

Appendix A

Water Demand Estimation

Job Title	Planning and Engineering Study for Wang Chau	
Calculation	Population Projection	
Job No.	226464	Rev.
Member/Location	A1	
Drg. Ref.		
Made by		
Date	23/10/2013	Chd.

Water Treatment Works (WTW)	FWSR	Supply Zone TPU	Location/ Estate	Projected Population ⁽¹⁾							Average Yearly-Based Projections									
				2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026		
Ngau Tam Mei WTW	Wang Chau	510 (TMF)	Tin Shui Wai	288,600	290,800	290,200	289,600	288,600	287,700	286,800	286,440	286,080	285,720	285,360	285,000	284,640	284,280	283,920		
		516		3,000	3,100	3,100	3,200	3,200	3,300	3,300	3,400	3,400	3,500	3,500	3,600	3,600	3,700	3,700		
		0.33*517		1,750	1,800	1,833	2,067	3,883	3,967	6,184	7,071	7,958								
		528	YLIE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		514*0.2		480	480	520	540	560	600	720	768	816								
		Sub-total		293,830	296,180	295,653	295,407	296,243	295,567	297,304	297,999	298,694								
		510 (FW)	Tin Shui Wai	288,600	290,800	290,200	289,600	288,600	287,700	286,800	286,440	286,080	285,720	285,360	285,000	284,640	284,280	283,920	283,560	
		511		6,100	6,400	6,600	6,800	7,000	7,100	7,200	7,300	7,400	7,500	7,600	7,700	7,800	7,900	8,000	8,100	
		512		6,700	6,800	6,800	6,800	6,800	6,800	6,800	6,800	6,800	6,800	6,800	6,800	6,800	6,800	6,800	6,800	6,800
		514*0.8		1,920	1,920	2,080	2,160	2,240	2,400	2,880	3,072	3,264								
0.66*517		3,500	3,600	3,668	4,132	7,768	7,934	12,368	14,142	15,915										
519		11,300	11,800	11,900	12,200	12,600	12,800	13,000	13,200	13,400	13,600	13,800	14,000	14,200	14,400	14,600	14,800			
Sub-total		318,120	321,320	321,248	321,692	325,008	324,834	331,548	334,234	336,919										
541		19,200	19,500	19,500	19,500	19,300	19,100	19,000	18,900	18,800	18,700	18,600	18,500	18,400	18,300	18,200	18,100			
542		11,100	11,300	11,600	12,000	12,200	12,500	13,000	13,900	14,460	15,020									
543	San Tin/ Mai Po	3,100	3,200	3,200	3,300	3,300	3,400	3,700	3,820	3,940										
544		3,700	3,900	3,900	3,900	3,900	3,900	3,900	3,900	3,900	3,900	3,900	3,900	3,900	3,900	3,900	3,900			
545 & 546		2,700	2,800	2,800	2,800	2,800	2,800	2,800	2,800	2,800	2,800	2,800	2,800	2,800	2,800	2,800	2,800			
528	Wang Chau	6,000	6,300	6,400	6,500	6,600	6,600	6,600	6,600	6,600	6,600	6,600	6,600	6,600	6,600	6,600	6,600			
Sub-total		39,800	40,700	41,000	41,500	41,500	41,500	41,800	43,800	45,400										
515		5,250																		
518		2,200																		
521		9,700																		
523		8,100																		
524	YL Town	63,400																		
525 & 526		3,300																		
527	YL Town	65,500																		
529	YL Town	15,400																		
532		10,000																		
522		17,700																		
531		14,300																		
0.2*533		1,040																		
Sub-total		215,890																		
441	Rural NW/NT	17,100																		
442	Rural NW/NT	7,600																		
423	Tuen Mun	174,700																		
Sub-total		199,400																		

Notes
 (1) Population from Planning Department WGPD Report, Table 15: Projected Population by TPU, 2013-2017

Water Treatment Works (WTTW)	FWSR	Supply Zone TPU (1)	Location/ Estate	Projected Population (2)										Average Yearly-Based Projections										
				2012					2022					2024					2026					
				Population/ Area	FW Demand (m ³ /d)	FLW Demand (m ³ /d)	Total Demand (m ³ /d)	Projected/ Planned Population	FW Demand (m ³ /d)	FLW Demand (m ³ /d)	Total Demand (m ³ /d)	Projected/ Planned Population	FW Demand (m ³ /d)	FLW Demand (m ³ /d)	Total Demand (m ³ /d)	Projected/ Planned Population	FW Demand (m ³ /d)	FLW Demand (m ³ /d)	Total Demand (m ³ /d)	Projected/ Planned Population	FW Demand (m ³ /d)	FLW Demand (m ³ /d)	Total Demand (m ³ /d)	
		510 (TMIF)	Tin Shui Wai	288,600	-	20,202	20,202	-	20,202	286,800	-	720	252	972	286,440	-	744	260	1,004	286,080	-	768	269	1,037
		516		3,000	600	210	810	3,600	6,184	1,237	433	1,670	3,720	7,071	1,414	495	1,909	3,840	7,958	10,500	1,592	557	2,149	
		0.33*517		1,750	350	123	473	6,184	-	3,000	1,000	4,000	-	768	154	54	207	816	-	163	57	220		
		528	YLIE (6)(7)	-	3,000	1,000	4,000	-	720	144	50	194	768	297,999	5,312	1,809	7,121	298,694	13,023	4,383	17,406			
		514*0.2		480	96	34	130	720	293,830	4,046	21,568	25,614	297,304	5,101	1,735	6,836	7,121	13,023	4,383	17,406				
		Sub-total		293,830	4,046	21,568	25,614	297,304	288,600	57,720	-	57,720	286,800	57,360	-	57,360	286,440	57,288	13,023	4,383	17,406			
		510 (FW)	Tin Shui Wai	288,600	1,220	427	1,647	8,100	1,620	1,620	-	1,620	1,700	8,500	1,700	-	1,700	8,900	1,780	-	1,780			
		511		6,100	1,340	469	1,809	7,100	1,420	1,420	-	1,420	1,436	7,180	1,436	-	1,436	7,260	1,452	-	1,452			
		512		6,700	1,340	469	1,809	7,100	1,420	1,420	-	1,420	1,436	7,180	1,436	-	1,436	7,260	1,452	-	1,452			
		514*0.8		1,920	384	134	518	2,880	576	202	778	3,072	614	215	829	3,264	653	228	881	4,297				
		0.66*517		3,500	700	245	945	12,368	2,474	866	3,339	14,142	2,828	990	3,818	15,915	3,183	1,114	4,297					
		519		11,300	2,260	791	3,051	14,300	2,860	-	2,860	14,900	2,980	-	2,980	15,500	3,100	-	3,100					
		Sub-total		318,120	63,624	2,066	65,690	331,548	66,310	1,067	67,377	334,234	66,847	1,205	68,052	336,919	67,384	1,343	68,726					
		541		19,200	8,547	2,849	11,396	19,000	8,442	2,814	11,256	18,950	8,442	2,814	11,256	18,920	8,442	2,814	11,256					
		542		11,100	3,443	1,148	4,591	13,900	4,424	1,475	5,899	14,450	4,424	1,475	5,899	15,020	4,424	1,475	5,899					
		543	San Tin/ Mai Po	3,100	815	272	1,086	3,700	1,060	353	1,413	3,820	1,060	353	1,413	3,940	1,060	353	1,413					
		544		3,700	3,106	1,035	4,141	4,100	3,155	1,052	4,207	4,180	3,155	1,052	4,207	4,260	3,155	1,052	4,207					
		545 & 546		2,700	717	239	956	3,100	782	261	1,042	3,180	782	261	1,042	3,260	782	261	1,042					
		528	Wang Chau	6,000	1,200	420	1,620	7,200	1,440	504	1,944	7,440	1,488	521	2,009	7,680	1,536	538	2,074					
		Proposed WC Development		-	-	-	-	YLIEE	5,519	2,449	7,968	YLIEE+ PH Phase 1	9,024	3,527	12,552	YLIEE+ PH Phases 1, 2 & 3	19,348	6,597	25,945					
		Sub-total		45,800	17,828	5,963	23,790	51,000	24,822	8,907	33,729	52,040	28,375	10,002	38,377	53,080	38,747	13,089	51,836					

Water Treatment Works (WTW)	FWSR	Supply Zone TPU (1)	Location/ Estate	Projected Population (2)						Average Yearly-Based Projections								
				2012			2022			2024			2026					
				Population/ Area	FW Demand (m ³ /d)	FLW Demand (m ³ /d)	Total Demand (m ³ /d)	Projected/ Planned Population	FW Demand (m ³ /d)	FLW Demand (m ³ /d)	Total Demand (m ³ /d)	Projected/ Planned Population	FW Demand (m ³ /d)	FLW Demand (m ³ /d)	Total Demand (m ³ /d)			
		515		5,250	1,050	368	1,418											
		518		2,200	440	154	594											
		521		9,700	1,940	679	2,619											
		523		8,100	1,620	567	2,187											
		524	YL Town	63,400	12,680	4,438	17,118											
	Au Tau Primary (Direct Feed)	525 & 526		3,300	660	231	891											
		527	YL Town	65,500	13,100	4,585	17,685											
		529	YL Town	15,400	3,080	1,078	4,158											
		532		10,000	2,000	700	2,700											
		522		17,700	3,540	1,239	4,779											
		531		14,300	2,860	1,001	3,861											
		0.2*533		1,040	208	73	281											
		Sub-total		215,890	43,178	15,112	58,290											
	Tuen Mun North	441	Rural NWNNT	17,100	3,420	1,197	4,617											
		442	Rural NWNNT	7,600	1,520	532	2,052											
		423	Tuen Mun	174,700	34,940	12,229	47,169											
		Sub-total		199,400	39,880	13,958	53,838											

Notes

- (1) Existing supply zone of reservoirs as of Oct 2012, refers to WSD drawing no. R2012018
- (2) Population from Planning Department WGPD Report, Table 15: Projected Population by TPU, 2013-2017
- (3) Fresh Water Unit Demand (UD) : Existing area UD = 0.2 m³/h/d derived from consumption rate in year 2012
- (4) Flushing Water Unit Demand (UD) : Existing area UD = 0.07 m³/h/d derived from consumption rate in year 2012
- (5) Assume construction works of Salt Water Supply to NWNNT and YL completed by year 2022.
Supply area as per WSD Sketch no. 90182/1 included Tin Shui Wai, Yuen Long Town, Tuen Mun-Yuen Long Corridor and Tuen Mun Town East.
- (6) The existing total water consumption in YUE is about 4,000 m³/per day according to HKSTP's estimation
- (7) Assuming that all 52 existing factories in YUE are in full operation, the ultimate total water consumption would be about 14,000 m³/per day according to HKSTP's estimation

Appendix B

Hydraulic Modelling

Calculations

Table B1 - Summary of Water Demand

Area	Type	MOD	Daily Operation			Fire Flow Scenario		
			Demand (m ³ /d)	Demand Multiplier	Flow (m ³ /d)	Demand (m ³ /d)	Flow (m ³ /d)	
YULEE	FW	5.519	3	16.557	3	5.519	11,000	
YULEE	FLW	2.449	2	4.898	2	2.449	4,898	
PH Phase 1	FW	1.148	2	2.296	2	1.148	2,296	
PH Phase 2 & 3	FW	4.148	2	8.296	2	4.148	8,296	

Headloss Analysis
 Water level at WCFWSR = 63.9 mPD
 Assume Minor Loss (HL) to be = 2.0 % of friction loss (Hf)
 $H = (0.78 L / d^{4.75}) (V / C)^{1.49}$
 Friction loss of Pipe where:
 H = Hazen Williams Formula
 L is length of pipeline in metres
 V is average velocity of flow (m/s)
 d is internal diameter of pipe (m)

Table B2a - Water Demand Distribution and Hydraulic Assessment - Daily Operation (Scenario A)

Location	Pipe IC	Downstream Node ID	Type	Internal Pipe Size (mm)	Length (m)	C Value	Demand (m ³ /d)	Velocity under normal operation (m/s)	Friction Loss (m)		Total Head Loss, H ₁ +H ₂ (m)	Residual Elevation (mPD)		
									H ₁	H ₂				
YULEE	FWM-P1	YULEE-2	FW	450	424	110	12,418	1.02	1.05	2.07	1.98	6.20	48.38	
YULEE	FWM-P2	YULEE-3	FW	250	253	110	4,139	1.12	1.27	2.39	1.52	6.20	43.16	
YULEE	TMF-P1	YULEE-2-1	FLW	250	518	90	3,974	1.00	4.69	5.69	5.55	6.20	42.81	
YULEE	TMF-P2	YULEE-2-2	FLW	100	95	110	1,223	0.59	0.17	0.76	0.29	6.20	42.91	
PH Phase 2 & 3	FWM-P3	PH2-2A	FW	450	386	110	30,623	2.59	6.83	9.42	7.95	11.00	32.54	
PH Phase 2 & 3	TMF-P3	PH2-2B	FLW	250	233	90	6,174	1.68	9.00	10.68	10.60	11.00	30.69	
PH Phase 1	FWM-P4	PH1-2A	FW	250	233	90	6,009	1.36	4.22	5.58	5.06	14.00	32.04	
PH Phase 1	TMF-P4	PH1-2B	FLW	150	138	90	1,000	0.77	3.98	4.75	4.78	14.00	32.32	
PH Phase 1	FWM-P5	PH1-4A	FW	250	233	90	5,611	1.52	4.61	6.13	5.53	15.00	28.48	
PH Phase 1	TMF-P5	PH1-4B	FLW	150	138	90	1,122	0.87	4.35	5.22	5.22	15.00	28.90	
WCFWSR to F&H Street	DN600-1	YULEE-1	FW	600	784	120	71,228	1.71	7.80	9.51	9.36	4.50	50.06	
F&H Street	DN600-1	PH-2-1	FW	600	586	120	49,783	2.14	1.72	3.86	3.24	2.07	48.29	
F&H Street	DN650-1	PH3	FW	450	424	110	32,726	1.04	0.74	1.78	1.51	0.89	5.00	46.60
Long Ping Road	DN450-2	PH1-1	FW	450	424	110	12,726	1.04	0.42	1.46	0.60	0.50	5.70	45.40
Long Ping Road	DN300-1	PH1-3	FW	300	282	110	6,733	1.25	3.40	4.65	4.07	6.00	41.02	

Residual Pressures are adequate

Residual Pressures are adequate

Residual Pressures are adequate

Residual Pressures are adequate

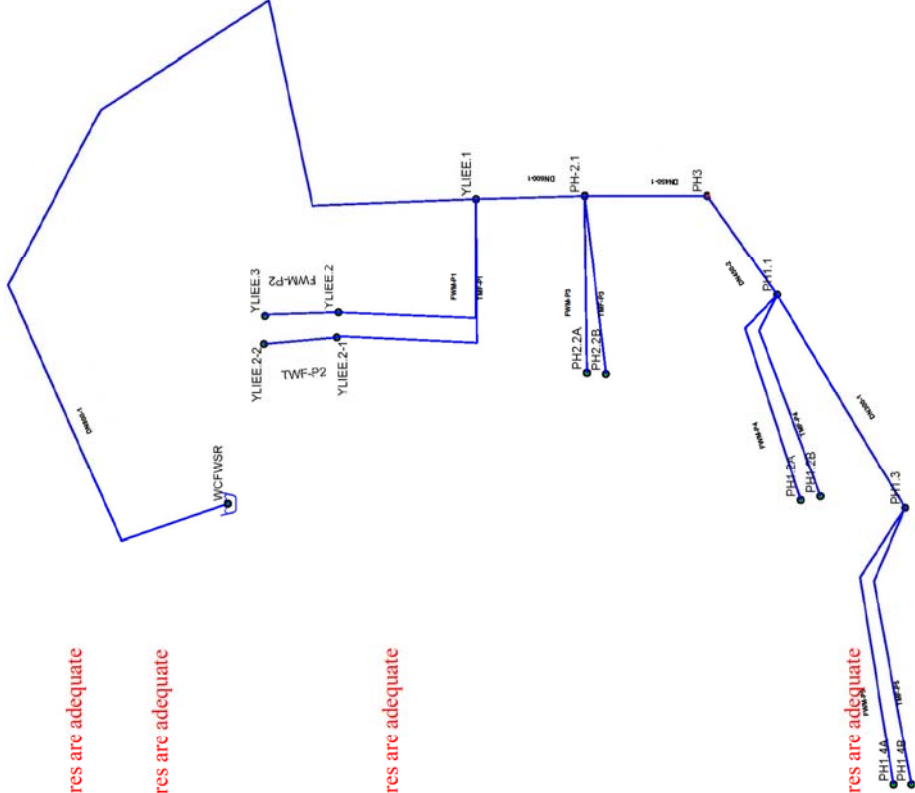


Table B2b - Water Demand Distribution and Hydraulic Assessment - Fire Flow at YULEE Node ID YULEE.3 (Scenario B)

Location	Pipe IC	Downstream Node ID	Type	Internal Pipe Size (mm)	Length (m)	C Value	Demand (m ³ /d)	Velocity under normal operation (m/s)	Friction Loss (m)		Total Head Loss, H ₁ +H ₂ (m)	Residual Elevation (mPD)		
									H ₁	H ₂				
YULEE	FWM-P2	YULEE-3	FW	250	253	110	12,360	3.36	8.62	11.98	6.20	41.44		
YULEE	TMF-P1	YULEE-2-1	FLW	250	518	110	1,837	0.50	0.88	1.38	1.06	6.20	53.88	
YULEE	TMF-P2	YULEE-2-2	FLW	100	95	110	612	1.00	2.90	3.90	3.48	6.20	50.40	
PH Phase 2 & 3	FWM-P3	PH2-2A	FW	450	424	386	10,251	0.84	0.87	1.71	1.04	11.00	48.79	
PH Phase 2 & 3	TMF-P3	PH2-2B	FLW	250	233	90	3,087	0.84	1.72	2.56	2.07	11.00	47.76	
PH Phase 1	FWM-P4	PH1-2A	FW	250	233	90	1,688	0.45	0.55	1.00	0.66	14.00	45.95	
PH Phase 1	TMF-P4	PH1-2B	FLW	150	138	90	1,000	0.77	3.98	4.75	4.78	14.00	45.38	
PH Phase 1	FWM-P5	PH1-4A	FW	250	233	90	3,870	0.81	0.83	1.64	0.72	15.00	44.27	
PH Phase 1	TMF-P5	PH1-4B	FLW	150	138	90	561	0.43	0.60	1.03	1.00	15.00	44.00	
WCFWSR to F&H Street	DN600-1	YULEE-1	FW	600	784	120	36,945	0.89	2.32	3.21	2.78	4.50	56.64	
F&H Street	DN600-1	PH-2-1	FW	600	586	120	17,877	0.77	0.26	0.65	0.31	4.20	56.63	
F&H Street	DN650-1	PH3	FW	450	424	110	4,599	0.38	0.11	0.49	0.14	5.00	55.69	
Long Ping Road	DN450-2	PH1-1	FW	450	424	110	4,599	0.38	0.06	0.44	0.01	0.08	5.70	54.92
Long Ping Road	DN300-1	PH1-3	FW	300	282	110	2,431	0.45	0.52	0.97	0.10	0.62	6.00	54.00

Table B2c - Water Demand Distribution and Hydraulic Assessment - Fire Flow at PH Site Node ID PH1.4A (Scenario C)

Location	Pipe IC	Downstream Node ID	Type	Internal Pipe Size (mm)	Length (m)	C Value	Demand (m ³ /d)	Velocity under normal operation (m/s)	Friction Loss (m)		Total Head Loss, H ₁ +H ₂ (m)	Residual Elevation (mPD)		
									H ₁	H ₂				
YULEE	FWM-P2	YULEE-3	FW	250	253	110	4,139	1.12	1.27	2.39	1.52	6.20	43.16	
YULEE	TMF-P1	YULEE-2-1	FLW	250	518	90	3,974	1.00	4.69	5.69	5.55	6.20	42.81	
YULEE	TMF-P2	YULEE-2-2	FLW	100	95	110	1,223	0.59	0.17	0.76	0.29	6.20	42.91	
PH Phase 2 & 3	FWM-P3	PH2-2A	FW	450	424	386	10,251	0.84	0.87	1.71	1.04	11.00	49.22	
PH Phase 2 & 3	TMF-P3	PH2-2B	FLW	250	233	90	3,087	0.84	1.72	2.56	2.07	11.00	48.20	
PH Phase 1	FWM-P4	PH1-2A	FW	250	233	90	1,688	0.45	0.55	1.00	0.66	14.00	45.61	
PH Phase 1	TMF-P4	PH1-2B	FLW	150	138	90	1,000	0.77	3.98	4.75	4.78	14.00	45.38	
PH Phase 1	FWM-P5	PH1-4A	FW	250	233	90	3,870	0.81	0.83	1.64	0.72	15.00	44.27	
PH Phase 1	TMF-P5	PH1-4B	FLW	150	138	90	561	0.43	0.60	1.03	1.00	15.00	44.00	
WCFWSR to F&H Street	DN600-1	YULEE-1	FW	600	784	120	31,945	0.77	1.77	2.54	2.12	4.50	57.30	
F&H Street	DN600-1	PH-2-1	FW	600	586	120	23,877	1.03	0.45	0.69	0.63	4.20	57.08	
F&H Street	DN650-1	PH3	FW	450	424	110	10,569	0.87	0.53	1.40	0.11	0.64	5.00	55.63
Long Ping Road	DN450-2	PH1-1	FW	450	424	110	10,569	0.87	0.30	1.17	0.36	5.70	54.57	
Long Ping Road	DN300-1	PH1-3	FW	300	282	110	8,421	1.56	5.15	6.71	1.03	6.18	6.00	48.09

<h1>ARUP</h1>	Job No.	Sheet No.	Rev.
	226464		
Job Title	Wang Chau		
Calculation	Water Demand Distribution and Pipe Network Input - Option 2		
	Member/Location	Drg. Ref.	
	Made by	LTT	Date 28/02/2014 Chd. NY

Table B3 - Summary of Water Demand

Area	Type	MDD (m ³ /d)	Normal Operation		Fire-Flow Scenario	
			Demand Multiplier	Demand (m ³ /d)	Demand Multiplier	Demand (m ³ /d)
Existing WCFWSR Supply Zone	FW	13,023	1.5	19,535	1	13,023
Existing WCFWSR Supply Zone	FLW	4,383	1.5	6,575	1	4,383
Wang Chau (Direct Feed)	FW	1,536	3	4,608	1	1,536
Wang Chau (Direct Feed)	FLW	538	2	1,076	1	538
Mai Po / San Tin (Direct Feed)	FW	17,863	3	53,589	1	17,863
	FLW	5,954	2	11,908	1	5,954
TKT North FWSR	FW	67,384	1.5	101,076	1	67,384
	FLW	1,343	1.5	2,015	1	1,343
YLIEE	FW	5,519	3	16,557	1	5,519
YLIEE	FLW	2,449	2	4,898	1	2,449
PH Site	FW	13,829	3	41,487	1	13,829
PH Site	FLW	4,148	2	8,296	1	4,148

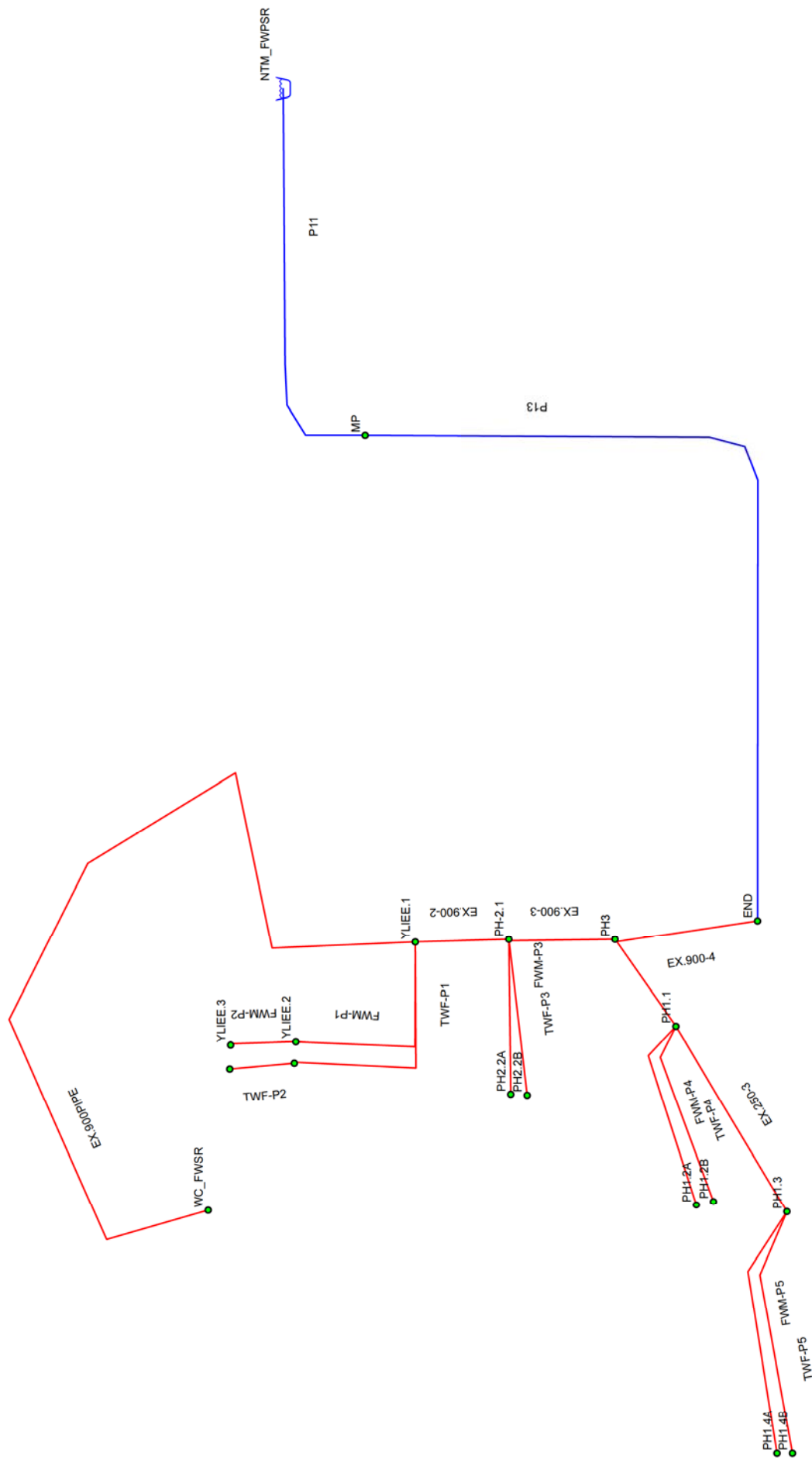
Table B4 - Pipe Network Input Data and Water Demand Distribution according to Population Distribution

Location	Existing / Proposed	Pipe ID in Model	Downstream Node ID in Model	Type	Nominal Pipe Size (mm)	Internal Diameter (mm)	Length (m)	Minor Loss Factor	Factored Length ⁽¹⁾ (m)	Demand drawoff at downstream node	
										Daily Operation (m ³ /d)	Fire-Flow Scenario (m ³ /d)
YLIEE	Proposed	FWM-P1	YLIEE.2	FW	450	424	518	1.2	622	12,418	4,139
YLIEE	Proposed	FWM-P2	YLIEE.3	FW	250	233	165	1.2	198	4,139	1,380
YLIEE	Proposed	TWF-P1	YLIEE.2-1	FLW	250	233	518	1.2	622	3,674	1,837
YLIEE	Proposed	TWF-P2	YLIEE.2-2	FLW	100	95	165	1.2	198	1,225	612
PH Phase 2 & 3	Proposed	FWM-P3	PH2.2A	FW	450	424	386	1.2	463	30,873	10,291
PH Phase 2 & 3	Proposed	TWF-P3	PH2.2B	FLW	250	233	386	1.2	463	6,174	3,087
PH Phase 1	Proposed	FWM-P4	PH1.2A	FW	200	189	387	1.2	464	5,003	1,668
PH Phase 1	Proposed	TWF-P4	PH1.2B	FLW	100	95	387	1.2	464	1,000	500
PH Phase 1	Proposed	FWM-P5	PH1.4A	FW	250	233	342	1.2	410	5,611	1,870
PH Phase 1	Proposed	TWF-P5	PH1.4B	FLW	150	138	342	1.2	410	1,122	561
Fuk Hi Street	Existing	Ex. DN900-2	YLIEE.1	FW	900	882	235	1.2	282	-	-
Fuk Hi Street	Existing	Ex. DN900-3	PH-2.1	FW	900	882	223	1.2	268	-	-
Fuk Hi Street	Existing	Ex. DN900-4	PH3	FW	900	882	223	1.2	268	5,684	2,074
From NTMFWPSR	Existing	P11	MP	FW	1400	1379	3200	1.2	3840	65,497	23,817
Yuen Long	Existing	P13	END	FW	1400	1379	5600	1.2	6720	103,091	68,727
From WCFWSR to Fuk Hi Street	Existing	EX. 900 PIPE	WC_FWSR	FW	900	882	2261	1.2	2713	26,109	17,406
Long Ping Road	Existing	Ex. 250-1	PH1.1	FW	300	282	125	1.2	150	-	-
Long Ping Road	Existing	Ex. 250-3	PH1.3	FW	250	233	455	1.2	546	-	-

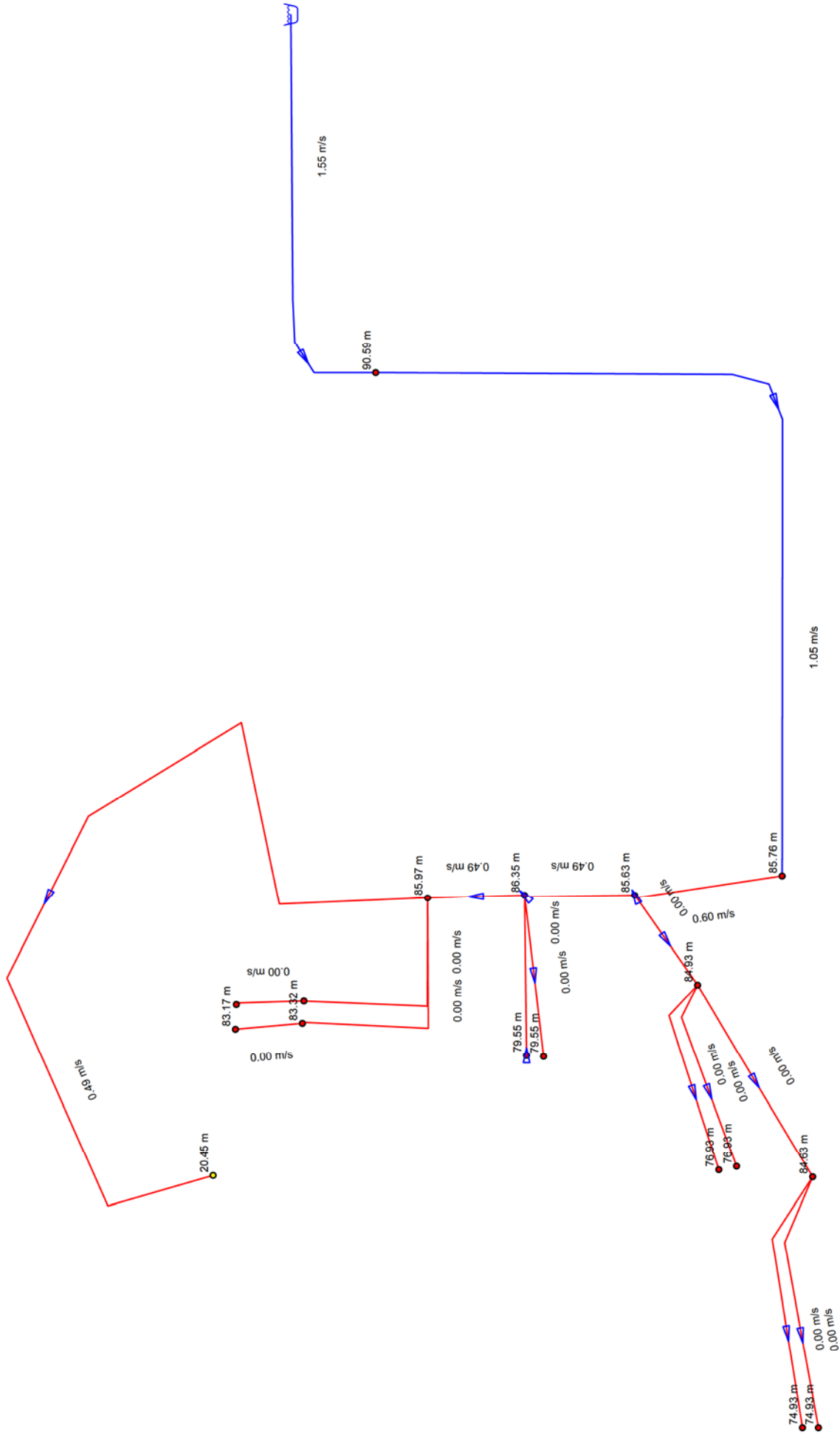
Notes

(1) The minor loss factor is used to multiply the length of the water mains to model the minor headlosses (due to bends and fittings)

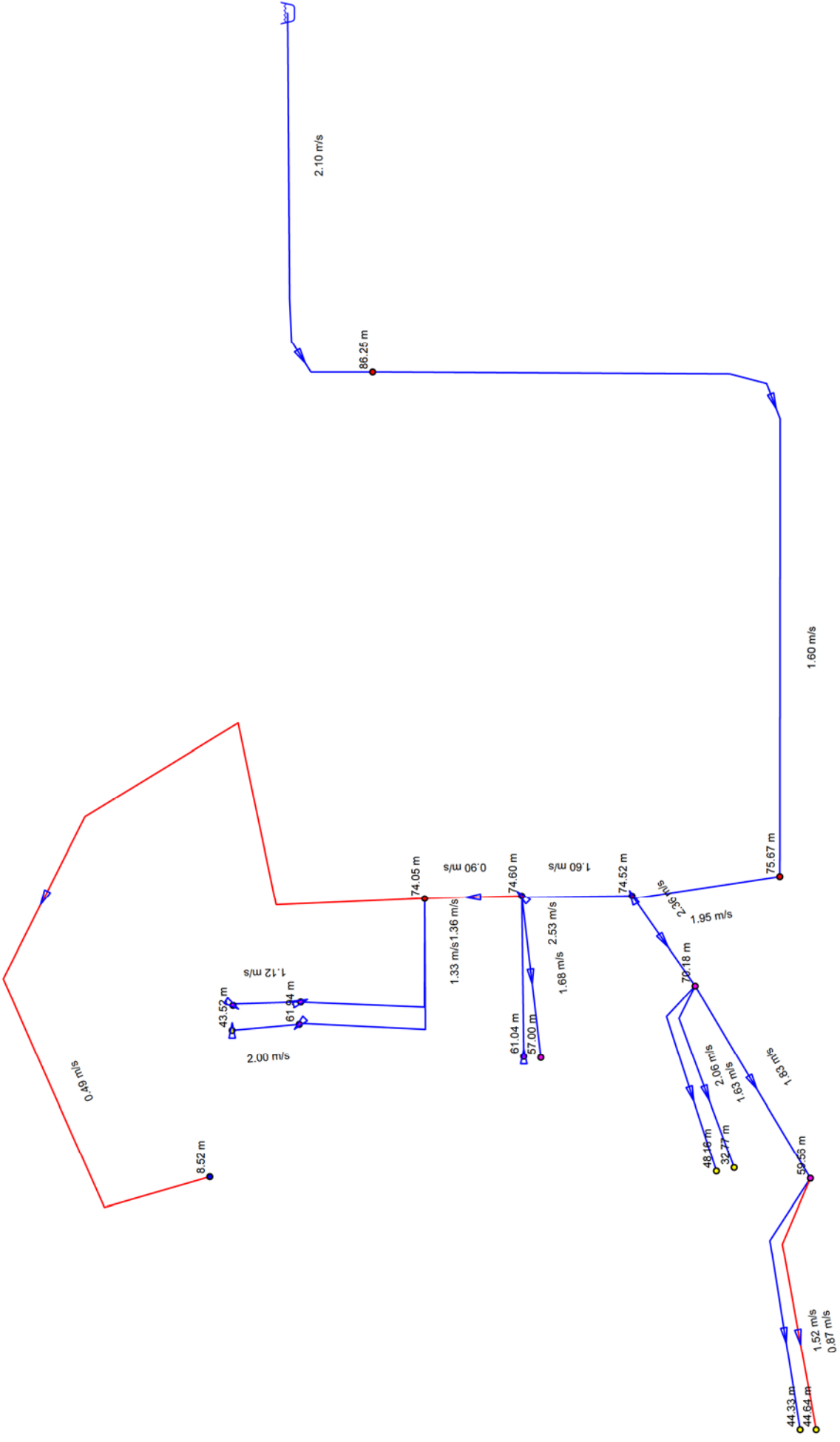
Model Network Layout



Existing Scenario - Performance



Scenario A - Performance



Scenario A

Daily Operation - Junction

	ID	Demand (m3/d)	Elevation (m)	Head (m)	Pressure (m)
1	END	103,090.32	2.80	78.47	75.67
2	MP	65,496.57	2.80	89.05	86.25
3	PH-2.1	0.00	2.00	76.60	74.60
4	PH1.1	0.00	3.50	73.68	70.18
5	PH1.2A	5,002.97	11.50	59.66	48.16
6	PH1.2B	999.99	11.50	44.27	32.77
7	PH1.3	0.00	3.80	63.36	59.56
8	PH1.4A	5,610.96	13.50	57.83	44.33
9	PH1.4B	1,121.99	13.50	58.14	44.64
10	PH2.2A	30,872.80	8.80	69.84	61.04
11	PH2.2B	6,173.96	8.80	65.80	57.00
12	PH3	5,683.96	2.80	77.32	74.52
13	WC_FWSR	26,108.83	67.00	75.52	8.52
14	YLIEE.1	0.00	2.30	76.35	74.05
15	YLIEE.2	12,417.92	4.95	72.98	68.03
16	YLIEE.2-1	3,673.98	4.95	66.89	61.94
17	YLIEE.2-2	1,224.99	5.10	48.62	43.52
18	YLIEE.3	4,138.97	5.10	71.46	66.36

Residual Pressure at WC FWSR is adequate

Scenario A

Daily Operation-Pipe

ID	From Node	To Node	Length (m)	Diameter (mm)	Roughness	Flow (m3/d)	Velocity (m/s)	Headloss (m)	HL/1000 (m/km)
1	PH3	PH1.1	150.00	282.00	110.00	12,735.92	2.36	3.64	24.28
2	PH1.1	PH1.3	546.00	233.00	110.00	6,732.96	1.83	10.32	18.90
3	PH-2.1	YLIEE.1	282.00	882.00	120.00	47,564.69	0.90	0.26	0.92
4	PH3	PH-2.1	268.00	882.00	120.00	84,611.45	1.60	0.72	2.67
5	END	PH3	300.00	882.00	120.00	103,031.33	1.95	1.15	3.84
6	YLIEE.1	WC_FWSR	2,713.00	882.00	120.00	26,108.83	0.49	0.82	0.30
7	YLIEE.1	YLIEE.2	622.00	424.00	110.00	16,556.89	1.36	3.37	5.42
8	YLIEE.2	YLIEE.3	198.00	233.00	110.00	4,138.97	1.12	1.52	7.67
9	PH-2.1	PH2.2A	463.00	424.00	120.00	30,872.80	2.53	6.77	14.61
10	PH1.1	PH1.2A	464.00	189.00	110.00	5,002.97	2.06	14.02	30.22
11	PH1.3	PH1.4A	410.00	233.00	110.00	5,610.96	1.52	5.53	13.48
12	NTM_FWPSR	MP	3,840.00	1,379.00	120.00	271,618.22	2.10	10.07	2.62
13	MP	END	6,720.00	1,379.00	120.00	206,121.66	1.60	10.57	1.57
14	YLIEE.1	YLIEE.2-1	622.00	233.00	90.00	4,898.97	1.33	9.46	15.21
15	YLIEE.2-1	YLIEE.2-2	198.00	95.00	90.00	1,224.99	2.00	18.27	92.27
16	PH-2.1	PH2.2B	463.00	233.00	90.00	6,173.96	1.68	10.81	23.34
17	PH1.1	PH1.2B	464.00	95.00	90.00	999.99	1.63	29.40	63.37
18	PH1.3	PH1.4B	410.00	138.00	90.00	1,121.99	0.87	5.22	12.72

Daily Operation-NTM FWPSR

ID	Flow (m3/d)	Head (m)
1	NTM_FWPSR -271,618.22	99.12

Scenario B & C

Fire Flow - Junction

ID	Static Demand (m ³ /d)	Static Pressure (m)	Static Head (m)	Fire-Flow Demand (m ³ /d)	Residual Pressure (m)	Available Flow @Hydrant (m ³ /d)	Available Flow Pressure (m)
1	1,667.99	76.57	90.07	5,999.96	46.79	10,484.86	20.78
2	1,869.99	76.12	89.62	5,999.96	49.72	11,638.14	20.95
3	10,290.93	82.60	91.40	5,999.96	80.71	64,470.00	49.35
4	1,379.99	86.47	91.57	10,999.93	70.79	26,399.42	26.26

Appendix C

Power Supply Loading

Calculations

Power Supply Analysis

Loading Estimation for HD/YLIEE Development Program

Program	Quantity of Unit	Unit area (m ²)	Program Area - GFA (m ²)	Assumed UFA (m ²)	Loading Density (kVA/unit as stated)	Assumed Public Services Load (kVA)	Estimated Load (MVA)	
Housing*	17,000	<50	-	-	3.90 /flat	7,200	73.50	
Primary School*	2,295	10	-	22,950	0.25 /m ²	600	6.34	
Social Welfare Facilities	-	-	4800 (NOFA)	7,680	0.15 /m ²	2,310	3.46	
Retail/Market (w/ catering)	-	-	5,130	4,361	0.56 /m ²	1,744	4.19	
Retail/Market (w/out catering)	-	-	5,130	4,361	0.30 /m ²	1,744	3.05	
Industrial (heavy)	-	-	144,400	122,740	0.18 /m ²	9,050	31.14	
Industrial (light)	-	-	144,400	122,740	0.05 /m ²	12,364	18.50	
Total Estimated Load (Peak, MVA)							140	(roundoff)
Diversity							0.8	
Estimated Load (MVA)							112	

Remarks:

- The loading density is based on recommended figures from CLP.
- The UFA of is assumed to be 0.85 of GFA for Retail and Industrial.
- For Social Welfare Facilities, the factor of 1.6 is taken for calculating the UFA (i.e. NOFA x 1.6)
- Retail / Market: 50% of the R/M area consists of catering whilst 50% of the total R&M area is without catering.
- Industrial: 50% of the Industrial area is considered as heavy industrial whilst the remain 50% is light industrial.
- Outdoor / road lighting is excluded
- Public Service includes public lighting, lift, water pump, fire services, air conditioning etc.
- Assumed one-third of the heavy industrial area and 60% of the light industrial area are covered by air-conditioning.
- * Individual air conditioners (Window type / Split type AC) are adopted and the loading is included in the calculations.

Appendix D

Power Substation Requirements from CLP



30 August 2013

By Post & By Fax [REDACTED]

Ove Arup & Partners Hong Kong Ltd
Level 5 Festival Walk
80 Tat Chee Avenue
Kowloon Tong, Kowloon

Attn: [REDACTED]

Our Ref. : NR/S566-13/AC/KKL/KSL
Your Ref. : 226464/L087/MW

Dear Mr Bamm,

**Request for Electrical Will-Serve Letter in Connection the
Planning & Engineering Study for the Public Housing Site and
Yuen Long Industrial Estate Extension (YLIEE) at Wang Chau**

We thank you for your letter dated 15 August and your subsequent email to our Mr. [REDACTED] on 29 August 2013 which provides us much more essential information including the estimated electricity supply target date of phase 1 by 2024.

To cope with your estimated load demand of 112MVA, we certainly need the provision of a 132kV substation for housing our transmission equipment. We shall be glad if you could provide us the proposed site for the 132kV substation for our engineering study. The typical dimensions of our 132kV substation is attached for your reference, we are flexible to discuss with you further on the dimensions upon receipt of your proposed location.

Should you have any further clarifications, please contact our Mr. [REDACTED] at [REDACTED] or the undersigned at [REDACTED]

Yours sincerely,
for and on behalf of
CLP Power Hong Kong Limited

[REDACTED]

Senior Planning & Design Manager (North Region)

Encl. as stated

ac/kkl

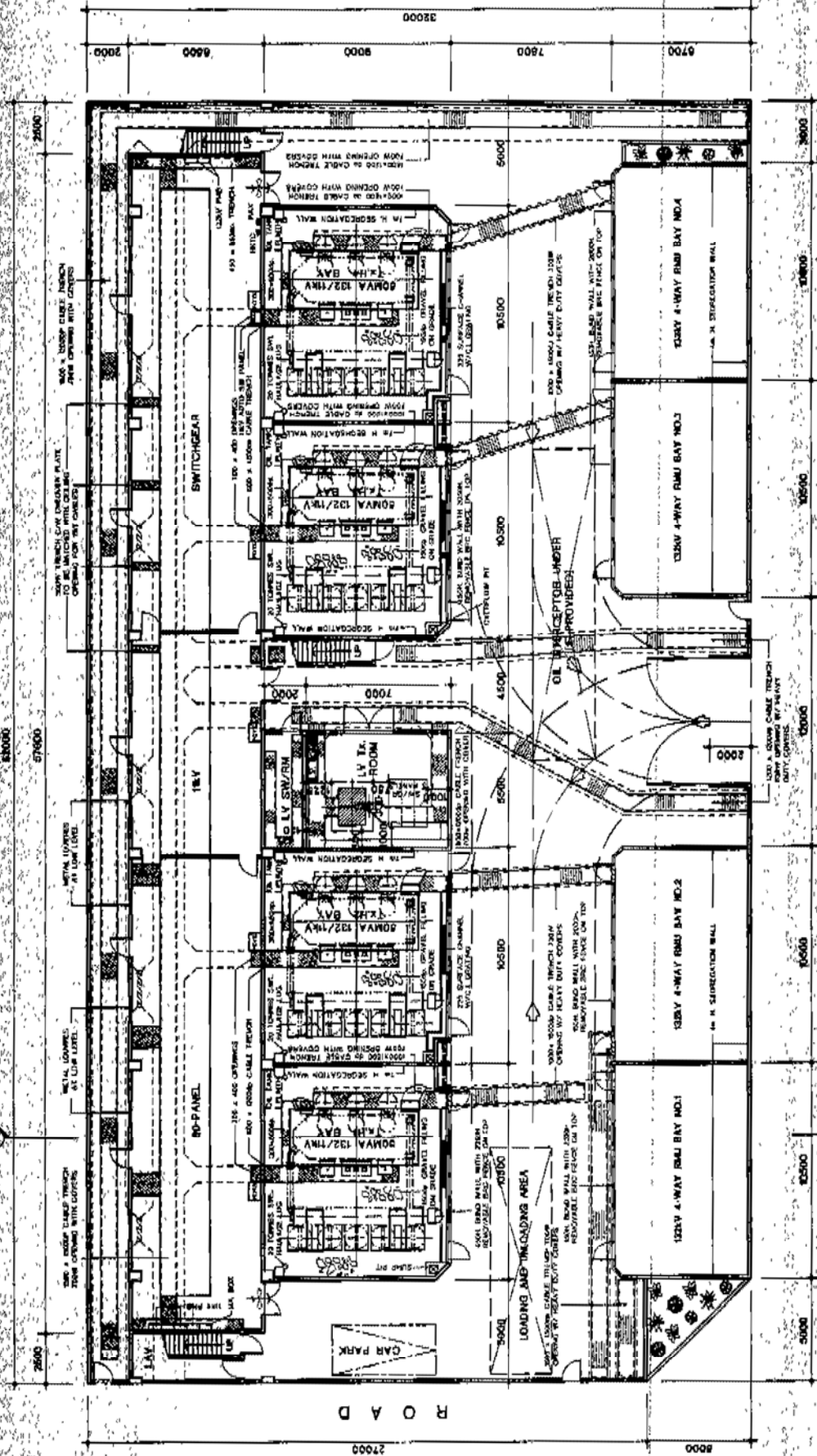
中華電力有限公司
CLP Power Hong Kong Limited

北區
North Region

香港新界上水鳳凰坊16號
16 Ka Fu Close, Sheung Shui
New Territories, Hong Kong

電話 Tel: (852) 2678 2156
傳真 Fax: (852) 2678 2180
網址 Website: www.clpgroup.com

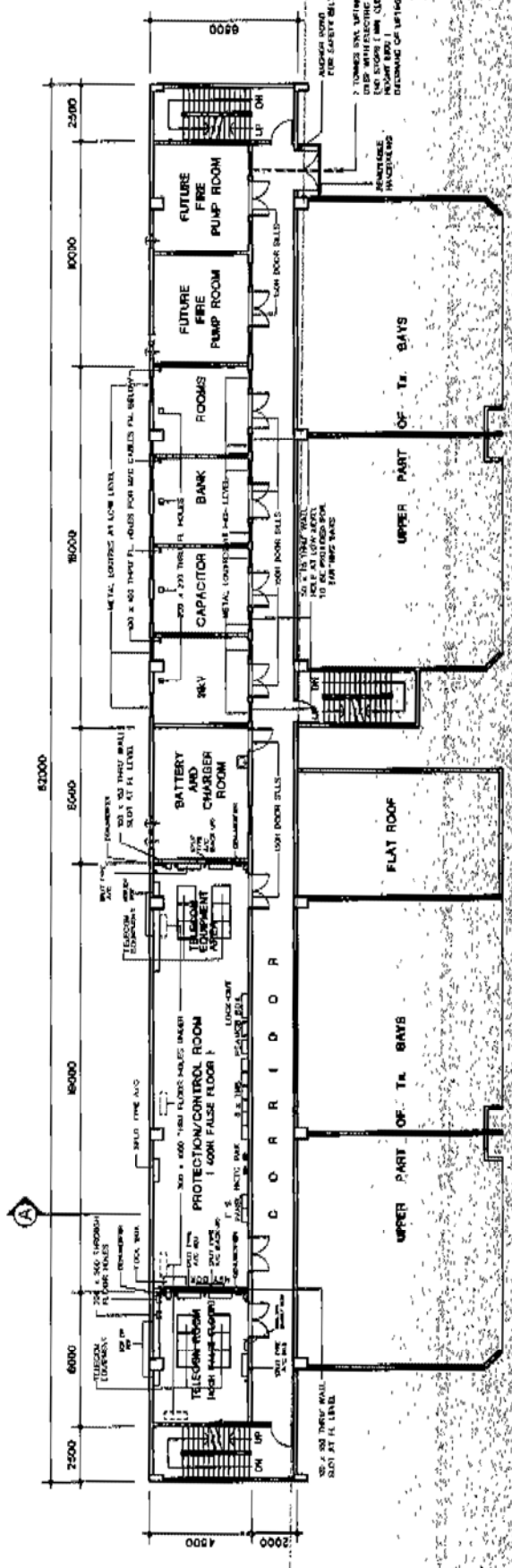
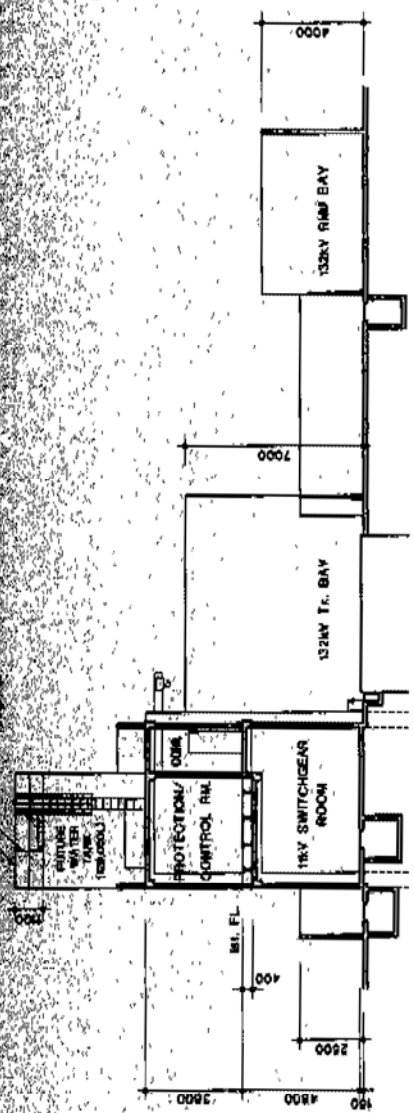




R O A D
GROUND FLOOR PLAN
R O A D

<p>CLP 中電</p>		<p>TYPICAL 132KV PRIMARY SUBSTATION LAYOUT WITH 4 x 50MVA 132/10kV Tx's & RMUs</p>	
<p>DATE: 04-2009</p>	<p>APPROVED:</p>	<p>PROJECT NO:</p>	<p>CONTRACT NO:</p>
<p>SCALE: 1:200</p>	<p>DRAWN: R000</p>	<p>DESIGNED: CUKORONG</p>	<p>DATE: 04-2009</p>
<p>GENERAL LAYOUT REVISED</p>	<p>GENERAL LAYOUT AND NOTES REVISED</p>	<p>GENERAL LAYOUT AND NOTES REVISED</p>	<p>GENERAL LAYOUT AND NOTES REVISED</p>
<p>NOTES CORRECTED</p>	<p>DETAIL DIMENSIONS FOR LV TK ROOM ADDED</p>	<p>WIDTH OF CABLE TRENCH REVISED</p>	<p>WIDTH OF CABLE TRENCH REVISED</p>

- NOTES:**
1. THE MAIN ENTRANCE MAY NOT BE SET BACK IF THERE IS CONCERN ABOUT LOITERING HAWKERS.
 2. FIRE SERVICES INLET SHOULD BE PROVIDED ALONG ONE OF THE ROADS AT SUITABLE LOCATION.
 3. ADDITIONAL POWER CABLE TRENCHES MAY BE ADDED FOR INDIVIDUAL STAYS AS REQUIRED.
 4. THE LEFT HAND SIDE BAY STAYS MAY BECOME 50KV-CBS ROOM IN FUTURE. NECESSARY CABLE BASEMENT WILL BE CONSTRUCTED AT THAT TIME.



- NOTES:**
- IF NEW C/S IS INSTALLED ALL TRV CAPACITOR OR FUSES SHOULD BE MOVED TO THE SECOND FLOOR NEXT TO WATER TANK TO MAKE ROOM FOR A LARGER PROTECTION/CONTROL ROOM ON FIRST FLOOR.
 - INTERCONNECTING TRUNKING OF TELECOM ROOMS WITH 2 COMPARTMENTS SHALL BE PROVIDED BETWEEN TELECOM ROOM AND TELECOM CABLES IN PROTECTION / CONTROL ROOM. THE TRUNKING SHALL ALLOW A SEPARATE SEPARATE PROTECT OF ROOMS.

CLP 中電

PROJECT NO: 4-8-2000

DATE: 4-8-2000

DESIGNED: [Signature]

CHECKED: [Signature]

PROJECT TITLE: TYPICAL 132KV PRIMARY SUBSTATION LAYOUT WITH 4 x 60MVA 132/11kV Tr's & RMU's

REV.	DESCRIPTION	DATE

F	LAYOUT FOR TELECOM EQUIPMENT ADDED
D	HARDWARE ON TOP OF TANK
C	P.O. ROOM & PROTECTION/CONTROL ROOM
B	SWITCH ADDED
A	FLOOR ON/O ROOM ADDED

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