Annex D - Air Ventilation Assessment – Expert Evaluation

JOINT-USER COMPLEX AND JOINT-USER GENERAL OFFICE BUILDING
AT AREA 29, KWU TUNG NORTH

AIR VENTILATION ASSESSMENT
EXPERT EVALUATION

FOR

JOINT-USER COMPLEX AND JOINT-USER GENERAL OFFICE BUILDING AT AREA 29, KWU TUNG NORTH

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Planning Department

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Project:	Air Ventilation Assessment Expert Evaluation for Joint-User Complex and Joint-User General Office Building at Area 29, Kwu Tung North
Report No.:	RP24431-CFD-01

Revision	Issue Date	Description	Author	Checker	Approver
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1 INTRODUCTION

1.1 Project Background

1.1.1 BeeXergy Consulting Limited (BXG) was commissioned by Urban Design & Planning Consultants Limited to undertake an Air Ventilation Assessment (AVA) – Expert Evaluation (EE) for the Joint-User Complex and Joint-User General Office Building at Area 29, Kwu Tung North (the Site).

1.1.2 The subject site (the Site) falls within an area zoned “Government, Institution or Community” (“G/IC”) on the approved Kwu Tung North Outline Zoning Plan NO. S/KTN/4 (the OZP). Relaxation of restrictions on maximum building height from +130mPD to +170mPD are proposed.

2 SITE CHARACTERISITICS

2.1 The Site and its surrounding areas

2.1.1 The Site is located at the Kwu Tung North New Development Area. According to the OZP, the Site is currently zoned “G/IC”.

2.1.2 To the north and east of the Site lies the future high-rise other specified uses buildings. To the immediate east of the Site lies the open space

2.1.3 To the north-east and north-west of the Site lies the future high-rise residential buildings.

2.1.4 To the immediate south of the Site lies the Castle Peak Road (Chau Tau) and the Fanling Highway.

2.1.5 To the south-east and south-west of the Site lies the low-rise residential buildings, Valais and Europa Garden respectively.

2.1.6 To the south of the Site lies the Kwu Tung Market Shopping Centre and Lady Ho Tung Welfare Centre Eco-learn Institute.

2.1.7 To the west of the Site lies the Kwu Tung North Multi-welfare Services Complex. To the immediate west of the Site lies the future school buildings.

2.1.8 Figure 1 shows an overview of the Site and its surroundings. Figure 2 shows a view of the Site and its surroundings as shown on the OZP. The building heights of the existing / planned developments in the vicinity of the Site are listed out in Table 1.

Figure 1 Overview of the Site and its Surroundings

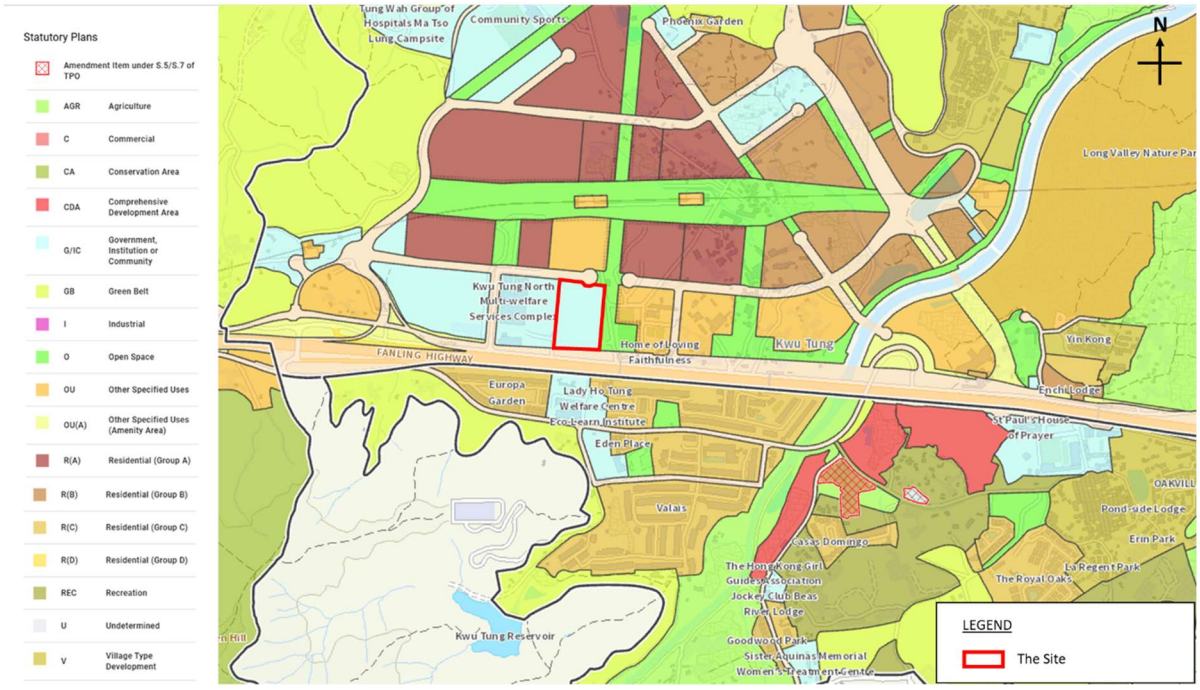


Figure 2 View of the Site and its Surroundings as shown on the OZP

(Source: Town Planning Board)

Table 1 Existing/Planned Developments around the Site

Existing / Planned Developments	Building Height (mPD)
Future other specified uses buildings to the north of the Site	120
Future residential buildings to the north-east to the Site	130
Future other specified uses buildings to the east of the Site	110
Valais	18.1 - 24.3
Lady Ho Tung Welfare Centre Eco-learn Institute	25.3
Kwu Tung Market Shopping Centre	30.8
Europa Garden	20.5 - 28.3
Future School	Max 8 storeys
Kwu Tung North Multi-welfare Services Complex	45.0
Kwu Tung North Substation	29.7
Future high-rise residential buildings to the north-west to the Site	120 - 135

2.2 Studied scenarios

2.2.1 Baseline Scheme

2.2.1.1 The Baseline Scheme comprises of two joint-user buildings (JUB) and one joint-user complex (JUC). Appendix A shows the Baseline Scheme.

2.2.1.2 JUB located at the north-west portion of the Site with a building height of 130mPD and at the north-east portion of the Site with a building height of 130mPD.

2.2.1.3 JUC is a L-shaped building which consists of two parts. The high rise building extent with a building height of 82.2mPD located at the west portion of the Site, the low rise building extent with a building height of 65mPD located at the south portion of the Site.

2.2.2 Proposed Scheme

2.2.2.1 The Proposed Scheme comprises of one joint-user building (JUB) and one joint-user complex (JUC). Appendix B shows the drawings of the Proposed Scheme.

2.2.2.2 JUB located at the north-east portion of the Site with a building height of 166.9mPD.

2.2.2.3 JUC is a L-shaped building with a building height of 63mPD located at the west and south portion of the Site.

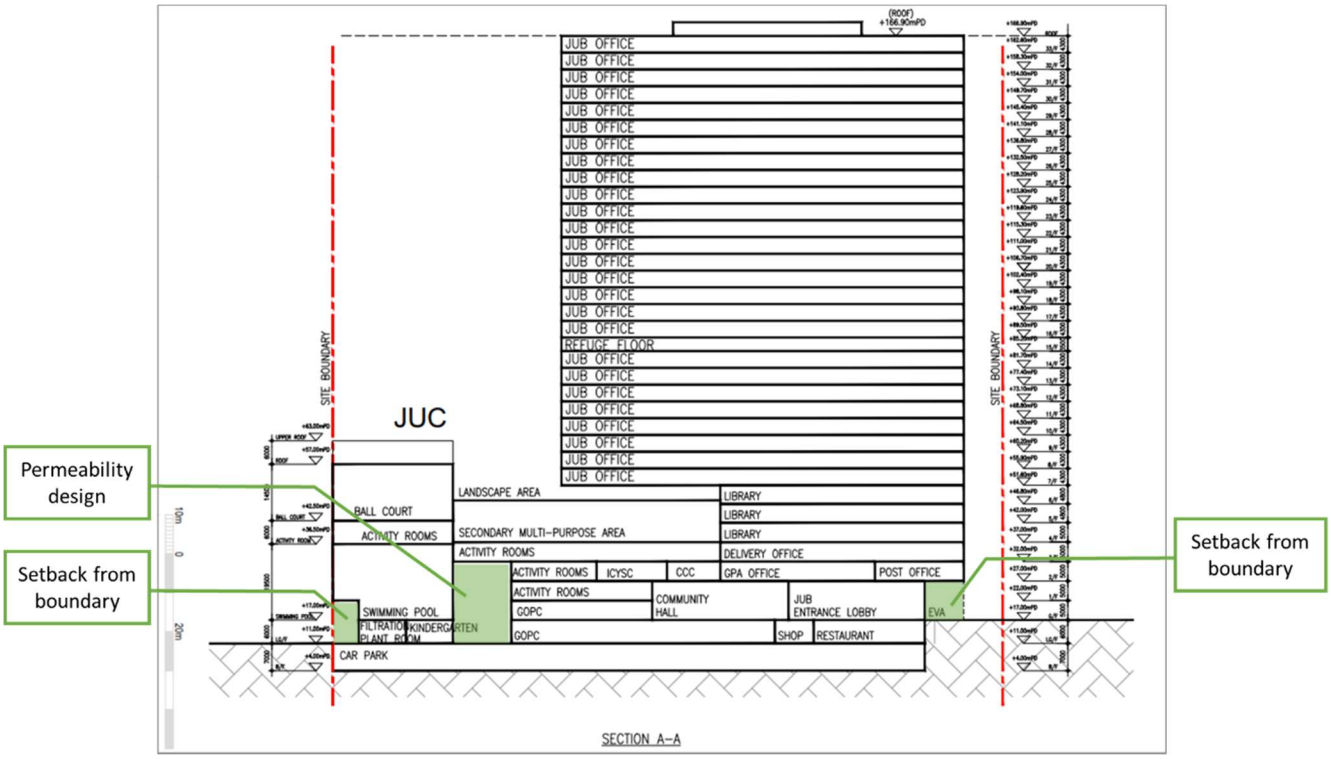
2.2.2.4 Design parameters of the Proposed Scheme:

Site Area	~20,980 m2
Plot Ratio	~7.8

2.2.3 Good Design Features in Proposed Scheme

2.2.3.1 The following good design features of the Proposed Scheme are identified:

- Setback from the northern, eastern and southern site boundaries
- High permeability podium design



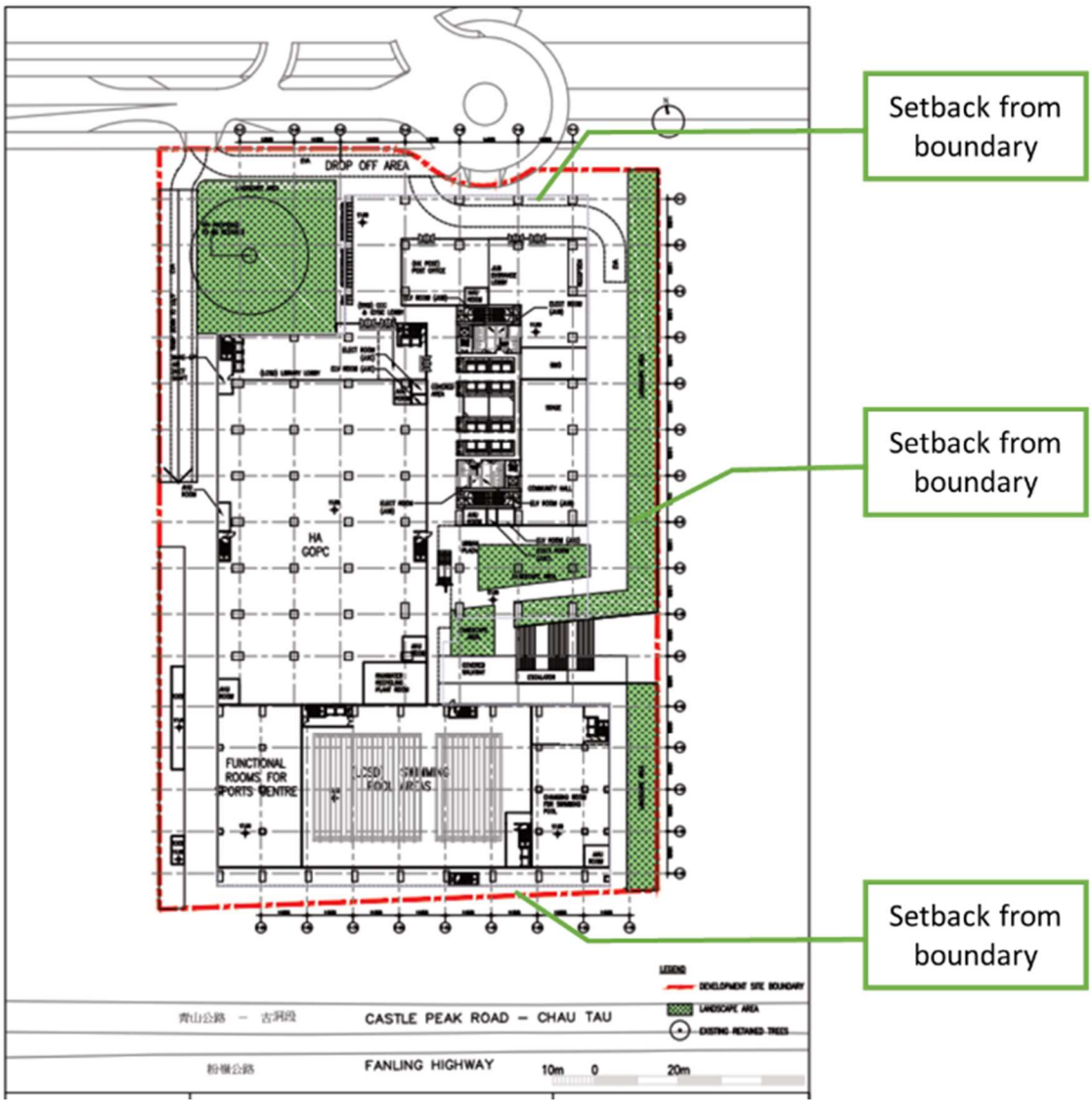


Figure 3 Good Design Features of the Proposed Scheme

3 SITE WIND AVAILABILITY

3.1 The characteristic of the site wind availability should be identified in order to investigate the wind performance of the Site. Site wind availability data could be used for assessing the wind characteristics in terms of the magnitude and frequency of approaching wind from each wind direction. In this study, the simulated Regional Atmospheric Modelling System (RAMS) wind data from PlanD has been used for the qualitative assessment.

3.2 RAMS WIND data

3.2.1 City University of Hong Kong utilized the meso-scale numerical model RAMS to produce site wind availability data for Hong Kong and is available at PlanD's database[1]. Based on the archived dataset, wind statistics and wind roses for each 0.5km×0.5km grid box at different height levels could be extracted. Simulated data at grid (X065, Y083) corresponds to the location of the Site and both annual and summer wind conditions at 200m above ground are referenced in this study. The location of grid (X065, Y083) is shown in Figure 4. The extracted wind roses show that easterly wind dominates under the annual wind condition while south westerly wind dominates under the summer wind condition. Figure 5 and Figure 6 show the annual and summer wind roses at 200m above ground level for grid (X065, Y083) respectively.

[1] http://www.pland.gov.hk/pland_en/info_serv/site_wind/site_wind/index.html

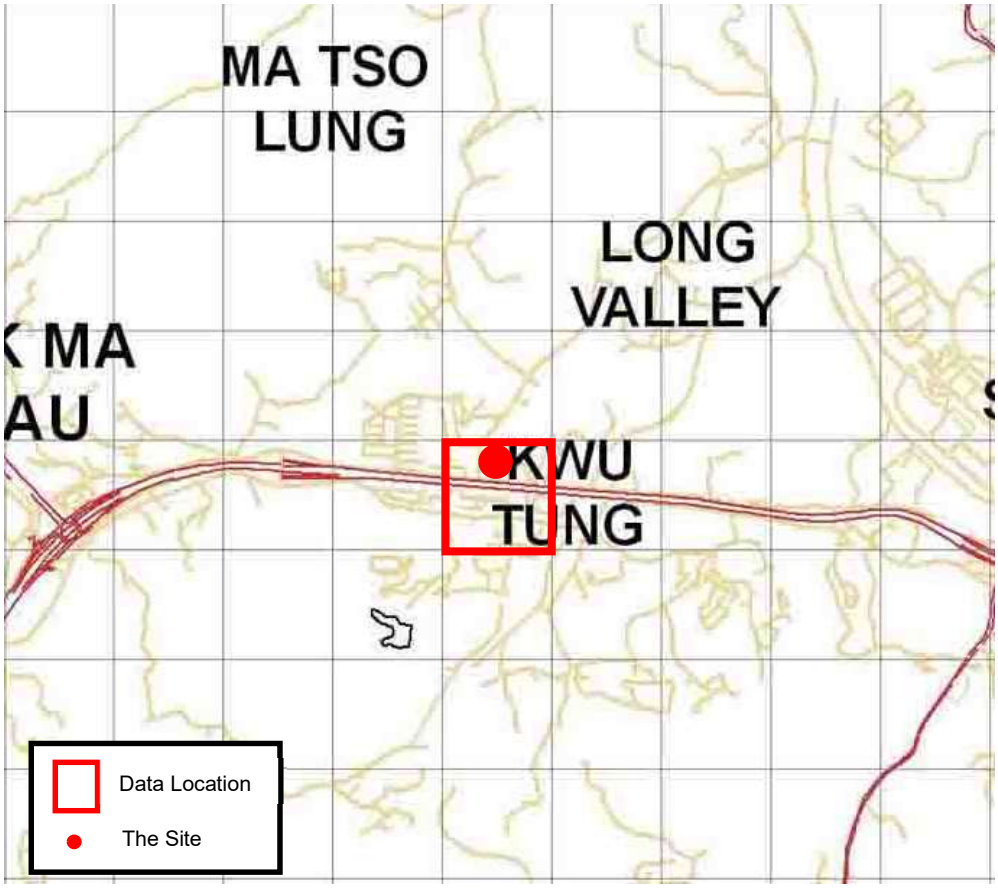


Figure 4 Location of the Selected RAMS Wind Data - Grid (X065, Y083)

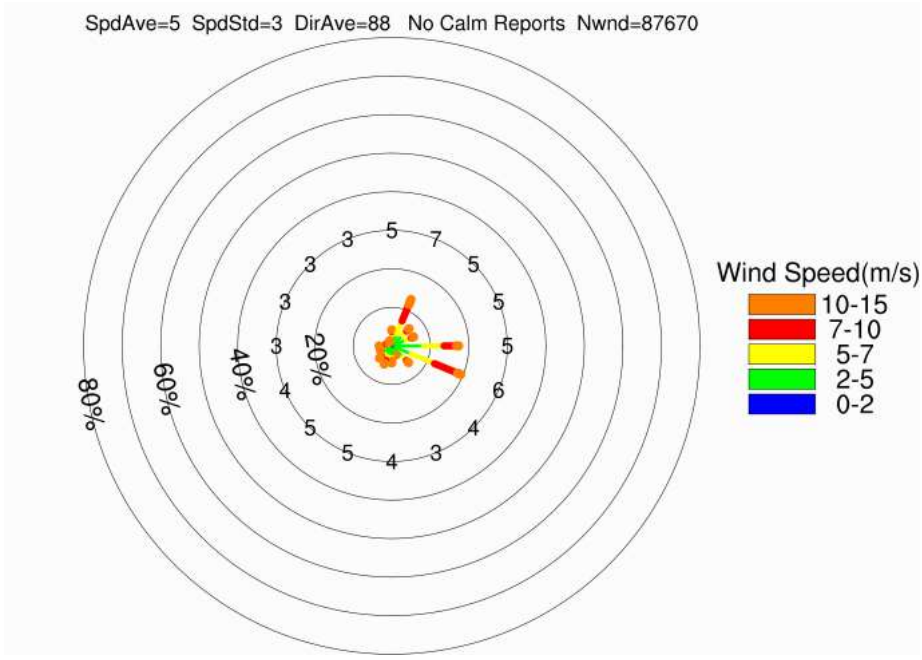


Figure 5 Annual Wind Rose at 200m - Grid (X065, Y083)

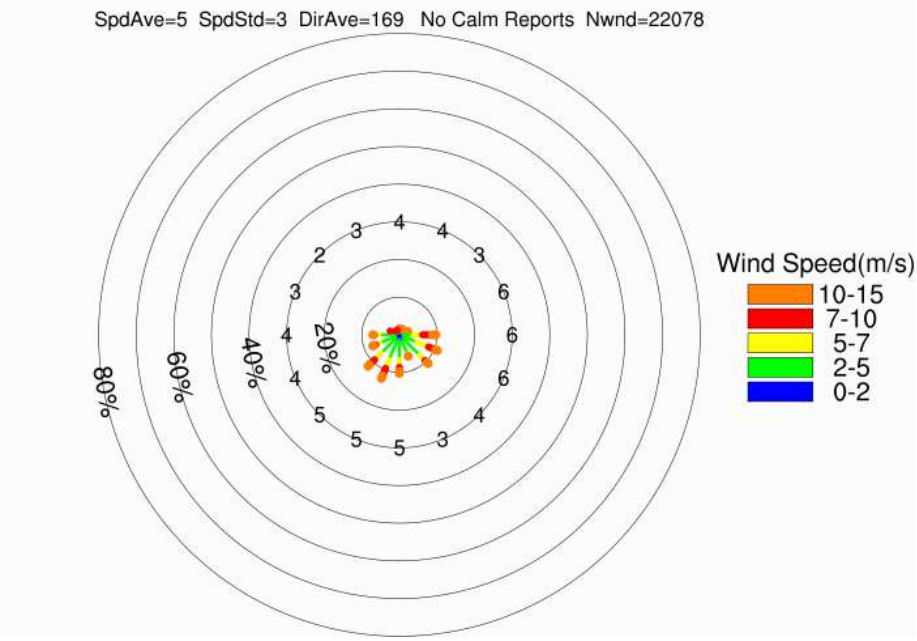


Figure 6 Summer Wind Rose at 200m - Grid (X065, Y083)

3.2.2 The extracted wind roses show that the easterlies dominate under the annual wind condition whilst south-westerlies dominate under the summer wind condition.

Table 2 Prevailing Wind Frequency of the Site by RAMS Wind Data

Prevailing Wind	**Annual**			**Summer**		
Wind Direction	NNE	E	ESE	ESE	SSW	SW
Wind Frequency	13.1%	17.4%	19.4%	11.0%	12.6%	11.8%

4 QUALITATIVE ANALYSIS OF THE EXISTING CONDITION, BASELINE SCHEME AND PROPOSED SCHEME

4.1 Annual wind condition

4.1.1 NNE, E and ESE winds are the annual prevailing winds.

4.1.2 Considered the future high rise buildings located at the east of the Site, the annual prevailing wind would flow along the Road L2 and the Castle Peak Road (Chau Tau) and reach the Site.

4.1.3 In the Baseline Scheme, the Road L2 and the Castle Peak Road (Chau Tau) act as the major breezeway. The incoming annual E wind would flow along the breezeway and reach the north portion of the Kwu Tung North Multi-welfare Services Complex and the future G/IC buildings.

4.1.4 The incoming NNE wind from the open space would reach the east boundary of the Site. Then the wind will pass through the setback from the eastern boundary and reach the Kwu Tung Market Shopping Centre and Lady Ho Tung Welfare Centre Eco-learn Institute to the south of the Site.

4.1.5 The incoming ESE wind skim over the low rise buildings and reach the Site freely. A portion of the ESE wind will be captured by the Site and a portion of the ESE will be diverted by the Site.

4.1.6 In the Proposed Scheme, the incoming annual E wind would flow along the major breezeway and reach the buildings in the leeward side. With the setback from the northern and the southern boundaries, the leeward side will enjoy more annual E wind.

4.1.7 The incoming NNE wind from the open space would reach the east boundary of the Site. The setback from the eastern boundaries allow the NNE wind reach the GIC building to the south of the Site freely.

4.1.8 Similar to the Baseline Scheme, the incoming ESE wind skim over the low rise buildings and reach the Site freely. With the permeable podium design, a portion of the ESE wind will pass through the Site and reach the leeward side.

4.1.9 The air ventilation impact arising from the Proposed Scheme would be comparable to that of the Baseline Scheme and no significant adverse impact is anticipated to the surrounding pedestrian wind environment.

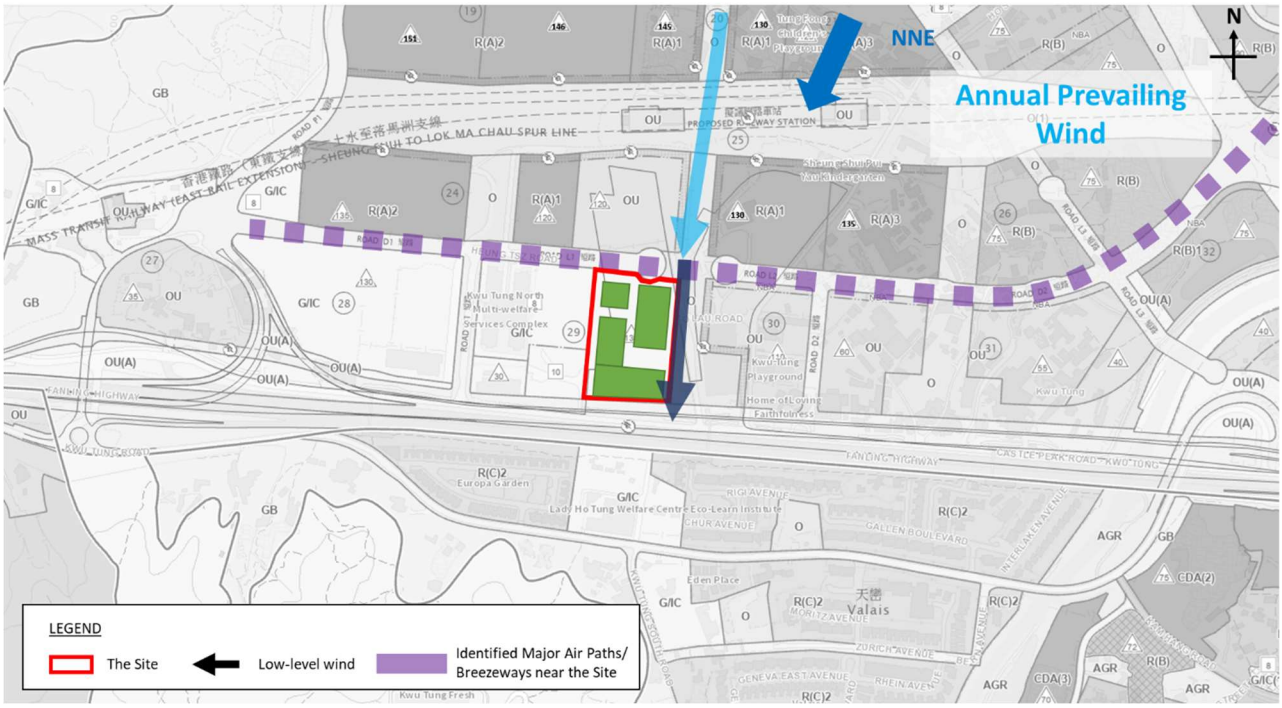


Figure 7 Major Air Paths under Baseline Scheme (NNE Wind)

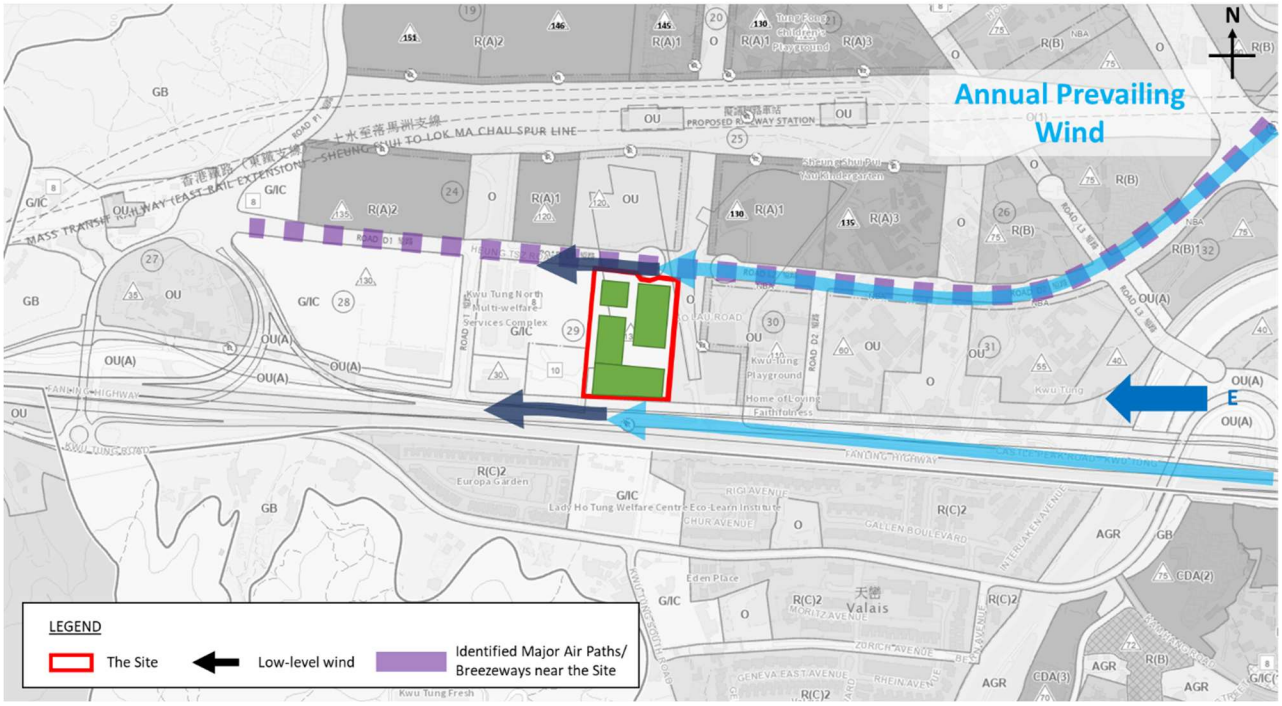


Figure 8 Major Air Paths under Baseline Scheme (E Wind)

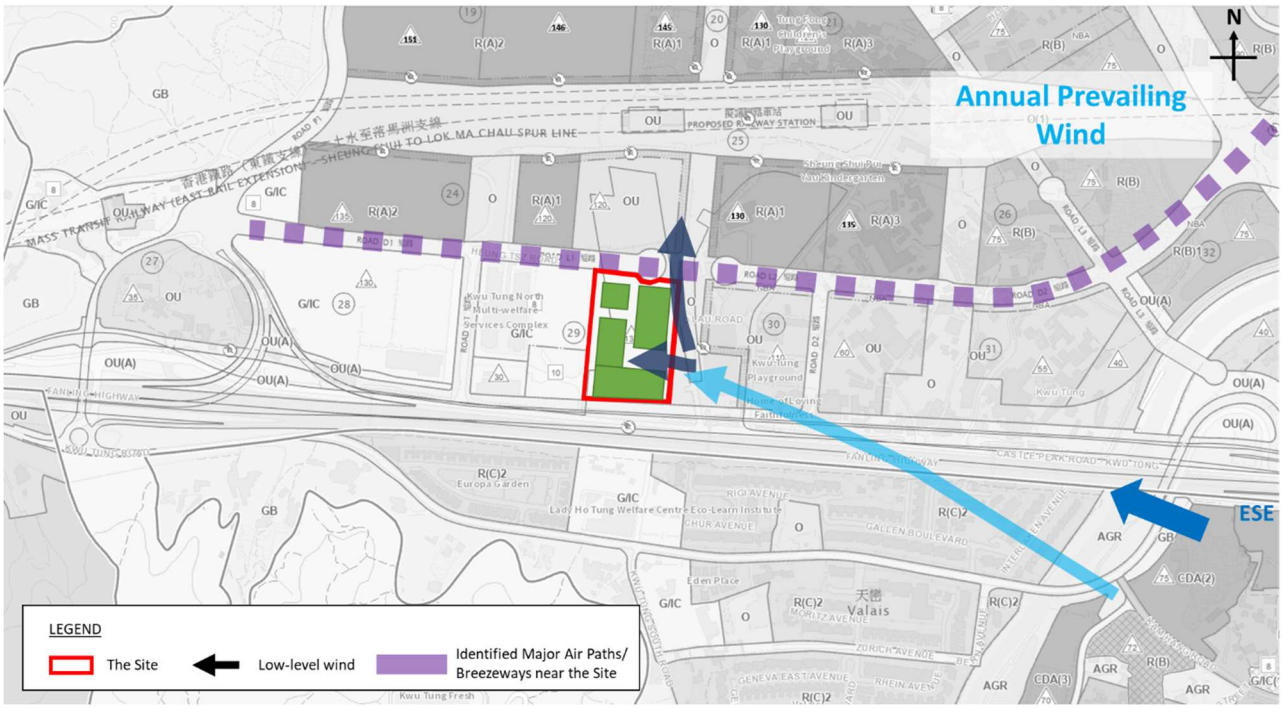


Figure 9 Major Air Paths under Baseline Scheme (ESE Wind)

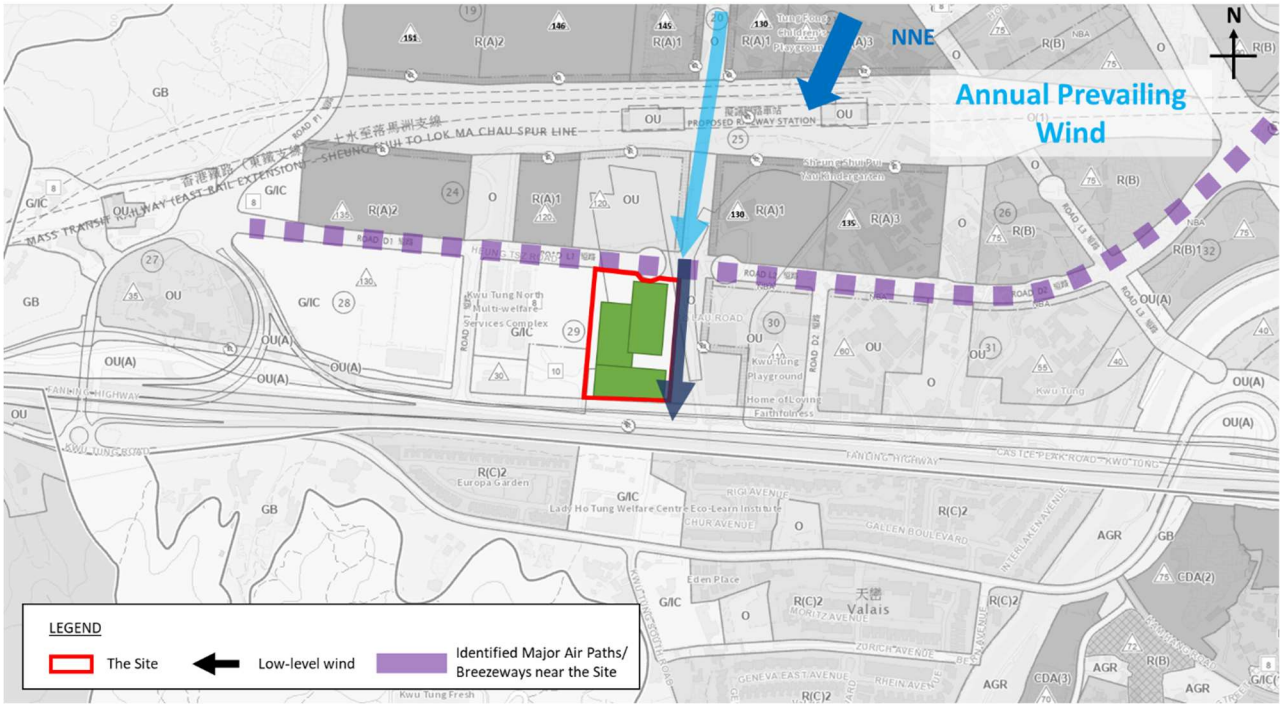


Figure 10 Major Air Paths under Proposed Scheme (NNE Wind)

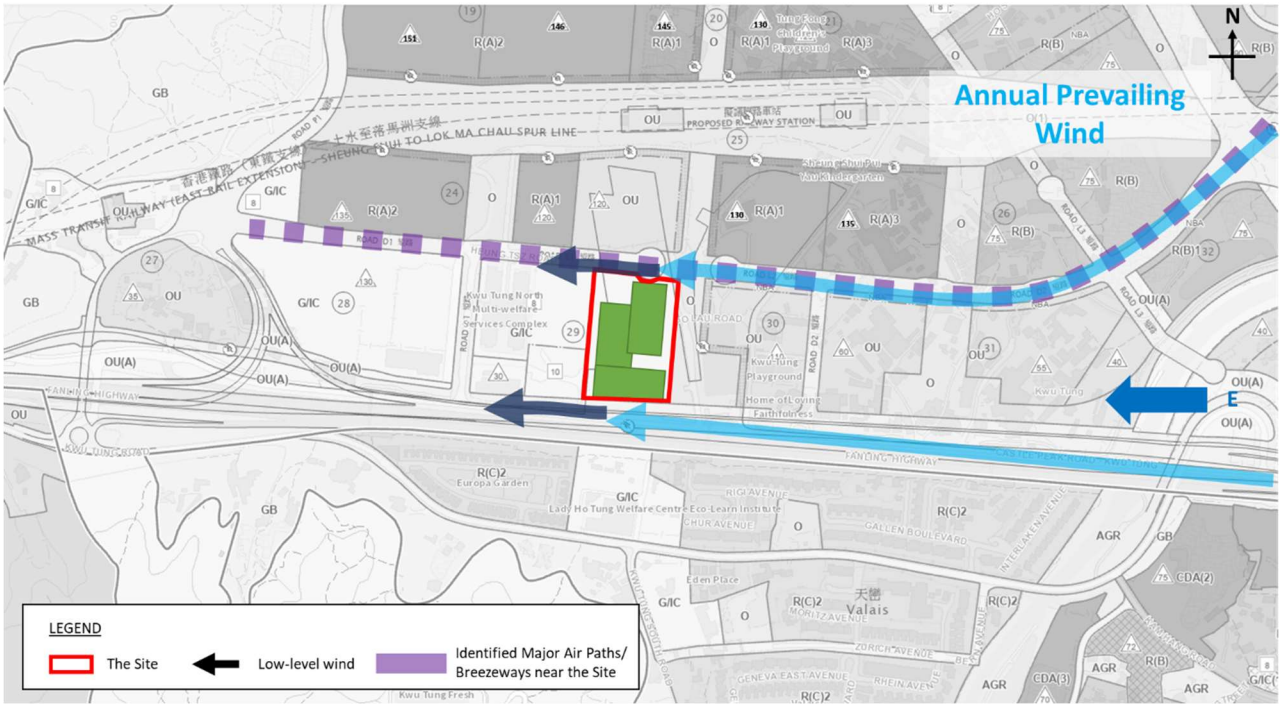


Figure 11 Major Air Paths under Proposed Scheme (E Wind)

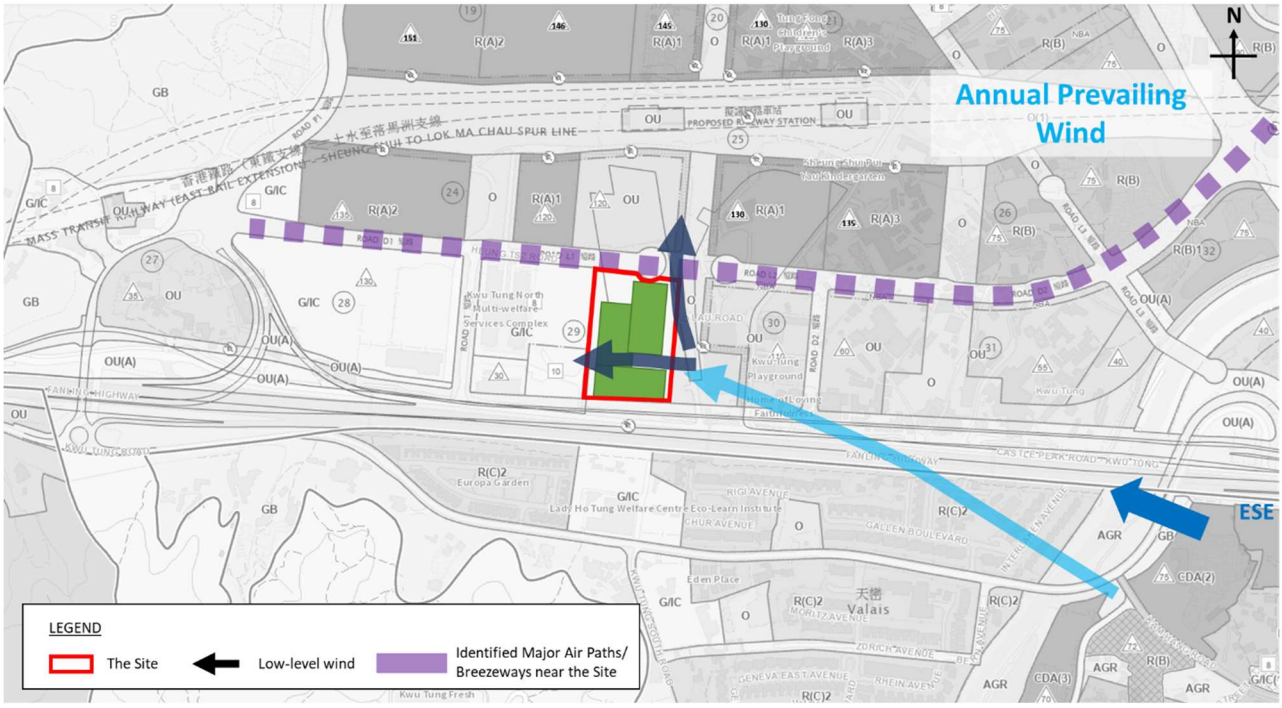


Figure 12 Major Air Paths under Proposed Scheme (ESE Wind)

4.2 Summer wind condition

4.2.1 ESE, SSW and SW winds are the summer prevailing winds.

4.2.2 The summer prevailing SW and SSW winds from the hilly terrain would reach the south side of the Site by skimming over the Europa Garden and the Kwu Tung Market Shopping Centre due to the low-rise nature.

4.2.3 In the Baseline Scheme, the incoming summer SW wind will be diverted by the JUC at the south of the Site and reach the future residential buildings and other specified uses buildings.

4.2.4 The SSW wind will reach the future high-rise other specified uses buildings via the separation between the western side of the Site and the Future School to the west of the Site.

4.2.5 Similar to the annual wind condition, the incoming ESE wind skim over the low rise buildings and reach the Site freely. A portion of the ESE wind will be captured by the Site and a portion of the ESE will be diverted by the Site.

4.2.6 In the Proposed Scheme, the incoming SW wind will also be diverted by the JUC at the south of the Site and reach the future residential buildings and other specified uses buildings.

4.2.7 The SSW wind will reach the future high-rise other specified uses buildings via the separation between the western side of the Site and the Future School to the west of the Site.

4.2.8 Similar to the Baseline Scheme, the incoming ESE wind skim over the low rise buildings and reach the Site freely. With the permeable podium design, a portion of the ESE wind will pass through the Site and reach the leeward side.

4.2.9 The air ventilation impact arising from the Proposed Scheme would be comparable to that of the Baseline Scheme and no significant adverse impact is anticipated to the surrounding pedestrian wind environment.

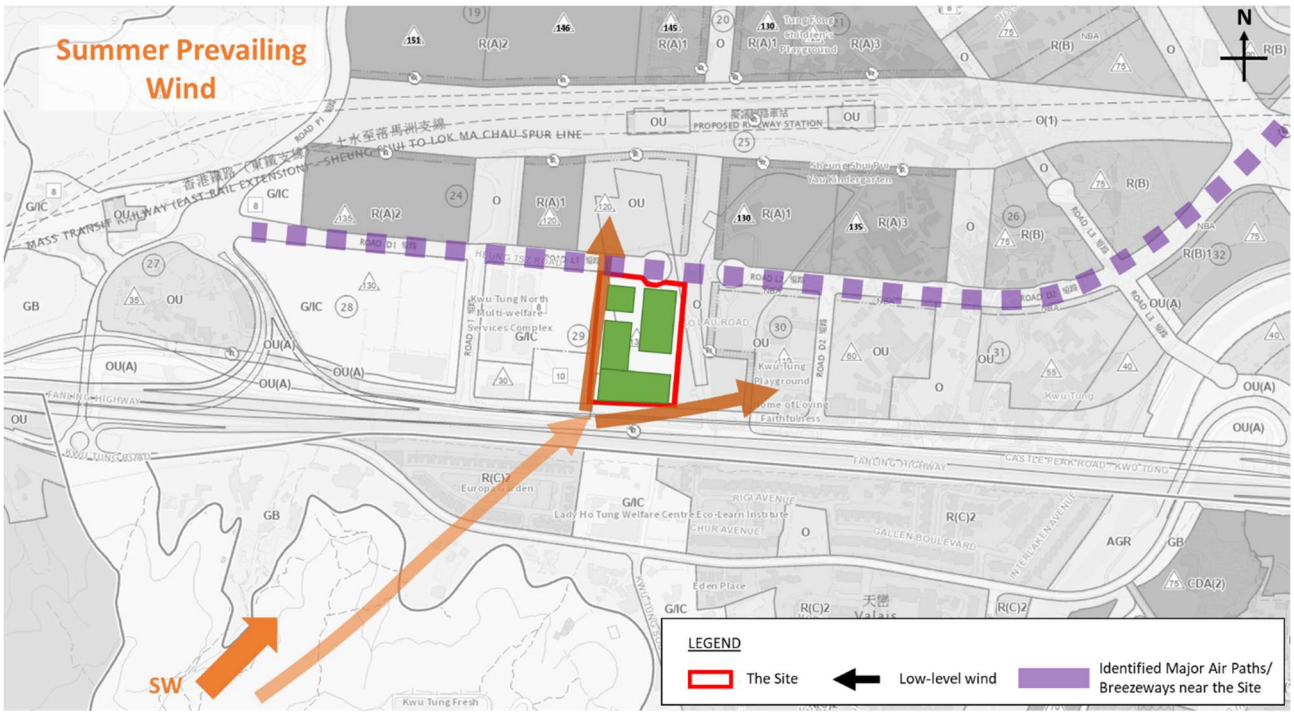


Figure 13 Major Air Paths under Baseline Scheme (SW Wind)

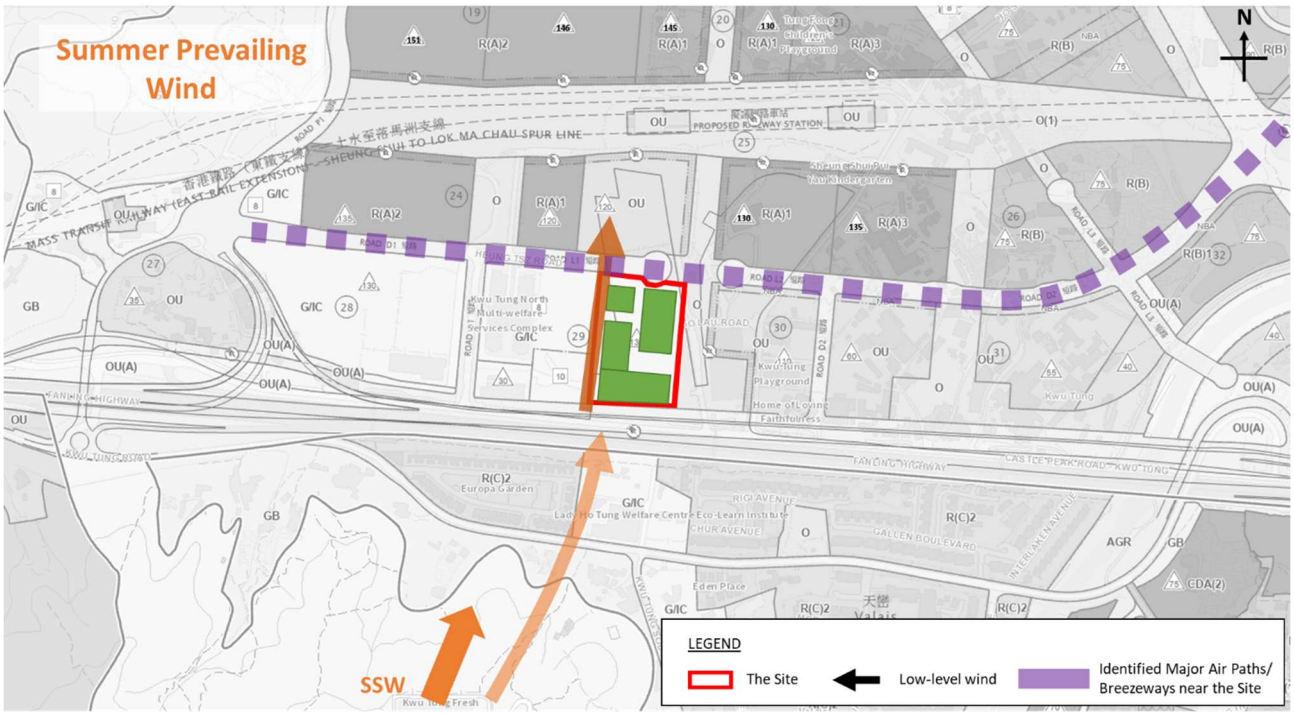


Figure 14 Major Air Paths under Baseline Scheme (SSW Wind)

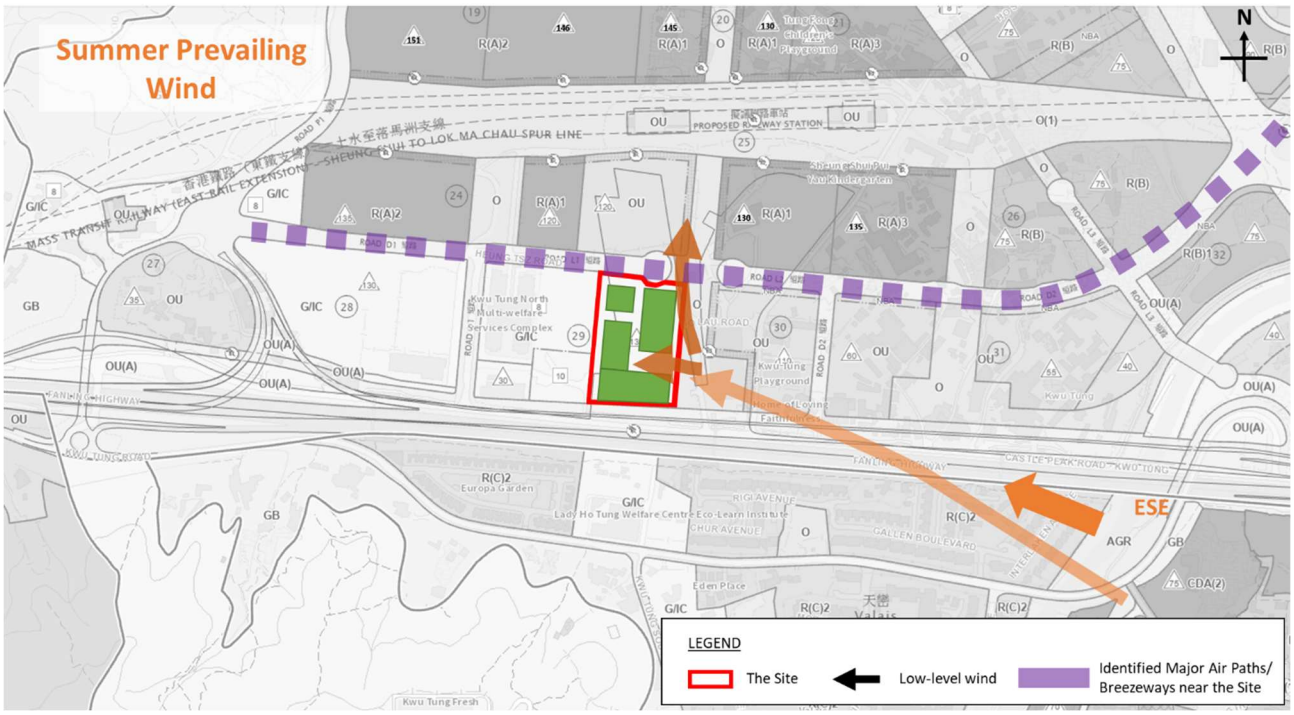


Figure 15 Major Air Paths under Baseline Scheme (ESE Wind)

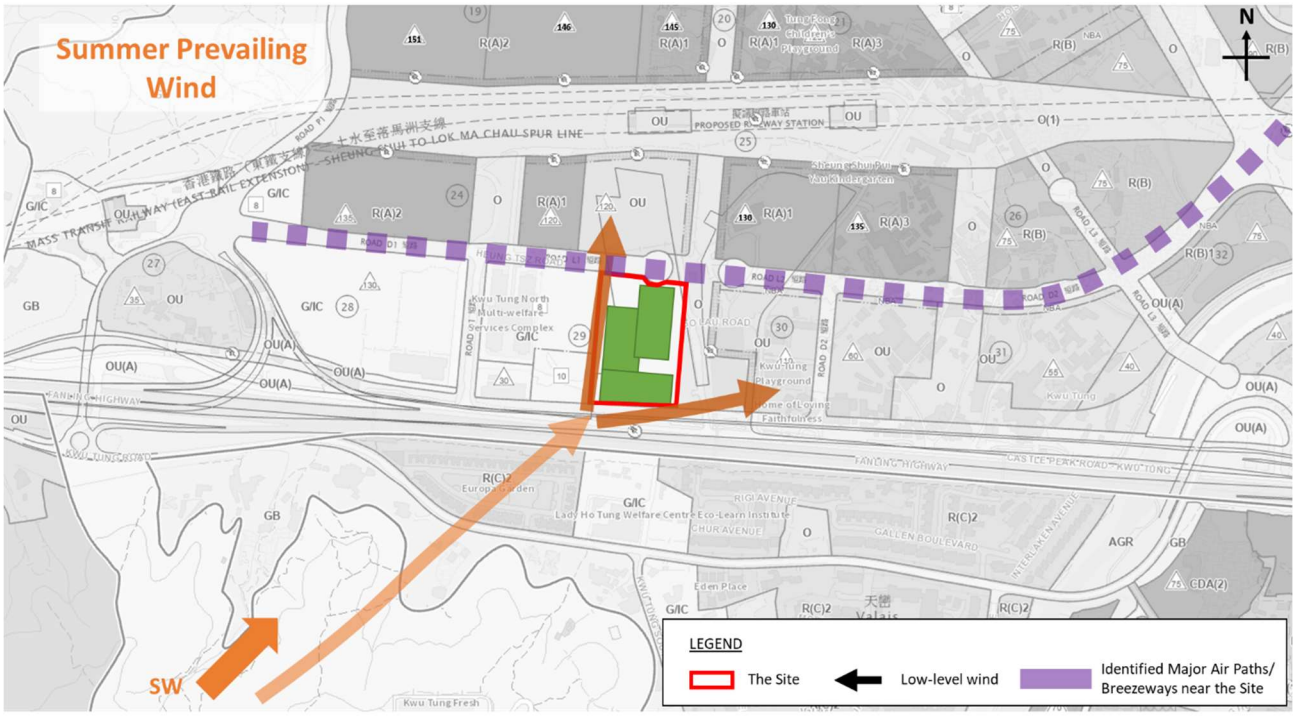


Figure 16 Major Air Paths under Proposed Scheme (SW Wind)

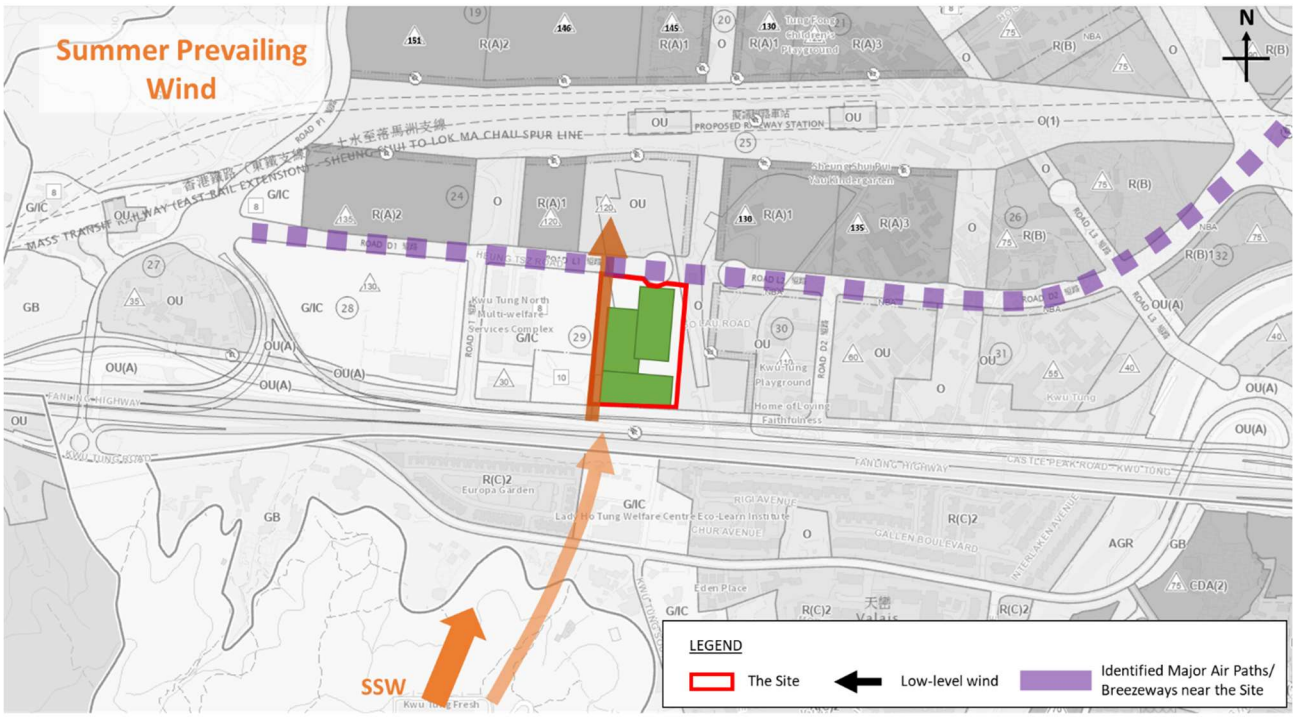


Figure 17 Major Air Paths under Proposed Scheme (SSW Wind)

Figure 18 Major Air Paths under Proposed Scheme (ESE Wind)

5 CONCLUSION

5.1 An AVA-EE was conducted for the Joint-User Complex and Joint-User General Office Building at Area 29, Kwu Tung North.

5.2 According to the site wind availability analysis, the annual prevailing winds come from NNE, E and ESE directions and the summer prevailing winds are from ESE, SSW and SW directions.

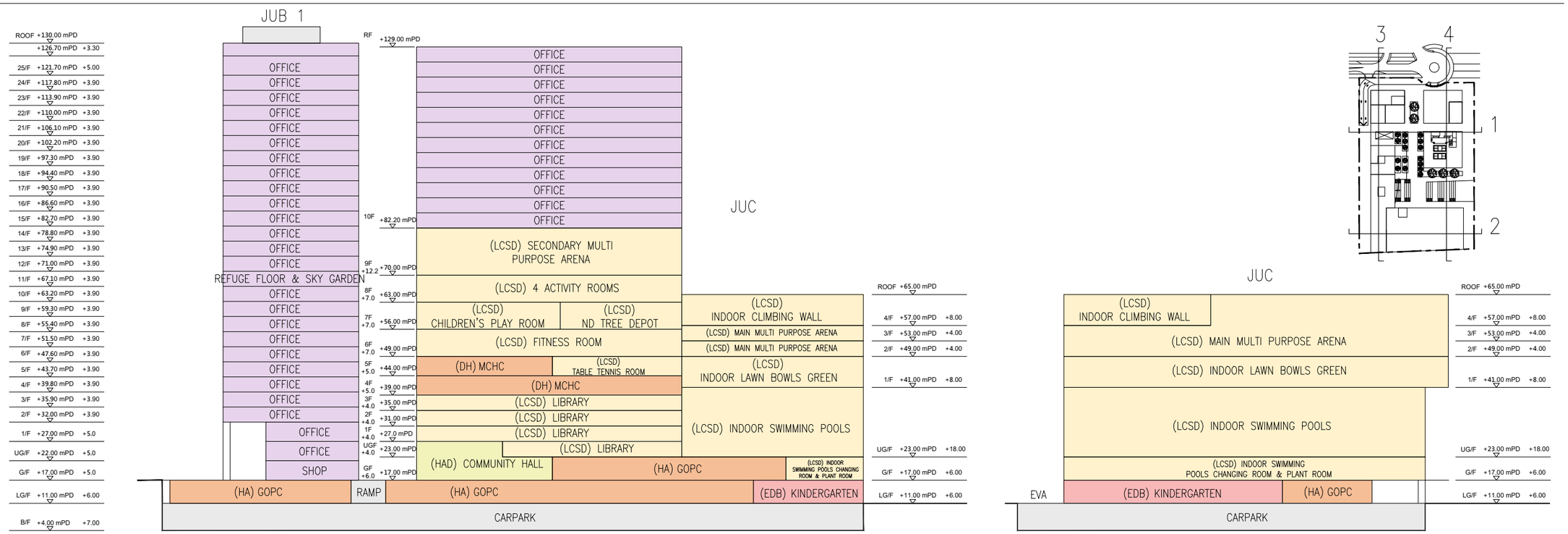
5.3 In the Baseline Scheme, the incoming annual E wind would flow along the major breezeway and reach the buildings in the leeward side. The incoming NNE wind will reach GIC building via the setback from the east boundary of the Site. A portion of the ESE wind will be captured by the Site and a portion of the ESE will be diverted by the Site.

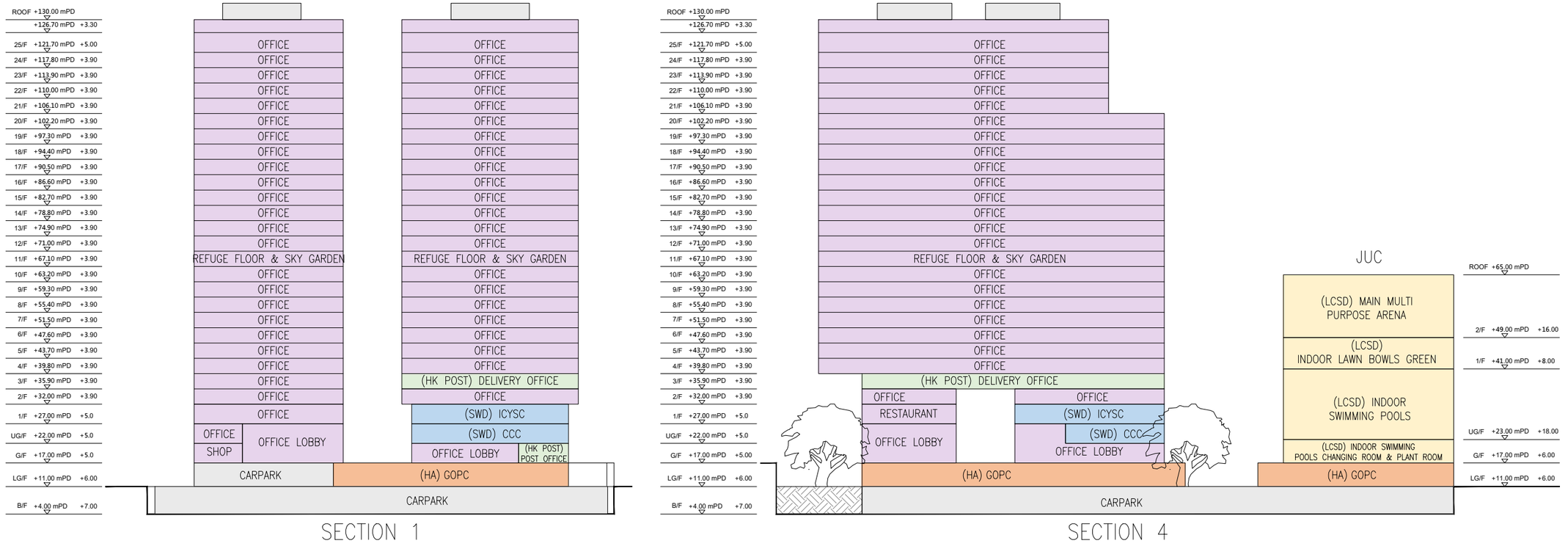
5.4 The incoming summer SW wind will be slighted diverted by the Site and reach the leeward side. The SSW wind will reach the future high-rise other specified uses buildings via the separation between the western side of the Site and the Future School to the west of the Site.

5.5 In the Proposed Scheme, the incoming annual E wind would flow along the major breezeway and reach the buildings in the leeward side. The incoming NNE wind will reach GIC building via the setback from the east boundary of the Site. The ESE wind will pass through the Site via the podium. Considering the setback from the eastern and southern site boundaries, it facilitates the air flow through the Site at pedestrian level towards the downwind area.

5.6 From the above expert review, the air ventilation impact arising from the Proposed Scheme would be comparable to that of the Baseline Scheme and no significant adverse impact is anticipated to the surrounding pedestrian wind environment. Hence, further AVA Initial Study for the Site is not required.

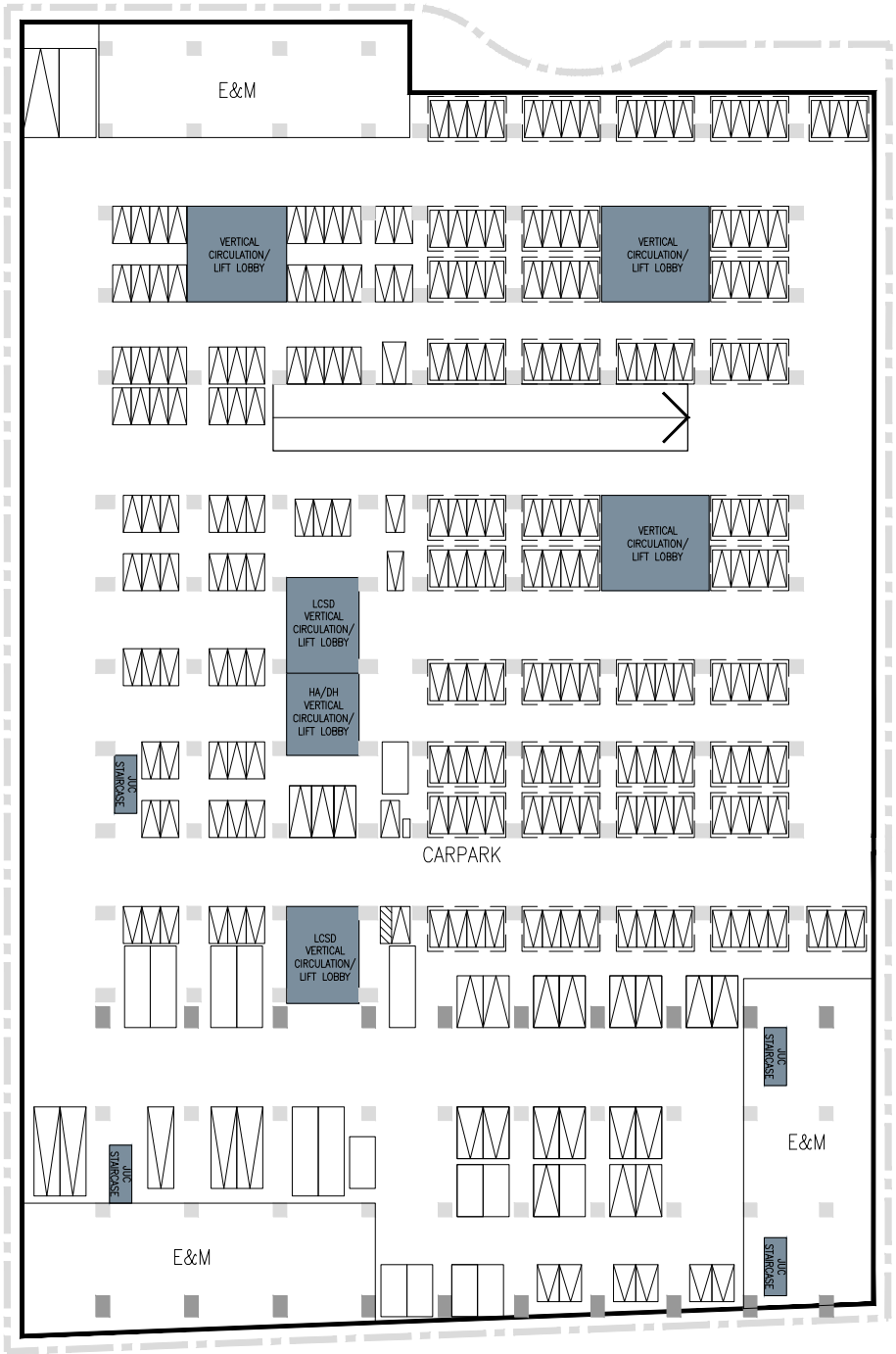
APPENDIX A
Baseline Scheme





BASELINE SCHEME (130 mPD) OF
KWU TUNG NORTH AREA 29, GIC SITE

SOURCE:
ARCHITECTURAL SERVICES DEPARTMENT



B/F

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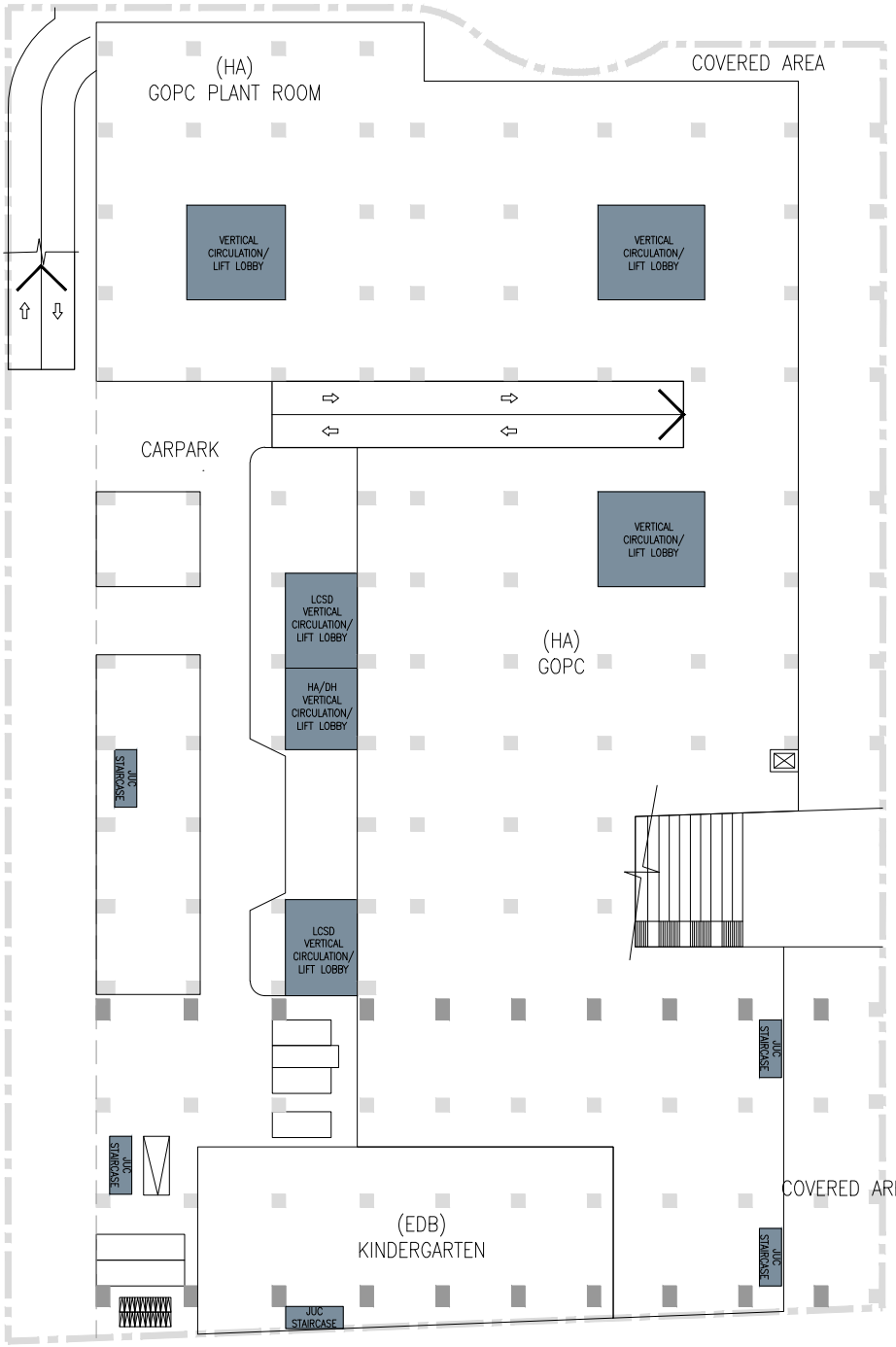
B/F PLAN 1:1000	DEVELOPMENT OF KWU TUNG NORTH AREA 29, GIC SITE PLANNING PROPOSAL	



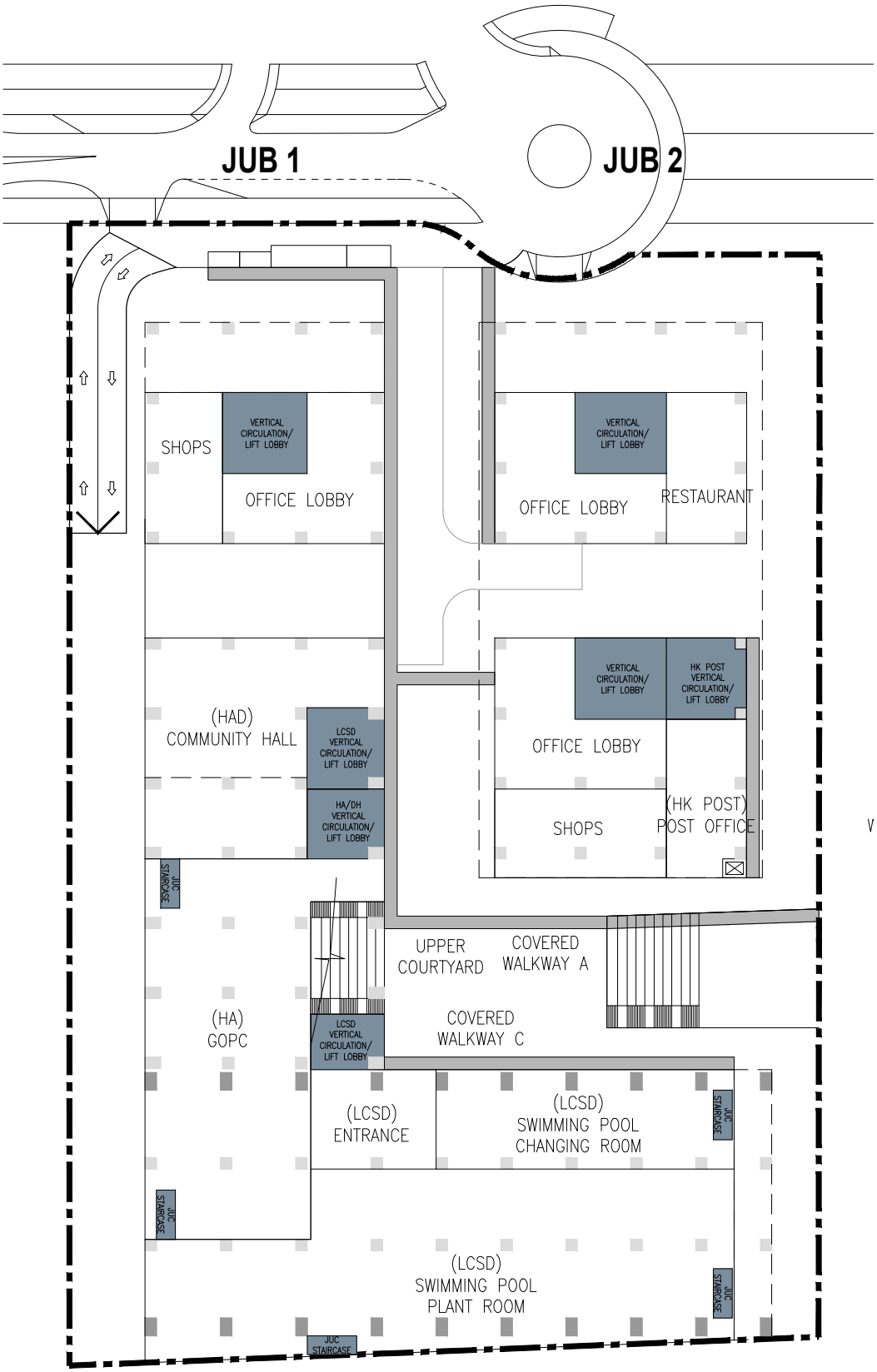
LG/F

青山公路 — 洲頭段 CASTLE PEAK ROAD — CHAU TAU

粉嶺公路 FANLING HIGHWAY

10m 0 20m

LG/F PLAN 1:1000	DEVELOPMENT OF KWU TUNG NORTH AREA 29, GIC SITE PLANNING PROPOSAL	



G/F PLAN	DEVELOPMENT OF KWU TUNG NORTH AREA 29, GIC SITE PLANNING PROPOSAL	
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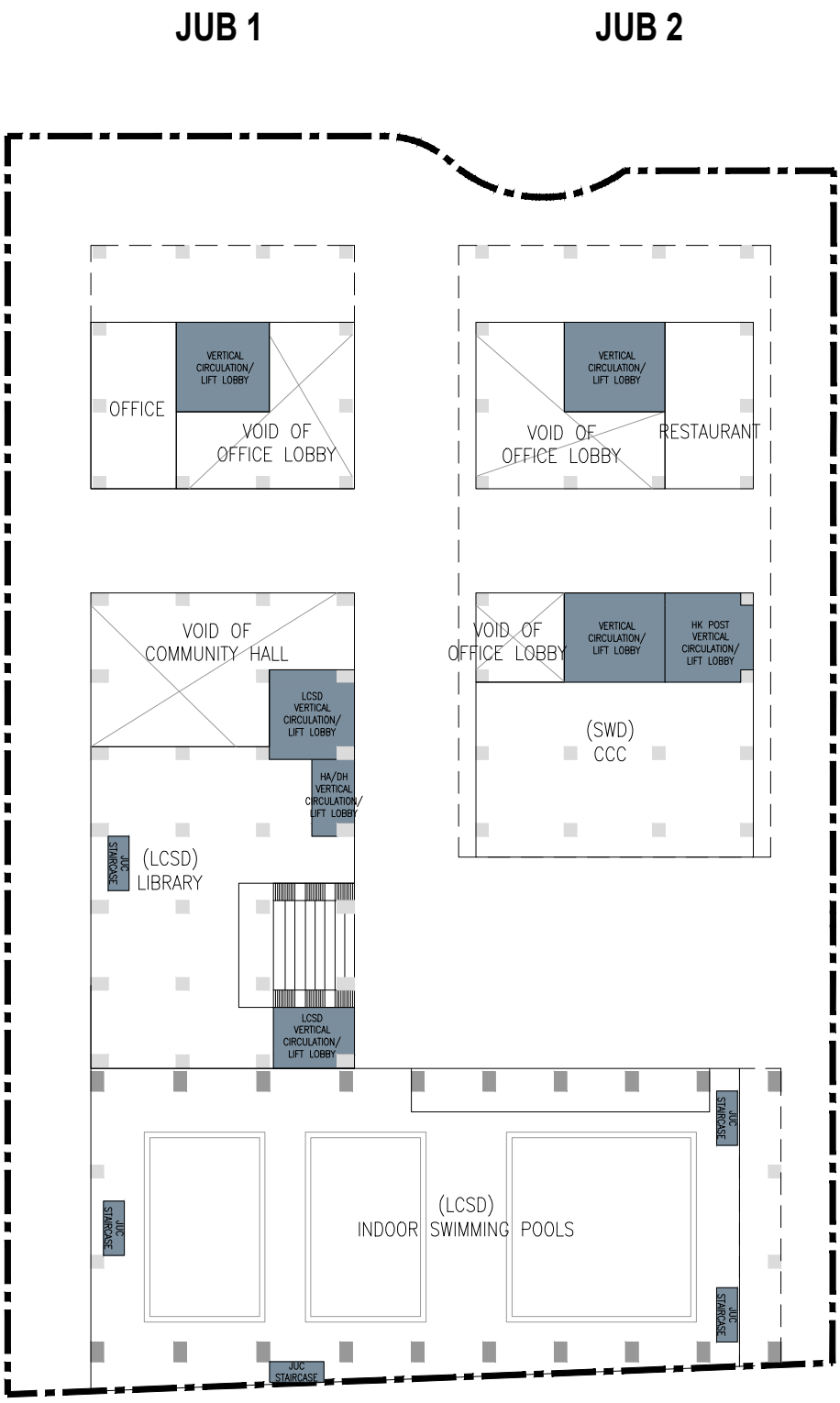

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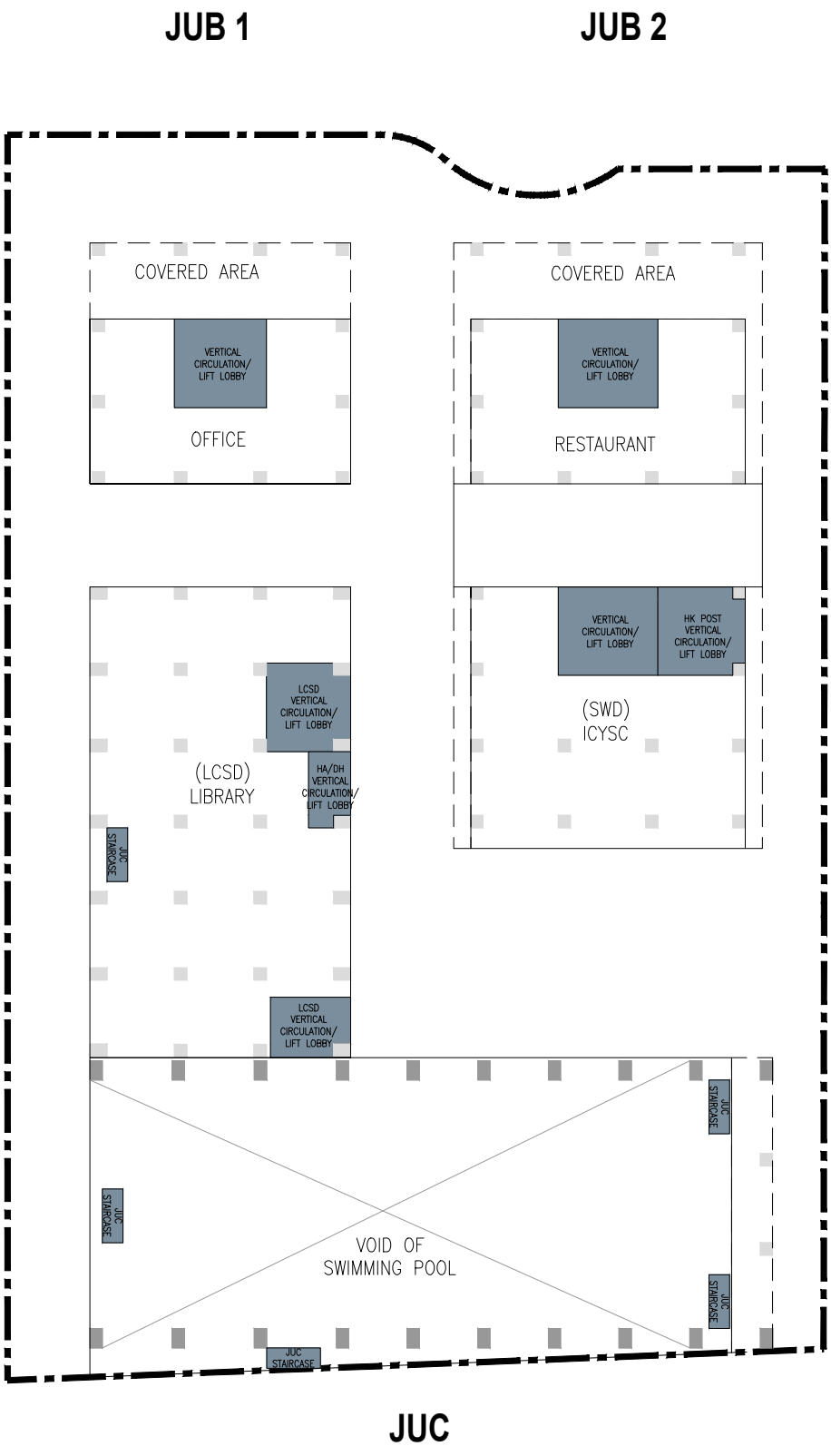

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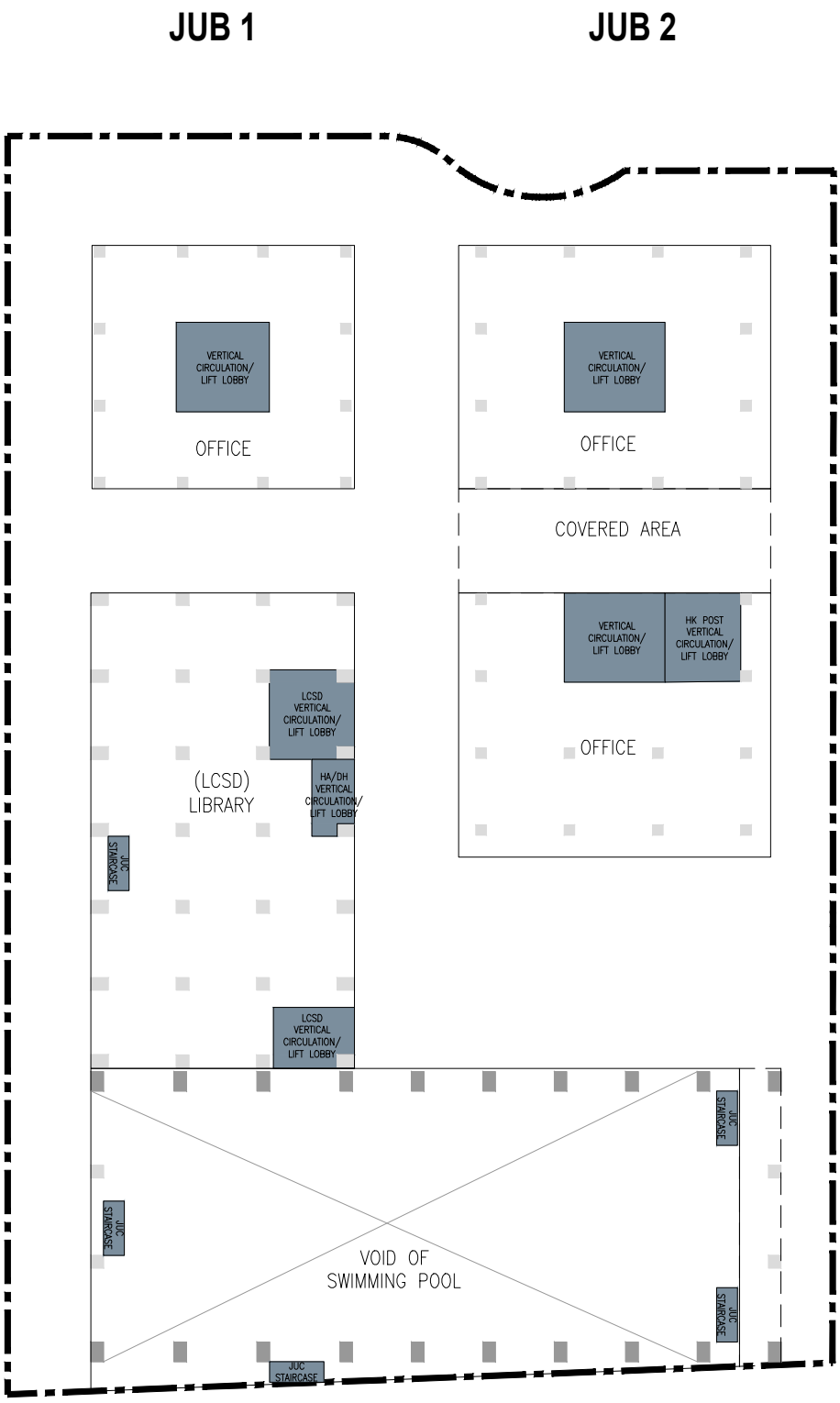

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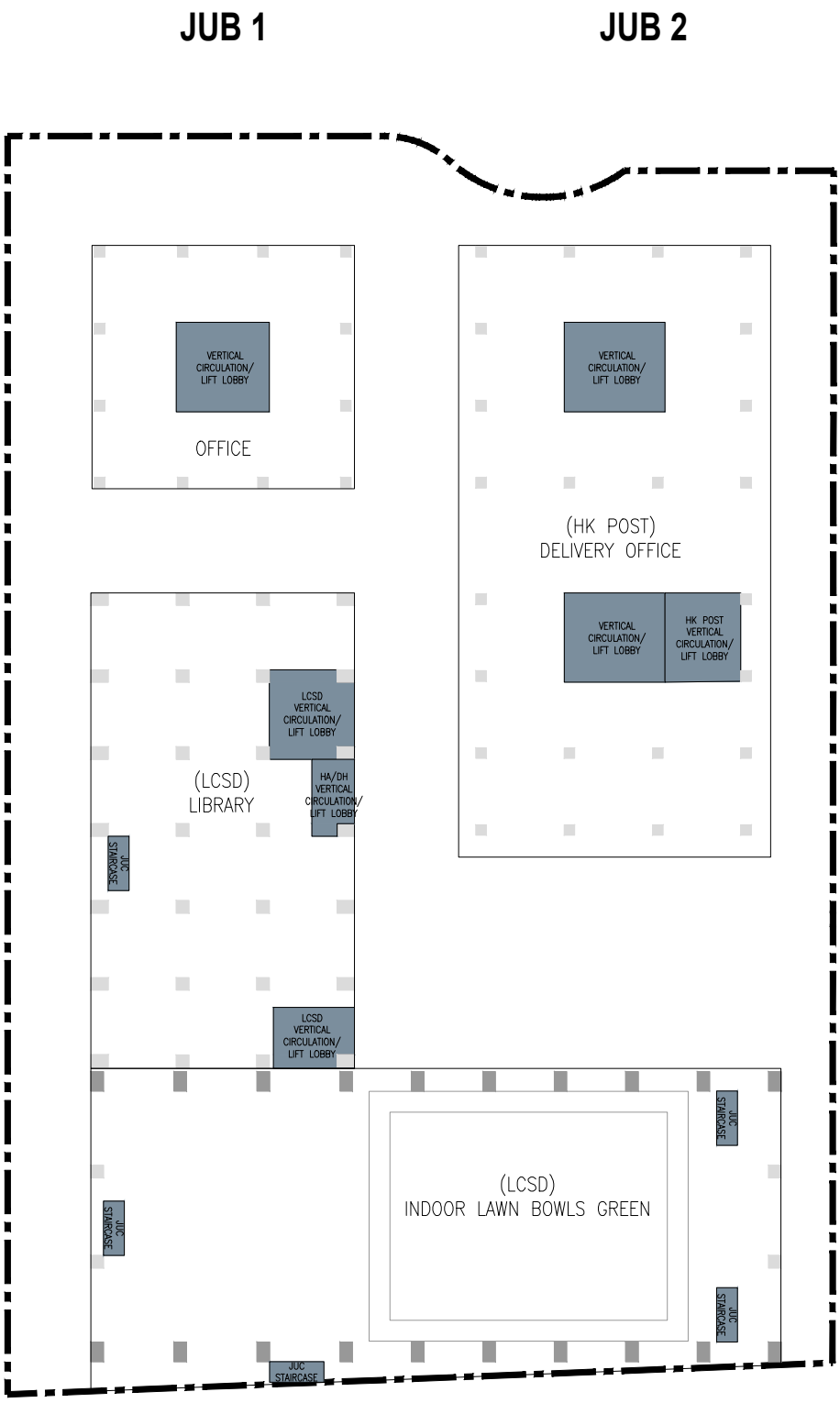

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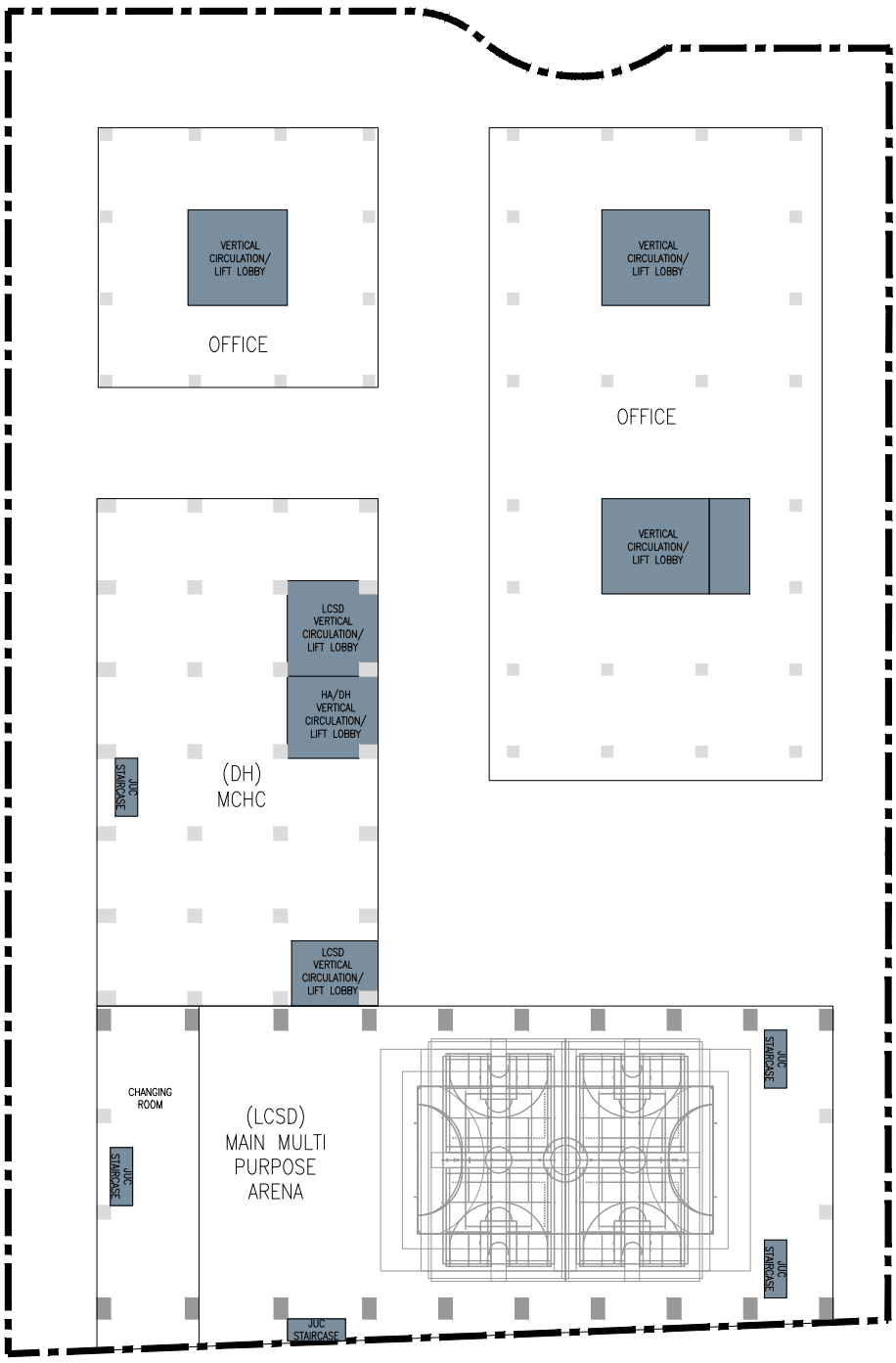

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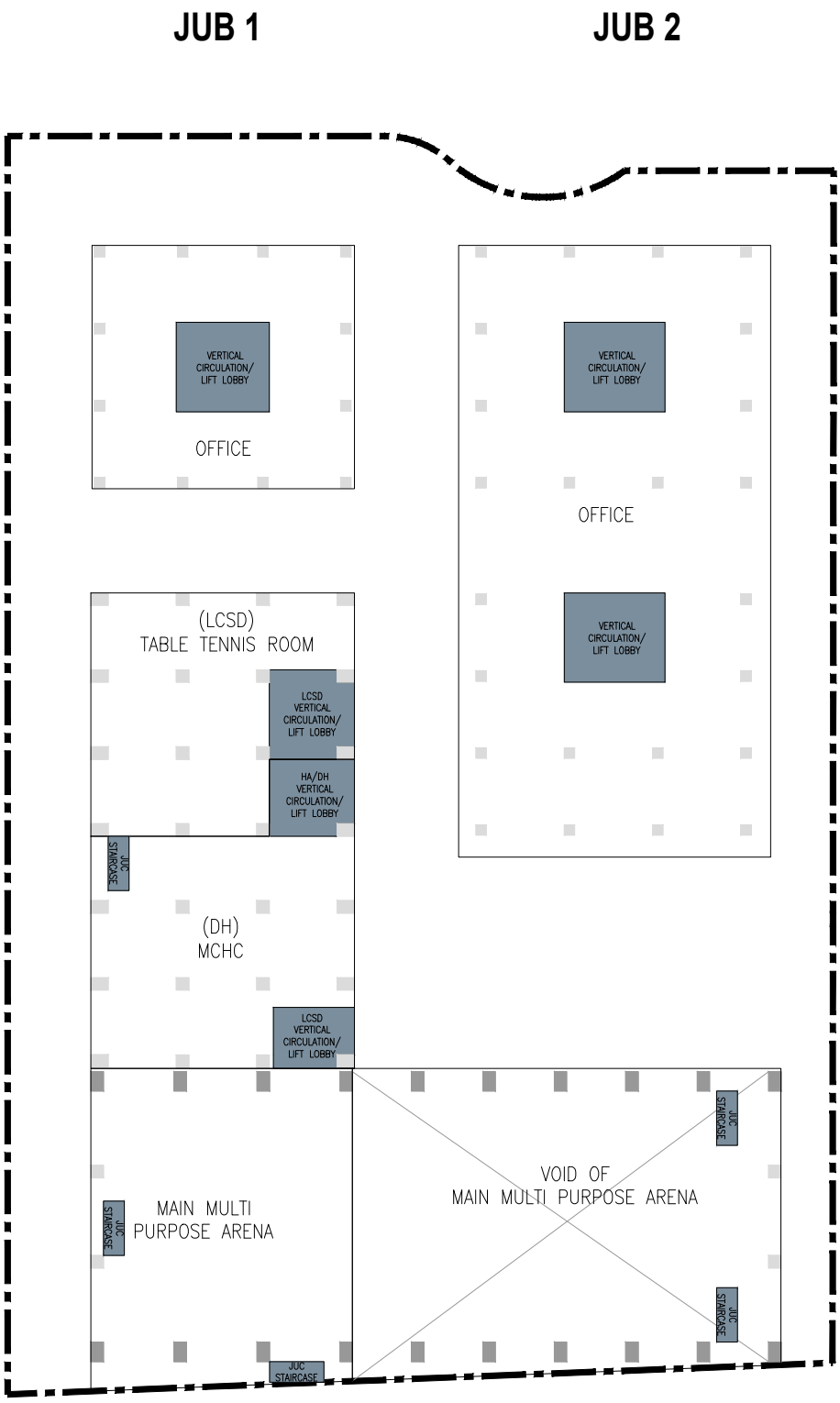

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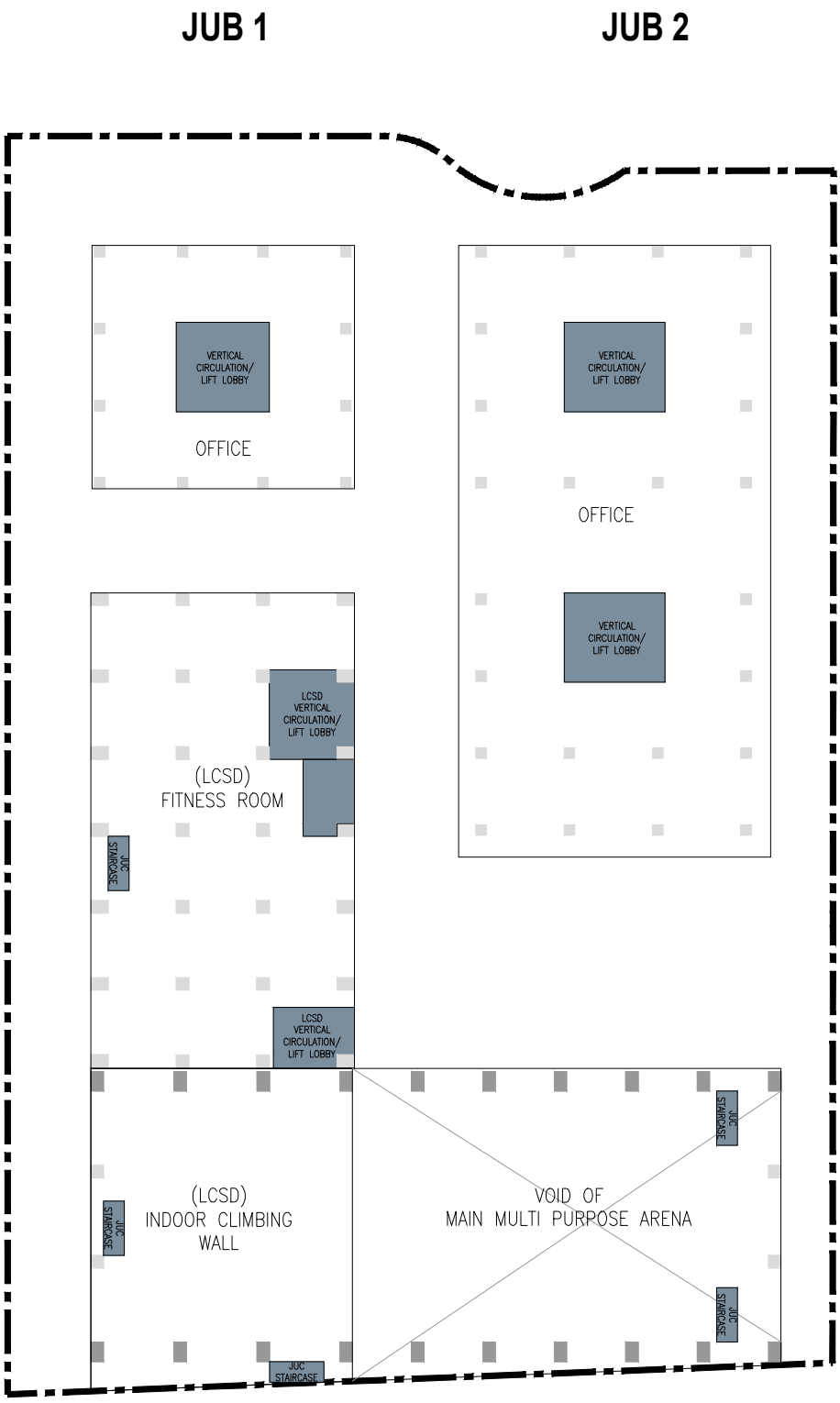

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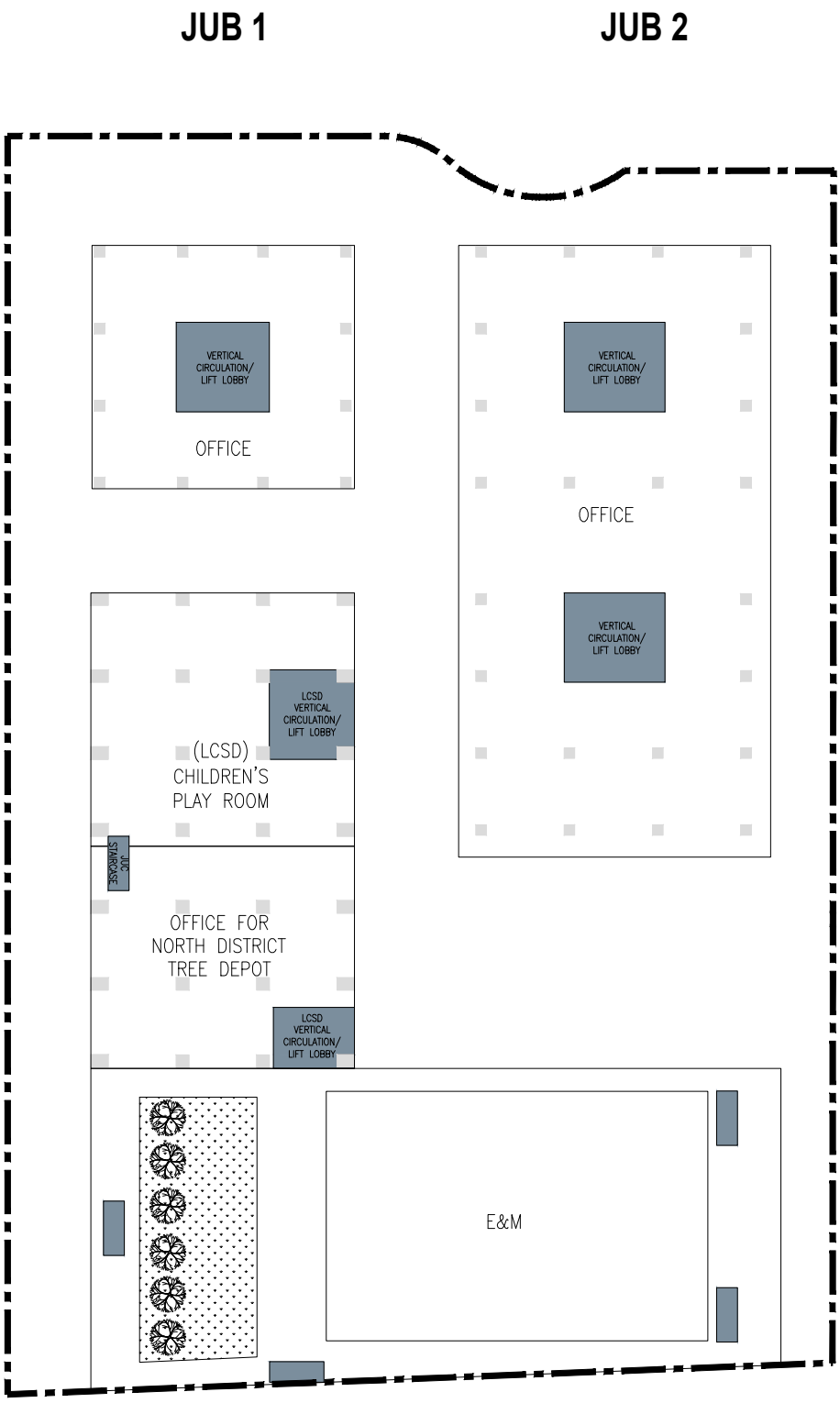

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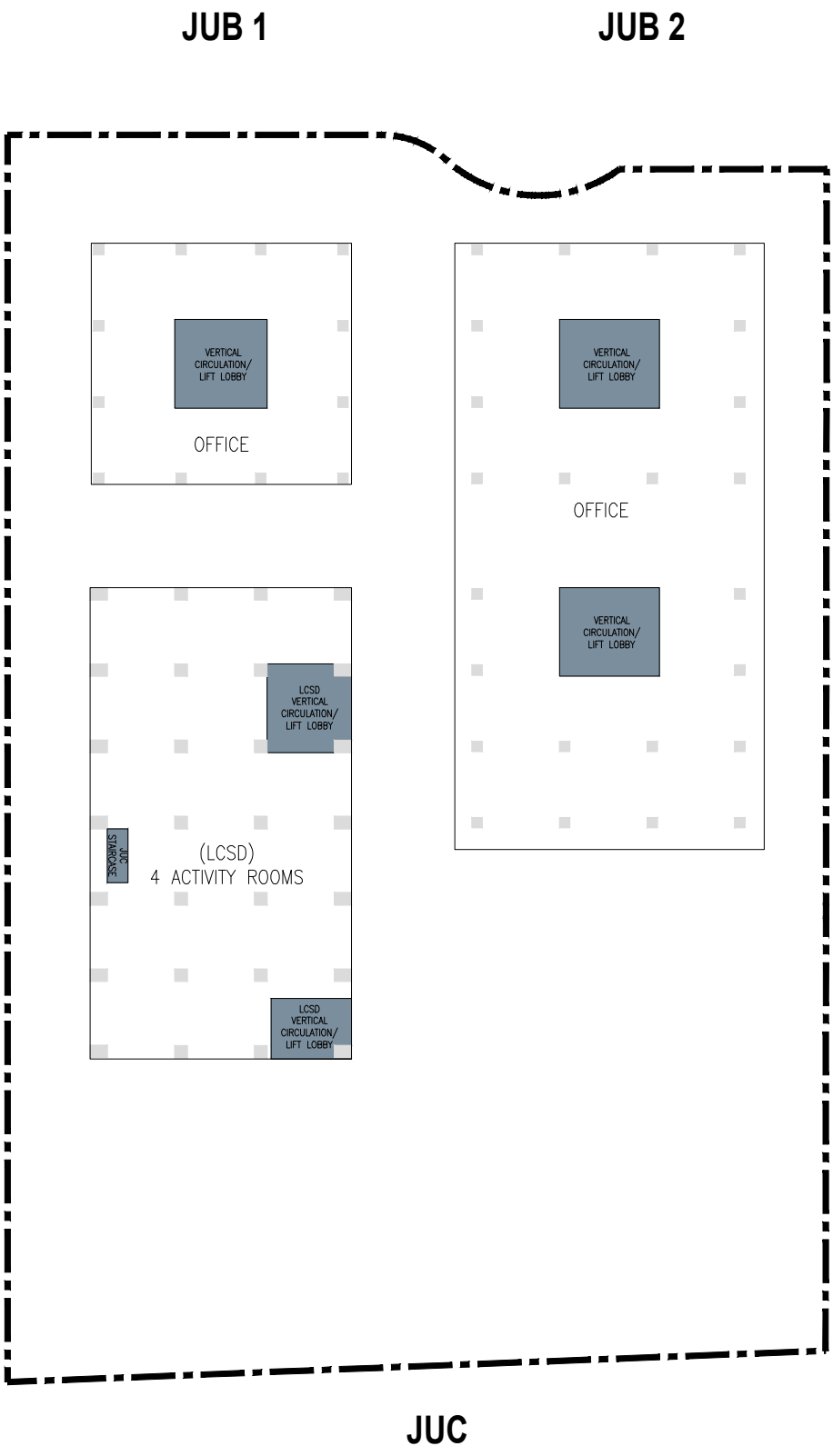
7/F PLAN	DEVELOPMENT OF KWU TUNG NORTH AREA 29, GIC SITE PLANNING PROPOSAL	
1:1000		

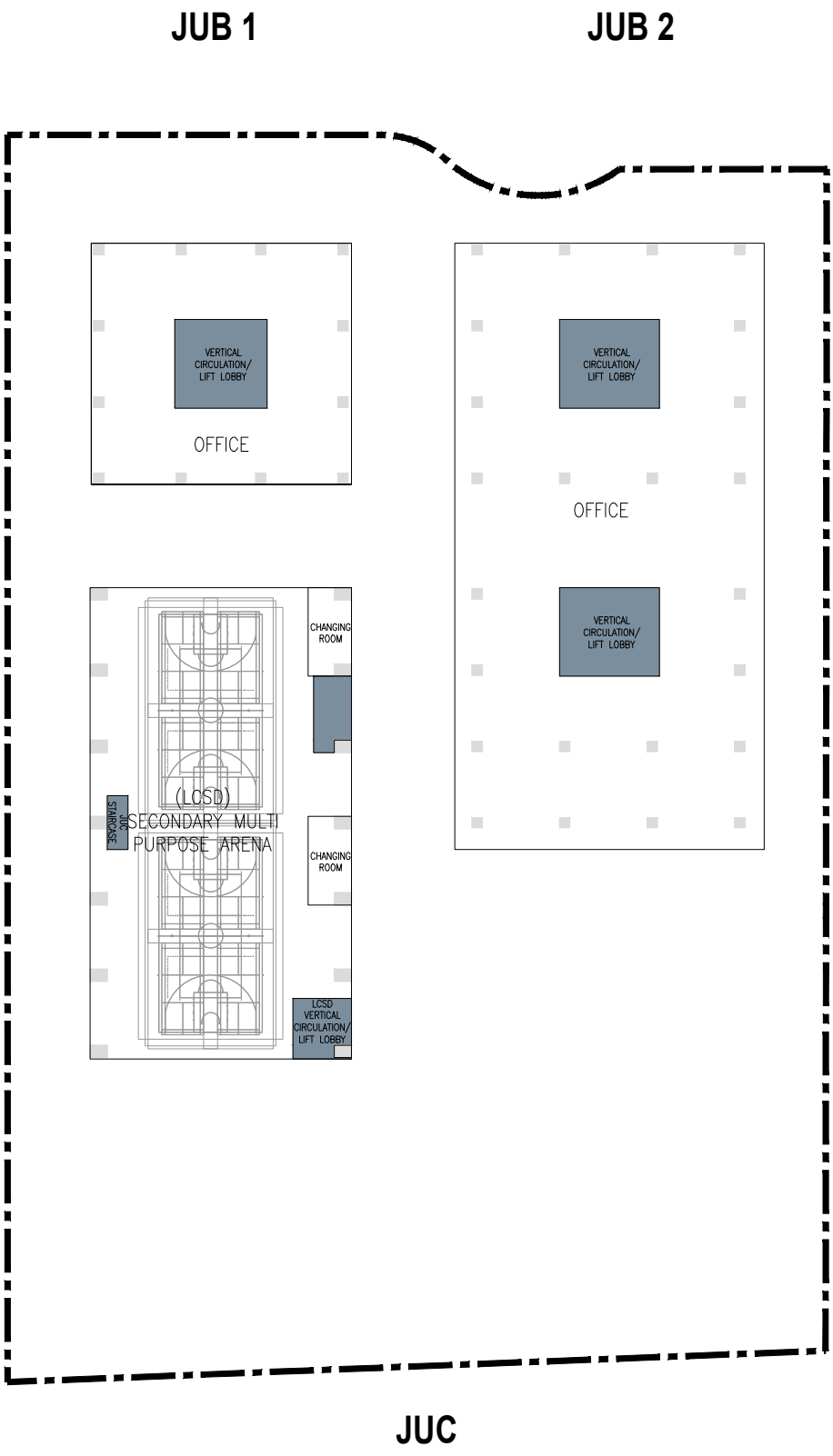


10m 0 20m

8/F PLAN

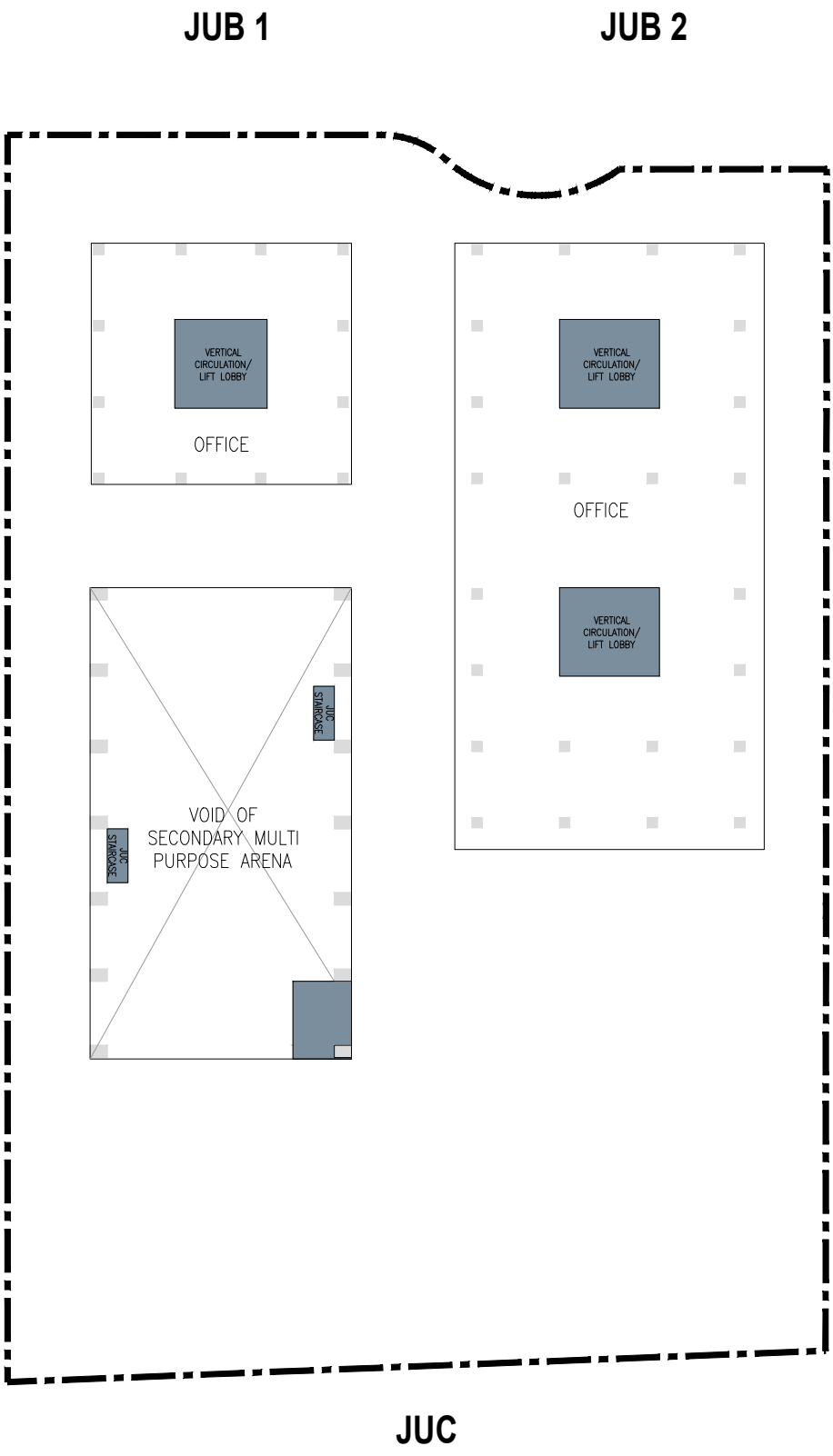
1:1000

DEVELOPMENT OF KWU TUNG NORTH AREA 29, GIC SITE PLANNING PROPOSAL



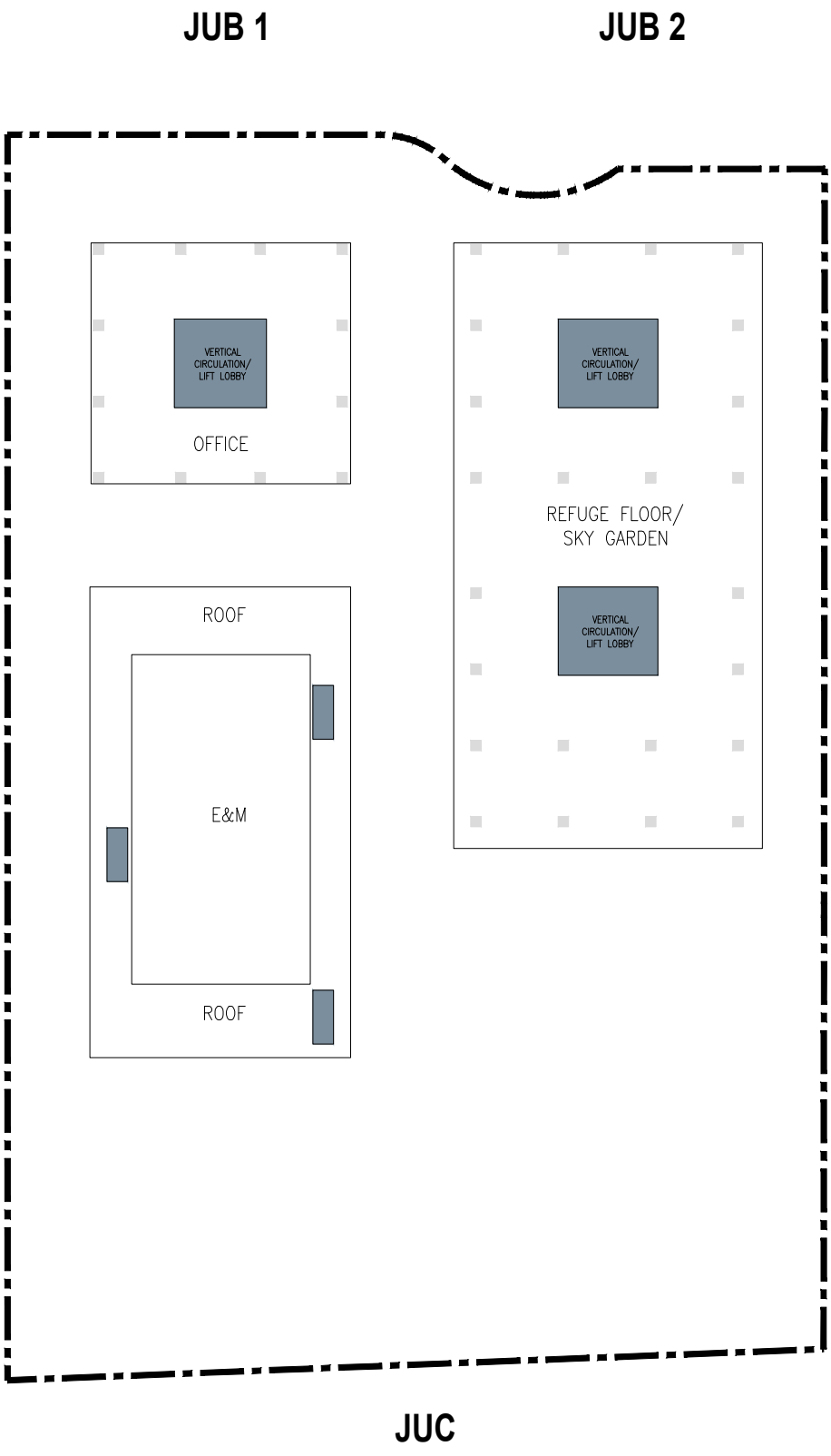
10m 0 20m

9/F PLAN 1:1000	DEVELOPMENT OF KWU TUNG NORTH AREA 29, GIC SITE PLANNING PROPOSAL	



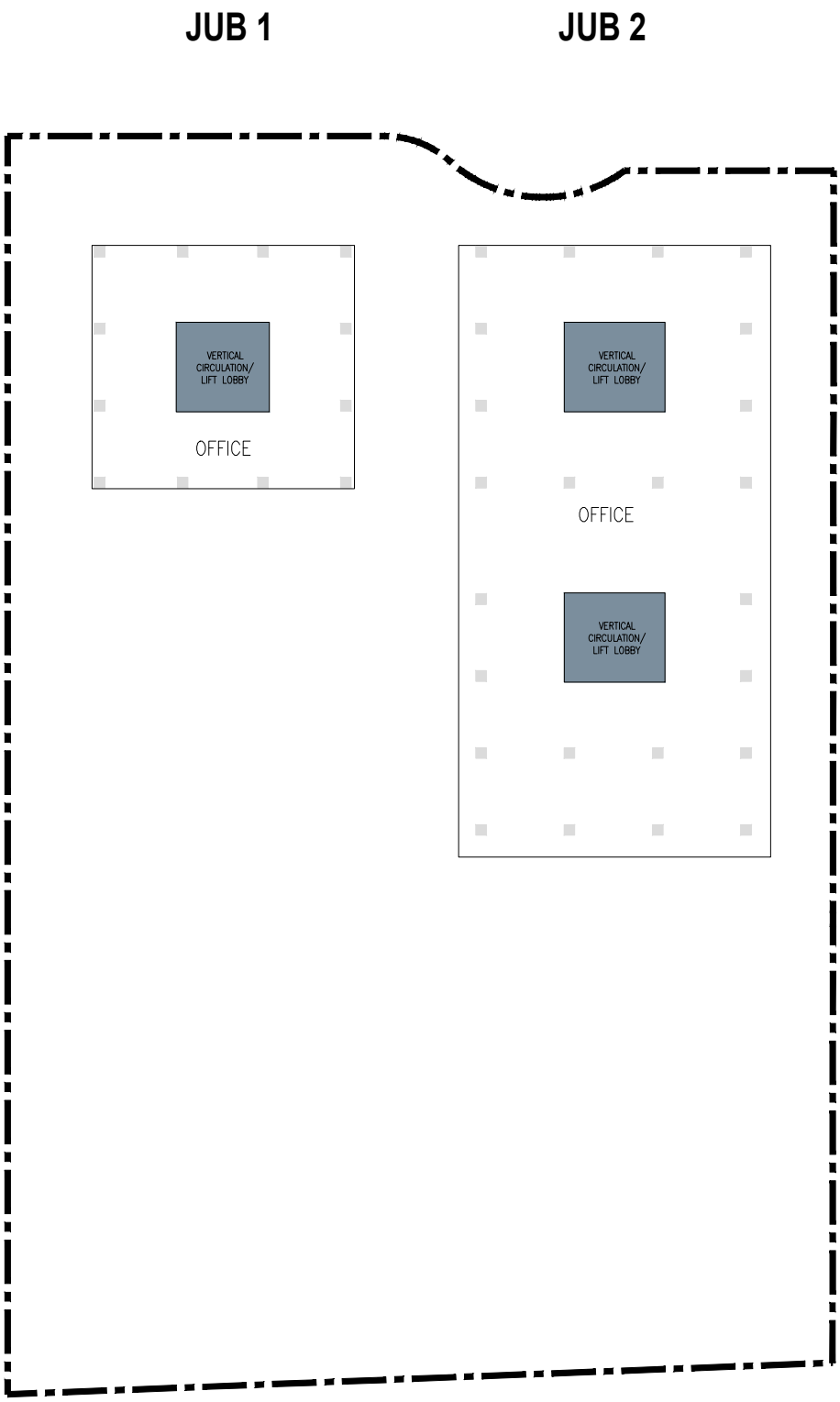
10m 0 20m

10/F PLAN 1:1000	DEVELOPMENT OF KWU TUNG NORTH AREA 29, GIC SITE PLANNING PROPOSAL	



10m 0 20m

11/F PLAN 1:1000	DEVELOPMENT OF KWU TUNG NORTH AREA 29, GIC SITE PLANNING PROPOSAL	



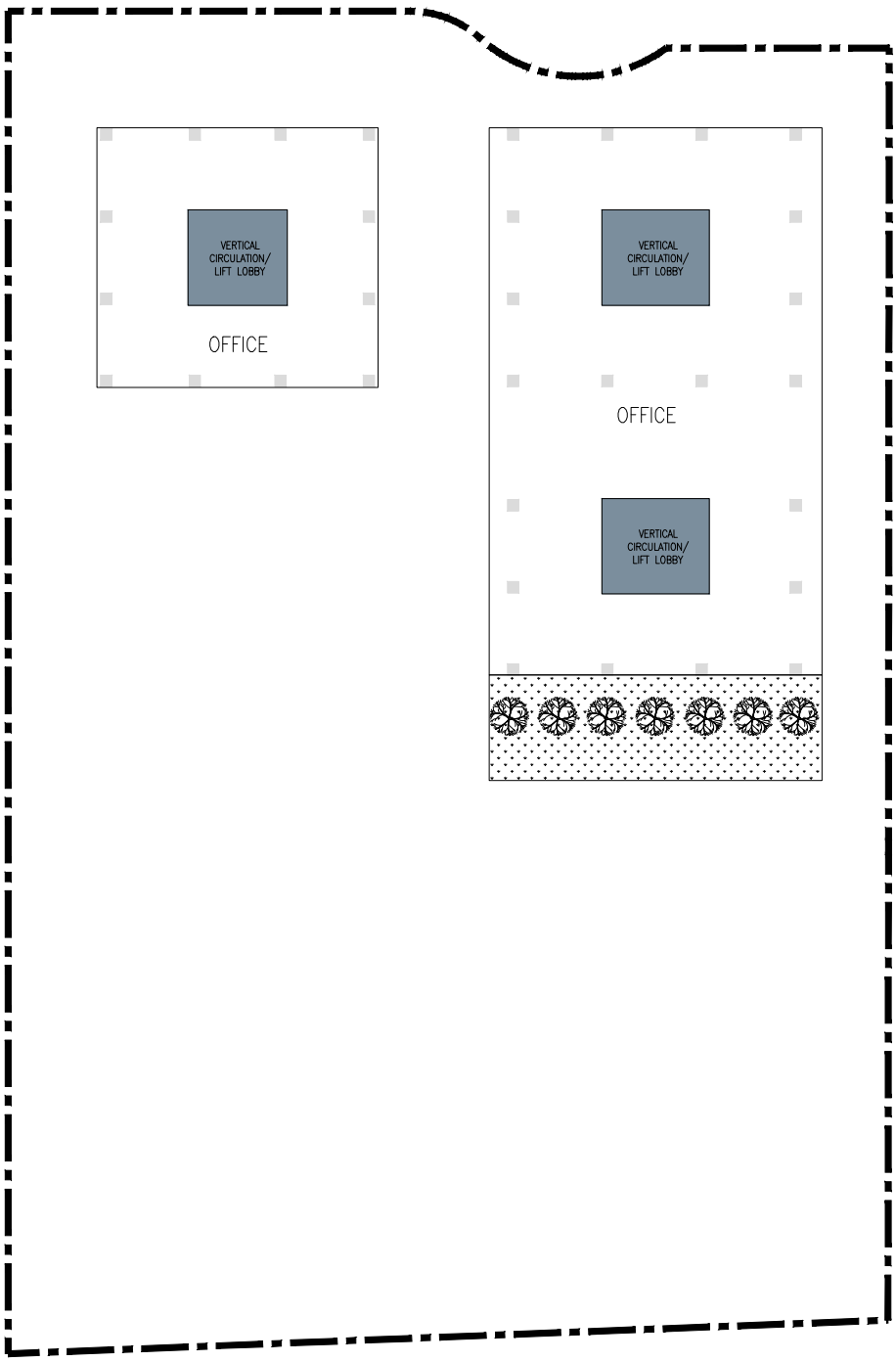
10m 0 20m

12/F -20/F PLAN

1:1000

DEVELOPMENT OF KWU TUNG NORTH AREA 29, GIC SITE PLANNING PROPOSAL

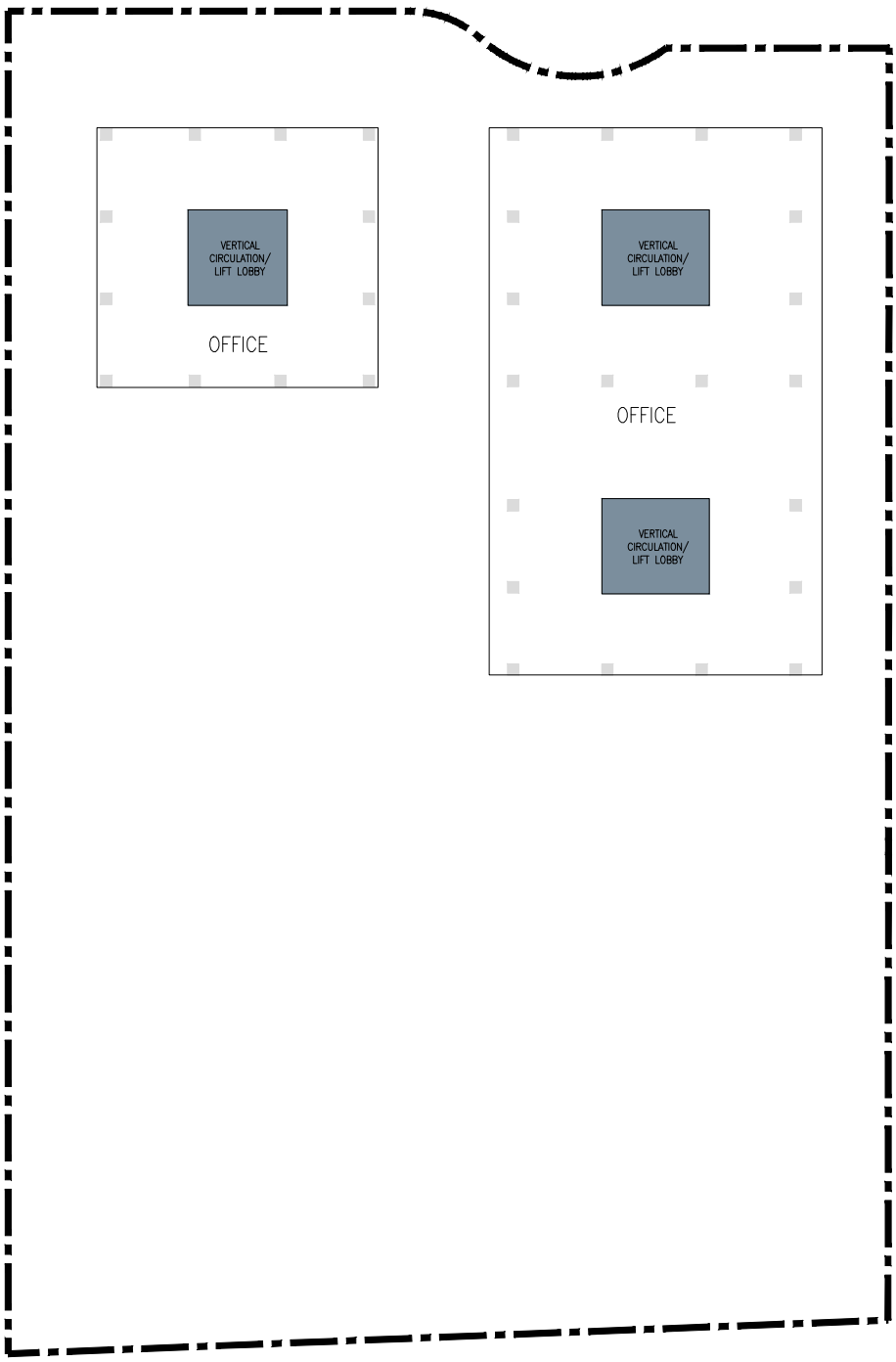
JUB 1 **JUB 2**



10m 0 20m

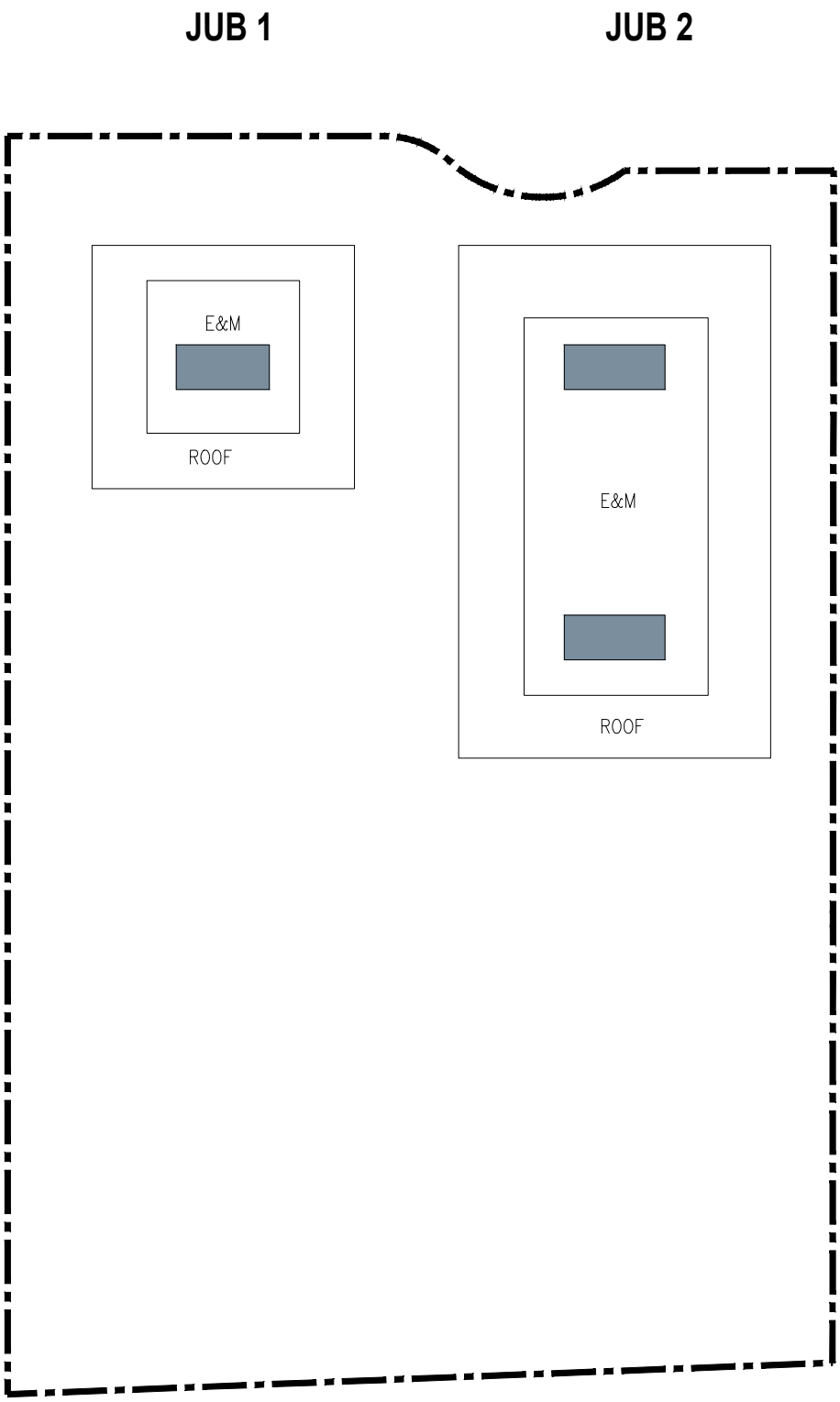
21/F PLAN 1:1000	DEVELOPMENT OF KWU TUNG NORTH AREA 29, GIC SITE PLANNING PROPOSAL	

JUB 1 **JUB 2**



10m 0 20m

22/F -25/F PLAN 1:1000	DEVELOPMENT OF KWU TUNG NORTH AREA 29, GIC SITE PLANNING PROPOSAL	



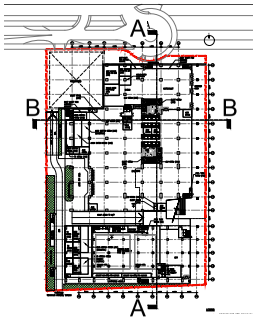
R/F PLAN 1:1000	DEVELOPMENT OF KWU TUNG NORTH AREA 29, GIC SITE PLANNING PROPOSAL	

APPENDIX B
Proposed Scheme

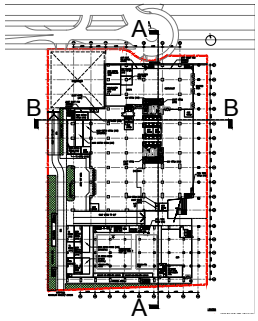
SECTION A-A

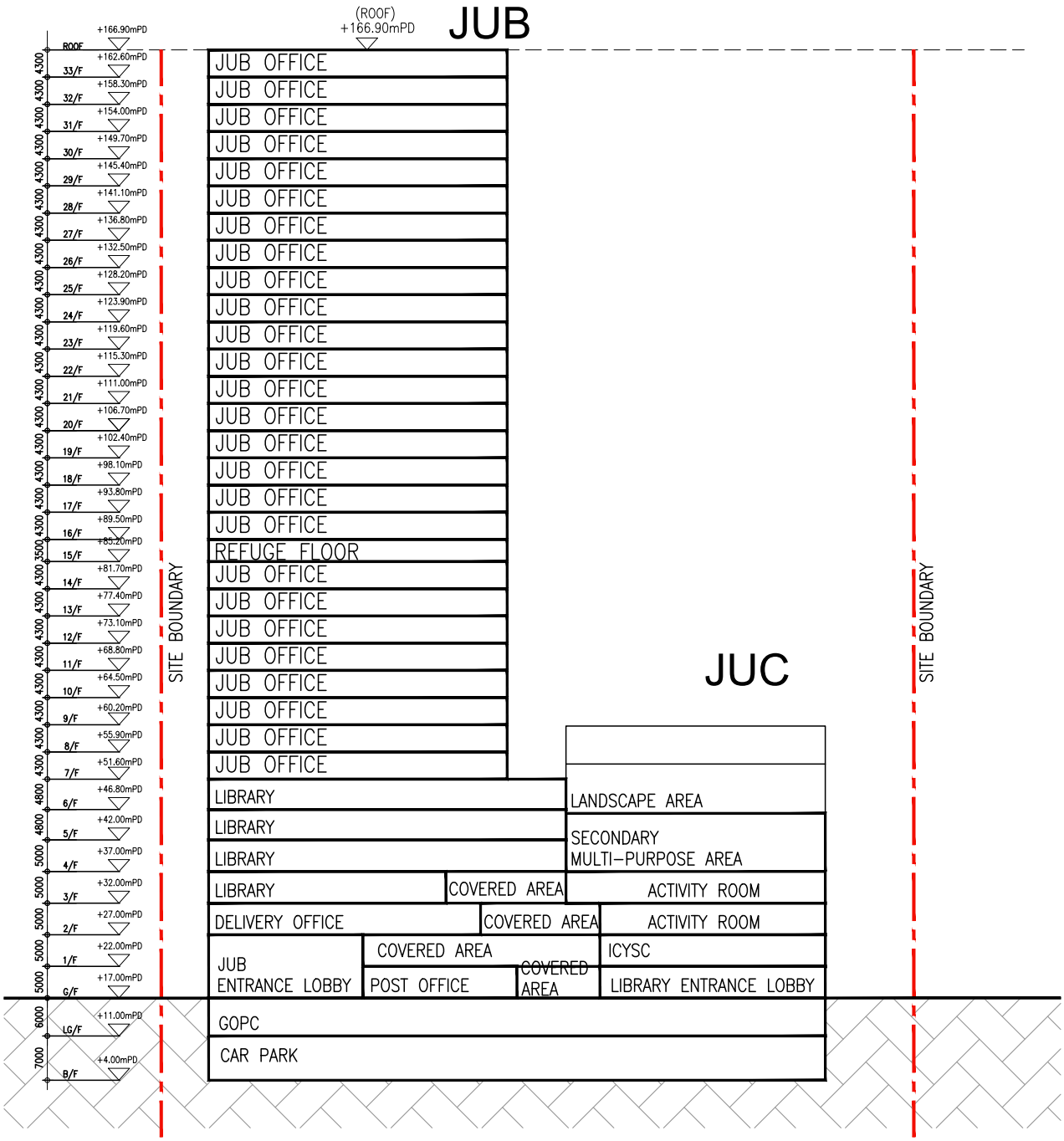
1:1000 @ A4

DEVELOPMENT OF KWU TUNG NORTH AREA 29, GIC SITE PLANNING PROPOSAL



SECTION A-A

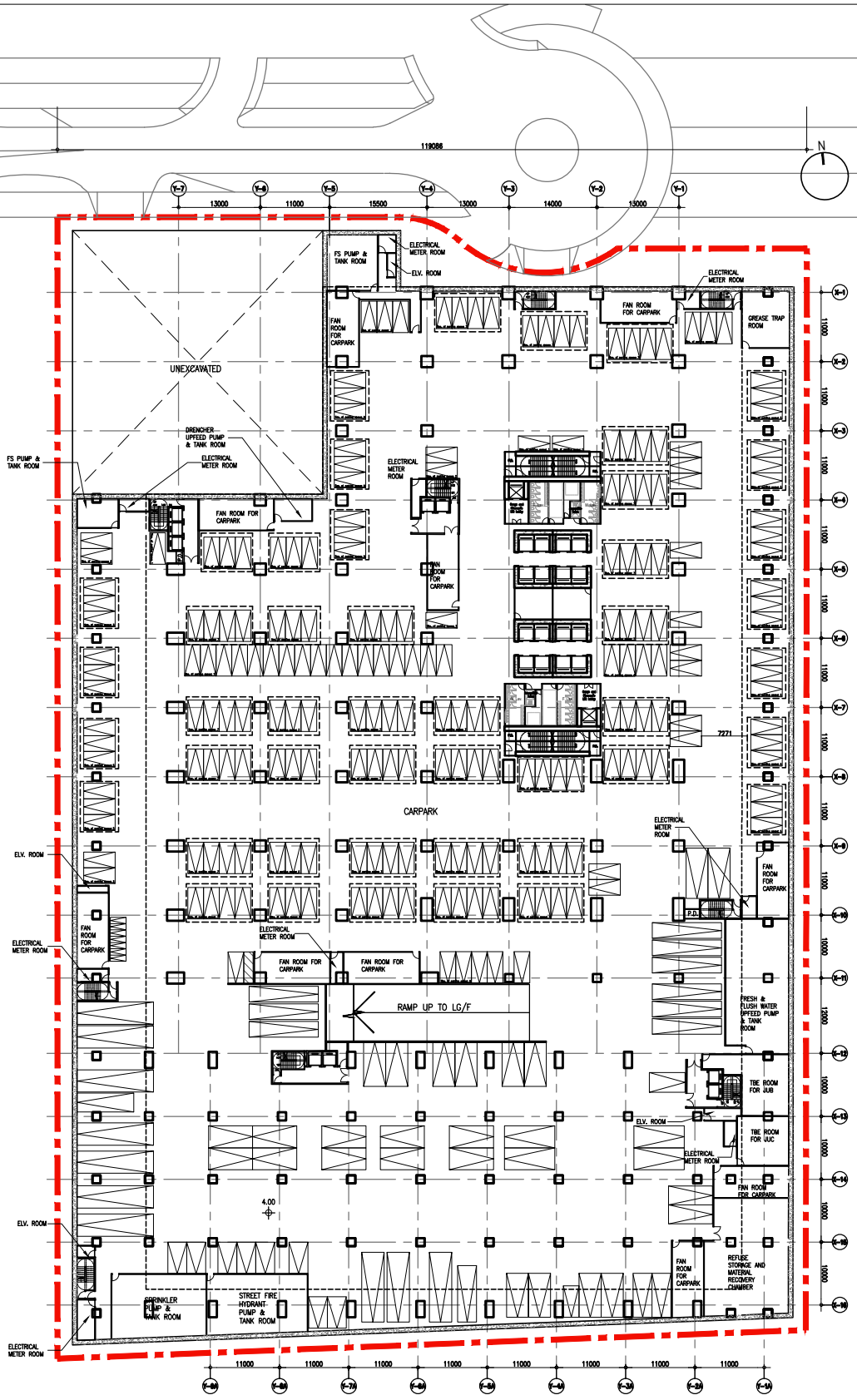




SECTION B–B

10m 0 20m

SECTION B-B 1:1000 @ A4	DEVELOPMENT OF KWU TUNG NORTH AREA 29, GIC SITE PLANNING PROPOSAL	



LEGEND

DEVELOPMENT SITE BOUNDARY

青山公路 — 洲頭段 CASTLE PEAK ROAD — CHAU TAU

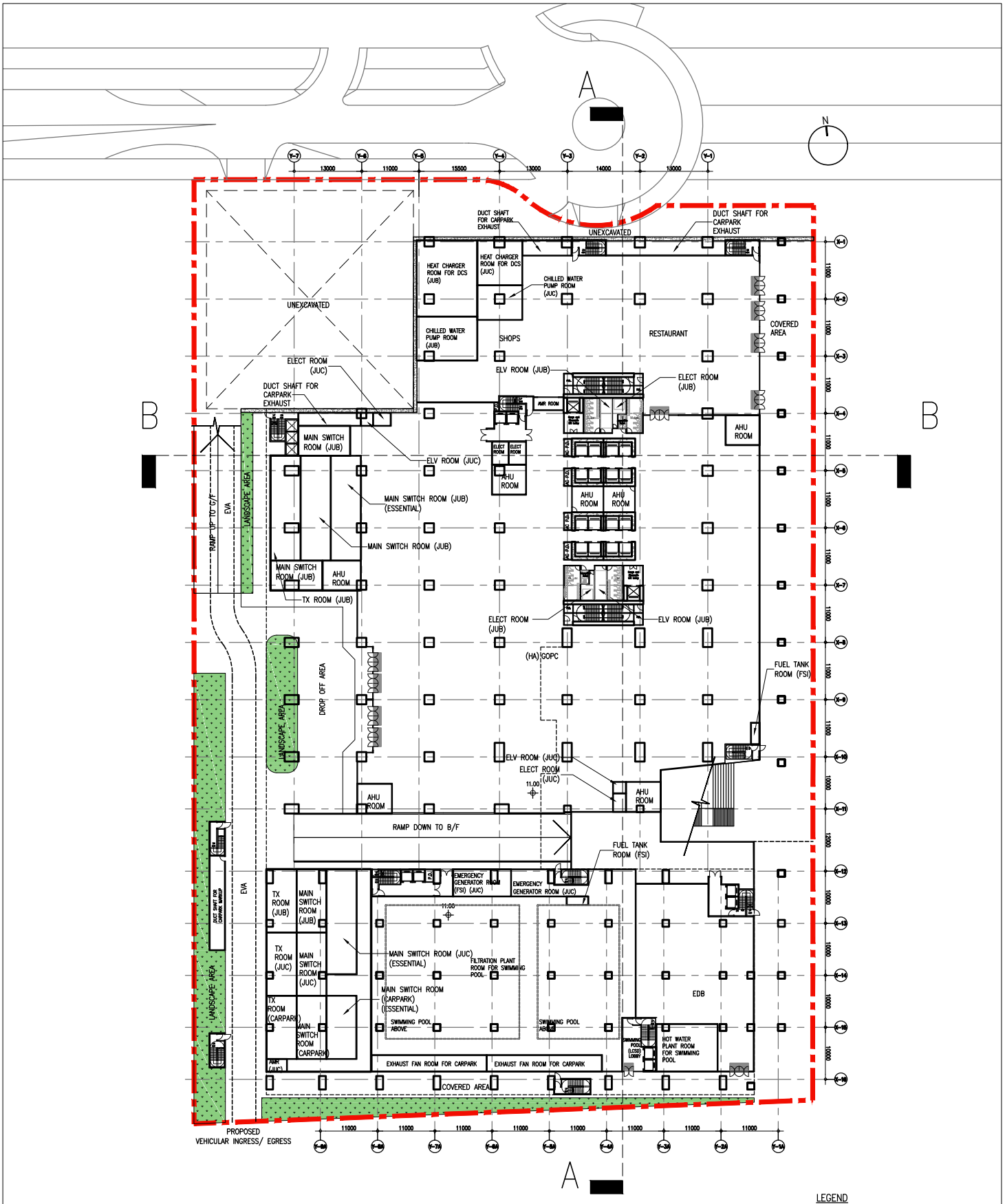
粉嶺公路 FANLING HIGHWAY

10m 0 20m

B/F PLAN

1:1000 @ A4

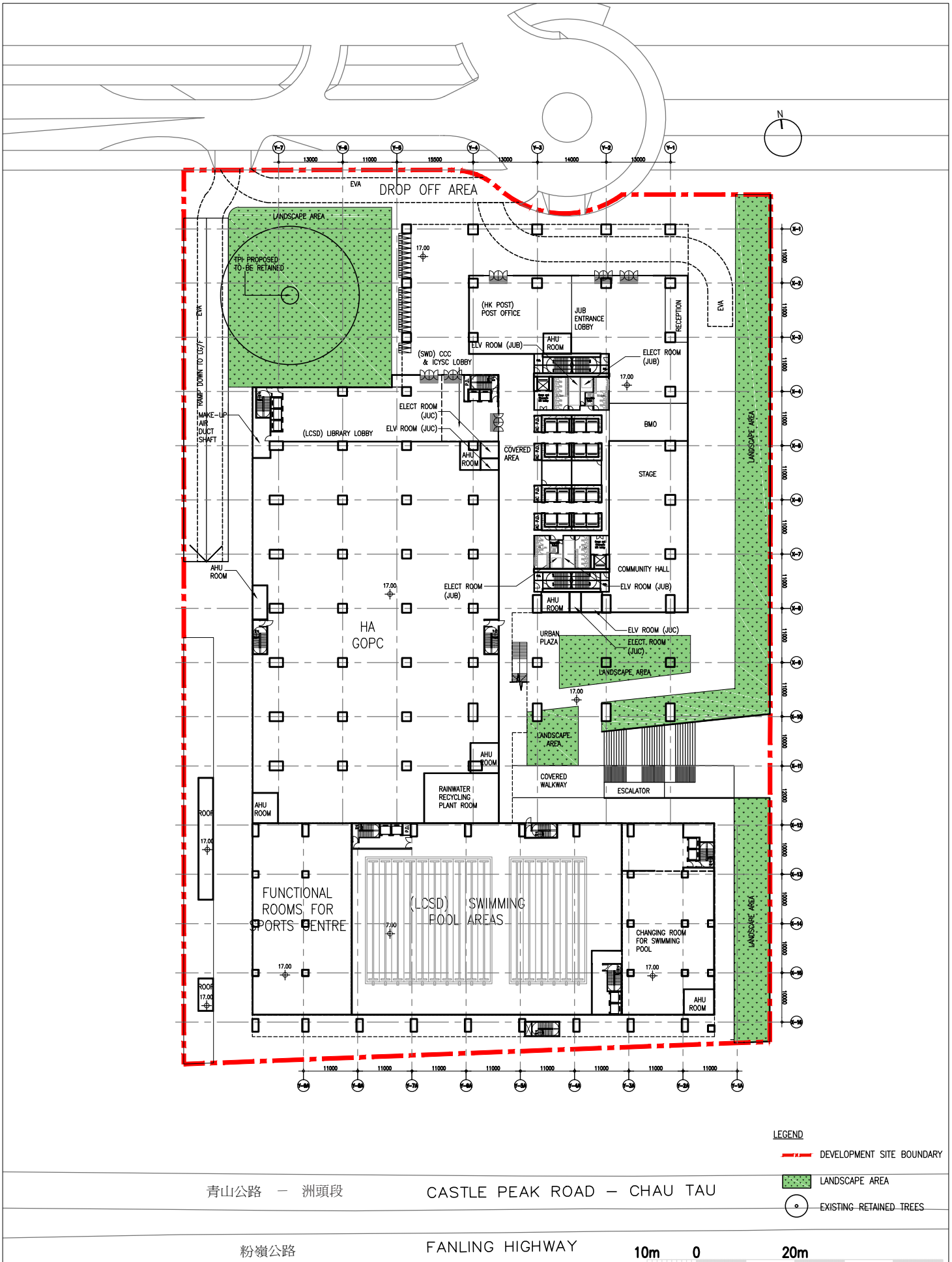
DEVELOPMENT OF KWU TUNG NORTH AREA 29, GIC SITE PLANNING PROPOSAL



LG/F PLAN

1:1000@A4

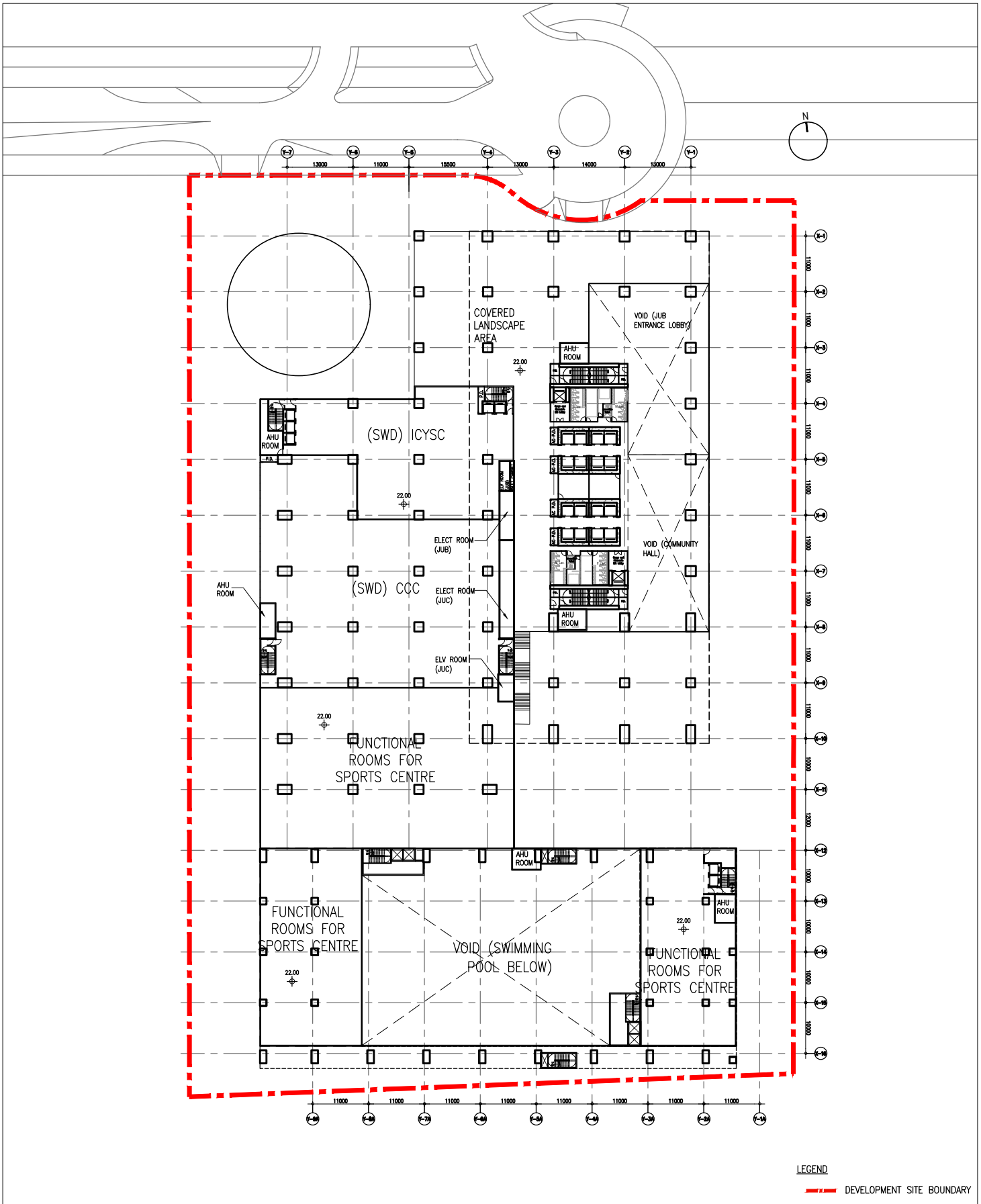
DEVELOPMENT OF KWU TUNG NORTH AREA 29, GIC SITE PLANNING PROPOSAL



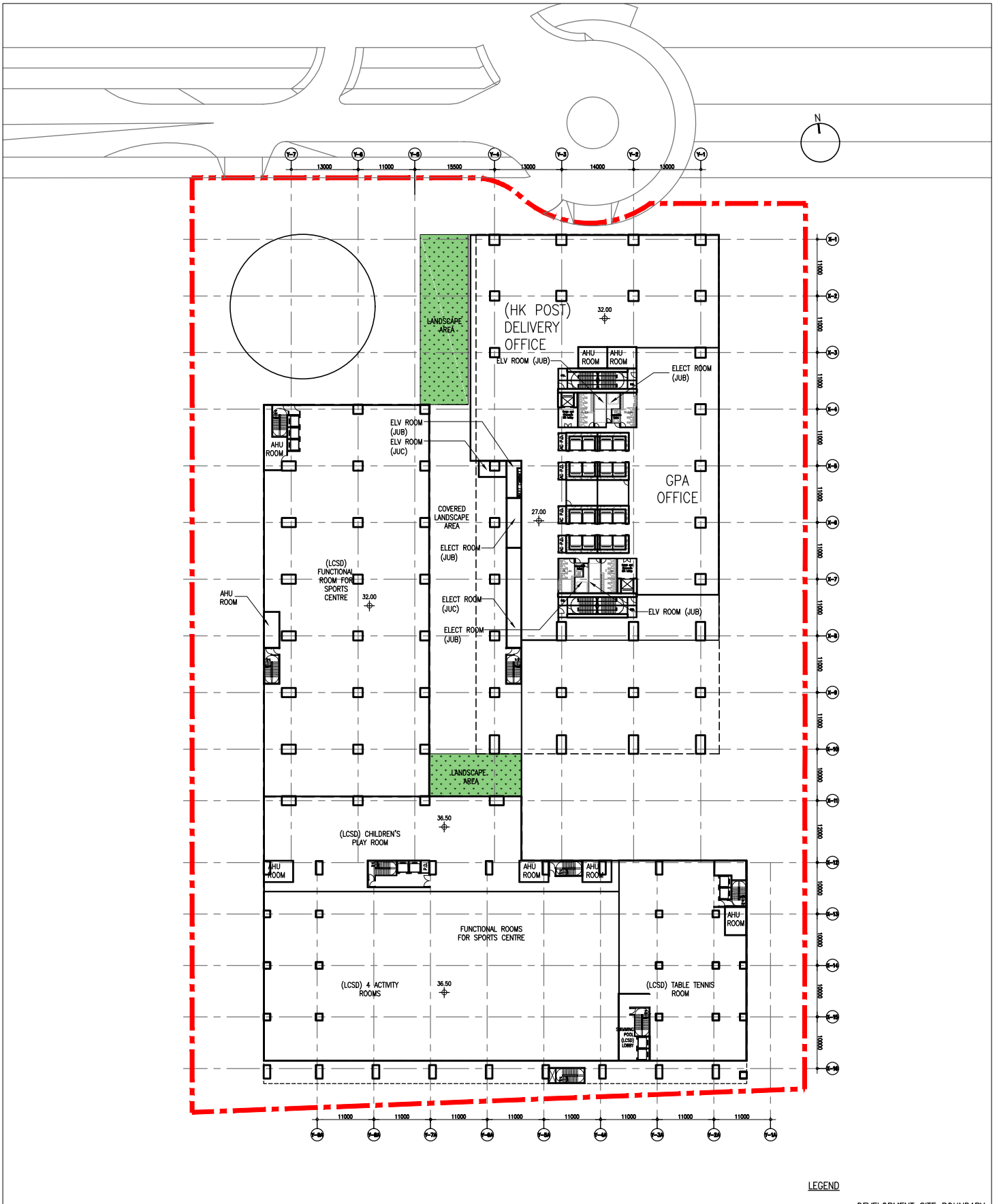
G/F PLAN

1:1000 @ A4

DEVELOPMENT OF KWU TUNG NORTH AREA 29, GIC SITE PLANNING PROPOSAL



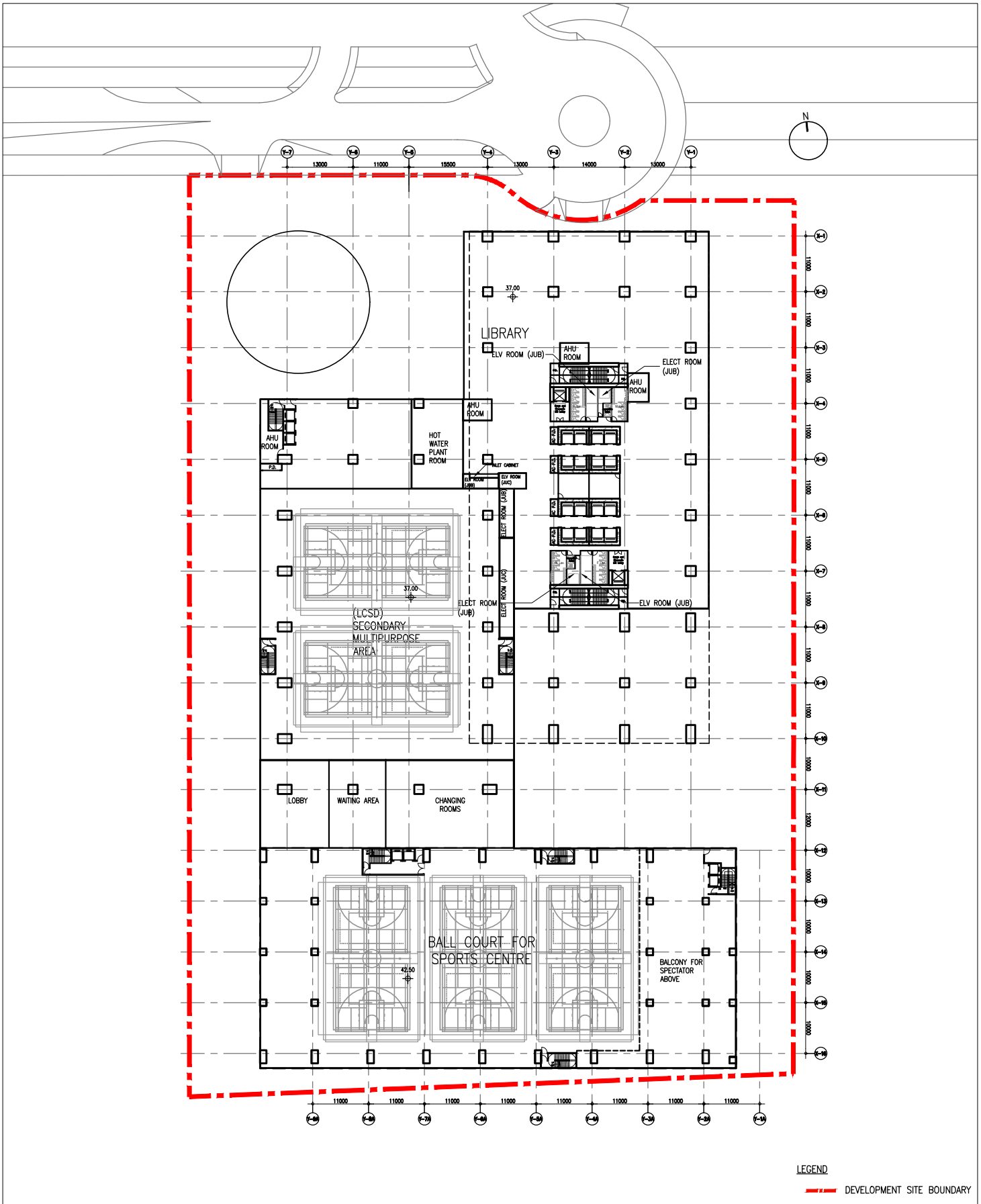
1/F PLAN 1:1000 @ A4	DEVELOPMENT OF KWU TUNG NORTH AREA 29, GIC SITE PLANNING PROPOSAL	



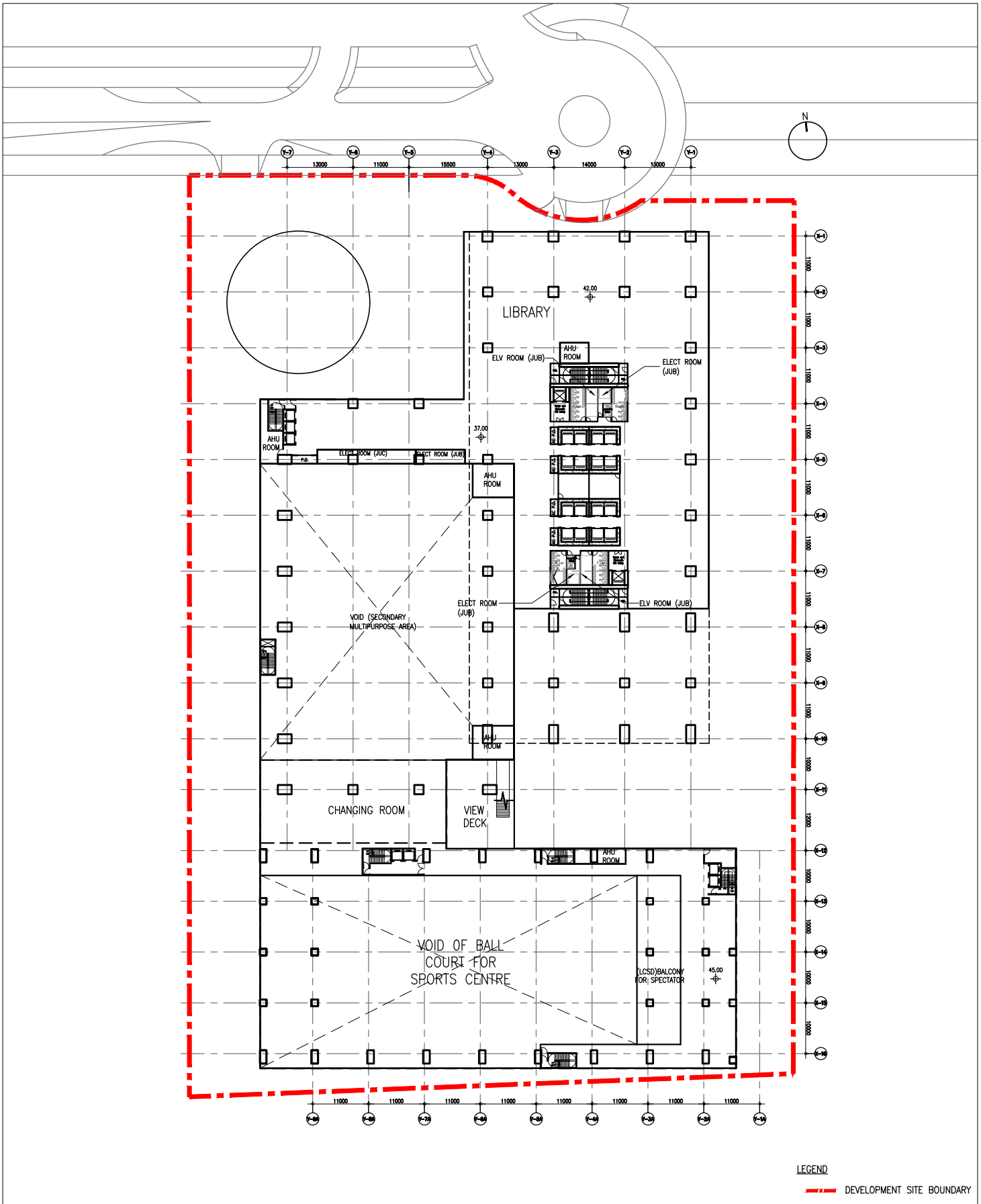
2/F PLAN

1:1000 @ A4

DEVELOPMENT OF KWU TUNG NORTH AREA 29, GIC SITE PLANNING PROPOSAL



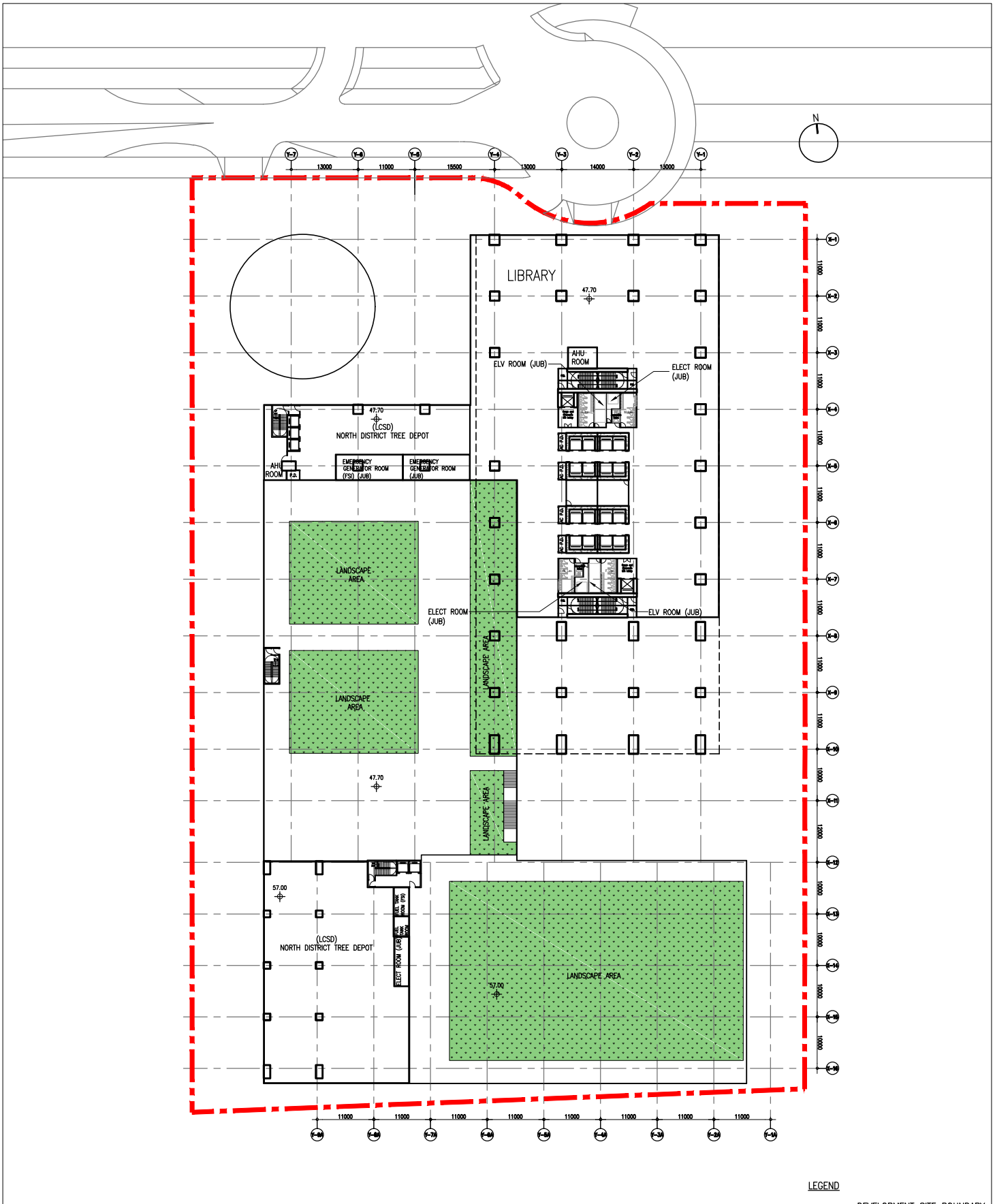
3/F PLAN 1:1000 @ A4	DEVELOPMENT OF KWU TUNG NORTH AREA 29, GIC SITE PLANNING PROPOSAL	



4/F PLAN

1:1000 @ A4

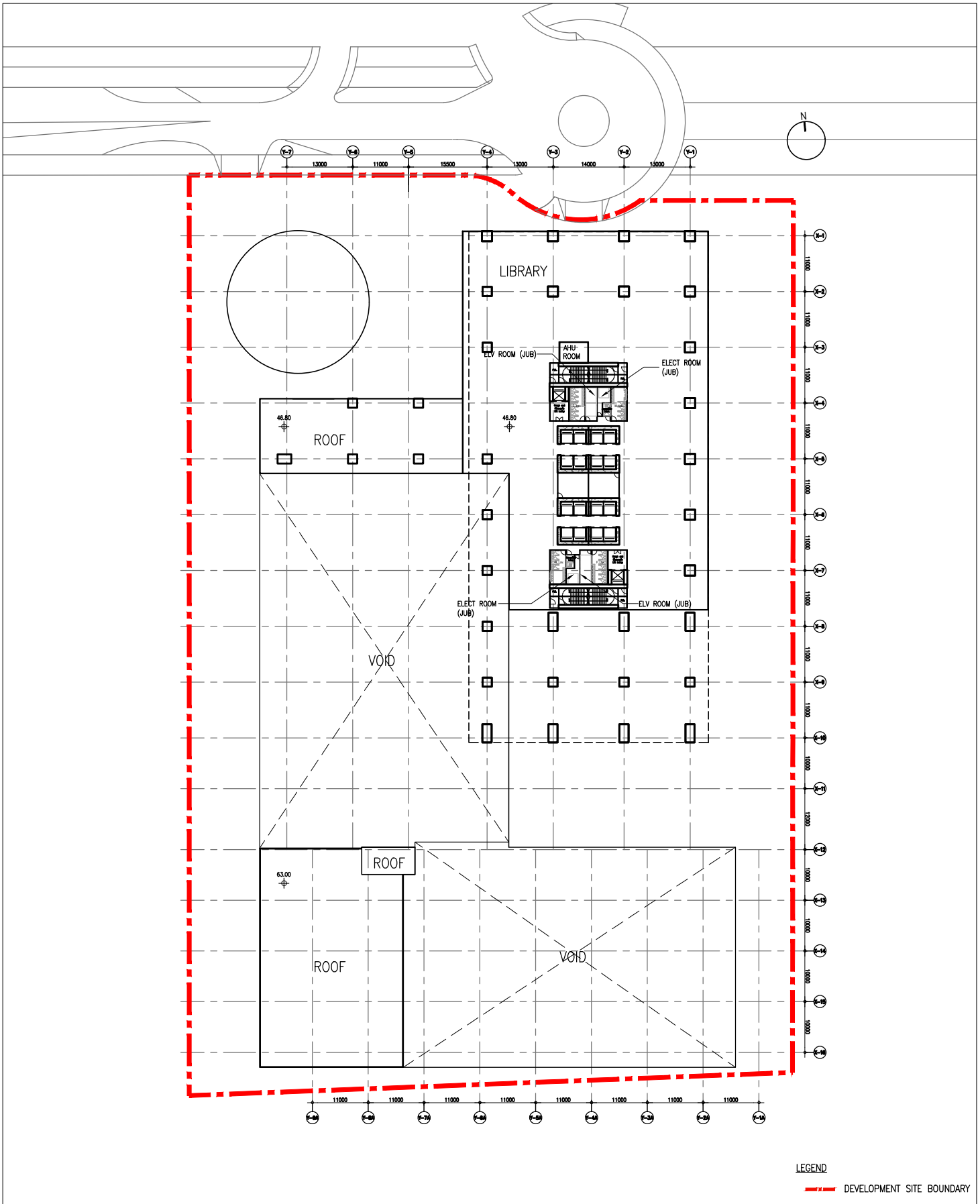
DEVELOPMENT OF KWU TUNG NORTH AREA 29, GIC SITE PLANNING PROPOSAL



5/F PLAN

1:1000 @ A4

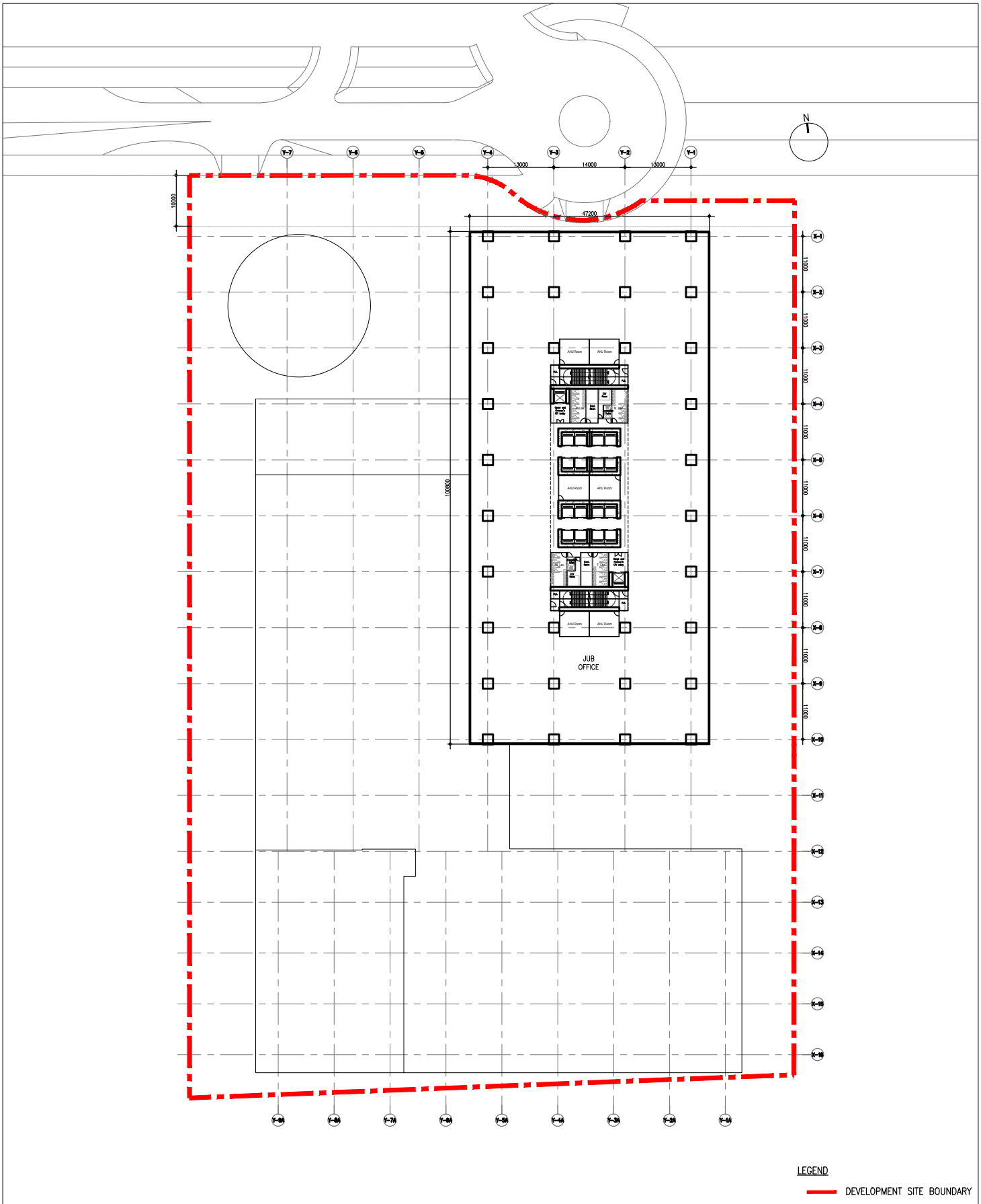
DEVELOPMENT OF KWU TUNG NORTH AREA 29, GIC SITE PLANNING PROPOSAL



6/F PLAN

1:1000 @ A4

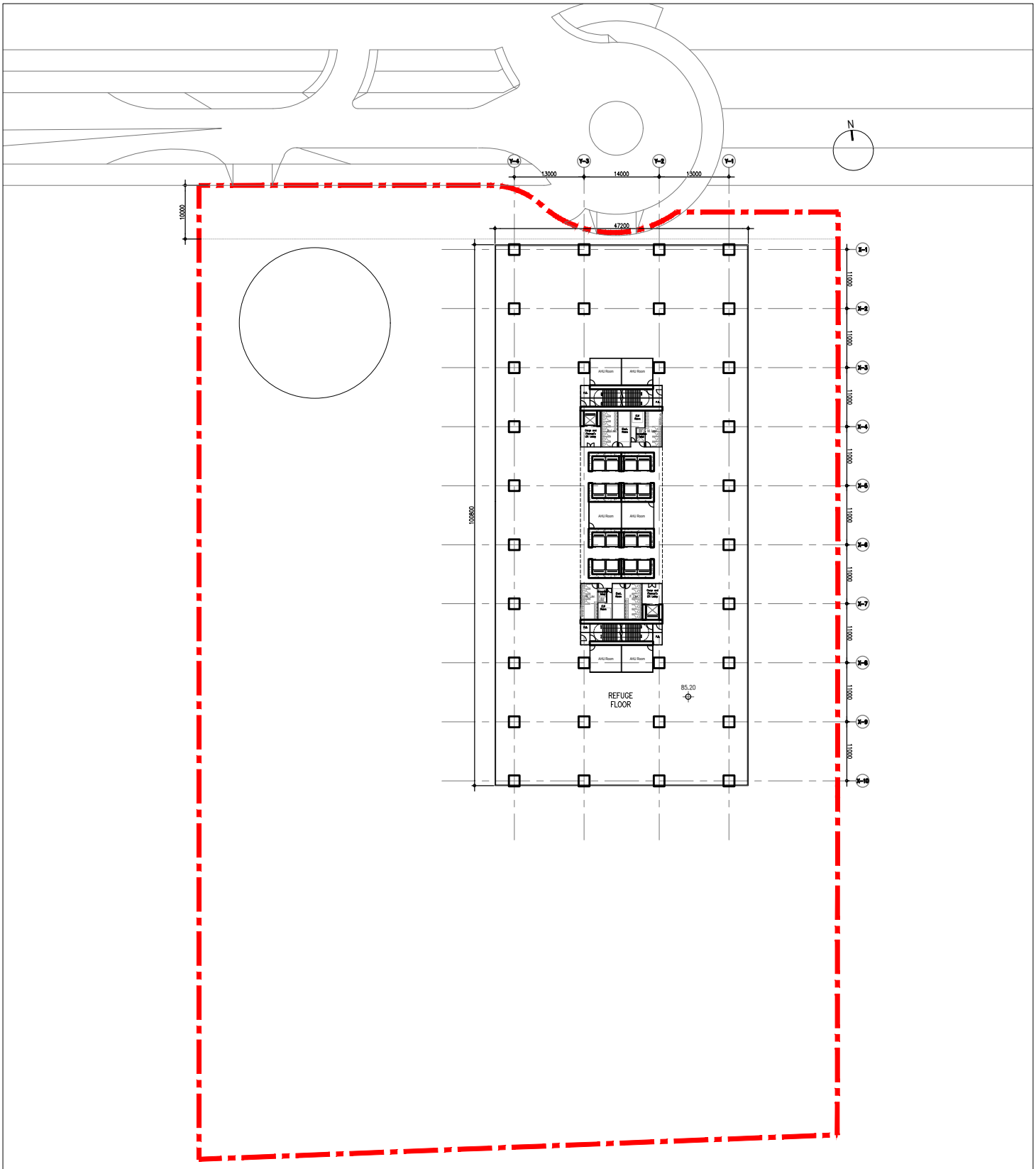
DEVELOPMENT OF KWU TUNG NORTH AREA 29, GIC SITE PLANNING PROPOSAL



7-14/F PLAN

1:1000 @ A4

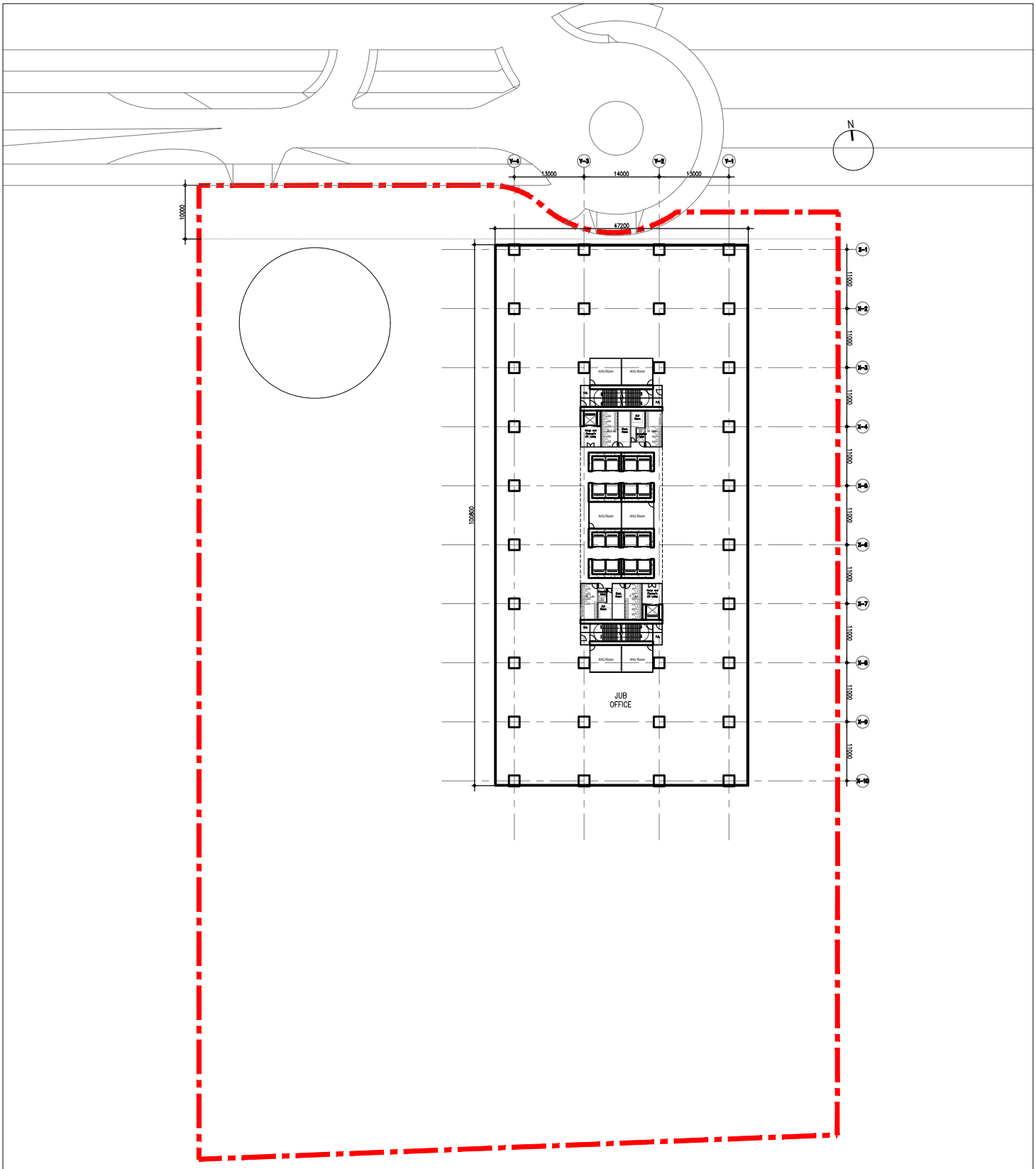
DEVELOPMENT OF KWU TUNG NORTH AREA 29, GIC SITE PLANNING PROPOSAL



15/F PLAN

1:1000 @ A4

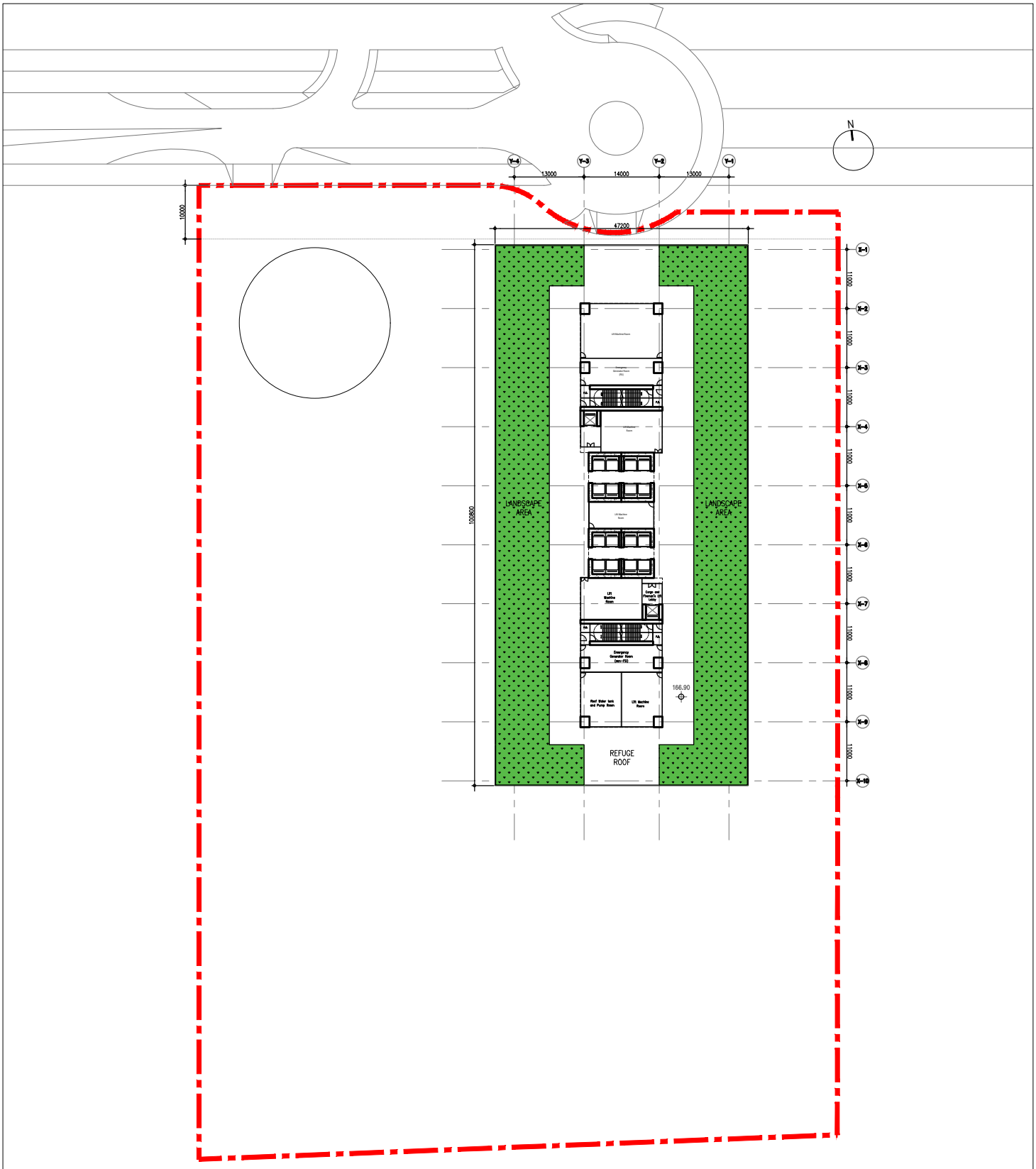
DEVELOPMENT OF KWU TUNG NORTH AREA 29, GIC SITE PLANNING PROPOSAL



16-33/F PLAN

1:1000 @ A4

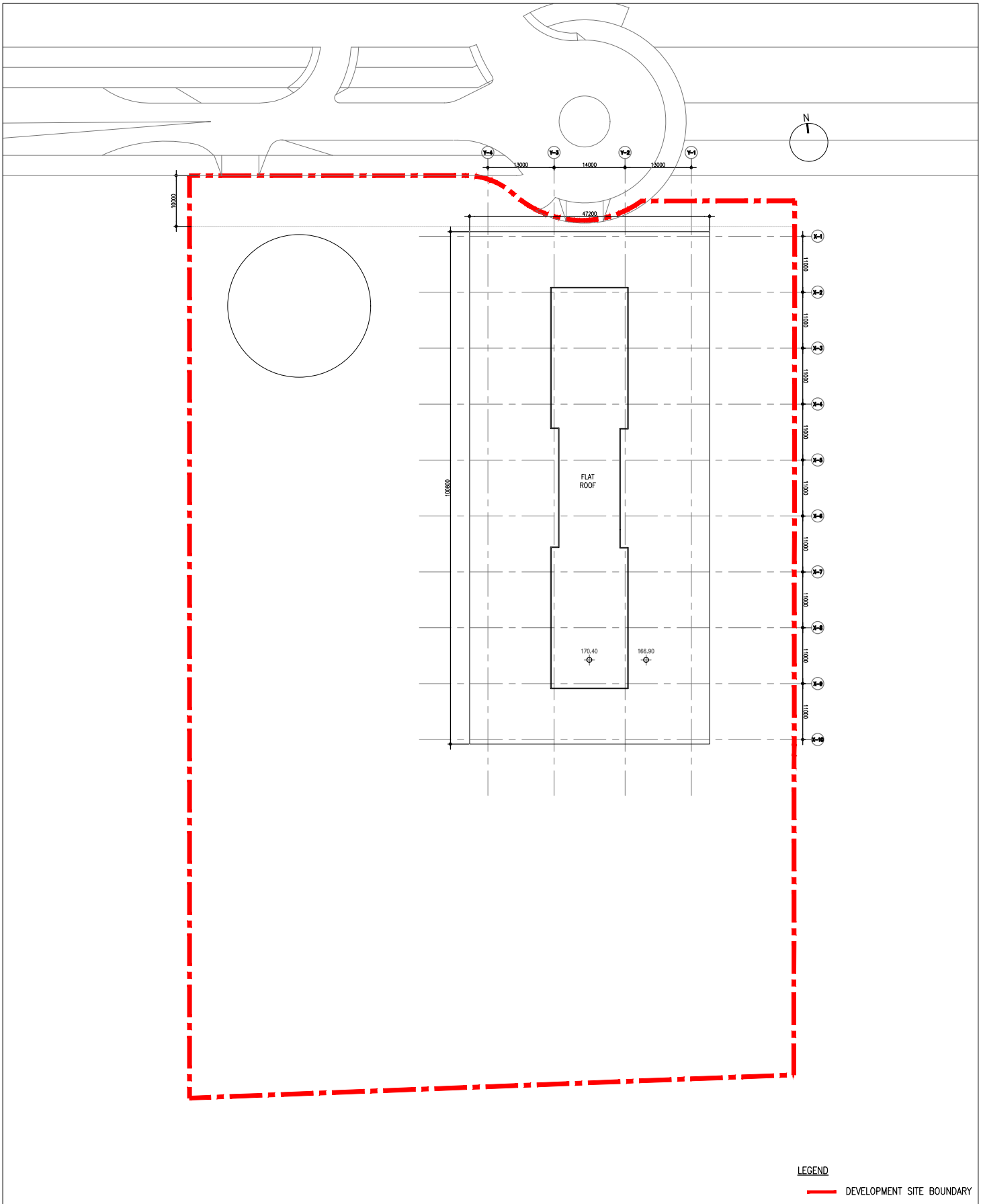
DEVELOPMENT OF KWU TUNG NORTH AREA 29, GIC SITE PLANNING PROPOSAL



R/F PLAN

1:1000 @ A4

DEVELOPMENT OF KWU TUNG NORTH AREA 29, GIC SITE PLANNING PROPOSAL



UR/F PLAN

1:1000 @ A4

DEVELOPMENT OF KWU TUNG NORTH AREA 29, GIC SITE PLANNING PROPOSAL