APPENDIX I

Revised Drainage Impact Assessment

Issue No. : 2

Issue Date : December 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

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1	October 2025	1st Submission	Various	Joanne Ng	Grace Kwok
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[redacted]

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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. As advised by Project Team, the proposed pipe connecting to the terminal manhole to SMH7021021 is 375mm dia. 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 0.502 m^3/s whereas the peak runoff after Proposed Development is 0.456 m^3/s. Detailed calculation is tabulated in ***Appendix 6-1*** and summarized in ***Table 6-1*** below:

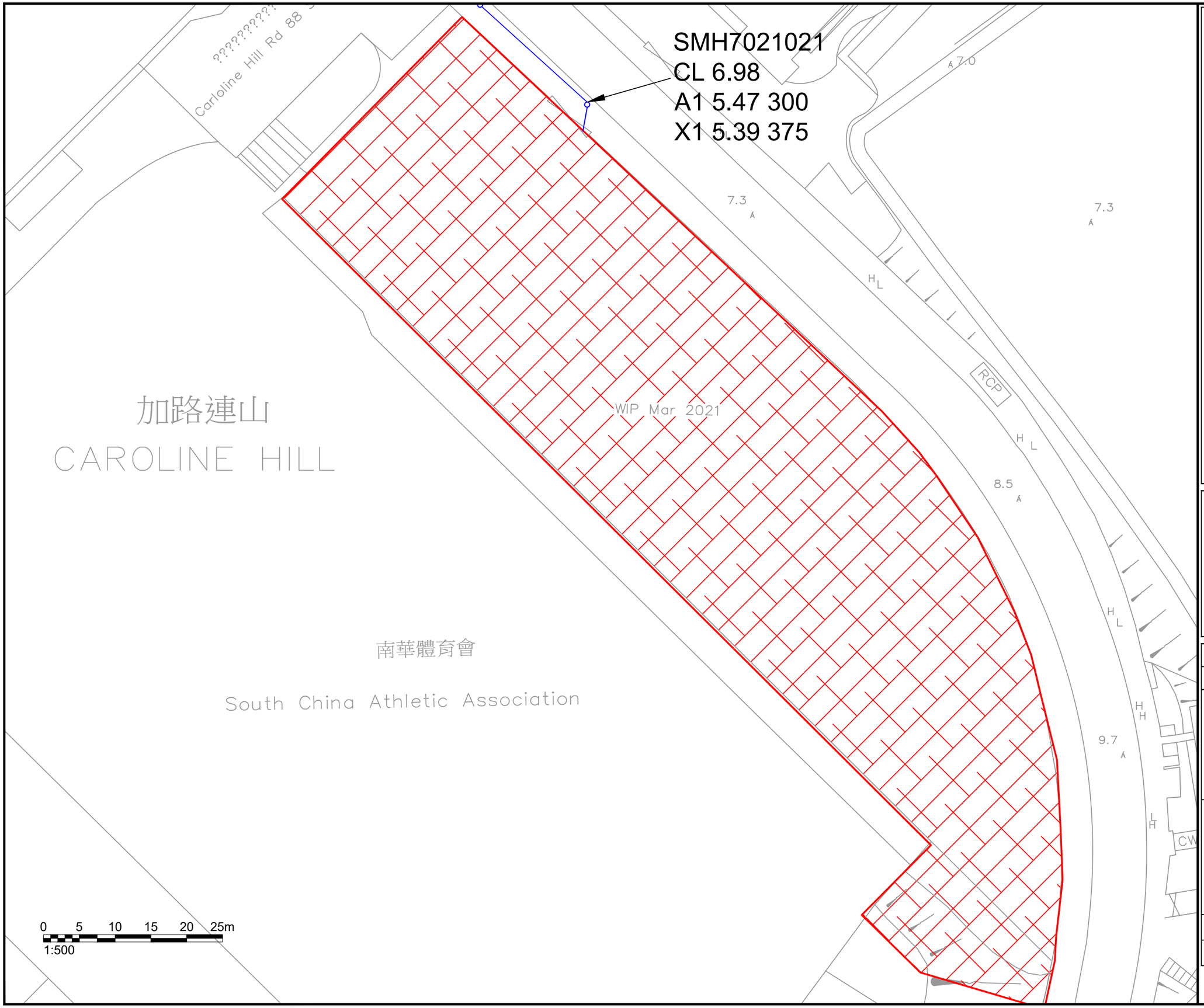
Table 6-1 Peak Flow of Subject Site

Catchment	Peak Flow (m^3/s)		Percentage (%)
	Before	After	
Subject Site	0.502	0.456	-9.16

6.1.2. Based on the calculation above, there is an anticipated 9.16% 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

Comprehensive Sports & Recreation Centre
G/F Plan ◦ 1 : 500 (A3) ◦ 29 Aug 2025

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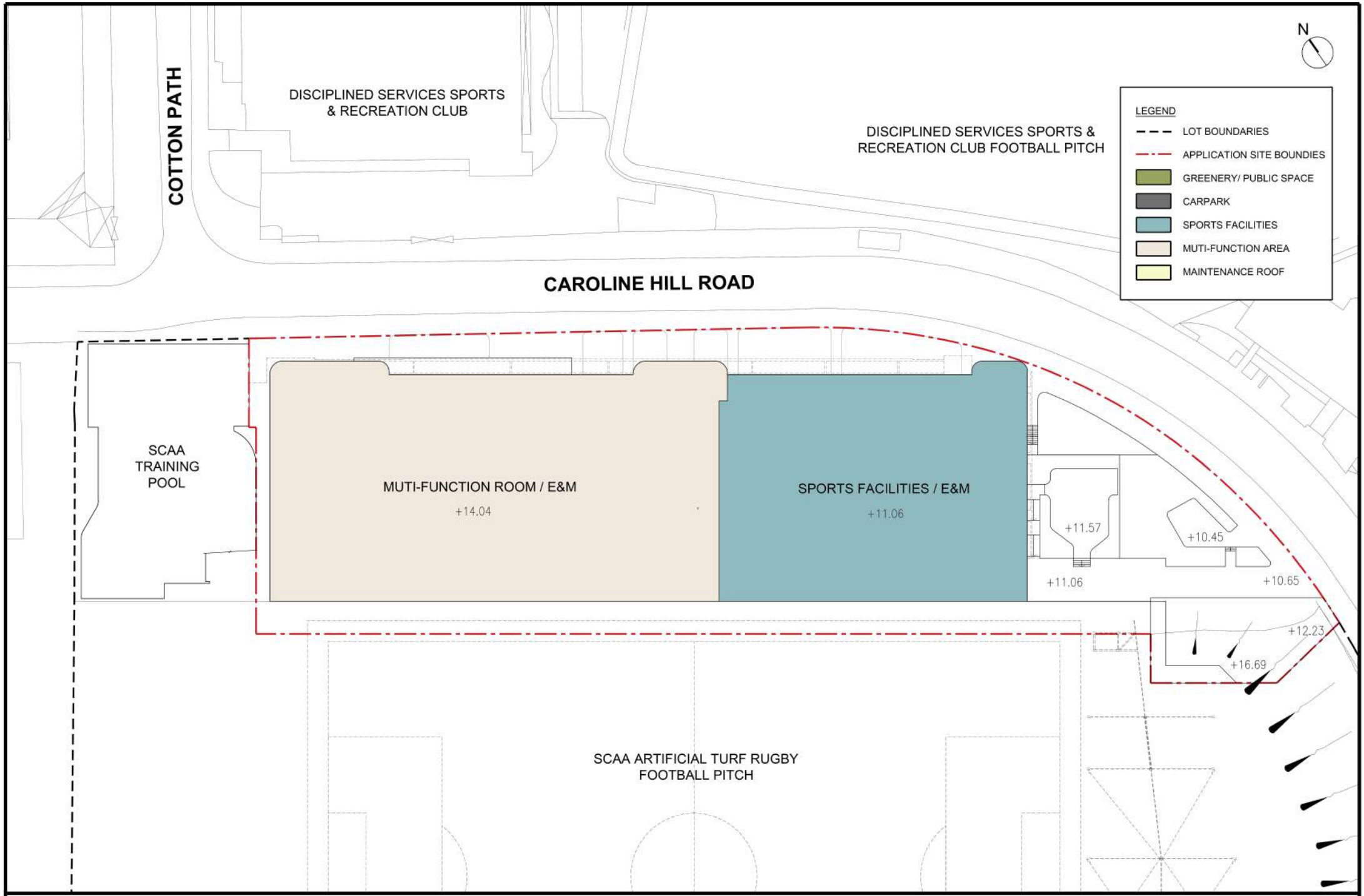

Comprehensive Sports & Recreation Centre
1/F Plan ◦ 1 : 500 (A3) ◦ 29 Aug 2025

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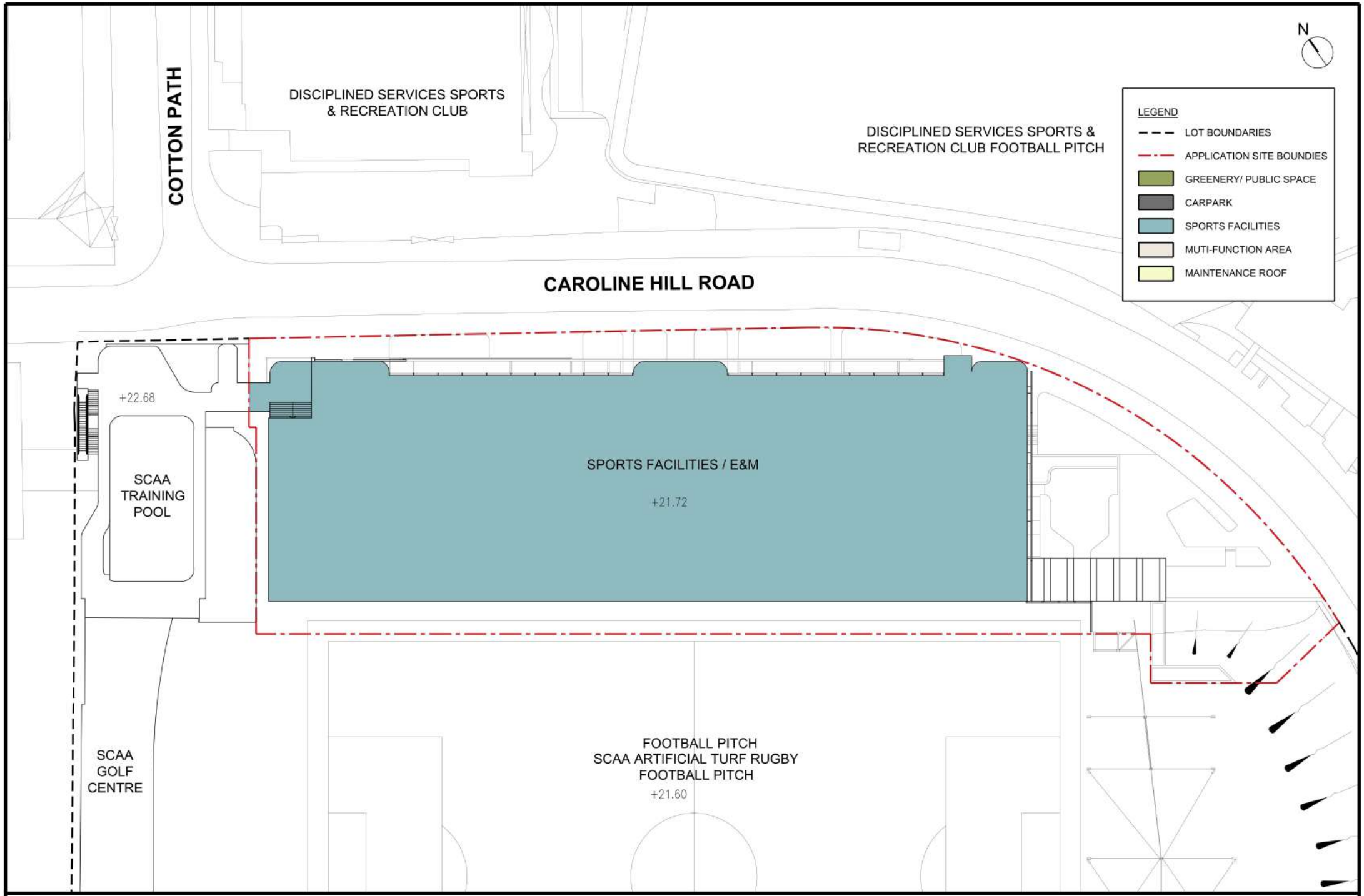

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2/F Plan ◦ 1 : 500 (A3) ◦ 29 Aug 2025

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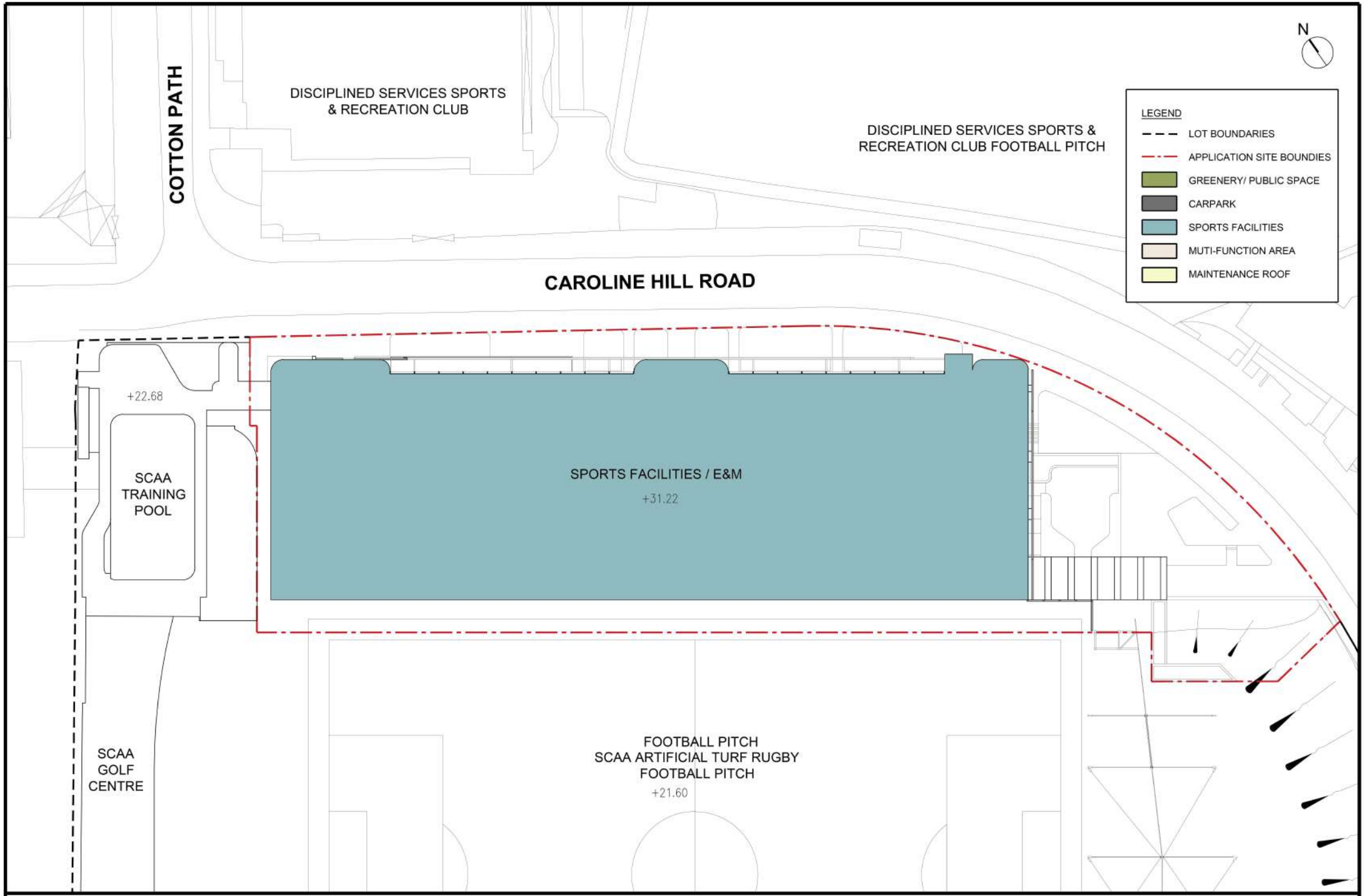

Comprehensive Sports & Recreation Centre
3/F Plan ◦ 1 : 500 (A3) ◦ 29 Aug 2025

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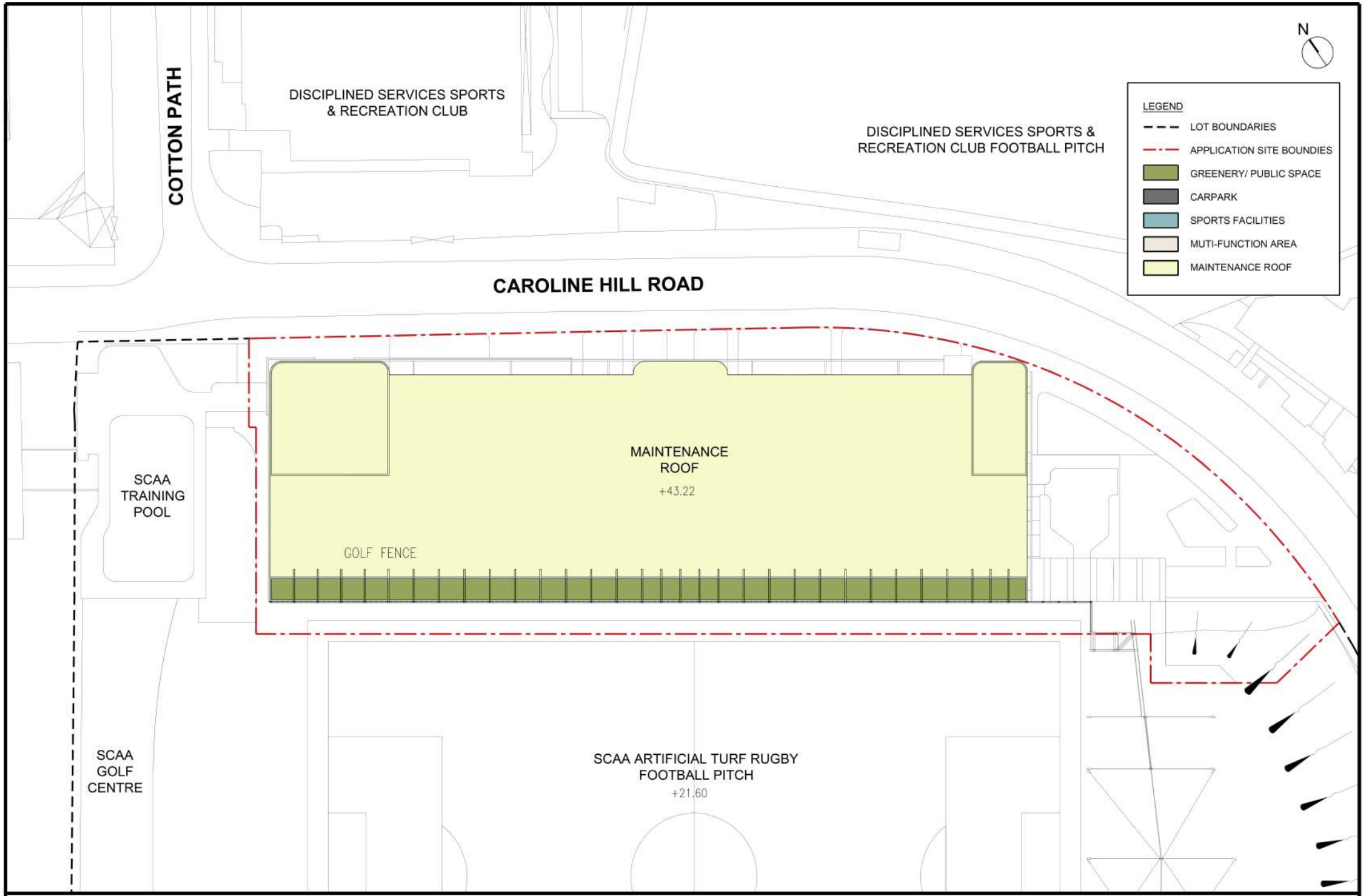

Comprehensive Sports & Recreation Centre
UR/F Plan ◦ 1 : 500 (A3) ◦ 29 Aug 2025

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Appendix 6-1

Peak Runoff Estimation

Appendix 6-1 Peak Runoff Estimation

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)	200-yr Return Period	Runoff Coefficient, C [3]	Rainfall Increase due to Climate Change, % [4]	Rainfall Increase for Design Allowance [5]	200-year Return Period Peak Runoff, Q_p (m^3/s) [6]	Total Peak Runoff, Qp (m3/s)
	Inlet invert level (mPD)	Outlet invert level (mPD)			Surface Characteristics			Extreme Mean Intensity, i (mm/hr) [2]					
Subject Site	11.3	6.7	2.91	6132	Concrete	6132	158	242	0.95	16.0	12.1	0.502	0.502
					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)	200-yr Return Period	Runoff Coefficient, C [3]	Rainfall Increase due to Climate Change, % [4]	Rainfall Increase for Design Allowance [5]	200-year Return Period Peak Runoff, Q_p (m^3/s) [6]	Total Peak Runoff, Qp (m3/s)
	Inlet invert level (mPD)	Outlet invert level (mPD)			Surface Characteristics			Extreme Mean Intensity, i (mm/hr) [2]					
Subject Site	14.13	6.93	4.56	6132	Concrete	5235	158	242	0.95	16.0	12.1	0.429	0.456
					Greenery	897			0.35	16.0	12.1	0.027	

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] Adopted the extreme intensity for 5 mins duration and 200-year Return Period from Table 2a in Stormwater Drainage Manual Corrigendum No. 1/2024 as conservative approach.

[3] 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.

[4] 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.

[5] 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.

[6] 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

Stormwater Drainage Manual CORRIGENDUM No. 1/2024 (26 March 2024)

Table 2a – Intensity-Duration-Frequency (IDF) Relationship of HKO Headquarters for durations not exceeding 240 minutes

Duration (min)	**Extreme Intensity (mm/h) for various Return Periods T (year)**								
	2	5	10	20	50	100	200	500	1000
240**	31.5	41.6	48.5	55.1	63.9	70.6	77.3	86.3	93.2
120++	50.4	66.0	75.7	84.7	95.9	104	112	121	128
60++	72.5	93.5	107	119	134	145	155	168	178
30++	93.3	115	128	139	153	162	170	180	187
15++	116	138	151	163	176	185	194	204	211
10*	131	155	169	181	195	204	212	222	229
5*	157	185	200	212	226	235	242	251	257
2*	191	223	239	252	265	273	280	287	291
1*	217	251	268	280	293	300	306	312	315
0.50*	242	279	296	309	320	327	332	337	339
0.25+++	268	307	324	336	347	353	357	361	363