APPENDIX IV

Revised Sewerage Impact Assessment

Issue No. : 2
Issue Date : December 2025
Project No. : 2215

SEWAGE 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

[redacted]

Document Verification

Project Title	Proposed SCAA Sports Link at South China Athletic Association, 88 Caroline Hill Road, Hong Kong	**Project No.**	2215
Document Title	Sewage Impact Assessment		

Issue No.	Issue Date	Description	Prepared by	Checked by	Approved by
1	October 2025	1st Submission	Coco Chin	Joanne Ng	Grace Kwok
2	December 2025	2nd Submission	Coco Chin	Joanne Ng	Grace Kwok

[redacted]

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1. Introduction

1.1.1. Allied Environmental Consultants Limited ("AEC") has been commissioned to prepare a Sewerage Impact Assessment ("SIA") in support of the Section 16 Planning Application for the Proposed SCAA Sports Link ("Proposed Development") at South China Athletic Association, 88 Caroline Hill Road, Hong Kong ("Subject Site").

2. Objectives

2.1.1. Main objectives of the study are to review the existing drainage facilities in the vicinity of the Proposed Development at the Subject Site, evaluate potential impacts based on the proposed sewerage drainage, recommend appropriate options for sewerage discharge, if necessary.

3. Site Description

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.

4. Relevant Government Standards

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. 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 operation stage.

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 1/23, domestic sewage should be discharged to a foul water sewer and surface water should be discharged via rainwater pipes to stormwater drains during operation phase.

5. Description of Sewerage System

5.1.1. Drainage record plans were obtained from the drawing office of the Drainage Services Department ("DSD") and the Proposed Development is indicated on the drainage record plans as shown in ***Figure 3-1***. Concerned sewerage network was identified for succeeding estimation of the potential sewerage impact to the downstream sewers associated with the Proposed Development.

5.1.2. The sewerage network of existing gravity sewers along Caroline Hill Road and Leighton Road collects sewage generated from the Proposed Development and the surrounding catchment areas. The sewage discharged from the corresponding catchment areas is conveyed to Wan Chai East Preliminary Treatment Works, and discharged to Stonecutter Island Sewage Treatment Works (SCISTW) for further treatment and ultimate disposal.

5.1.3. The sewage generated from Proposed Development will be conveyed to the existing manhole FMH7019720 with an existing 225mm vitrified clay pipe as shown in ***Figure 3-1***.

5.1. Design Standard Guideline

5.1.1. This assessment has been prepared in accordance with the following documents:

- For the roughness of sewers, the recommended value in "Sewerage Manual Part 1" published by DSD has been adopted;
- The recommended unit flow factors ("UFF") and peaking factors in "Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning Version 1.0 (Report No.:

EPD/TP1/05" ("GESF") published by Environmental Protection Department ("EPD") have been adopted to estimate the sewage generated from the Proposed Development.

5.2. Design Parameters and Assumptions

5.2.1. Based on the above reference documents, the UFF for different types of population as shown in ***Table 5-1*** have been used in calculating the sewerage flow from the Proposed Development.

Table 5-1 Global Unit Flow Factor

Development Type	Unit	UFF (m^3/day)
Commercial Flow[1]		
J11, Community, Social & Personal Services	Employee	0.28
Visitors[2]	Person	0.032

Notes:

[1] Category of UFFs is selected according to Table T-1 and Table T-2 of the GESF.

[2] The unit flow factor for visitors of recreational facility is made reference to Kai Tak Multi-purpose Sports Complex Environmental Impact Assessment Report (AEIAR-204/2017), 0.032 m3/person/d.

6. Evaluation of Sewage Flow Rate

6.1. Predicted Sewage Flow from Proposed Development

6.1.1. The total estimated Average Dry Weather Flow ("ADWF") from the Proposed Development is estimated to be 27.02 m^3/day. The sewage flow estimation for Proposed Development is summarized in ***Table 6-1***. The population estimated ADWF of Proposed Development is summarized in ***Appendix 6-1***.

Table 6-1 Sewage Flow Estimation for The Proposed Development

Type of Occupancy[1]	Population		Category[2]	UFF (m^3/day)	ADWF (m^3/day)
Office	14	Person	Community, Social & Personal Services	0.28	3.92
Visitors	722	Person	Visitors[3]	0.032	23.10
				Total (m^3/day)	**27.02**

Notes:
[1] Information extracted from SoA table received on 13 June 2025.
[2] UFFs for various occupancy types are adopted according to Table T-1 and Table T-2 of the GESF.
[3] The unit flow factor for visitors of recreational facility is made reference to Kai Tak Multi-purpose Sports Complex Environmental Impact Assessment Report (AEIAR-204/2017), 0.032 m3/person/d.

6.1.2. According to the previous approved SIA report dated 23 September 2022, the Subject Site was previously proposed as an E-Sport Complex development with ADWF of 198.4 m^3/day. As demonstrated in ***Appendix 6-2***, the previous hydraulics calculation indicated that the existing sewerage system has sufficient capacity to cater the sewage flow from proposed E-Sport Complex, together with the sewage flows from the surrounding catchments.

6.1.3. In comparison, the current Proposed Development would generate a much smaller sewage generation, with an estimated ADWF of 27.02 m^3/day, representing an approximate 86% reduction compared with the previous proposed E-Sport Complex. Despite the reduction in flow, the sewage from the Proposed Development will continue to discharge to the same terminal manhole as previous approved SIA. The upstream and downstream sewerage

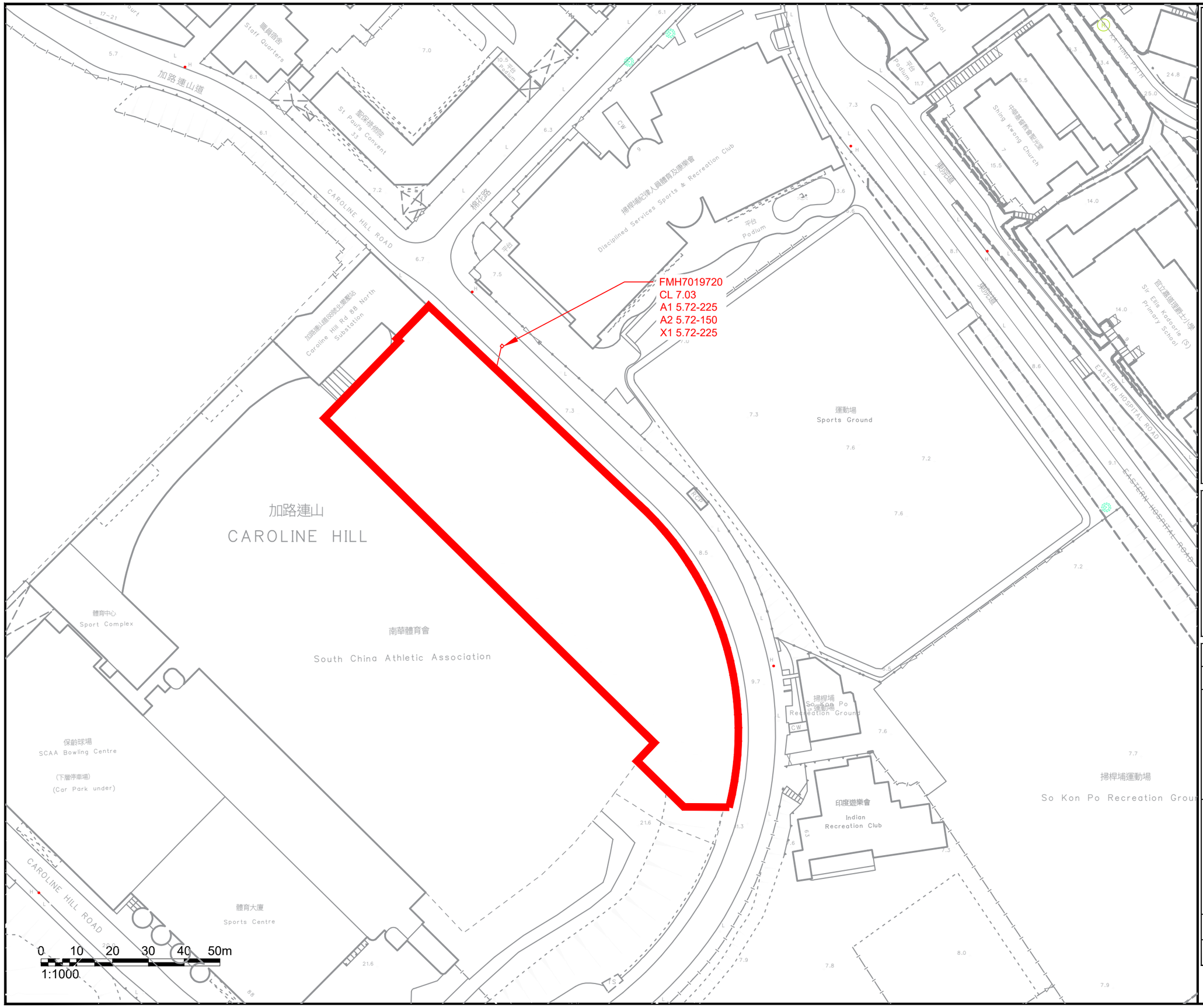
systems were also remained the same.

6.1.4. Given that the existing sewerage system have adequate capacity and considering the reduction in ADWF, no adverse sewerage impact to the existing sewerage system is anticipated.

7. Conclusions

7.1.1. According to the sewage flow estimation, the Proposed Development will discharge in a substantially lower ADWF compared to the previous approved SIA.

7.1.2. As the sewerage from the Proposed Development will continue to discharge to the same terminal manhole with unchanged upstream and downstream sewerage systems compared to previous approved SIA, no adverse impact to public sewerage system associated with the Proposed Redevelopment is expected. No immediate upgrading or improvement works to the existing local sewerage system is required.



NOTES :

SUBJECT SITE

EXISTING SEWERAGE SYSTEM

Consultant

Allied Environmental Consultants Limited

Project No. :	2215
Drawn By :	CC

Project :

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

Drawing Title :

SUBJECT SITE LOCATION

Drawing No : FIGURE 3-1	Revision : 0
Scale : AS SHOWN	Date : OCT 2025

A3 420 x 297

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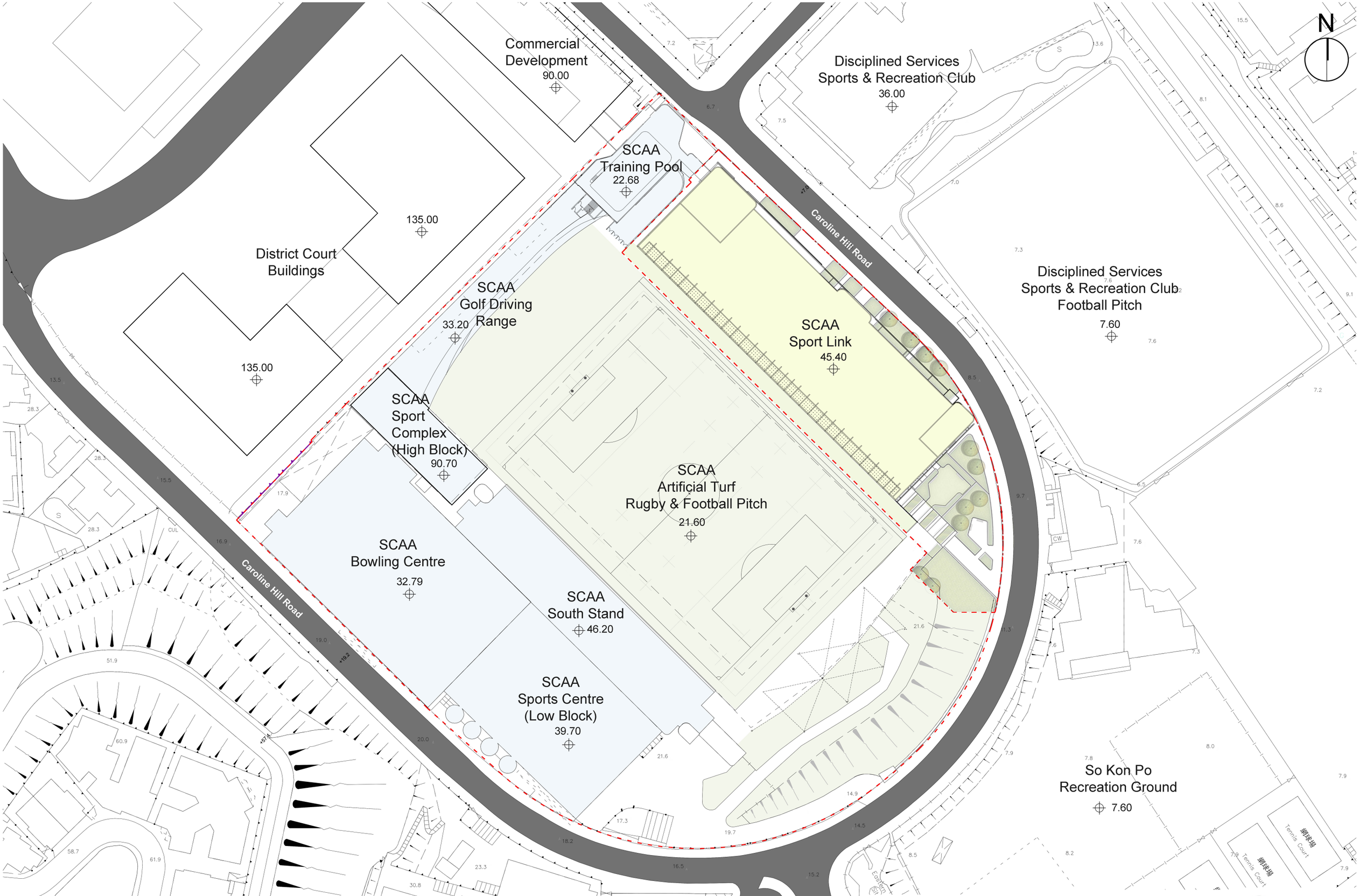
Appendix 3-1

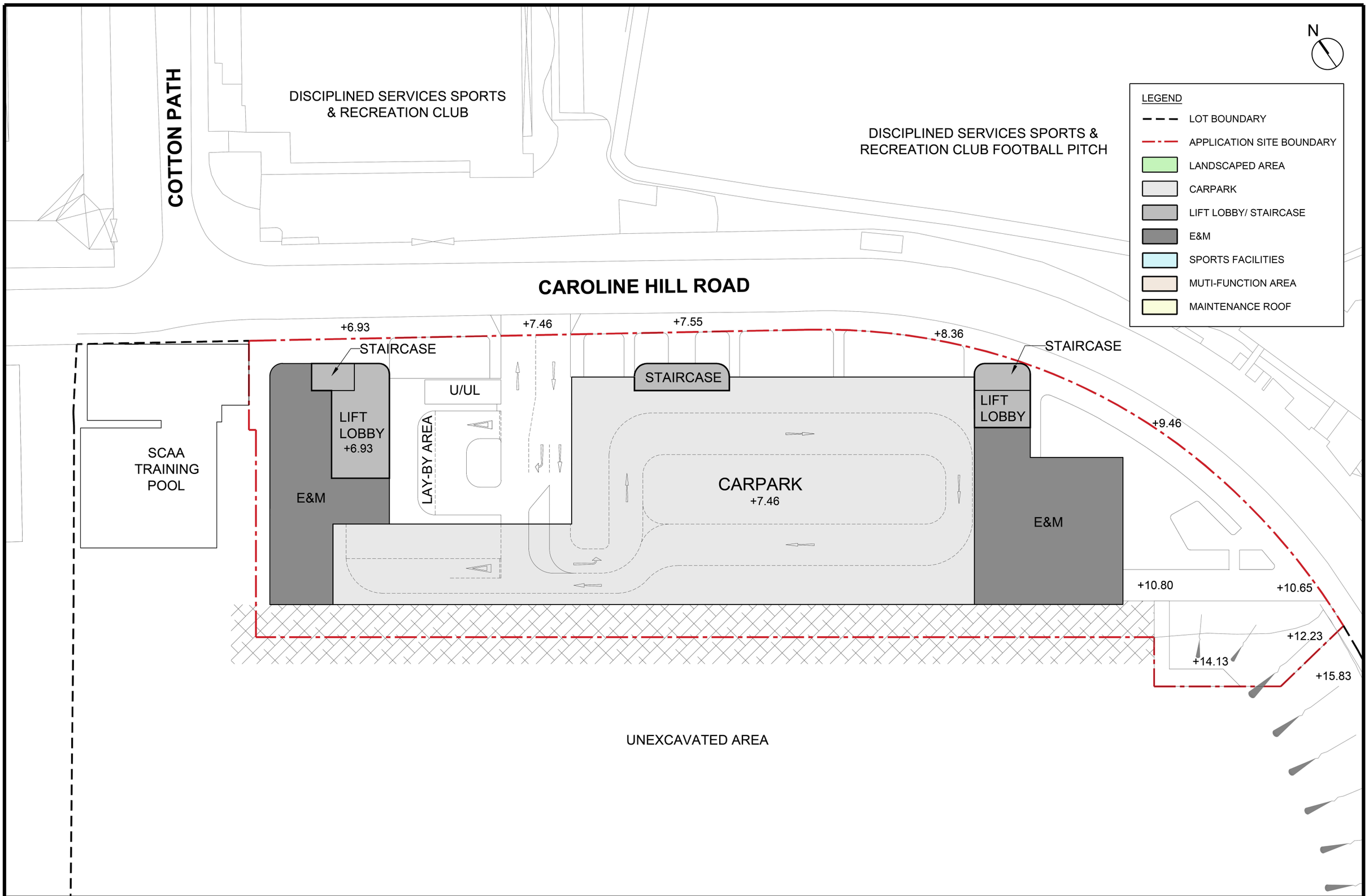
Site Layout Plan



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

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

Design 2 Architects



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

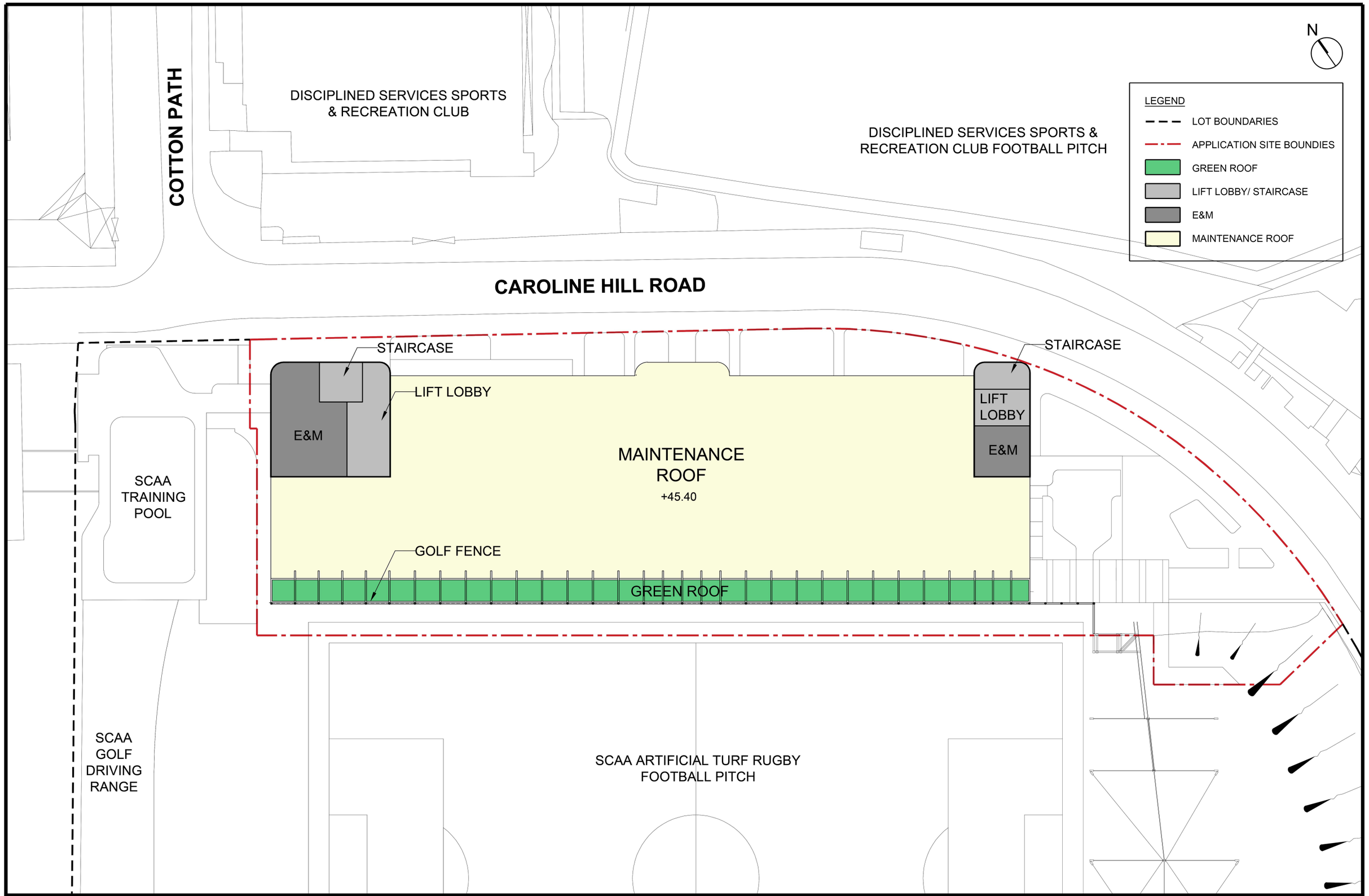
SCAA GOLF DRIVING RANGE

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

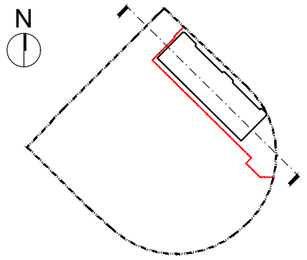
Design 2 (HK) Limited



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

16200

11900

11900

37940

7560

6580

R/F +45.40

3/F +33.50

2/F +21.60

1/F +14.04

G/F +7.46

Caroline Hill Road

Existing Slope

Approx. +10.65

Landscape Garden

+10.65

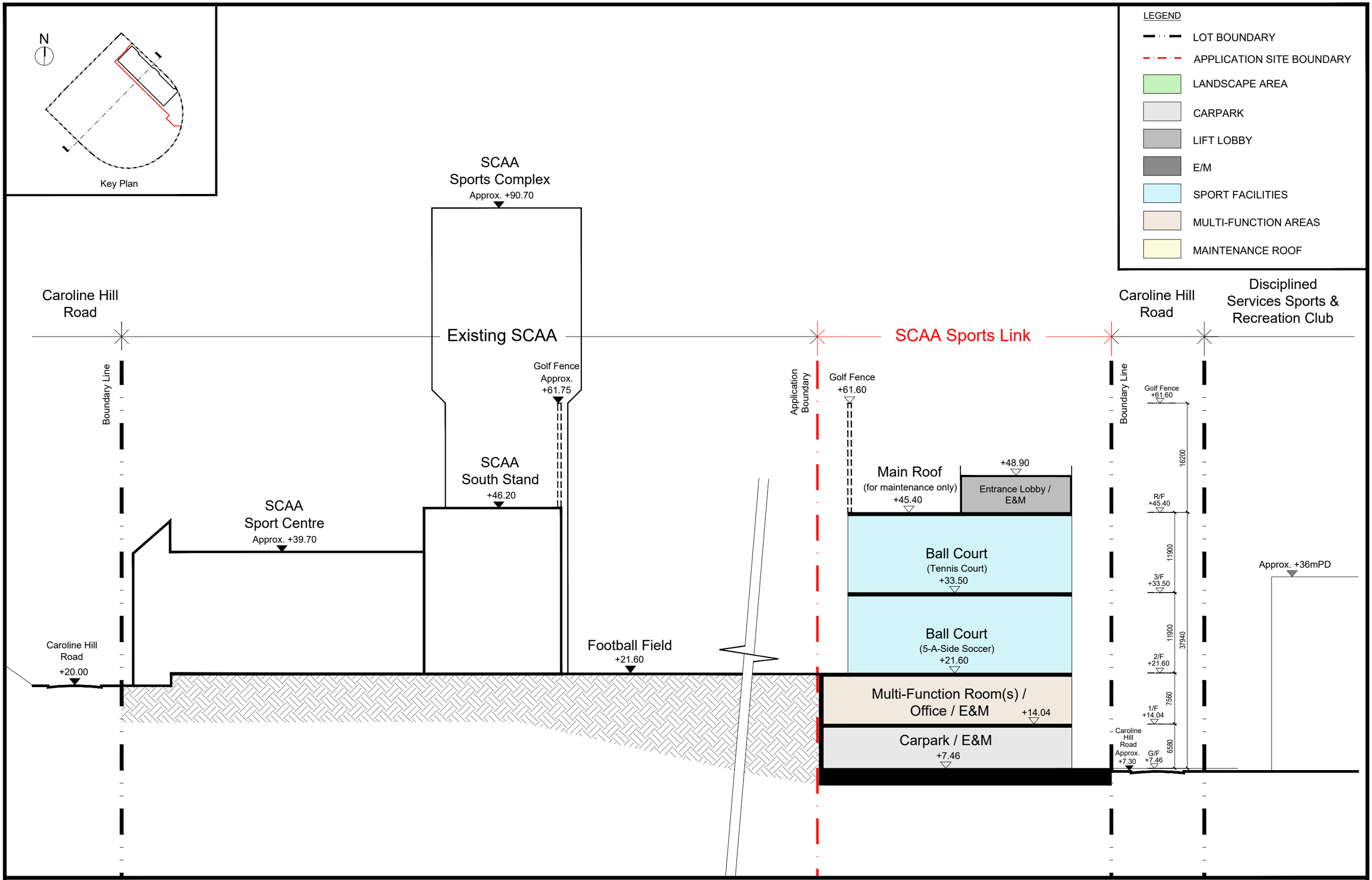
+8.811

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

Estimation of Sewerage Flow from Proposed Redevelopment

Appendix 6-1 : Estimation of Sewage Flow from the Proposed Development

Proposed Development

Type of Occupancy[1]	No. of Occupancy	Unit Flow Factor[2]		Total Average Sewage Discharge (m^3/day)
		Category	m^3/day	
Office	14	Community, Social & Personal Services	0.28	3.92
Visitors	722	Visitors	0.032	23.10
Total	**736**			**27.02**
				0.0003 (m3/s)

Note:

[1] The information is extracted from SoA table received on 13 June 2025

[2] The unit flow factor is made reference to "Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning (Version 1.0)", published by EPD.

Appendix 6-2

Hydraulics Calculation of Previously Approved SIA Report

Appendix 7-1. Calculation of Occupancy Rate of Sewerage System

Sewer No.				Internal Diameter (m) [a]	Cross-section Area (m^2)	Length (m) [a]	Inlet mPD (m) [a]	Outlet mPD (m) [a]	Hydraulic pipeline roughness (m) [b]	Hydraulic Gradient	Mean Velocity (m/s) [c]	Max Capacity of Sewer (m^3/s)	Total Average Dry Weather Flow	Contributing Population	Peaking Factor	Catchment Inflow Factor	Revised Total Average Dry Weather Flow	Peak Discharge through Manhole (m^3/s)	Peak Discharge from Swimming pool backwash (m^3/s)	Peak Discharge through Manhole (With Swimming Pool Backwash) (m^3/s)	Total Peak Flow Occupancy (%)	Project Site Peak Flow Occupancy (%)	Contributing Catchment No.	Development ID
ID	From	ID	To	D	A	l				s	V		m^3/day	[d]	[e]	[f]	m^3/day							
PD	Proposed development	5	FMH7019720	0.150	0.0177	8	6.43	5.720	0.0006	0.089	3.01	0.053	198.36	735	8.0	1.0	198	0.018	0.000	0.018	34%	34%	**Proposed development**	
5	FMH7019720	6	FMH7009996	0.225	0.0398	40.43	5.720	5.000	0.0006	0.018	1.74	0.069	343	1270	6.0	1.0	343	0.024	0.000	0.024	34%	20%	**K+I**+Proposed development	K1-4, I1-2, Proposed development
6	FMH7009996	7	FSH7003590	0.400	0.1257	9.4	5.000	4.840	0.0006	0.017	2.46	0.309	440	1628	6.0	1.0	440	0.031	0.023	0.054	17%	4%	K+I+Proposed development+**L**	K1-4, I1-2, Proposed development, L1
7	FSH7003590	8	FSH7003589	0.400	0.1257	8.78	4.840	4.720	0.0006	0.014	2.20	0.277	440	1628	6.0	1.0	440	0.031	0.023	0.054	19%	5%	K+I+Proposed development+L	
8	FSH7003589	9	FSH7003588	0.400	0.1257	27.57	4.720	4.350	0.0006	0.013	2.18	0.274	454	1681	6.0	1.0	454	0.032	0.023	0.055	20%	5%	K+I+Proposed development+L+**J**	K1-4, I1-2, Proposed development, L1, J1-2
9	FSH7003588	10	FMH7058641	0.400	0.1257	2.61	4.350	3.600	0.0006	0.287	10.17	1.278	454	1681	6.0	1.0	454	0.032	0.023	0.055	4%	1%	K+I+Proposed development+L+J	
10	FMH7058641	11	FMH7058642	0.400	0.1257	21.51	3.600	3.370	0.0006	0.011	1.95	0.245	454	1681	6.0	1.0	454	0.032	0.023	0.055	22%	6%	K+I+Proposed development+L+J	
11	FMH7058642	12	FMH7058643	0.400	0.1257	7.71	2.600	2.530	0.0006	0.009	1.79	0.225	454	1681	6.0	1.0	454	0.032	0.023	0.055	24%	6%	K+I+Proposed development+L+J	
12	FMH7058643	13	FMH7058644	0.400	0.1257	21.39	2.530	2.360	0.0006	0.008	1.68	0.211	454	1681	6.0	1.0	454	0.032	0.023	0.055	26%	7%	K+I+Proposed development+L+J	
13	FMH7058644	14	FSH7003587	0.400	0.1257	13.3	2.360	2.250	0.0006	0.008	1.71	0.215	751	2783	6.0	1.0	751	0.052	0.023	0.076	35%	6%	K+I+Proposed development+L+J+**N**	K1-4, I1-2, Proposed development, L1, J1-2, N1
14	FSH7003587	15	FSH3007586	0.400	0.1257	6.54	2.250	2.200	0.0006	0.008	1.64	0.207	751	2783	6.0	1.0	751	0.052	0.023	0.076	37%	7%	K+I+Proposed development+L+J+N	
15	FSH3007586	16	FMH7058647	0.400	0.1257	27.15	2.200	2.140	0.0006	0.002	0.88	0.110	751	2783	6.0	1.0	751	0.052	0.023	0.076	69%	12%	K+I+Proposed development+L+J+N	
16	FMH7058647	17	FSH7003585	0.400	0.1257	20.06	2.140	2.090	0.00232	0.006	1.18	0.149	751	2783	6.0	1.0	751	0.052	0.023	0.076	51%	9%	K+I+Proposed development+L+J+N	
17	FSH7003585	18	FMH7058340	0.500	0.1963	8.75	2.090	2.070	0.00069	0.001	0.51	0.100	900	3333	6.0	1.0	900	0.062	0.023	0.086	85%	14%	K+I+Proposed development+L+J+N+**D**	K1-4, I1-2, Proposed development, L1,J1-2, N1, D1-2
18	FMH7058340	19	FSH7004660	0.500	0.1963	33.38	2.07	2.000	0.003	0.003	0.95	0.187	900	3333	6.0	1.0	900	0.062	0.023	0.086	46%	7%	K+I+Proposed development+L+J+N+D	
19	FSH7004660	20	FSH7004661	0.500	0.1963	23.44	2.000	1.760	0.00193	0.010	1.88	0.370	900	3333	6.0	1.0	900	0.062	0.023	0.086	23%	4%	K+I+Proposed development+L+J+N+D	
20	FSH7004661	21	FSH7004662	0.5	0.1963	33.99	1.76	1.400	0.0006	0.011	2.23	0.438	1113	4124	6.0	1.0	1113	0.077	0.023	0.101	23%	3%	K+I+Proposed development+L+J+N+D+**C**	K1-4, I1-2, Proposed development, L1, J1-2, N1, D1-2, C1-3
21	FSH7004662	22	FMH7010025	0.500	0.1963	4.65	1.400	1.390	0.0006	0.002	1.00	0.196	1113	4124	6.0	1.0	1113	0.077	0.023	0.101	51%	7%	K+I+Proposed development+L+J+N+D+C	
22	FMH7010025	23	FSH7004682	0.500	0.1963	9.44	1.390	1.200	0.00168	0.020	2.70	0.529	2618	9696	5.0	1.0	2618	0.152	0.047	0.198	37%	2%	K+I+Proposed development+L+J+N+D+C+**A+B+F+G+H+M+O**	K1-4, I1-2, Proposed development, L1, J1-2, N1, D1-2, C1-3, A1-4, B1, F1-5, G1-3, H1-6, M1,O1
23	FSH7004682	24	FSH7001980	0.600	0.2827	41.59	1.2	1.080	0.0006	0.003	1.30	0.367	3153	11677	4.0	1.0	3153	0.146	0.047	0.192	52%	3%	K+I+Proposed development+L+J+N +D+C+A+B+F+G+H+M+O+**E**	All

Note:
[a] Information from Drainage Layout Plan
[b] Assume slimed of clayware in "Poor" condition for exisitng sewer
[c] The velocity is calculated using the Colebrook-White Formula:

$$V = -2(2gDS)^{0.5}\log\left(\frac{k}{3.7D} + \frac{2.5\nu}{D(2gDS)^{0.5}}\right)$$

where
k = Colebrook-White roughness coefficient, in meter
V = mean velocity (m/s)
D = circular cross-section pipe, inside diameter (m)
S = slope, in meters per meter
v = kinematic viscosity of water, in meter per second (0.000001306 m/s)
g = gravitational acceleration (m/s2) (9.807m/s2)
[d] The Contributing Population is defined as:

$$\text{Contributing Population} = \frac{\text{Calculated total average flow (m3/day)}}{\text{0.27 (m3/person/day)}}$$

[e] Reference from Table T-5 (a) of Guidelines for Estimating Sewage Flows for Sewerage Infrastructure Planning
[f] Reference from Table T-4 of Guidelines for Estimating Sewage Flows for Sewerage Infrastructure Planning, Catchment inflow factor of Wan Chai is adopted.