone 3 and the eastern side of Zone 4, both within Ho Chung SAI. However the extent of disturbance is yet to be verified. Please revise the section and others as appropriate, and change "the site has **no** archaeological potential" to "the site has **low** archaeological potential" in this section to tally with other sections which advised that Zone 3 is of low archaeological potential.	Noted. Section 4.2.9 has been revised from "no" to "low" accordingly. Please refer to the replacement pages of the Updated Archaeological Baseline Review Report in **Annex A** for details.
	Section 5.4.6 2. Please clarify the meaning of the first sentence, "It is noted from field scanning that the archaeological potential of areas to the north of Zone C of the SKNPW2015 (Zones 4 and 5 within the Application Site) might only not be partly disturbed by the open storage development."	Please be clarified that it was a typo. The first sentence of Section 5.4.6 has been revised as "…might only ~~**not**~~ be partly disturbed …". Please refer to the replacement pages of the Updated Archaeological Baseline Review Report in **Annex A** for details.
	3. Please note the field scanning of SKNPW2015 didn't cover Zones 4 and 5, and the fielding scanning conducted by the applicant didn't access to the two zones due to dense vegetation. Please revise the relevant section(s) accordingly and follow up to do Zones 4 and 5 at suitable juncture.	The first sentence of Section 5.4.6 has been revised as "~~**It is noted from field scanning that t**~~**The** archaeological potential of areas …". Please note that this amendment does not result in change to the conclusion of this report. Please refer to the replacement pages of the Updated Archaeological Baseline Review Report in **Annex A** for details.
	Section 6.1.3 4. Please indicate the follow up on Zone 3 when features or deposits of archaeological significance are identified from the archaeological survey.	Item (2) of Section 6.1.3 has been revised in as follows: "2. To recommend mitigation measures should adverse impacts arises. **Mitigation measures could include, but not limited to, preservation (such as by record or *in situ*) before the commencement of any construction works and would be**

Responses to Comments

No.	Comments	Responses
		subjected to agreement with AMO and the project proponent." Please refer to the replacement pages of the Updated Archaeological Baseline Review Report in **Annex A** for details.
	Section 6.1.6 5. Editorial errors which are misleading are still be found in the draft report despite our repeated reminders. For instance, there are no "Item 3" and "Item 4" in Section 6.1.2. AMO's previous request to the applicant to check to ensure the accuracy of the draft report, which has been reiterated, is still valid.	Section 6.1.6 has been revised as follows: "~~**This**~~ **The** archaeological survey-cum-excavation involves two parts: (a) archaeological survey), and (b) archaeological excavation. The archaeological survey should feed adequate information for items (1) to (~~3~~6) mentioned in Section 6.1.~~**2**~~**4** and presented in an interim report in due course. The archaeological excavation will be part of the mitigation measure (items (~~**4**~~**5) and (6**) in Section 6.1.~~**2**~~**4**). It should be proposed by the qualified archaeologist if the Proposed Residential Development has impact on the archaeology of the site." Please refer to the replacement pages of the Updated Archaeological Baseline Review Report in **Annex A** for details.
	Figures 17 & 18 6. As shown in Figure 18, no archaeological works has been carried out at Zone 3. Please made necessary amendment to demarcate the "Area Archaeologically Unsurveyed within the Application Site" for clarity.	Noted. The legends on Figures 17 and 18 have been revised as "Area Archaeologically Unsurveyed within the Application Site **and Ho Chung SAI**". The Area shown on Figures 17 and 18 have also been revised accordingly to include such area within Zones 3, 4 and 5. Please refer to the replacement pages of the Updated Archaeological Baseline Review Report in **Annex A** for details.
	Overall Please revise relevant sections in this report as appropriate to address AMO's comment.	Noted. Please refer to the replacement pages of the Updated Archaeological Baseline Review Report in **Annex A** for details.

(Last Updated 22 May 2024)

Agenda Item No. 3
Replacement Page of RNTPC Paper No. Y/SK-HC/7A
For consideration by the RNTPC on 7.6.2024

Appendix II of RNTPC
Paper No. Y/SK-HC/7A

Detailed Comments from Government Departments

Comments of the District Lands Officer/Sai Kung, Lands Department (DLO/SK, LandsD):

Land Status of the Application Site

1. The application site (the Site) comprises unleased and ***un***allocated Government land (GL) and 24 private lots, namely Lot Nos. 788 RP (Part), 789 RP (Part), 827 RP (Part), 828 RP (Part), 855 RP, 863 RP (Part), 865 RP (Part), 868 RP, 871, 872, 873, 874, 875 RP, 876 RP, 877 RP, 878 RP and 879 RP all in D.D. 244 (collectively "the Group 1 Lots") and Lot Nos. 1939 s.B ss.3, 1939 s.E, 1939 s.F, 1939 RP, 1940 (Part), 1944 RP and 2189 (part) all in D.D. 244 (collectively "the Group 2 Lots"). The land documents governing the private lots and the lot ownership are summarized as follow:-

   (a) The Group 1 Lots are old schedule agricultural lots held under Block Government Lease and no building/structure is permitted. Among the Group 1 Lots, Lot Nos. 788 RP, 789 RP, 827 RP and 828 RP all in D.D. 244 are subject to a short term waiver No. SW46 which permits the lots to be used for the purpose of factory buildings, quarters and open storage;

   (b) Lot Nos. 1939 RP, 1939 s.B ss.3, 1939 s.E and 1939 s.F all in D.D. 244 are governed by New Grant No. 2846 that the sale conditions for these lots could not be traced by this office. Lot Nos. 1940 and 1944 both in D.D. 244 are governed by New Grant No. 2914 subject to G.N. 364 of 1934 as amended by G.N. 50 of 1940 and 106 of 1946. According to the government rent payroll records, these six lots are agricultural lots;

   (c) Lot No. 2189 in D.D. 244 is held under the Conditions of Exchange dated 26.11.2019 and registered in the Land Registry as New Grant No. 22828 for private residential purposes and only the Pink Hatched Black Area ("PHBA") of this lot is involved in the Site. The lease modification application for permitting Lot Nos. 1939 RP and 1944 RP both in D.D. 244 together with any new lot(s) to be granted in the event of any in situ land exchange of these two lots to have vehicular and pedestrian access over the PHBA was approved by DLC on 22.4.2023. The Modification Letter dated 20.12.2023 to effect the proposed lease modification has been registered in Land Registry on 15.1.2024;

   (d) Regarding current ownership, the Group 2 Lots and Lot Nos. 877 RP, 878 RP and 879 RP all in D.D. 244 are owned by the applicants. These lots were involved in the withdrawn s.16 application No. A/SK-HC/338 for proposed recreational use and associated filling and excavation of land ancillary to the residential use in Lot No. 2189 in D.D. 244. The remaining lots of the Site are under different ownership;

The PHBA of Lot No. 2189 in D.D. 244

2. the PHBA of Lot No. 2189 in D.D. 244 ("Lot 2189") is subject to a planning permission approved with conditions by the Town Planning Board on 8.2.2013 under Application No. A/SK-HC/223 for "Proposed House (Ancillary Road)" of Lot 2189. This planning intention has been reflected in the lease that the PHBA is designated as non-building area and restricted for the purposes of the vehicular and pedestrian access road to and from Lot 2189. According to District Lands Conference notes dated 4.6.2014 regarding the approved land exchange of Lot No. 2189 in D.D. 244, the PHBA shall not be countable for gross floor area (GFA) and site coverage (SC) calculations of Lot 2189 under lease after taking the advice of the Planning Department;

3. as noted from the applicants' submission, the PHBA is not taken into account in the GFA and SC calculations under the Indicative Scheme. Since incorporating the PHBA into the rezoning site and taking into account of the PHBA in plot ratio/GFA/SC calculations for developments at the Site would not have any conflict with the existing lease conditions related to the PHBA, preliminarily I have no adverse comment on such proposal; and

4. on the other hand, the PHBA is currently designated as the vehicular and pedestrian access road to and from Lot 2189 and to be formed as the sole access road of the development site under the Indicative Scheme. In view of this, advice from the Transport Department should be sought on whether the traffic capacity of the PHBA is adequate to cope with the additional traffic flow induced by the Indicative Development.

Comments of the Chief Town Planner/Urban Design and Landscape, Planning Department (CTP/UD&L, PlanD):

the applicants should be reminded that approval of s.12A application under Town Planning Ordinance does not imply approval of the site coverage of greenery requirements under APP PNAP-152 and/or under the lease. The site coverage of greenery calculation should be submitted separately to the Buildings Department (BD) for approval. Similarly for any proposed tree preservation/ removal scheme and compensatory planting proposal, the applicants should approach relevant authority direct to obtain necessary approval as appropriate.

Comments of the Chief Engineer/Construction, Water Supplies Department (CE/C, WSD):

1. existing water mains pass through the Site and will be affected by the proposed development. The applicants are required to divert the water mains found on Site.

2. existing water mains inside the Site are needed to be diverted outside the site boundary of the proposed development to lie in GL. A strip of land of minimum 1.5m in width should be provided for the diversion of the existing water mains. The cost of diversion of existing water mains upon request will have to be borne by the applicants; and the applicants shall submit all relevant proposal to WSD for consideration and agreement before the works commence;

3. for those water mains in close vicinity to the Site where diversion is not required, the following conditions shall apply:

(a) existing water mains are affected and no development which requires resiting of water mains will be allowed;

(b) details of site formation work shall be submitted to the Director of Water Supplies for approval prior to commencement of works;

(c) no structures shall be built or materials stored within 1.5m from the centre line(s) of water main(s). Free access shall be made available at all times for staff of the Director of Water Supplies or their contractor to carry out construction, inspection, operation, maintenance and repair works;

(d) no trees or shrubs with penetrating roots may be planted within the Waterworks Reserve or in the vicinity of the water main(s). No change of existing site condition may be undertaken within the aforesaid area without the prior agreement of the Director of Water Supplies. Rigid root barriers may be required if the clear distance between the proposed tree and the pipe is 2.5m or less, and the barrier

must extend below the invert level of the pipe;

(e) no planting or obstruction of any kind except turfing shall be permitted within the space of 1.5m around the cover of any valve or within a distance of 1m from any hydrant outlet; and

(f) tree planting may be prohibited in the event that the Director of Water Supplies considers that there is any likelihood of damage being caused to water mains.

Comments of the Chief Building Surveyor/New Territories East 2 and Rail, BD (CBS/NTE2 & Rail BD):

1. unless the proposed sites abut on a specified street complying with the requirements under Building (Planning) Regulations (B(P)R) 18A(3) and not less than 4.5m wide, the development intensity of the site should be determined by the Building Authority under B(P)R 19(3);

2. under B(P)R 5, all sites shall be provided with means of obtaining access thereto from a street;

3. emergency vehicular access complying with B(P)R 41D shall be provided for all the buildings within the sites; and

4. detailed comments under the Buildings Ordinance will be given provided at the building plan submission stage.

Comments of the Head of Geotechnical Engineering Office, Civil Engineering and Development Department (H(GEO), CEDD):

the proposed development would be located adjacent to the existing Features No. 11NE-B/CR924 and 11NE-B/FR295. The applicants should be reminded to make necessary submissions to LandsD and/or BD for approval if the geotechnical features could affect or be affected by the proposed development (if any) in accordance with the provisions of the Buildings Ordinance.

Comments of the Director of Electrical and Mechanical Services (DEMS):

Electricity Safety

1. in the interests of public safety and ensuring the continuity of electricity supply, the parties concerned with planning, designing, organising and supervising any activity near the underground cable or overhead line should approach the electricity supplier (i.e. CLP Power) for the requisition of cable plans (and overhead line alignment drawings, where applicable) to find out whether there is any underground cable and/or overhead line within and/or in the vicinity of the Site. The parties concerned should also be reminded to observe the Electricity Supply Lines (Protection) Regulation and the "Code of Practice on Working near Electricity Supply Lines" established under the Regulation when carrying out works in the vicinity of the electricity supply lines;

Town Gas Safety

2. There is a high pressure underground town gas transmission pipeline (running along Hiram's Highway) in the vicinity of the proposed development at Nam Pin Wai. It is anticipated that the proposed development will result in a significant increase in population in the vicinity of the above gas installations. A quantitative risk

assessment (QRA) is required from the project proponent to assess the potential risks associated with the gas installations, having considered the proposed development at the Site;

3. no comment on the applicants' QRA submission;

4. the project proponent/consultant/works contractor shall liaise with the Hong Kong and China Gas Company Limited in respect of the exact locations of existing or planned gas pipes/gas installations in the vicinity of the Site and any required minimum set back distance away from them during the design and construction stages of development; and

5. the project proponent/consultant/works contractor is required to observe the Electrical and Mechanical Services Department's requirements on the "Avoidance of Damage to Gas Pipes 2nd Edition" for reference.

9.1.3 Development and redevelopment within this "CDA" site is subject to a maximum plot ratio (PR) of 0.75, a maximum site coverage (SC) of 25% and a maximum building height not exceeding 12m with 3 storeys over one storey of carport as stipulated in the Notes of the Plan. To provide flexibility for innovative design adapted to the characteristics of particular sites, minor relaxation of these restrictions may be considered by the Board through the planning permission system. Each proposal will be considered on its individual planning merits. The implementation of the "CDA" zone largely depends on private initiatives for land assembly. However, in view of the sizeable area of the site, phased development could be carried out provided that the intention for comprehensive redevelopment of the whole site would not be prejudiced.

9.1.4 Pursuant to section 4A(1) of the Ordinance, any development/ redevelopment proposal within this zone is subject to the approval of the Board by way of a planning application under section 16 of the Ordinance. A Master Layout Plan (MLP) should be submitted together with the relevant assessment reports and a landscape master plan as well as other materials as specified in the Notes of the Plan for the approval of the Board under section 4A(2) of the Ordinance. Development/redevelopment will be in accordance with an approved MLP and it should be ensured that the nature and scale of new development will be in keeping with the surrounding natural landscape and land-uses and will not exert pressure on the limited road and other infrastructural provisions in the Area. A copy of the approved MLP shall be made available for public inspection in the Land Registry pursuant to section 4A(3) of the Ordinance.

9.2 Residential (Group C) ("R(C)") : Total Area ~~*3.30*~~ *3.96* ha

9.2.1 The planning intention of this zone is primarily for low-rise, low-density residential developments where commercial uses serving the residential neighbourhood may be permitted on application to the Board, and to restrict the future developments within the prescribed development parameters.

9.2.2 This zone can be divided into two sub-areas:

(a) "R(C)1" - The residential development in this sub-area is subject to a maximum PR of 0.75, either with a maximum SC of 37.5% and a height not exceeding 9m with 2 storeys over one storey of carport, or with a maximum SC of 25% and a height not exceeding 12m with 3 storeys over one storey of carport.

This sub-area covers only ~~*one*~~ *two* ~~*site*~~ *sites* which ~~*is*~~ *are* located in ~~*the area*~~ *areas* sandwiched between Hiram's Highway and Nam Pin Wai Village.

Figure No.	*Scale*	*Figure Title*	**Proposed Amendments to the Approved Ho Chung Outline Zoning Plan No. S/SK-HC/11 – Explanatory Statement of the "R(C)" Zone**
5.5d	-		
ARUP	*Date* May 2023	*Source*	Extracted from the Approved Ho Chung Outline Zoning Plan (No. S/SK-HC/11)

The sub-area falls within the Ho Chung Site of Archaeological Interest. The Antiquities and Monuments Office (AMO) of the Leisure and Cultural Services Department (LCSD) should be consulted well in advance on any development or redevelopment proposals affecting this site of archaeological interest as well as their immediate environs.

(b) "R(C)2" – The residential development in this sub-area is subject to a maximum PR of 0.4, a maximum SC of 20% and a height not exceeding 9m with 2 storeys over one storey of carport.

This sub-area covers the area to the south-west of Hing Keng Shek which has mostly been developed into low-density residential houses. The site is only accessible via the sub- standard Hing Keng Shek Road.

9.2.3 The above sub-areas mainly reflect the existing character and development intensity. The development restrictions are mainly to conserve the existing character and intensity of the developments so as to blend in well with the surrounding natural environment and rural character as well as not to overload the limited infrastructural facilities, particularly the transport network in the Area.

9.2.4 Minor relaxation of the stated restrictions may be considered by the Board on application under section 16 of the Ordinance. This provision is to allow the Board to consider proposals for building layout and design which, while not strictly complying with the stated restrictions, meet the planning objectives. It is hoped to encourage imaginative designs which are adapted to the characteristics of particular sites, and overcome the need for stilting or allow for the conservation of environmentally important natural features or mature vegetation. Each proposal will be considered on its own merits.

9.2.5 Some scattered areas outside existing private residential lots within this zone may not be suitable for residential development. Their suitability for development or inclusion into adjoining lots for development would be assessed individually at the land administration stage based on their visual and amenity value, accessibility and geotechnical, environmental, infrastructural and traffic impacts.

9.3 Residential (Group D) ("R(D)") : Total Area 6.78 ha

9.3.1 The planning intention of this zone is primarily for improvement and upgrading of existing temporary structures within the rural areas through redevelopment of existing temporary structures into permanent buildings. It is also intended for low-rise, low-density residential developments subject to planning permission from the Board. This is in

Figure No.	Scale	Figure Title	**Proposed Amendments to the Approved Ho Chung Outline Zoning Plan No. S/SK-HC/11 – Explanatory Statement of the "R(C)" Zone**
5.5e	-		
ARUP	Date: May 2023	Source:	Extracted from the Approved Ho Chung Outline Zoning Plan (No. S/SK-HC/11)