Appendix 6

Sewerage Impact Assessment

Proposed Residential Re-development

at

No. 66 Deep Water Bay Road

Hong Kong

R.B.L. 573

Sewerage

Impact Assessment Report

Kwong Wah Consultants Ltd.

Issue & Revision Record Sheet

Client Name	:	BLUE WATER GROUP MANAGEMENT LIMITED
Project Title	:	Proposed Residential Re-development at No. 66 Deep Water Bay Road, R.B.L. 573
Report Title	:	Sewerage Impact Assessment Report
Report Revision Number	:	Rev.1
Date	:	25 June 2025

Rev	Date	Originator	Checker	Approver	Description
0	16 April 25	N. Chow	W. Mak	W. Mak	1st Issue
1	25 June 25	N. Chow	W. Mak	W. Mak	1st Issue

Unit 1802, 18/F CFC Tower
28 Mody Road
Tsimshatsui
Hong Kong

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Fax 2581 2113

CONTENT **PAGE**

Appendix

I. Site Location Plan

II. BD's Drainage Record Plan

III. DSD's Record Plan

IV. BD's GBP Record Plan

V. Proposed Re-development Plan

VI. Assessment of Existing Sewer Capacity (Hydraulic Calculation)

1) Introduction

1.1 The subject site at no. 66 Deep Water Bay Road was proposed to re-develop into 2 nos. 3-storey residential houses with 1-storey basement for common plantrooms and car parking facility. The total site area was 2,043.869m^2. **(refer Appendix I - Site Location Plan)**

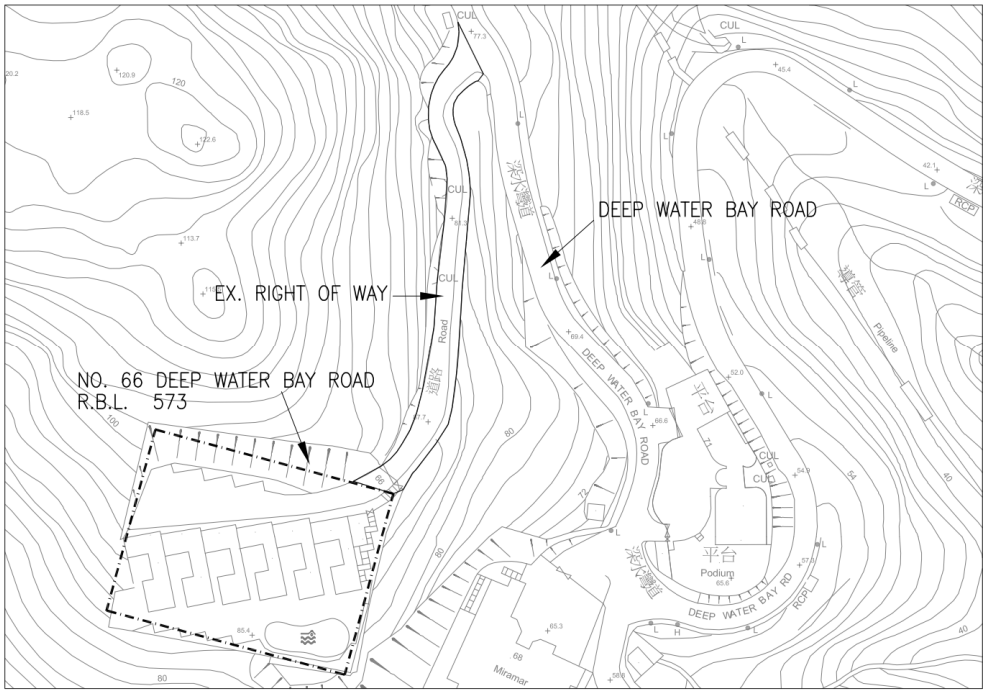


Fig. 1 – Site Location Plan

2) Objective

2.1 This assessment is to evaluate the potential impact on the existing sewerage facility that may arise from the proposed re-development, and investigate the adequacy of the capacity of the existing sewer connecting the site.

3) Methodology

3.1 The sewage flow generated from the proposed development was estimated in accordance with the Environmental Protection Department's Report No. EPD/TP 1/05 – "Guideline for Estimating Sewage Flows for Sewage Infrastructure Planning" (GESF).

3) Methodology (Cont'd)

3.2 Sewage flows generated from the proposed development was assessed to identify any sewers with inadequate capacity. The parameter and design assumption used in the assessment would be presented in the corresponding section.

3.3 The flow capacity of the sewage pipe would be assessed by Colebrook-White Equation and Ks of 3mm was adopted.

4) Existing Sewerage system

4.1 There are 6 nos. of 4-storey detached single family houses, 1 watchman quarter and 1 swimming pool in the existing development.

4.2 The subject site was provided with permanent sewerage facilities to government sewer. According to drainage record plan from Building Department **(Appendix II – BD's Drainage Record Plan)** and the site survey result, there was an existing 150mm diameter underground sewage pipe and manholes running from the No. 66 Deep Water Bay Road (ie. The Site) to the Government sewer connection point FTH7000464 and FMH 7017092 along with the access road to the site (ie. Right of Way) **(Appendix III – DSD's Record Plan)**. That existing DN150 sewer was serving No. 66 Deep Water Road exclusively.

4.3 The permanent sewerage facilities on the access road to government sewer was built in year 1998 under A&A works (BD's ref. no. 4/3018/87).

5) Sewerage Impact Assessment

5.1 Flow Discharge in Ex. Dia.150 Sewer from the Site along Access Road

According to the GBP Record Plan **(Appendix IV – GBP Record Plan)**, accommodations and estimated occupancy in each house was summarized below:

Floor	Accommodation	Estimated Occupancy (persons)
Level 3	Bedroom (Left)	2
	Bedroom (Right)	2
Level 2	Master Bedroom	2
Level 1	Servant	2
	Total of Each House:	8
	Total of 6 Houses:	8 x 6 = 48

Occupancy of Watctman Quarter 1

Total Population of the Development 49 person

The design parameters for the Sewage Flow

Usage	Unit	Flow Parameter (m^3/ day)
Residential (R3)	Person	0.37

Peaking factor to be applied in the pipe capacity assessment would be 8 (for population 1,000 – 5,000) with inclusion of stormwater allowance.

The average flow calculation for the residential:

Total Population = 49 person

Average Flow: $= \frac{49 \times 0.37 \times 1000}{24 \times 3600}$

= 0.210 L/s

5) Sewerage Impact Assessment (Cont'd)

5.1 Flow Discharge in Ex. Dia.150 Sewer from the Site along Access Road (Cont'd)

The average flow calculation for the Pool Filtration System backwash:

Pool Area	=	106.72 m^2
Pool Water Depth	=	1.75 m (average)
Pool Capacity	=	186.76 m^3
Turn-over Rate	=	6 hours
Flowrate	=	8.65 L/s

According to Section 5.1, CoP of The Management and Treatment of Swimming Pool Water (August 2019) - Pool Water Treatment Advisory Group (PWTAG), flow velocity of filter medium shall be at 10-25 m/h.

Selection of Sand Filter:

Required Filter Area	=	8.65 x 1000 / (25 / 3600)
	=	1.2456 m^2
No. of Sand Filter	=	2 no.
Req. Area of each Filter	=	0.6228 m^2
Diameter of each Filter	=	900 mm
Area of each Filter	=	$(0.9/2)^2$ x 3.14
	=	0.6359 m^2 (> 0.6228m^2 , OK)

Calculation of Backwash:

Assumed the backwash operation of each Sand Filter to be carried out sequentially.

According to Section 5.4 of the CoP, backwash velocity on filter medium shall be 30m/h.

Backwash Flowrate	=	(0.6359 x 30 / 3600) x 1000
	=	5.30 L/s

Total Flow from the Existing Development:

	Average Flow (L/s)	Peaking Factor	Peak Flowrate (L/s)
Residential	0.21	8*	1.68
Pool System Backwash			5.30
		Total:	6.98

** For population < 1,000 persons, including stormwater allowance*

5) Sewerage Impact Assessment (Cont'd)

5.2 Future Flow Discharge in Ex. Dia.150 Sewer for the Proposed Re-development

According to the proposed Re-development Plan **(Appendix V – Proposed Re-development Plan)**, accommodations and estimated occupancy in the houses was summarized below:

Floor	Accommodation	Estimated Occupancy (persons)
House 1		
2/F	Master Bedroom	2
1/F	Bedroom 1	2
	Bedroom 2	2
	Staff/ Back of House	8
House 2		
1/F	Master Bedroom	2
Common Area		
G/F	Caretake Quarter	2
	Total of 6 Houses:	18

Total Population of the Re-Development **18 person**

The average flow calculation for the residential (Re-development):

Total Population = 18 person

Average Flow: $= \frac{18 \times 0.37 \times 1000}{24 \times 3600}$

= 0.077 L/s

The average flow calculation for the Pool Filtration System backwash:

Pool Area = 88.8 m^2

Pool Water Depth = 1.5 m (average)

Pool Capacity = 133.2 m^3

Turn-over Rate = 6 hours

Flowrate = 6.17 L/s

5) Sewerage Impact Assessment (Cont'd)

5.2 Future Flow Discharge in Ex. Dia.150 Sewer for the Proposed Re-development (Cont'd)

According to Section 5.1, CoP of The Management and Treatment of Swimming Pool Water (August 2019) - Pool Water Treatment Advisory Group (PWTAG), flow velocity of filter medium shall be at 10-25 m/h.

Selection of Sand Filter:

Required Filter Area = 6.17 x 1000 / (25 / 3600)
= 0.8885 m^2

No. of Sand Filter = 2 no.

Req. Area of each Filter = 0.4442 m^2

Diameter of each Filter = 900 mm

rea of each Filter = $(0.9/2)^2$ x 3.14
= 0.6359 m^2 (> 0.4442 m^2 , OK)

Calculation of Backwash:

Assumed the backwash operation of each Sand Filter to be carried out sequentially.

According to Section 5.4 of the CoP, backwash velocity on filter medium shall be 30m/h.

Backwash Flowrate = (0.6359 x 30 / 3600) x 1000
= 5.30 L/s

Total Flow from the Proposed Re-Development:

	Average Flow (L/s)	Peaking Factor	Peak Flowrate (L/s)
Residential	0.077	8*	0.616
Pool System Backwash			5.30
		Total:	5.916

** For population < 1,000 persons, including stormwater allowance*

5) Sewerage Impact Assessment (Cont'd)

5.3 Comparison of Sewerage Discharge Flowrate

The sewerage discharge flowrate from the site before and after the re-development are summarized below:

	Existing	Proposed Re-development
Residential	1.68 L/s	0.616 L/s
Pool System Backwash	5.30 L/s	5.30 L/s
Total	6.98 L/s	5.916 L/s
% difference	-	- 15.2 %

Although the development scale of the proposed re-development is similar the existing, the population will be substantially reduced because only two buildings are to be developed. The size of the swimming pool will also be reduced by 8.3%.

Based on the estimation, the overall sewerage discharge from the site after the proposed re-development will be reduced by 15.2%. The existing sewerage facilities will not be adversely affected.

6) Hydraulic Calculation for the Existing Dia. 150mm Sewer

Assessment of the discharge capacity of the existing dia.150mm sewer along the access road against the Existing Condition and Future Condition after Re-development was attached in **Appendix VI.**

The hydraulic calculation suggested that the existing dia. 150mm Sewer has sufficient capacity to handle the sewerage discharge from the site before and after the re-development.

7) Conclusion

7.1 The proposed re-development will have reduced population and the size of swimming pool. The overall sewerage discharge from the site after the re-development will be reduced by 15.2%.

7.2 The existing permanent sewerage facilities, comprising dia.150mm underground vitrified clay pipe and manholes, to the government sewer at Deep Water Bay Road has sufficient handling capacity for the sewerage discharge from the site before and after the re-development.

7.3 Based on the above, it was concluded that the proposed re-development will have no adverse effect to the sewerage facility at the vicinity.

End of Report

Appendix I - Site Location Plan

DEEP WATER BAY ROAD

EX. RIGHT OF WAY

NO. 66 DEEP WATER BAY ROAD
R.B.L. 573

SITE LOCATION PLAN
SCALE 1:500@A3

Appendix II - BD's Drainage Record Plan

EX. GOV. MANHOLE
FMH7017092

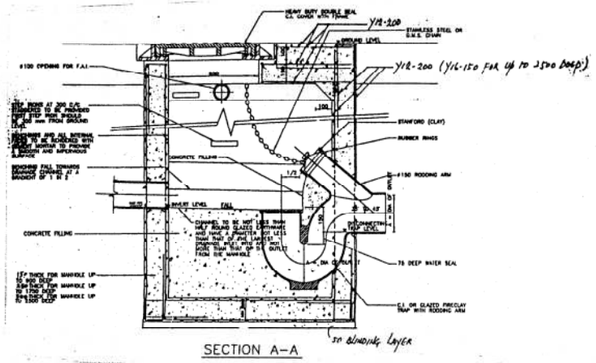
EX. GOV.
CONNECTION POINT
FTH7000464

ACCESS ROAD
(RIGHT OF WAT)

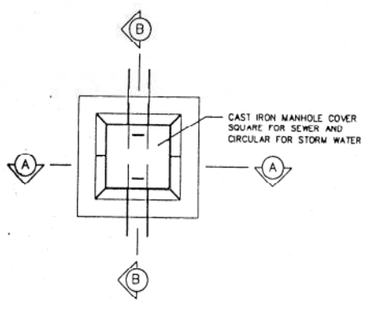
LOT BOUNDARY
66 Deep Water Bay Road)

EX. SEWERAGE
FACILITIES
(DIA. 150 V.C. PIPE)

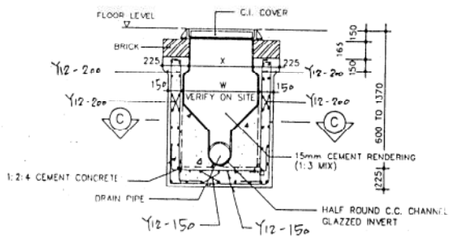
SCALE = 1:200



SECTION A–A



PLAN



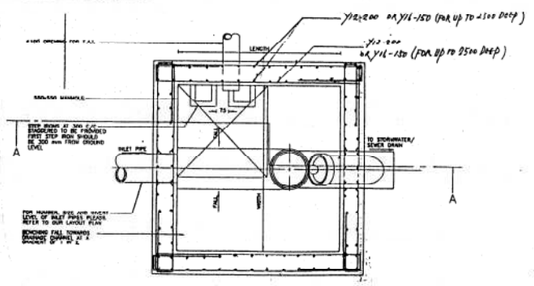
SECTION A–A

LEGEND :

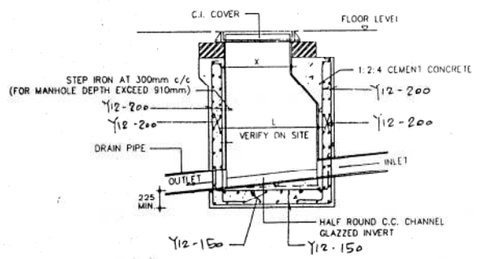
- SUBMERSIBLE PUMP
- GATG VALVE
- CHECK VALVE
- D.I. — DUCTILE IRON PIPE AND FITTING TO BS4772 CLASS K9 COLD BITUMEN COATED EXTERNALLY AND INTERNALLY TO BS 3416 TYPE (LB) WITH TYTON OR FLANGE JOINT.
- V.P. — VENT PIPE - GALVANISED PIPE AND FITTING TO BS1387, CLASS B
- VITRIFIED CLAY PIPE TO GOVERNMENT STANDARD (UNDERGROUND PIPE BEYOND LAST MANHOLE)
- ASMH □ PROPOSED ADDITIONAL SOIL & WASTE MANHOLE

NOTE :

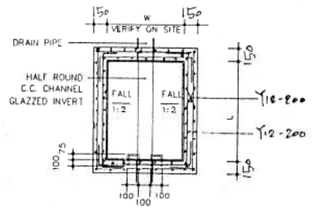
1. CLEANING EYES SHALL BE PROVIDED TO ALL JUNCTIONS & BENDS OF PIPES EXCEPT VENT PIPE
2. CONCRETE TO BE GRADE 25/20 MIX. EXCEPT OTHERWISE STATED.
3. MINIMUM COVER TO ALL STEEL : a) WALL = 60 (CONTACT WITH EARTH)
   = 40 (EXPOSED TO WEATHERING)
   b) TOP SLAB = 40
   c) BASE SLAB = 60
4. LAP LENGTH OF STEEL - TENSION LAP SHALL BE 46 D (D- DIAMETER OF BAR)
5. CHARACTERISTIC STRENGTH OF MATERIALS (STEEL COMPLYING TO CS2:1995)
   a) MILD STEEL REINFORCEMENT (NOTATION - R) – 250 mPa
   b) HIGH YIELD STEEL REINFORCEMENT (NOTATION - Y) – DIA. 6mm ~ 16mm – 460 mPa



TERMINAL MANHOLE PLAN
(PIPE SIZE UP TO 300mm)



SECTION B–B
STANDARD MANHOLE



SECTIONAL PLAN C–C

(DEPTH UP TO 1370mm)

STANDARD MANHOLE

NOTE : X=475mm FOR DEPTH OF MANHOLE UNDER 900mm (SEWER AND STORM WATER)
X=525mm FOR DEPTH OF MANHOLE 900mm OR OVER 900 (SEWER ONLY)
X=575mm FOR DEPTH OF MANHOLE 900mm OR OVER 900 (STROM WATER ONLY)
L=1500mm & W=1350mm FOR NOS. OF DRAIN PIPE RUN TO M.H. IS > 3
L=1050mm & W=800mm FOR NOS. OF DRAIN PIPE RUN TO M.H. IS < 3

B D D REF NO. 4/3018/87

SUBMISSION	DATE
1	29-4-97
2	4-9-97
3	27-3-98

Plan Approved
CHEUNG Kwok-man
Chief Building Surveyor
for BUILDING AUTHORITY
23 APR 1998

L. Y. WONG · ARCHITECT
M. ARCH RIBA HKIA AP RAIA

REV.	DATE	DESCRIPTION
B	20/3/98	AMENDED FOR SITE CONSTRAINTS
A	2/9/97	REVISED AS PER BD'S COMMENT DATED 22/8/97

REVISION

ALL MEASUREMENT MUST BE CHECKED AT THE SITE DO NOT SCALE DRAWINGS FIGURED DIMENSIONS TO BE OBSERVED READ THIS DRAWING IN CONNECTION WITH GENERAL ARCHITECTURAL PLANS AND OTHER RELATED DOCUMENTS -- THE ARCHITECT TO BE NOTIFIED IMMEDIATELY OF ANY DISCREPANCY FOUND THEREIN. ALL COPY RIGHT TO BE RESERVED BY THE ARCHITECT

ARCHITECT
L Y WONG ASSOCIATES LTD
ARCHITECTS INTERIOR DESIGNERS
PROJECT MANAGEMANT CONSULTANTS
ROOM 1722, 17/F., LEIGHTON CENTRE,
77 LEIGHTON ROAD, CAUSEWAY BAY, H.K.
Tel: 2890 1505 Fax: 2577 5942

E & M CONSULTANT
滙智機電工程師
TALENT MECHANICAL & ELECTRICAL ENGINEERS
UNIT 1901-2, 19/F, EASTERN COMMERCIAL CENTRE,
393 - 407 HENNESSY ROAD, WANCHAI, HONG KONG.
Tel: 2838 9133 Fax: (852) 2836 0750

PROJECT

PROPOSED ALTERATION WORKS ON SOIL & WASTE DRAINAGE FOR RESIDENTIAL HOUSES AT 66 DEEP WATER BAY ROAD R.B.L. 573

TITLE

S & W LAYOUT FOR ACCESS ROAD AND MANHOLE DETAILS

SCALE	NIL	JOB NO.	9605
DATE	APRIL,1997	DRAWING NO.	REV.
DESIGNED BY	K.C.HO	DR-02	B
CHECKED BY	K.D.CHU		

Appendix III – DSD's Record Plan

DATE: 12/2/2025

PART OF DRAINAGE RECORD PLAN (1-SW-250-3)

SCALE 1:500

Drainage Services Department
Hong Kong & Islands

FOR INFORMATION ONLY

EX. GOVERNMENT MANHOLE
FMH-7017092

Access Road

Road

道路

Pipeline

導管

深水灣道

深水灣道66號

66 Deep Water Bay Road

DEEP WATER BAY ROAD

N

837000E

837100E

837125E

812100

812000

Appendix IV – BD's GBP Record Plan

BUILDINGS & LANDS DEPARTMENT

B.D.D. (B/S) 2/3018/8

F.S.D. REF. NO.

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WATCHMAN QUARTER ROOF PLAN

LEVEL 87.000 FLOOR PLAN

HOUSES LAYOUT PLAN

UNDER DECK SEWAGE TREATMENT PLANT / CENTRAL A/C PLANT ROOM LAYOUT PLAN

AMENDMENT

G. DELETE ENTRACE GATE, CHANGE PLANTER PATTERN. 30 APRIL 1990
REVISED R.C. WATER TANK FOR WATCHMAN QUARTER
F 30 DEC. '89
E 14 JUNE 89
D. 15. APRIL 89.

B. HUNG & ASSOCIATES
ARCHITECTS ENGINEERS
建洪基相師城
RM. 203 LUCKY BUILDING
39-41 WELLINGTON STREET HONGKONG
PHONE 5-265027
FACSIMILE 5-8450161

17 MAY 1990

Approved
D.M. CONNELL
PRO BUILDING AUTHORITY
15 JUN 1990

BENJAMIN T. HUNG
B. ARCH. (NSW) A.R.A.I.A. A.R.I.B.A.

PROJECT
HOUSES AT RBL NO. 573 DEEP WATER BAY ROAD HONG KONG.

DWG. TITLE
HOUSES LAYOUT PLAN

JOB NO. 131
DATE 10_3_89
SCALE 1:100
DRAWN YKC
DWG. NO. 1 G

BUILDINGS & LANDS DEPARTMENT
B.C.D.(B) 2/3018/87
B.S.D. REF. NO.

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PART PLAN FOR BLOCK 'A', 'B' AND 'C' ONLY

PART PLAN FOR BLOCK 'A', 'B' AND 'C' ONLY

SECTION G_G
PLAN REF. DWG. NO. 1

DETAIL B 1:20

SECTION H_H

DETAIL A 1:20

ELEVATION OF WATCHMAN QUARTER

SECTION D_D

SECTION E_E

SWIMMING POOL FLOOR PLAN
FINISH LEVEL
STRUC. LEVEL

CAR PARK FLOOR PLAN

LEVEL 1 FLOOR PLAN

LEVEL 2 FLOOR PLAN

LEVEL 3 FLOOR PLAN AND LOW LEVEL FLAT ROOF

UPPER ROOF PLAN

AMENDMENT

1. REVISED PLANTER AT OPEN COURT & SHOWER TRAY AT M.B.R. 30 APR'91 (30)
REVISED FAMILY RM. & M.B.M., B.M. FOR
H. 30 DEC. 89 BLOCK A, B & C.
G 10. OCT 89.
F. 24. AUG. 89

B. HUNG & ASSOCIATES
ARCHITECTS
ENGINEERS
建洪
基恒
師城
RM. 203 LUCKY BUILDING
39-41 WELLINGTON STREET HONGKONG
PHONE 5-269027
FACSIMILE 5-8450161

17 MAY 1990

BENJAMIN T. HUNG
B ARCH (NSW) A.R.A.I.A. A.R.I.B.A.

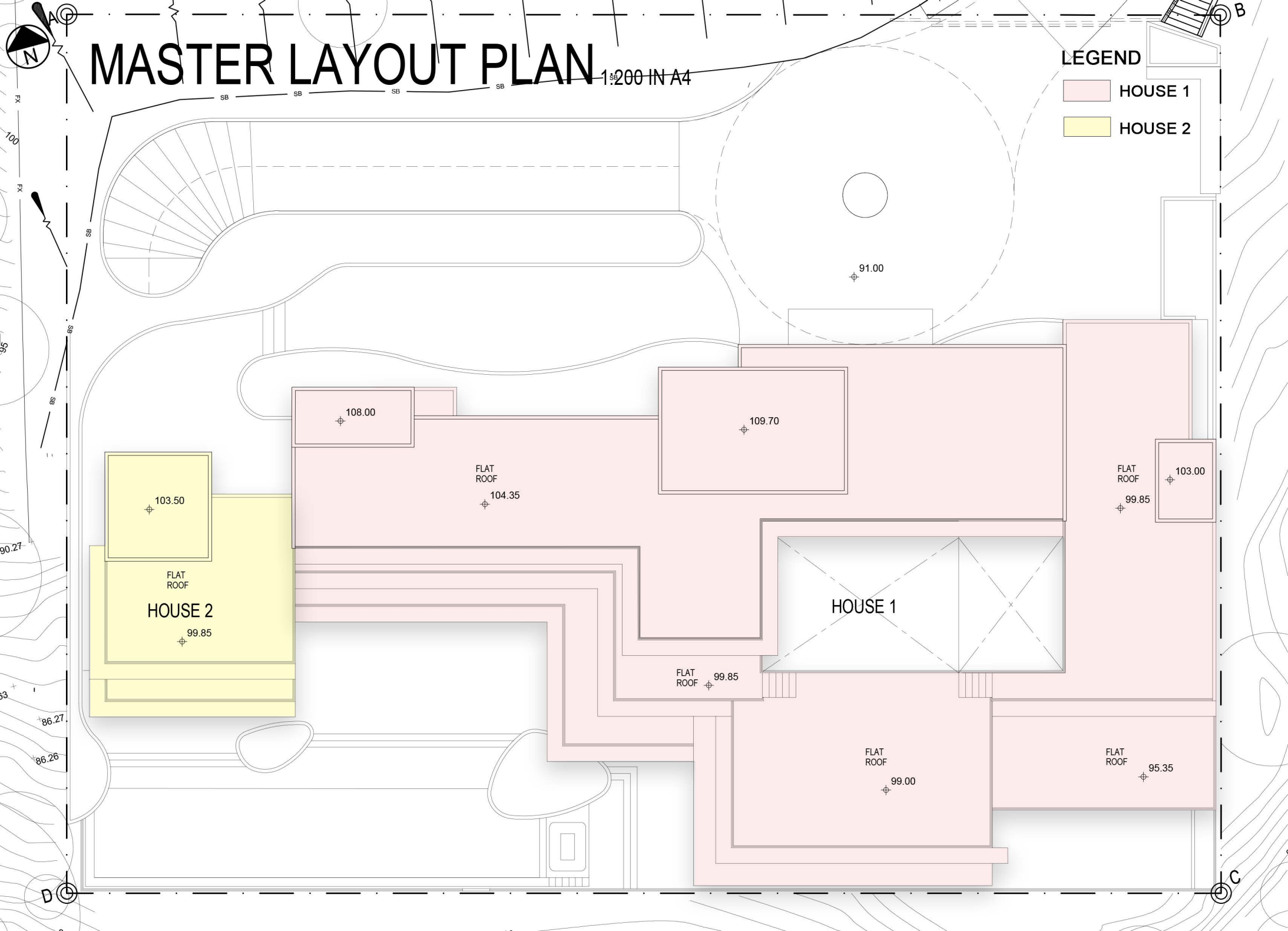
PROJECT
HOUSES AT RBL NO. 573
DEEP WATER BAY RD.
HONG KONG

DWG. TITLE
PLANS (TYPICAL BUILDING)

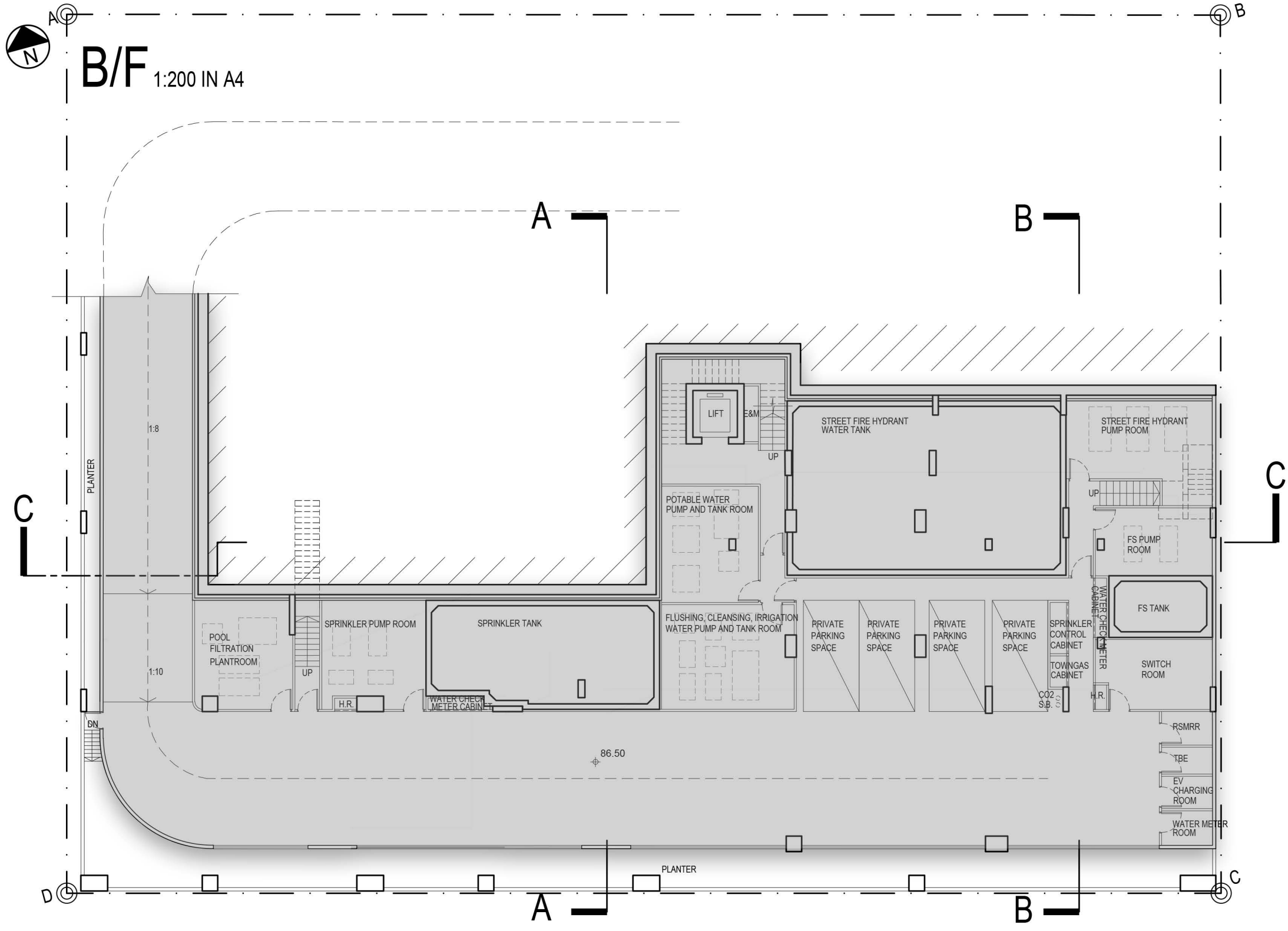
JOB NO. 731	DWG NO. 2 I
DATE 12.9.87	
SCALE 1:100	
DRAWN YKC	

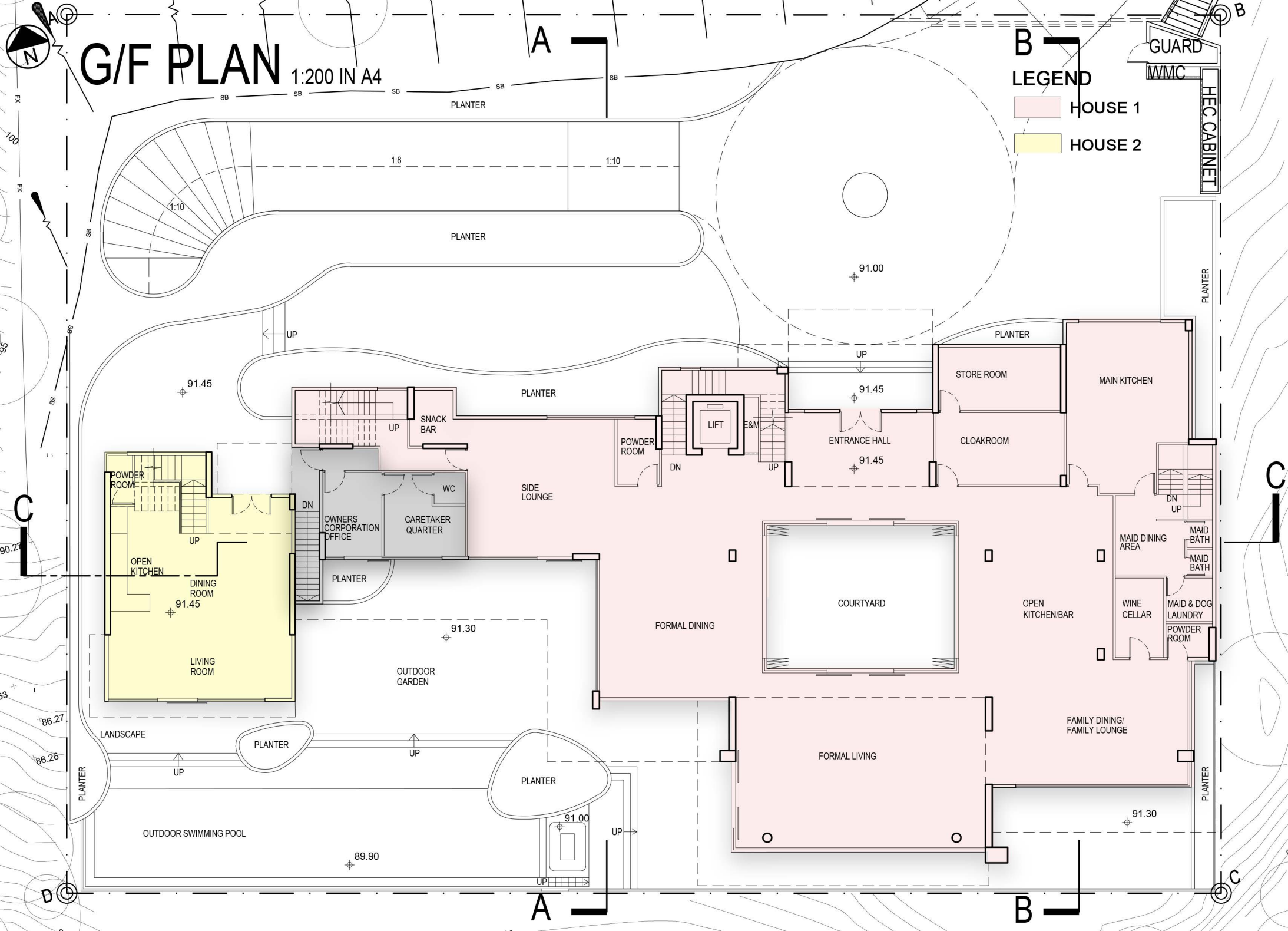
Appendix V – Proposed Re-development Plan

MASTER LAYOUT PLAN 1:200 IN A4



B/F 1:200 IN A4


A
B
C
D
N
LIFT
E&M
UP
STREET FIRE HYDRANT WATER TANK
STREET FIRE HYDRANT PUMP ROOM
POTABLE WATER PUMP AND TANK ROOM
FS PUMP ROOM
FS TANK
WATER CHECK METER CABINET
SWITCH ROOM
1:8
PLANTER
POOL FILTRATION PLANTROOM
1:10
SPRINKLER PUMP ROOM
SPRINKLER TANK
H.R.
WATER CHECK METER CABINET
FLUSHING, CLEANSING, IRRIGATION WATER PUMP AND TANK ROOM
PRIVATE PARKING SPACE
PRIVATE PARKING SPACE
PRIVATE PARKING SPACE
PRIVATE PARKING SPACE
SPRINKLER CONTROL CABINET
TOWNGAS CABINET
CO2 S.B.
H.R.
DN
86.50
RSMRR
TBE
EV CHARGING ROOM
WATER METER ROOM
PLANTER


G/F PLAN 1:200 IN A4
LEGEND
HOUSE 1
HOUSE 2
GUARD
WMC
HEC CABINET
PLANTER
1:8
1:10
1:10
91.00
91.45
91.45
91.45
91.30
91.30
91.00
89.90
86.27
86.26
SNACK BAR
LIFT
E&M
POWDER ROOM
ENTRANCE HALL
CLOAKROOM
STORE ROOM
MAIN KITCHEN
SIDE LOUNGE
POWDER ROOM
WC
OWNERS CORPORATION OFFICE
CARETAKER QUARTER
OPEN KITCHEN
DINING ROOM
LIVING ROOM
COURTYARD
FORMAL DINING
OPEN KITCHEN/BAR
MAID DINING AREA
MAID BATH
MAID BATH
WINE CELLAR
MAID & DOG LAUNDRY
POWDER ROOM
FAMILY DINING/ FAMILY LOUNGE
FORMAL LIVING
OUTDOOR GARDEN
LANDSCAPE
OUTDOOR SWIMMING POOL
UP
DN
SB
FX
A
B
C
D

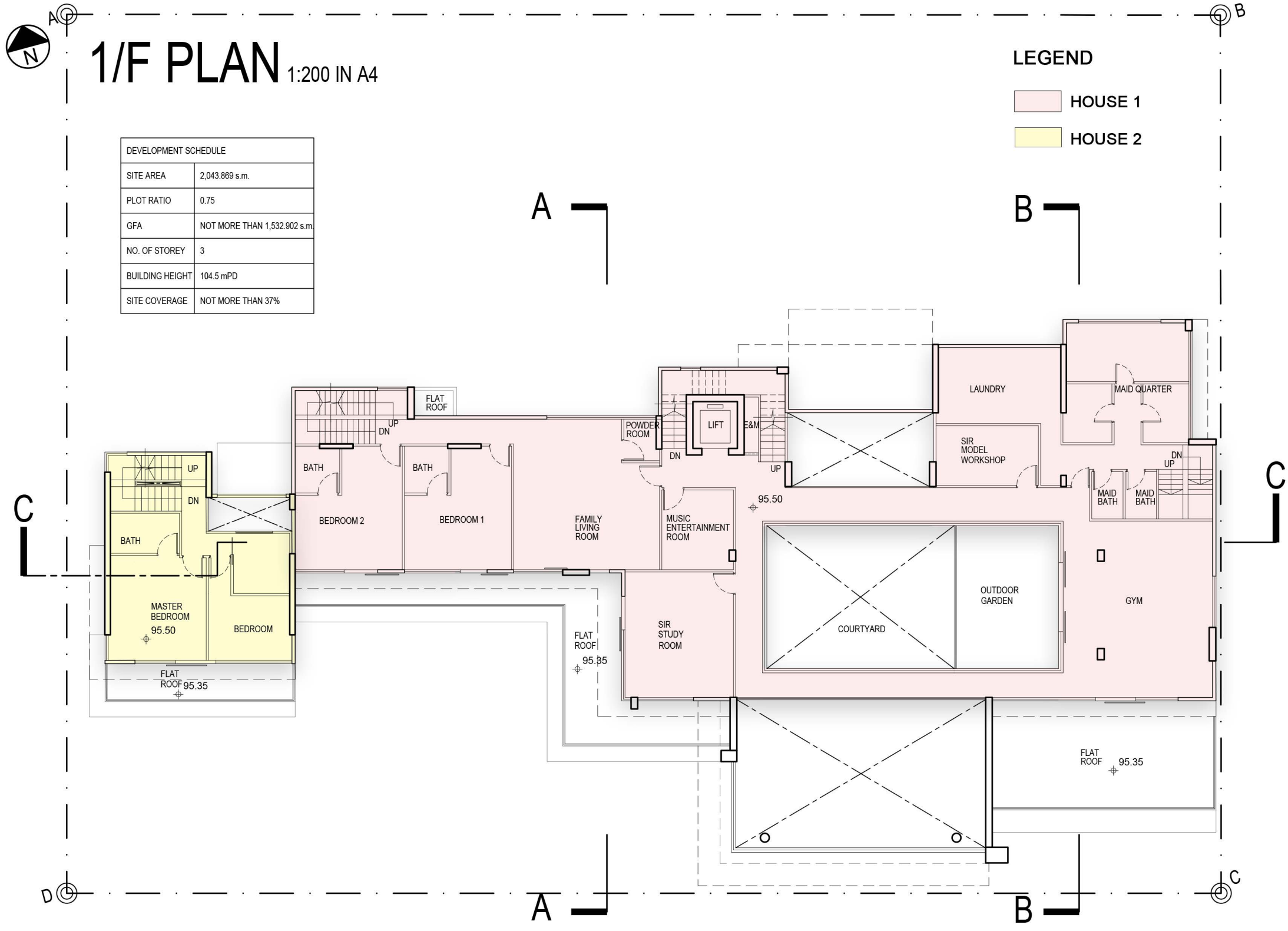
1/F PLAN 1:200 IN A4

DEVELOPMENT SCHEDULE	
SITE AREA	2,043.869 s.m.
PLOT RATIO	0.75
GFA	NOT MORE THAN 1,532.902 s.m.
NO. OF STOREY	3
BUILDING HEIGHT	104.5 mPD
SITE COVERAGE	NOT MORE THAN 37%

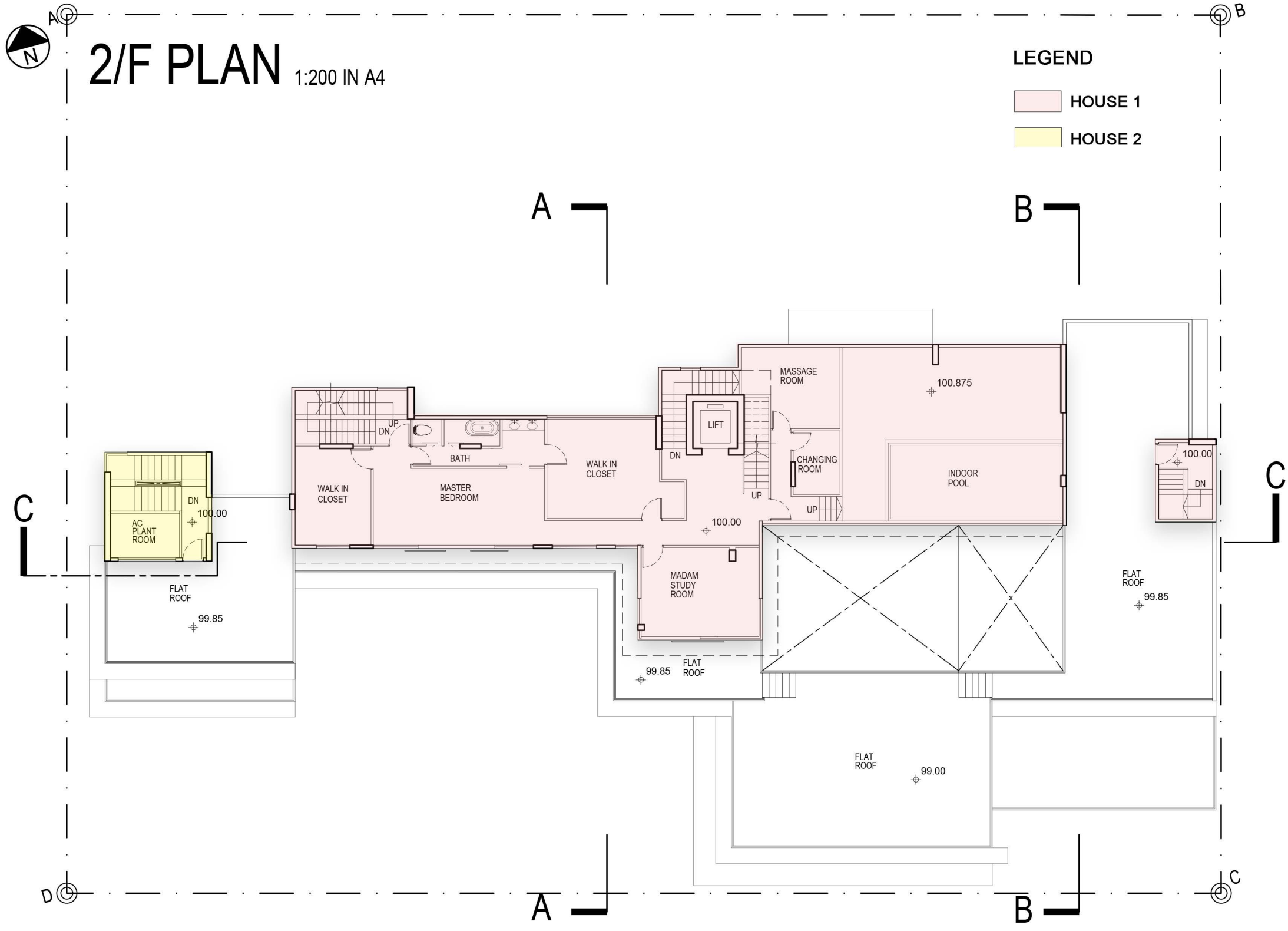
LEGEND

HOUSE 1

HOUSE 2



2/F PLAN 1:200 IN A4

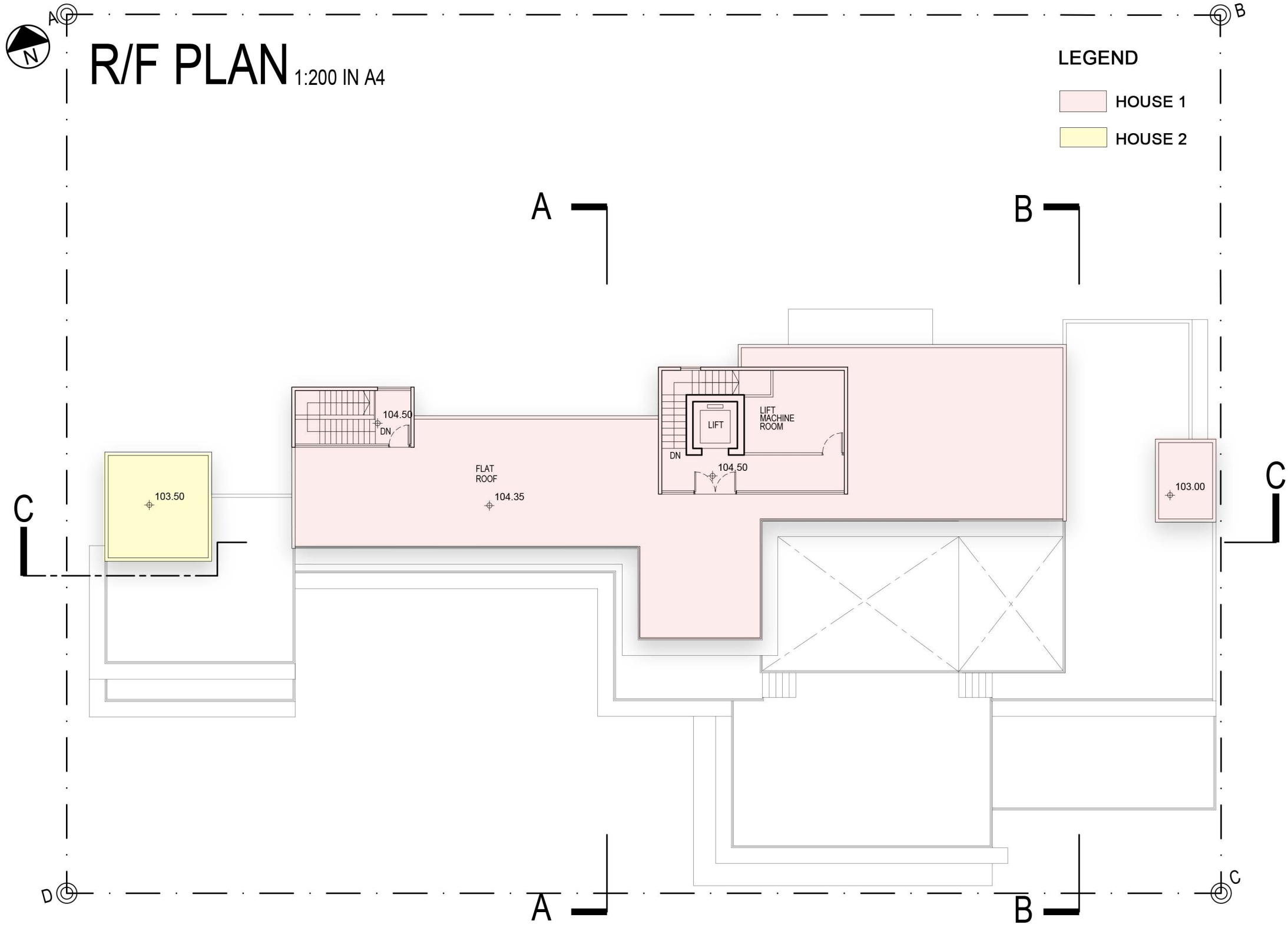


R/F PLAN 1:200 IN A4

LEGEND

HOUSE 1

HOUSE 2



Appendix VI – Assessment of Existing Sewer Capacity (Hydraulic Calculation)

Proposed Residential Re Development at 66 Deep Water Bay Road, R.B.L. 573

Assessment of Sewer Capacity against Existing Condition

CW Equation Parameters:

k	=	3	mm
g	=	9.81	m/s^2
v	=	1.00E-06	m^2/s
		0.014	

Sewer		Trunk/ Branch	Dia. of Pipe (mm)	Pipe Length (m)	US GL (mpD)	DS GL (mpD)	US IL (mpD)	DS IL (mpD)	US Cover Depth (mpD)	DS Cover Depth (mpD)	Gradient	Full bore Velocity (m/s)	Full bore Capacity (m^3/s)	Base Flow* (m^3/s)	Total Design Flow (m^3/s)	Full-bore Capacity > Estimated Comulative Flow	% of Full-bore Capacity	Remarks
From	To																	
ASMH-1	ASMH-2	Trunk	150	19.1	90.8	87.3	89.75	86.5	0.9	0.65	0.1702	3.21	0.057		0.006980	Yes	12.3%	Existing V.C. Pipe
ASMH-2	ASMH-3	Trunk	150	26.2	87.3	83.15	86.5	82.35	0.65	0.65	0.1584	3.09	0.055		0.006980	Yes	12.8%	Existing V.C. Pipe
ASHM-3	ASMH-4	Trunk	150	26.1	83.15	79.65	82.35	78.85	0.65	0.65	0.1341	2.85	0.050		0.006980	Yes	13.9%	Existing V.C. Pipe
ASHM-4	ASMH-5	Trunk	150	11.5	79.65	78.82	78.85	78.020	0.65	0.65	0.0722	2.09	0.037		0.006980	Yes	18.9%	Existing V.C. Pipe
ASHM-5	ASMH-6	Trunk	150	8.3	78.82	77.94	78.02	77.14	0.65	0.65	0.1060	2.53	0.045		0.006980	Yes	15.6%	Existing V.C. Pipe
ASHM-6	FTH7000464	Trunk	150	9.1	77.94	77.11	77.14	75.38	0.65	1.58	0.1934	3.42	0.060		0.006980	Yes	11.6%	Existing V.C. Pipe
FTH7000464	FMH7017092	Trunk	200	5.142	77.11	76.93	75.38	73.74	1.53	2.99	0.3189	5.35	0.168		0.006980	Yes	4.2%	Existing V.C. Pipe

Note: *Total Flow for ASMH-1 refers to the Calculation of Peak Flow from the Site (6.98 L/s)

$$V = -2\sqrt{2g \cdot D \cdot S_f} \cdot log\left(\frac{k_s}{3{,}70 \cdot D} + \frac{2{,}51 \cdot \upsilon}{D\sqrt{2g \cdot D \cdot S_f}}\right)$$

with $S_f = \frac{h_f}{L}$

V =	mean velocity	[m/s]
D =	Hydraulic Diameter	[m]
k_s =	surface roughness	[m]
υ =	Kinematic viscosity water, 20°C= $1{,}00 \cdot 10^{-6}$	[kg/ms]
S_f =	slope of hydraulic gradient	[-]
h_f =	frictional head loss	[m]
L =	Length between the Head Loss	[m]
g =	earths gravity	[m/s^2]

Proposed Residential Re Development at 66 Deep Water Bay Road, R.B.L. 573
Assessment of Sewer Capacity against Future Condition after Re-development

CW Equation Parameters:	k	=	3	mm
	g	=	9.81	m/s^2
	v	=	1.00E-06	m^2/s
			0.014	

Sewer		Trunk/ Branch	Dia. of Pipe (mm)	Pipe Length (m)	US GL (mpD)	DS GL (mpD)	US IL (mpD)	DS IL (mpD)	US Cover Depth (mpD)	DS Cover Depth (mpD)	Gradient	Full bore Velocity (m/s)	Full bore Capacity (m^3/s)	Base Flow* (m^3/s)	Total Design Flow (m^3/s)	Full-bore Capacity > Estimated Comulative Flow	% of Full-bore Capacity	Remarks
From	To																	
ASMH-1	ASMH-2	Trunk	150	19.1	90.8	87.3	89.75	86.5	0.9	0.65	0.1702	3.21	0.057		0.005916	Yes	10.4%	Existing V.C. Pipe
ASMH-2	ASMH-3	Trunk	150	26.2	87.3	83.15	86.5	82.35	0.65	0.65	0.1584	3.09	0.055		0.005916	Yes	10.8%	Existing V.C. Pipe
ASHM-3	ASMH-4	Trunk	150	26.1	83.15	79.65	82.35	78.85	0.65	0.65	0.1341	2.85	0.050		0.005916	Yes	11.8%	Existing V.C. Pipe
ASHM-4	ASMH-5	Trunk	150	11.5	79.65	78.82	78.85	78.020	0.65	0.65	0.0722	2.09	0.037		0.005916	Yes	16.0%	Existing V.C. Pipe
ASHM-5	ASMH-6	Trunk	150	8.3	78.82	77.94	78.02	77.14	0.65	0.65	0.1060	2.53	0.045		0.005916	Yes	13.2%	Existing V.C. Pipe
ASHM-6	FTH7000464	Trunk	150	9.1	77.94	77.11	77.14	75.38	0.65	1.58	0.1934	3.42	0.060		0.005916	Yes	9.8%	Existing V.C. Pipe
FTH7000464	FMH7017092	Trunk	200	5.142	77.11	76.93	75.38	73.74	1.53	2.99	0.3189	5.35	0.168		0.005916	Yes	3.5%	Existing V.C. Pipe

Note: *Total Flow for ASMH-1 refers to the Calculation of Peak Flow from the Site (5.916 L/s)

$$V = -2\sqrt{2g \cdot D \cdot S_f} \cdot log\left(\frac{k_s}{3{,}70 \cdot D} + \frac{2{,}51 \cdot \upsilon}{D\sqrt{2g \cdot D \cdot S_f}}\right)$$

with $S_f = \frac{h_f}{L}$

V =	mean velocity	[m/s]
D =	Hydraulic Diameter	[m]
k_S =	surface roughness	[m]
υ =	Kinematic viscosity water, 20°C= $1{,}00 \cdot 10^{-6}$	[kg/ms]
S_f =	slope of hydraulic gradient	[-]
h_f =	frictional head loss	[m]
L =	Length between the Head Loss	[m]
g =	earths gravity	[m/s^2]