

Appendix 6: Drainage Impact Assessment

**Layout Plan Submission and
Proposed Minor Relaxation of
Building Height Restriction for
Permitted Flat Use At 131 Pok Fu
Lam Road, Hong Kong, RBL 136RP**

Drainage Impact Assessment
Report

183437/LILY/004/Issue 1

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November 2023

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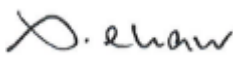
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	Name	Signature	Date
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Checked	Kenneth CHAN		November 2023
Reviewed	Sylvia CHAN		November 2023

1. INTRODUCTION

- 1.1 Binnies Hong Kong Limited (Binnies) has been commissioned to carry out drainage impact assessment to support a Section 16 planning application for layout plan submission and proposed minor relaxation of building height restriction for the permitted flat use (Proposed Development) at 131 Pok Fuk Lam Road, Hong Kong, RBL 136RP (Application Site). This report presents the findings of the drainage impact assessment for the Proposed Development at the Application Site.
- 1.2 The Application Site is currently the Ebenezer School and Home for the Visually Impaired. Access to the Application Site is via Pok Fu Lam Road as shown in **Drawing No. LILY16/LP/001**.
- 1.3 The Proposed Development consists of residential flats, clubhouse facilities and carpark area. The Application Site occupies an area of approximately 0.65 ha.
- 1.4 The Proposed Development consists of four residential blocks with 9-10 residential storeys excluding one level of lobby, car parking facilities and 4 club houses. The Proposed Development layout is shown in **Drawing No. LILY16/MLP/001**. A summary of key information of the Proposed Development is shown below in **Table 1**.

Table 1--- Development Schedule

	Proposed Development
<i>Site Area</i>	About 6,460 m ²
<i>Plot Ratio</i>	1.9
<i>No. of Storey</i>	9-10 residential storeys excluding one level of lobby
<i>Total Gross Floor Area (GFA)</i>	Not more than 12,274 m ²
<i>No. of Residential Units</i>	135
<i>Total Non-Domestic GFA (Residential Clubhouse)</i>	Not more than 614 m ²

- 1.5 This DIA is prepared based upon available information and requirements under DSD Advice Note No. 1 – Application to the Drainage Impact Assessment Process to Private Sector Projects.
- 1.6 This DIA report comprises the following sections after this introduction:
- **Chapter 2** discusses the development proposal and the existing drainage characteristics;
 - **Chapter 3** presents the potential drainage impact arising from the Proposed Development and the proposed drainage system within the Application Site;
 - **Chapter 4** provides consideration on operation and maintenance of the drainage system; and
 - **Chapter 5** summarizes the conclusion and recommendations of this DIA report.

2. APPLICATION SITE & EXISTING DRAINAGE SYSTEM

Descriptions of the Application Site

- 2.1 The existing ground level of the Application Site ranges from approximately +135.0 mPD to +128.3 mPD sloping generally northeast to southwest as shown in **Appendix A**.
- 2.2 Currently, the Application Site is mostly paved. The aerial photographs are presented in **Drawing No. LILY16/DIA/001**.

Existing Drainage Network

- 2.3 There is an existing natural stream flowing from northeast to southwest adjacent to the Application Site. The natural stream conveys runoff from upper catchment of the Application Site to the downstream 1800 mm dia. cross-road drain, then to the 2x 2250 mm dia. drain at Kong Sin Wan Road.
- 2.4 Surface runoff from the Application Site is currently conveyed to this natural stream via internal drains. The existing catchment and drainage system at downstream of the Application Site are shown in **Drawing No. LILY16/DIA/002**.

Current Flooding Susceptibility

- 2.5 No flooding events are recorded within the Application Site.

3. DRAINAGE IMPACT ASSESSMENT

3.1 As change in land use would affect the amount of surface runoff flowing into the existing drainage system, the paved / unpaved ratio of the Application Site before and after the Proposed Development were reviewed and summarized in **Table 2**. A greenery ratio of 20% is adopted in the Proposed Development.

Table 2 --- Paved / Unpaved Ratio of the Application Site

	Before Development	After Development
Paved Area	5,408 (84%)	5,164 m ² (80%)
Unpaved Area	1,052 (16%)	1,296 m ² (20%)

3.2 There is no significant change in the paved / unpaved ratio of the Application Site due to the Proposed Development. The change in surface runoff discharging into the downstream drainage system is therefore considered insignificant.

Drainage Works within the Application Site

3.3 To properly convey the surface runoff from the Application Site after the Proposed Development, internal drainage works are proposed. It is proposed to convey the surface runoff from the Application Site by 500 mm u-channel for discharge to the adjacent natural stream via a 525 mm dia. outlet drain. The layout and hydraulic calculation of the proposed drainage works are enclosed in **Drawing No. LILY16/DIA/003** and **Appendix B** respectively.

4. OPERATION AND MAINTENANCE

Maintenance Responsibility

- 4.1 The drainage facilities provided as part of the Proposed Development inside the Application Site will be maintained by the developer or the management of the development after completion. No specific maintenance operations are envisaged but it is considered desirable that the facilities will be inspected annually before the commencement of the wet season to ensure that these drains can function properly.

Construction Consideration

- 4.2 The contractor is responsible for temporary drainage arrangement during construction and to ensure that the existing drainage system in adjacent to the Application Site would not be affected at the construction stage.
- 4.3 Should any temporary blockage or diversion of the flow path be necessary for construction, the work must be carried out within the dry seasons and the Contractor must have appropriate mitigation measures in place. Examples of appropriate mitigation measures include providing sandbags or similar to increase the in-channel capacity and to maintain flow through a given channel section through over-pumping.
- 4.4 Flow diversion should be designed in accordance with standards and recommendations established in the Drainage Service Department (DSD) Stormwater Drainage Manual (SDM), DSD Technical Circular No. 14/2000 - Temporary Flow Diversions and Temporary Works Affecting Capacity in Stormwater Drainage System, and DSD Practice Note No. 1/2004 - Design Rainfall Depth for Temporary Works within the Dry Season.
- 4.5 Proper measures shall be taken to maintain the existing drainage characteristics of the catchment areas and to minimize drainage impacts associated with the construction works. The principal drainage impacts which are associated with construction of the works have been identified as follows:
- Erosion of ground materials;
 - Sediment transportation to existing downstream drainage system; and
 - Obstruction to drainage systems.
- 4.6 Excavated slopes for the Application Site shall be well-compacted and protected to prevent any loose material being washed out during rainfall. Temporary protection may be in the form of placing layers of granular material and rock fill material or hard surface cover on the sloping faces of channel or tarpaulin covering.
- 4.7 Perimeter u-channels should be provided wherever possible at the crest of the excavated slope to intercept the runoff and hence avoiding erosion to the slope surfaces.
- 4.8 Regular inspection shall be carried out to ensure integrity of the works. These inspections shall cover works under construction as well as recently completed areas.

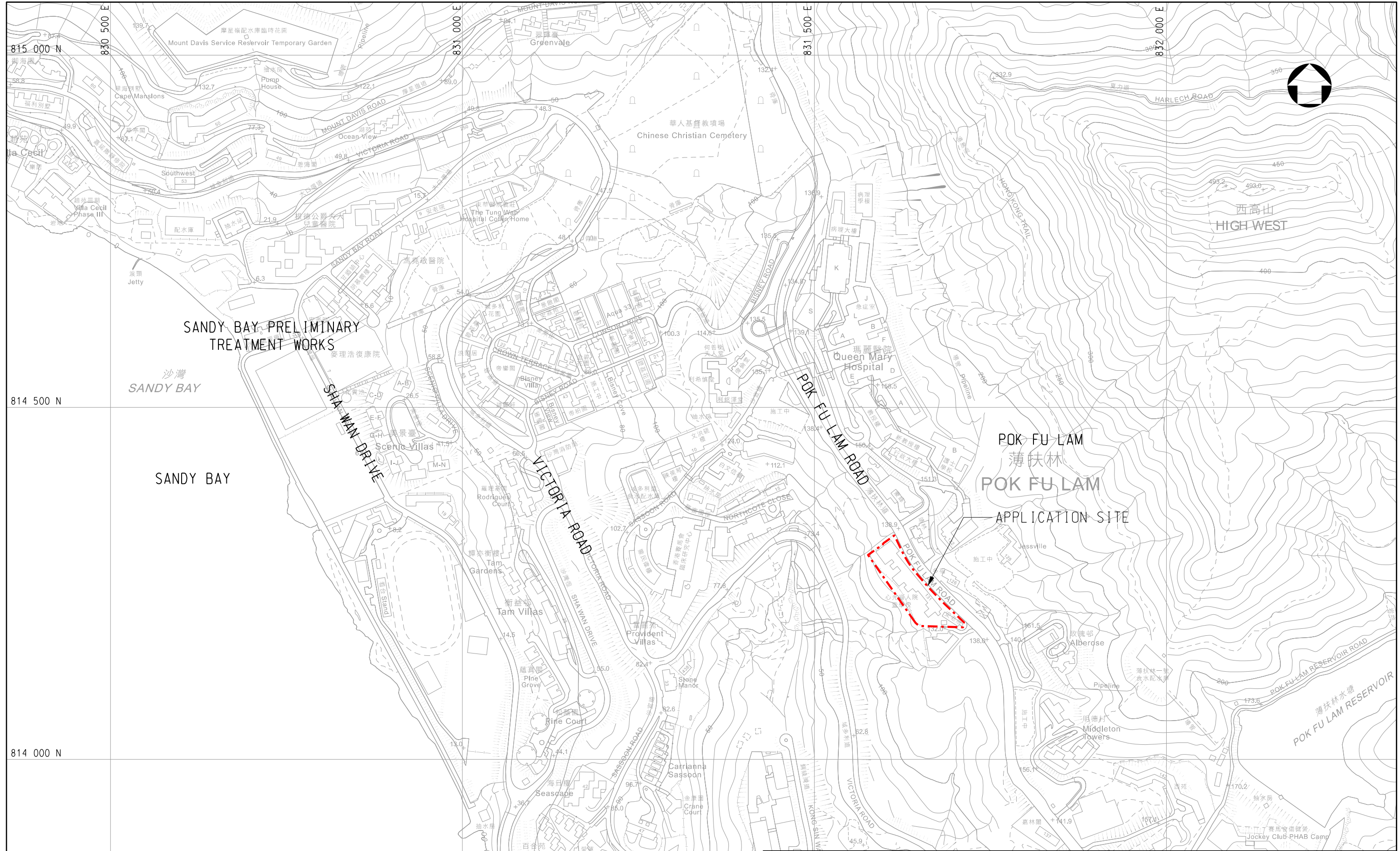
- 4.9 No excavated materials should be left on site. If it is not possible to transport away the excavated material within the same day, the material should be covered by tarpaulin / impervious sheets. Measures shall be taken to ensure that runoff from the Application Site is managed so that silts and other pollution are properly intercepted.
- 4.10 In the event of extreme weather including Landslip Warning, issuance of Amber / Red / Black Rainstorm Warning, Special Flood Announcement in the Northern New Territories, Typhoon Signal No. 3 or above and the like, site inspections and surveys shall be carried out by the contractor's emergency team as deemed practical and safe before and after the events to ascertain if there has been any siltation or erosion. If it is determined that any unacceptable siltation or erosion has occurred, the contractor shall rectify it immediately. An initial report needs to be submitted to the Resident Site Staff (RSS) within 1 day after the event and a full report within 4 working days of the event.

5. CONCLUSION

- 5.1 After development, there is no change in surface runoff discharging into the downstream drainage system as the Application Site is currently paved. Therefore, the drainage impact is considered insignificant.
- 5.2 Internal drainage works are proposed to properly convey the surface runoff from the Application Site to the existing natural stream, following the existing flow path for discharging to the sea.

END OF TEXT

Drawings

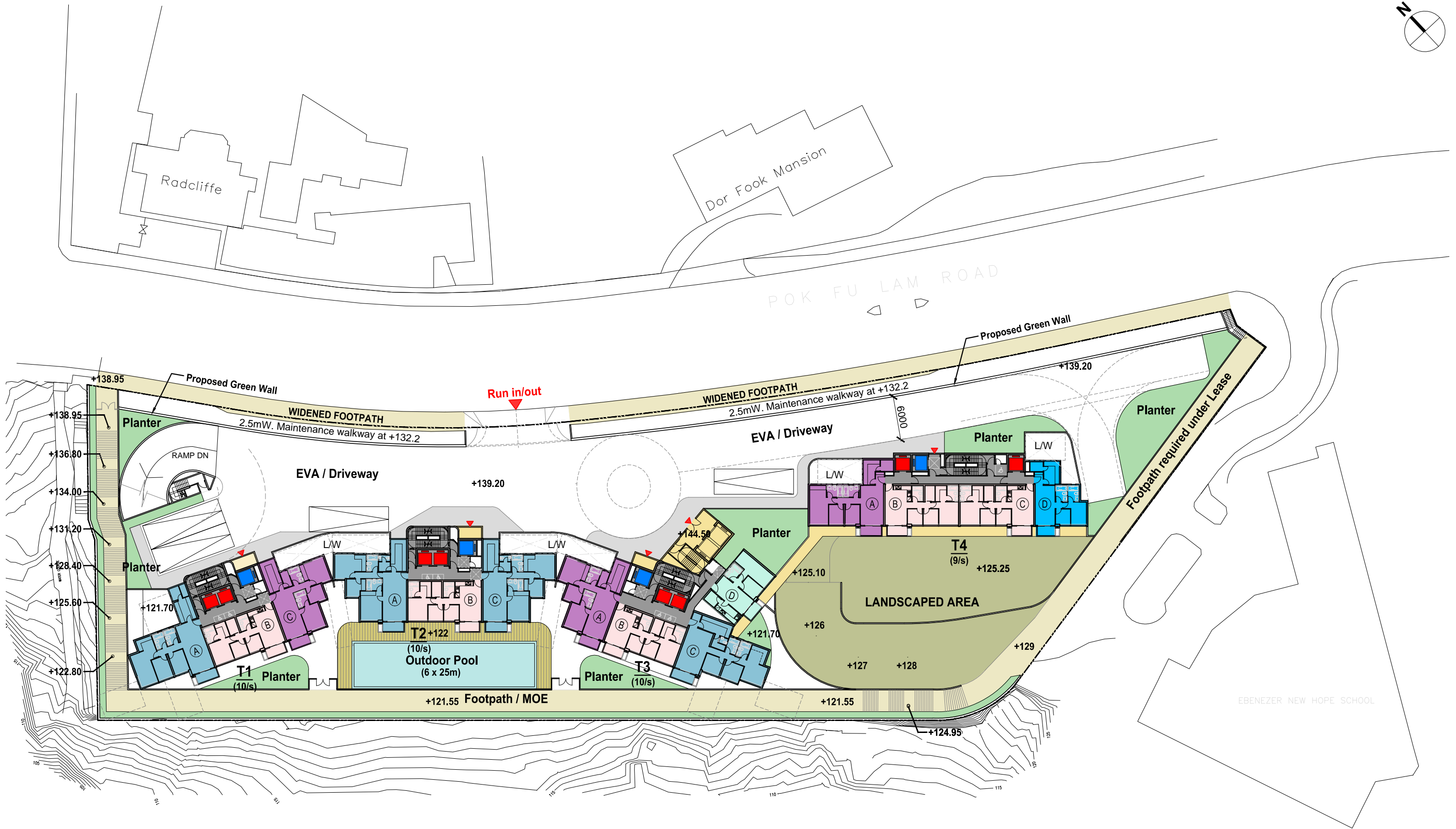


Plot date : 2023/11/9

LEGEND:

--- APPLICATION SITE

<p>Title</p> <p>LOCATION PLAN</p>	<p>Project title</p> <p>LAYOUT PLAN SUBMISSION AND PROPOSED MINOR RELAXATION OF BUILDING HEIGHT RESTRICTION FOR PERMITTED FLAT USE AT 131 POK FU LAM ROAD, HONG KONG, RBL 136RP</p>		<p>Figure no.</p> <p>LILY16/LP/001</p>	
	<p>binnies</p> <p>BINNIES HONG KONG LIMITED 賓尼士工程顧問有限公司</p>		<p>Prepared</p> <p>-</p>	<p>Checked</p> <p>-</p>
		<p>Date</p> <p>11/23</p>	<p>Scale</p> <p>A3 1:5000</p>	





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	Designed	Reviewed	Drawn	Checked
Initial	WKC	SC	WKC	SC
Date	Aug 2023	Aug 2023	Aug 2023	Aug 2023
Revision	Date	Description		Initial

Legend
 Application Site
 Unpaved Area

Approved

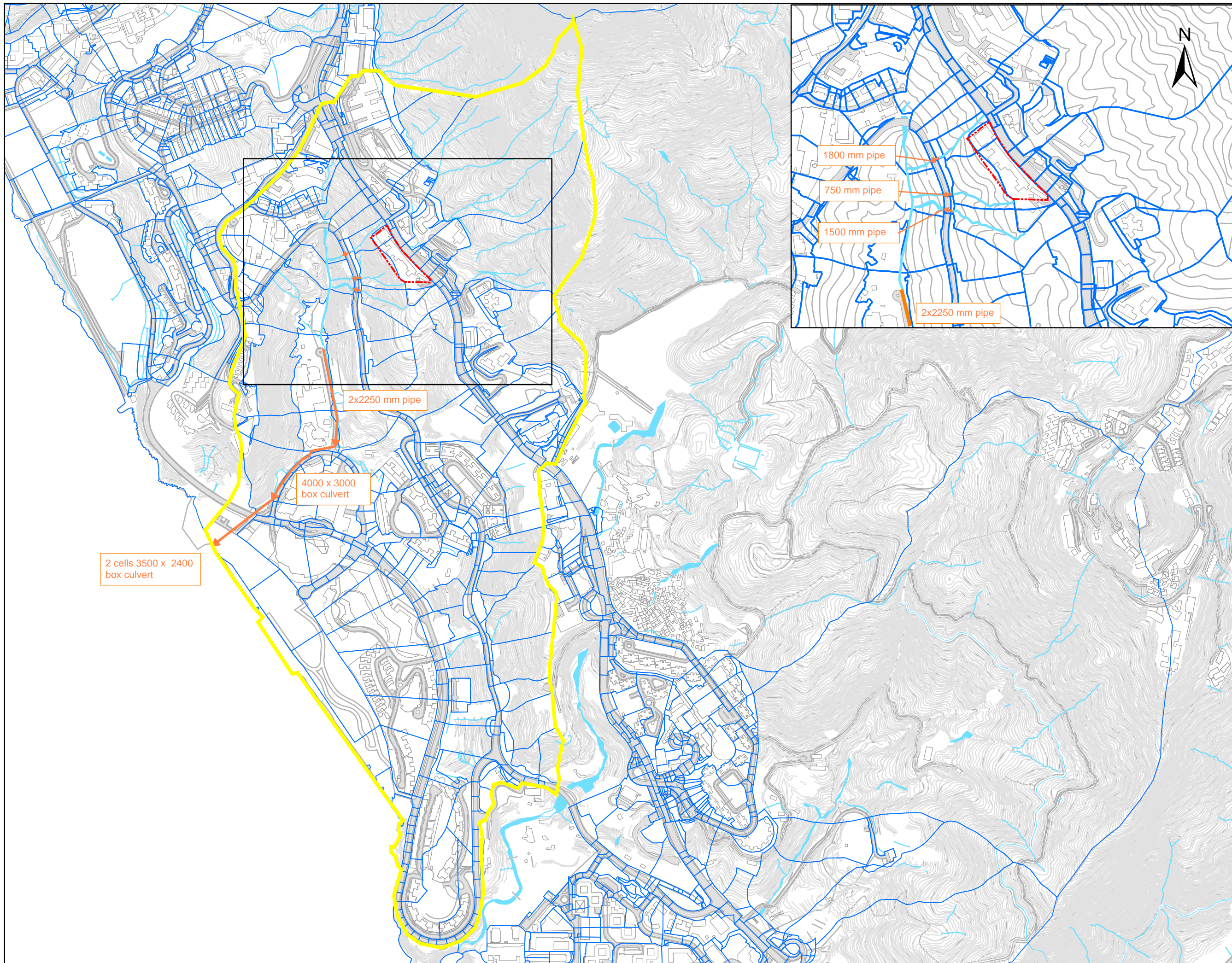
Project Title
 LAYOUT PLAN SUBMISSION AND
 PROPOSED MINOR RELAXATION OF
 BUILDING HEIGHT RESTRICTION FOR
 PERMITTED FLAT USE AT 131 POK FU
 LAM ROAD, HONG KONG, RBL 136RP

Figure Title
 AERIAL PHOTOGRAPHS

Drawing No. LILY16/DIA/001 Scale 1:1,000 @ A3

Client

Consultant
 BINNIES HONG KONG LIMITED
 賓尼斯工程顧問有限公司



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Initial	Designed	Reviewed	Drawn	Checked
	WKC	SC	WKC	SC
Date	Aug 2023	Aug 2023	Aug 2023	Aug 2023
Revision	Date	Description	Initial	

- Legend**
- - - Application Site
 - Subcatchment
 - Drainage Basin
 - Existing Drainage System
 - Stream

Approved

Project Title
 LAYOUT PLAN SUBMISSION AND
 PROPOSED MINOR RELAXATION OF
 BUILDING HEIGHT RESTRICTION FOR
 PERMITTED FLAT USE AT 131 POK FU
 LAM ROAD, HONG KONG, RBL 136RP

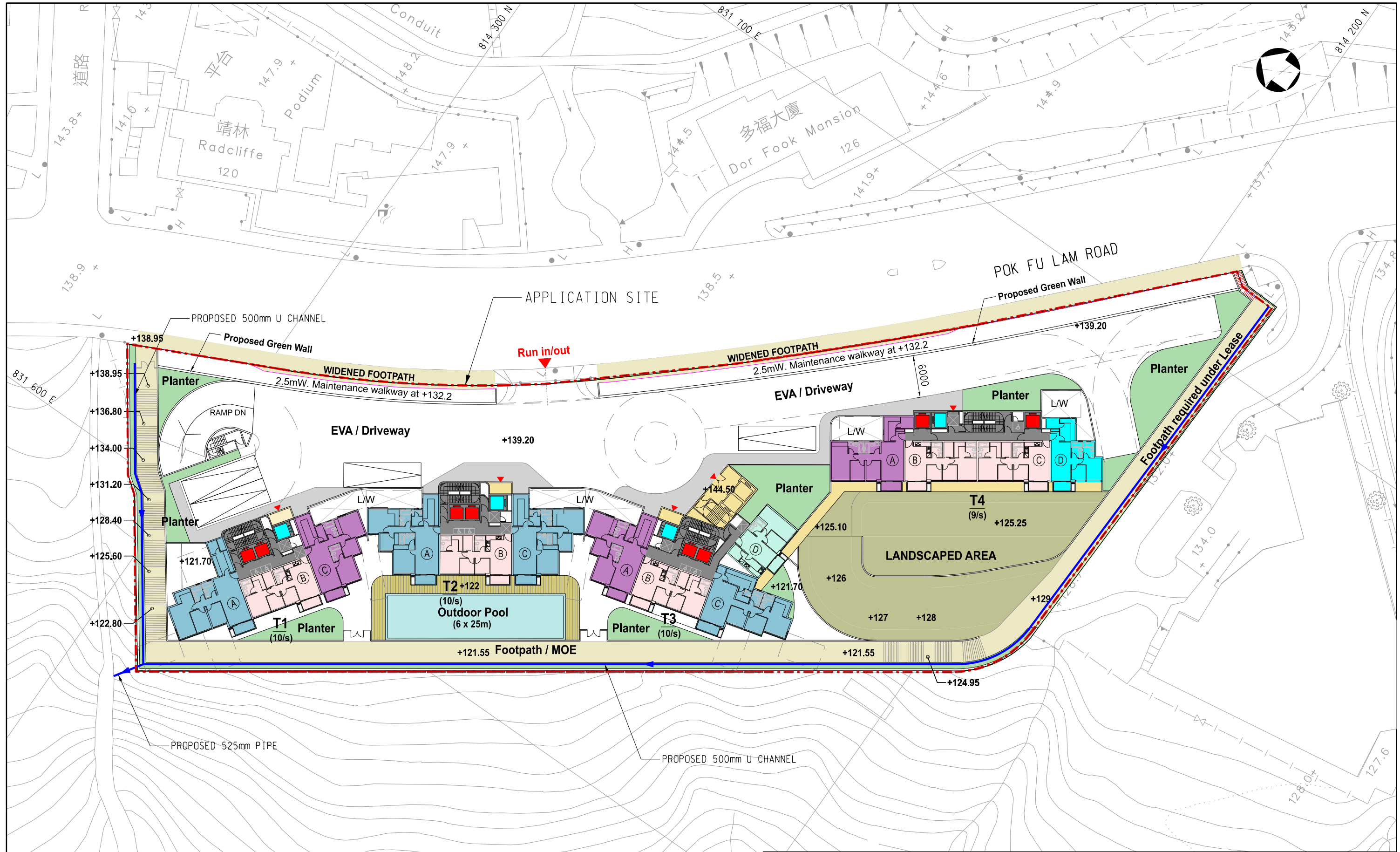
Figure Title
 Catchment Plan &
 Existing Drainage Networks

Drawing No. LILY16/DIA/002	Scale 1:8,000 @ A3
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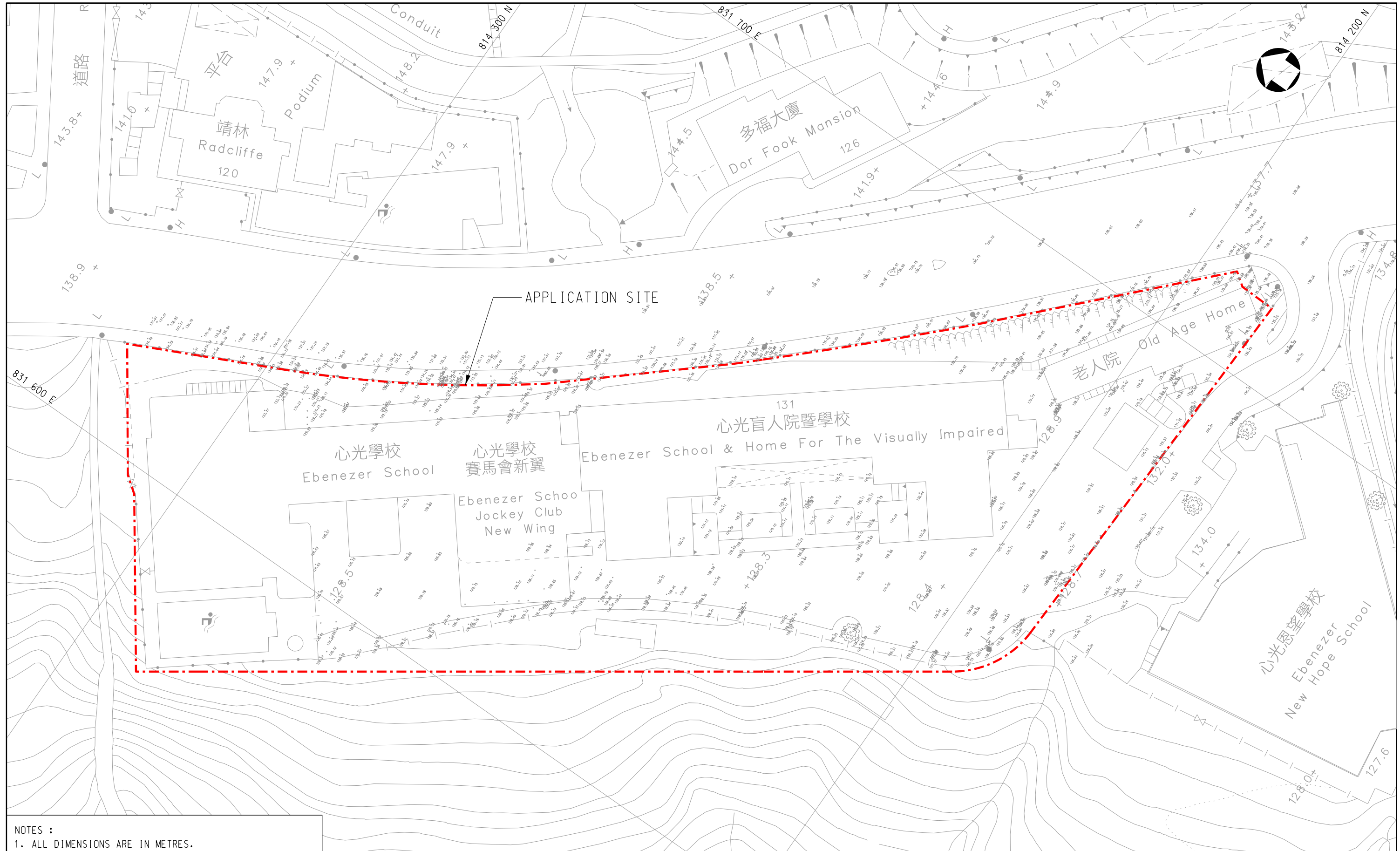
Plot date : 2023/11/9

LEGEND:
 APPLICATION SITE

PROPOSED DRAINAGE WORKS	Project title LAYOUT PLAN SUBMISSION AND PROPOSED MINOR RELAXATION OF BUILDING HEIGHT RESTRICTION FOR PERMITTED FLAT USE AT 131 POK FU LAM ROAD, HONG KONG, RBL 136RP		Figure no. LILY16/DIA/003	
	Date 11/23		Prepared -	Checked -
BINNIES HONG KONG LIMITED 賓尼士工程顧問有限公司		Scale A3 1:500		


Appendix A

Existing Topography Plan



- NOTES :
1. ALL DIMENSIONS ARE IN METRES.
 2. ALL SPOT LEVEL POSITIONS ARE INDICATED BY A CROSS.
 3. ALL LEVELS ARE IN METRES TO PRINCIPAL DATUM (PD) UNLESS NOTED OTHERWISE.
 4. ALL CO-ORDINATES ARE REFER TO HONG KONG (1980) METRIC GRID CO-ORDINATES SYSTEM.

LEGEND:
 APPLICATION SITE

Title EXISTING TOPOGRAPHY PLAN	Project title LAYOUT PLAN SUBMISSION AND PROPOSED MINOR RELAXATION OF BUILDING HEIGHT RESTRICTION FOR PERMITTED FLAT USE AT 131 POK FU LAM ROAD, HONG KONG, RBL 136RP	Figure no. LILY16/DIA/APPENDIX A	
	 BINNIES HONG KONG LIMITED 賓尼士工程顧問有限公司	Prepared -	Checked -
		Date 11/23	Scale A3 1:500

Plot date : 2023/11/9

Appendix B

Hydraulic Calculation of Proposed Drainage Works

Project Layout Plan Submission and Proposed Minor Relaxation of Building Height Restriction for Permitted Flat Use At 131 Pok Fu Lam Road, Hong Kong, RBL 136RP

Subject Proposed Drainage Works for Application Site

Design Assumption

1. Design follows the Rational Method in accordance with DSD's Stormwater Drainage Manual (SDM).
2. Runoff coefficient for paved land is 0.9.
3. Runoff coefficient for unpaved land is 0.35.
4. Design return period is 50 years.

Check for Design Flow of U-Channel

Land Type	C	Area	Corresponding Area %
Unpaved	0.35	5164.00 m ²	20%
Paved	0.90	1296.00 m ²	80%
Effective Runoff Coefficient	0.79		

Runoff estimation

	Average slope, H	=	8.333
	Natural Catchment area, A	=	6460.00 m ²
	Distance between summit and point under consideration, L	=	180 m
SDM 7.5.2	Time of concentration of natural catchment, t _o	=	0.14465 x L / (H ^{0.2} x A ^{0.1})
		=	7.09 min.
	Length of drain, L _j	=	180 m
	Velocity, V _j (assumed)	=	2.5 m/s
SDM 7.5.2	Flow time, t _f	=	Σ (L _j / V _j)
		=	1.200 min.
	Time of concentration, t _c	=	t _o + t _f
		=	8.29 min.
SDM Table 3	Storm constants for 50-year return period:	a =	451.3
		b =	2.46
		c =	0.337
SDM 4.3.2	Extreme mean intensity, i _{50yr}	=	a / (t _d + b) ^c
		=	202.7 mm/hr
	Runoff coefficient, C	=	0.79
SDM 7.5.2	Design flow, Q _d	=	0.278 C i A
		=	0.288 m ³ /s
Table 28	Rainfall Increase due to Climate Change (End of 21 st Century)	=	16.0%
Table 31	Design Allowance in End of 21 st Century (Rainfall Increase)	=	12.1%
	Design flow with consideration of Climate Change, Q _d	=	0.368 m ³ /s

UC capacity calculation

	UC diameter	=	500 mm
	Gradient	=	1 %
	Flow velocity	=	1.945 m/s
	Design Capacity	=	0.434 m ³ /s
		>	Q _d = 0.368 m ³ /s
			OK

Check for Design Flow of Proposed Outlet Pipe

Pipe capacity calculation

	Pipe diameter	=	525 mm
	Gradient	=	1 %
	Hydraulic Radius	=	0.1313 m
	Flow velocity	=	1.801 m/s
	Design Capacity	=	0.443 m ³ /s
		>	Q _d = 0.368 m ³ /s
			OK