

Appendix VII

Drainage Impact Assessment

Prepared for
Fruit Design and Build Limited

Prepared by
Ramboll Hong Kong Limited

PLANNING APPLICATION FOR PROPOSED COMPREHENSIVE
DEVELOPMENT SCHEME TO INCLUDE WETLAND
RESTORATION PROPOSAL AND PROPOSED FILLING OF
PONDS/LAND AND EXCAVATION OF LAND IN "OU(CDWRA)"
ZONE AT VARIOUS LOTS IN D.D. 104, NORTH OF KAM POK
ROAD EAST, POK WAI, YUEN LONG, NEW TERRITORIES

DRAINAGE IMPACT ASSESSMENT

Date 14 March 2023

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Signed 

Project Reference FDBNPWWREA00

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1. INTRODUCTION

- 1.1.1 The applicant proposes to develop the Application Site at various lots in DD104, north of Kam Pok Road East, Yuen Long, into a residential development cum wetland restoration area. The zoning of the Application Site is "Other Specified Uses – Comprehensive Development to include Wetland Restoration Area" (OU(CDWRA)) on the approved Nam Sang Wai Outline Zoning Plan S/YL-NSW/8. A S16 application is required for the proposed development.
- 1.1.2 Ramboll Hong Kong Limited has been commissioned by the Project Proponent to conduct the said Drainage Impact Assessment (DIA) for the proposed development under this application. Architectural drawings and technical information of the Development Site were largely provided respectively by the project architect and other project team members.
- 1.1.3 The Application Site is also the subject of a previous planning application under the application no. A/YL-NSW/290 and a DIA report (R7192) was previously submitted in support of that planning application (Previous DIA). Since then, the layout plan of proposed development has been further reviewed taking into account the concerns of AFCD with respect to the layout of proposed wetland restoration area. Compared to the previous scheme in Previous DIA, the application boundary in current application remains the same. Thus, this DIA serves as an update to the above-mentioned previous submitted DIA report based on the current proposed development.
- 1.2 Application Site and its Environs
 - 1.2.1 The Application Site is about 51,073 m², and it is immediate southeast of an existing low-rise residential development, Man Yuen Chuen and north of the Kam Pok Road East. The Application Site is partly occupied by abandoned ponds and partly by soil ground.
 - 1.2.2 Figure 1.1 shows the location of the Application Site and the environs.
- 1.3 Proposed Development
 - 1.3.1 The proposed development comprises a total of 114 units in 108 housing blocks of 3- to 5-storey high (i.e. 89 in the form of 2- to 4-storey on top of 1-level of communal basement carpark and 25 in 2-storey on top of 1-level of carport), two 2-storeys clubhouses, an underground sewage pumping station (SPS) and a proposed wetland restoration area (WRA).
 - 1.3.2 The indicative Master Layout Plan (MLP) and sections of the Proposed Development are included in Appendix 1.1.

2. DRAINAGE IMPACT ASSESSMENT ("DIA")

2.1 Scope of Work

2.1.1 The aim of this study is to assess the changes to runoff from the Application Site as a result of the proposed development and the potential impacts on the existing drainage system and surrounding areas. Drainage Record Plans from the Drainage Services Department (DSD) were obtained for the information of drainage impact assessment.

2.2 Assessment Criteria and Methodology

2.2.1 The assessment standard complies with the Stormwater Drainage Manual (2018 Edition) published by DSD (DSD SDM). The Site is located within an urban drainage branch system and a 1 in 50 years return storm has therefore been adopted for the DIA.

2.2.2 The catchment runoff has been calculated using the "Rational Method", as outlined in the DSD SDM:

$$Q = 0.278 C i A$$

Where Q = peak runoff in m³/s
 C = runoff coefficient (dimensionless)
 i = rainfall intensity in mm/hr
 A = catchment area in km

2.2.3 The existing Site consists of a group of abandoned ponds of around 4.9 ha in total. According to the latest development layout, the proposed development comprises houses. In the site inspection, it has been noted that parts of the Application Site have been paved concrete and pantry, unpaved soft landscape around intermixed among fishponds. Runoff coefficient of 0.95 has been adopted for the paved areas and 0.35 has been adopted for unpaved areas (i.e. soft landscape). A runoff coefficient of 0.35 has been adopted for fishponds in the existing scenario and a coefficient of 1.0 has been adopted for fishponds and the proposed WRA in the proposed scenario. A summary of catchment characteristics is provided in Appendix 2.1.

2.2.4 The design criteria for flood level depends on a combination of rainstorm event and tida level, as well as the catchment characteristics. With reference to the Table 11 of DSD SDM, the determination of flood level is provided in Table 2.1.

Table 2.1 Determination of Flood Level

Flood Level Return Period Scenarios	Rainfall Return Period (year)	Sea Level Return Period (year)
50-years A (Case I)	50	10
50-years B (Case II)	10	50

2.2.5 With the reference to Table 28 of DSD SDM, as extracted in Table 2.2 below, rainfall increase and sea level rise due to climate change has been considered in the calculations. As 1 in 50 years return storm is adopted for the assessment, the mid-21st century value has been considered.

Table 2.2 Rainfall Increase and Sea Level Rise due to Climate Change

	Rainfall Increase	Sea Level Rise (m)
Mid-21 st Century	10.4%	0.23

(2041 – 2060)		
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2.3 Existing Drainage and Condition of the Application Site

- 2.3.1 According to the Drainage Record Plans obtained from DSD, there is no public drainage in the immediate vicinity of the Site. There is a drainage ditch to the west of the site, which runs northwards along the eastern perimeter of Ma Yuen Chuen. The drainage ditch turns westward before discharging into Ngau Tam Mei Drainage Channel.
- 2.3.2 Based on the ground levels shown on the basemaps, surface runoff within the Site runs westwards, entering the abovementioned drainage ditch. For the ponds outside Site to the north and northeast of the Site, and the construction site and open storage area to the east of the site, the existing ground level indicates that surface runoff would run westwards as well then enter the above-mentioned drainage ditch. For the Hong Kong and China Gas Company Limited Yuen Long Open Yard to the south of the Site, runoff runs towards the east and south into another drainage ditch, which discharges to Ngau Tam Mei Drainage Channel. For Ma Yuen Chuen and the open storage area to the west of the Site, based on site observation, there are gullies along Kam Pok Road collecting runoff from these areas. The runoff then discharges to Ngau Tam Mei Drainage Channel as well.
- 2.3.3 The existing drainage system in the vicinity of the Application Site and the direction of runoff flow are shown in Figure 2.1. Sections of the existing drainage ditch to the west of the Site are shown in Appendix 5.1.

2.4 Proposed Development and Drainage System

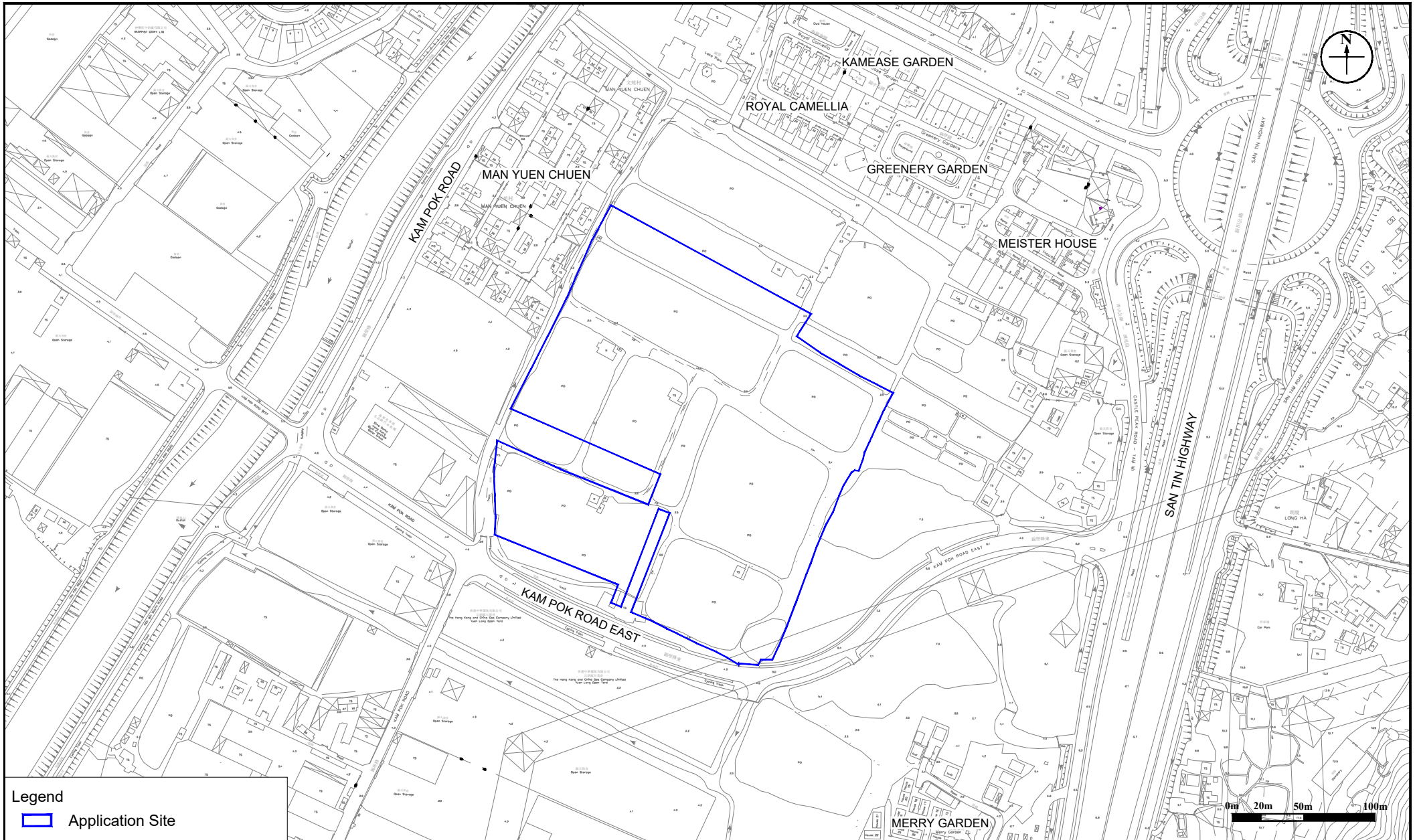
- 2.4.1 The proposed site formation of the proposed development is about +5.1mPD. The proposed site will be formed at a level higher than the adjacent areas (Catchments C2 and C3) after the proposed development is completed. It may block the original surface runoff (from east to west) of Catchments C2 and C3. Thus, a set of 800mm peripheral drain is proposed along the east of the application site boundary to divert the surface runoff from Catchments C2 and C3 and to maintain the flow as its original flow direction. This set of peripheral drain will finally be connected to the internal drain of the application site.
- 2.4.2 A set of internal peripheral drains are proposed across the Site to collect stormwater runoff from the Proposed Development, Catchment C2 and Catchment C3. It runs to the proposed 1350mm drains (at section S10 in Appendix 5.1) and then runs to the existing drainage ditch immediate downstream of the Subject Site.
- 2.4.3 Based on the hydraulic calculations, a section of existing drainage ditch should be modified/upgraded to 1350mm and 1600mm drains to convey surface runoff from the Subject Site, the surrounding areas and the area further upstream. The runoff would be conveyed by the modified/upgraded 1350mm drain to the west of the Site then to the modified/upgraded 1600mm drain and eventually enter Ngau Tam Mei Drainage Channel.
- 2.4.4 However, with reference to related comments from DSD previously received during the Previous DIA and having considered various uncertainties with the existing drainage conditions in and around the Site, to be conservative, it is proposed the section of existing ditch to the west of the Site should be upgraded to a 1800mm drain or maintain the width of the existing ditch (whichever is greater). Details will be subject to later detailed design stage.

- 2.4.5 Details of the internal drainage facilities will be provided at detailed design and implementation stages. The indicative location of peripheral drains within the Application Site, and the reprofiled drain are indicated in Figure 3.1.
- 2.4.6 The boundary conditions of the application site provided by DSD is shown in Appendix 4.1.
- 2.4.7 Upon the completion of the Proposed Development, the Site would consist of residential blocks, clubhouses, driveways/EVAs, and a WRA. Except the WRA, the other areas will be paved. With the adoption of Rational Method, the WRA is considered as paved area under a conservative perspective in the hydraulic analysis/calculation. Consideration has been given to the rainfall intensity and sea level rise due to climate change effect when calculating the drainage discharge under backwater effect, which are demonstrated in Appendix 2.1, Appendix 2.2, 2.3 and Appendix 3.1.
- 2.4.8 Based on the result shown in Appendix 3.1, the water level of some segments is above the ground level. The ground level of these segments are existing ground levels and are consistent with the existing ground level of nearby catchments. However, as these existing levels are lower than the downstream boundary water level of Ngau Tam Mei Drainage Channel under both conditions of 50A and 50B, as shown in Appendix 4.1, the unfavourable condition is not due to the Proposed Development. Thus, no mitigation is proposed. However, with the presence of existing flap valve at the outlet pipe to Ngau Tam Mei Drainage Channel, backflow of river water through the drains is not anticipated. Thus, flooding due to backflow is not anticipated for the Application Site and the nearby catchments.
- 2.4.9 There will be a basement for a communal carpark. The carpark will be at about +1.7 mPD. The entrance of the communal carpark will be at the south-eastern corner of the Site near the clubhouses. A section of 5.5m tall fence wall (noise barrier) is also proposed along eastern site boundary line. In case of heavy rain, flooding of the basement may occur due to the lower ground level. In order to avoid flooding of the basement, the following precautionary measures will be adopted during detailed design of the Proposed Development:
- The level of the entrance of the basement carpark will be raised; and
 - A flood gate will be installed at the entrance of the basement carpark. The gate will be closed in case of potential flooding condition. The flood gate will be regularly inspected and maintained to ensure normal function in case of emergency.

3. OVERALL CONCLUSION

- 3.1.1 A residential development cum wetland restoration area is proposed for the Application Site at various lots in DD104, north of Kam Pok Road, Yuen Long. The potential drainage impact has been quantitatively addressed.
- 3.1.2 The Proposed Development will increase the runoff generated from the Application Site. Runoff from the Proposed Development and nearby Catchments to the east of the Site will be conveyed to the drainage ditch to the west of the Site, and then discharging into Ngau Tam Mei Drainage Channel.
- 3.1.3 Temporary drainage measures shall be implemented to ensure that the flooding conditions will not be worsened during construction. Periodic inspection by the Authorized Person or his representative will be carried out during construction.
- 3.1.4 With the implementation of the above proposed drainage measures and temporary drainage works during construction, if any, the Proposed Development at the Application Site is technically feasible; having no insurmountable impact from drainage point of view.

Figures



Legend


 Application Site

Figure: 1.1

Title: Application Site and Its Environs

Project: Planning Application for Proposed Comprehensive Development Scheme to include Wetland Restoration Proposal and Proposed Filling of Ponds/Land and Excavation of Land in "OU(CDWRA)" Zone at Various Lots in D.D. 104, North of Kam Pok Road East, Pok Wai, Yuen Long, New Territories

RAMBOLL

Drawn by: SN

Checked by: HN

Rev.: 1.2

Date: Mar 2023

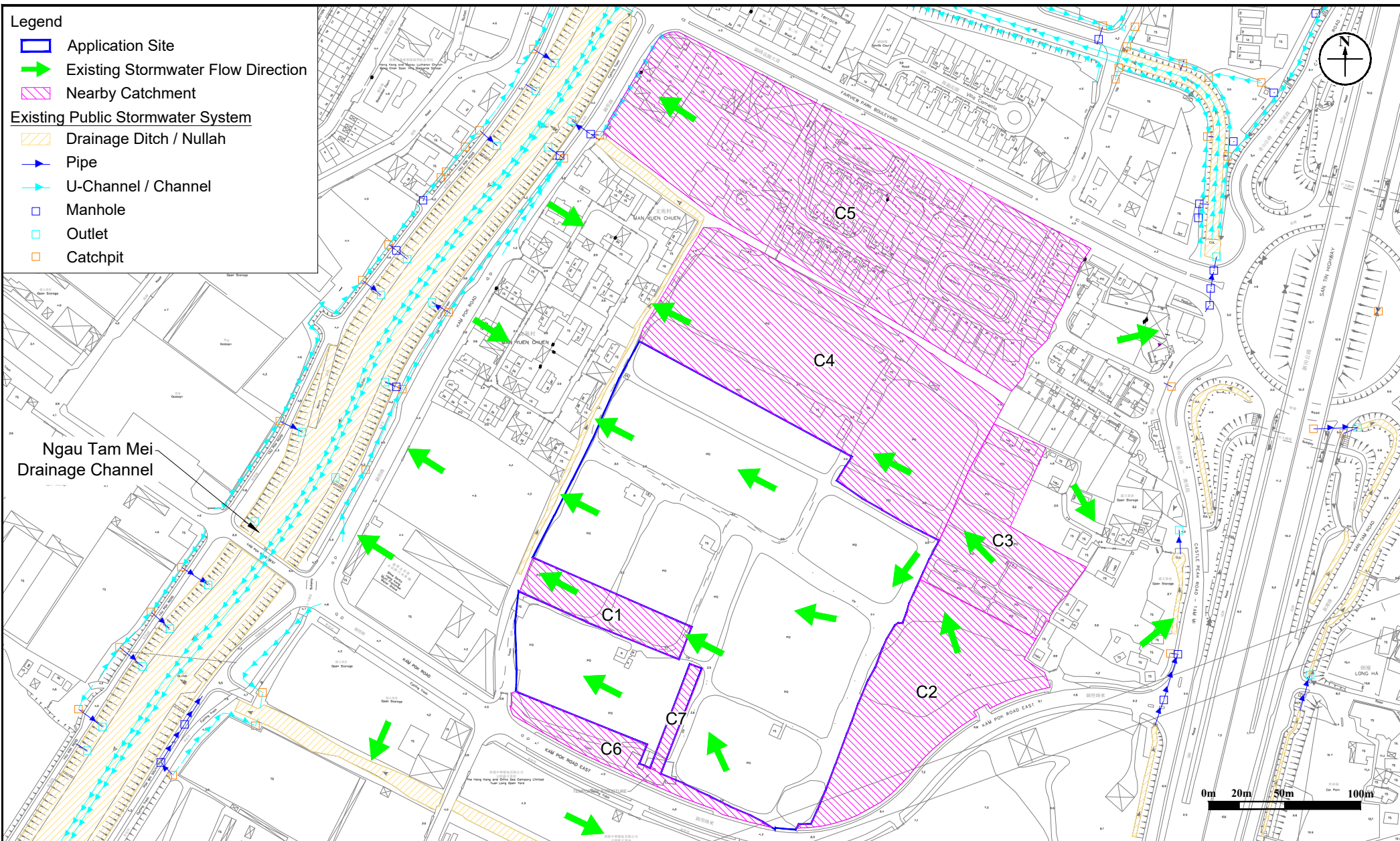


Figure: 2.1

Title: Existing Drainage System in the vicinity of the Application Site

Project: Planning Application for Proposed Comprehensive Development Scheme to include Wetland Restoration Proposal and Proposed Filling of Ponds/Land and Excavation of Land in "OU(CDWRA)" Zone at Various Lots in D.D. 104, North of Kam Pok Road East, Pok Wai, Yuen Long, New Territories

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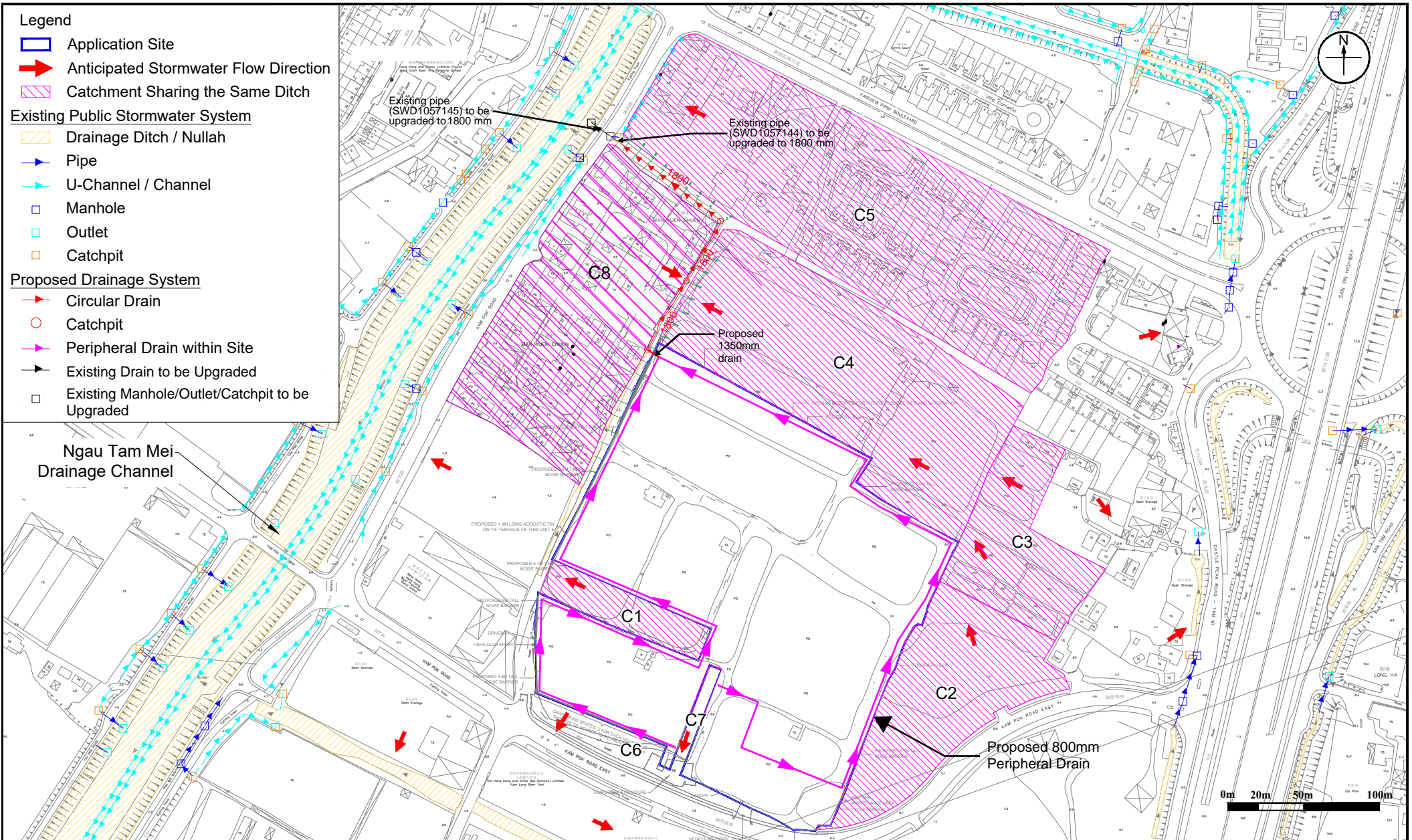


Figure: 3.1
Title: Proposed Drainage System for the Application Site

Project: Planning Application for Proposed Comprehensive Development Scheme to include Wetland Restoration Proposal and Proposed Filling of Ponds/Land and Excavation of Land in "OU(CDWRA)" Zone at Various Lots in D.D. 104, North of Kam Pok Road East, Pok Wai, Yuen Long, New Territories

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Appendix 1.1 Indicative Master Layout Plan of the Proposed Development

Please refer to the Planning Statement

Appendix 2.1 Summary of Catchment Characteristic

Summary of Catchment Characteristic

Catchment		Area	Coverage	Runoff Coefficient
		(m ²)		
Existing (Site)	Pond	49,000.0	96%	0.35
	Unpaved pond bund / footpath	2,073.3	4%	0.35
	Total	51,073.3		
Future (Site)	Paved area	18,189.9	35%	0.95
	Wetland Restoration Area (WRA)	20,202.4	40%	1.00
	Uncovered horizontal PA, Reed Zone and Grass Paver	12,681.0	25%	0.35
	Total	51,073.3		
C1	Pond	2191.3	79%	1.00
	Unpaved pond bund / footpath	593.5	21%	0.35
	Total	2,784.8		
C2	Construction site for village houses	4365.1	40%	0.95
	Open storage area	6,547.6	60%	0.35
	Total	10,912.7		
C3	Pond	5,954.1	81%	1.00
	Unpaved pond bund / footpath	942.4	13%	0.35
	Village houses	497.7	7%	0.95
	Total	7,394.2		
C4	Pond	15,359.8	70%	1.00
	Unpaved pond bund / footpath	6,657.0	30%	0.35
	Total	22,016.8		
C5	Pond	626.5	2%	1.00
	Village houses / paved area	30,333.1	96%	0.95
	Landscaping area	660.0	2%	0.35
	Total	31,619.6		
C6	Pond	734.0	29%	1.00
	Temporary structure / paved area	1,824.5	71%	0.95
	Total	2,558.5		
C7	Pond	537.2	86%	1.00
	Temporary structure / paved area	86.2	14%	0.95
	Total	623.4		
C8	Unpaved area	340.3	20%	0.35
	Paved area	1,355.0	80%	0.95
	Total	1,695.3		

Appendix 2.2 Drainage Impact Assessment Calculations under Existing Condition

Appendix 2.2 Drainage Impact Assessment Calculations under Existing Condition

Note:

1) Colebrook-White's equation is adopted for full-bore pipe velocity calculation; Manning's equation is adopted for non-circular features.

From	To	US I.L. (mPD)	DS I.L. (mPD)	No. of pipe	Shape	Bottom Width (m)	Height (m)	Top Width (m)	Side Slope (m/m)	Inflow Catchment	Runoff from Catchment (m ³ /s)	Full Flow Velocity (m/s)	Full Flow Capacity (m ³ /s)	Cumulative Runoff (m ³ /s)	Utilization
S1	S2	2.96	2.55	1	Trapezoidal	1.47	0.70	2.54	1.53	C1, C6, C7	0.293	7.221	8.771	8.771	3.3%
S2	S3	2.55	2.48	1	Trapezoidal	2.38	1.27	4.64	1.78	-	0.000	4.207	14.878	14.878	2.0%
S3	S4	2.48	2.54	1	Trapezoidal	2.40	1.17	3.89	1.27	-	0.000	4.106	14.349	14.349	2.0%
S4	S5	2.54	2.41	1	Trapezoidal	0.61	0.91	5.15	2.49	C8	0.104	3.405	2.718	2.718	14.6%
S5	S6	2.41	2.49	1	Trapezoidal	1.44	1.16	5.08	1.57	-	0.000	3.971	9.035	9.035	4.4%
S6	S7	2.49	2.44	1	Trapezoidal	1.06	1.13	4.51	1.53	-	0.000	2.974	5.445	5.445	7.3%
S7	S8	2.44	2.41	1	Trapezoidal	1.02	1.01	3.87	1.41	-	0.000	2.022	3.191	3.191	12.4%
S8	S9	2.41	2.40	1	Trapezoidal	1.03	0.53	2.92	1.78	-	0.000	0.929	0.588	0.588	67.4%
S9	S10	2.40	2.39	1	Trapezoidal	1.44	0.68	4.63	2.35	-	0.000	1.055	1.117	1.117	35.5%
S10	S11	2.39	2.37	1	Trapezoidal	1.49	0.72	4.63	2.18	C2, C3, Site	1.800	1.599	1.886	1.886	116.5%
S11	S12	2.37	2.27	1	Trapezoidal	1.60	0.76	3.90	1.51	-	0.000	3.715	5.343	5.343	41.1%
S12	S13	2.27	2.28	1	Trapezoidal	0.98	1.10	5.26	1.95	-	0.000	1.227	1.878	1.878	117.0%
S13	S14	2.28	2.26	1	Trapezoidal	1.44	1.67	7.06	1.68	-	0.000	2.332	8.527	8.527	25.8%
S14	S15	2.26	2.25	1	Trapezoidal	0.44	0.32	0.76	0.50	C4	0.178	0.646	0.201	0.201	1183.0%
S15	S16	2.25	2.20	1	Trapezoidal	0.40	0.36	0.70	0.42	-	0.000	1.502	0.615	0.615	386.3%
S16	S17	2.20	2.00	1	Trapezoidal	0.50	0.48	2.44	2.02	-	0.000	3.188	1.016	1.016	233.9%
S17	S18	2.00	1.73	1	Trapezoidal	0.61	0.54	3.03	2.24	-	0.000	4.075	1.686	1.686	140.9%
S18	S19	1.73	1.61	1	Trapezoidal	0.62	0.94	5.32	2.50	-	0.000	2.855	2.406	2.406	98.7%
S19	S20	1.61	1.59	1	Trapezoidal	2.24	1.09	6.94	2.16	-	0.000	1.972	5.313	5.313	44.7%
S20	S21	1.59	1.60	1	Trapezoidal	1.84	0.99	6.08	2.14	-	0.000	1.328	2.725	2.725	87.2%
S21	S22	1.60	1.54	1	Trapezoidal	1.13	0.63	6.55	4.30	-	0.000	2.345	1.697	1.697	140.0%
S22	S23	1.54	1.46	1	Trapezoidal	2.05	0.98	7.16	2.61	-	0.000	3.781	8.091	8.091	29.4%
S23	S24	1.46	1.23	1	Trapezoidal	0.60	1.11	6.23	2.54	-	0.000	5.153	5.342	5.342	44.5%
S24	S25	1.23	1.87	1	Trapezoidal	1.64	1.22	6.82	2.12	-	0.000	11.207	27.253	27.253	8.7%
S25	S26	1.87	1.98	1	Trapezoidal	2.61	1.17	5.01	1.03	-	0.000	5.357	21.158	21.158	11.2%
S26	S27	1.98	1.32	1	Trapezoidal	1.89	1.57	9.32	2.37	-	0.000	14.301	51.600	51.600	4.6%
S27	Outlet	1.32	1.58	1	Trapezoidal	3.23	2.96	8.49	0.89	C5	2.087	19.690	344.174	344.174	1.3%

Appendix 2.3 Drainage Impact Assessment Calculations under Proposed Condition

Appendix 2.3 Drainage Impact Assessment Calculations under Proposed Condition

Note:

1) Colebrook-White's equation is adopted for full-bore pipe velocity calculation; Manning's equation is adopted for non-circular features.

From	To	US I.L. (mPD)	DS I.L. (mPD)	No. of pipe	Shape	Bottom Width (m)	Height (m)	Top Width (m)	Side Slope (m/m)	Pipe Size (m)	Inflow Catchment	Runoff from Catchment (m ³ /s)	Full Flow Velocity (m/s)	Full Flow Capacity (m ³ /s)	Cumulative Runoff (m ³ /s)	Utilization
S1	S2	2.96	2.55	1	Trapezoidal	1.47	0.70	2.54	1.53	-	C1, C6, C7	0.293	4.955	6.019	0.293	4.9%
S2	S3	2.55	2.48	1	Trapezoidal	2.38	1.27	4.64	1.78	-	-	0.000	2.932	10.367	0.293	2.8%
S3	S4	2.48	2.54	1	Trapezoidal	2.40	1.17	3.89	1.27	-	-	0.000	2.787	9.739	0.293	3.0%
S4	S5	2.54	2.41	1	Trapezoidal	0.61	0.91	5.15	2.49	-	C8	0.104	2.574	2.055	0.396	19.3%
S5	S6	2.41	2.49	1	Trapezoidal	1.44	1.16	5.08	1.57	-	-	0.000	2.792	6.352	0.396	6.2%
S6	S7	2.49	2.44	1	Trapezoidal	1.06	1.13	4.51	1.53	-	-	0.000	2.108	3.860	0.396	10.3%
S7	S8	2.44	2.41	1	Trapezoidal	1.02	1.01	3.87	1.41	-	-	0.000	1.419	2.239	0.396	17.7%
S8	S9	2.41	2.40	1	Trapezoidal	1.03	0.53	2.92	1.78	-	-	0.000	0.646	0.409	0.396	96.9%
S9	S10	2.40	2.39	1	Trapezoidal	1.44	0.68	4.63	2.35	-	-	0.000	0.743	0.787	0.396	50.4%
S10	S11	2.39	2.35	1	Circular	-	-	-	-	1.35	C2, C3, Site	2.076	2.288	2.947	2.473	83.9%
S11	S12	2.35	2.31	1	Circular	-	-	-	-	1.35	-	0.000	2.288	2.947	2.473	83.9%
S12	S13	2.31	2.27	1	Circular	-	-	-	-	1.35	-	0.000	2.288	2.947	2.473	83.9%
S13	S14	2.27	2.23	1	Circular	-	-	-	-	1.35	-	0.000	2.288	2.947	2.473	83.9%
S14	S15	2.23	2.19	1	Circular	-	-	-	-	1.35	C4	0.178	2.288	2.947	2.651	90.0%
S15	S16	2.19	2.15	1	Circular	-	-	-	-	1.35	-	0.000	2.288	2.947	2.651	90.0%
S16	S17	2.15	2.11	1	Circular	-	-	-	-	1.35	-	0.000	2.288	2.947	2.651	90.0%
S17	S18	2.11	2.07	1	Circular	-	-	-	-	1.35	-	0.000	2.288	2.947	2.651	90.0%
S18	S19	2.07	2.01	1	Circular	-	-	-	-	1.35	-	0.000	2.288	2.947	2.651	90.0%
S19	S20	2.01	1.95	1	Circular	-	-	-	-	1.35	-	0.000	2.558	3.296	2.651	80.4%
S20	S21	1.95	1.90	1	Circular	-	-	-	-	1.35	-	0.000	2.558	3.296	2.651	80.4%
S21	S22	1.90	1.85	1	Circular	-	-	-	-	1.35	-	0.000	2.558	3.296	2.651	80.4%
S22	S23	1.85	1.80	1	Circular	-	-	-	-	1.35	-	0.000	2.558	3.296	2.651	80.4%
S23	S24	1.80	1.75	1	Circular	-	-	-	-	1.35	-	0.000	2.558	3.296	2.651	80.4%
S24	S25	1.75	1.70	1	Circular	-	-	-	-	1.35	-	0.000	2.558	3.296	2.651	80.4%
S25	S26	1.70	1.65	1	Circular	-	-	-	-	1.35	-	0.000	2.558	3.296	2.651	80.4%
S26	S27	1.65	1.60	1	Circular	-	-	-	-	1.35	-	0.000	2.558	3.296	2.651	80.4%
S27	Outlet	1.60	1.58	1	Circular	-	-	-	-	1.60	C5	2.087	2.844	5.147	4.738	92.1%

Appendix 3.1 Calculation of Backwater Effect

Backwater Analysis for the Proposed Application Site

Appendix 3.1

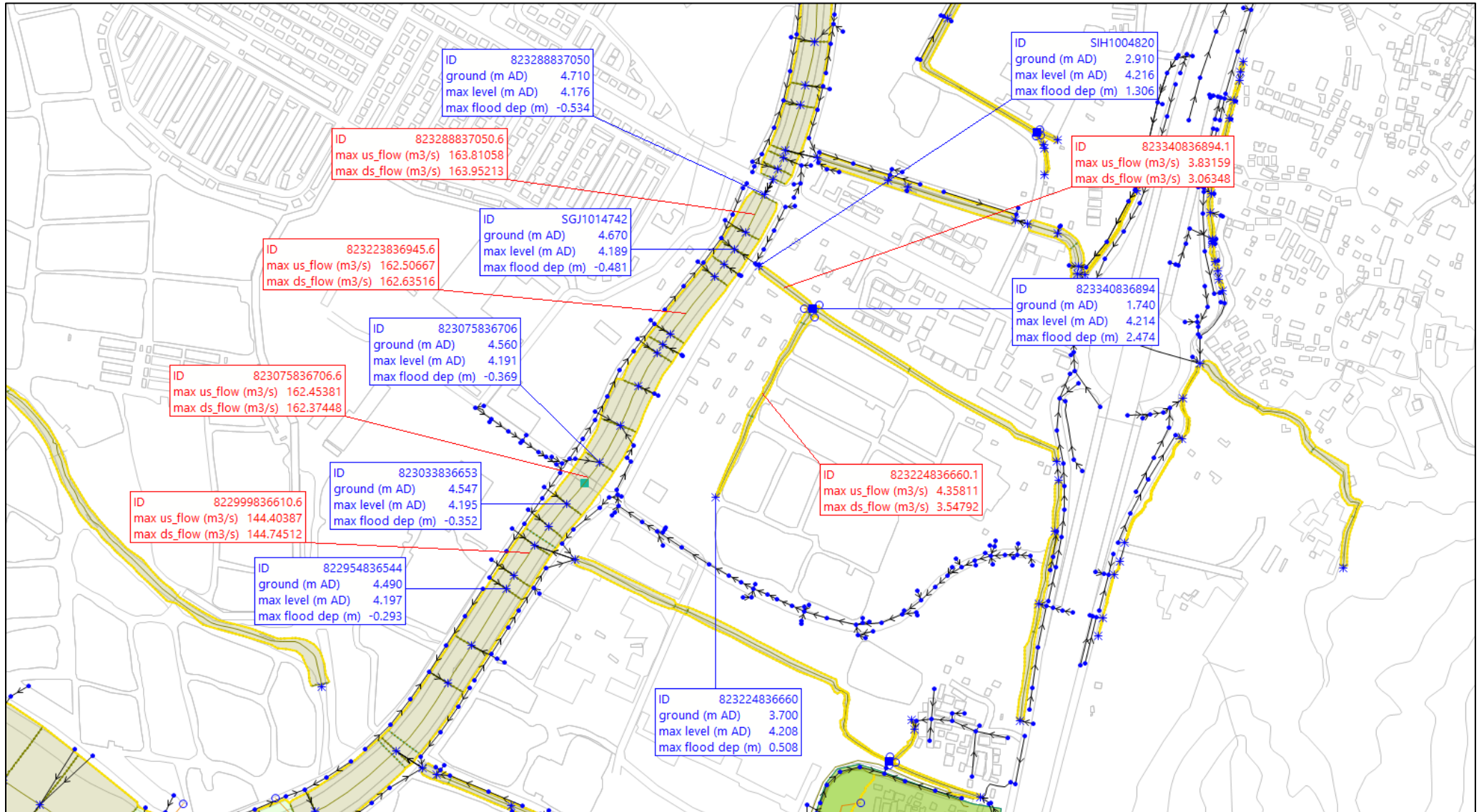
Type	Size			Upstream Invert Level (mPD)	Downstream Invert Level (mPD)	Hydraulics				Friction Loss	Inlet/Outlet		Water Level ⁽¹⁾ (mPD)	Ground Level (mPD)	Check ⁽²⁾
	Width (m)	Height (m)	Length (m)			Radius (m)	Flow (m ³ /s)	Velocity (m/s)	Friction slope (S _f)		K	Loss			
Circular Drain	1.60	1.60	5.00	1.40	0.98	0.40	0.296666667	0.147549895	0.000016621	0.000	1	0.0011	4.563		
Circular Pipe	1.60	1.60	2.17	1.58	1.40	0.40	0.296666667	0.147549895	0.000016621	0.000			4.56	4.0	
Proposed Circular Drain	1.30	1.30	84.46		1.56	0.33	0.296666667	0.223507533	0.000050302	0.004			4.57	4.0	NOT OK
Proposed Circular Drain	1.30	1.30	109.00			0.33	0.890000000	0.670522600	0.000452722	0.049			4.62	3.1	NOT OK
Proposed Circular Drain	1.30	1.30	7.81			0.33	0.840000000	0.632852791	0.000403283	0.003	0.5	0.0013	4.57	3.1	NOT OK
													4.57	5.1	OK

Remark:

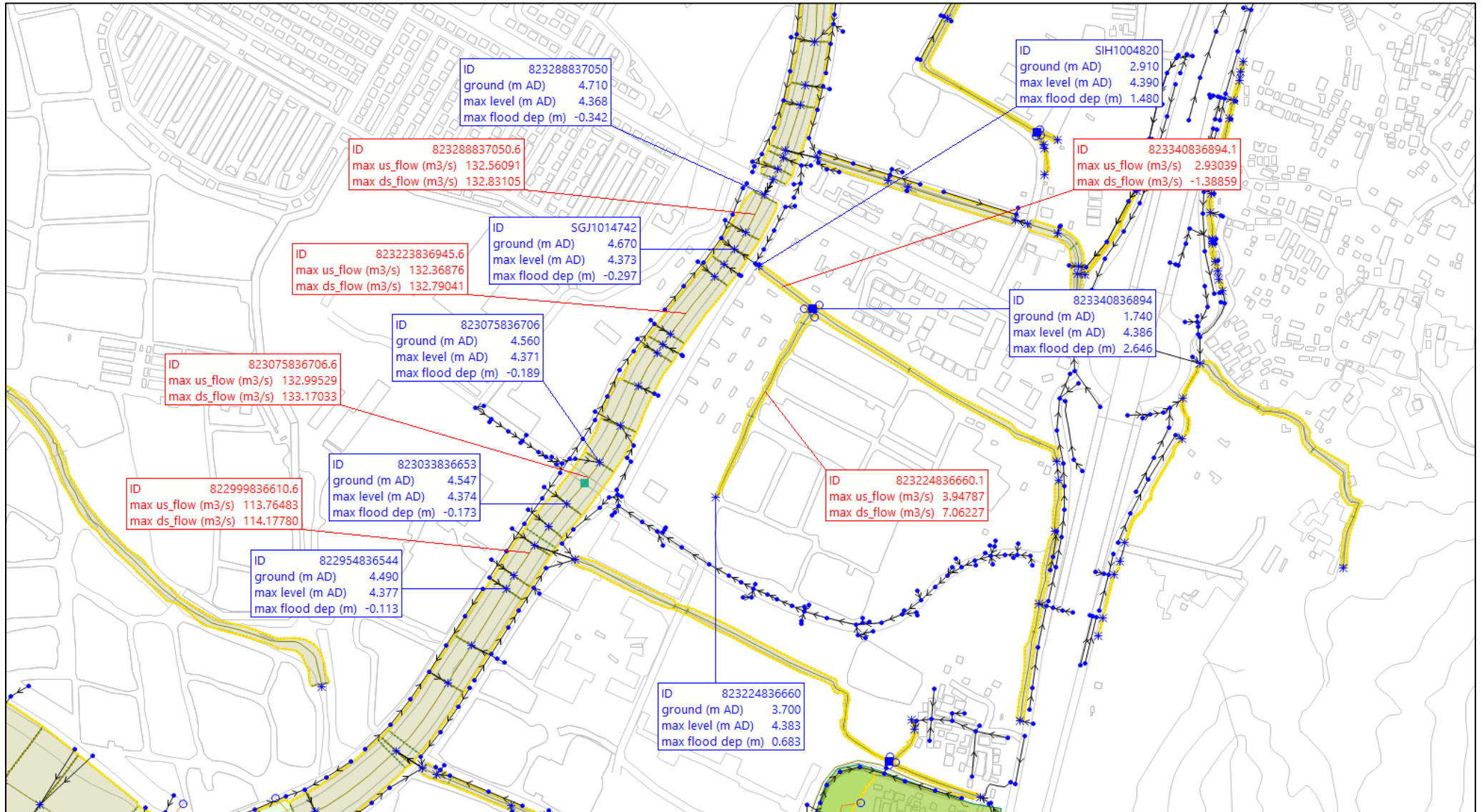
(1) With reference to the Appendix 4, flood level of 50B (PP with climate change) provided by DSD, the maximum water level of the Ngau Tam Mei Drainage Channel at the outlet is +4.563 mPD.

(2) According to Appendix 4, the boundary water level of Ngau Tam Mei River is already higher than the ground level, hence, the unfavourable condition is not a result of the Proposed Development. Thus, no mitigation works is proposed under this project.

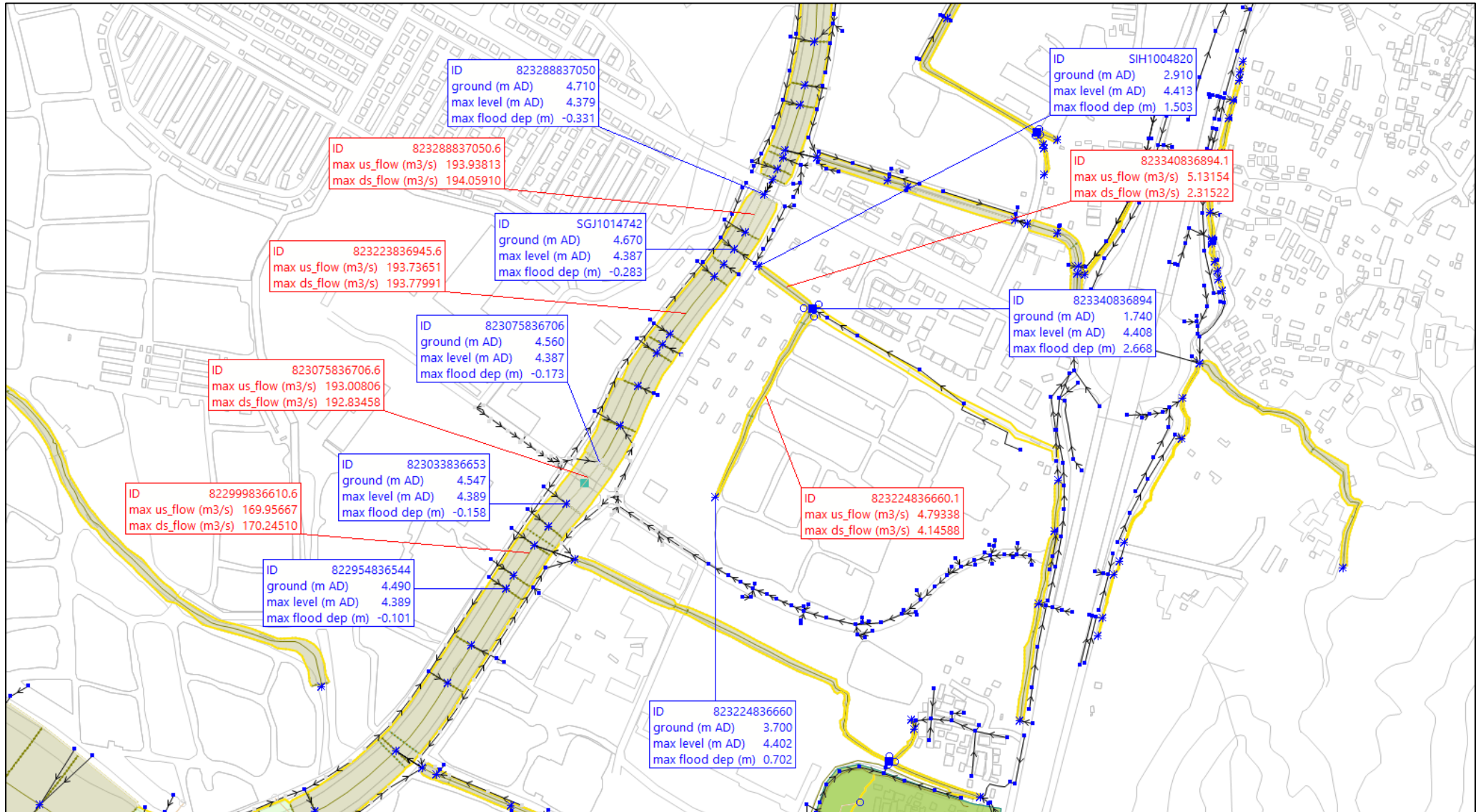
Appendix 4.1 Boundary Condition provided by DSD



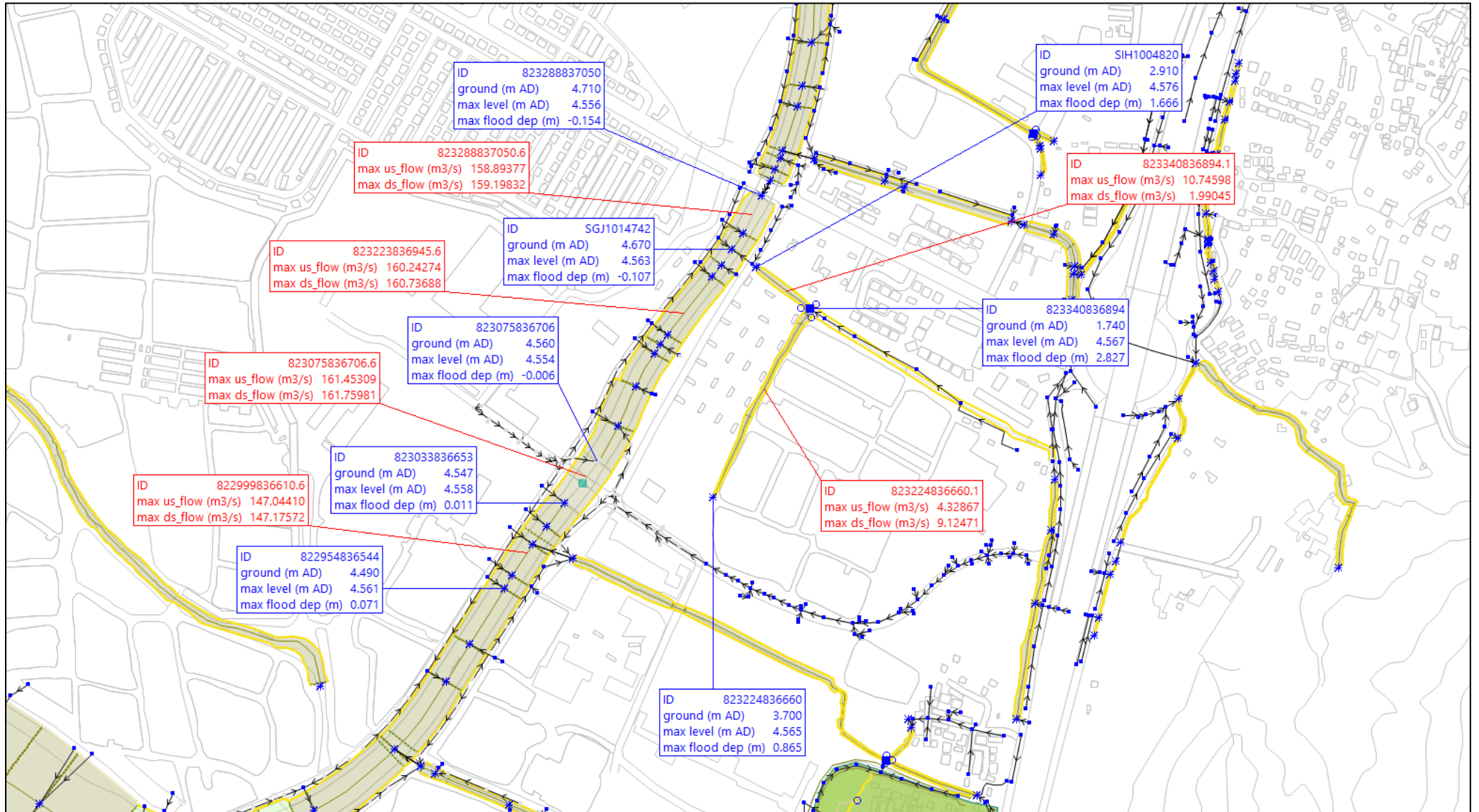
50A (EE)



50B (EE)

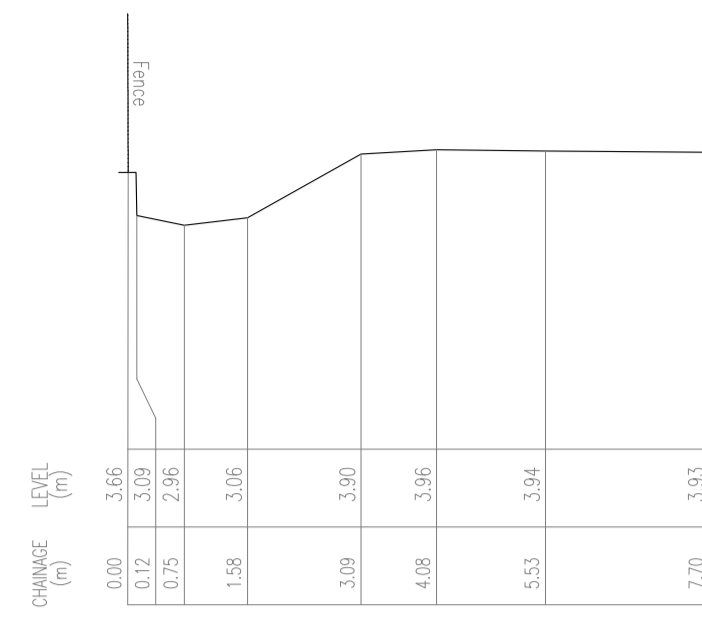


50A (PP with climate change)

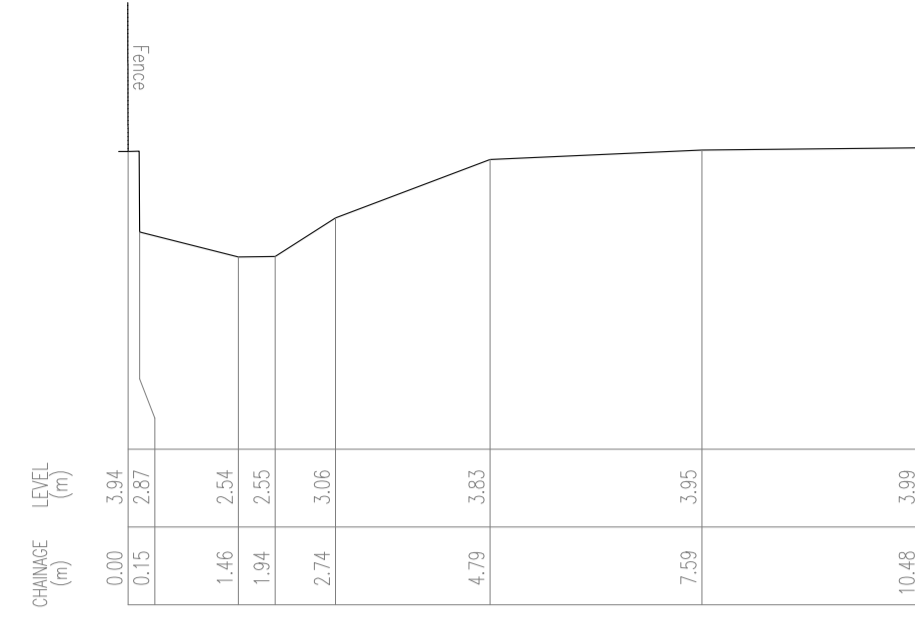


50B (PP with climate change)

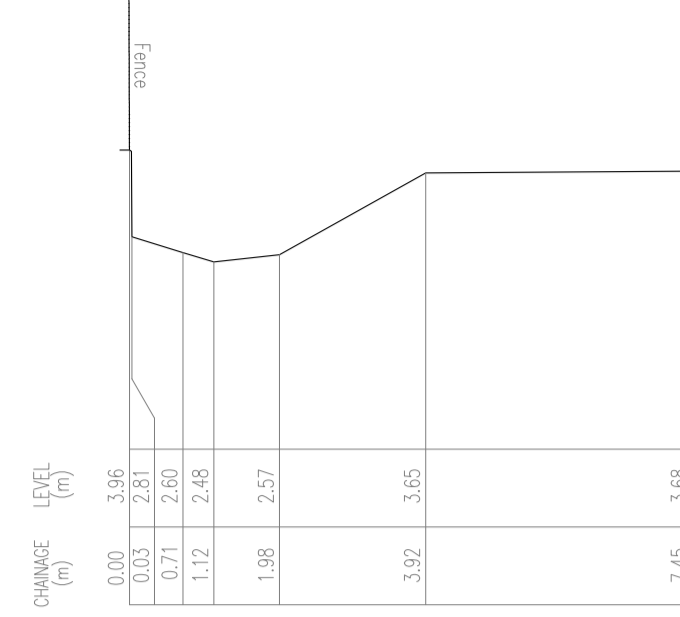
Appendix 5.1 Site Surveying of Existing Drainage Ditch



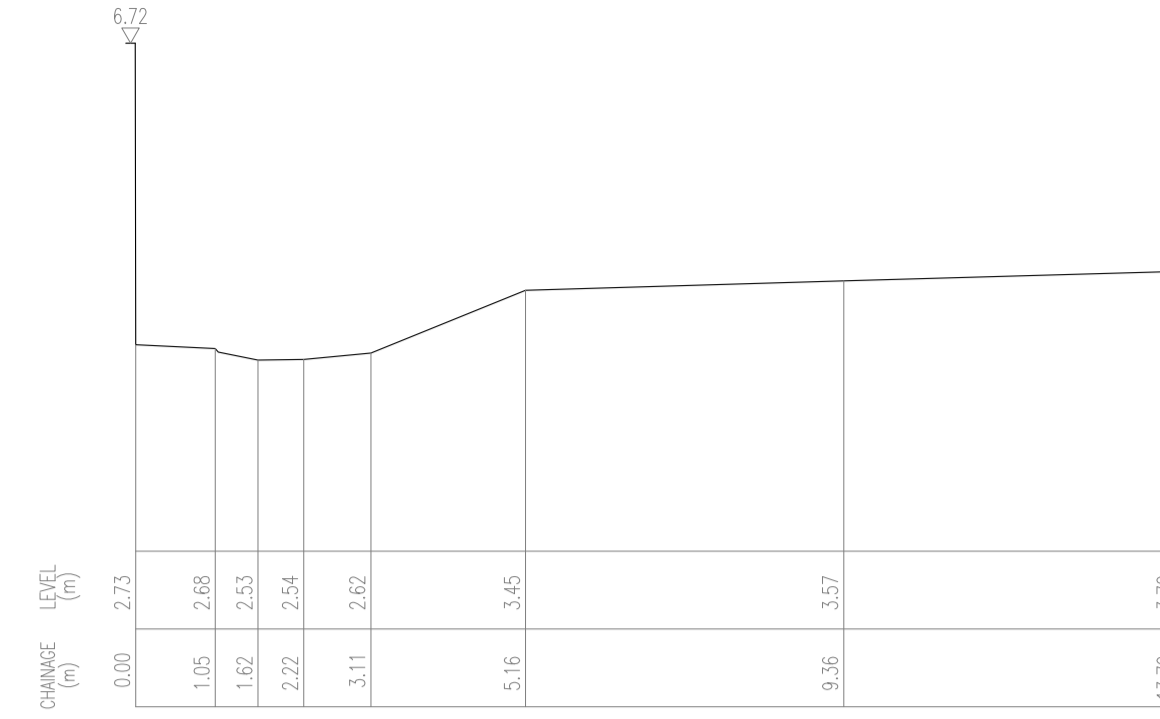
SECTION S1



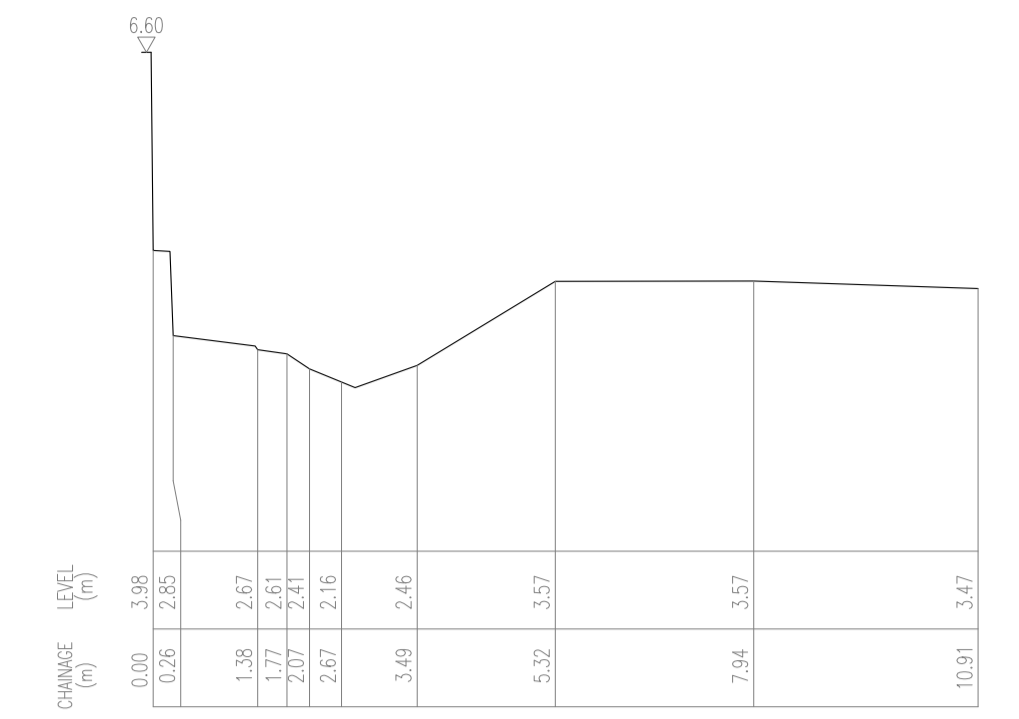
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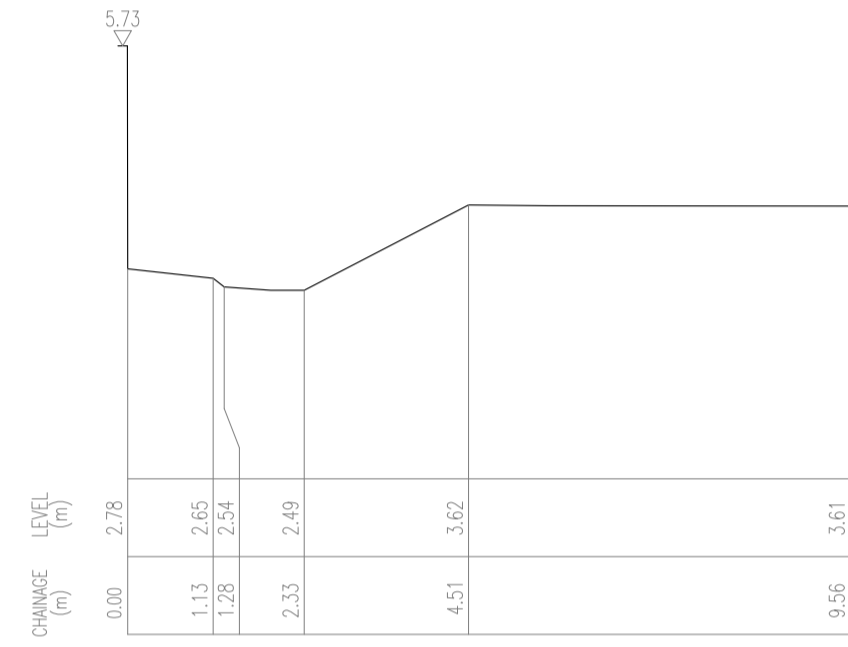
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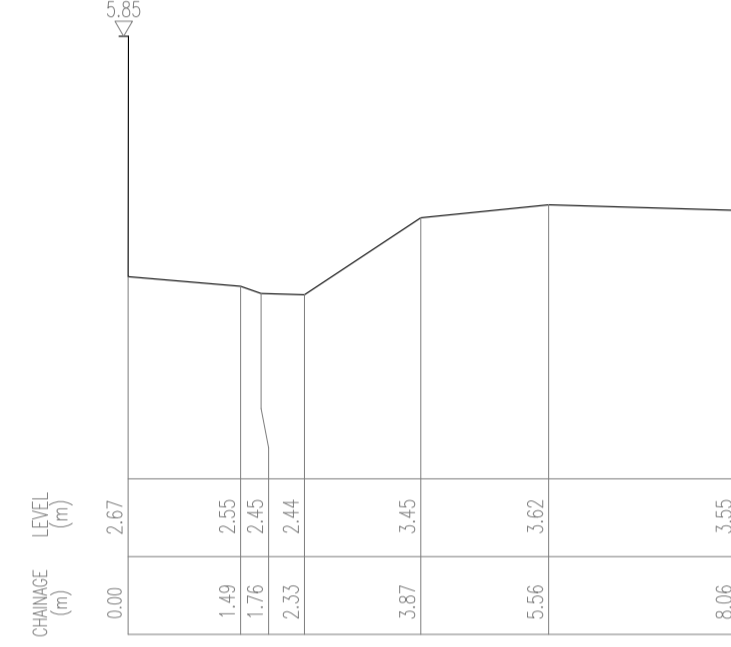
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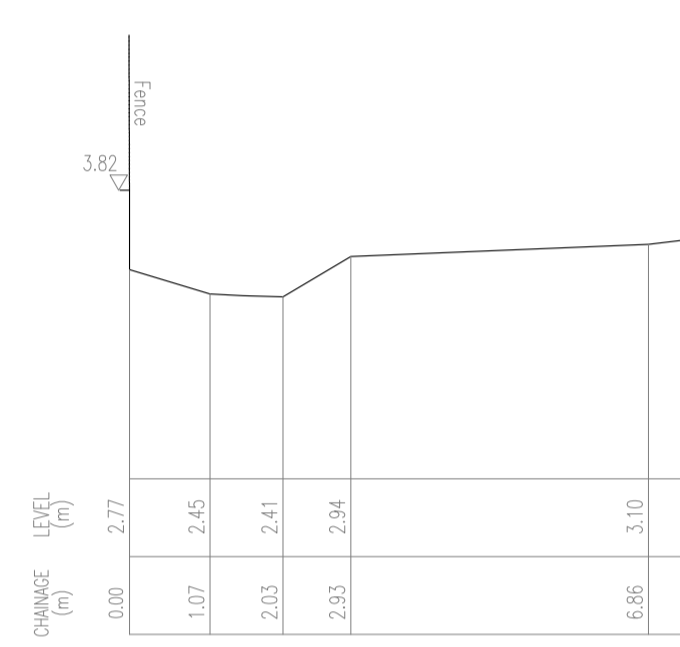
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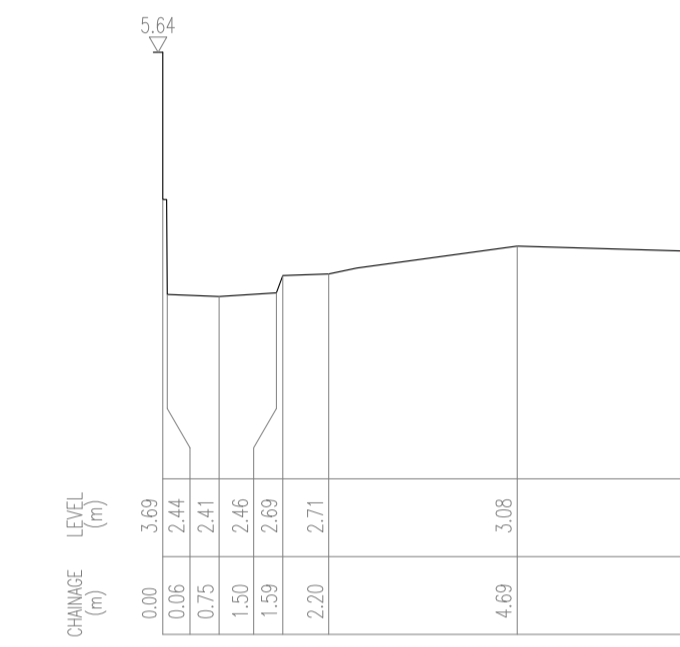
SECTION S6



SECTION S7



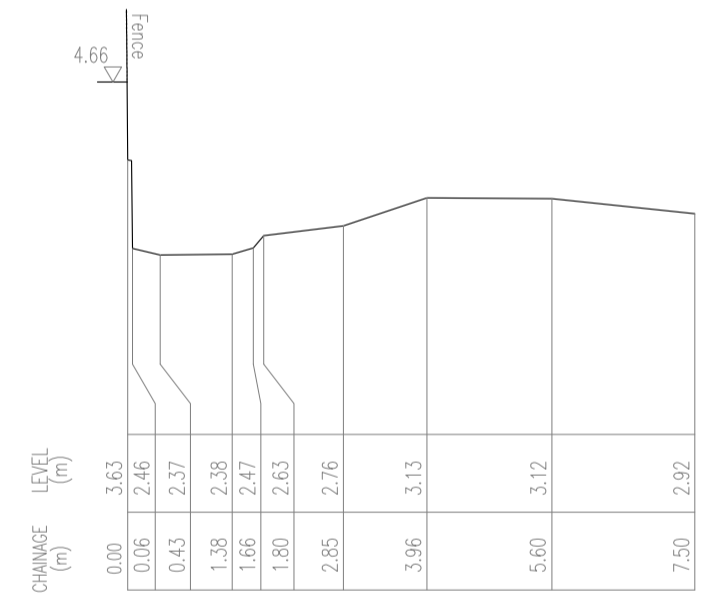
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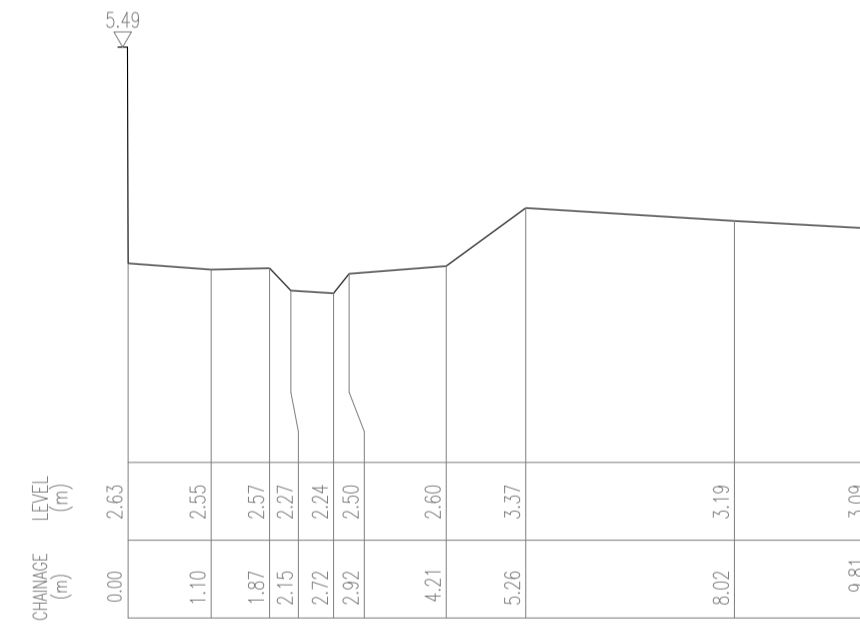
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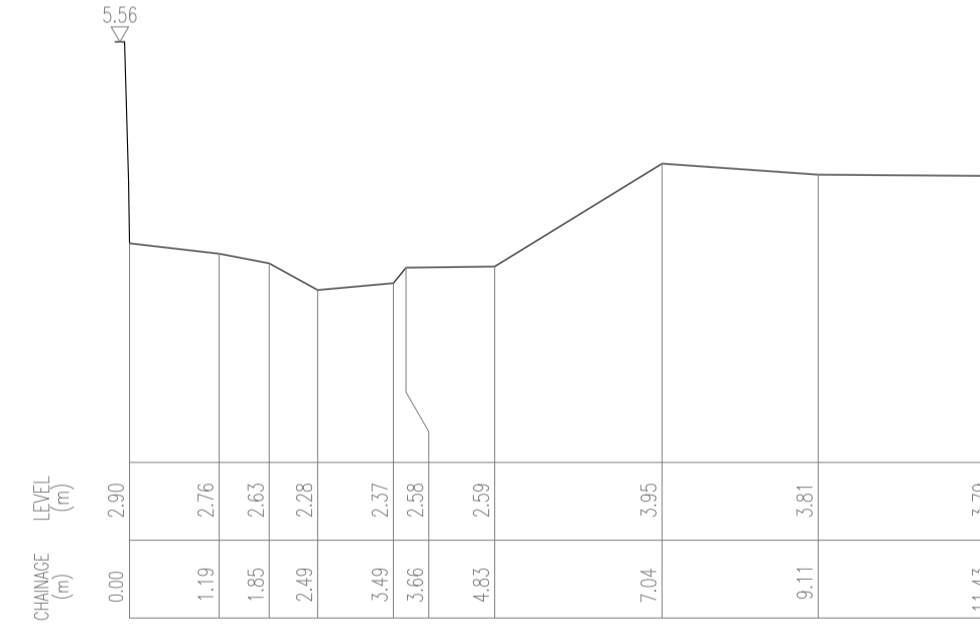
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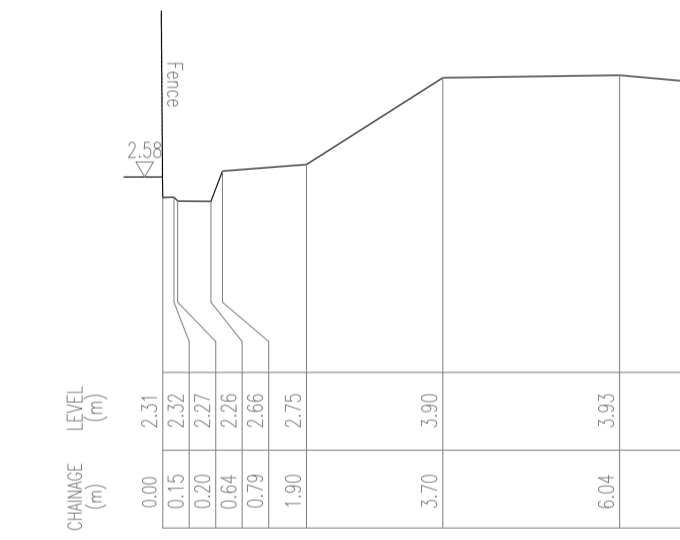
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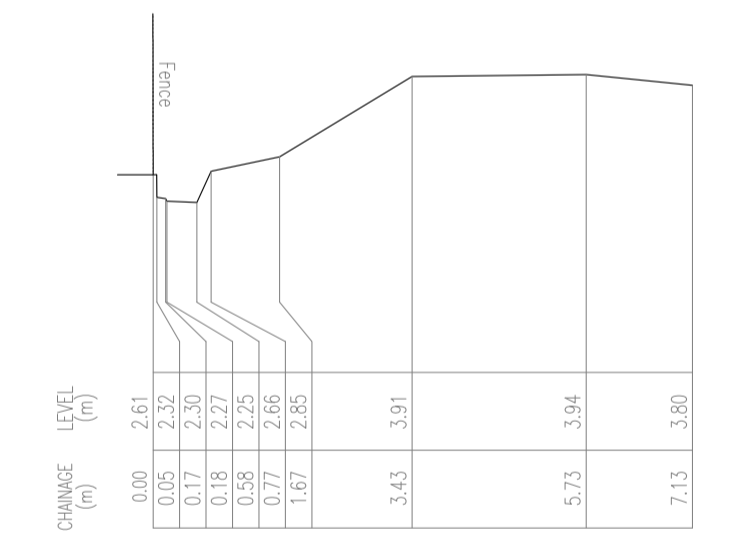
SECTION S12



SECTION S13



SECTION S14



SECTION S15

LEGEND:

- ARTIFICIAL SLOPE
- CHANNEL WITH FLOW DIRECTION
- STEP CHANNEL WITH FLOW DIRECTION
- BOUNDARY LINE & BOUNDARY POINT
- GATE
- PERMANENT BUILDING AND CANOPY
- TREE WITH TREE NO.
- INCLINED WALL
- GRAVE

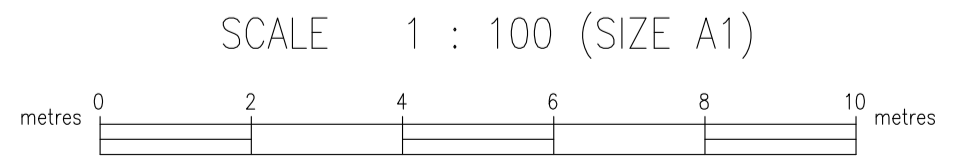
- CONTOURS
- TEMPORARY STRUCTURE
- PILLAR BOX
- HAND RAILING
- HOARDING
- KERB LINE (BOTTOM)
- SLOPE TOP
- SLOPE BOTTOM
- FENCE
- BARRIERS
- BENCH
- ELECTRIC POLE
- SIGN BOARD
- SIGN POLE
- LAMP POST
- TELEPHONE POLE
- TRAFFIC LIGHT
- FIRE HYDRANT
- PARKING METER
- BOLLARD AT ROAD
- GULLY
- GRATING

- VALVE FIRE
- VALVE GAS
- VALVE WATER WORKS
- MANHOLE
- MANHOLE, ATC
- MANHOLE, CABLE TV
- MANHOLE, ELECTRIC & MECHANICAL SERVICES DEPARTMENT
- MANHOLE, PCOW-HKT TELEPHONE LIMITED
- MANHOLE, DRAINAGE SERVICES DEPARTMENT
- MANHOLE, PUBLIC LIGHTING

- MANHOLE, HUTCHISON COMMUNICATION LIMITED
- MANHOLE, HUTCHISON GLOBAL CROSSING LIMITED BROADBAND
- CATCH PIT
- MANHOLE, FOUL WATER/SEWER
- MANHOLE, STORM WATER
- MANHOLE, PACIFIC CENTURY CABLE & WIRELESS
- MANHOLE, NEW WORLD TELEPHONE
- MANHOLE, CLP POWER
- MANHOLE, WHAT T & T
- MANHOLE, TOWNGAS TELECOM

ABBREVIATION:

- BOULDER
- BERM
- BOUNDARY STONE
- CANOPY
- CULVERT
- COLUMN
- CONCRETE
- ELECTRIC BOX
- END OF OBJECT
- FLOWER BED
- FOOTPATH
- INVERT LEVEL
- NULLAH
- OVERBRIDGE
- PLATFORM
- PIEZOMETER TUBE
- RAMP
- RUIN
- SHRINE
- TEMPORARY STRUCTURE
- VEHICLE BARRIERS
- WELL
- WORK IN PROGRESS
- WATER TANK



HONG KONG METRIC GRID
PRINCIPAL DATUM HONG KONG
ALL UNITS IN METRES

NOTE: ALL SPOT LEVEL POSITIONS ARE THE DECIMAL POINT OR A CROSS

DATE OF SURVEY: DECEMBER 2022

INITIAL	10/01/2023	---
REVISION	DATE	DESCRIPTION

Fruit Design & Build Ltd.
Topographical Survey
Nam Sang Wai
New Territories

SAM MAK & ASSOCIATES SURVEYORS (HK) LTD.
CONSULTANTS IN LAND, ENGINEERING, MARINE & AERIAL SURVEYS
ROOM 901, MARINA HOUSE, NO.68 HING MAN STREET, SHAUKEIWAN, HONG KONG.
TEL : 28951918 FAX : 28901759 E-mail: hkoffice@sammak.com

PLAN NO. 9215/01/01 (Sheet 2 of 3)

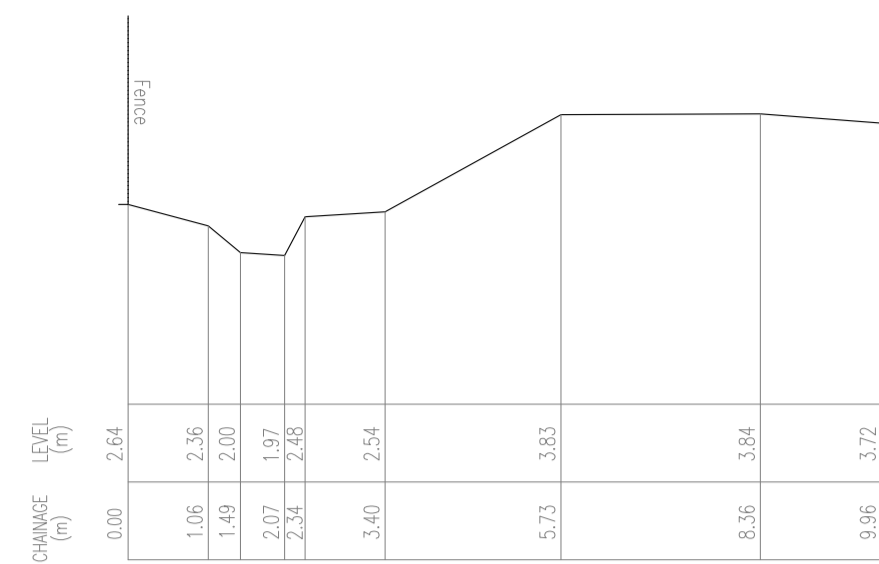
PRELIMINARY

Cheung Chee Pak
Authorized Land Surveyor

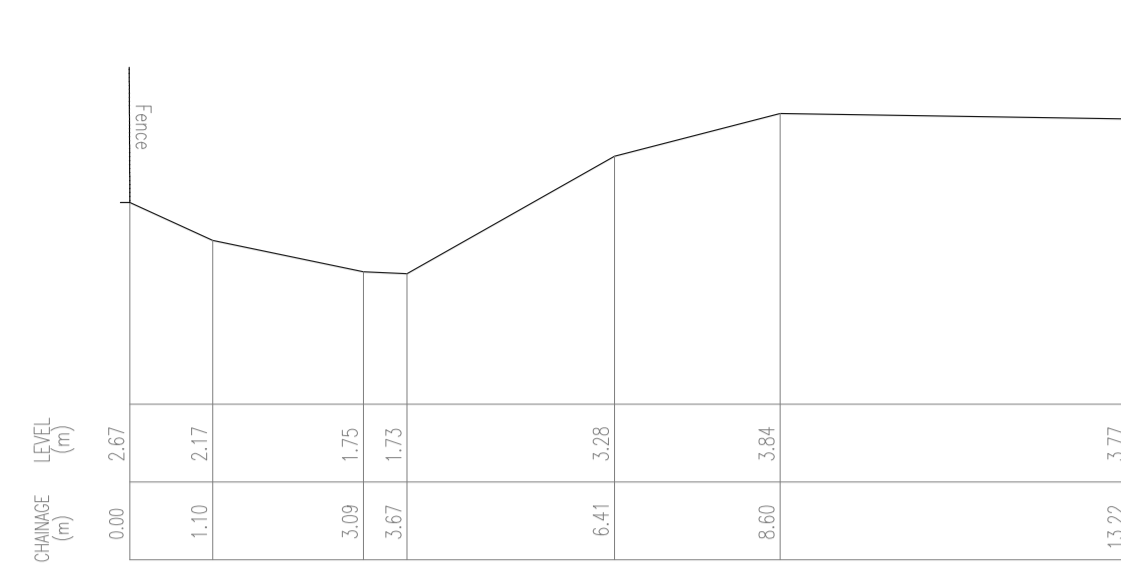
(10/01/2023)



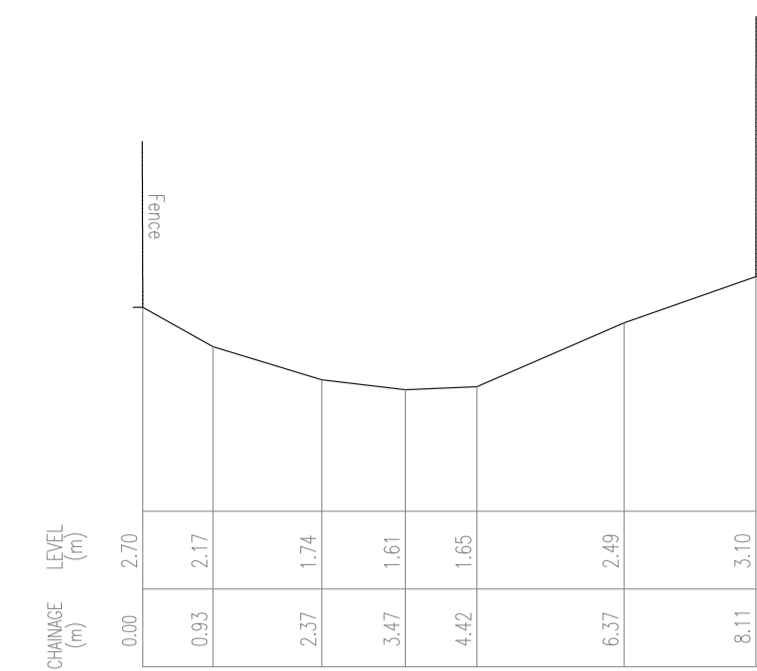
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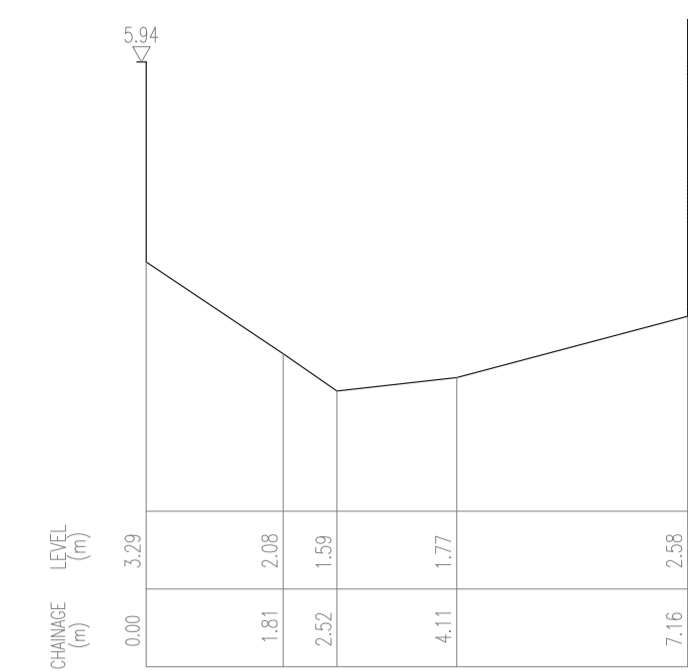
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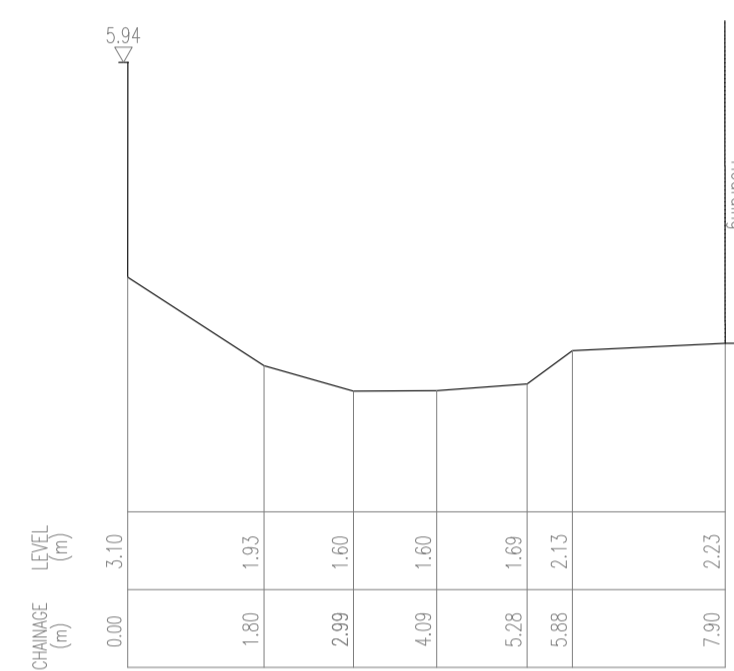
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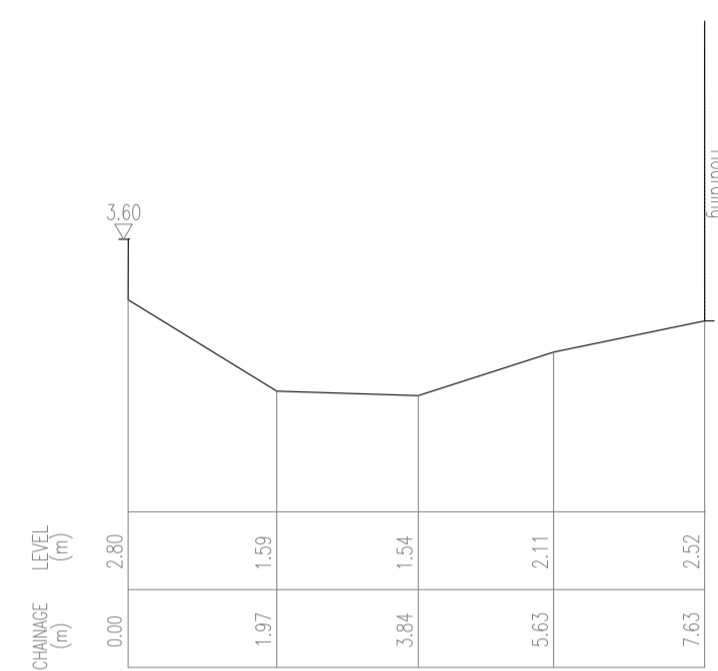
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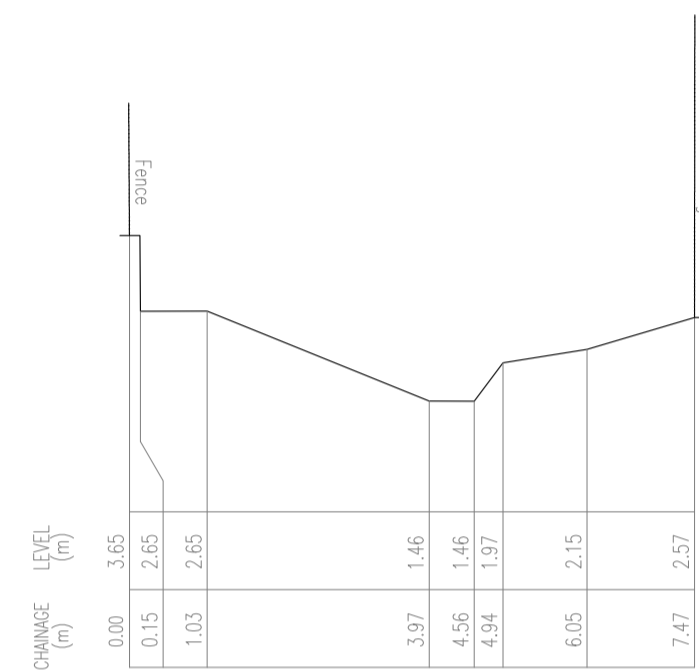
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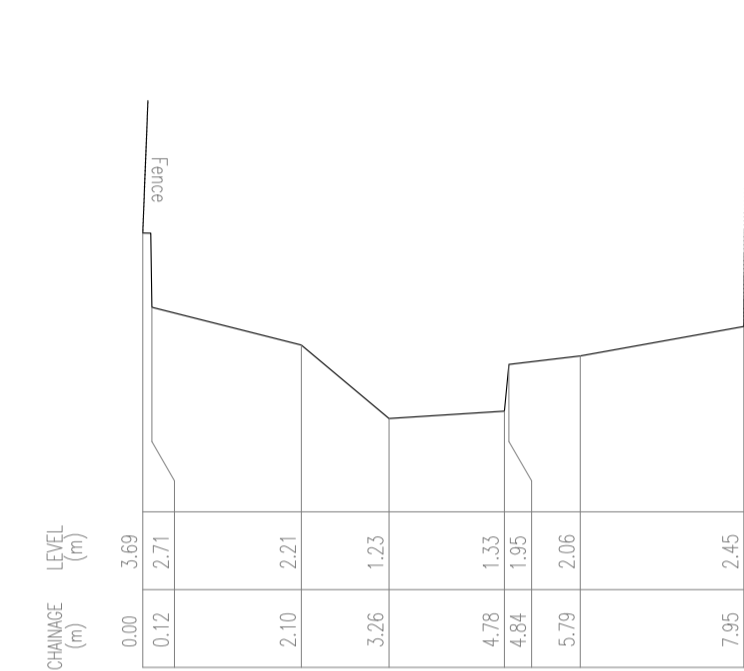
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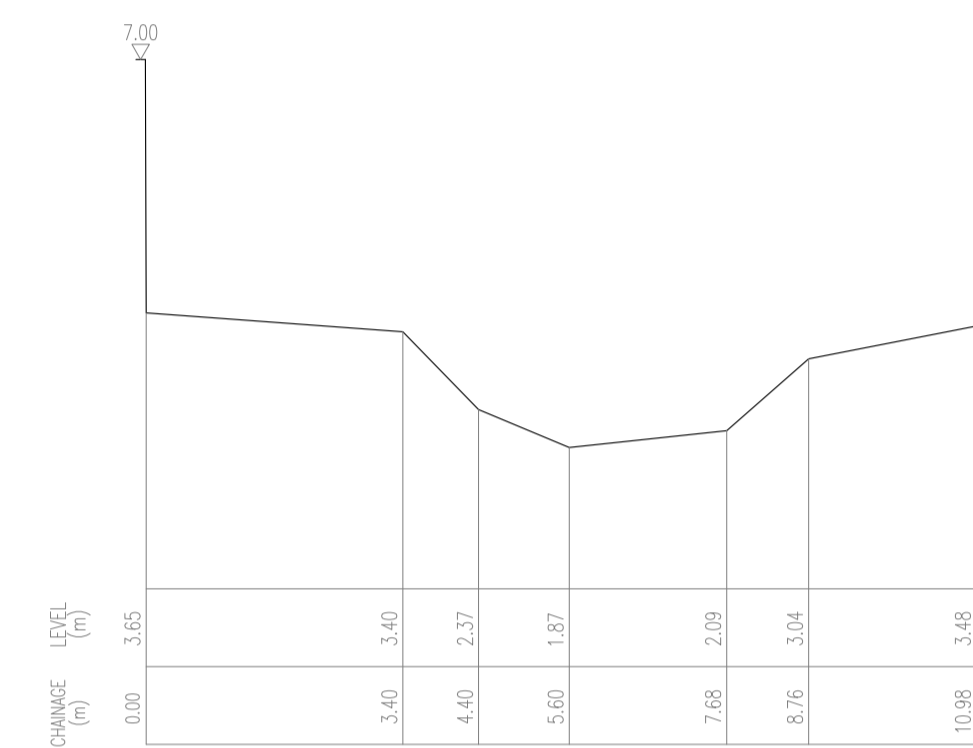
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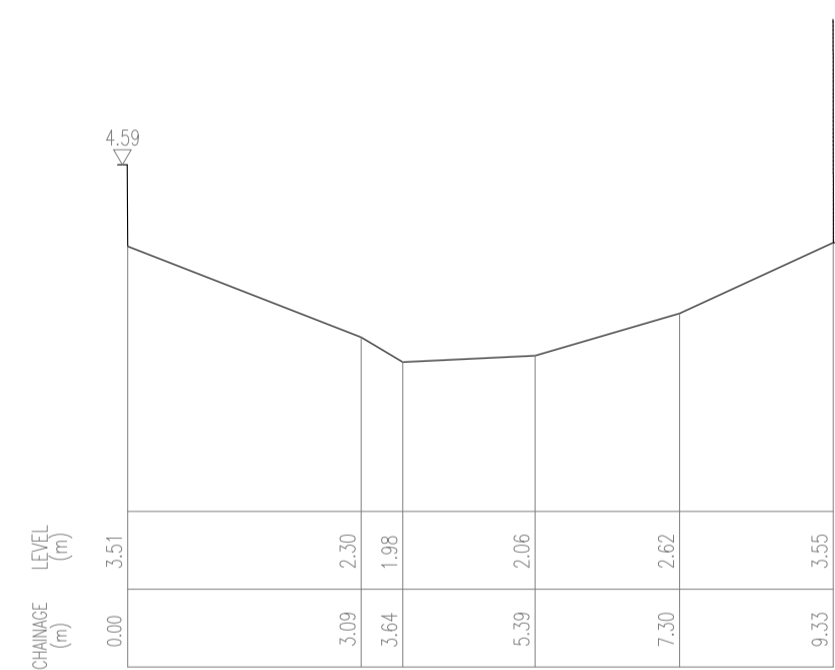
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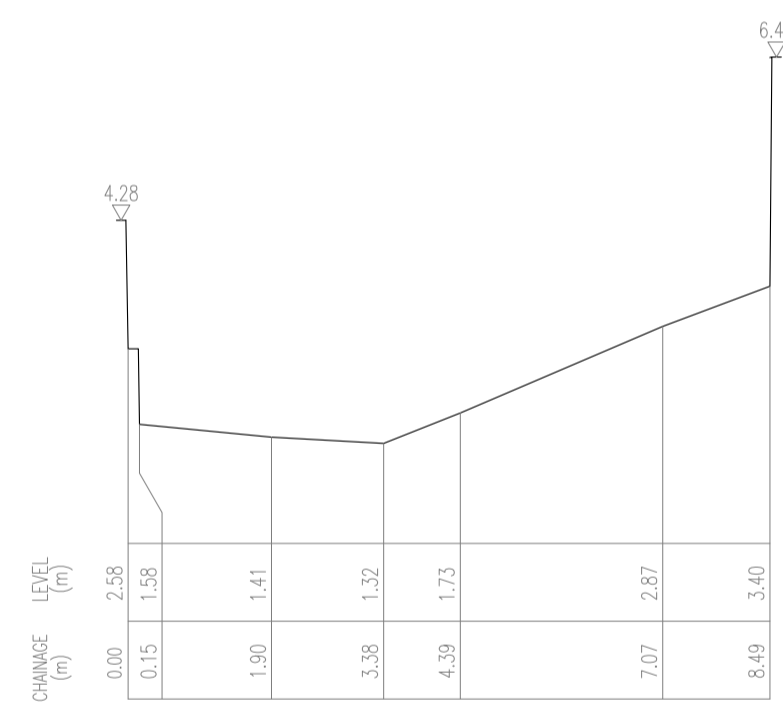
SECTION S24



SECTION S25



SECTION S26



SECTION S27

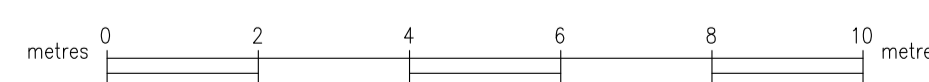
LEGEND:

- ARTIFICIAL SLOPE
- CHANNEL WITH FLOW DIRECTION
0.80 WIDE OF CHANNEL
- STEP CHANNEL WITH FLOW DIRECTION
0.80 WIDE OF STEP CHANNEL
- BOUNDARY LINE & BOUNDARY POINT
- GATE
- PERMANENT BUILDING AND CANOPY
- TREE WITH TREE NO.
- INCLINED WALL (BOTTOM)
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- MANHOLE, CLP POWER
- MANHOLE, WHAFT T & T
- MANHOLE, TOWNGAS TELECOM

ABBREVIATION:

- BD BOULDER
- BE BERM
- BS BOUNDARY STONE
- CA CANOPY
- CUL COLVERT
- CO COLUMN
- CONC CONCRETE
- EB ELECTRIC BOX
- END END OF OBJECT
- FB FLOWER BED
- FP FOOTPATH
- IL INVERT LEVEL
- NU NULLAH
- OH OVERHANG
- PL PLATFORM
- PO POND
- PZ PIEZOMETER TUBE
- RP RAMP
- RU RUIN
- SS SHRINE
- TS TEMPORARY STRUCTURE
- VE VEHICLE BARRIERS
- WB WELL
- WE WORK IN PROGRESS
- WT WATER TANK

SCALE 1 : 100 (SIZE A1)



HONG KONG METRIC GRID
PRINCIPAL DATUM HONG KONG
ALL UNITS IN METRES

NOTE
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DATE OF SURVEY: DECEMBER 2022

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TEL : 28951918 FAX : 28901759 E-mail: hkoffice@sammak.com

PLAN NO. 9215/01/01 (Sheet 3 of 3)

PRELIMINARY

(10/01/2023)
Cheung Chee Pak
Authorized Land Surveyor