Contract No. ND/2019/02

Kwu Tung North New Development Area, Phase 1: Road and Drains between Kwu Tung North New Development Area and Shek Wu Hui

Baseline Condition Survey and Baseline Vibration Impact Assessment Report

Rev. 3

31 Aug 2022

Project	Contract No. ND/2019/02 Kwu Tung North New Development Area, Phase 1: Road and Drains between Kwu Tung North New Development Area and Shek Wu Hui
Title	Baseline Condition Survey and Baseline Vibration Impact Assessment Report
Date	31 Dec 2021
Client	Chun Wo - Kwan Lee Joint Venture
Prepared by	Construction Technology Limited

Revision Table

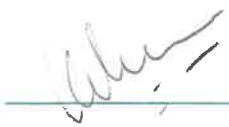
Revision	Prepared by	Approved by	Date	Comments
0	Michael Leung	Chong Yuk En	30 Apr 2022	Revised
1	Michael Leung	Chong Yuk En	31 May 2022	Revised
2	Michael Leung	Chong Yuk En	15 Jul 2022	Revised
3	Michael Leung	Chong Yuk En	31 Aug 2022	ET & IEC No further comments

Signature Page

Contract No. ND/2019/02

Kwu Tung North New Development Area, Phase 1: Road and Drains between Kwu Tung North New Development Area and Shek Wu Hui

Baseline Condition Survey and Baseline Vibration Impact Assessment Report



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Our Ref: WMA20002/AECOM/mm220920_C2.6

AECOM

8/F Grand Central Plaza Tower 2
138 Shatin Rural Committee Road
Shatin, Hong Kong

By Mail
20th September 2022

Attn.: Mr. Chris Ho

Dear Mr. Ho,

Service Contract No. NDO 04/2019
Environmental Team for Environmental Monitoring and Audit Works in Construction Phase for the First Phase Development of Kwu Tung North and Fanling North New Development Areas
- **[EP-465/2013/A]San Tin Highway and Fanling Highway Kwu Tung Section Widening (Between San Tin Interchange and Po Shek Wu Interchange)(Condition 2.6)**
- **[EP-466/2013]Castle Peak Road Diversion (Condition 2.6)**
- **[EP-468/2013/A]Kwu Tung North New Development Area Road D1 to D5 (Condition 2.6)**

Submission of Baseline Condition Survey and Baseline Vibration Impact Assessment Report

I refer to the Baseline Condition Survey and Baseline Vibration Impact Assessment Report (Rev.3) (31 Aug 2022) submitted to us via email dated 13th September 2022.

I am pleased to inform you that I have no further comment and I hereby agree to certify the above document in accordance with the Environmental Permit (No. EP-465/2013/A, EP-466/2013, and EP-468/2013/A), Condition 1.9 and 2.6.

If you need any further information, please call our Mr. Marco Ma at 2151 2073 or me at 2151 2089 / 9161 7287.

Yours faithfully,
WELLAB Limited

Dr. Priscilla Choy
Environmental Team Leader

c.c. CEDD (Attn: Mr. Raymond Cheng) By e-mail: kmcheng@cedd.gov.hk
IEC - Mott MacDonald Hong Kong Ltd
(Attn.: Mr. Thomas Chan) By e-mail: Thomas.Chan@mottmac.com

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Attention: Mr. Chris Ho

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Agreement No. CE 33/2019 (EP)
Independent Environmental Checker for Environmental Monitoring and Audit Works in Construction Phase for the First Phase Development of Kwu Tung North and Fanling North New Development Areas – Investigation

Environmental Permit No. EP-466/2013 & EP-468/2013/A:
Baseline Condition Survey and Baseline Vibration Impact Assessment (Condition 2.6)

21 September 2022
BY EMAIL

Dear Sir,

Reference is made to the submission of the Baseline Condition Survey and Baseline Vibration Impact Assessment Report (Rev.3) in accordance with Condition 2.6 of the Environmental Permit (No. EP-466/2013 & EP-468/2013/A) certified by the ET Leader on 20 September 2022.

We would like to inform you that we have no adverse comment on the captioned submission. Therefore we write to verify the captioned submission in accordance with the requirement stipulated in Condition 1.9 and 2.6 of EP-466/2013 & EP-468/2013/A.

Should you have any queries, please contact the undersigned at 2828 5967.

Yours faithfully,
For and on behalf of the
Mott MacDonald Hong Kong Limited

Ir Thomas Chan
Independent Environmental Checker
T +852 2828 5967
Thomas.Chan@mottmac.com

c.c.

CEDD	Mr. Raymond Cheng	kmcheng@cedd.gov.hk
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Content

Appendices

List of Tables

1. BACKGROUND INFORMATION

1.1 Introduction

The Environmental Impact Assessment (EIA) Report (Register No.: AEIAR-175/2013) (approved EIA Report) for the North East New Territories New Development Areas (the Project) was approved on 18 October 2013 and an Environmental Permit (EP) EP No: EP-465/2013/A, EP-466/2013 and EP-468/2013/A for the construction and operation of the Project.

The construction of the Project has been divided into a series of Works Contracts and Contract No. ND/2019/02 mainly comprises road and drainage works between Kwu Tung North New Development Area and Shek Wu Hui; construction of a sewage pumping station, a visitor centre for Long Valley Nature Park and a footbridge spanning across Sheung Yue River; and site formation of land and the associated engineering infrastructure works for a village resite area in Kwu Tung North New Development Area. (hereinafter referred to as "the Contract").

Chun Wo - Kwan Lee Joint Venture (the Contractor) has been commissioned by the Civil Engineering and Development Department (CEDD) to carry out the construction works under this Contract. The Contract works commenced in Feb 2020 and are tentative completion at the end of 2024.

This Baseline Condition Survey and Baseline Vibration Impact Assessment to define the vibration limit of identified built heritage features, determine construction vibration monitoring and structural strengthening measures are required during construction phase; and maintain a record of the condition survey of graded historic buildings that may be affected by the Project.

1.2 Scope of Work

1.2.1 Referring to the Environmental Permit (EP) EP No: EP-465/2013/A, EP-466/2013 and EP-468/2013/A conditions 2.6 & 2.7 stated a baseline condition survey and vibration impact assessment should be conducted for sites G202, G308 & HKT03 and Environmental Monitoring and Audit Manual stated a baseline condition survey and vibration impact assessment should be conducted for sites G202, G203, G303, G308, HKT03 & KT57. Their corresponding location is shown in **Appendix A**.

1.2.2 This report aims to provide a baseline condition survey and baseline vibration impact assessment of the abovementioned cultural heritage. Other than that, the following information should be included:

a) Determine a vibration limit;
b) Determine tilting limits;
c) Determine settlement limits; and
d) Determine if any construction vibration, tilting, settlement monitoring and structural strengthening measures are required during the construction phase.

2 CONDITION SURVEY METHODOLOGY

2.1 General Approach

2.1.1 The visual inspection would be conducted for condition survey and vibration impact assessment. It shall be carried out to present a true and accurate record of the state of cultural heritages at the time of the inspection. This comprises a comprehensive inspection of the cultural heritages to establish their general condition. Particular emphasis was given to the presence of existing defects such as cracks, water leakage, corrosion, spalled concrete, surface spalling, signs of settlement and defective finishes.

2.1.2 The location and details of these defects were recorded on sketches and a schedule of defects accompanied by a comprehensive set of record photographs is presented in this report. The visual inspection also comprised a detailed crack mapping; with crack widths measured utilising a crack visual gauge.

2.1.3 The terminology used in the description of general structural element defects, excluding road pavement surfaces shall be interpreted as follows:

Table 2.1: General Defect Terms and Corresponding Descriptions

Defect Terminology	Descriptions
Fine crack	Crack below 1mm wide, and not being structural unless otherwise stated.
Moderate crack	Crack not wider than 2mm, and not being structural unless otherwise stated.
Wide crack	Crack wider than 2mm, and not being structural unless otherwise stated.
Minor spalled concrete	Spalling up to 0.1m² and sporadic. No reinforcement bar exposed unless otherwise stated.
Major spalled concrete	Spalling greater than 0.1m² and extensive. No reinforcement bar exposed unless otherwise stated.
Crazing	A network of fine cracks on the surface of a material.
Water stain	Stain on the surface caused by past water penetration The surface is dry.

Damp patch	Moisture saturated surface with no significant trace of water.
Water seepage	Water oozing out from the surface. The surface is wet.
Water leakage	Water oozing out from the surface. The surface is wet and/or with running water.
Verticality	A visual assessment of the verticality of the building.
Rust and pits	Discolouration and uneven steel surfaces caused by corrosion, and not being structural unless otherwise stated.
Serious corrosion	Corrosion of structural steel member that has resulted in a loss of section.

2.2 Condition Grading of Cultural Heritages

2.2.1 The condition grading of the cultural heritages shall be defined as follow:

Table 2.2: Condition Grading of the Cultural Heritages

Grade	General Condition	Descriptions
1	Good	No significant visible deterioration, new or evidence of recent maintenance and / or repair / modification.
2	Fair	Dilapidated with significant visible deterioration.
3	Poor	Seriously dilapidated, significant visible deterioration, damage to major component
4	Very Poor	Spalling up to 0.1m² and sporadic. No reinforcement bar exposed unless otherwise stated.

2.3 Impact Assessment of Cultural Heritages

2.3.1 To assess the impact of the vibration from future construction works to the existing heritage, multiple factors should be taken into concern:

a) Distance to the future construction site
b) Surrounding environment of the heritage
c) Current condition of the heritage

2.3.2 The determination of vibration limit should be based on the abovementioned factors. If the cultural heritage is expected to suffer from potential hazards (e.g. collapse) due to future construction works, this report would propose a vibration, tilting and settlement monitoring scheme and structural strengthening measures for that particular heritage as required. Otherwise, the vibration would be monitored based on the Buildings Department's Practice Note (PNAP APP-137) and Contract Particular Specification Section 39 Clause 39.01(2), the note could be found in **Appendix D**. Below **table 2.3** summarizes the vibration limited from the practice note.

Table 2.3: Vibration Limit from PNAP APP-137 & PS 39.01(2)

Type of Building	Guide Values of Maximum PPV* (mm/s)	
	Transient Vibration	Continuous Vibration
BD PNAP Vibration-sensitive / Dilapidated Buildings	7.5	3.0
PS 39.01 (2) Declared Monuments/ Graded Historical Structures	3.0	3.0

* Peak particle velocity.

2.3.3 As each existing heritage will have different tolerance in accommodating movements of their foundations, acceptance of estimated ground settlements should be considered on a case-by-case basis with respect to the integrity, stability and functionality of the supporting structures. the vibration would be monitored based on the Buildings Department's Practice Note (PNAP APP-Otherwise and Contract Particular Specification Section 39 Clause 39.01(2), the note could be found in **Appendix D.** Below **table 2.4** are the provisional AAA trigger values which summarise the tilting and settlement limit.

Table 2.4: Tolerable ground settlement limits and tilting limits

Type of Building	Instrument	Criterion	Alert	Alarm	Action
BD PNAP	Ground settlement marker	Total settlement	12mm	18mm	25mm
BD PNAP	Services settlement marker	Total settlement & Angular distortion	12mm or 1:600	18mm or 1:450	25mm or 1:300
BD PNAP	Building tilting marker	Angular distortion	1:1000	1:750	1:500
PS 39.01 (2) Declared Monuments/ Graded Historical Structures	Ground settlement marker	Ground settlement	12mm	18mm	25mm
PS 39.01 (2) Declared Monuments/ Graded Historical Structures	Building settlement market	Building settlement	5mm	7.5mm	10mm
PS 39.01 (2) Declared Monuments/ Graded Historical Structures	Building tilting marker	Angular distortion	1:2000	1:1500	1:1000

Remarks:
The "Action Level" response actions should be taken if any of the following criteria occurs:

1. Any monitoring station has a reading reaching the specific trigger value based on serviceability limit[1], or in the absence of such engineering assessment, the provisional trigger value, whichever is applicable.
2. The undue settlement as indicated in any checkpoints (e.g. an increase of 5mm between two consecutive daily readings).
3. Sign of distress or damages observed in any adjacent structures and/or services.

Serviceability limit is defined as the maximum calculated movements estimated in the design or the maximum allowable movement or response of the adjacent ground, groundwater regime, structures and services. (10/2018)

3 RECORD OF INSPECTION

3.1 Basic Information to Cultural Heritages

The cultural heritages are located inside the future Kwu Tung North New Development Area, those heritages are in different nature. **Table 3.1** below summarizes the nature of those cultural heritages to the future Kwu Tung North New Development Area. Referring to the approved EIA Report (Register No.: AEIAR-175/2013) for the North East New Territories New Development Areas. The EIA report abstract in **Appendix A** would provide details of the cultural heritage.

Table 3.1: Basic Information of the Cultural Heritages

Site Code	Site Name	Nature of Cultural Heritage
G202	Earth God Shrine of Kam Tsin	Shrines (Grade 2)
G203	Enchi Lodge (Main Building & Ancillary Block)	Heritage Building (Grade 2)
G303	Yeung Yuen (also known as Yeung Garden)	Heritage Building (Grade 3)
G308	Yan Wah Lo	Heritage Building (Grade 3)
HKT03	Home of Loving Faithfulness	Building
KT57	Law grave	Grave

3.2 Inspection Record

3.2.1 The available cultural heritages were inspected. **Table 3.2** below summarizes the location, date of inspection and the causes of unavailable in the remarks.

Table 3.2: Table of Inspected Items

Site Code	Date of Inspection	Remarks
G202	8 Apr 2022	
G203	Not available	The main contractor called and sent a request for the baseline condition survey by registered post. The occupier stated they are Social Welfare Dept. licensed centre and not allowed for a visit during the pandemic of COVID-19. The main contractor will conduct a follow-up call to seeking of availability on monthly basis.
G303	12 Apr 2022	
G308	8 Apr 2022 & 13 Apr 2022	Part of the building was locked and the neighbourhood said the owners moved out from Hong Kong. The main contractor will conduct a follow-up visit to seeking of availability on monthly basis.
HKT03	12 Jun 2021, 7-13 Jun 2022	
KT57	7 Apr 2022	

3.3 Summary of Defects

3.3.1 The defects identified during the visual inspection and their corresponding photo ID are summarised in the table below. The plans in **Appendix B** showing the location of the defects and their corresponding Photo No. can be referred in **Appendix C**.

Table 3.3: Summary of Defects

Site Code	Description of Defects	Length (mm)	Width (mm)	Photo No.
G202	Wide Crack on Surface	45	10	G202-11
G202	Wide Crack on Surface	50	5	G202-12
G202	Wide Crack on Surface	109	5	G202-13
G202	Wide Crack on Surface	126	10	G202-14
G202	Wide Crack on Surface	150	5	G202-15
G202	Fine Crack on Surface	100	2	G202-16
G202	Wide Crack on Surface	440	30	G202-17
G202	Wide Crack on Surface	135	50	G202-18
G202	Moderate Crack on Surface	200	3	G202-19
G303	Fine Crack on Surface	350	1	G303-33
G303	Fine Crack on Surface	640	1	G303-34
G303	Fine Crack on Surface	200	1	G303-35
G303	Fine Crack on Surface	40	1	G303-36
G303	Fine Crack on Surface	250	1	G303-37
G303	Fine Crack on Surface	420	1	G303-38
G303	Moderate Crack on Surface	500	2	G303-39
G303	Moderate Crack on Surface	1138	2	G303-40
G303	Fine Crack on Surface	1520	1	G303-41
G303	Moderate Crack on Surface	2000	2	G303-42
G308	Moderate Crack on Surface	50	2	G308-28
G308	Moderate Crack on Surface	50	2	G308-29
G308	Wide Crack on Surface	70	20	G308-30
G308	Wide Crack on Surface	60	10	G308-31
G308	Wide Crack on Surface	70	5	G308-32
G308	Wide Crack on Surface	100	20	G308-33
G308	Wide Crack on Floor Surface	270	30	G308-34
G308	Moderate Crack on Surface	70	1	G308-35

Site Code	Description of Defects	Length	Width	Photo No.
G308	Moderate Crack on Surface	900	1	G308-36
G308	Moderate Crack on Surface	250	2	G308-37
G308	Wide Crack on Surface	250	3	G308-38
G308	Fine Crack on Surface	160	1	G308-39
G308	Wide Crack on Surface	100	5	G308-40
G308	Fine Crack	120	1	G308-41
G308	Moderate Crack on Surface	250	2	G308-42
G308	Moderate Crack on Surface	350	2	G308-43
HKT03	Missing bricks on the structure	200	300	HKT03-EG-9
HKT03	Missing bricks on the structure	200	300	HKT03-EG-10
HKT03	Peel off paint with moisture	900	200	HKT03-23
HKT03	Fine Crack on floor tiles	1000	1	HKT03-33
HKT03	Moderate Crack on Surface	800	2	HKT03-51
HKT03	Fine Crack on Surface	400	1	HKT03-52
HKT03	Fine Crack on Surface	400	1	HKT03-53
KT57	Moderate Crack on Surface	120	2	KT57-2
KT57	Moderate Crack on Surface	120	2	KT57-3

4 CONCLUSION AND RECOMMENDATION

4.1 Condition Grading

4.1.1 From the results of the Condition Survey, the summary of the conclusions and condition grading for the following items are presented in the table below:

Table 4.1: Summary of Condition Grading

Site Code	Photo No.	Conclusion	Condition Grading
G202	G202-1 – G202-19	The shrine is in fair condition, with a majority of defects are surface cracks.	2 - Fair
G203	Not available	Not available	Not available
G303	G303-1 – G303-42	The building is in good condition, with a majority of defects are surface cracks.	1 - Good
G308	G308-1 – G308-44	The building is in fair condition, with a majority of defects are surface cracks and missing roof tiles near trees.	2 - Fair
HKT03 Entrance Gate	HKT03-EG-1 – HKT03-EG-10	The entry gate is in fair condition, with a majority of defects are missing bricks.	2 - Fair
HKT03	HKT03-1 – HKT03-53	The building is in good condition, with a majority of defects are surface cracks.	1 - Good
KT57	KT57-1 – KT57-10	The grave is in fair condition, with a majority of defects are surface cracks.	2 - Fair

4.2 Conclusion

4.2.1 Though defects were observed in some of the cultural heritages, they are assessed to be structurally feasible, with no immediate hazards to their structural performance from the future construction works.

4.3 Recommendation

4.3.1 It is proposed that all the cultural heritage abovementioned be monitored in accordance with the PNAP APP-137 from Buildings Department and Contract Particular Specification Section 39 Clause 39.01(2) against vibration. A monitoring plan is proposed according to below table 4.2. Each surveyed cultural heritage is adopted to the vibration monitoring plan. The condition of the graded cultural heritage should be closely monitored.

4.3.2 4 nos. of monitoring points are proposed at the 4 sides of each cultural heritage buildings and 1 no. of monitoring point are proposed for in front of each shines and graves. The location of the monitoring points should submit to ER for approval prior to the commencement of construction works.

Table 4.2: Proposed Monitoring Plan

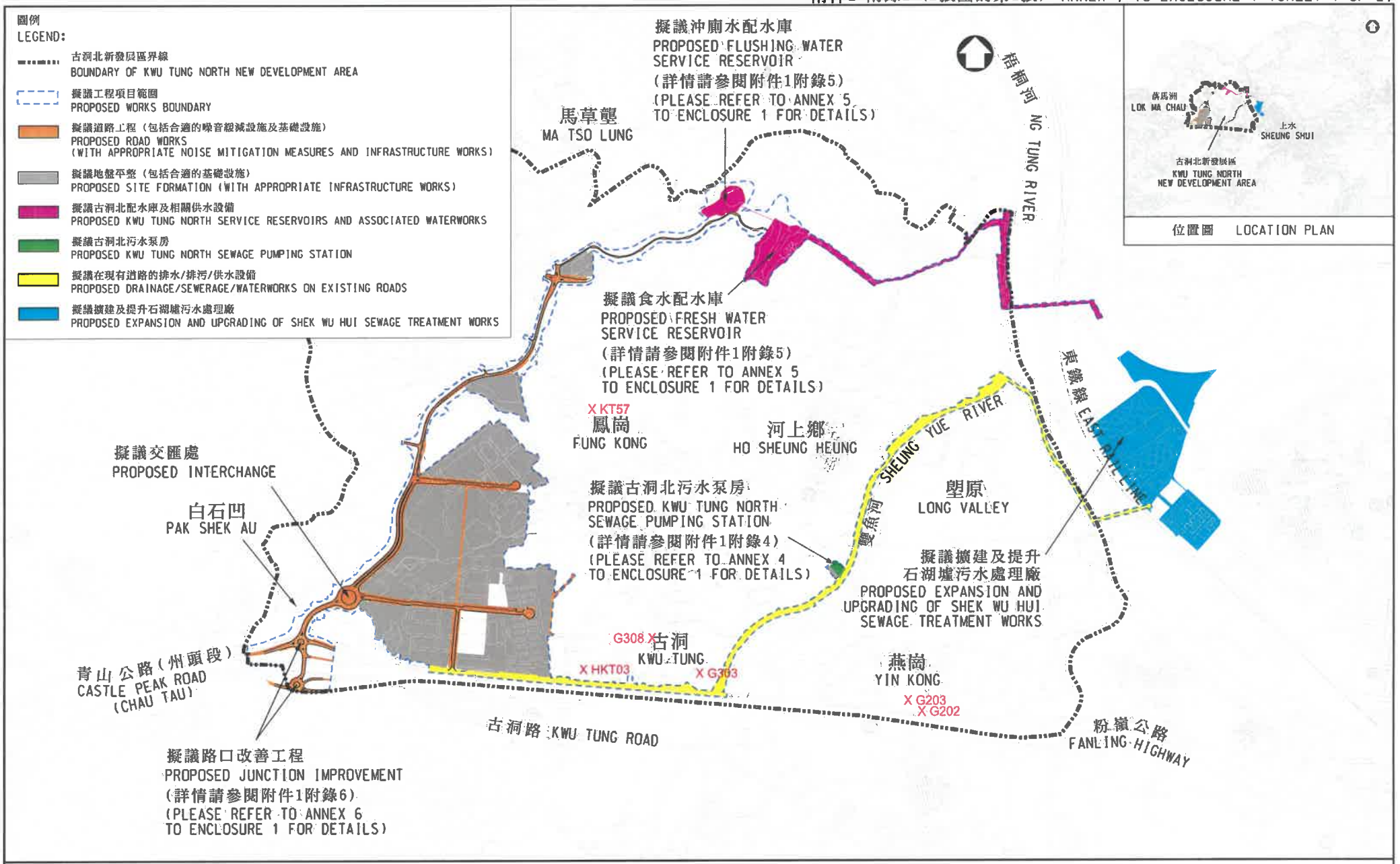
Distance with Construction Works	Monitoring Plan
Within 50m	Daily assessment is required
Within 75m	Bi-daily assessment is required
Within 100m	Weekly assessment is required

4.3.3 The installation of temporary pile walls such as steel sheet piles, pipe piles or steel channel plankings, pile driving and similar operation are often included in the site formation and excavation and lateral support works. Such temporary pile walls, pile driving and similar operation if installed by percussive or vibratory methods, are likely to generate vibrations and settlements that may cause damage to adjacent buildings/structures/services, particularly those that are vulnerable to vibrations.

4.3.4 For the vibration monitoring of trial pile, test pile, pile driving and similar operation, the maximum ground-borne vibrations, measured in terms of peak particle velocity (ppv), should be recorded at every meter length of penetration of pile, at final set and at levels where obstructions are encountered. The monitoring readings should be taken by a properly calibrated device under the direction of the RSE with the agreement of the ER and/or BA. If the measured ground-borne vibrations have been found to exceed the allowable values or if damage to either the structural or non-structural elements of the adjacent buildings/structures/services has been observed, all pile driving operations should be stopped and the agreed precautionary measures referred to item 4(o) of PNAP APP-18 should be reviewed and revised as necessary, and submitted by the RSE to the ER and/or BA for agreement. The suspended pile driving operations should not be resumed without the prior agreement of the ER and/or BA.

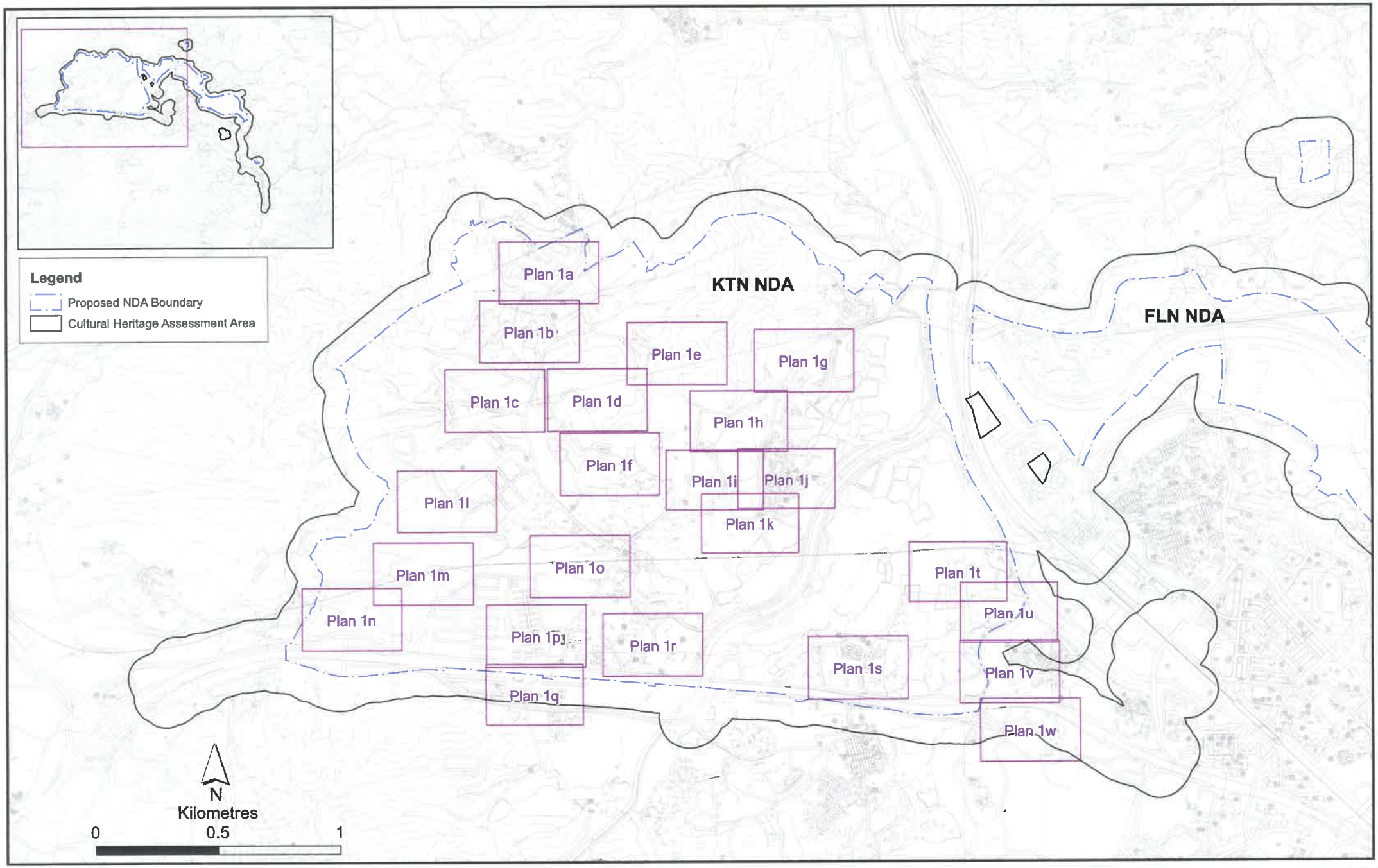
4.3.5 Immediate action for structural strengthening of the cultural heritages is not required. However, visual assessment should be carried out concurrently with the vibration monitoring assessment, once significant deficiencies (e.g. tilting, differential settlement) were observed, the construction works should stop immediately and seek the structural engineer's advice for any remedial works.

APPENDIX A - LOCATION PLAN



工務計劃項目第747CL號
古洞北新發展區及粉嶺北新發展區前期地盤平整和基礎設施工程-平面圖（古洞北新發展區）

PWP ITEM NO. 747CL
ADVANCE SITE FORMATION AND INFRASTRUCTURE WORKS FOR KWU TUNG NORTH NEW DEVELOPMENT AREA AND FANLING NORTH NEW DEVELOPMENT AREA-LAYOUT PLAN (KWU TUNG NORTH NEW DEVELOPMENT AREA)



CEDD 土木工程拓展署 CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT

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ARUP

Job Title
Agreement No. CE 61/2007 (CE)
North East New Territories New Development Areas
Planning and Engineering Study - Investigation

Drawing Title
Key Plan of Identified Built Heritage Items in KTN NDA and Associated Infrastructure Works CHAA

Rev	Description	Date
4th	ISSUE	04/13
3rd	ISSUE	01/13
2nd	ISSUE	12/11
1st	ISSUE	10/10

Drawn: FT | Date: 04/13
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Rev.:

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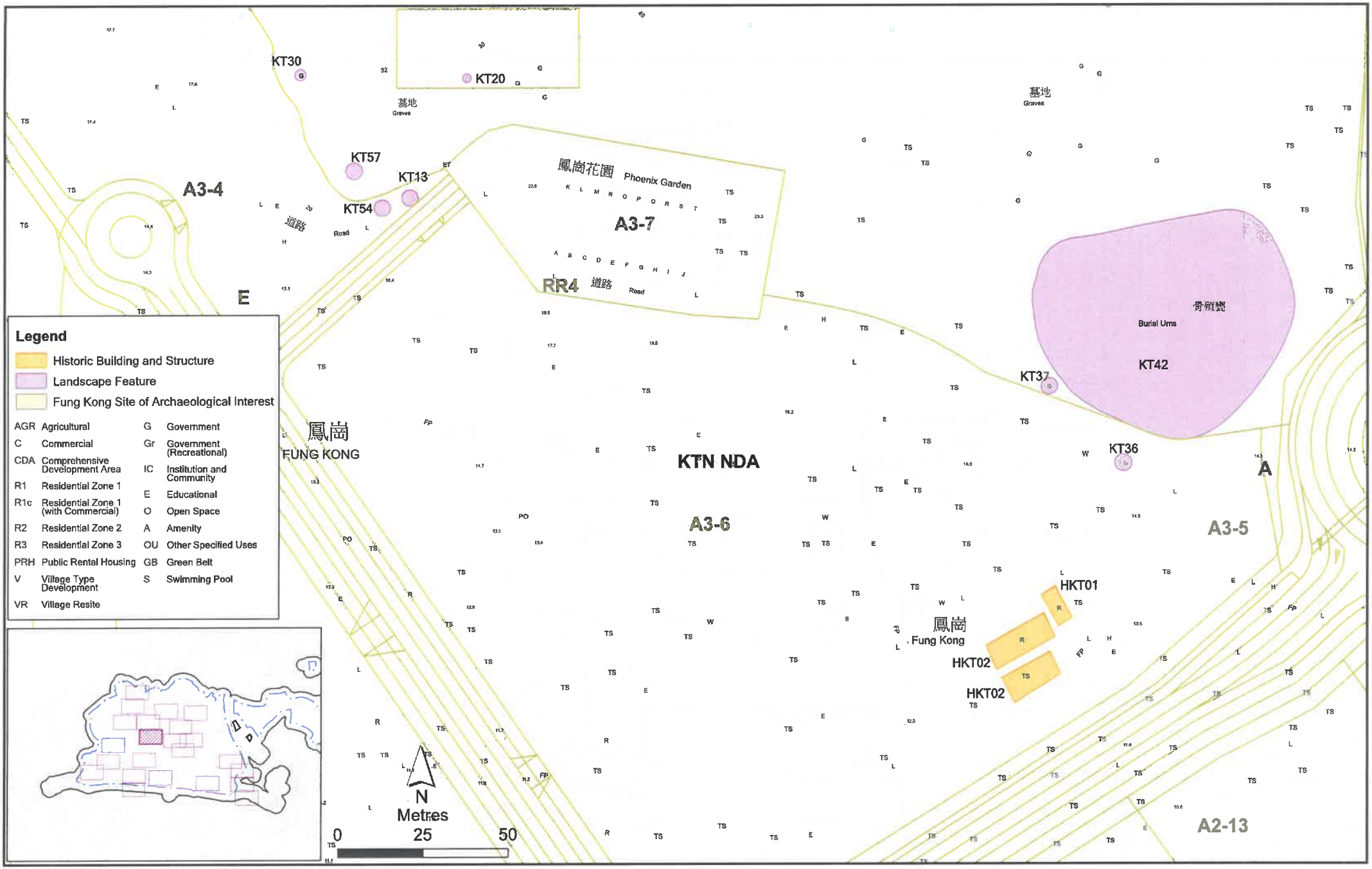

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Drawing Title: Identified Built Heritage Items in KTN NDA and Associated Infrastructure Works CHAA	Drawn: FT 04/13	Checked: PW 04/13	Approved: SC 04/13
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Rev	Description	Date
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2nd	ISSUE	01/13
1st	ISSUE	10/10

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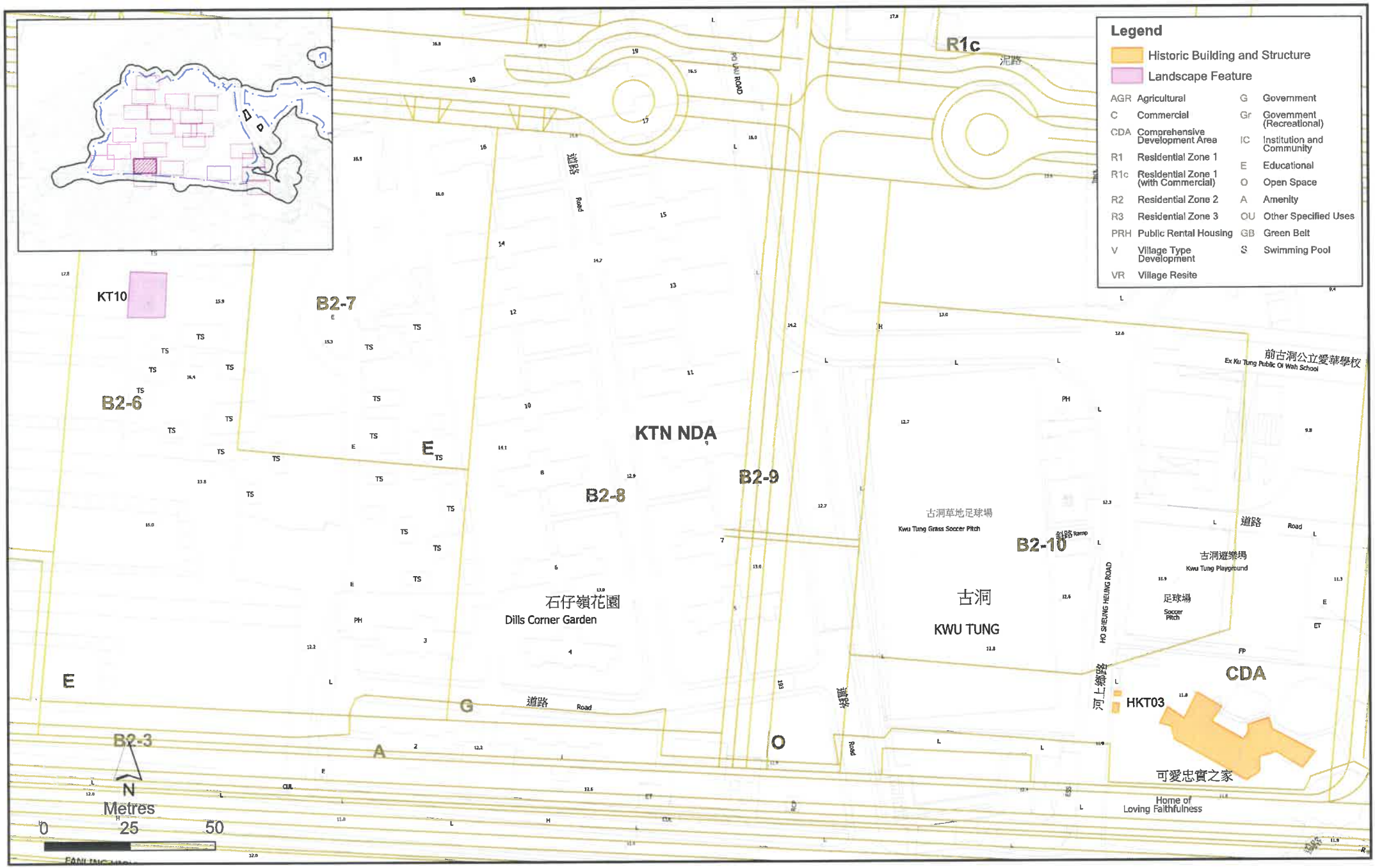

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Rev	Description	Date
3rd	ISSUE	04/13
2nd	ISSUE	01/13
1st	ISSUE	10/10

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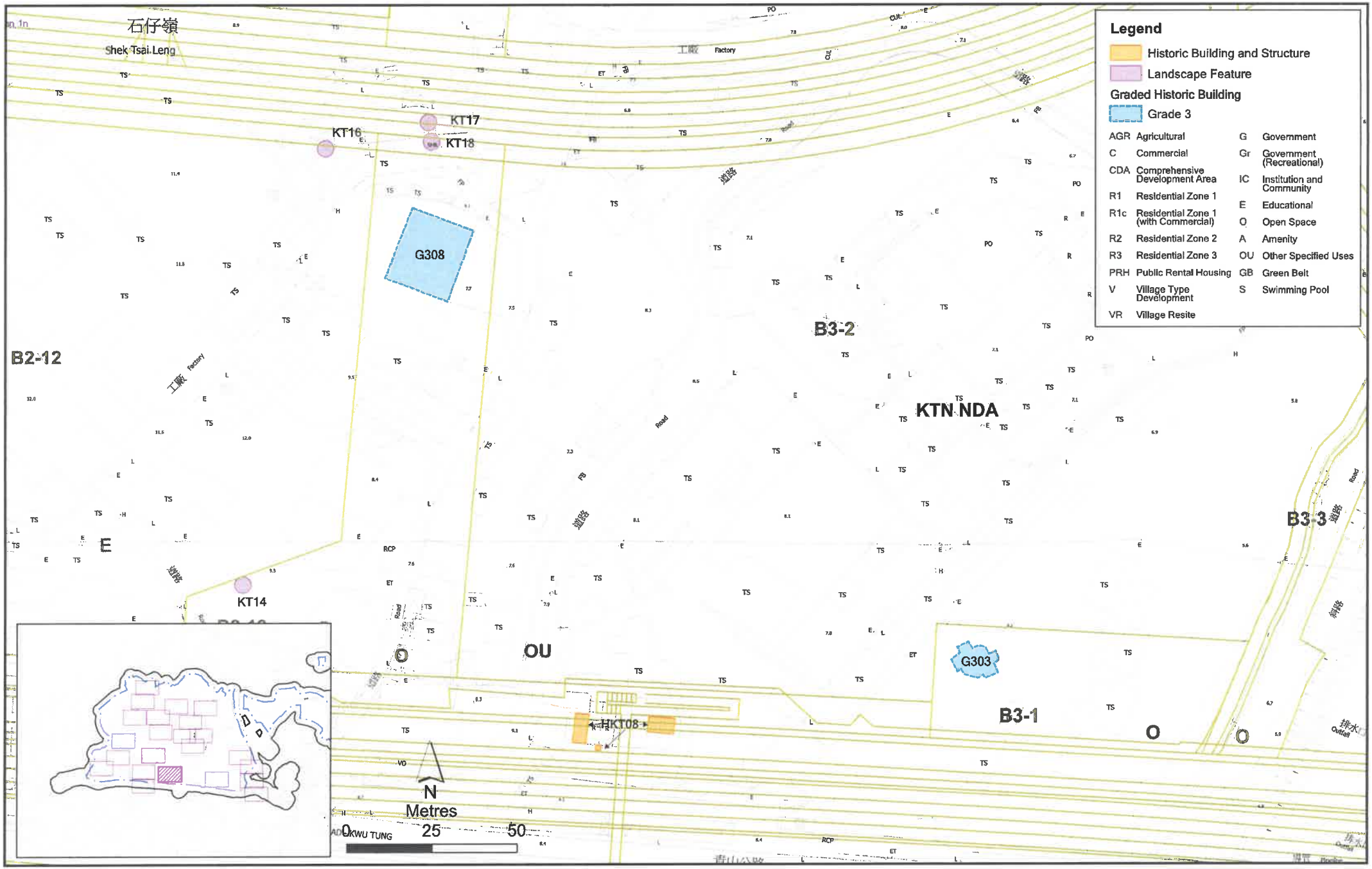

CEDD 土木工程拓展署 CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT

規劃署 PLANNING DEPARTMENT

ARUP

Job Title
Agreement No. CE 61/2007 (CE)
North East New Territories New Development Areas
Planning and Engineering Study - Investigation

Drawing Title
Identified Built Heritage Items in KTN NDA and Associated Infrastructure Works CHAA

Rev	Description	Date
	3rd ISSUE	04/13
	2nd ISSUE	01/13
	1st ISSUE	10/10

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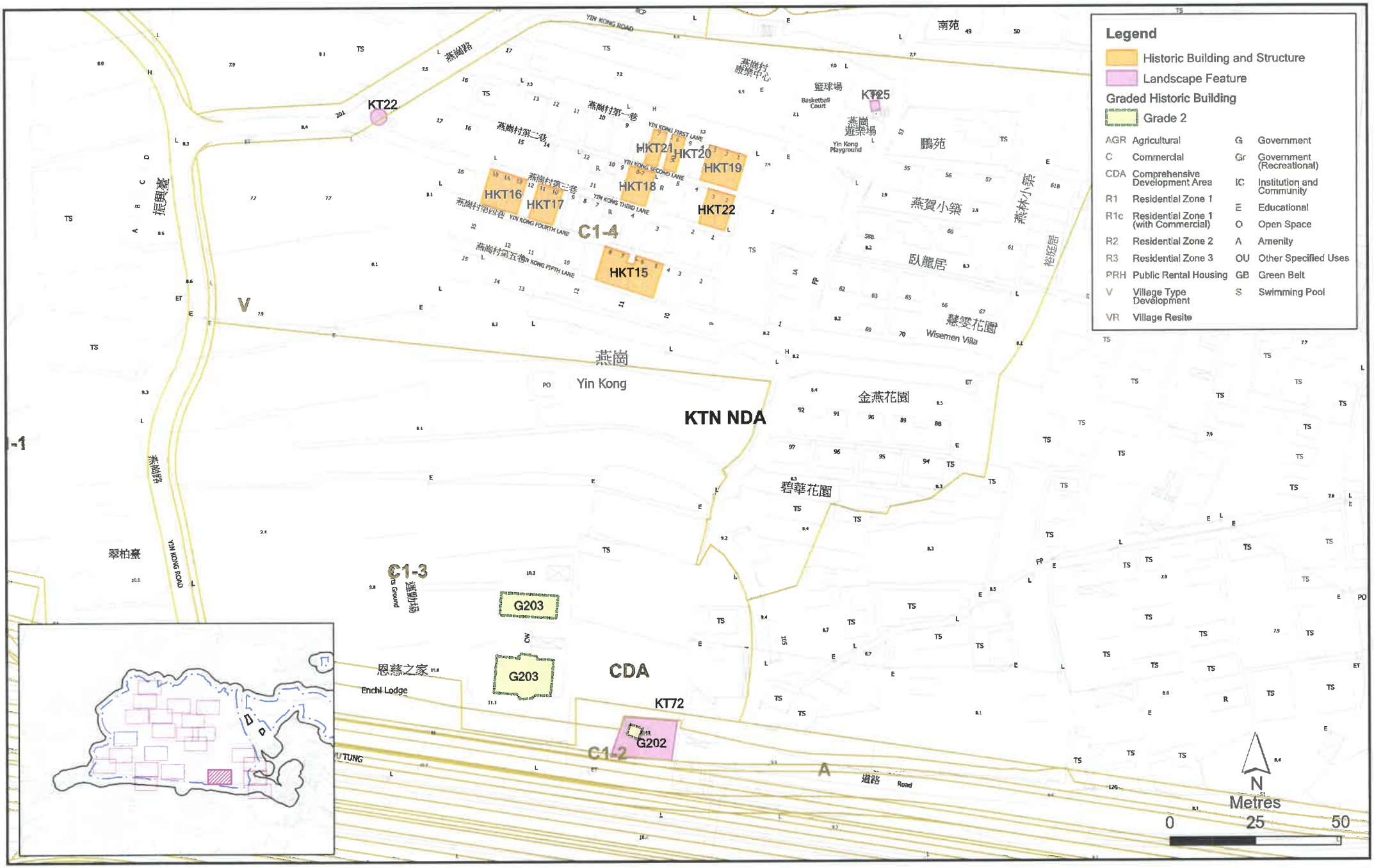

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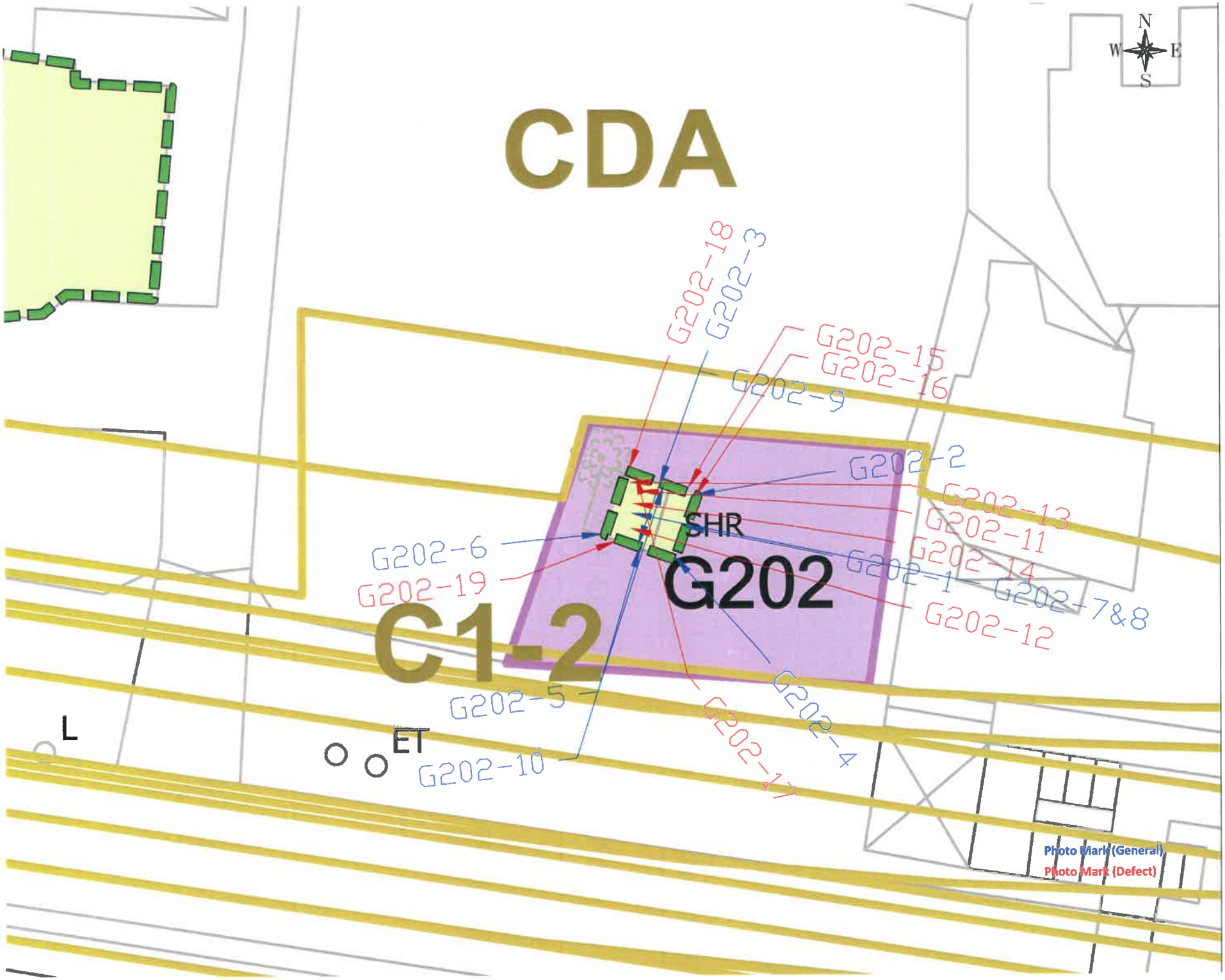
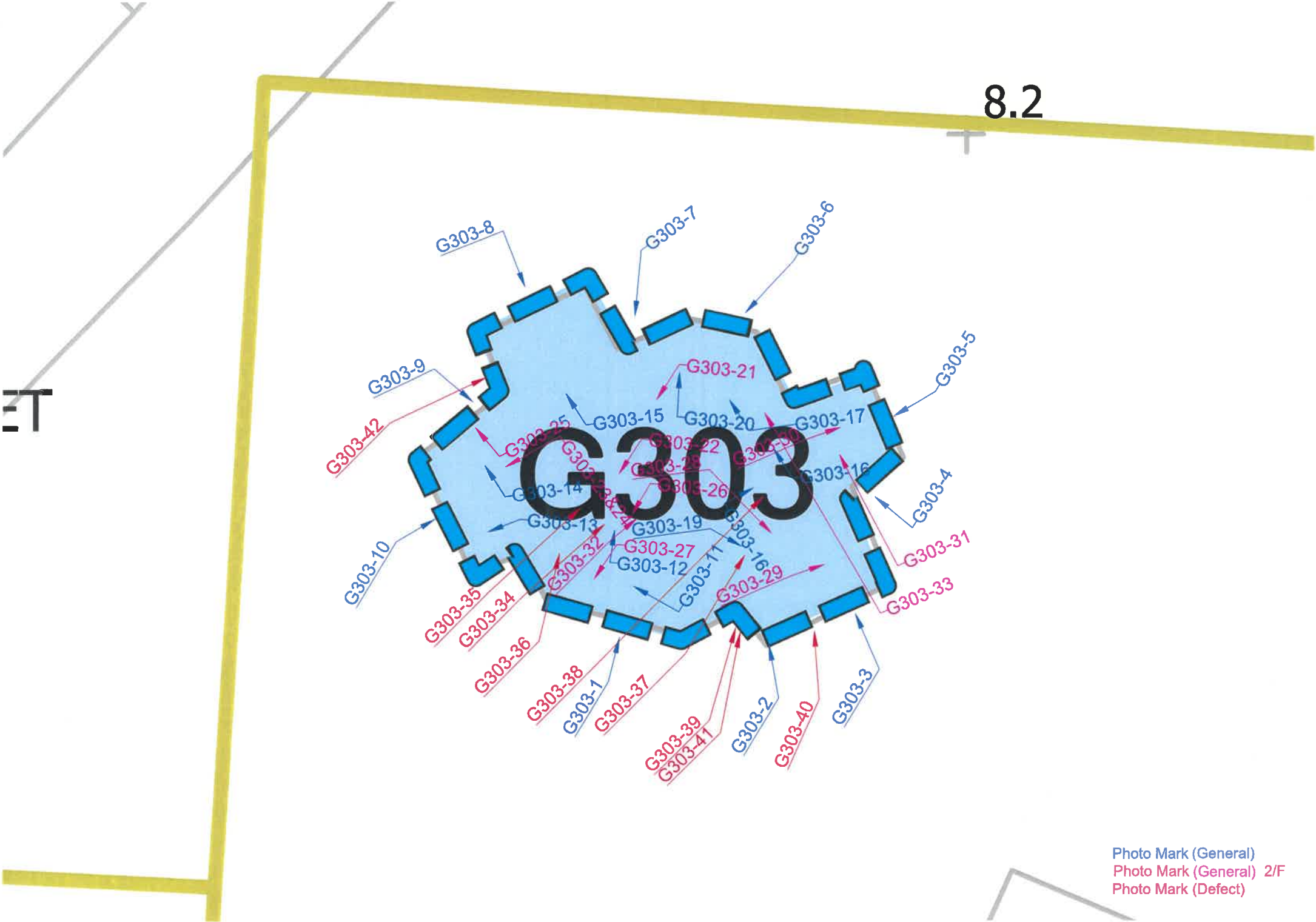
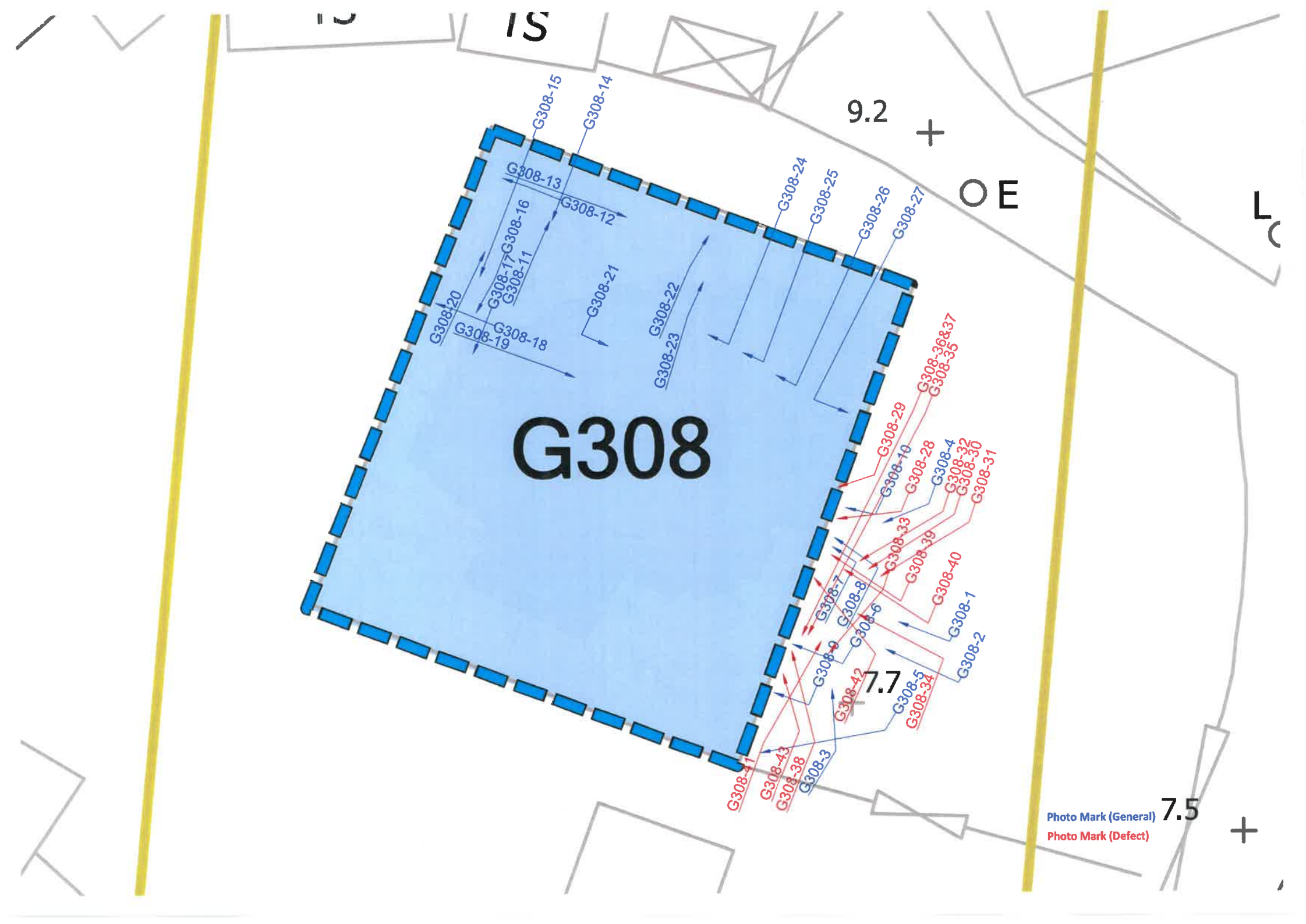
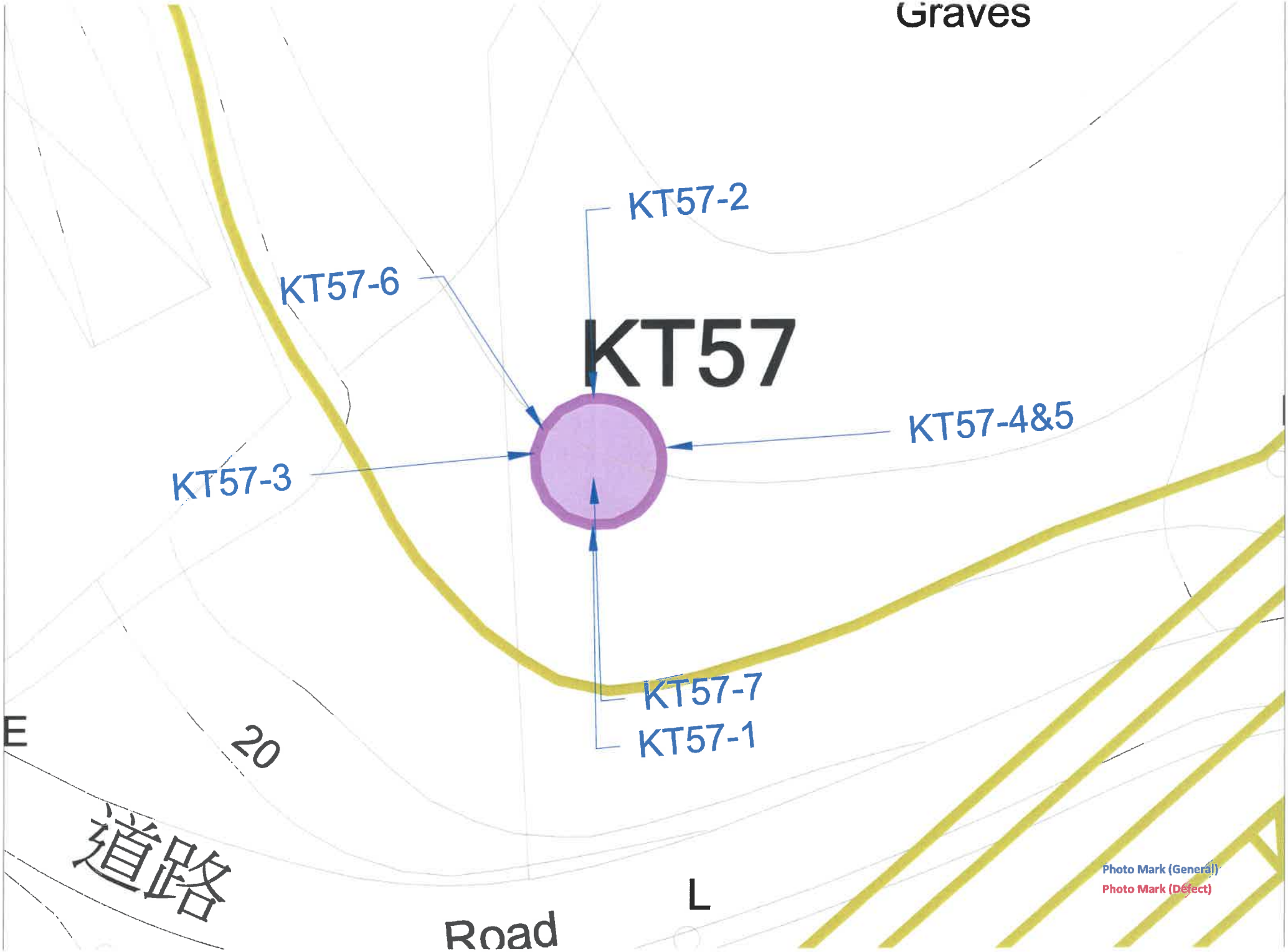
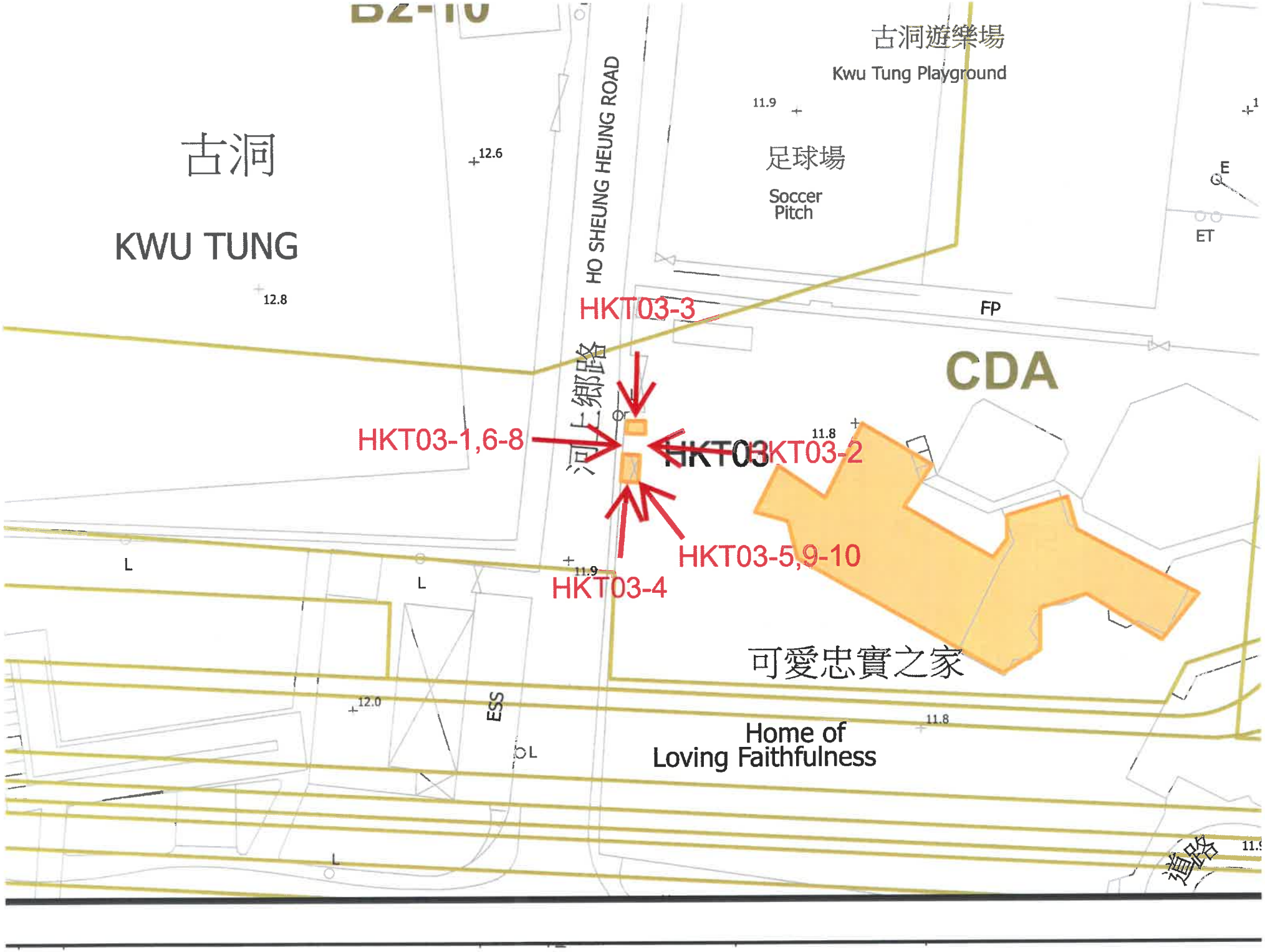
APPENDIX B – PHOTO PLAN

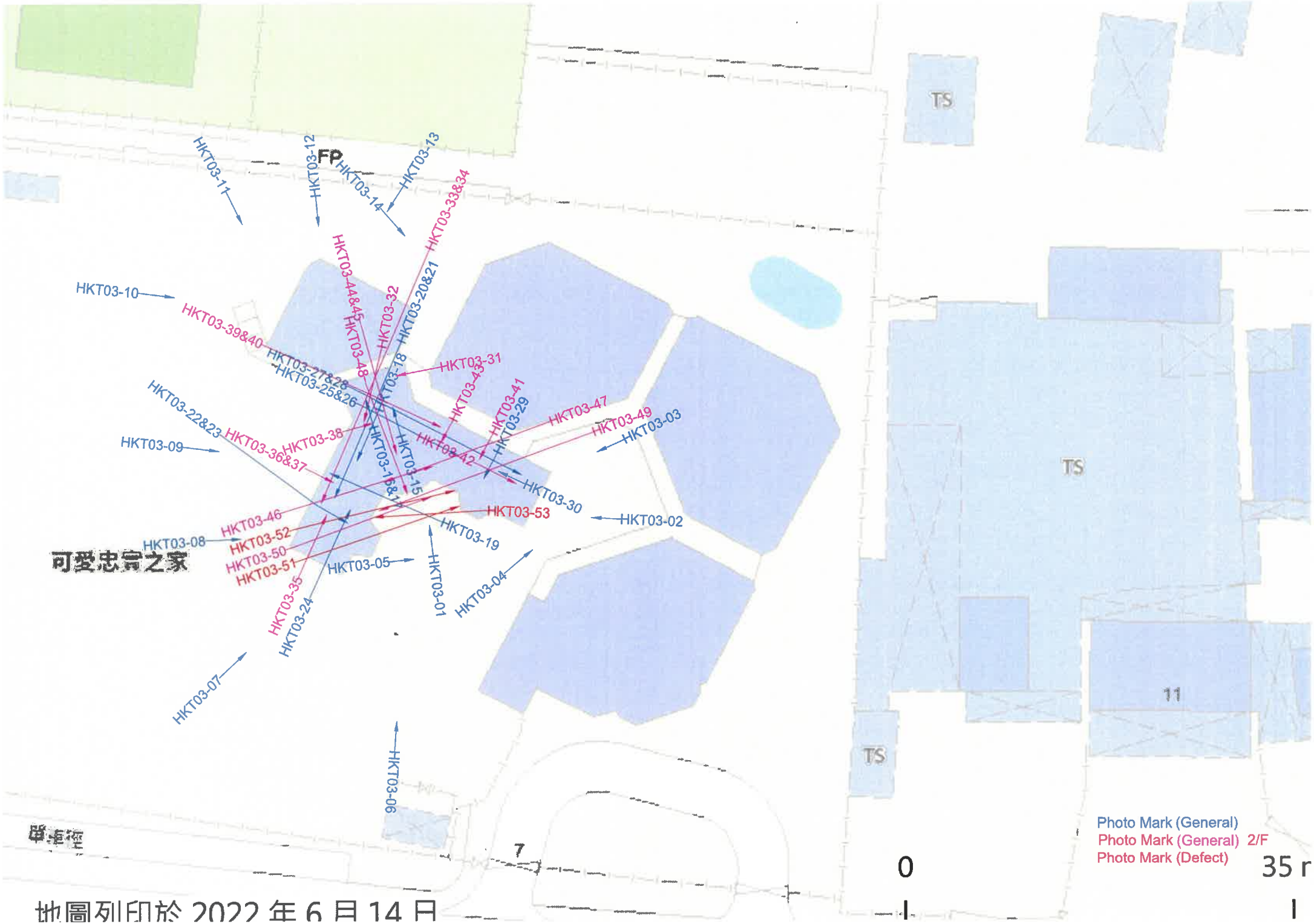

CDA
N
W
E
S
G202-18
G202-3
G202-15
G202-16
G202-9
G202-2
G202-13
G202-11
G202-14
G202-1
G202-7&8
G202-12
G202-6
G202-19
SHR
G202
C1-2
G202-5
G202-4
G202-17
G202-10
L
ET
Photo Mark (General)
Photo Mark (Defect)


8.2
G303
G303-8
G303-7
G303-6
G303-9
G303-5
G303-42
G303-21
G303-15
G303-20
G303-17
G303-25
G303-22
G303-30
G303-28
G303-16
G303-14
G303-26
G303-4
G303-13
G303-19
G303-10
G303-27
G303-31
G303-32
G303-12
G303-11
G303-18
G303-29
G303-33
G303-35
G303-34
G303-36
G303-38
G303-1
G303-37
G303-39
G303-41
G303-2
G303-40
G303-3
Photo Mark (General)
Photo Mark (General) 2/F
Photo Mark (Defect)


G308
G308-15
G308-14
G308-13
G308-12
G308-16
G308-17
G308-11
G308-20
G308-19
G308-18
G308-21
G308-22
G308-23
G308-24
G308-25
G308-26
G308-27
G308-36&37
G308-35
G308-29
G308-10
G308-28
G308-4
G308-32
G308-30
G308-31
G308-33
G308-39
G308-40
G308-7
G308-8
G308-6
G308-1
G308-9
G308-2
G308-42
G308-5
G308-34
G308-41
G308-43
G308-38
G308-3
9.2
7.7
7.5
Photo Mark (General)
Photo Mark (Defect)


Graves
KT57-2
KT57-6
KT57
KT57-4&5
KT57-3
KT57-7
KT57-1
E
20
道路
Road
L
Photo Mark (General)
Photo Mark (Defect)


古洞遊樂場
Kwu Tung Playground
古洞
KWU TUNG
足球場
Soccer Pitch
HO SHEUNG HEUNG ROAD
河上鄉路
FP
CDA
HKT03-3
HKT03-1,6-8
HKT03
HKT03-2
HKT03-5,9-10
HKT03-4
可愛忠實之家
Home of Loving Faithfulness
ESS
ET
12.6
12.8
11.9
12.0
11.8



地圖列印於 2022 年 6 月 14 日

APPENDIX C – CONDITION SURVEY PHOTO

Photographic Records
Site Code: G202
Site Name: Earth God Shrine of Kam Tsin (金錢土地神壇)

Photo : G202-1 (General View)

Photo : G202-2 (General View)

Photographic Records
Site Code: G202
Site Name: Earth God Shrine of Kam Tsin (金錢土地神壇)

Photo : G202-3 (General View)

Photo : G202-4 (General View)

Photographic Records
Site Code: G202
Site Name: Earth God Shrine of Kam Tsin (金錢土地神壇)

Phot : G202-5 (General View)

Photo : G202-6 (General View)

Photographic Records
Site Code: G202
Site Name: Earth God Shrine of Kam Tsin (金錢土地神壇)

Photo : G202-7 (General View)

Photo : G202-8 (General View)

Photographic Records
Site Code: G202
Site Name: Earth God Shrine of Kam Tsin (金錢土地神壇)

Photo : G202-9 (General View)

Photo : G202-10 (General View)

Photographic Records
Site Code: G202
Site Name: Earth God Shrine of Kam Tsin (金錢土地神壇)

Photo : G202-11 Wide Crack on Surface

Photo : G202-12 Wide Crack on Surface

Photographic Records
Site Code: G202
Site Name: Earth God Shrine of Kam Tsin (金錢土地神壇)

Photo : G202-13 Wide Crack on Surface

Photo : G202-14 Wide Crack on Surface

Photographic Records
Site Code: G202
Site Name: Earth God Shrine of Kam Tsin (金錢土地神壇)

Photo : G202-15 Wide Crack on Surface

Photo : G202-16 Fine Crack on Surface

金

Photographic Records
Site Code: G202
Site Name: Earth God Shrine of Kam Tsin (金錢土地神壇)

Photo : G202-17 Wide Crack on Surface

Photo : G202-18 Wide Crack on Surface

Photographic Records
Site Code: G202
Site Name: Earth God Shrine of Kam Tsin (金錢土地神壇)

Photo : G202-19 Moderate Crack on Surface

Photographic Records
Site Code: G303
Site Name: Yeung Yuen (also known as Yeung Garden)

Photo: G303-1: Front View (South to North)

Photo: G303-2: Oblique View (South East to North West)

Photographic Records

Site Code: G303

Site Name: Yeung Yuen (also known as Yeung Garden)

Photo: G303-3: Oblique View (South East to North West)

Photo: G303-4: Side View (East to West)

Photographic Records
Site Code: G303
Site Name: Yeung Yuen (also known as Yeung Garden)

Photo: G303-5: Oblique View (North East to South West)

Photo: G303-6: Oblique View (North East to South West)

Photographic Records
Site Code: G303
Site Name: Yeung Yuen (also known as Yeung Garden)

Photo: G303-7: Front View (North to South)

Photo: G303-8: Oblique View (North West to South East)

Photographic Records
Site Code: G303
Site Name: Yeung Yuen (also known as Yeung Garden)

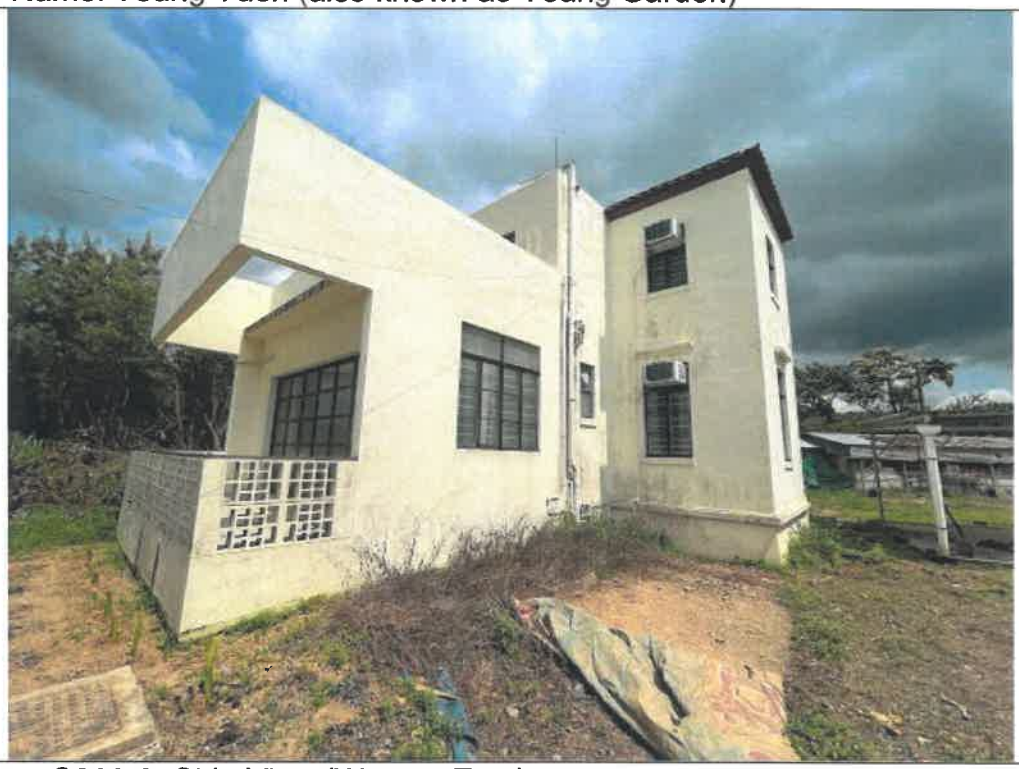


Photo: G303-9: Side View (West to East)

Photo: G303-10: Oblique View (South West to North East)

Photographic Records
Site Code: G303
Site Name: Yeung Yuen (also known as Yeung Garden)

Photo: G303-11: G/F Entrance

Photo: G303-12: G/F Living Room

Photographic Records
Site Code: G303
Site Name: Yeung Yuen (also known as Yeung Garden)

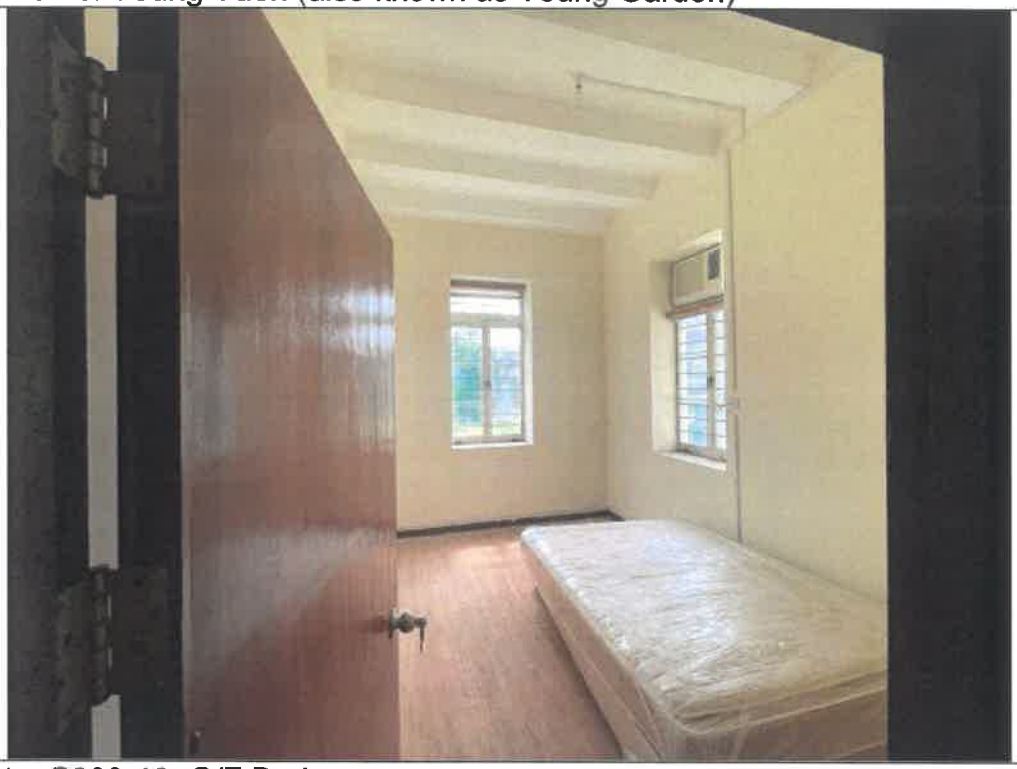


Photo: G303-13: G/F Bedroom

Photo: G303-14: G/F Toilet

Photographic Records
Site Code: G303
Site Name: Yeung Yuen (also known as Yeung Garden)

Photo: G303-15: G/F Living Room

Photo: G303-16: G/F Kitchen

Photographic Records
Site Code: G303
Site Name: Yeung Yuen (also known as Yeung Garden)

Photo: G303-17: G/F Kitchen

Photo: G303-18 G/F Toilet

Photographic Records
Site Code: G303
Site Name: Yeung Yuen (also known as Yeung Garden)

Photo: G303-19: G/F Bedroom

Photo: G303-20: G/F Staircase

Photographic Records
Site Code: G303
Site Name: Yeung Yuen (also known as Yeung Garden)

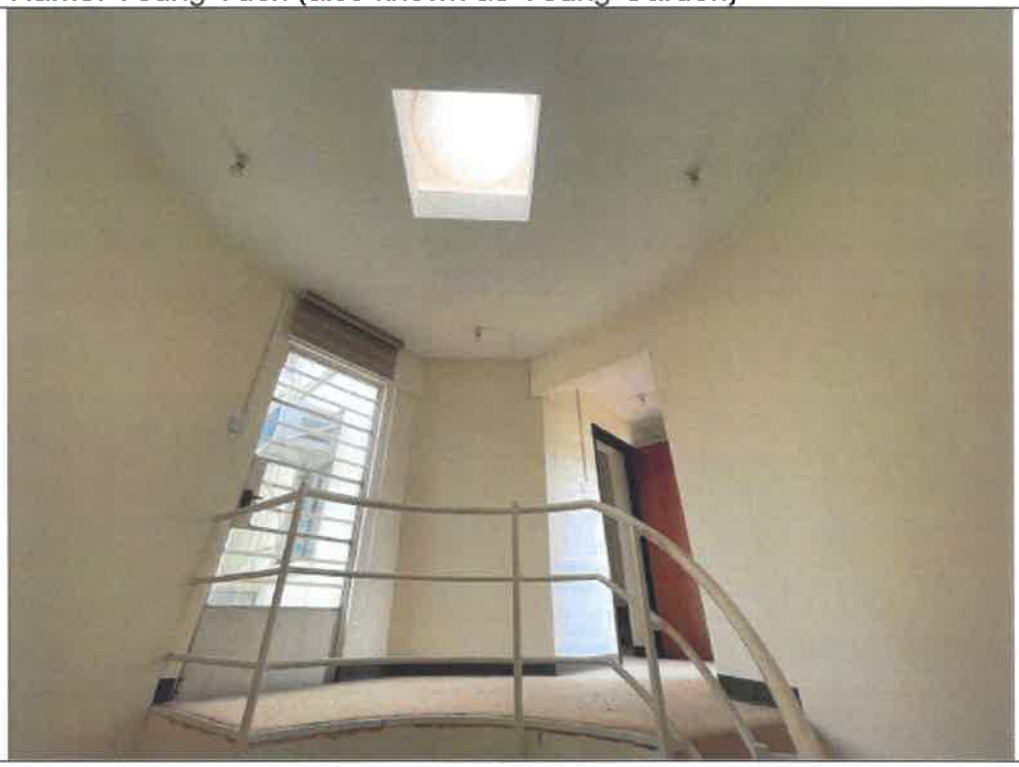


Photo: G303-21: 1/F Staircase

Photo: G303-22: 1/F Living Room

Photographic Records
Site Code: G303
Site Name: Yeung Yuen (also known as Yeung Garden)

Photo: G303-23: 1/F Bedroom

Photo: G303-24: 1/F Bedroom Ceiling

Photographic Records
Site Code: G303
Site Name: Yeung Yuen (also known as Yeung Garden)

Photo: G303-25: 1/F Toilet

Photo: G303-26: 1/F Living Room

Photographic Records
Site Code: G303
Site Name: Yeung Yuen (also known as Yeung Garden)

Photo: G303-27: 1/F Balcony

Photo: G303-28: 1/F Bedroom

Photographic Records
Site Code: G303
Site Name: Yeung Yuen (also known as Yeung Garden)

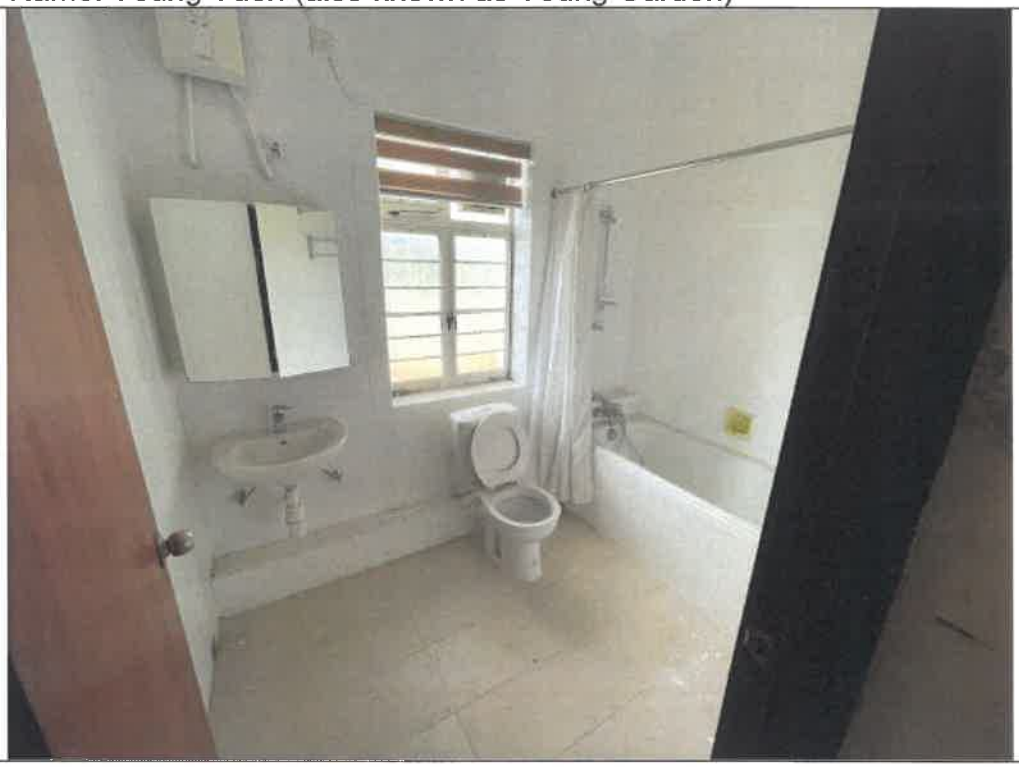


Photo: G303-29: 1/F Toilet

Photo: G303-30: 1/F Balcony

Photographic Records
Site Code: G303
Site Name: Yeung Yuen (also known as Yeung Garden)

Photo: G303-31: 1/F Balcony

Photo: G303-32: 1/F Balcony

Photographic Records
Site Code: G303
Site Name: Yeung Yuen (also known as Yeung Garden)

Photo: G303-33: 1/F Balcony

Photo: G303-34: Fine Crack on Surface

Photographic Records
Site Code: G303
Site Name: Yeung Yuen (also known as Yeung Garden)

Photo: G303-35: Fine Crack on Surface

Photo: G303-36: Fine Crack on Surface

Photographic Records
Site Code: G303
Site Name: Yeung Yuen (also known as Yeung Garden)

Photo: G303-37: Fine Crack on Surface

Photo: G303-38: Fine Crack on Surface

Photographic Records
Site Code: G303
Site Name: Yeung Yuen (also known as Yeung Garden)

Photo: G303-39: Moderate Crack on Surface

Photo: G303-40: Moderate Crack on Surface

Photographic Records
Site Code: G303
Site Name: Yeung Yuen (also known as Yeung Garden)

Photo: G303-41: Fine Crack on Surface

Photo: G303-42: Moderate Crack on Surface

Photographic Records
Site Code: G308
Site Name: Yan Wah Lo

Photo G308-1: Front View (East to West)

Photo G308-2: Front View (East to West)

Photographic Records
Site Code: G308
Site Name: Yan Wah Lo

Photo G308-3: Oblique View (South West to North East)

Photo G308-4: Oblique View (South East to North West)

Photographic Records
Site Code: G308
Site Name: Yan Wah Lo

Photo G308-5: Bottom View (South East to North West)

Photo G308-6: Bottom View (East to West)

Photographic Records
Site Code: G308
Site Name: Yan Wah Lo

Photo G308-7: Bottom View (South West to North East)

Photo G308-8: Bottom View (South West to North East)

Photographic Records
Site Code: G308
Site Name: Yan Wah Lo

Photo G308-9: Orientation: (East to West), A Window Is located next to the room above left

Photo G308-10: Orientation: (East to West), A Window Is located next to the room above right

Photographic Records
Site Code: G308
Site Name: Yan Wah Lo

Photo G308-11: Inside View

Photo G308-12: Inside View

Photographic Records
Site Code: G308
Site Name: Yan Wah Lo

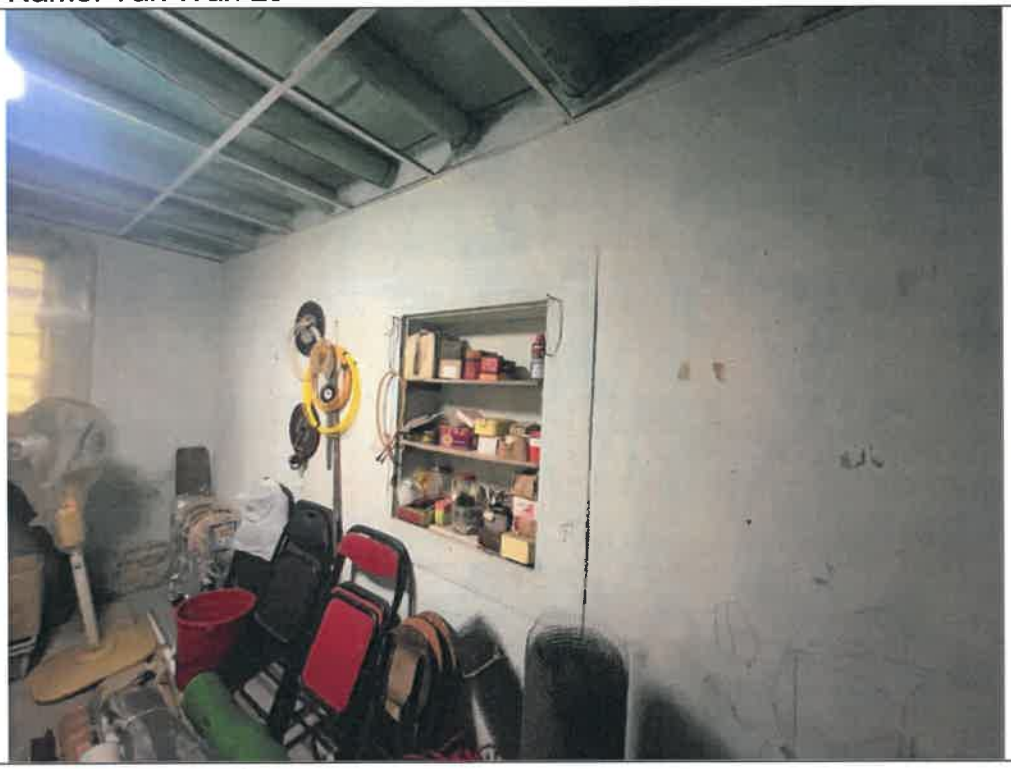


Photo G308-13: Inside View

Photo G308-14: Inside View

Photographic Records
Site Code: G308
Site Name: Yan Wah Lo

Photo G308-15: Inside View

Photo G308-16: Inside View

Photographic Records
Site Code: G308
Site Name: Yan Wah Lo

Photo G308-17: Inside View

Photo G308-18: Inside View

Photographic Records
Site Code: G308
Site Name: Yan Wah Lo

Photo G308-19: Inside View

Photo G308-20: Inside View

Photographic Records
Site Code: G308
Site Name: Yan Wah Lo

Photo G308-21: Inside View

Photo G308-22: Inside View

Photographic Records
Site Code: G308
Site Name: Yan Wah Lo

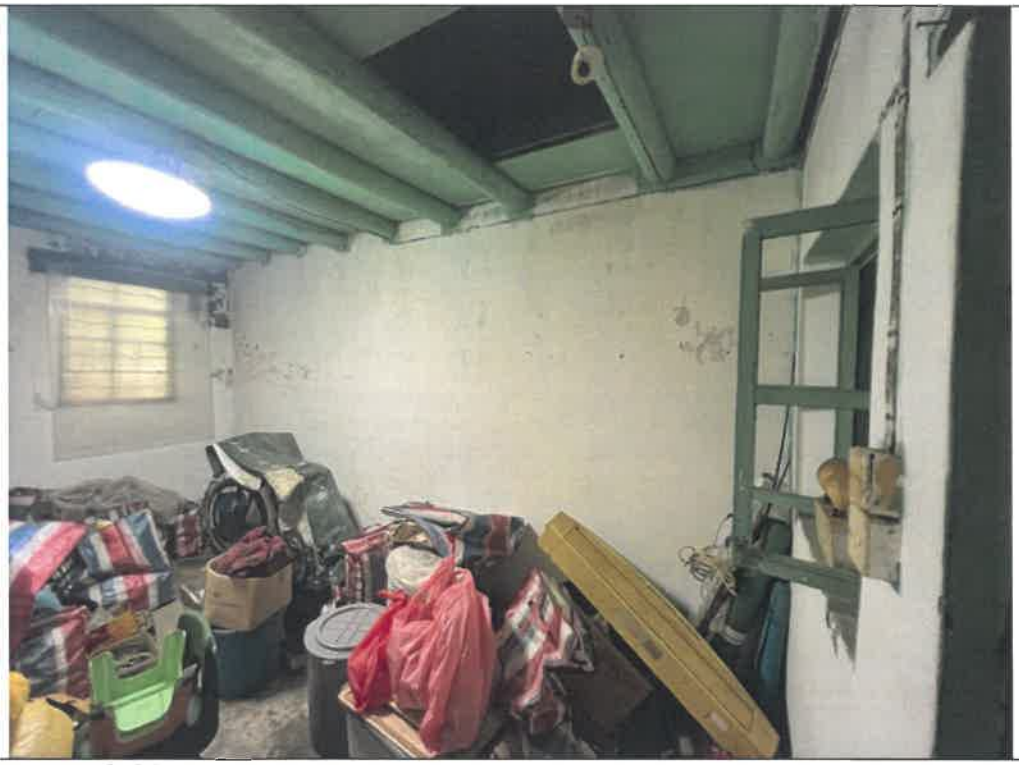


Photo G308-23: Inside View

Photo G308-24: Inside View

Photographic Records
Site Code: G308
Site Name: Yan Wah Lo

Photo G308-25: Inside View

Photo G308-26: Inside View

Photographic Records
Site Code: G308
Site Name: Yan Wah Lo

Photo G308-27: Inside View

Photo G308-28: Moderate Crack

Photographic Records
Site Code: G308
Site Name: Yan Wah Lo

Photo G308-29: Moderate Crack

Photo G308-30: Wide Crack

Photographic Records
Site Code: G308
Site Name: Yan Wah Lo

Photo G308-31: Wide Crack

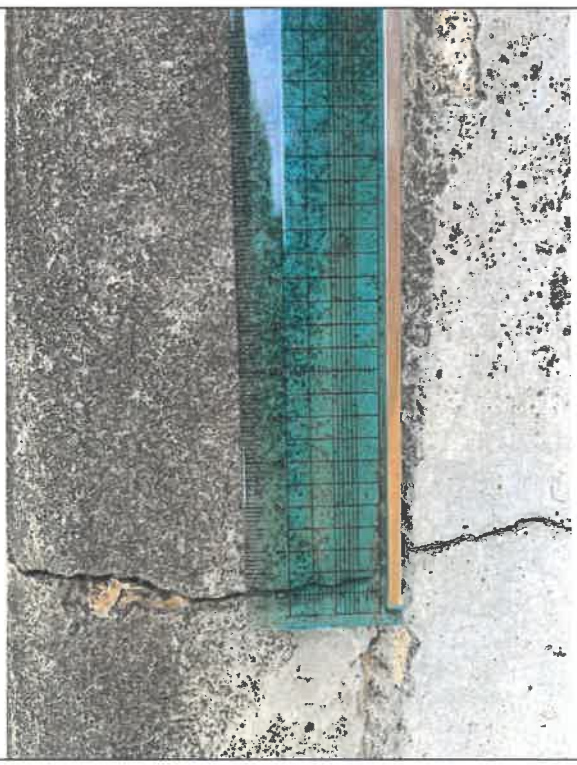


Photo G308-32: Wide Crack

Photographic Records
Site Code: G308
Site Name: Yan Wah Lo

Photo G308-33: Wide Crack

Photo G308-34: Wide Crack

Photographic Records
Site Code: G308
Site Name: Yan Wah Lo

Photo G308-35: Moderate Crack

Photo G308-36: Moderate Crack on Surface

Photographic Records
Site Code: G308
Site Name: Yan Wah Lo

Photo G308-37: Moderate Crack

Photo G308-38: Wide Crack

Photographic Records
Site Code: G308
Site Name: Yan Wah Lo

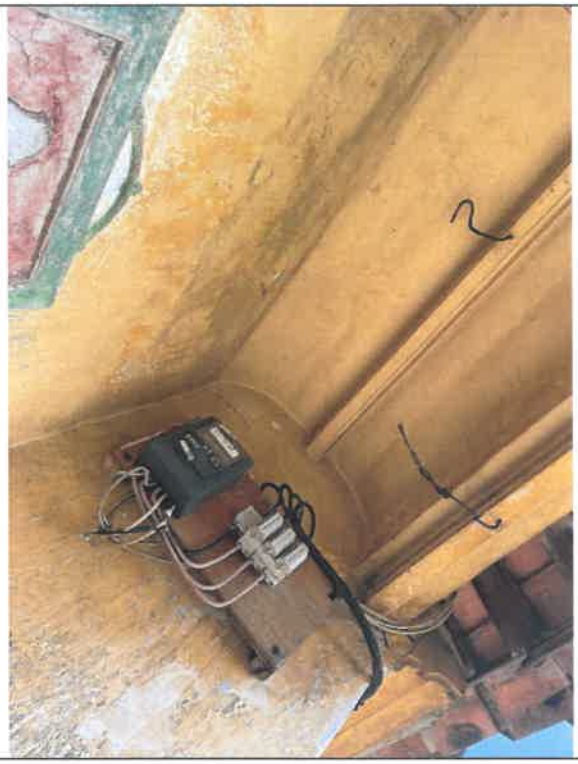


Photo G308-39: Fine Crack

Photo G308-40: Wide Crack

Photographic Records
Site Code: G308
Site Name: Yan Wah Lo

Photo G308-41: Fine Crack

Photo G308-42: Moderate Crack

Photographic Records
Site Code: G308
Site Name: Yan Wah Lo

Photo G308-43: Moderate Crack

Photo G308-44: Top View (East to West)

Photographic Records
Site Code: HKT03
Site Name: Home of Loving Faithfulness (Entrance Gate)

Photo 1- EG-1: Front View (West to East)

Photo 1- EG-2 Front View (East to West)

Photographic Records
Site Code: HKT03
Site Name: Home of Loving Faithfulness (Entrance Gate)

Photo 1- EG-3: Side View (North to South)

Photo 1- EG-4 Side View (South to North)

Photographic Records
Site Code: HKT03
Site Name: Home of Loving Faithfulness (Entrance Gate)

Photo 1- EG-5: Oblique View (South East to North West)

Photo 1- EG-6 Top tiles of the entrance gate

Photographic Records
Site Code: HKT03
Site Name: Home of Loving Faithfulness (Entrance Gate)

Photo 1- EG-7: Ridge of the entrance gate

Photo 1- EG-8 Stone base of the entrance gate

Photographic Records
Site Code: HKT03
Site Name: Home of Loving Faithfulness (Entrance Gate)

Photo 1- EG-9: Missing bricks on the structure

Photo 1-EG-10 Missing bricks on the structure

Photographic Records
Site Code: HKT03
Site Name: White House (Home of Loving Faithfulness)

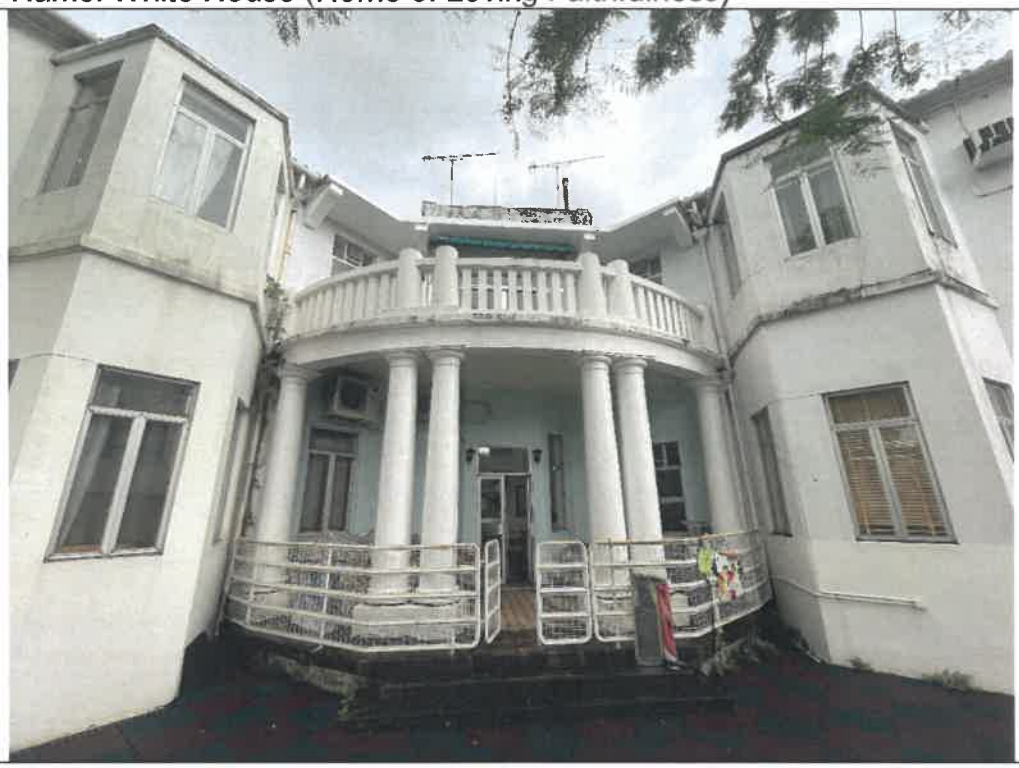


Photo: HKT03-01 Front View (South to North)

Photo: HKT03-02 Side View (East to West)

Photographic Records
Site Code: HKT03
Site Name: White House (Home of Loving Faithfulness)

Photo: HKT03-03 Oblique View (North East to South West)

Photo: HKT03-04 Oblique View (South West to North East)

Photographic Records
Site Code: HKT03
Site Name: White House (Home of Loving Faithfulness)

Photo: HKT03-05 Oblique View (West to East)

Photo: HKT03-06 Front View (South to North)

Photographic Records
Site Code: HKT03
Site Name: White House (Home of Loving Faithfulness)

Photo: HKT03-07 Oblique View (South West to North East)

Photo: HKT03-08 Oblique View (South West to North East)

Photographic Records
Site Code: HKT03
Site Name: White House (Home of Loving Faithfulness)

Photo: HKT03-09 Side View (West to East)

Photo: HKT03-10 Side View (West to East)

Photographic Records
Site Code: HKT03
Site Name: White House (Home of Loving Faithfulness)

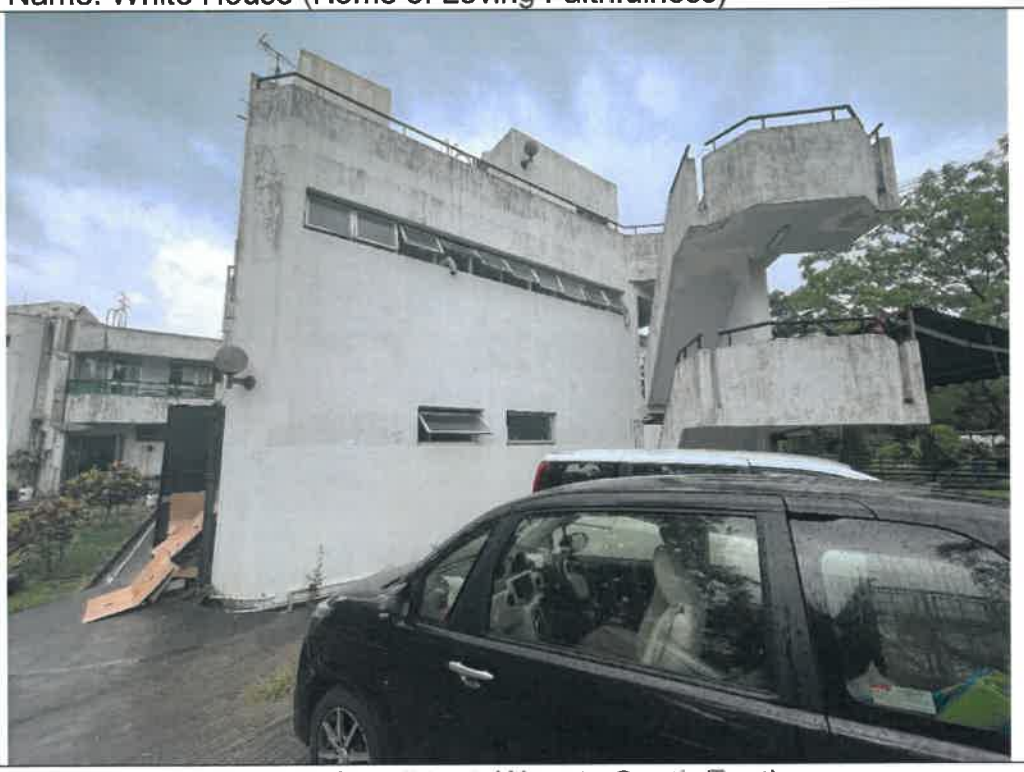


Photo: HKT03-11 Oblique View (North West to South East)

Photo: HKT03-12 Front View (North to South)

Photographic Records
Site Code: HKT03
Site Name: White House (Home of Loving Faithfulness)

Photo: HKT03-13 Oblique View (North East to South West)

Photo: HKT03-14 Oblique View (North West to South East)

Photographic Records
Site Code: HKT03
Site Name: White House (Home of Loving Faithfulness)

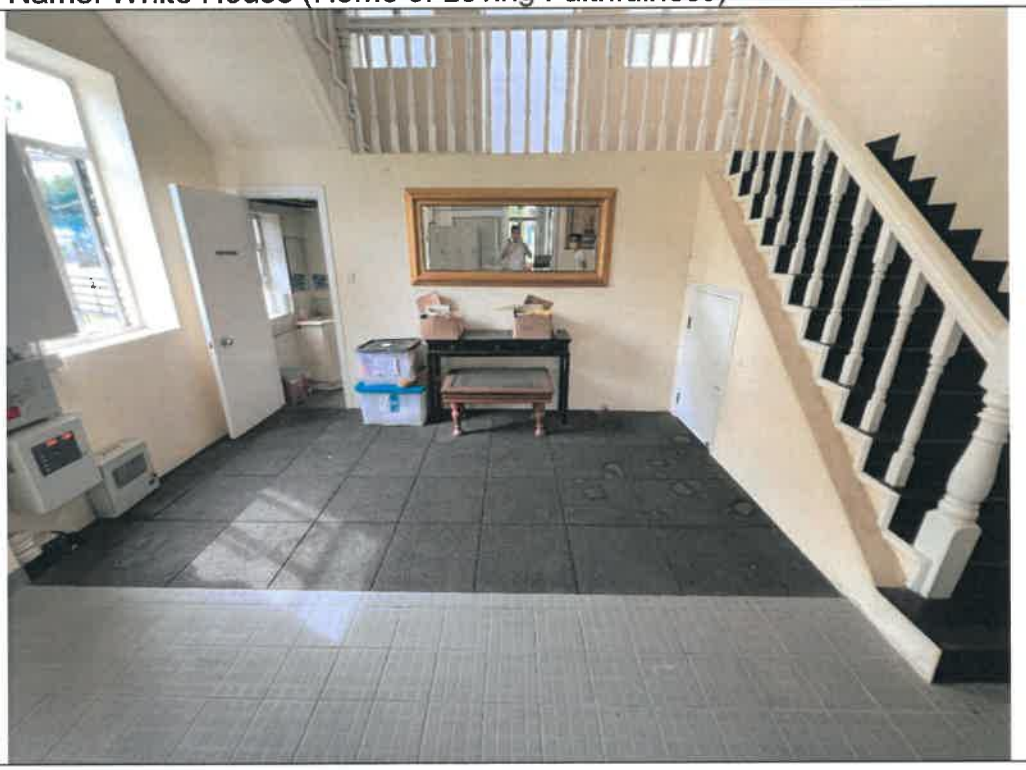


Photo: HKT03-15 Inside View

Photo: HKT03-16 Inside View

Photographic Records
Site Code: HKT03
Site Name: White House (Home of Loving Faithfulness)

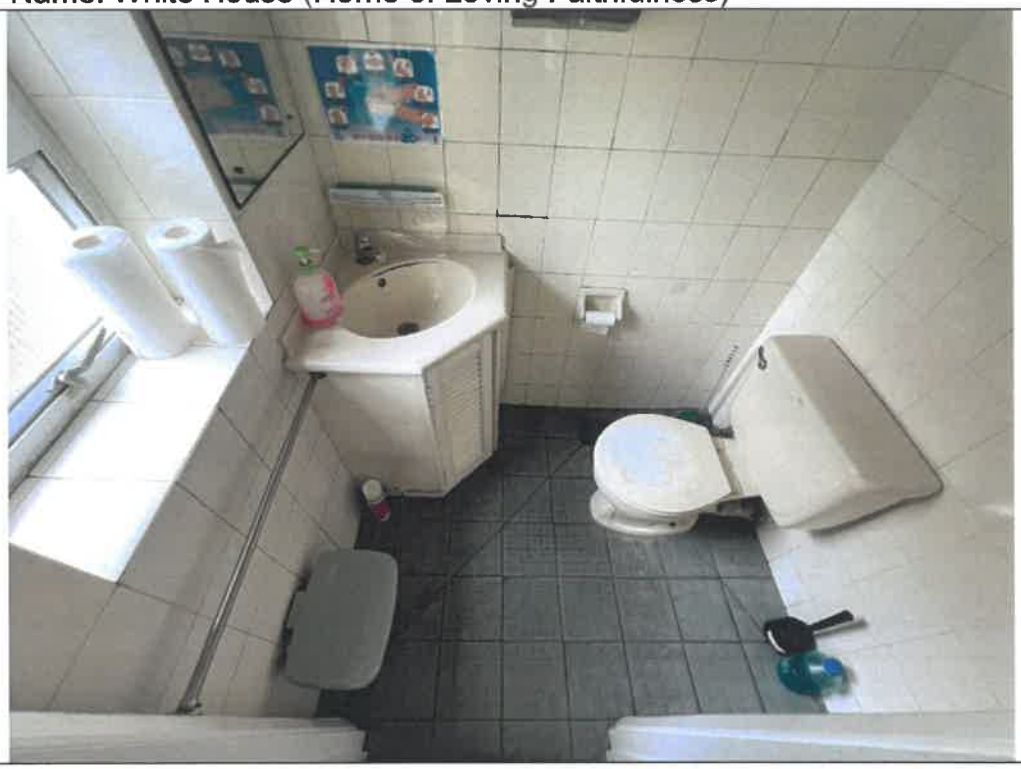


Photo: HKT03-17 Inside View

Photo: HKT03-18 Inside View

Photographic Records
Site Code: HKT03
Site Name: White House (Home of Loving Faithfulness)

Photo: HKT03-19 Inside View

Photo: HKT03-20 Inside View

Photographic Records
Site Code: HKT03
Site Name: White House (Home of Loving Faithfulness)

Photo: HKT03-21 Inside View

Photo: HKT03-22 Inside View

Photographic Records
Site Code: HKT03
Site Name: White House (Home of Loving Faithfulness)

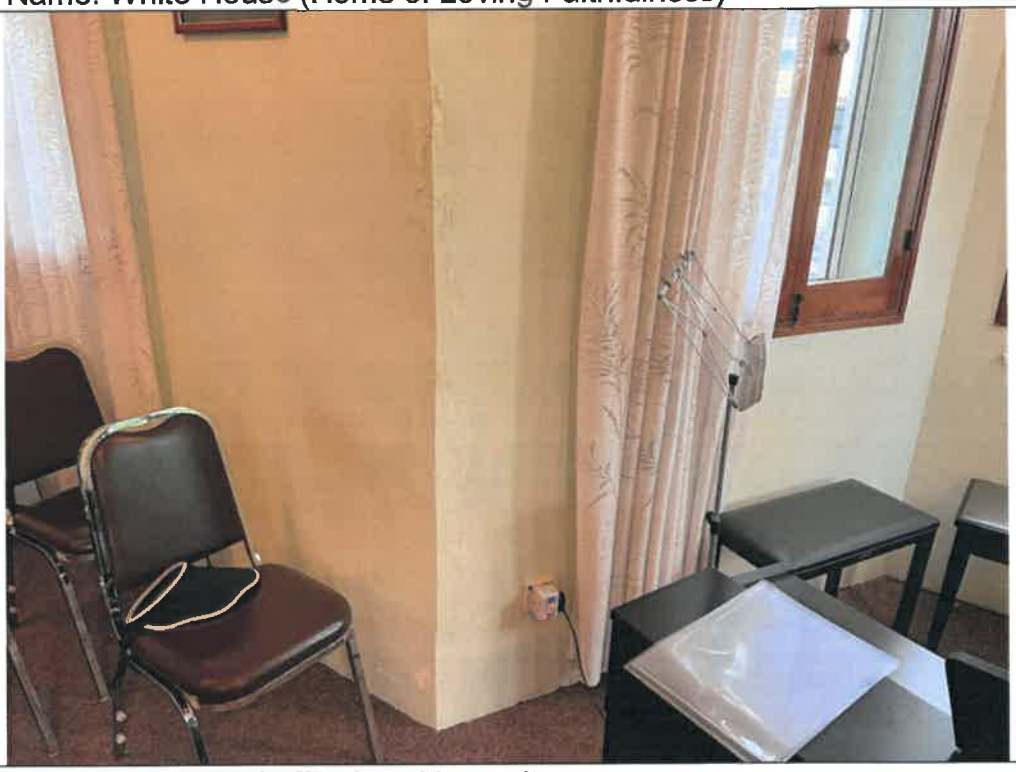


Photo: HKT03-23 Peel off paint with mositure

Photo: HKT03-24 Inside View

Photographic Records
Site Code: HKT03
Site Name: White House (Home of Loving Faithfulness)

Photo: HKT03-25 Inside View

Photo: HKT03-26 Inside View

Photographic Records
Site Code: HKT03
Site Name: White House (Home of Loving Faithfulness)

Photo: HKT03-27 Inside View

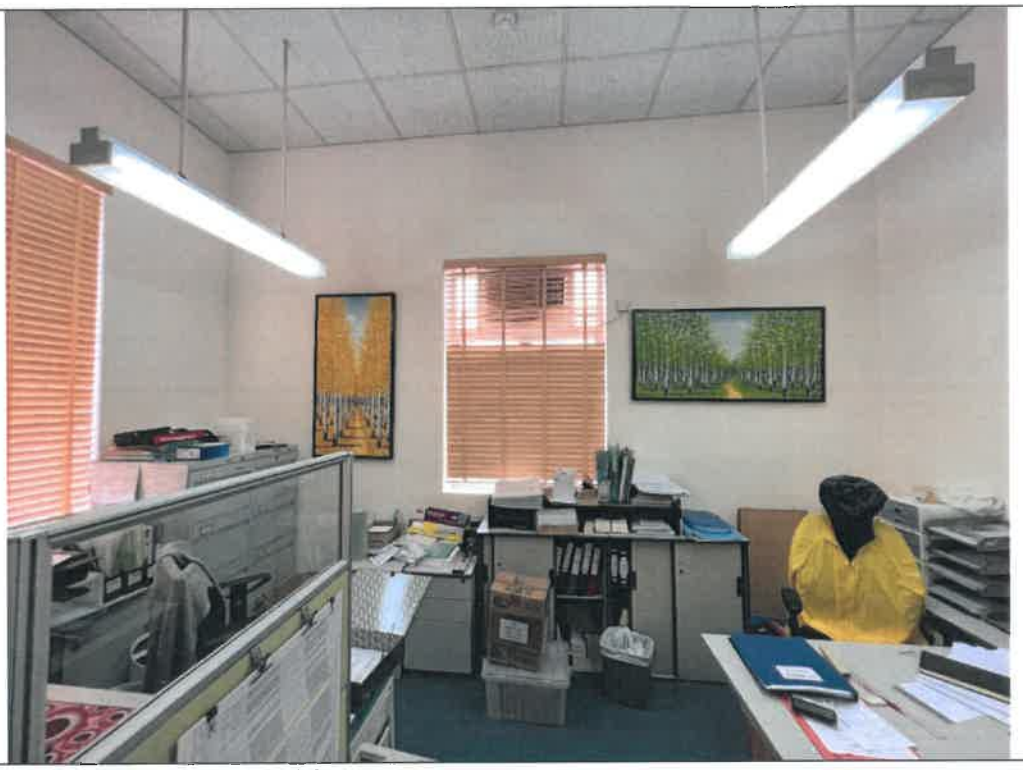


Photo: HKT03-28 Inside View

Photographic Records
Site Code: HKT03
Site Name: White House (Home of Loving Faithfulness)

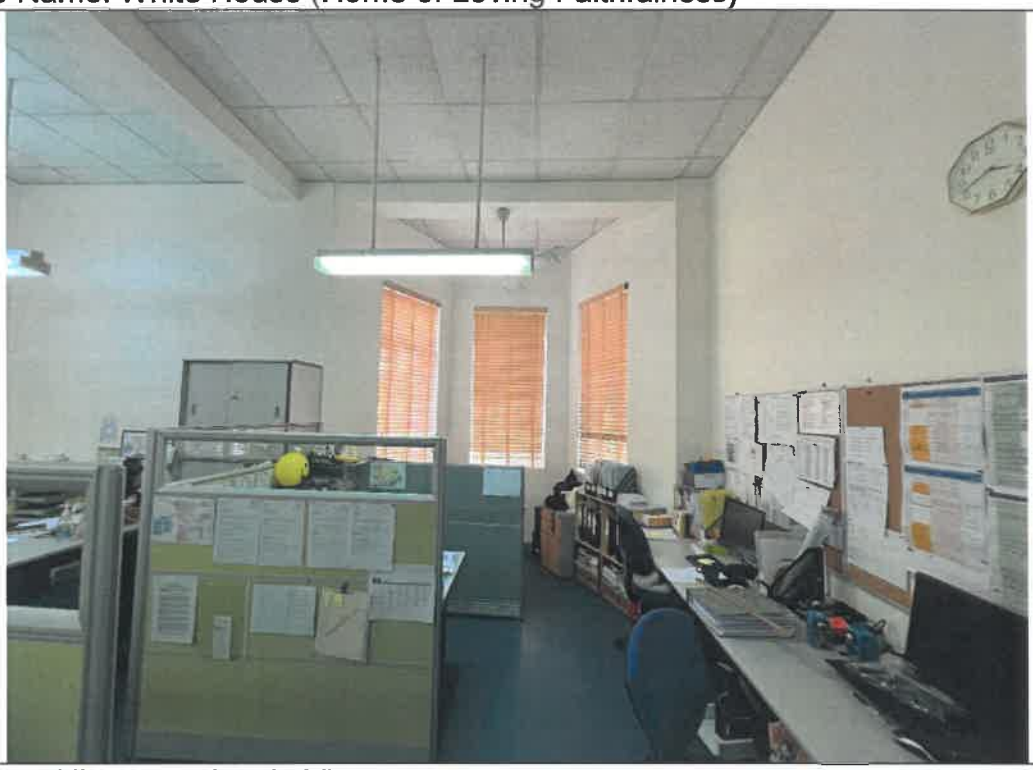


Photo: HKT03-29 Inside View

Photo: HKT03-30 Inside View

Photographic Records
Site Code: HKT03
Site Name: White House (Home of Loving Faithfulness)

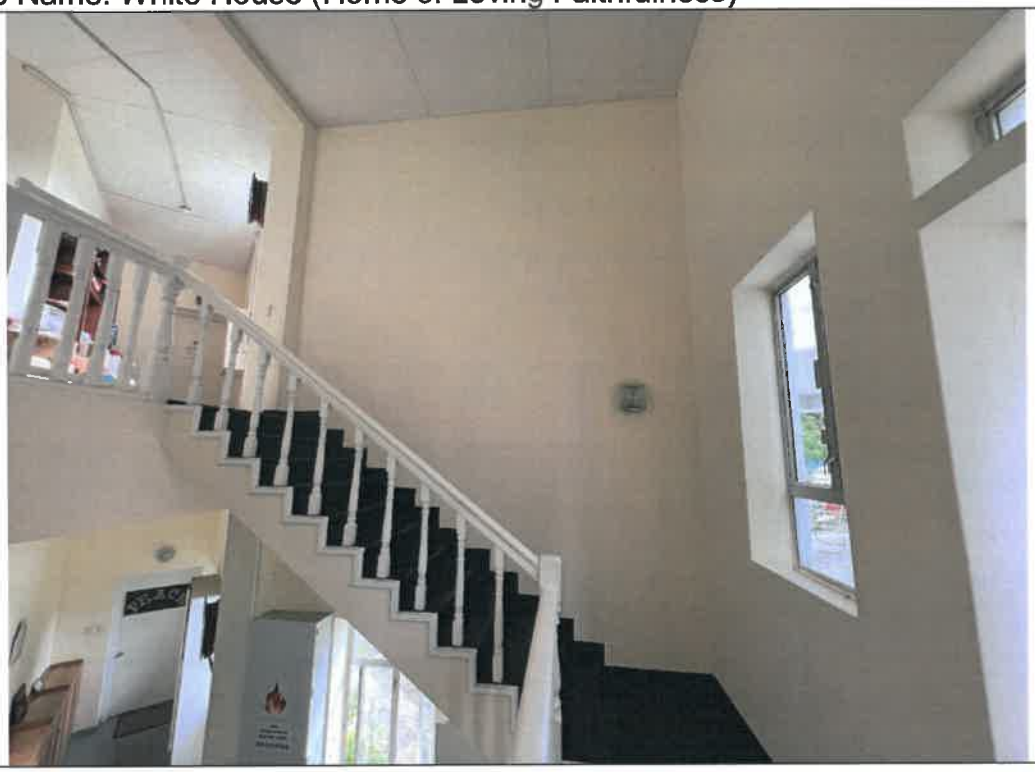


Photo: HKT03-31 Inside View

Photo: HKT03-32 Inside View

Photographic Records
Site Code: HKT03
Site Name: White House (Home of Loving Faithfulness)

Photo: HKT03-33 Crack on floor tiles

Photo: HKT03-34 Inside View

Photographic Records
Site Code: HKT03
Site Name: White House (Home of Loving Faithfulness)

Photo: HKT03-35 Inside View

Photo: HKT03-36 Inside View

Photographic Records
Site Code: HKT03
Site Name: White House (Home of Loving Faithfulness)

Photo: HKT03-37 Inside View

Photo: HKT03-38 Inside View

Photographic Records
Site Code: HKT03
Site Name: White House (Home of Loving Faithfulness)

Photo: HKT03-39 Inside View

Photo: HKT03-40 Inside View

Photographic Records
Site Code: HKT03
Site Name: White House (Home of Loving Faithfulness)

Photo: HKT03-41 Inside View

Photo: HKT03-42 Inside View

Photographic Records
Site Code: HKT03
Site Name: White House (Home of Loving Faithfulness)

Photo: HKT03-43 Inside View

Photo: HKT03-44 Inside View

Photographic Records
Site Code: HKT03
Site Name: White House (Home of Loving Faithfulness)

Photo: HKT03-45 Inside View

Photo: HKT03-46 Inside View

Photographic Records
Site Code: HKT03
Site Name: White House (Home of Loving Faithfulness)

Photo: HKT03-47 Inside View

Photo: HKT03-48 Inside View

Photographic Records
Site Code: HKT03
Site Name: White House (Home of Loving Faithfulness)

Photo: HKT03-49 Inside View

Photo: HKT03-50 Inside View

Photographic Records
Site Code: HKT03
Site Name: White House (Home of Loving Faithfulness)

Photo: HKT03-51 Moderate cracks on surface

Photo: HKT03-52 Fine cracks on surface

Photographic Records
Site Code: HKT03
Site Name: White House (Home of Loving Faithfulness)

Photo: HKT03-53 Fine cracks on surface

Photographic Records
Site Code: KT57
Site Name: Law grave

Photo KT57-1: Front View (South to North)

Photo KT57-2: back View (North to South)

Photographic Records
Site Code: KT57
Site Name: Law grave

Photo KT57-3: Side View (West to East)

Photo KT57-4: Side View (East to West)

Photographic Records
Site Code: KT57
Site Name: Law grave

Photo KT57-5: Oblique View (East to West)

Photo KT57-6: Oblique View (North West to South East)

Photographic Records
Site Code: KT57
Site Name: Law grave

Photo KT57-7: Orientation: (South to North), A grave

APPENDIX D - BD PNAP APP-137 & P. SECTION 39 CLAUSES 39.01(2)

Ground-borne Vibrations and Ground Settlements Arising from Pile Driving and Similar Operations

Pile driving (including pile withdrawal) operations and the like generate vibrations and settlements which, if not properly controlled, may have adverse effects on, or cause damage to, adjacent buildings/structures/services, in particular, non-structural elements therein. For the purpose of this practice note, such operations are termed as "pile driving operations".

2. This practice note aims to provide guidelines on the control of ground-borne vibrations and ground settlements generated from pile driving or similar operations with a view to minimizing possible damage to adjacent properties and streets. Authorized Persons (AP)/Registered Structural Engineers (RSE) are reminded that under the Buildings Ordinance, it is their responsibility to ensure that the building works carried out will not impair the stability of, or cause damage to any building, structure, land, street or services. They should also exercise their professional judgment in choosing suitable and safe construction methods and provide vigilant supervision over the works throughout the construction period.

Piling Plan Submission

3. Piling plans submitted for approval should, in general, follow the requirements laid down in PNAP APP-18. AP/RSE's particular attention should be paid to the monitoring requirements and the required appraisal report at items 4(k) and 4(o) therein respectively for adjacent buildings/structures/services. Depending on the structural condition of the adjacent buildings/structures/services, the Building Authority (BA) may require the following details to be included in the appraisal report :

(a) Pre-construction condition survey with a full set of photographic record of the external and common areas of the buildings/structures/services that are vulnerable to vibration and settlement damage. If access to some internal areas can be gained, the condition therein should also be recorded.

(b) Recommended vibration and settlement control limits (with due consideration of the recommendations given in Appendix A and Appendix B of this practice note) and monitoring proposal. Critical locations for monitoring should be identified by the RSE and included in the monitoring proposal.

(c) Preliminary appraisal including a vibration and settlement assessment of the stability of the structural and non-structural elements of adjacent buildings/structures/services under the expected ground-borne vibrations and ground settlements.

/(d) ...

(d) If vibration control limits greater than those given in Appendix A are to be adopted, a detailed assessment of the magnitude of the ground-borne vibrations generated by the piling operations should be made. Under such circumstances, reference could be made to Technical Note 142 published by CIRIA of the UK for such assessment or to any other relevant references acceptable to the BA. Consideration should also be given to the cumulative effects from the driving of all piles at the site. The structural stability of all adjacent buildings/structures/services due to the effects of ground-borne vibrations in item (c) above should also be appraised by detailed engineering analyses.

(e) A monitoring proposal to monitor the movements of adjacent grounds and buildings/structures/services.

(f) If the site is situated close to buildings/structures/services that are vulnerable to damage caused by the piling operations, a trial pile proposal to confirm the accuracy of the vibration and settlement assessments and the effects of the pile driving operations on adjacent buildings/structures/services (see paragraphs 7 to 8 below).

Required actions from the RSE prior to consent application for piling works

4. Prior to consent application, the RSE is required to confirm with the Registered Specialist Contractor (RSC) the method of construction including the maximum number of piles to be driven concurrently and the relevant details of the construction plants. In case there are changes from the approved details, the RSE should submit an amendment plan together with a re-assessment of the ground-borne vibrations and ground settlements and, if necessary, revise the appraisal report for item 3(c) above. Final reports for items 3(b) & (c) above shall be submitted together with the amendment submission.

5. It should be noted that certain types of piles installed by percussive/vibratory equipment may cause significant damage to vibration sensitive buildings/structures/services such as those mentioned in Appendix A of this practice note. Such method will not normally be accepted by the BA unless it can be satisfactorily demonstrated to the BA by means of trial piling as described below. Prior to the installation of the trial piles, precautionary measures such as the provision of shoring for temporary support to cracked structural members of adjacent buildings may need to be provided.

Trial /Test Pile(s) for Vibration and Settlement Control

6. If the adjacent buildings/structures/services are not vulnerable to the effects of vibration from the pile driving operations, the magnitude of ground-borne vibrations and ground settlements as assessed at item 3(b) or the re-assessed values at paragraph 4 above, as appropriate, can be verified during the driving test of piles. Ground-borne vibrations should be measured during the driving of the test pile(s) as

/detailed ...

detailed in paragraph 8 below and the associated settlements recorded upon the completion of the test. The RSE will be required, under BO section 17 and in accordance with the Code of Practice for Site Supervision to provide quality supervision of the pile driving works to ensure that the allowable limits of the ground-borne vibrations and ground settlements will not be exceeded. The effects of the pile driving operations on the adjacent buildings/structures/services should also be assessed by the RSE during the driving of the test pile(s).

7. In cases where buildings or structures that are particularly vulnerable to the effects of vibration, such as declared monuments or masonry buildings, are in the proximity of the piling site, the AP/RSE should submit for approval a trial pile proposal to confirm the magnitude of ground-borne vibrations assessed at item 3(b) or the re-assessed values at paragraph 4 above, as appropriate, at each critical ground condition where generation of maximum ground-borne vibrations will be expected (usually at the highest founding level/obstruction at shallow depth/interbedded strata of rock and soil). The number of such trial pile(s) would depend on the actual site condition in particular for very large construction site. The RSE will be required, under BO section 17 and in accordance with the Code of Practice for Site Supervision to provide quality supervision of the pile driving works to ensure the allowable limits of the ground-borne vibrations will not be exceeded.

8. For the vibration monitoring of trial/test pile(s), the maximum ground-borne vibrations, measured in terms of peak particle velocity (ppv), should be recorded at every meter length of penetration of pile, at final set and at levels where obstructions are encountered. The monitoring readings should be taken by a properly calibrated device under the direction of the RSE with the agreement of the BA. If the measured ground-borne vibrations have been found to exceed the allowable values or if damage to either the structural or non-structural elements of the adjacent buildings/structures/services has been observed, all pile driving operations should be stopped and the agreed precautionary measures referred to at item 4(o) of PNAP APP-18 should be reviewed and revised as necessary, and submitted by the RSE to the BA for agreement. The suspended pile driving operations should not be resumed without the prior agreement of the BA.

9. A condition survey of all adjacent buildings/structures/services should be carried out after the completion of the trial piles for confirmation of the effects of the pile driving operations. Two sets of trial piling report on ground-borne vibrations and ground settlements and their effects on adjacent buildings/structures/services should be submitted to the BA for consideration prior to the application for consent to the commencement of the driving of the working piles.

10. To address the concerns of the occupants of adjacent buildings affected by the vibrations of pile driving operations, the AP/RSE/RSC are advised to formulate a Public Relations Plan (PR Plan), setting out the actions to be carried out before and after the commencement of the pile driving operations. Guidelines on the PR Plan are given in Appendix C of this practice note. The purpose of the PR Plan is to put in place a system to notify in advance the nearby occupants of the forthcoming pile driving

/operations ...

operations, to facilitate communication between the affected occupants and the contractor, to minimize possible complaints, and to enable the AP/RSE/RSC to handle complaints in a timely and effective manner. The RSE is advised to submit the PR Plan to the BA for agreement prior to the commencement of pile driving operations.

Required actions from the RSE during the pile driving operations

11. The RSE is required to submit the related works programme of the pile driving operations setting out clearly the types and duration of the major vibration-generating construction activities to the BA prior to the commencement of pile driving operations. The supervision of the monitoring works should be provided in accordance with the Code of Practice for Site Supervision. The RSE should review the site situation from time to time and if found necessary, suspend the pile driving operations, revise the precautionary measures and/or vibration monitoring proposal and submit them to the BA for agreement prior to the resumption of the pile driving operations. Reference shall be made to item 4(k) of PNAP APP-18.

Requirements for controlling vibrations and settlements arising from site formation and excavation and lateral support works

12. The installation of temporary pile walls such as steel sheet piles, pipe piles or steel channel plankings are often included in the site formation and excavation and lateral support works. Such temporary pile walls, if installed by percussive or vibratory methods, are likely to generate vibrations and settlements that may cause damage to adjacent buildings/structures/services, particularly those that are vulnerable to vibrations. Excessive vibrations are also likely to be experienced during the removal of underground obstructions. Guide values on limits of vibration and ground settlements are given in Appendices A and B respectively to this practice note. A detailed vibration and settlement monitoring proposal on all adjacent buildings, structures, land, streets or services should be included in the site formation or excavation and lateral supports plans to be submitted to the BA for approval/acceptance. If there are vibration sensitive buildings in the proximity of the site, a test pile proposal to confirm the accuracy of the vibration assessments and effects of the piling works on adjacent buildings/structures/services shall be included in the plans for the approval/acceptance of the BA. The AP/RSE/RGE will be required, under BO Section 17 and in accordance with the Code of Practice for Site Supervision to provide quality supervision of the piling works.

(CHEUNG Tin-cheung)
Building Authority

Ref. : BD/GP/BREG/C/36

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Appendix A
(PNAP APP-137)

Vibration Measurement and Recommended Ground-borne Vibration Limits Resulting from Piling and Similar Operations

Vibration measurement

The effect of ground-borne vibration from piling works on adjacent structures should be assessed by the maximum peak particle velocity (ppv). The maximum ppv should be evaluated from the peak particle velocities at three orthogonal axes measured at ground levels of the structures in question. All such measurements should be made by properly calibrated device and under the supervision of the RSE or his representatives.

Recommended Ground-borne vibration limits

2. For the detailed assessment of the effects of ground-borne vibrations on adjacent buildings/structures/services, an engineering analysis should be carried out. Reference could be made to BS 7385 Part 1 : 1990 or similar references.

3. In the absence of an engineering analysis, the following empirical guidelines may be used for reference :

Type of building	Guide values of maximum ppv (mm/sec)	
	Transient Vibration (eg. Drop hammer)	Continuous Vibration (eg. Vibratory hammer)
Robust and stable buildings in general	15	7.5
Vibration-sensitive/ dilapidated buildings	7.5	3.0

4. The above guide values of maximum ppv are suggested to give minimal risks of vibration-induced damage. Due attention should also be paid to sensitive buildings close to the piling site such as hospitals, academic institutes, declared monuments, old buildings with shallow foundations, old tunnels/caverns, buildings installed with sensitive equipment, masonry retaining walls or sites with history of instability, monuments or buildings with historical significance etc. A more stringent control on the allowable limit of ppv for these buildings may have to be specified based on site and building conditions together with the duration and frequency of the exciting source.

5. The AP/RSE/RGE is also required to fulfill the requirements imposed by other government departments.

6. For vibration impacts on existing railway and related structures, technical requirements given in PNAP APP-24 may be useful.

(2/2012)

Appendix B
(PNAP APP-137)

Recommended Ground Settlement Limits Resulting from Piling and Similar Operations

Ground movements

. The ground movements arising from pile driving and similar operations depend on several factors including installation method, construction sequence, sub-soil geology, groundwater conditions, layout of the piling works and workmanship. Excessive ground movements in the vicinity of the pile driving and similar operations may be detrimental to adjacent buildings or structures, especially those supported by shallow foundations, piles with inadequate lateral resistance or foundations with inherently low factors of safety.

Tolerable ground settlement limits

2. As different structures will have different tolerance in accommodating movements of their foundations, acceptance of estimated ground settlements should be considered on a case-by-case basis with respect to the integrity, stability and functionality of the supported structures.

3. Provided that there are no particularly sensitive adjacent buildings, structures and services, the following empirical limits may be taken as the provisional AAA trigger values for the purposes of item 4(k) of PNAP APP- 18:

Instrument	Criterion	Alert	Alarm	Action
Ground settlement marker	Total settlement	12mm	18mm	25mm
Services settlement marker	Total settlement & Angular distortion	12mm or 1:600	18mm or 1:450	25mm or 1:300
Building tilting marker	Angular distortion	1:1000	1:750	1:500

Remarks :

The "Action Level" response actions should be taken if any of the following criteria occurs:

- Any monitoring station has a reading reaching the specific trigger value based on serviceability limit[1], or in the absence of such engineering assessment, the provisional trigger value, whichever is applicable.
- Undue settlement as indicated in any check points (e.g. an increase of 5mm between two consecutive daily readings).
- Sign of distress or damages observed in any adjacent structures and/or services.

[1] Serviceability limit is defined as the maximum calculated movements estimated in the design or the maximum allowable movement or response of the adjacent ground, groundwater regime, structures and services.

Appendix C
(PNAP APP-137)

Guidelines on Public Relations Plan (PR Plan)

A PR Plan should include the following information :

i) Background of the project, including list of vibration-generating construction activities and its tentative construction programme;

ii) Details of AP, RSE, RGE and RSC of the project;

iii) Organization chart including the appointment of a PR Officer;

iv) Objectives of the PR Plan;

v) List of concerned groups (eg Owners'Corporation, Mutual Aid Committee, District Council etc.);

vi) List of vibration and/or settlement sensitive buildings/structures/services;

vii) List of public relation activities (e.g. briefing session; posting notices; issuing notifications on works programme etc.);

viii) List of telephone hotlines and contact persons for public enquiries;

ix) Arrangement for issuing notification letters to the relevant stakeholders of nearby building/structure/services informing that they would be notified immediately upon any monitoring reading(s) in relation to their building/structure/services reaching the "Action Level" trigger value during the construction period, and the relevant monitoring readings could be made available upon request; and

x) Complaint handling system to resolve complaints or incidents in timely and effective manner.

SECTION 39

ARCHAEOLOGICAL IMPACTS MITIGATION MEASURES

Baseline Condition Survey and baseline vibration, titling and settlement impact assessment

39.01 (1) In accordance with the NENT NDA EIA Study and the associated latest Environmental Monitoring and Audit Manual, baseline condition survey and baseline vibration, titling and settlement impact assessment should be conducted for the identified built heritages which fall within or in the proximity of the Site prior to construction works. The locations of the concerned built heritages shall be referred to the relevant figures in NENT NDA EIA Study and the EM&A.

(2) Baseline condition survey and baseline vibration impact assessment should be conducted by a qualified building surveyor or qualified structural engineer to define the vibration , tilting and settlement limits (a vibration limit at 3mm/s, a tilting limit at 1/1000, ground settlement limit at 25mm, building settlement limit at 10mm could be adopted for graded historical buildings, declared monuments and historical structures respectively) and to evaluate if construction vibration, tilting and settlement monitoring and structural strengthening measures are required during construction phase to ensure the construction performance meets with the monitoring standard stated in the EIA report.

(3) The *Contractor* shall submit the particulars of the qualified building surveyor or qualified structural engineer for the *Project Manager*'s acceptance 2 weeks prior to the baseline condition survey and baseline n impact assessment.

(4) Baseline condition survey shall be submitted to the *Project Manager* for acceptance within 2 weeks after the completion of the baseline condition survey for each heritage and the baseline vibration tilting and settlement impact assessment shall be submitted to the *Project Manager* for acceptance with 2 weeks after the submission of baseline condition survey. No construction works which considered would affect such heritage shall be carried out prior to the acceptance from the *Project Manager* to both baseline condition survey and baseline vibration tilting and settlement impact assessment. The *Contractor* shall upon instruction to provide the baseline condition survey of graded historic buildings for AMO's information.

(5) Based on the recommendation of baseline condition survey and baseline vibration, tilting and settlement impact assessment conducted prior to commencement of construction works, vibration monitoring might be carried out in a regular basis. If the evaluated and/or measured vibrations, tilting and settlements have been found to exceed the allowable values or if damage to either structural or non-structural elements of the historic buildings have been identified, the construction work should be stopped and the construction method and appropriate mitigation measures should be reviewed. No extra time or cost should be granted to the *Contractor* due to the events as described in this sub-clause.

Photographic and Cartographic Recording 39.02 (1) In accordance with the NENT NDA EIA Study and the associated latest Environmental Monitoring and Audit Manual, photographic and cartographic recording should be conducted for the identified built heritages and historic graves which fall within or in the proximity of the Site prior to construction works. The locations of the concerned built heritages and historic graves shall be referred to the relevant figures in NENT NDA EIA Study and the EM&A.

(2) Photographic and cartographic recording shall be conducted within 2 months from the *starting date* and the records should be submitted to the *Project Manager* for acceptance within 1 weeks after the completion of the recording. No construction works which considered would affect such built heritage shall be carried out prior to the acceptance from the *Project Manager* to the photographic and cartographic recording. The *Contractor* shall upon instruction to provide the photographic and cartographic recording for AMO's information.

Temporary drainage system and construction access route design 39.03 (1) For any retained built heritage items in developable area as identified in the NENT EIA Study, the *Contractor* shall design their temporary drainage system and construction access route to prevent the persevered flooding and maintain the accessibility to the built heritage.

Inform upon archaeological discovery 39.04 (1) Pursuant to the Antiquities and Monuments Ordinance, the *Contractor* should inform the *Project Manager* and AMO immediately in case of discovery of antiquities or supposed antiquities and significant archaeological feature in the course of construction works. Should there be the significant feature is found, the feature shall be conserved in-situ and report to *Project Manager* and AMO immediately. The site meeting shall be arranged to discuss how to way forward of significant archaeological finds. Special attention should be given to areas evaluated to have archaeological potential or significance as identified in the NENT NDA EIA Study.

(2) The *Contractor* shall develop and submit a proposal to the *Project Manager* for the reporting system of archaeological discovery within 1 month after the *starting date* for acceptance.

Other requirements 39.05 (1) In addition to the above mitigation measures and requirements, the *Contractor* shall also take note and implemented all the other associated archaeological related mitigation measures and monitoring works at their own costs in accordance with the NENT NDA EIA Study and the respective EM&A manual. Any cost or time incurred due to violation of EIA and EM&A manual, it shall be borne by the *Contractor*.

Ground-borne Vibrations and Ground Settlements Arising from Pile Driving and Similar Operations

Pile driving (including pile withdrawal) operations and the like generate vibrations and settlements which, if not properly controlled, may have adverse effects on, or cause damage to, adjacent buildings/structures/services, in particular, non-structural elements therein. For the purpose of this practice note, such operations are termed as "pile driving operations".

2. This practice note aims to provide guidelines on the control of ground-borne vibrations and ground settlements generated from pile driving or similar operations with a view to minimizing possible damage to adjacent properties and streets. Authorized Persons (AP)/Registered Structural Engineers (RSE) are reminded that under the Buildings Ordinance, it is their responsibility to ensure that the building works carried out will not impair the stability of, or cause damage to any building, structure, land, street or services. They should also exercise their professional judgment in choosing suitable and safe construction methods and provide vigilant supervision over the works throughout the construction period.

Piling Plan Submission

3. Piling plans submitted for approval should, in general, follow the requirements laid down in PNAP APP-18. AP/RSE's particular attention should be paid to the monitoring requirements and the required appraisal report at items 4(k) and 4(o) therein respectively for adjacent buildings/structures/services. Depending on the structural condition of the adjacent buildings/structures/services, the Building Authority (BA) may require the following details to be included in the appraisal report :

(a) Pre-construction condition survey with a full set of photographic record of the external and common areas of the buildings/structures/services that are vulnerable to vibration and settlement damage. If access to some internal areas can be gained, the condition therein should also be recorded.

(b) Recommended vibration and settlement control limits (with due consideration of the recommendations given in Appendix A and Appendix B of this practice note) and monitoring proposal. Critical locations for monitoring should be identified by the RSE and included in the monitoring proposal.

(c) Preliminary appraisal including a vibration and settlement assessment of the stability of the structural and non-structural elements of adjacent buildings/structures/services under the expected ground-borne vibrations and ground settlements.

/(d) ...

(d) If vibration control limits greater than those given in Appendix A are to be adopted, a detailed assessment of the magnitude of the ground-borne vibrations generated by the piling operations should be made. Under such circumstances, reference could be made to Technical Note 142 published by CIRIA of the UK for such assessment or to any other relevant references acceptable to the BA. Consideration should also be given to the cumulative effects from the driving of all piles at the site. The structural stability of all adjacent buildings/structures/services due to the effects of ground-borne vibrations in item (c) above should also be appraised by detailed engineering analyses.

(e) A monitoring proposal to monitor the movements of adjacent grounds and buildings/structures/services.

(f) If the site is situated close to buildings/structures/services that are vulnerable to damage caused by the piling operations, a trial pile proposal to confirm the accuracy of the vibration and settlement assessments and the effects of the pile driving operations on adjacent buildings/structures/services (see paragraphs 7 to 8 below).

Required actions from the RSE prior to consent application for piling works

4. Prior to consent application, the RSE is required to confirm with the Registered Specialist Contractor (RSC) the method of construction including the maximum number of piles to be driven concurrently and the relevant details of the construction plants. In case there are changes from the approved details, the RSE should submit an amendment plan together with a re-assessment of the ground-borne vibrations and ground settlements and, if necessary, revise the appraisal report for item 3(c) above. Final reports for items 3(b) & (c) above shall be submitted together with the amendment submission.

5. It should be noted that certain types of piles installed by percussive/vibratory equipment may cause significant damage to vibration sensitive buildings/structures/services such as those mentioned in Appendix A of this practice note. Such method will not normally be accepted by the BA unless it can be satisfactorily demonstrated to the BA by means of trial piling as described below. Prior to the installation of the trial piles, precautionary measures such as the provision of shoring for temporary support to cracked structural members of adjacent buildings may need to be provided.

Trial /Test Pile(s) for Vibration and Settlement Control

6. If the adjacent buildings/structures/services are not vulnerable to the effects of vibration from the pile driving operations, the magnitude of ground-borne vibrations and ground settlements as assessed at item 3(b) or the re-assessed values at paragraph 4 above, as appropriate, can be verified during the driving test of piles. Ground-borne vibrations should be measured during the driving of the test pile(s) as

/detailed ...

detailed in paragraph 8 below and the associated settlements recorded upon the completion of the test. The RSE will be required, under BO section 17 and in accordance with the Code of Practice for Site Supervision to provide quality supervision of the pile driving works to ensure that the allowable limits of the ground-borne vibrations and ground settlements will not be exceeded. The effects of the pile driving operations on the adjacent buildings/structures/services should also be assessed by the RSE during the driving of the test pile(s).

7. In cases where buildings or structures that are particularly vulnerable to the effects of vibration, such as declared monuments or masonry buildings, are in the proximity of the piling site, the AP/RSE should submit for approval a trial pile proposal to confirm the magnitude of ground-borne vibrations assessed at item 3(b) or the re-assessed values at paragraph 4 above, as appropriate, at each critical ground condition where generation of maximum ground-borne vibrations will be expected (usually at the highest founding level/obstruction at shallow depth/interbedded strata of rock and soil). The number of such trial pile(s) would depend on the actual site condition in particular for very large construction site. The RSE will be required, under BO section 17 and in accordance with the Code of Practice for Site Supervision to provide quality supervision of the pile driving works to ensure the allowable limits of the ground-borne vibrations will not be exceeded.

8. For the vibration monitoring of trial/test pile(s), the maximum ground-borne vibrations, measured in terms of peak particle velocity (ppv), should be recorded at every meter length of penetration of pile, at final set and at levels where obstructions are encountered. The monitoring readings should be taken by a properly calibrated device under the direction of the RSE with the agreement of the BA. If the measured ground-borne vibrations have been found to exceed the allowable values or if damage to either the structural or non-structural elements of the adjacent buildings/structures/services has been observed, all pile driving operations should be stopped and the agreed precautionary measures referred to at item 4(o) of PNAP APP-18 should be reviewed and revised as necessary, and submitted by the RSE to the BA for agreement. The suspended pile driving operations should not be resumed without the prior agreement of the BA.

9. A condition survey of all adjacent buildings/structures/services should be carried out after the completion of the trial piles for confirmation of the effects of the pile driving operations. Two sets of trial piling report on ground-borne vibrations and ground settlements and their effects on adjacent buildings/structures/services should be submitted to the BA for consideration prior to the application for consent to the commencement of the driving of the working piles.

10. To address the concerns of the occupants of adjacent buildings affected by the vibrations of pile driving operations, the AP/RSE/RSC are advised to formulate a Public Relations Plan (PR Plan), setting out the actions to be carried out before and after the commencement of the pile driving operations. Guidelines on the PR Plan are given in Appendix C of this practice note. The purpose of the PR Plan is to put in place a system to notify in advance the nearby occupants of the forthcoming pile driving

/operations ...

operations, to facilitate communication between the affected occupants and the contractor, to minimize possible complaints, and to enable the AP/RSE/RSC to handle complaints in a timely and effective manner. The RSE is advised to submit the PR Plan to the BA for agreement prior to the commencement of pile driving operations.

Required actions from the RSE during the pile driving operations

11. The RSE is required to submit the related works programme of the pile driving operations setting out clearly the types and duration of the major vibration-generating construction activities to the BA prior to the commencement of pile driving operations. The supervision of the monitoring works should be provided in accordance with the Code of Practice for Site Supervision. The RSE should review the site situation from time to time and if found necessary, suspend the pile driving operations, revise the precautionary measures and/or vibration monitoring proposal and submit them to the BA for agreement prior to the resumption of the pile driving operations. Reference shall be made to item 4(k) of PNAP APP-18.

Requirements for controlling vibrations and settlements arising from site formation and excavation and lateral support works

12. The installation of temporary pile walls such as steel sheet piles, pipe piles or steel channel plankings are often included in the site formation and excavation and lateral support works. Such temporary pile walls, if installed by percussive or vibratory methods, are likely to generate vibrations and settlements that may cause damage to adjacent buildings/structures/services, particularly those that are vulnerable to vibrations. Excessive vibrations are also likely to be experienced during the removal of underground obstructions. Guide values on limits of vibration and ground settlements are given in Appendices A and B respectively to this practice note. A detailed vibration and settlement monitoring proposal on all adjacent buildings, structures, land, streets or services should be included in the site formation or excavation and lateral supports plans to be submitted to the BA for approval/acceptance. If there are vibration sensitive buildings in the proximity of the site, a test pile proposal to confirm the accuracy of the vibration assessments and effects of the piling works on adjacent buildings/structures/services shall be included in the plans for the approval/acceptance of the BA. The AP/RSE/RGE will be required, under BO Section 17 and in accordance with the Code of Practice for Site Supervision to provide quality supervision of the piling works.

(CHEUNG Tin-cheung)
Building Authority

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Appendix A
(PNAP APP-137)

Vibration Measurement and Recommended Ground-borne Vibration Limits Resulting from Piling and Similar Operations

Vibration measurement

The effect of ground-borne vibration from piling works on adjacent structures should be assessed by the maximum peak particle velocity (ppv). The maximum ppv should be evaluated from the peak particle velocities at three orthogonal axes measured at ground levels of the structures in question. All such measurements should be made by properly calibrated device and under the supervision of the RSE or his representatives.

Recommended Ground-borne vibration limits

2. For the detailed assessment of the effects of ground-borne vibrations on adjacent buildings/structures/services, an engineering analysis should be carried out. Reference could be made to BS 7385 Part 1 : 1990 or similar references.

3. In the absence of an engineering analysis, the following empirical guidelines may be used for reference :

Type of building	Guide values of maximum ppv (mm/sec)	
	Transient Vibration (eg. Drop hammer)	Continuous Vibration (eg. Vibratory hammer)
Robust and stable buildings in general	15	7.5
Vibration-sensitive/ dilapidated buildings	7.5	3.0

4. The above guide values of maximum ppv are suggested to give minimal risks of vibration-induced damage. Due attention should also be paid to sensitive buildings close to the piling site such as hospitals, academic institutes, declared monuments, old buildings with shallow foundations, old tunnels/caverns, buildings installed with sensitive equipment, masonry retaining walls or sites with history of instability, monuments or buildings with historical significance etc. A more stringent control on the allowable limit of ppv for these buildings may have to be specified based on site and building conditions together with the duration and frequency of the exciting source.

5. The AP/RSE/RGE is also required to fulfill the requirements imposed by other government departments.

6. For vibration impacts on existing railway and related structures, technical requirements given in PNAP APP-24 may be useful.

(2/2012)

Appendix B
(PNAP APP-137)

Recommended Ground Settlement Limits Resulting from Piling and Similar Operations

Ground movements

. The ground movements arising from pile driving and similar operations depend on several factors including installation method, construction sequence, sub-soil geology, groundwater conditions, layout of the piling works and workmanship. Excessive ground movements in the vicinity of the pile driving and similar operations may be detrimental to adjacent buildings or structures, especially those supported by shallow foundations, piles with inadequate lateral resistance or foundations with inherently low factors of safety.

Tolerable ground settlement limits

2. As different structures will have different tolerance in accommodating movements of their foundations, acceptance of estimated ground settlements should be considered on a case-by-case basis with respect to the integrity, stability and functionality of the supported structures.

3. Provided that there are no particularly sensitive adjacent buildings, structures and services, the following empirical limits may be taken as the provisional AAA trigger values for the purposes of item 4(k) of PNAP APP- 18:

Instrument	Criterion	Alert	Alarm	Action
Ground settlement marker	Total settlement	12mm	18mm	25mm
Services settlement marker	Total settlement & Angular distortion	12mm or 1:600	18mm or 1:450	25mm or 1:300
Building tilting marker	Angular distortion	1:1000	1:750	1:500

Remarks :

The "Action Level" response actions should be taken if any of the following criteria occurs:

- Any monitoring station has a reading reaching the specific trigger value based on serviceability limit[1], or in the absence of such engineering assessment, the provisional trigger value, whichever is applicable.
- Undue settlement as indicated in any check points (e.g. an increase of 5mm between two consecutive daily readings).
- Sign of distress or damages observed in any adjacent structures and/or services.

[1] Serviceability limit is defined as the maximum calculated movements estimated in the design or the maximum allowable movement or response of the adjacent ground, groundwater regime, structures and services.

Appendix C
(PNAP APP-137)

Guidelines on Public Relations Plan (PR Plan)

A PR Plan should include the following information :

i) Background of the project, including list of vibration-generating construction activities and its tentative construction programme;

ii) Details of AP, RSE, RGE and RSC of the project;

iii) Organization chart including the appointment of a PR Officer;

iv) Objectives of the PR Plan;

v) List of concerned groups (eg Owners'Corporation, Mutual Aid Committee, District Council etc.);

vi) List of vibration and/or settlement sensitive buildings/structures/services;

vii) List of public relation activities (e.g. briefing session; posting notices; issuing notifications on works programme etc.);

viii) List of telephone hotlines and contact persons for public enquiries;

ix) Arrangement for issuing notification letters to the relevant stakeholders of nearby building/structure/services informing that they would be notified immediately upon any monitoring reading(s) in relation to their building/structure/services reaching the "Action Level" trigger value during the construction period, and the relevant monitoring readings could be made available upon request; and

x) Complaint handling system to resolve complaints or incidents in timely and effective manner.

SECTION 39

ARCHAEOLOGICAL IMPACTS MITIGATION MEASURES

Baseline Condition Survey and baseline vibration, titling and settlement impact assessment

39.01 (1) In accordance with the NENT NDA EIA Study and the associated latest Environmental Monitoring and Audit Manual, baseline condition survey and baseline vibration, titling and settlement impact assessment should be conducted for the identified built heritages which fall within or in the proximity of the Site prior to construction works. The locations of the concerned built heritages shall be referred to the relevant figures in NENT NDA EIA Study and the EM&A.

(2) Baseline condition survey and baseline vibration impact assessment should be conducted by a qualified building surveyor or qualified structural engineer to define the vibration , tilting and settlement limits (a vibration limit at 3mm/s, a tilting limit at 1/1000, ground settlement limit at 25mm, building settlement limit at 10mm could be adopted for graded historical buildings, declared monuments and historical structures respectively) and to evaluate if construction vibration, tilting and settlement monitoring and structural strengthening measures are required during construction phase to ensure the construction performance meets with the monitoring standard stated in the EIA report.

(3) The *Contractor* shall submit the particulars of the qualified building surveyor or qualified structural engineer for the *Project Manager*'s acceptance 2 weeks prior to the baseline condition survey and baseline n impact assessment.

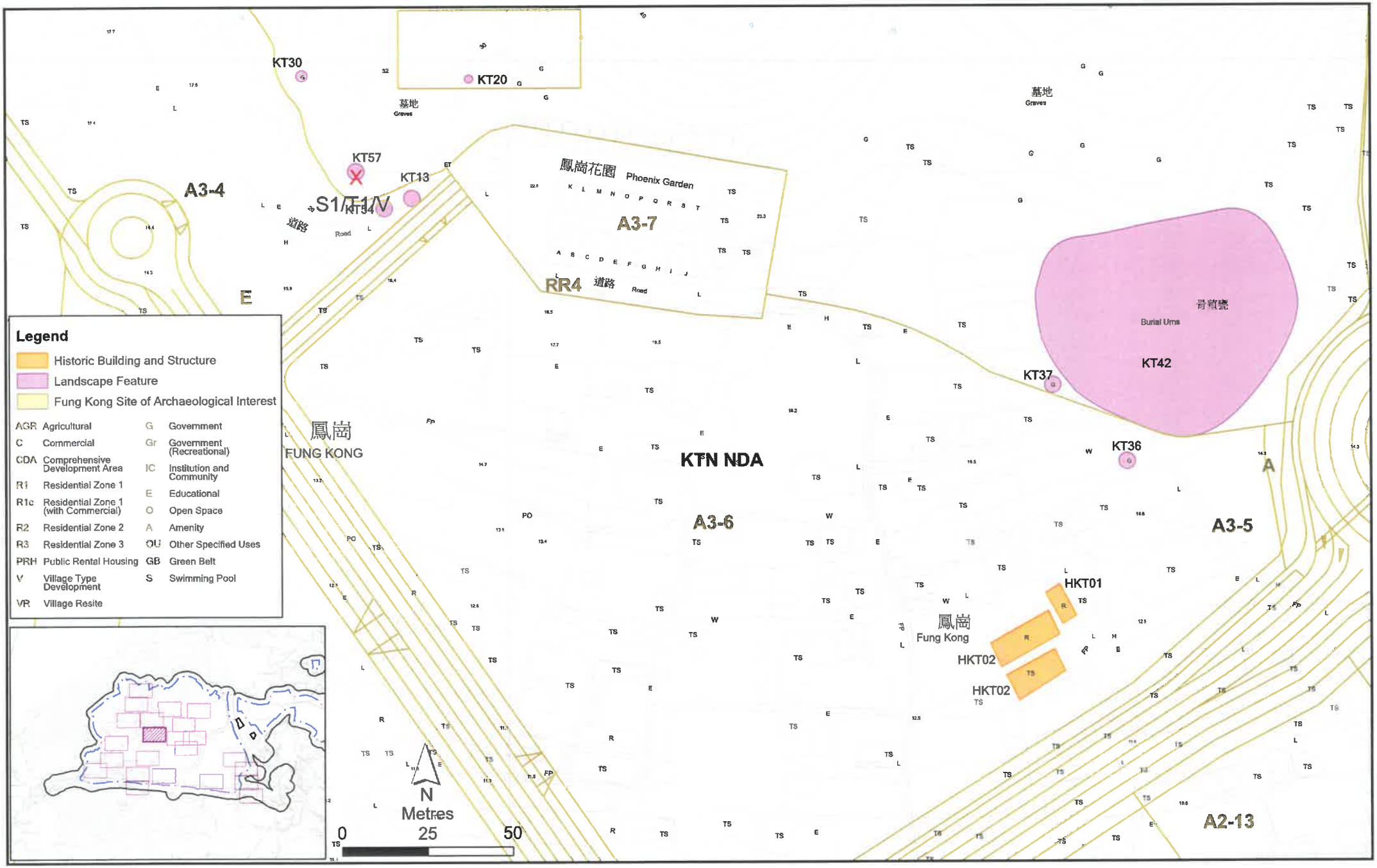
(4) Baseline condition survey shall be submitted to the *Project Manager* for acceptance within 2 weeks after the completion of the baseline condition survey for each heritage and the baseline vibration tilting and settlement impact assessment shall be submitted to the *Project Manager* for acceptance with 2 weeks after the submission of baseline condition survey. No construction works which considered would affect such heritage shall be carried out prior to the acceptance from the *Project Manager* to both baseline condition survey and baseline vibration tilting and settlement impact assessment. The *Contractor* shall upon instruction to provide the baseline condition survey of graded historic buildings for AMO's information.

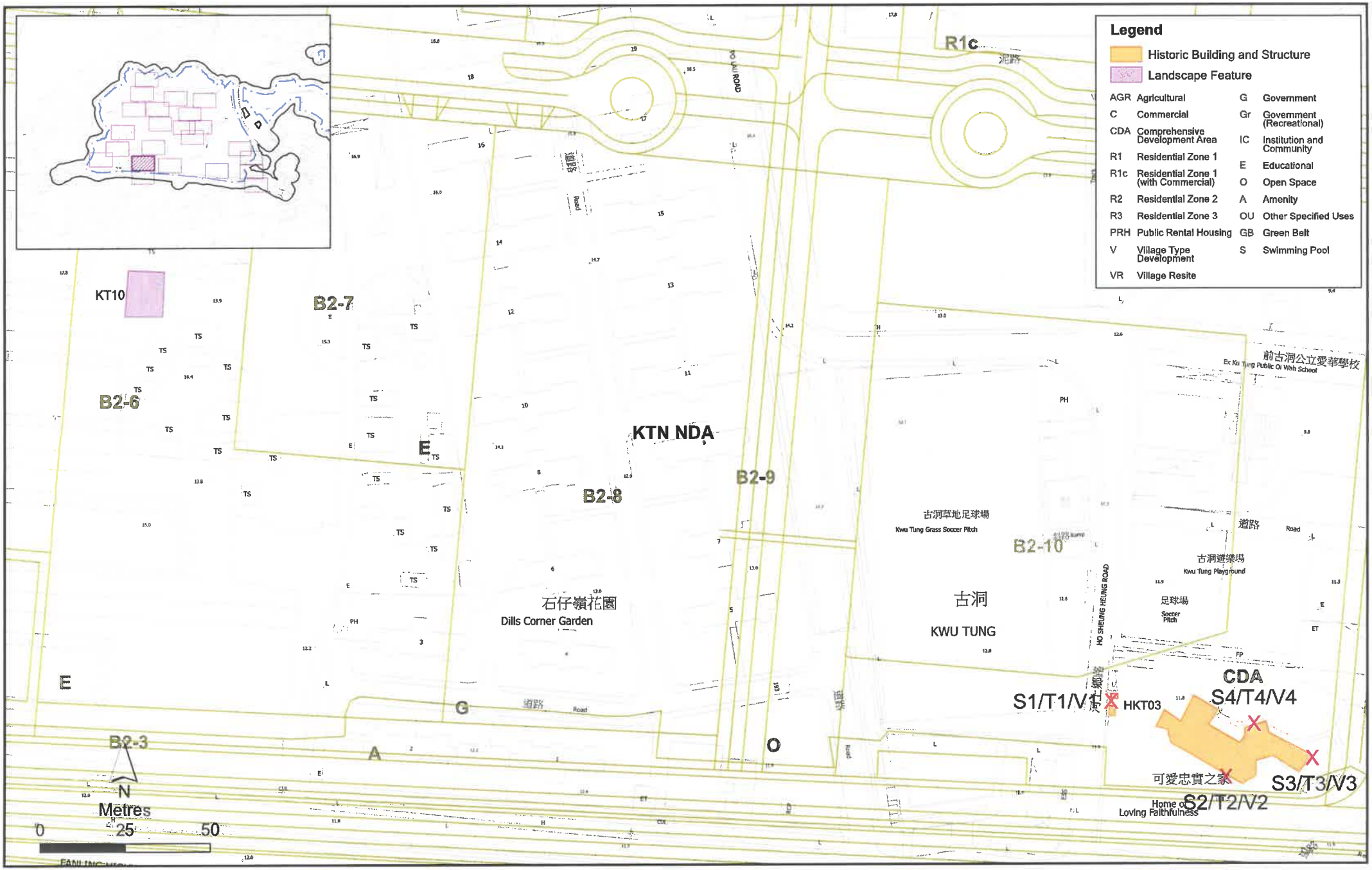
		(5)	Based on the recommendation of baseline condition survey and baseline vibration, tilting and settlement impact assessment conducted prior to commencement of construction works, vibration monitoring might be carried out in a regular basis. If the evaluated and/or measured vibrations, tilting and settlements have been found to exceed the allowable values or if damage to either structural or non-structural elements of the historic buildings have been identified, the construction work should be stopped and the construction method and appropriate mitigation measures should be reviewed. No extra time or cost should be granted to the *Contractor* due to the events as described in this sub-clause.
Photographic and Cartographic Recording	39.02	(1)	In accordance with the NENT NDA EIA Study and the associated latest Environmental Monitoring and Audit Manual, photographic and cartographic recording should be conducted for the identified built heritages and historic graves which fall within or in the proximity of the Site prior to construction works. The locations of the concerned built heritages and historic graves shall be referred to the relevant figures in NENT NDA EIA Study and the EM&A.
		(2)	Photographic and cartographic recording shall be conducted within 2 months from the *starting date* and the records should be submitted to the *Project Manager* for acceptance within 1 weeks after the completion of the recording. No construction works which considered would affect such built heritage shall be carried out prior to the acceptance from the *Project Manager* to the photographic and cartographic recording. The *Contractor* shall upon instruction to provide the photographic and cartographic recording for AMO's information.
Temporary drainage system and construction access route design	39.03	(1)	For any retained built heritage items in developable area as identified in the NENT EIA Study, the *Contractor* shall design their temporary drainage system and construction access route to prevent the persevered flooding and maintain the accessibility to the built heritage.
Inform upon archaeological discovery	39.04	(1)	Pursuant to the Antiquities and Monuments Ordinance, the *Contractor* should inform the *Project Manager* and AMO immediately in case of discovery of antiquities or supposed antiquities and significant archaeological feature in the course of construction works. Should there be the significant feature is found, the feature shall be conserved in-situ and report to *Project Manager* and AMO immediately. The site meeting shall be arranged to discuss how to way forward of significant archaeological finds. Special attention should be given to areas evaluated to have archaeological potential or significance as identified in the NENT NDA EIA Study.

(2) The *Contractor* shall develop and submit a proposal to the *Project Manager* for the reporting system of archaeological discovery within 1 month after the *starting date* for acceptance.

Other requirements 39.05 (1) In addition to the above mitigation measures and requirements, the *Contractor* shall also take note and implemented all the other associated archaeological related mitigation measures and monitoring works at their own costs in accordance with the NENT NDA EIA Study and the respective EM&A manual. Any cost or time incurred due to violation of EIA and EM&A manual, it shall be borne by the *Contractor*.

APPENDIX E – RECOMMENDED MONITORING POINTS


KT30
KT20
墓地
Graves
KT57
KT13
KT34
A3-4
S1/T1/V
道路
Road
鳳崗花園 Phoenix Garden
A3-7
RR4
道路
Road
骨灰甕
Burial Urns
KT42
KT37
KT36
鳳崗
FUNG KONG
KTN NDA
A3-6
A3-5
A
HKT01
鳳崗
Fung Kong
HKT02
HKT02
A2-13
Legend
Historic Building and Structure
Landscape Feature
Fung Kong Site of Archaeological Interest
AGR Agricultural
C Commercial
CDA Comprehensive Development Area
R1 Residential Zone 1
R1c Residential Zone 1 (with Commercial)
R2 Residential Zone 2
R3 Residential Zone 3
PRH Public Rental Housing
V Village Type Development
VR Village Resite
G Government
Gr Government (Recreational)
IC Institution and Community
E Educational
O Open Space
A Amenity
OU Other Specified Uses
GB Green Belt
S Swimming Pool
N
Metres
0
25
50

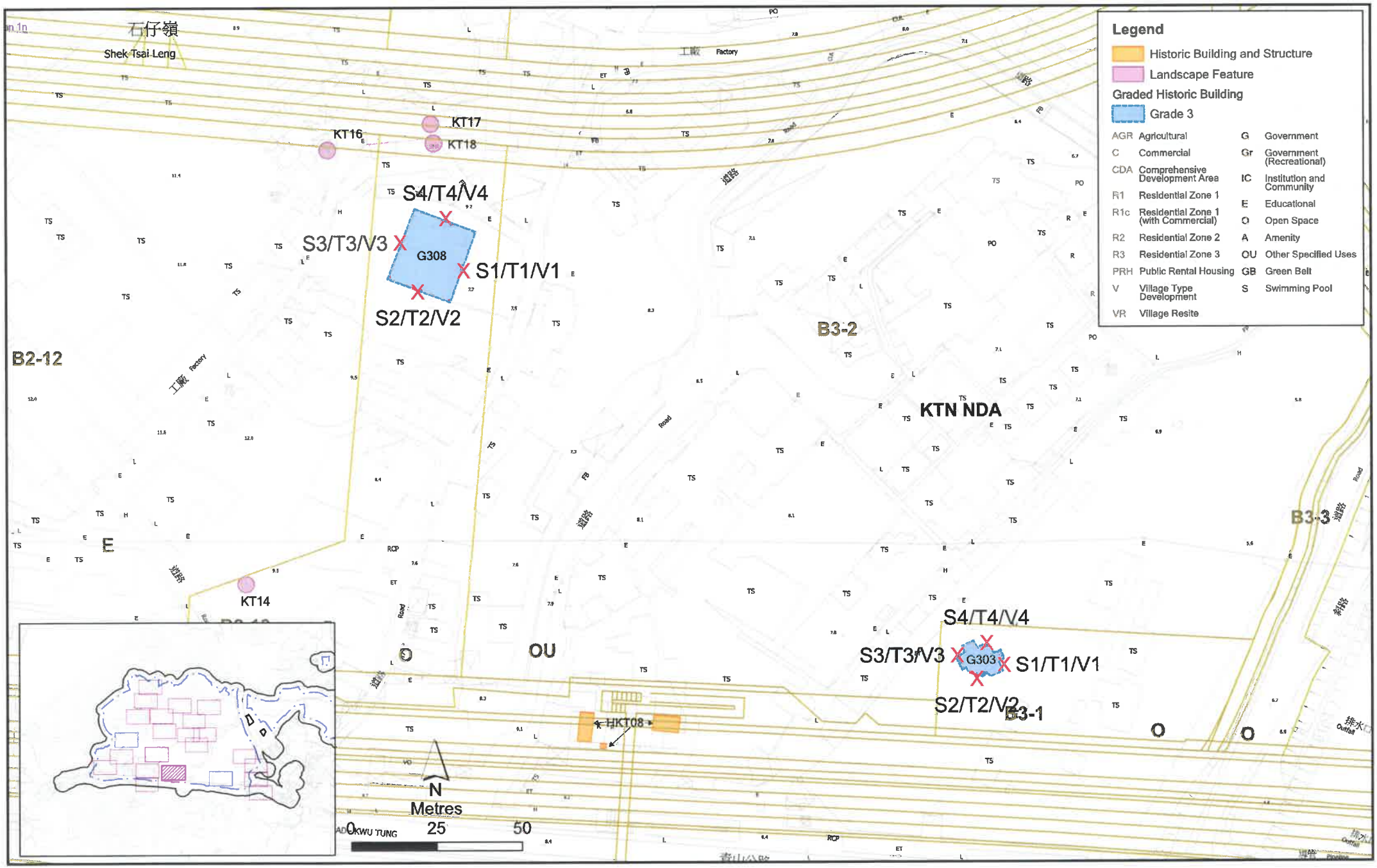


Legend

S1-S4 Settlement Marker

T1-T4 Tilting Marker

V1-V4 Vibration Monitoring Point

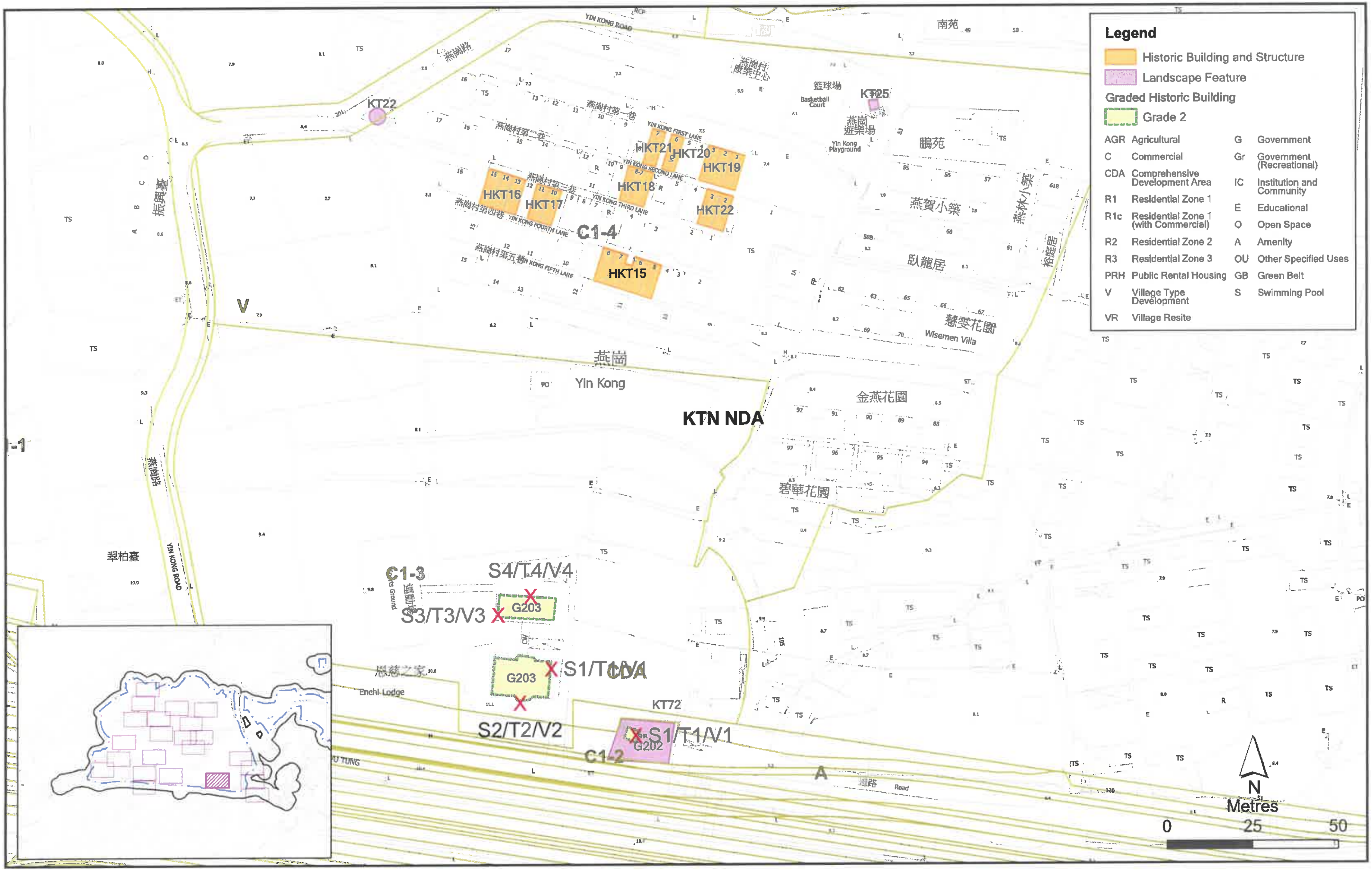


Legend

S1-S4 Settlement Marker

T1-T4 Tilting Marker

V1-V4 Vibration Monitoring Point


Legend
Historic Building and Structure
Landscape Feature
Graded Historic Building
Grade 2
AGR Agricultural
C Commercial
CDA Comprehensive Development Area
R1 Residential Zone 1
R1c Residential Zone 1 (with Commercial)
R2 Residential Zone 2
R3 Residential Zone 3
PRH Public Rental Housing
V Village Type Development
VR Village Resite
G Government
Gr Government (Recreational)
IC Institution and Community
E Educational
O Open Space
A Amenity
OU Other Specified Uses
GB Green Belt
S Swimming Pool
KT22
KT25
HKT15
HKT16
HKT17
HKT18
HKT19
HKT20
HKT21
HKT22
C1-4
C1-3
C1-2
KT72
G202
G203
S1/T1/V1
S2/T2/V2
S3/T3/V3
S4/T4/V4
CDA
V
A
燕崗
Yin Kong
KTN NDA
Enchi Lodge
恩慈之家
Wisemen Villa
慧雯花園
金燕花園
碧華花園
臥龍居
燕賀小築
鵬苑
南苑
燕崗遊樂場
Yin Kong Playground
籃球場
Basketball Court
翠柏臺
振興臺
燕崗路
YIN KONG ROAD
N
Metres
0
25
50