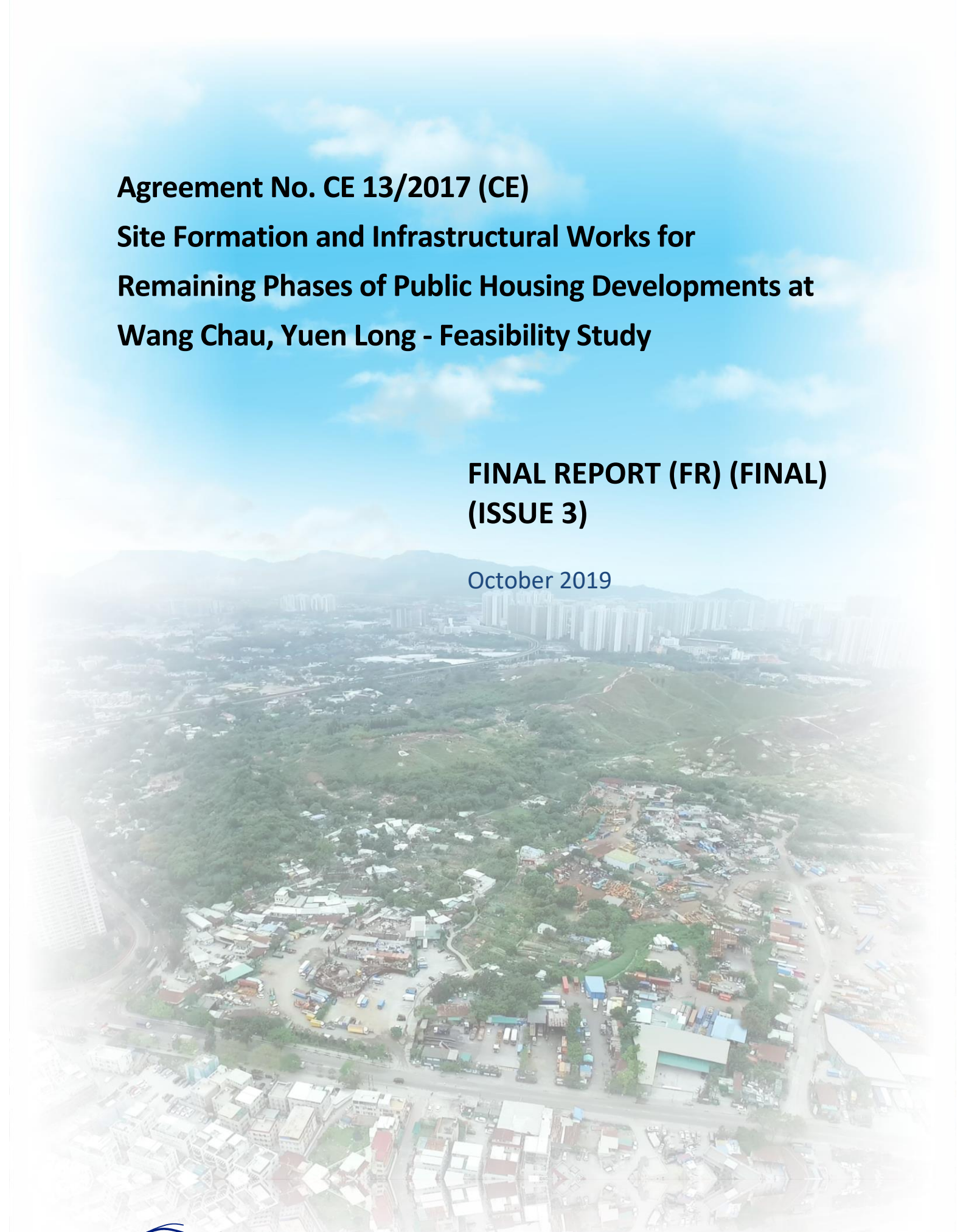
Agreement No. CE 13/2017 (CE)
Site Formation and Infrastructural Works for Remaining Phases of Public Housing Developments at Wang Chau, Yuen Long - Feasibility Study

FINAL REPORT (FR) (FINAL) (ISSUE 3)

October 2019



土木工程拓展署
Civil Engineering and Development Department

BLACK & VEATCH

Agreement No. CE 13/2017 (CE)

Site Formation and Infrastructural Works for Remaining Phases of Public Housing Developments at Wang Chau, Yuen Long – Feasibility Study

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Final Report (FR) (Final)

196587/B&V/050/Issue 3

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October 2019

DOCUMENT CONTROL	**Agreement No. CE 13/2017 (CE)**	No: **196587/B&V/050**
AMENDMENT RECORD	**Site Formation and Infrastructural Works for Remaining Phases of Public Housing Developments at Wang Chau, Yuen Long – Feasibility Study**	Prepared by: **B&V**
Final Report (FR) (Final)	Client: CEDD	Initial: [redacted]
		Date: **October 2019**

Pages	Date	Issue No	Description	Initials
All	April 2019	1	Issue to CEDD for comment	[redacted]
All	April 2019	2	Issue to CEDD for comment	
All	October 2019	3	Issue to CEDD for record and retention	

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	Name	Signature	Date
Prepared	[redacted]		October 2019
Checked			October 2019
Reviewed			October 2019
Authorised			October 2019

1 INTRODUCTION

1.1 Project Background

1.1.1 Black & Veatch Hong Kong Limited (B&V) was commissioned by Civil Engineering and Development Department (CEDD) to examine the technical feasibility and sustainability of remaining phases of public housing developments at Wang Chau (the Assignment), location of which is shown on **Figure 196587/B&V/GEN/002**.

1.1.2 The proposed site (the Site) was identified by the Government as part of the prevailing Government's policy to increase land supply to meet public demand. The Site is located at the western flank of Shan Pui Alluvial Valley, bounded by Fuk Hi Street to the east and Kai Shan to the west, the planned Yuen Long Industrial Estate Extension (YLIEE) to the north and a number of natural hillsides to the south. Generally, the Site is a relatively flat terrain with a gentle gradient of 2% sloping from +3.9 mPD at the southeast near Long Ping Road/Fuk Hi Street to +15.8 mPD at the west near Kai Shan. Currently, the Site is zoned 'Green Belt' (GB) and 'Open Storage' (OS) on the approved Ping Shan OZP No. S/YL-PS/18, as shown in **Figure 196587/B&V/OZP/001**, and is occupied by open storage, vehicle parks, farmland, fallow land, grassland, rural residential dwellings and temporary structures.

1.1.3 The Assignment is to confirm the feasibility of the development and infrastructure works by undertaking a series of technical assessments so as to support the proposed zoning amendment of land use. Both cost-effectiveness and technical feasibility of the Development would be considered in formulating proposed works, mitigation measures and implementation programme for potential phased population intake. Subject to findings of the Assignment, an investigation, design and construction consultancy may be commissioned to implement the final recommended site formation and infrastructure works.

1.1.4 "The Development" means collectively the developments proposed in an optimal scheme for the proposed public housing, Government/Institutional and Community (G/IC), schools within the Site, re-provision of any existing structures/facilities therein, and the associated site formation and infrastructure works, which comprise the following (subject to findings and recommendations from other technical assessments):

a) Site formation works including slope cutting and earth filling works, as well as geotechnical works and earth retaining structures;

b) Works for land decontamination;

c) Road works (including construction of new roads, footpaths, cycle tracks, existing road improvements, provision of new junctions, etc.);

d) Sewerage infrastructure works (including network of gravity sewers and/or sewage pumping station and associated rising mains, etc.);

e) Drainage infrastructure works (including stormwater drainage network, surface drains, improvement to existing drainage channel and construction of drainage box culvert);

f) Environmental mitigation measures; and

g) Other infrastructure works including water supply and utility services connections (by respective agencies or utility undertakings).

1.2 Objective of this Report

1.2.1 The purpose of this Final Report is to:

a) Provide a summary of the overall Assignment;

b) Set out key findings, proposals and recommendations of the Assignment;

c) Present the approach, methodology and results of the technical assessments; and

d) Proposes the implementation strategy and framework, including cost estimation, recommendation on implementation and phasing for the Infrastructure works.

1.2.2 The structure of the report is as follows:

- Section 1 introduces the project background, the main tasks and purpose of this report.
- Section 2 discusses the latest development proposal in the Development;
- Section 3 summarises the findings in the Traffic and Transport Impact Assessment (TTIA);
- Section 4 summarises the findings in the Preliminary Drainage Impact Assessment (DIA);
- Section 5 summarises the findings in the Preliminary Sewerage Impact Assessment (SIA);
- Section 6 summarises the findings in the Preliminary Water Supply Impact Assessment (WSIA);
- Section 7 summarises the findings in the Preliminary Utilities Impact Study Report;
- Section 8 summarises the findings in the Preliminary Geotechnical Assessment;

- Section 9 summarises the findings in the Preliminary Site Formation Assessment;
- Section 10 summarises the findings in the Preliminary Environmental Review;
- Section 11 summarises the findings in the Landscape and Visual Impact Assessment;
- Section 12 summarises the findings in the Land Contamination Assessment;
- Section 13 summarises the findings in the Preliminary Air Ventilation Assessment;
- Section 14 summarises the findings in the Preliminary Land Requirement Study;
- Section 15 summarises the findings in the Preliminary Sustainability Assessment;
- Section 16 presents the Cost Estimation, Phasing, Programme, Implementation Mechanisms; and
- Section 17 provides the conclusion to the report.

2 LATEST DEVELOPMENT PROPOSAL

2.1 Option Generation

2.1.1 In the Option Generation, Evaluation and Preliminary Assessments under the Assignment, a set of guiding principles were established to address key constraints of the Site identified in the Baseline Review. Three development layout options have been formulated and compared against a set of evaluation criteria in different aspects including planning, land requirements, engineering and infrastructure, environment, economics and social aspects. An Optimal Scheme was chosen and carried forward for further analysis and assessments. The optimal scheme is shown in **Figure 196587/B&V/OPT/003**.

2.2 Development Layout

2.2.1 The Site will be rezoned for public housing development with 13 residential blocks (10 blocks with 40 domestic storeys and 3 blocks with 42 domestic storeys with building height at approximately +121.1 mPD to +130.7 mPD) to provide 13,000 flats, which are subject to review in the detailed design stage. The public housing development will be supported by retail facilities, community facilities, car park (around 23 m high at +30.5 mPD), Public Transport Interchange (PTI) (around 10 m high at +14.5 mPD to +16.5 mPD), kindergarten and two primary schools (around 20 m high at +26.5 mPD).

2.2.2 The preliminary development parameters are summarized in **Table 2.1**.

Table 2.1 – Preliminary Development Parameters

	Development Parameters
Total Site Area	12.04 ha
Net Site Area for Public Housing	10.83 ha
Maximum Permitted Domestic Plot Ratio (PR)	6.0
Maximum Permitted Non-domestic Plot Ratio (PR)	0.5
Maximum Building Height	135 mPD
Total Flat Production	13,000 Flats
Average Flat Size	50 m2
Person Per Flat	2.8
Design Population	36,400
Retail	12,972 m2 GFA
Community Facilities	1,296 m2 GFA
Public Transport Interchange	5,290 m2 GFA
Above-ground carpark	30,000 m2 GFA
Kindergarten	26 Classrooms
School Provision	Two 24-Classroom Primary Schools (25.5 Students per class)
Target Population Intake	2033

3 PRELIMINARY TRAFFIC AND TRANSPORT IMPACT ASSESSMENT (TTIA)

3.1 Introduction

3.1.1 The objectives of the Preliminary Traffic and Transport Impact Assessment (TTIA) include the following:

- To conduct a comprehensive review of the traffic and transport data and carry out assessments to appraise the existing traffic condition within the Area of Influence (AOI);
- To present the methodology of traffic forecast and predict the future demand for traffic and public transport arising from the Development in design scenarios;
- To investigate different road schemes for both of internal and external road network to the Development; and
- To assess the traffic implication in different design scenarios and formulate mitigation measure / improvement schemes within the AOI.

3.1.2 Findings and recommendations of the TTIA are presented in Preliminary Traffic and Transport Impact Assessment Report. A summary of the assessment is presented in the sections below.

3.2 Traffic Impacts

3.2.1 Traffic to be generated from the Development will cause an increase in junction flows and link flows. To cater for the additional trips, the operational performance of critical junctions and road links should be reviewed and junction improvement schemes should be proposed if necessary. Also, the Development will generate significant demand on other modes of transportation including pedestrian and public transportation. Pedestrian connectivity and capacity of transportation facilities should be addressed.

3.3 Methodologies

Existing Traffic Condition

3.3.1 In order to assess the traffic and transport impact arising from the Development, an AOI has been established and agreed with the Transport Department. A traffic survey in the form of manual classified counts were carried out during the periods from 0730 to 0930 and from 1700 to 1900 of a typical weekday in September of 2017 to determine the existing traffic demand within the AOI during peak periods. The locations of the surveyed junctions / links are illustrated in **Figure 196587/B&V/TTIA/101**.

3.3.2 Existing operational performance of key junctions were assessed by calculating the reserve capacity (RC) for signal-controlled junctions, and the ratio of flow to capacity (RFC) for priority junctions and roundabouts.

Design Year

3.3.3 The Development is targeted for population intake by year 2033. In order to assess the impact of the traffic in relation to the Development on the local road network, it is necessary to forecast the traffic flows for year 2036, which is 3 years upon the target population intake.

Traffic Model Methodology for Base Year Model

3.3.4 Transport Department's 2008-based Base District Traffic Model (BDTM) "NTW1" covering Yuen Long and Tin Shui Wai is adopted for the Study. The NTW1 year 2016 traffic model are cordoned off and fine tuned to produce a Local Area Model (LAM) for providing traffic flows within the agreed AOI to improve the efficiency of modelling run time.

3.3.5 The base year and future year local area models for weekday AM & PM peaks using the latest 2014-based Territorial Population and Employment Data Matrices (TPEDM) planning assumption released by the Planning Department in March 2017 are developed for providing traffic forecast for traffic impact assessment.

3.3.6 As the current 2008-based BDTM NTW1 model are not developed based on the latest 2014-based TPEDM planning assumptions, in-house Strategic Model, MVCTS, are adopted to provide strategic traffic forecast and cordoned matrices for the LAM. MVCTS model is validated and updated using the latest 2014-based TPEDM, 2014 Annual Traffic Census flows, highway and railway network development programme, port and airport throughput assumptions, toll assumptions, and economic forecast indicators.

Development Traffic Generation

3.3.7 Trip generation rates for the Development are referenced to the Transport Planning & Design Manual (TPDM) Volume 1 Chapter 3 Annex D Traffic Generation and Attraction Rates.

Traffic Model Methodology for Future Design Year

3.3.8 Similar to base year model development, MVCTS for future years adopted the latest 2014-based TPEDM planning data. Cordon matrices are provided by MVCTS for building up the initial matrices for future year LAM.

3.4 Traffic Impact Assessment

3.4.1 A TIA has been carried out to identify critical issues and recommend any associated traffic improvement schemes. The key junctions and major road links under this assessment are shown in **Figure 196587/B&V/TTIA/101**.

Assessment of Major Junctions

3.4.2 The operational performance of the identified critical junctions are assessed for Design Year 2036. The results are summarized in **Table 3.1.**

Table 3.1 – Junctions Performance in Design Year 2036

Ref.	Junction	Method of Control	RC/RFC(1)			
			2036 Reference Case		2036 Design Case	
			AM Peak	PM Peak	AM Peak	PM Peak
J1	Fuk Hi Street / Long Ping Road	Signal	67%	95%	-5%	27%
J2	Long Ping Road / Long Ping Estate Bus Terminus	Priority	1.11	0.99	1.52	1.20
J3	Long Ping Road / Fung Chi Road	Signal	24%	40%	-7%	9%
J4	Fung Chi Road / Wang Tat Road	Signal	15%	13%	-4%	11%
J5	Wang Tat Road / Ma Wang Road / Ma Miu Road	Signal	69%	77%	62%	71%
J6	Shui Pin Wai Interchange	Signal	55%	54%	30%	26%
J7	Castle Peak Road-Ping Shan / Long Tin Road / Ma Wang Road / Wang Tat Road	Signal	46%	52%	40%	48%
J9	Fuk Hi Street / Wang Lok Street	Signal	35%	28%	-10%	-8%
J10	Wang Lok Street / Wang Tat Road/ Long Yip Street / Yuen Long On Lok Road / Ma Wang Road	Signal	43%	48%	16%	18%
J11	Po Yip Street / Long Yip Street / Yuen Long On Lok Road	Signal	30%	41%	16%	30%
J12	Castle Peak Road-Yuen Long / Long Yat Road / Long Lok Road	Signal	32%	38%	25%	33%
J13	Pok Oi Interchange	Roundabout	0.92	0.92	0.97	0.97
J14	Fuk Hi Street / Proposed Development Access	Signal	-	-	22%	59%
J15	Fuk Hi Street / Proposed PTI	Priority	-	-	0.33	0.32

Note: (1) RC = Reserve Capacity, RFC = Ratio of Flow to Capacity

3.4.3 The assessment results indicate that all the critical junctions would be operated within their capacities (i.e. RC >0% and RFC <1.0) except 5 junctions including J1 – Fuk Hi Street / Long Ping Road, J2 – Long Ping Road / Long Ping Estate Bus Terminus, J3 – Long Ping Road / Fung Chi Road, J4 – Fung Chi Road / Wang Tat Road and J9 – Fuk Hi Street / Wang Lok Street would be operated over their capacities and J13 – Pok Oi Interchange would be operated near its capacity in Design Year 2036.

Assessment of Road Links

3.4.4 The operational performance of the identified road links are assessed for Design Year 2036. The results are summarized in **Table 3.2**.

Table 3.2 – Road Links Performance in Design Year 2036

Ref.	Road	Dir.	Capacity[1] (pcu/hr)	2036 Reference Case				2036 Design Case			
				Traffic Flow (pcu/hr)		V/C Ratio		Traffic Flow (pcu/hr)		V/C Ratio	
				AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
L1	Fuk Hi Street	EB	2,800	500	540	0.18	0.19	775	710	0.28	0.25
		WB	2,800	740	775	0.26	0.28	975	1,020	0.35	0.36
L2	Long Ping Road	NB	2,800	1,030	905	0.37	0.32	1,245	1,095	0.44	0.39
		SB	2,800	795	725	0.28	0.26	1,590	1,230	0.57	0.44
L3	Wang Lok Street	NB	2,800	725	735	0.26	0.26	1,030	930	0.37	0.33
		SB	2,800	795	685	0.28	0.24	1,005	905	0.36	0.32
L4	Fung Chi Road	NB	2,800	585	580	0.21	0.21	800	600	0.29	0.21
		SB	2,800	425	295	0.15	0.11	460	315	0.16	0.11
L5	Wang Tat Road	EB	2,800	1,100	1,235	0.39	0.44	1,155	1,290	0.41	0.46
L6	Ma Wang Road	WB	4,450	985	1,190	0.22	0.27	1,185	1,205	0.27	0.27
L7	Long Tin Road (West of Shui Pin Wai Interchange)	EB	5,700	2,620	2,480	0.46	0.44	2,705	2,555	0.47	0.45
		WB	5,700	2,145	2,695	0.38	0.47	2,245	2,755	0.39	0.48
L8	Long Tin Road (North of Tong Yan San Tsuen Interchange)	NB	5,700	3,805	3,450	0.67	0.61	4,190	3,680	0.74	0.65
		SB	5,700	2,870	3,160	0.50	0.55	3,205	3,450	0.56	0.61
L9	Long Yip Street	EB	2,800	1,260	1,305	0.45	0.47	1,535	1,470	0.55	0.53
L10	Yuen Long On Lok Road	WB	4,450	1,235	1,285	0.28	0.29	1,420	1,475	0.32	0.33
L11	Castle Peak Road – Yuen Long	EB	3,200	1,670	1,840	0.52	0.58	1,710	1,860	0.53	0.58
		WB	3,200	1,480	1,475	0.46	0.46	1,525	1,490	0.48	0.47
L12	Castle Peak Road – Ping Shan	EB	3,200	3,105	2,925	0.97	0.91	3,340	3,060	1.04	0.96
		WB	3,200	2,470	3,120	0.77	0.98	2,640	3,290	0.83	1.03
L13	Yuen Long Highway (North of Pok Oi Interchange)	NB	6,100	7,280	6,360	0.89	0.78	7,515	6,495	0.92	0.79
		SB	6,100	5,515	6,185	0.90	1.01	5,655	6,315	0.93	1.04
L14	Yuen Long Highway (Between Pok Oi Interchange and Shap Pat Heung Interchange)	NB	4,000	4,115	4,060	1.03	1.02	4,135	4,060	1.03	1.02
		SB	4,000	4,220	3,630	1.06	0.91	4,220	3,630	1.06	0.91
L15	Yuen Long Highway (Between Shap Pat Heung Interchange and Tong Yan San Tsuen Interchange)	EB	6,100	5,725	4,960	0.94	0.81	5,725	4,960	0.94	0.81
		WB	6,100	5,240	5,105	0.86	0.84	5,260	5,105	0.86	0.84
L16	Yuen Long Highway (West of Tong Yan San Tsuen Interchange)	EB	6,100	5,535	5,565	0.91	0.91	5,850	5,855	0.96	0.96
		WB	6,100	6,180	5,610	1.01	0.92	6,565	5,840	1.08	0.96

Ref.	Road	Dir.	Capacity(1) (pcu/hr)	2036 Reference Case				2036 Design Case			
				Traffic Flow (pcu/hr)		V/C Ratio		Traffic Flow (pcu/hr)		V/C Ratio	
				AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
L17	Slip road from Long Tin Road (SB) to Yuen Long Highway (EB)	-	1,800	1,695	1,155	0.94	0.64	1,695	1,155	0.94	0.64
L18	Slip road from Long Tin Road (SB) to Yuen Long Highway (WB)	-	3,600	1,840	1,815	0.51	0.50	2,120	2,045	0.59	0.57
L19	Slip road from Yuen Long Highway (EB) to Long Tin Road (NB)	-	3,600	1,785	1,855	0.50	0.52	2,095	2,145	0.58	0.60
L20	Slip road from Yuen Long Highway (WB) to Long Tin Road (NB)	-	1,800	1,555	1,730	0.86	0.96	1,580	1,730	0.88	0.96

Note: (1) Road link capacity was made reference to Table 6.2, Technical Report of Restructuring and Enhancement of the CTS-3 Model – Feasibility Study

3.4.5 The assessment results show that all the above road links will still be operated within capacity (i.e. V/C ratios below 1.0.) in design year 2036 except 4 road links including L12 – Castle Peak Road – Ping Shan, L13 - Yuen Long Highway (North of Pok Oi Interchange), L14 - Yuen Long Highway (Between Pok Oi Interchange and Shap Pat Heung Interchange) and L16 - Yuen Long Highway (West of Tong Yan San Tsuen Interchange), which would operate with V/C ratio between 1.0 and 1.1, meaning that the road sections are slightly overloaded, but heavy congestions and long traffic queues would not be expected. The road sections will experience some delay with reduced traffic speed at peak periods, which is commonly seen at the strategic roads in some urban areas, but it will still be manageable.

Footpaths and Crossings in the Vicinity of the Site

3.4.6 It is anticipated that majority of the pedestrian demands in the peak hours are related to the public transport mode, which include rail and non-rail trips to/from the Development. According to the operational assessment result, all footpaths and crossings would be operated with ample capacities in design year 2036 after population intake of the Development.

Provision of Public Transport Facilities / Services

3.4.7 Based on the MVCTS Public Transport Model, **Table 3.3** summarises Design Year 2036 AM (Completion year + 3 years) peak boardings (i.e. outbound direction) on the bus services (including Bus mode and Bus-to-Rail mode) together with the estimated number of bus routes required.

Table 3.3 – Proposed Bus Service

Scenario	Site	Population	2036 AM Peak Outbound Direction Public Transport Demand(1) (patronage/hr)	Required Bus Trips(2) (bus/hr)	Required Bus Routes(3)
1	Northern and Southern Portions	36,400	3,640	40	6

Note:
(1) According to MVCTS Public Transport Model, a public transport trip rate of 0.1 patronage/hr/population was adopted
(2) Based on an occupancy of 90 passengers per bus (70% of full bus capacity [130 passengers])
(3) Based on maximum frequency of 8 minutes for each bus routes

Construction Traffic Impact Assessment

3.4.8 Considering the construction sequence and schedule, Year 2029 is identified as the critical construction stage with respect to the peak construction traffic generated. Refer to the construction activities during the peak construction period, around 144 trucks per day or 45 pcu/hr would be generated from and attracted to the site. Therefore, traffic forecasts are developed for Design Year 2029.

3.4.9 The operational performance of the identified critical junctions and road links are assessed for Design Year 2029. The results are summarized in **Table 3.4** and **Table 3.5** respectively.

Table 3.4 – Junctions Performance in Design Year 2029

Ref.	Junction	Method of Control	RC/RFC(1)			
			2029 Reference Case		2029 Design Case	
			AM Peak	PM Peak	AM Peak	PM Peak
J1	Fuk Hi Street / Long Ping Road	Signal	69%	100%	61%	89%
J2	Long Ping Road / Long Ping Estate Bus Terminus	Priority	1.08	0.97	1.10	0.99
J3	Long Ping Road / Fung Chi Road	Signal	27%	43%	23%	37%
J4	Fung Chi Road / Wang Tat Road	Signal	18%	18%	18%	18%
J5	Wang Tat Road / Ma Wang Road / Ma Miu Road	Signal	74%	86%	74%	86%
J6	Shui Pin Wai Interchange	Signal	62%	60%	59%	56%
J7	Castle Peak Road-Ping Shan / Long Tin Road / Ma Wang Road / Wang Tat Road	Signal	50%	60%	50%	60%
J9	Fuk Hi Street / Wang Lok Street	Signal	38%	29%	38%	29%
J10	Wang Lok Street / Wang Tat Road/ Long Yip Street / Yuen Long On Lok Road / Ma Wang Road	Signal	46%	53%	46%	53%
J11	Po Yip Street / Long Yip Street / Yuen Long On Lok Road	Signal	31%	46%	31%	46%
J12	Castle Peak Road-Yuen Long / Long Yat Road / Long Lok Road	Signal	37%	41%	37%	41%
J13	Pok Oi Interchange	Roundabout	0.88	0.84	0.88	0.84
J14	Fuk Hi Street / Proposed Development Access	Signal	-	-	93%	>100%

Note: (1) RC = Reserve Capacity, RFC = Ratio of Flow to Capacity

3.4.10 The assessment results indicate that all the critical junctions would be operated within their capacities (i.e. RC >0% and RFC <1.0) except J2 – Long Ping Road / Long Ping Estate Bus Terminus would be operated near its capacities in Design Year 2029.

Table 3.5 – Road Links Performance in Design Year 2029

Ref.	Road	Dir.	Capacity(1) (pcu/hr)	2029 Reference Case				2029 Design Case			
				Traffic Flow (pcu/hr)		V/C Ratio		Traffic Flow (pcu/hr)		V/C Ratio	
				AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
L1	Fuk Hi Street	EB	2,800	490	530	0.18	0.19	490	530	0.18	0.19
		WB	2,800	725	760	0.26	0.27	725	760	0.26	0.27
L2	Long Ping Road	NB	2,800	1,015	885	0.36	0.32	1,015	885	0.36	0.32
		SB	2,800	780	710	0.28	0.25	780	710	0.28	0.25
L3	Wang Lok Street	NB	2,800	715	725	0.26	0.26	715	725	0.26	0.26
		SB	2,800	775	670	0.28	0.24	775	670	0.28	0.24
L4	Fung Chi Road	NB	2,800	565	560	0.20	0.20	565	560	0.20	0.20
		SB	2,800	410	285	0.15	0.10	410	285	0.15	0.10
L5	Wang Tat Road	EB	2,800	1,070	1,160	0.38	0.41	1,070	1,160	0.38	0.41
L6	Ma Wang Road	WB	4,450	970	1,160	0.22	0.26	970	1,160	0.22	0.26
L7	Long Tin Road (West of Shui Pin Wai Interchange)	EB	5,700	2,555	2,390	0.45	0.42	2,555	2,390	0.45	0.42
		WB	5,700	2,100	2,640	0.37	0.46	2,100	2,640	0.37	0.46
L8	Long Tin Road (North of Tong Yan San Tsuen Interchange)	NB	5,700	3,745	3,400	0.66	0.60	3,790	3,445	0.66	0.60
		SB	5,700	2,840	3,095	0.50	0.54	2,885	3,140	0.51	0.55
L9	Long Yip Street	EB	2,800	1,240	1,240	0.44	0.44	1,240	1,240	0.44	0.44
L10	Yuen Long On Lok Road	WB	4,450	1,220	1,245	0.27	0.28	1,220	1,245	0.27	0.28
L11	Castle Peak Road – Yuen Long	EB	3,200	1,620	1,765	0.51	0.55	1,620	1,765	0.51	0.55
		WB	3,200	1,445	1,410	0.45	0.44	1,445	1,410	0.45	0.44
L12	Castle Peak Road – Ping Shan	EB	3,200	3,020	2,850	0.94	0.89	3,020	2,850	0.94	0.89
		WB	3,200	2,405	3,050	0.75	0.95	2,405	3,050	0.75	0.95
L13	Yuen Long Highway (North of Pok Oi Interchange)	NB	6,100	7,070	6,180	0.86	0.75	7,070	6,180	0.86	0.75
		SB	6,100	5,370	6,005	0.88	0.98	5,370	6,005	0.88	0.98
L14	Yuen Long Highway (Between Pok Oi Interchange and Shap Pat Heung Interchange)	NB	4,000	4,015	3,970	1.00	0.99	4,015	3,970	1.00	0.99
		SB	4,000	4,090	3,520	1.02	0.88	4,090	3,520	1.02	0.88
L15	Yuen Long Highway (Between Shap Pat Heung Interchange and Tong Yan San Tsuen Interchange)	EB	6,100	5,570	4,860	0.91	0.80	5,570	4,860	0.91	0.80
		WB	6,100	5,115	4,970	0.84	0.81	5,115	4,970	0.84	0.81
L16	Yuen Long Highway (West of Tong Yan San Tsuen Interchange)	EB	6,100	5,410	5,470	0.89	0.90	5,455	5,515	0.89	0.90
		WB	6,100	6,035	5,480	0.99	0.90	6,080	5,525	1.00	0.91

Ref.	Road	Dir.	Capacity(1) (pcu/hr)	2029 Reference Case				2029 Design Case			
				Traffic Flow (pcu/hr)		V/C Ratio		Traffic Flow (pcu/hr)		V/C Ratio	
				AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
L17	Slip road from Long Tin Road (SB) to Yuen Long Highway (EB)	-	1,800	1,655	1,135	0.92	0.63	1,655	1,135	0.92	0.63
L18	Slip road from Long Tin Road (SB) to Yuen Long Highway (WB)	-	1,800	1,820	1,800	1.01	1.00	1,865	1,845	1.04	1.03
L19	Slip road from Yuen Long Highway (EB) to Long Tin Road (NB)	-	1,800	1,765	1,840	0.98	1.02	1,810	1,885	1.01	1.05
L20	Slip road from Yuen Long Highway (WB) to Long Tin Road (NB)	-	1,800	1,525	1,705	0.85	0.95	1,525	1,705	0.85	0.95

Note: (1) Road link capacity was made reference to Table 6.2, Technical Report of Restructuring and Enhancement of the CTS-3 Model – Feasibility Study

3.4.11 The results indicate that all the above road links will still operate within capacity (i.e. V/C ratios below 1.0.) in design year 2029 except L14 - Yuen Long Highway (Between Pok Oi Interchange and Shap Pat Heung Interchange), L16 - Yuen Long Highway (West of Tong Yan San Tsuen Interchange), L18 - Slip road from Long Tin Road (SB) to Yuen Long Highway (WB) and L19 - Slip road from Yuen Long Highway (EB) to Long Tin Road (NB), with V/C ratio slightly over 1.0. V/C ratio between 1.0 and 1.1 means that the road sections are slightly overloaded, but heavy congestions and long traffic queues would not be expected. The road sections will experience some delay with reduced traffic speed at particular peak period, which is commonly seen at the strategic roads in some urban areas, but it will still be manageable.

3.5 Mitigation Measures

Road Junction

3.5.1 To alleviate the future traffic condition for J1, it is proposed to widen the traffic lane at Fuk Hi Street southbound from 2 lanes to 3 lanes to provide one "turn right" traffic lanes, one "straight-ahead and turn right" and one "straight-ahead" traffic lane as illustrated in **Figure 196587/B&V/TTIA/102**. **Figure 196587/B&V/TTIA/103** shows the road arrangement on Fuk Hi Street including the junction configuration at J1, J14 and J15.

3.5.2 To ease the capacity of J2, the junction is proposed to alter from existing priority-controlled junction to signalized-controlled junction. It is proposed to provide two "straight-ahead" lanes at Long Ping Road northbound and southbound and provide one "turn left and turn right" traffic lane at the exit of Long Ping Estate Bus Terminus as illustrated in **Figure 196587/B&V/TTIA/104**.

3.5.3 To improve the junction performance of J3, it is proposed to modify the planned 4 stages method of control to the proposed 5 stages method of control with split phase of east-west traffic movements as illustrated in **Figure 196587/B&V/TTIA/105**.

3.5.4 For J4, it is proposed to widen the traffic lane at Fung Chi Road southbound to provide one addition "straight-ahead" traffic lane, as illustrated in **Figure 196587/B&V/TTIA/106**. To accommodate the additional lane, it is proposed to terminate the existing cycle track aside the widened road section to minimize the impact to the existing cyclist and pedestrian.

3.5.5 To relieve the condition of J9, it is proposed to widen the existing Wang Lok Street northbound to provide one full "turn left" traffic lane as illustrated in **Figure 196587/B&V/TTIA/107**.

3.5.6 Given that the junction capacity of J13 has approached its design capacity in the reference case and the Development will not be in place until 2033, it is considered that the proposed improvement scheme of J13 should be carried out by other project proponents before 2033 to improve the performance. To improve the junction performance, it is proposed to provide an exclusive left turn lane at Castle Peak Road – Yuen Long westbound by reducing one westbound approaching lane and one southbound receiving lane as illustrated in **Figure 196587/B&V/TTIA/108**. In additional, it is also proposed to widen the southbound approaching lanes to provide more space for the southbound traffic.

3.5.7 With the improvement measures, the operational performance at junctions J1, J2, J3, J4, J9, J13 have been reassessed and the results are summarized in **Table 3.6**. The junctions mentioned above would operate within their capacity in Design Year 2036.

Table 3.6 – Junction Performance under Proposed Improvement Schemes in Design Year 2036

Ref.	Junction	Method of Control	RC/RFC(1)			
			2036 Reference Case		2036 Design Case	
			AM Peak	PM Peak	AM Peak	PM Peak
J1	Fuk Hi Street / Long Ping Road (refer to Figure 196587/B&V/TTIA/102)	Signal	>100%	>100%	23%	38%
J2	Long Ping Road / Long Ping Estate Bus Terminus (refer to Figure 196587/B&V/TTIA/104)	Signal	41%	48%	18%	27%
J3	Long Ping Road / Fung Chi Road (refer to Figure 196587/B&V/TTIA/105)	Signal	30%	37%	15%	21%
J4	Fung Chi Road / Wang Tat Road (refer to Figure 196587/B&V/TTIA/106)	Signal	51%	50%	32%	48%

Ref.	Junction	Method of Control	RC/RFC(1)			
			2036 Reference Case		2036 Design Case	
			AM Peak	PM Peak	AM Peak	PM Peak
J9	Fuk Hi Street / Wang Lok Street (refer to Figure 196587/B&V/TTIA/107)	Signal	72%	70%	19%	26%
J13	Pok Oi Interchange (refer to Figure 196587/B&V/TTIA/108)	Roundabout	0.63	0.78	0.71	0.85

Note: (1) RC = Reserve Capacity, RFC = Ratio of Flow to Capacity

Public Transportation

3.5.8 Based on the estimated public transport demand, an off-street bus terminus with sawtooth bus bay design is proposed to provide a minimum of 6 bus bays and 12 stacking spaces subject to actual bus service route planning at the later stage. Apart from the provided bus bays, the provision of one GMB bay and one Urban taxi bay and one New Territories taxi bay at the PTI are recommended to provide comprehensive coverage of the public transport services for the Development. The preliminary layout of the PTI is illustrated in **Figure 196587/B&V/TTIA/109**.

3.5.9 Based on the standard design of 6 ppl per sq.m for rail transport, it is estimated that an approximate 2,075 passengers per hour generated from the Development would induce only marginal increase of the maximum hourly passenger flow during the AM peak at the West Rail Line.

Improvement Schemes under Construction Stage

Long Ping Road / Long Ping Estate Bus Terminus (J2)

3.5.10 The junction is proposed to alter from existing priority-controlled junction to signalized-controlled junction. It is proposed to provide two "straight-ahead" lanes at Long Ping Road northbound and southbound and provide one "turn left and turn right" traffic lane at the exit of Long Ping Estate Bus Terminus as illustrated in **Figure 196587/B&V/TTIA/104**.

3.5.11 With the improvement measures, the junction performance during construction design year 2029 were reassessed with the proposed improvement schemes and the results are summarized in **Table 3.7**.

Table 3.7 – Junction Performance under Proposed Improvement Schemes in Design Year 2029

Ref.	Junction	Method of Control	RC/RFC(1)			
			2029 Reference Case		2029 Design Case	
			AM Peak	PM Peak	AM Peak	PM Peak
J2	Long Ping Road / Long Ping Estate Bus Terminus (refer to Figure 196587/B&V/TTIA/104)	Signal	44%	51%	41%	48%

Note: (1) RC = Reserve Capacity, RFC = Ratio of Flow to Capacity

3.5.12 With the proposed improvement schemes under construction stage, J2 – Long Ping Road / Long Ping Estate Bus Terminus would operate within its capacity in Design Year 2029.

4 PRELIMINARY DRAINAGE IMPACT ASSESSMENT (DIA)

4.1 Introduction

4.1.1 The objective of the Preliminary Drainage Impact Assessment (DIA) is to:

- Review the drainage master plan for Yuen Long area, relevant drainage studies and the existing and planned drainage networks in the vicinity of the Development;
- Assess the potential drainage impacts arising from the Development taking into account the climate change effect;
- Study and recommend feasible and environmental-friendly schemes for necessary drainage diversion;
- Recommend all necessary measures for proper stormwater conveyance and to mitigate adverse drainage impacts arising from the Development during both construction and operational phases; and
- and carry out schematic design of the proposed improvement schemes and measures.

4.1.2 Findings and recommendation of the DIA are presented in Preliminary Drainage Impact Assessment Report. A summary of the assessment is presented in the sections below.

4.2 Methodologies

Technical Approach

4.2.1 InfoWorks ICM Version 6.0 has been adopted for assessing the potential drainage impact arising from the Development and verifying the effectiveness of the proposed mitigation measures under the Assignment.

4.2.2 Drainage record plans, as-built drawings, topographic information, and site inspection have been used in examining the adequacy of the drainage system when developing the hydraulic model.

4.2.3 The software has the benefit of being able to model unsteady, gradually varied flow in looped network with flat or reverse gradients where the direction of flow may reverse. It is therefore well-suited for modelling of lowland, flat areas in the study area where the pipes have minimal gradients and are subject to tidal intrusion or backwater effects from the main river channels.

Assessment Criteria

4.2.4 According to the 5th edition of Stormwater Drainage Manual (SDM), a 50-year design return period with a minimum of 300 mm freeboard is recommended for the design and checking of urban drainage branch system. Furthermore, a 200-year design return period is adopted for checking the adequacy of the urban drainage trunk system.

Determination of Flood Level Combinations

4.2.5 The design criteria for flood level depend on a combination of rainstorm events and tidal level, as well as the catchment characteristics. With reference to the SDM, the determination of the flood level is provided in **Table 4.1**.

Table 4.1 – Determination of Flood Level in the Fluvial-Tidal Zone

Flood Level Return Period	Case A	Case B
50-yr	50-yr rain + 10-yr sea level	10-yr rain + 50-yr sea level
200-yr	200-yr rain + 10-yr sea level	10-yr rain + 200-yr sea level

4.3 Existing and Planned Drainage System

4.3.1 There are no existing drainage pipes within the Site. To the east of the Site, there are existing storm drains with diameters ranging from 450 mm to 1,200 mm running south along Fuk Hi Street. To the south of the Site, there are also existing storm drains with diameters ranging from 450 mm to 1,800 mm running east along Long Ping Road.

4.3.2 At the junction between Long Ping Road and Fuk Hi Street, the existing storm drains discharge to a downstream twin-cell 2.0 m (H) by 3.5 m (W) box culverts running underneath Fuk Hi Street and Wang Lok Street, which further discharges to Yuen Long Nullah.

4.3.3 There are some watercourses at Kai Shan, which is situated at the western part of the Site. The surface runoff from Kai Shan is conveyed from the hillside to the existing drainage system adjacent to the Site.

4.3.4 There are two major planned drainage improvement works in the vicinity of the Site, namely Yuen Long Barrage Scheme (YLBS) and the drainage works proposed under Wang Chau Phase 1 Development.

4.4 Potential Drainage Impacts and Proposed Drainage Schemes

4.4.1 All watercourses within the Site would be removed during site formation works. The dry weather flow in these watercourses, as well as the excess runoff from Kai Shan Catchment, would be diverted to a proposed single-cell box culvert of 3.5 m (W) × 2.0 m (H) within the Site. This proposed single-cell box culvert would also replace

the major section of the existing ditch to the immediate east of the Site and connect to the existing twin-cell 3.5 m (W) x 2.0 m (H) box culvert underneath the junction of Long Ping Road and Fuk Hi Street. Moreover, the remaining section of the existing ditch would be replaced by a proposed 900 mm diameter pipe with connection at the proposed single-cell box culvert. For more development flexibility, the alignment of the proposed box culvert will be reviewed and adjusted if necessary during the detailed design stage.

4.4.2 Surface runoff from hillsides to the west and south of the Site will be collected by proposed peripheral drains including U-channels of size ranging from 600 to 750 mm.

4.4.3 The change in land use from unpaved to paved surface would potentially increase the amount of runoff entering into the stormwater drainage system. **Table 4.2** presents the change in paving condition of the Site under the baseline and the proposed scenario. The change in the surface characteristics would lead to an overall increase in peak runoff generated from the associated sub-catchments which currently comprise woodland, grassland, agricultural land, slopes, squatters and brownfield operations.

Table 4.2 – Change in Paving Condition of the Site

	Baseline Scenario		**Proposed Scenario(1)**	
	Paved Area (m^2)	**Unpaved Area (m^2)**	**Paved Area (m^2)**	**Unpaved Area (m^2)**
Housing Site	67,367	41,038	75,884	32,522(1)
School & Access Road	8,538	3,466	12,005	0
Proposed Footpath Along Southern Boundary of the Site	269	945	1,214	0
Total	76,174	45,449	89,103	32,522

Note:
(1) 30% green coverage of the housing site (area: 108,405 m^2) is assumed in accordance with Chapter 4, Hong Kong Planning Standards and Guidelines.

Drainage Conditions under Baseline Scenario (with Yuen Long Barrage)

4.4.4 Based on the results of the hydraulic model, the YLBS would improve the hydraulic performance of the drainage system along Fuk Hi Street and Long Ping Road under both 50 and 200 year return periods. However, it is noted that the entrance of the Site will be flooded due to inadequate discharge capacity of the existing watercourse within the Site. Moreover, several segments of Fuk Hi Street and Long Ping Road are prone to flooding due to two major reasons: (i) road segments are low-lying together with relatively high downstream water level and (ii) inadequate capacity of some local drainage pipes.

Drainage Conditions under Proposed Scenario (with Yuen Long Barrage)

4.4.5 As mentioned in Para. 4.4.1, the existing stream inside the Site and the ditch to the east of the Site would be replaced by the proposed single-cell 3.5 m (W) × 2.0 m (H)

box culvert, and hence the associated flood risk within the Site would be mitigated.

4.4.6 It is noted that some local areas at Fuk Hi Street and Long Ping Road are still prone to flooding after commissioning of the YLBS. One of the local flooding areas is located to the east of the Site at Fuk Hi Street. As the major cause of this flooding issue is the inadequate capacity of the existing 300–450 mm diameter pipes along the southbound of Fuk Hi Street, it is proposed to upgrade these existing pipes to 1,500 mm diameter, which is anticipated to be carried out under other project. It is noted that some other local areas at Fuk Hi Street and Long Ping Road are prone to flooding under Case A of 200-year return period. In order to avoid any adverse drainage impacts imposed on these problematic areas during the peak flow period, it is proposed to collect and store the additional runoff arising from the Development in a proposed storage tank with size of approximately 1,360 m^3 underneath the proposed public access road. The exact location of the proposed storage tank is subject to further review in the later design stage. The layout of the proposed drainage works are shown in **Figure 196587/B&V/DIA/105.**

4.4.7 Based on the modelling results, the main trunk system (1,200 mm dia. pipe and twin-cell 2.0 m (H) by 3.5 m (W) box culvert along Fuk Hi Street from node ID SMH1031687 to Yuen Long Nullah) will have freeboard more than 300 mm under Cases 50A, 50B and 200B. The maximum flood depth at the representative points after implementation of the proposed mitigation measures are summarised in **Table 4.3** and **Table 4.4**. Table 4.4 indicates that the maximum flood depth at all representative points under Case 200A will be reduced after mitigation, no adverse impact is anticipated.

Table 4.3 – Maximum Flood Depths after Mitigation (with YLBS; 50-year Return Period)

	50-yr Case A			50-yr Case B		
Node ID	Max. Flood Depth Before Mitigation (m)(1)	Max. Flood Depth After Mitigation (m)(1)	Freeboard > 300 mm	Max. Flood Depth Before Mitigation (m)(1)	Max. Flood Depth After Mitigation (m)(1)	Freeboard > 300 mm
OJ-20344704	-2.291	-2.264	OK	-2.784	-2.728	OK
OJ-20345814	-1.471	-1.451	OK	-1.935	-1.884	OK
OJ-20346607	-1.43	-1.419	OK	-1.719	-1.702	OK
OJ-20346701	-0.428	-0.416	OK	-0.843	-0.824	OK
OJ-20346702	-2.293	-2.293	OK	-2.304	-2.304	OK
OJ-20347506	-0.484	-0.478	OK	-0.693	-0.689	OK
OJ-20347507	-1.257	-1.25	OK	-1.529	-1.523	OK
OJ-342407A	-1.198	-1.151	OK	-2.007	-1.964	OK
OJ-344708B	-0.761	-0.714	OK	-1.394	-1.342	OK
OJ-345703B	-0.388	-0.873	OK	-0.891	-1.036	OK
OJ-345815A	-2.426	-2.411	OK	-2.82	-2.78	OK
OJ-345905A	1.223	-0.286	OK(2)	0.969	-0.817	OK
OJ-H1027047	-1.468	-1.456	OK	-1.831	-1.803	OK

Node ID	50-yr Case A			50-yr Case B		
	Max. Flood Depth Before Mitigation (m)(1)	Max. Flood Depth After Mitigation (m)(1)	Freeboard > 300 mm	Max. Flood Depth Before Mitigation (m)(1)	Max. Flood Depth After Mitigation (m)(1)	Freeboard > 300 mm
PH1-1	-1.772	-1.789	OK	-4.15	-4.15	OK
SMH1031684	-0.47	-0.466	OK	-0.943	-0.92	OK
SMH1031687	-0.528	-0.536	OK	-1.005	-1.001	OK
SMH4031681	-0.52	-0.509	OK	-0.989	-0.954	OK

Note:
(1) Positive flood depth indicates an occurrence of flooding.
(2) As flooding is originially occurred at this node, the freeboard at this node after mitigation is considered acceptable.

Table 4.4 – Maximum Flood Depths after Mitigation (with YLBS; 200-year Return Period)

Node ID	200-yr Case A			200-yr Case B		
	Max. Flood Depth Before Mitigation (m)(1)	Max. Flood Depth After Mitigation (m)(1)	Change in Max. Flood Depth (m)	Max. Flood Depth Before Mitigation (m)(1)	Max. Flood Depth After Mitigation (m)(1)	Flood Depth < 0
OJ-20344704	-1.328	-1.424	-0.096	-2.266	-2.208	OK
OJ-20345814	-0.518	-0.605	-0.087	-1.432	-1.379	OK
OJ-20346607	-0.593	-0.614	-0.021	-1.256	-1.242	OK
OJ-20346701	0.273	0.27	-0.003	-0.419	-0.399	OK
OJ-20346702	-1.739	-1.74	-0.001	-2.302	-2.302	OK
OJ-20347506	0.099	0.098	-0.001	-0.385	-0.382	OK
OJ-20347507	-0.425	-0.434	-0.009	-1.036	-1.031	OK
OJ-342407A	-0.21	-0.214	-0.004	-1.492	-1.432	OK
OJ-344708B	0.208	0.177	-0.031	-0.862	-0.798	OK
OJ-345703B	0.256	-0.163	-0.419	-0.552	-1.036	OK
OJ-345815A	-1.504	-1.572	-0.068	-2.337	-2.298	OK
OJ-345905A	1.743	0.494	-1.249	1.043	-0.281	OK
OJ-H1027047	-0.614	-0.615	-0.001	-1.355	-1.333	OK
PH1-1	-0.962	-0.98	-0.018	-1.613	-1.6	OK
SMH1031684	0.476	0.375	-0.101	-0.446	-0.409	OK
SMH1031687	0.412	0.31	-0.102	-0.512	-0.486	OK
SMH4031681	0.427	0.326	-0.101	-0.49	-0.446	OK

Note:
(1) Positive flood depth indicates an occurrence of flooding.

Drainage Conditions under Baseline Scenario (without the Yuen Long Barrage)

4.4.8 In the absence of the YLBS, Fuk Hi Street and Long Ping Road is prone to significant flooding in both 50-year and 200-year return periods due to the inadequate capacity of the drainage system and significant backwater effect arising from the high water level at Yuen Long Nullah.

Drainage Conditions under Proposed Scenario (without the Yuen Long Barrage)

4.4.9 As the drainage system along Fuk Hi Street and Long Ping Road is already at capacity in the baseline condition, it is proposed to collect and store the additional runoff arising from the Development in the proposed storage tank with size of approximately 3,900 m^3 underneath the proposed access road in order to avoid worsening the hydraulic performance of the downstream drainage system. The exact location of the proposed storage tank is subject to further review in the later design stages. The layout of the proposed drainage works are shown in **Figure 196587/B&V/DIA/106.**

4.4.10 **Table 4.5** and **Table 4.6**, which summarise the maximum flood depth at the representative points after proposed mitigation, indicate that no adverse impact will be induced by the Development.

Table 4.5 – Maximum Flood Depths after Mitigation (without YLBS; 50-year Return Period)

Node ID	50-yr Case A			50-yr Case B		
	Max. Flood Depth Before Mitigation (m)(1)	Max. Flood Depth After Mitigation (m)(1)	Change in Max. Flood Depth (m)	Max. Flood Depth Before Mitigation (m)(1)	Max. Flood Depth After Mitigation (m)(1)	Change in Max. Flood Depth (m)
OJ-20344704	-0.847	-0.934	-0.087	-0.74	-0.793	-0.053
OJ-20345814	-0.024	-0.115	-0.091	0.099	0.043	-0.056
OJ-20346607	0.042	0.021	-0.021	0.316	0.303	-0.013
OJ-20346701	0.708	0.703	-0.005	0.885	0.882	-0.003
OJ-20346702	-1.21	-1.211	-0.001	-1.019	-1.02	-0.001
OJ-20347506	0.56	0.559	-0.001	0.756	0.755	-0.001
OJ-20347507	0.24	0.232	-0.008	0.548	0.543	-0.005
OJ-342407A	-0.029	-0.03	-0.001	-0.117	-0.116	0.001(2)
OJ-344708B	0.573	0.542	-0.031	0.604	0.587	-0.017
OJ-345703B	0.486	0.215	-0.271	0.458	0.283	-0.175
OJ-345815A	-0.965	-1.032	-0.067	-0.793	-0.834	-0.041
OJ-345905A	1.76	0.913	-0.847	1.577	1.04	-0.537
OJ-H1027047	-0.031	-0.04	-0.009	0.179	0.172	-0.007
PH1-1	-0.314	-0.333	-0.019	-0.033	-0.046	-0.013
SMH1031684	0.936	0.851	-0.085	1.052	0.998	-0.054
SMH1031687	0.86	0.772	-0.088	0.97	0.915	-0.055

Node ID	50-yr Case A			50-yr Case B		
	Max. Flood Depth Before Mitigation (m)(1)	Max. Flood Depth After Mitigation (m)(1)	Change in Max. Flood Depth (m)	Max. Flood Depth Before Mitigation (m)(1)	Max. Flood Depth After Mitigation (m)(1)	Change in Max. Flood Depth (m)
SMH4031681	0.9	0.813	-0.087	1.02	0.966	-0.054

Note:
(1) Positive flood depth indicates an occurrence of flooding.
(2) As no flooding is occurred at this node, minimal increase in water level is considered acceptable.

Table 4.6 – Maximum Flood Depths after Mitigation (without YLBS; 200-year Return Period)

Node ID	200-yr Case A			200-yr Case B		
	Max. Flood Depth Before Mitigation (m)(1)	Max. Flood Depth After Mitigation (m)(1)	Change in Max. Flood Depth (m)	Max. Flood Depth Before Mitigation (m)(1)	Max. Flood Depth After Mitigation (m)(1)	Change in Max. Flood Depth (m)
OJ-20344704	-0.239	-0.297	-0.058	-0.058	-0.115	-0.057
OJ-20345814	0.588	0.534	-0.054	0.79	0.73	-0.06
OJ-20346607	0.666	0.65	-0.016	1.053	1.038	-0.015
OJ-20346701	1.279	1.27	-0.009	1.587	1.584	-0.003
OJ-20346702	-0.647	-0.652	-0.005	-0.32	-0.321	-0.001
OJ-20347506	1.147	1.147	0	1.437	1.431	-0.006
OJ-20347507	0.867	0.86	-0.007	1.295	1.288	-0.007
OJ-342407A	0.213	0.205	-0.008	0.166	0.166	0
OJ-344708B	1.032	0.98	-0.052	1.134	1.105	-0.029
OJ-345703B	0.942	0.693	-0.249	0.922	0.838	-0.084
OJ-345815A	-0.351	-0.392	-0.041	-0.087	-0.132	-0.045
OJ-345905A	2.441	1.508	-0.933	2.055	1.709	-0.346
OJ-H1027047	0.541	0.52	-0.021	0.869	0.857	-0.012
PH1-1	0.31	0.297	-0.013	0.705	0.69	-0.015
SMH1031684	1.55	1.471	-0.079	1.743	1.682	-0.061
SMH1031687	1.474	1.384	-0.09	1.658	1.595	-0.063
SMH4031681	1.512	1.452	-0.06	1.71	1.651	-0.059

Note:
(1) Positive flood depth indicates an occurrence of flooding.

4.5 Summary and Recommendation

Summary

4.5.1 The hydraulic assessment indicates that the Development would not induce adverse drainage impact upon commissioning of the following proposed drainage works:-

(i) Construction of peripheral U-channels with size ranging from 600 to 750 mm;

(ii) Construction of a new 900 mm diameter pipe for replacement of part of the existing ditch adjacent to the Site;

(iii) Construction of a single-cell 3.5m (W) × 2.0m (H) box culvert within the Site and running underneath a segment of footpath along Fuk Hi Street for proper conveyance of runoff from Kai Shan Catchment;

(iv) Upgrading of existing stormwater pipes along the southbound of Fuk Hi Street from 300–450 mm to 1,500 mm diameter (under other project); and

(v) Construction of a stormwater storage tank within the Site for temporary storage of the additional runoff induced by the Development.

Recommendation and Follow-up Actions

4.5.2 Close coordination with utility undertakers is recommended to be carried out during the detailed design stage so as to confirm the necessary utility diversion and lowering works. In addition, sufficient time shall be allowed in the construction programme to accommodate the utility works.

4.5.3 Drainage reserves within the Site are required for proper maintenance of the drainage pipes and box culvert to be handed over to the Drainage Services Department (DSD). Details of drainage reserves including the location, width etc. will be further discussed among relevant departments.

4.5.4 It is suggested to install sand traps at the inlet of the drainage pipes and box culverts to minimise blockage and the associated maintenance requirements.

4.5.5 In view that the proposed drainage mitigation measures at this feasibility stage is schematic in nature, it is recommended that the modelling assumptions (including but not limited to the siltation condition of the existing network) and the proposed scheme (including but not limited to weir design, connection location of the discharge pipe, necessity of spare capacity of the flood storage facility) shall be reviewed and a detailed hydraulic assessment (including a flood extent map, if necessary) shall be provided in the subsequent stages of the Development when the site formation scheme, building layout and the programme of interfacing projects (i.e. the YLBS) are confirmed. Furthermore, alternative schemes, such as construction of a separate drainage system to discharge runoff from Kai Shan and the Development directly to Yuen Long Nullah, can be considered to take advantage of the improved downstream drainage conditions from the YLBS during the subsequent stages of the Development.

5 PRELIMINARY SEWERAGE IMPACT ASSESSMENT (SIA)

5.1 Introduction

5.1.1 The objective of the Preliminary Sewerage Impact Assessment (SIA) is to:

- Review and summarize the latest information relevant to the SIA;
- Examine the existing and planned sewerage facilities in the region;
- Discuss the approach, methodology, assumptions and parameters adopted in the SIA;
- Formulate feasible sewage disposal and treatment scheme with schematic design for the Development; and
- Define the scope of upgrading work as appropriate for mitigating sewerage impact arising from the Development.

5.1.2 Findings and recommendation of the SIA are presented in Preliminary Sewerage Impact Assessment Report. A summary of the assessment is presented in the sections below.

5.2 Methodologies

5.2.1 The assessment is undertaken in accordance with the following standards, Code of Practice and Design Manuals:-

- Environmental Protection Department (EPD)'s "Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning" (GESF);
- DSD's Sewerage Manual (Part 1) – Key Planning Issues and Gravity Collection System; and
- DSD's Sewerage Manual (Part 2) – Pumping Stations and Rising Mains.

5.2.2 InfoWorks ICM Version 6.0.2 is adopted to prepare a sewerage model for checking the hydraulic performance of the concerned sewers. The hydraulic model is checked against the latest record plans, as-built and construction drawings obtained from DSD.

5.2.3 The sewerage system is designed to cater for the Development based on flows estimated from the proposed population and employment figures. The proposed sewers are designed to provide sufficient capacities to accommodate peak flow without surcharge and to fulfill the following criteria:

- Velocity – The sewers shall be sized to achieve a self-cleansing velocity of 1 m/s at full bore flow. The maximum velocity at full bore flow shall be limited to 3 m/s;

- Freeboard – A minimum free board of 1 m and no overflow occurs at flow rate of 1.15 times peak flow shall be achieved;
- Gradient – The sewers shall be laid to follow the ground profile wherever possible, but at all times a gradient steep enough to satisfy the minimum velocity criteria given above shall be maintained; and
- Cover – A minimum pipe cover of 0.9 m and 0.45 m will be adopted for pipes in carriageway and footpath respectively as far as possible.

5.2.4 To account for the effect of sedimentation, a 10% reduction in flow area is adopted in the SIA.

5.3 Existing and Planned Sewerage System

5.3.1 The Development is located within the Yuen Long Sewerage Catchment, which is served by the Yuen Long Sewage Treatment Works (YLSTW). The existing treatment capacity of the YLSTW is approximately 70,000 m^3/day.

5.3.2 According to DSD's drainage record plan, the Site is currently served with no sewage discharge. The nearest sewerage network from the Site comprises two gravity sewers: a sewer with 300 – 1,800 mm diameter runs towards the north direction along Fuk Hi Street, transversing Yuen Long Industrial Estate (YLIE) and eventually connecting to the YLSTW; the other sewer with 450 mm diameter runs towards south direction along Fuk Hi Street. A plan showing all existing sewerage facilities in the vicinity of the Site is presented in **Figure 196587/B&V/SIA/001**.

5.3.3 DSD is currently implementing the proposed upgrading works of the Yuen Long Effluent Polishing Plant (YLEPP) in order to upgrade the treatment level of YLSTW from secondary to tertiary and upgrade the treatment capacity to 150,000 m^3/day to cope with the future sewage flows in the sewage catchment.

5.4 Sewerage Impact

5.4.1 The Development comprises residential flats with supporting retail facilities and schools. Sewage generated from the Development is categorized into four sources: Residential, which consists of the sewage generated from the residents of the public housing development; students and teachers of the proposed schools; visitors and employees of the community facilities; and patrons of retail facilities.

5.4.2 The total ADWF generated from the Development is estimated to be 7,642 m^3/day. The breakdown of the sewage generation from the Development is shown in **Table 5.1**.

Table 5-1 – Estimation of Sewage Generated from the Development

Sewage Type	Quantity	Unit
Residential		
Design population	36,400	
Unit flow factor	0.19	m^3/person/day
ADWF	**6,916**	**m^3/day**
School		
Design student population	1974	
Unit flow factor for students	0.04	m^3/person/day
ADWF for students	**79**	**m^3/day**
Design teaching staff No.	172	
Unit flow factor for teaching staffs	0.28	m^3/employee/day
ADWF for teaching staffs	**48**	**m^3/day**
Community Facility		
Design population	43	
Unit flow factor	0.28	m^3/employee/day
ADWF	**12**	**m^3/day**
Retail		
Design population (other commercial activities)	227	
Unit flow factor (other commercial activities)	0.28	m^3/employee/day
ADWF for other commercial activities	**64**	**m^3/day**
Design population (catering services)	331	
Unit flow factor (catering services)	1.58	m^3/employee/day
ADWF for catering services	**523**	**m^3/day**
Total		
ADWF from the Development	**7,642**	**m^3/day**

5.4.3 The additional sewage generation will have an impact to the existing / planned sewage treatment works and sewerage network.

Potential Impacts to Existing / Planned Sewage Treatment Works

5.4.4 As the DSD is currently implementing the proposed upgrading works of the YLEPP, the treatment capacity of the YLSTW will be upgraded to 150,000 m^3/day and it is anticipated that the upgrading works of the YLSTW will be completed prior to the population intake of the Development. As advised by the EPD, according to the latest design of the YLEPP, there is sufficient spare capacity in the YLEPP to cater for the sewage generated from the Development.

Potential Impacts to Existing / Planned Sewerage Network

5.4.5 New sewers are required to collect the sewage from the Development to the nearest sewerage network. In addition, according to the results of the hydraulic assessment, the capacities of the existing 300 - 900 mm diameter gravity sewers will be insufficient to cater for the additional sewage arising from the Development.

5.5 Mitigation Measures

5.5.1 The proposed sewage scheme would collect sewage by the internal sewerage system and discharged to a proposed terminal manhole, which is located near the entrance of the Site. Sewage collected at the proposed terminal manhole will be conveyed via the proposed 750 mm diameter sewer to the public sewerage system along Fuk Hi Street and eventually discharged at the YLSTW for treatment and disposal.

5.5.2 To ensure that the public sewerage system has adequate level, capacity and performance, it is proposed to upgrade the existing gravity sewers from 300 - 900 mm diameter to 1,050 – 1,200 mm diameters with new gradients. The length of the proposed upgrading works is approximately 1,050 m.

5.5.3 The proposed sewerage scheme including the recommended upgrading works is shown in **Figure 196587/B&V/SIA/102**.

5.5.4 According to the results of the hydraulic assessment, the upgraded sewerage system will have adequate capacity to cater for the accumulated sewage flow from the Development.

6 PRELIMINARY WATER SUPPLY IMPACT ASSESSMENT (WSIA)

6.1 Introduction

6.1.1 The objective of the Preliminary Water Supply Impact Assessment (WSIA) is to:

- Assess the existing capacity of the fresh water and salt water supply facilities;
- Discuss the assumptions and parameters adopted in the WSIA;
- Estimate fresh water and flushing water demands of the Development;
- Identify needs for provision of any new waterworks, reserves and other improvement works to meet the water demand of the Development;
- Identify any mitigation and protective measures to cope with the Development; and
- Protect waterworks facilities and keep minimum disturbance to their normal operation during construction and operational stage of the Development.

6.1.2 Findings and recommendation of the WSIA are presented in Preliminary Water Supply Impact Assessment Report. A summary of the assessment is presented in the sections below.

6.2 Methodologies

Technical Approach

6.2.1 The estimate of the fresh and flushing water demands for the Development is based on the latest development parameters identified in Baseline Review Report under the Assignment. The estimates are calculated with reference to the unit water demands as recommended under the Water Supplies Department (WSD)'s Departmental Instruction (DI) No. 1309 and the "Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning" published by EPD.

6.2.2 The water supply impact assessment is undertaken in accordance with the following standards, Code of Practice and Design Manuals:-

- Civil Engineering Design Manual (WSD);
- EDP's Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning;
- Manual of Mainlaying Practice (2012 Edition); and
- WSD's Departmental Instruction (DI) No. 1309.

Design Criteria

6.2.3 Two scenarios (scenarios A and B) are considered in the hydraulic analysis as shown in **Table 6.1**.

Table 6.1 – Scenarios to be considered in Hydraulic Analysis

Scenario	Water Demand	Description
A	Existing + the Development	Daily Operation (Without Fire-Fighting)
B	Existing + the Development	With Fire-Fighting

6.2.4 In accordance with the WSD's DI 1309, the design criteria of the proposed fresh and flushing water supply systems in the two scenarios are presented in **Table 6.2**.

Table 6.2 – Design Criteria for Fresh Water Mains and Flushing Water Mains for the Development

Scenario	Design Peak Flow in Distribution Main (m^3/day)	Minimum Residual Head (m)			Maximum Velocity (m/s)
		Fresh Water(1)	Flushing Water	Fire Location	
A	• Fresh water – 3 x Mean Daily Demand • Flushing water – 2 x Mean Daily Demand	20	15	-	3
B	• Fresh water – 1 x Mean Daily Demand • Flushing water – 1 x Mean Daily Demand			17	3

Note:
(1) In accordance with the WSD's instruction of 26 June 2017, fresh water supply infrastructure for new developments should be planned for a minimum residual head of 20m with immediate effect, except for village supplies and situations where such reduction would adversely affect the supply to the adjacent existing buildings / developments which have been designed for a residual head of 30m.

6.3 Existing and Planned Water Supply Facilities and Services

Existing Fresh Water Supply Facilities

6.3.1 The Site is located at the boundaries of supply zones between the Wang Chau Fresh Water Service Reservoir (WCFW S/R) and the Ngau Tam Mei Fresh Water Primary Service Reservoir (NTMFW PS/R). The fresh water supply for the existing area within the Site is presently fed by the WCFW S/R via a network of trunk mains and distribution mains. The key waterworks and fresh water supply zones are shown in **Figure 196587/B&V/WSIA/001**. The alignments of the existing water mains are shown in **Figure 196587/B&V/WSIA/002**.

6.3.2 The existing information of the WCFW S/R is summarized in **Table 6.3**.

Table 6.3 – Existing Information of WCFW S/R

Service Reservoir	Capacity (m^3)	Top Water Level (mPD)	Invert Level (mPD)
WCFW S/R	58,790	67.0	60.81

Existing Salt Water Supply Facilities

6.3.3 The rural residential dwellers and brownfield operators within the Site are currently using fresh water for flushing. The Site is not covered by any salt water supply.

6.3.4 As shown in **Figure 196857/B&V/WSIA/003,** the Site is located in close proximity to the salt water supply zone served by the existing Tan Kwai Tsuen Salt Water Service Reservoir (TKTSW S/R) which is sourced from Lok On Pai Salt Water Pumping Station (LOPSW P/S). However, there are barely any spare capacities in the existing or planned salt water supply system to cater for the additional flushing water demand arising from the Development.

Planned Water Supply Facilities

6.3.5 WSD plans to expand Ngau Tam Mei Water Treatment Works (NTM WTW) from 230 MLD to 450 MLD. As the Site is located within the distribution zone of NTM WTW and Au Tau Water Treatment Works (AT WTW). It is expected that it can cater for additional water demand arising from new developments in Yuen Long, including the Development.

6.3.6 As proposed under Wang Chau Phase 1 Development, a DN600 fresh water main would be constructed along Fuk Hi Street and Long Ping Road. It is understood that both the fresh and flushing water demands from the Wang Chau Phase 1 Development would be taken up by WCFW S/R and NTM WTW. The proposed waterworks under Wang Chau Phase 1 Development are shown in **Figure 196857/B&V/WSIA/002.**

6.4 Water Demand of the Development

6.4.1 In accordance with the WSD DI No. 1309 and information from the WSD, the unit demands for fresh water and flushing water are summarized in **Table 6.4** and **Table 6.5**, respectively.

Table 6.4 – Summary of Fresh Water Unit Demand

Consumer Class	Residential	Services Trades	Other	Unit
Public Housing (PH)	230	40	-	l/h/d
Residential (R1)	230	40	-	l/h/d
School	-	-	25	l/h/d
Irrigation	-	-	100	m^3/ha/d

Table 6.5 – Summary of Flushing Water Unit Demand

Consumer Class	Residential	Services Trades	Other	Unit
Public Housing (PH)	70	-	-	l/h/d
Residential (R1)	70	-	-	l/h/d
School	-	-	25	l/h/d

6.4.2 Based on the Development parameters presented in **Table 2.1**, the estimated average water demands arising from the Development are summarized in **Table 6.6**.

Table 6.6 – Summary of Ultimate Daily Water Demand from the Development

Fresh Water Demand in 2033 (m^3/day)	Flushing Water Demand in 2033 (m^3/day)	Total Fresh and Flushing Water Demand in 2033 (m^3/day)
11,039	2,826	13,864

6.4.3 The additional demands will have impact to existing/planned fresh water and flushing water supply system.

6.5 Total Water Demand

6.5.1 The total water demand from all known existing and planned interfacing developments as well as the Development within the WCFW S/R supply zones in 2033 is summarized in **Table 6.7**.

Table 6.7 – Summary of Total Water Demand in Year 2033

Water Treatment Works (WTW)	Fresh Water Service Reservoirs (FW S/R)	Total Fresh Water Demand (m^3/day)	Total Flushing Water Demand in 2033 (m^3/day)	Total Fresh and Flushing Water Demand in 2033 (m^3/day)
NTM WTW	WCFW S/R	47,517	6,429	53,947

6.6 Impact on Existing and Planned Waterworks Facilities

Impacts to Existing and Planned Fresh Water Supply System

6.6.1 The fresh water demand from the Development is estimated to be 11.0 MLD. It is anticipated that the impact on the NTM WTW arising from the Development is insignificant. With the planned expansion of the NTM WTW from 230 MLD to 450 MLD and availability of water surplus at the AT WTW, the existing WCFW S/R are considered to be capable for catering for the additional water demands from the Development.

6.6.2 A capacity assessment was conducted to evaluate the impacts on the WCFW S/R. Results of the assessment are shown in **Table 6.8**.

Table 6.8 – Summary of Capacity Assessment of Existing Fresh Water Facilities

	WCFW S/R
Existing Capacity (m^3)	58,790
Required Capacity for existing and planned interfacing developments as well as the Development within WCFW S/R supply zone in 2033 (m^3)	53,947 x 0.8 = 43,158(1)

Note:
(1) Capacity of FW S/R = 0.8 MDD (FW+TMF) referring to WSD's DI No. 1309

Impacts to Existing and Planned Flushing Water Supply System

6.6.3 As mentioned in Section 6.3, there is no spare capacity on the salt water supply system from Lok On Pai and Tan Kwai Tsuen to cater for the additional flushing water demand arising from the Development.

6.7 Mitigation Measures

Fresh Water Supply Scheme

6.7.1 It is proposed to upgrade an existing distribution main along Fuk Shun Street from sizes of DN600 to DN900 in order to cater for the water demands in the existing water supply zone and the Development.

6.7.2 The fresh water supply for the Site would be fed by proposed DN900 fresh water mains along Fuk Shun Street and planned DN600 water mains along Fuk Hi Street under Wang Chau Phase 1 Development. To serve buildings in the Development, a DN600 fresh water main is proposed along the access road within the Site. The proposed waterworks for fresh water supply are shown in **Figure 196587/B&V/WSIA/004.**

6.7.3 Hydraulic analysis has been carried out for the proposed water supply scheme. Under daily operation scenario (Scenario A) and fire-fighting scenario (Scenario B), it is anticipated that the proposed water supply system could meet the required design criteria.

Flushing Water Supply Scheme

6.7.4 In order to provide sufficient flushing water for the Development, the following available sources for flushing are explored.

Treated Sewage Effluent (TSE) – Possibly from the Planned YLEPP

6.7.5 Upon liaison with the DSD, it is noted that there would be TSE supply to the Development from the planned YLEPP. However, the programme for the supply of TSE to the Development from the planned YLEPP is still under investigation. Close liaison with the DSD on the availability of TSE for the Development is required in the subsequent stages of the Development.

Salt Water (SW) – From the Salt Water Supply System in Yuen Long

6.7.6 As discussed above, the LOPSW P/S does not have sufficient spare capacity to convey salt water to the Site. Upgrading works of pump to provide an additional pumping capacity of 0.04 m^3/s[(1)] in the LOPSW P/S would be required for the provision of salt water for flushing use.

Temporary Mains Water for Flushing (TMF) – From NTM WTW and WCFW S/R

6.7.7 The option for supply flushing water by TMF is also considered. However, in order to safeguard the precious fresh water and minimise fresh water consumption as far as practicable, TMF will only be considered as a last resort measure for limited duration in unlikely event.

Evaluation of three options

6.7.8 Concerning the environmental and economic considerations, TSE is recommended as the flushing medium due to the lower unit life-cycle costs. However, since the programme for the supply of TSE has not been confirmed, the use of salt water is recommended as an interim measure for the Development at this stage. Should there be more updated information in flushing water supply availability, adopting TSE as the flushing medium will be further reviewed in the investigation phase of the project before proceeding into detailed design stage.

6.7.9 In view of the insufficient spare capacity of the LOPSW P/S to serve the additional flushing water demand generated by the Development, salt water supply via pump upgrade in LOPSW P/S and provision of a new DN300 salt water main from the existing DN400 salt water main along Long Ping Road to the Site are required for supplying flushing water to the Development. The details of the proposed salt water mains are shown in **Figure 196587/B&V/WSIA/004**.

Smart Water Initiatives and Automatic Meter Readings

6.7.10 The provision of Smart Water Initiatives and Automatic Meter Readings will be investigated in the subsequent stages of the Development.

(1) Additional Capacity of the Pumping Station Required = 1.2 x MDD (Flushing Demand)

6.8 Summary

6.8.1 Subject to further review, the latest development parameters of the Development are assumed and adopted, and the updated water supply records have been collected and reviewed in the WSIA. WCFW S/R is expected to have sufficient spare capacity to meet additional fresh water demand arisen by the Development. In addition, the NTM WTW's planned capacity would be sufficient to accommodate the additional demand from the Development.

6.8.2 It is proposed to serve the Development through an upgraded DN900 fresh water main along Fuk Shun Street, planned DN600 fresh water main to be constructed under Wang Chau Phase 1 Development along Fuk Hi Street and DN600 fresh water main along the new public road within the Site. It is anticipated that the proposed water supply system would be viable from the hydraulic point of view.

6.8.3 TSE is recommended as the flushing medium due to the lower unit life-cycle costs. However, since the programme for the supply of TSE has not been confirmed, the use of salt water is recommended as an interim measure for the Development at this stage. In view of the insufficient spare capacity of LOPSW P/S to serve the additional flushing water demand generated by the Development, salt water supply via pump upgrade in LOPSW P/S and provision of a new DN300 salt water main from the existing DN400 salt water main along Long Ping Road to the Site are required for supplying flushing water to the Development. While there is no committed programme for the supply of TSE to the Site from the planned YLEPP, close liaison with DSD on the availability of TSE for the Development is required in the subsequent stages of the Development. In the unlikely event of both TSE and salt water will not be available for the Development, TMF will be considered as a last measure for a limited duration.

7 PRELIMINARY UTILTIIES IMPACT STUDY

7.1 Introduction

7.1.1 The objective of the Preliminary Utilities Impact Study (UIS) is to identify the existing and planned capacity of electricity supply, gas supply, telephone service system and street lighting.

7.1.2 Findings and recommendation of the UIS are presented in the Preliminary Utilities Impact Study Report. A summary of various aspects of the review are presented in the sections below.

7.2 Utilities Impact

7.2.1 The increase of population arising from the Development may pose the need to upgrade existing utilities. Utilities required for assessment for the Development include power supply, highway lighting, gas supply and telecommunication services.

7.3 General Requirements for Utility Installation

7.3.1 For the purpose of planning and study, the general requirement for utilities installation as stipulated in the Hong Kong Planning Standards and Guidelines (HKPSG) and the Highways Department Technical Circular 3/90 are referred to. The minimum cover and separation requirements for various utility installations are summarized in **Table 7.1**.

Table 7.1 – General Requirement for Underground Utility Installation

Common Utility	Minimum Cover		Separation from Other Utilities & Planting
	Footpath / Areas without Vehicular Traffic	Road / Areas with Vehicular Traffic	
CLP cables -132 kV -11 kV	1,000 mm 750 mm	1,200 mm 900 mm	Working clearance of 300 mm from other utilities for 132kV cables and 150 mm from other utilities for 11 kV cables (1m working clearance between 132kV and 11kV)
HKCGC pipes -Low pressure -Intermediate pressure	700 mm 1,000 mm	1,100 mm 1,100 mm	Working clearance of 600 mm for steel gas pipes, 300 mm for other gas pipes

Common Utility	Minimum Cover		Separation from Other Utilities & Planting
	Footpath / Areas without Vehicular Traffic	Road / Areas with Vehicular Traffic	
PCCW cables HGC cables HKBN cables Wharf T&T cables NWT cables CTV cables	450 mm 450 mm 450 mm 450 mm 450 mm 450 mm	900 mm 900 mm 900 mm 900 mm 900 mm 900 mm	Working clearance of 300mm from other utilities or as required by the service provider

7.4 Analysis and Findings

Impacts to Existing and Planned Electricity Supply Network

7.4.1 The CLP Power Hong Kong Limited (CLP) is consulted regarding their existing transmission and distribution networks in the vicinity of the Site. Existing 11 kV transmission cables are identified along Fuk Hi Street and Long Ping Road. Some 11 kV transmission cables are in the Site supplying electricity to the existing dwellings. Diversion of the existing transmission cables is therefore required. The arrangement will be further liaised with CLP at a later stage.

7.4.2 As advised by the CLP, the existing substation within the area currently has a reserved capacity of less than 2 MVA, which is unable to meet the power demand of the Development. The CLP indicated that a new 132 kV substation with a site area of approximately 32m x 62m is required partly to support the Development. The additional load demand from the Development is 68.3 MVA, which is about 46% of the ultimate capacity (150 MVA) of a standard 132 kV substation. A separate site search exercise would be conducted by the CLP to identify suitable site for the new substation.

7.4.3 It is expected that the electricity transmission cables which connect from the new 132kV substation to the Site will be installed by the CLP in order to supply electricity for the Development. The exact alignment and arrangement of power supply will be further discussed and determined by the CLP at a later stage.

Impacts to Existing and Planned Gas Supply Network

7.4.4 For gas supply, the Hong Kong and China Gas Company Limited (HKCGC) has been consulted. Currently there are no existing gas mains within the Site. In the vicinity of the Site, there are 200-250 mm dia. underground low pressure gas mains running along Long Ping Road, Fuk Hi Street and Fung Chi Road. In addition, there are 315 mm dia. underground medium pressure gas mains running along Fuk Wang Street, Long Ping Road and Fuk Hi Street.

7.4.5 As advised by the HKCGC, a series of upgrading works is proposed to be implemented. These upgrading works include upgrading of the Au Tau Offtake

Station, installation of about 1 km of medium pressure gas main along Castle Peak Road and installation of a new offtake station at Tin Shui Wai. Upon the completion of the proposed upgrading works, there will be sufficient gas supply to the Site.

7.4.6 The exact implementation programme of the upgrading works as well as the alignment and gas supply arrangement will be further discussed and determined with the HKCGC at a later stage.

Impacts to Existing and Planned Telecommunication Network

7.4.7 Telecommunication companies including providers of telephone, broadband and television services are consulted. Information on the existing and planned cable networks within and in the vicinity of the Site is obtained.

7.4.8 HKT and HGC have telecommunication service feeds running within the Site and adjacent to the Site at Fuk Hi Street and Long Ping Road. HKBN an HKC have service feeds running along Long Ping Road. These existing cables are all laid underground. The cable diversion works and actual connection points would be further liaised with the telecom services providers at a later stage.

7.4.9 Given the availability of existing telecommunication services near the Site, it is expected that any proposed telecommunication networks within the Site will be connected to the existing networks nearby.

7.4.10 The exact alignment and arrangement of telecommunication service will be further discussed and determined by telecommunication service providers at a later stage.

Impacts to Existing and Planned Street Lighting Network

7.4.11 New street lights will be required along the public roads within the Site including those for Emergency Vehicle Access (EVA) purpose. The space requirements for the cables and pillar boxes are achievable for incorporation into the Development.

7.4.12 Details and alignment of the proposed street lighting along the public road to be maintained by HyD shall be agreed with HyD Lighting Division at a later stage.

7.4.13 The exact street lighting arrangement will be further discussed and determined by street lighting providers at a later stage.

Potential Hazardous Installations

7.4.14 There are no potential hazardous installations within or in the vicinity of the Site.

Summary

7.4.15 There are no insurmountable problems for supply of utilities to the Development.

8 PRELIMINARY GEOTECHNICAL ASSESSMENT

8.1 Introduction

8.1.1 The objective of the Preliminary Geotechnical Assessment (GA) is to:

- Identify all potentially significant ground and geotechnical engineering constraints associated with the Development and essential Infrastructures;
- Recommend solutions to the ground and geotechnical engineering constraints and confirm the technical and economic feasibility of the Development; and
- Investigate any natural terrain hazards that might affect the existing structures.

8.1.2 Findings and recommendation of the GA are presented in the Preliminary Geotechnical Assessment Report. A summary of the assessment is presented in the sections below.

8.2 Geological Conditions

8.2.1 The solid geology of the Site consists of meta-siltstones and sandstones of the Mai Po Member of Lok Ma Chau Formation (Cmp). Fault bounded subcrops of marble from Yuen Long Formation are located to the southeast of the Site. The Site is generally underlain by terraced alluvium (clay and gravelly sand) and debris flow deposits (unsorted sand, gravel, cobbles and boulders; clay/silt matrix.).

8.2.2 The Site falls within Scheduled Area No. 2, which is an area of complex geology where karst features such as an uneven upper surface and dissolution cavities are known to occur within a potential marble stratum. Considering the identified marble in the surrounding area, and the limited ground investigation (GI) record within the Site, the presence of marble bedrock layer is anticipated.

8.2.3 According to the available Ground Investigation (GI) reports, the Site is underlain by a layer of fill (various from 0.5 m to 4.5 m thick), alluvium (various from 2 m to 13.5 m thick) and completely to highly decomposed meta-sedimentary rock (various from 13 m to 56 m thick). Bedrock is encountered at a depth varying from about 20 m to beyond 60 m below ground. In view of the limited available GI data and high variation in bedrock level, adequate site-specific GI are required in order to establish a reliable ground model. The location of the existing GI stations, site specific GI station and inferred geological profiles of the Site are illustrated in **Figures 196587/B&V/PGA/008 and 196587/B&V/PGA/009**, respectively.

8.2.4 A GI was conducted to investigate the geological profiles of the Site. The location of the GI is shown in **Figure 196587/B&V/PGA/019**, and the site-specific GI result is present in **Table 8.1**.

Table 8.1 – Summary of Site Specific GI result

No.	Ground Level (mPD)	Rock head (mPD)	End of Hole (mPD)	Fill Thick-ness (m)	ALL Thick-ness (m)	CD Rock Thick-ness (m)	HD Rock Thick-ness (m)	MD Rock or above (mPD)
DH4	4.6	-59.01	-80.56	1.4	14	8	40.11	-59.01 to -80.6

8.3 Groundwater Regime

8.3.1 Existing groundwater monitoring records from relevant vertical drillholes were retrieved and inspected. It is found that the highest groundwater level in the vicinity of the Site were +4.94 mPD (i.e. 6.15 mbgl in drillhole WC-AD07 under Report No. 63534).

8.3.2 It is anticipated that groundwater seepage may be encountered during site formation and infrastructure works. Shoring or properly designed excavation with lateral support system will be required to maintain stability of the trenches or working pits. Dewatering and working pits may also be necessary.

8.4 Preliminary Geotechnical Assessment

Geotechnical Appraisal Related to Man-made Features

8.4.1 A review of existing slopes and retaining walls within and in the vicinity to the Site that may affect or be affected by the Development is carried out.

8.4.2 Guidance given in the Geotechnical Engineering Office Technical Guidance Note No. 15 (TGN 15) regarding the travel angle of landslide debris and the crest influence zones for slopes and retaining walls are adopted for determining if any geotechnical feature will affect or will be affected by the proposed woks. The crest influence zone is taken as the feature height. If the proposed works at toe of a feature is within the extreme travel distance of the potential landslide debris of the feature, the failure of the feature is considered to be affecting the proposed works and shall be considered in the geotechnical assessment.

8.4.3 A registered man-made feature (Feature No. 6NW-B/R 88) is identified within the boundary of the Site, which is shown in **Figure 196587/B&V/PGA/002**. Regarding the registered man-made features in close proximity to the Site (Feature Nos. 6NW-B/C 103, 6NW-B/C 104, 6NW-B/C 105 and 6NW-B/C 122), with the assessment of the extreme travel distance of the potential landslide debris of the features, it is considered that any failure of the concerned man-made features will unlikely affect the Development.

8.4.4 After a series of site visit to accessible areas, it is found that there are no non-registered geotechnical features within or in the vicinity of the Site which would potentially be affected by / affect the Development. Further site visit should

be conducted after land resumption so as to confirm the presence of non-registered geotechnical features.

Geotechnical Consideration and Geotechnical Constraints

8.4.5 When more information from ground investigation are available, a settlement analysis shall be carried out. Should the results indicated an unfavorable time frame or degree of settlement, removal of the fill and alluvium layer is one of the options during site formation works so as to prevent settlement due to degradation of non-inert materials and increase of surcharge. The quantities of fill removal will be determined when more information from site-specific GI works are available. Apart from fill removal, in-situ ground improvement such as surcharging, stone columns, deep cement mixing and vertical drains should also be considered at a later stage.

8.4.6 The provision for adjusting the proposed site formation and infrastructure works to cope with any possible constraints should be reviewed at a later stage when more site investigation are carried out.

8.4.7 According to the topographic map and site reconnaissance, a watercourse running through the Site is observed. Temporary drainage system should be constructed to discharge the surface runoff from the Site during site formation works. Temporary surface protection of the Site should also be provided to prevent surface erosion. The existing natural streams within the Site will be demolished during the formation of building platforms. Change in land use from unpaved to paved surface will increase the amount of runoff entering into the drainage system. Change in formation level and cross-fall in the Site will also alter the overland flow pattern and discharge point into the drainage system resulting in modification of the catchment plan. The surface runoff after the completion of the site formation works will be collected by the proposed drainage system and discharged to the existing drainage system downstream.

Feasibility of the Infrastructure

8.4.8 From the current available information, no adverse geological and geotechnical features are observed. It is considered that the Development is feasible from geotechnical point of view, subject to further review when more comprehensive GI information can be obtained at a later stage of the Development.

8.5 Natural Terrain Hazards Study (NTHS)

8.5.1 The potential risk from landslides on natural hillsides will inevitably increase as the Development encroaches into areas adjacent to natural hillsides. The objective of NTHS is to identify any natural terrain hazards that could affect an existing or a proposed development and to enable a decision to be reached so as to ascertain whether any potential risk to the site can be mitigated.

8.5.2 According to the GEO Report No. 138, hillside catchments potentially posing natural terrain hazards to the Site are classified into Channelized Depression (CD),

Topographic Depression (TD) and Open Hillslope (OH) catchments. The classification of catchments has been undertaken based on a review of the catchment characteristics (i.e. topography, drainage/debris concentration, discharge outlet, debris path and potential hazard models), Light Detection and Ranging (LiDAR) data, aerial photographs as well as field reconnaissance observations.

Initial Screening

8.5.3 An initial screening to determine the need for a NTHS is carried out in accordance with Annex GC28 A5 of GEO Circular No. 28 (GEO, 2013) and GEO Report No. 138 (GEO, 2016). Six numbers of catchments (Catchments A to F) are identified as shown in **Figure 196587/B&V/PGA/012** and may have potential to pose natural terrain hazards to the Site. The initial screening results are presented in **Table 8.2**.

Table 8.2 – Initial Screening for NTHS

Catchment	Proposed Facility	Inclusion Guidelines		Need for further screening [Satisfying (1) AND (2) => Yes; otherwise => No]
		(1) Group 1, 2 or 3 Facility [Table 1, GEO Report No. 138]	(2) Presence of an undisturbed 'hillside' sloping at more than 15° within 100m horizontally upslope of the facility	
A	Residential Buildings	Group 1	Yes	Yes
B			Yes	Yes
C			Yes	Yes
D			Yes	Yes
E			Yes	Yes
F			Yes	Yes

"In-principle Objection Criteria" Screening and "Alert Criteria" Screening

8.5.4 Further to the initial screening exercise, two sets of technical criteria, "In-principle Objection Criteria" and the "Alert Criteria", for screening of sites in respect of natural terrain hazards have been carried out.

8.5.5 In line with the current practice, GEO would object in-principle to proposals for the zoning and disposal of a site that falls under this criterial. The six identified catchments (Catchments A, B, C, D, E and F) were reviewed and angles of elevations were between 15° and 35° which fall outside the "In-principle Objection Criteria" of the GEO Report No. 138.

8.5.6 The result of "Alert Criteria" screening is presented in **Table 8.3** and **Figure 196587/B&V/PGA/013**. It is considered that four numbers of catchment (Catchments A, C, D and F) satisfy the "Alert Criteria" of the GEO Report No. 138.

Table 8.3 – "Alert Criteria" Screening for NTHS

Section	Angular Elevation > 20°	50m of Ground Sloping at >15°	Alert Criteria Met?
A	Y	Y	Y
B	N	Y	N
C	Y	Y	Y
D	Y	Y	Y
E	N	N	N
F	Y	Y	Y

8.5.7 Although four numbers of catchment satisfy the Alert Criteria, section 2.3.6 of GEO Report No. 138 (Second Edition) presented the special considerations for dealing with planar hillside catchments. It states that the requirement for a NTHS would not be imposed on new development sites if all the following principles are met as shown in **Table 8.4**.

Table 8.4 – Special Considerations for Dealing with Planar Hillside Catchments

Criteria	Catchment			
	A	C	D	F
The hillside catchment(s) directly overlooking the site is planar in nature, i.e. devoid of topographic depressions or drainage lines.	Y	Y	Y	Y
The natural hillside overlooking the subject site has an angular elevation of ,25^{o} (i.e. the first criterion regarding angular elevation of the Alert Criteria is relaxed from 20^{o} to 25^{o}); the second criterion regarding ground slope angle remains unchanged.	Y	Y	Y	Y
There are no recent ENTLI records and reported landslide incidents within and in the immediate vicinity of the hillside catchments.	Y	Y	Y	Y
There are no Class A and B relict ENTLI records within and in the immediate vicinity of the hillside catchment(s);	Y	Y	Y	Y
There are no obvious sign of distress (e.g. tension crack) within and in the immediate vicinity of the hillside catchment(s) from API or vantage point observations; and	Y	Y	Y	Y

Criteria	Catchment			
	A	C	D	F
There are no obvious signs of boulder fall hazard or evidence of severe surface erosion within and in the immediate vicinity of the hillside from a review of aerial photographs. An example would be to see if there are any recent boulder falls on the hillslope by reviewing different years of aerial photos (e.g. year 1963) for baseline and recent years for latest conditions). This review also serves to supplement the landslide records of recent years not yet covered by the ENTLI.	Y	Y	Y	Y

8.5.8 Based on the geomorphological characteristics of the catchments, the landslide history and the significance of the landslide hazards in each catchment, the Development is not subjected to a significant risk of natural terrain hazards. Hence, further NTHS is not required for the Site.

9 PRELIMINARY SITE FORMATION ASSESSMENT

9.1 Introduction

9.1.1 The objective of the Preliminary Site Formation Assessment (SFA) is to recommend the most suitable formation level, profile and design for the Development.

9.1.2 Findings and recommendation of the SFA are presented in Preliminary Site Formation Assessment Report. A summary of the assessment is presented in the sections below.

9.2 Site Formation Design Considerations and Constraints

9.2.1 A balanced cut and fill approach is adopted as far as practicable in designing the proposed site formation level to minimise the export/import of fill materials. This could reduce construction cost due to import or disposal of fill materials and minimise any possible dust emission.

9.2.2 The site formation scheme should be designed to take into account the existing topography and geological conditions so as to avoid excessive cut and fill and minimise the extent and scale of retaining structures. Where necessary, retaining structures should be kept less than 8 m high to avoid the use of bored pile wall system, which is considered less cost-effective than typical L-shaped retaining wall.

9.2.3 Considering the drainage impact under the worst-case scenario (without the YLBS), the maximum water level in the proposed box culvert at the western end of the proposed public access road is approximately +6.5 mPD. The site formation should be designed to avoid flooding risks within the Site and allow sufficient fall of the internal drains for discharging the site runoff to the proposed box culvert by gravity, while still provide enough flexibility to adjust the site level at later stages if the YLBS by DSD is able to match the population intake year of 2033 as anticipated under its tentative implementation programme.

9.2.4 It is noted that the YLIEE will be located to the immediate north of the Site and there is an interface with site levels along the northern boundary of the Site. In view that the implementation programme of the YLIEE is uncertain, the site formation scheme shall avoid permanent retaining structures along the northern boundary so as to minimize potential future abortive works.

9.2.5 In addition to the above, the site formation levels should be designed to ensure high compatibility with the proposed sewerage, waterworks, road and other infrastructure designs.

9.2.6 The Site is generally located at low-lying flood plain which implies that the ground water level is generally high. Over drawdown of groundwater during excavation should be avoided as it may induce ground settlement of the surrounding areas, collapse of cavities and disturbance of the groundwater system in the region. The

groundwater and the adjacent facilities shall be closely monitored throughout the construction.

9.3 Proposed Site Formation Works

9.3.1 In order to match the existing topography and to suit the housing layout as much as possible, it is proposed to form a 3-step platform to separate the westmost portion, the middle portion the remaining portion of the Site. The westmost platform would accommodate Block 1 and Block 6, while the middle portion would accommodate Block 2 and Block 7 based on the block layout of the Optimal Scheme under this Assignment, as shown in **Figure 198170/B&V/OPT/003**. The proposed site formation layout and details of the proposed retaining structures and slopes are provided in **Figure 196587/B&V/SFA/001** and **Figure 196587/B&V/SFA/001A.**

9.3.2 The proposed eastern platform, which covers approximately 75% of the Site, will be formed as a gently inclined ground rising from the east to the west direction to match the existing topography. The lowest formation level is designed to be +6.5 mPD to allow sufficient fall of the internal drains. Each proposed school site at the eastmost portion of the Site would be formed as a single platform with a uniform level of +6.5 mPD. To the west of the proposed cul-de-sac, the eastern platform will rise from +6.5 to +8.0 mPD to match, in general, the existing topography.

9.3.3 The eastern end of the proposed public access road will be formed at +4.2 mPD to match the existing ground level of Fuk Hi Street. The proposed public access road will rise to +6.5 mPD at the western end with a gradient of about 3%. Furthermore, the access of the proposed PTI at the northeast corner of the Site will be formed at +4.5 mPD for connection to Fuk Hi Street. The back end of the PTI will rise to +6.5 mPD to facilitate its accessibility for the residents within the Site.

9.3.4 In order to maximize the use of site area and avoid excessive cut into the hillside, two stepped platforms are proposed at the western portion and the middle portion of the Site. Four construction access roads with gradient of 5% are provided for construction vehicle access between the three proposed platforms. Under the Optimal Scheme, a future Emergency Vehicular Access (EVA) is planned along the western site boundary and there is not enough room in between for slope grading works. In view that the maximum existing ground level along the western boundary is approximately +19.1 mPD, the formation level of the western platform is proposed at +12.0 mPD to limit the retaining height to less than 8 m.

9.4 Associated Geotechnical Works

Retaining wall

9.4.1 L-shaped retaining walls with retaining height of 2.2 m to 7.2 m are proposed at the western boundary of the Site. Prior to any major earthworks within the Site, the proposed retaining walls shall be installed. As the major cut works are expected at the western portion of the Site, it is recommended that the proposed earthworks

starts from the western portion to provide a source of materials for the proposed earth-filling works at remaining parts of the Site.

Temporary /Permanent Slopes

9.4.2 In addition to the proposed retaining wall mentioned above, slope systems (with gradient of 1:2) will be proposed on all sides of the Site to accommodate various level differences between the Site and the adjacent grounds. Permanent slopes are proposed along part of the western and southern boundaries where rooms for slope grading are available based on the block layout of the Optimal Scheme under the Assignment. As discussed above, the proposed formation level at the eastern portion of the Site is constrained by the drainage condition in the vicinity of the Site. With the YLBS, the drainage condition in the vicinity of the Site can be improved and the proposed site level at the eastern portion can be further optimized. Moreover, the formation level of YLIEE to the immediate north of the Site is subject to review and adjustment. In view of the uncertainty of the implementation status of the YLIEE and the YLBS, temporary slopes are proposed along the northern and eastern boundaries to avoid potential abortive works due to unnecessary retaining walls and allow flexibility to further optimize the site level / cut-fill balance.

9.5 Unsuitable Top Soil Material

9.5.1 Reference is made to the existing GI records and observations during site inspection for estimation of quantities of unsuitable top soil materials. As more than half of the Site is brownfield area and no deep excavation in the Site had been observed from the aerial photos, an average depth of 0.5 m unsuitable top soil materials is assumed for the overall site. An extra depth of 1.5 m of unsuitable top soil materials is assumed for areas of agricultural lands and green landscape. The exact quantities of the unsuitable and top soil materials would require further confirmation after site-specific GI could be carried out.

9.5.2 The unsuitable materials would be disposed off-site, while the remaining top soil would be re-used for planting purpose. The top soil materials would be used in planting areas such as roadside slope, roadside planter, amenity area and local open space.

9.6 Earthwork Inventory

9.6.1 The estimated cut and fill volumes for the Development are shown in **Table 9.1**. The area distribution of the associated cut and fill within the Site are shown in **Figure 196587/B&V/SFA/002.**

Table 9.1 – Earthwork Volume for the Development

Cut (m^3)		Fill (m^3)	Surplus/ Deficit(1) (+/-) (m^3)
Unsuitable Top Soil Materials	Suitable Materials		
105,841	23,466	225,869	-202,403

Note:
(1) Surplus / Deficit = (Suitable Material) – (Fill)

9.7 Imported Fill Material

9.7.1 For preliminary design it is assumed that the major public fill source will be from the Tuen Mun Area 38 Fill Bank, which is the closest public fill reception facility to the Site. The allocation of the fill source will be subject to approval by the Public Fill Committee (PFC) of the CEDD.

9.7.2 Alternative sources for fill materials using available public fill materials from other concurrent construction projects will be identified at a later stage. The mechanism to receive public fill is to designate some concurrent projects as supply source before commencement of construction.

9.8 Dumping of Unsuitable Materials

9.8.1 The dumping of unsuitable materials should be carried out in accordance with WBTC No. 12/2000 and ETWB TCW No. 34/2002. The preliminary estimated quantity of unsuitable materials to be disposed off-site is about 105,841m^3. The volume will be further confirmed upon the completion of more site-specific GI at a later stage.

9.8.2 As the estimated C&D material is more than 50,000 m^3, a C&D Material Management Plan (C&DMMP) will be prepared in accordance with PAH Chapter 4 and ETWB TCW No. 19/2005.

9.8.3 The West New Territories (WENT) Landfill at Nim Wan is considered as a feasible site for dumping the unsuitable materials. However, consultation with EPD and PFC should be conducted to identify the final dumping site within the Northwest New Territories (NWNT) for the unsuitable materials.

10 PRELIMINARY ENVIRONMENTAL REVIEW

10.1 Introduction

10.1.1 The objective of the Preliminary Environmental Review (PER) is to:

- To identify the important environmental factors of the Development and infrastructure works;
- To identify existing and planned sensitive receivers and sensitive parts of the natural environment which might subject to impact by the Development and infrastructure works;
- To determine the possible impacts of the Development and infrastructure works on the environment;
- To identify, assess and specify methods, measures and standards, to be included in the detailed design, construction and operation of the Development and infrastructure works which are necessary to mitigate these impacts and reduce them to established levels;
- To identify alternate proposals/alignments of the Development and infrastructure works to minimise the potential environmental impacts; and
- To determine the environmental impacts arising from and encountered by the Development and to recommend mitigation measures to keep the potential impacts within the acceptable levels of the current standards/regulations.

10.1.2 Findings and recommendation of the PER are presented in Preliminary Environmental Review Report. A summary of the assessment is presented in the sections below.

10.1.3 It has been confirmed that the Development will be implemented in one phase. The following three scenarios will be taken into account to assess whether they will have a bearing on the environmental impacts of the Development.

- Scenario 1 – Existing brownfield operations to the north of the Site shall continue at the time of population intake for the Development;
- Scenario 2 – Existing brownfield operations to the north of the Site were cleared at the time of population intake for the Development; and
- Scenario 3 - The development of the YLIEE is complete at the time of population intake for the Development.

10.2 Air Quality Impact

Air Sensitive Receiver

10.2.1 The assessment area for air quality impact is defined by a distance of 500 m from the boundary of the Site and associated infrastructure works.

10.2.2 The existing and planned Air Sensitive Receivers (ASRs) during construction phase and operational phase have been identified with reference to the HKPSG as shown in **Figure 196587/B&V/PER/FIG 3.1a – 3.1d** and **Figure 196587/B&V/PER/FIG 3.2**, and their impacts to the ASRs have been assessed.

Air Quality Impact during Construction Phase

10.2.3 The construction works for the Development is tentatively scheduled to commence in early 2027, after the completion of land resumption/site clearance. The infrastructure works within the Site and outside the Site would be completed by 2029 and 2033 respectively. During the construction of the Development, potential air quality impacts on the nearby ASRs are related to dust and emission (sulphur dioxide (SO_2) and nitrogen dioxide (NO_2)) arising from movement of vehicles/ construction equipment along unpaved roads and paved road, as well as material handling and wind erosion of exposed area.

10.2.4 The air quality impact is considered manageable provided that appropriate mitigation measures specified in Air Pollution Control (Construction Dust) Regulation are implemented. Given the limited number of construction plant required on-site for a development of this scale, the associated gaseous emissions are expected to be limited. For Non-road Mobile Machineries (NRMM) at construction work sites, they are controlled under the Air Pollution Control (Non-road Mobile Machinery) (Emission) Regulation and that site works will strictly comply with the regulatory requirements so as to minimize emissions from NRMM. It is therefore considered that the air quality impact arising from construction plant should be minimal.

Air Quality Impact during Operational Phase

Vehicular Emissions

10.2.5 The existing ASRs and planned ASRs within the Site will potentially be affected by vehicle exhausts from existing roads, in particular Fuk Hi Street, Long Ping Road and the proposed access road to the Site. NO_2, respirable and fine suspended particulates (RSP and FSP) are the major pollutants of concern from vehicle exhaust, especially to receivers at low level. The layout design has incorporated appropriate setback distance of at least 5 m and 10 m from the local road and district distributor respectively with reference to the requirements stated in the HKPSG. Hence, the potential vehicular emission impact is considered minimal.

Chimney Emissions

10.2.6 A total of 22 active chimneys identified within YLIE are shown in **Figure 196587/B&V/PER/FIG 3.3**, of which 4 chimneys are located within 500 m of the Site. Apart from a small part of the carpark cum community facilities, all sensitive receivers are at least 200 m away from the existing active chimneys. It is not uncommon that community facilities will not rely on windows for ventilation and be equipped with central air conditioning. It is recommended that any fresh air intake location of the community facilities should be located at least 200 m away from the nearest chimney. With appropriate design of fresh air intake location for the community facilities to be at least 200 m away from the nearest chimney, all sensitive receivers within the Site would comply with the minimum buffer distance from chimneys recommended in the HKPSG.

10.2.7 The planned development of the YLIEE may also has chimney installations which are regarded as future air pollution sources. However, since there is no information on the development programme and details of the YLIEE at this stage and the development of the YLIEE is a designated project under the Environmental Impact Assessment Ordinance (EIAO), the potential impact associated with chimney installations of the YLIEE should be addressed as part of the Environmental Impact Assessment (EIA) study for the development of the YLIEE.

Public Transport Interchange

10.2.8 Mechanical ventilation system will be installed at PTI (if required in future detailed design) to reduce the air pollutants accumulation inside PTI.

Mitigation measures

Construction Phase

10.2.9 To mitigate fugitive dust impacts, all dust control measures recommended in the Air Pollution Control (Construction Dust) Regulation, where applicable, will be implemented.

Operational Phase

10.2.10 As mentioned in Para. 10.2.6, fresh air intake location for the community facilities shall be designed to be at least 200 m away from the existing active chimneys.

Public Transport Interchange

10.2.11 A mechanical ventilation system will be provided (if required in future detailed design) for the PTI to ensure that air quality inside the PTI would comply with the requirement of the EPD. Should a mechanical ventilation system is provided in future, the exhaust louver of the ventilation fan would be located at the northern façade, which is facing away from the planned ASRs within the Development and the existing ASRs along Fuk Hi Street. The ventilation system will be designed based on the considerations as specified in EPD's Control of Air Pollution in Semi-Confined

Public Transport Interchanges (ProPECC PN1/98). Therefore, adverse air quality impact due to the PTI is not anticipated.

10.3 Noise Impact

Noise Sensitive Receiver

10.3.1 Noise sensitive receivers (NSRs) are identified with reference to the HKPSG at a distance of 300 m from the boundary of the Site, as shown in **Figure 196587/B&V/PER/FIG 4.1** and **Figure 196587/B&V/PER/FIG 4.1a - 4.1c**. The impacts to the NSRs during the construction and operational phases have been assessed.

Construction Noise Impact

10.3.2 Key construction activities of the proposed site formation and infrastructure works have been identified for noise assessment. The major construction works would include the following activities:

- Site clearance;
- Excavation works;
- Filling works;
- Construction of retaining structures;
- Formation of internal access road;
- Infrastructure works such as sewerage works, water supply works, drainage works, and utilities construction; and
- Road improvement works and junction improvement works.

Unmitigated Scenario

10.3.3 There would be noise exceedances predicted at all NSRs except C07. Exceedances are anticipated at all NSRs (C01-C03, C10-C11) along Fuk Shun Street throughout late 2027 to early 2029. Village houses at the Wang Chau Village Extension Area (C04-C05, C12-C13) and Kam Ping House at Long Ping Estate (C06) are also predicted with exceedances for the period of late 2027 to late 2029. In addition, C08 near the junction improvement of Fuk Hi Street and Wang Lok Street as well as C09 near the junction improvement of Fung Chi Road and Wang Tat Road are both predicted with exceedances in late 2028. Implementation of noise mitigation measures would be necessary to reduce the noise impact.

Mitigation Measures

10.3.4 Noise mitigation measures including the use of quiet Powered Mechanical Equipment (PMEs), installation of temporary noise barriers and enclosure for the PMEs to screen noise from the affected NSRs are proposed.

10.3.5 Future appointed contractor will be required through contract specifications to provide and implement sufficient direct mitigation measures with reference to the recommendations in this PER or the future detailed design to achieve acceptable noise levels on the nearby NSRs.

10.3.6 It is also recommended to implement good site practices as far as practicable so as to further reduce noise impact at NSRs. Since the effect of the good site practices could not be quantified, the mitigated noise levels calculated in the subsequent sections have not taken into account this effect.

10.3.7 With the implementation of the proposed mitigation measures, adverse construction noise impact to all NSRs is not anticipated.

Operational Noise Impact - Road Traffic Noise

10.3.8 The road traffic noise impact imposed on the existing NSRs and planned NSRs of the Development would be generated by the roads within 300 m from the boundary of the Site, road improvement works, and junction improvement works. The main roads considered for the road traffic noise assessment are Fuk Hi Street, Long Ping Road and the proposed access road to the Site, as well as the roads in the vicinity of the junction proposed for improvements.

10.3.9 Under the three scenarios mentioned in Para. 10.1.3, the road traffic will have different noise impacts to the existing and planned NSRs.

Scenarios 1 and 2

10.3.10 Under Scenarios 1 and 2, worse road traffic noise impact would occur in AM peak hour. There would be exceedances for existing NSRs along Fuk Hi Street and Long Ping Road as well as planned NSRs within the Site (i.e. Blocks 11, 13 and two proposed primary schools) and the planned Wang Chau Phase 1 Development. For some of the existing NSRs and all planned NSRs within the Site, the exceedances are due to Project Roads (i.e. Fuk Hi Street, proposed access road). Therefore, direct mitigation measures would be required such that the predicted noise level at these NSRs would comply with the noise criteria.

Scenario 3

10.3.11 As mentioned previously, since there is currently no available information on the YLIEE, a quantitative assessment could not be conducted. Nonetheless, it is expected that the road traffic noise impact of Scenario 3 would be greater than that of Scenario 2 due to the addition of vehicles induced by the YLIEE. As for comparing between Scenario 1 and Scenario 3, it is difficult to determine whether the traffic of brownfield operations under Scenario 1 or the YLIEE under Scenario 3 is greater at

this stage. Since the development of YLIEE is a designated project under the EIAO, the potential road traffic noise induced by the YLIEE should be quantitively addressed as part of the EIA study for the development of YLIEE.

Mitigation Measures

10.3.12 Direct mitigation measures should be considered or proposed for road projects if there would be adverse environmental impact. If the NSRs are affected by noise from other existing roads, direct mitigation measures are required to reduce the noise from the concerned road projects. Upon exhausting all direct mitigation measures, indirect mitigation measures in the form of window insulation and air-conditioning is often the "last resort" to address the noise impact.

10.3.13 Exceedance of the noise criteria at both existing NSRs and planned NSRs within the Site are predicted in the unmitigated case for both Scenario 1 and Scenario 2. As such, direct mitigation measures are required to alleviate the potential road traffic noise impact. The predicted unmitigated noise levels revealed that the AM peak hour in Scenario 1 generally represented the worst-case between the two scenarios. Hence, direct mitigation measures are recommended to mitigate the road traffic noise impact for this worst-case scenario, which would be applicable and acceptable for other scenarios with less impact.

10.3.14 A combination of roadside barrier and application of low noise road surfacing material (LNRS) of polymer modified friction course (PMFC) material is proposed for noise mitigation works for parts of Fuk Hi Street as far as possible. Two 4 m high vertical barriers along the southbound of Fuk Hi Street is proposed to reduce the road traffic noise impact on the existing NSRs. Further mitigation measures have been considered ineffective as the exceedance is mainly due to the direct line of sight to Fuk Hi Street through the vehicular ingress/egress.

10.3.15 At-receiver mitigation measures in the form of architectural fins made of concrete and acoustic windows with noise reduction of 4.7 dB(A) are proposed to alleviate the road traffic noise impacts for the NSRs at Block 11 and Block 13, subject to detailed design at later stages. With the implementation of a combination of LNRS along Fuk Hi Street and architectural fins and acoustic windows at the receivers, the predicted noise levels at all the representative planned residential NSRs within the Site will comply with the relevant noise criteria.

10.3.16 For the two primary schools within the Site, increasing the boundary wall of schools to 5 m high is proposed as the only feasible direct mitigation measure at this stage taking into account the inapplicable of LNRS at the proposed access road and limit of sightline due to erection of noise barriers along the proposed access road and Fuk Hi Street near the access road junction. However, the adoption of the 5 m boundary wall shall be reviewed by Architectural Services Department or the future project proponent of the school following the Class Assessment Document when detailed layout of the schools is available during detailed design stage of the primary schools.

10.3.17 The locations and extents of the proposed noise mitigation measures are summarized and illustrated in **Figure 196587/B&V/PER/FIG 4.8**.

10.3.18 In addition to the LNRS (PMFC type) proposed for the section of Fuk Hi Street with road improvement works, the application of LNRS (PMSMA6) on the proposed access road and braking zone of Fuk Hi Street has also been explored, as shown in **Figure 196587/B&V/PER/FIG 4.9.** However, promising findings of the trials with PMSMA6 have yet to be established and such technical application criteria are still undetermined. It is thus recommended that a review on the use of new road surfacing materials, if applicable, on roads within the Project Boundary (including the proposed access road and at the junction of Fuk Hi Street and Long Ping Road where the application of LNRS is constrained by current application criteria) shall be conducted at the detailed design stage with a view to further alleviating the traffic noise impacts to the existing and planned NSRs. The feasibility and effectiveness of the application of PMSMA6 is subject to findings from ongoing trials conducted by the Highways Department.

Residual Road Traffic Noise Impacts

10.3.19 With the implementation of direct mitigation measures such as noise barriers, LNRS, architectural fins and acoustic windows, there should be no adverse road traffic noise impact on the residential blocks within the Site.

10.3.20 Residual impacts are still predicted at the auxiliary blocks of the two proposed schools, which are primarily due to the proposed access road and Fuk Hi Street. As discussed above, both noise barriers and LNRS are not feasible for the proposed access road. Nonetheless, the Architectural Services Department or the project proponent of the schools to be identified in the future should follow the Class Assessment Document to provide the necessary noise mitigation measures for the confirmed detailed layout of the school to address the noise impact during the detailed design stage of the primary school development.

10.3.21 For existing NSRs, upon exhausting all feasible direct mitigation measures, residual impacts contributed dominantly by the Project Roads were predicted at E02, E03, E06 and E07. However, these NSRs do not fulfill all the testing criteria eligible for indirect mitigation measure. Hence, indirect mitigation measures would not be provided. Nevertheless, with the provision of proposed mitigation measures, the traffic noise impact along the modified section of Fuk Hi Street is alleviated when compare with the without Project scenario.

<u>Operational Noise Impact - Fixed Plant Noise Impact</u>

Scenario 1

10.3.22 Fixed noise impacts due to the applicable sources identified in **Figure 196587/B&V/PER/FIG 4.5** have been predicted for the planned representative NSRs within the Site under Scenario 1. To minimize direct line-of-sight with NSRs, the ventilation fan of the PTI (if required in future detailed design) is proposed to be located at the north facing façade of the PTI. It is assumed to be located at the furthest west of the north facing façade as a worst case assumption. By limiting the Sound Power Levels (SWLs) of the ventilation fan to 100 dB(A) and 94 dB(A) for daytime/evening and night-time period respectively, full compliance of the criteria

would be achievable at all planned NSRs. The results revealed that full compliance to the noise criteria can be achieved at all NSRs within the Site.

Scenario 2

10.3.23 Fixed noise impacts due to the applicable sources identified in **Figure 196587/B&V/PER/FIG 4.6** are predicted for the representative NSRs under Scenario 2. The ventilation fan of the PTI (if required in future detailed design) is assumed to be located at the furthest west of the north facing façade as a worst-case assumption. The results revealed that full compliance to the noise criteria can be achieved at all planned NSRs within the Site.

Scenario 3

10.3.24 **Figure 196587/B&V/PER/FIG 4.7** shows the location of fixed noise sources under scenario 3. However, since there is no information on the development programme and nature of YLIEE at this stage, no quantitative fixed noise impact assessment has been conducted for Scenario 3. Nonetheless, since the development of YLIEE is a designated project under the EIAO, the induced fixed noise sources impact on the planned NSRs within the Site is expected to be assessed to confirm compliance with the criteria stipulated in the Noise Control Ordinance (NCO).

Impacts on Existing NSRs due to Planned Noise Sources

10.3.25 To cater for a worst-case scenario for the existing NSRs, a separate SWL has been established by assuming the location of the ventilation fan at the far east of the north facing façade (if required in future detailed design). Should the ventilation fan of the PTI be located at the far east of the northern façade (if required in future detailed design), the SWLs of the ventilation fan will need to be limited to 96 dB(A) and 88 dB(A) for daytime/evening and night-time period respectively in order to achieve full compliance to the criteria at existing NSRs.

Mitigation Measures

10.3.26 Future appointed contractor will be required through contract specifications to implement a design that could mitigate noise impact with reference to the recommendations in the PER or the future detailed design such that no adverse noise impact arising from the planned ventilation fan of PTI (if required in future detailed design) is anticipated.

10.3.27 If installation of mechanical ventilation system at the PTI is required in future detailed design, no residual fixed noise source impacts are anticipated for the existing NSRs at Fuk Hi Street as well as all planned NSRs within the Site by adopting a maximum allowable SWL for the ventilation fan. As such, no residual fixed noise source impacts are envisaged with the adoption of recommended mitigation measures.

10.4 Water Quality

Assessment Area and Water Sensitive Receivers

10.4.1 The assessment area for water quality is defined as all areas within 500 m from the boundary of the Site.

10.4.2 According to the desktop reviews and site surveys, the water quality sensitive receivers within the assessment area for water quality were identified as shown in **Figure 196587/B&V/PER/FIG 5.3**.

Identification and Evaluation of Impact

Construction Water Quality

10.4.3 Surface runoff of the Site may cause potential water quality impact. During construction, soil surfaces would be exposed. Surface runoff of the Site would wash away soil particles on unpaved lands and areas with topsoil exposed. This runoff is characterised by high concentrations of suspended solids. Release of the runoff into water bodies directly or via drainage channels could lead to increase in suspended solid levels and turbidity in the nearby water bodies. The runoff may also wash away contaminated soil particles and therefore cause water pollution.

10.4.4 The runoff generated from these watercourses upstream of the Site will be intercepted and diverted into peripheral U-channels, and eventually be discharged to Yuen Long Nullah. The construction of these U-channels would commence with general site formation works. Mitigation measures are to be implemented during alterations. As such, no unacceptable water quality impacts would be expected.

10.4.5 Site drainage would be well maintained and good construction practices would be observed to ensure that litter, fuels and solvents are managed, stored and handled properly and will not enter nearby streams and water bodies. Therefore, it is expected that no water quality impact will be caused by accidental spillage.

10.4.6 Domestic sewage would be generated from workforce of construction stage. However, it should be collected onsite using chemical toilets and be suitably handled by licensed contractors. No direct discharge of sewage to water bodies would be allowed. No adverse water quality impact from sewage effluent from construction workforce is expected.

Operational Water Quality

10.4.7 The sewage generated from the Development will be discharged to the nearby public sewers to meet the requirement as stipulated in the Technical Memorandum on Water Pollution Control Ordinance. As all sewage will be properly collected by public sewer leading to the YLSTW for treatment before discharge, no adverse water quality impact is expected.

10.4.8 Surface run-off to be generated from the Development is known as non-point source pollution. At the planning and design stages, the drainage systems should be properly planned to receive road runoff. Road runoff is expected to carry silt and grit and should be properly handled before discharge. Appropriate facilities, such as gullies and silt traps shall be installed to intercept suspended solids before discharge into the nearby drainage system. With the implementation of the proposed mitigation measures, no adverse water quality from road runoff would be expected.

10.4.9 Surface runoff arises from the Development due to the increase in paved area. The level of contaminants in the runoff is generally limited for new development area and does not pose a significant threat to the nearby watercourses. For locations that are prone to pollution, e.g. public transport interchange and car park, separate drainage system should be considered at these locations and the collected runoff should be intercepted by gullies, silt traps or oil interceptors before discharge as necessary. With the implementation of the proposed mitigation measures, no adverse water quality impact from surface runoff is expected.

10.5 Waste

Identification and Evaluation of Potential Impacts

10.5.1 The construction activities to be carried out for the Development would generate a variety of wastes that can be divided into distinct categories based on their composition and ultimate method of disposal. The identified waste types include:

- Site clearance waste
- Construction and demolition (C&D) materials
- General refuse
- Chemical waste
- Asbestos containing materials (ACM)

10.5.2 C&D materials, comprising both inert and non-inert portions, would be generated from site excavation and general construction works. The estimated amount of inert C&D materials generated during the construction phase would be approximately 127,501 m^3, of which about 23,466 m^3 of the soft inert C&D materials are expected to be reused on site and approximately 104,035 m^3 of both hard and soft inert C&D materials, which is considered as unsuitable soil, will be disposed off-site to designate public fill reception facilities. Opportunities to maximise the reuse of inert C&D materials will be explored during the detailed design stage. The estimated amount of non-inert C&D materials is approximately 1,806 m^3, which will be disposed of at landfill. Detailed breakdown of the various types of waste material is provided in **Table 10.1**. Although the excavated material would be mostly general fill material, not all excavated material would be suitable for backfilling. On the

other hand, import of approximately 202,403 m^3 of fill material will be required for site formation of raised platform.

Table 10.1 – Summary of Estimated Quantities of C&D Materials

Type of C&D Materials and Waste		Total Quantity (m^3)	Reused on Site (m^3)	Disposed offsite (m^3)
Inert C&D Material	*Soft Inert Material*	115,460	23,466	91,994
	Hard Inert Material	12,041	-	12,041
Non-inert C&D Materials		1,806	-	1,806
Total		**129,307**	**23,466**	**105,841**

10.5.3 The C&D materials generated from site formation should be sorted on-site into inert C&D materials (that is, public fill) and non-inert C&D materials. In order to minimise the impact resulting from collection and transportation of C&D materials for off-site disposal, the excavated materials comprising fill materials should be reused on-site as backfilling material as far as practicable. Non-inert C&D materials, such as wood, plastic, steel and other metals should be reused or recycled, as a last resort, before disposing of to landfill.

10.5.4 Precautionary measures related to the handling and disposal of asbestos should also be implemented based on Handling of Asbestos Containing Materials in Buildings (ProPECC PN 2/97).

10.5.5 With the implementation of mitigation measures, such as maximizing the reuse of inert C&D materials, and proper waste management practices for handling, transportations and disposal of identified waste arisings from the site formation works, no residual impacts are expected during the construction phase.

10.6 Ecological Impact

Ecological Impacts within and in the vicinity of the Site

10.6.1 The assessment area for ecological impact is defined as areas within 500 m from the boundary of the Site and associated infrastructure works, which would be potentially affected by the Development.

10.6.2 Ecological surveys were carried out from December 2012 to February 2014 under the previous "Planning and Engineering Study for the Public Housing Site and Yuen Long Industrial Estate Extension at Wang Chau" (P&E Study), which covers habitat and vegetation, mammal, avifauna, herpetofauna, butterfly and dragonfly, and freshwater fauna. To supplement the desktop study, site visits and verification surveys were conducted between September and December 2017 covering a 4 months period including both wet and dry seasons to update the current conditions.

10.6.3 The assessment area for ecological impact assessment contains developed area, agricultural lands, plantation, shrubland/grassland, woodland, fishponds and watercourses, while the Site mainly consists of developed area, agricultural land and some minor watercourses. The infrastructure works are located mainly along existing roads. The overall ecological value of the Site is fairly low due to its

disturbed nature. Thus the overall direct impact due to loss of habitats of the Site is ranked as minor.

10.6.4 Japanese Pipistrelle, Common Rat Snake and Freshwater Crab were the species of conservation importance recorded within the Site. Japanese Pipistrelle was recorded in previous study, but its location is not specified in the study. Similar with birds, Japanese Pipistrelle was in low abundance within the Site and more suitable alternative habitats are available outside the Site. Common Rat Snake was recorded in section of watercourse by previous studies and a Freshwater Crab species *Somanniathelphusa zanklon* was recorded during the verification study. Channelised watercourse is not the typical habitat for Common Rat Snake or the dependent habitat for the Freshwater Crab given that natural sections of watercourse with better conditions were present upstream. Both species were only recorded in small numbers. In view of the potential pollution, the severity of impact is considered to be minor.

10.6.5 **Figure 196587/B&V/PER/FIG 8.2** has shown the ecological resources within and in the vicinity of the Site identified in literature review and verification survey.

Direct Impacts during Construction Phase

10.6.6 All existing habitats within the boundary of the Site will be lost due to the proposed site formation works. However, the Site only consists of developed area, agricultural land and minor watercourses. As shown in **Table 10.2,** the ecological values of the Habitats inside the Site were ranked as "Low".

Table 10.2 – Ecological Values of the Habitats inside the Site

Criteria	Developed Area	Agricultural Land	Watercourse
Naturalness	Man-made.	Man-made habitat.	The watercourse towards the west (upstream) is largely natural, while the lower course is channelised and modified, mostly with concrete wall and bottom. The watercourse is subject to pollution from the surroundings.
Size of Habitat Loss	9.83 ha	2.21 ha	660 m
Diversity	Low floral and faunal diversity	Low floral and faunal diversity.	Low floral and faunal diversity.
Rarity	Very common habitat; Two bird species, Collared Crow, and While-shouldered Starling, recorded are of conservation importance.	Common habitat in the rural area. Greater Coucal of conservation importance recorded.	Common habitat in rural areas in Hong Kong. Common Rat Snake, and Freshwater Crab *Somanniathelphusa zanklon* were of conservation importance.

Criteria	Developed Area	Agricultural Land	Watercourse
Re-creatability	Readily re-creatable.	Readily re-creatable.	Re-creatable.
Fragmentation	Not fragmented.	Fragmented by the developed area.	Fragmented from the natural section upstream by modification and pollution.
Ecological Linkage	No significant linkage.	Isolated from other natural habitats	No significant linkage due to channelized section.
Potential Value	Limited.	Limited due to the small size and isolation from natural habitats	Low given the channelization.
Nursery / Breeding Ground	No known breeding ground of significance	No known nursery/breeding ground of significance	Not observed
Age	Unknown.	Unknown.	Unknown
Abundance / Richness of Wildlife	Moderate floral abundance and diversity; low faunal abundance and diversity.	Low floral and faunal abundance and diversity.	Low floral and faunal diversity and abundance
Ecological Value	**Low**	**Low** as species of conservation importance recorded are in small numbers, and not restricted to this habitat type.	**Low**

10.6.7 The associated infrastructure works, such as the upgrade of a water main connecting the existing service reservoir, would be taken place along the existing roads. As the existing roads would be reinstated to the original conditions after the works, no permanent habitat loss would be caused by the associated infrastructure works area.

Indirect Impacts during Construction Phase

10.6.8 Disturbance to the surrounding habitats may occur during the construction and operational phases due to the increase in human activities. The surrounding habitats are already subject to disturbance from the existing uses in the Site and the adjacent developed areas to the north and east. Only negligible disturbance impact to these areas will occur during construction and operational phases.

10.6.9 The surrounding areas of the associated infrastructure works are mostly developed areas which are under high level of human activities. Hence, the disturbance to the surrounding habitats of the associated infrastructure works is considered to be insignificant. Part of the associated infrastructure works near the Wang Chau Service Reservoir falls within Conservation Area zone and is immediately adjacent to secondary woodland. Since this section of infrastructure works located on an existing road and at the edge of Conservation Area zone and the works area is small,

the disturbance to the surrounding habitats of the associated infrastructure works is considered to be insignificant.

Operational Phase Impacts

10.6.10 Possible bird strikes with buildings and/or noise barriers by birds (if any) may occur. The cause of bird strikes is related to the transparent or reflective nature of the building facade or the barriers. Impacts are not likely to be of significance as the abundance of birds is low at the Site and the Site is not located between areas with high abundance of birds.

Impacts on Recognised Sites and Species of Conservation Importance

10.6.11 The Site is located outside Wetland Conservation Area (WCA) and Wetland Buffer Area (WBA) and outside Deep Bay Buffer Zone 1 and Zone 2. No recognised sites of conservation importance were identified within the Site. The northern portion of the associated infrastructure works falls within the WBA, while the northern end of the assessment area also falls within WCA. Since the associated infrastructure works would be taken place in existing roads of developed area, significant adverse impact on wetlands of conservation significance from associated infrastructure works are not expected with implementation of good site practices and compliance with the Water Pollution Control Ordinance during the construction and operational phases.

10.6.12 Hillsides near the western and southwestern parts and fish ponds on the northern fringe of the assessment area are zoned as "Conservation Area" (CA). The CA is to protect and retain existing natural landscape, ecological or topographical features of the area for conservation, education and research purposes. This is a general presumption against developments in the CA. In general, only developments that are needed to support conservation of the existing natural landscape or scenic quality of the area or any essential infrastructure works with overriding public interest may be permitted. The section of minor watercourse within the Site is located downstream from the nearest CA zone on slopes of Kai Shan. The WCFR S/R and access road, that are subjected to improvement works also fall within CA zone at Kai Shan. The improvement works, though along the fringe of CA, lies on existing roads, and therefore potential ecological impact on the CA zone are not anticipated.

10.6.13 A butterfly hotspot at Kai Shan was located more than 400 m to the west of the Site although it also lies along and in the vicinity of the infrastructure works along the existing road.

10.6.14 The Site is located at the fringe of the secondary woodland. No loss or fragmentation of the suitable habitats for butterflies will result from the Development. The nectar/larval food plants for the butterfly species of conservation interest recorded within the Site are all common or very common. No significant ecological impacts on the potential feeding/breeding/nursery ground for the butterfly species of conservation significance recorded in the assessment area are expected.

Ecological Mitigation

Avoidance

10.6.15 The CA zone including Kai Shan Butterfly Hotspot, WBA, WCA, the ponds and surrounding wetland habitats in the west and northwest of the assessment area are ecologically linked to the Deep Bay Area are areas or habitats of conservation importance. They should be well protected and preserved to avoid any negative impacts arising from the Development.

Minimisation

10.6.16 The boundary of the Site has been refined during the course of the assessment to minimize the loss of habitats with ecological value, in particular to reduce the woodland loss caused by the Development.

10.6.17 The alignment of the infrastructure works will all follow and within existing roads. The impacts would be limited to temporary disturbance and temporary habitat loss during construction phase. Due to this, the impacts of both habitat loss and disturbance would be minimised.

Mitigation

10.6.18 Sensitive design of building facade and noise barrier is to be adopted to prevent bird strike. The use of transparent or reflective materials should be avoided where possible, except the necessary ones such as windows for residential flats. Large-scaled and continuous application of transparent or reflective materials such as glass curtain walls should be avoided.

10.6.19 Common Rat Snake and Freshwater Crab *Somanniathelphusa zanklon* were recorded in channelised minor watercourse within the Site. They were both widely distributed in Hong Kong and only of low abundance within the Site. To take a precautionary approach, a precautionary site check and translocation if necessary covering fauna of conservation importance (Common Rat Snake and the Freshwater Crab *Somanniathelphusa zanklon*) prior to site formation at the minor watercourse is recommended. If any individuals are captured, they should be translocated to other nearby watercourses with natural banks and beds outside the Site.

10.6.20 Proper site management measures should be implemented to control site runoff and drainage, and thereby minimize potential adverse impacts on water quality. It shall follow prevailing practices, including mitigation measures for design, construction, operation and maintenance as specified in the ProPECC PN 1/94 - Construction Site Drainage. These mitigation measures should include good practices to minimise site surface runoff and the chance of erosion, and also to retain and reduce any suspended solids prior to discharge.

Enhancement on the Quality of the Habitats for Butterflies by planting Nectar/ Larval Food Plants in the Site:

10.6.21 Vegetation within the Site will be cleared for the Development, including a number of floral species which are the nectar/ larval food plants for butterfly species of conservation significance that have been recorded at Kai Shan. Though these butterfly species were not identified within the Site, the nectar/ larval food plants within the assessment area may be a possible food source for them. Since these plant species, and also other nectar plants which attract many butterfly species, are very common or common (Xing et al., 2000) and are mostly not present in large numbers in the areas to be cleared, the loss of nectar/larval food plants is predicted to be of low significance. Yet, it is still proposed to plant a number of floral species in the landscaped areas, if possible. This can enhance the quality of the habitats for butterflies and to provide a benefit to the wider butterfly community.

10.7 Cultural Heritage

Environmental Legislation, Policies, Standards and Criteria

10.7.1 The relevant legislations, standards and guidelines applicable to the Assignment for the assessment of cultural heritage include:

- Antiquities and Monuments Ordinance;
- Technical Memorandum on Environmental Impact Assessment Process;
- Hong Kong Planning Standards and Guidelines;
- Guidelines for Cultural Heritage Impact Assessment;
- Development Bureau Technical Circular (Works) No. 6/2009: Heritage Impact Assessment Mechanism for Capital Works Projects;
- List of the 1,444 Historic Buildings with Assessment Results; and
- List of New Items for Grading Assessment with Assessment Results.

Archaeological Background

10.7.2 According to **Figure 196587/B&V/PER/FIG 9.1**, no Sites of Archaeological Interest (SAI) is identified within the Development. Two SAI, namely Sheung Cheung Wai SAI and Mong Tseng SAI are identified in the vicinity of the Development. The closest distance from the SAI to the Development is about 1,300 m. It is anticipated that no SAI will be affected by the proposed works.

Historical Villages

10.7.3 There are a number of historical villages around the Site. No historical village is within the Site. The location of historical villages in the vicinity of the Development

is presented in **Figure 196587/B&V/PER/FIG 9.2**. The shortest distance from the historical village (i.e. Shui Tin Tsuen) to the Development is about 32 m. Since the infrastructure works is confined within existing roads which comprises various underground utilities, it is anticipated that no historical village will be affected by the proposed works.

Built Heritage

10.7.4 A well and shrine is identified within the Site, which is shown in **Figure 196587/B&V/PER/FIG 9.3**. The well has a plaque with a date of 1912 written on it and it seems that the date refers to the notice for usage. Given its high fung shui value and historical value for the local communities, it is recommended that the well and shrine could be retained in-situ as far as possible within the Site. Antiquities and Monuments Office (AMO) has no adverse comment on the retention of the well and shrine in-situ.

10.7.5 No declared monument or graded historic building is identified within the Site and 50 m from the boundary of the Site, hereafter defined as assessment area for built heritage. It is anticipated that no declared monument and graded historic building will be affected by the proposed works. The declared monument and graded historic buildings in the vicinity of the Development are shown in **Figure 196587/B&V/PER/FIG 9.3** and **196587/B&V/PER/FIG 9.4.**

10.7.6 A few items of heritage interest are barely encroached into the assessment area. The items are about 48 m from the infrastructure works. Since the infrastructure works is confined within existing roads which comprises various underground utilities, it is anticipated that no items of heritage interest will be affected by the proposed works. The items are shown in **Figure 196587/B&V/PER/FIG 9.4** and are listed below:

- HB01 – Village House in Shing Uk Tsuen
- HB02 – Shrine at Tai Tseng Wai
- HB03 – Shrine at Ng Uk Tsuen

10.7.7 As shown in **Figures 196857/B&V/PER/FIG 9.3** and **196857/B&V/PER/FIG 9.5**, there are existing burial grounds and graves which are located to the south and west of the Site. The boundary of the Site has been adjusted to preserve the burial grounds and graves in-situ. Direct impact to these burial grounds or graves is not expected.

Findings of Archaeology

10.7.8 After reviewing the Archaeological Desk-based Review and Proposal for Archaeological Field Survey in the P&E Study, three archaeological potential areas were identified, namely Area A, Area B and Area C which are indicated in **Figure 196587/B&V/PER/FIG 9.1**. Only Area A and Area C are partially within the southern part of the Site respectively. These areas may have moderate archaeological potential to yield Ming to Early Qing dynasty archaeological deposits due to observations identified during site walks. During the site visit, it is noticed that the archaeological potential areas are mostly private and permission are

required from respective owners or tenants to carry out field investigation work. Due to issues on privacy and rights of land ownership, there are constraints on the access for a comprehensive field investigation. It is therefore recommended that field investigation and field testing work should be conducted to assess the archaeological potential in Area A and Area C falling within the Site after land resumption.

10.7.9 The potential impact on archaeological resources cannot be determined at this stage. It is subject to further field investigation and field testing work which will be conducted at potential areas in Area A and Area C falling within the Site after land resumption. Future contractor should appoint qualified archaeologist and prepare a field investigation and field-testing report and seek AMO agreement before construction.

11 PRELIMINARY LANDSCAPE AND VISUAL IMAPCT ASSESSMENT

11.1 Introduction

11.1.1 The objective of a landscape and visual impact assessment is to:

(a) Carry out a baseline study including an appraisal of the landscape resources and characters of the Site;

(b) Assess the potential landscape impacts associated with the Development and recommend effective mitigation measures to avoid or minimize the adverse landscape impacts identified; and

(c) Assess the potential visual impacts associated with the Development and recommend effective mitigation measures to avoid or minimize the adverse visual impacts identified.

11.1.2 Findings and recommendations of the LVIA are presented in the Preliminary Landscape and Visual Impact Assessment Report. A summary of the assessment is presented in the sections below.

11.2 Methodologies

Landscape

11.2.1 Landscape Impact Assessment has been carried out under this Assignment out with the steps below.

(a) Identification of the baseline Landscape Resources (LRs) and Landscape Character Areas (LCAs) should be found within the assessment area, achieved by site visits and desktop studies;

(b) Assessment of the degree of sensitivity to change of the LRs and LCAs;

(c) Identification of potential sources of landscape change;

(d) Identification of the magnitude of landscape change;

(e) Identification of potential landscape mitigation measures;

(f) Prediction of the significance of landscape impacts before and after the implementation of the mitigation measures; and

(g) Prediction of Acceptability of Impacts.

11.2.2 The assessment area for landscape impact (hereinafter named as the assessment area) is 500 m from the site boundary and 100 m from the Inset A, B and C boundary. It is illustrated on **Figure 196587/B&V/LVIA/001**.

Visual

11.2.3 The overall visual impact of the Development is evaluated, taking into account the sensitivity of the key public viewers, visual resources and visual amenities likely to be affected, the magnitude, extent and duration of impact and any resultant improvement or degradation in the visual quality and character of the surrounding areas, and planning intention and known planned developments nearby.

11.2.4 The methodology adopted for this visual appraisal consists of:

(a) Identification of Baseline Conditions (Assessment Area/ Zone of Visual Influence (ZVI)), Planned and Committed Development, Visual Elements and Resources and Public Viewing Points;

(b) Identification of Potential Sources of Impact;

(c) Mitigation Measures;

(d) Appraisal of Visual Change;

(e) Assessment of the potential magnitude of visual change; and

(f) Evaluation of overall visual impact.

11.2.5 The assessment of the potential magnitude of visual changes depends on a number of factors including the physical extent of the change, the landscape and visual contexts of the change – i.e. a set of circumstances/facts surrounding the change, the compatibility of the project with the surrounding landscape; and the time-scale of the change - i.e. whether it is temporary (short, medium or long term), permanent but potentially reversible, or permanent and irreversible.

11.3 Baseline Condition

11.3.1 Based on the broad-brush tree survey, an estimated total of 7,799 nos. of existing trees in 80 tree groups were identified within 500 m from the boundary of the Site and 100 m from the Inset A, Inset B and Inset C. No registered Old and Valuable Trees (OVTs) were identified. 10 nos. of Important Trees (ITs) were identified in village and residential areas outside the Site. The approximate locations are also marked on **Figure 196587/B&V/LVIA/003**. Approximately 509 nos. of trees within the Site, 5 nos. of them within Inset A, 20 nos. of them within Inset B and 60 nos. of them within Inset C are recorded within the proposed limits of site formation and infrastructure works. According to the preliminary findings, about 2 nos. of affected trees within the Site and 3 nos. of trees within Inset A would be transplanted, about 558 nos. of trees within the Site, Inset A, Inset B and Inset C would require felling due to unavoidable conflicts with the Development, while the remaining trees would be preserved in place. Detailed tree felling application and compensatory planting proposals will be submitted in accordance with ETWB TCW No. 29/2004, DEVB TCW 6/2015 and 7/2015 in the detail design stage of the Development. This requires a compensatory planting ratio of a minimum 1:1 by number as far as possible.

Landscape Baseline Review

11.3.2 Twenty-six LRs and twenty LCAs have been identified within the assessment area and their locations are illustrated in **Figure 196587/B&V/LVIA/003 and Figure 196587/B&V/LVIA/004**, respectively.

Visual Analysis of Key Viewpoints

11.3.3 Six key public viewing points within the zone of visual influence have been identified and are indicated on **Figure 196587/B&V/LVIA/006**.

11.4 Impact Assessment Prior Mitigation

Landscape

11.4.1 The magnitude of change, before implementation of mitigation measures, on the LRs and LCAs that would occur in the construction phase is summarised below and tabulated in **Table 11.1**.

Table 11.1 – Magnitude of Landscape Change during the Construction and Operation Phases before Mitigation

ID No.	**Landscape Resources/ Landscape Character Areas**	**Construction Phase/ Operation Phase**	**Magnitude of Change before Mitigation** (None, Negligible, Small, Intermediate, Large)
LR1	Agricultural Land and associated Tree Planting outside Site	Construction	None
		Operation	None
LR1(S)	Agricultural Land and associated Tree Planting within Site	Construction	Large
		Operation	Large
LR1 & LR1(S) combined	Agricultural Land and associated Tree Planting within Assessment area	Construction	Large
		Operation	Large
LR2	Secondary Woodland	Construction	None
		Operation	None
LR3	Mixed Trees, Shrubs and Grassland outside Site	Construction	None
		Operation	None
LR3(S)	Mixed Trees, Shrubs and Grassland within Site	Construction	Large
		Operation	Large

ID No.	Landscape Resources/ Landscape Character Areas	Construction Phase/ Operation Phase	Magnitude of Change before Mitigation (None, Negligible, Small, Intermediate, Large)
LR3 and LR3(S) Combined	Mixed Trees, Shrubs and Grassland within Assessment Area	Construction	Negligible
		Operation	Negligible
LR4	Ponds	Construction	None
		Operation	None
LR5	Natural Watercourses	Construction	None
		Operation	None
LR6	Amenity Planting within Residential Area	Construction	None
		Operation	None
LR7	Amenity Planting along Roads and Urban Infrastructure outside Inset A, Inset B and Inset C	Construction	None
		Operation	None
LR7(A)	Amenity Planting along Roads and Urban Infrastructure within Inset A	Construction	Large
		Operation	Large
LR7(B)	Amenity Planting along Roads and Urban Infrastructure within Inset B	Construction	Intermediate
		Operation	Intermediate
LR7(C)	Amenity Planting along Roads and Urban Infrastructure within Inset C	Construction	Large
		Operation	Large
LR7, LR7(A), LR7(B) and LR7(C) Combined	Amenity Planting along Roads and Urban Infrastructure within Assessment Area	Construction	Small
		Operation	Small
LR8	Amenity Planting within Industrial Area	Construction	None
		Operation	None

ID No.	Landscape Resources/ Landscape Character Areas	Construction Phase/ Operation Phase	**Magnitude of Change before Mitigation** (None, Negligible, Small, Intermediate, Large)
LR9	Amenity Planting within Open Storage Area outside Site	Construction	None
		Operation	None
LR9(S)	Amenity Planting within Open Storage Area of the Site	Construction	Large
		Operation	Large
LR9(C)	Amenity Planting within Open Storage Area of Inset C	Construction	Large
		Operation	Large
LR9, LR9(S) and LR9(C) combined	Amenity Planting within Open Storage Area within Assessment area	Construction	Intermediate
		Operation	Intermediate
LR10	Amenity Planting within Village Area outside Site	Construction	None
		Operation	None
LR10(S)	Amenity Planting within Village Area of the Site	Construction	Large
		Operation	Large
LR10 and LR10(S) combined	Amenity Planting within Village Area of the Assessment Area	Construction	Small
		Operation	Small
LR11	Watercourses outside Site	Construction	None
		Operation	None
LR11(S)	Watercourses within Site	Construction	Large
		Operation	Large
LR11 and LR11(S) Combined	Watercourses within Assessment Area	Construction	Large
		Operation	Large
LCA1	Industrial Urban Landscape	Construction	None
		Operation	None

ID No.	Landscape Resources/ Landscape Character Areas	Construction Phase/ Operation Phase	**Magnitude of Change before Mitigation** (None, Negligible, Small, Intermediate, Large)
LCA2	Miscellaneous Rural Fringe Landscape outside Site	Construction	None
		Operation	None
LCA2(S)	Miscellaneous Rural Fringe Landscape within Site	Construction	Large
		Operation	Large
LCA2 and LCA2(S) combined	Miscellaneous Rural Fringe Landscape within Assessment Area	Construction	Intermediate
		Operation	Intermediate
LCA3	Upland and Hillside Landscape outside Site	Construction	None
		Operation	None
LCA3 (S)	Upland and Hillside Landscape within Site	Construction	Large
		Operation	Large
LCA3 and LCA3 (S) Combined	Upland and Hillside Landscape within Assessment Area	Construction	Negligible
		Operation	Negligible
LCA4	Residential Urban Landscape	Construction	None
		Operation	None
LCA5	Transportation Corridor Landscape outside Inset A, Inset B and Inset C	Construction	None
		Operation	None
LCA5(A)	Transportation Corridor Landscape within Inset A	Construction	Intermediate
		Operation	Intermediate
LCA5(B)	Transportation Corridor Landscape within Inset B	Construction	Intermediate
		Operation	Intermediate
LCA5(C)	Transportation Corridor Landscape within Inset C	Construction	Large
		Operation	Large
LCA5, LCA5(A), LCA5(B) and LCA5(C) Combined	Transportation Corridor Landscape within Assessment Area	Construction	Small
		Operation	Small

ID No.	Landscape Resources/ Landscape Character Areas	Construction Phase/ Operation Phase	Magnitude of Change before Mitigation (None, Negligible, Small, Intermediate, Large)
LCA6	Urban Peripheral Village Landscape outside Site	Construction	None
		Operation	None
LCA6(S)	Urban Peripheral Village Landscape within Site	Construction	Large
		Operation	Large
LCA6 and LCA6(S) combined	Urban Peripheral Village Landscape within Assessment Area	Construction	Small
		Operation	Small
LCA7	Urban River Corridor Landscape	Construction	None
		Operation	None
LCA8	Agricultural Landscape outside Site	Construction	None
		Operation	None
LCA8(S)	Agricultural Landscape within Site	Construction	Large
		Operation	Large
LCA8 and LCA8(S) combined	Agricultural Landscape within Assessment Area	Construction	Intermediate
		Operation	Intermediate

Visual

VP1: View from Wang Lok Street (refer **Figure 196587/B&V/LVIA/011a** to **Figure 196587/B&V/LVIA/011b**)

11.4.2 The view along Wang Lok Street is selected as a representative of views from drivers and pedestrians along Wang Lok Street between the urban area of Yuen Long and the Yuen Long Industrial Estate (YLIE). Wang Lok Street has mature and semi-mature trees along either side, and viewers currently experience partial views towards the Site. After construction, drivers and pedestrians will experience partial views of the upper storeys of the proposed residential buildings at a distance of approximately 400 m from this viewpoint.

11.4.3 Wang Lok Street is a busy road with daily vehicular and pedestrian traffic. These public viewers will tend to be focused on both the roadway and the surrounding streetscape. Their views will be transient and brief. As such, these public viewers are considered to have a *Low* sensitivity to visual change.

VP2: View from Yuen Long Industrial Estate (refer **Figure 196587/B&V/LVIA/012a** to **Figure 196587/B&V/LVIA/012b**)

11.4.4 The YLIE is a privately owned industrial development, which is located to the north of the Site. The height of the buildings varies from 3 storeys to 8 storeys. Existing views towards the Site comprise a man-made channel and a public footpath along the edge of the YLIE in the foreground, agricultural land and a two-storey village house in the middle ground, and Kai Shan in the distance with the upper storeys of Long Ping Estate as the skyline. Workers or visitors to the YLIE will have partial (the lower portion will be screened by existing vegetation) permanent views of the Development at a distance of approximately 500 m. The small footpaths on both sides of the drainage channel adjacent to the YLIE are used by a small number of pedestrians on a daily basis, mostly workers accessing to the agricultural fields and open storage areas. Their distance of view to the Site is far (500 m) and they will tend to be focused on the agricultural land and the ridgeline of Kai Shan to the west. These public viewers are considered to have *Medium* sensitivity to visual change as they are either within or accessing to a place of work.

VP3: View from hiking trail on Kai Shan (refer **Figure 196587/B&V/LVIA/013a** to **Figure 196587/B&V/LVIA/013b**)

11.4.5 Kai Shan lies to the west of the Site. The view to the east towards the Site from the hiking trail is of mixed trees, shrubs and grassland in the foreground, open storage areas, village houses and Kai Shan in the middle ground, the vegetated hill of Chu Wong Ling, the ridgelines of Kai Kung Leng, Ngau Tam Mei and the Long Ping Estate in the background. Hikers and visitors to the existing grave sites will have permanent partial views of the upper storeys of the Site at a distance of approximately 400 m.

11.4.6 The hiking trail is frequented by a small number of walkers on a daily basis, some for recreational hiking and some for visiting the grave sites. As recreational hikers seek high quality views, these viewers are considered to have a *High* sensitivity to visual change.

VP4: View from Long Ping Road (refer **Figure 196587/B&V/LVIA/014a** to **Figure 196587/B&V/LVIA/014b**)

11.4.7 This viewpoint was selected as a representative of views from drivers, passengers and pedestrians along Long Ping Road as it provides views from the south of the Site. The viewpoint is provided on the footpath northwest of Long Ping Estate at an elevation of approximately +5 mPD. Long Ping Road has mature and semi-mature trees along either side, and viewers currently experience partial views towards the Site. It is assumed that Wang Chau Phase 1 Development should be completed before the Development and will thus obstruct most of the sight. Following construction, drivers and passengers will experience partial views of the upper storeys of the proposed residential buildings at a distance of approximately 300 m.

11.4.8 The viewers will tend to be focused on both the roads and the surrounding streetscape. Their views will be transient and brief. However, since the existing view is relatively open, these public viewers are therefore considered to have *Medium* sensitivity to visual change.

VP5: View from Sai Tau Wai Village (refer **Figure 196587/B&V/LVIA/015a** to **Figure 196587/B&V/LVIA/015b**)

11.4.9 Sai Tau Wai lies to the east of the Site. Existing views comprise dense low-rise village housing and narrow streets in the foreground and an open skyline beyond. With the implementation of the Development, villagers will have partial views of the upper storeys of the proposed residential buildings at a distance of approximately 250 m. The pathways within the village are used by a large number of villagers on a daily basis. The distance of view is relatively close (250 m) so the viewers will tend to focus on the village houses rather than the skyline. As such, these public viewers are considered to have *Medium* sensitivity to visual change.

VP6: View from Fuk Hi Street (refer **Figure 196587/B&V/LVIA/016a** to **Figure 196587/B&V/LVIA/016b**)

11.4.10 The view along Fuk Hi Street is selected as a representative of views from drivers, passengers and pedestrians travelling between the urban area of Yuen Long and the YLIE. There are existing mature and semi-mature trees along Fuk Hi Street. Viewers currently experience low level full views towards the Site. The existing Long Ping Estate forms a dominant vertical visual element on the left side of the view. An open skyline above the tree line appears at the centre and right hand side of the view. Wang Chau Phase 1 Development will be constructed, which will extend the vertical mass of the Long Ping Estate towards the centre of view. Drivers and passengers experience a full view towards the Development including the roadside trees and the new building façades.

11.4.11 Fuk Hi Street is a busy road with daily vehicular and pedestrian traffic. The distance of view to the Site is very close (potentially as close as 10 m although for the purposes of illustration a set-back view has been selected). The public viewers will tend to focus on both the roadway and the surrounding streetscape. Although the existing view is of transitory nature, which includes an open skyline of reasonable quality. Therefore, the public viewers are considered to have *Medium* sensitivity to visual change.

11.5 Mitigation Measures

11.5.1 Tree preservation and compensatory tree planting will be carried out in accordance with the DEVB TC (W) No. 7/2015 Tree Preservation. This requires a compensatory planting ratio of a minimum 1:1 by number, as far as possible. During the later stage of the Development, an updated tree survey will be carried out and a tree felling application will be submitted. The exact number of trees to be retained/transplanted/felled will be reviewed. The final tree transplantation

locations shall be identified and the compensatory planting proposal will be prepared together with the application.

11.5.2 Mitigation measures can only be illustrated generically on plan at this stage. An Outline Landscape Plan has been developed in the study which illustrates the conceptual layout of the mitigation measures.

11.5.3 The proposed landscape and visual mitigation measures for potential impacts generated during the construction and operational phases together with the associated funding, implementation, management and maintenance agencies are described below in **Table 11.2** and **Table 11.3** and are illustrated on **Figure 196587/B&V/LVIA/017**.

Table 11.2 – Proposed Landscape and Visual Mitigation Measures During the Construction Phase

ID No.	Landscape and Visual Mitigation Measure	Landscape measure	Visual measure	Funding Agency	Implementation Agency
CM1	The construction area and contractor's temporary works areas should be minimised to avoid impacts on adjacent landscape.	✓	✓	CEDD for roads; Education Bureau for schools; HKHA for housing area development during foundation and main contract	CEDD's Contractor (during site formation phase); Education Bureau and HKHA (during housing development phase)
CM2	Reduction of construction period to practical minimum.		✓	CEDD for roads; Education Bureau for schools; HKHA for housing area development during foundation and main contract	EDB/ HKHA/CEDD's Contractor
CM3	Construction traffic including construction plant, construction vessels should be kept to a practical minimum.		✓	CEDD for roads; Education Bureau for schools; HKHA for housing area development during foundation and main contract	EDB/ HKHA/CEDD's Contractor
CM4	Erection of decorative mesh screens or construction hoardings around works areas in visually unobtrusive colours.		✓	CEDD for roads; Education Bureau for schools; HKHA for housing area development during foundation and main contract	EDB/ HKHA/CEDD's Contractor
CM5	Avoidance of excessive height and bulk of site buildings and structures.		✓	CEDD for roads; Education Bureau for schools; HKHA for housing area development during foundation and main contract	EDB/ HKHA/CEDD's Contractor

ID No.	Landscape and Visual Mitigation Measure	Landscape measure	Visual measure	Funding Agency	Implementation Agency
CM6	Control of night-time lighting by hooding all lights and through minimisation of night working periods.		✓	CEDD for roads; Education Bureau for schools; HKHA for housing area development during foundation and main contract	EDB/ HKHA/CEDD's Contractor
CM7	All existing trees to be retained adjacent to the site boundary shall be carefully protected before, during and after construction. A Detailed Tree Protection Specification shall be provided in the Contract Specification. Under this specification, the Contractor shall be required to submit, for approval, a detailed working method statement for the protection of trees prior to undertaking any works adjacent to all retained trees or trees to be transplanted, including trees in contractor's works areas. Early preparation of trees to be transplanted shall be undertaken to increase their likely survival rate following transplanting.	✓	✓	CEDD for site formation works	CEDD's Contractor

Table 11.3 – Proposed Landscape and Visual Mitigation Measures During the Operation Phase

ID No.	Landscape and Visual Mitigation Measure	Landscape Measure	Visual Measure	Funding Agency	Implementation Agency	Management Agency	Maintenance Agency
OM1	Sensitive design of buildings in terms of scale, height and bulk (visual weight).		✓	HKHA	HKHA	HKHA	HKHA
OM2	Use of appropriate building materials and colours to complement surroundings.		✓	HKHA	HKHA	HKHA	HKHA
OM3	Road lighting units to be directional and minimise		✓	CEDD/ HKHA	CEDD/ HKHA	HyD/ HKHA	HyD/ HKHA

ID No.	Landscape and Visual Mitigation Measure	Landscape Measure	Visual Measure	Funding Agency	Implementation Agency	Management Agency	Maintenance Agency
	unnecessary light spill and glare.						
OM4	Provision of 20% amenity planting/ greenery area within schools in accordance to *Development Bureau Technical Circular (Works) No. 3/2012 – Site Coverage of Greenery for Government Building Projects*. The exact layout of the greenery area will be subjected to detail design in the future.	✓	✓	ArchSD	ArchSD	Future schools	Future schools
OM5	Compensatory tree planting shall be provided at 1:1 ratio as far as possible based on felled tree numbers and to the satisfaction of relevant Government departments. Required numbers and locations of compensatory trees shall be determined and agreed separately with Government during the Tree Felling Application process under *Development Bureau Technical Circular (Works) No. 7/2015 – Tree Preservation.*	✓	✓	CEDD	CEDD	LCSD	LCSD
OM6	Provision of landscape roof on top of multi-storey carpark if appropriate.	✓	✓	HKHA	HKHA	HKHA	HKHA
OM7	Streetscape (e.g. paving, signage, street furniture, lighting etc.) shall be	✓	✓	CEDD/ HKHA	CEDD/ HKHA	HyD/ HKHA	HyD/ HKHA

ID No.	Landscape and Visual Mitigation Measure	Landscape Measure	Visual Measure	Funding Agency	Implementation Agency	Management Agency	Maintenance Agency
	sensitively designed in a manner that responds to the existing context, and minimises potential adverse landscape and visual impacts.						
OM8	Provision of amenity landscape area and new tree planting (approximately 640 nos.) within the HKHA Site.	✓	✓	HKHA	HKHA	HKHA	HKHA
OM9	Aesthetic design of noise barriers along Fuk Hi Street		✓	CEDD	CEDD	HyD	HyD

Notes:
- The proposed mitigation measures, management and maintenance Agency shall be agreed with the relevant government departments before implementation.
- "CEDD" stands for Civil Engineering and Development Department
- "ArchSD" stands for Architectural Services Department
- "HKHA" stands for Hong Kong Housing Authority
- "HyD" stands for Highways Department
- "LCSD" stands for Leisure and Cultural Services Department
- "EDB" stands for Education Bureau

11.5.4 The Development would provide adequate local open space according to the requirements of the HKPSG subject to detailed design.

11.6 Residual Impact Assessment – Upon Implementation of Mitigation Measures

Significance of Residual Landscape Impacts upon Mitigation

11.6.1 The potential significance of the landscape impacts during the construction and operational phases after mitigation is provided in **Table 11.4**. The assessment follows the methodology outlined in Section 11.2 and assumes that the appropriate mitigation measures identified in **Table 11.2** and **Table 11.3** will be implemented, and that the full effect of the soft landscape mitigation measures will be realised after 10 years.

Table 11.4 – Significance of Landscape Impacts during the Construction and Operation Phases

Id. No.	Landscape Resource / Landscape Character	Recommended Mitigation Measures	Residual Impact Significance Threshold AFTER Mitigation (None, Insubstantial, Slight, Moderate, Substantial)		
			Construction	Operation	
				DAY 1	**YEAR 10**
Landscape Resources					
LR1	Agricultural Land and associated Tree Planting outside Site	N/A	None	None	None
LR1(S)	Agricultural Land and associated Tree Planting within Site	CM1, CM7, OM8	Substantial	Moderate	Moderate
LR1 and LR1(S) combined	Agricultural Land and associated Tree Planting within Assessment Area	CM1, CM7, OM8	Substantial	Moderate	Moderate
LR2	Secondary Woodland	N/A	None	None	None
LR3	Mixed Trees, Shrubs and Grassland outside Site	N/A	None	None	None
LR3(S)	Mixed Trees, Shrubs and Grassland within Site	CM1, CM7, OM5, OM7, OM8	Substantial	Moderate	Slight
LR3 and LR3(S) Combined	Mixed Trees, Shrubs and Grassland outside Site	CM1, CM7, OM5, OM7, OM8	Insubstantial	Insubstantial	Insubstantial
LR4	Ponds	N/A	None	None	None
LR5	Natural Watercourses	N/A	None	None	None
LR6	Amenity Planting within Residential Area	N/A	None	None	None
LR7	Amenity Planting along Roads and Urban Infrastructure outside Inset A, Inset B, Inset C	N/A	None	None	None
LR7(A)	Amenity Planting along Roads and Urban Infrastructure within Inset A	CM1, CM2, CM3, CM6, CM7, OM3, OM5, OM7	Moderate	Moderate	Moderate

Id. No.	Landscape Resource / Landscape Character	Recommended Mitigation Measures	Residual Impact Significance Threshold AFTER Mitigation (None, Insubstantial, Slight, Moderate, Substantial)		
			Construction	Operation	
				DAY 1	**YEAR 10**
LR7(B)	Amenity Planting along Roads and Urban Infrastructure within Inset B	CM1, CM2, CM3, CM6, CM7, OM3, OM5, OM7	Moderate	Moderate	Moderate
LR7(C)	Amenity Planting along Roads and Urban Infrastructure within Inset C	CM1, CM2, CM3, CM6, CM7, OM3, OM5, OM7	Moderate	Slight	Insubstantial
LR7, LR7(A), LR7(B) and LR7(C) combined	Amenity Planting along Roads and Urban Infrastructure within Assessment Area	CM1, CM2, CM3, CM6, CM7, OM3, OM5, OM7	Slight	Slight	Slight
LR8	Amenity Planting within Industrial Area	N/A	None	None	None
LR9	Amenity Planting within Open Storage Area outside Site	N/A	None	None	None
LR9(S)	Amenity Planting within Open Storage Area of the Site	OM4, OM8	Moderate	Slight	Insubstantial
LR9(C)	Amenity Planting within Open Storage Area of Inset C	CM1, CM2, CM3, CM6, CM7, OM3, OM5, OM7	Moderate	Slight	Insubstantial
LR9 and LR9(S) combined	Amenity Planting within Open Storage Area of the Assessment Area	CM1, CM7 OM4, OM8	Moderate	Slight	Insubstantial
LR10	Amenity Planting within Village Area outside Site	N/A	None	None	None
LR10 (S)	Amenity Planting within Village Area of the Site	OM5, OM8	Substantial	Moderate	Slight
LR10 and LR10(S) combined	Amenity Planting within Village Area of the Assessment Area	CM1, CM7 OM4, OM8	Slight	Slight	Insubstantial
LR11	Watercourses within Site	N/A	None	None	None

Id. No.	Landscape Resource / Landscape Character	Recommended Mitigation Measures	Residual Impact Significance Threshold AFTER Mitigation (None, Insubstantial, Slight, Moderate, Substantial)		
			Construction	Operation	
				DAY 1	**YEAR 10**
LR11 (S)	Watercourses outside Site	N/A	Moderate	Moderate	Moderate
LR11 and LR11(S) Combined	Watercourses within Assessment Area	N/A	Moderate	Moderate	Moderate
Landscape Character Areas					
LCA1	Industrial Urban Landscape	N/A	None	None	None
LCA2	Miscellaneous Rural Fringe Landscape outside Site	N/A	None	None	None
LCA2 (S)	Miscellaneous Rural Fringe Landscape within Site	CM7 OM4, OM6, OM7, OM8	Moderate	Slight	Slight
LCA2 and LCA2(S) combined	Miscellaneous Rural Fringe Landscape within Assessment Area	CM1, CM7 OM4, OM6, OM7, OM8	Slight	Insubstantial	Insubstantial
LCA3	Upland and Hillside Landscape outside Site	N/A	None	None	None
LCA3(S)	Upland and Hillside Landscape within Site	CM1, CM7, OM8	Substantial	Moderate	Slight
LCA3 and LCA3(S) Combined	Upland and Hillside Landscape within Assessment Area	CM1, CM7, OM8	Insubstantial	Insubstantial	Insubstantial
LCA4	Residential Urban Landscape	N/A	None	None	None
LCA5	Transportation Corridor Landscape outside Site	N/A	None	None	None
LCA5(A)	Transportation Corridor Landscape within Inset A	CM1, CM2, CM3, CM6, CM7, OM3, OM5, OM7	Moderate	Insubstantial	Insubstantial
LCA5(B)	Transportation Corridor Landscape within Inset B	CM1, CM2, CM3, CM6, CM7, OM3, OM5, OM7	Moderate	Insubstantial	Insubstantial

Id. No.	Landscape Resource / Landscape Character	Recommended Mitigation Measures	Residual Impact Significance Threshold AFTER Mitigation (None, Insubstantial, Slight, Moderate, Substantial)		
			Construction	Operation	
				DAY 1	**YEAR 10**
LCA5(C)	Transportation Corridor Landscape within Inset C	CM1, CM2, CM3, CM6, CM7, OM3, OM5, OM7	Moderate	Slight	Insubstantial
LCA5, LCA5(A), LCA5(B) and LCA5(C) combined	Transportation Corridor Landscape within Assessment Area	CM1, CM2, CM3, CM6, CM7, OM3, OM5, OM7	Slight	Insubstantial	Insubstantial
LCA6	Urban Peripheral Village Landscape outside Site	N/A	None	None	None
LCA6 (S)	Urban Peripheral Village Landscape within Site	CM1, CM7, OM4, OM7, OM8	Moderate	Moderate	Moderate
LCA6 and LCA6(S) combined	Urban Peripheral Village Landscape within Assessment Area	CM1, CM7, OM4, OM7, OM8	Slight	Slight	Slight
LCA7	Urban River Corridor Landscape	N/A	None	None	None
LCA8	Agricultural Landscape outside Site	N/A	None	None	None
LCA8 (S)	Agricultural Landscape within Site	OM4, OM8	Substantial	Substantial	Substantial
LCA8 and LCA8(S) combined	Agricultural Landscape within Assessment Area	CM1, CM7, OM4, OM8	Moderate	Moderate	Moderate

Significance of Residual Visual Impacts upon Mitigation

11.6.2 The photomontages showing the Development at 'Existing Baseline Conditions' on 'Day 1 of completed works without mitigation measures', 'Day 1 of the completed works with mitigation measures' and 'Year 10 of the completed works with mitigation measures' are illustrated on **196587/B&V/LVIA/011a, 011b, 012a, 012b, 013a, 013b, 014a, 014b, 015a, 015b, 016a and 016b.**

11.6.3 The magnitude of visual change resulting from the construction and operational phases of the Development before mitigation is summarised in **Table 11.5.**

Table 11.5 – Magnitude of Visual Change during Construction and Operational Phases before Mitigation

Viewpoint No.	Key VSR	Magnitude of Visual Change BEFORE Mitigation (Large/ Intermediate/ Small/ Negligible/ None)	
		Construction	Operation
VP1	View from Wang Lok Street	Intermediate	Intermediate
VP2	View from Yuen Long Industrial Estate	Intermediate	Intermediate
VP3	View from hiking trail on Kai Shan	Large	Large
VP4	View from Long Ping Road	Intermediate	Intermediate
VP5	View from Sai Tau Wai	Small	Small
VP6	View from Fuk Hi Street	Large	Large

11.6.4 **Viewpoint 1: View from Wang Lok Street**

(a) The view of the Development from Wang Lok Street will be distant (approximately 400 m) and partially obscured by existing trees along the carriageway and in the foreground where the street intersects Fuk Hi Street.

(b) Effects on Visual Composition: This existing view currently comprises the tree-lined Wang Lok Street with dense avenues of trees on either side of the carriageway that concentrate views down the roadway. The tops of the towers of the Wang Chau Phase 1 Development will be visible above the trees on the left hand side of the view and similarly only the tops of the Site will be visible above the tree in the centre of the view. The Development will be perceived as an extension of the Wang Chau Phase 1 Development and will form a relatively inconspicuous visual backdrop as viewers will tend to focus on the closer and lower streetscape elements.

(c) Effects on Visual Obstruction: The presence of the Development will result in visual obstruction on part of the open skyline above the existing treeline.

(d) Effects on Visual Elements/ Resources: Apart from the effects on the existing skyline, the presence of the proposed buildings will result in no additional impact upon the existing Visual Elements/ Resources.

(e) Effects on Public Viewers: The current view of Motorists along Wang Lok Street consists of a lush, tree lined avenue with views of the Development in the background. Following construction the public viewers will have partially obscured views of the Development at a distance of approximately 400 m. The Development will constitute an ***Intermediate*** magnitude of change. This when combined with the ***Low*** sensitivity of the public viewers will result in ***Moderately Adverse*** visual impact significance. The residual impact will be reduced to ***Slightly Adverse*** as the streetscape in Inset B will be resumed to its original character and the new public housing integrates with the adjacent residential building following mitigation.

11.6.5 Viewpoint 2: View from Yuen Long Industrial Estate

(a) The view of the Development from Yuen Long Industrial Estate will be distant (approximately 500 m) and partial as the lower storeys will be screened by existing vegetation in the foreground.

(b) Effects on Visual Composition: The view currently comprises a man-made channel and a public footpath along the edge of the YLIE in the foreground, agricultural land and a two-storey village house in the middle ground, and Kai Shan dominating the middle skyline with the upper storeys of Long Ping Estate on the southern skyline. The scene is essentially a rural outlook but the Site will be seen as an extension of the urban character of the YLIE and an intensification of the existing Long Ping Estate which will block some of the skyline. Due to the distance, the scale of the Site will not dominate the visual composition and the dominance of Kai Shan will remain.

(c) Effects on Visual Obstruction: The Development will result in visual obstruction of part of the open skyline, the Long Ping Estate and part of the newly constructed Wang Chau Phase 1 to the south. However, this will only be a minor reduction of the expansive skyline panorama.

(d) Effects on Visual Elements/ Resources: In additional to the impact on the existing skyline and residential development, the presence of the proposed buildings will not affect any other existing visual elements.

(e) Effects on Public Viewers: The public viewers will have permanent partial views of the Development at a distance of approximately 500 m. The Development will constitute an ***Intermediate*** magnitude of change. This when combined with the ***Medium*** sensitivity of the public viewers will result in a ***Moderately Adverse*** visual impact significance. Following mitigation, the residual impact remains ***Moderately Adverse*** as the mitigation measures cannot further reduce the impact significance.

11.6.6 Viewpoint 3: View from hiking trail on Kai Shan

(a) The view of the Development from hiking trail on Kai Shan will be distant and partial with the lower storeys of the Site blocked by existing topography and vegetation screens.

(b) Effects on Visual Composition: The view towards the Site from the hiking trail is open and expansive with green vegetated slopes in the foreground, open storage areas, village houses, the YLIE and Yuen Long in the middle distance and the vegetated hills of Chu Wong Ling and the prominent ridgelines of Kai Kung Leng, Ngau Tam Mei in the far distance. The Site is compatible in character with the Long Ping Estate to the east and the general urban area but from this view point it does not integrate with them in terms of scale being visually very intrusive to the existing visual composition.

(c) Effects on Visual Obstruction: The Development will result in the visual obstruction of most of Yuen Long and the distant ridgelines of Chu Wong Ling, Kai Kung Leng, Ngau Tam Mei. The distant hills provide a scenic outlook and the visual obstruction constitutes a major adverse impact to hikers.

(d) Effects on Visual Elements/ Resources: apart from the obstruction of the visual elements listed in the previous item, existing vegetation on the Site will be removed and replaced with the residential towers.

(e) Effects on Public Viewers: Hikers will have permanent partial views of the upper storeys of the Development at a distance of approximately 400 m. The Development will constitute a ***Large*** magnitude of change. This when combined with the ***High*** sensitivity of the public viewers will result in a visual impact significance considered to be ***Substantially Adverse.*** Following mitigation, the residual impact significance remains ***Substantially Adverse*** as the scale and mass of the Development cannot be effectively mitigated from this viewpoint.

11.6.7 **Viewpoint 4: View from Long Ping Road**

(a) The view of the Development from Long Ping Road will be relatively far (300 m) and partially obscured by existing roadside vegetation screens and the new Wang Chase Phase 1 Development.

(b) Effects on Visual Composition: The viewpoint is on the footpath northwest of Long Ping Estate at an elevation of approximately +5 mPD. Long Ping Road has mature and semi-mature trees along either side, and viewers currently experience partial views towards the Site through existing tree screens. Wang Chau Phase 1 and the Development will introduce new high-rise elements behind the trees, dominating the skyline.

(c) Effects on Visual Obstruction: The Development will result in visual obstruction of an area of the open sky above the treeline (although this will be relatively minor compared to the obstruction caused by Wang Chau Phase 1 which is nearer the viewpoint).

(d) Effects on Visual Elements/ Resources: Apart from the impact on the existing skyline, the presence of the proposed buildings will result in no additional impact upon the Visual Elements/ Resources.

(e) Effects on Public Viewers: Long Ping Road has mature and semi-mature trees along either side, and the public viewers will experience partial views of the upper storeys of the Development at a distances of approximately 300 m. The Development will constitute an ***Intermediate*** magnitude of change. This when combined with the ***Medium*** sensitivity of the public viewers will result in a visual impact significance considered to be ***Moderately Adverse.*** Following mitigation, the residual impact significance remains ***Moderately Adverse*** as the openness of this view is significantly blocked.

11.6.8 **Viewpoint 5: View from Sai Tau Wai**

(a) The view of the Development from Sai Tau Wai Village will be distant and partially obscured as only the upper storeys will be visible on the skyline above the existing village development.

(b) Effects on Visual Composition: The view currently comprises dense, low rise village housing in the fore-and middle ground and an open sky above. The Development will result in buildings of a different visual forms on the skyline. However, due to the distance and relatively small scale as perceived from this viewpoint, the additional visual element is considered

to only represent a minor adverse impact on the existing visual composition.

(c) Effects on Visual Obstruction: The Development will result in visual obstruction of small part of the skyline above the village houses.

(d) Effects on Visual Elements/ Resources: Apart from the impact on the existing skyline, the presence of the proposed buildings will result in no additional impact upon the Visual Elements/ Resources.

(e) Effects on Public Viewers: The public viewers will have permanent, partial views of the upper storeys of the Development at a distance of approximately 250 m. The Development will constitute a ***Small*** magnitude of change. This when combined with the ***Medium*** sensitivity of the public viewers will result in a visual impact significance considered to be ***Slightly Adverse.*** Following mitigation, the residual impact significance remains ***Slightly Adverse*** as the scale and mass of the Development cannot be effectively mitigated from this viewpoint.

11.6.9 **Viewpoint 6: View from Fuk Hi Street**

(a) The view of the Development from Fuk Hi Street will be close and full.

(b) Effects on Visual Composition: The view is on the footpath along Fuk Hi Street towards the Development. The current visual composition is of tree-lined streetscape with an open skyline above except for the high-rise towers of the Long Ping Estate dominating the skyline to the south west. The Development will introduce a striking new visual element, the scale of which will dominate the view. 4 m high noise barriers are proposed along the street between the carriageway and the planter. The character of the element will be visually compatible with the existing housing development but the increased height of the towers will change the perception of the locality from urban fringe to urban.

(c) Effects on Visual Obstruction: The Development will result in a visual obstruction of a large part of the open skyline above the Fuk Hi Street.

(d) Effects on Visual Elements/ Resources: Apart from the impact of the existing skyline and the presence of the proposed buildings, the only other effect on visual resources will be the loss of existing trees and vegetation within the Site.

(e) Effects on Public Viewers: The public viewers will experience full unobstructed views towards the Development including trees along the site boundary and the boundary fence. The Development will constitute a ***Large*** magnitude of change to the existing view. This when combined with the ***Medium*** sensitivity of the public viewers will result in a visual impact significance considered to be ***Substantially Adverse***. Following mitigation, the residual impact significance remains ***Substantially Adverse*** as the scale and mass of the Development cannot be effectively mitigated from this viewpoint.

11.6.10 The magnitude of visual change resulting from the construction and operational phases of the Development after mitigation is summarised in **Table 11.6** below.

Table 11.6 – Significance of Visual Impacts

Viewpoint	Recommended Visual Mitigation Measures	Impact Significance during Operation Phase after Mitigation (Substantial, Moderate, Slight, Insubstantial)
VP1: View from Wang Lok Street	CM1, CM2, CM3, CM5, CM6 OM1, OM2, OM3	**Slightly Adverse**
VP2: View from Yuen Long Industrial Estate	CM1, CM2, CM3, CM5, CM6 OM1, OM2, OM3	**Moderately Adverse**
VP3: View from Hiking trail on Kai Shan	CM1, CM2, CM3, CM5, CM6 OM1, OM2, OM3	**Substantially Adverse**
VP4: View from Long Ping Road	CM1, CM2, CM3, CM5, CM6, CM7 OM1, OM2, OM3, OM5	**Moderately Adverse**
VP5: View from Sai Tau Wai	CM1, CM2, CM3, CM5, CM6 OM1, OM2, OM3	**Slightly Adverse**
VP6: View from Fuk Hi Street	CM1, CM2, CM3, CM4, CM5, CM6, CM7 OM1, OM2, OM3, OM4, OM5, OM6, OM7, OM8, OM9	**Substantially Adverse**

11.7 Summary of Landscape and Visual Impacts

11.7.1 The Development will generate some unavoidable landscape and visual impacts which are identified and addressed in this LVIA with an aim of avoiding (where practicable) and at the very least, minimising such impacts to within acceptable levels. There are opportunities, during the project's design, construction and operational stages, for incorporating mitigation measures which will reduce landscape and visual impacts. These include reducing the scale of the construction impact and designing and implementing new buildings and structures which are sensitively integrated into the existing environment.

11.7.2 Of the 26 LRs identified within the assessment area, 15 LRs are within the Site and are affected by the Development. When assessed within the context of the Site, Inset A, Inset B and Inset C only, the significance of any adverse residual landscape impacts at Year 10 following mitigation is *Moderate* (LR1(S), LR7(A), LR7(B) and LR11(S)), *Slight* (LR3(S) and LR10(S)) and *Insubstantial* (LR7(C), LR9(S) and LR9(C)). When assessed in the context of the assessment area as a whole, the significance of any adverse residual impacts at Year 10 following mitigation is *Moderate* (LR1 and LR1(S) Combined and LR11 and LR11(S) Combined), *Slight* (LR7, LR7(A), LR7(B) and LR7(C) Combined), and *Insubstantial* (LR3 and LR3(S) Combined, LR9 and LR9(S) Combined and LR10 and LR10(S) Combined).

11.7.3 Of the 20 LCAs identified within the assessment area, 12 LCAs occur within the Site and are affected by the Development. When assessed within the context of the Site, Inset A, Inset B and Inset C only, the significance of any adverse residual impacts at Year 10 following mitigation is *Substantial* (LCA8(S)), *Moderate* (LCA6(S)), *Slight* (LCA2(S) and LCA3(S)) and *Insubstantial* (LCA5(A), LCA5(B) and LCA5(C)). When

assessed in the context of the assessment area as a whole, the significance of any adverse residual impacts at Year 10 following mitigation is *Moderate* (LCA8 and LCA8(S) Combined), *Slight* (LCA6 and LCA6(S) Combined) and *Insubstantial* LCA2 and LCA2(S) Combined, LCA3 and LCA3(S) Combined and LCA5, LCA5(A), LCA5(B) and LCA5(C) Combined).

11.7.4 The overall residual landscape impacts of the Development are considered to be **Moderately Adverse** following mitigation during the construction and operational phases (i.e. the Development will, with or without mitigation measures result in overall terms, negative landscape impacts to the identified LRs and LCAs).

11.7.5 Of the 6 key public viewpoints identified within the visual assessment area, the significance of the adverse residual visual impact significance following mitigation at Year 10 is *Substantial* (VP3 and VP6), *Moderate* (VP2 and VP4) and *Slight* (VP1 and VP5). In accordance with the criteria and guidelines for evaluating and assessing visual impacts as stated in TPB PG-No.41, the overall *residual visual impacts* of the Development are considered to be **Moderately Adverse** with mitigation during the operational phase (i.e. the Development will, with or without mitigation measures result in overall terms, negative visual impacts to the identified key public viewpoints).

12 PRELIMINARY LAND CONTAMINATION ASSESSMENT

12.1 Introduction

12.1.1 The objective of the Preliminary Land Contamination and Remediation Study (LCRS) is to evaluate and assess the potential land contamination impact due to previous land uses and the existing operations and determine the nature and the extent of contamination.

12.1.2 Findings and recommendations of the LCRS are presented in the Preliminary Land Contamination and Remediation Study Report. A summary of the assessment is presented in the sections below.

12.2 Legislation and Guidelines

12.2.1 The preliminary land contamination and remediation study is prepared following the guidances and steps outlined in the EPD published guidelines listed below:

- Guidance Manual for Use of Risk-Based Remediation Goals for Contaminated Land Management, dated December 2007;
- Guidance Note for Contaminated Land Assessment and Remediation, dated 15 August 2007; and
- Practice Guide for Investigation and Remediation of Contaminated Land, dated August 2011 (hereafter refers as "EPD's Practice Guide").

12.3 Identification of Land Contamination Issues

12.3.1 The site appraisal comprising desktop review and site inspections were conducted to identify the potentially contaminated land uses that may pose adverse impact to the Development. For the desktop review, the following information was reviewed:

- Aerial photographs;
- Past site investigation (SI) records; and
- Records on dangerous goods, chemical wastes, chemical spillage incidents from relevant government departments.

12.3.2 The site inspections were conducted in November 2017 and July 2018 to identify any sources of land contamination or hotspots and review the site conditions. It was observed that the public access roads are paved with concrete in good condition (i.e. no crack observed) and there were no signs of obvious/suspected contamination such as oil staining, abnormal odour, distress vegetation, dangerous goods storages and/or chemical waste storage within the areas accommodating the associated infrastructure works.

12.3.3 Rural residential dwellings, farmlands and natural vegetation were observed within the southern portion of the Site while a lot of industrial activities (e.g. open carpark, open storage, waste recycling, vehicle services, workshops and etc.) were observed in operation within the remaining parts of the Site. However, most of the remaining parts of the Site accommodating current industrial activities were inaccessible during the site inspections. Observation of these areas was made from Kai Shan.

12.4 Site Inspection and Observation

12.4.1 Site inspections covering the Site were conducted in November 2017 and July 2018. Since there are a lot of private lands within the Site and the industrial activities in the northern portion of the Site are still in operation, some areas within the Site are inaccessible. **Figure 196587/B&V/FR/LCRS/001** shows the layout of photo taking area in the site inspections. The observations are summarized below.

Areas Accommodating Associated Infrastructure Works (A15)

12.4.2 During the site inspections at the areas accommodating the associated infrastructure works, it was observed that the public access roads are paved with concrete in a good condition (i.e. no crack observed) and there were no signs of obvious/suspected contamination such as oil staining, abnormal odour, distress vegetation, dangerous goods storages and/or chemical waste storage.

Southern Portion of the Site (A1 to A10) and Middle Portion of the Site (A11 to A14)

12.4.3 Squatters for residential purpose, farmlands and natural vegetation were observed within the southern portion of the Site. It was also observed that the areas of the squatters for residential purpose are paved with concrete and there were no signs of obvious/suspected contamination such as oil staining, abnormal odour, distress vegetation, dangerous goods storages and/or chemical waste storage. No industrial activities were observed within the areas of the squatters for residential purpose.

Eastern Portion of the Site (A16 to A20) and Northern Portion of the Site (A21 to A26)

12.4.4 During the site visits, most of the eastern and northern portions of the Site accommodating the existing industrial activities were inaccessible. However, based on the observation from Kai Shan and peripheral observation of some industrial premises, there are a lot of industrial activities (e.g. open carpark, open storage, waste recycling, vehicle services, workshops and etc.) in operation within the eastern and northern portions of the Site.

12.4.5 Based on the peripheral observations and the signboards of few premises near the eastern boundary of the northern portion of the Site observed during the site visits, there were three premises for vehicle repairing and maintenance services (including two sharing the same land lot in A19 and one in A20 and two logistic companies in A16 and A21.

12.4.6 Based on the observation from the Kai Shan and/or the peripheral observations, there were suspected waste recycling workshops in A17, A23 and A26 at the eastern central and western parts of the northern portion of the Site respectively, and open carparks in A18 and A22 at the eastern and northern parts of the northern portion of the Site respectively. Areas for storage of construction equipment in A24 and open storage areas for suspected construction materials in A25 at the western part of the northern portion of the Site were also observed. Since these areas were inaccessible, there was no further information of the industrial activities for these areas.

12.4.7 Moreover, the Consultant approached some current occupiers of the premises within the northern portion of the Site. However, there were no responses from them up to the time of the preparation of this LCRS. Hence, there is no further information to identify the industrial activities in detail for each premise within the northern portion of the Site.

12.5 Proposed Site Investigation

12.5.1 The extent of the proposed SI area for the LCRS is determined based on findings from the site appraisal. Based on the signboards of the premises, the peripheral site observations, the observation from Kai Shan and records of chemical waste producer, the proposed SI area is divided into eleven (11) parts (namely A16 to A26), as shown on **Figure 196587/B&V/PER/FIG 10.2**. For each part of the proposed SI area, the proposed site investigation in regular grid pattern for land contamination has been determined based on recommendations given in the Practice Guide for Investigation and Remediation of Contaminated Land (PG). The proposed square grid size of regular grid pattern and a number of proposed sampling locations for each part are summarised in **Table 12.1**.

12.5.2 Based on the past and current land uses for each part of the proposed SI area, the associated potential Chemicals of Concern (COCs) are determined. The associated potential COCs for each part of proposed SI area are summarised in **Table 12.1**.

Table 12.1 – Summary of Proposed Site Investigation and Potential COCs

Area No.	Historical Land Use	Current Land Use (1)	Approximate Area (m^2)	Size of Proposed Sampling Grid(2)	Number of Proposed Sampling Location(2)	Potential COCs (2), (3)
Eastern Part of Northern Portion of the Site						
A16	Farmlands and natural vegetation since 1982 or before, then industrial activities (suspected open carparks and suspected open storages) gradually developed within the area	Logistic company	[redacted]	15m x 15m	13	M & HC
A17		Waste recycling workshop/ facilities		17m x 17m	15	M, HC & PCBs
A18		Open carparks		19m x 19m	29	M & HC
A19		Vehicle repairing and maintenance service workshops		13m x13m	13	M & HC
A20				13m x 13m	11	M & HC

Area No.	Historical Land Use	Current Land Use (1)	Approximate Area (m^2)	Size of Proposed Sampling Grid(2)	Number of Proposed Sampling Location(2)	Potential COCs (2), (3)
A21		Logistic company	[redacted]	17m x 17m	23	M & HC
Northern Part of the Northern Portion of the Site						
A22	Farmlands and natural vegetation in 1982 and before, then industrial activities (suspected open carparks and suspected open storages) gradually developed within the area	Open carparks	[redacted]	29m x 29m	32	M & HC
Centre Part of Northern Portion of the Site						
A23	Farmlands and natural vegetation in 1982 and before, then industrial activities (suspected open carparks and suspected open storages) gradually developed within the area	Suspected waste recycling workshop	[redacted]	17m x 17m	21	M, HC & PCBs
Southern Part of Northern Portion of the Site						
A24	Farmlands and natural vegetation in 1982 and before, then industrial activities (suspected open carparks and suspected open storages) gradually developed within the area	Open storage area for construction equipment	[redacted]	20m x 20m	31	M & HC
Western Part of Northern Portion of the Site						
A25	Farmlands and natural vegetation in 1982 and before, then industrial activities (suspected open carparks and suspected open storages) gradually developed within the area	Open storage area for suspected construction materials	[redacted]	22m x 22m	34	M & HC
A26		Suspected waste recycling workshop	[redacted]	16m x 16m	15	M, HC & PCBs

Notes:

(1) The current land use was determined based on the current aerial photos, site visit / peripheral site observations, signboard of the premises and valid registered of Chemical Waste Producer.

(2) Based on the historical and current land use, the proposed grid size, number of proposed sampling location and potential of COCs are tentatively proposed for the respective area only, but subject to review in the future site re-appraisal after land resumption.

(3) M-Metals (including Antimony, Arsenic, Barium, Cadmium, Chromium III, Chromium VI, Cobalt, Copper, Lead, Manganese, Mercury, Molybdenum, Nickel, Tin and Zinc, all inclusive as listed in Annex H); HC-Hydrocarbons (including Petroleum Carbon Range (PCRS), VOCs, SVOCs, all inclusive as listed in Annex H of PCAP); PCBs – Polychlorinated biphenyls.

12.5.3 The majority of potential contaminated sites in the Proposed SI Area for the LCRS were inaccessible. Therefore, it is recommended that once land resumption is completed, further site re-appraisal should be conducted for the whole Site in order to assess any changes in land use which may give rise to potential land contamination and to ascertain the contaminative sources, hotspots of contamination and the associated potential COCs within the Site. The sampling and testing plans should be updated based on the future site re-appraisal and submitted in the comprehensive Contamination Assessment Plan (CAP) for EPD's endorsement. Therefore, the proposed sampling strategies as described in **Table 12.1** are tentative only and subject to further review in the future site-re-appraisal after land resumption.

12.5.4 Contamination Assessment Report (CAR), Remediation Action Plan (RAP) and Remediation Report (RR) (if necessary) should also be prepared and submitted to EPD for agreement and remediation works (if necessary) should be finished prior to the commencement of the site formation for the Development.

13 PRELIMINARY AIR VENTILATION ASSESSMENT

13.1 Introduction

13.1.1 In order to demonstrate that the Development will not induce undesirable impact to various air ventilation aspects and the surrounding pedestrian wind environment, an Air Ventilation Assessment in the form of Expert Evaluation (AVA-EE) is carried out.

13.2 Methodology

13.2.1 As the preliminary air ventilation assessment is conducted in the form of expert evaluation, it is considered acceptable to use the Regional Atmospheric Modelling System (RAMS) data for site wind availability as a starting point. The latest RAMS data of the grid (049, 072) extracted from the Site Wind Availability Data of Planning Department's website are used for the assessment.

13.2.2 The 500 m site wind availability data represents the wind characteristics giving a good indication of the free wind at the Site. The 200 m site wind availability data represents the wind characteristics that takes into account the topographical effect around the Site. Therefore, a lower level of windrose at 200 m height is considered more representative to study the prevailing wind condition as it represents the incoming wind to the Site and the influence on the prevailing winds by the surrounding topography.

13.3 Air Ventilation Impacts and Mitigation Measures

13.3.1 Based on the wind data from RAMS and the Experimental Site Wind Availability Study (SWAS) for Public Housing Site and the YLIEE at Wang Chau (2014), it is considered that the annual prevailing wind comes from NNE, NE, E, ENE and S directions while the summer prevailing wind comes from SSE, S, SW, SSW and WSW directions.

13.3.2 As shown in **Figure 196587/B&V/AVA/008**, under annual E wind condition, the proposed high-rise residential building blocks (ie. Blocks 6 to 8) would obstruct the E winds from penetrating into its downstream areas such as the hilly region of Kai Shan to the west of the Site. Although the air ventilation performance compared with existing condition in the surrounding areas would be lowered, the proposed building separation of at least 28 m along E-W direction between the two schools and the two rows of residential blocks will enable the entry of E prevailing wind to the open areas within the Site and penetrate to the downstream area at Kai Shan. In addition, the E prevailing wind would penetrate atop the proposed low-rise buildings (i.e. at-grade PTI with integrated design and other facilities and multi-storey carpark etc.) at the northern portion of the Development or through the setback of Block 13 (around 21 m) from the southern boundary of the Development to the downstream areas of Kai Shan. Therefore, the unfavorable impact in terms of wind environment on the surrounding areas is expected to be

reduced.

13.3.3 The illustration of wind flow from NE, NNE and ENE are shown in **Figure 196587/B&V/AVA/009** and **Figure 196587/B&V/AVA/010.** Under annual NE, NNE and ENE wind conditions, the proposed high-rise residential buildings within the Development will obstruct these prevailing winds from reaching the downstream areas near Kai Shan located to the northwestern of the Site, Wing Ning Tsuen, Umah International Primary School and Wang Chau Phase 1 Development. However, the annual NE and NNE prevailing winds are expected to flow atop the low-rise village houses located to the east of the Development and proposed schools and towards Long Ping Road via the open space between Block 13 and Long Ping Road. Moreover, it is expected that the prevailing winds will flow atop the at-grade PTI with integrated design and reach the open area at the central area of the Development. Furthermore, there are 15 m building separations between Block 1 and Block 2, between Block 2 and Block 3 and between Block 4 and Block 5. It allows part of the NNE and NE winds to penetrate through and reach the open spaces inside the Development and the downstream areas including the southeast side of the Development. Therefore, it is anticipated that the unfavourable impact in terms of wind environment would be reduced. For ENE wind conditions, the wind will penetrate the Development and flow towards Kai Shan between the building separations between the two schools and between Block 8 and Block 9. The ENE wind is also expected to flow towards Wang Chau Phase 1 development via the open space between Block 13 and Long Ping Road. Therefore, the unfavorable impact in terms of wind environment on the surrounding areas is expected to be reduced.

13.3.4 Under SSE and S wind conditions, although the availability of SSE and S winds will be limited due to the high- rise buildings of Long Ping Estate and Wang Chau Phase 1 Development and will not be able to penetrate through the building separations between Block 1 to Block 5 to reach the downstream areas, around 15 m building separations between Block 12 and Block 13, between School 2 and Block 11 and between School 1 and Block 5 along S-N direction and building setbacks (around 26 m) are proposed in order to alleviate any possible air ventilation impact from the Development on the downstream areas (e.g. existing brownfields, YLIE and planned YLIEE) by increasing the wind penetration through the Site. The illustration of wind flow under SSE and S wind condition is shown in **Figure 196587/B&V/AVA/011.**

13.3.5 As illustrated in **196587/B&V/AVA/012**, the proposed high-rise residential buildings of the Development will obstruct these prevailing winds from reaching the downstream area under summer SW, SSW and WSW wind condition. 15 m building separations (between Blocks 6 and 7, between Blocks 7 and 8, between Blocks 9 and 10) along SSW-NNE direction are proposed in order to alleviate any possible air ventilation impacts from the Development on the downstream areas (e.g. existing brownfields, YLIE and planned YLIEE) by increasing the wind penetration through the Development. In addition, the SW, SSW and WSW prevailing winds are expected to flow to the village houses located to the east of the Development along Long Ping Road and via the open space between Block 13 and Long Ping Road. Given that the building setbacks (about 26 m) from the boundary of the Development along Fuk Hi Street are proposed, the SW, SSW and WSW winds could flow along Fuk Hi Street to

the downstream areas such as proposed YILEE. Therefore, the unfavourable impact in terms of wind environment on the surrounding areas is expected to be reduced.

13.3.6 It is considered that the proposed high-rise buildings within the Development may obstruct the wind flow to downwind areas under the annual and summer prevailing wind directions. The opportunity to create wind corridors within the Development has been optimized and the proposed mitigated measures such as effective building separations and setbacks in have been incorporated in the design of the site layout to allow wind penetration, as illustrated in **Figure 196587/B&V/AVA/013**.

13.4 Recommendations

13.4.1 Apart from building separations and building setbacks in the site layout design, the following recommendations shall also be considered in the detailed design stage:

- Building Permeability equivalent to 20% to 33.3% of total frontal area with reference to PNAP APP-152;
- Minimisation of podium bulk with ground coverage of no more than 65%;
- Building setback with reference to PNAP APP-152;
- Providing minimum 20% greening ratio but targeting for 30%, taking into account the site constraints of individual phases;
- Avoidance of long continuous façades; and
- Reference should also be made to recommendations of design measures in the Hong Kong Planning Standards and Guidelines.

13.4.2 It is recommended that a quantitative AVA (in form of Initial Study) shall be conducted for the Development at the detailed design stage to review the mitigation measures to suit the detailed architectural layout. The current qualitative AVA is subject to change upon detail layout development.

14 PRELIMINARY LAND REQUIREMENT STUDY

14.1 Introduction

14.1.1 The objective of the Preliminary Land Requirement Study (LRS) is to:

- Identify all existing, planned, possible or proposed land uses, facilities, installations and development rights which may be affected by the implementation of the Development;
- Identify the need for land resumption, site clearance and re-provisioning / improvement works; and
- Prepare a plan which includes and clearly delineates the works areas required for the implementation of the Development.

14.1.2 Findings and recommendations of the LRS are presented in Preliminary Land Requirement Study Report. A summary of various aspects of the review are presented in the sections below.

14.2 Methodologies

14.2.1 A desk study on iB1000 Digital Topographic Map, iC1000 Digital Land Boundary Map, aerial photographs taken in 2017 and land owner information from Land Registry has been carried out to establish the current land status in the vicinity of the Development. Several site visits were also conducted in 2017 and 2018 for further verification of the land status of the concerned areas. The details are shown in Preliminary LRS Report prepared under this Assignment.

14.3 Land Requirement

14.3.1 The extent of land requirement for the Development (i.e. the proposed works limit) is presented in the Land Requirement Plan as shown in **Figures 196587/B&V/LRP/001 to 007**. The total area of the required land is approximately 173,386 m^2. The affected private and government lands required within the Site are presented in **Figure 196587/B&V/LRS/001a** to **Figure 196587/B&V/LRS/001b**, and are summarised in **Table 14.1**.

Table 14.1 – Land Required for the Development (Works limit for construction contract)[1]

Type of Land	Area (m^2)
(a) Private lots to be resumed	84,791
(b) Government land to be required within the Site	36,996
(c) Government land on public roads	51,599
Total required land (i.e. land within the works limit) = (a) + (b) + (c)	173,386

Private Land and Rights

14.3.2 A total number of 233 private lots with approximately 84,791 m^2 of area are located within the proposed works limit. All of these private lots are classified as Old Schedule Lot (OSL). Some of the private lots within the Site will be significantly affected by the Development, in which the remaining areas after the Development would be smaller than 0.01 acre (一分地). To avoid segmentation of land parcels, the whole lots will be fully acquired under land resumption.

14.3.3 Compensation to the owners of the affected private lots will be assessed by the Lands Department (LandsD) based on the latest Ex-gratia Compensation Rates for Resumed Land.

14.3.4 In addition to the private lots, 2 Building Licences (BL)[2], 26 Modification of Tenancy (MOT)[3] and 2 Letter of Approval (LOA)[4] are identified within the Site and would be resumed / cancelled prior to the proposed site formation works for the Development.

Government Land Allocations, Tenancies and Licences

14.3.5 The total area of the government land required for the Development is 88,595 m^2. Government Land Allocation (GLA) No. GLA-YL 86, which is a permanent GLA for Wang Chau Service Reservoir, is the only GLA situated within the proposed works limit. An area of approximately 2,220 m^2 of this GLA will be temporarily affected due to the proposed upgrading works of the existing watermains. Moreover, no Government Land Licence (GLL) is located within the proposed works limit and no associated resumption will be required.

14.3.6 14 Short Term Tenancies (STT) with a total area of 9,032 m^2 are located within the Site.

1 Works Limit is the physical limit of which contractor has obligation to carry out relevant construction works under contract.
2 A licence granted by the Government permitting the erection of building(s) on a land.
3 The permission granted by the Government to construct temporary structure(s) on a land.
4 The permission granted by the Government to construct agricultural structure(s) on a leasehold agricultural land.

Burial Grounds, Graves, Cultural Heritage and Fung Shui Concerns

14.3.7 A significant extent of permitted burial ground area is located to the south and west of the Site. These burial ground areas, which comprise a number of "Tso"/ "Tong" graves, have high fung shui values to the local communities. The proposed works limit will not encroach upon these burial ground areas.

14.3.8 There is no grave, urn and kam tap identified within the proposed works limit. However, a well and a shrine are identified within the Site. The well has a plaque with a date of 1912 written on it, which seems to refer to the year of beginning of service. Given their fung shui and historical value, it is recommended that the well and shrine could be retained in-situ as far as possible within the Site. AMO has no adverse comment on the retention of the well and shrine in-situ.

Villages, Buildings, Structures, and Residents

14.3.9 According to the latest approved Ping Shan OZP and Yuen Long OZP, the proposed works limit will not encroach upon "Village Type Development" zones. However, a non-indigenous village called "Tseng Tau Tsuen" is partially located within the proposed site boundary, as indicated in **Figure 196587/B&V/LRP/006**.

14.3.10 A total number of 161 buildings/structures covering a total of 17,209 m^2 are identified within the Site. Among these 161 identified buildings/structures, 49 of them are considered as domestic use, while 112 of them are considered as non-domestic uses. The domestic building/structures are mainly squatters and dwellings of Tseng Tau Tsuen, while non-domestic buildings/structures are mainly low-rise offices and open-sided shelters. These affected buildings/structures will be cleared during the proposed site formation works at the Site.

14.3.11 Also, along the northern site boundary, there are three (3) existing non-domestic structures currently straddle across the Site into the area of future YLIEE. To avoid partially cutting off existing structures, it is recommended to fully resume the structures for the Development and the future YLIEE development.

Trees, Agricultural Lands, Fish Ponds and Livestock Farms

14.3.12 A total area of approximately 22,071 m^2 of agricultural lands (including orchards) is identified within the Site.

Roads, Footpaths and Accesses

14.3.13 The access to Kai Shan and the existing squatters/dwellings to the south of the Site will be partially affected during the site formation works at the Site. A new footpath along the southern boundary of the Site is proposed for reprovision of access to these areas.

Businesses and Services

14.3.14 There are brownfield operations within the Site, including open storage areas, open carparks, vehicle repair/maintenance workshops, logistic companies and waste recycling workshops. Based on the aerial photos, site reconnaissance and other available information, 38 nos. of businesses units with a total area of 75,375 m^2 will be affected by the Development, as illustrated in **Figure 196587/B&V/LRS/006**. It is anticipated that the clearance of brownfield will be addressed by proper compensation or relocation policy (e.g. brownfield relocation), which is now under separate studies by the Government.

Other Regulated Uses

14.3.15 The proposed works limit for the improvement works at the junction of Fung Chi Road/Wang Tat Road encroaches upon the Railway Protection Boundary for MTR's West Rail Line. In order to ensure no adverse impact to be imposed on MTR's services during the construction phase, further liaison with MTR Corporation shall be made during the later stages of the Development.

Summary

14.3.16 Based on the proposed extent of land required for the implementation of the Development, the number and extent of the land uses, facilities and properties that may be affected by the Development has been identified and summarised in ***Table 14.2***.

Table 14.2 – Summary of Major Features Affected by the Development

Feature	Affected Number	Affected Area (m^2)
Private Lot (OSL)	233	84,791
BL	2	91
MOT	26	2,490
LOA	2	84
GLA	1	2,220
Existing STT	14	9,032
Graves/Urns/Kam Taps	0	-
Shrines	1	-
Building/ Structures	161	17,209
Residents	142	-
Registered Slope	1	-
Agricultural Lands	-	22,071
Businesses (1)	38	75,375

Note: (1) According to the Preliminary Land Requirement Study Report of this study, the term "Businesses" include open storage areas, open carparks, vehicle repair/maintenance workshops, logistic companies, waste recycling workshops, etc.

15 PRELIMINARY SUSTAINABILITY ASSESSMENT

15.1 Introduction

15.1.1 The objective of the Preliminary Sustainability Assessment (SA) is to:

a) Use the Computer-Aided Sustainability Evaluation Tool (CASET) as evaluation framework to evaluate and assess the sustainability implications;

b) Devise a set of guiding principles; indicators and evaluation criteria to assess / update the sustainability implications;

c) Conduct assessment on cost effectiveness and possible environmental impacts during construction and operational stages;

d) Conduct assessment on the social implications to the local community as well as to Hong Kong at large; and

e) Identify key sustainability issues.

15.1.2 Findings and recommendations of the SA are presented Preliminary Sustainability Assessment Report. A summary of assessment is presented in the sections below.

15.2 Approaches for Sustainability Assessment

15.2.1 An application namely "Computer-Aided Sustainability Evaluation Tool (the CASET) Version 4.1" developed by Planning Department is adopted as an evaluation framework to assess the sustainability implications of the Development in a structured manner.

15.2.2 A set of guiding principles extracted from the CASET is listed as follows:

- Economy;
- Health and Hygiene;
- Natural Resources;
- Society and Social Infrastructure;
- Biodiversity;
- Leisure and Cultural Vibrancy;
- Environmental Quality; and
- Mobility.

15.2.3 A list of characterisation includes:

- Art / Culture / Recreation / Entertainment;
- Conservation, Environment and Agriculture;

- Demographics;
- Economics;
- Education;
- Energy;
- Health and Living Conditions;
- Housing;
- Industry;
- Land and Infrastructure;
- Transport; and
- Waste and Waste Water.

15.3 Scenario

15.3.1 Considerations are compared between the "with the Development" and "without the Development" scenarios. For instance, the "without" scenario represents the baseline condition of the indicator prior to the implementation of the Development while the "with" scenario would include the Development.

15.3.2 The Site is currently zoned as GB and OS, of which re-zoning is required prior to implementation of the Development.

15.3.3 The site formation works include earth filling/excavation works as well as geotechnical works/structures. The proposed infrastructure works, i.e. road works, drainage (drains and box culvert), water supply (water mains), sewerage (gravity sewers) etc. will be constructed to cater for the increase in future demand due to population intake scheduled in 2033.

15.3.4 Environmental mitigation measures would be proposed, if necessary, to minimise environmental and public disturbance.

15.4 Results of the Sustainability Assessment

15.4.1 The computer programme - CASET is adopted as evaluation framework to assess the sustainability implications of the Development. The CASET parameters have been assessed qualitatively and quantitatively where possible. The SA results are summarized in **Table 15.1**.

Table 15.1 – Summary of Anticipated Impacts for each Sustainability Parameter

Economic / Environmental Parameters	Qualitative Changes	Expected Range of Change in Conditions
Carbon Dioxide Emitted Per Year	Increase	Very Small Deterioration
Construction Waste	Increase	Very Small Deterioration
Cost-benefit	Increase	Very Small Improvement

Economic / Environmental Parameters	Qualitative Changes	Expected Range of Change in Conditions
Criteria Air Pollutants	Increase	Very Small Deterioration
Energy Consumption	Remain	-
Excessive Noise	Remain	-
Fixed Capital	Increase	Small Improvement
Freight Costs	Decrease	Small Improvement
Freshwater Supplied and Consumed	Decrease	Small Deterioration
Income Differential	Remain	-
Job Creation	Increase	Very Small Improvement
Landfill Capacity	Decrease	Very Small Deterioration
Local Freshwater	Remain	-
Municipal Solid Waste	Increase	Very Small Deterioration
Open Space Shortfall	Decrease	Small Improvement
River Water Quality	Remain	-
Significant Landscape Features (Area)	Decrease	Small Deterioration
Significant Landscape Features (point)	Decrease	Very Small Deterioration
Terrestrial Ecological Value	Decrease	Small Deterioration
Travel Distance	Decrease	Small Improvement
Travel Speed	Remain	-

15.4.2 The SA at this stage indicates that with the implementation of the Development, the main benefits would be improvement in housing and living conditions, economy, leisure and society and social infrastructure. These benefits come in the form of improved health and well-being of residents, positive economic return, and enhancement to social involvement. Also, the associated transport infrastructure would improve connectivity between the Site and nearby areas. On the other hand, negative impacts come mainly in the form of environmental degradation, with deterioration in natural resources.

15.4.3 Overall, the benefits produced by the Development outweigh the residual negative impacts especially in the long term. Therefore, with the implementation of the proposed mitigation measures to minimize the negative impacts, the Development is considered sustainable.

16 COST ESTIMATION, PHASING, PROGRAMME, IMPLEMENTATION MECHNISMS

16.1 Cost Estimation

16.1.1 The proposed infrastructure and associated works, as discussed in the previous sections, consists of drainage works, sewerage works, waterworks, roadworks, site formation works, environmental mitigation measures, landscaping works and land decontamination.

16.1.2 The unit rates or prices adopted are based on historical data from other government projects with adjustment using Civil Engineering Works Index published by CEDD. The estimates are calculated at September 2018 price level. Some items of works are excluded from the cost estimate. The excluded items include private utility works such as electricity, town gas and telecommunication.

16.1.3 The estimated construction costs at September 2018 price level are summarized in **Table 16.1**.

Table 16.1 – Estimated Construction Costs of Works Packages (excluding project contingencies)

Item	Cost (HK$ Million)
Total Base Estimate	
Site Formation	
Earth Retaining Structures	
Roadworks	
Drainage	
Sewerage	
Waterworks	
Landscaping Works	
Noise Mitigation Works	
Environmental Investigation and Remediation	
Total	
Pre-tender Estimate (PTE)	
Preliminaries (30%)	
Site Safety & Environmental	
Provisional Sum for MPF	
Consultancy fees	
Ground Investigation works	
Contingency	
Resident Site Staff (RSS) Cost	
Total Estimate Cost	

16.1.4 The total annual recurrent cost for the Development is approximately HK$ while the annual recurrent proposed for respective maintenance agents are summarized in **Table 16.2**.

Table 16.2 – Estimated Recurrent Costs for Maintenance Agents

Department	Recurrent Cost Estimates (HK$ in Sept 2018 prices)
DSD	
FEHD	
LCSD	
HyD	
TD	
WSD	
HD	
ArchSD	
Others	
Total (with [redacted]% uncertainty)	

16.2 Implementation Mechanisms

16.2.1 Detailed implementation strategy and risk considerations are provided in Report on Implementation Approach. This section summarizes the proposed implementation approach for the Development.

Contract Procurements

16.2.2 "Designer led" or Engineer-Design-Contractor-Build (EDCB) is a traditional approach which is for delivery of public works in Hong Kong, and many of stakeholders and the responsible staff are well familiar with the procedures.

16.2.3 Considering the nature of the Development, by utilising EDCB, the risk of uncertainties would not be transferred to contractors as the scope of works of the Development would be well-defined and designed before the construction works whilst it is expected that the design responsibility will be rested with consultants. In addition, it is also envisaged that contractors might bid a competitive tender when all design information is available. Design-Build (DB) Approach is not suitable for public housing development as it is the norm for CEDD to carry out site formation works before handing over formed site to Housing Department for building works. As such, we recommend using the EDCB approach for contract procurement for the Development.

Construction Packaging

16.2.4 The prime objective of the Development is to complete all the essential site formation, infrastructure and building works supporting for the population intake in 2033. Thus, it is considered more appropriate to package the works in a single works contract for site formation and infrastructure works in order to have the works implemented in a more effective manner.

Funding Arrangement

16.2.5 The estimated cost for consultancy fees is about HK$[redacted], which could be classified as a PWP category D project. This offers slight programme advantage in

the funding arrangement for pre-construction stage. However, the total cost for construction stage would certainly exceed HK$ 30M. Hence the Development would be upgraded to Category B after successful inclusion of project in Resource Allocation System (RAS), and subsequently be upgraded to Category A after the approval of Finance Committee of the Legislature.

Contract Form

16.2.6 New Engineering Contract (NEC) has been promoted by DEVB for public works projects in Hong Kong, and therefore we suggest adopting NEC for the construction of this Development.

16.2.7 In general, the six Main Options can be categorized into four major types of contract strategies, which have different risk allocation between the Employer and the Contractor. The six Main Options are listed as follows.

- Option A – Priced Contract with Activity Schedule
- Option B – Priced Contract with Bills of Quantities
- Option C – Target Contract with Activity Schedule
- Option D – Target Contract with Bills of Quantities
- Option E – Cost Reimbursable Contract
- Option F – Management Contract

16.2.8 To identify the most appropriate Main Option for the Development, a qualitative approach was used to evaluate the six Options available under NEC.

16.2.9 Option D is a target cost contract with a pain/gain share mechanism. The Contractor will be reimbursed with actual costs plus a percentage fee subject to a cap determined by a target cost. The target cost is calculated by the bill of quantities. The pain/gain share mechanism is an incentive to the Contractor for better project management or cost-saving proposals. In fact, we expect that the Contractor may have an alternative cost-saving design, whilst the pain/gain share mechanism under Option D will encourage the Contractor to propose such designs. In addition, timely completion of the land decontamination works, if any and site formation works are the key to success in the Development with an aim to meet the population intake target. The pain/gain share mechanism is an incentive to the Contractor for better project management to minimize the construction time and hence to reduce his overhead costs. Admittedly, under the current partnering policy on construction industry, target cost contract is promoted and encouraged by the Hong Kong's Government for civil engineering projects due to its benefits. Hence, using Option D under the proposed works contract is preferable than Option B.

16.2.10 In fact, there are many benefits under Option D. If the Employer wishes to make interim assessments of the Contractor's share for cost monitoring and management

purposes or for interim payment, the Employer has to prepare his forecast of the final Price for Work Done to Date and his forecast of the final total of the Prices. Since the target price of Option D is based on bill of quantities, the Employer can establish the forecast final total of the Prices with the bills of quantities for the comprehensive unit rates to facilitate calculation of compensation events. Despite that compensation events are priced on actual cost, i.e. an estimate from first principle of labour, plant, and materials; the bill rates can be used as a guide to direct a cross check against the cost.

16.2.11 Last but not least, Option D may have positive effect to the contract management of this proposed works contract. When looking into the details of the specific works nature, Option D would be the appealing choice.

16.2.12 In addition to the main options, Engineering and Construction Contract (ECC) also has different secondary options to suit the needs of different projects. The following secondary options are recommended for the Development:

- X1 (Price adjustment for inflation) – This clause includes an amount for price adjustment to the amount due (for Options A and B) or to the total of the Prices (for Options C and D) in each payment to compensate the Contractor's costs due to inflation. It is proposed to include this clause to reduce the inflation risk of the Contractor.

- X5 (Section Completion) – Sectional completion of the works may be required for some environmental mitigation works such as land decontamination works, if any.

- X7 (Delay damages) – It is equivalent to the "liquidated damages" of traditional GCC contract. It is proposed to include this clause to protect the Employer if the works are delayed by the Contractor.

- X15 (Limitation of the Contractor's liability for his design to reasonable skill and care) – This option reduces the Contractor's liability for his design from "fit for the purpose" to "reasonable skill and care". It is a common practice of traditional GCC contract and has been adopted in other previous NEC contracts in Hong Kong.

- X16 (Retention) – It is proposed to keep retention money to ensure the Contractor to perform the contract.

- X20 (Key Performance Indicators) – The clause will be used to incorporate the new Pay for Safety Performance Merit Scheme in the contract.

- Z (Additional conditions of contract) – This option is for inclusion of other additional conditions, such as those promulgated by the Government's technical circulars or memos, into the contract.

16.3 Implementation Programme

16.3.1 The milestone dates of the key activities are summarised in ***Table 16.3*** below.

Table 16.3 – Milestone Dates of the Key Activities

Key Activities	Milestone Dates
Completion of Rezoning Exercise	August 2021
Commencement of Investigation Phase	June 2020
Commencement of Detailed Design Phase	December 2021
Completion of Road Gazettal Process (including ExCo Approval)	June 2023
Completion of Land Resumption / Land Clearance	March 2025
Commencement of Construction Phase (Site formation and Infrastructure Works)	January 2027
Site Formation Works Completed for Site Handover to HD	July 2029
Completion of public housing construction of Remaining Phases of Wang Chau Development	July 2033

16.3.2 The proposed implementation programme is presented in **Appendix A**. It shall be noted that the programme will need further review throughout the subsequent stages of the Development. Details of the project implementation programme should refer to the Report on Programme and Phasing Report under this Study.

16.4 Works Phasing and Programme of Major Works

16.4.1 It is given to understand that the proposed site formation works and the essential infrastructure works including roadworks (except the internal roads within the future housing sites), drainage, sewerage and water supply facilities, as well as the necessary environmental and natural terrain hazard mitigation measures, will be carried out by CEDD; while the implementation of the proposed public housing developments will be carried out by HD. The implementation programme showing the major works elements is presented in **Appendix B**. Details of the project implementation programme should refer to the Report on Programme and Phasing Report under this Study.

17 CONCLUSION

17.1 General

17.1.1 This Final Report summarizes the findings and other salient issues of relevant technical assessments for the Development in terms of infrastructures, utilities, geotechnical, site formation, environmental, landscape, visual, cost estimation and operation and maintenance requirements.

17.2 Traffic and Transportation

17.2.1 In order to support the Development, various new traffic and transport facilities and upgrading of existing facilitates are recommended. It is proposed to provide the development access at Fuk Hi Street. In order to cater for the additional traffic, it is proposed to widen the existing Fuk Hi Street from single 2 carriageway to dual 2 carriageway with 3 northbound traffic lanes and 2 southbound traffic lanes. The access road and Fuk Hi Street will form a new signalized junction to provide an all movement access. Junction improvements at Fuk Hi Street / Long Ping Road, Long Ping Road / Long Ping Estate Bus Terminus, Long Ping Road/ Fung Chi Road, Fung Chi Road / Wang Tat Road, Fuk Hi Street / Wang Lok Street are proposed to alleviate the future traffic condition.

17.3 Drainage, Sewerage, Water Supply and Utilities

17.3.1 New provision of infrastructures and upgrading of existing utilities have been proposed to support the Development and mitigate impacts to be induced by the Development. No adverse impact is anticipated with respect to drainage, sewerage, water supply and utilities.

17.4 Geotechnical Assessment and Site Formation

17.4.1 From the current available information, no adverse geological and geotechnical features are observed. The proposed works is considered feasible.

17.4.2 An initial screening and alert criteria screening for NTHS are carried out in accordance with GEO Report No. 138. Based on the geomorphological characteristics of the catchments, the landslide history and the significance of the landslide hazards in each catchment, the Development is not subjected to a significant risk of natural terrain hazards, further NTHS are not required for the Site.

17.4.3 Based on the existing topography at the Development, a site formation scheme is proposed to obtain a balanced cut and fill approach to minimize the export or import of fill materials. It is proposed to form a 3-step platform to separate the westmost portion with +12.0 mPD, the middle portion with +10.0 mPD the remaining portion of the Site with +8.0 mPD to +6.5 mPD.

17.5 Environmental, Landscape and Visual, Land contamination and Sustainability

17.5.1 Environmental and planning considerations are reviewed and preliminary mitigation measures are proposed to minimize adverse impacts as much as practicable. Further liaison with relevant authorities at the detailed design stage is required to confirm proper implementation of mitigation measures.

17.6 Air Ventilation

17.6.1 An expert evaluation of wind performance of the Development is carried out.

17.6.2 According to the findings of this AVA-EE, the annual prevailing wind comes from NNE, NE, E, ENE and S directions while the summer prevailing wind comes from SSE, S, SW, SSW and WSW directions. The block layout is carefully considered incorporating good design practices in air ventilation aspect. After taking into account the existing topography, the location of the existing built areas and provision of mitigation measures, it is considered that the Development would not have adverse air ventilation impacts to surrounding environment.

17.7 Land Requirement

17.7.1 Based on the proposed extent of land required for the implementation of the Development, the number and extent of the land uses, facilities and properties that may be affected by the Development has been identified.

17.7.2 It is recommended a Clearance Application Form (CAF) be prepared and submitted in the investigation and detailed design consultancies so as to kick start the process of land resumption / land clearance for the Development. Further liaison with LandsD should be carried out at a later stage.

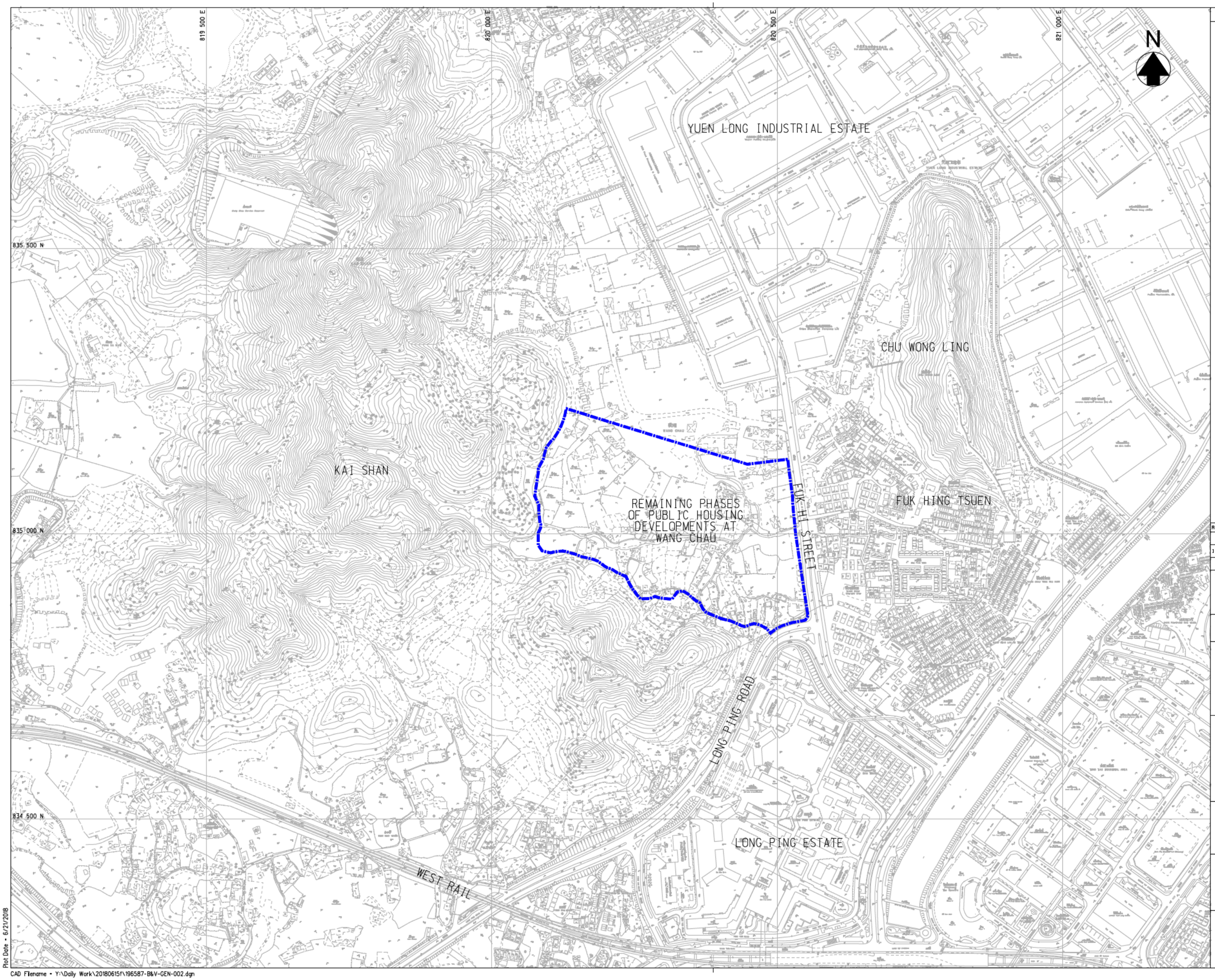
17.8 Cost and Implementation

17.8.1 The estimated cost for the site formation and infrastructure works is approximately [redacted] (at September 2018 price level). The recurrent costs are estimated to be approximately [redacted] per annum.

17.8.2 An implementation programme is proposed with the site formation and infrastructure works tentatively completed in mid-2029 and Q1 2033 respectively subject to successful funding arrangement and procurement of works contract.

END OF TEXT

FIGURES



LEGEND:

BOUNDARY OF THE SITE (SUBJECT TO REVIEW)

Revision	Date	Description		Initial
	Designed	Checked	Drawn	Checked
Initial	–	–	SZ	–
Date	12/17	12/17	12/17	12/17

Approved

Agreement no.

CE 13/2017 (CE)

Project Title

SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG – FEASIBILITY STUDY

Drawing Title

LOCATION PLAN OF THE SITE

Drawing No.	Scale
196587/B&V/GEN/002	1 : 3000 (A1) 1 : 6000 (A3)

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

BLACK & VEATCH HONG KONG LIMITED
博威工程顧問有限公司

Plot Date = 6/21/2018

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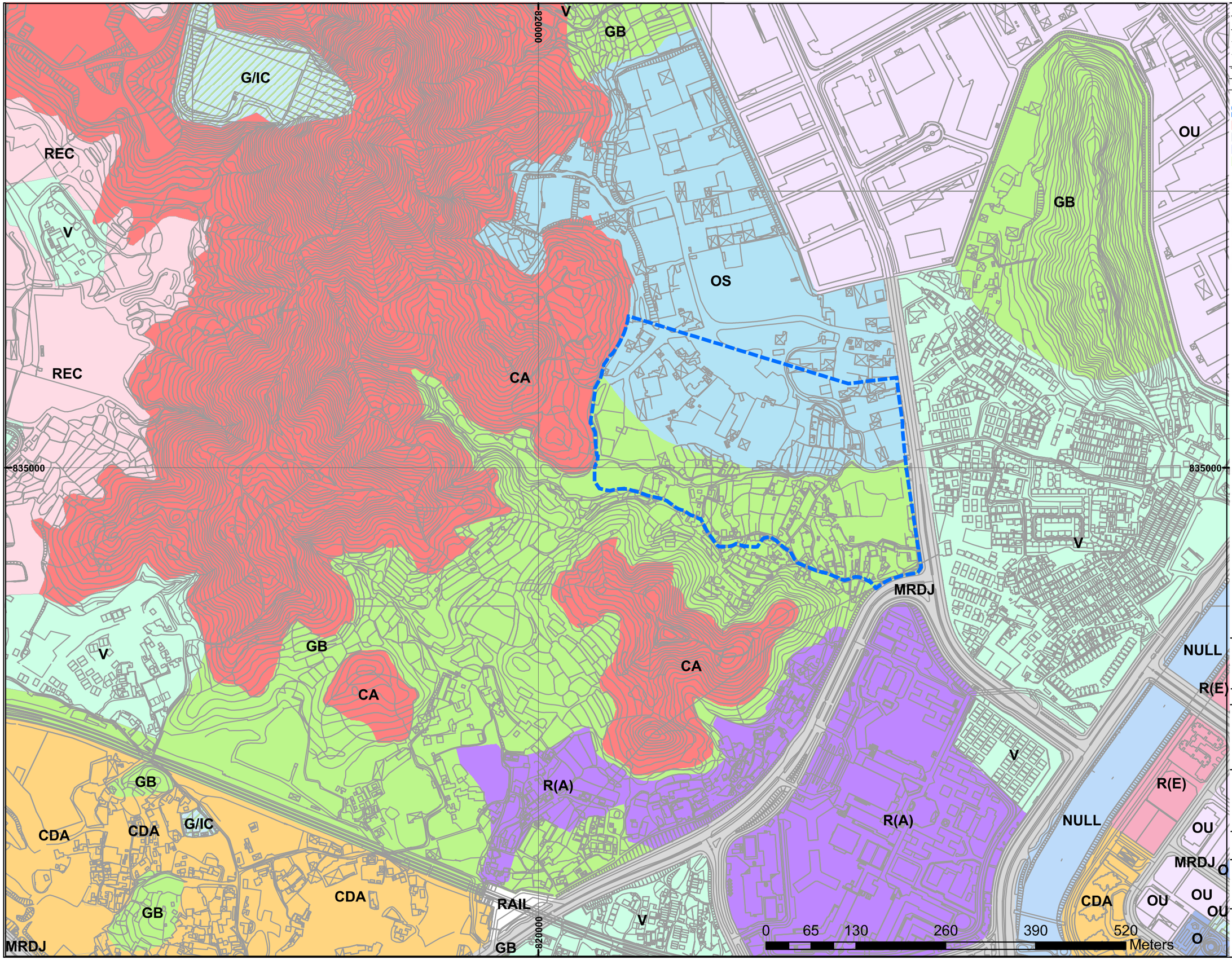

	Designed	Reviewed	Drawn	Checked
Initial	WT	KC	WT	KC
Date	Sep 2017	Sep 2017	Sep 2017	Sep 2017

Revision	Date	Description	Initial
-	-	-	-

Legend

- BOUNDARY OF THE SITE (SUBJECT TO REVIEW)
- CONSERVATION AREA (CA)
- COMPREHENSIVE DEVELOPMENT AREA (CDA)
- GOVERNMENT, INSTITUTION OR COMMUNITY (G/IC)
- GREEN BELT (GB)
- MAJOR ROAD AND JUNCTION (MRDJ)
- NULL
- OPEN SPACE (O)
- OPEN STORAGE (OS)
- OTHER SPECIFIED USES (OU)
- RESIDENTIAL(A) R(A)
- RESIDENTIAL(E) R(E)
- RECREATION (REC)
- VILLAGE DEVELOPMENT (V)

Approved

Agreement No. CE 13/2017 (CE)

Project Title

SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG - FEASIBILITY STUDY

Figure Title

OUTLINE ZONING PLAN

Drawing No.	Scale
196587/B&V/OZP/001	1:5,000 @ A3

Client

CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT

Consultant

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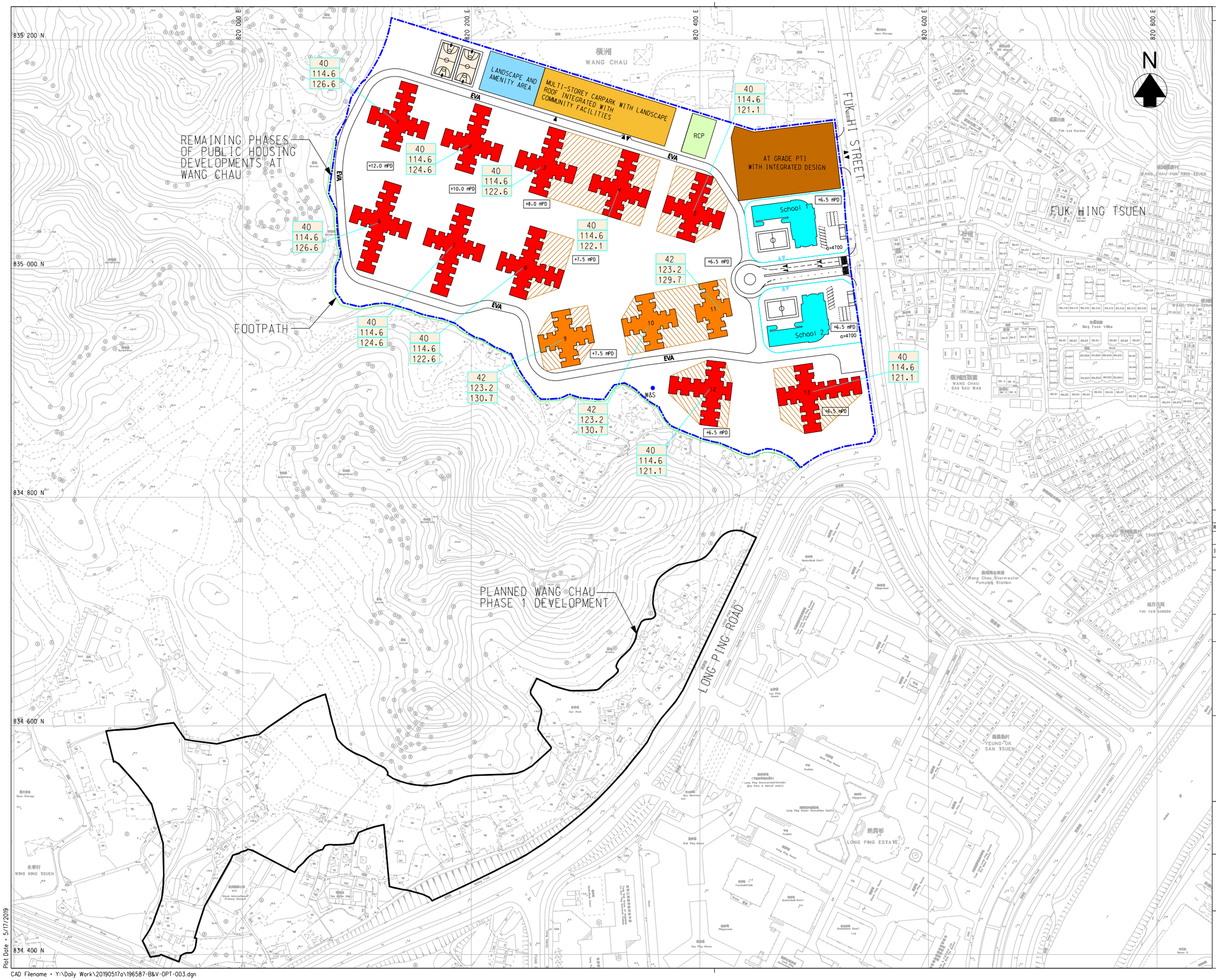

LEGEND:

- SITE BOUNDARY FOR PHASE 1 OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU
- SITE BOUNDARY FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU (SUBJECT TO REVIEW)
- RESIDENTIAL BLOCKS (41 STOREYS)
- RESIDENTIAL BLOCKS (44 STOREYS (WITH 1 REFUGE FLOOR))
- RETAIL
- G/IC FACILITY
- 40 — NO. OF DOMESTIC STOREYS (EXCL. PODIUM/LOBBY)
- 114.6 — BUILDING HEIGHT (METERS)
- 123.6 — mPD OF BUILDING (METERS)
- WELL AND SHRINE (TO BE RETAINED IN SITU AS FAR AS POSSIBLE)
- PROPOSED FOOTPATH
- ACCESS TO SCHOOL SITE

Revision	Date	Description	Initial
A	01/18		WT

	Designed	Checked	Drawn	Checked
Initial	WT	KC	SZ	-
Date	01/18	01/18	01/18	01/18

Approved

Agreement no.
CE 13/2017 (CE)

Preject Title
SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG - FEASIBILITY STUDY

Drawing Title
PROPOSED LAYOUT OF INITIAL DEVELOPMENT OPTION 3

Drawing No.	Scale
196587/B&V/OPT/003	1 : 1500 (A1) 1 : 3000 (A3)

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

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博威工程顧問有限公司

Plot Date = 5/17/2019

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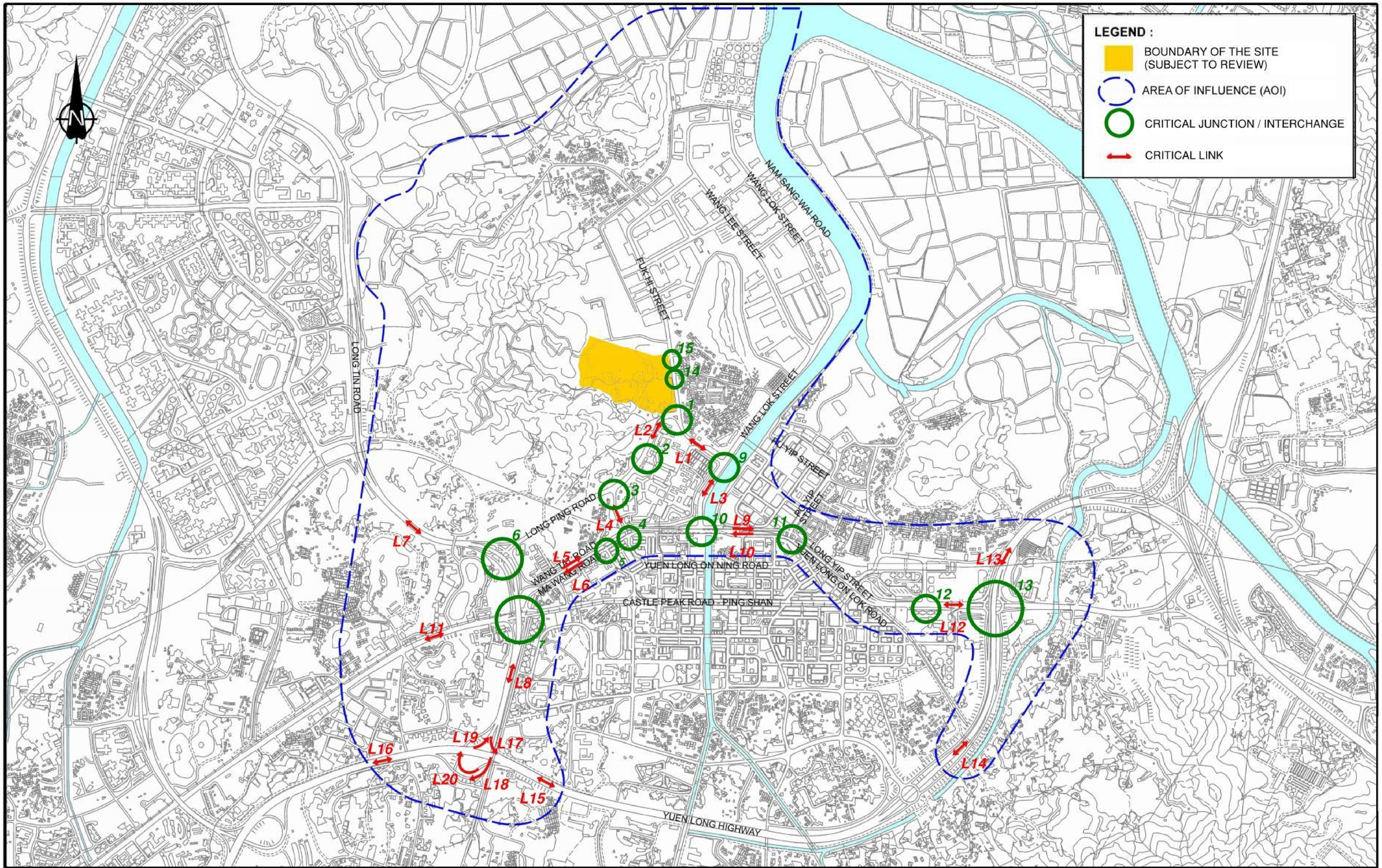

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C	MINOR AMENDMENT	GPH	01AUG18
B	MINOR AMENDMENT	GPH	28JUN18
A	MINOR AMENDMENT	GPH	27APR18

Project Title

SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG - FEASIBILITY STUDY

Drawing Title

EXISTING ROAD NETWORK

Designed	Checked	Scale	Date	Drawing No.	Rev.
SFL	GPH	N.T.S.	DEC 2017	196587/B&V/TTIA/101	C

土木工程拓展署 Civil Engineering and Development Department

BLACK & VEATCH HONG KONG LIMITED

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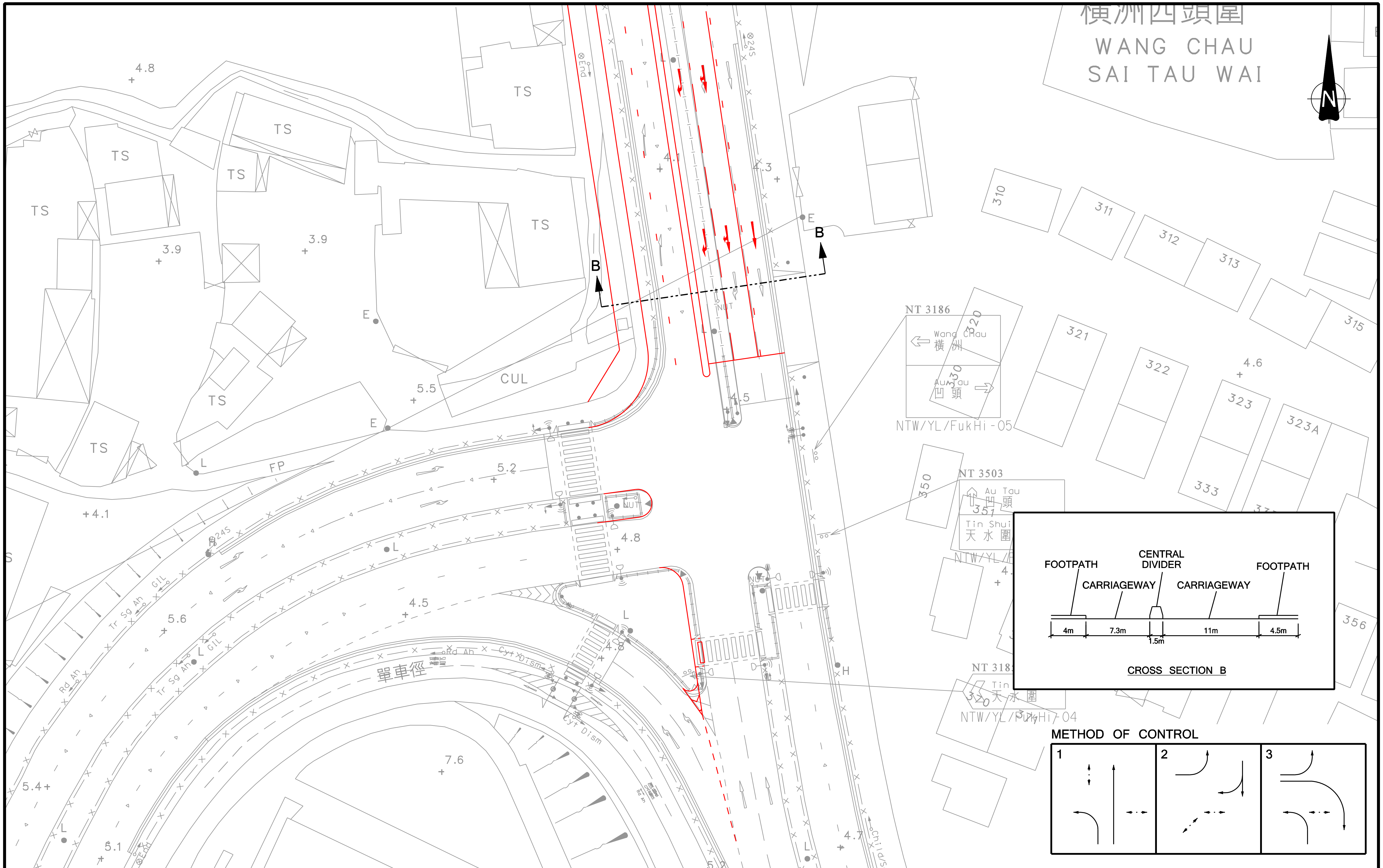

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A	MINOR AMENDMENT	GPH	23APR18
Rev.	Description	Checked	Date

Project Title

SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC DEVELOPMENTS AT WANG CHAU, YUEN LONG - FEASIBILITY STUDY

Drawing Title

PROPOSED IMPROVEMENT SCHEME AT FUK HI STREET/ LONG PING ROAD (J1)

Designed	Checked	Scale	Date	Drawing No.	Rev.
SFL	GPH	1:500(A3)	JAN 2018	196587/B&V/TTIA/102	A

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SYSTRA MVA

CHK50284710/TIA/F53-A.DGN/CYC/23APR18

LEGEND:

BOUNDARY OF THE SITE (SUBJECT TO REVIEW)

J1

J14

J15

FUK HI STREET

LONG PING ROAD

WANG CHAU SAI TAU WAI 橫洲西頭圍

Chun Yick Garden 振益花園

Elegant Villa 雍雅山莊

Meun Court 美安苑

福喜街

Rev.	Description	Checked	Date
E	MINOR AMENDMENT	GPH	21DEC18
D	MINOR AMENDMENT	GPH	05SEP18
C	MINOR AMENDMENT	GPH	28JUN18
B	MINOR AMENDMENT	GPH	30MAY18

Project Title

SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC DEVELOPMENTS AT WANG CHAU, YUEN LONG - FEASIBILITY STUDY

Drawing Title

PROPOSED JUNCTION LAYOUTS AT FUK HI STREET (J1, J14 & J15)

Designed	Checked	Scale	Date	Drawing No.	Rev.
SFL	GPH	1:1000(A3)	JAN 2018	196587/B&V/TTIA/103	E

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

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SYSTRA MVA

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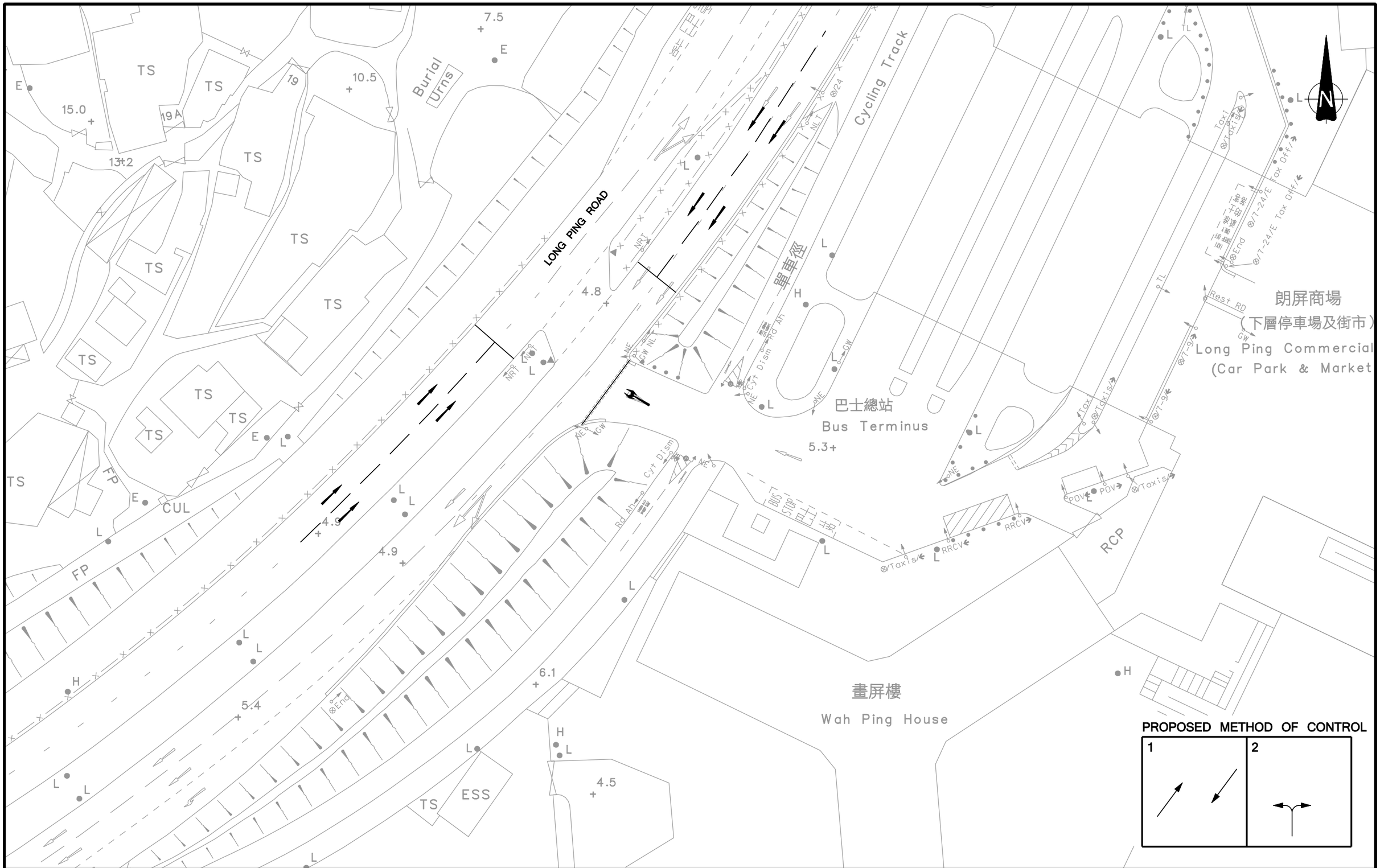

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A	MINOR AMENDMENT	GPH	20APR18

Project Title

SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC DEVELOPMENTS AT WANG CHAU, YUEN LONG - FEASIBILITY STUDY

Drawing Title

MODIFICATION OF METHOD OF CONTROL AT JUNCTION OF LONG PING ROAD/LONG PING ESTATE BUS TERMINUS (J2)

Designed	Checked	Scale	Date	Drawing No.	Rev.
SFL	GPH	1:500(A3)	JAN 2018	196587/B&V/TTIA/104	A

土木工程拓展署 Civil Engineering and Development Department

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SYSTRA MVA

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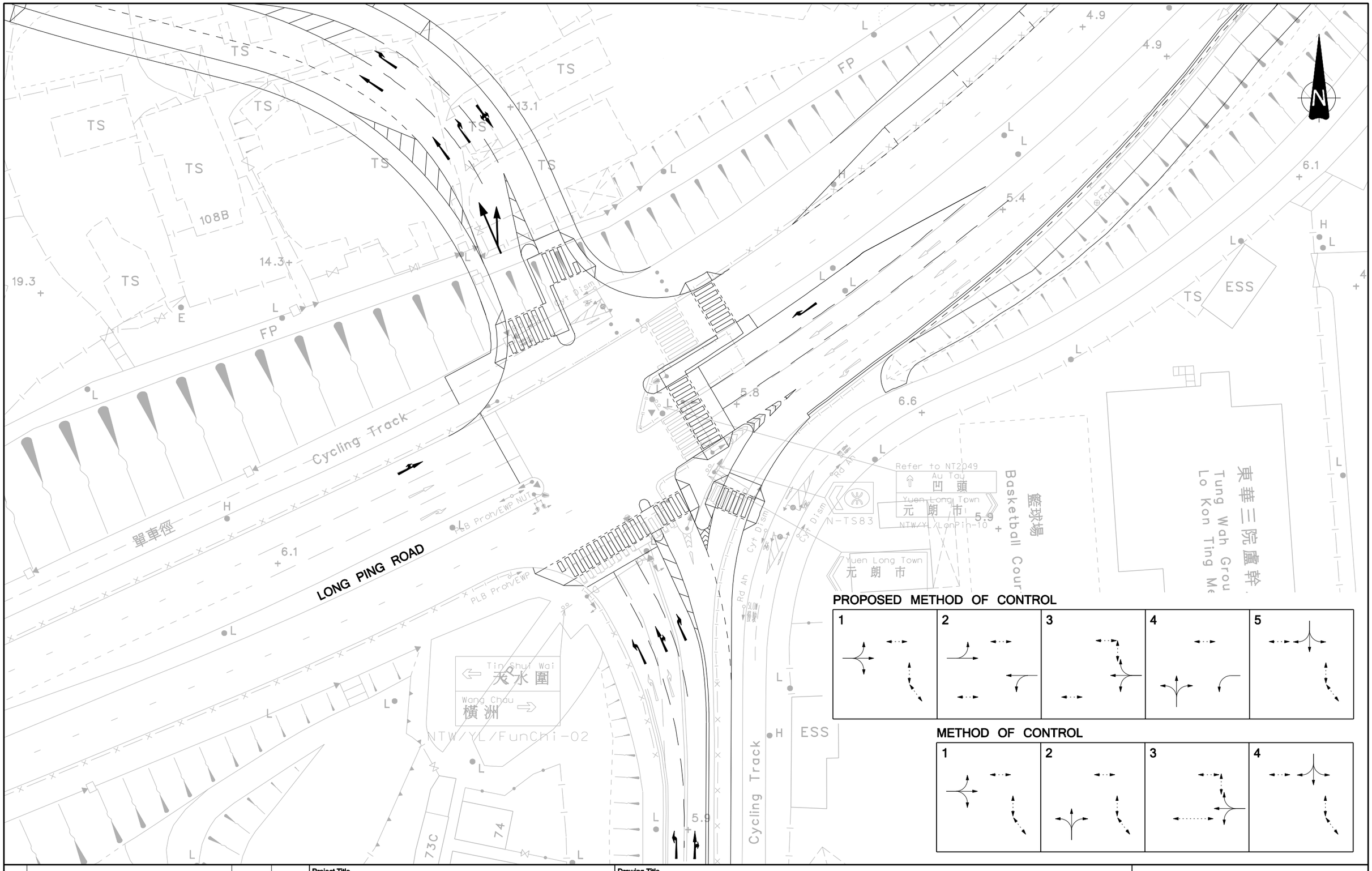

PROPOSED METHOD OF CONTROL

METHOD OF CONTROL

Rev.	Description	Checked	Date
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Project Title

SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC DEVELOPMENTS AT WANG CHAU, YUEN LONG - FEASIBILITY STUDY

Drawing Title

MODIFICATION OF METHOD OF CONTROL AT LONG PING ROAD/ FUNG CHI ROAD (J3)

Designed	Checked	Scale	Date	Drawing No.	Rev.
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土木工程拓展署 CEDD Civil Engineering and Development Department

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SYSTRA

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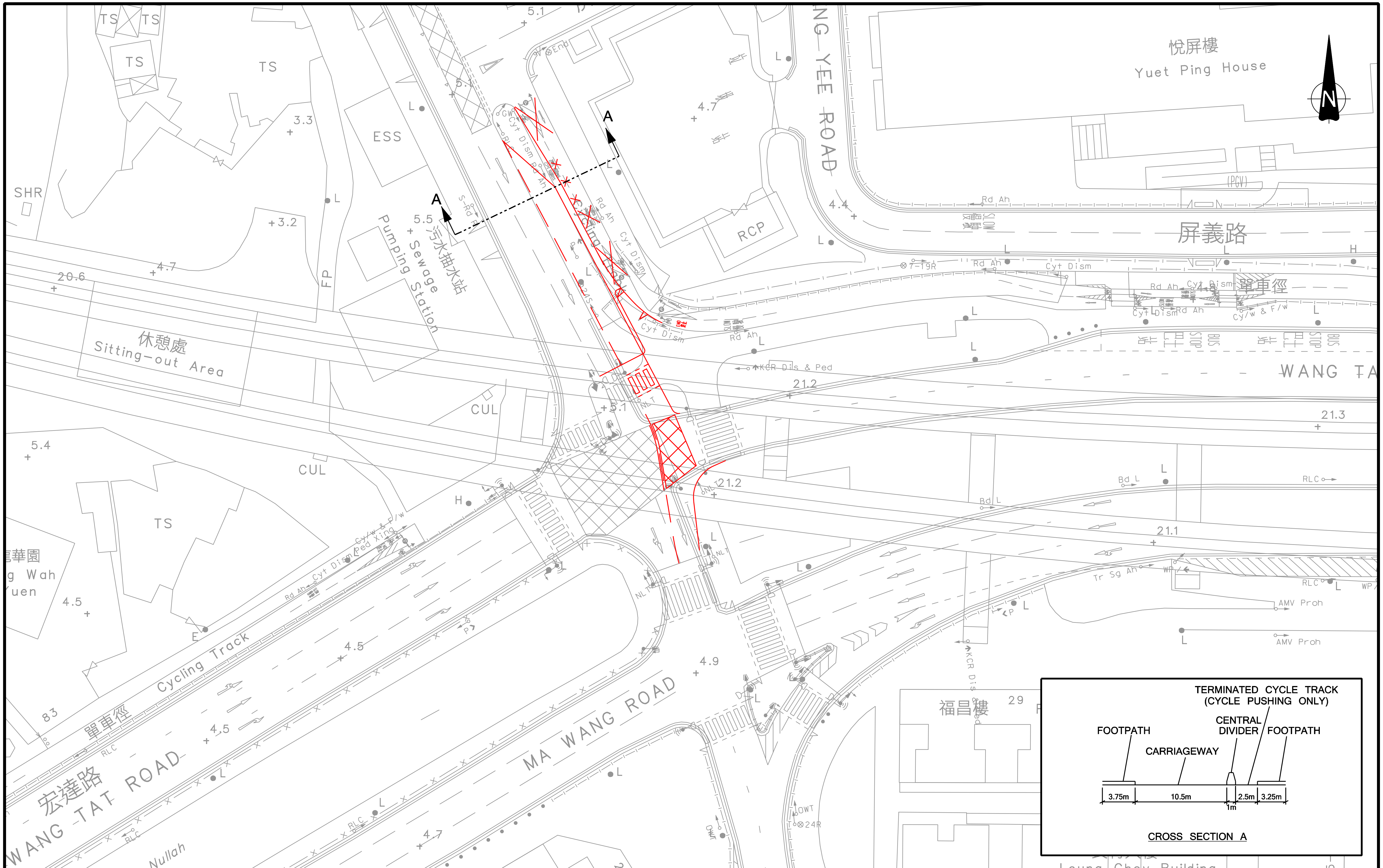

Rev.	Description	Checked	Date
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B	MINOR AMENDMENT	GPH	16MAY18
A	MINOR AMENDMENT	GPH	02MAY18

Project Title

SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC DEVELOPMENTS AT WANG CHAU, YUEN LONG - FEASIBILITY STUDY

Drawing Title

PROPOSED IMPROVEMENT SCHEME AT JUNCTION OF FUNG CHI ROAD / WANG TAT ROAD (J4)

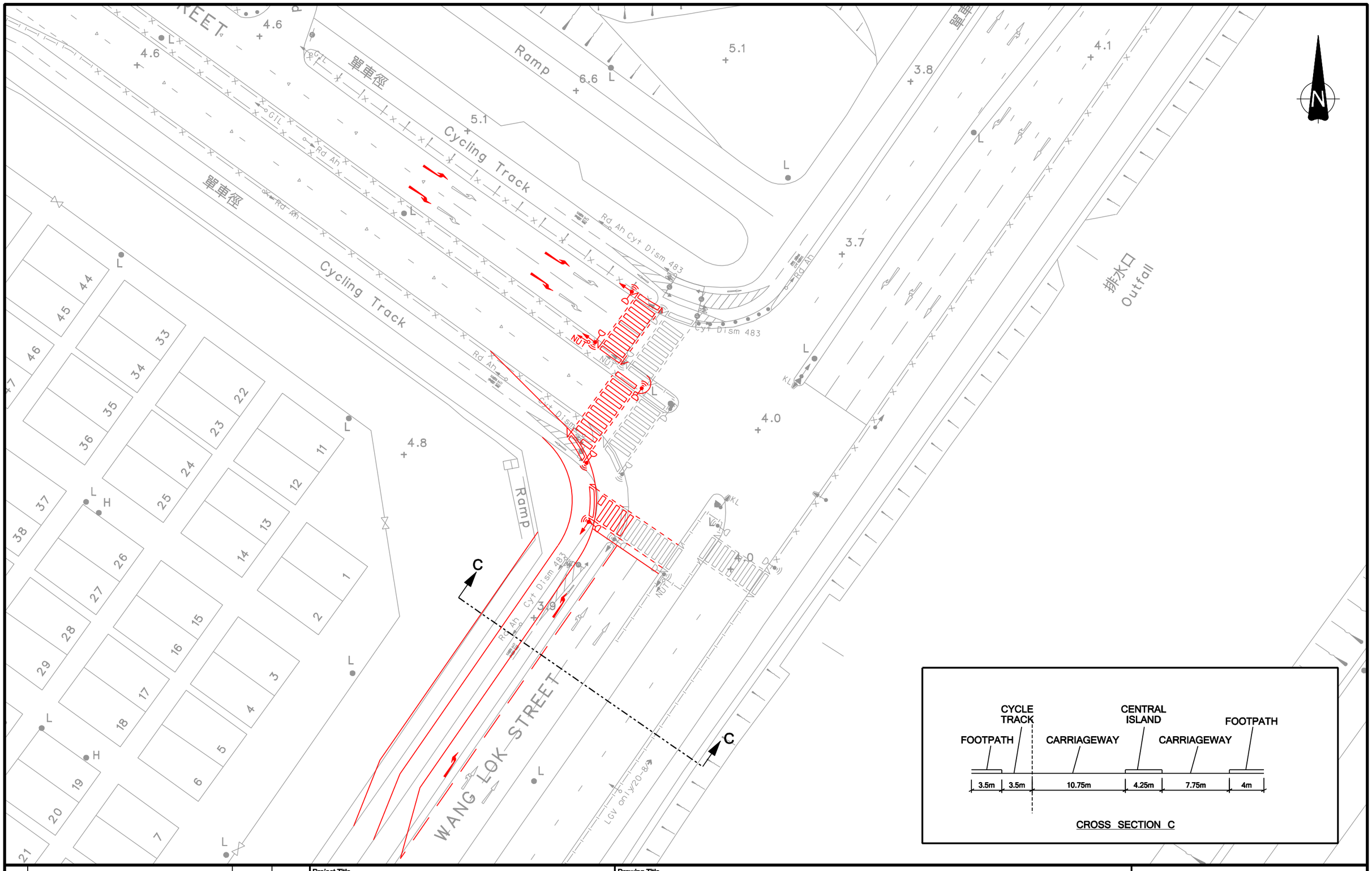
Designed	Checked	Scale	Date	Drawing No.	Rev.
SFL	GPH	1:500(A3)	JAN 2018	196587/B&V/TTIA/106	B

土木工程拓展署 Civil Engineering and Development Department

BLACK & VEATCH HONG KONG LIMITED 博威工程顧問有限公司

SYSTRA MVA

CHK50284710/TIA/F56-B.DGN/CYC/16MAY18



Rev.	Description	Checked	Date
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-	-	-	-
-	-	-	-
-	-	-	-

Project Title

SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC DEVELOPMENTS AT WANG CHAU, YUEN LONG - FEASIBILITY STUDY

Drawing Title

PROPOSED JUNCTION OF FUK HI STREET/ WANG LOK STREET (J9)

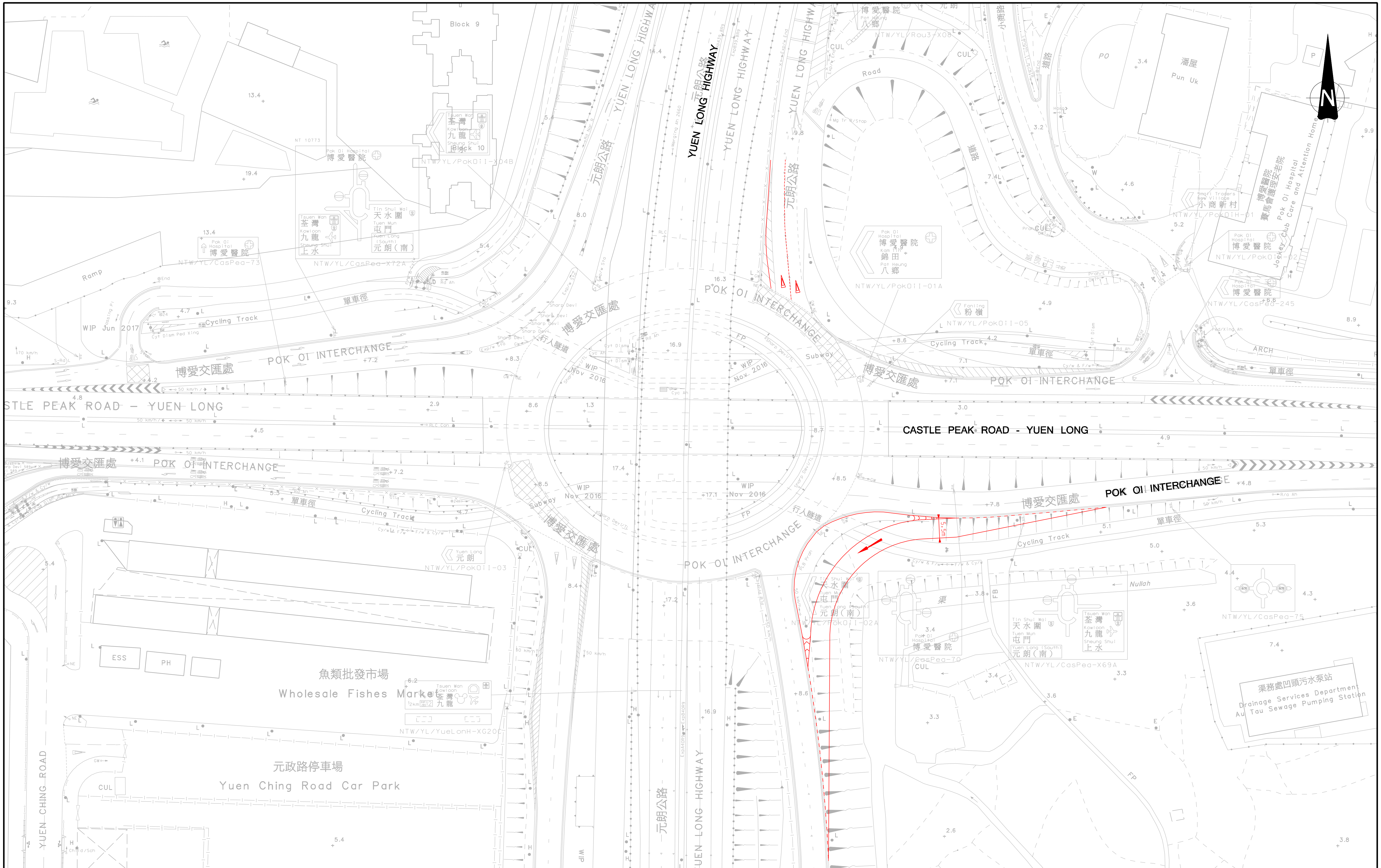
Designed	Checked	Scale	Date	Drawing No.	Rev.
SFL	GPH	1:500(A3)	APR 2018	196587/B&V/TTIA/107	-

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

BLACK & VEATCH HONG KONG LIMITED 博威工程顧問有限公司

SYSTRA MVA

CHK50284710/TIA/F57.DGN/CYC/27APR18



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-	-	-	-
-	-	-	-
-	-	-	-
Rev.	Description	Checked	Date

Project Title

SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC DEVELOPMENTS AT WANG CHAU, YUEN LONG - FEASIBILITY STUDY

Drawing Title

PROPOSED JUNCTION IMPROVEMENT AT POK OI INTERCHANGE (J13) (BY OTHERS)

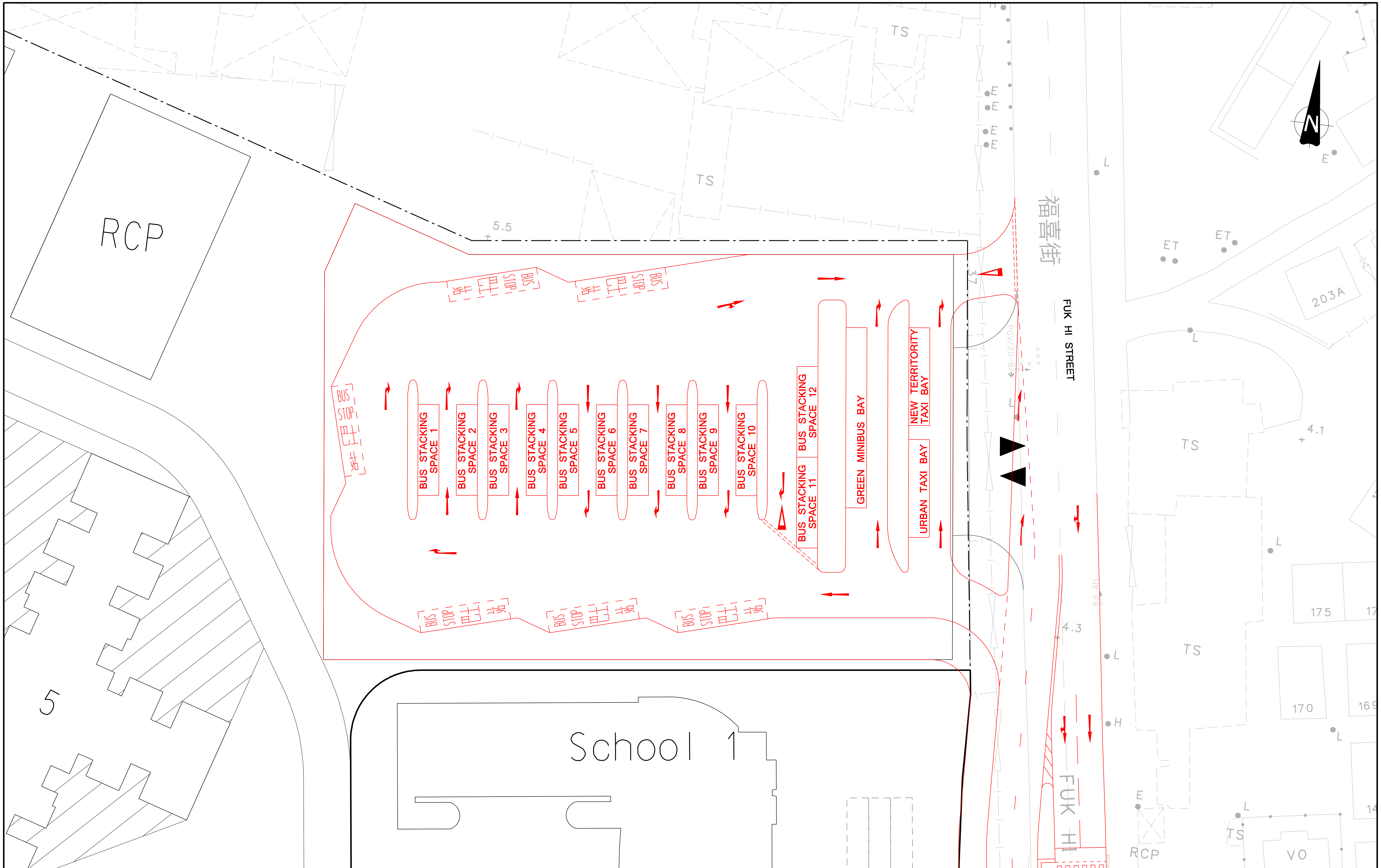
Designed	Checked	Scale	Date	Drawing No.	Rev.
SFL	GPH	1:1000(A3)	JAN 2018	196587/B&V/TTIA/108	-

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

BLACK & VEATCH HONG KONG LIMITED
博威工程顧問有限公司

SYSTRA

CHK50284710/TIA/F216.DGN/HJQ/17JAN18



Rev.	Description	Checked	Date
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-

Project Title

SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC DEVELOPMENTS AT WANG CHAU, YUEN LONG - FEASIBILITY STUDY

Drawing Title

PROPOSED LAYOUT OF PUBLIC TRANSPORT INTERCHANGE

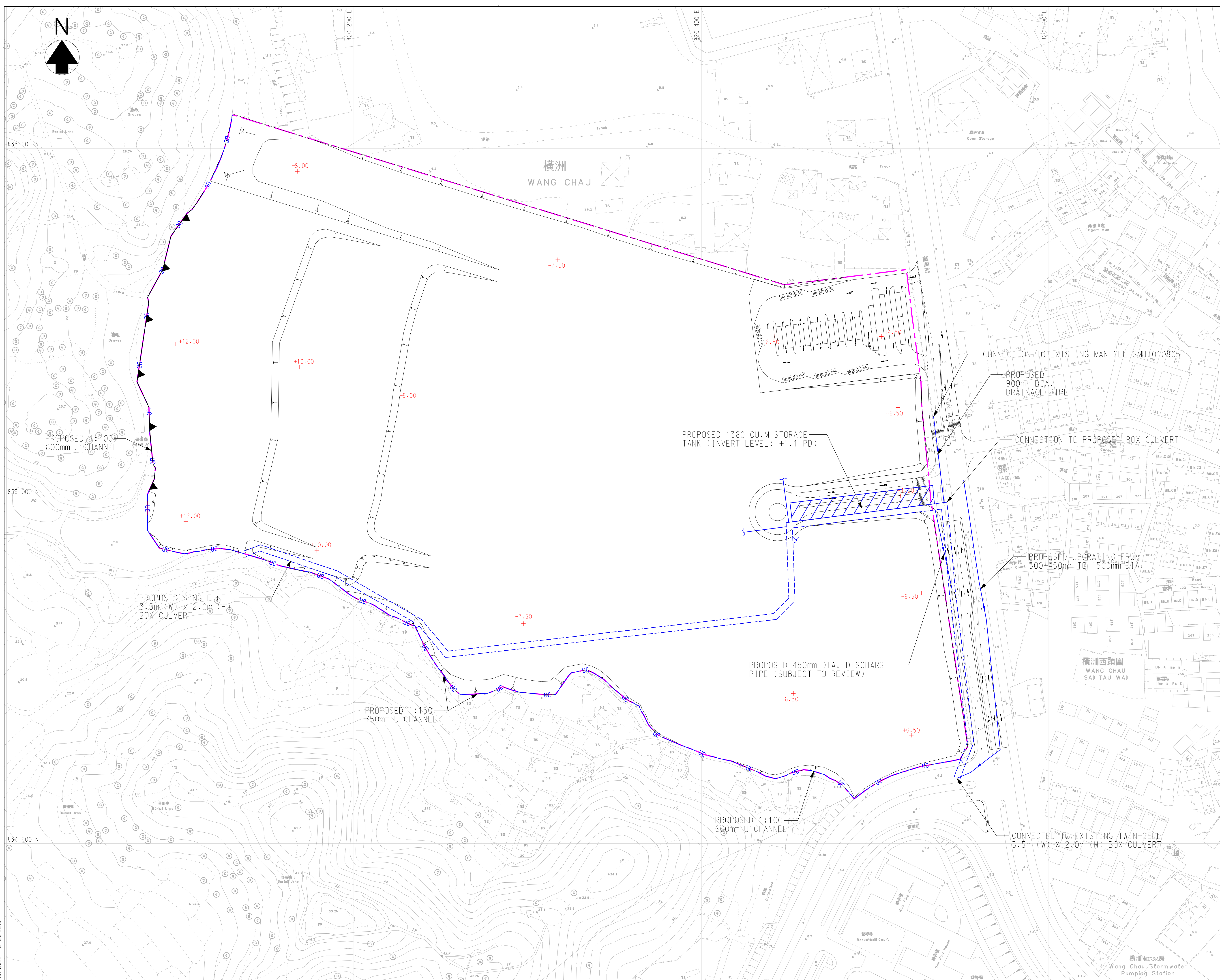
Designed	Checked	Scale	Date	Drawing No.	Rev.
LAU	GPH	1:500(A3)	MAY 2018	196587/B&V/TTIA/109	-

土木工程拓展署 Civil Engineering and Development Department

BLACK & VEATCH HONG KONG LIMITED 博威工程顧問有限公司

SYSTRA

CHK50284710/TIA/F34.DGN/CYC/14MAY18



LEGEND:

- PROPOSED DRAINAGE PIPE
- UC PROPOSED U-CHANNEL
- PROPOSED BOX CULVERT
- PROPOSED UNDERGROUND STORAGE TANK
- BOUNDARY OF THE SITE (SUBJECT TO REVIEW)
- PROPOSED RETAINING WALL
- PROPOSED SLOPE
- +8.00 PROPOSED SITE FORMATION LEVEL

Revision	Date	Description		Initial
	Designed	Checked	Drawn	Checked
Initial	WT	KC	SZ	-
Date	10/18	10/18	10/18	10/18

Approved

Agreement no.
CE 13/2017 (CE)

Project Title
SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG - FEASIBILITY STUDY

Drawing Title
PROPOSED DRAINAGE SYSTEM (WITH YLBS)

Drawing No.
196587/B&V/DIA/105

Scale
1 : 1000 (A1)
1 : 2000 (A3)

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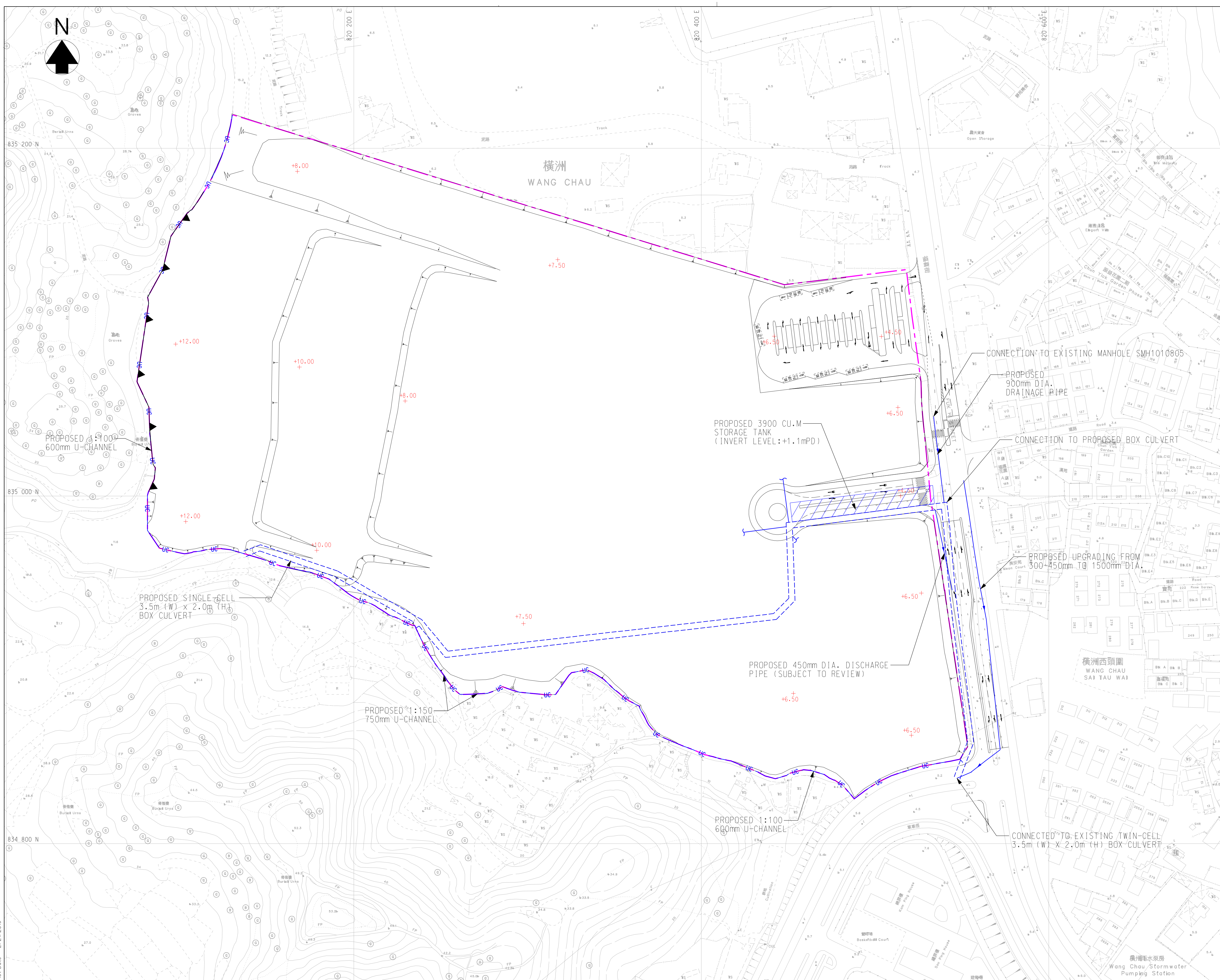
CEDD Civil Engineering and Development Department

BLACK & VEATCH HONG KONG LIMITED
博威工程顧問有限公司

Plot Date - 2/21/2019

CAD Filename - Y:\Daily Work\20190221e\196587-B&V-DIA-105.dgn



LEGEND:

- PROPOSED DRAINAGE PIPE
- UC — PROPOSED U-CHANNEL
- PROPOSED BOX CULVERT
- PROPOSED UNDERGROUND STORAGE TANK
- BOUNDARY OF THE SITE (SUBJECT TO REVIEW)
- PROPOSED RETAINING WALL
- PROPOSED SLOPE
- +8.00 PROPOSED SITE FORMATION LEVEL

Revision	Date	Description		Initial
	Designed	Checked	Drawn	Checked
Initial	WT	KC	SZ	-
Date	10/18	10/18	10/18	10/18

Approved

Agreement no.
CE 13/2017 (CE)

Project Title
SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG - FEASIBILITY STUDY

Drawing Title
PROPOSED DRAINAGE SYSTEM (WITHOUT YLBS)

Drawing No.
196587/B&V/DIA/106

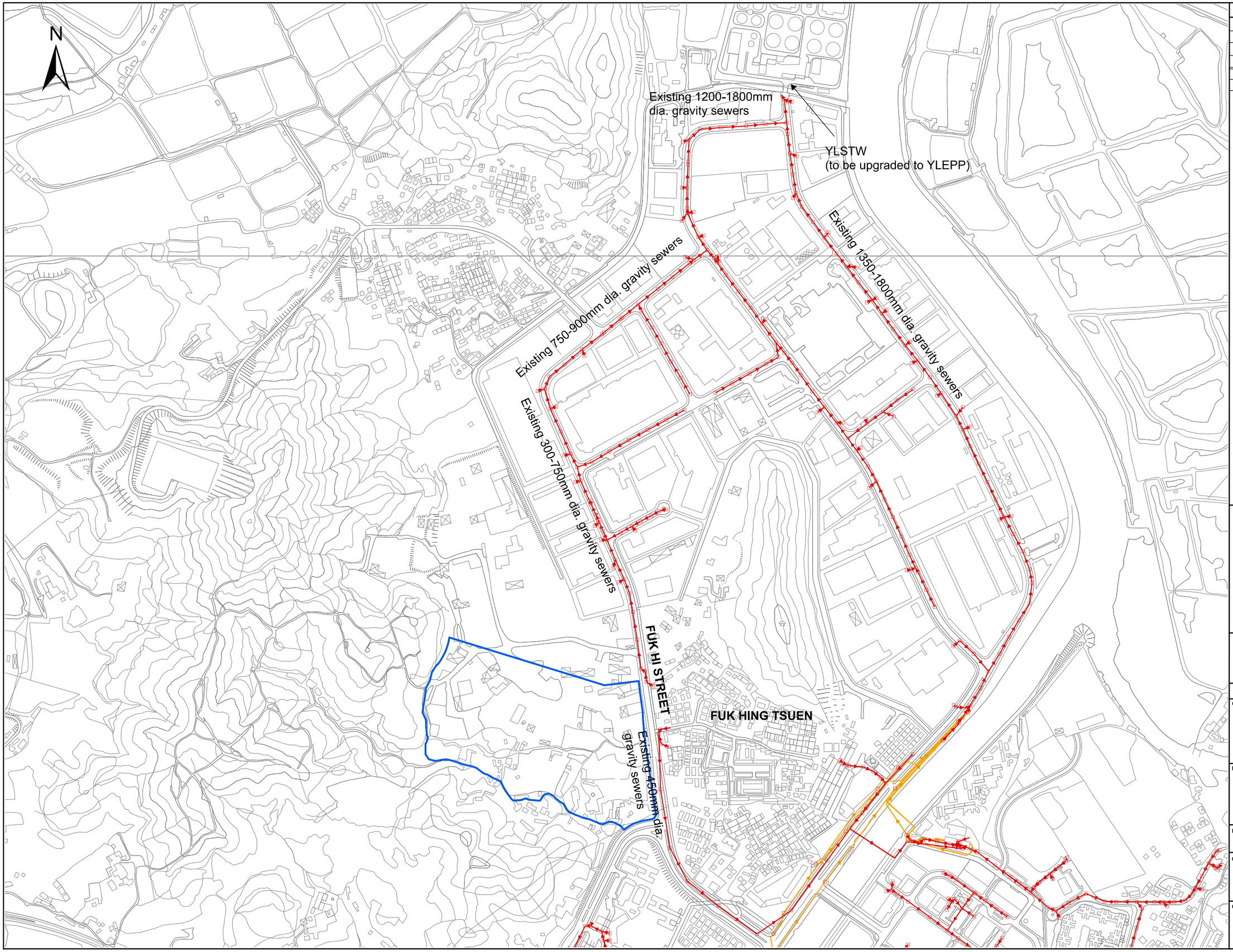
Scale
1 : 1000 (A1)
1 : 2000 (A3)

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

BLACK & VEATCH HONG KONG LIMITED
博威工程顧問有限公司

Plot Date - 2/21/2019

CAD Filename - Y:\Daily Work\20190221e\196587-B&V-DIA-106.dgn



	Designed	Reviewed	Drawn	Checked
Initial	CLH	CLH	CLH	CLH
Date	12/17	12/17	12/17	12/17

Revision	Date	Description	Initial

LEGEND

- BOUNDARY OF THE SITE (SUBJECT TO REVIEW)
- EXISTING SEWAGE MANHOLE
- EXISTING GRAVITY SEWER
- EXISTING RISING MAIN

NOTE:
SEWERAGE WITHIN FUK HING TSUEN IS NOT SHOWN ON THE FIGURE FOR SIMPLICITY.

Overview

Approved

Contract Title

AGREEMENT NO. CE 13/2017 (CE)
SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG – FEASIBILITY STUDY

Figure Title

EXISTING SEWAGE SYSTEM

Drawing No.	Scale
196587/B&V/SIA/001	1:7,000 @ A3

Client

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Consultant

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MXD: B:\Project\196587\MXD

N

819 500 E
820 000 E
820 500 E
821 000 E
836 000 N
835 500 N
835 000 N

PROPOSED CONNECTION AT MANHOLE NO. FMH1008582

PROPOSED 1200mm DIA. SEWER (UPGRADED FROM EXISTING 750 - 900mm SEWER)

PROPOSED 1050mm DIA. SEWER (UPGRADED FROM EXISTING 300 - 750mm SEWER)

PROPOSED CONNECTION AT MANHOLE NO. FMH1009148

PROPOSED 750mm DIA. SEWER

PROPOSED SEWERAGE MANHOLE

+8.00
+7.50
+12.00
+7.50
+12.00
+7.50
+4.50
+6.50
+4.50
+6.50
+6.50

LEGEND:

- PROPOSED SEWERAGE PIPE
- PROPOSED SEWERAGE MANHOLE
- BOUNDARY OF THE SITE (SUBJECT TO REVIEW)
- PROPOSED RETAINING WALL
- PROPOSED SLOPE
- +8.00 PROPOSED SITE FORMATION LEVEL

Revision	Date	Description		Initial
	Designed	Checked	Drawn	Checked
Initial	WT	KC	SZ	-
Date	09/18	09/18	09/18	09/18

Approved

Agreement no.
CE 13/2017 (CE)

Project Title
SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG - FEASIBILITY STUDY

Drawing Title
PROPOSED SEWERAGE SCHEME

Drawing No.	Scale
196587/B&V/SIA/102	1 : 2500 (A1) 1 : 5000 (A3)

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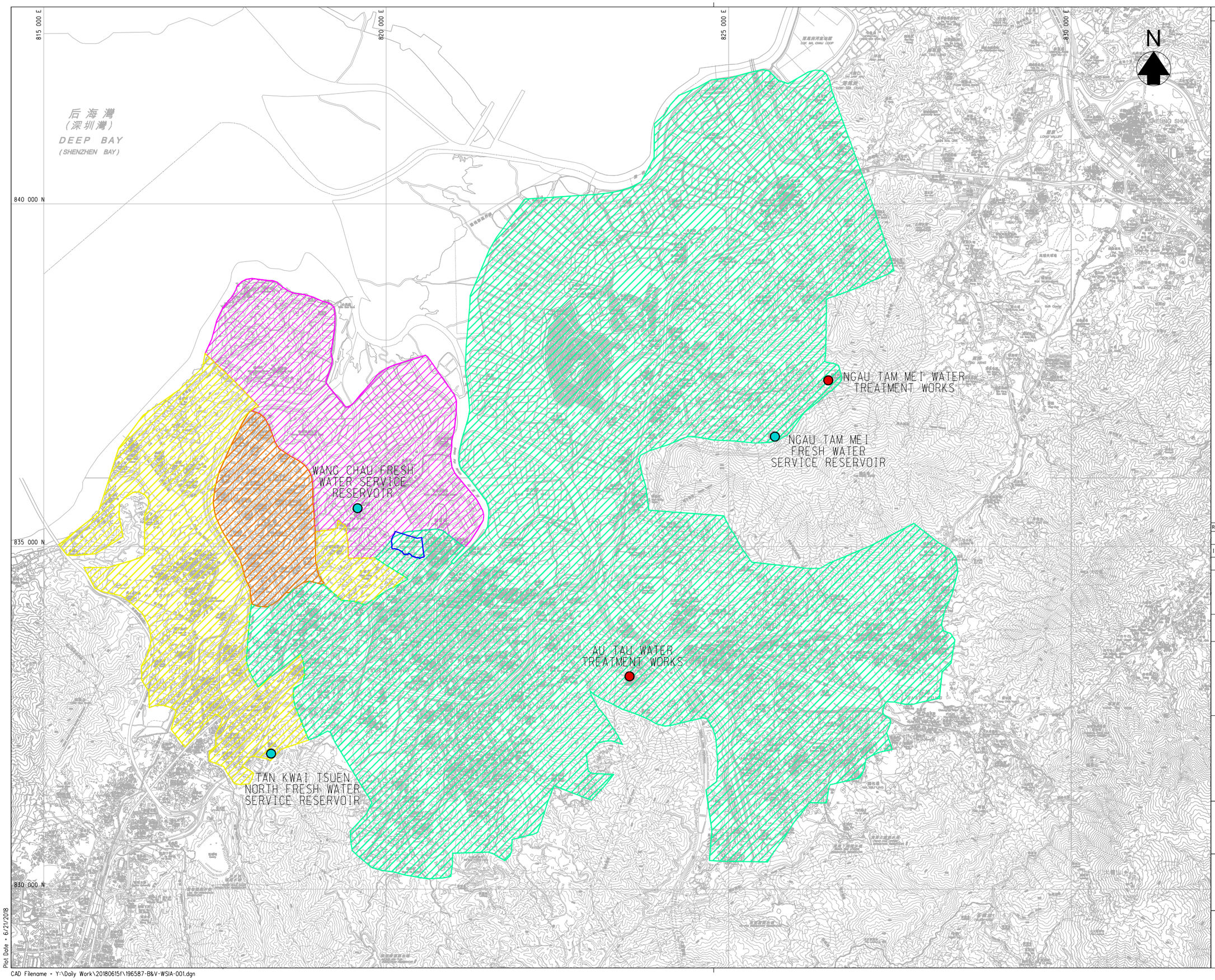
CEDD Civil Engineering and Development Department

BLACK & VEATCH HONG KONG LIMITED
博威工程顧問有限公司

Plot Date = 2/21/2019

CAD Filename = Y:\Daily Work\20190221e\196587-B&V-SIA-102.dgn



LEGEND:

- SITE BOUNDARY FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU (SUBJECT TO REVIEW)
- WANG CHAU FRESH WATER SERVICE RESERVOIR SUPPLY ZONE
- TAN KWAI TSUEN NORTH FRESH WATER SERVICE RESERVOIR SUPPLY ZONE
- JOINT WANG CHAU AND TAN KWAI TSUEN NORTH FRESH WATER SERVICE RESERVOIR SUPPLY ZONE
- NGAU TAM MEI FRESH WATER PRIMARY SERVICE RESERVOIR AND AU TAU FRESH WATER PRIMARY RESERVOIR SUPPLY ZONE
- EXISTING FRESH WATER SERVICE RESERVOIRS
- WATER TREATMENT WORKS

Revision	Date	Description		Initial
	Designed	Checked	Drawn	Checked
Initial	WT	KC	SZ	-
Date	09/17	09/17	09/17	09/17

Approved

Agreement no.
CE 13/2017 (CE)

Project Title
SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG - FEASIBILITY STUDY

Drawing Title
FRESH WATER SUPPLY ZONE

Drawing No.	Scale
196587/B&V/WSIA/001	1 : 25000 (A1) 1 : 50000 (A3)

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

BLACK & VEATCH HONG KONG LIMITED
博威工程顧問有限公司

Plot Date = 6/21/2018

CAD Filename = Y:\Daily Work\20180615\196587-B&V-WSIA-001.dgn

	Designed	Reviewed	Drawn	Checked
Initial	WT	KC	HLam	KC
Date	Feb 2018	Feb 2018	Feb 2018	Feb 2018

Revision	Date	Description	Initial
-	-	-	-

Legend

- SITE BOUNDARY FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENT AT WANG CHAU (SUBJECT TO REVIEW)
- SITE BOUNDARY FOR PHASE 1 OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU
- EXISTING FRESH WATER DISTRIBUTION MAIN
- EXISTING FRESH WATER TRUNK MAIN
- PLANNED FRESH WATER MAINS (BY OTHERS)

Approved

Agreement No. CE 13/2017 (CE)

Project Title

SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG - FEASIBILITY STUDY

Figure Title

EXISTING AND PLANNED FRESH WATER SUPPLY LAYOUT

Drawing No.	Scale
196587/B&V/WSIA/002	1:8,000 @ A3

Client

CEDD CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT

Consultant

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Ng Uk Tsuen
Kai Shan
Chu Wong Ling
Long Ping Estate
Long Ping Staton
Fuk Shun Street
Fuk Hi Street
Wang Lok Stieet
Long Ping Road
Source from Wang Chau Fresh Water Service Reservoir
Source from Tan Kwai Tsuen North Fresh Water Service Reservoir
Source from Ngan Tam Mei Fresh Water Primary Service Reservoir
DN 600 and DN 450
DN 750 DI
DN 900 MS
DN 450 DI
DN 250 DI
DN 300 DI
DN 450 DI
DN 300 AC
DN 900 MS
DN 600 MS
DN 80 PE
DN 200 DI
DN 150 DI
DN 900 MS
DN 300
DN 600
DN 80 PE
DN 80 PE
DN 250 DI
819000
819500
820000
820500
821000
821500
836000
835500
835000
834500

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	Designed	Reviewed	Drawn	Checked
Initial	WT	KC	HLam	KC
Date	Feb 2018	Feb 2018	Feb 2018	Feb 2018

Revision	Date	Description	Initial
-	-	-	-

Legend

- SITE BOUNDARY FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENT AT WANG CHAU (SUBJECT TO REVIEW)
- SITE BOUNDARY FOR PHASE 1 OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU
- EXISTING SALT WATER DISTRIBUTION MAIN

Approved

Agreement No. CE 13/2017 (CE)

Project Title

SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG - FEASIBILITY STUDY

Figure Title

EXISTING AND PLANNED SALT WATER SUPPLY LAYOUT

Drawing No.	Scale
196587/B&V/WSIA/003	1:7,000 @ A3

Client

CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT

Consultant

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Fuk Shun Street

Fuk Hi Street

Kai Shan

Chu Wong Ling

DN 300 DI SW MAIN

Wang Lok Street

Long Ping Estate

DN 400 DI SW MAIN

Source from Tan Kwai Tsuen Salt Water Service Reservoir

Long Ping Road

Source from Tan Kwai Tsuen Salt Water Service Reservoir

819500 820000 820500 821000

835500 835000 834500

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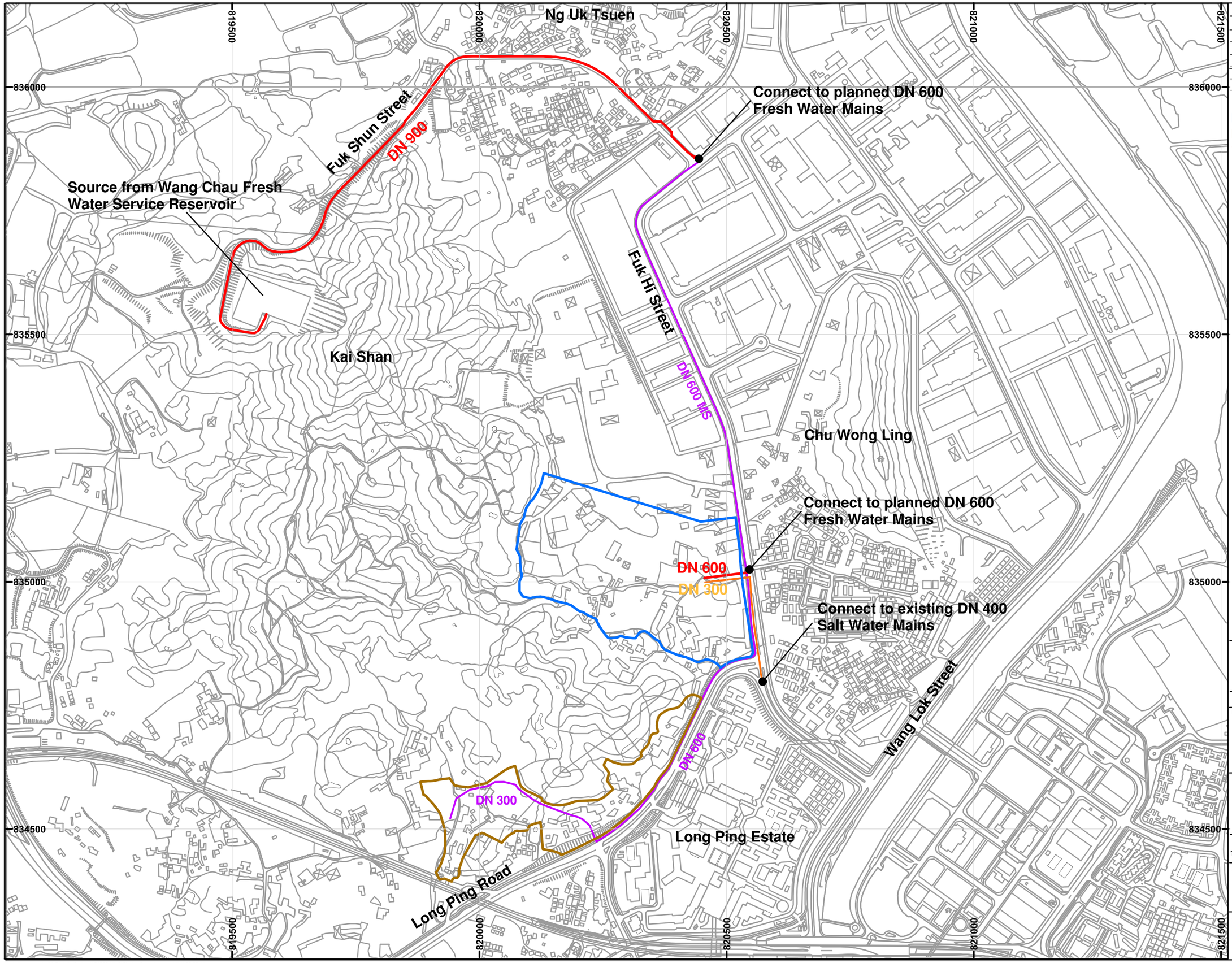
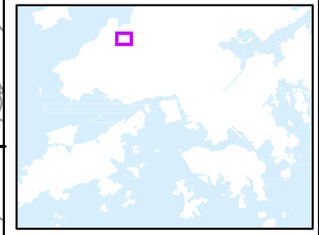


	Designed	Reviewed	Drawn	Checked
Initial	WT	KC	HLam	KC
Date	Feb 2018	Feb 2018	Feb 2018	Feb 2018

Revision	Date	Description	Initial
-	-	-	-

Legend

- SITE BOUNDARY FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENT AT WANG CHAU (SUBJECT TO REVIEW)
- SITE BOUNDARY FOR PHASE 1 OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU
- PROPOSED FRESH WATER MAIN
- PROPOSED SALT WATER MAIN
- PLANNED FRESH WATER MAINS (BY OTHERS)



Approved

Agreement No. CE 13/2017 (CE)

Project Title

SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG - FEASIBILITY STUDY

Figure Title

PROPOSED FRESH AND FLUSHING WATER SUPPLY SCHEME (SALT WATER)

Drawing No.	Scale
196587/B&V/WSIA/004	1:7,000 @ A3

Client

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LEGEND:

- BOUNDARY OF THE SITE (SUBJECT TO REVEIW)
- EXISTING BOREHOLE
- SITE-SPECIFIC DRILLHOLE

Revision	Date	Description		Initial
	Designed	Checked	Drawn	Checked
Initial	WT	KC	SZ	-
Date	04/18	04/18	04/18	04/18

Approved

Agreement no.
CE 13/2017 (CE)

Project Title
SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG - FEASIBILITY STUDY

Drawing Title
EXISTING GROUND INVESTIGATION RECORDS

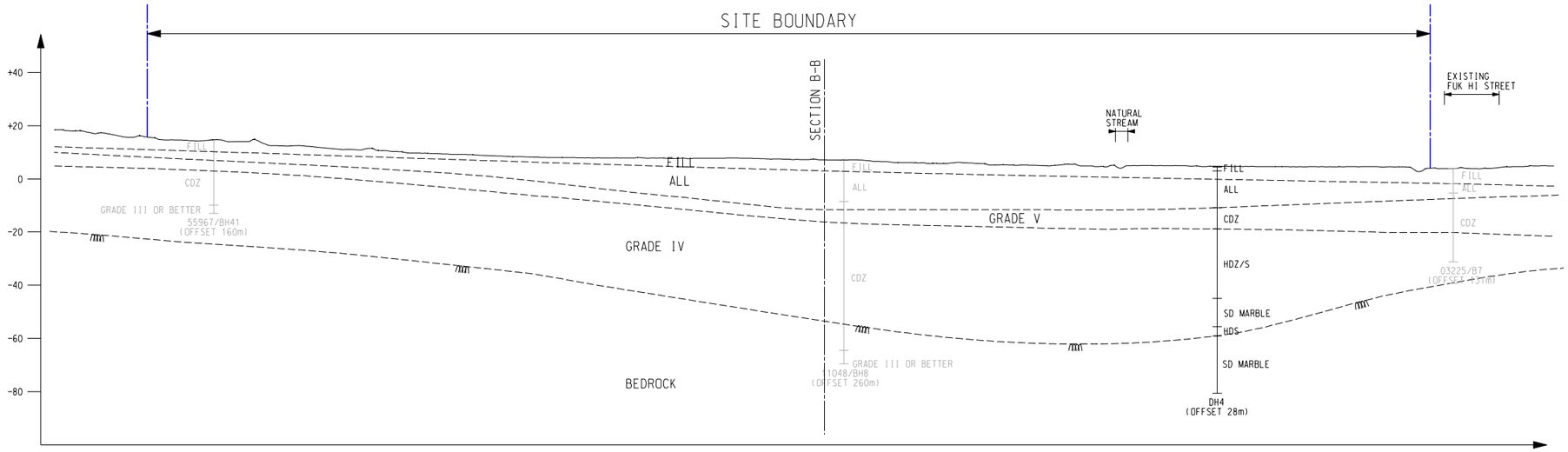
Drawing No.	Scale
196587/B&V/PGA/008	1 : 1500 (A1) 1 : 3000 (A3)

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

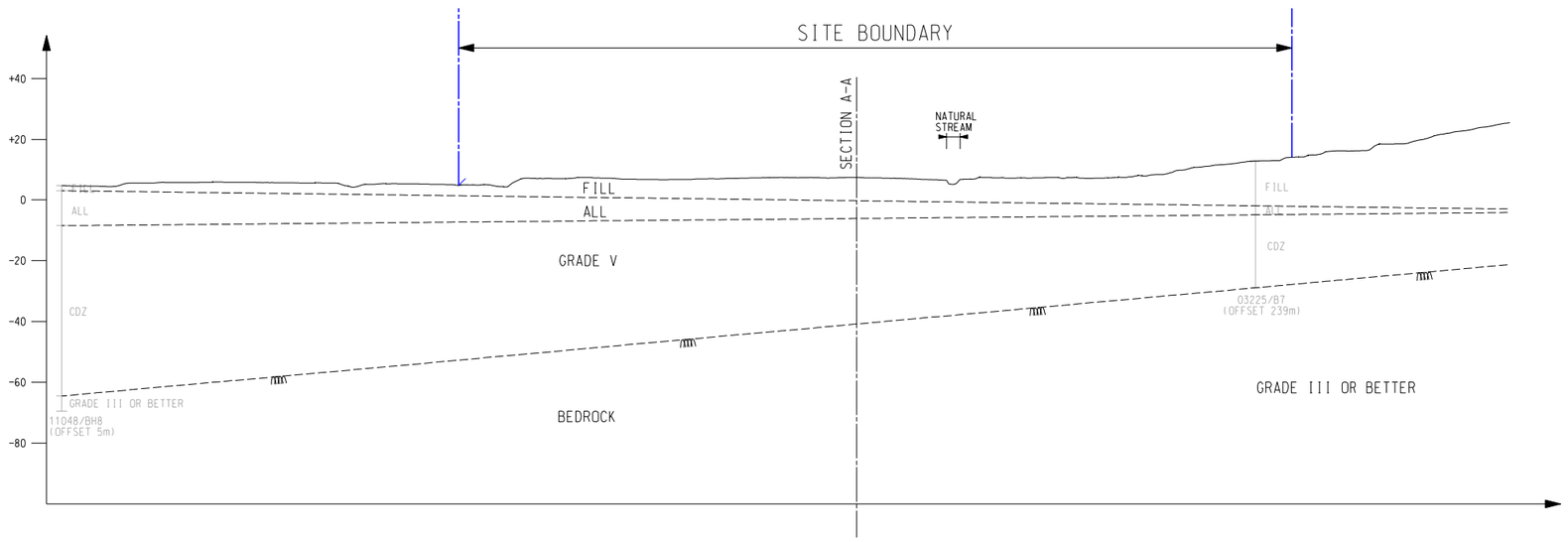
BLACK & VEATCH HONG KONG LIMITED
博威工程顧問有限公司

KEY PLAN
SCALE A1 1:60000
A3 1:120000

Plot Date = 11/22/2018
CAD Filename = Y:\Daily Work\20181120e\196587-B&V-PGA-008.dgn



SECTION A - A
SCALE 1 : 2000 (A3)



SECTION B - B
SCALE 1 : 2000 (A3)

LEGEND:

FILL	FILL
ALL	ALLUVIUM
CDZ	COMPLETELY DECOMPOSED METASILTSTONE
HDZ/S	HIGHLY DECOMPOSED METASILTSTONE / METASANDSTONE
SD MARBLE	SLIGHTLY DECOMPOSED MARBLE
----	INFERRED GEOLOGICAL PROFILE
—m—	INFERRED BEDROCK LEVEL

Revision	Date	Description		Initial
	Designed	Checked	Drawn	Checked
Initial	FN	LCH	SZ	LGH
Date	05/18	05/18	05/18	05/18

Approved

Agreement no.
CE 13/2017 (CE)

Project Title
SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG - FEASIBILITY STUDY

Drawing Title
INFERRED GEOLOGICAL PROFILES

Drawing No.
196587/B&V/PGA/009

Scale
1 : 1000 (A1)
1 : 2000 (A3)

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

BLACK & VEATCH HONG KONG LIMITED
博威工程顧問有限公司

Plot Date = 12/12/2018

CAD Filename = Y:\Daily Work\20181212\196587-B&V-PGA-009.dgn

	Designed	Reviewed	Drawn	Checked
Initial	WT	KC	WT	KC
Date	Sep 2017	Sep 2017	Sep 2017	Sep 2017

Revision	Date	Description	Initial
-	-	-	-

LEGEND

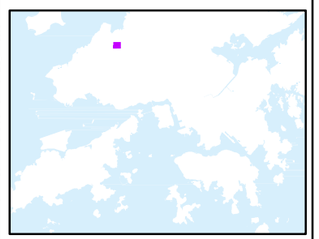
BOUNDARY OF THE SITE (SUBJECT TO REVIEW)

PROPOSED DRILLHOLE

DH4

820600 820100 820200 820300 820400 820500 820600

835200 835100 835000 834900 834800



Approved

Agreement No. CE 13/2017 (CE)

Project Title

SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG - FEASIBILITY STUDY

Figure Title

PROPOSED GROUND INVESTIGATION

Drawing No.	Scale
196587/B&V/PGA/019	1:2,000 @ A3

Client

CEDD CIVIL ENGINEERING AND EVE.OPMENT DEPARTMENT

Consultant

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LEGEND:

- BOUNDARY OF THE SITE (SUBJECT TO REVIEW)
- EXISTING MAN-MADE FEATURES

6NW-B/C 3
6NW-B/C 4
6NW-B/C 69
6NW-B/F 204
6NW-B/C 146
6NW-B/C 145
6NW-B/C 109
6NW-B/C 108
6NW-B/C 107
6NW-B/C 101
6NW-B/C 114
6NW-B/C 116
6NW-B/C 117
6NW-B/C 118
6NW-B/C 112
6NW-B/C 111
6NW-B/C 113
6NW-B/C 110
6NW-B/C 105
6NW-B/C 103
6NW-B/C 104
6NW-B/C 102
6NW-B/C 119
6NW-B/C 121
6NW-B/C 120
6NW-B/R 88
6NW-B/C 122
6NW-B/C 56
6NW-B/R 85
6NW-B/C 22
6NW-B/C 21
6NW-B/C 20
6NW-B/R 89
6NW-B/C 23
6NW-B/C 24
6NW-B/R 18
6NW-B/F 52
6NW-B/F 51
6NW-B/C 16
6NW-B/C 154

820 000 E
820 500 E
835 500 N
835 000 N

KAI SHAN
WANG CHAU
FUK HING TSUEN
FUK HI STREET
LONG PING ROAD
LONG TIN ROAD
NAM SANG WAI
YUEN LONG
HONG KONG WETLAND PARK

REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU

N

KEY PLAN
SCALE A1 1:20000
A3 1:40000

Revision	Date	Description			Initial
	Designed	Checked	Drawn	Checked	
Initial	WT	KC	SZ	-	
Date	10/17	10/17	10/17	10/17	

Approved

Agreement no.
CE 13/2017 (CE)

Project Title
SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG - FEASIBILITY STUDY

Drawing Title
LOCATION OF REGISTERED GEOTECHNICAL FEATURES

Drawing No.	Scale
196587/B&V/PGA/002	1 : 2000 (A1) 1 : 4000 (A3)

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

BLACK & VEATCH HONG KONG LIMITED
博威工程顧問有限公司

Plot Date = 11/22/2018
CAD Filename = Y:\Daily Work\20181120e\196587-B&V-PGA-002.dgn

	Designed	Reviewed	Drawn	Checked
Initial	YLC	KC	WT	KC
Date	Oct 2017	Oct 2017	Oct 2017	Oct 2017

Revision	Date	Description	Initial
-	-	-	-

LEGEND

- NATURAL TERRAIN SCREENING SECTION
- NATURAL TERRAIN CATCHMENT
- BOUNDARY OF THE SITE (SUBJECT TO REVIEW)
- BURIAL GROUND

Approved

Agreement No. CE 13/2017 (CE)

Project Title

SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG - FEASIBILITY STUDY

Figure Title

NATURAL TERRAIN HAZARDS STUDY SCREENING MAP

Drawing No.	Scale
196587/B&V/PGA/012	1:2,500 @ A3

Client

CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT

Consultant

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Mxd: [hkng-mpdc-01\Gis] B:\Project\184926\MXD\Study_Boundary.mxd WH 26/03/14

	Designed	Reviewed	Drawn	Checked
Initial	WT	WT	HLam	KC
Date	02/18	02/18	02/18	02/18

Revision	Date	Description	Initial

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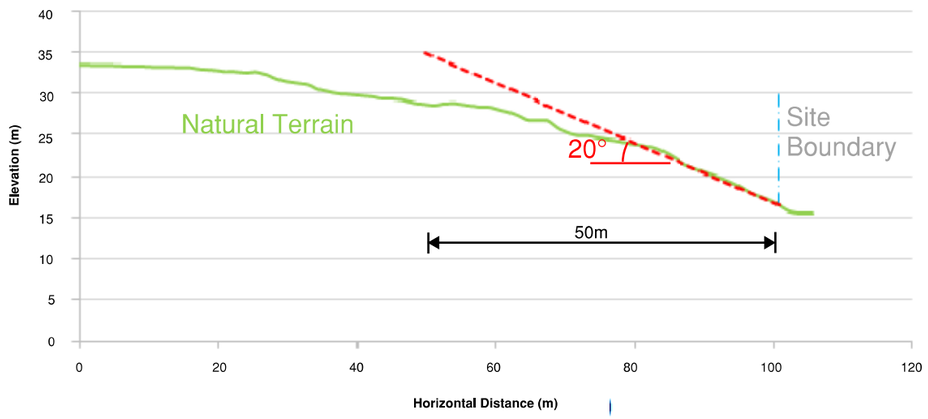

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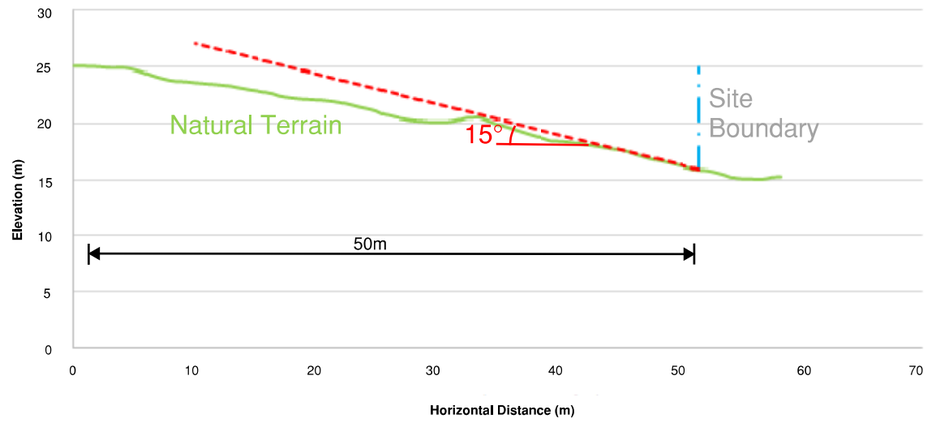
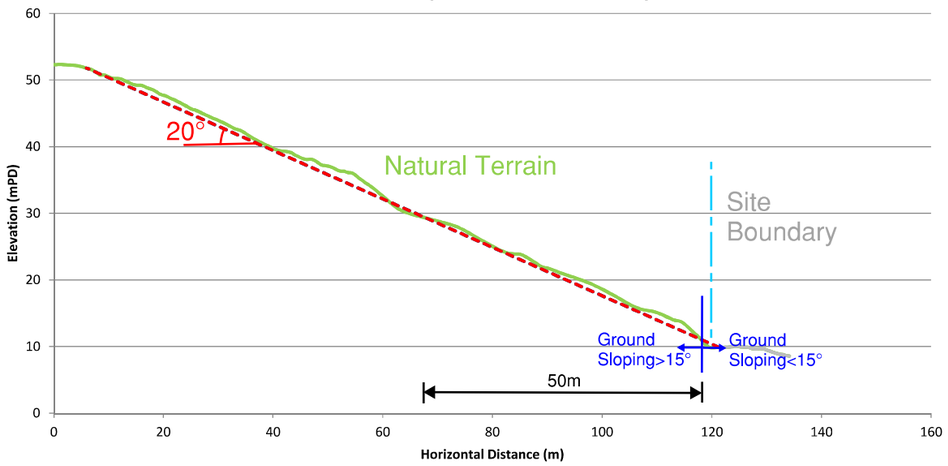


Section C-C (Alert Criteria met)



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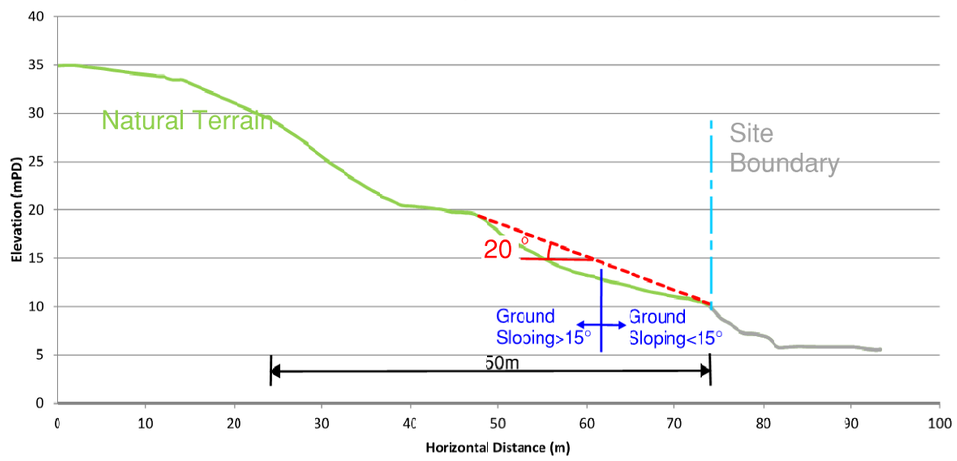

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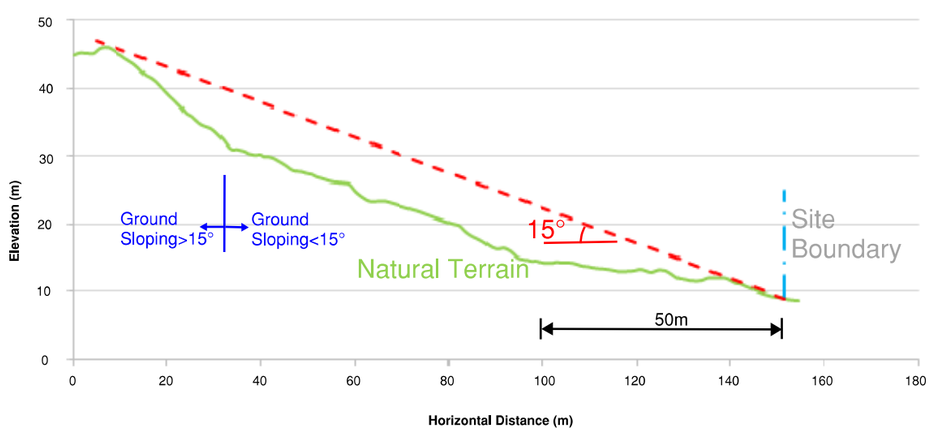
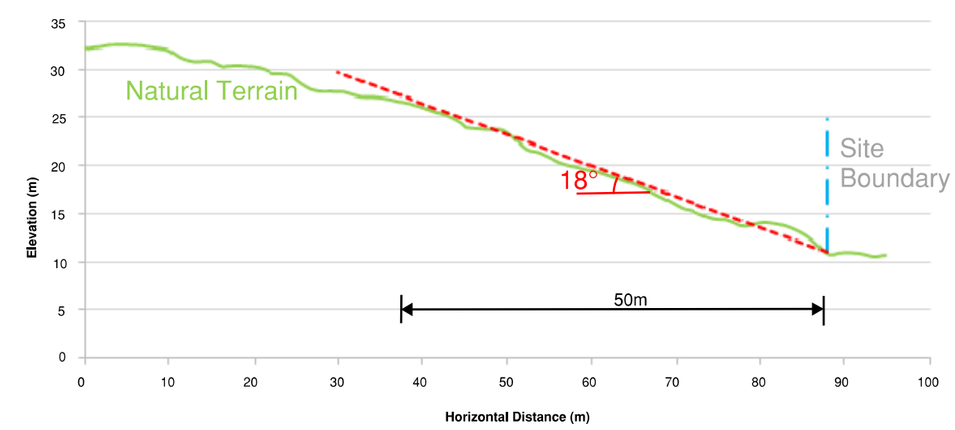


Section F-F (Alert Criteria met)



Approved

Contract Title
SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG - FEASIBILITY STUDY

Figure Title
SECTIONS FOR NATURAL TERRAIN SCREENING

Drawing No.: 196587/B&V/PGA/013
Scale: N.T.S.

Client: CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT

Consultant: BLACK & VEATCH Building a world of difference.

MXD: C:\Program Files\ArcGIS\Bin\Icons\A3_Template.mxt 11/6/2007 11:57:55 Enter Author Name in File>Properties

LEGEND:

- PROPOSED RETAINING WALL
- BOUNDARY OF THE SITE (SUBJECT TO REVIEW)
- TEMPORARY SLOPE
- PERMANENT SLOPE
- +7.80 EXISTING GROUND LEVEL
- +8.00 PROPOSED SITE FORMATION LEVEL
- UC PROPOSED U-CHANNEL MAINTAINED AND MANAGED BY DSD
- BH4 PROPOSED DRILLHOLE

PROPOSED 1:2 TEMPORARY CUT/FILL SLOPE

PROPOSED 1:2 TEMPORARY FILL SLOPE

PROPOSED 2.2 TO 7.2m HIGH RETAINING WALL

WESTERN PLATFORM

EASTERN PLATFORM

PROPOSED 1:2 TEMPORARY CUT/FILL SLOPE

PROPOSED 1:2 TEMPORARY CUT/FILL SLOPE

PROPOSED 1:2 PERMANENT FILL SLOPES

PROPOSED 1:2 TEMPORARY FILL SLOPE

PROPOSED 1:2 TEMPORARY FILL SLOPE

PROPOSED 1:2 PERMANENT CUT SLOPE

PROPOSED 1:2 TEMPORARY FILL SLOPE

PROPOSED 1:2 TEMPORARY FILL SLOPE

橫洲 WANG CHAU

橫洲西頭圍 WANG CHAU SAI TAU WAI

橫洲雨水泵房 Wang Chau Stormwater Pumping Station

FUK TI STREET

DH4

835 200 N

835 000 N

834 800 N

820 200 E

820 400 E

820 600 E

Revision	Date	Description		Initial
	Designed	Checked	Drawn	Checked
Initial	WT	KC	SZ	-
Date	10/18	10/18	10/18	10/18

Approved

Agreement no.
CE 13/2017 (CE)

Project Title
SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG - FEASIBILITY STUDY

Drawing Title
PROPOSED RETAINING STRUCTURES AND SLOPE GRADING

Drawing No.
196587/B&V/SFA/001

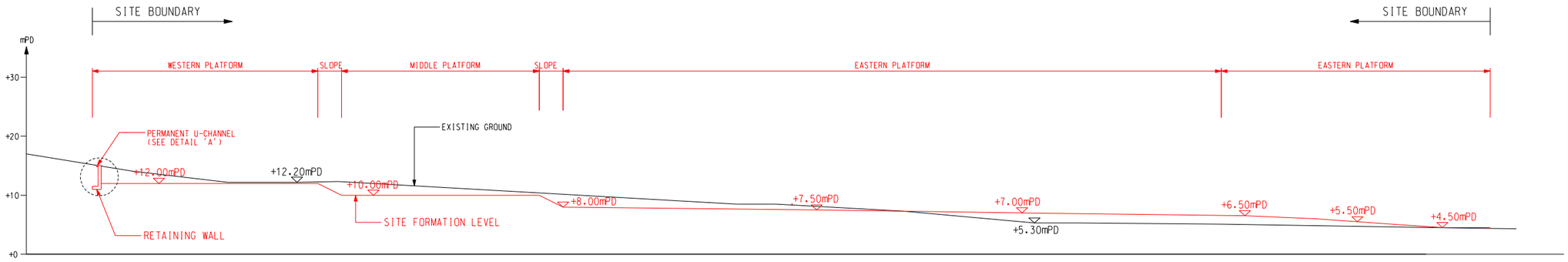
Scale
1 : 1000 (A1)
1 : 2000 (A3)

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

BLACK & VEATCH HONG KONG LIMITED
博威工程顧問有限公司

Plot Date = 2/15/2019

CAD Filename = Y:\Daily Work\20190213c\196587-B&V-SFA-001.dgn



SECTION A - A

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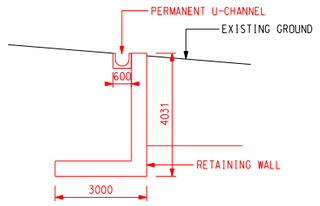
VERTICAL A1 1 : 400



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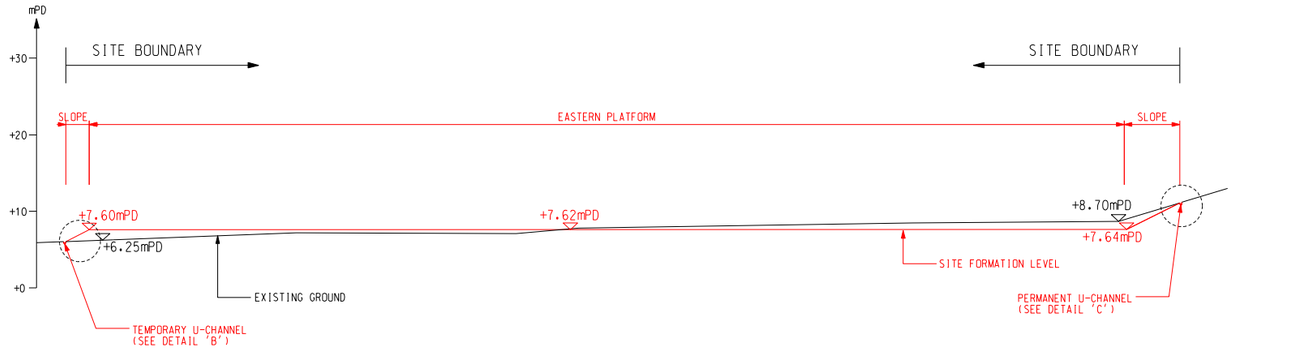

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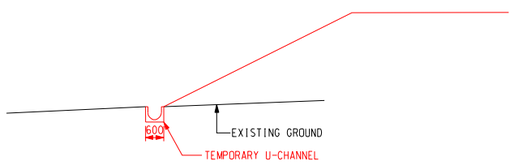

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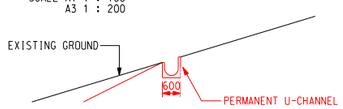
A3 1 : 200



DETAIL 'C'

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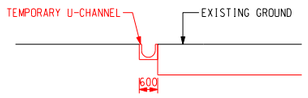

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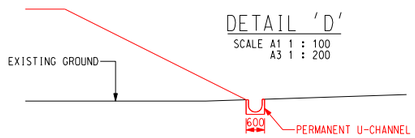

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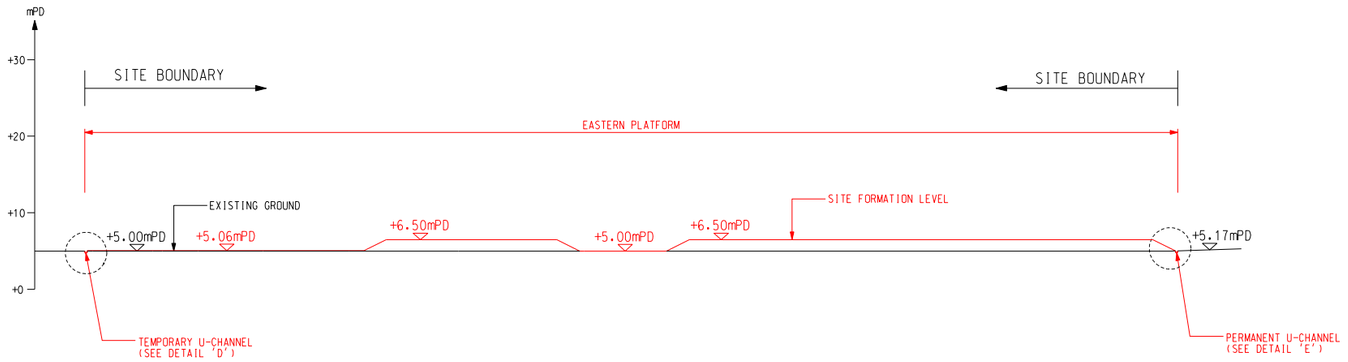

SECTION C - C

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VERTICAL A1 1 : 400

Revision	Date	Description		Initial
	Designed	Checked	Drawn	Checked
Initial	WT	KC	SZ	-
Date	11/18	11/18	11/18	11/18

Approved

Agreement no.
CE 13/2017 (CE)

Project Title
SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG - FEASIBILITY STUDY

Drawing Title
CROSS SECTION OF PROPOSED SITE FORMATION

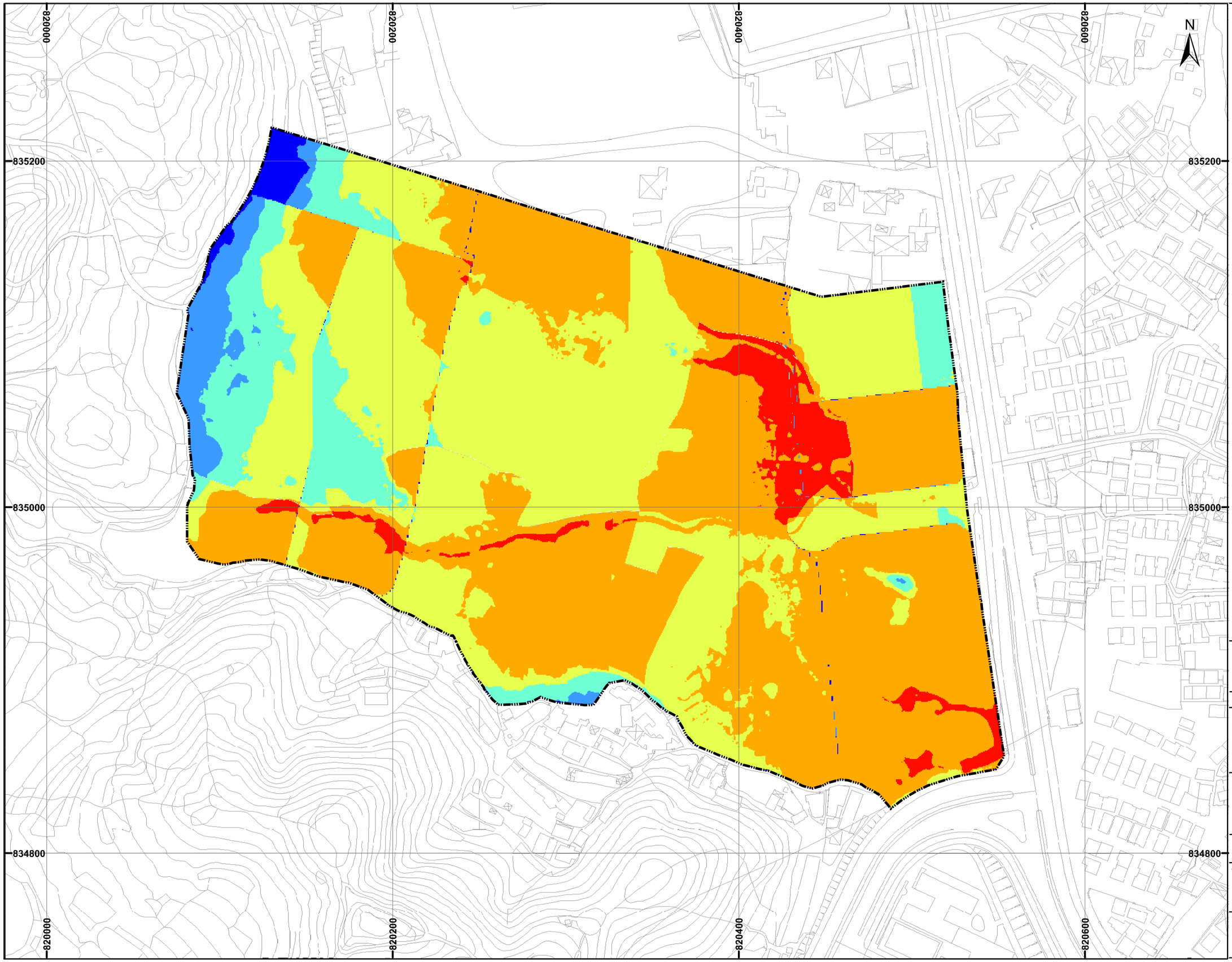
Drawing No.	Scale
196587/B&V/SFA/001A	AS SHOWN

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

BLACK & VEATCH HONG KONG LIMITED
博威工程顧問有限公司

Plot Date = 2/15/2019

CAD Filename = Y:\Daily Work\20190213c\196587-B&V-SFA-001A.dgn



	Designed	Reviewed	Drawn	Checked
Initial	CLH	KC	CLH	KC
Date	Aug 2018	Aug 2018	Aug 2018	Aug 2018

Revision	Date	Description	Initial
-	-	-	-

LEGEND

BOUNDARY OF THE SITE (SUBJECT TO REVIEW)

FILL DEPTH (m) (NEGATIVE VALUE = CUT DEPTH)

- -18.51185608 - -4
- -3.999999999 - -2
- -1.999999999 - 0
- 0 - 2
- 2.000000001 - 4
- 4.000000001 - 10

Approved

Agreement No. CE 13/2017 (CE)

Project Title

SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG - FEASIBILITY STUDY

Figure Title

CUT AND FILL AREAS

Drawing No.	Scale
196587/B&V/SFA//002	1:2,000 @ A3

Client

CEDD CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT

Consultant

BLACK & VEATCH Building a world of difference.

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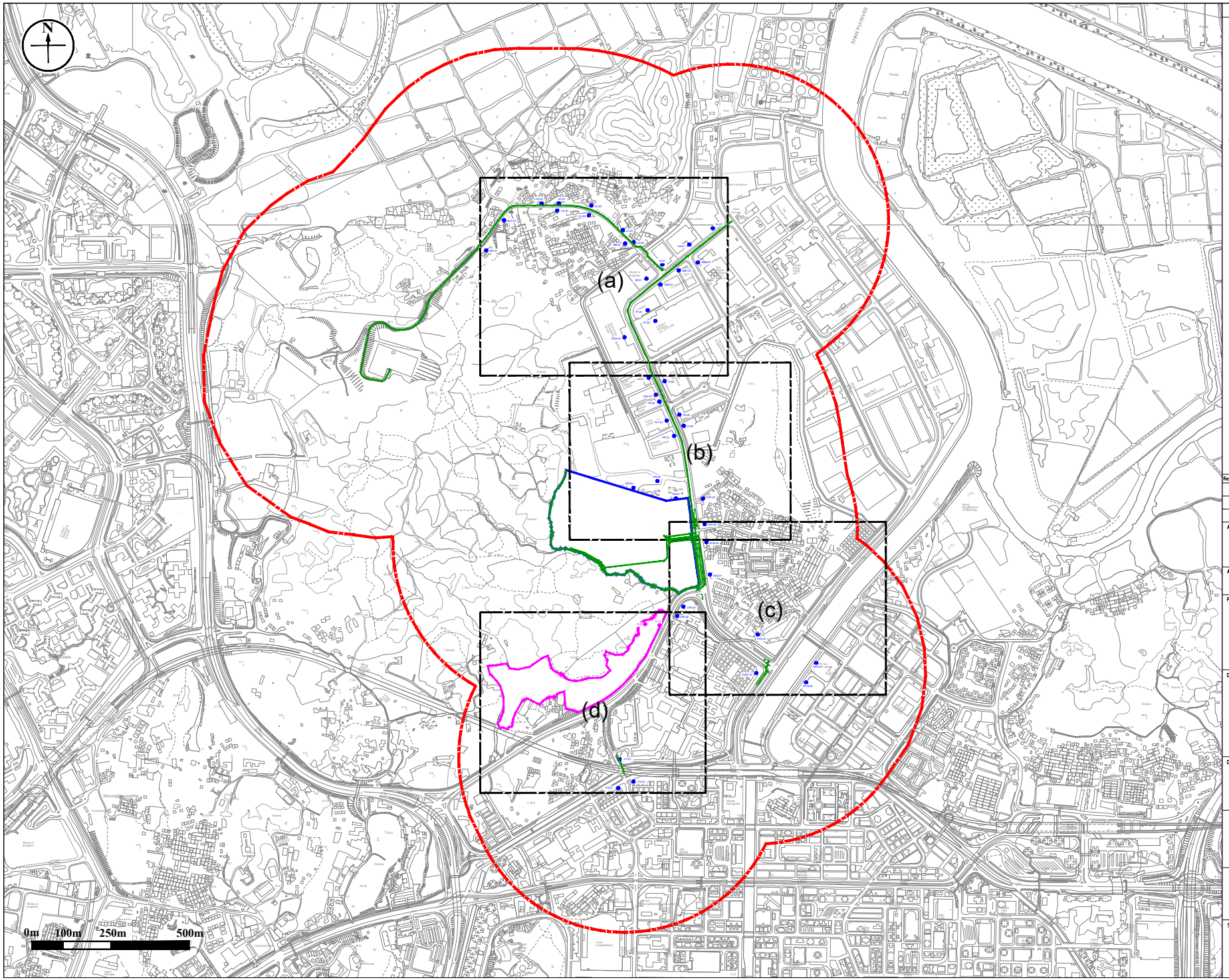


LEGEND

- AIR SENSITIVE RECEIVERS (EXISTING)
- AIR SENSITIVE RECEIVERS (PLANNED)
- ASSESSMENT AREA FOR CONSTRUCTION AIR QUALITY (500M FROM BOUNDARY OF THE SITE AND INFRASTRUCTURE WORKS)
- BOUNDARY OF THE SITE (SUBJECT TO REVIEW)
- INFRASTRUCTURE WORKS
- PLANNED WANG CHAU PHASE 1 DEVELOPMENT

NOTE
THE LAYOUT OF PLANNED WANG CHAU PHASE 1 DEVELOPMENT IS SUBJECT TO DETAILED DESIGN.

Revision	Date	Description			Initial
	Designed	Checked	Drawn	Checked	
Initial	WT	KC	SZ	-	
Date	07/18	07/18	07/18	07/18	

Approved

Agreement no.
CE 13/2017 (CE)

Project Title
SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG- FEASIBILITY STUDY

Drawing Title
LOCATION OF REPRESENTATIVE AIR SENSITIVE RECEIVERS DURING CONSTRUCTION PHASE

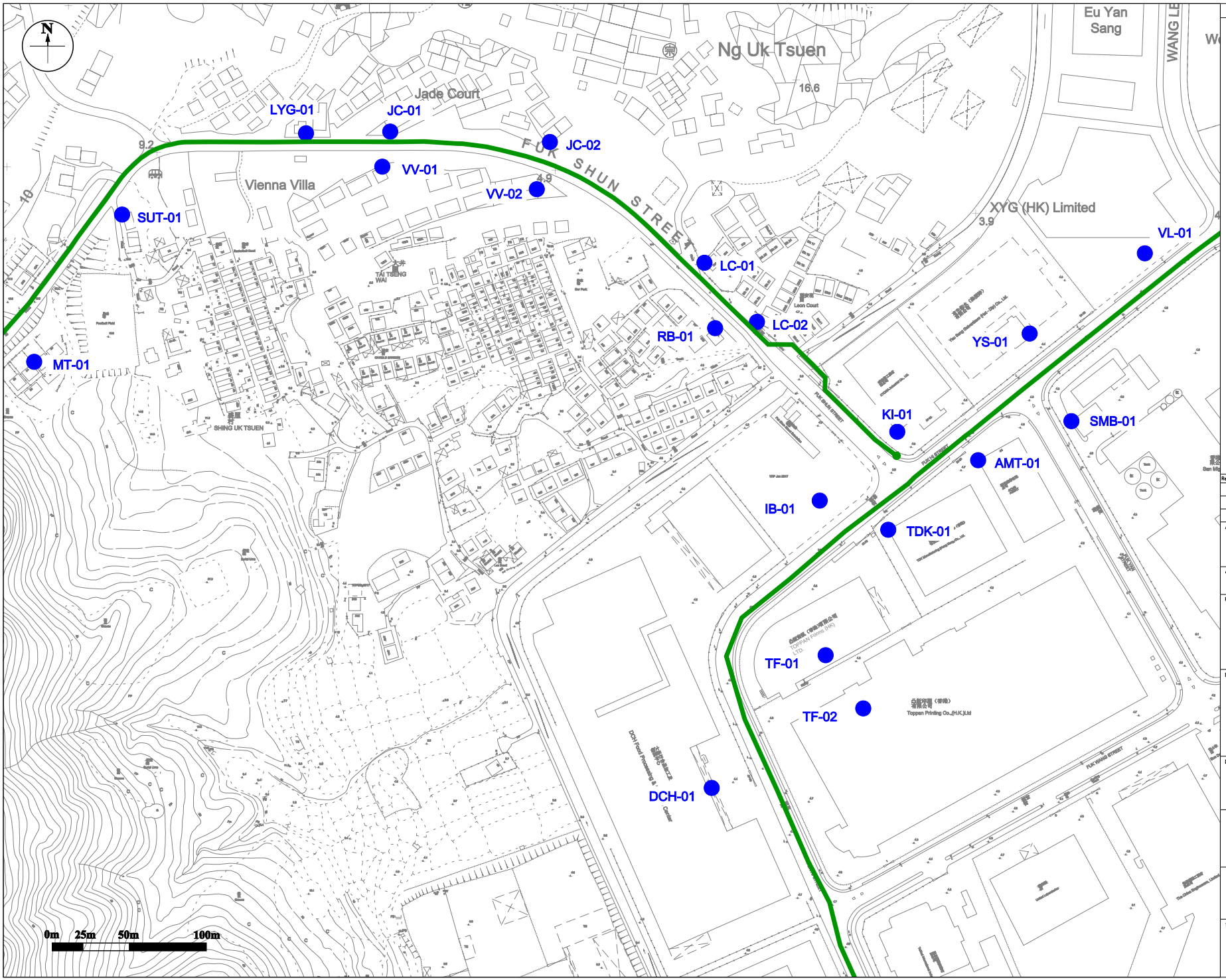
Drawing No.
196587/B&V/PER/FIG 3.1

Scale

土木工程拓展署
Civil Engineering and Development Department

BLACK & VEATCH HONG KONG LIMITED
博威工程顧問有限公司

Sub Consultant:
RAMBOLL



LEGEND

- AIR SENSITIVE RECEIVERS (EXISTING)
- INFRASTRUCTURE WORKS

Revision	Date	Description			Initial
	Designed	Checked	Drawn	Checked	
Initial	WT	KC	SZ	-	
Date	07/18	07/18	07/18	07/18	

Approved

Agreement no.
CE 13/2017 (CE)

Project Title
SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG- FEASIBILITY STUDY

Drawing Title
LOCATION OF REPRESENTATIVE AIR SENSITIVE RECEIVERS DURING CONSTRUCTION PHASE

Drawing No.
196587/B&V/PER/FIG 3.1a

Scale

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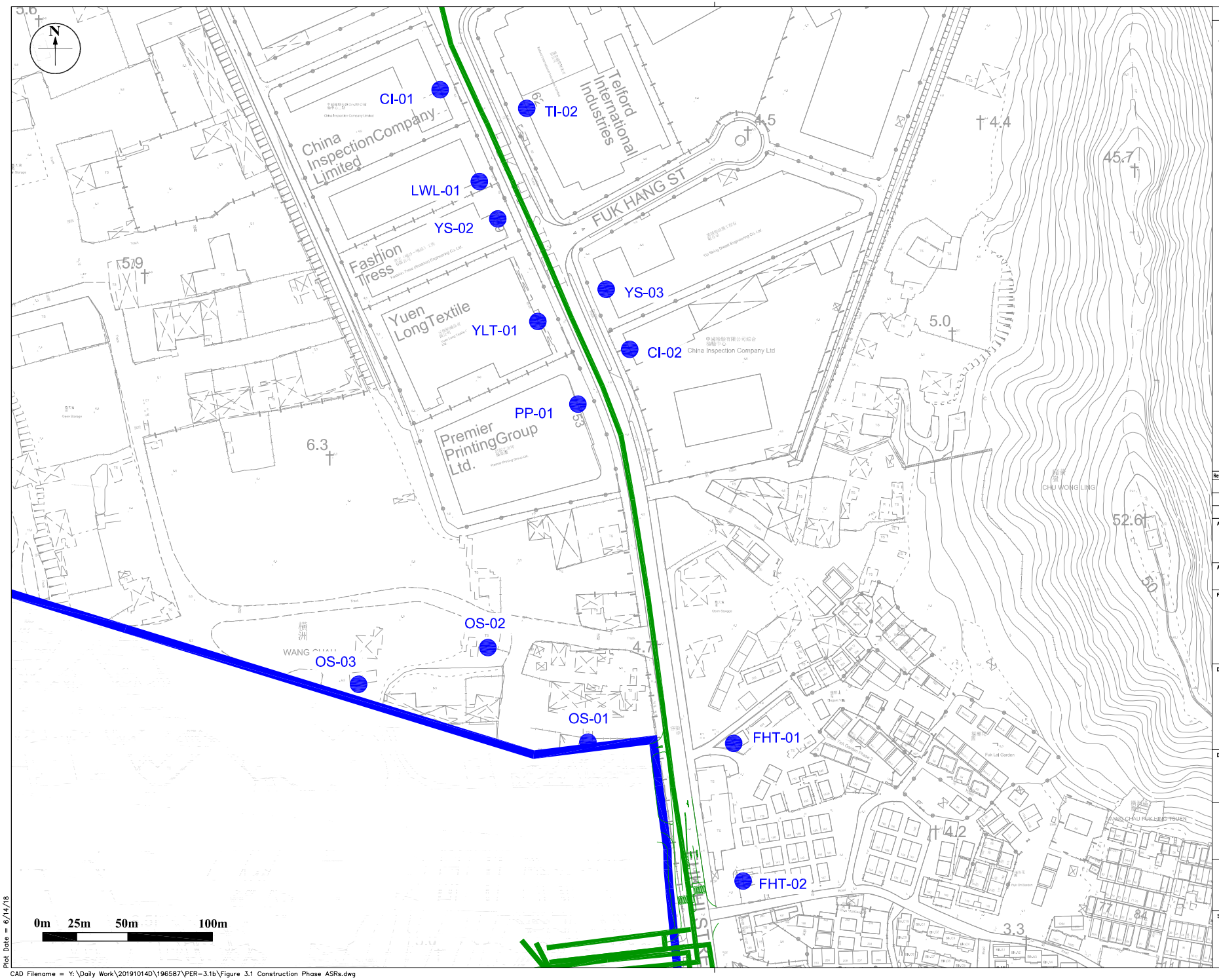
BLACK & VEATCH HONG KONG LIMITED
博威工程顧問有限公司

Sub Consultant:
RAMBOLL



LEGEND

- AIR SENSITIVE RECEIVERS (EXISTING)
- BOUNDARY OF THE SITE (SUBJECT TO REVIEW)
- INFRASTRUCTURE WORKS

Revision	Date	Description			Initial
	Designed	Checked	Drawn	Checked	
Initial	WT	KC	SZ	–	
Date	07/18	07/18	07/18	07/18	

Approved

Agreement no.
CE 13/2017 (CE)

Project Title
SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG– FEASIBILITY STUDY

Drawing Title
LOCATION OF REPRESENTATIVE AIR SENSITIVE RECEIVERS DURING CONSTRUCTION PHASE

Drawing No.
196587/B&V/PER/FIG 3.1b

Scale

土木工程拓展署
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BLACK & VEATCH HONG KONG LIMITED
博威工程顧問有限公司

Sub Consultant:
RAMBOLL

Plot Date = 6/14/18

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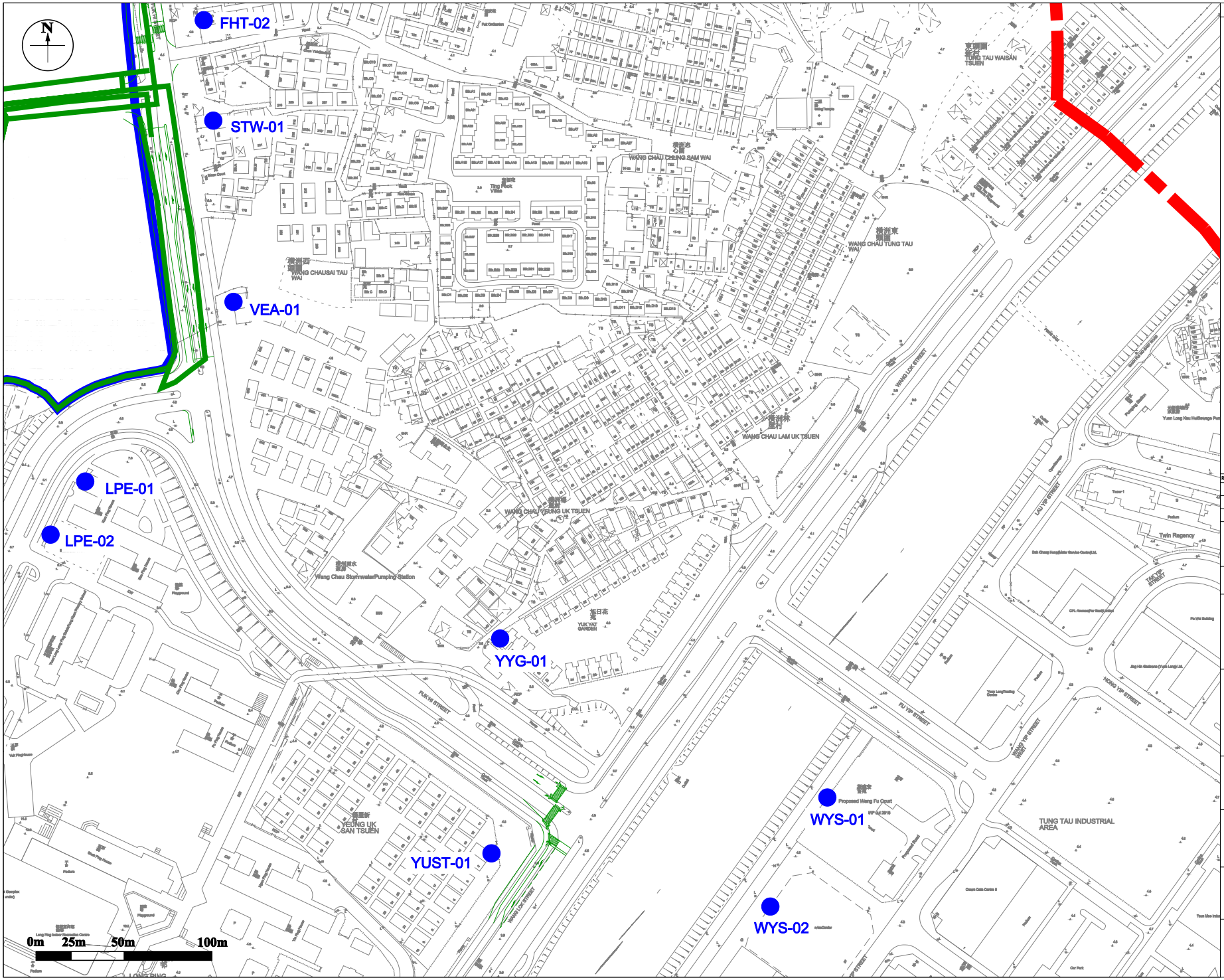


LEGEND

- AIR SENSITIVE RECEIVERS (EXISTING)
- ASSESSMENT AREA FOR AIR QUALITY (500M FROM BOUNDARY OF THE SITE AND INFRASTRUCTURE WORKS)
- BOUNDARY OF THE SITE (SUBJECT TO REVIEW)
- INFRASTRUCTURE WORKS

Revision	Date	Description			Initial
	Designed	Checked	Drawn	Checked	
Initial	WT	KC	SZ	-	
Date	07/18	07/18	07/18	07/18	

Approved

Agreement no.
CE 13/2017 (CE)

Project Title
SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG- FEASIBILITY STUDY

Drawing Title
LOCATION OF REPRESENTATIVE AIR SENSITIVE RECEIVERS DURING CONSTRUCTION PHASE

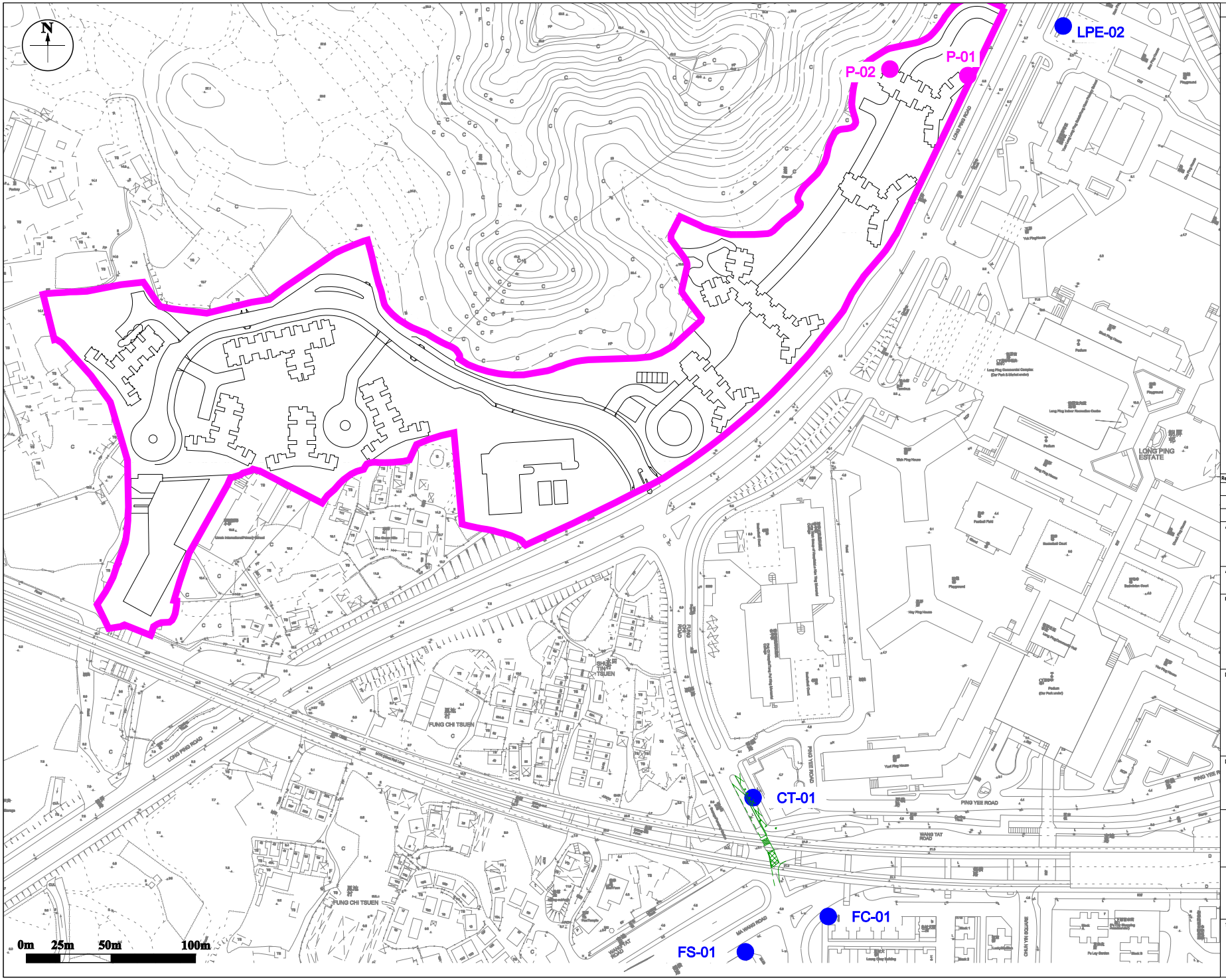
Drawing No.
196587/B&V/PER/FIG 3.1c

Scale

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

BLACK & VEATCH HONG KONG LIMITED
博威工程顧問有限公司

Sub Consultant:
RAMBOLL



LEGEND

- AIR SENSITIVE RECEIVERS (EXISTING)
- AIR SENSITIVE RECEIVERS (PLANNED)
- INFRASTRUCTURE WORKS
- PLANNED WANG CHAU PHASE 1 DEVELOPMENT

NOTE

THE LAYOUT OF PLANNED WANG CHAU PHASE 1 DEVELOPMENT IS SUBJECT TO DETAILED DESIGN.

Revision	Date	Description			Initial
	Designed	Checked	Drawn	Checked	
Initial	WT	KC	SZ	-	
Date	07/18	07/18	07/18	07/18	

Approved

Agreement no.
CE 13/2017 (CE)

Project Title
SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG- FEASIBILITY STUDY

Drawing Title
LOCATION OF REPRESENTATIVE AIR SENSITIVE RECEIVERS DURING CONSTRUCTION PHASE

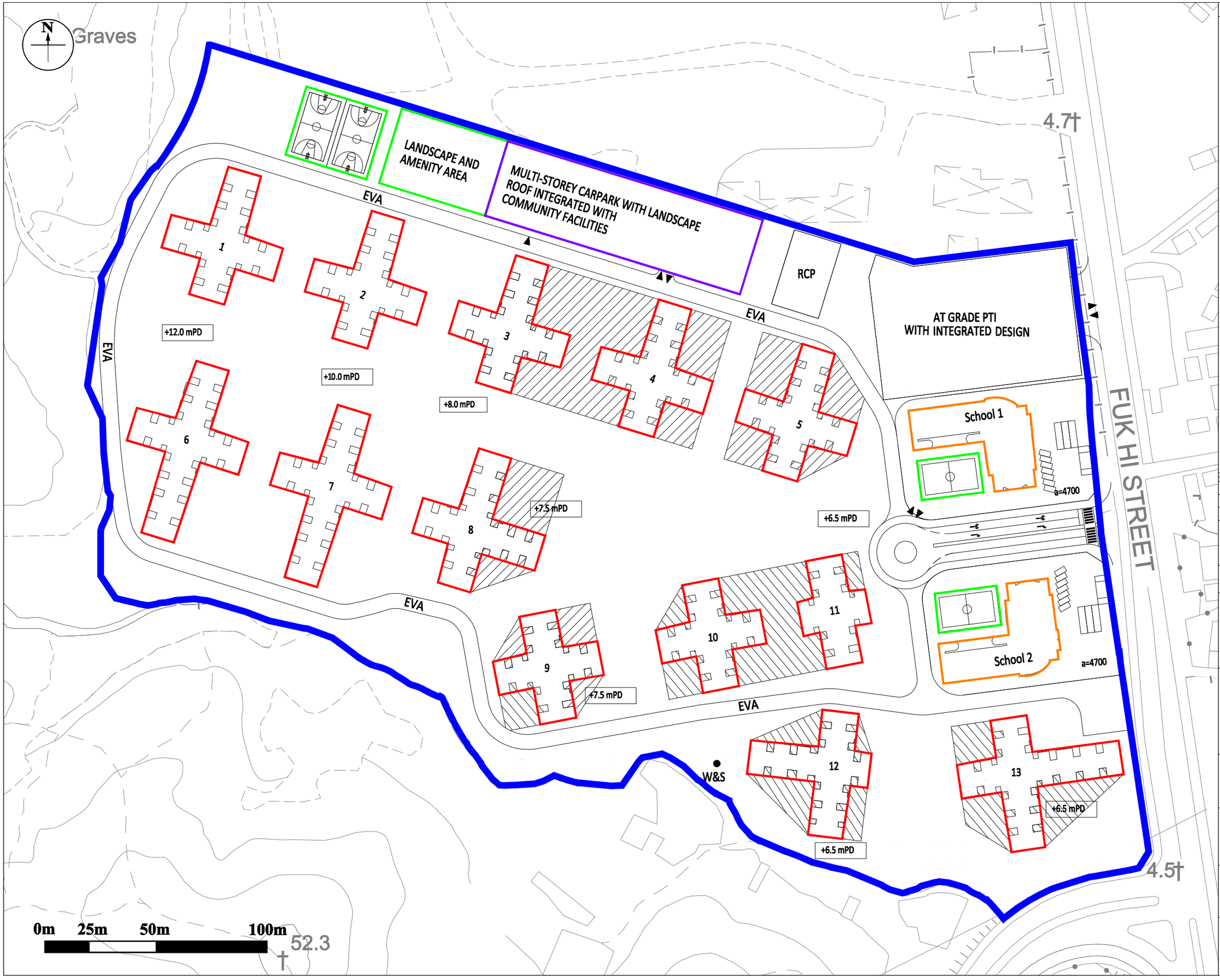
Drawing No.
196587/B&V/PER/FIG 3.1d

Scale

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

BLACK & VEATCH HONG KONG LIMITED
博威工程顧問有限公司

Sub Consultant:
RAMBOLL



LEGEND

- BOUNDARY OF THE SITE (SUBJECT TO REVIEW)
- PUBLIC HOUSING BLOCK
- SCHOOL
- USE COMMONLY SUPPLIED BY AIR-CONDITIONING
- RECREATION AREA

Revision	Date	Description			Initial
	Designed	Checked	Drawn	Checked	
Initial	WT	KC	SZ	–	
Date	12/17	12/17	12/17	12/17	

Approved

Agreement no.
CE 13/2017 (CE)

Project Title
SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG– FEASIBILITY STUDY

Drawing Title
LOCATION OF REPRESENTATIVE AIR SENSITIVE RECEIVERS DURING OPERATIONAL PHASE

Drawing No.
196587/B&V/PER/FIG 3.2

Scale

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

BLACK & VEATCH HONG KONG LIMITED
博威工程顧問有限公司

Sub Consultant:
RAMBOLL

LEGEND

- CHIMNEY
- ASSESSMENT AREA FOR OPERATIONAL AIR QUALITY ASSESSMENT (500M FROM BOUNDARY OF THE SITE)
- BOUNDARY OF THE SITE (SUBJECT TO REVIEW)

evision	Date	Description			Initial
	Designed	Checked	Drawn	Checked	
Initial	WT	KC	SZ	–	
Date	07/18	07/18	07/18	07/18	

Approved

Agreement no.

CE 13/2017 (CE)

Preject Title

SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG– FEASIBILITY STUDY

Drawing Title

LOCATION OF CHIMNEYS

Drawing No.

196587/B&V/PER/FIG 3.3

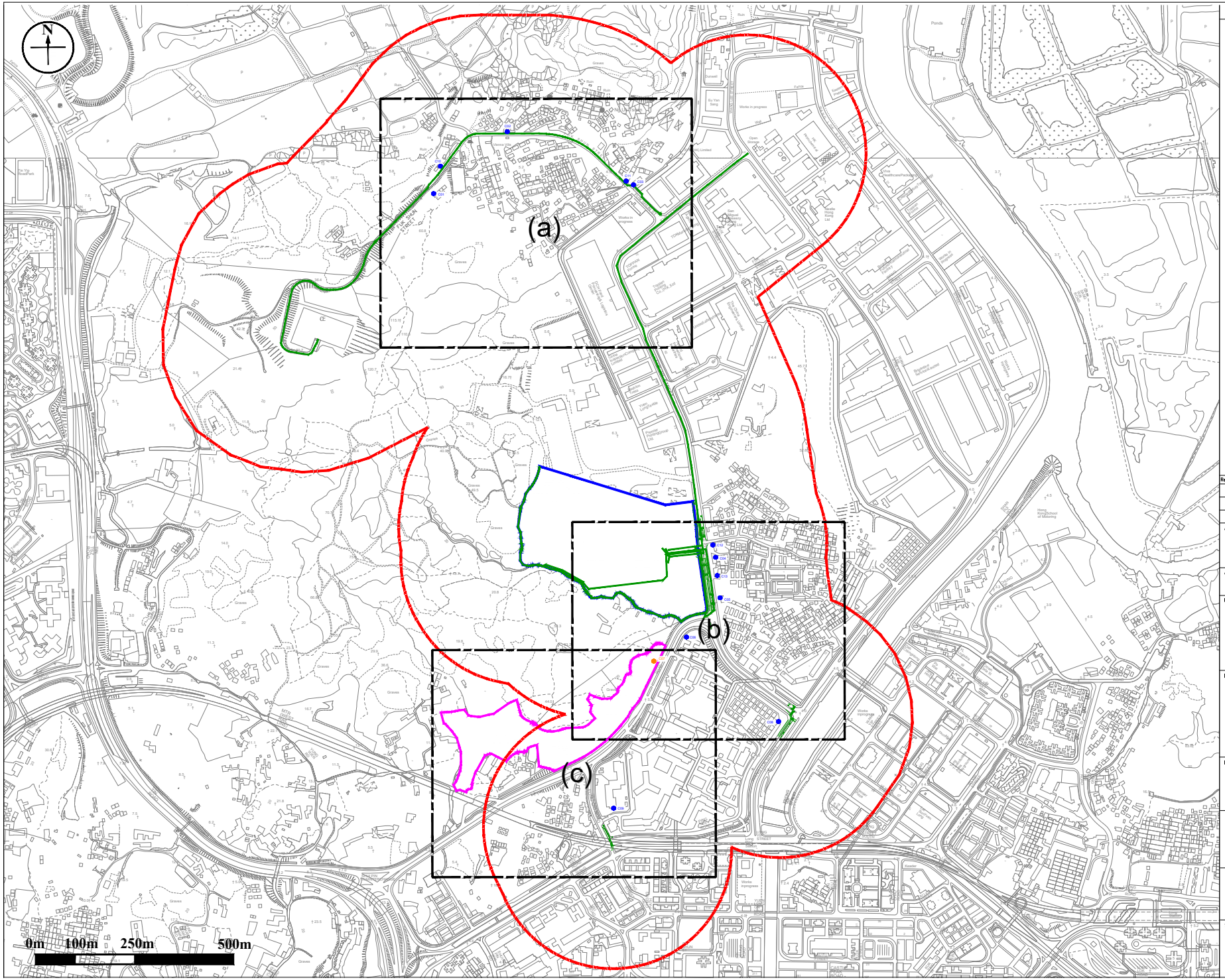
Scale

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

BLACK & VEATCH HONG KONG LIMITED
博威工程顧問有限公司

Sub Consultant:

RAMBOLL



LEGEND

- NOISE SENSITIVE RECEIVERS (EXISTING)
- NOISE SENSITIVE RECEIVERS (PLANNED)
- ASSESSMENT AREA FOR CONSTRUCTION NOISE IMPACT (300M FROM BOUNDARY OF THE SITE AND INFRASTRUCTURE WORKS)
- BOUNDARY OF THE SITE (SUBJECT TO REVIEW)
- INFRASTRUCTURE WORKS
- PLANNED WANG CHAU PHASE 1 DEVELOPMENT

NOTE
THE LAYOUT OF PLANNED WANG CHAU PHASE 1 DEVELOPMENT IS SUBJECT TO DETAILED DESIGN.

Revision	Date	Description			Initial
	Designed	Checked	Drawn	Checked	
Initial	WT	KC	SZ	-	
Date	07/18	07/18	07/18	07/18	

Approved

Agreement no.
CE 13/2017 (CE)

Project Title
SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG- FEASIBILITY STUDY

Drawing Title
LOCATION OF REPRESENTATIVE NOISE SENSITIVE RECEIVERS DURING CONSTRUCTION PHASE

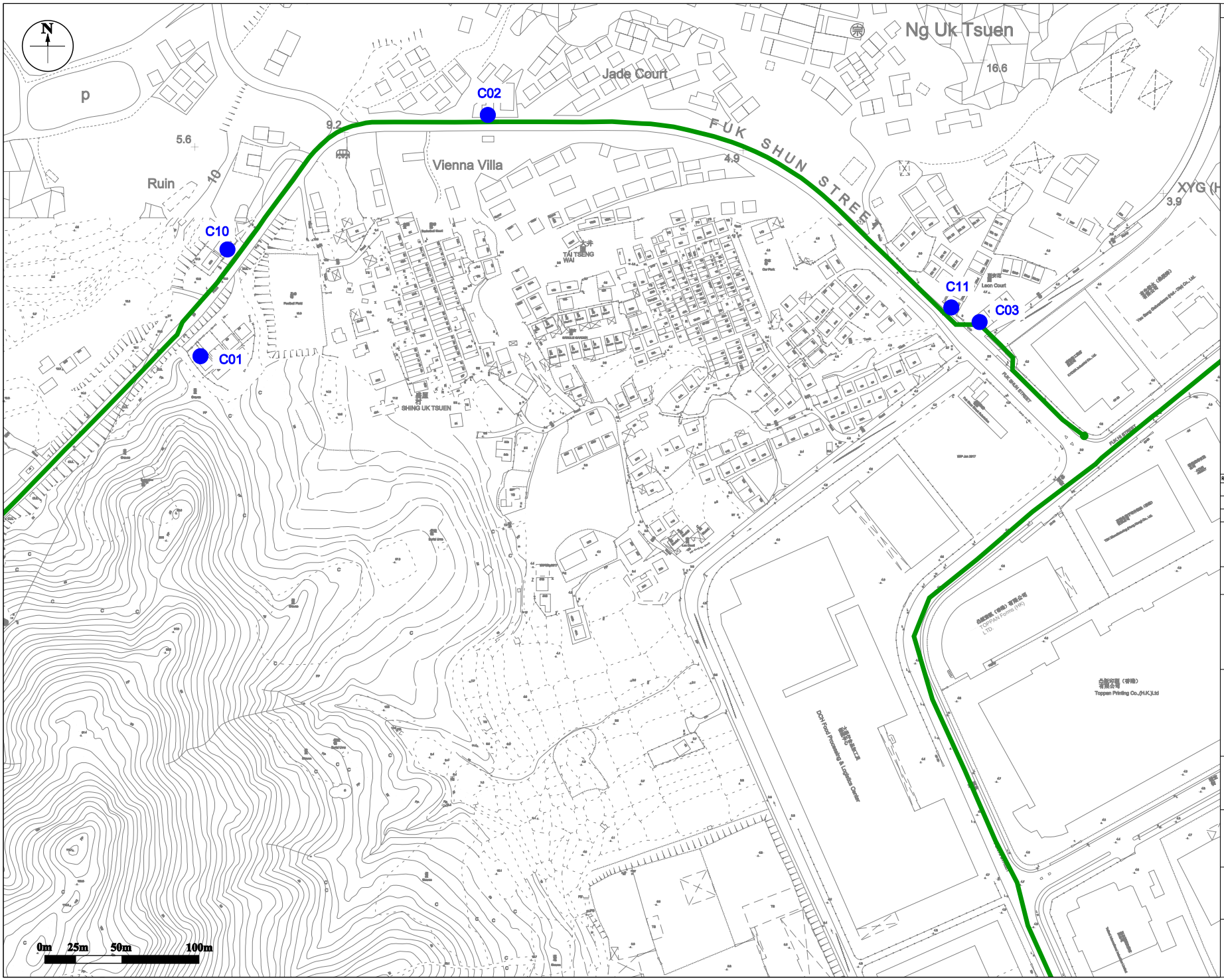
Drawing No.
196587/B&V/PER/FIG 4.1

Scale

土木工程拓展署
Civil Engineering and Development Department

BLACK & VEATCH HONG KONG LIMITED
博威工程顧問有限公司

Sub Consultant:
RAMBOLL



LEGEND

- NOISE SENSITIVE RECEIVERS (EXISTING)
- INFRASTRUCTURE WORKS

Revision	Date	Description			Initial
	Designed	Checked	Drawn	Checked	
Initial	WT	KC	SZ	-	
Date	07/18	07/18	07/18	07/18	

Approved

Agreement no.
CE 13/2017 (CE)

Project Title
SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG- FEASIBILITY STUDY

Drawing Title
LOCATION OF REPRESENTATIVE NOISE SENSITIVE RECEIVERS DURING CONSTRUCTION PHASE

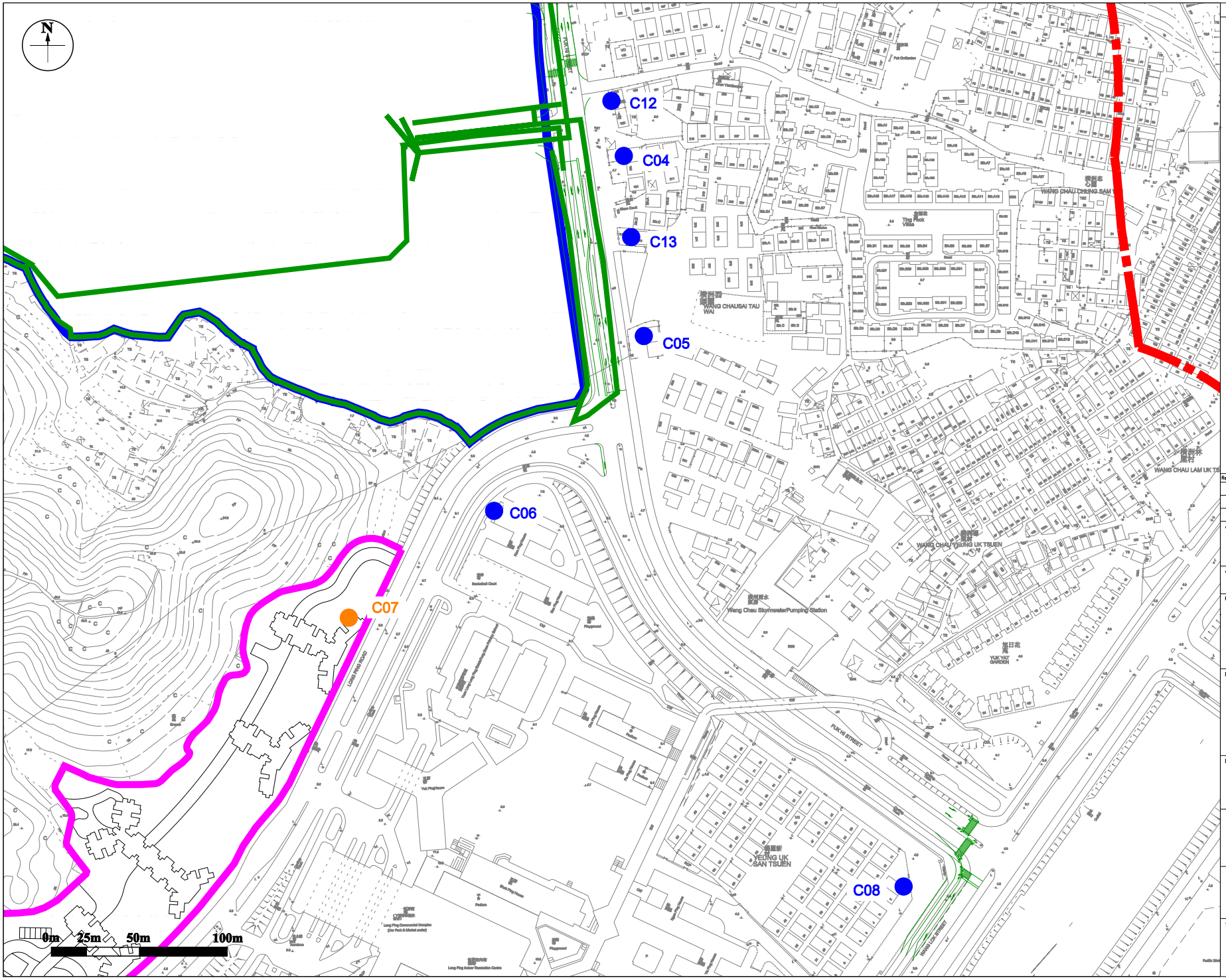
Drawing No.
196587/B&V/PER/FIG 4.1a

Scale

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

BLACK & VEATCH HONG KONG LIMITED
博威工程顧問有限公司

Sub Consultant:
RAMBOLL



LEGEND

- NOISE SENSITIVE RECEIVERS (EXISTING)
- NOISE SENSITIVE RECEIVERS (PLANNED)
- ASSESSMENT AREA FOR CONSTRUCTION NOISE IMPACT (300M FROM BOUNDARY OF THE SITE AND INFRASTRUCTURE WORKS)
- BOUNDARY OF THE SITE (SUBJECT TO REVIEW)
- INFRASTRUCTURE WORKS
- PLANNED WANG CHAU PHASE 1 DEVELOPMENT

NOTE

THE LAYOUT OF PLANNED WANG CHAU PHASE 1 DEVELOPMENT IS SUBJECT TO DETAILED DESIGN.

Revision	Date	Description			Initial
	Designed	Checked	Drawn	Checked	
Initial	WT	KC	SZ	-	
Date	07/18	07/18	07/18	07/18	

Approved

Agreement no.
CE 13/2017 (CE)

Project Title
SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG- FEASIBILITY STUDY

Drawing Title
LOCATION OF REPRESENTATIVE NOISE SENSITIVE RECEIVERS DURING CONSTRUCTION PHASE

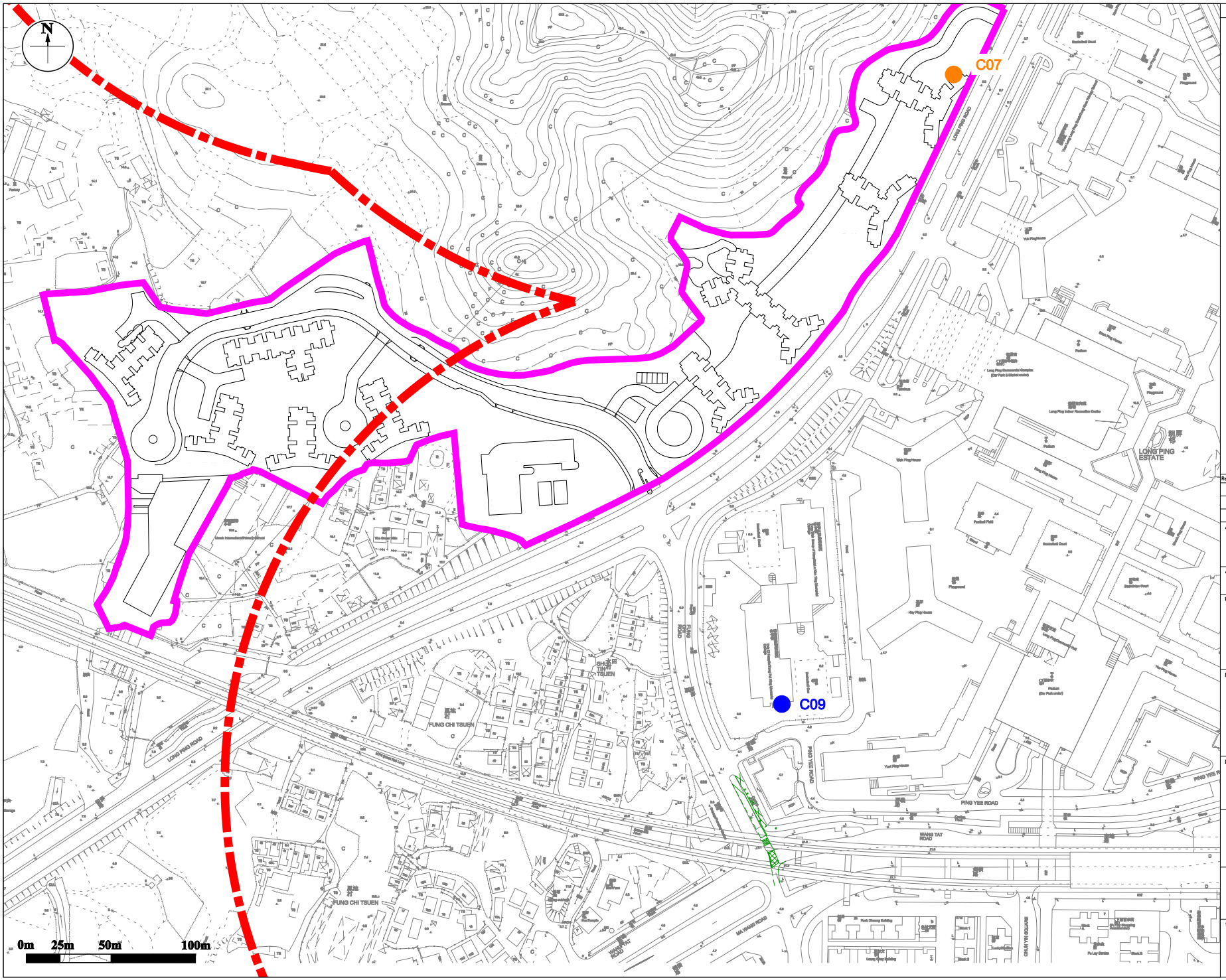
Drawing No.
196587/B&V/PER/FIG 4.1b

Scale

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

BLACK & VEATCH HONG KONG LIMITED
博威工程顧問有限公司

Sub Consultant:
RAMBOLL



LEGEND

- NOISE SENSITIVE RECEIVERS (EXISTING)
- NOISE SENSITIVE RECEIVERS (PLANNED)
- ASSESSMENT AREA FOR CONSTRUCTION NOISE IMPACT (300M FROM BOUNDARY OF THE SITE AND INFRASTRUCTURE WORKS)
- INFRASTRUCTURE WORKS
- PLANNED WANG CHAU PHASE 1 DEVELOPMENT

NOTE

THE LAYOUT OF PLANNED WANG CHAU PHASE 1 DEVELOPMENT IS SUBJECT TO DETAILED DESIGN.

Revision	Date	Description			Initial
	Designed	Checked	Drawn	Checked	
Initial	WT	KC	SZ	-	
Date	07/18	07/18	07/18	07/18	

Approved

Agreement no.
CE 13/2017 (CE)

Project Title
SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG- FEASIBILITY STUDY

Drawing Title
LOCATION OF REPRESENTATIVE NOISE SENSITIVE RECEIVERS DURING CONSTRUCTION PHASE

Drawing No.
196587/B&V/PER/FIG 4.1c

Scale

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

BLACK & VEATCH HONG KONG LIMITED
博威工程顧問有限公司

Sub Consultant:
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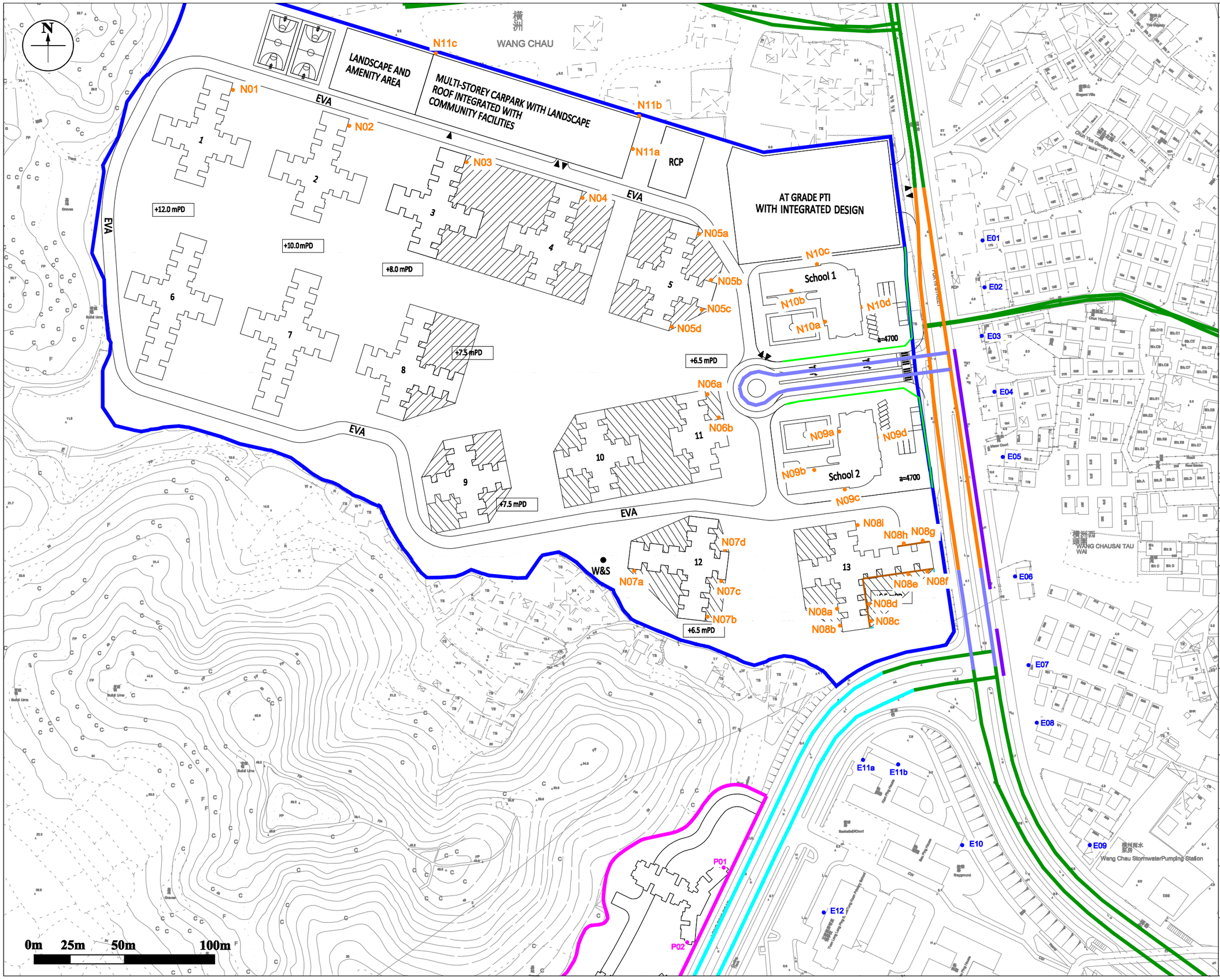

LEGEND

- NOISE SENSITIVE RECEIVERS WITHIN THE SITE
- NOISE SENSITIVE RECEIVERS (EXISTING)
- NOISE SENSITIVE RECEIVERS (PLANNED)
- BOUNDARY OF THE SITE (SUBJECT TO REVIEW)
- PLANNED WANG CHAU PHASE 1 DEVELOPMENT
- EXISTING ROAD
- EXISTING ROAD WITH LOW NOISE ROAD SURFACING
- PROJECT ROAD
- PROJECT ROAD WITH PROPOSED LOW NOISE ROAD SURFACING
- PROPOSED 4M VERTICAL BARRIER
- PROPOSED 5M BOUNDARY WALL
- 2M ARCHITECTURAL FIN
- ACOUSTIC WINDOW

NOTE
THE LAYOUT OF PLANNED WANG CHAU PHASE 1 DEVELOPMENT IS SUBJECT TO DETAILED DESIGN.

Revision	Date	Description			Initial
	Designed	Checked	Drawn	Checked	
Initial	WT	KC	SZ	–	
Date	08/18	08/18	08/18	08/18	

Approved

Agreement no.
CE 13/2017 (CE)

Project Title
SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG– FEASIBILITY STUDY

Drawing Title
PROPOSED MITIGATION MEASURES FOR ROAD TRAFFIC NOISE IMPACT ASSESSMENT

Drawing No.
196587/B&V/PER/FIG 4.8

Scale

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

BLACK & VEATCH HONG KONG LIMITED 博威工程顧問有限公司

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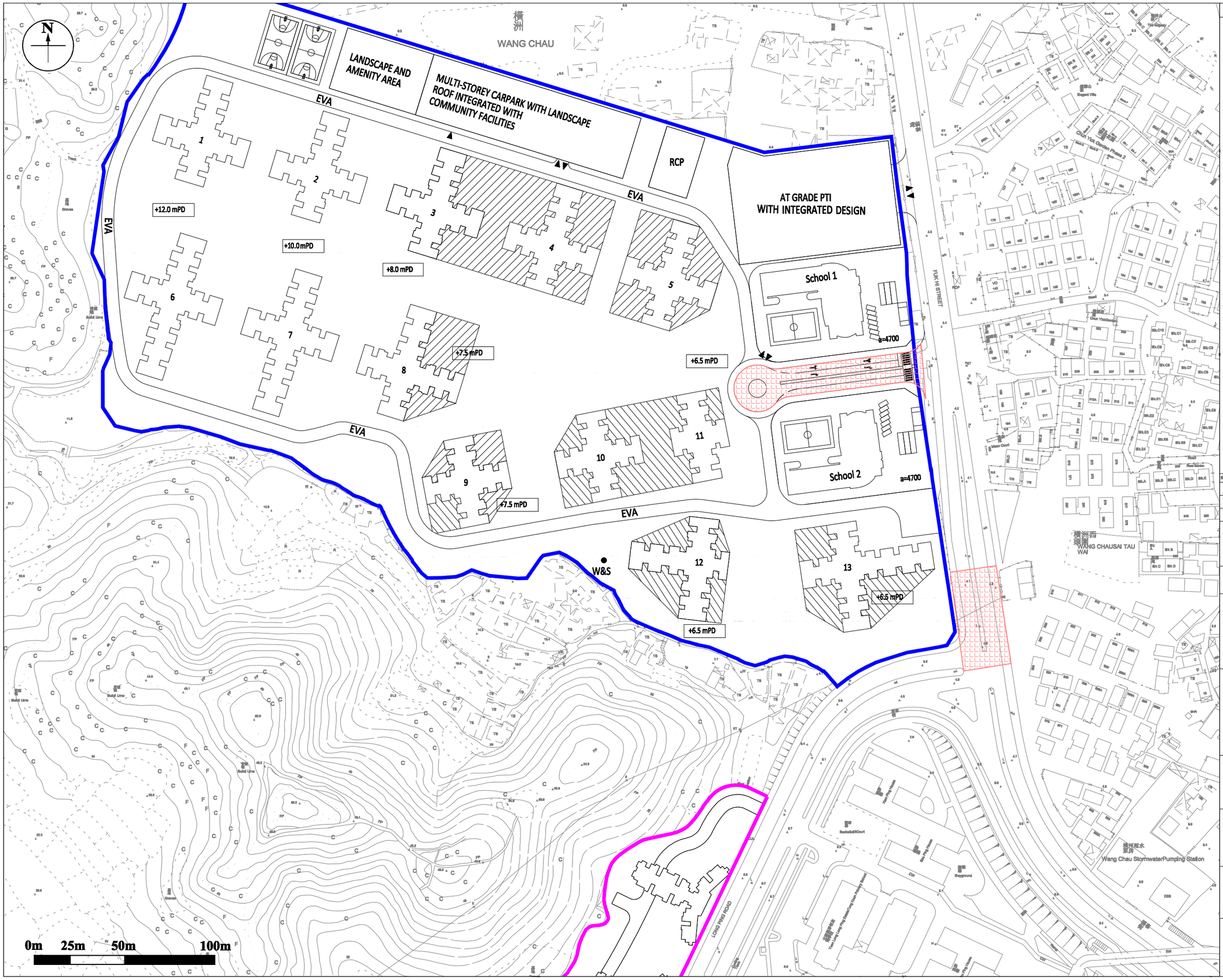

LEGEND

- BOUNDARY OF THE SITE (SUBJECT TO REVIEW)
- PLANNED WANG CHAU PHASE 1 DEVELOPMENT
- POTENTIAL LOCATIONS FOR THE APPLICATION OF PMSMA6

NOTE

1 THE FEASIBILITY AND EFFECTIVENESS OF THE APPLICATION OF PMSMA6 IS SUBJECT TO FINDINGS FROM ONGOING TRIALS CONDUCTED BY HIGHWAYS DEPARTMENT.

2 THE LAYOUT OF PLANNED WANG CHAU PHASE 1 DEVELOPMENT IS SUBJECT TO DETAILED DESIGN.

Revision	Date	Description			Initial
	Designed	Checked	Drawn	Checked	
Initial	WT	KC	SZ	–	
Date	08/18	08/18	08/18	08/18	

Approved

Agreement no.

CE 13/2017 (CE)

Project Title

SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG- FEASIBILITY STUDY

Drawing Title

POTENTIAL LOCATIONS FOR THE APPLICATION OF PMSMA6

Drawing No.

196587/B&V/PER/FIG 4.9

Scale

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

BLACK & VEATCH HONG KONG LIMITED
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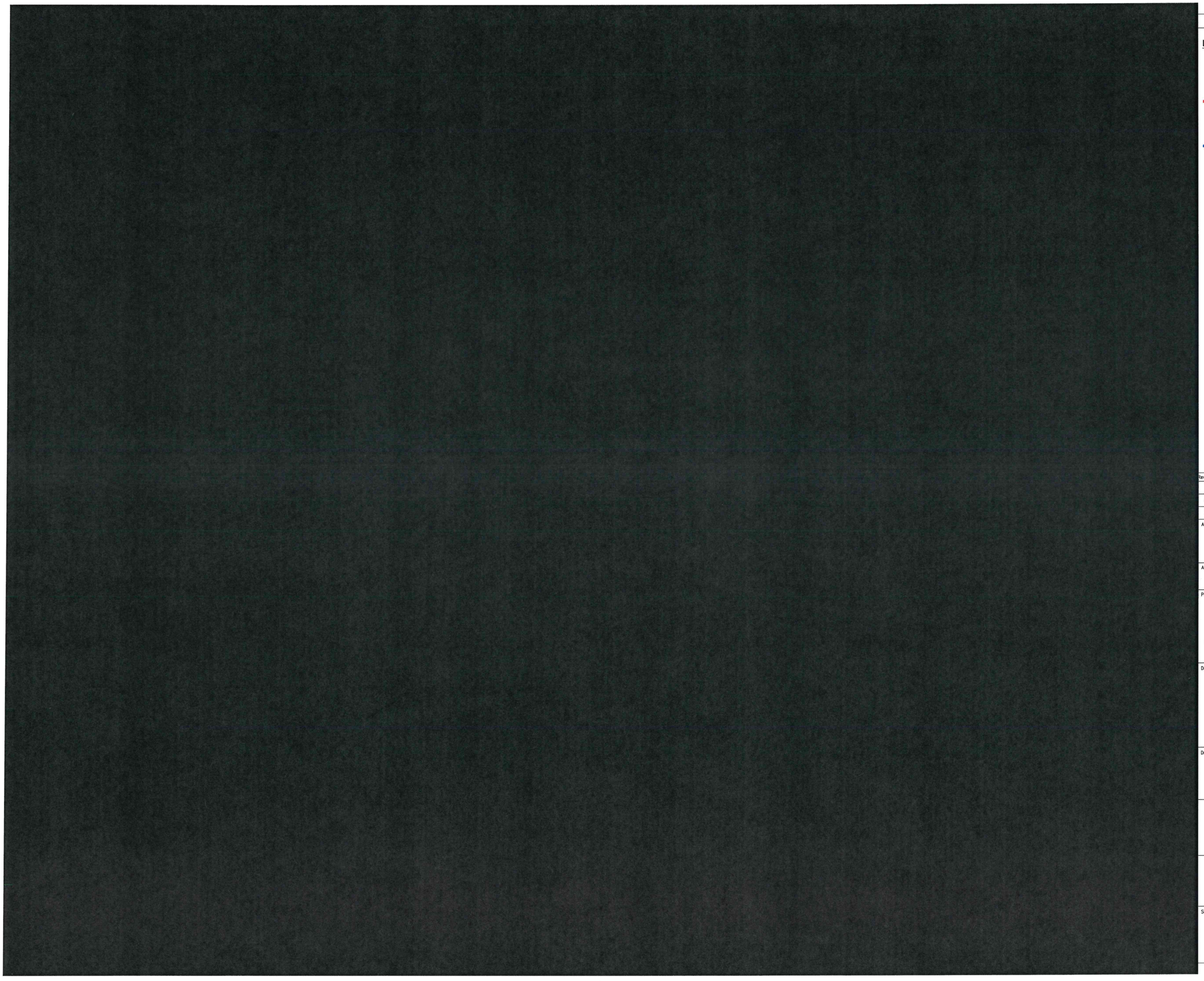

LEGEND

- FIXED NOISE SOURCE
- ASSESSMENT AREA FOR FIXED NOISE SOURCE IMPACT (300M FROM BOUNDARY OF THE SITE)
- BOUNDARY OF THE SITE (SUBJECT TO REVIEW)

Revision	Date	Description		Initial
	Designed	Checked	Drawn	Checked
Initial	WT	KC	SZ	–
Date	07/18	07/18	07/18	07/18

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Agreement no.
CE 13/2017 (CE)

Project Title
SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG- FEASIBILITY STUDY

Drawing Title
LOCATION OF FIXED NOISE SOURCES (SCENARIO 1)

Drawing No.
196587/B&V/PER/FIG 4.5

Scale

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Sub Consultant:
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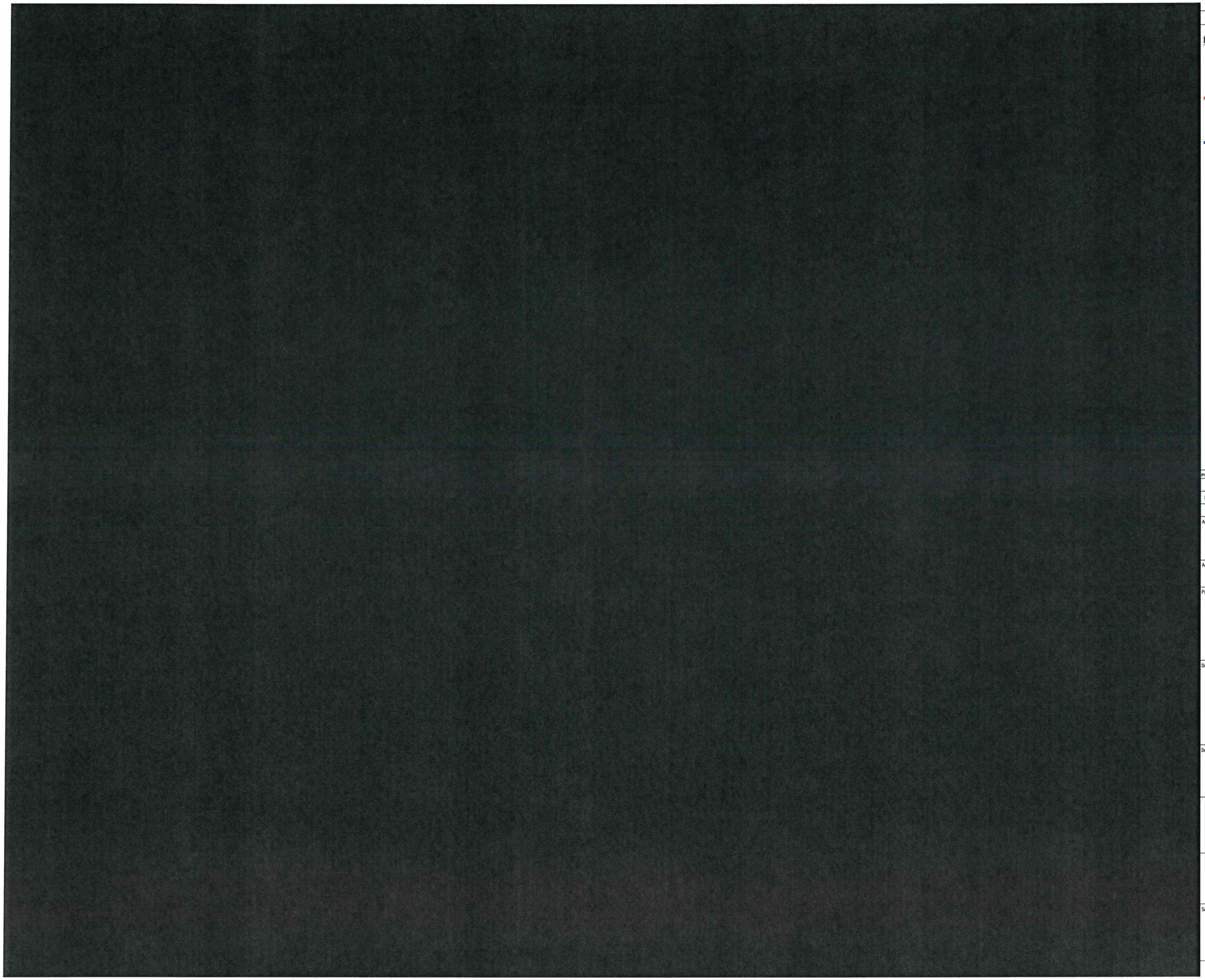

LEGEND

- FIXED NOISE SOURCE
- ASSESSMENT AREA FOR FIXED NOISE SOURCE IMPACT (300M FROM BOUNDARY OF THE SITE)
- BOUNDARY OF THE SITE (SUBJECT TO REVIEW)

evision	Date	Description			Initial
	Designed	Checked	Drown	Checked
Initial	WT	KC	SZ	–
Date	07/18	07/18	07/18	07/18

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Agreement no.

CE 13/2017 (CE)

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SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG– FEASIBILITY STUDY

Drawing Title

LOCATION OF FIXED NOISE SOURCES (SCENARIO 2)

Drawing No.

196587/B&V/PER/FIG 4.6

Scale

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

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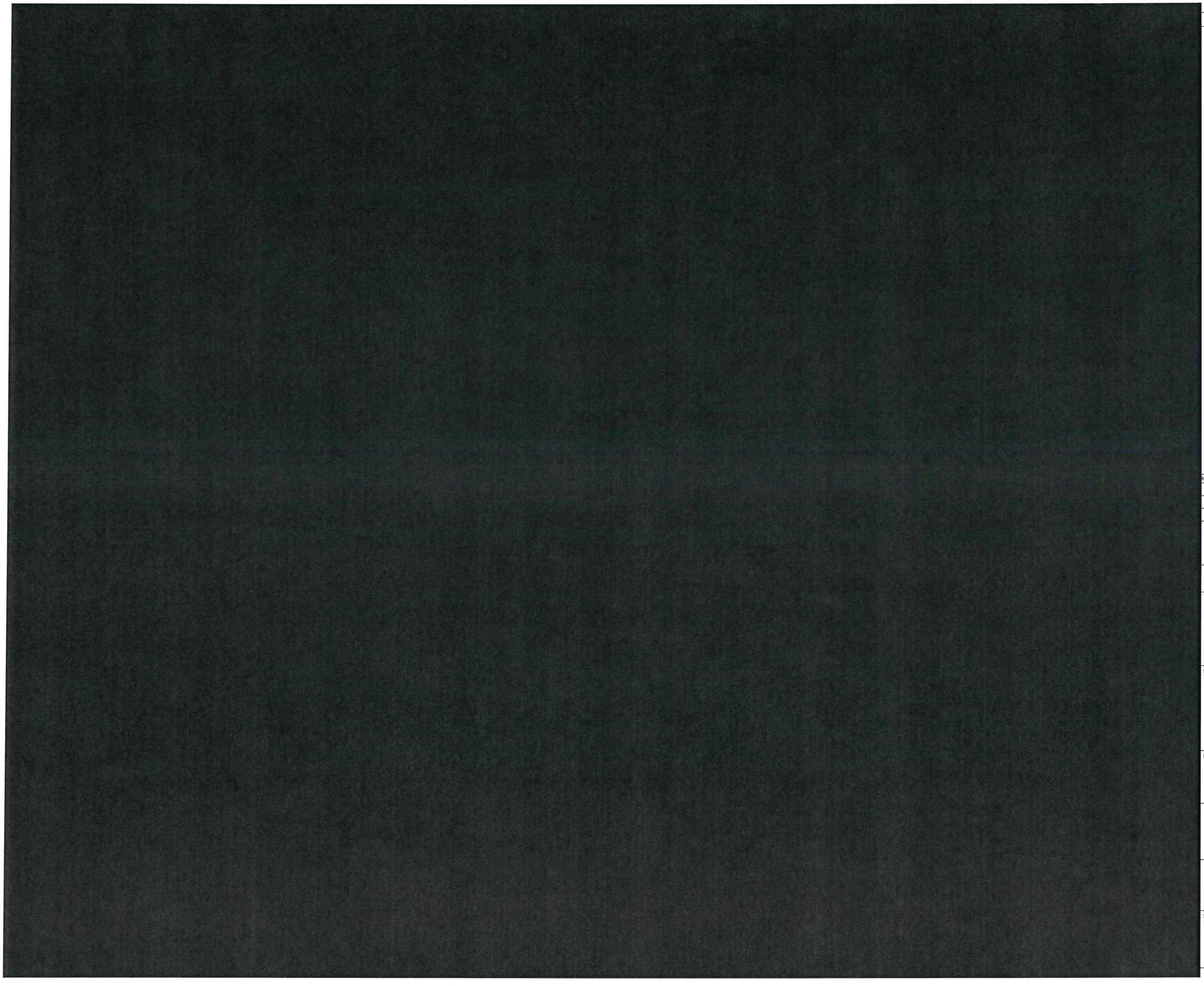
Sub Consultant:

RAMBOLL



LEGEND

- FIXED NOISE SOURCE
- ASSESSMENT AREA FOR FIXED NOISE SOURCE IMPACT (300M FROM BOUNDARY OF THE SITE)
- BOUNDARY OF THE SITE (SUBJECT TO REVIEW)
- BOUNDARY OF YUEN LONG INDUSTRIAL ESTATE EXTENSION

Revision	Date	Description			Initial
	Designed	Checked	Drawn	Checked	
Initial	WT	KC	SZ	–	
Date	07/18	07/18	07/18	07/18	

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Agreement no.

CE 13/2017 (CE)

Project Title

SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG– FEASIBILITY STUDY

Drawing Title

LOCATION OF FIXED NOISE SOURCES (SCENARIO 3)

Drawing No.

196587/B&V/PER/FIG 4.7

Scale

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Sub Consultant:

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LEGEND

- ASSESSMENT AREA FOR WATER QUALITY (500M FROM BOUNDARY OF THE SITE)
- BOUNDARY OF THE SITE (SUBJECT TO REVIEW)
- INFRASTRUCTURE WORKS

WATER SENSITIVE RECEIVERS

- WETLAND CONSERVATION AREA
- PONDS
- WATERCOURSES
- MAN-MADE CHANNELS
- IRRIGATION SYSTEMS

SPECIES OF CONSERVATION IMPORTANCE

- COMMON RAT SNAKE
- NANHAIPOTAMON HONGKONGENSE
- SOMMANNIATHELPHUSA ZANKLON
- SMALL SNAKEHEAD

Revision	Date	Description			Initial
		Designed	Checked	Drawn	Checked
Initial		WT	KC	SZ	–
Date		07/18	07/18	07/18	07/18

Approved

Agreement no.

CE 13/2017 (CE)

Project Title

SITE FORMATION AND INFRASTRUCTURALWORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTSAT WANG CHAU, YUEN LONG– FEASIBILITY STUDY

Drawing Title

LOCATION OF WATER SENSITIVE RECEIVERS

Drawing No.

196587/B&V/PER/FIG 5.3

Scale

土木工程拓展署
Civil Engineering and Development Department

BLACK & VEATCH HONG KONG LIMITED
博威工程顧問有限公司

Sub Consultant:

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0m 100m 250m 500m

Plot Date = 6/14/18

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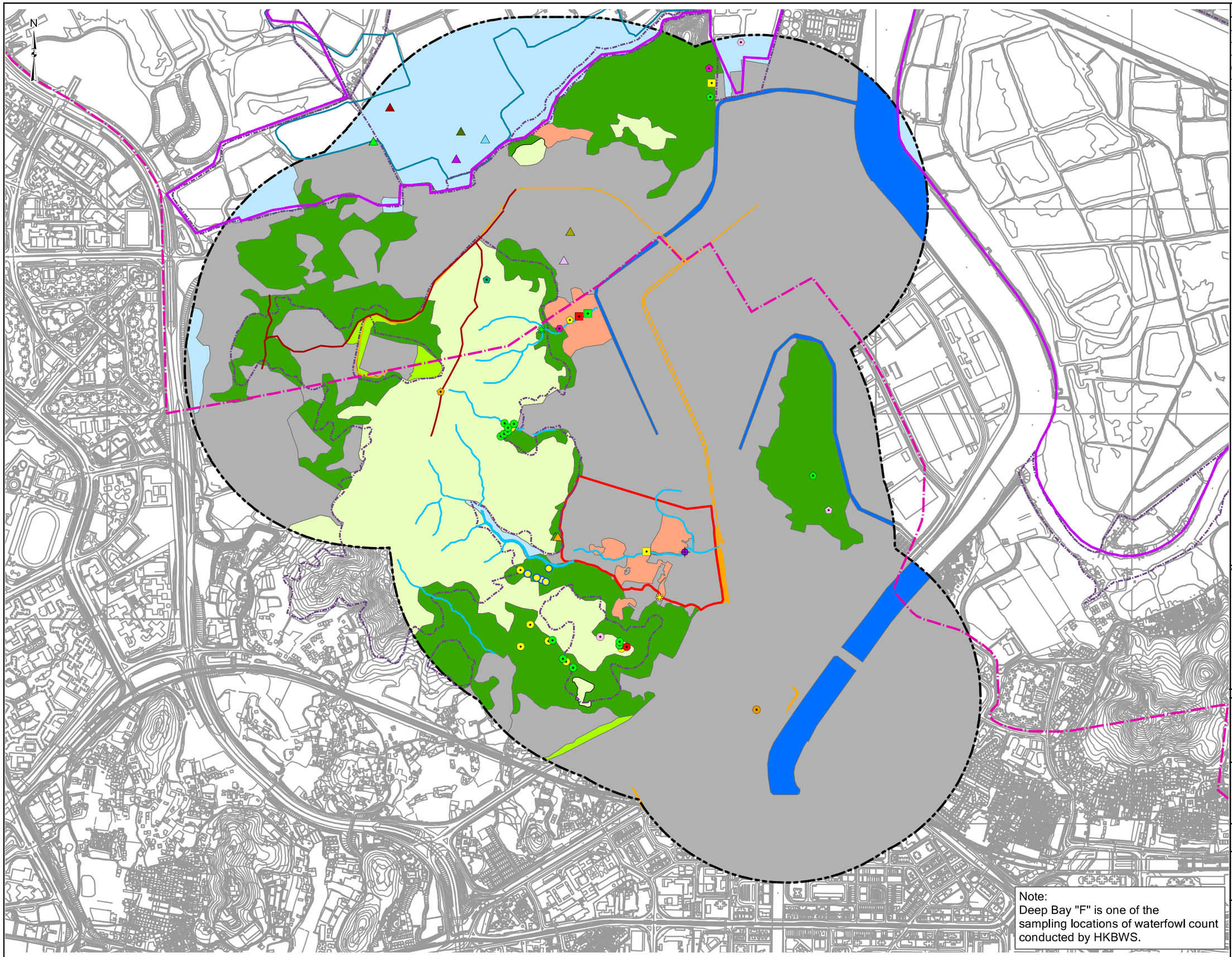

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Initial	WT	KC	HLam	KC
Date	09/18	09/18	09/18	09/18

Revision	Date	Description	Initial

Legend

- BUTTERFLY HOTSPOT
- WETLAND BUFFER AREA
- WETLAND CONSERVATION AREA
- ZONING BOUNDARY OF CONSERVATION AREA
- DEEP BAY "F"
- BOUNDARY OF THE SITE (SUBJECT TO REVIEW)
- ASSESSMENT AREA FOR ECOLOGICAL IMPACT
- INFRASTRUCTURE WORKS

HABITAT

- AGRICULTURAL LAND
- DEVELOPED AREA/WASTELAND
- FISH PONDS
- PLANTATION
- SHRUBLAND/GRASSLAND
- WATERCOURSE
- SECONDARY WOODLAND

VERIFICATION SURVEY

PLANT
- AQUILARIA SINENSIS (SEEDLINGS)

BIRD
- BLACK KITE
- CHINESE HWAMEI
- COMMON EMERALD DOVE
- GREAT EGRET
- GREATER SPOTTED EAGLE
- GREY HERON
- INTERMEDIATE EGRET
- WHITE THROATED KINGFISHER
- TUFTED DUCK

MACROINVERTEBRATE
- SOMANNIATHELPHUSA ZANKLON

LITERATURE REVIEW

PLANT
- AQUILARIA SINENSIS (POTENTIAL OVT)
- AQUILARIA SINENSIS (SEEDLINGS)
- AQUILARIA SINENSIS (TREE)
- CAMELLIA OLIFERA
- RHODODENDRON SIMSII

HERPETOFAUNA
- CHINESE BULL FROG
- COMMON RAT SNAKE
- REEVES TERRAPIN

BUTTERFLY
- COLON SWIFT
- COMMON AWL
- COMMON YELLOW SWALLOWTAIL
- FORGET-ME-NOT
- PALE PALM DART
- PEACOCK ROYAL

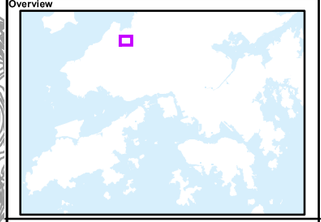
DRAGONFLY
- RUBY DARTER
- SCARLET BASKER

MACROINVERTEBRATE
- NANHAIPOTAMON HONGKONGENSE

FISH
- SMALL SNAKEHEAD

MAMMAL
- JAPANESE PIPISTRELLE (LOCATION NOT SPECIFIED)

Overview



Approved

Contract Title

SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG - FEASIBILITY STUDY

Figure Title

HABITAT MAP

Drawing No.	Scale
196587/B&V/PER/FIG 8.2	1:10,000 @ A3

Client

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Consultant

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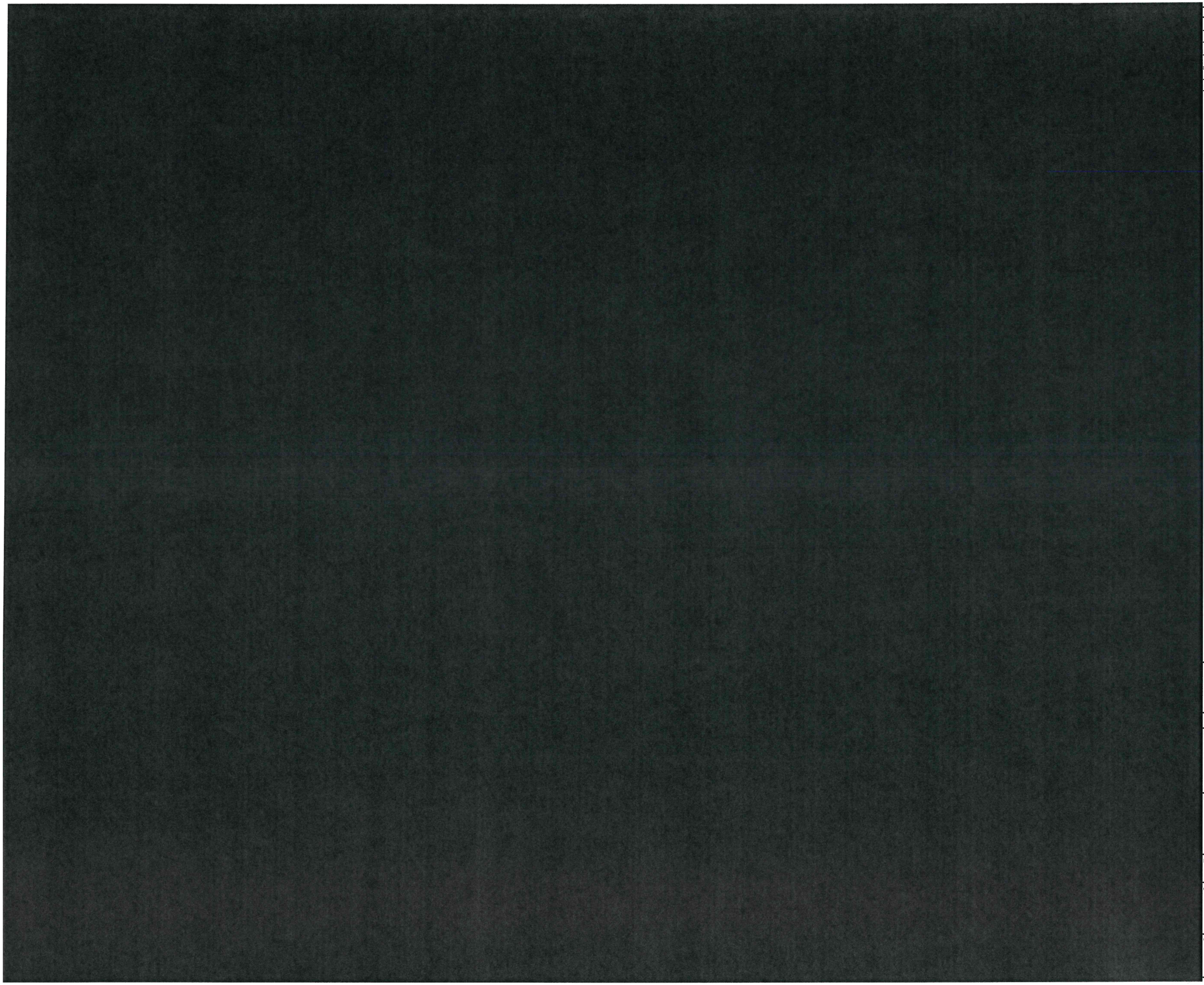

	Designed	Reviewed	Drawn	Checked
Initial	FL	ET	FL	ET
Date	JUL 2018	JUL 2018	JUL 2018	JUL 2018

Revision	Date	Description	Initial

Legend

- BOUNDARY OF THE SITE (SUBJECT TO REVIEW)
- INFRASTRUCTURE WORKS
- SITE OF ARCHAEOLOGICAL INTEREST
- ARCHAEOLOGICAL POTENTIAL AREA*

*NOTE:
AREAS REFERS TO ARCHAEOLOGICAL DESK-BASED REVIEW AND PROPOSAL FOR ARCHAEOLOGICAL FIELD SURVEY PREPARED UNDER AGREEMENT NO. CB2012093 PLANNING AND ENGINEERING STUDY FOR THE PUBLIC HOUSING SITE AND YUEN LONG INDUSTRIAL ESTATE EXTENSION AT WANG CHAU.

Approved

Agreement No. CE 13/2017 (CE)

Project Title

SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASE OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG - FEASIBILITY STUDY

Figure Title

SITE OF ARCHAEOLOGICAL INTEREST

Drawing No.	Scale
196587/B&V/PER/FIG 9.1	1:13,000 @ A3

Client

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	Designed	Reviewed	Drawn	Checked
Initial	FL	ET	FL	ET
Date	JUL 2018	JUL 2018	JUL 2018	JUL 2018

Revision	Date	Description	Initial

N

Legend

- BOUNDARY OF THE SITE (SUBJECT TO REVIEW)
- INFRASTRUCTURE WORKS
- HISTORICAL VILLAGE

Ng Uk Tsuen
Shing Uk Tsuen
Tai Tseng Wai
Fuk Hing Tsuen
Tung Tau Wai
Chung Sam Wai
Sai Tai Wai
Lam Uk Tsuen
Yeung Uk Tsuen
Shui Tin Tsuen
Fung Chi Tsuen

0 75 150 300 Meters

Approved

Agreement No. CE 13/2017 (CE)

Project Title
SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASE OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG - FEASIBILITY STUDY

Figure Title
LOCATIONS OF HISTORICAL VILLAGES

Drawing No.	Scale
196587/B&V/PER/FIG 9.2	1:8,000 @ A3

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Document Path: C:\Users\lam80489\Desktop\GIS\MXD\196587-Wang Chau\Heritage\Figure 2.mxd

	Designed	Reviewed	Drawn	Checked
Initial	FL	ET	FL	ET
Date	JUL 2018	JUL 2018	JUL 2018	JUL 2018

Revision	Date	Description	Initial

Legend

- BOUNDARY OF THE SITE (SUBJECT TO REVIEW)
- INFRASTRUCTURE WORKS
- ASSESSMENT AREA FOR BUILT HERITAGE
- DELCARED MONUMENT
- GRADED HISTORIC BUILDINGS
- ITEMS OF HERITAGE INTEREST
- GRAVES
- SHRINE
- WELL AND SHRINE (TO BE RETAINED IN SITU AS FAR AS POSSIBLE)

No. 41 Fuk Hing Tsuen
No. 40 Fuk Hing Tsuen
Yu Yuen, Tung Tau Wai
I Shing Temple
Nos. 4 & 7A and Lot WCL132 in DD123, Sai Tau Wai
Lung Wah Yuen. No. 83 Fung Chi Tsuen
Tin Hau Temple, Fung Chi Tsuen

0 37.5 75 150 Meters

Approved

Agreement No. CE 13/2017 (CE)

Project Title
SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASE OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG - FEASIBILITY STUDY

Figure Title
BUILT HERITAGE RESOURCES (SHEET 1 OF 2)

Drawing No.	Scale
196587/B&V/PER/FIG 9.3	1:4,000 @ A3

Client
CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT

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	Designed	Reviewed	Drawn	Checked
Initial	FL	ET	FL	ET
Date	JUL 2018	JUL 2018	JUL 2018	JUL 2018

Revision	Date	Description	Initial

Legend

- BOUNDARY OF THE SITE (SUBJECT TO REVIEW)
- INFRASTRUCTURE WORKS
- ASSESSMENT AREA FOR BUILT HERITAGE
- DELCARED MONUMENT
- GRADED HISTORIC BUILDINGS
- ITEMS OF HERITAGE INTEREST

Entrance Gate at Tai Tseng Ng Uk Tsuen

HB03 – Shrine at Ng Uk Tsuen

HB01 – Village House in Shing Uk Tsuen

HB02 – Shrine at Tai Tseng Wai

No. 39-43 Shing Uk Tsuen

Wang Chau Service Reservoir

0 37.5 75 150 Meters

Approved

Agreement No. CE 13/2017 (CE)

Project Title

SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASE OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG - FEASIBILITY STUDY

Figure Title

BUILT HERITAGE RESOURCES (SHEET 2 OF 2)

Drawing No.	Scale
196587/B&V/PER/FIG 9.4	1:4,000 @ A3

Client

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	Designed	Reviewed	Drawn	Checked
Initial	FL	ET	FL	ET
Date	JUL 2018	JUL 2018	JUL 2018	JUL 2018

Revision	Date	Description	Initial

Legend

- BOUNDARY OF THE SITE (SUBJECT TO REVIEW)
- INFRASTRUCTURE WORKS
- BURIAL GROUNDS

Kai Shan Burial Grounds

Chu Wong Ling

0 75 150 300 Meters

Approved

Agreement No. CE 13/2017 (CE)

Project Title

SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASE OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG - FEASIBILITY STUDY

Figure Title

BURIAL GROUNDS

Drawing No. 196587/B&V/PER/FIG 9.5

Scale 1:7,000 @ A3

Client

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Document Path: C:\Users\lam80489\Desktop\GIS\MXD\196587-Wang Chau\Heritage\Figure 5.mxd

LEGEND:

BOUNDARY OF THE ASSESSMENT AREA (SUBJECT TO REVIEW)

PROPOSED SITE INVESTIGATION AREA

AREA EXCLUDED FROM THE PROPOSED SITE INVESTIGATION AREA

evision	Date	Description			Initial
	Designed	Checked	Drawn	Checked
Initial				
Date				

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Agreement no.

CE 13/2017 (CE)

Project Title

SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG– FEASIBILITY STUDY

Drawing Title

PROPOSED SITE INVESTIGATION AREA

Drawing No.

196587/B&V/PER/FIG 10.2

Scale

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Sub Consultant:

RAMBOLL

LEGEND

- ASSESSMENT AREA FOR LANDSCAPE RESOURCES
- BOUNDARY OF THE SITE (SUBJECT TO REVIEW)
- BOUNDARY FOR ROAD IMPROVEMENT WORKS OF THE DEVELOPMENT (SUBJECT TO REVIEW)
- +9.10 EXISTING LEVEL

Revision	Date	Description	Initial
C	01FEB19	FINAL LVIA ISSUE 2	CI
B	13DEC18	FINAL LVIA ISSUE 1	CI
A	17JUL18	ISSUE 2	CI

	Designed	Checked	Drawn	Checked
Initial	CI	TO	AC	CI
Date	04/18	04/18	04/18	04/18

Approved

Agreement no.
CE 13/2017 (CE)

Project Title
SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG - FEASIBILITY STUDY

Drawing Title
AERIAL PHOTO AND LANDSCAPE IMPACT ASSESSMENT AREA

Figure No.
196587/B&V/LVIA/001

Scale
1 : 7500 (A3)

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Civil Engineering and Development Department

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博威工程顧問有限公司

Planning, Urban Design, Landscape, Golf & Environmental Consultants
Urbis Limited, 11/F Siu On Centre, 188 Lockhart Road, Wan Chai, Hong Kong. Tel 2802 3333 Fax 2802 6662

Plot Date = 06/Jun/2019

CAD Filename = I:\BP15\DGN-GA\Preliminary LVIA\Final LVIA issue 4\196587B&VLVIA_001.dgn

NOTE:
AREAS NOT COLOURED WITHIN THE STUDY BOUNDARY DO NOT CONSTITUTE LANDSCAPE RESOURCES.

LEGEND

- ASSESSMENT AREA FOR LANDSCAPE RESOURCES
- BOUNDARY OF THE SITE (SUBJECT TO REVIEW)
- BOUNDARY FOR ROAD IMPROVEMENT WORKS OF THE DEVELOPMENT (SUBJECT TO REVIEW)
- LR7(A) AMENITY PLANTING ALONG ROADS AND URBAN INFRASTRUCTURE WITHIN INSET A (0.01 HA)
- LR7(B) AMENITY PLANTING ALONG ROADS AND URBAN INFRASTRUCTURE WITHIN INSET B (0.06 HA)
- LR7(C) AMENITY PLANTING ALONG ROADS AND URBAN INFRASTRUCTURE WITHIN INSET C(0.23 HA)
- LR8 AMENITY PLANTING WITHIN INDUSTRIAL AREA (0.9 HA)
- LR9 AMENITY PLANTING WITHIN OPEN STORAGE AREA OUTSIDE SITE (2.5 HA)
- LR9(S) AMENITY PLANTING WITHIN OPEN STORAGE OF THE SITE (1.3 HA)
- LR9(C) AMENITY PLANTING WITHIN OPEN STORAGE OF INSET C(0.04 HA)
- LR10 AMENITY PLANTING WITHIN VILLAGE AREA OUTSIDE SITE (3.1HA)
- LR10(S) AMENITY PLANTING WITHIN VILLAGE AREA OF THE SITE (0.2 HA)
- LR11 WATERCOURSES OUTSIDE SITE (88m)
- LR11(S) WATERCOURSES WITHIN SITE (673m)
- T1 IMPORTANT TREES

SPECIES OF CONSERVATION IMPORTANCE (LITERATURE REVIEW)

- AQUILARIA SINENSIS (SEEDLINGS)
- AQUILARIA SINENSIS (TREE)
- CAMELIA OLIFERA
- RHODODENDRON SIMSII

SPECIES OF CONSERVATION IMPORTANCE (VERIFICATION SURVEY)

- AQUILARIA SINENSIS (SEEDLINGS)

SPECIES UNDER CAP.96

- MICHELIA X ALBA

- LR1 AGRICULTURAL LAND & ASSOCIATED TREE PLANTING OUTSIDE SITE (2.1 HA)
- LR1(S) AGRICULTURAL LAND & ASSOCIATED TREE PLANTING WITHIN SITE (2.2 HA)
- LR2 SECONDARY WOODLAND (25.9 HA)
- LR3 MIXED TREES, SHRUBS AND GRASSLAND OUTSIDE SITE (40.2 HA)
- LR3(S) MIXED SHRUBS AND GRASSLAND WITHIN SITE (0.4 HA)
- LR4 PONDS (0.3 HA)
- LR5 NATURAL WATERCOURSES OUTSIDE SITE (2261m)
- LR6 AMENITY PLANTING WITHIN RESIDENTIAL AREA (7.7 HA)
- LR7 AMENITY PLANTING ALONG ROADS AND URBAN INFRASTRUCTURE OUTSIDE INSET A, INSET B AND INSET C (3.8 HA)

Revision	Date	Description	Initial
D	03JUN19	FINAL LVIA ISSUE 4	CI
C	01FEB19	FINAL LVIA ISSUE 2	CI
B	13DEC18	FINAL LVIA ISSUE 1	CI
A	17JUL18	ISSUE 2	CI

	Designed	Checked	Drawn	Checked
Initial	CI	TO	AC	CI
Date	04/18	04/18	04/18	04/18

Approved

Agreement no.
CE 13/2017 (CE)

Project Title
SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG - FEASIBILITY STUDY

Drawing Title
LANDSCAPE RESOURCES PLAN

Figure No.
196587/B&V/LVIA/003

Scale
1 : 7500 (A3)

土木工程拓展署
Civil Engineering and Development Department

BLACK & VEATCH HONG KONG LIMITED
博威工程顧問有限公司

Urbis Limited
Planning, Urban Design, Landscape, Golf & Environmental Consultants
Urbis Limited, 11/F Siu Ki Centre, 148 Lockhart Road, Wan Chai, Hong Kong. Tel 2802 3533 Fax 2802 0662

SCALE 1 : 7,500
0 100 200 300 400 500m

Plot Date = 28/Jun/2019

CAD Filename = I:\BP15\DGN-GA\Preliminary LVIA\Final LVIA issue 4\196587B&VLVIA_003.dgn

LEGEND

- ASSESSMENT AREA FOR LANDSCAPE RESOURCES
- BOUNDARY OF THE SITE (SUBJECT TO REVIEW)
- BOUNDARY FOR ROAD IMPROVEMENT WORKS OF THE DEVELOPMENT (SUBJECT TO REVIEW)
- LCA1 — INDUSTRIAL URBAN LANDSCAPE (17.2 Ha)
- LCA2 — MISCELLANEOUS RURAL FRINGE LANDSCAPE OUTSIDE SITE (16.9Ha)
- LCA2(S) — MISCELLANEOUS RURAL FRINGE LANDSCAPE WIHTIN SITE (8.0 Ha)
- LCA3 — UPLAND AND HILLSIDE LANDSCAPE OUTSIDE SITE (66.7 Ha)
- LCA3(S) — UPLAND AND HILLSIDE LANDSCAPE WITHIN SITE (0.4 Ha)
- LCA4 — RESIDENTIAL URBAN LANDSCAPE (20.2 Ha)
- LCA5 — TRANSPORTATION CORRIDOR LANDSCAPE OUTSIDE INSET A, INSET B AND INSET C (9.2 Ha)
- LCA5(A) — TRANSPORTATION CORRIDOR LANDSCAPE WITHIN INSET A (0.14 Ha)
- LCA5(B) — TRANSPORTATION CORRIDOR LANDSCAPE WITHIN INSET B (0.31 Ha)
- LCA5(C) — TRANSPORTATION CORRIDOR LANDSCAPE WITHIN INSET C (1.05 Ha)
- LCA6 — URBAN PERIPHERAL VILLAGE LANDSCAPE OUTSIDE SITE (25.7 Ha)
- LCA6(S) — URBAN PERIPHERAL VILLAGE LANDSCAPE WITHIN SITE (1.5 Ha)
- LCA7 — URBAN RIVER CORRIDOR LANDSCAPE (4.4 Ha)
- LCA8 — AGRICULTURAL LANDSCAPE OUTSIDE SITE (2.0 Ha)
- LCA8(S) — AGRICULTURAL LANDSCAPE WITHIN SITE (2.2 Ha)
- HERITAGE FEATURE
- T1 — IMPORTANT TREES

SPECIES OF CONSERVATION IMPORTANCE (LITERATURE REVIEW)

- AQUILARIA SINENSIS (SEEDLINGS)
- AQUILARIA SINENSIS (TREE)
- CAMELIA OLIFERA
- RHODODENDRON SIMSII

SPECIES OF CONSERVATION IMPORTANCE (VERIFICATION SURVEY)

- AQUILARIA SINENSIS (SEEDLINGS)

SPECIES UNDER CAP.96

- MICHELIA X ALBA

Revision	Date	Description	Initial
D	03JUN19	FINAL LVIA ISSUE 4	CI
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B	13DEC18	FINAL LVIA ISSUE 1	CI
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Approved

Agreement no.
CE 13/2017 (CE)

Project Title
SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG - FEASIBILITY STUDY

Drawing Title
LANDSCAPE CHARACTER AREAS PLAN

Figure No.
196587/B&V/LVIA/004

Scale
1 : 7500 (A3)

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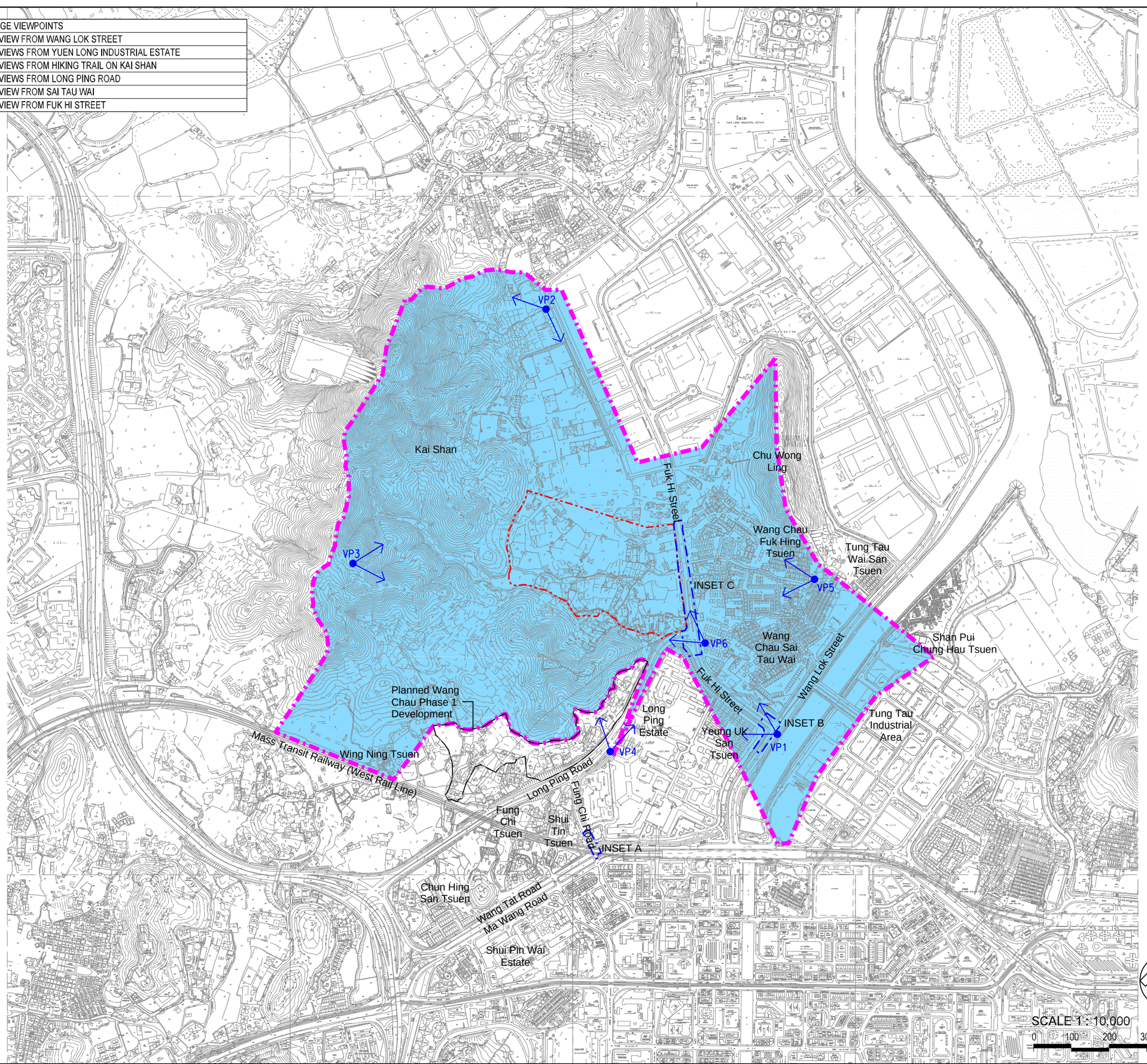
SCALE 1 : 7,500
0 100 200 300 400 500m

Plot Date = 28/Jun/2019
CAD Filename = I:\BP15\DGN-GA\Preliminary LVIA\Final LVIA issue 4\196587B&VLVIA_004.dgn

PHOTOMONTAGE VIEWPOINTS	
VP1	VIEW FROM WANG LOK STREET
VP2	VIEWS FROM YUEN LONG INDUSTRIAL ESTATE
VP3	VIEWS FROM HIKING TRAIL ON KAI SHAN
VP4	VIEWS FROM LONG PING ROAD
VP5	VIEW FROM SAI TAU WAI
VP6	VIEW FROM FUK HI STREET



LEGEND

- BOUNDARY OF THE SITE (SUBJECT TO REVIEW)
- BOUNDARY FOR ROAD IMPROVEMENT WORKS OF THE DEVELOPMENT (SUBJECT TO REVIEW)
- ZONE OF VISUAL INFLUENCE (ZVI)
- EXTENT OF VISUAL IMPACT
- PHOTOMONTAGE VIEWPOINTS (VP1)

Revision	Date	Description	Initial
B	13DEC18	FINAL LVIA ISSUE 1	CI
A	17JUL18	ISSUE 2	CI

	Designed	Checked	Drawn	Checked
Initial	CI	TO	AC	CI
Date	04/18	04/18	04/18	04/18

Approved

Agreement no.
CE 13/2017 (CE)

Project Title
SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG - FEASIBILITY STUDY

Drawing Title
ZONE OF VISUAL INFLUENCE (ZVI) AND KEY PUBLIC VEWPOINTS

Figure No.
196587/B&V/LVIA/006

Scale
1:10,000 (A3)

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Plot Date = 31/Jan/2019

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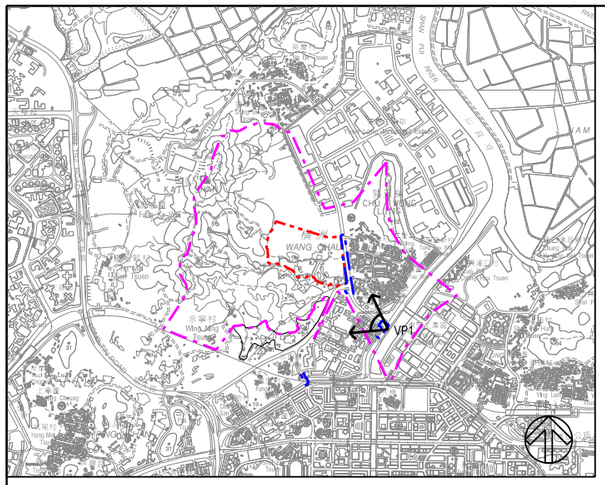

KEY PLAN

EXISTING CONDITIONS

DAY 1 WITHOUT MITIGATION MEASURES

LEGEND

- BOUNDARY OF THE SITE (SUBJECT TO REVIEW)
- BOUNDARY FOR ROAD IMPROVEMENT WORKS OF THE DEVELOPMENT (SUBJECT TO REVIEW)
- EXTENT OF VISUAL IMPACT

Revision	Date	Description	Initial
C	01FEB19	FINAL LVIA ISSUE 2	CI
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A	17JUL18	ISSUE 2	CI

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Initial	CI	TO	AC	CI
Date	04/18	04/18	04/18	04/18

Approved

Agreement no.
CE 13/2017 (CE)

Project Title
SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG - FEASIBILITY STUDY

Drawing Title
PHOTOMONTAGE VIEWPOINT VP1: VIEW FROM WANG LOK STREET (1 OF 2)

Figure No.
196587/B&V/LVIA/011a

Scale
NTS (A3)

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Plot Date • 06/Jun/2019

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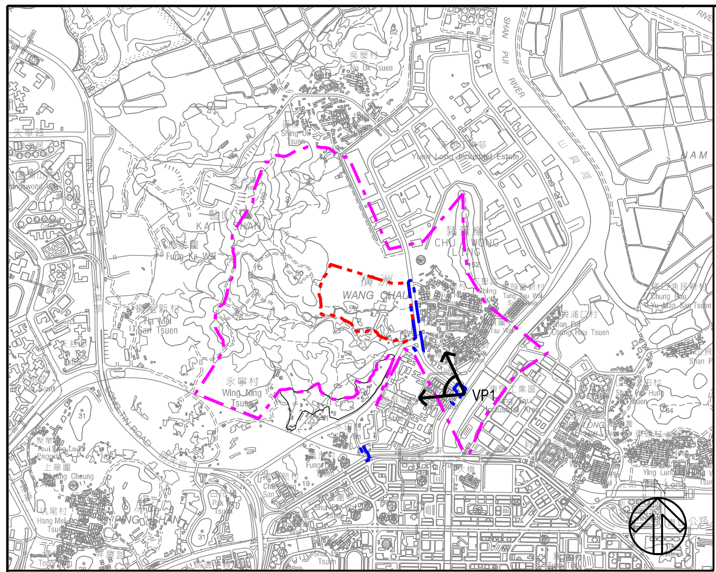

KEY PLAN

Proposed Operation Phase Landscape and Visual Mitigation Measures

ID No.	Landscape and Visual Mitigation Measure
OM1	Sensitive design of buildings in terms of scale, height and bulk (visual weight).
OM2	Use of appropriate building materials and colours to complement surroundings.
OM3	Road lighting units to be directional and minimise unnecessary light spill and glare.
OM7	Streetscape (e.g. paving, signage, street furniture, lighting etc.) shall be sensitively designed in a manner that responds to the existing context, and minimises potential adverse landscape and visual impacts.

DAY 1 WITH MITIGATION MEASURES

YEAR 10 WITH MITIGATION MEASURES

LEGEND

- BOUNDARY OF THE SITE (SUBJECT TO REVIEW)
- BOUNDARY FOR ROAD IMPROVEMENT WORKS OF THE DEVELOPMENT (SUBJECT TO REVIEW)
- EXTENT OF VISUAL IMPACT

Revision	Date	Description	Initial
C	01FEB19	FINAL LVIA ISSUE 2	CI
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Date	04/18	04/18	04/18	04/18

Approved

Agreement no.

CE 13/2017 (CE)

Project Title

SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG - FEASIBILITY STUDY

Drawing Title

PHOTOMONTAGE VIEWPOINT VP1: VIEW FROM WANG LOK STREET (2 OF 2)

Figure No.

196587/B&V/LVIA/011b

Scale

NTS (A3)

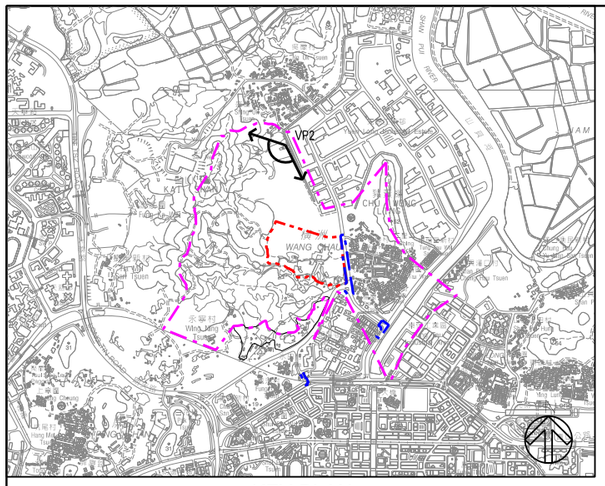
土木工程拓展署
CEDD Civil Engineering and Development Department

BLACK & VEATCH HONG KONG LIMITED
博威工程顧問有限公司

Urbis Limited

Plot Date - 06/Jun/2019

CAD Filename - I:\BP15\DGN-GA\Preliminary LVIA\Final LVIA issue 4\196587B&VLVIA_011b.dgn



KEY PLAN

EXISTING CONDITIONS

DAY 1 WITHOUT MITIGATION MEASURES

LEGEND

- BOUNDARY OF THE SITE (SUBJECT TO REVIEW)
- BOUNDARY FOR ROAD IMPROVEMENT WORKS OF THE DEVELOPMENT (SUBJECT TO REVIEW)
- EXTENT OF VISUAL IMPACT

Revision	Date	Description	Initial
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Initial	CI	TO	AC	CI
Date	04/18	04/18	04/18	04/18

Approved

Agreement no.
CE 13/2017 (CE)

Project Title
SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG - FEASIBILITY STUDY

Drawing Title
PHOTOMONTAGE VIEWPOINT VP2: VIEW FROM YUEN LONG INDUSTRIAL ESTATE (1 OF 2)

Figure No.
196587/B&V/LVIA/012a

Scale
NTS (A3)

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CEDD Civil Engineering and Development Department

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Plot Date = 06/Jun/2019

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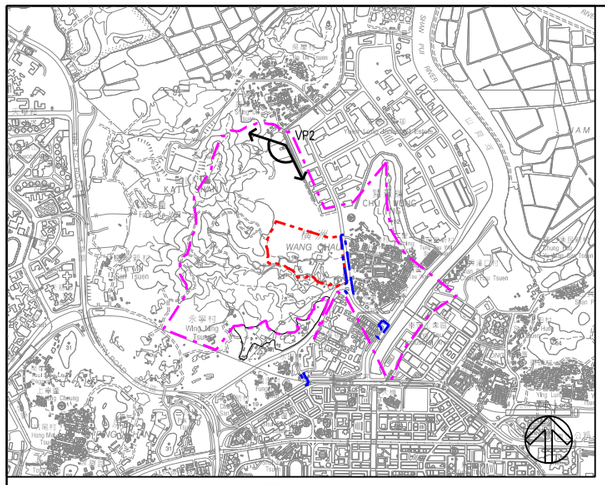

KEY PLAN

Proposed Operation Phase Landscape and Visual Mitigation Measures

ID No.	Landscape and Visual Mitigation Measure
OM1	Sensitive design of buildings in terms of scale, height and bulk (visual weight).
OM2	Use of appropriate building materials and colours to complement surroundings.

DAY 1 WITH MITIGATION MEASURES

YEAR 10 WITH MITIGATION MEASURES

LEGEND

- BOUNDARY OF THE SITE (SUBJECT TO REVIEW)
- BOUNDARY FOR ROAD IMPROVEMENT WORKS OF THE DEVELOPMENT (SUBJECT TO REVIEW)
- EXTENT OF VISUAL IMPACT

Revision	Date	Description	Initial
C	01FEB19	FINAL LVIA ISSUE 2	CI
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Initial	CI	TO	AC	CI
Date	04/18	04/18	04/18	04/18

Approved

Agreement no.
CE 13/2017 (CE)

Project Title
SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG - FEASIBILITY STUDY

Drawing Title
PHOTOMONTAGE VIEWPOINT VP2: VIEW FROM YUEN LONG INDUSTRIAL ESTATE (2 OF 2)

Figure No.
196587/B&V/LVIA/012b

Scale
NTS (A3)

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

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Plot Date = 06/Jun/2019

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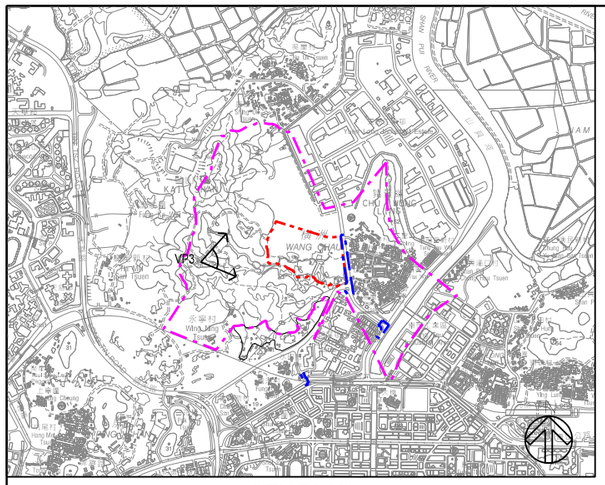

KEY PLAN

DAY 1 WITHOUT MITIGATION MEASURES

EXISTING CONDITIONS

LEGEND

- BOUNDARY OF THE SITE (SUBJECT TO REVIEW)
- BOUNDARY FOR ROAD IMPROVEMENT WORKS OF THE DEVELOPMENT (SUBJECT TO REVIEW)
- EXTENT OF VISUAL IMPACT

Revision	Date	Description	Initial
D	03JUN19	FINAL LVIA ISSUE 4	CI
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Approved

Agreement no.
CE 13/2017 (CE)

Project Title
SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG - FEASIBILITY STUDY

Drawing Title
PHOTOMONTAGE VIEWPOINT VP3: VIEW FROM HIKING TRAIL ON KAI SHAN (1 OF 2)

Figure No.
196587/B&V/LVIA/013a

Scale
NTS (A3)

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Plot Date = 28/Jun/2019

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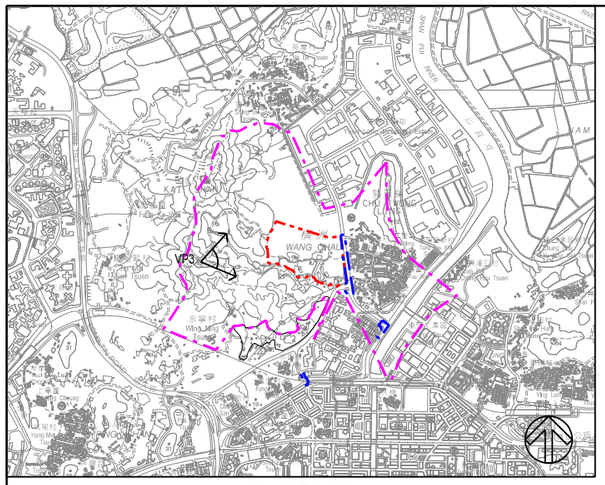

KEY PLAN

Proposed Operation Phase Landscape and Visual Mitigation Measures

ID No.	Landscape and Visual Mitigation Measure
OM1	Sensitive design of buildings in terms of scale, height and bulk (visual weight).
OM2	Use of appropriate building materials and colours to complement surroundings.

YEAR 10 WITH MITIGATION MEASURES

DAY 1 WITH MITIGATION MEASURES

LEGEND

- BOUNDARY OF THE SITE (SUBJECT TO REVIEW)
- BOUNDARY FOR ROAD IMPROVEMENT WORKS OF THE DEVELOPMENT (SUBJECT TO REVIEW)
- EXTENT OF VISUAL IMPACT

Revision	Date	Description	Initial
D	03JUN19	FINAL LVIA ISSUE 4	CI
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Initial	CI	TO	AC	CI
Date	04/18	04/18	04/18	04/18

Approved

Agreement no.
CE 13/2017 (CE)

Project Title
SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG - FEASIBILITY STUDY

Drawing Title
PHOTOMONTAGE VIEWPOINT VP3: VIEW FROM HIKING TRAIL ON KAI SHAN (2 OF 2)

Figure No.
196587/B&V/LVIA/013b

Scale
NTS (A3)

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Plot Date = 28/Jun/2019

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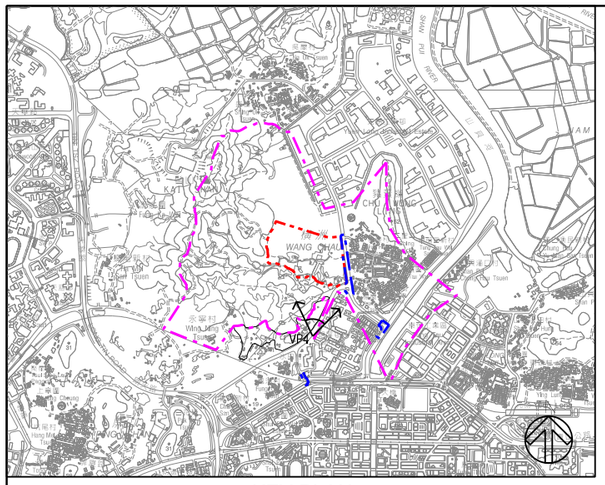

KEY PLAN

LEGEND

BOUNDARY OF THE SITE (SUBJECT TO REVIEW)

BOUNDARY FOR ROAD IMPROVEMENT WORKS OF THE DEVELOPMENT (SUBJECT TO REVIEW)

EXTENT OF VISUAL IMPACT

DAY 1 WITHOUT MITIGATION MEASURES

WANG CHAU PHASE 1 DEVELOPMENT

EXISTING CONDITIONS

Revision	Date	Description	Initial
C	01FEB19	FINAL LVIA ISSUE 2	CI
B	13DEC18	FINAL LVIA ISSUE 1	CI
A	17JUL18	ISSUE 2	CI

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Approved

Agreement no.
CE 13/2017 (CE)

Project Title
SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG - FEASIBILITY STUDY

Drawing Title
PHOTOMONTAGE VIEWPOINT VP4: VIEW FROM LONG PING ROAD (1 OF 2)

Figure No.
196587/B&V/LVIA/014a

Scale
NTS (A3)

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Plot Date = 06/Jun/2019

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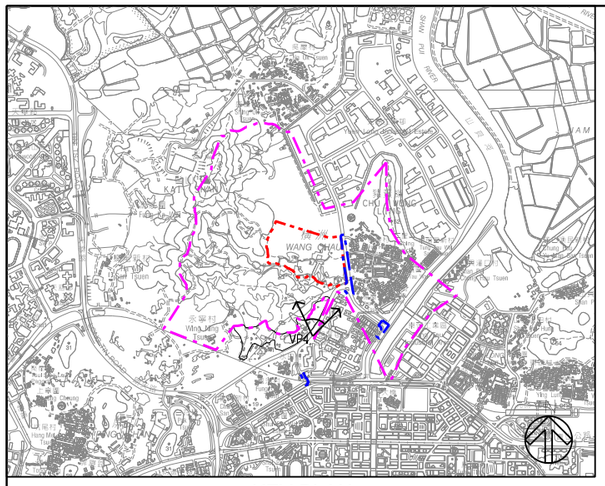

KEY PLAN

Proposed Operation Phase Landscape and Visual Mitigation Measures

ID No.	Landscape and Visual Mitigation Measure
OM1	Sensitive design of buildings in terms of scale, height and bulk (visual weight).
OM2	Use of appropriate building materials and colours to complement surroundings.

YEAR 10 WITH MITIGATION MEASURES

DAY 1 WITH MITIGATION MEASURES

LEGEND

- BOUNDARY OF THE SITE (SUBJECT TO REVIEW)
- BOUNDARY FOR ROAD IMPROVEMENT WORKS OF THE DEVELOPMENT (SUBJECT TO REVIEW)
- EXTENT OF VISUAL IMPACT

Revision	Date	Description	Initial
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Agreement no.
CE 13/2017 (CE)

Project Title
SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG - FEASIBILITY STUDY

Drawing Title
PHOTOMONTAGE VIEWPOINT VP4: VIEW FROM LONG PING ROAD (2 OF 2)

Figure No.
196587/B&V/LVIA/014b

Scale
NTS (A3)

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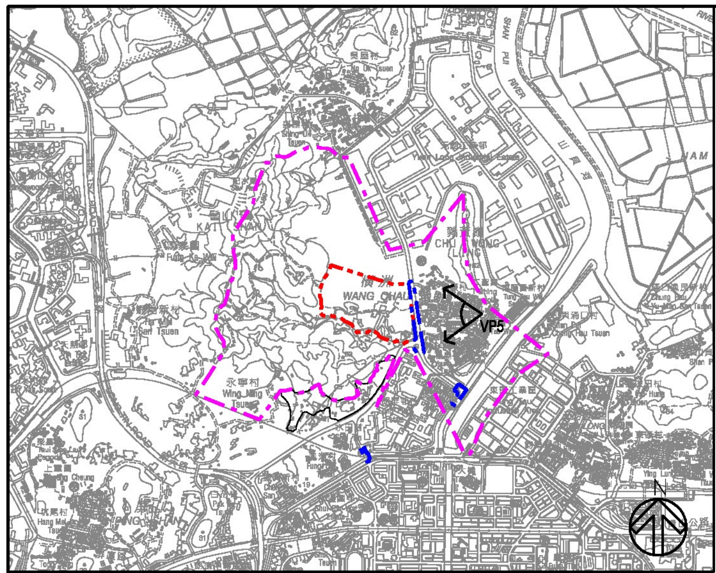

KEY PLAN

EXISTING CONDITIONS

DAY 1 WITHOUT MITIGATION MEASURES

LEGEND

- BOUNDARY OF THE SITE (SUBJECT TO REVIEW)
- BOUNDARY FOR ROAD IMPROVEMENT WORKS OF THE DEVELOPMENT (SUBJECT TO REVIEW)
- EXTENT OF VISUAL IMPACT

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Agreement no.

CE 13/2017 (CE)

Project Title

SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG - FEASIBILITY STUDY

Drawing Title

PHOTOMONTAGE VIEWPOINT VP5: VIEW FROM SAI TAU WAI (1 OF 2)

Figure No.

196587/B&V/LVIA/015a

Scale

NTS (A3)

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Urbis Limited
Planning, Urban Design, Landscape, Golf & Environmental Consultants

Plot Date - 06/Jun/2019

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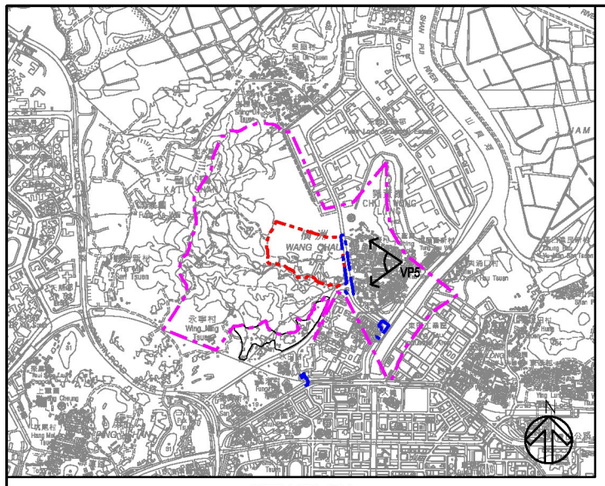
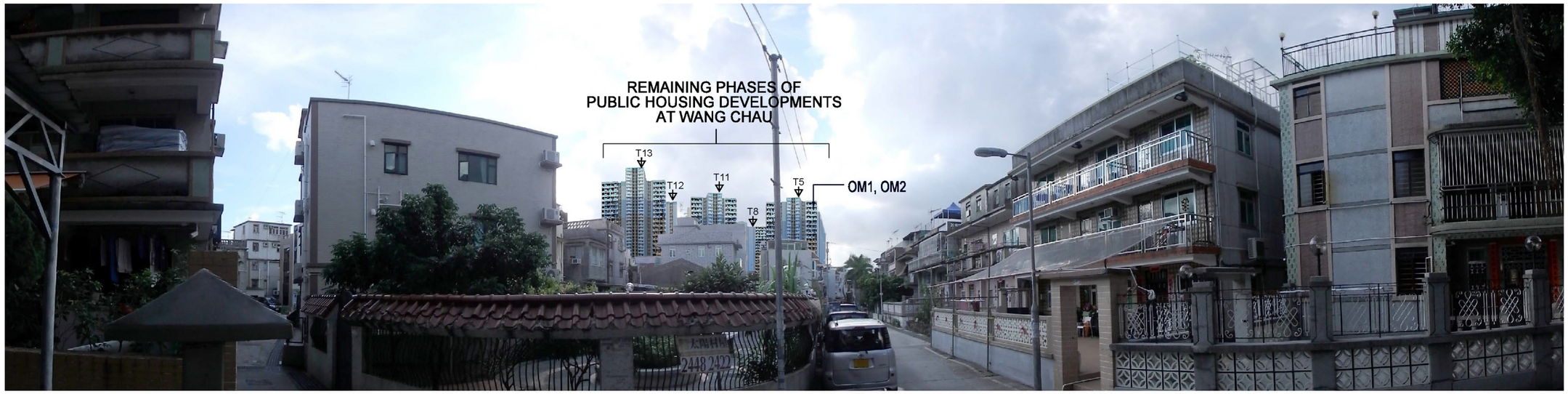


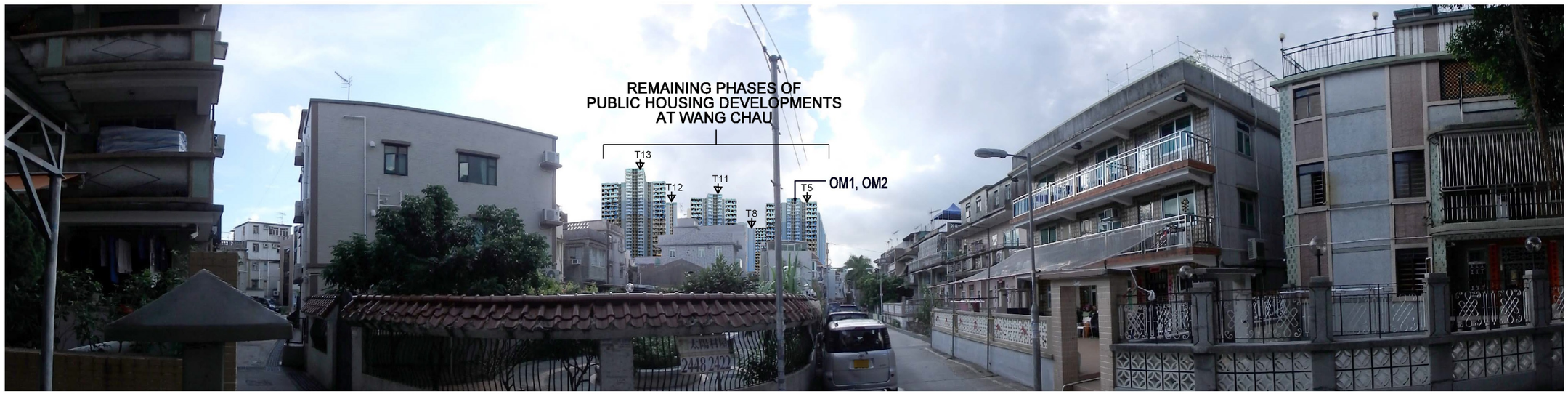
KEY PLAN

Proposed Operation Phase Landscape and Visual Mitigation Measures

ID No.	Landscape and Visual Mitigation Measure
OM1	Sensitive design of buildings in terms of scale, height and bulk (visual weight).
OM2	Use of appropriate building materials and colours to complement surroundings.



DAY 1 WITH MITIGATION MEASURES



YEAR 10 WITH MITIGATION MEASURES

LEGEND

- BOUNDARY OF THE SITE (SUBJECT TO REVIEW)
- BOUNDARY FOR ROAD IMPROVEMENT WORKS OF THE DEVELOPMENT (SUBJECT TO REVIEW)
- EXTENT OF VISUAL IMPACT

Revision	Date	Description	Initial
C	01FEB19	FINAL LVIA ISSUE 2	CI
B	13DEC18	FINAL LVIA ISSUE 1	CI
A	17JUL18	ISSUE 2	CI

	Designed	Checked	Drawn	Checked
Initial	CI	TO	AC	CI
Date	04/18	04/18	04/18	04/18

Approved

Agreement no.
CE 13/2017 (CE)

Project Title
SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG - FEASIBILITY STUDY

Drawing Title
PHOTOMONTAGE VIEWPOINT VP5: VIEW FROM SAI TAU WAI (2 OF 2)

Figure No.
196587/B&V/LVIA/015b

Scale
NTS (A3)

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

BLACK & VEATCH HONG KONG LIMITED
博威工程顧問有限公司

Urbis Limited
Planning, Urban Design, Landscape, Golf & Environmental Consultants
Urbis Limited, 11/F Siu On Centre, 188 Lockhart Road, Wan Chai, Hong Kong. Tel 3182 3333 Fax 3182 3182

Plot Date = 06/Jun/2019

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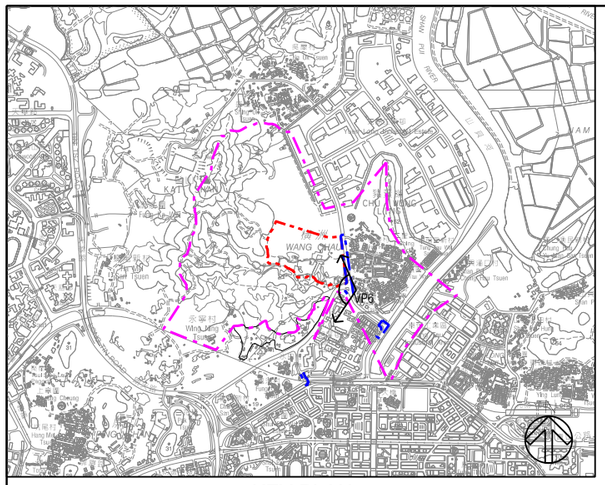
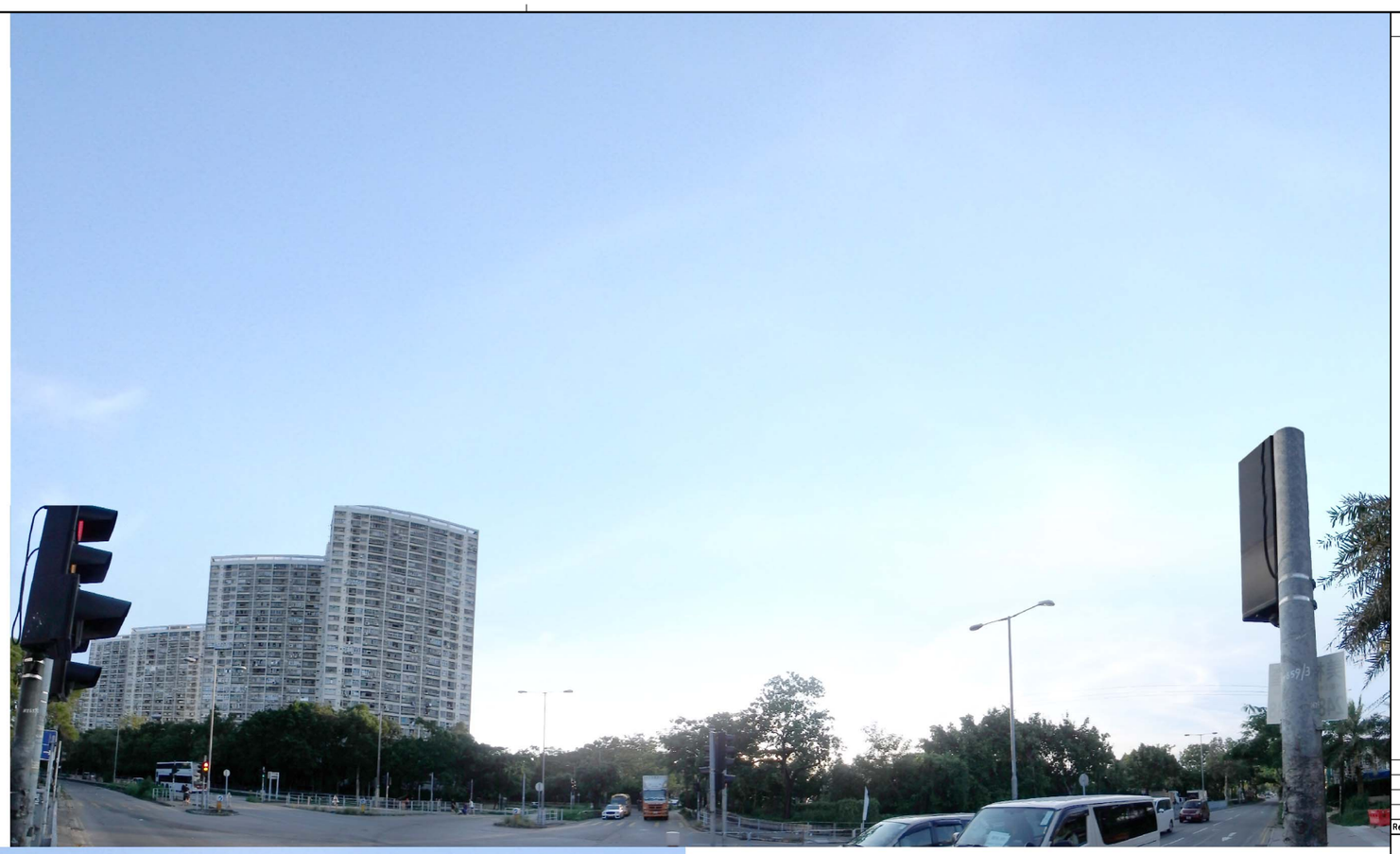


KEY PLAN



EXISTING CONDITIONS

DAY 1 WITHOUT MITIGATION MEASURES

LEGEND

- BOUNDARY OF THE SITE (SUBJECT TO REVIEW)
- BOUNDARY FOR ROAD IMPROVEMENT WORKS OF THE DEVELOPMENT (SUBJECT TO REVIEW)
- EXTENT OF VISUAL IMPACT

Revision	Date	Description	Initial
D	03JUN19	FINAL LVIA ISSUE 4	CI
C	01FEB19	FINAL LVIA ISSUE 2	CI
B	13DEC18	FINAL LVIA ISSUE 1	CI
A	17JUL18	ISSUE 2	CI

	Designed	Checked	Drawn	Checked
Initial	CI	TO	AC	CI
Date	04/18	04/18	04/18	04/18

Approved

Agreement no.
CE 13/2017 (CE)

Project Title
SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG - FEASIBILITY STUDY

Drawing Title
PHOTOMONTAGE VIEWPOINT VP6: VIEW FROM FUK HI STREET (1 OF 2)

Figure No.
196587/B&V/LVIA/016a

Scale
NTS (A3)

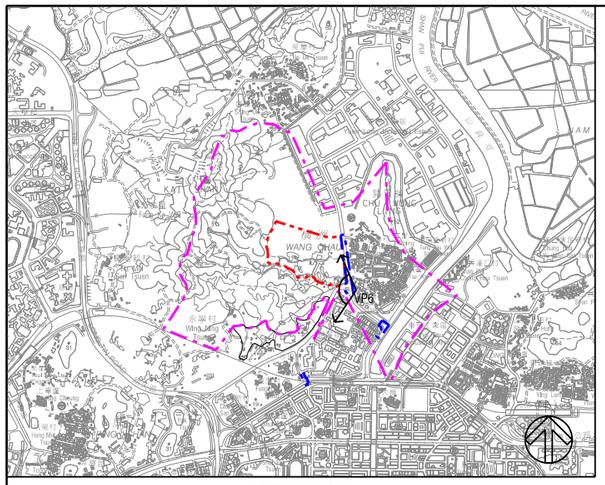
土木工程拓展署
CEDD Civil Engineering and Development Department

BLACK & VEATCH HONG KONG LIMITED
博威工程顧問有限公司

Planning, Urban Design, Landscape, Golf & Environmental Consultants
Urbis Limited, 11/F Siu On Centre, 188 Lockhart Road, Wan Chai, Hong Kong. Tel 2802 2331 Fax 2802 5662

Plot Date = 28/Jun/2019

CAD Filename = I:\BP15\DGN-GA\Preliminary LVIA\Final LVIA issue 4\196587B&VLVIA_016a.dgn



KEY PLAN

YEAR 10 WITH MITIGATION MEASURES

DAY 1 WITH MITIGATION MEASURES

Proposed Operation Phase Landscape and Visual Mitigation Measures

ID No.	Landscape and Visual Mitigation Measure
OM1	Sensitive design of buildings in terms of scale, height and bulk (visual weight).
OM2	Use of appropriate building materials and colours to complement surroundings.
OM3	Road lighting units to be directional and minimise unnecessary light spill and glare.
OM5	Compensatory tree planting shall be provided at 1:1 ratio as far as possible based on felled tree numbers and to the satisfaction of relevant Government departments. Required numbers and locations of compensatory trees shall be determined and agreed separately with Government during the Tree Felling Application process under Development Bureau Technical Circular (Works) No. 7/2015 - Tree Preservation.
OM7	Streetscape (e.g. paving, signage, street furniture, lighting etc.) shall be sensitively designed in a manner that responds to the existing context, and minimises potential adverse landscape and visual impacts.
OM8	Provision of amenity landscape area and new tree planting (approximately 640 nos.) within the HKHA Site.
OM9	Aesthetic design of noise barriers along Fuk Hi Street.

LEGEND

- BOUNDARY OF THE SITE (SUBJECT TO REVIEW)
- BOUNDARY FOR ROAD IMPROVEMENT WORKS OF THE DEVELOPMENT (SUBJECT TO REVIEW)
- EXTENT OF VISUAL IMPACT

Revision	Date	Description	Initial
D	03JUN19	FINAL LVIA ISSUE 4	CI
C	01FEB19	FINAL LVIA ISSUE 2	CI
B	13DEC18	FINAL LVIA ISSUE 1	CI
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Date	04/18	04/18	04/18	04/18

Approved

Agreement no.
CE 13/2017 (CE)

Project Title
SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG - FEASIBILITY STUDY

Drawing Title
PHOTOMONTAGE VIEWPOINT VP6: VIEW FROM FUK HI STREET (2 OF 2)

Figure No.
196587/B&V/LVIA/016b

Scale
NTS (A3)

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

BLACK & VEATCH HONG KONG LIMITED
博威工程顧問有限公司

Urbis Limited
Planning, Urban Design, Landscape, Golf & Environmental Consultants
Urbis Limited, 11/F Siu On Centre, 188 Lockhart Road, Wan Chai, Hong Kong. Tel 2802 2331 Fax 2802 5662

Plot Date = 28/Jun/2019

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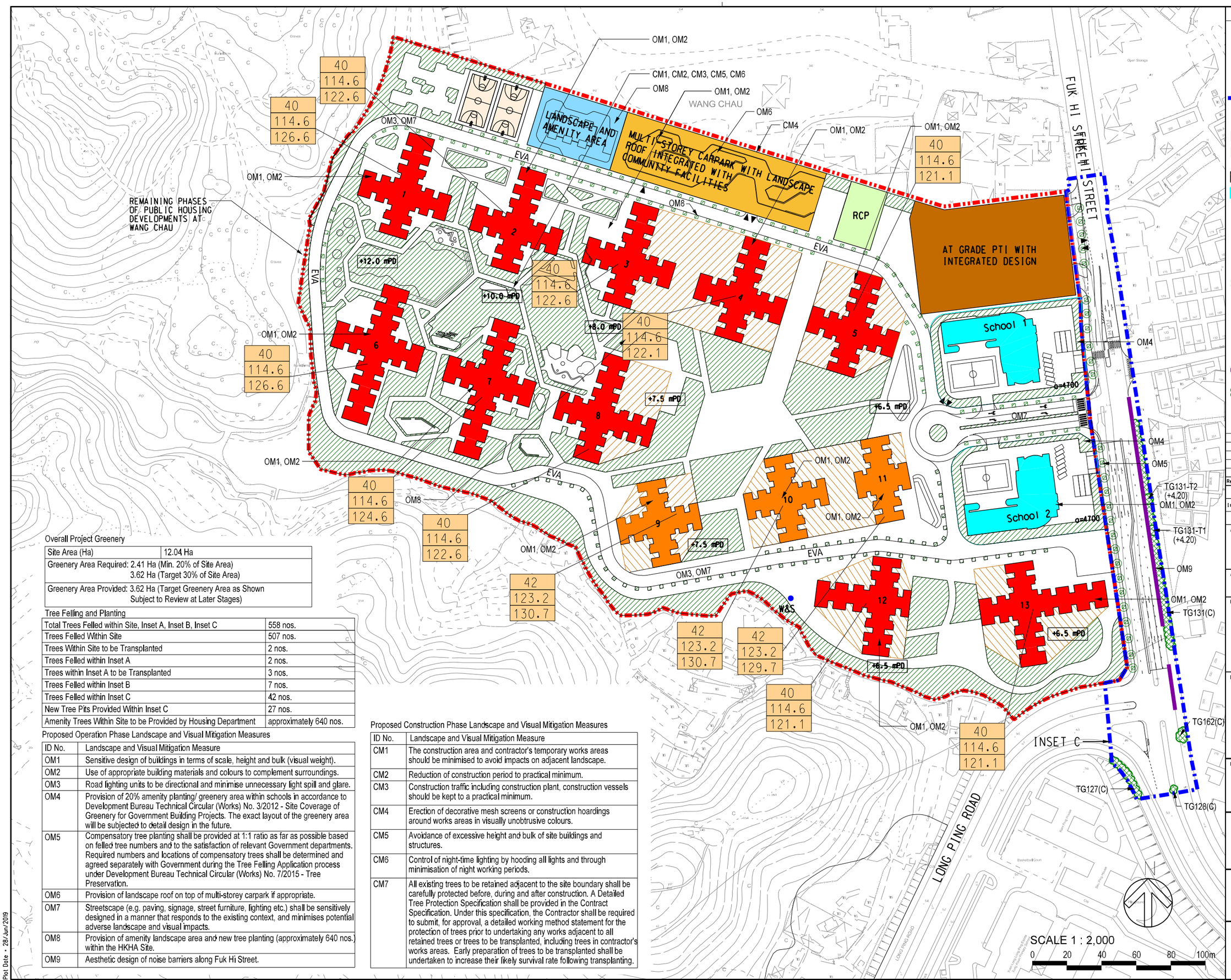

LEGEND

- SITE BOUNDARY FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU (SUBJECT TO REVIEW)
- BOUNDARY FOR ROAD IMPROVEMENT WORKS OF THE DEVELOPMENT (SUBJECT TO REVIEW)
- RESIDENTIAL BLOCK (41 STOREYS)
- RESIDENTIAL BLOCK (44 STOREYS (WITH 1 REFUGE FLOOR))
- RETAIL
- G/IC FACILITY
- 40 / 114.6 / 123.6 — NO. OF DOMESTIC STOREYS (EXCL. PODIUM/LOBBY) / BUILDING HEIGHT (METERS) / mPD OF BUILDING (METERS)
- WELL AND SHRINE (TO BE RETAINED IN SITU AS FAR AS POSSIBLE)
- NOTIONAL POTENTIAL GREENERY AREA
- TREE PIT (STREETSCAPE TREE PLANTING), OM5
- +6.5mPD — PROPOSED LEVELS
- OM8 TREE PIT WITHIN SITE
- PROPOSED 4m VERTICAL BARRIER
- EXISTING TREES TO BE RETAINED

Revision	Date	Description	Initial
E	03JUN19	FINAL LVIA ISSUE 4	CI
D	17APR19	FINAL LVIA ISSUE 3	CI
C	01FEB19	FINAL LVIA ISSUE 2	CI
B	13DEC18	FINAL LVIA ISSUE 1	CI
A	17JUL18	ISSUE 2	CI

	Designed	Checked	Drawn	Checked
Initial	CI	TO	AC	CI
Date	04/18	04/18	04/18	04/18

Approved

Agreement no.
CE 13/2017 (CE)

Project Title
SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG - FEASIBILITY STUDY

Drawing Title
LANDSCAPE AND VISUAL MITIGATION MEASURES

Figure No.
196587/B&V/LVIA/017

Scale
1 : 2000 (A3)

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

BLACK & VEATCH HONG KONG LIMITED
博威工程顧問有限公司

Urbis Limited
Planning, Urban Design, Landscape, Golf & Environmental Consultants
Urbis Limited, 11/F Siu On Centre, 188 Lockhart Road, Wan Chai, Hong Kong. Tel 2802 3333 Fax 2802 0662

Overall Project Greenery

Site Area (Ha)	12.04 Ha
Greenery Area Required: 2.41 Ha (Min. 20% of Site Area) 3.62 Ha (Target 30% of Site Area)	
Greenery Area Provided: 3.62 Ha (Target Greenery Area as Shown Subject to Review at Later Stages)	

Tree Felling and Planting

Total Trees Felled within Site, Inset A, Inset B, Inset C	558 nos.
Trees Felled Within Site	507 nos.
Trees Within Site to be Transplanted	2 nos.
Trees Felled within Inset A	2 nos.
Trees within Inset A to be Transplanted	3 nos.
Trees Felled within Inset B	7 nos.
Trees Felled within Inset C	42 nos.
New Tree Pits Provided Within Inset C	27 nos.
Amenity Trees Within Site to be Provided by Housing Department	approximately 640 nos.

Proposed Operation Phase Landscape and Visual Mitigation Measures

ID No.	Landscape and Visual Mitigation Measure
OM1	Sensitive design of buildings in terms of scale, height and bulk (visual weight).
OM2	Use of appropriate building materials and colours to complement surroundings.
OM3	Road lighting units to be directional and minimise unnecessary light spill and glare.
OM4	Provision of 20% amenity planting/ greenery area within schools in accordance to Development Bureau Technical Circular (Works) No. 3/2012 - Site Coverage of Greenery for Government Building Projects. The exact layout of the greenery area will be subjected to detail design in the future.
OM5	Compensatory tree planting shall be provided at 1:1 ratio as far as possible based on felled tree numbers and to the satisfaction of relevant Government departments. Required numbers and locations of compensatory trees shall be determined and agreed separately with Government during the Tree Felling Application process under Development Bureau Technical Circular (Works) No. 7/2015 - Tree Preservation.
OM6	Provision of landscape roof on top of multi-storey carpark if appropriate.
OM7	Streetscape (e.g. paving, signage, street furniture, lighting etc.) shall be sensitively designed in a manner that responds to the existing context, and minimises potential adverse landscape and visual impacts.
OM8	Provision of amenity landscape area and new tree planting (approximately 640 nos.) within the HKHA Site.
OM9	Aesthetic design of noise barriers along Fuk Hi Street.

Proposed Construction Phase Landscape and Visual Mitigation Measures

ID No.	Landscape and Visual Mitigation Measure
CM1	The construction area and contractor's temporary works areas should be minimised to avoid impacts on adjacent landscape.
CM2	Reduction of construction period to practical minimum.
CM3	Construction traffic including construction plant, construction vessels should be kept to a practical minimum.
CM4	Erection of decorative mesh screens or construction hoardings around works areas in visually unobtrusive colours.
CM5	Avoidance of excessive height and bulk of site buildings and structures.
CM6	Control of night-time lighting by hooding all lights and through minimisation of night working periods.
CM7	All existing trees to be retained adjacent to the site boundary shall be carefully protected before, during and after construction. A Detailed Tree Protection Specification shall be provided in the Contract Specification. Under this specification, the Contractor shall be required to submit, for approval, a detailed working method statement for the protection of trees prior to undertaking any works adjacent to all retained trees or trees to be transplanted, including trees in contractor's works areas. Early preparation of trees to be transplanted shall be undertaken to increase their likely survival rate following transplanting.

Plot Date = 28/Jun/2019

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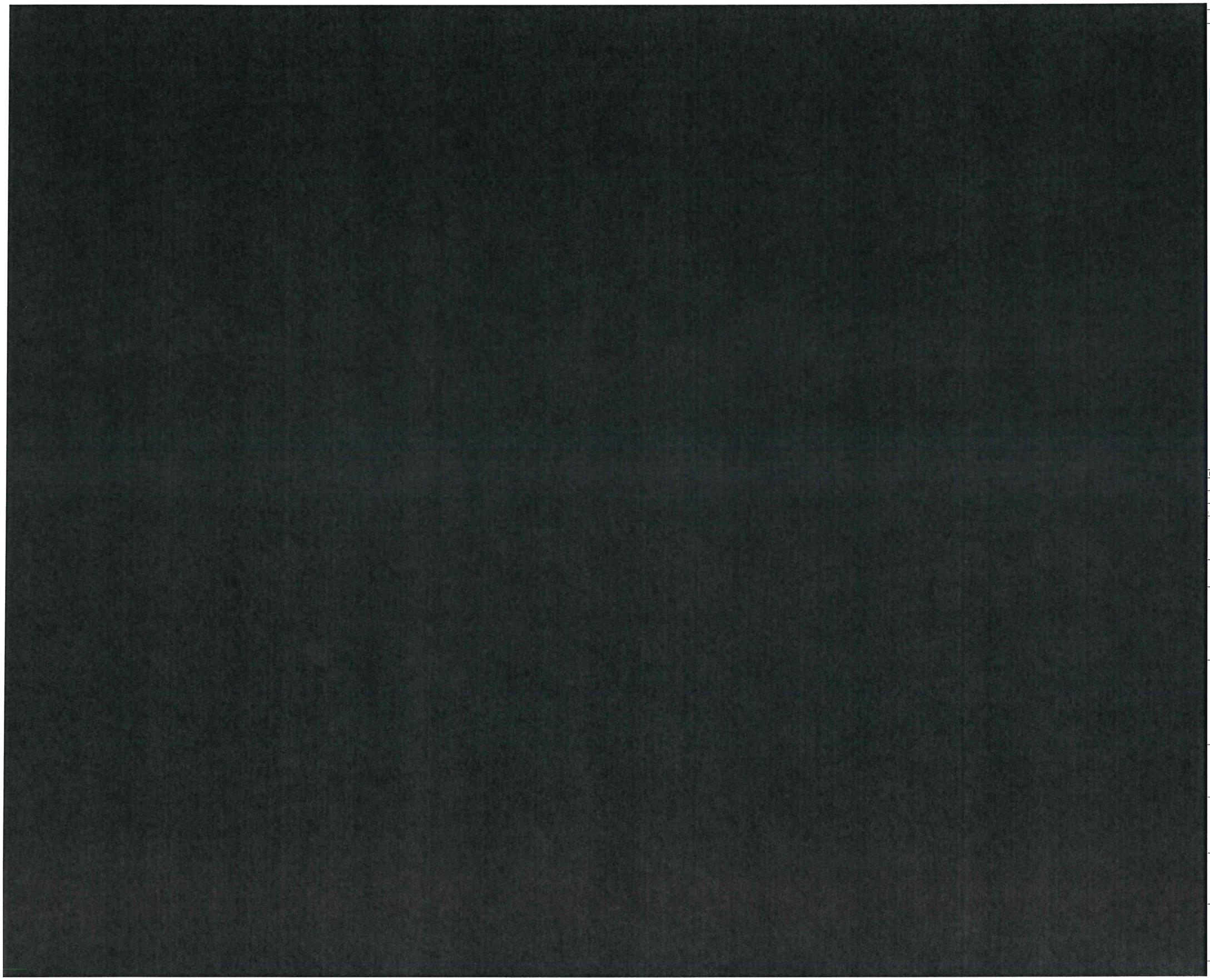

LEGEND:

BOUNDARY OF THE ASSESSMENT AREA (SUBJECT TO REVIEW)

PHOTO TAKING AREA WITH AREA NO.

Revision	Date	Description			Initial
	Designed	Checked	Drawn	Checked	
Initial					
Date					

Approved

Agreement no.

CE 13/2017 (CE)

Preject Title

SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG– FEASIBILITY STUDY

Drawing Title

SITE INSPECTION LOCATION

Drawing No.

196587/B&V/FR/LCRS/001

Scale

土木工程拓展署
Civil Engineering and Development Department

BLACK & VEATCH HONG KONG LIMITED
博威工程顧問有限公司

Sub Consultant:

RAMBOLL

LEGEND:

- BOUNDARY OF THE SITE (SUBJECT TO REVIEW)
- PLANNED WANG CHAU (PHASE 1) DEVELOPMENT
- RETAIL
- EXPECTED WIND FLOW (PEDESTRIAN WIND)
- EXSTING BREEZEWAY
- WIND CORRIDOR
- PORTION OF COVERED PTI WITHOUT SIDE WALL
- ANNUAL WIND

N

ANNUAL WIND (E)

820 000 E | 820 200 E | 820 400 E | 820 600 E

835 200 N | 835 000 N | 834 800 N

横洲
WANG CHAU

LANDSCAPE AND AMENITY AREA

MULTI-STOREY CARPARK WITH LANDSCAPE ROOF INTEGRATED WITH COMMUNITY FACILITIES

RCP

AT GRADE PTI WITH INTEGRATED DESIGN

FUK HIK STREET

School 1

School 2

26m

a=4700

EVA

15m

+12.0 mPD

+10.0 mPD

+8.0 mPD

28m

+6.5 mPD

+7.5 mPD

13°

15°

18m

21m

W&S

1 2 3 4 5 6 7 8 9 10 11 12 13

横洲西頭圖
WANG CHAU SAI TAU WAI

Revision	Date	Description		Initial
	Designed	Checked	Drawn	Checked
Initial	WT	KC	SZ	-
Date	07/19	07/19	07/19	07/19

Approved

Agreement no.
CE 13/2017 (CE)

Project Title
SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG - FEASIBILITY STUDY

Drawing Title
ILLUSTRATION OF WIND FLOW FROM EAST DIRECRION

Drawing No.
196587/B&V/AVA/008

Scale
1 : 1000 (A1)
1 : 2000 (A3)

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

BLACK & VEATCH HONG KONG LIMITED
博威工程顧問有限公司

Plot Date = 7/18/2019

CAD Filename = Y:\Daily Work\20190712e\196587-B&V-AVA-008.dgn

LEGEND:

- BOUNDARY OF THE SITE (SUBJECT TO REVIEW)
- PLANNED WANG CHAU (PHASE 1) DEVELOPMENT
- RETAIL
- EXPECTED WIND FLOW (PEDESTRIAN WIND)
- EXSTING BREEZEWAY
- WIND CORRIDOR
- PORTION OF COVERED PTI WITHOUT SIDE WALL
- ANNUAL WIND

820 000 E
820 200 E
820 400 E
820 600 E
835 200 N
835 000 N
834 800 N

N

ANNUAL WIND
(NNE & NE)

横洲
WANG CHAU

LANDSCAPE AND AMENITY AREA

MULTI-STOREY CARPARK WITH LANDSCAPE ROOF INTEGRATED WITH COMMUNITY FACILITIES

RCP

AT GRADE PTI WITH INTEGRATED DESIGN

FUK HI STREET

EVA

15m

28m

26m

18m

21m

+12.0 mPD
+10.0 mPD
+8.0 mPD
+7.5 mPD
+6.5 mPD

13°

1
2
3
4
5
6
7
8
9
10
11
12
13

School 1
School 2
a=4700

W&S

横洲西頭圖
WANG CHAU SAI TAU WAI

Revision	Date	Description		Initial
	Designed	Checked	Drawn	Checked
Initial	WT	KC	SZ	-
Date	07/19	07/19	07/19	07/19

Approved

Agreement no.
CE 13/2017 (CE)

Project Title
SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG - FEASIBILITY STUDY

Drawing Title
ILLUSTRATION OF WIND FLOW FROM NNE AND NE DIRECTIONS

Drawing No.
196587/B&V/AVA/009

Scale
1 : 1000 (A1)
1 : 2000 (A3)

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

BLACK & VEATCH HONG KONG LIMITED
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Plot Date = 7/18/2019
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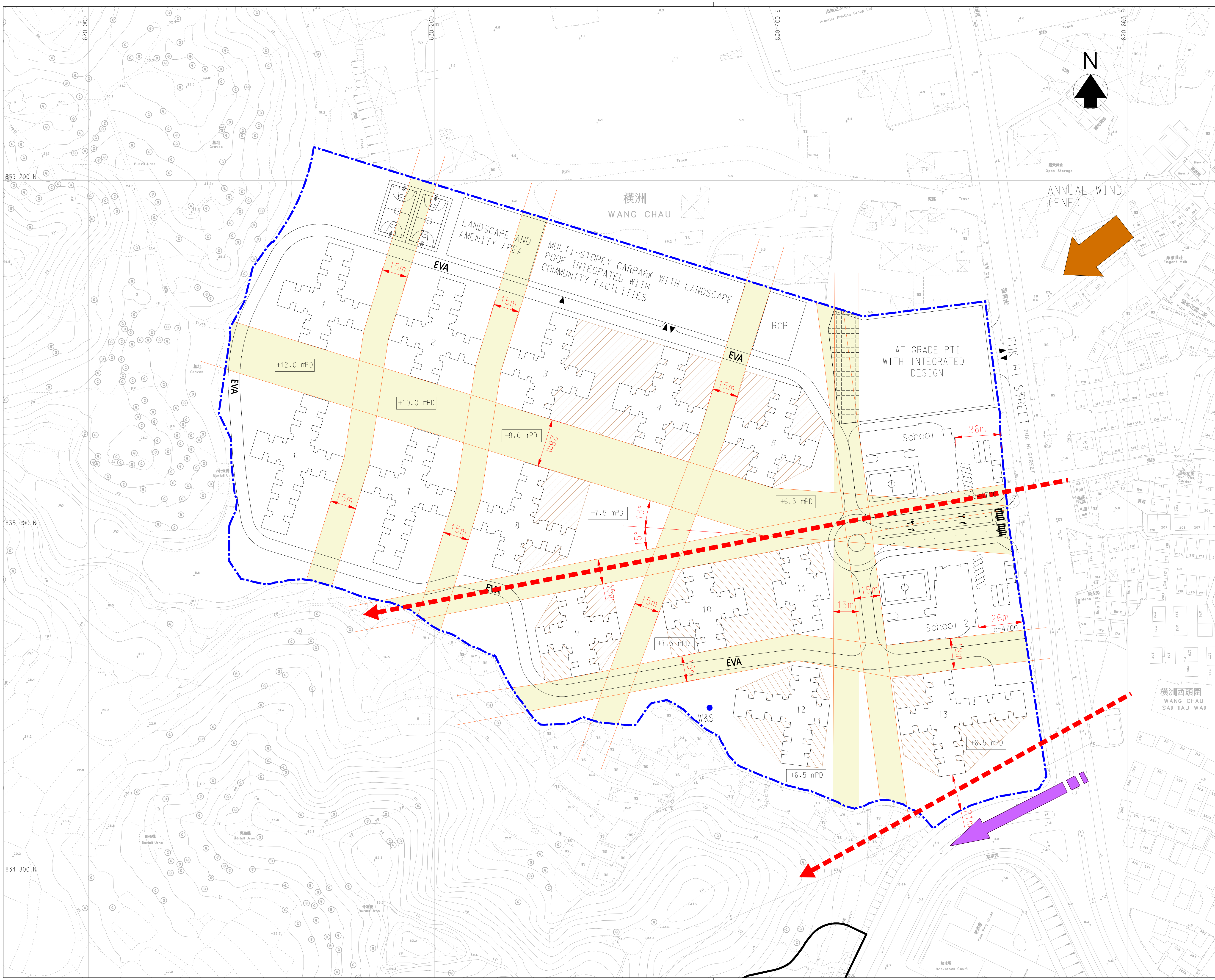

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LEGEND:

- BOUNDARY OF THE SITE (SUBJECT TO REVIEW)
- PLANNED WANG CHAU (PHASE 1) DEVELOPMENT
- RETAIL
- EXPECTED WIND FLOW (PEDESTRIAN WIND)
- EXSTING BREEZEWAY
- WIND CORRIDOR
- PORTION OF COVERED PTI WITHOUT SIDE WALL
- ANNUAL WIND

Revision	Date	Description	Initial

	Designed	Checked	Drawn	Checked
Initial	WT	KC	SZ	-
Date	07/19	07/19	07/19	07/19

Approved

Agreement no.
CE 13/2017 (CE)

Project Title
SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG - FEASIBILITY STUDY

Drawing Title
ILLUSTRATION OF WIND FLOW FROM ENE DIRECTION

Drawing No. 196587/B&V/AVA/010

Scale 1 : 1000 (A1) 1 : 2000 (A3)

土木工程拓展署
Civil Engineering and Development Department

BLACK & VEATCH HONG KONG LIMITED
博威工程顧問有限公司

Plot Date : 7/18/2019

CAD Filename : Y:\Daily Work\20190712e\196587-B&V-AVA-010.dgn

820 000 E | 820 200 E | 820 400 E | 820 600 E

835 200 N | 835 000 N | 834 800 N

N

LEGEND:

- BOUNDARY OF THE SITE (SUBJECT TO REVIEW)
- PLANNED WANG CHAU (PHASE 1) DEVELOPMENT
- RETAIL
- EXPECTED WIND FLOW (PEDESTRIAN WIND)
- EXSTING BREEZEWAY
- WIND CORRIDOR
- PORTION OF COVERED PTI WITHOUT SIDE WALL
- ANNUAL WIND
- SUMMER WIND

横洲
WANG CHAU

LANDSCAPE AND AMENITY AREA

MULTI-STOREY CARPARK WITH LANDSCAPE ROOF INTEGRATED WITH COMMUNITY FACILITIES

RCP

AT GRADE PTI WITH INTEGRATED DESIGN

FUK HI STREET

School 1

School 2

EVA

15m

28m

26m

18m

21m

+12.0 mPD

+10.0 mPD

+8.0 mPD

+7.5 mPD

+6.5 mPD

13°

15°

W&S

ANNUAL / SUMMER WIND (S)

SUMMER WIND (SSE)

横洲西頭圖
WANG CHAU SAI TAU WAI

Revision	Date	Description		Initial
	Designed	Checked	Drawn	Checked
Initial	WT	KC	SZ	-
Date	07/19	07/19	07/19	07/19

Approved

Agreement no.
CE 13/2017 (CE)

Project Title
SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG - FEASIBILITY STUDY

Drawing Title
ILLUSTRATION OF WIND FLOW FROM S AND SSE DIRECTIONS

Drawing No.
196587/B&V/AVA/011

Scale
1 : 1000 (A1)
1 : 2000 (A3)

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

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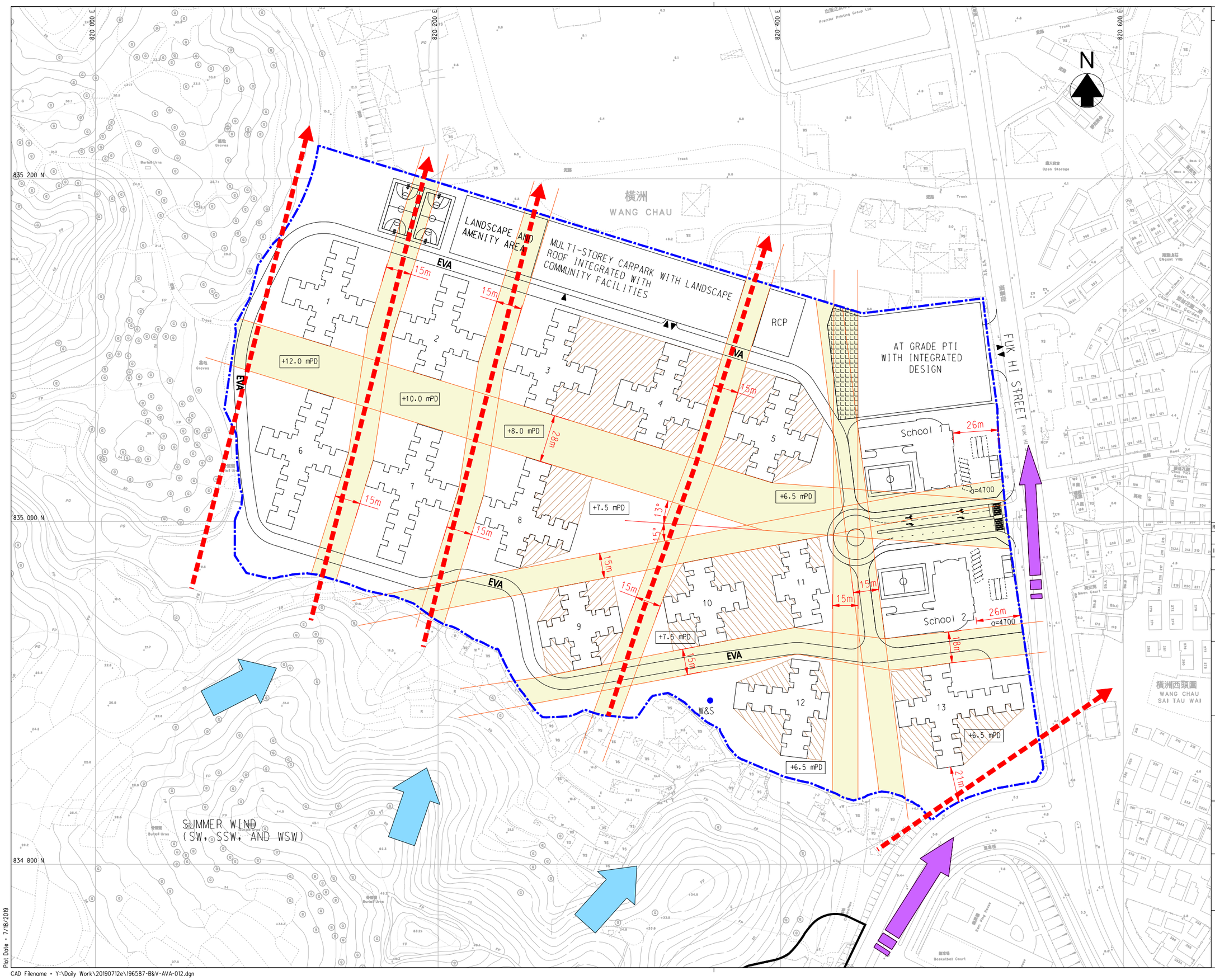

LEGEND:

- BOUNDARY OF THE SITE (SUBJECT TO REVIEW)
- PLANNED WANG CHAU (PHASE 1) DEVELOPMENT
- RETAIL
- EXPECTED WIND FLOW (PEDESTRIAN WIND)
- EXSTING BREEZEWAY
- WIND CORRIDOR
- PORTION OF COVERED PTI WITHOUT SIDE WALL
- SUMMER WIND

Revision	Date	Description		Initial
	Designed	Checked	Drawn	Checked
Initial	WT	KC	SZ	-
Date	07/19	07/19	07/19	07/19

Approved

Agreement no.
CE 13/2017 (CE)

Project Title
SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG - FEASIBILITY STUDY

Drawing Title
ILLUSTRATION OF WIND FLOW FROM SW, SSW AND WSW DIRECTIONS

Drawing No.
196587/B&V/AVA/012

Scale
1 : 1000 (A1)
1 : 2000 (A3)

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

BLACK & VEATCH HONG KONG LIMITED
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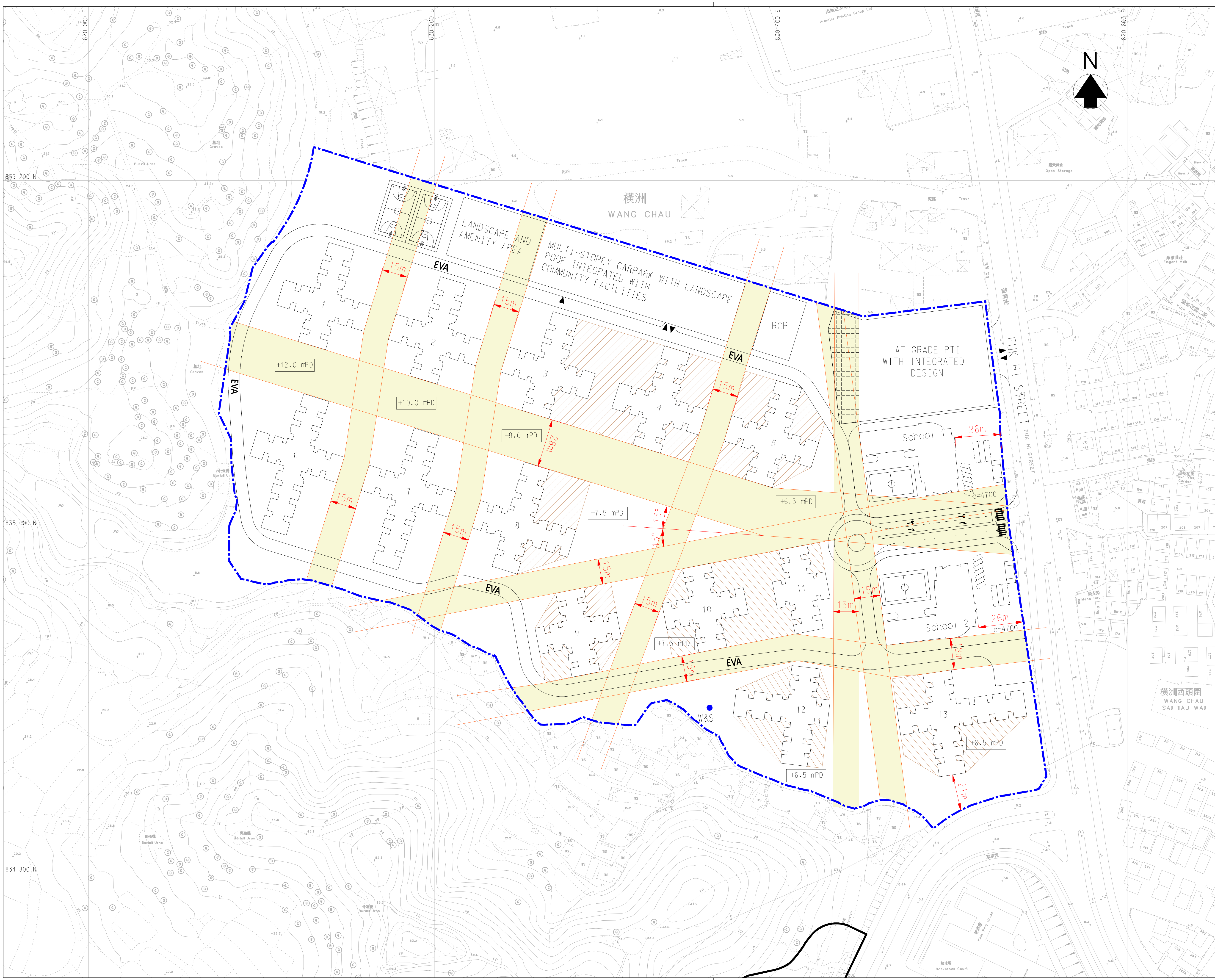
Plot Date = 7/18/2019

CAD Filename = Y:\Daily Work\20190712e\196587-B&V-AVA-012.dgn



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LEGEND:

- BOUNDARY OF THE SITE (SUBJECT TO REVIEW)
- PLANNED WANG CHAU (PHASE 1) DEVELOPMENT
- RETAIL
- WIND CORRIDOR
- PORTION OF COVERED PTI WITHOUT SIDE WALL

Revision	Date	Description	Initial

	Designed	Checked	Drawn	Checked
Initial	WT	KC	SZ	-
Date	07/19	07/19	07/19	07/19

Approved

Agreement no.
CE 13/2017 (CE)

Project Title
SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG - FEASIBILITY STUDY

Drawing Title
DETAILED INFORMATION OF THE PROPOSED MEASURES

Drawing No.
196587/B&V/AVA/013

Scale
1 : 1000 (A1)
1 : 2000 (A3)

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

BLACK & VEATCH HONG KONG LIMITED
博威工程顧問有限公司

Plot Date : 7/18/2019
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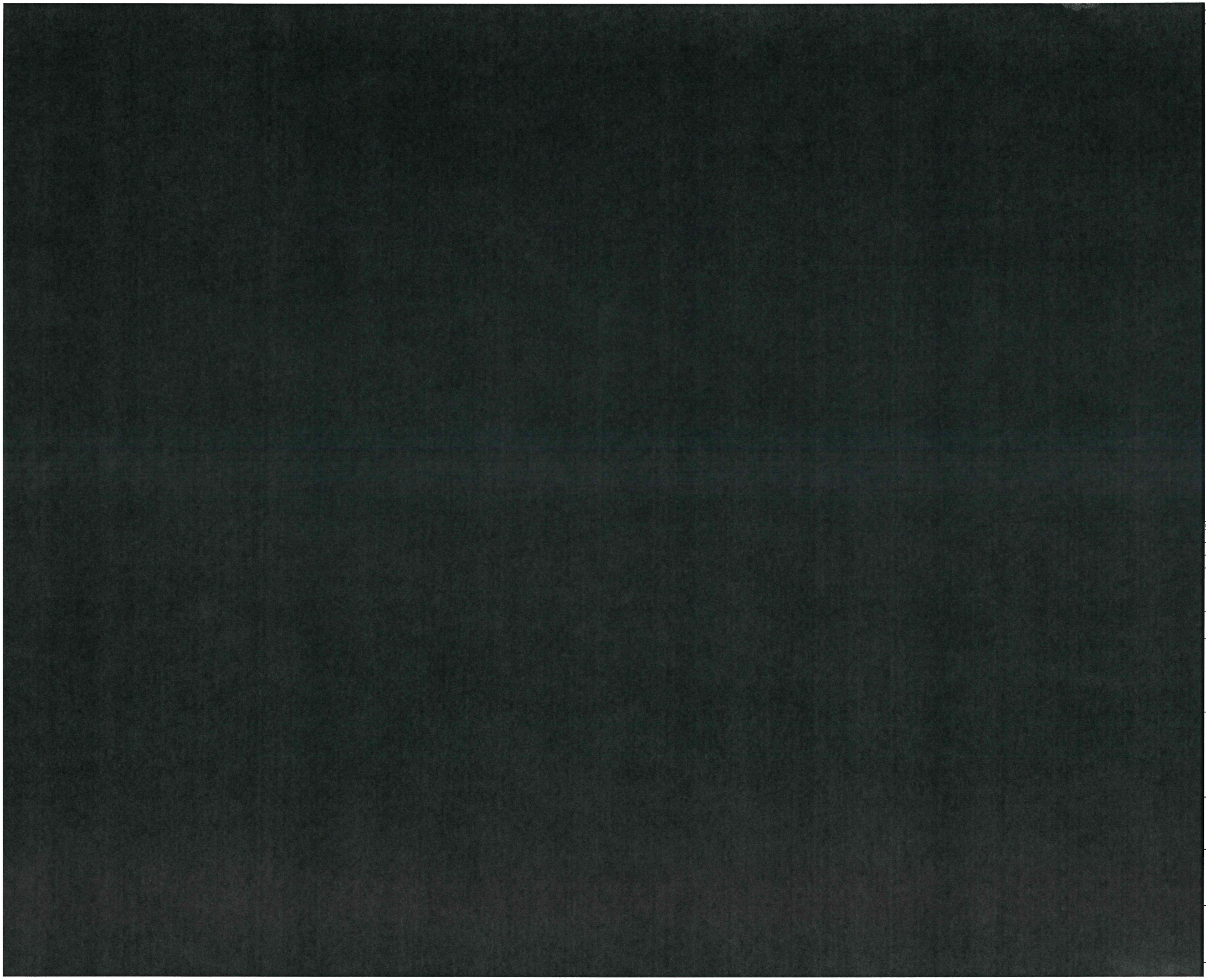

LEGEND:

- PROPOSED WORKS LIMIT
- BOUNDARY OF THE SITE (SUBJECT TO REVIEW)
- EXTENT OF ROAD OPENINGS / ROADWORKS WITHIN EXISTING ROADS (SUBJECT TO REVIEW)
- EXISTING STRUCTURES TO BE CLEARED
- EXISTING FARMLANDS TO BE CLEARED
- EXTENT OF ROAD OPENINGS / ROADWORKS WITHIN EXISTING FOOTPATHS / CYCLE TRACKS (SUBJECT TO REVIEW)

Revision	Date	Description			Initial
	Designed	Checked	Drawn		Checked
Initial	CLH	WT	SZ		WT
Date	07/18	07/18	07/18		07/18

Approved

Agreement no.

CE 13/2017 (CE)

Project Title

SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG - FEASIBILITY STUDY

Drawing Title

LAND REQUIREMENT PLAN (KEY PLAN)

Drawing No.	Scale
196587/B&V/LRP/001	1 : 4500 (A1) 1 : 9000 (A3)

土木工程拓展署
Civil Engineering and Development Department

BLACK & VEATCH HONG KONG LIMITED
博威工程顧問有限公司

NOTES:

1. FOR NOTES AND LEGEND REFER TO 196587/B&V/LRP/001
2. SEE APPENDIX A FOR THE REGISTERED NUMBER AND APPROXIMATE AREA OF THE AFFECTED LOTS.
3. STOCKPILE AREAS/TEMPORARY WORKS AREA FOR CONTRACTORS AND RESIDENT SITE STAFF WILL BE DETERMINED AND ALLOCATED IN THE SUBSEQUENT STAGES OF THE DEVELOPMENT.

LEGEND:

PROPOSED WORKS LIMIT

EXTENT OF ROAD OPENINGS / ROADWORKS WITHIN EXISTING ROADS (SUBJECT TO REVIEW)

Revision	Date	Description			Initial
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Agreement no.

CE 13/2017 (CE)

Project Title

SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG - FEASIBILITY STUDY

Drawing Title

LAND REQUIREMENT PLAN

(SHEET 1 OF 6)

Drawing No.

196587/B&V/LRP/002

Scale

1 : 1000 (A1)
1 : 2000 (A3)

土木工程拓展署
Civil Engineering and Development Department

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博威工程顧問有限公司

NOTES:

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LEGEND:

PROPOSED WORKS LIMIT

EXTENT OF ROAD OPENINGS / ROADWORKS WITHIN EXISTING ROADS (SUBJECT TO REVIEW)

Revision	Date	Description			Initial
	Designed	Checked	Drawn		Checked
Initial	CLH	WT	SZ		WT
Date	07/18	07/18	07/18		07/18

Approved

Agreement no.

CE 13/2017 (CE)

Project Title

SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG - FEASIBILITY STUDY

Drawing Title

LAND REQUIREMENT PLAN

(SHEET 2 OF 6)

Drawing No.

196587/B&V/LRP/003

Scale

1 : 1000 (A1)
1 : 2000 (A3)

土木工程拓展署
Civil Engineering and Development Department

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博威工程顧問有限公司

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LEGEND:

PROPOSED WORKS LIMIT

EXTENT OF ROAD OPENINGS / ROADWORKS WITHIN EXISTING ROADS (SUBJECT TO REVIEW)

evision	Date	Description			Initial
	Designed	Checked	Drawn		Checked
nitial	CLH	WT	SZ		WT
Date	07/18	07/18	07/18		07/18

Approved

Agreement no.

CE 13/2017 (CE)

Project Title

SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG - FEASIBILITY STUDY

Drawing Title

LAND REQUIREMENT PLAN

(SHEET 3 OF 6)

Drawing No.

196587/B&V/LRP/004

Scale

1 : 1000 (A1)
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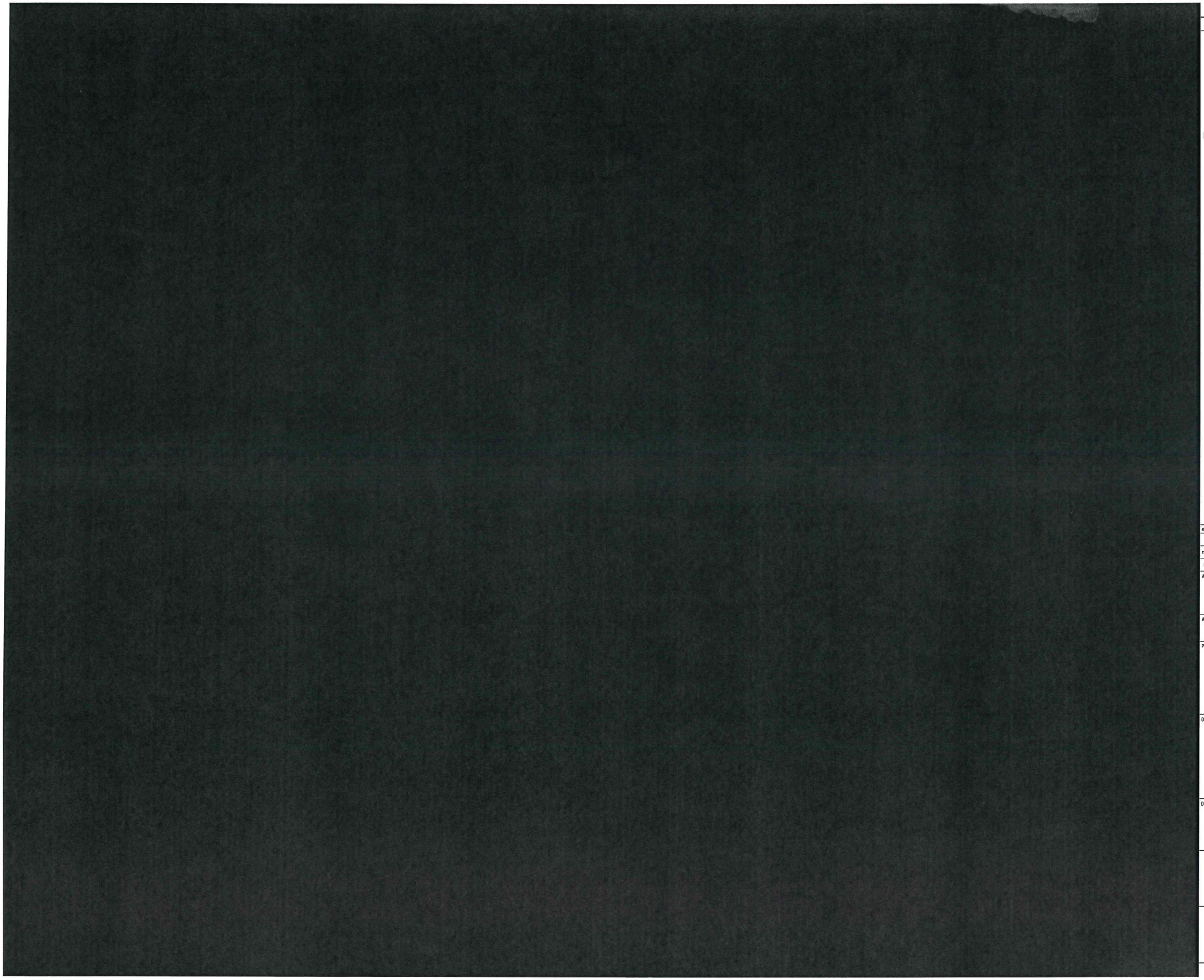
土木工程拓展署
Civil Engineering and Development Department

BLACK & VEATCH HONG KONG LIMITED
博威工程顧問有限公司



NOTES:

1. FOR NOTES AND LEGEND REFER TO 196587/B&V/LRP/001
2. SEE APPENDIX A FOR THE REGISTERED NUMBER AND APPROXIMATE AREA OF THE AFFECTED LOTS.
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LEGEND:

PROPOSED WORKS LIMIT

EXTENT OF ROAD OPENINGS / ROADWORKS WITHIN EXISTING ROADS (SUBJECT TO REVIEW)

evision	Date	Description			Initial
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nitial	CLH	WT	SZ		WT
Date	07/18	07/18	07/18		07/18

Approved

Agreement no.
CE 13/2017 (CE)

Project Title
SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG - FEASIBILITY STUDY

Drawing Title
LAND REQUIREMENT PLAN

(SHEET 4 OF 6)

Drawing No.
196587/B&V/LRP/005

Scale
1 : 1000 (A1)
1 : 2000 (A3)

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

BLACK & VEATCH HONG KONG LIMITED
博威工程顧問有限公司

NOTES:

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LEGEND:

- PROPOSED WORKS LIMIT
- BOUNDARY OF THE SITE (SUBJECT TO REVIEW)
- EXTENT OF ROAD OPENINGS / ROADWORKS WITHIN EXISTING ROADS (SUBJECT TO REVIEW)
- EXISTING STRUCTURES TO BE CLEARED
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- EXTENT OF ROAD OPENINGS / ROADWORKS WITHIN EXISTING FOOTPATHS / CYCLE TRACKS (SUBJECT TO REVIEW)

Revision	Date	Description			Initial
	Designed	Checked	Drawn	Checked	
Initial	CLH	WT	SZ	WT	
Date	07/18	07/18	07/18	07/18	

Approved

Agreement no.
CE 13/2017 (CE)

Project Title
SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG - FEASIBILITY STUDY

Drawing Title
LAND REQUIREMENT PLAN

(SHEET 5 OF 6)

Drawing No.
196587/B&V/LRP/006

Scale
1 : 1000 (A1)
1 : 2000 (A3)

土木工程拓展署
Civil Engineering and Development Department

BLACK & VEATCH HONG KONG LIMITED
博威工程顧問有限公司

NOTES:

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2. SEE APPENDIX A FOR THE REGISTERED NUMBER AND APPROXIMATE AREA OF THE AFFECTED LOTS.
3. STOCKPILE AREAS/TEMPORARY WORKS AREA FOR CONTRACTORS AND RESIDENT SITE STAFF WILL BE DETERMINED AND ALLOCATED IN THE SUBSEQUENT STAGES OF THE DEVELOPMENT.

LEGEND:

PROPOSED WORKS LIMIT

EXTENT OF ROAD OPENINGS / ROADWORKS WITHIN EXISTING ROADS (SUBJECT TO REVIEW)

EXTENT OF ROAD OPENINGS / ROADWORKS WITHIN EXISTING FOOTPATHS / CYCLE TRACKS (SUBJECT TO REVIEW)

evision	Date	Description			Initial
	Designed	Checked	Drawn		Checked
nitial	CLH	WT	SZ		WT
Date	07/18	07/18	07/18		07/18

Approved

Agreement no.

CE 13/2017 (CE)

Project Title

SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG - FEASIBILITY STUDY

Drawing Title

LAND REQUIREMENT PLAN

(SHEET 6 OF 6)

Drawing No.

196587/B&V/LRP/007

Scale

1 : 1000 (A1)
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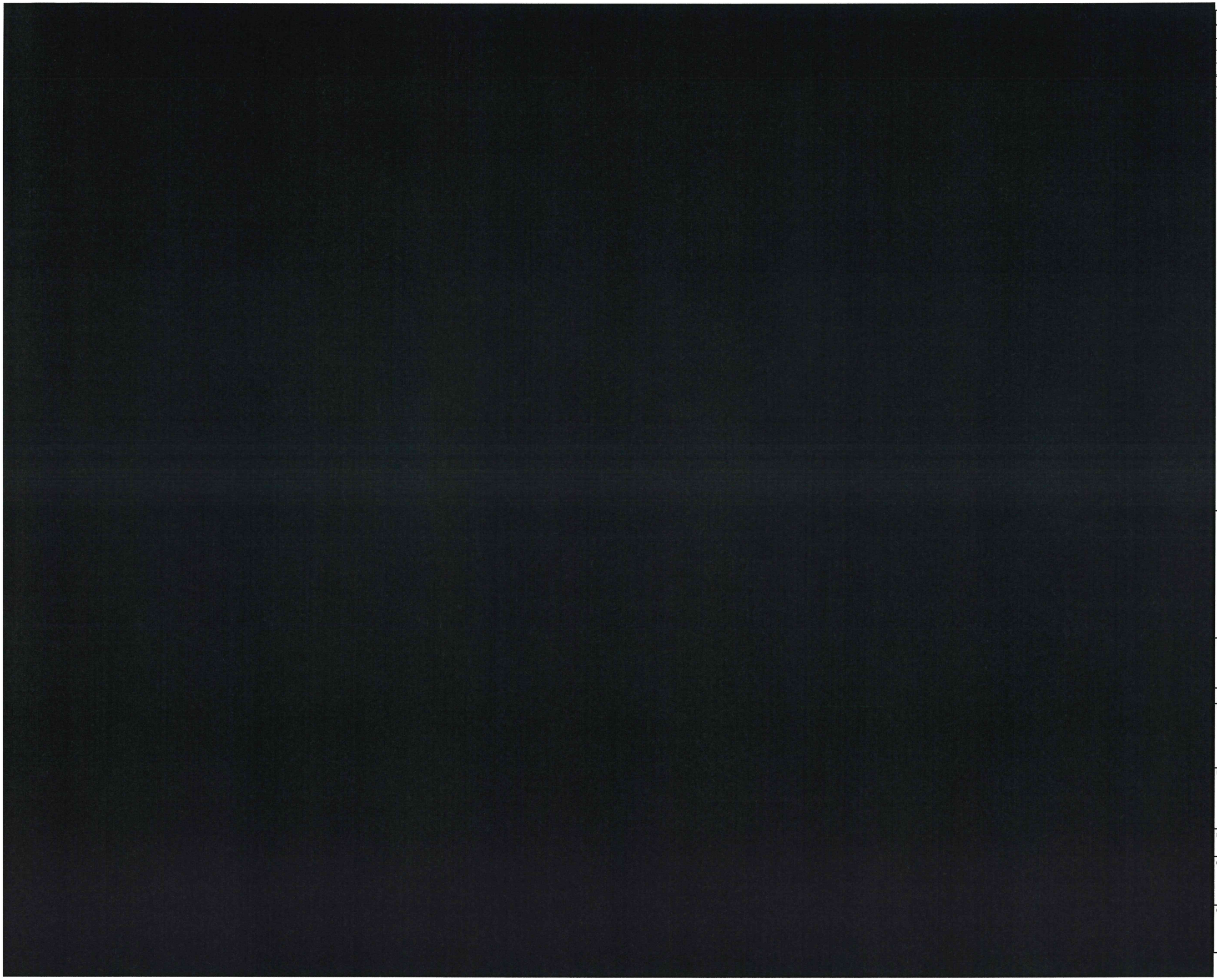
土木工程拓展署
Civil Engineering and Development Department

BLACK & VEATCH HONG KONG LIMITED
博威工程顧問有限公司



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Initial	CLH	BT	CLH	BT
Date	10/18	10/18	10/18	10/18

Revision	Date	Description	Initial

LEGEND

- BOUNDARY OF THE SITE (SUBJECT TO REVIEW)
- LETTER OF APPROVAL
- MODIFICATION OF TENANCY
- PROPOSED WORKS LIMIT
- BUILDING LICENCE
- EXISTING SHORT TERM TENANCY
- PRIVATE LOT

Overview

Approved

Contract Title

AGREEMENT NO. CE 13/2017 (CE)
SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG – FEASIBILITY STUDY

Figure Title

AFFECTED PRIVATE AND GOVERNMENT LANDS
(SHEET 1 OF 2)

Drawing No.	Scale
196587/B&V/LRS/001a	1:2,000 @ A3

Client

CEDD CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT

Consultant

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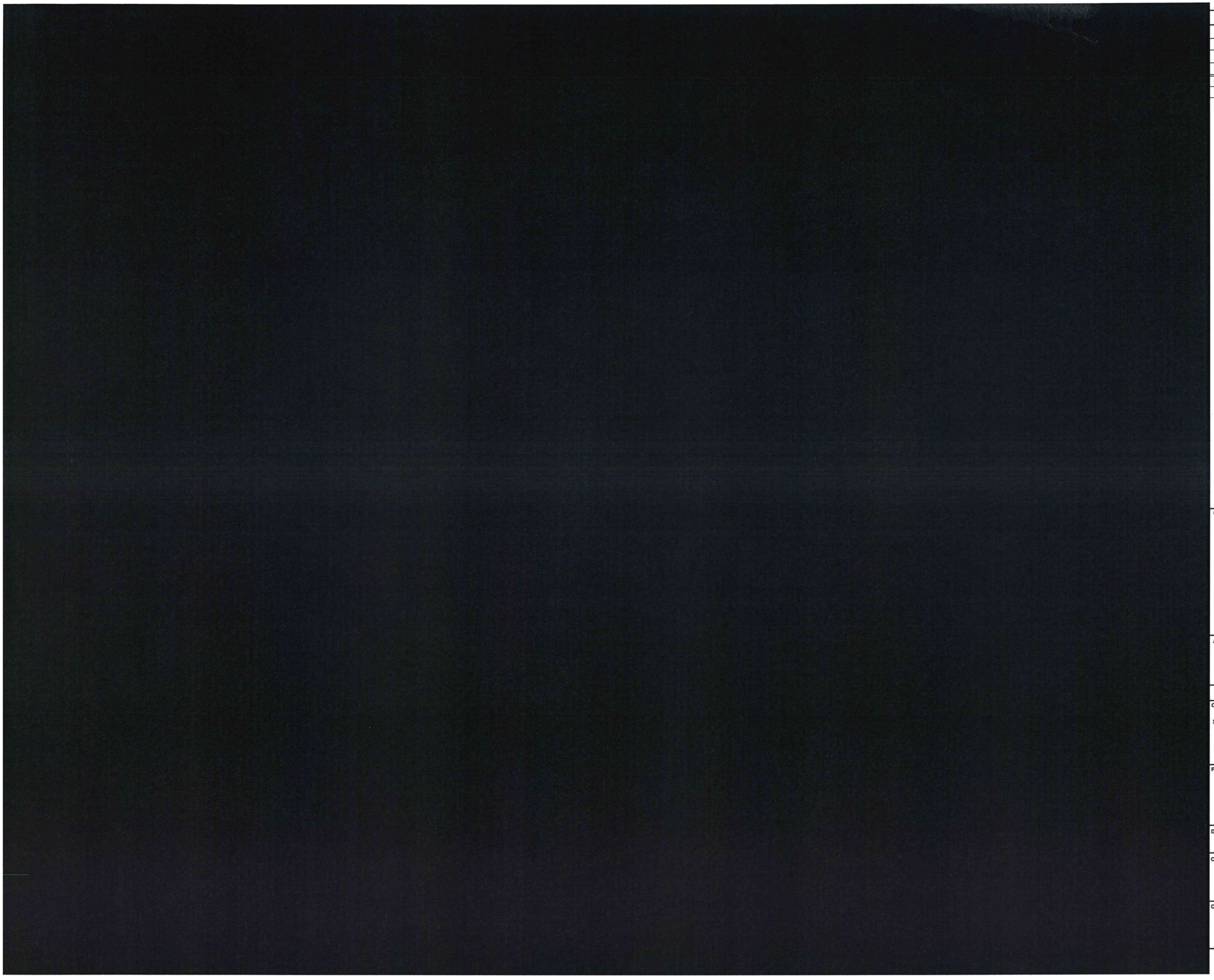

	Designed	Reviewed	Drawn	Checked
Initial	CLH	WT	CLH	WT
Date	07/18	07/18	07/18	07/18

Revision	Date	Description	Initial

LEGEND

PROPOSED WORKS LIMIT

GOVERNMENT LAND ALLOCATION

Overview

Approved

Contract Title

AGREEMENT NO. CE 13/2017 (CE)
SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG – FEASIBILITY STUDY

Figure Title

AFFECTED PRIVATE AND GOVERNMENT LANDS (SHEET 2 OF 2)

Drawing No.	Scale
196587/B&V/LRS/001b	1:2,000 @ A3

Client

CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT

Consultant

BLACK & VEATCH
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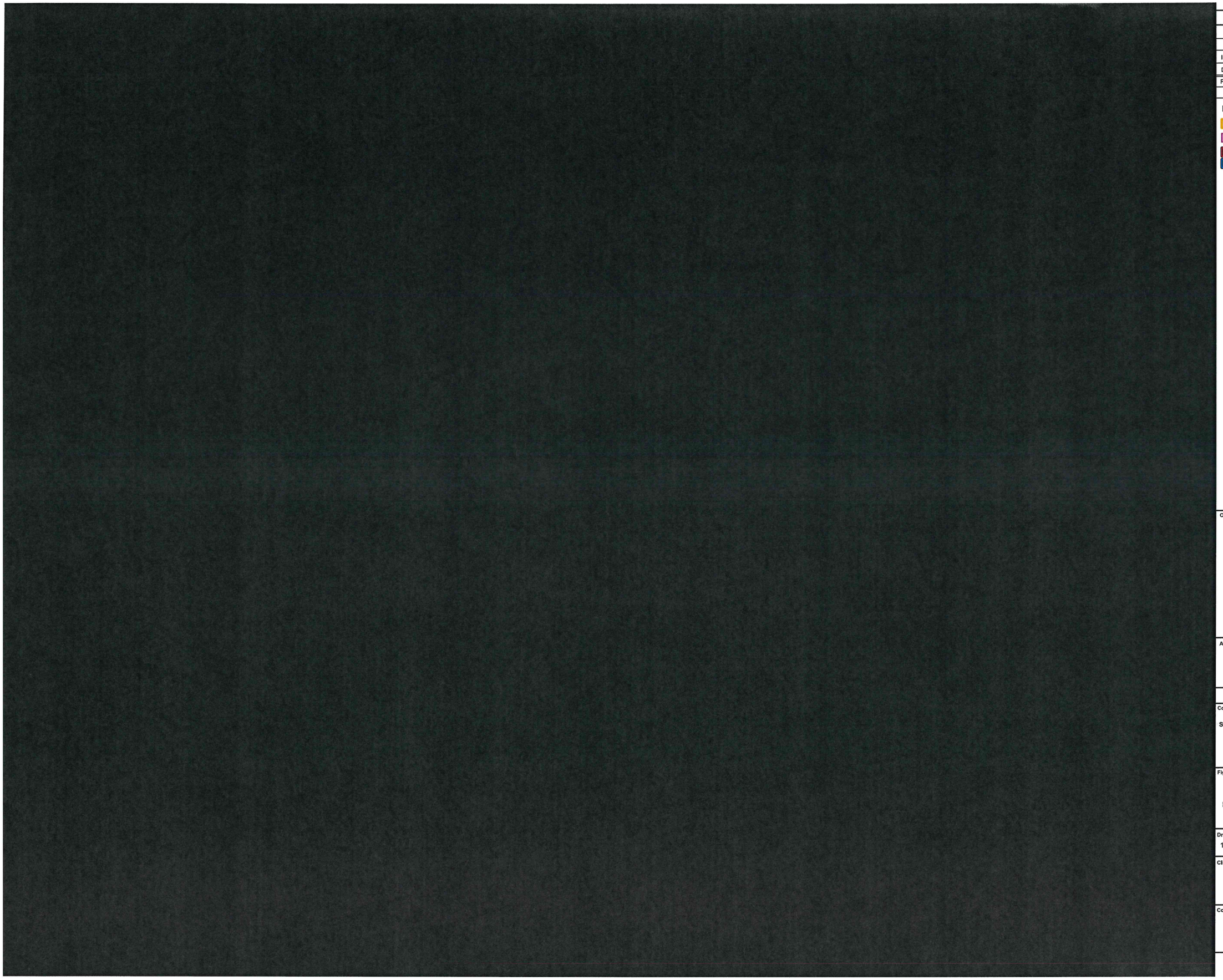

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Initial	CLH	WT	CLH	WT
Date	07/18	07/18	07/18	07/18

Revision	Date	Description	Initial

LEGEND

- BOUNDARY OF EXISTING BUSINESS
- ACCESS ROAD FOR BROWNFIELD OPERATIONS WITHIN THE SITE
- BOUNDARY OF THE SITE (SUBJECT TO REVIEW)
- PROPOSED WORKS LIMIT

Overview

Approved

Contract Title

AGREEMENT NO. CE 13/2017 (CE)
SITE FORMATION AND INFRASTRUCTURAL WORKS FOR REMAINING PHASES OF PUBLIC HOUSING DEVELOPMENTS AT WANG CHAU, YUEN LONG – FEASIBILITY STUDY

Figure Title

BROWNFIELD OPERATIONS WITHIN THE SITE

Drawing No.	Scale
196587/B&V/LRS/006	1:1,500 @ A3

Client

CEDD CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT

Consultant

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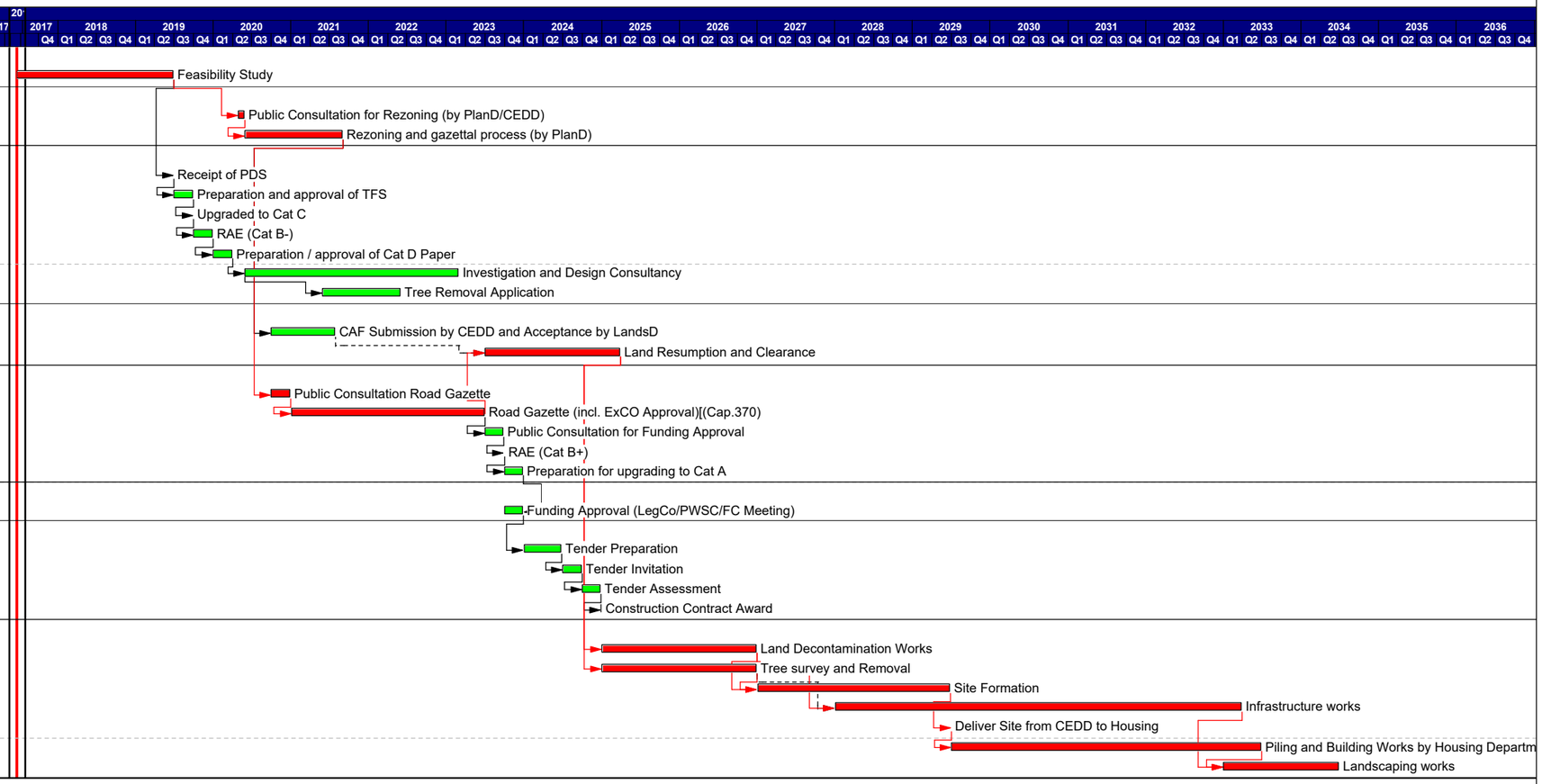
APPENDIX A

TENTATIVE PROJECT IMPLEMENATION PROGRAMME

Final Report - Appendix A - Tentative Project Implementation Programme

Activity ID	Description	Orig Dur	Early Start	Early Finish
Feasbility Study				
1000	Feasibility Study	496	28JUL17	28JUN19
Rezoning Exercise				
1010	Public Consultation for Rezoning (by PlanD/CEDD)	21	01MAY20	29MAY20
1020	Rezoning and gazettal process (by PlanD)	325	01JUN20	31AUG21
Investigation Stage				
1090	Receipt of PDS	1	01JUL19	01JUL19
1091	Preparation and approval of TFS	64	02JUL19	30SEP19
1092	Upgraded to Cat C	1	01OCT19	01OCT19
1093	RAE (Cat B-)	64	02OCT19	31DEC19
1094	Preparation / approval of Cat D Paper	64	02JAN20	31MAR20
1030	Investigation and Design Consultancy	714	01JUN20	28FEB23
1031	Tree Removal Application	261	01JUN21	31MAY22
Land Resumption				
1070	CAF Submission by CEDD and Acceptance by LandsD	215	01OCT20	30JUL21
1230	Land Resumption and Clearance	450	03JUL23	31MAR25
Gazettal Procedure				
1320	Public Consultation Road Gazette	65	01OCT20	31DEC20
1311	Road Gazette (incl. ExCO Approval)[(Cap.370)	649	04JAN21	30JUN23
1440	Public Consultation for Funding Approval	64	03JUL23	29SEP23
1410	RAE (Cat B+)	1	02OCT23	02OCT23
1420	Preparation for upgrading to Cat A	63	03OCT23	29DEC23
Public Works Programme Procedure				
1110	Funding Approval (LegCo/PWSC/FC Meeting)	64	02OCT23	29DEC23
Tender Stage				
1340	Tender Preparation	129	02JAN24	28JUN24
1350	Tender Invitation	64	02JUL24	30SEP24
1360	Tender Assessment	64	01OCT24	30DEC24
1390	Construction Contract Award	1	31DEC24	31DEC24
Construction Stage				
1270	Land Decontamination Works	517	02JAN25	31DEC26
1290	Tree survey and Removal	517	02JAN25	31DEC26
1260	Site Formation	647	04JAN27	29JUN29
1265	Infrastructure works	1357	03JAN28	31MAR33
1280	Deliver Site from CEDD to Housing	1	02JUL29	02JUL29
1300	Piling and Building Works by Housing Department	1034	03JUL29	30JUN33
1310	Landscaping works	389	03JAN33	30JUN34



Start date	28JUL17
Finish date	30JUN34
Data date	28JUL17
Run date	16OCT19
Page number	1A
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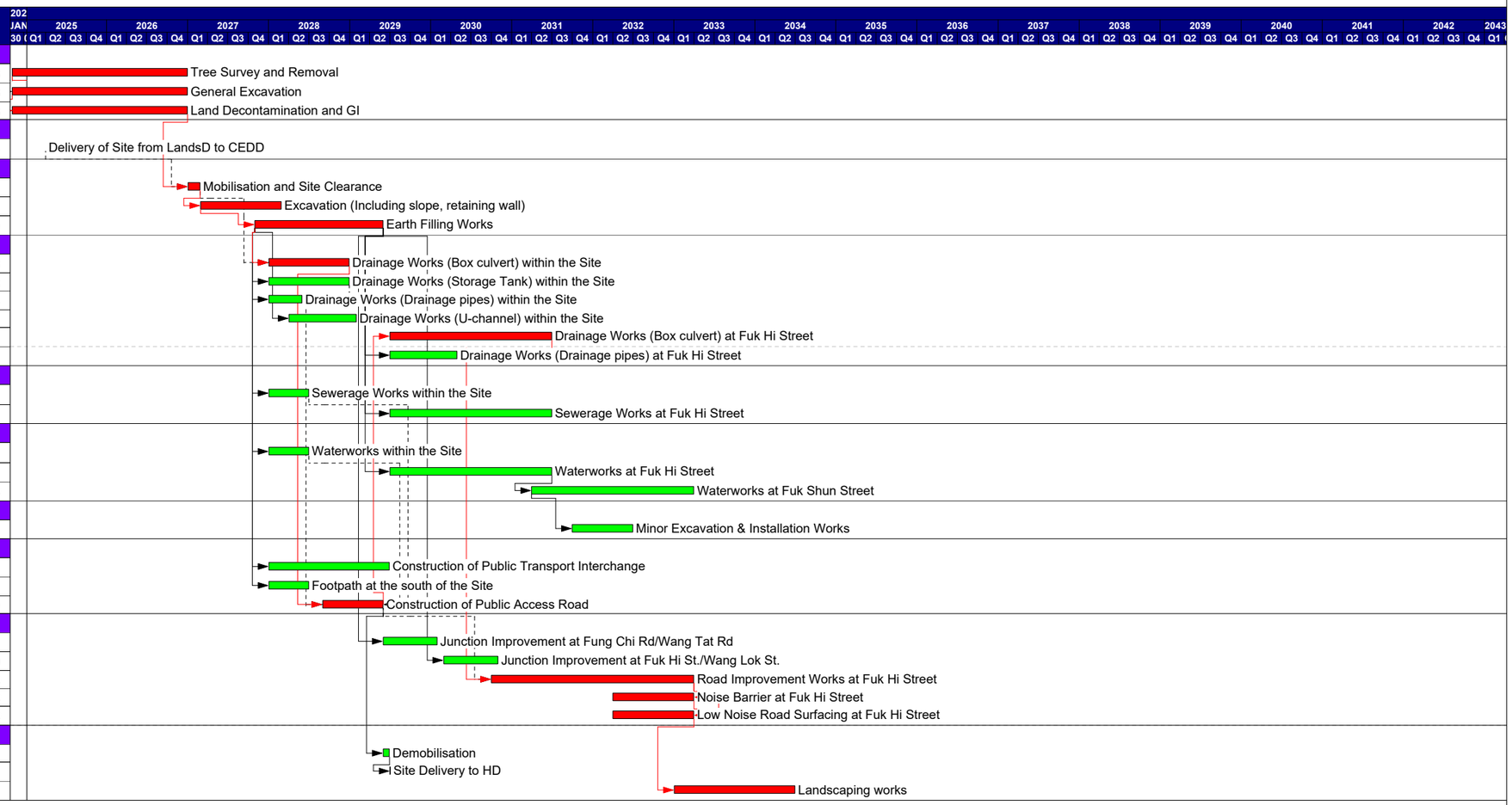
CE13/2017 (CE)
Site Formation and Infrastructural Works for Remaining Phases of Public Housing Developments at Wang Chau

- Early bar
- Progress bar
- Critical bar
- Summary bar
- Start milestone point
- Finish milestone point

APPENDIX B

TENTATIVE MASTER PROGRAMME FOR MAJOR WOKRS

Activity ID	Description	Orig Dur	Early Start	Early Finish
LAND DECONTAMINATION				
2010	Tree Survey and Removal	517	02JAN25	31DEC26
2011	General Excavation	517	02JAN25	31DEC26
2012	Land Decontamination and GI	517	02JAN25	31DEC26
LAND RESUMPTION AND SITE DELIVERY				
2001	Delivery of Site from LandsD to CEDD	1	01APR25	01APR25
SITE FORMATION WORKS				
2020	Mobilisation and Site Clearance	40	04JAN27	26FEB27
2023	Excavation (Including slope, retaining wall)	261	01MAR27	28FEB28
2022	Earth Filling Works	411	01NOV27	31MAY29
DRAINAGE WORKS				
2031	Drainage Works (Box culvert) within the Site	258	03JAN28	29DEC28
2032	Drainage Works (Storage Tank) within the Site	258	03JAN28	29DEC28
2033	Drainage Works (Drainage pipes) within the Site	108	03JAN28	31MAY28
2030	Drainage Works (U-channel) within the Site	215	03APR28	31JAN29
2034	Drainage Works (Box culvert) at Fuk Hi Street	515	02JUL29	30JUN31
2035	Drainage Works (Drainage pipes) at Fuk Hi Street	214	02JUL29	30APR30
SEWERAGE WORKS				
2040	Sewerage Works within the Site	130	03JAN28	30JUN28
2041	Sewerage Works at Fuk Hi Street	515	02JUL29	30JUN31
WATERWORKS				
2050	Waterworks within the Site	130	03JAN28	30JUN28
2052	Waterworks at Fuk Hi Street	515	02JUL29	30JUN31
2051	Waterworks at Fuk Shun Street	520	01APR31	31MAR33
UTILITIES WORKS				
2060	Minor Excavation & Installation Works	194	01OCT31	30JUN32
ROADWORKS WITHIN SITE				
2074	Construction of Public Transport Interchange	387	03JAN28	29JUN29
2077	Footpath at the south of the Site	130	03JAN28	30JUN28
2073	Construction of Public Access Road	193	01SEP28	31MAY29
ROADWORKS OUTSIDE SITE				
2071	Junction Improvement at Fung Chi Rd/Wang Tat Rd	171	01JUN29	30JAN30
2085	Junction Improvement at Fuk Hi St./Wang Lok St.	174	01MAR30	31OCT30
2070	Road Improvement Works at Fuk Hi Street	648	01OCT30	31MAR33
2075	Noise Barrier at Fuk Hi Street	261	01APR32	31MAR33
2076	Low Noise Road Surfacing at Fuk Hi Street	261	01APR32	31MAR33
MOBILIZATION AND SITE DELIVERY TO HD				
2080	Demobilisation	21	01JUN29	29JUN29
2081	Site Delivery to HD	1	02JUL29	02JUL29
2065	Landscaping works	389	03JAN33	30JUN34



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Data date	01JAN25
Run date	28OCT19
Page number	1A
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CE13/2017 (CE)
Site Formation and Infrastructural Works for Remaining Phases of Public Housing Developments at Wang Chau

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- Finish milestone point