寄件者: [redacted]
寄件日期: 2025年10月15日星期三 11:04
收件者: tpbpd/PLAND
副本: [redacted]
主旨: Fw: S. 16 Planning Application No. A/YL-KTN/1113 - Departmental Comments
附件: Drainage Proposal-R1.pdf

[redacted]

Thank you for the email. Please see the attachment for the updated further information for updated drainage proposal. Please contact Mr. Tang on phone [redacted] or email to [redacted] if you have any question regarding to the proposal.

Your Sincerely,
Mr. Tang

Response to Comment Table

Comments from Drainage Services Department **(Contact Person: Ms. Jessica KWAN; Tel.: 2300 1444)** I have the following comments on the submitted drainage proposal:		
(1) Para. 3.2.3 - "Ng Tung River" and the quoted channel feature no. are not applicable to this submission.		Noted. The irrelevant channels are removed.
(2) A simple table in the main text should be added to compare the runoff generated by different catchments before and after the proposed development.		Noted. **Table 4.1** has been added accordingly.
(3) As mentioned in para. 4.3.2, the stormwater will enter the Project Site through the section where no concrete footing is provided at the hoardings. However, majority of the site will be filled to about 11.0 - 11.2mPD as shown in **Figure 4.1**. Please advise (with illustration by cross-sections) how the surface runoff from the adjoining area could still be collected properly by the proposed drainage system. For **Figure 2.5**, please clarify the extent of the hoarding with and without concrete footing and if it will be modified under the proposed development.		Noted. **Section 4.1.2** has been revised to further elaborate how the filling works would not affect the surface runoff path from the adjoining area entering the Project Site after the proposed development. **Figure 2.4c** has been added to demonstrate the level of the Project Site after the filling works. A markup has been added to **Figure 2.5** to show the extend of fence without a permeable footing.
(4) It is noted that the natural stream within the site is heavily vegetated. Please carry out routine vegetation clearance to maintain its hydraulic capacity.		Noted. Project proponent will be responsible for regular clearance of vegetations. **Section 4.4.3** has been added to confirm.

UMWELT CONSULTING LIMITED
23/F, On Hong Commercial Building, 145 Hennessy Road, Wan Chai, Hong Kong

Application No. A/YL-KTN/1113
Lots 949 (Part) and 1103 (Part) in D.D. 107, Kam Tin North, Yuen Long, New Territories

Drainage Proposal
Revision 1
14 October 2025

Content:

Figures:

Appendices:

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1. Introduction

1.1 Project Title

1.1.1 Application for Permission Under Section 16 of the Town Planning Ordinance Application No. A/YL-KTN/1113.

1.2 Project Background

1.2.1 A Planning Application No. A/YL-KTN/1113 was submitted to the Town Planning Board on 15 July 2024 to seek planning permission for a Proposed Temporary Animal Boarding Establishment with Ancillary Facilities and Associated Filling of Land for a Period of 3 Years at the application site (the Project Site) in Lots 949 (Part) and 1103 (Part) in D.D. 107, Kam Tin North, Yuen Long, New Territories.

Statutory Land Use Zoning of the Project Site

1.2.2 The Project Site falls within the 'Agricultural' ("AGR") zone according to the Approved Kam Tin North Outline Zoning Plan No. S/YL-KTN/11 ("the OZP"). According to the Notes of the OZP, 'Animal Boarding Establishment' belongs to Column 2, that the uses may be permitted with or without conditions on application to the Town Planning Board ("TPB"). A Planning Application is therefore submitted for the proposed development at the Project Site.

Location of the Project Site

1.2.3 The location of the Project Site is given in **Figure 1.1**. A panoramic view of the Project Site is given in **Figure 1.2**.

1.2.4 The Project Site has an area of about 5,070m^2 and the proposed development mainly comprises 18 non-domestic buildings with building heights not more than 6m and not with not more than 2 storeys. The buildings are mainly used for shelters for animals.

1.3 Summary of the Project

1.3.1 An outline on the Project is given in **Table 1.1**.

Table 1.1: Outline on the Project

Project title	Application for Permission Under Section 16 of the Town Planning Ordinance
Proponent	
Contact Person (name/telephone)	Mr. TANG Lok San / 6848 3319
Nature and description of the project	Proposed Temporary Animal Boarding Establishment with Ancillary Facilities and Associated Filling of Land for a Period of 3 Years
Location (include plans)	Lots 949 (Part) and 1103 (Part) in D.D. 107, Kam Tin North, Yuen Long, New Territories
Area of project site and % paved/unpaved (existing and proposed)	About 5,070m^2, partially paved
Level to be filled up	About 0.3m
Whether planning permission application is required	Yes
Whether lease modification application is required	Not Applicable
Statutory land use zoning	Agriculture
Recent and dated photographs to shown a panoramic view of the site	Please refer to **Figure 1.2**.

1.4 Purpose of this Proposal

1.4.1 A Drainage Proposal has been submitted to the TPB on 4 November 2024. Pursuant to the comment received from Drainage Services Department ("DSD"), this drainage proposal is prepared in response to the comments and to supplement the application and the captioned condition to demonstrate no adverse drainage impact will be caused to the adjacent area.

1.5 Relevant Guidelines and Classification of the Project Site

Relevant Guidelines for this Drainage Proposal

1.5.1 This Drainage Proposal has been carried out in accordance with the guidelines given as follows:

a) Technical Note to Prepare a Drainage Submission ("the TN");
b) Stormwater Drainage Manual Planning, Design and Management (Fifth Edition, January 2018) ("the Manual");
c) Drainage Services Department Stormwater Drainage Manual Corrigendum No. 1/2022 and 1/2024;
d) Advice Note No.1 - Application of the Drainage Impact Assessment Process to Private Sector Projects issued by Drainage Services Department, September 2010. Hong Kong Planning Standards and Guidelines, August 2011; and
e) Relevant standard drawings provided by Civil Engineering and Development Department.

Classification of the Project Site

1.5.2 As the Project Site is approximately 5,070m^2, which is smaller than 1 ha, in accordance with the TN, the Project Site is classified as a Simple Site. A Drainage Proposal will be prepared in accordance with the standards set out in the Manual. This Drainage Proposal therefore presented the drainage arrangement within the Project Site only.

2. Existing Environment of the Project Site

2.1 Overview of Local Terrain and Surrounding Environment

Local Terrain within Proximity of the Project Site

2.1.1 The Project Site is located within Fung Kat Heung. To the south of the Project Site located a number of farmlands. The local uncharted drainage system within the farmlands serve as the main discharge channels for the surrounding area.

2.1.2 The area to the north, east and west of the Project Site are generally used as open storage. Within the area to the east, construction works is currently in progress and to the south are farmlands and residential areas.

2.1.3 The local terrain is higher at the north and lower at the south. Stormwater falls at the north of the Project Site will flow towards the site, which will be collected by the U-channel within the Project Site and ultimately discharged southwards, either through the stream located at the central of the Project Site or other minor channels located within the farmlands. The natural stream that runs through the Project Site serves as the main discharge channel for the area and will direct the collected stormwater southwards into local drainage networks, and discharge into the channel feature SUP1019960, and ultimately into the feature SCP1009640.

Terrain of the Project Site

2.1.4 The Project Site is an area of about 5,070m^2. Majority of the Project Site is paved with concrete, and a section of the site is covered with vegetation which is permeable. Multiple temporary structures were erected within the Project Site. Some trees are growing along the eastern, northwestern, and southwestern side of the site. The surrounding areas are predominant by open space storage to the north, northwest, and east, and farmlands and residential units to the south and to the west. At northern side of the Project Site is an open space storage currently used as storage space for construction vehicle.

2.1.5 The Project Site is generally flat, but slightly higher at the northern side and gradually fall towards the southern end, following the local terrain.

2.1.6 **Figure 2.1** shows the indicative topography of the Project Site. **Figure 2.2** shows the existing drainage identified within the Project Site. **Figure 2.3** shows the full alignment of the discharge path from the application site all the way down to the ultimate discharge point.

2.1.7 A cross-section for the Project Site is given in **Figure 2.4**.

2.2 Existing Drainage Channel

Recorded Public Drainage Channel

2.2.1 No public drainage channel was identified within proximity of the Project Site. The nearest discharge channel, a 600mm wide U-Channel SUP1019960, is located at about 60m from the Project Site to the southwest. A 6500mm wide trapezoidal channel SCP1009640, is further south at about 85m from the Project Site to the southwest. This trapezoidal channel is the main discharge channel for the area. **Figure 2.2** shows the identified channels within the proximity of the Project Site. The full alignment of the

discharge path from the application site all the way down to the ultimate discharge point is given in **Figure 2.3**.

2.2.2 The area is currently not a flooding prone area. Demonstrated the trapezoidal channel SCP1009640 would have enough discharge capacity to handle the rainwater for the area.

Site Visit and Observation

2.2.3 A site visit was conducted on 10 December 2024 to obtain the current condition of the surrounding area and existing drainage system within the Project Site. Photos taken during the site visit showing the features identified in the following sections are given in **Figure 2.5** to **Figure 2.9**.

Current Condition of the Project Site

2.2.4 A hoarding made with sheet metal have been erected surrounding the Project Site. Part of the hoardings have no concrete footing, hence the hoarding of the Project Site does not totally seal the project boundary and stormwater would be able to flow into and out of the Project Site during rainstorm at some of the area. (Photo 1 and 2 in **Figure 2.5**) The extend of fence with non-permeable footing is also show in **Figure 2.5**. In addition, some of the hoardings have concrete sealed the lower section of the hoardings, preventing stormwater from flowing towards west, out of the Project Site. (Photo 3 in **Figure 2.5**) The stormwater would be directed by the hoarding and flows towards the east, where existing drainage channels within the Project Site will direct the stormwater towards the centre of the site and enters the natural stream and be discharged. The aerial photos showing the existing stream is given in **Figure 2.6**.

2.2.5 A natural stream was found running through the centre of the Project Site. The stream is trapezoidal in shape with dimension of about 2m wide and 1.5m deep. The stream flows under the access road running through the centre of the Project Site and exit the Project Site. (Photo 1 and 2 in **Figure 2.7**)

2.2.6 Within the Project Site, it is observed that simple network of U-channel is in place to direct stormwater through the site. (Photo 3 in **Figure 2.7**, and Photo 1, 2, and 3 in **Figure 2.8**) The location of the identified U-channel and respective size are given in **Figure 2.2**.

Current Condition of the Surrounding Area

2.2.7 At the immediate north of the Project Site is a number of residential units. These premises will have its own drainage system and discharge the stormwater into the channel that connects to the stream and enters the Project Site. Further north is an open space which is currently used for storage of construction vehicles. The area is paved with concrete.

2.2.8 Concrete walls were erected by other landowners at their premises. Rainfalls within other premise are anticipated to be intercepted by the local drainage networks and overflow into other premise is not anticipated. (Photo 1 to 2 in **Figure 2.9**) A tree protection zone is also allocated at the northwest corner of the Project Site. (Photo 3 in **Figure 2.9**)

2.2.9 At the east of the Project Site is an open space storage area where vehicle parking is also observed. A U-channel was identified at east of the Project Site directing stormwater towards east and be discharged.

2.2.10 At the south and west of the Project Site are farmlands. U-channels network was identified. These networks would direct the collected stormwater southwards. Exact drainage path cannot be identified as the U-channels enters private lands which are not accessible, but the stormwater should ultimately enter existing discharge channels SCP1009640 or other discharge channels.

2.2.11 The locations are shown in the photomap given in **Figure 2.10**.

3. Drainage Flow Evaluation

3.1 Relevant Guidelines and Classification of the Project Site

3.1.1 This Drainage Proposal has been carried out in accordance with the guidelines given as follows:

a) Technical Note to Prepare a Drainage Submission ("the TN");
b) Stormwater Drainage Manual Planning, Design and Management (Fifth Edition, January 2018) ("the Manual");
c) Drainage Services Department Stormwater Drainage Manual Corrigendum No. 1/2022 and 1/2024;
d) Advice Note No.1 - Application of the Drainage Impact Assessment Process to Private Sector Projects issued by Drainage Services Department, September 2010. Hong Kong Planning Standards and Guidelines, August 2011; and
e) Relevant standard drawings provided by Civil Engineering and Development Department.

3.2 Existing Stormwater Flow Path

3.2.1 The local stormwater falling at the north of the Project Site and within the Project Site will be directed into the stream and flows along the stream southwards and exit the Project Site. The stormwater then enters the network of local drainage channel network. U-channel directs the stormwater southwards and exits the Project Site at the southern end, enters the U-channel SUP1001962 and ultimately enters Ng Tung River.

Catchment Area Near the Project Site and Respective Stormwater Flow Pattern

3.2.2 The adjacent area is higher at the northern side of the Project Site and lower at the southern side and at the centre of the Project Site. This allows stormwater falls within the proximity of the Project Site enters the natural stream within the Project Site and being directed southwards the discharge channel SUP1001962 and ultimately enters Ng Tung River.

3.2.3 Stormwater falls outside the Project Site will be directed by the local drainage network.

3.2.4 There are a number of catchment areas identified and are shown in **Figure 3.1**. The unpaved area indicated in the figure can reference to **Figure 2.6**. They are discussed as follows:

Catchment A

3.2.5 Locates at the northwestern side of the Project Site, the Catchment A is a private area with a number of structures located at the north of the Project Site.

3.2.6 The area was not accessible, but during the site visit a discharge point was identified leading out of the area, and discharge into the natural stream. As Catchment A is bounded by an impermeable perimeter fence, all stormwater falls within the catchment would be discharged through the drain into the natural stream, and be discharged accordingly.

Catchment B

3.2.7 Locates at the northeastern side of the Project Site, the Catchment B refers to the area located at the north of the Project Site currently occupied by structures with some open space.

3.2.8 Similar to Catchment A, a discharge point was identified leading out of the area, which was accessible during the site visit, and discharge into the natural stream, where the stormwater will be discharged accordingly.

Catchment C

3.2.9 Catchment C is the Project Site area at the western side of the natural stream. A section of the area, about 970.3m^2, is unpaved and used for cattle keeping and tree protection zone respectively. The remaining area is paved with structures established.

3.2.10 Stormwater falls within this catchment will flows eastwards towards the centre of the Project Site, and then enters the natural stream, where the stormwater will be discharged accordingly.

Catchment D

3.2.11 Catchment D is the Project Site area at the eastern side of the natural stream. A section of the area is unpaved and covered by vegetation. The remaining area is paved with structures established.

3.2.12 Stormwater falls within this catchment will flows westwards towards the centre of the Project Site, and then enters the natural stream, where the stormwater will be discharged accordingly.

Capacity of Existing Drainage Channel

3.2.13 Stormwater falls within the Project Site will be directed towards the natural stream within the Project Site and ultimately enters Ng Tung River.

3.2.14 The natural stream is 2m wide and 1.5m depth. The capacity of the natural stream is considered sufficient under the current scenario as no flooding was recorded during the previous rainstorms.

3.2.15 The photos of the natural stream are given in **Figure 3.2**.

4. Proposed Drainage Infrastructure

4.1 Impact on Local Stormwater Flow Pattern and Discharge Channel Capacity

4.1.1 As given in **Table 1.1**, the Project Site is proposed to fill up to about +11.0mPD with concrete for levelling. The filling works will follow the existing terrain. This would result in less stormwater be able to be soak away into the unpaved ground during a rainstorm. **Figure 4.1** shows proposed area to be filled.

4.1.2 The water flow path is not affected by the filling work, as the filled level would follow the existing terrain, where surface runoff entering the Project Site before the proposed development will not be affected despite the raised ground level. **Figure 2.4c** showed the cross section of the project site before and after the filling works. Also, no additional impermeable structures, including additional fences, and creation of concrete footings, etc, will be established. The extend of fence with non-permeable footing is also show in **Figure 2.5**. As such, the current stormwater flow pattern will be maintained, that stormwater falls at the north of the Project Site will flows towards south entering the Project Site, where the proposed perimeter U-Channel will intercept and collect the stormwater for discharge. Stormwater falling within the Project Site will be directed to the natural stream located at the centre of the Project Site and be discharged.

4.1.3 To properly collect the stormwater falls within the project site, a drainage system is proposed to collect the stormwater and discharge into the natural stream within the project site, that ultimately discharged through the local drainage system.

4.1.4 The amount of runoff generated by different catchments before and after the proposed development is given in **Table 4.1**. Detailed calculations are given in **Appendix 4.1 and 4.2**.

Table 4.1: Runoff Generated by the Catchment Area before and after the Proposed Development

Catchment Area	Generated Runoff, m^3/s	
	Before Proposed Development	After Proposed Development
Catchment A	0.1253	0.1253
Catchment B	0.1228	0.1228
Catchment C	0.0230	0.0951
Catchment D	0.0237	0.1501

4.2 General Specification and Dimension of the Channel

4.2.1 In accordance with the TN, a site with area of 5,070m^2, a perimeter U-channel of 525mm at 1 in 200 gradient will be required. Where necessary, the size of the U-Channel will be increased to ensure enough capacity to handle the stormwater.

4.2.2 At each change of direction, a catchpit with cover will be provided. Catchpits with sand trap shall be provided at the outlets of the drainage system before entering the nullah. The covers of the proposed channels should be flush with the existing adjoining ground level.

4.2.3 Catchpit will be provided at all corners of the Project Site where the U-channel changes direction, and a sand trap will be provided to intercept the debris carried by the stormwater. The dimensions of the U-channels, covers of the catchpits will make reference to Civil Engineering and Development Department (CEDD) Drawing Nos. C2409I, C2406/1, C2406/2A and Drainage Services Department (DSD) Drawing No. DS 1025B.

4.3 Channel Alignment and Components

Drainage Arrangement for Stormwater Flow within the Project: U-channel, floodwall and catchpit

4.3.1 4 U-channel sections will be established within the Project Site to collect the stormwater falls within the Project Site. The drainage channel at the northern side of the project site will intercept the stormwater flows from the Catchment A and Catchment B, while the drainage channel at the southern side of the Project Site will intercept the stormwater falls within the Project Site.

4.3.2 As shown in Photo 1 of **Figure 2.5**, the stormwater will enter the Project Site through the section where no concrete footing is provided at the hoardings. The overland flow entering the Project Site will be intercepted by the U-channel and discharged accordingly.

4.3.3 All 4 sections will be terminated at the natural stream by a sand trap prior discharge into the natural stream.

4.3.4 The natural stream within the Project Site is filled with vegetation. The existing condition, hence the discharge capacity, cannot be properly determined. However, in view of the necessity to maintain the capacity of the discharge stream, the channel under the access road at the middle of the stream, and the exit of the stream, will be upgraded to a casted rectangular box culvert to ensure enough capacity is available to discharge the stormwater collected from the 4 catchments.

4.3.5 Catchpits will be provided at each sharp turn, and at the junctions of drainage channels.

4.3.6 As the Project Site located within the inland of north New Territories with elevation at 10mPD or higher, rise of mean sea level due to climate change does not have significant influence on the drainage capacity of the local drainage channel. Nonetheless, catchment runoff has been included a 16% increment for worst case scenario.

4.3.7 **Figure 4.2** shows the proposed layout of the drainage channel for the Project Site. Technical details of the proposed drainage channel, including the type, dimensions, invert levels are given in **Table 4.2**. The technical details of the proposed upgrade of the natural stream are given in **Table 4.3**. Detailed calculations are given in **Appendix 4.1** to **Appendix 4.4**. As the Project Site is located within Kam Tin North district. According to Figure 3 Delineation of Rainfall Zones of the Manual, the area is outside the 3 specific areas: Tai Mo Shan Area, West Lantau Area, North District Area. As such Storm Constants for rainfall statistics of HKO Headquarters is used in the calculation. The design drainage system is to handle stormwater of Return Period of 50 years.

Table 4.2: Technical Details of the Proposed Drainage Channels

Segment	Upstream Invert Level	Downstream Invert Level	Dimension		Slope	% of Full Capacity under the Peak Flow
			Length	Diameter		
Unit	**mPD**	**mPD**	**m**	**mm**	**-**	**%**
Catchment A						
Channel A-1	10.75	10.60	28.3	525	1 in 189	51.3%
Channel A-2	10.60	10.58	3.1	525	1 in 155	46.5%
Channel A-3	10.58	10.37	40.9	525	1 in 195	52.1%
Catchment B						
Channel B-1	10.55	10.39	32.5	525	1 in 203	52.2%
Channel B-2	10.39	10.37	3.3	525	1 in 165	47.0%
Channel B-3	10.37	10.30	13.1	525	1 in 187	50.1%
Channel B-4	10.30	10.23	13.6	525	1 in 194	51.0%
Channel B-5	10.23	10.21	4.3	525	1 in 215	53.7%
Channel B-6	10.21	10.16	10.2	525	1 in 204	52.3%
Channel B-7	10.16	10.13	5.7	525	1 in 190	50.5%
Channel B-8	10.13	10.03	19.5	525	1 in 195	51.1%
Catchment C						
Channel C-1	10.75	10.65	28.4	525	1 in 284	47.8%
Channel C-2	10.65	10.50	60.8	525	1 in 405	57.1%
Channel C-3	10.37	10.30	19.5	525	1 in 279	47.3%
Catchment D						
Channel D-1	10.55	10.52	6.1	525	1 in 203	63.8%
Channel D-2	10.52	10.39	26.5	525	1 in 204	63.9%
Channel D-3	10.39	10.28	21.4	525	1 in 195	62.4%
Channel D-4	10.28	9.98	59.4	525	1 in 198	63.0%
Channel D-5	10.10	9.98	28.3	525	1 in 236	68.8%

Table 4.3: Technical Details of the Proposed Upgrade of the Natural Stream

Segment	Type of Channel	Dimension		Slope	% of Full Capacity under the Peak Flow
		Width	Height		
Unit	**--**	**M**	**m**	**-**	**%**
Natural Stream at the Centre of the Project Site – Discharge Point for all Catchment Area					
Stream at the Centre of Project Site - Centre Section under Access Road	Rectangular Concrete Structure	0.8	0.8	1 in 167	17.10%

Segment	Type of Channel	Dimension		Slope	% of Full Capacity under the Peak Flow
		Width	Height		
Unit	--	M	m	-	%
Stream at the Centre of Project Site - Discharge Point	Rectangular Concrete Structure	0.8	0.8	1 in 167	17.10%

4.4 Construction and Maintenance

4.4.1 During construction stage, the Applicant shall ensure that no works, including any site formation works, shall be carried out adversely interfere with the free flow condition of the existing drains, channels and watercourses on or in the vicinity of the subject site any time during or after the works.

4.4.2 The proposed U-channel will intercept and deliver stormwater into the U-channels at the west and south of the Project Site and ultimately discharged into Ng Tung River. The maintenance of the proposed U-channels and catchpits shall be undertaken by the Applicant.

4.4.3 The Applicant shall rectify the system if it is found to be inadequate or ineffective during operation at his / her own expense, in addition to those within the Project Site. Regular maintenance includes clearance of vegetation growing within the stream at the centre of the Project Site.

4.4.4 In addition, the Applicant, and the successive lot owners, shall also:

a) make good all adjacent affected areas upon the completion of the drainage works;
b) allow all time free access for the Government and its agent to conduct site inspection on his completed drainage works; and
c) allow connections from the adjacent lots to be completed drainage works on Government Land when so required.

5. Conclusion

5.1.1 Consider the location is not a flooding black spot, the existing drainage channel, including the natural stream running through the Project Site and the ultimate discharge channel, Ng Tung River, are adequate to handle the stormwater discharge for the area. As the project will not increase the stormwater load to the drainage system within proximity of the Project Site, the drainage system after the implementation of the project will not be adversely affected.

5.1.2 Additional connecting U-channels and catchpits are required to collect the stormwater falls within the Project Site and divert to the public drainage network for discharge. Associated drainage proposal has been presented.

5.1.3 The Applicant will ensure the construction works be conducted in a manner that the works will not adversely interfere with the free flow condition of the existing drains, channels and watercourses on or in the vicinity of the subject site any time during or after the works.

Figures

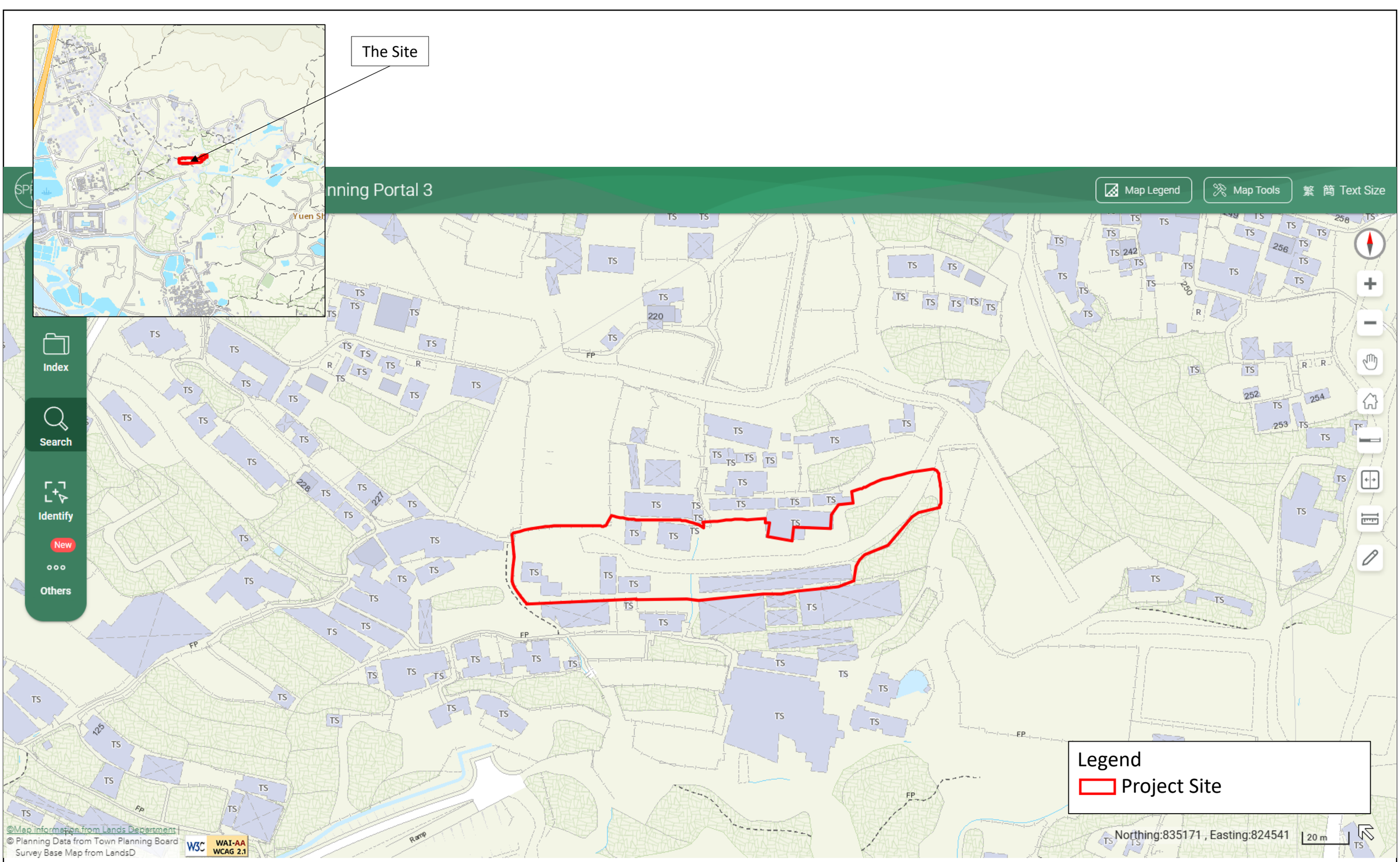

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Figure 1.1 – Location of the Site as in Planning Application

Map Source: Town Planning Board Statutory Planning Portal

Date: 6 May 2025

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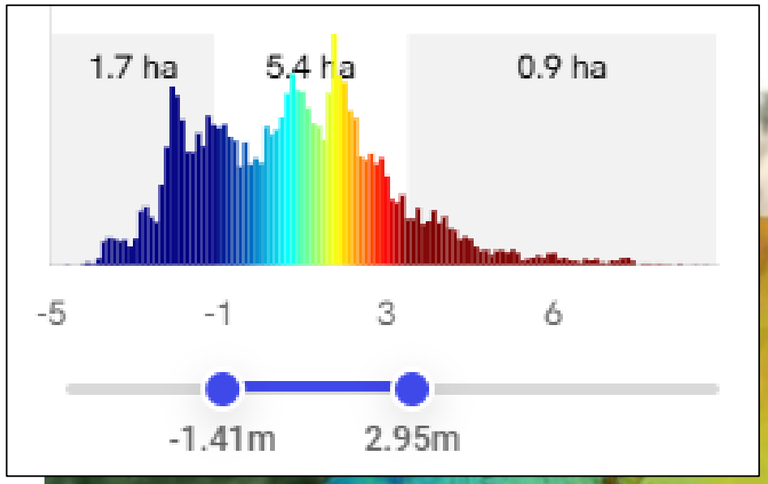
Figure 1.2 – Panoramic View of the Project Site



NOTE:
1. area with higher ground level are indicated in Red colour while area with lower ground level are indicated in Blue colour
2. Elevations are for relative comparison only

Legend
Indicative Project Site Area

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Figure 2.1 – Indicative Terrain of the Project Site

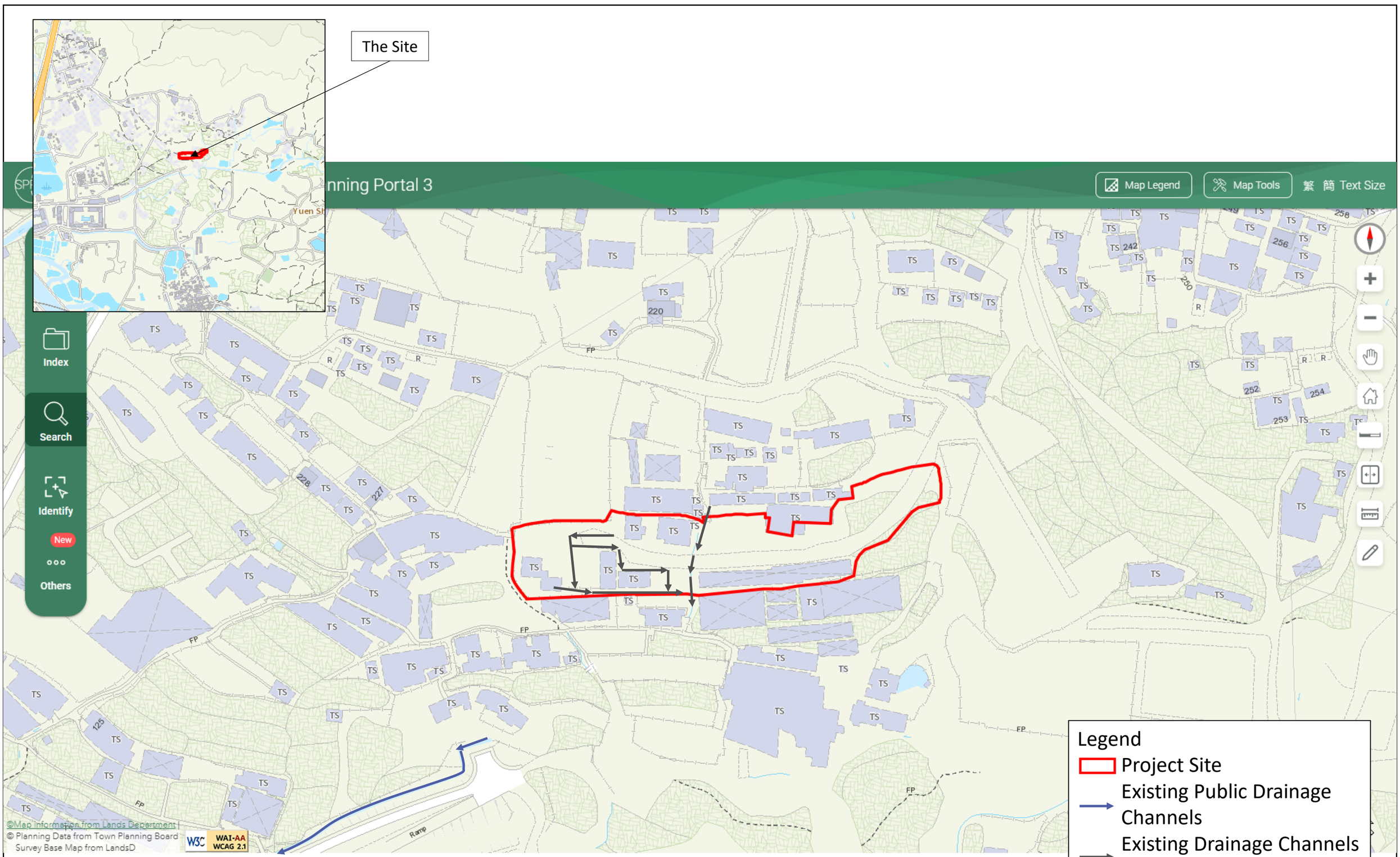

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Figure 2.2 – Identified Existing Drainage Channels

Map Source: GeoInfo Map

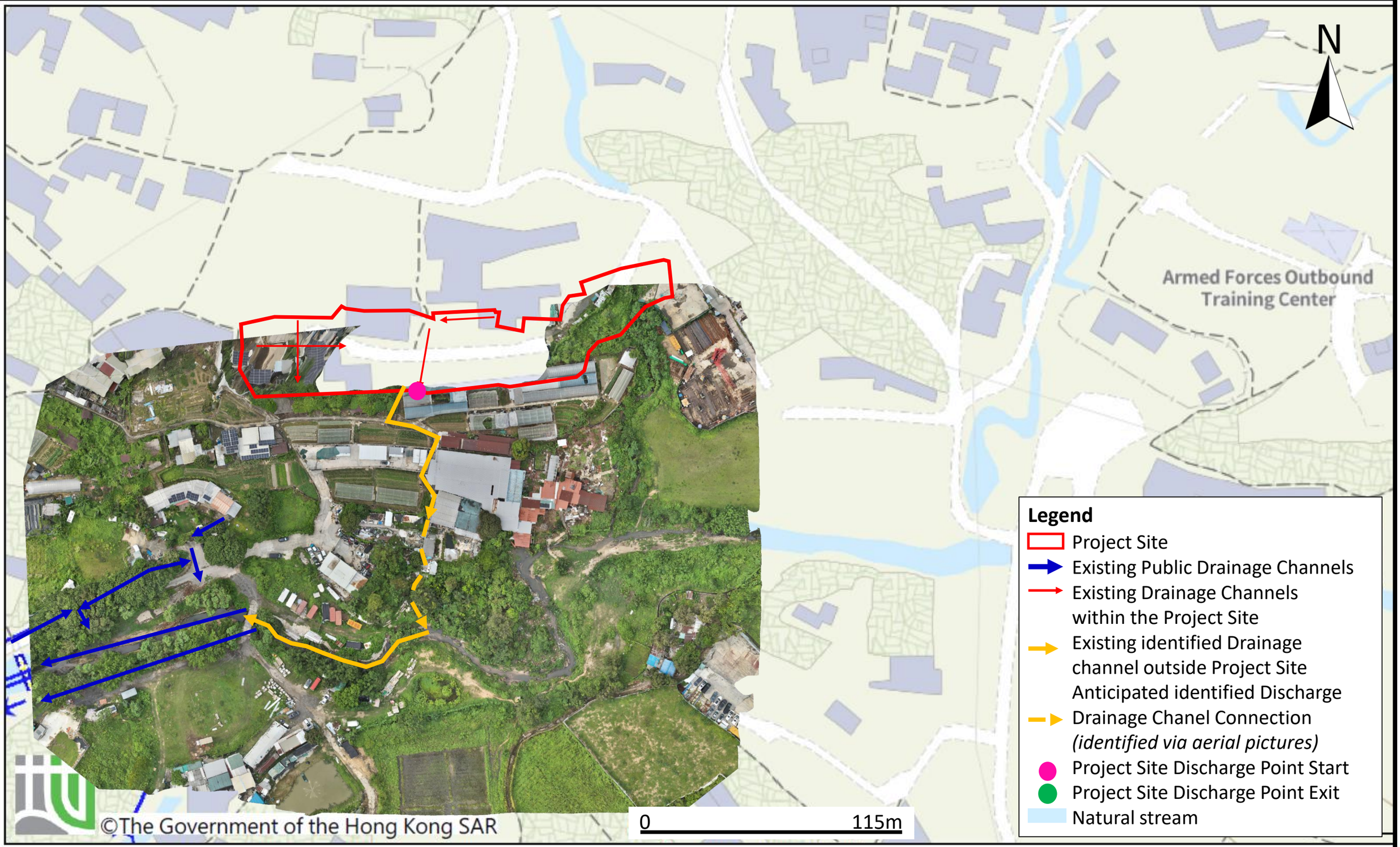

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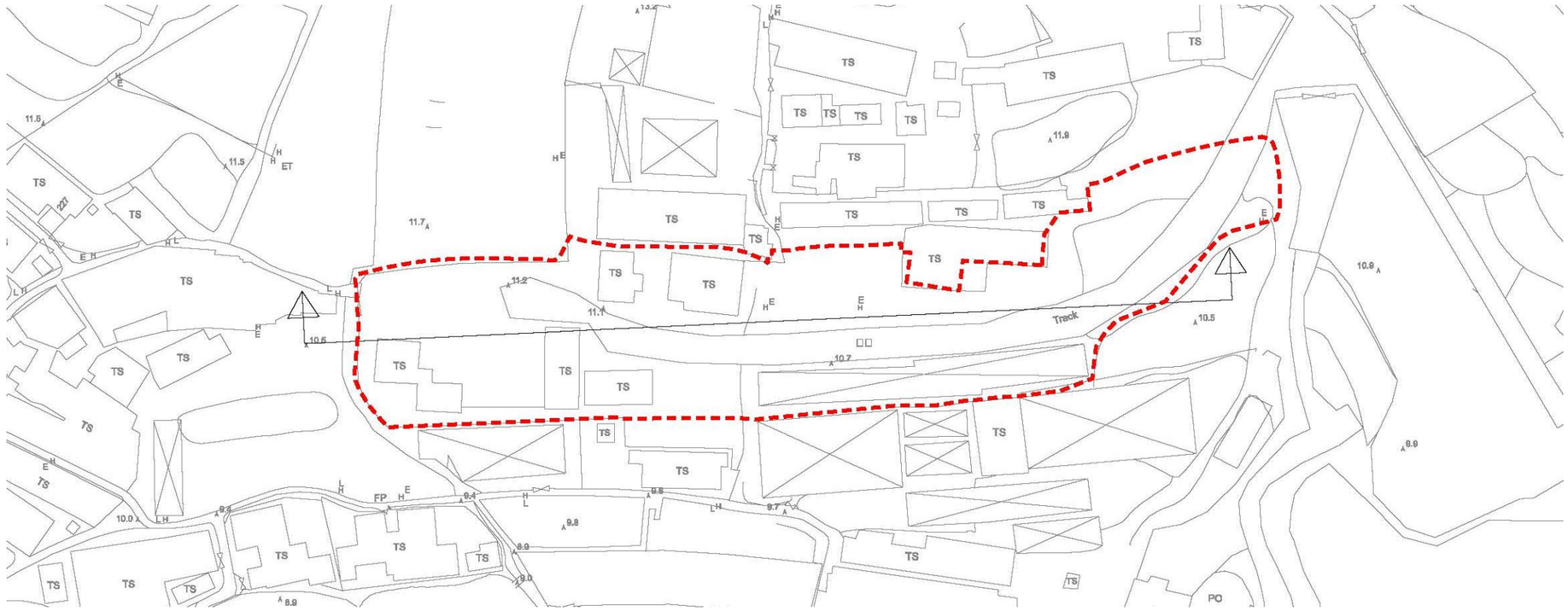
Figure 2.3 – Discharge Path for Stormwater collected within the Project Site

Map Source: GeoInfo Map, Aerial Photo



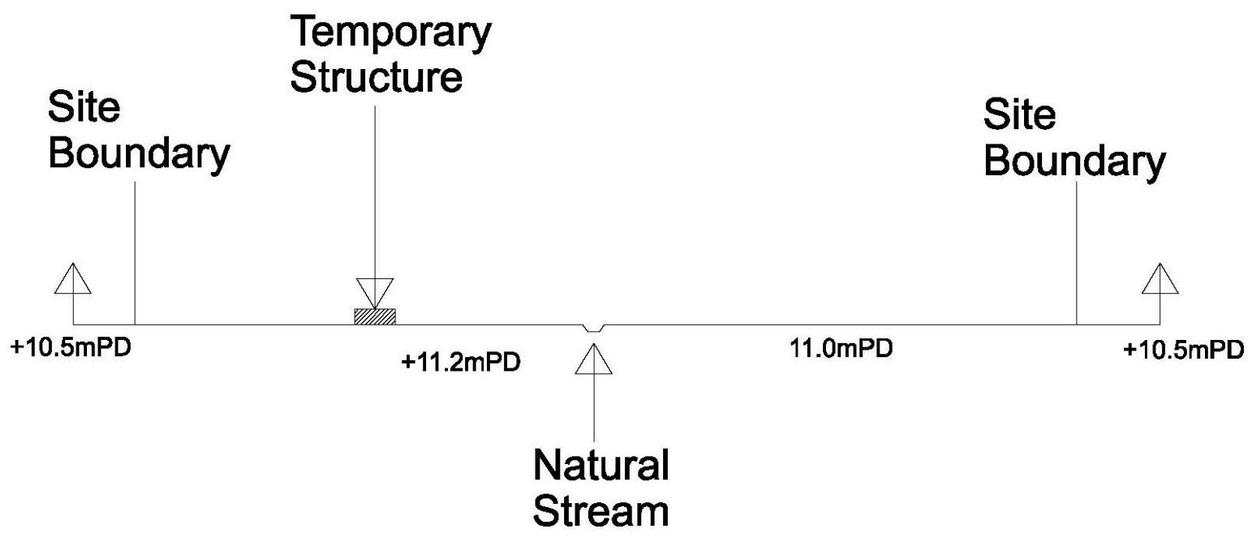


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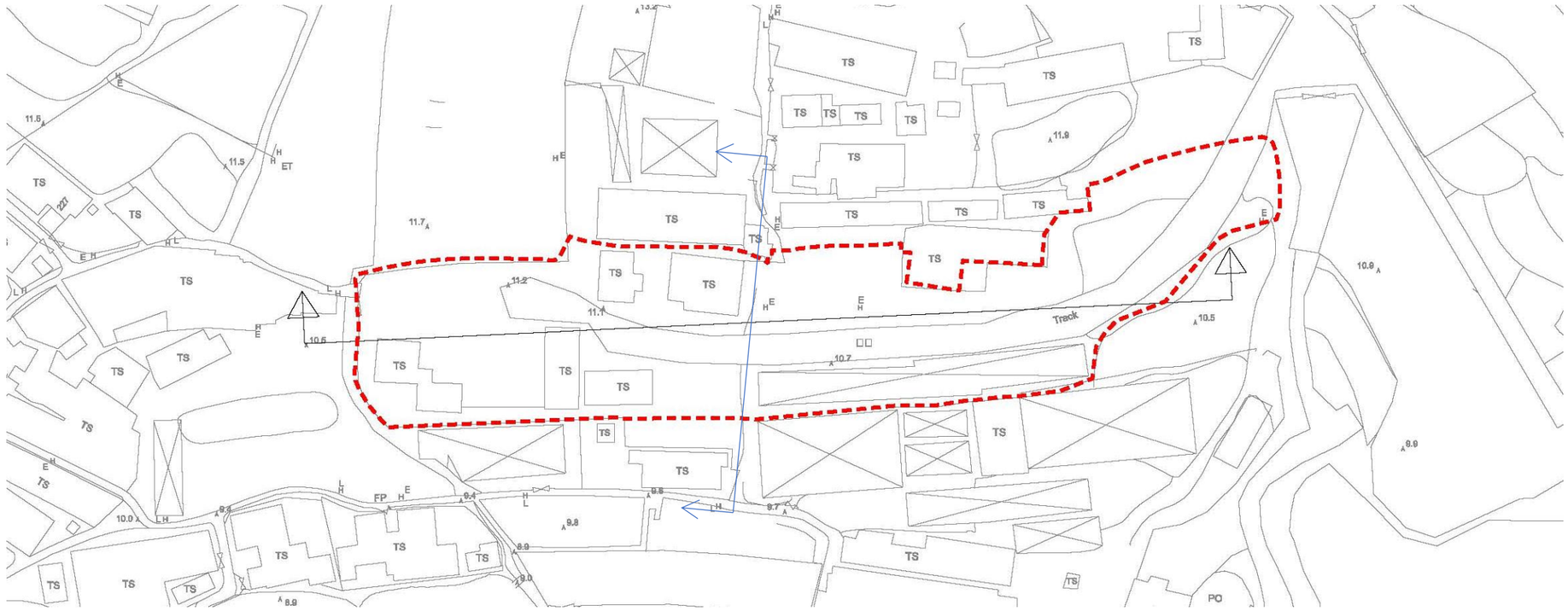
Figure 2.4a – Cross-Section for the Project Site



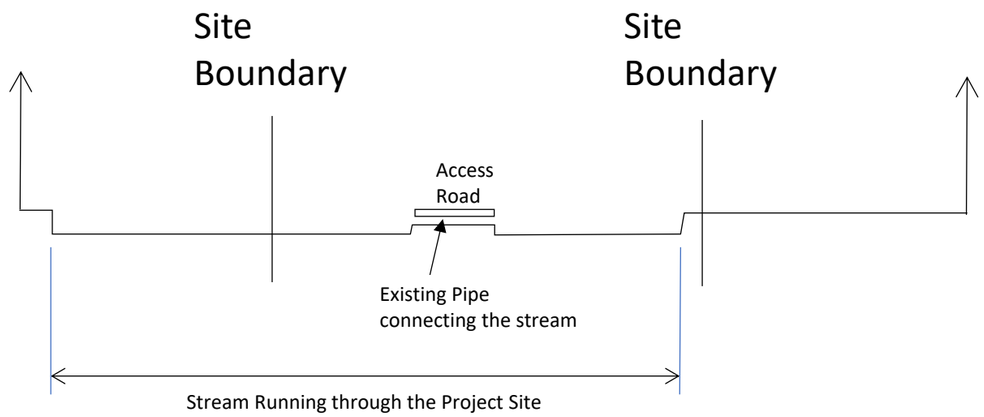


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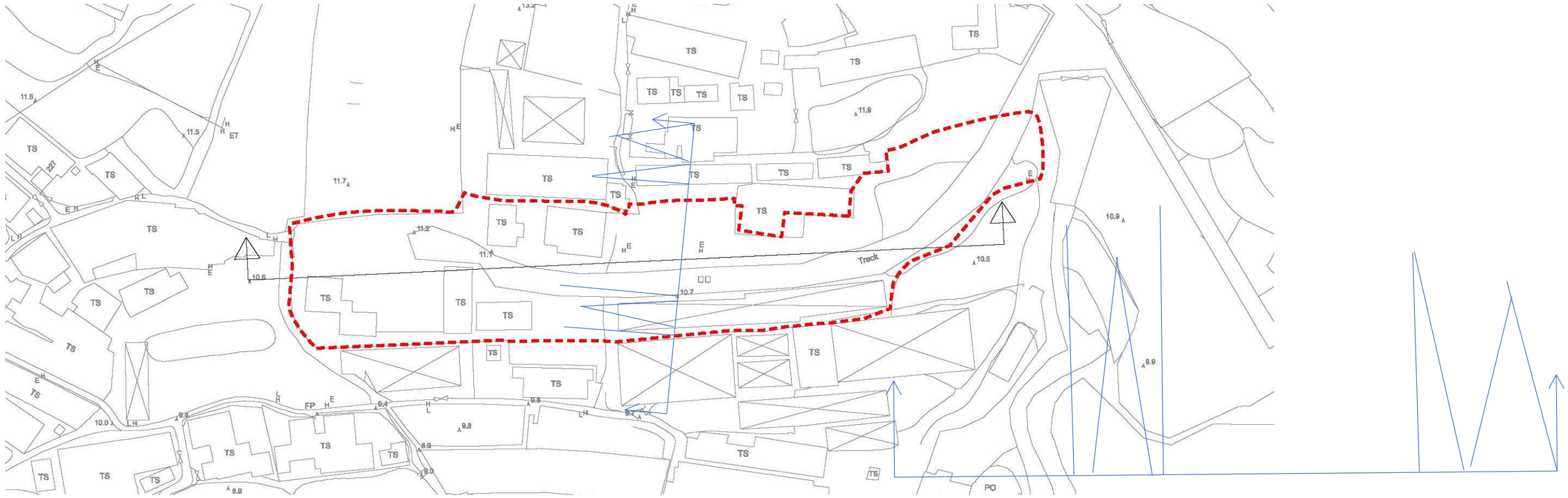
Figure 2.4b – Cross-Section for the Project Site



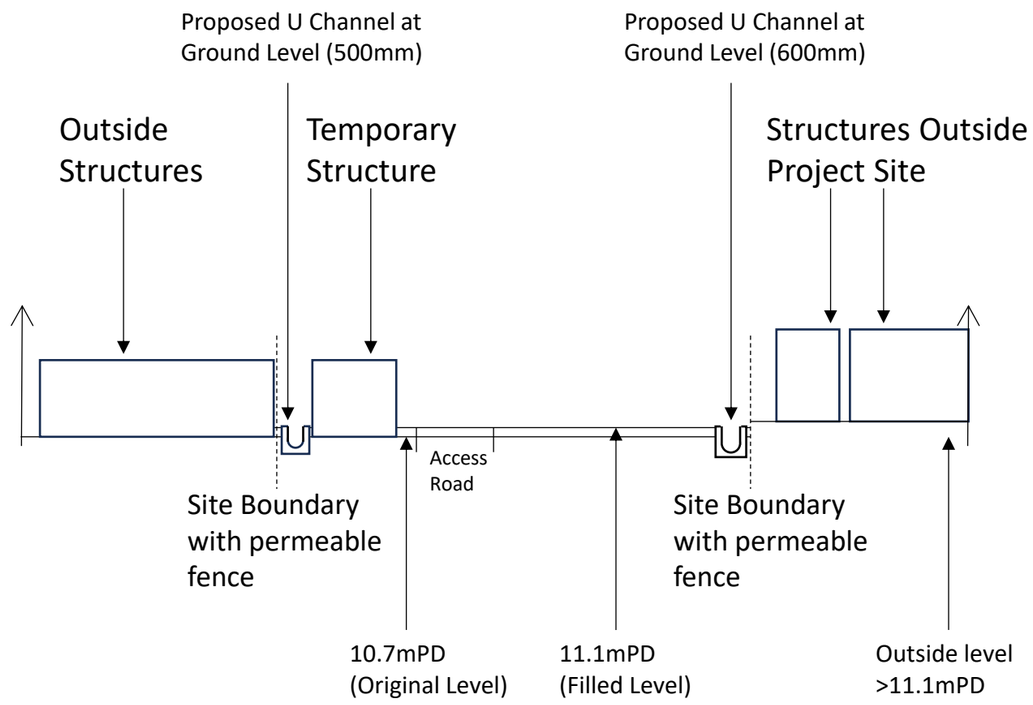


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Figure 2.4c – Cross-Section for the Project Site

Photo 1: Hoarding without concrete footing

View Angle of the Photos

NOTE:
Green line shows the extend of fence without a permeable footing. The proposed development would not affect the permeability of the fences.

Photo 2: Hoarding without Concrete Footing

Photo 3: Hoarding with Concrete Footing

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Figure 2.5 – Site Photos showing the Existing Scenario of the Project Site

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Figure 2.6 – Aerial Photos showing the Existing Drainage Channel

Photo 1: Natural Stream within Project Site

View Angle of the Photos

Photo 2: Natural Stream within Project Site

Photo 3: Drainage Network within Project Site

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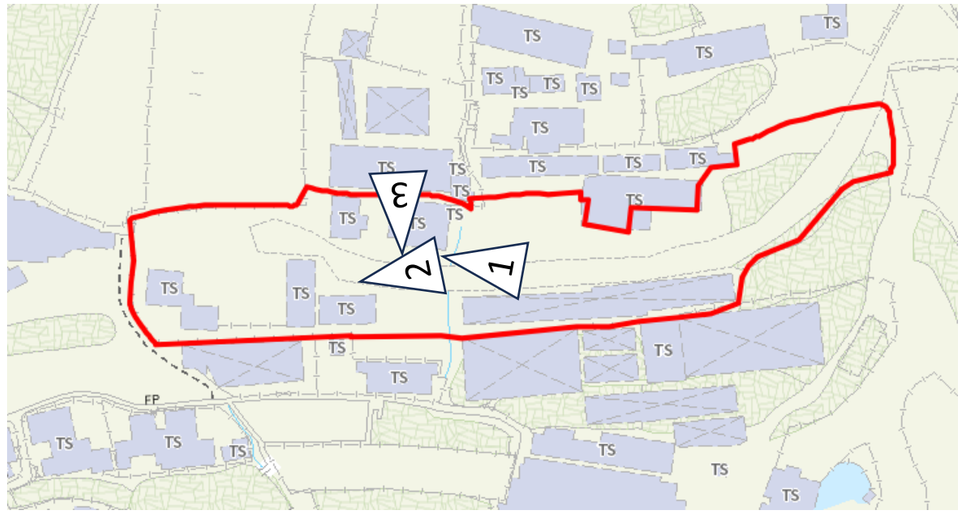
Figure 2.7 – Site Photos showing the Existing Scenario of the Project Site

Photo 1: Drainage Network within Project Site

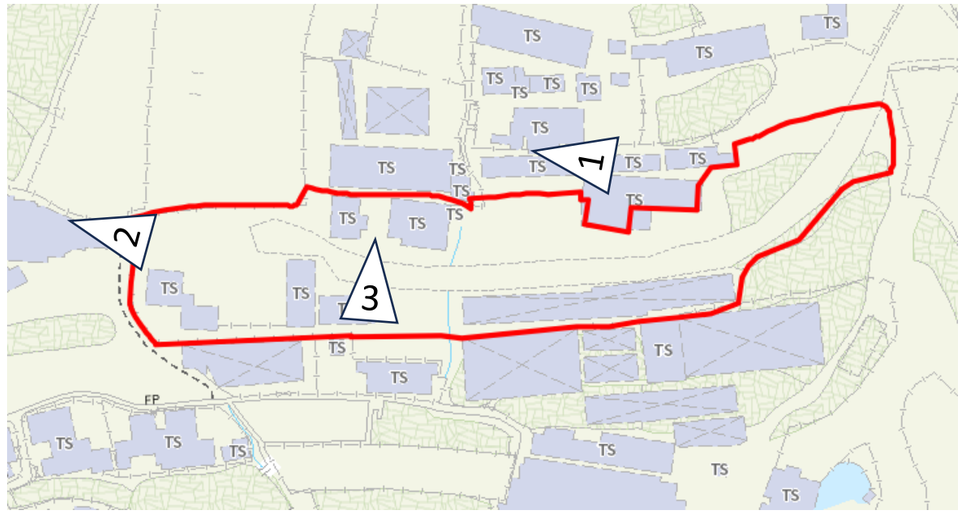


View Angle of the Photos

Photo 2: Drainage Network within Project Site

Photo 3: Drainage Network within Project Site

Photo 1: Concrete Footing at other premises



View Angle of the Photos

Photo 2: Concrete Footing at other premises

Photo 3: Tree Protection Zone

Figure 2.9 – Site Photos showing the Existing Scenario of the Project Site

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Figure 2.10 – Photomap for the Area Surrounding the Project Site

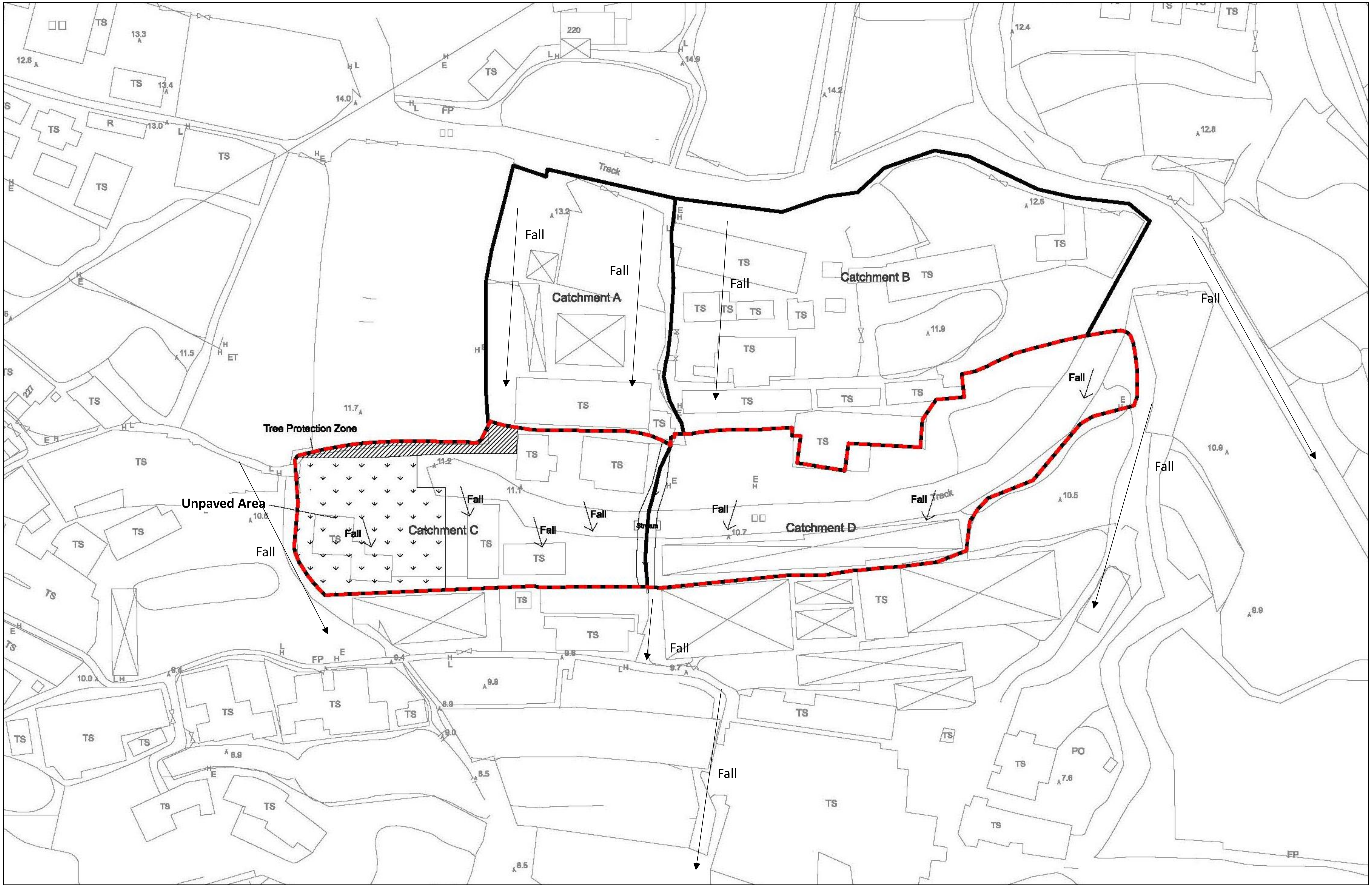

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Figure 3.1 – Identified Catchment Area

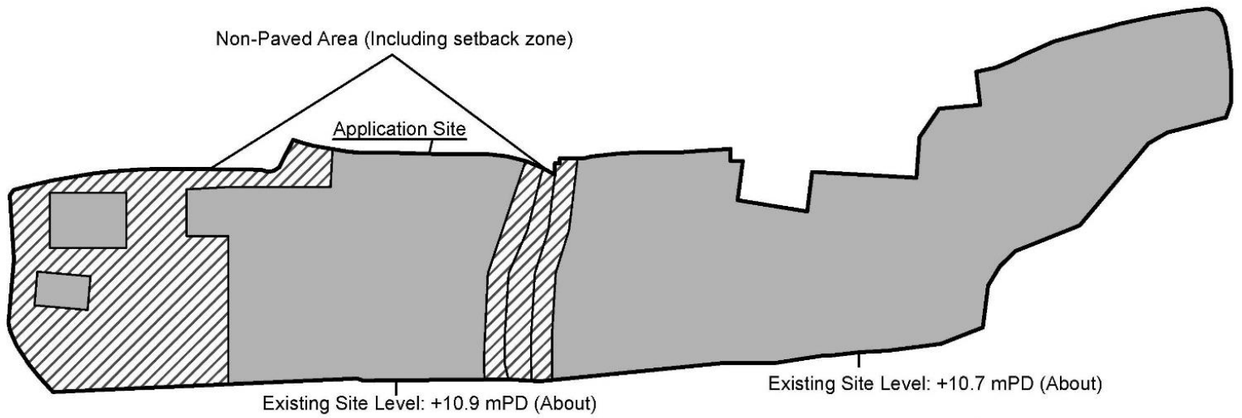
Natural Stream leading out of the Project Site
in January 2025

Concrete pipe under the walkway at the
center of the Project Site

Natural Stream leading out of the Project Site
in May 2025

Figure 3.2 – Condition of the Natural Stream

N



Paved Ratio

Paved Area: 3,938.4 m^2 (About 77.6%)

Non-Paved Area: 1,138 m^2 (About 22.4%)

Legend:

Paved Area 平整範圍

Non-Paved Area 不平整範圍

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Figure 4.1 – Areas to be Filled

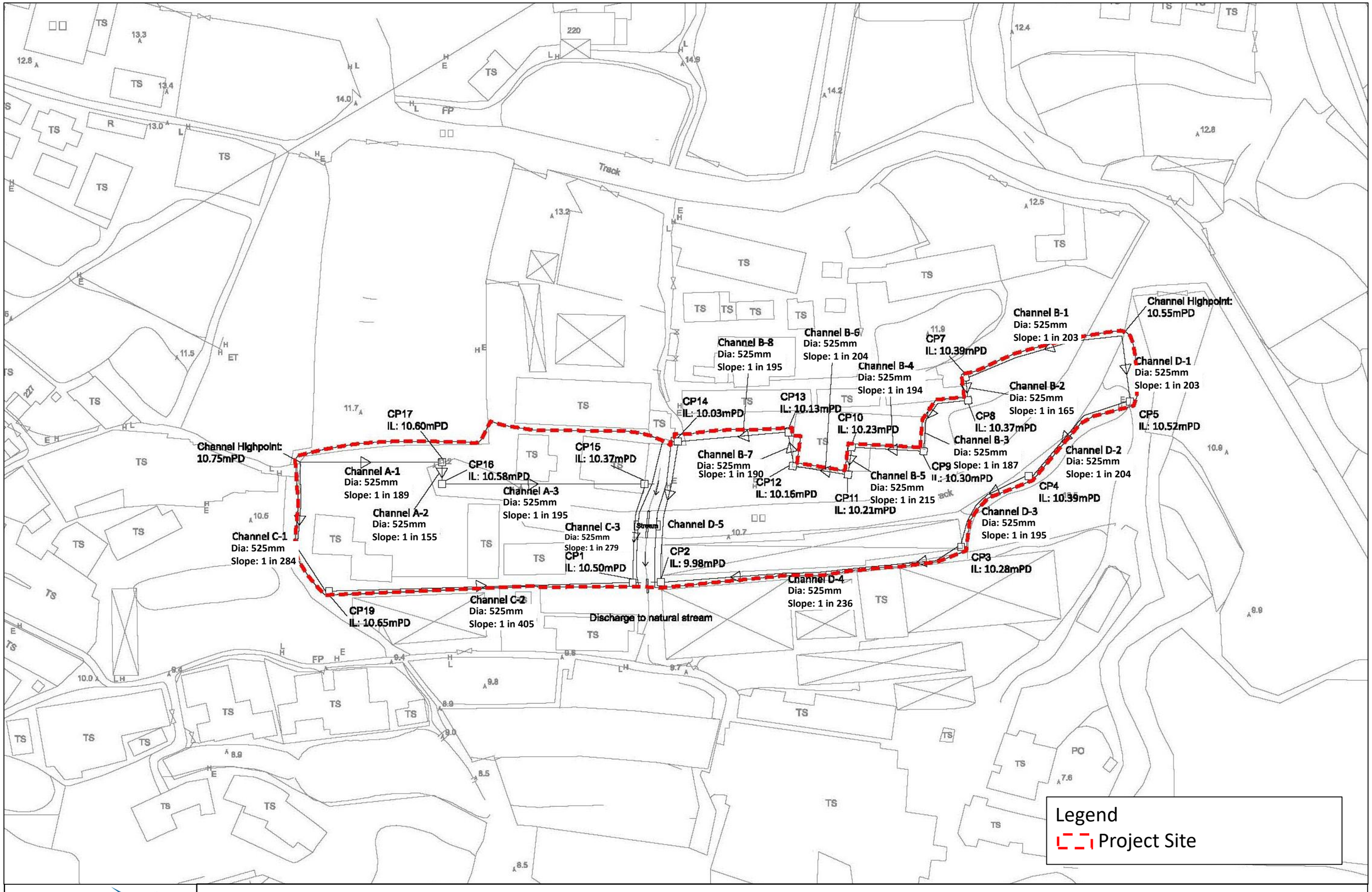

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Figure 4.2 – Proposed Layout of the Drainage Channel for the Project Site

Appendix 4.1:
Time of Concentration

Appendix 4.1:
Time of Concentration

Brandsby William's Equation

$$t_c = \frac{0.14465 \times L}{(H^{0.2} \times A^{0.1})}$$

where:

t_c: time of concentration (min)

A: area of catchment (m^2)

H: average fall (m per 100m) from the summit of catchment to the point of design

L : distance in metre measured on the line of natural flow between the design section and that point of catchment from which water would take the longest time to reach the design section (m)

Catchment Time of Concentration Calculation

	A				H	L	t_c
	Area	High Point	Low Point	Length	Average Fall	Distance of line of natural flow	Time of Concentration
	m^2	m	m	m	m per 100m	m	min
Catchment-Full	11,373.50	28.2	10.7	379	4.617	379.0	15.867
Catchment A	1,989.40	15.8	12.5	95	3.474	95.0	5.012
Catchment B	4,306.90	12.9	11.9	96	1.042	96.0	5.965
Catchment C	2,362.90	11.5	11.1	74	0.541	74.0	5.567
Catchment D	2,714.30	11.3	10.7	116	0.517	116.0	8.683

Appendix 4.2:
Catchment Runoff Estimation for the Project Site

Appendix 4.2:
Catchment Runoff Estimation for the Project Site Before the Proposed Development

Intensity Calculation:

Intensity-Duration-Frequency Relation:

$$i = \frac{a}{(t_d + b)^c} \times 116\%$$

where:
Constants used in the formula refers to Table 2a-d of the Stormwater Drainage Manual, Fifth Edition, January 2018

Location: HKO Headquarters
Return Period T: 50 Years
a: 505.5
b: 3.29
c: 0.355

NOTE:
1. Storm Constants for Return Periods of 50 Years for North District Area is used in the calculation
2. 16% has been added to allow a worse case scenario due to climate change

Intensity of Catchments:

	a	b	c	t_d, min	*i*
Catchment-Full	505.5	3.29	0.355	15.87	177.203
Catchment A	505.5	3.29	0.355	5.01	238.478
Catchment B	505.5	3.29	0.355	5.97	229.390
Catchment C	505.5	3.29	0.355	5.57	233.014
Catchment D	505.5	3.29	0.355	8.68	209.410

NOTE:
Assume: $t_d = t_c$

Runoff Estimation:

Rational Method

$$Q_p = 0.278 i \sum_{j=1}^{m} C_j A_j$$

Catchment	Site Area, m2	Percentage of Paved area	Fixed runoff coefficients		Runoff, m^3/s
			Paved	Unpaved	50 Year
Catchment ID					
Catchment-Full	11,373.5	32%	0.95	0.15	0.2255
Catchment A	1,989.4	100%	0.95	0.15	0.1253
Catchment B	4,306.9	37%	0.95	0.15	0.1228
Catchment C	2,362.9	0%	0.95	0.15	0.0230
Catchment D	2,714.3	0%	0.95	0.15	0.0237

Appendix 4.2:
Catchment Runoff Estimation for the Project Site After the Proposed Development

Intensity Calculation:

Intensity-Duration-Frequency Relation:

$$i = \frac{a}{(t_d + b)^c} \times 116\%$$

where:
Constants used in the formula refers to Table 2a-d of the Stormwater Drainage Manual, Fifth Edition, January 2018

Location: HKO Headquarters
Return Period T: 50 Years
a: 505.5
b: 3.29
c: 0.355

NOTE:
1. Storm Constants for Return Periods of 50 Years for North District Area is used in the calculation
2. 16% has been added to allow a worse case scenario due to climate change

Intensity of Catchments:

	a	b	c	t_d, min	*i*
Catchment-Full	505.5	3.29	0.355	15.87	177.203
Catchment A	505.5	3.29	0.355	5.01	238.478
Catchment B	505.5	3.29	0.355	5.97	229.390
Catchment C	505.5	3.29	0.355	5.57	233.014
Catchment D	505.5	3.29	0.355	8.68	209.410

NOTE:
Assume: $t_d = t_c$

Runoff Estimation:

Rational Method

$$Q_p = 0.278 i \sum_{j=1}^{m} C_j A_j$$

Catchment	Site Area, m2	Percentage of Paved area	Fixed runoff coefficients		Runoff, m^3/s
			Paved	Unpaved	50 Year
Catchment ID					
Catchment-Full	11,373.5	68%	0.95	0.15	0.3873
Catchment A	1,989.4	100%	0.95	0.15	0.1253
Catchment B	4,306.9	37%	0.95	0.15	0.1228
Catchment C	2,362.9	59%	0.95	0.15	0.0951
Catchment D	2,714.3	100%	0.95	0.15	0.1501

Appendix 4.3:

Calculation of Pipe Capacity for the Proposed Discharge Segment for the Project Site

Appendix 4.3
Calculation of Pipe Capacity for the Proposed Discharge Segment for the Project Site

Manning Equation

$$\bar{V} = \frac{R^{1/6}}{n}\sqrt{RS_f}$$

Segment	Upstream Manhole	Downstream Manhole	Slope		Dimension				R	S_f	n	90% Full Capacity Velocity [2]	90% Full Capacity	Catchment Area	Catchment Flow Rate	% of Full Capacity under the Peak Flow of the Proposed Project
			Upstream Invert Level	Downstream Invert Level	Length	Diameter	Diameter	Area	Hydraulic Radius	Slope	Manning coefficient [1]					
			mPD	mPD	m	mm	m	m^2	m	-	$s/m^{1/3}$	m/s	l/s	-	l/s	%
Catchment A																
Channel A-1	--	CP17	10.75	10.60	28.3	450	0.450	0.159	0.11250	0.005	0.015	1.018	161.903	Catchment A	125.296	77.39%
Channel A-2	CP17	CP16	10.60	10.58	3.1	450	0.450	0.159	0.11250	0.006	0.015	1.123	178.622	Catchment A	125.296	70.15%
Channel A-3	CP16	CP15	10.58	10.37	40.9	450	0.450	0.159	0.11250	0.005	0.015	1.002	159.349	Catchment A	125.296	78.63%
Catchment B																
Channel B-1	CP6	CP7	10.55	10.39	32.5	525	0.525	0.216	0.13125	0.005	0.015	1.087	235.366	Catchment B	122.824	52.18%
Channel B-2	CP7	CP8	10.39	10.37	3.3	525	0.525	0.216	0.13125	0.006	0.015	1.206	261.146	Catchment B	122.824	47.03%
Channel B-3	CP8	CP9	10.37	10.30	13.1	525	0.525	0.216	0.13125	0.005	0.015	1.133	245.211	Catchment B	122.824	50.09%
Channel B-4	CP9	CP10	10.30	10.23	13.6	525	0.525	0.216	0.13125	0.005	0.015	1.112	240.661	Catchment B	122.824	51.04%
Channel B-5	CP10	CP11	10.23	10.21	4.3	525	0.525	0.216	0.13125	0.005	0.015	1.057	228.774	Catchment B	122.824	53.69%
Channel B-6	CP11	CP12	10.21	10.16	10.2	525	0.525	0.216	0.13125	0.005	0.015	1.085	234.861	Catchment B	122.824	52.30%
Channel B-7	CP12	CP13	10.16	10.13	5.7	525	0.525	0.216	0.13125	0.005	0.015	1.124	243.360	Catchment B	122.824	50.47%
Channel B-8	CP13	CP14	10.13	10.03	19.5	525	0.525	0.216	0.13125	0.005	0.015	1.110	240.220	Catchment B	122.824	51.13%
Catchment C																
Channel C-1	--	CP19	10.75	10.65	28.4	525	0.525	0.216	0.13125	0.004	0.015	0.920	199.052	Catchment C	95.070	47.76%
Channel C-2	CP19	CP1	10.65	10.50	60.8	525	0.525	0.216	0.13125	0.002	0.015	0.770	166.617	Catchment C	95.070	57.06%
Channel C-3	CP15	CP1	10.37	10.30	19.5	525	0.525	0.216	0.13125	0.004	0.015	0.928	200.982	Catchment C	95.070	47.30%
Catchment D																
Channel D-1	CP6	CP5	10.55	10.52	6.1	525	0.525	0.216	0.13125	0.005	0.015	1.087	235.246	Catchment D	150.115	63.81%
Channel D-2	CP5	CP4	10.52	10.39	26.5	525	0.525	0.216	0.13125	0.005	0.015	1.085	234.950	Catchment D	150.115	63.89%
Channel D-3	CP4	CP3	10.39	10.28	21.4	525	0.525	0.216	0.13125	0.005	0.015	1.111	240.500	Catchment D	150.115	62.42%
Channel D-4	CP3	CP2	10.28	9.98	59.4	525	0.525	0.216	0.13125	0.005	0.015	1.101	238.393	Catchment D	150.115	62.97%
Channel D-5	CP14	CP2	10.10	9.98	28.3	525	0.525	0.216	0.13125	0.004	0.015	1.008	218.304	Catchment D	150.115	68.76%

NOTE:

[1] For the Manning coefficient use for the proposed channel, the value for Cement mortar surfaces under bad condition is adopted.

[2] Consider the sedimentation, the pipes are considered to be at 90% of its full capcacity for worse case scenario

Appendix 4.4:
Calculation of the Capacity of the Natural Stream

Appendix 4.4
Calculation of the Capacity of the Stream at the Center of Project Site

Manning Equation

$$\bar{V} = \frac{R^{1/6}}{n}\sqrt{RS_f}$$

	Dimension				R	S_f	n						
Segment	Width	Height	Area	Wetted Perimeter	Hydraulic Radius	Slope	Manning coefficient [1]	90% Full Capacity Velocity [2]	90% Full Capacity	90% Full Capacity	Catchment Area	Catchment Flow Rate (l/s)	% of Full Capacity
	m	m	m^2	m	m	-	$s/m^{1/3}$	m/s	m3/s	l/s	-		%
Stream at the Center of Project Site - Centre Section under Access Road	0.8	0.8	1.131	1.500	0.28274	0.0060	0.015	2.002	2.264	2264.336	Catchment-Full	387.310	17.10%
Stream at the Center of Project Site - Discharge Point	0.8	0.8	1.131	1.500	0.28274	0.0060	0.015	2.002	2.264	2264.336	Catchment-Full	387.310	17.10%

NOTE:
[1] For the Manning coefficient use for the proposed channel, the value for Cement mortar surfaces under bad condition is adopted.
[2] Consider the sedimentation, the pipes are considered to be at 90% of its full capcacity for worse case scenario