Appendix VII

Drainage Impact Assessment

Issue No. : 1

Issue Date : October 2025

Project No. : 2215

DRAINAGE IMPACT ASSESSMENT

FOR

PROPOSED SCAA SPORTS LINK AT SOUTH CHINA ATHLETIC ASSOCIATION, 88 CAROLINE HILL ROAD, HONG KONG

Prepared by

Allied Environmental Consultants Limited

COMMERCIAL-IN-CONFIDENCE

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Document Verification

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Document Title	Drainage Impact Assessment		

Issue No.	Issue Date	Description	Prepared by	Checked by	Approved by
1	October 2025	1st Submission	Various	Joanne Ng	Grace Kwok

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1. Introduction

1.1.1. Allied Environmental Consultants Limited ("AEC") has been commissioned to prepare a Drainage Impact Assessment ("DIA") in support of the Section 16 Planning Application for Development of Comprehensive Sports & Recreation Centre ("Proposed Development") at North Site, South China Athletic Association, Caroline Hill Road, Causeway Bay, Hong Kong ("Subject Site").

2. Objectives

2.1.1. The objectives of this DIA are to review the existing drainage facilities in the vicinity of the Subject Site and to evaluate the potential impacts on the current drainage system due to the additional discharge from the Proposed Development, and proposed mitigation measures where appropriate to mitigate potential impacts.

3. Description of the Proposed Development

3.1.1. The Proposed Development is a 4-story complex consist of facilities for sports and recreational usage (i.e., Multi-proposed/ activities Rooms, artificial turf pitches, tennis courts and ancillary office & facilities etc.). The site layout plans for the Proposed Development are provided in ***Appendix 3-1***.

3.1.2. Subject Site falls within Wong Nai Chung Inland Lot No. 9041 zoned Other Specified Uses (Sports and Recreation Club) ("OU (Sports and Recreation Club)") on the Approved Wong Nai Chung Outline Zoning Plan No. S/H7/21. The Proposed Development is expected to be operated in Year 2030.

3.1.3. The Subject Site area is approximately 6,132m^2. It is located at the north of the existing South China Stadium of South China Athletic Association, and at the south of the Disciplined Services Sports and Recreation Club. Its surrounding areas are zoned Other Specified Uses ("OU"), Government, Institution or Community ("G/IC"), Commercial ("C"), Open Space ("O"), Residential (Group B) ("R(B)"), Residential (Group C) ("R(C)") and Green Belt ("GB"). ***Figure 3-1*** shows the location of the Subject Site and Existing Stormwater Drainage.

4. Drainage Impact Assessment

4.1. Legislation, Standards and Guidelines

4.1.1. Water quality in Hong Kong is legislated by the provisions of the Water Pollution Control Ordinance (Cap 358), 1980 ("WPCO"). Territorial Water has been subdivided into ten Water Control Zones ("WCZ") and four supplementary water control zones. The study area lies within the North Western WCZ. A Technical Memorandum on Standards for Effluents discharged into Drainage and Sewerage Systems, Inland and Coastal Water (TMES) has been issued, which requires licensing of all discharges into all public sewers and drains. The water quality standards will have to be met during the construction and operation stages.

4.1.2. Besides as stipulated in the Building (Standards of Sanitary Fitments, Plumbing, Drainage Works and Latrines) Regulations 41(1), 40(2), 41(1), 90 and recap in ProPECC PN 5/93, domestic sewage should be discharged to a foul water sewer and surface water should be discharged via rainwater pipes to stormwater drains during operational phase.

5. Assessment Methodology

5.1.1. Surface runoff within the Subject Site will be collected and discharged to the stormwater drainage network located at the northeast of the Application Site, as shown in ***Figure 3-1***. Perimeter drains will be established at the site boundary to collect surface runoff from the Proposed Development during operation phase.

5.1.2. With reference to the Storm Water Drainage Manual, Planning, Design and Management published by Drainage Services Department (DSD), Rational Method shall be applied to estimate the peak surface runoff values. The idea behind the Rational Method is that for a spatially and temporally uniform intensity *i*, which continues indefinitely, the runoff at the outlet of a catchment will increase until the time concentration t_c, when the whole catchment is contributing flow to the outlet. The peak runoff is calculated as follows:

$$Q_P = 0.278\ C\ i\ A \quad \ldots\ldots (1)$$

Where

Q_p = *peak runoff in* m^3/s

C = *runoff coefficient (dimensionless)*

i = *rainfall intensity in mm/hr*

A = *catchment area in* km^2

5.1.3. Runoff coefficient C depends on the permeability, slope and pond character of the surface; rainfall intensity i, is the average rainfall intensity selected on the basis of the design rainfall duration and return period.

5.2. Existing Drainage System

5.2.1. According to the DSD drainage record plans, public stormwater pipes of 375mm in diameters are available on the north of the Subject Site along Caroline Hill Road.

5.2.2. As shown in ***Figure 3-1***, stormwater runoff generated from the Subject Site will be collected by the existing public stormwater network along Caroline Hill Road, via stormwater manhole SMH7021021. The location of the stormwater network is shown in ***Figure 3-1.***

5.3. Catchment Area

5.3.1. The coverage of the Subject Site before the Proposed Development is fully concrete paved. As advised by the Project Team, the Proposed Development will consist of approximately 14.6% of horizontal greenery area.

5.3.2. The details of the catchment area of the Subject Site before and after Proposed Development that contributes to the generation of stormwater generation is summarized in ***Table 5-1***.

Table 5-1 Catchment area of the Subject Site before and after Proposed Development

Catchment	Catchment Area (m^2)		
	Total	Concrete	Greenery
Subject Site Before Development	6,132	6,132	0
Subject Site After Development	6,132	5,235	897

6. Evaluation of Drainage Flow Rate

6.1.1. The surface runoff discharged from the Subject Site is calculated from equation (1) as mentioned in Section 5.1.2. The peak runoff from the Subject Site area before Proposed Development is 0.447 m^3/s whereas the peak runoff after Proposed Development is 0.406 m^3/s. Detailed calculation is tabulated in ***Appendix 6-1*** and summarized in ***Table 6-1*** below:

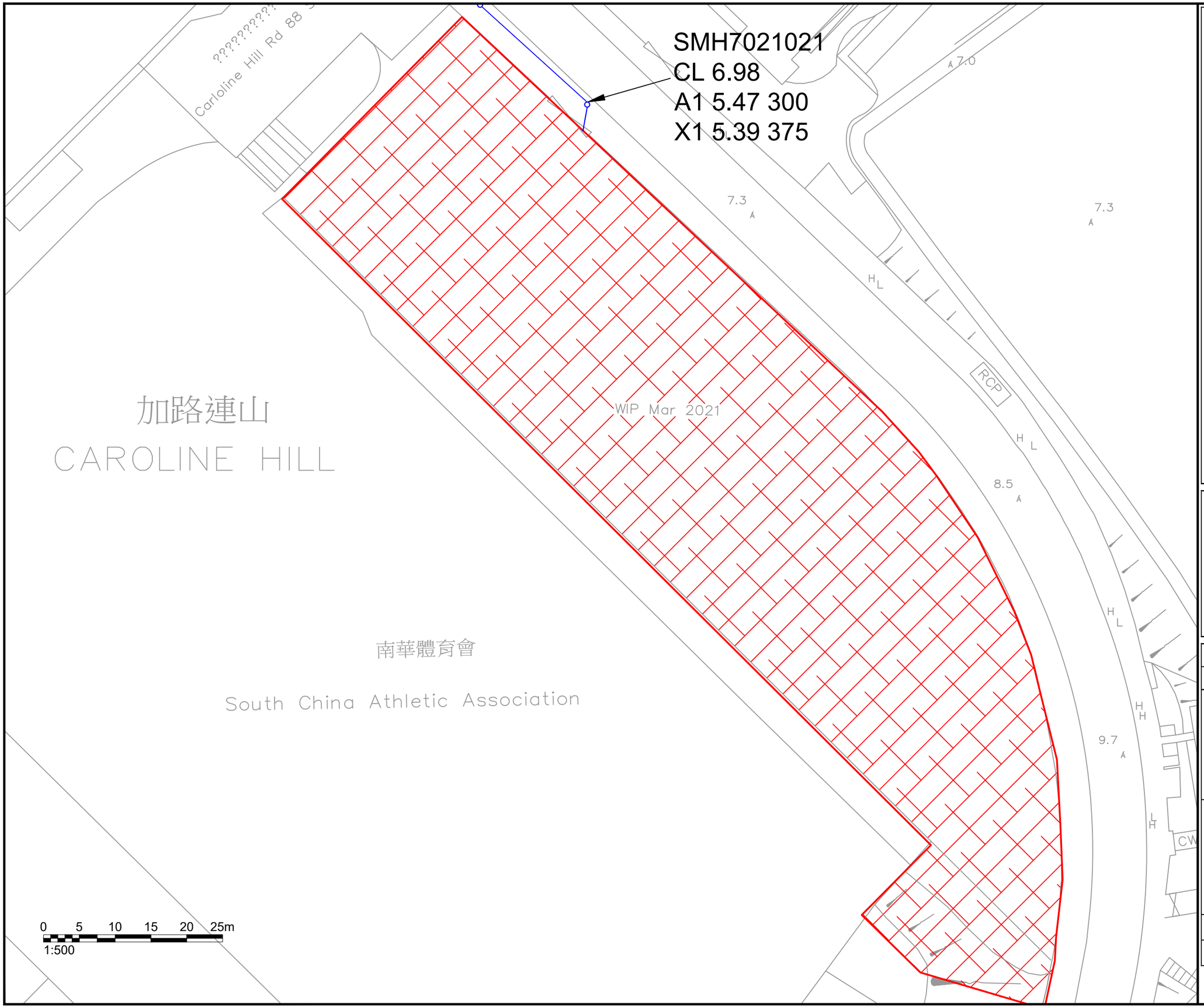
Table 6-1 Peak Flow of Subject Site

Catchment	Peak Flow (m^3/s)		Percentage (%)
	Before	After	
Subject Site	0.447	0.406	-9.17

6.1.2. Based on the calculation above, there is an anticipated 9.17% decrease in peak runoff from the Subject Site area after the Proposed Development. It is anticipated that no adverse stormwater drainage impact due to the Proposed Development would be imposed to the existing public drainage system at Caroline Hill Road.

7. Conclusion

7.1.1. A reduction in contribution of stormwater surface runoff associated with the proposed development is anticipated, it is therefore concluded that no potential drainage impact on existing stormwater system is anticipated.



NOTES :

Subject Site

Drainage Connection

Consultant

Allied Environmental Consultants Limited

Project No. :	2215
Drawn By :	ZX

Project :

Proposed SCAA Sports Link at
South China Athletic Association
88 Caroline Hill Road, Hong Kong

Drawing Title :

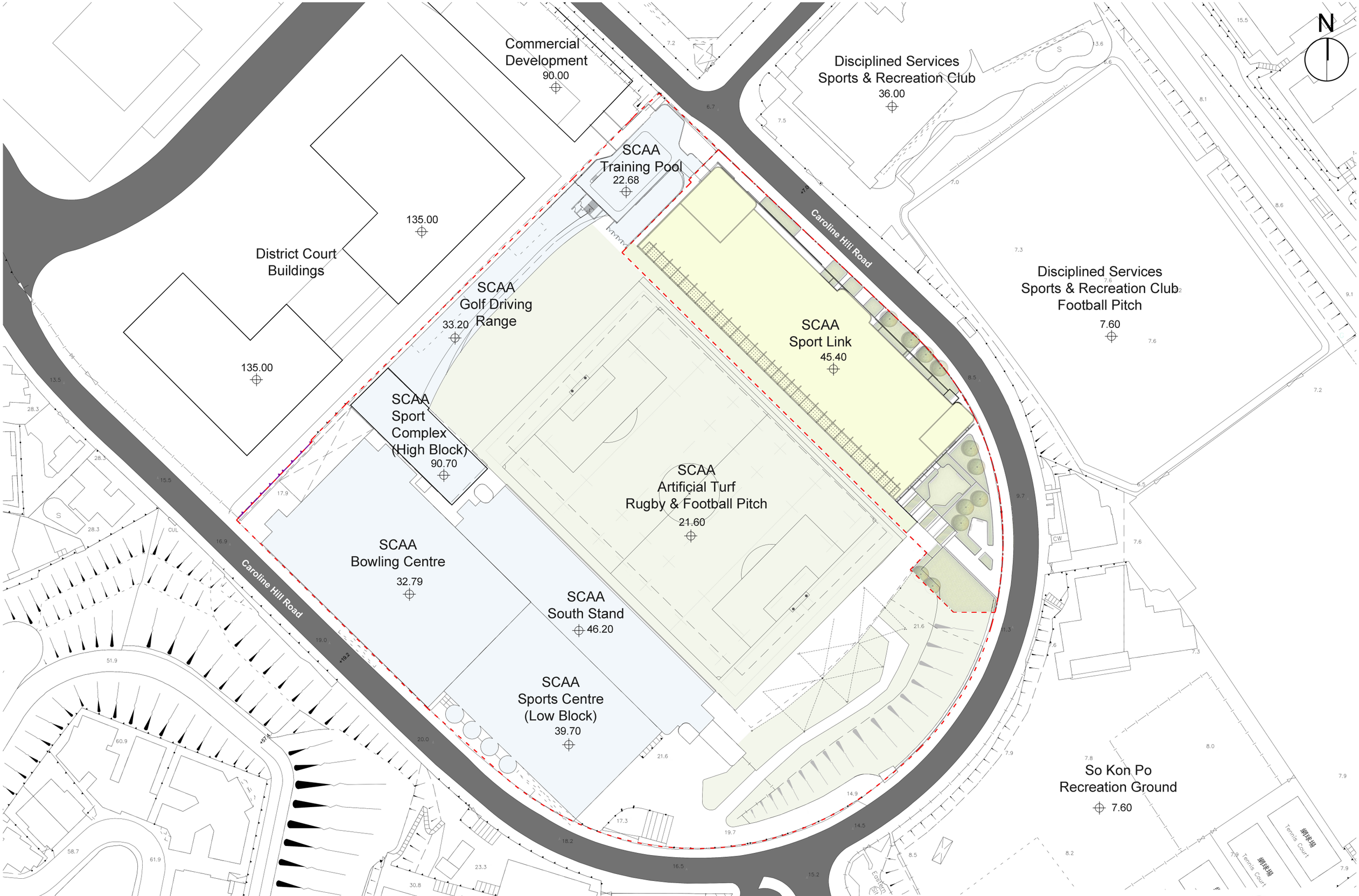
Subject Site Location and
Existing Stormwater Drainage

Drawing No :	Revision :
Figure 3-1	0
Scale : As Shown	Date : August 2025

A3 420 x 297

Appendix 3-1

Site Layout Plans



Proposed SCAA Sports Link at South China Athletic Association, 88 Caroline Hill Road, Hong Kong

Master Layout Plan ◦ 1:1000 (A3) ◦ 13 Oct 2025

m 10 20 30 50 100

Design 2 Architects

N

LEGEND
- LOT BOUNDARY
- APPLICATION SITE BOUNDARY
- LANDSCAPED AREA
- CARPARK
- LIFT LOBBY/ STAIRCASE
- E&M
- SPORTS FACILITIES
- MUTI-FUNCTION AREA
- MAINTENANCE ROOF

COTTON PATH

DISCIPLINED SERVICES SPORTS & RECREATION CLUB

DISCIPLINED SERVICES SPORTS & RECREATION CLUB FOOTBALL PITCH

CAROLINE HILL ROAD

+6.93
+7.46
+7.55
+8.36
+9.46
+10.80
+10.65
+12.23
+14.13
+15.83

STAIRCASE
STAIRCASE
STAIRCASE
LIFT LOBBY
+6.93
LIFT LOBBY
U/UL
LAY-BY AREA
CARPARK
+7.46
E&M
E&M
SCAA TRAINING POOL

UNEXCAVATED AREA

Proposed SCAA Sports Link at South China Athletic Association, 88 Caroline Hill Road, Hong Kong
G/F Plan ○ 1 : 500 (A3) ○ 13 Oct 2025

Design 2 (HK) Limited

N

LEGEND

- LOT BOUNDARY
- APPLICATION SITE BOUNDARY
- LANDSCAPED AREA
- CARPARK
- LIFT LOBBY/ STAIRCASE
- E&M
- SPORTS FACILITIES
- MUTI-FUNCTION AREA
- MAINTENANCE ROOF

COTTON PATH

DISCIPLINED SERVICES SPORTS & RECREATION CLUB

DISCIPLINED SERVICES SPORTS & RECREATION CLUB FOOTBALL PITCH

CAROLINE HILL ROAD

SCAA TRAINING POOL

STAIRCASE

LIFT LOBBY

STAIRCASE

MUTI-FUNCTION ROOMS & ANCHILLARY FACILITIES

+14.04

BALLCOURT (TENNIS) & ANCILLARY FACILITIES

+11.06

STAIRCASE

LIFT LOBBY

LANDSCAPE AREA

+11.57

+10.45

+11.06

+10.65

+12.23

+16.69

UNEXCAVATED AREA

Proposed SCAA Sports Link at South China Athletic Association, 88 Caroline Hill Road, Hong Kong

1/F Plan ◦ 1 : 500 (A3) ◦ 13 Oct 2025

Design 2 (HK) Limited

N

LEGEND
- LOT BOUNDARY
- APPLICATION SITE BOUNDARY
- LANDSCAPED AREA
- CARPARK
- LIFT LOBBY/ STAIRCASE
- E&M
- SPORTS FACILITIES
- MUTI-FUNCTION AREA
- MAINTENANCE ROOF

COTTON PATH

DISCIPLINED SERVICES SPORTS & RECREATION CLUB

DISCIPLINED SERVICES SPORTS & RECREATION CLUB FOOTBALL PITCH

CAROLINE HILL ROAD

STAIRCASE

STAIRCASE

STAIRCASE

LIFT LOBBY

LIFT LOBBY

+22.68

SCAA TRAINING POOL

BALL COURT
(5-A-SIDE SOCCER)
& ANCILLARY FACILITIES

+21.60

E&M

SCAA GOLF DRIVING RANGE

SCAA ARTIFICIAL TURF RUGBY FOOTBALL PITCH

+21.60

Proposed SCAA Sports Link at South China Athletic Association, 88 Caroline Hill Road, Hong Kong

2/F Plan ◦ 1 : 500 (A3) ◦ 13 Oct 2025

Design 2 (HK) Limited

N

LEGEND
- LOT BOUNDARY
- APPLICATION SITE BOUNDARY
- LANDSCAPED AREA
- CARPARK
- LIFT LOBBY/ STAIRCASE
- E&M
- SPORTS FACILITIES
- MUTI-FUNCTION AREA
- MAINTENANCE ROOF

COTTON PATH

DISCIPLINED SERVICES SPORTS & RECREATION CLUB

DISCIPLINED SERVICES SPORTS & RECREATION CLUB FOOTBALL PITCH

CAROLINE HILL ROAD

STAIRCASE

STAIRCASE

STAIRCASE

E&M

LIFT LOBBY

LIFT LOBBY

+22.68

SCAA TRAINING POOL

BALLCOURT (TENNIS) & ANCILLARY FACILITIES

+33.50

E&M

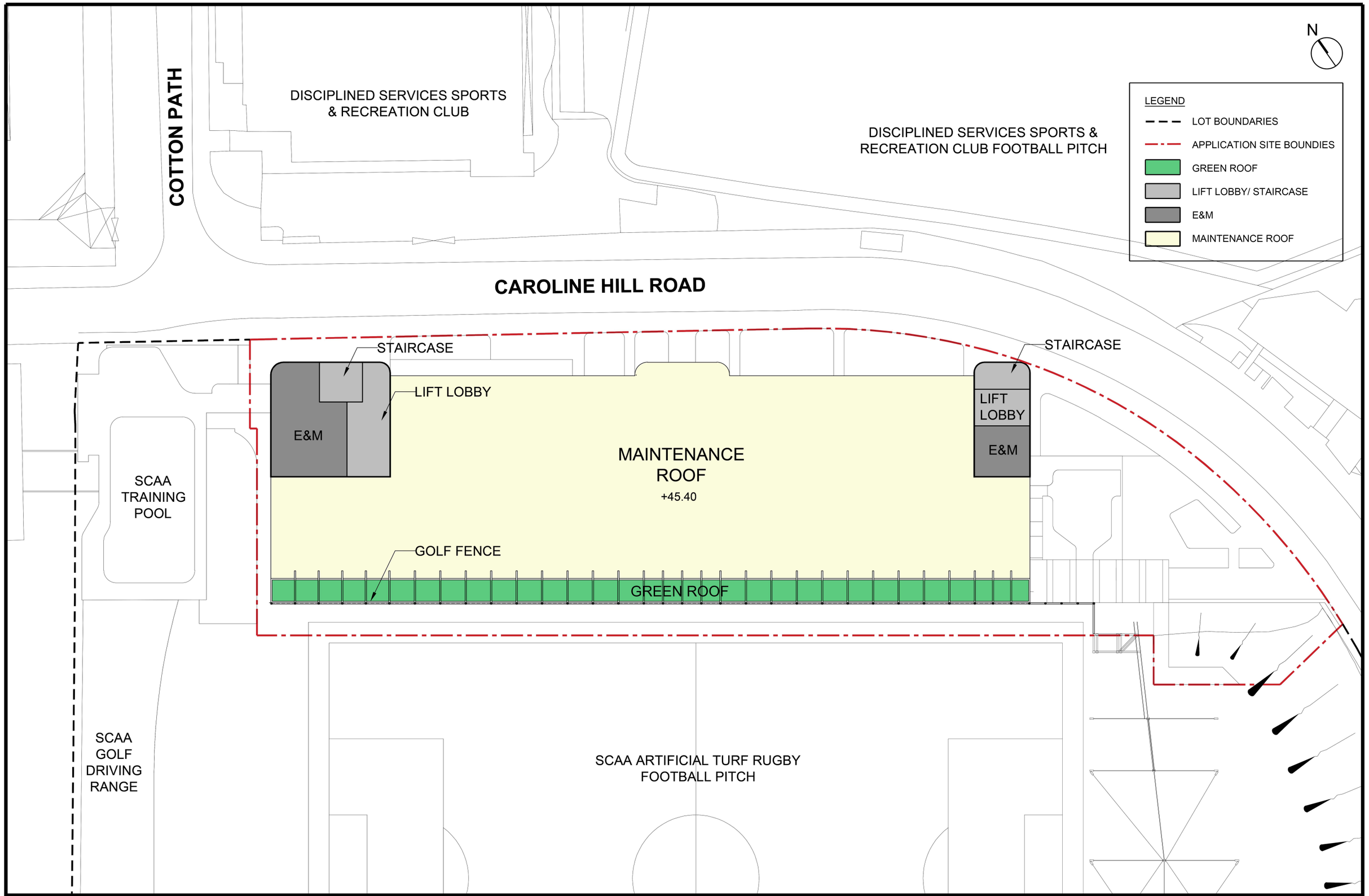
SCAA GOLF DRIVING RANGE

SCAA ARTIFICIAL TURF RUGBY FOOTBALL PITCH

Proposed SCAA Sports Link at South China Athletic Association, 88 Caroline Hill Road, Hong Kong

3/F Plan ◦ 1 : 500 (A3) ◦ 13 Oct 2025

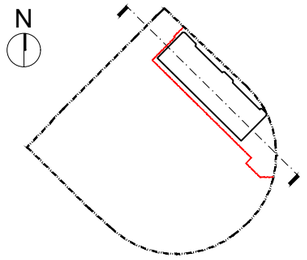
Design 2 (HK) Limited



Proposed SCAA Sports Link at South China Athletic Association, 88 Caroline Hill Road, Hong Kong

Design 2 (HK) Limited

UR/F Plan ◦ 1 : 500 (A3) ◦ 13 Oct 2025



Key Plan

LEGEND

- LOT BOUNDARY
- APPLICATION SITE BOUNDARY
- LANDSCAPE AREA
- CARPARK
- LIFT LOBBY
- E/M
- SPORT FACILITIES
- MULTI-FUNCTION AREAS
- MAINTENANCE ROOF

SCAA Sports Link

SCAA Training Pool

Adjoining Commercial Development

Boundary Line

Application Boundary

Boundary Line

Golf Fence +61.60

Golf Fence +61.60

Golf Fence +61.60

16200

11900

11900

10540

3600

37940

R/F +45.40

3/F +33.50

2/F +21.60

1/F +11.06

G/F +7.46

+48.90

Entrance Lobby / E&M

Main Roof (for maintenance only) +45.40

+48.90

Entrance Lobby / E&M

Ball Court (Tennis Court) +33.50

Ball Court (Tennis Court) +33.50

Ball Court (5-A-Side Soccer) +21.60

Ball Court (5-A-Side Soccer) +21.60

Ball Court (Tennis Court) +11.06

Multi-Function Room(s) / Office / E&M +14.04

Carpark +7.46

Entrance Lobby +6.93

E&M

E&M

Carpark

Linkage with Training Pool

Linkage with Adjoining Development

Training Pool +22.68

+18.60

7560

6580

Caroline Hill Road

Existing Slope

Approx. +10.65

Landscape Garden

+10.65

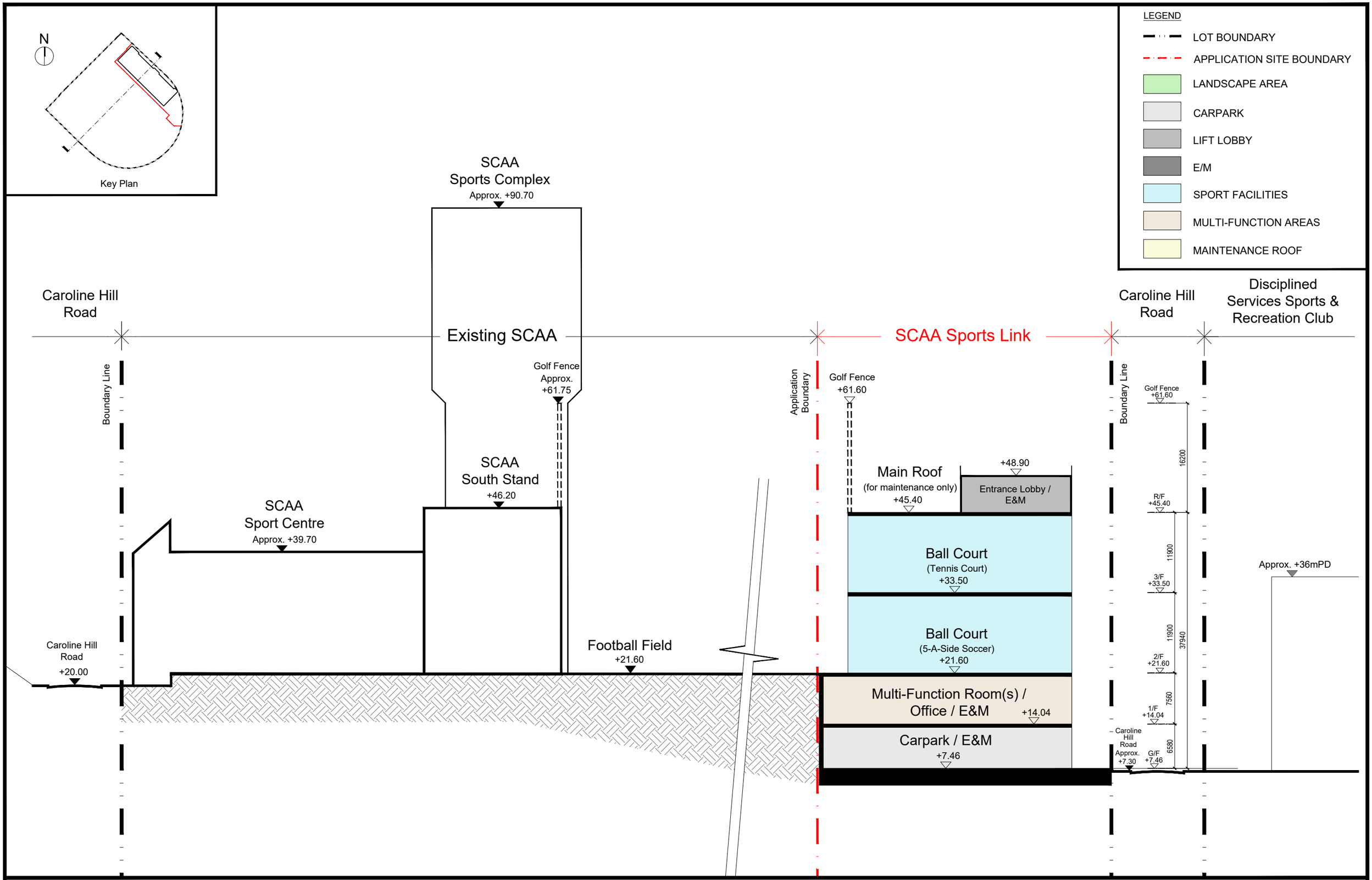
+8.811

Mean Street Level of North Site

Proposed SCAA Sports Link at South China Athletic Association, 88 Caroline Hill Road, Hong Kong

Section A-A ○ 1 : 500 (A3) ○ 13 Oct 2025

Design 2 (HK) Limited



Proposed SCAA Sports Link at South China Athletic Association, 88 Caroline Hill Road, Hong Kong

Section B-B ○ 1 : 500 (A3) ○ 13 Oct 2025

Design 2 (HK) Limited

Appendix 6-1

Peak Runoff Estimation

50-year return period

Peak Runoff Estimation Before Proposed Development

Catchment	Topography		Average Slope, H (m per 100m)[1]	Total Catchment Area, A (m2)	Land Use	Catchment Area, A (m^2)	Flow Distance, L (m)	Inlet Time, t_o (min) [2]	Flow Time, t_f (min) [3]	Duration, t_c (min) [4]	50 - year return period			Extreme Mean Intensity, i (mm/hr) [6]	Runoff Coefficient, C [6]	Rainfall Increase due to Climate Change, % [8]	Rainfall Increase for Design Allowance [9]	50-year Return Period Peak Runoff, Q_p (m^3/s) [10]	Total Peak Runoff, Qp (m3/s) [9]
	Inlet invert level (mPD)	Outlet invert level (mPD)			Surface Characteristics						Storm Constant, a [5]	Storm Constant, b [5]	Storm Constant, c [5]					
Subject Site	11.3	6.7	2.91	6132	Concrete	6132	158	7.73	0	7.73	505.5	3.29	0.355	215.63	0.95	16.0	12.1	0.447	0.447
					Greenery	0									0.35	16.0	12.1	0.000	

Peak Runoff Estimation After Proposed Development

Catchment	Topography		Average Slope, H (m per 100m)[1]	Total Catchment Area, A (m2)	Land Use	Catchment Area, A (m^2)	Flow Distance, L (m)	Inlet Time, t_o (min) [2]	Flow Time, t_f (min) [3]	Duration, t_c (min) [4]	50 - year return period			Extreme Mean Intensity, i (mm/hr) [6]	Runoff Coefficient, C [7]	Rainfall Increase due to Climate Change, % [8]	Rainfall Increase for Design Allowance [9]	50-year Return Period Peak Runoff, Q_p (m^3/s) [10]	Total Peak Runoff, Qp (m3/s) [9]
	Inlet invert level (mPD)	Outlet invert level (mPD)			Surface Characteristics						Storm Constant, a [5]	Storm Constant, b [5]	Storm Constant, c [5]					
Subject Site	11.3	6.7	2.91	6132	Concrete	5235	158	7.73	0	7.73	505.5	3.29	0.355	215.63	0.95	16.0	12.1	0.382	0.406
					Greenery	897									0.35	16.0	12.1	0.024	

Note:

[1] Average slope, H is calculated using the highest and lowest elevations of the Subject Site and catchments as well as the flow distance. The elevation levels are referenced from the topographic survey map while the flow distance is measured between the highest and lowest elevation points.

[2] Brandsby William's equation is referenced from Section 4.3.3 in DSD Stormwater Drainage Manual (Fifth Edition).

$$t_o = \frac{0.14465L}{H^{0.2} A^{0.1}}$$

where t_o = time of concentration of a natural catchment (min.)

A = catchment area (m^2)

H = average slope (m per 100 m), measured along the line of natural flow, from the summit of the catchment to the point under consideration

L = distance (on plan) measured on the line of natural flow between the summit and the point under consideration (m)

[3] t_f is assumed to be 0 for conservative estimation.

[4] $$t_c = t_o + t_f$$

[5] Storm constants are referenced to Table 3a in DSD Stormwater Drainage Manual (Fifth Edition) based on corresponding return periods.

[6] Intensity-Duration-Frequency calculation is referenced from Section 4.3.3 in DSD Stormwater Drainage Manual (Fifth Edition).

$$i = \frac{a}{(t_d + b)^c}$$

where i = extreme mean intensity in mm/hr,

t_d = duration in minutes ($t_d \leq 240$), and

a, b, c = storm constants given in Tables 3a, 3b, 3c and 3d.

[7] Runoff coefficient is referenced from Section 7.5.2 in DSD Stormwater Drainage Manual (Fifth Edition). For conservative estimation, coefficient of 0.35 is assumed for unpaved area while that of 0.95 for paved area.

[8] Rainfall increase precentage due to climate change is referenced from Table 28 in Stormwater Drainage Manual Corrigendum No. 1/2022. 16.0% for End of 21st Century is adopted as worst case scenario.

[9] Rainfall increase precentage for design allowance calculation (i.e. 12.1%) is referenced from Table 31 in DSD Stormwater Drainage Manual - Corrigendum No. 1/2022.

[10] Rational method for peak runoff estimation is referenced from Section 4.3.3 in DSD Stormwater Drainage Manual (Fifth Edition).

$$Q_p = 0.278\, C\, i\, A$$

where Q_p = peak runoff in m^3/s

C = runoff coefficient (dimensionless)

i = rainfall intensity in mm/hr

A = catchment area in km^2