Appendix 5

Drainage Impact Assessment

DRAINAGE IMPACT ASSESSMENT AMENDMENT

S16 Amendment to Approved Application No. A/YL-MP/344 for a Comprehensive Development to include Wetland Restoration Area at Wo Shang Wai, Yuen Long, Lots 77 and 50 S.A in DD101

(REVISION 0)
DATE: JULY 2025

WSP (ASIA) LTD.
[redacted]

Quality Management

Issue/revision	0			
Remarks				
Date	15 July, 2025.			
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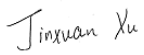
Signature				
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Signatures

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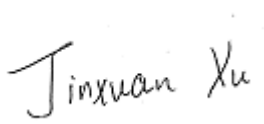

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1 INTRODUCTION

1.1 BACKGROUND AND PREVIOUS APPROVED DIA

1.1.1 WSP (Asia) Limited (hereinafter "WSP") was commissioned by Profit Point Enterprises Limited to carry out a Drainage Impact Assessment (DIA) Amendment for the proposed Comprehensive Residential Development at Wo Shang Wai, Yuen Long.

1.1.2 The purpose of this amendment is to amend the previously approved planning application No. A/YL-MP/344, and its approval letter is shown in **Appendix A**, which was approved for a comprehensive residential development, including a Wetland Restoration Area (WRA). The proposed amendment relates to the approved layout of the residential portion, and does not affect the WRA that is already completed.

1.1.3 The Applicant, Profit Point Enterprises Limited, proposes to revise the layout and form of the housing developments in the Application Site (Amendment Scheme). The main revision is to relocate the majority of the basement car parking spaces to the ground level for cost-effectiveness and ease of implementation.

1.1.4 The Application Site is located at Wo Shang Wai, Yuen Long. It is generally bounded by Castle Peak Road – Mai Po and San Tin Highway to the east, fishponds to the north, residential developments, namely Royal Palms and Palm Springs to the south, and Wo Shang Wai Village to the southeast, as shown in **Figure 1**.

1.1.5 The proposed comprehensive residential development comprises a revised mixture of residential buildings and ancillary residential facilities including car parks, club house and landscaped open spaces. The total site area is approximately 20.74ha. The revised MLP of the development is shown in **Appendix B.**

1.1.6 The key data of the Application Site for the Planning Application No. A/YL-MP/344 approved in 2024 and the Amendment Scheme are summarized in **Table 1-1** below.

Table 1-1 Key Data for the Application Site

	Planning Application No. A/YL-MP/344 Approved in 2024	**Amendment Scheme**
1. Site Data		
Application Site Area	207,408 m^2 (approx.)	207,408 m^2 (approx.)

Paved Area plus Pool Area (47.1%) [incl. Residential Houses, Club House & Roads]	97,776 m^2 (Pool Area of 730m^2 Included) (	97,776 m^2 (This Scheme Has No Pool Area)
As-Built Restored Wetland (22.9%)	47,400 m^2	47,400 m^2
Vegetated Area +(30%) [incl. Amenity Planting & Garden]	62,232 m^2	62,232 m^2
2. Residential Development		
Plot Ratio	0.4	0.4
Domestic GFA	82,963 m^2	82,963 m^2

2 OBJECTIVES OF THIS DRAINAGE IMPACT ASSESSMENT REPORT

2.1.1 The purpose of this DIA Amendment is to review the drainage impact of the Amendment Scheme as compared with that in the previous approved planning application No. A/YL-MP/344 with respect to the revised MLP and the previous agreed drainage mitigation measures. This DIA Amendment also includes the followings:

a) Review the existing drainage condition and flooding susceptibility of the Application Site, which is a requirement introduced subsequent to the previous approval.

b) Outline the methodology for the assessment.

- Susceptibility to flooding of neighbouring areas of the Application Site;
- Exacerbation to existing flooding issue during the construction period;
- Exacerbation to existing flooding issue upon completion of the development; and
- Effect on existing drainage conditions.

c) Outline changes to the drainage characteristics and potential drainage impacts in the following aspects.

d) Propose drainage impact mitigation measures, if necessary, to mitigate the potential drainage impact due to the revision of the MLP.

e) Discuss the responsibility of the maintenance aspects of the proposed drainage system and drainage impact mitigation measures.

3 EXISTING DRAINAGE CHARACTERISTICS

3.1 EXISTING DRAINAGE CONDITION WITHIN THE APPLICATION SITE

3.1.1 The Application Site is located at two drainage basins, namely San Tin Basin and Ngau Tam Mei Basin as shown in **Figure 2**. However, as concluded in the previous approved DIA, the runoff generated from the Application Site is discharged merely to San Tin Basin through a ditch along the Application Site's perimeter and thus no runoff is discharged to Ngau Tam Mei Basin. In this regard, the drainage impact to Ngau Tam Mei Basin will not be assessed.

3.1.2 The runoff from the western periphery of the Application Site is collected in a depression with lower elevation before being discharged into a tributary of the Mai Po River (thereafter named as the Mai Po Tributary) via a pipe. According to topographic data, the Mai Po Tributary is trapezoidal in shape with average dimensions of 2m deep by 10m base width. Mai Po Tributary joins Mai Po River at its downstream end. Mai Po River further merges with Shenzhen River and then discharges into Deep Bay.

3.1.3 No formal drainage system exists for runoff generated from the eastern portion of the Application Site. The runoff either infiltrates into the ground or discharges directly into the Mai Po Tributary. In additional to the site runoff, three 1350mm dia. pipes in the eastern portion of the Application Site. t serves conveying runoff from the vacant lots between Castle Peak Road and Royal Palms as shown in **Figure 3**.

3.1.4 San Tin basin is characterized by flat agricultural land with a large amount of fishponds at the downstream portion with some village developments along San Tin Highway. Hilly vegetated areas exist on the upland in the basin. The existing drainage features and the overland flow path within the Application Site are shown in **Figure 3**.

3.2 EXISTING FLOW PATH THROUGH THE APPLICATION SITE – WO SHANG WAI VILLAGE

3.2.1 To the south of the Application Site is Wo Shang Wai Village (i.e. sub-catchment MP02A-a4 as shown in **Figure 4**). Wo Shang Wai Village is a low-lying area with ground level ranges from 2.4mPD to 2.8mPD. It is surrounded by Royal Palms, Palm Springs and the Application Site. According to drainage record plans and building record plans, runoff from Royal Palms and Palm Springs are intercepted and discharged to Ngau Tam Mei Basin. Runoff from the surroundings developments will not drain into Wo Shang Wai Village therefore it is independent from the surrounding developments.

3.2.2 As shown in **Appendix C**, the drainage system in Wo Shang Wai utilizes an existing flood storage pond and an associated pumping system. The system lifts stormwater through two 200mm dia. rising mains and discharges it into four 400mm dia. aboveground pipes that

extend eastward along the boundary of the Application Site. Subsequently, these pipes merge into two 200mm dia. underground pipes in the eastern portion of the Application Site, directing flow northward before final discharge into the Mai Po Tributary.

3.3 EXISTING FLOW PATH THROUGH THE APPLICATION SITE – VACANT LOTS BETWEEN CASTLE PEAK RD & ROYAL PALMS

3.3.1 The stormwater from the vacant lots between Castle Peak Road and Royal Palms is drained to the Mai Po Tributary via 3 x 1350mm dia. pipes through Application Site while runoff from the northern portion of Royal Palms is discharged to Ngau Tam Mei Basin. The runoff from the said vacant lots eventually discharges into Mai Po Tributary via the eastern ditch across the Application Site. The inlet of 3 x 1350mm dia. pipes through the Application Site can be seen on the south boundary of the Application Site's eastern portion, as shown in **Appendix C**.

3.4 EXISTING FLOW PATH THROUGH THE APPLICATION SITE – NORTH-EASTERN SIDE OF THE APPLICATION SITE

3.4.1 The runoff from the northeastern areas to the Application Site (i.e., sub-catchments MP02A-a7 and MP02A-a8 as shown in **Figure 4**) dips northward to the Mai Po Tributary.

3.5 FLOODING BLACKSPOTS AROUND THE APPLICATION SITE

3.5.1 According to the Drainage Services Department (DSD) – Location of DSD Flooding Blackspots in **Appendix D**, no flooding blackspots exists in the sub-catchment of the Mai Po River for which the Application Site is located in. The nearest flooding blackspot in the same basin as the proposed development is at Shek Wu Wai (ID No.1) of San Tin which was recorded to be a medium[1] flooding blackspot. Moreover, this village is located within the "San Tin Western Drainage Channel" catchment, which is independent from Mai Po Tributary and Mai Po River, therefore it will not be discussed in this DIA Amendment.

[1] Definition of Medium as per DSD - affecting area of more than 10 hectares or resulting in significant property damage or serious traffic disruption

4 POTENTIAL ADVERSE DRAINAGE IMPACTS

4.1.1 The potential adverse drainage impacts incurred by the proposed development in relation to the previous approved DIA which have addressed the following:

- Loss in flood storage volume due to filling up the Application Site;
- Increase in total runoff and peak discharge due to change in land use and the corresponding increase in CN value; and
- Blockage of existing drainage flow paths through the Application Site.

4.1.2 The proposed mitigation measures recommended in the previous approved DIA are detailed in **Section 8** of this report and the adequacy of the previous agreed mitigation measures is discussed in **Section 9**.

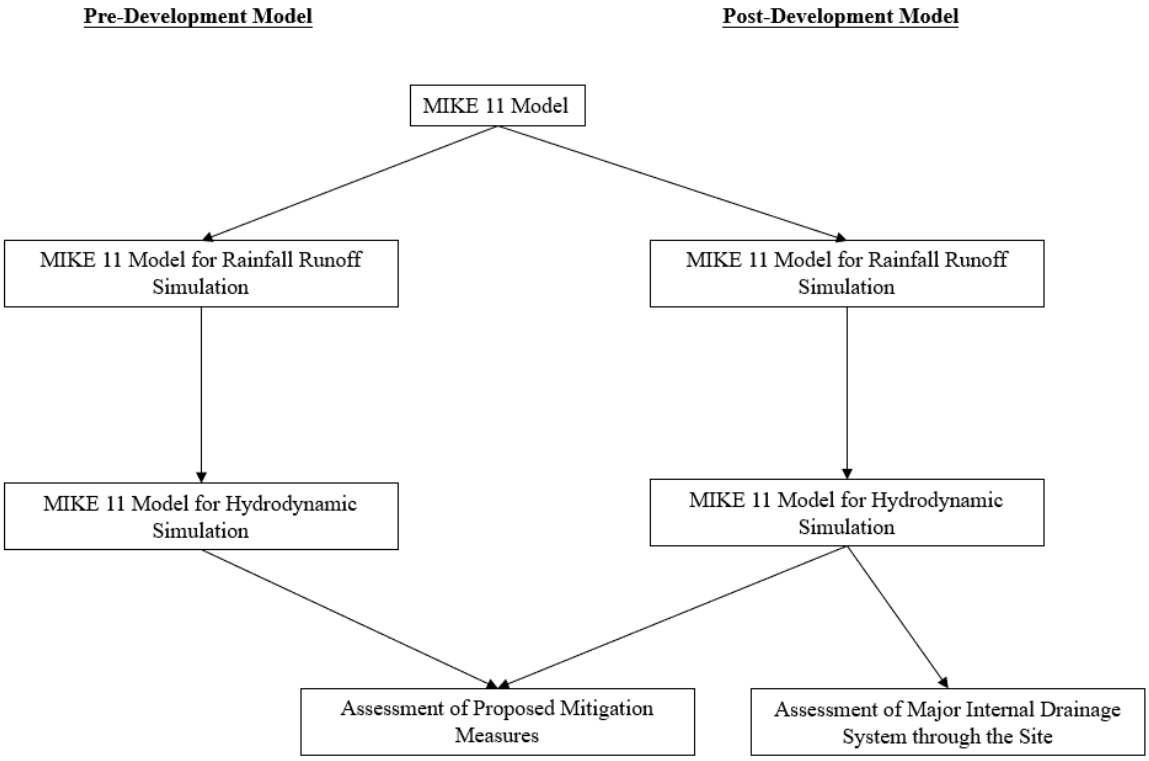
5 METHODOLOGY FOR ASSESSMENT

5.1 OVERVIEW OF METHODOLOGY

5.1.1 This DIA Amendment is carried out in accordance with the requirements of "Advice Note No. 1 – Application of the Drainage Impact Assessment Process to Private Sector Projects" issued by DSD, as well as the Stormwater Drainage Manual - Fifth Edition (SDM).

5.1.2 The methodology for the hydrological and hydraulic assessment has been established and agreed in the previous approved DIA. In this regard, the same methodology and principle are adopted in this assessment for the sake of consistency.

5.1.3 The logic flow of the analysis which agreed in the previous approved DIA is illustrated by the following flow chart diagram:



5.2 UPDATE THE MODEL SETTING

5.2.1 This assessment follows the approach of the previous approved DIA, takes the previous approved model as a basis and refines to facilitate hydraulic assessment for the proposed development in the San Tin Basin.

5.2.2 Having reviewed the aerial photos and property information of San Tin Basin, the land use of this area is almost unchanged from last approved DIA in March 2024. The areas in the

Santin Basin, such as Wo Shang Wai, Rolling Hills, Noble Villas, Maple Gardens, Mai Po San Tsuen and Mai Po Lo Wai, are mostly developed 20 years ago, which is much earlier than the approval of last DIA. Meanwhile, the developments in the San Tin Basin mostly are low-density, which suggests the minor changes in runoff generation between pre-development and post-development. In addition, there should not be many changes to the Mai Po Tributary and Mai Po River since last approved DIA which was completed this year. Thus, the previous approved model is still reliable for this drainage impact assessment.

5.2.3 The catchment boundary with sub-catchment delineation for the pre-development and post-development scenarios are shown in **Figure 4** and **Figure 5**, respectively. Sub-catchments MP02A-a2 and MP02A-a3 under pre-development are delineated to MP02A-a9, MP02A-aa, -ab, -ac, -ad and -ae to simulate the drainage condition of the proposed development under post-development scenario. The sub-catchments under post-development scenario are refined based on the land use change within the Application Site as mentioned in the **Section 7** and **Appendix B**.

5.2.4 To simulate the flood plains, the approved assessment model used virtual side branches which have connections to river courses. The virtual side branches and the connections were named STS and STW in their prefixes, respectively.

5.2.5 For the pre-development model, due to the existing topography, the Application Site would become a flood plain under extreme rainfall and tidal events. To reflect the flood storage characteristics of the Application Site, the virtual side branches mentioned above is extended and connections are made to ch690 and ch490 in the pre-development model. These side branches and the connections at ch490 and ch690 are removed in the post-development scenario since the Application Site will be filled up by the proposed development and therefore will not be characterized as a flood plain.

5.3 RAINFALL – RUNOFF SIMULATION

5.3.1 In this DIA Amendment, a 4-hr synthetic rainfall profile, as shown in **Appendix E** was updated using the formulation mentioned in Section 4.3.5(b) in the DSD-SDM with parameters specified for HKO area referring to the Table 3a in the Stormwater Drainage Manual-Corrigendum No. 1/2024.

5.3.2 In addition, the potential drainage impact will consider the climate change effects up to end of 21st century. Referring to the Table 28 and 31 in the Stormwater Drainage Manual-Corrigendum No. 1/2022, 28.1 % rainfall increase due to climate change, including 16% rainfall increase and 12.1% design allowance, has been added into the 4-hr synthetic rainfall profiles.

5.3.3 The catchment MP02A-a2 and a3 under the pre-development scenario is re-delineated for the purpose of this development to develop the pre-development scenario to incorporate the latest information as mentioned below.

5.3.4 The increase in CN value due to the proposed development is reflected in the post-development model.

5.4 HYDRODYNAMIC SIMULATION

5.4.1 The hydrodynamic model performs the hydrodynamic run to assess the hydraulic performance of river courses and drains.

5.4.2 The boundary condition (i.e. Tide level) adopted in this assessment is referred to the Table 8, Table 29, Table 30b and Table 31 in the Stormwater Drainage Manual- Corrigendum No. 1/2022, as shown in the following table:

Table 5-1 Design Tide level at Tsim Bei Tsui

Return period (Years)	Design extreme sea level (mPD)	Mean Sea Level Rise due to Climate Change (mPD)	Storm Surge Increase in End of 21st century (mPD)	Design Allowance in End of 21st century (mPD)	Design extreme sea level considering climate change effect (mPD)
	A	B	C	D	E=A+B+C+D
2	3.07	0.47	0.09	0.20	3.83
10	3.52	0.47	0.15	0.23	4.37
50	4.09	0.47	0.20	0.25	5.01
200	4.78	0.47	0.26	0.27	5.78

5.5 SCENARIOS FOR IMPACT ASSESSMENT

5.5.1 It is confirmed in the previous approved DIA that the impacts to river courses other than Mai Po Tributary and Mai Po River are very minimal and therefore only the impacts to Mai Po Tributary and Mai Po River are assessed in this assessment.

5.5.2 The high antecedent moisture conditions (AMC3[2]) are adopted in this assessment model in consistency with the previous approved DIA.

5.5.3 Hydraulic impact incurred by rainfall profiles with areal reduction factors of 0.82 and 1.0 are analysed in consistency with the previous approved DIA. Areal reduction factor of 1.0 was used for the San Tin Basin to estimate peak flood levels for all areas in the San Tin Basin.

[2] AMC3 = heavy rainfall occurred within last 5 days; saturated soil

Whilst an aerial reduction factor of 0.82 was used for the entire Shenzhen River Basin including the catchments draining from Chinese Mainland to estimate peak flood levels for the Shenzhen River. The worst-case scenario from the two conditions will be used in the analysis for the proposed mitigation measures.

5.5.4 Hydraulic performance for 2, 10, 50 and 200yr Average Recurrence Interval (ARI) events for the Application Site, Mai Po Tributary and Mai Po River will be assessed in accordance with the requirement stipulated in the Advice Note No.1. A, B and C scenarios under respective ARI event are simulated according to the following table:

Table 5-2 Summary of Assessment Scenarios

ARI Event	Abbreviation	Areal Reduction Factor	Rainfall	Tide Level
2	2A	0.82	2 yr	2 yr
	2C	1.00	2 yr	2 yr
10	10A	0.82	10 yr	2 yr
	10B	0.82	2 yr	10 yr
	10C	1.00	10 yr	2 yr
50	50A	0.82	50 yr	10 yr
	50B	0.82	10 yr	50 yr
	50C	1.00	50 yr	10 yr
200	200A	0.82	200 yr	10 yr
	200B	0.82	10 yr	200 yr
	200C	1.00	200 yr	10 yr

Note: Same as the previous approved DIA.

6 DESIGN ASSUMPTIONS AND PARAMETERS

6.1.1 Design assumptions and parameters agreed in the previous approved DIA would be adopted in this assessment. The rationale of adopting the set of parameters in the assessment is reiterated in the sections below.

6.1.2 The manning's n to be adopted in this assessment is referred to the previously approved DIA while the Colebrook White K_S roughness is referred to DSD-SDM. The surface roughness coefficients adopted in this assessment are summarized in:

Table 6-1 Surface's Roughness Coefficient

Surface Type	**Manning's n**	**CW's ks**
Engineered channels (Smooth Concrete surfacing)	0.015	N/A
Engineered channels (Rough Concrete surfacing)	0.020	N/A
Engineered channels (Smooth Natural bed)	0.020	N/A
Engineered channels (Rough Natural bed)	0.025	N/A
Natural Channel	0.035	0.6
One culvert system with rough natural bed in MAI PO River CH1625	0.040	1.5
Concrete Pipe (Fair Condition)	0.015	N/A
Concrete Pipe (Bad Condition)	0.016	3.0

Note: Same as the previous approved DIA.

7 PROPOSED CHANGES TO THE DRAINAGE CHARACTERISTICS

7.1 CHANGES IN LAND USE

7.1.1 The Application Site is a vacant lot with a combination of greenfield, access road and other impervious areas. The approved developments will lead to increase in paved surface and thus the CN value. The current amendment scheme will largely maintain the impervious and pervious coverage. The CN value for the residential area under post-development scenario is estimated to be 90. The land use coverage and the corresponding CN values are detailed in **Table 7-1**.

Table 7-1 CN Values of Pre & Post Developments for the Application Site

Land Use	Area (m^2)	CN Value
Pre-Development		
Vacant Lot (Northern portion of Application Site – MP02A-a2)	145,400	85
Vacant Lot (Southern Portion of Application Site – MP02A-a3)	62,000	85
Total	207,400	85
Post-Development (Planning Application No. A/YL-MP/344 Approved in 2024)		
Wetland Restoration Area (MP02A-a9)		
Open Water Surface	34,500	100
Vegetated Area	12,900	100
- Sub-total	47,400	100
Residential Area (MP02A-aa, ab, ac, ad and ae)		
Paved Area	97,776	95
Vegetated Area	62,232	80
Pool Area	730	100
- Sub-total	160,008	90
Total	**207,408**	**92**
Post-Development (Current Arrangement)		
Wetland Restoration Area (MP02A-a9)		
Open Water Surface	34,500	100
Vegetated Area	12,900	100
- Sub-total	47,400	100
Residential Area (MP02A-aa, ab, ac, ad and ae)		

Paved Area	97,776	95
Vegetated Area	62,232	80
Pool Area	0	100
- Sub-total	160,008	90
Total	**207,408**	**92**

7.1.2 CN value of abandoned ponds adopted in both the pre-development and post-development models is revised to 100 to reflect its hydrological characteristic. **Table 7-2 and Table 7-3** present the detailed CN values applied for both the pre- and post-development model. **Table 7-3** also presents the detailed CN values of the post-development for both the planning application No. A/YL-MP/344 approved in 2024 and Amendment Scheme.

Table 7-2 CN Values Applied for the Pre-Development Model

Catchment ID	Land Use	Percentage of Full Catchment	Area(m^2)	CN Value
MP02A-a1	Abandoned Ponds	48.5%	373,800	100
MP02A-a2	Vacant Lot – Northern Portion of proposed Development	18.8%	145,400	85
MP02A-a3	Vacant Lot – Southern Portion of proposed Development	8.1%	62,000	85
MP02A-a4	WSW Village	1.8%	13,700	90
MP02A-a5	Vacant Lots between Castle Peak Rd & Royal Palms	10.8%	82,800	85
MP02A-a6	Vacant Lots between Castle Peak Rd & Royal Palms	2.2%	17,100	85
MP02A-a7	Vacant Lot	2.7%	20,800	85
MP02A-a8	Vacant Lot	2.7%	20,800	85

Revised MP02A-a	**Total**	**100.0%**	**770,300**	**93.4**

Table 7-3 CN Values Applied for the Post-Development Model

Catchment ID	Land Use	Percentage of Full Catchment	Area(m^2)	CN Value for Planning Application No. A/YL-MP/344 in 2024	CN Value for Amendment Scheme
MP02A-a1	Abandoned Ponds	48.5%	373,800	100	100
MP02A-a4	WSW Village	1.8%	13,700	90	90
MP02A-a5	Vacant Lots between Castle Peak Rd & Royal Palms	10.8%	82,800	85	85
MP02A-a6	Vacant Lots between Castle Peak Rd & Royal Palms	2.2%	17,100	85	85
MP02A-a7	Vacant Lot	2.7%	20,800	85	85
MP02A-a8	Vacant Lot	2.7%	20,800	85	85
MP02A-a9	Wetland Restoration Area	6.2%	47,400	100	100

MP02A-aa	Western Residential Portion of the Application Site	4.2%	32,498	90	90
MP02A-ab	Mid-Western Residential Portion of the Application Site	3.0%	23,277	90	90
MP02A-ac	Southern Residential Portion of the Application Site	6.3%	48,683	90	90
MP02A-ad	Mid-Eastern Residential Portion of the Application Site	3.4%	26,313	90	90
MP02A-ae	Eastern Residential Portion of the Application Site	3.8%	29,237	90	90
Revised MP02A-a	**Total**	**100.0%**	**770,300**	**94.8**	**94.8**

Note: The land-use information for post-development is the same as the previous approved DIA

7.1.3 The model network illustrating the chainage along Mai Po River is shown in **Figure 1**. The hydrological model parameters for the re-delineated MP02A-a for both the pre- and post-development models is attached in **Appendix F.**

8 PROPOSED DRAINAGE ARRANGEMENT AND MITIGATION MEASURES

8.1 OVERVIEW OF PROPOSED DRAINAGE ARRANGEMENT AND MITIGATION MEASURES

8.1.1 Consistent with that stated in the planning application No. A/YL-MP/344 approved in 2024, the proposed drainage system will mainly comprise of an approximate 300m long 3.5m(W) x 2.5m(H) box culvert and a drainage pipe network of pipe size ranging from 1050mm to 2100mm dia. as shown in **Figure 6**. The box culvert will drain the eastern portion of the Application Site (MP02A-ae) as well as the runoff from the vacant lots between Castle Peak Road and Royal Palms (MP02A-a5 and a6) while the pipe network will convey the runoff from Wo Shang Wai Village (MP02A-a4) and western and central portions of the Application Site (MP02A-aa, ab, ac and ad).

8.1.2 The invert levels are 2.66mPD for the proposed terminal drainage pipe (DN2100), and 1.71mPD for the proposed terminal box culvert (3.5m in width x 2.5m in height), which are both higher than the invert level of Mai Po Tributary of 1.38mPD based on the previous approved DIA.

8.1.3 All these drains will be discharged to Mai Po Tributary at the northern site boundary. This drainage arrangement within the Application Site is indicated in **Figure 6**.

8.2 DETENTION BY THE AS-BUILT WETLAND RESTORATION AREA

8.2.1 Wetland Restoration Area (WRA) has been constructed, in accordance with the town planning approvals. It will attenuate the discharge from the WRA itself to mitigate the potential adverse drainage impact due to the CN values increase in the development. The drainage system of Wetland Restoration Area (i.e.MP02A-a9) is totally independent from the drainage system of the residential areas of the development.

8.2.2 The Wetland Restoration Area only collects runoff generated within itself. No runoff generated from residential areas of development is discharged to WRA or vice versa even during the severe rainstorm event.

8.2.3 To attenuate the discharge from Wetland Restoration Area, it is designed to be a large detention pond. The attenuation effect of the Wetland Restoration Area has been achieved by its large buffer volume in conjunction with the outlet structures that control the discharge flow rate.

8.2.4 The outlet structures compose of twin 225mm pipes and a 4m wide emergency bypass spillway with invert level at 4.2mPD and 4.65mPD respectively. The twin 225mm pipes are

for control of normal water level and the spillway is for relieving excessive flow. The rating curves for outlet structures and discharge hydrographs under various scenarios are shown in **Appendix G**. As illustrated on the hydrographs, the runoff from Wetland Restoration Area has been significantly attenuated and the peak discharges from WRA will be trimmed to about 18% of the peak inflow.

8.2.5 According to the assessment result, the freeboards of Wetland Restoration Area (i.e., measured from the embankment level at 5.0mPD) under 50yr and 200yr ARI events are both more than 200mm.

8.2.6 After passing of a 50yr ARI rainstorm, it would take approximate 1 day to drain back to normal water level which is at 4.2mPD. Penstocks will be installed, so that the drain-off process can speed up if necessary.

8.2.7 The key dimensions of the wetland restoration area are summarized in **Table 8-1**.

Table 8-1 Key Dimensions of Wetland Restoration Area

Key Dimensions	
Area	47,400 m^2
Maximum Width	120 m
Maximum Length	530 m
Average Depth	1.5 m

8.2.8 To prevent pollution and impacts on the WRA and its irrigation structures caused by surface runoff from the residential portion, a bund wall (or solid protective barrier) and a surface channel are proposed along the boundary between the residential area and WRA, as shown in **Figure 6**. The bund wall will stop the runoff from flowing into the WRA and ensure it is retained in the residential area until drained through the surface channel. The design of surface channel will be considered at the detailed design stages, and ensure there would not be runoff/flow into the WRA.

8.3 RE-PROVISION OF DRAINAGE PATH – WO SHANG WAI VILLAGE

8.3.1 The runoff within WSW Village is currently discharged to the Application Site via a storage pond and pumping system maintained by the local villagers, then discharges to Mai Po Tributary through 2×200mm dia. drainage pipes in the Application Site, as shown in **Figure 3**. Upon completion of the development, the existing pipes will be demolished and a designated drain with diameter 1050mm to 2100mm will be re-provided for conveying the flow from the outlets of the pump to Mai Po Tributary. This drainage pipe will also convey the runoff from western and central portions of the Application Site (MP02A-aa, ab, ac and ad). The arrangements of the inlets and outlets are consistent with that stated in the planning application No. A/YL-MP/344 approved in 2024.

8.3.2 The discharge from WSW Village will be collected by an inlet chamber within the Application Site. Openings will be provided at the existing invert level of the discharge pipes, which is at +4.2mPD, for connection. The runoff will be conveyed to Mai Po Tributary by a designated drainage system mentioned above. Therefore, the proposed development would not change the discharge pattern of Wo Shang Wai Village drainage system as approved.

8.3.3 If the existing pumps at Wo Shang Wai Village become malfunction during severe rainstorm event, the runoff from Wo Shang Wai Village cannot discharge to the surrounding area and will be cumulated within the village. According to **Appendix E**, a total of 446mm depth of rainfall will be incurred under a 200yr return period 4-hour rainfall event. In this connection, the water level at Wo Shang Wai Village will reach approximately +3.3mPD. However, the water will not overflow to the Application Site as there is a bund at the northern boundary of Wo Shang Wai Village which at the level of more than +5mPD, as shown in **Appendix C** and **L**. Therefore, based on the current conditions, overflow cannot enter the Application Site, and this status will remain unaffected by future development.

8.3.4 A flap valve will be installed at the outfall of the designated pipe to prevent backwater effect from Mai Po Tributary. Since no proposed measures will be carried out in Wo Shang Wai Village, the existing pumping configuration from WSW Village will be unchanged.

8.4 RE-PROVISION OF DRAINAGE PATH - VACANT LOTS BETWEEN CASTLE PEAK RD & ROYAL PALMS, SAME AS PREVIOUS APPROVED DIA

8.4.1 A 3.5m(W) x 2.5m(H) box culvert is proposed in the previous approved DIA to convey the runoff from the area between Royal Palms and Castle Peak Road – Mai Po (MP02A-a5), a section south of Royal Palms (MP02A-a6) and east parts of the Application Site. The box culvert will have a larger hydraulic capacity than the existing three 1350mm dia. pipes.

8.4.2 The box culvert is sized for the 1 in 50-year design return period according to the recommendation in Table 10 of the DSD-SDM. The box culvert has been designed to capture the discharge from the existing triple 1.35m diameter culvert as discussed in **Section 3.3**. This arrangement is consistent with that stated in the planning application No. A/YL-MP/344 approved in 2024. A trash grille and flap valve will be provided at the final discharge point of the box culvert that connects to Mai Po Tributary.

8.5 MISCELLANEOUS, SAME AS PREVIOUS APPROVED DIA

8.5.1 Bank protection measures will be provided at the outfalls of the proposed drainage system to minimize the risk of scouring and erosion of the riverbed.

9 ASSESSMENT ON DRAINAGE IMPACT

9.1 ASSESSMENT OF MAI PO TRIBUTARY AND MAI PO RIVER

9.1.1 With the incorporation of the proposed mitigation measures stipulated in **Section 8** following the previous approved DIA, hydraulic performance of the Application Site, Mai Po Tributary and Mai Po River is assessed according to the methodology stipulated in **Section 5**. The results of peak runoff, total runoff and max water level under 50ARI event are summarized in **Table 9-1**, **Table 9-2** and **Table 9-3**, respectively.

Table 9-1 Change in Peak Discharge from the Application Site

Rainfall return-periods (Yr)	Pre-development peak discharge (m^3/s)	Post-development peak discharge (m^3/s)	Change in peak discharge (m^3/s)
2yr	9.29	7.72	-1.57
10yr	12.30	10.07	-2.23
50yr	14.29	11.61	-2.67
200yr	15.65	12.65	-3.00

Note: Values based on scenario C, AMC 3

Table 9-2 Change in Total Runoff from the Application Site

Rainfall return-periods (Yr)	Total Runoff from Pre-Developed Application Site (m^3)	Total Runoff from Post-Developed Application Site (m^3)	Change in Total Runoff (m^3)
2yr	33,585	35,887	2,302
10yr	54,472	56,855	2,384
50yr	72,605	75,025	2,420
200yr	88,334	90,776	2,442

Note: Values based on scenario C, AMC 3

Table 9-3 Change in Water Level along Mai Po River and Mai Po Tributary under 50yr ARI

River chainage (m)	Water level(mPD) Pre-development			Water level(mPD) Post-development			Change in water level(m)		
	50A	50B	50C	50A	50B	50C	50A	50B	50C
0	3.778	3.934	3.835	3.777	3.947	3.834	-0.001	0.013	-0.001
690	3.772	3.929	3.827	3.764	3.930	3.825	-0.008	0.001	-0.002
980	3.766	3.926	3.822	3.759	3.928	3.821	-0.007	0.002	-0.001
1150	3.756	3.923	3.812	3.748	3.925	3.810	-0.008	0.002	-0.002

1620	3.750	3.927	3.809	3.742	3.930	3.808	-0.008	0.003	-0.001
1880	3.573	3.890	3.656	3.564	3.893	3.650	-0.009	0.003	-0.006

9.1.2 The change in water level along Mai Po Tributary and Mai Po River under 2yr, 10yr, 50yr and 200yr ARI events are summarized in **Appendix I**.

9.1.3 Although there will be increase in CN value causing increasing total runoff, by the detention effect of the as-built Wetland Restoration Area at the northern part of the Application Site independent from the drainage system of the residential areas, the peak discharge from the Application Site will be significantly attenuated, as shown in **Appendix H** and there will be no adverse drainage impacts to the Application Site, Mai Po Tributary and Mai Po River under 50yr ARI event. This arrangement is consistent with that stated in the planning application No. A/YL-MP/344 approved in 2024.

9.1.4 The water level at Mai Po River and Mai Po Tributary would not increase due to the change, as shown in **Table 9-3**. It is concluded that the recommendation made in the planning application No. A/YL-MP/344 approved in 2024 is adequate to mitigate the potential drainage impact due to the revised master layout.

9.2 ASSESSMENT OF DESIGNATED DRAIN FOR WESTERN PORTION

9.2.1 As revealed by the model simulation results in **Appendix J**, the water level at the outlet of the designated drain for Wo Shang Wai and the west portion of Application Site is much lower than the ground level of the Application Site (6.8mPD). In this regard, the designated drain will not incur adverse impact to the Application Site.

9.3 ASSESSMENT OF PROPOSED 3.5M(W) X 2.5M(H) BOX CULVERT

9.3.1 Since the current proposal following the previous approved DIA will have a larger hydraulic capacity than the existing triple pipes, there will be no adverse drainage impact to Application Site. The freeboard of the outlet of the box culvert is shown in **Appendix K**.

10 TEMPORARY DRAINAGE ARRANGEMENT

10.1.1 Large scale site formation works will be included in the construction stage of the proposed development. During the rainstorm events, construction site runoff would come from all over the works site. 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.

10.1.2 Construction runoff would cause impact to the stormwater drainage system. Runoff with concrete and cement-derived material would cause blockage of drainage channels and increase of suspended solid levels in the downstream drainage system. Sediment deposition rate would be increased and hence lower the capacity of the downstream drainage.

10.1.3 Since large area of soil will be exposed during the construction, in order to eliminate the source of contamination, the exposed soil, especially for the open stockpiles area, shall be covered properly by suitable material such as geotextile or tarpaulin to minimize the amount of soil being washed into the downstream drainage system.

10.1.4 The construction runoff which is contaminated by suspended solids, dust and waste shall be properly treated before discharging to the public drainage system. Sedimentation tank, sand/silt traps or other desilting facilities shall be provided to collect debris and silt and allow sedimentation before discharge. Channels / earth bunds / sand bag barriers shall be provided on site to properly direct the runoff to the desilting facilities. Those desilting facilities should be adequately designed and be inspected and cleaned out in a regular basis to maintain its functionality.

10.1.5 Moreover, temporary drainage system designed with sufficient capacity should be provided to prevent the flood risk within the Application Site. For example, perimeter channels should be provided at site boundary to intercept surface runoff from outside the Application Site so that overland flow across the Application Site can be avoided.

10.1.6 Further guidelines and site practices outlined in EPD's Practice Note ProPECC PN2/24, DSD Technical Circular No. 1/2017 – Temporary Flow Diversions and Temporary Works Affecting Capacity in Stormwater Drainage System, and DSD Practice Note No. 1/2017 – Design Rainfall Depth for Temporary Works within the Dry Season shall be followed as far as practicable to minimize the adverse drainage impact caused by the construction works.

11 MAINTENANCE RESPONSIBILITIES

11.1.1 Consistent with that stated in the planning application No. A/YL-MP/344 approved in 2024, the Applicant will be responsible for the maintenance of all surface channels, underground drainage system and stormwater retention facilities within the Application Site, including designated drainage facilities for conveying runoff generated from Wo Shang Wai Village and the area between Royal Palms and Castle Peak Road – Mai Po.

11.1.2 The designated drainage system serving Wo Shang Wai Village within the Application Site will be maintained by the Applicant while the storage pond and the pumps within Wo Shang Wai Village will be maintained by the villagers.

11.1.3 The maintenance responsibility of all drainage facilities outside the Application Site will remain unchanged.

12 SUMMARY AND CONCLUSIONS

12.1.1 The purpose of this DIA Amendment is to assess the drainage impact of the Amendment Scheme as compared with that in the previously approved planning application No. A/YL-MP/344 in 2024. The total site area is approximately 207,408m².

12.1.2 To offset the increase in pavement area after development, a Wetland Restoration Area has been built, which has a sufficient detention effect to mitigate the potential drainage impacts. The drainage system of the Wetland Restoration Area (i.e.MP02A-a9) is totally independent on the drainage system of the residential areas of the proposed development.

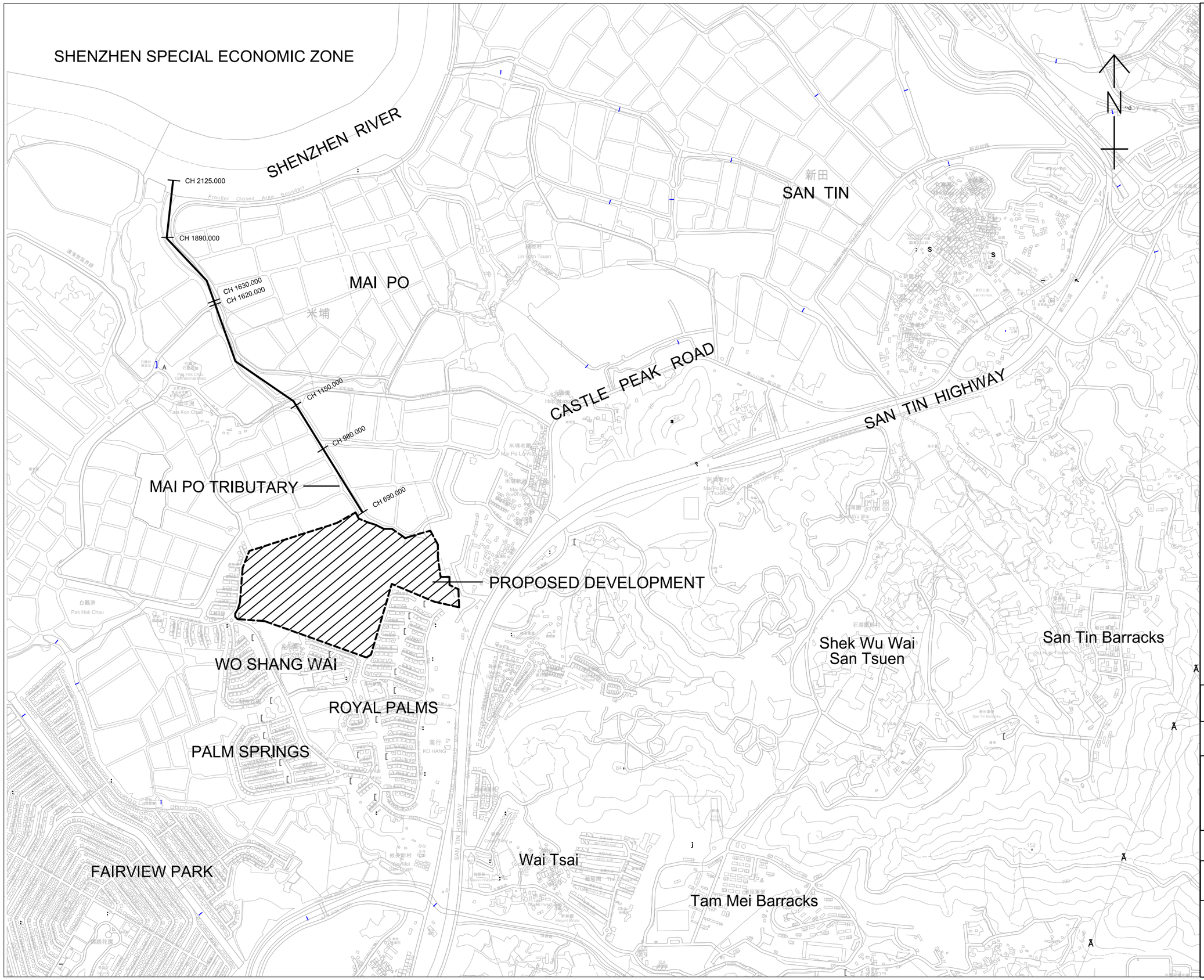
12.1.3 The permanent drainage system for the proposed development will comprise of an approximately 300m (L) x 2.5m(H) x 3.5m(W) box culvert for the runoff from the eastern portion of the Application Site (MP02A-ae) and the vacant lots between Castle Peak Road and Royal Palms (MP02A-a5 and a6), and a drainage pipe network of pipe sizes ranging from DN1050 to DN2100 for the runoff from Wo Shang Wai Village (MP02A-a4) and western and central portions of the Application Site (MP02A-aa, ab, ac and ad).

12.1.4 The mitigation measures outlined in **Section 8** above are consistent with that stated in the planning application No. A/YL-MP/344 approved in 2024. Subsequent to the currently proposed revision of the Master Layout Plan, the DIA Amendment has been updated, and the same mitigation measures are incorporated. These proposed mitigation measures are sufficient to mitigate the potential drainage impacts of the change in master layout. It is concluded that the completion of the proposed development will not aggravate the flooding conditions around the Application Site.

12.1.5 Temporary drainage arrangement within the site will be implemented during construction stage to avoid imposing unacceptable flood risk to the adjacent areas.

12.1.6 The Applicant will take up the maintenance responsibilities for the proposed drainage system inside the Application Site including the proposed main trunk box-culvert and designated drainage system for WSW Village and outfall structures.

Figures



LEGEND

PROPOSED DEVELOPMENT

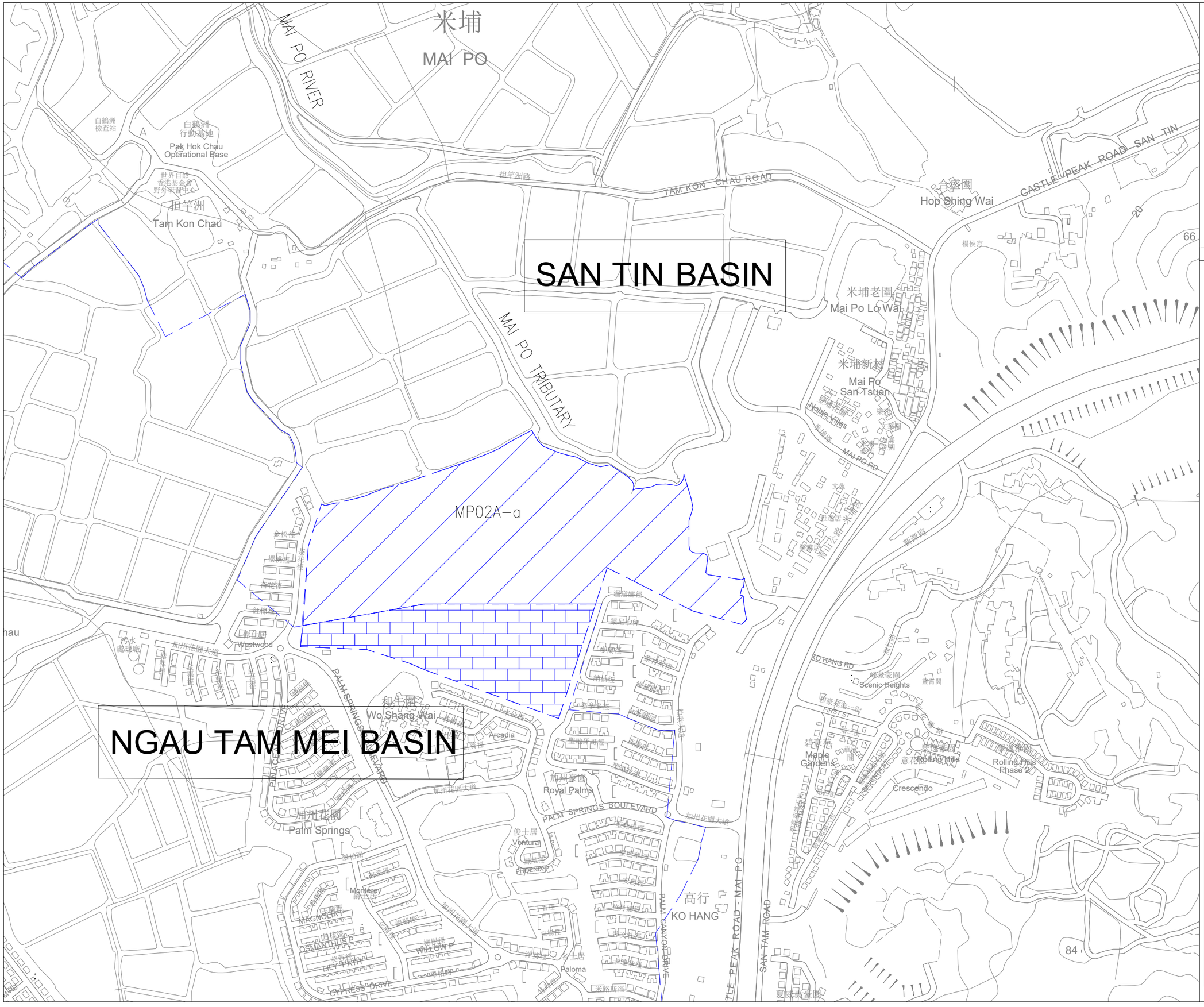
CH690 — RIVER CHAINAGE OF MAI PO RIVER DEFINED IN MIKE 11 MODEL

WSP HONG KONG LIMITED

PROPOSED COMPREHENSIVE DEVELOPMENT AT WO SHANG WAI, YUEN LONG

LOCATION PLAN OF PROPOSED DEVELOPMENT

FIGURE 1



LOCATION PLAN

LEGENDS:

- SUB–CATCHMENT MP02A–a AS PER NORTHERN NEW TERRITORY DRAINAGE MASTER PLAN
- APPLICATION SITE WITHIN SAN TIN BASIN
- APPLICATION SITE WITHIN NGAU TAM MEI BASIN

Rev	Description	By	Date

Consultant

wsp

Project title

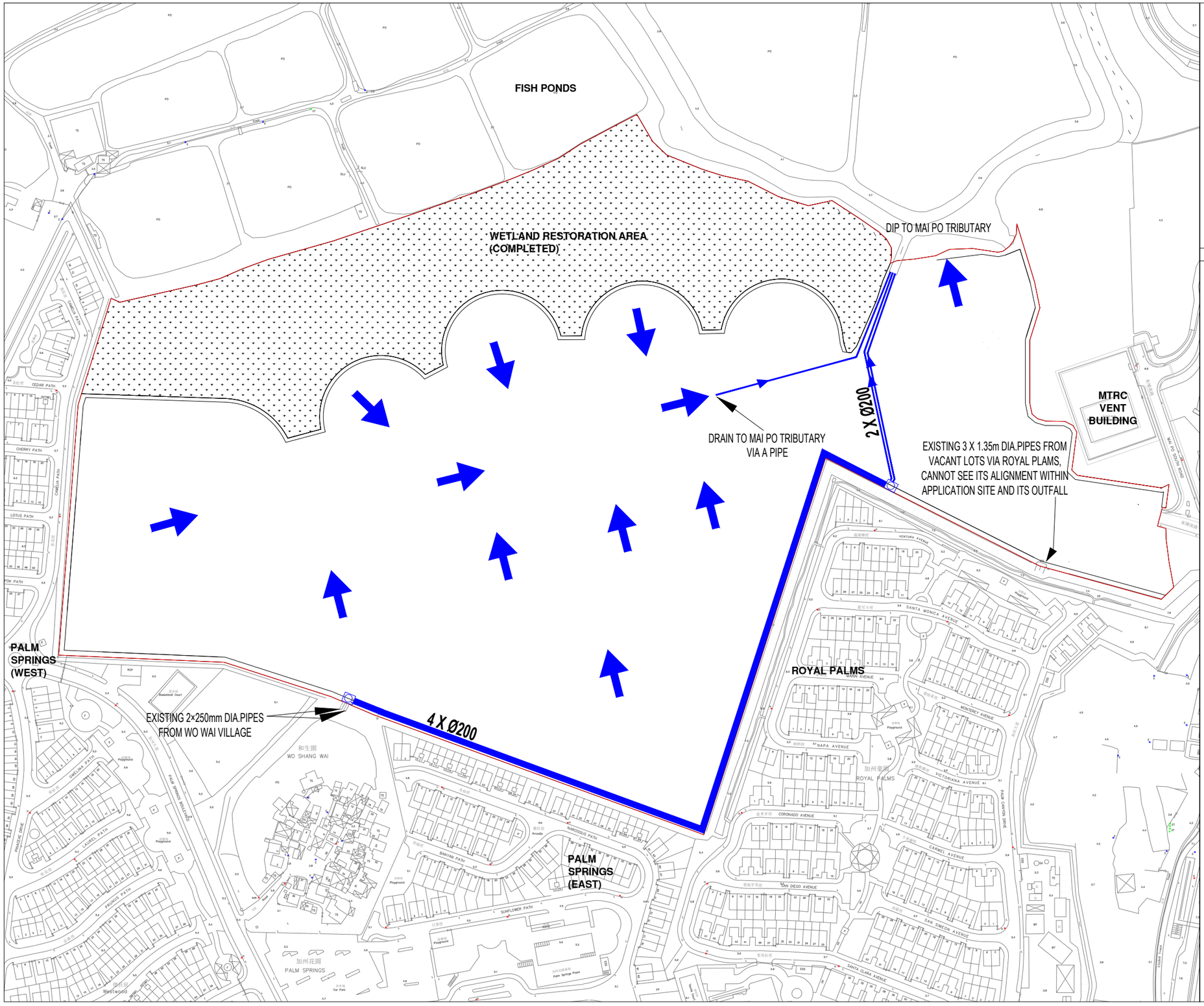
DRAINAGE IMPACT ASSESSMENT

S16 Amendment to Approved Application No. A/YL–MP/344 for a Comprehensive Development to include Wetland Restoration Area at Wo Shang Wai, Yuen Long, Lots 77 and 50 S.A in DD101

Drawing title

SUB–CATCHMENT PLAN OF MP02A–a

Drawing no.		Rev.
Figure 2		0
Drawn: JX	Date: JULY2025	Checked: – / Approved: –
Scale: 1:3000	Status:	



N

LOCATION PLAN

LEGENDS:

APPLICATION SITE BOUNDARY

FLOW DIRECTION

EXISTING PIPES

Rev	Description	By	Date

Consultant

wsp

Project title

DRAINAGE IMPACT ASSESSMENT

S16 Amendment to Approved Application No. A/YL-MP/344 for a Comprehensive Development to include Wetland Restoration Area at Wo Shang Wai, Yuen Long, Lots 77 and 50 S.A in DD101

Drawing title

EXISTING DRAINAGE

Drawing no.		Rev.
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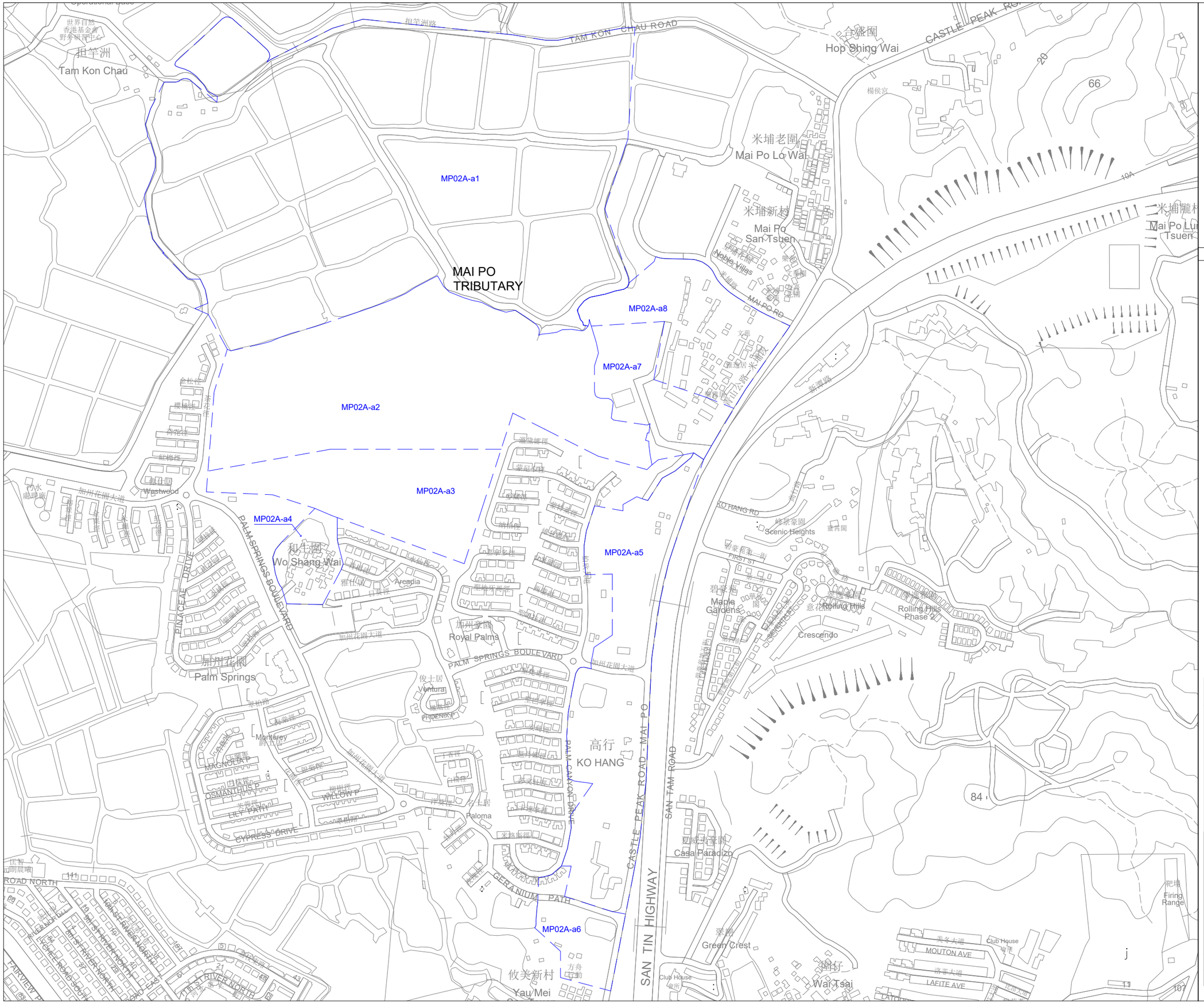

N

LOCATION PLAN

LEGENDS:

SUB-CATCHMENT BOUNDARY

Rev	Description	By	Date

Consultant

wsp

Project title

DRAINAGE IMPACT ASSESSMENT

S16 Amendment to Approved Application No. A/YL-MP/344 for a Comprehensive Development to include Wetland Restoration Area at Wo Shang Wai, Yuen Long, Lots 77 and 50 S.A in DD101

Drawing title

SUB-CATCHMENT PLAN OF MP02A-a FOR PRE-DEVELOPMENT MODEL

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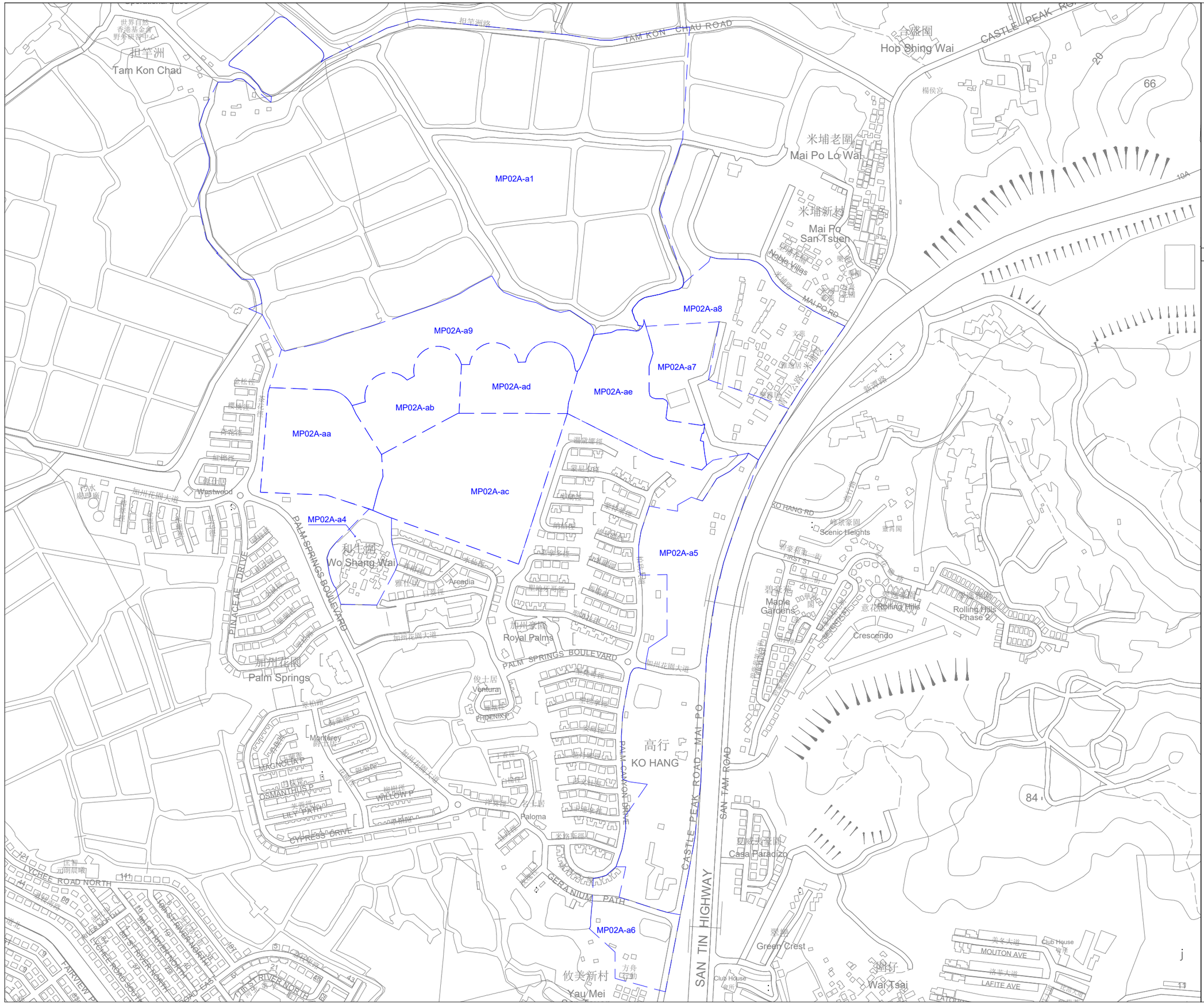

LOCATION PLAN

LEGENDS:

SUB-CATCHMENT BOUNDARY

Rev	Description	By	Date

Consultant

wsp

Project title

DRAINAGE IMPACT ASSESSMENT AMENDMENT

S16 AMENDMENT TO APPROVED APPLICATION NO. A/YL-MP/344 FOR A COMPREHENSIVE DEVELOPMENT TO INCLUDE WETLAND RESTORATION AREA AT WO SHANG WAI, YUEN LONG, LOTS 77 AND 50 S.A IN DD101

Drawing title

SUB-CATCHMENT PLAN OF MP02A-a FOR POST-DEVELOPMENT

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Figure 5			–
Drawn	Date	Checked	Approved
JX	–	–	–
Scale		Status	
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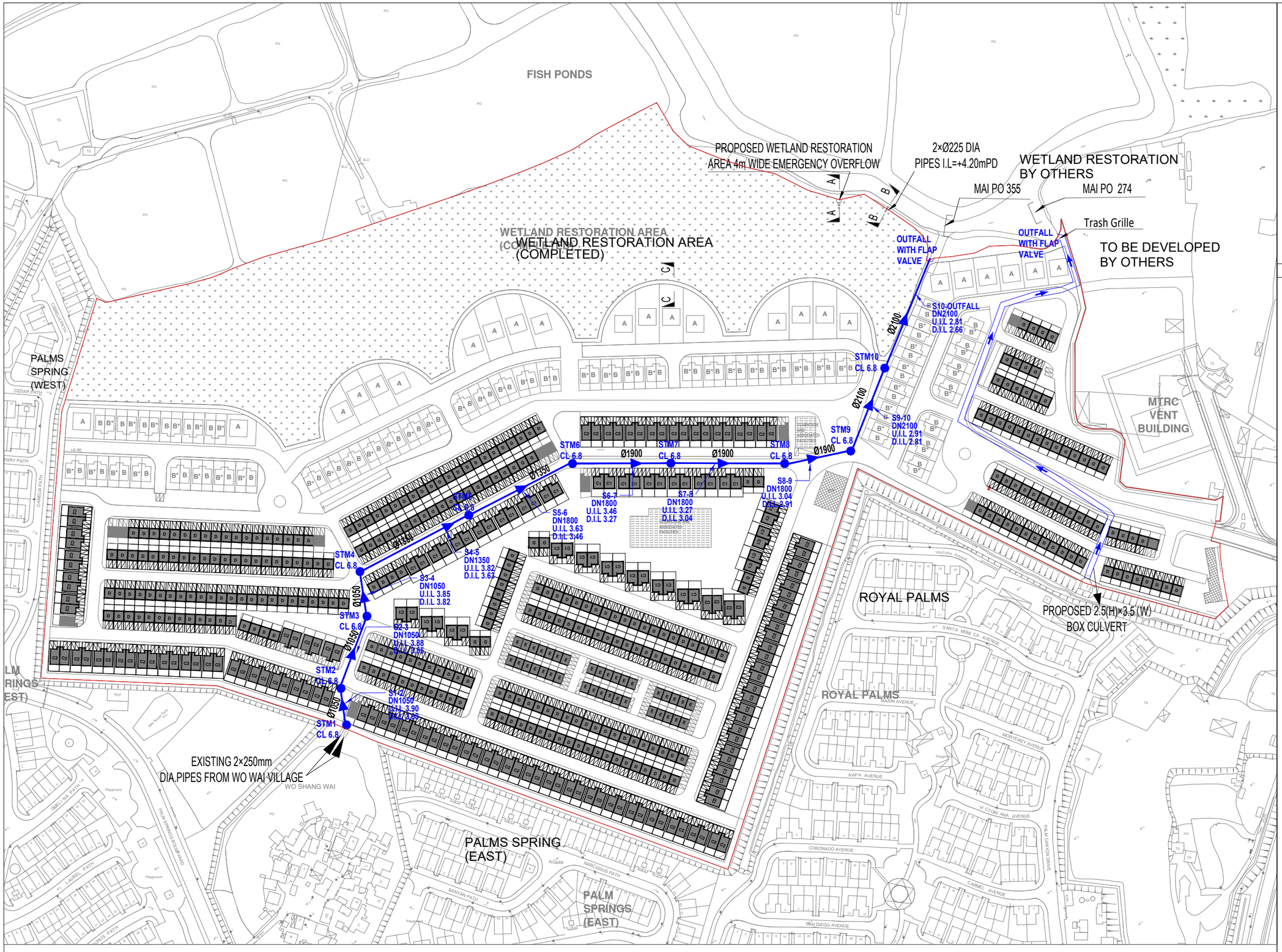


N

LOCATION PLAN

LEGENDS:

- APPLICATION SITE BOUNDARY
- PROPOSED MANHOLE
- ø1800 — PROPOSED DRAINAGE SYSTEM
- PROPOSED 2.5(H)×3.5(W) BOX CULVERT
- S1-2 / U.I.L 3.90 / D.I.L 3.88 — STORM PIPE NUMBER; PIPE DIAMETER; UPSTREAM INVERT LEVEL (mPD); DOWNSTREAM INVERT LEVEL (mPD)
- STM1 / CL 6.8 — STORM MANHOLE NUMBER; COVER IEVEL (mPD)

Rev	Description	By	Date

Consultant

wsp

Project title

DRAINAGE IMPACT ASSESSMENT AMENDMENT

S16 Amendment to Approved Application No. A/YL-MP/344 for a Comprehensive Development to include Wetland Restoration Area at Wo Shang Wai, Yuen Long, Lots 77 and 50 S.A in DD101

Drawing title

PROPOSED DRAINAGE

Drawing no.			Rev.
Figure 6			1
Drawn: JX	Date: –	Checked	Approved
Scale: 1:1200		Status	

Appendices

Appendix A

Approval Letter of
Planning Application No. A/YL-MP/344

城 市 規 劃 委 員 會
香港北角渣華道三百三十三號
北角政府合署十五樓

TOWN PLANNING BOARD
15/F., North Point Government Offices
333 Java Road, North Point,
Hong Kong.

傳　真 Fax: 2877 0245 / 2522 8426
電　話 Tel: 2231 4810
來函檔號 Your Reference:

覆函請註明本會檔號
In reply please quote this ref.: TPB/A/YL-MP/344

By Post & Fax (2587 7068)

1 March 2024

Masterplan Ltd.

[redacted]

(Attn.: Benson Poon)

Dear Sir/Madam,

Proposed Comprehensive House and Wetland Habitat Development with Filling and Excavation of Land (Amendments to an Approved Scheme) in "Other Specified Uses" annotated "Comprehensive Development to include Wetland Restoration Area" Zone, Lots 50 S.A and 77 in D.D.101, Wo Shang Wai, Mai Po, Yuen Long

I refer to my letter to you dated 15.2.2024.

After giving consideration to the application, the Town Planning Board (TPB) approved the application for permission under section 16 of the Town Planning Ordinance on the terms of the application as submitted to the TPB. The permission shall be valid until 16.2.2028, and after the said date, the permission shall cease to have effect unless before the said date, the development permitted is commenced or the permission is renewed. The permission is subject to the following conditions :

(a) the submission and implementation of a revised Master Layout Plan to take into account conditions (b) to (i) below to the satisfaction of the Director of Planning or of the TPB;

(b) the submission and implementation of a Landscape Master Plan to the satisfaction of the Director of Planning or of the TPB;

(c) the implementation of drainage proposal identified in the accepted Drainage Impact Assessment to the satisfaction of the Director of Drainage Services or of the TPB;

(d) the implementation of the mitigation measures identified in the Ecological Impact Assessment to the satisfaction of the Director of Agriculture, Fisheries and Conservation or of the TPB;

(e) the design and provision of vehicular access, parking and loading/unloading facilities for the proposed development to the satisfaction of the Commissioner for Transport or of the TPB;

(f) the design and provision of improvement measures at the junction of Castle Peak Road - San Tin and Shek Wu Wai Road before the occupation of the proposed development to the satisfaction of the Commissioner for Transport or of the TPB;

(g) the design and provision of improvement measures at the junction of Fairview Park Interchange, if deemed required by Transport Department, before the occupation of the proposed development to the satisfaction of the Commissioner for Transport or of the TPB;

(h) the submission of a revised Sewerage Impact Assessment (SIA) to the satisfaction of the Director of Environmental Protection or of the TPB; and

(i) the implementation of sewage disposal arrangement identified in the revised SIA including the on-site sewerage treatment plant and the reuse of treated effluent, as proposed by you, to the satisfaction of the Director of Environmental Protection or of the TPB.

The TPB also agreed to advise you to note the advisory clauses as set out at the Appendix attached.

Regarding the determination on commencement of an approved development, please refer to TPB Guidelines No. 35D for details. If you wish to seek an extension of the validity of this permission, you may submit an application under 16A of the Town Planning Ordinance to the TPB no less than six weeks before its expiry. This is to allow sufficient time for processing of the application in consultation with the concerned departments. The TPB will not consider the application if the time limit for commencement of development specified in the permission has already expired at the time of consideration by the TPB. Please refer to the TPB Guidelines No. 35D and 36C for details. The Guidelines and application forms are available at the TPB's website (https://www.tpb.gov.hk/en/resources/index.html), the Planning Enquiry Counters of the Planning Department (Hotline : 2231 5000) at 17/F, North Point Government Offices, 333 Java Road, North Point; 14/F, Sha Tin Government Offices, 1 Sheung Wo Che Road, Sha Tin; and the Secretariat of the TPB at 15/F, North Point Government Offices.

For amendments to the approved development that may be permitted with or without application under section 16A, please refer to TPB Guidelines No. 36C for details.

The TPB Paper in respect of the application (except the supplementary planning statement/technical report(s), if any) is available at this link (https://www.tpb.gov.hk/en/meetings/RNTPC/Agenda/736_rnt_agenda.html) and the relevant extract of minutes of the TPB meeting held on 16.2.2024 is enclosed herewith for your reference.

Under section 17(1) of the Town Planning Ordinance, an applicant aggrieved by a decision of the TPB may apply to the TPB for a review of the decision. If you wish to seek a review, you should inform me within 21 days from the date of this letter (on or before 22.3.2024). I will then contact you to arrange a hearing before the TPB which you and/or your authorized representative will be invited to attend. The TPB is required to consider a review application within three months of receipt of the application for review. Please note that any review application will be published for three weeks for public comments.

This permission by the TPB under section 16 of the Town Planning Ordinance should not be taken to indicate that any other government approval which may be needed in connection with the development, will be given. You should approach the appropriate government departments on any such matter.

If you have any queries regarding this planning permission, please contact Mr. Kimson Chiu of Fanling, Sheung Shui & Yuen Long East District Planning Office at 3168 4033. In case you wish to consult the relevant Government departments on matters relating to the above approval conditions, a list of the concerned Government officers is attached herewith for your reference.

Yours faithfully,

(Leticia LEUNG)
for Secretary, Town Planning Board

LL/CN/cl

List of Government Department Contacts

(Application No. A/YL-MP/344)

部門 Department	辦事處 Office	聯絡人姓名 Name of Contact Person	電話號碼 Telephone No.	傳真號碼 Facsimile No.
漁農自然護理署 Agriculture, Fisheries and Conservation Department	自然護理組(元朗) Nature Conservation Section (Yuen Long)	黃金欣博士 Dr. WONG Kam Yan, Azaria	2150 6932	2377 4427
渠務署 Drainage Services Department	新界北渠務部 Mainland North Division	梁長政先生 Mr. LEONG Cheung Ching	2300 1432	2770 4761
環境保護署 Environmental Protection Department	環境評估科 Environmental Assessment Division	陳麗薇女士 Ms. CHAN Lai Mei, Jolitta	2835 1112	2591 0558
運輸署 Transport Department	交通工程(新界西)部 Traffic Engineering (NTW) Division	梁志江先生 Mr. LEUNG Chi Kong, Donald	2399 2778	2381 3799

Appendix B

Master Layout Plan of the Proposed Development

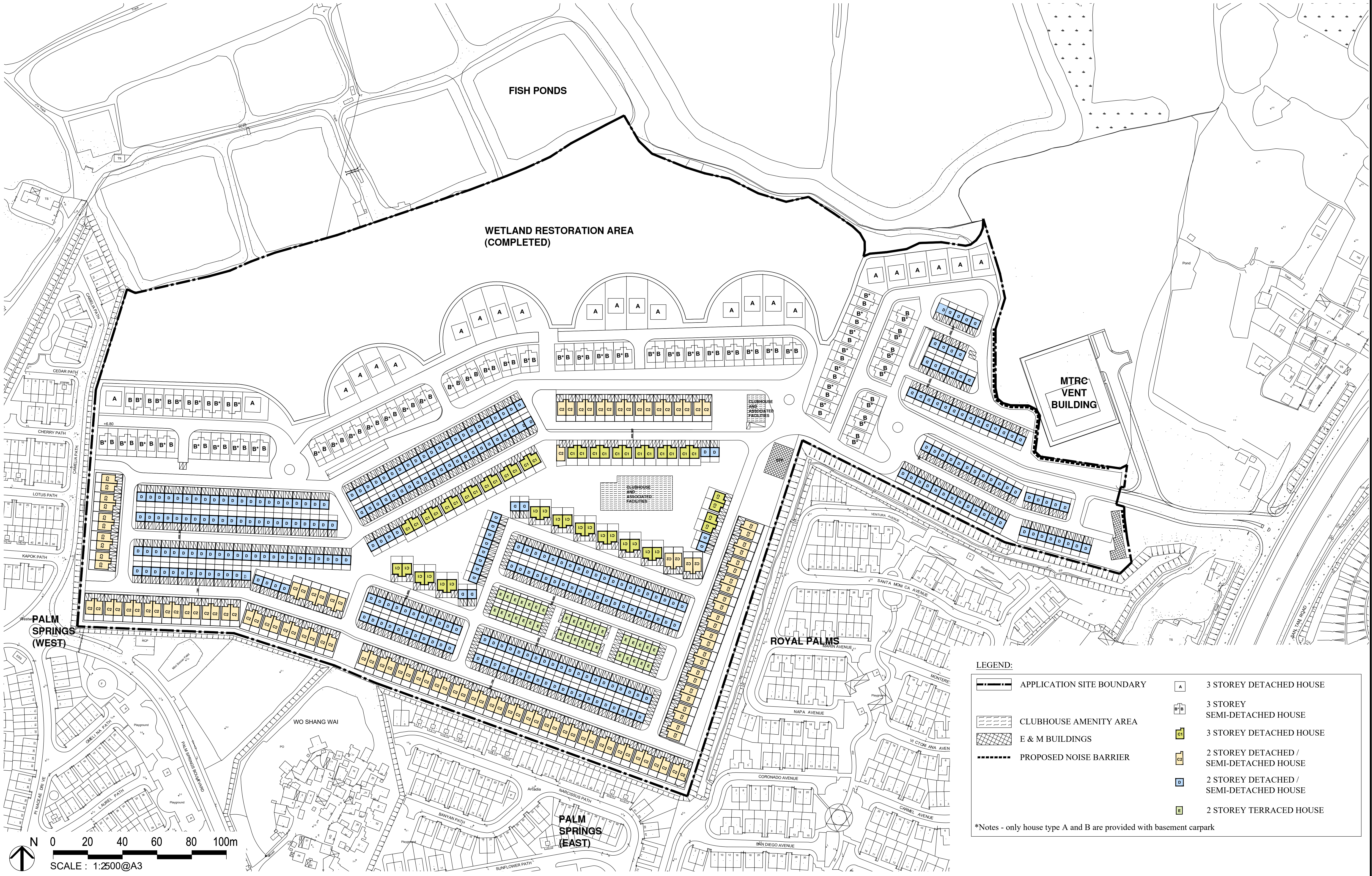


Figure 3: Revised Master Layout Plan in this Amendment Application

LWK
+PARTNERS

1:2500 in A3
DWG. No. : 3809-003

Appendix C

Site Visit Photo

Figure 1: Fishpond in WSW village and pump panel


Figure 2: Current inlet of rising mains to Application Site

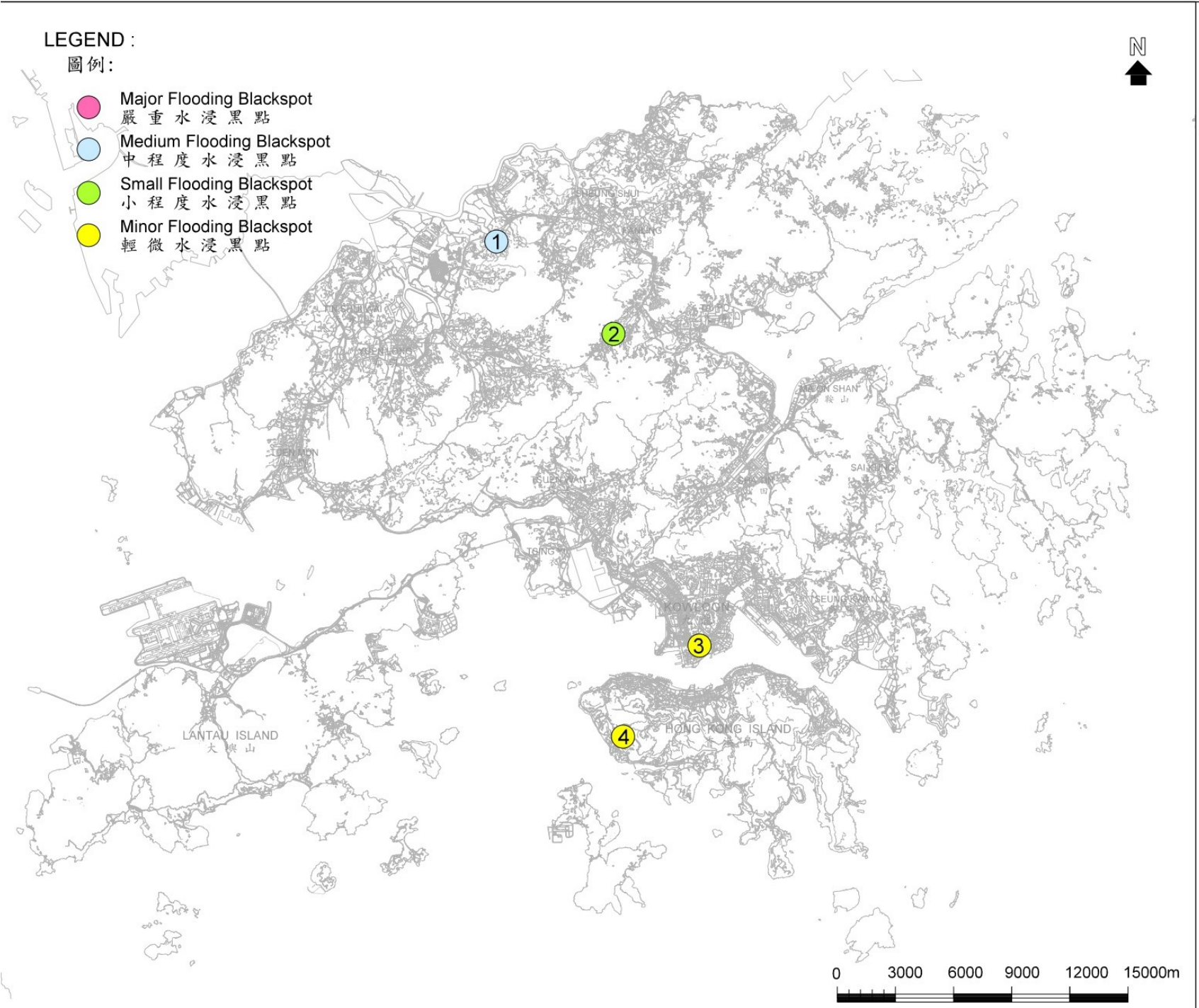
Figure 3: Bund along Application Site Boundary

Figure 4: Outlet of triple 1350mm dia. pipes before Application Site

Figure 5: Inlet of triple 1350mm dia. Pipes to east portion of Application Site

Appendix D

Location of DSD Flooding Blackspots
(Information Extracted from DSD Website)



Flooding Blackspots
水浸黑點

No. 編號	Location 地點
1	Shek Wu Wai, San Tin 新田石湖圍
2	Lam Tsuen Valley Basin 林村谷盆地
3	Chatham Road South (Granville Road to Austin Avenue) 漆咸道南 (加連威老道和柯士甸路之間)
4	Pok Fu Lam Village 薄扶林村

Remarks :

The DSD blackspots list and location map are produced based on previous flooding records and complaints received by DSD for monitoring the maintenance and mitigation measures to alleviate flooding at the blackspots. Locations susceptible to flooding problems dominated by tidal influence were not included. The blackspots list and maps should not be used as an indication of the actual or hidden flood risk at any particular location in Hong Kong.

備註：

渠務署水浸黑點名單及位置圖是根據我們以往的水浸記錄及收到的水浸投訴編制而成，用以監察該地點維修及防洪措施的進展，一些純粹因潮漲引發水浸的地點並未包括在內。水浸黑點名單及位置圖並不適用於顯示本港任何地方的實際或隱藏水浸風險。

Drawing title

Flooding Blackspots as at March 2024

水浸黑點(2024年3月情況)

Drawing no.	Scale	Date
DLD 4012D	A4 (1:300000)	Mar 2024

Office: LAND DRAINAGE DIVISION

DRAINAGE SERVICES DEPARTMENT
HONG KONG

Appendix E

Synthetic Rainfall Profile and
Its Calculation Example

Design 4-hr Rainfall Profile

Rainfall intensity is calculated according to Section 4.3.5 of SDM as below

Rain Storm Return / Period Storm Constant	2yr	10yr	50yr	200yr
a=	446.1	485	505.5	508.8
b=	3.38	3.11	3.29	3.46
c=	0.463	0.397	0.355	0.322

Rainfall Intensity(mm/hr) I

$$F(t) = \begin{cases} \dfrac{a[b+2(1-c)t]}{(2t+b)^{c+1}} & , \quad 0 \le t \le \dfrac{t_d}{2} \\ F(-t) & , \quad -\dfrac{t_d}{2} \le t \le 0 \end{cases}$$

Rainfall Depth (mm) =28.1%*[Rainfall Intensity/60]

t	Time Series	Rainfall Depth (mm)				t	Time Series	Rainfall Depth (mm)				t	Time Series	Rainfall Depth (mm)				t	Time Series	Rainfall Depth (mm)				t	Time Series	Rainfall Depth (mm)			
		2yr	10yr	50yr	200yr			2yr	10yr	50yr	200yr			2yr	10yr	50yr	200yr			2yr	10yr	50yr	200yr			2yr	10yr	50yr	200yr
120	0:00:00	0.41	0.71	1.00	1.26	70	0:50:00	0.52	0.88	1.21	1.51	20	1:40:00	0.95	1.47	1.90	2.27	30	2:30:00	0.78	1.24	1.64	1.99	80	3:20:00	0.49	0.84	1.15	1.44
119	0:01:00	0.41	0.71	1.00	1.27	69	0:51:00	0.53	0.89	1.22	1.51	19	1:41:00	0.98	1.50	1.94	2.31	31	2:31:00	0.77	1.23	1.62	1.96	81	3:21:00	0.49	0.83	1.15	1.44
118	0:02:00	0.41	0.72	1.00	1.27	68	0:52:00	0.53	0.89	1.22	1.52	18	1:42:00	1.00	1.53	1.98	2.35	32	2:32:00	0.76	1.21	1.60	1.94	82	3:22:00	0.49	0.83	1.14	1.43
117	0:03:00	0.41	0.72	1.01	1.27	67	0:53:00	0.53	0.90	1.23	1.53	17	1:43:00	1.03	1.57	2.02	2.39	33	2:33:00	0.75	1.20	1.59	1.92	83	3:23:00	0.48	0.82	1.14	1.42
116	0:04:00	0.41	0.72	1.01	1.28	66	0:54:00	0.54	0.90	1.24	1.53	16	1:44:00	1.06	1.61	2.07	2.44	34	2:34:00	0.74	1.18	1.57	1.91	84	3:24:00	0.48	0.82	1.13	1.42
115	0:05:00	0.41	0.72	1.01	1.28	65	0:55:00	0.54	0.91	1.24	1.54	15	1:45:00	1.10	1.65	2.11	2.50	35	2:35:00	0.73	1.17	1.55	1.89	85	3:25:00	0.48	0.82	1.13	1.41
114	0:06:00	0.42	0.73	1.02	1.28	64	0:56:00	0.55	0.92	1.25	1.55	14	1:46:00	1.13	1.70	2.17	2.55	36	2:36:00	0.72	1.15	1.54	1.87	86	3:26:00	0.48	0.81	1.12	1.41
113	0:07:00	0.42	0.73	1.02	1.29	63	0:57:00	0.55	0.92	1.26	1.56	13	1:47:00	1.18	1.75	2.23	2.62	37	2:37:00	0.71	1.14	1.52	1.85	87	3:27:00	0.47	0.81	1.12	1.40
112	0:08:00	0.42	0.73	1.02	1.29	62	0:58:00	0.55	0.93	1.26	1.57	12	1:48:00	1.22	1.81	2.30	2.69	38	2:38:00	0.70	1.13	1.51	1.84	88	3:28:00	0.47	0.81	1.11	1.40
111	0:09:00	0.42	0.73	1.03	1.30	61	0:59:00	0.56	0.93	1.27	1.57	11	1:49:00	1.28	1.88	2.37	2.76	39	2:39:00	0.69	1.12	1.49	1.82	89	3:29:00	0.47	0.80	1.11	1.39
110	0:10:00	0.42	0.74	1.03	1.30	60	1:00:00	0.56	0.94	1.28	1.58	10	1:50:00	1.34	1.95	2.45	2.85	40	2:40:00	0.68	1.11	1.48	1.81	90	3:30:00	0.47	0.80	1.11	1.39
109	0:11:00	0.43	0.74	1.03	1.30	59	1:01:00	0.57	0.95	1.29	1.59	9	1:51:00	1.41	2.04	2.55	2.95	41	2:41:00	0.67	1.10	1.47	1.79	91	3:31:00	0.46	0.79	1.10	1.38
108	0:12:00	0.43	0.74	1.04	1.31	58	1:02:00	0.57	0.95	1.29	1.60	8	1:52:00	1.49	2.14	2.66	3.07	42	2:42:00	0.67	1.08	1.45	1.78	92	3:32:00	0.46	0.79	1.10	1.38
107	0:13:00	0.43	0.74	1.04	1.31	57	1:03:00	0.58	0.96	1.30	1.61	7	1:53:00	1.59	2.26	2.80	3.21	43	2:43:00	0.66	1.07	1.44	1.76	93	3:33:00	0.46	0.79	1.09	1.37
106	0:14:00	0.43	0.75	1.04	1.32	56	1:04:00	0.58	0.97	1.31	1.62	6	1:54:00	1.72	2.41	2.96	3.37	44	2:44:00	0.65	1.06	1.43	1.75	94	3:34:00	0.46	0.78	1.09	1.37
105	0:15:00	0.43	0.75	1.05	1.32	55	1:05:00	0.59	0.97	1.32	1.63	5	1:55:00	1.87	2.60	3.16	3.58	45	2:45:00	0.65	1.05	1.42	1.74	95	3:35:00	0.45	0.78	1.08	1.36
104	0:16:00	0.43	0.75	1.05	1.32	54	1:06:00	0.59	0.98	1.33	1.64	4	1:56:00	2.08	2.84	3.42	3.84	46	2:46:00	0.64	1.05	1.41	1.73	96	3:36:00	0.45	0.78	1.08	1.36
103	0:17:00	0.44	0.76	1.05	1.33	53	1:07:00	0.60	0.99	1.34	1.65	3	1:57:00	2.38	3.18	3.77	4.19	47	2:47:00	0.63	1.04	1.40	1.71	97	3:37:00	0.45	0.77	1.08	1.35
102	0:18:00	0.44	0.76	1.06	1.33	52	1:08:00	0.60	1.00	1.35	1.66	2	1:58:00	2.83	3.69	4.29	4.71	48	2:48:00	0.63	1.03	1.39	1.70	98	3:38:00	0.45	0.77	1.07	1.35
101	0:19:00	0.44	0.76	1.06	1.34	51	1:09:00	0.61	1.00	1.36	1.67	1	1:59:00	3.62	4.58	5.17	5.55	49	2:49:00	0.62	1.02	1.38	1.69	99	3:39:00	0.44	0.77	1.07	1.35
100	0:20:00	0.44	0.76	1.06	1.34	50	1:10:00	0.61	1.01	1.37	1.68	0	2:00:00	5.42	6.60	7.07	7.28	50	2:50:00	0.61	1.01	1.37	1.68	100	3:40:00	0.44	0.76	1.06	1.34
99	0:21:00	0.44	0.77	1.07	1.35	49	1:11:00	0.62	1.02	1.38	1.69	1	2:01:00	3.62	4.58	5.17	5.55	51	2:51:00	0.61	1.00	1.36	1.67	101	3:41:00	0.44	0.76	1.06	1.34
98	0:22:00	0.45	0.77	1.07	1.35	48	1:12:00	0.63	1.03	1.39	1.70	2	2:02:00	2.83	3.69	4.29	4.71	52	2:52:00	0.60	1.00	1.35	1.66	102	3:42:00	0.44	0.76	1.06	1.33
97	0:23:00	0.45	0.77	1.08	1.35	47	1:13:00	0.63	1.04	1.40	1.71	3	2:03:00	2.38	3.18	3.77	4.19	53	2:53:00	0.60	0.99	1.34	1.65	103	3:43:00	0.44	0.76	1.05	1.33
96	0:24:00	0.45	0.78	1.08	1.36	46	1:14:00	0.64	1.05	1.41	1.73	4	2:04:00	2.08	2.84	3.42	3.84	54	2:54:00	0.59	0.98	1.33	1.64	104	3:44:00	0.43	0.75	1.05	1.32
95	0:25:00	0.45	0.78	1.08	1.36	45	1:15:00	0.65	1.05	1.42	1.74	5	2:05:00	1.87	2.60	3.16	3.58	55	2:55:00	0.59	0.97	1.32	1.63	105	3:45:00	0.43	0.75	1.05	1.32
94	0:26:00	0.46	0.78	1.09	1.37	44	1:16:00	0.65	1.06	1.43	1.75	6	2:06:00	1.72	2.41	2.96	3.37	56	2:56:00	0.58	0.97	1.31	1.62	106	3:46:00	0.43	0.75	1.04	1.32
93	0:27:00	0.46	0.79	1.09	1.37	43	1:17:00	0.66	1.07	1.44	1.76	7	2:07:00	1.59	2.26	2.80	3.21	57	2:57:00	0.58	0.96	1.30	1.61	107	3:47:00	0.43	0.74	1.04	1.31
92	0:28:00	0.46	0.79	1.10	1.38	42	1:18:00	0.67	1.08	1.45	1.78	8	2:08:00	1.49	2.14	2.66	3.07	58	2:58:00	0.57	0.95	1.29	1.60	108	3:48:00	0.43	0.74	1.04	1.31
91	0:29:00	0.46	0.79	1.10	1.38	41	1:19:00	0.67	1.10	1.47	1.79	9	2:09:00	1.41	2.04	2.55	2.95	59	2:59:00	0.57	0.95	1.29	1.59	109	3:49:00	0.43	0.74	1.03	1.30
90	0:30:00	0.47	0.80	1.11	1.39	40	1:20:00	0.68	1.11	1.48	1.81	10	2:10:00	1.34	1.95	2.45	2.85	60	3:00:00	0.56	0.94	1.28	1.58	110	3:50:00	0.42	0.74	1.03	1.30
89	0:31:00	0.47	0.80	1.11	1.39	39	1:21:00	0.69	1.12	1.49	1.82	11	2:11:00	1.28	1.88	2.37	2.76	61	3:01:00	0.56	0.93	1.27	1.57	111	3:51:00	0.42	0.73	1.03	1.30
88	0:32:00	0.47	0.81	1.11	1.40	38	1:22:00	0.70	1.13	1.51	1.84	12	2:12:00	1.22	1.81	2.30	2.69	62	3:02:00	0.55	0.93	1.26	1.57	112	3:52:00	0.42	0.73	1.02	1.29
87	0:33:00	0.47	0.81	1.12	1.40	37	1:23:00	0.71	1.14	1.52	1.85	13	2:13:00	1.18	1.75	2.23	2.62	63	3:03:00	0.55	0.92	1.26	1.56	113	3:53:00	0.42	0.73	1.02	1.29
86	0:34:00	0.48	0.81	1.12	1.41	36	1:24:00	0.72	1.15	1.54	1.87	14	2:14:00	1.13	1.70	2.17	2.55	64	3:04:00	0.55	0.92	1.25	1.55	114	3:54:00	0.42	0.73	1.02	1.28
85	0:35:00	0.48	0.82	1.13	1.41	35	1:25:00	0.73	1.17	1.55	1.89	15	2:15:00	1.10	1.65	2.11	2.50	65	3:05:00	0.54	0.91	1.24	1.54	115	3:55:00	0.41	0.72	1.01	1.28
84	0:36:00	0.48	0.82	1.13	1.42	34	1:26:00	0.74	1.18	1.57	1.91	16	2:16:00	1.06	1.61	2.07	2.44	66	3:06:00	0.54	0.90	1.24	1.53	116	3:56:00	0.41	0.72	1.01	1.28
83	0:37:00	0.48	0.82	1.14	1.42	33	1:27:00	0.75	1.20	1.59	1.92	17	2:17:00	1.03	1.57	2.02	2.39	67	3:07:00	0.53	0.90	1.23	1.53	117	3:57:00	0.41	0.72	1.01	1.27
82	0:38:00	0.49	0.83	1.14	1.43	32	1:28:00	0.76	1.21	1.60	1.94	18	2:18:00	1.00	1.53	1.98	2.35	68	3:08:00	0.53	0.89	1.22	1.52	118	3:58:00	0.41	0.72	1.00	1.27
81	0:39:00	0.49	0.83	1.15	1.44	31	1:29:00	0.77	1.23	1.62	1.96	19	2:19:00	0.98	1.50	1.94	2.31	69	3:09:00	0.53	0.89	1.22	1.51	119	3:59:00	0.41	0.71	1.00	1.27
80	0:40:00	0.49	0.84	1.15	1.44	30	1:30:00	0.78	1.24	1.64	1.99	20	2:20:00	0.95	1.47	1.90	2.27	70	3:10:00	0.52	0.88	1.21	1.51	120	4:00:00	0.41	0.71	1.00	1.26
79	0:41:00	0.49	0.84	1.16	1.45	29	1:31:00	0.80	1.26	1.66	2.01	21	2:21:00	0.93	1.44	1.87	2.23	71	3:11:00	0.52	0.88	1.20	1.50						
78	0:42:00	0.50	0.85	1.16	1.45	28	1:32:00	0.81	1.28	1.68	2.03	22	2:22:00	0.91	1.41	1.84	2.20	72	3:12:00	0.52	0.87	1.20	1.49						
77	0:43:00	0.50	0.85	1.17	1.46	27	1:33:00	0.82	1.30	1.71	2.06	23	2:23:00	0.89	1.39	1.81	2.17	73	3:13:00	0.51	0.87	1.19	1.48						
76	0:44:00	0.50	0.85	1.17	1.47	26	1:34:00	0.84	1.32	1.73	2.08	24	2:24:00	0.87	1.36	1.78	2.14	74	3:14:00	0.51	0.86	1.19	1.48						
75	0:45:00	0.51	0.86	1.18	1.47	25	1:35:00	0.86	1.34	1.75	2.11	25	2:25:00	0.86	1.34	1.75	2.11	75	3:15:00	0.51	0.86	1.18	1.47	**4-hr Total Rainfall Depth(mm)**		**180.44**	**281.91**	**369.83**	**446.05**
74	0:46:00	0.51	0.86	1.19	1.48	24	1:36:00	0.87	1.36	1.78	2.14	26	2:26:00	0.84	1.32	1.73	2.08	76	3:16:00	0.50	0.85	1.17	1.47						
73	0:47:00	0.51	0.87	1.19	1.48	23	1:37:00	0.89	1.39	1.81	2.17	27	2:27:00	0.82	1.30	1.71	2.06	77	3:17:00	0.50	0.85	1.17	1.46						
72	0:48:00	0.52	0.87	1.20	1.49	22	1:38:00	0.91	1.41	1.84	2.20	28	2:28:00	0.81	1.28	1.68	2.03	78	3:18:00	0.50	0.85	1.16	1.45						
71	0:49:00	0.52	0.88	1.20	1.50	21	1:39:00	0.93	1.44	1.87	2.23	29	2:29:00	0.80	1.26	1.66	2.01	79	3:19:00	0.49	0.84	1.16	1.45						

Noted:

i. The storm constants are based on the SDM Corrigendum No. 1/2024

ii. The climate change effect is adopted in accordance with the DSD-SDM. A total increase of 28.1% in rainfall is added to above four design rainfall profiles, including 16% increase due to climate change up to end of 21st Century as per Table 28 of the SDM Corrigendum No. 1/2022 and 12.1% increase for design allowance as per Table 31 of the SDM Corrigendum No. 1/2022.

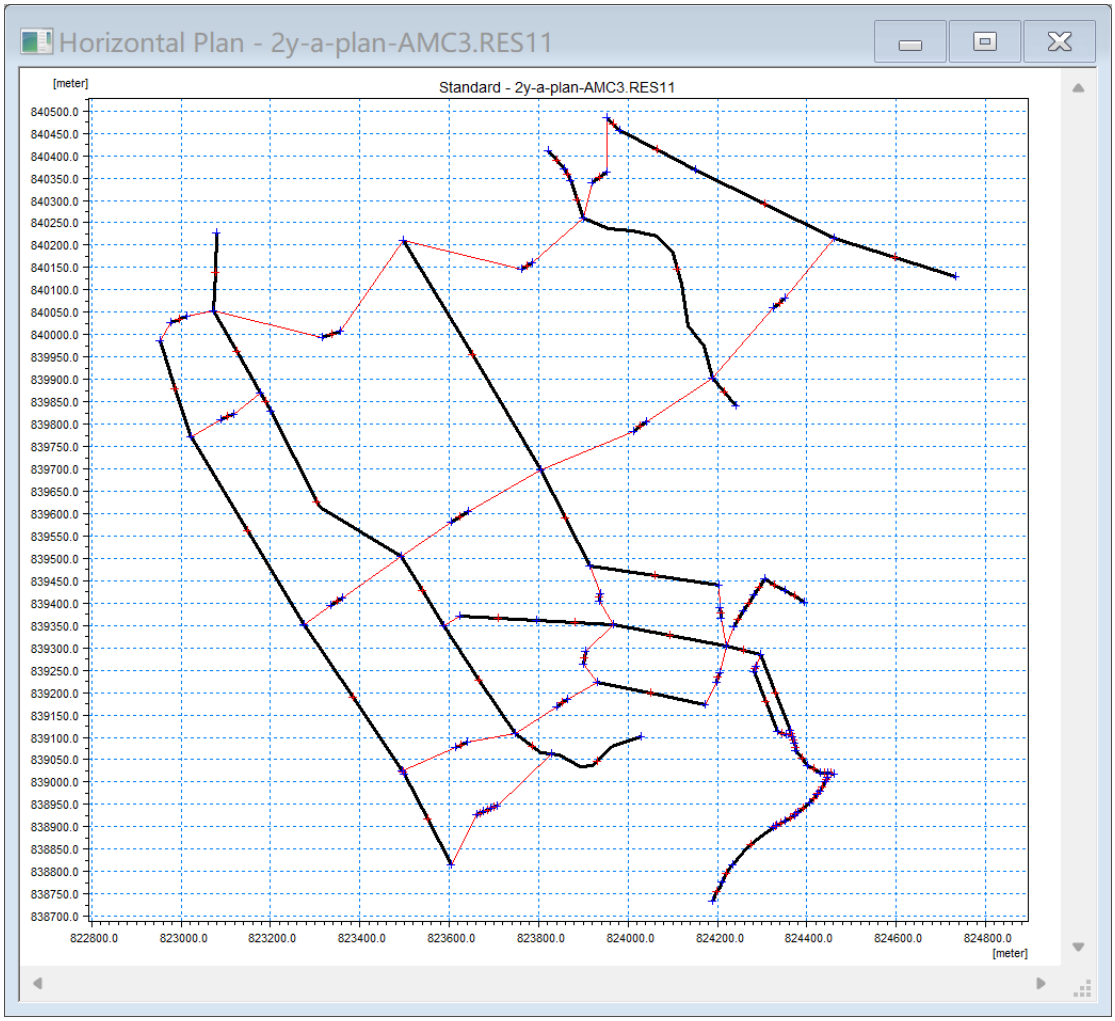
Calculational Examples：1 in 2yr 0:00:00(t=120) Rainfall Depth =28.1%*[446.1*[3.38+2*(1-0.463)*120]/(2*120+3.38)$^{0.463+1}$]/60=0.41 (mm)

Appendix F

Catchment Characteristic Input for
MP02A-A1 to A8 and AA-AE
(Information Extracted from Mike11 RR Model)
&
Modelling settings in Mike 11 for Wetland
Restoration Area

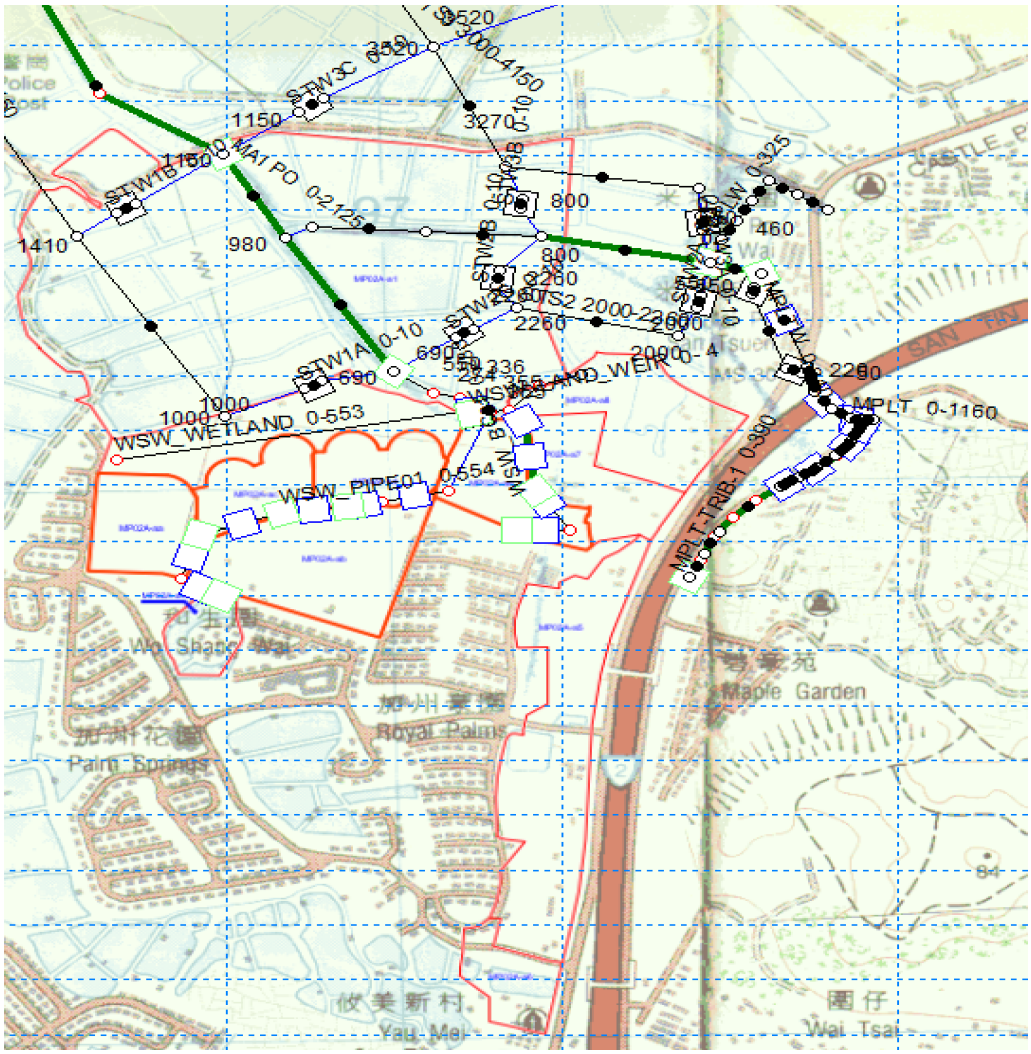
Catchment Characteristic Input in Mike 11 Hydraulic Model

Pre-Development Drainage Network



Catchment Characteristic Input in Mike 11 Hydraulic Model

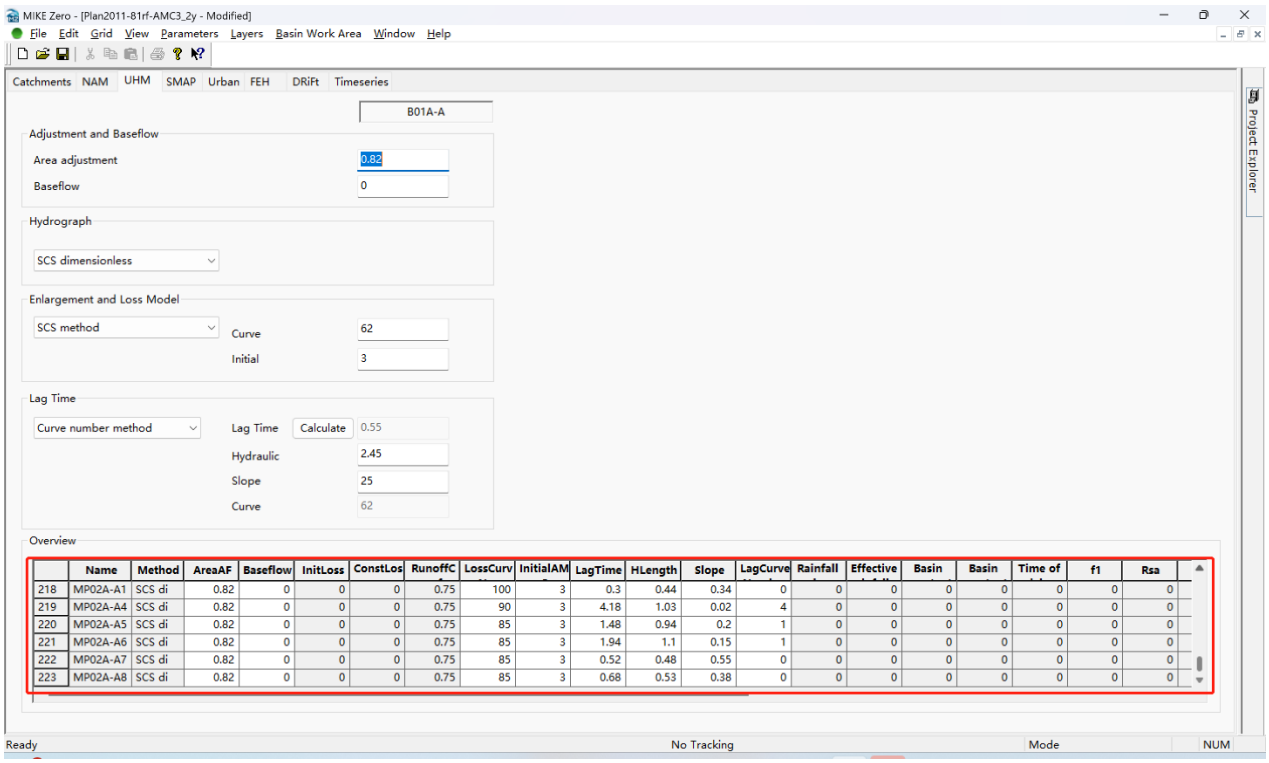
Post-Development Drainage Network



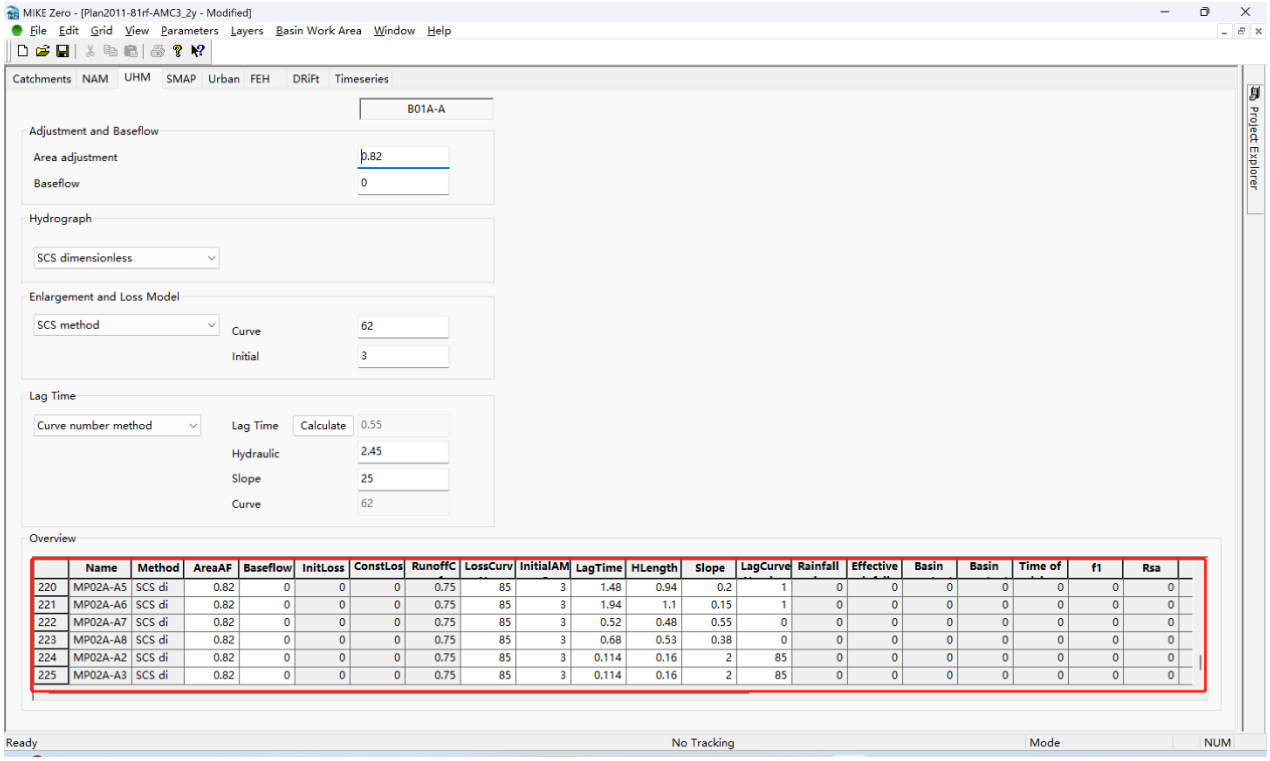
Catchment Characteristic Input in Mike 11 Hydraulic Model

Pre-Development Condition of Catchment MP02A-A1 to A8

(Areal reduction factors of 0.82 and AMC 3 as example)



	Name	Method	AreaAF	Baseflow	InitLoss	ConstLos	RunoffC	LossCurv	InitialAM	LagTime	HLength	Slope	LagCurve	Rainfall	Effective	Basin	Basin	Time of	f1	Rsa
218	MP02A-A1	SCS di	0.82	0	0	0	0.75	100	3	0.3	0.44	0.34	0	0	0	0	0	0	0	0
219	MP02A-A4	SCS di	0.82	0	0	0	0.75	90	3	4.18	1.03	0.02	4	0	0	0	0	0	0	0
220	MP02A-A5	SCS di	0.82	0	0	0	0.75	85	3	1.48	0.94	0.2	1	0	0	0	0	0	0	0
221	MP02A-A6	SCS di	0.82	0	0	0	0.75	85	3	1.94	1.1	0.15	1	0	0	0	0	0	0	0
222	MP02A-A7	SCS di	0.82	0	0	0	0.75	85	3	0.52	0.48	0.55	0	0	0	0	0	0	0	0
223	MP02A-A8	SCS di	0.82	0	0	0	0.75	85	3	0.68	0.53	0.38	0	0	0	0	0	0	0	0

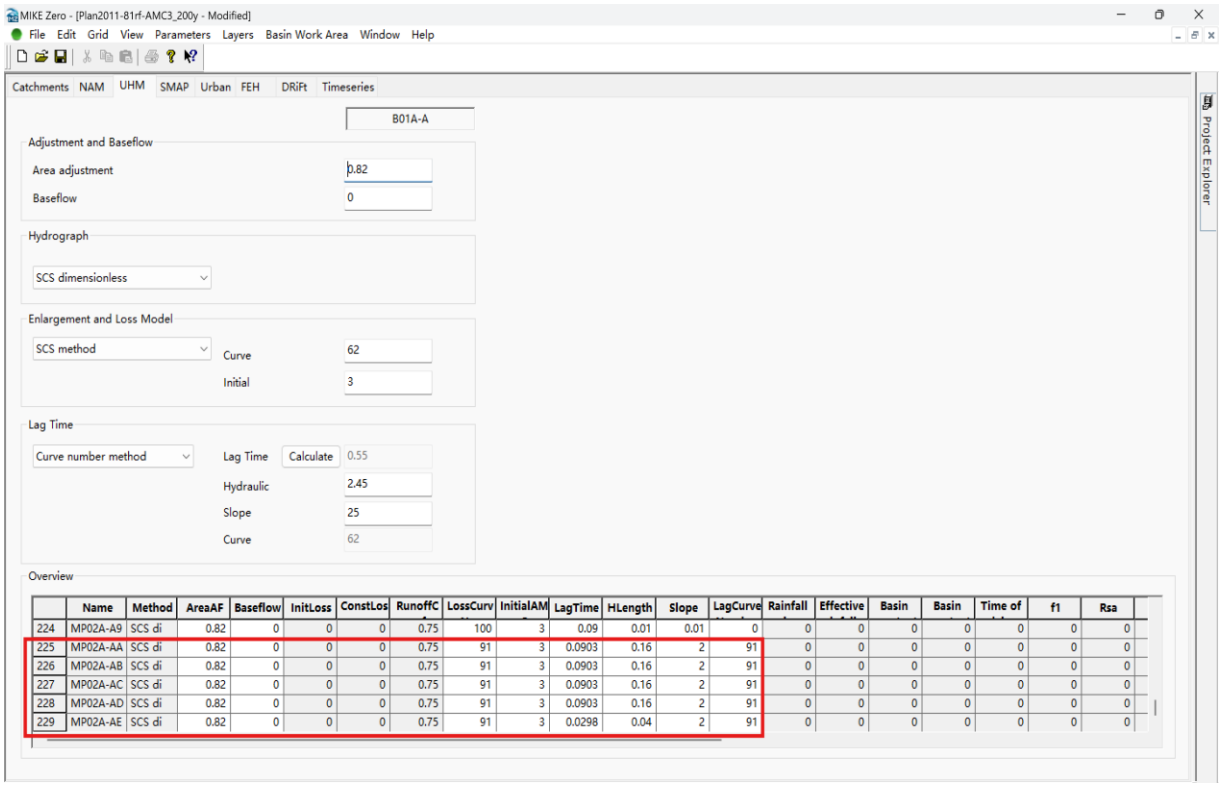


	Name	Method	AreaAF	Baseflow	InitLoss	ConstLos	RunoffC	LossCurv	InitialAM	LagTime	HLength	Slope	LagCurve	Rainfall	Effective	Basin	Basin	Time of	f1	Rsa
220	MP02A-A5	SCS di	0.82	0	0	0	0.75	85	3	1.48	0.94	0.2	1	0	0	0	0	0	0	0
221	MP02A-A6	SCS di	0.82	0	0	0	0.75	85	3	1.94	1.1	0.15	1	0	0	0	0	0	0	0
222	MP02A-A7	SCS di	0.82	0	0	0	0.75	85	3	0.52	0.48	0.55	0	0	0	0	0	0	0	0
223	MP02A-A8	SCS di	0.82	0	0	0	0.75	85	3	0.68	0.53	0.38	0	0	0	0	0	0	0	0
224	MP02A-A2	SCS di	0.82	0	0	0	0.75	85	3	0.114	0.16	2	85	0	0	0	0	0	0	0
225	MP02A-A3	SCS di	0.82	0	0	0	0.75	85	3	0.114	0.16	2	85	0	0	0	0	0	0	0

Catchment Characteristic Input in Mike 11 Hydraulic Model

Post-Development Condition of Catchment MP02A-AA to AE

(Areal reduction factors of 0.82 and AMC 3 as example)

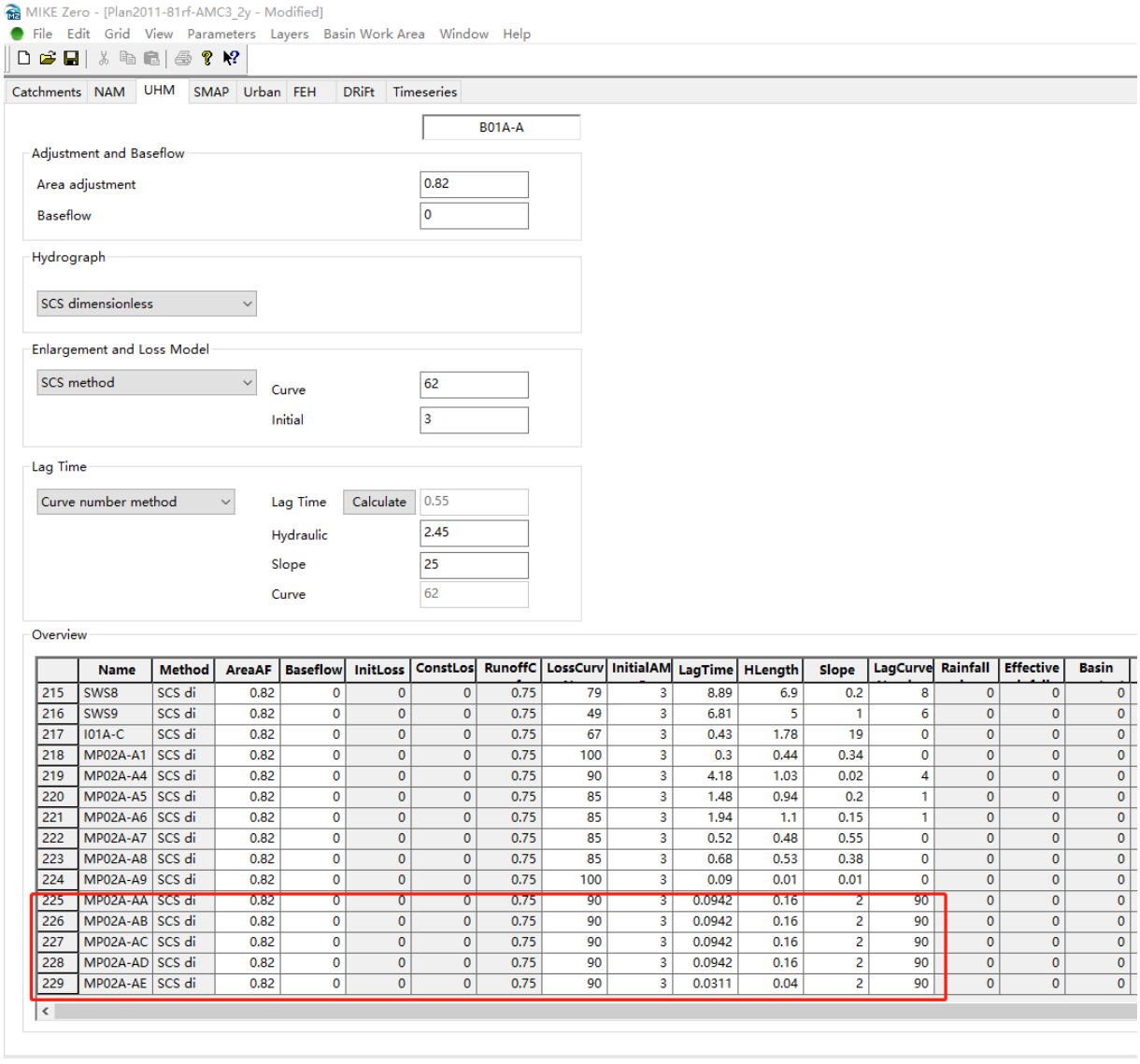


	Name	Method	AreaAF	Baseflow	InitLoss	ConstLos	RunoffC	LossCurv	InitialAM	LagTime	HLength	Slope	LagCurve	Rainfall	Effective	Basin	Basin	Time of	f1	Rsa
224	MP02A-A9	SCS di	0.82	0	0	0	0.75	100	3	0.09	0.01	0.01	0	0	0	0	0	0	0	0
225	MP02A-AA	SCS di	0.82	0	0	0	0.75	91	3	0.0903	0.16	2	91	0	0	0	0	0	0	0
226	MP02A-AB	SCS di	0.82	0	0	0	0.75	91	3	0.0903	0.16	2	91	0	0	0	0	0	0	0
227	MP02A-AC	SCS di	0.82	0	0	0	0.75	91	3	0.0903	0.16	2	91	0	0	0	0	0	0	0
228	MP02A-AD	SCS di	0.82	0	0	0	0.75	91	3	0.0903	0.16	2	91	0	0	0	0	0	0	0
229	MP02A-AE	SCS di	0.82	0	0	0	0.75	91	3	0.0298	0.04	2	91	0	0	0	0	0	0	0

Catchment Characteristic Input in Mike 11 Hydraulic Model in Previous Approved DIA in March 2024

Post-Development Condition of Catchment MP02A-AA to AE

(Areal reduction factors of 0.82 and AMC 3 as example)



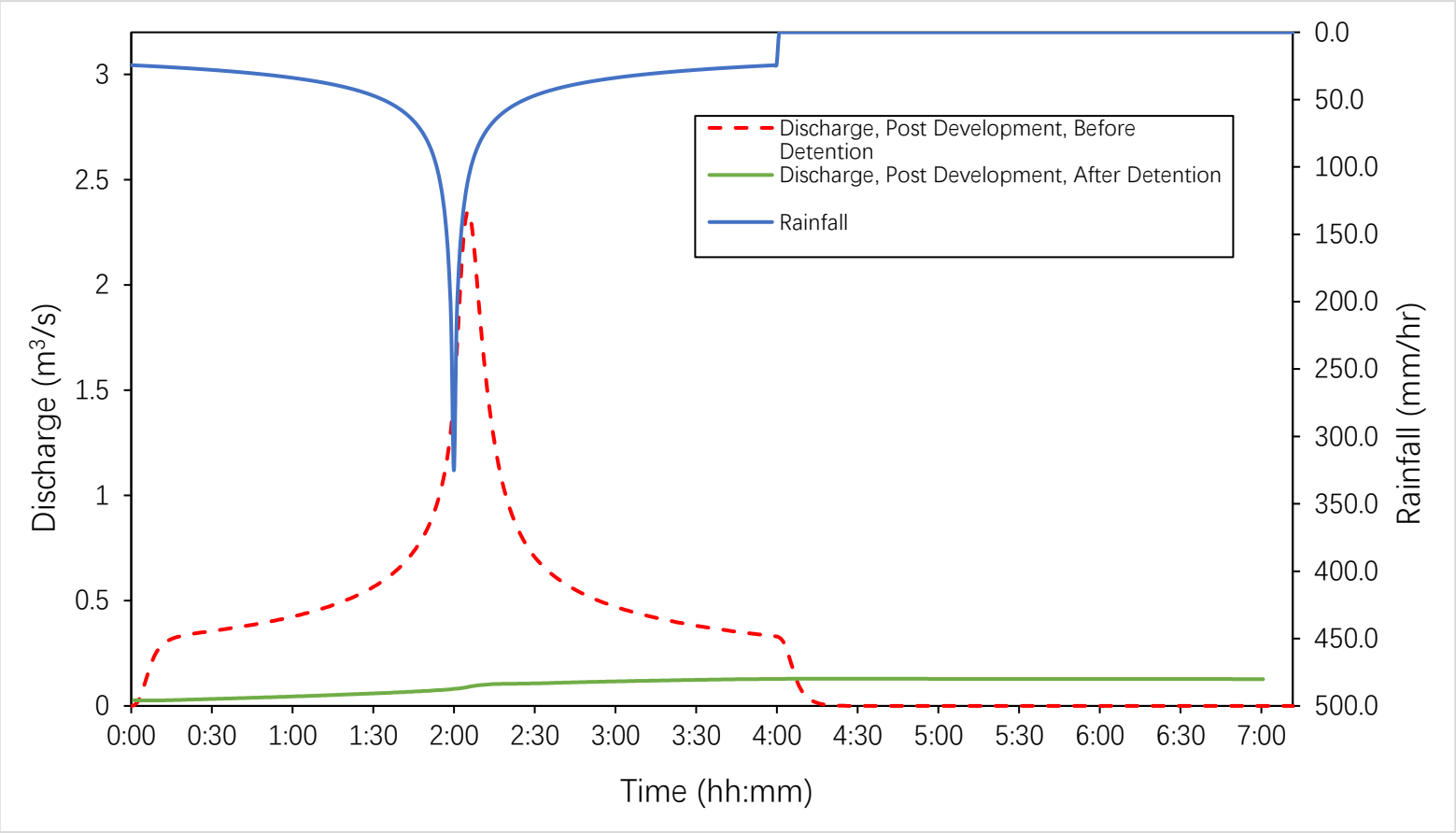
	Name	Method	AreaAF	Baseflow	InitLoss	ConstLos	RunoffC	LossCurv	InitialAM	LagTime	HLength	Slope	LagCurve	Rainfall	Effective	Basin
215	SWS8	SCS di	0.82	0	0	0	0.75	79	3	8.89	6.9	0.2	8	0	0	0
216	SWS9	SCS di	0.82	0	0	0	0.75	49	3	6.81	5	1	6	0	0	0
217	I01A-C	SCS di	0.82	0	0	0	0.75	67	3	0.43	1.78	19	0	0	0	0
218	MP02A-A1	SCS di	0.82	0	0	0	0.75	100	3	0.3	0.44	0.34	0	0	0	0
219	MP02A-A4	SCS di	0.82	0	0	0	0.75	90	3	4.18	1.03	0.02	4	0	0	0
220	MP02A-A5	SCS di	0.82	0	0	0	0.75	85	3	1.48	0.94	0.2	1	0	0	0
221	MP02A-A6	SCS di	0.82	0	0	0	0.75	85	3	1.94	1.1	0.15	1	0	0	0
222	MP02A-A7	SCS di	0.82	0	0	0	0.75	85	3	0.52	0.48	0.55	0	0	0	0
223	MP02A-A8	SCS di	0.82	0	0	0	0.75	85	3	0.68	0.53	0.38	0	0	0	0
224	MP02A-A9	SCS di	0.82	0	0	0	0.75	100	3	0.09	0.01	0.01	0	0	0	0
225	MP02A-AA	SCS di	0.82	0	0	0	0.75	90	3	0.0942	0.16	2	90	0	0	0
226	MP02A-AB	SCS di	0.82	0	0	0	0.75	90	3	0.0942	0.16	2	90	0	0	0
227	MP02A-AC	SCS di	0.82	0	0	0	0.75	90	3	0.0942	0.16	2	90	0	0	0
228	MP02A-AD	SCS di	0.82	0	0	0	0.75	90	3	0.0942	0.16	2	90	0	0	0
229	MP02A-AE	SCS di	0.82	0	0	0	0.75	90	3	0.0311	0.04	2	90	0	0	0

Appendix G

Hydrograph of Wetland Restoration Area

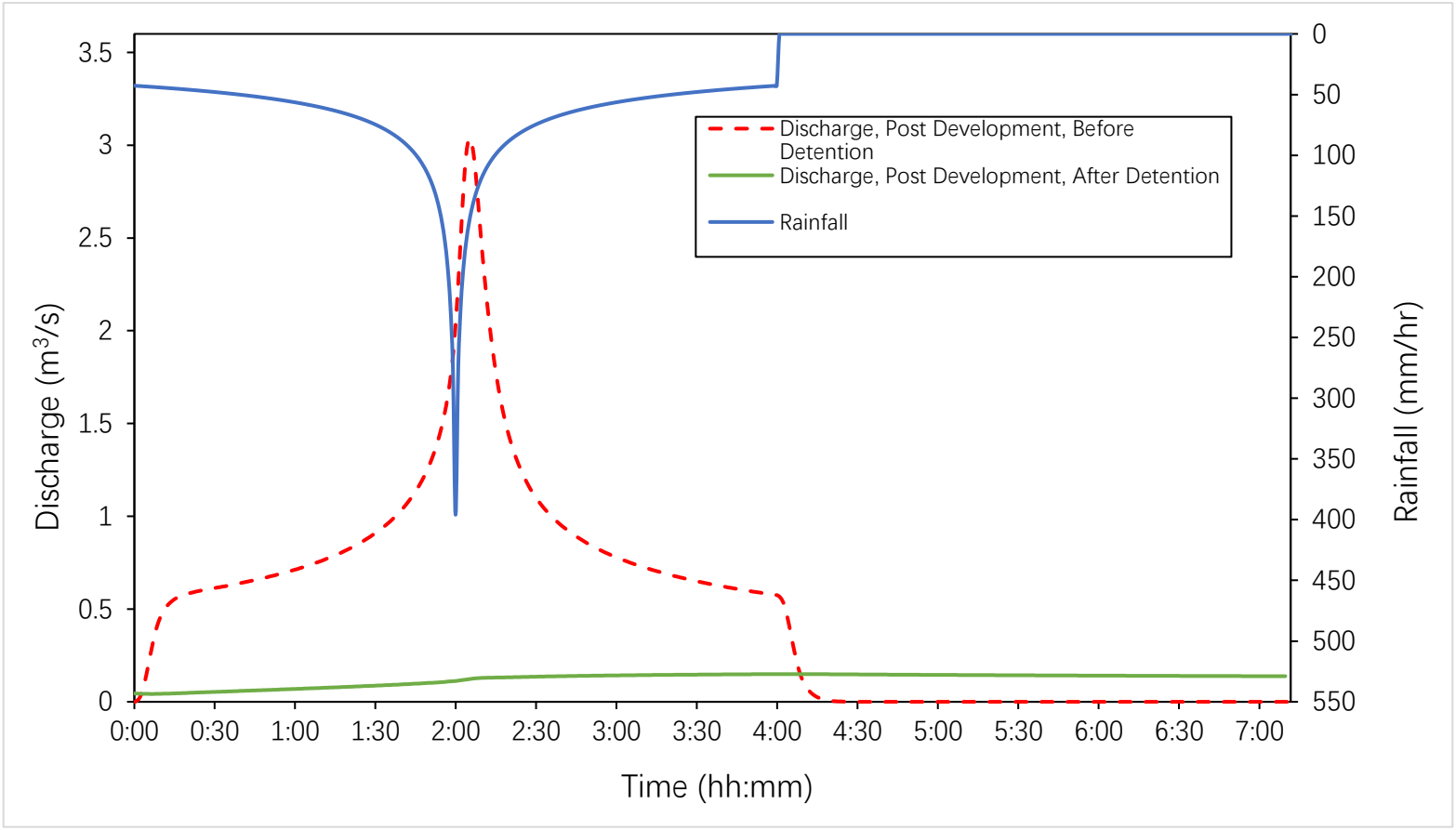
Hydrograph of Wetland Restoration Area

2yr Rainstorm Event, AMC3, RF=1.0



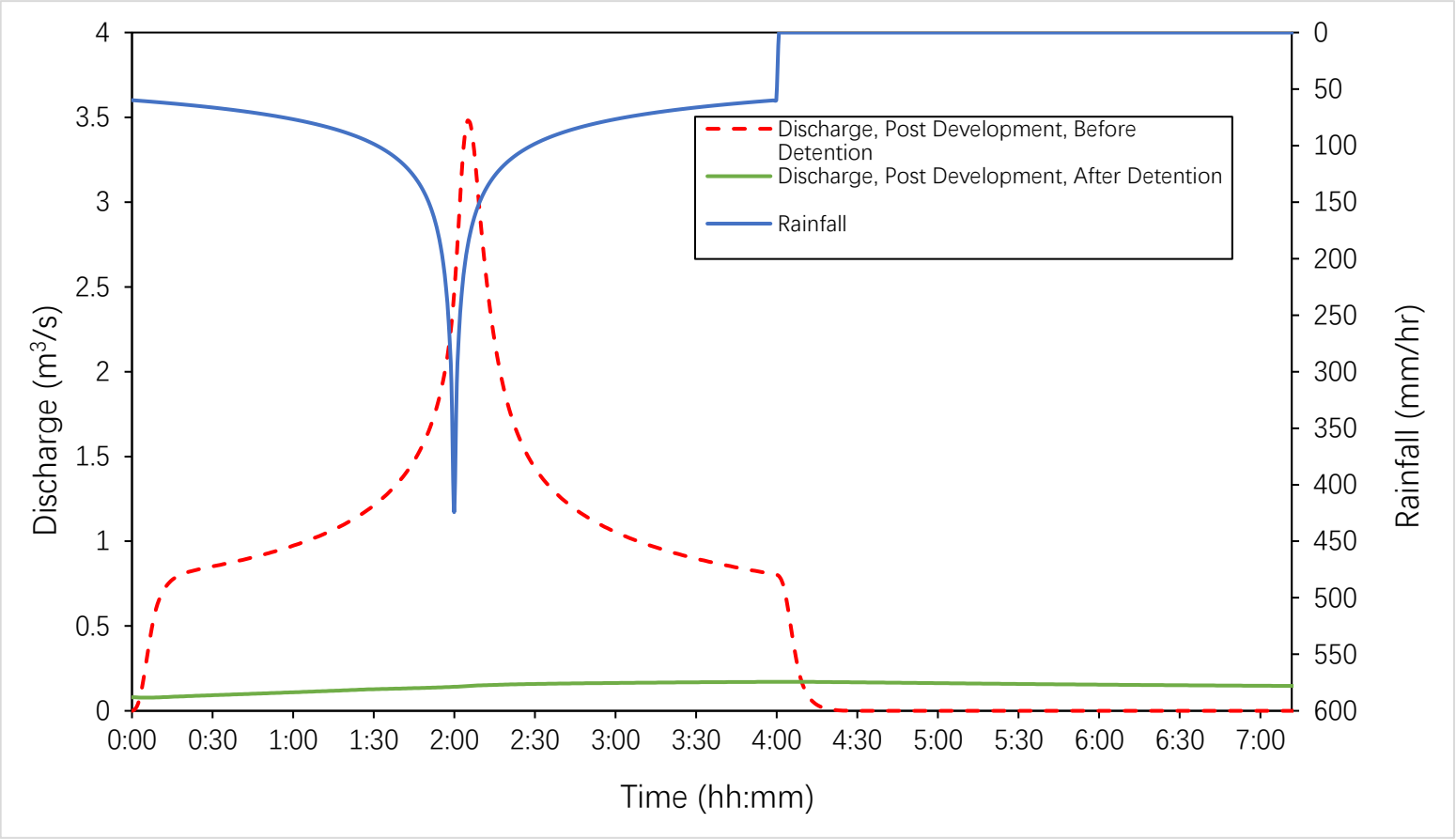
Hydrograph of Wetland Restoration Area

10yr Rainstorm Event, AMC3, RF=1.0



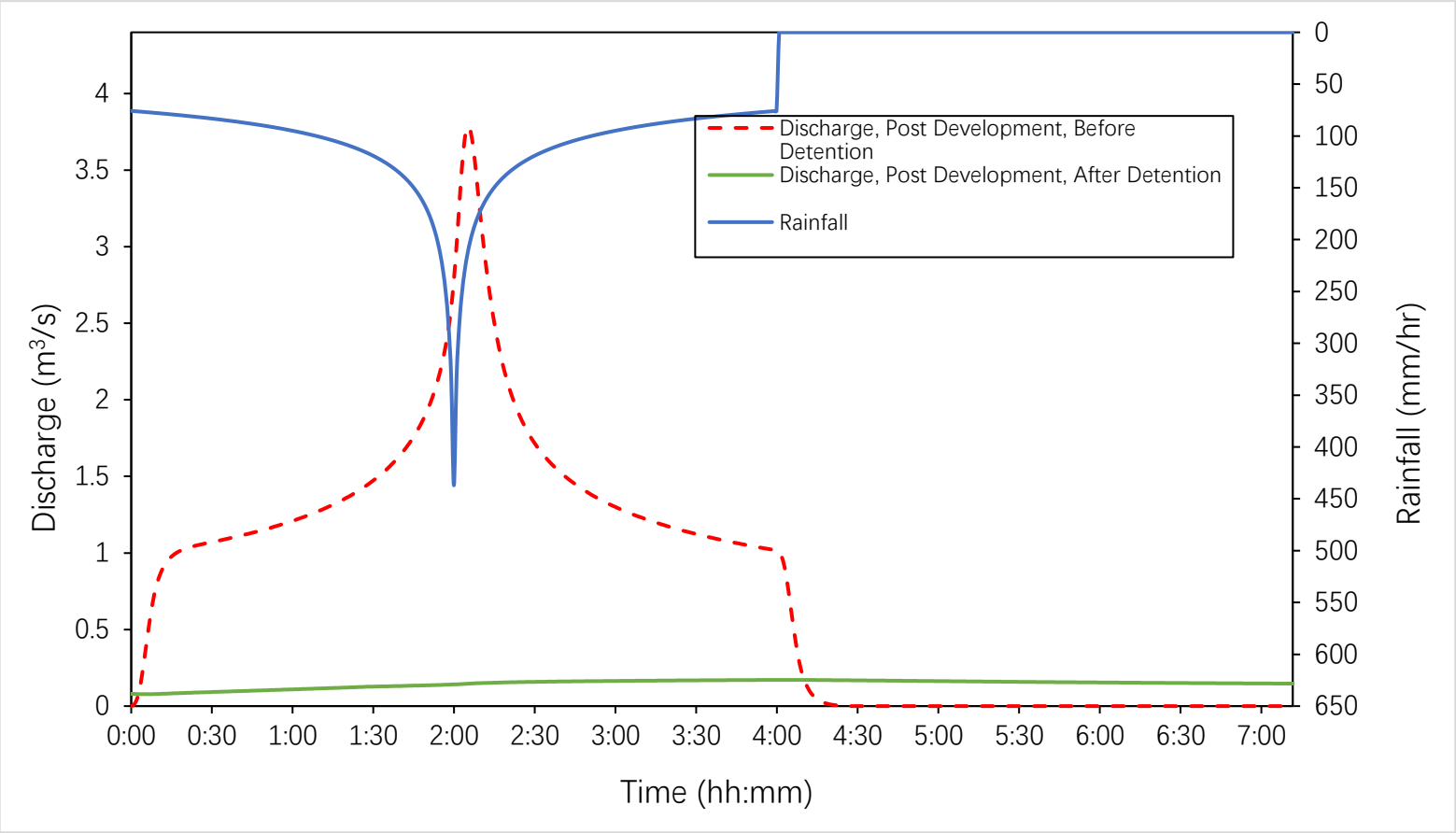
Hydrograph of Wetland Restoration Area

50yr Rainstorm Event, AMC3, RF=1.0



Hydrograph of Wetland Restoration Area

200yr Rainstorm Event, AMC3, RF=1.0

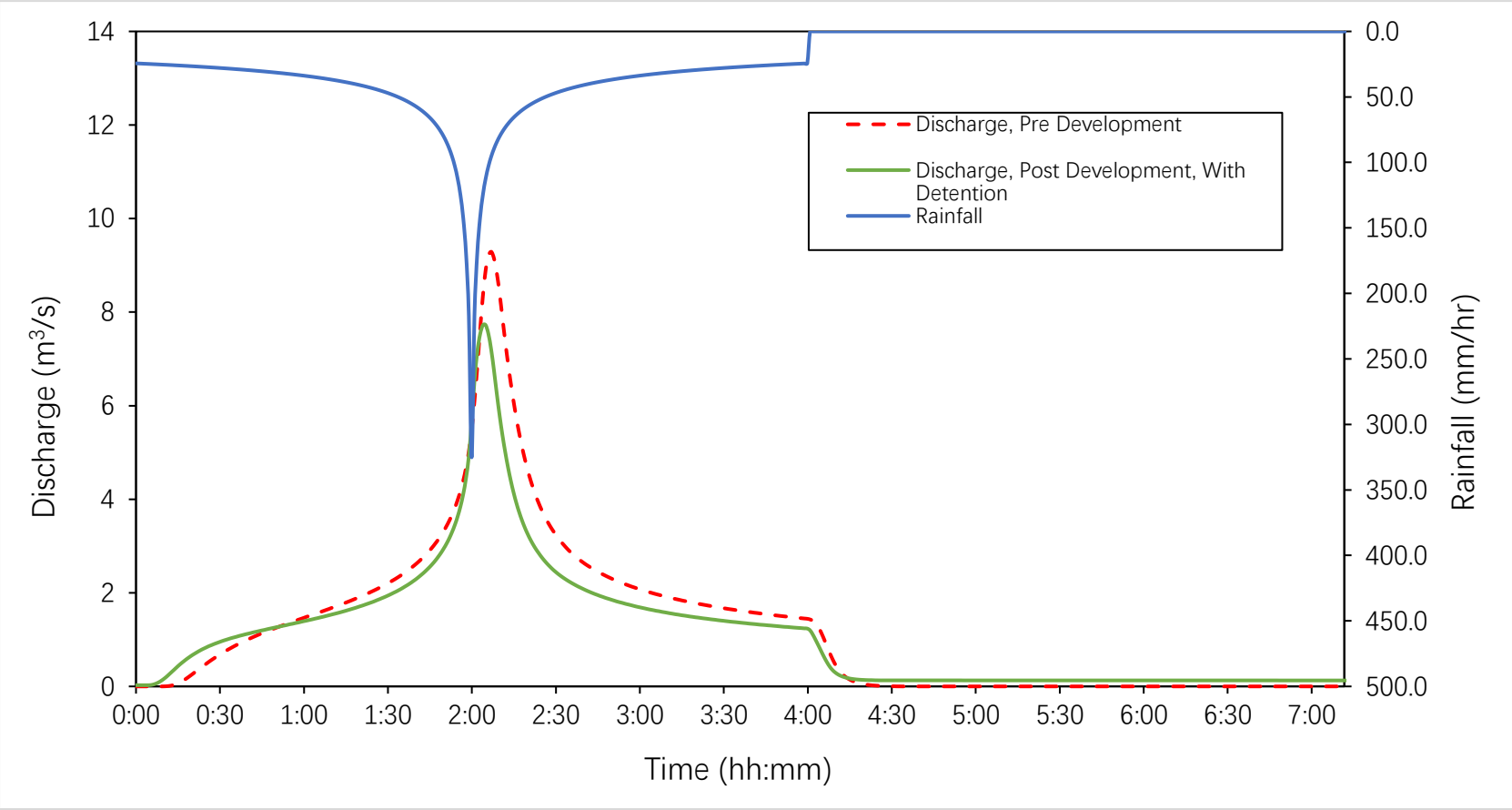


Appendix H

Hydrograph of the Proposed Development

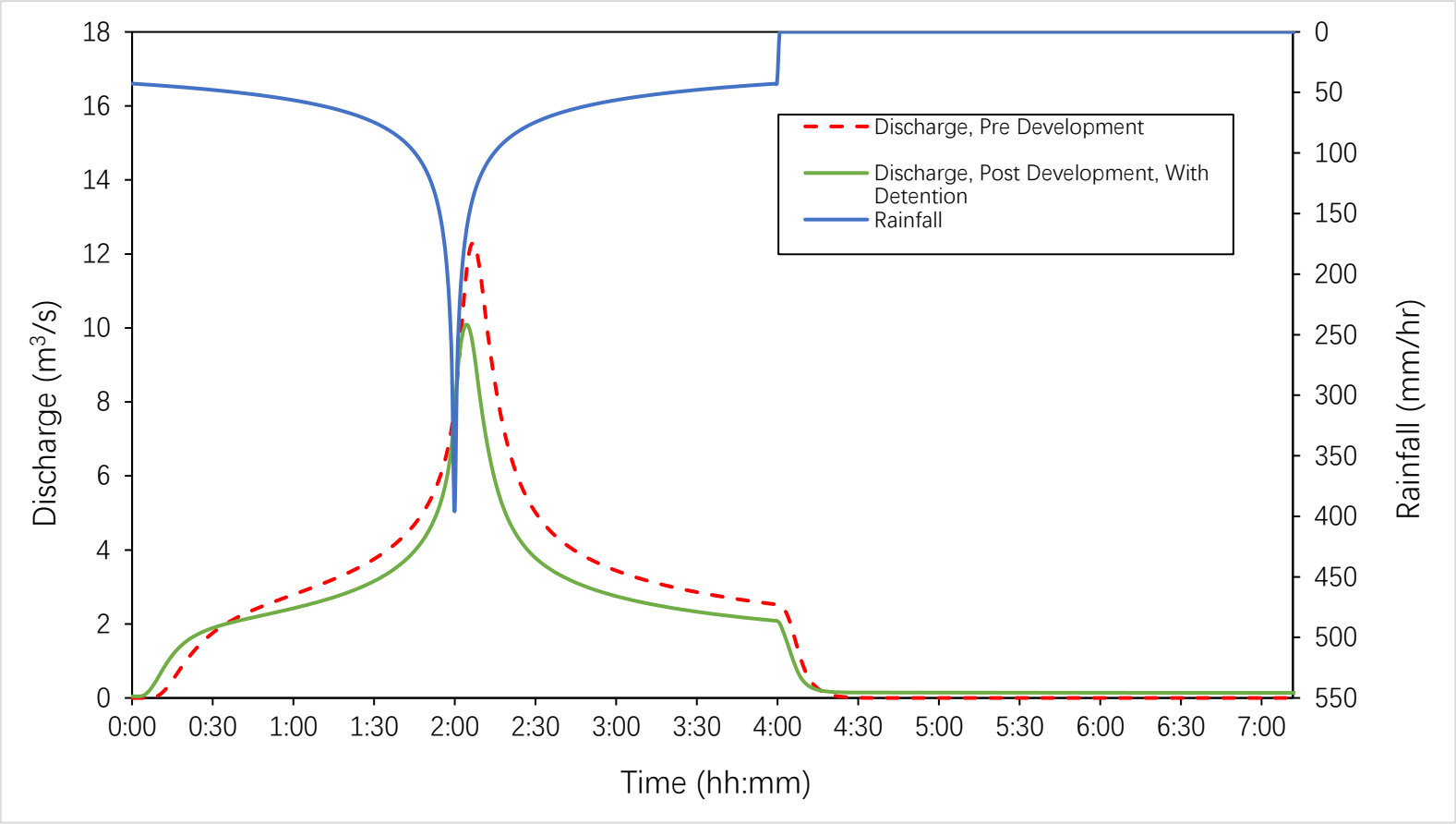
Hydrograph of Proposed Development

2yr Rainstorm Event, AMC3, RF=1.0



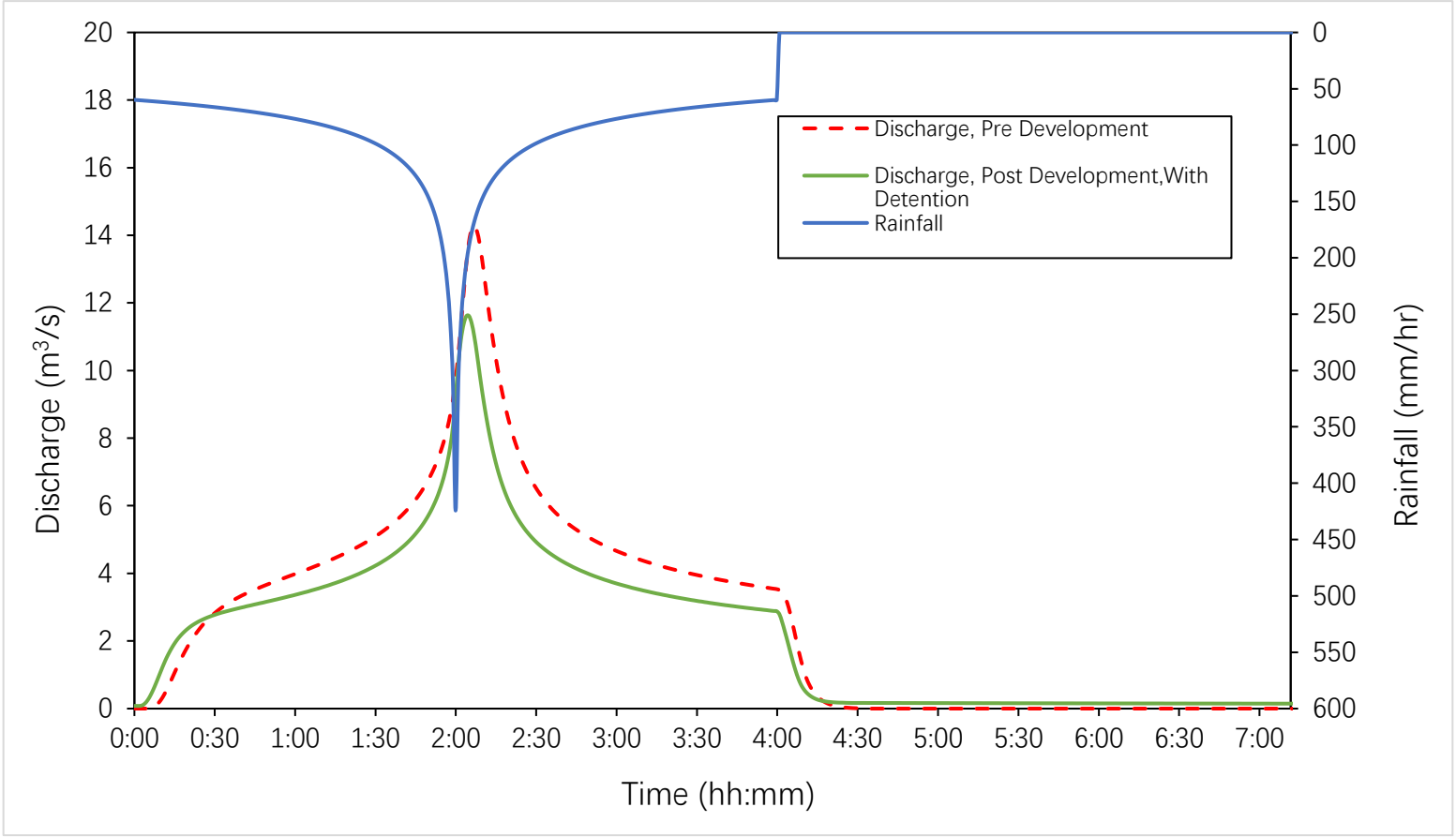
Hydrograph of Proposed Development

10yr Rainstorm Event, AMC3, RF=1.0



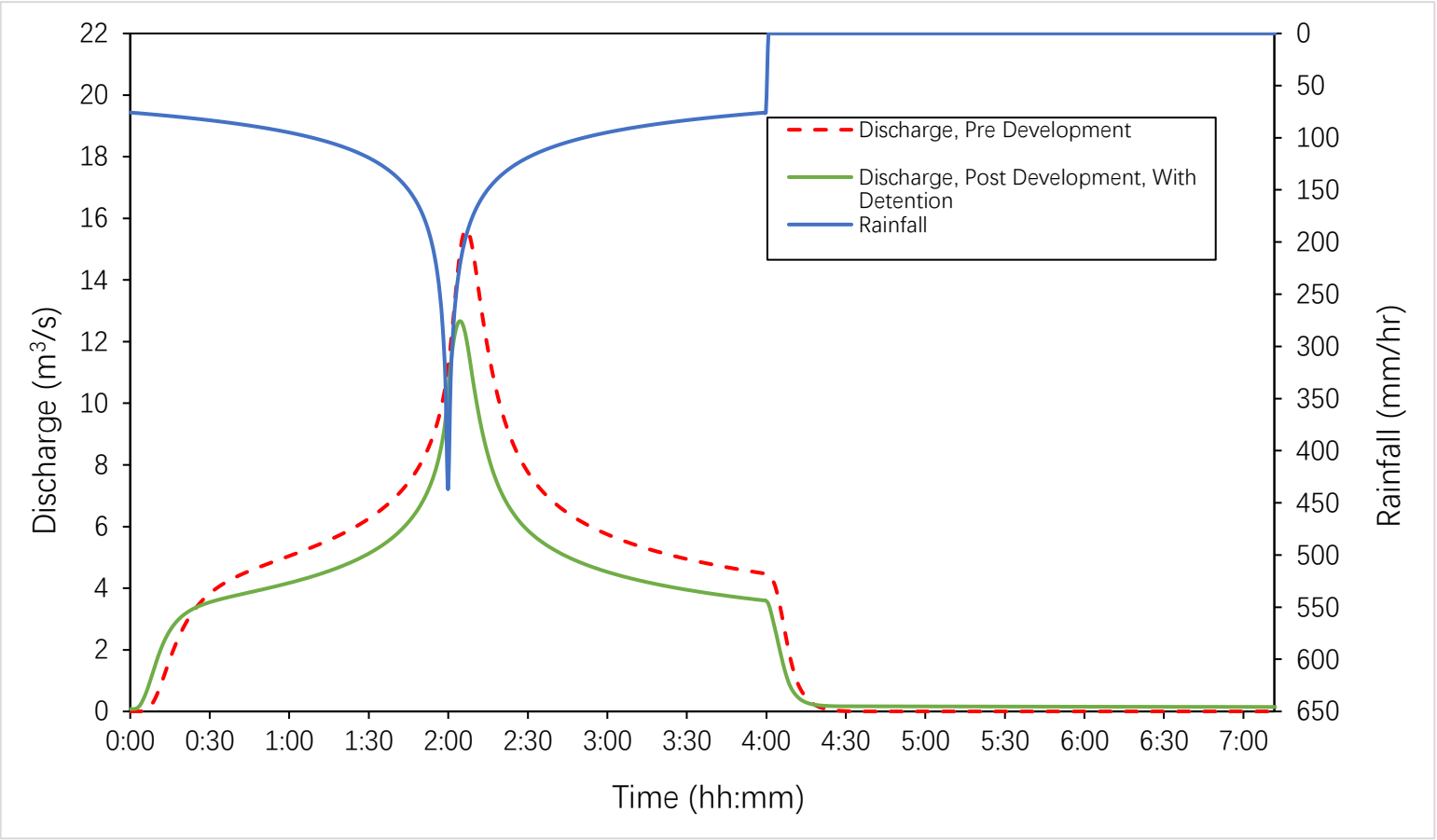
Hydrograph of Proposed Development

50yr Rainstorm Event, AMC3, RF=1.0



Hydrograph of Proposed Development

200yr Rainstorm Event, AMC3, RF=1.0



Appendix I

Summary of Hydrodynamic Modelling Results

(AMC3, Scenario C)

Pre-Development (AMC3)								
River Chainage/ Max Water Level (m)	2c (mPD)	Freeboard for 2c(m)	10c (mPD)	Freeboard for 10c(m)	50c (mPD)	Freeboard for 50c(m)	200c (mPD)	Freeboard for 200c(m)
MAI PO 0	3.568	4.572	3.742	4.398	3.835	4.305	3.890	4.250
MAI PO 490	3.562	4.578	3.738	4.402	3.830	4.310	3.883	4.257
MAI PO 490	3.562	4.578	3.738	4.402	3.830	4.310	3.883	4.257
MAI PO 690	3.562	4.578	3.734	4.406	3.827	4.313	3.880	4.260
MAI PO 690	3.562	4.578	3.734	4.406	3.827	4.313	3.880	4.260
MAI PO 980	3.556	4.584	3.730	4.410	3.822	4.318	3.875	4.265
MAI PO 980	3.556	4.584	3.730	4.410	3.822	4.318	3.875	4.265
MAI PO 1150	3.522	4.618	3.716	4.424	3.812	4.328	3.865	4.275
MAI PO 1150	3.522	4.618	3.716	4.424	3.812	4.328	3.865	4.275
MAI PO 1620	3.280	4.860	3.687	4.453	3.809	4.331	3.867	4.273
MAI PO 1630	3.039	5.101	3.444	4.696	3.725	4.415	3.818	4.322
MAI PO 1630	3.039	5.101	3.444	4.696	3.725	4.415	3.818	4.322
MAI PO 1880	2.736	5.404	3.306	4.834	3.656	4.484	3.756	4.384
MAI PO 1180	2.736	5.404	3.306	4.834	3.656	4.484	3.756	4.384
MAI PO 2125	2.366	5.774	3.098	5.042	3.396	4.744	3.400	4.740

Post-Development (AMC3)								
River Chainage/ Max Water Level (m)	2c (mPD)	Freeboard for 2c (m)	10c (mPD)	Freeboard for 10c(m)	50c (mPD)	Freeboard for 50c(m)	200c (mPD)	Freeboard for 200c(m)
MAI PO 0	3.546	4.594	3.742	4.398	3.834	4.306	3.932	4.208
MAI PO 274	3.546	4.594	3.732	4.408	3.833	4.307	3.913	4.227
MAI PO 274	3.546	4.594	3.732	4.408	3.833	4.307	3.913	4.227
MAI PO 336	3.545	4.595	3.733	4.407	3.832	4.308	3.912	4.228
MAI PO 336	3.545	4.595	3.733	4.407	3.832	4.308	3.912	4.228
MAI PO 355	3.545	4.595	3.733	4.407	3.832	4.308	3.911	4.229
MAI PO 355	3.545	4.595	3.733	4.407	3.832	4.308	3.911	4.229
MAI PO 690	3.543	4.597	3.725	4.415	3.825	4.315	3.881	4.259
MAI PO 690	3.543	4.597	3.725	4.415	3.825	4.315	3.881	4.259
MAI PO 980	3.535	4.605	3.721	4.419	3.821	4.319	3.875	4.265
MAI PO 980	3.535	4.605	3.721	4.419	3.821	4.319	3.875	4.265
MAI PO 1150	3.423	4.717	3.706	4.434	3.810	4.330	3.863	4.277
MAI PO 1150	3.423	4.717	3.706	4.434	3.810	4.330	3.863	4.277
MAI PO 1620	3.295	4.845	3.675	4.465	3.808	4.332	3.865	4.275
MAI PO 1630	3.047	5.093	3.429	4.711	3.722	4.418	3.814	4.326
MAI PO 1630	3.047	5.093	3.429	4.711	3.722	4.418	3.814	4.326
MAI PO 1880	2.744	5.396	3.286	4.854	3.650	4.490	3.753	4.387
MAI PO 1880	2.744	5.396	3.286	4.854	3.650	4.490	3.753	4.387
MAI PO 2125	2.366	5.774	3.098	5.042	3.396	4.744	3.400	4.740

Note:

1) The Lowest Levee Level from River Chainage from MAI PO 0 to MAIPO 2125 is 8.14mPD.
2) Freeboard = The Lowest Levee Level - Max Water Level

Appendix J

Hydraulic Analysis of the Proposed Drainage Pipe Network

Hydraulic Analysis of the Proposed Drainage Pipe Network at

Mai Po 355 (WSW_PIPE01), the location is shown in Figure 6

Extracted from MIKE11 model

Freeboard of Drainage Pipe at Mai Po 355 (WSW_PIPE01 554)

Design ARI Events	Max water level (mPD)	Freeboard (m)
2A	3.498	3.302
2C	3.545	3.255
10A	3.682	3.118
10B	3.710	3.090
10C	3.733	3.067
50A	3.771	3.029
50B	3.938	2.862
50C	3.832	2.968
200A	3.841	2.959
200B	4.147	2.653
200C	3.912	2.888

Note:

1) The average ground level of the drainage manhole is approximately 6.8mPD.

2) Freeboard = Ground Level - Max Water Level

Appendix K

Hydraulic Analysis of the Proposed
3.5m(W) x 2.5m(H) Box Culvert

Hydraulic Analysis of the Proposed 3.5m(W) × 2.5m(H) Box Culvert at MAI PO 274 (WSW_BC01 283), the location is shown in Figure 6

Extracted from MIKE11 model

Freeboard of Box Culvert at MAI PO 274 (WSW_BC01 283)

Design ARI Events	Max water level (mPD)	Freeboard (m)
2A	3.498	3.302
2C	3.546	3.254
10A	3.682	3.118
10B	3.710	3.090
10C	3.732	3.068
50A	3.770	3.030
50B	3.939	2.861
50C	3.833	2.967
200A	3.842	2.958
200B	4.146	2.654
200C	3.913	2.887

Note:

1) The average ground level of the box culvert is approximately 6.8mPD.

2) Freeboard = Ground Level - Max Water Level

Appendix L

Current Spot Level

823400.000 E
823600.000 E
823800.000 E
824000.000 E
839000.000 N
838800.000 N
838600.000 N
Open Storage
Track
CEDAR PATH
CHERRY PATH
LOTUS PATH
KAPOK PATH
CAMELIA PATH
Westwood
WO SHANG WAI
Playground
VENTURA AVENUE
SANTA MONICA AVENUE
MARIN AVENUE
MONTEREY AVENUE
NAPA AVENUE
VICTORIANA AVENUE
CORONADO AVENUE
CARMEL AVENUE
SAN DIEGO AVENUE
PALM CANYON DRIVE
NARCISSUS PATH
BANYAN PATH
SUNFLOWER PATH