

Appendix A

Hydraulic Modelling

Calculations

**Planning and Engineering Study for the Public Housing Site
and Yuen Long Industrial Estate Extension at Wang Chau
Technical Report No.3 (TR-3)**



Subcatchment Data

16-Oct-13

Summary of Subcatchment Area

Existing_Urban	
ID	Area (m ²)
0	57144
1	59000
2	76851

YLIEE	
ID	Area (m ²)
0	43901
1	35405
2	35421
3	31755
4	11222

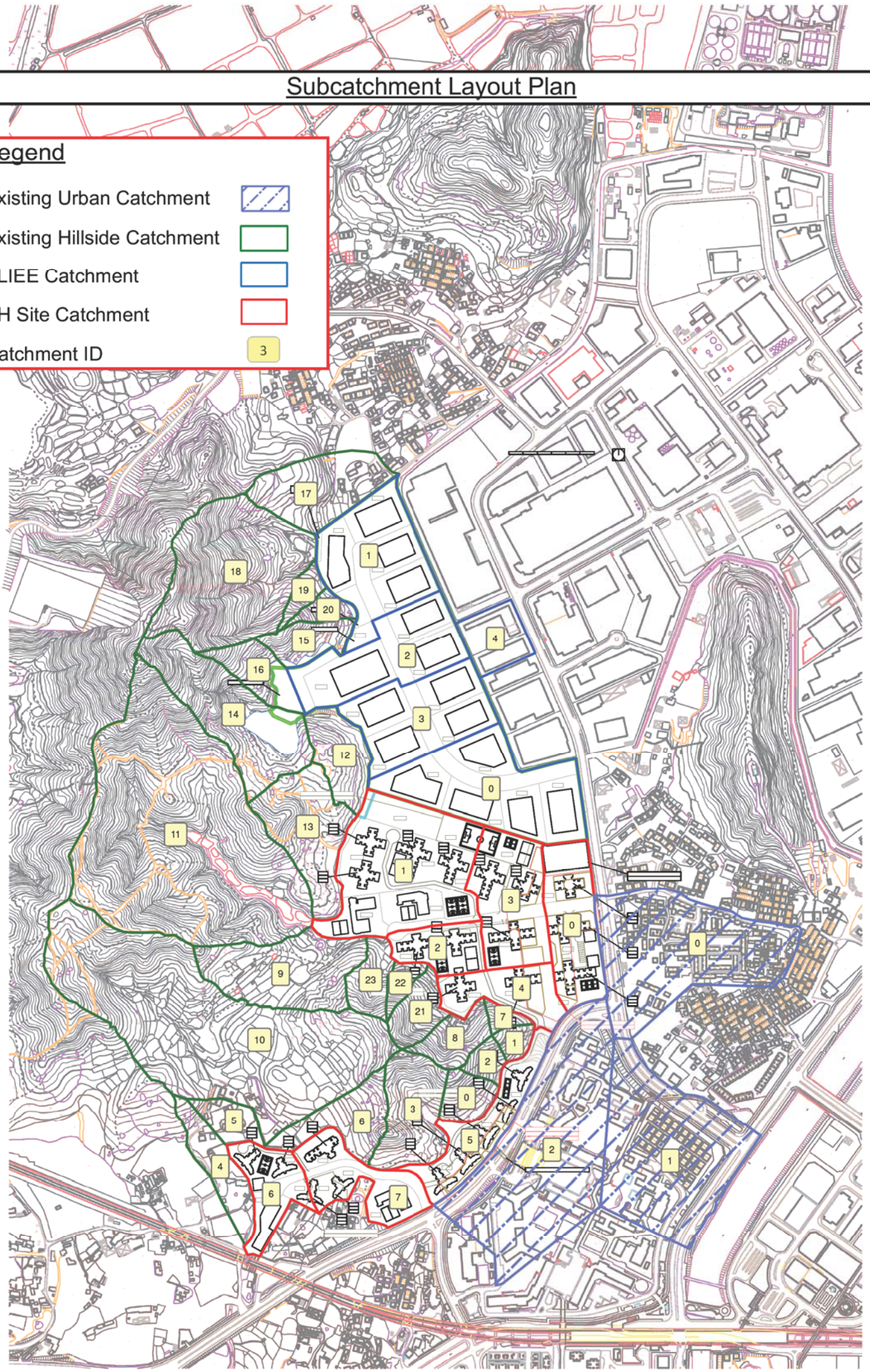
PH Site	
ID	Area (m ²)
0	24543
1	53030
2	12269
3	27864
4	16490
5	20105
6	14620
7	19774

Existing_Hillside	
ID	Area (m ²)
0	7149
1	3222
2	3863
3	20879
4	12664
5	6850
6	15242
7	2557
8	9105
9	30614
10	115125
11	130030
12	13923
13	26020
14	36016
15	9257
16	10679
17	22810
18	53152
19	3806
20	3941
21	8886
22	3672
23	8377

Subcatchment Layout Plan

Legend

- Existing Urban Catchment 
- Existing Hillside Catchment 
- YLIEE Catchment 
- PH Site Catchment 
- Catchment ID 



ARUP	Job No.	Sheet No.	Rev.
	226464		
Job Title	Member/Location		
Planning and Engineering Study at Wang Chau	Drg. Ref.		
Calculation	Made by	Date	Chd.
Design Assumptions - Stormwater Drainage	LTT	15/07/2013	NY

Flow Estimation

Design Flow = CiA

Runoff Coefficient	Existing C	Propoed C ⁽¹⁾ (PH Site)	Propoed C ⁽²⁾ (YLIEE)
paved	0.95	0.80	0.80
grassland	0.35	0.35	0.35
	For Checking Existing System	For Proposed System	
Design Return Periods	10	50	yrs
a	603	687	
b	4.4	4.2	
c	0.44	0.42	
Inlet Time			
Urban	2.0	min	
Natural	5.0	min	

Hydraulic Assessment

Full-bore Capacity =

VA

Colebrook-White Equation from Section 8.3.1 & Table 12 of SDM for circular pipes

$$\bar{V} = -\sqrt{32gRS_f} \log \left[\frac{k_s}{14.8R} + \frac{1.255\nu}{R\sqrt{32gRS_f}} \right]$$

Roughness Coefficient (Ks)	Existing	Proposed	mm
	1.5	0.6	mm

Manning's Equation from Section 8.3.1 & Table 12 of SDM for channels & box culverts

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

Roughness Coefficient (n)	For Concrete Lined Channel =	0.016

Notes

- (1) 25% paved area is landscape area
- (2) 25% paved area is landscape area

Description	US MH No.	DS MH No.	Length (m)	Type (UC/Pipe/BC/RC)	Diameter of Pipe/Channel (mm)	Height of Channel (m, For BC and RC only)	No of Cells For BC only)	Pipe/Channel/FRC			Roughness Coefficient (nms, For Pipe only)	Catchment Ref.	Catchment ID	Paved Area (m ²)	Glassed Area (m ²)	Design Data		Pipeworks Design						
								Gradient (1 in)	Perimeter (m)	Hydraulic Radius (m)						Existing / Proposed	Additional Effective Catchment Area (m ²)	Effective Catchment Area (m ²)	Velocity (m/s)	Check for Full-bore Pipe (1-4m/s)	Peak Runoff (m ³ /s)	Capacity Utilization Ratio	Check (<100%)	
YLIEE - Discharge to Fok Hi Street (System P3)	SMH 10001	SMH 03001	220	UC	600	2.0	0.321	1.54	0.208	Proposed	Hillside	12	13,923	4,873	1.00	2.36	3.36	293.74	1.55	OK	0.398	80%	OK	
	SMH 02001	SMH 02001	89	UC	450	7.0	0.181	1.16	0.156	Proposed	Hillside	16	10,679	3,738	1.00	0.68	1.68	326.35	2.17	OK	0.339	86%	OK	
	Existing Terrain	SMH 02001	300	UC	300	3.30	0.300	1.54	0.208	Proposed	Hillside	14	36,016	12,606	1.00	0.77	2.87	302.20	1.27	OK	0.388	95%	OK	
	SMH 04002	SMH 05001	142	UC	600	3.00	0.321	1.54	0.208	Proposed	Hillside	15,20	13,198	4,619	1.00	0.87	1.77	324.47	1.65	OK	0.120	90%	OK	
	SMH 06003	SMH 05001	76	UC	300	0.080	0.77	0.104	0.104	Proposed	Hillside	19	3,806	1,332	1.00	1.87	1.77	324.47	1.65	OK	0.120	90%	OK	
	Existing Terrain	SMH 05001	300	UC	300	3.00	0.080	0.77	0.104	Proposed	Hillside	18	53,152	18,603	7.25	0.77	3.77	287.31	2.17	OK	0.207	25%	OK	
	SMH 13002	SMH 13003	100	BC	2500	2.0	3.750	5.50	0.682	Proposed	YLIEE	3	31,755	25,404	3.00	0.77	4.02	283.55	2.17	OK	2.001	25%	OK	
	SMH 13003	SMH 08001	33	BC	2500	2.0	3.750	5.50	0.682	Proposed	YLIEE	0	0	25,404	3.77	0.25	4.02	283.55	2.17	OK	2.001	25%	OK	
	SMH 07001	SMH 07001	133	Pipe	900	2.0	0.636	2.83	0.230	Proposed	YLIEE	2	35,421	0	16,343	7.68	0.44	8.12	239.29	2.21	OK	1.086	77%	OK
	SMH 08001	SMH 08001	40	BC	2500	2.0	3.750	5.50	0.682	Proposed	YLIEE	2	28,337	74,957	9.45	0.38	9.45	229.21	1.67	OK	1.351	72%	OK	
Discharge to Fok Hi Street (System P1)	SMH 10001	SGJ 1018766	40	Pipe	1200	1.000	1.131	3.77	0.300	Proposed	YLIEE	4	11,222	8,978	3.00	0.67	3.67	286.79	0.99	OK	0.720	64%	OK	
	SMH 10001	SMH 10001	125	Pipe	1200	1.000	1.131	3.77	0.300	Proposed	YLIEE	0	0	8,978	3.00	2.10	5.10	269.24	0.99	OK	0.671	60%	OK	
	SMH 10001	SMH 11001	47	BC	3000	2.5	1.000	6.000	7.00	0.857	YLIEE	0	0	83,935	9.83	0.44	10.27	223.63	1.78	OK	5.214	49%	OK	
	SMH 06001	SMH 11001	64	Pipe	600	2.000	0.283	1.88	0.150	Proposed	YLIEE	0	0	2,310	1.00	0.62	1.62	327.84	1.72	OK	0.210	43%	OK	
	SMH 06002	SMH 11002	33	Pipe	600	2.000	0.283	1.88	0.150	Proposed	YLIEE	0	0	2,310	1.00	0.32	1.32	335.23	1.72	OK	0.215	44%	OK	
	SMH 11001	SMH 11002	41	BC	3000	2.5	1.200	6.000	7.00	0.857	YLIEE	0	0	86,244	10.27	0.42	10.69	220.96	1.63	OK	5.294	54%	OK	
	SMH 11002	SMH 11003	164	BC	3000	2.5	1.200	6.000	7.00	0.857	YLIEE	1	35,405	28,324	116,878	10.69	1.68	12.37	211.27	1.63	OK	6.859	70%	OK
	SMH 09001	SMH 11003	81	RC	2000	2.0	5.000	4.000	6.00	0.667	YLIEE	17	22,810	7,984	27,919	7.25	0.63	7.88	241.24	2.13	OK	1.871	22%	OK
	SMH 11003	SGJ101323 (Point G)	106	BC	3000	2.5	1.200	6.000	7.00	0.857	YLIEE	0	144,797	12,37	1.09	13.46	13.46	205.71	1.63	OK	8.274	85%	OK	
	SMH 13000	SMH 13001	227	Pipe	1650	4.00	2.138	5.18	0.413	Proposed	YLIEE	0	35,121	35,121	3.00	1.67	4.67	274.70	2.27	OK	2.680	55%	OK	
Discharge to Fok Hi Street (System P2)	SMH 13001	SMH 1031687	230	Pipe	1650	4.00	2.138	5.18	0.413	Proposed	YLIEE	0	35,121	35,121	4.67	1.69	6.36	255.28	2.27	OK	2.490	51%	OK	
	Existing Terrain	SMH 51003	650	UC	750	6.39	0.502	1.93	0.260	Proposed	Hillside	11	130,030	45,511	16.71	1.65	2.65	306.25	1.80	OK	0.775	86%	OK	
	SMH 51001	SMH 51002	178	UC	750	150	0.502	1.93	0.260	Proposed	Hillside	13	26,020	9,107	10.715	1.00	0.52	1.52	330.24	2.08	OK	0.983	94%	OK
	SMH 51003	SMH 55001	65	UC	750	450	0.321	1.54	0.208	Proposed	Hillside	9	30,614	10,715	10.715	1.00	1.21	2.21	314.89	1.04	OK	0.256	77%	OK
	SMH 52001	SMH 55001	75	UC	750	200	0.442	2.96	0.188	Proposed	Hillside	23	8,377	2,932	2.932	0.58	0.38	3.23	295.93	1.98	OK	0.449	86%	OK
	SMH 51003	SMH 55000	69	Pipe	1500	400	1.767	4.71	0.375	Proposed	YLIEE	0	0	0	54,618	16.71	0.51	17.22	189.69	2.14	OK	2.878	76%	OK
	SMH 55000	SMH 55001	70	Pipe	1650	400	2.138	5.18	0.413	Proposed	YLIEE	0	0	0	54,618	17.22	0.51	17.73	187.81	2.27	OK	2.849	59%	OK
	SMH 55001	SMH 58001	167	Pipe	1800	500	2.545	5.65	0.450	Proposed	PH Site	2	12,269	9,815	78,080	17.73	1.30	19.03	183.31	2.14	OK	3.976	73%	OK
	SMH 54001	SMH 58001	286	Pipe	1650	500	2.138	5.18	0.413	Proposed	PH Site	1	53,030	42,424	3.00	2.35	5.35	266.26	2.03	OK	3.138	72%	OK	
	Proposed Twin Cells Box Culvert along Fok Hi Street (System P3)	SMH 59001	SMH 58001	109	Pipe	1200	500	1.131	3.77	0.300	Proposed	PH Site	4	16,690	13,192	3.00	1.69	4.09	282.59	1.67	OK	1.066	55%	OK
SMH 58001		SMH 71001	138	BC	3000	1	5.00	4.500	6.00	0.750	PH Site	3	27,864	155,987	19.03	1.00	20.03	180.11	2.31	OK	7.804	75%	OK	
SMH 71001		SMH 1031687	80	BC	3000	1	5.00	4.500	6.00	0.750	PH Site	0	24,543	175,621	20.03	0.58	20.61	178.33	2.31	OK	8.100	84%	OK	
SMH 1031687		SMH 13005	170	BC	3500	2	15.00	10.500	9.50	1.105	Basin/Urban	0	57,144	265,029	20.61	1.64	22.25	173.60	1.73	OK	12.780	71%	OK	
SMH 13005		SMH 71001 (Shan Poi River)	387	BC	3500	2	15.00	10.500	9.50	1.105	Basin/Urban	0	0	265,029	22.25	3.74	25.99	164.22	1.73	OK	12.090	67%	OK	

Job Title	Planning and Engineering Study at Wong Chau	Date	15 OCT 2013	Out	NY
Client	Hydraulic Assessment of Proposed Drainage System	Drawn by	LTJ	Checked	[Blank]
Member Location	[Blank]	Date	15 OCT 2013	Out	NY

Design Rainfall Return Period

50

Being conservative, assuming the existing channel to be RC.

Description	US MH No.	DS MH No.	Length (m)	Type (UC/RP/BC)	Diameter of Pipe/Channel (mm)	Height of Channel (m, For BC and RC only)	No of Cuts For BC only	Pipe/Channel/FRC			Design Data				Pipelines Design													
								Gradient (1 in)	Area (m ²)	Perimeter (m)	Hydraulic Radius (m)	Existing / Proposed	Roughness Coefficient (nms, For Pipe only)	Catchment Ref.	Catchment ID	Paved Area (m ²)	Gleasland Area (m ²)	Additional Effective Catchment Area (m ²)	Cumulative Effective Catchment Area (m ²)	Velocity (m/s)	Check for Full-bore Pipe (1-4m/s)	Peak Runoff (m ³ /s)	Capacity Utilization Ratio	Check (<100%)				
PH Site Phase 2 Discharge to Long Ping Road (System P2)	SMH 61004	SMH 61003	89	UC	450			200	0.181	1.16	0.156	Proposed	0.6	Hillside	22	3,672	1,285	1,285	1.00	1.16	2.16	315.93	1.28	OK	0.113	49%	OK	
	SMH 61002	SMH 61003	90	UC	525			200	0.246	1.35	0.182	Proposed	0.6	Hillside	21	8,886	3,110	3,110	1.00	1.06	2.06	318.07	1.42	OK	0.275	79%	OK	
	SMH 61001	SMH 63001	192	Pipe	600			300	0.283	1.88	0.150	Proposed	0.6	Hillside	0	0	4,395	4,395	2.16	2.28	4.44	277.71	1.40	OK	0.339	86%	OK	
	SMH 63002	SMH 63001	78	UC	525			200	0.246	1.35	0.182	Proposed	0.6	Hillside	8	9,105	3,187	3,187	1.00	0.91	1.91	321.12	1.42	OK	0.284	81%	OK	
	SMH 63001	SMH 63001	101	UC	300			100	0.080	0.77	0.104	Proposed	0.6	Hillside	7	2,557	895	895	1.00	1.22	2.22	314.70	1.38	OK	0.078	70%	OK	
	SMH 63001	SMH 63002	90	Pipe	900			400	0.636	2.83	0.225	Proposed	0.6	Hillside	0	0	8,477	8,477	4.44	0.96	5.40	265.67	1.56	OK	0.626	63%	OK	
	SMH 63002	SMH 63001	77	Pipe	900			400	0.636	2.83	0.225	Proposed	0.6	Hillside	0	0	8,477	8,477	4.44	0.18	5.58	265.59	1.56	OK	0.621	63%	OK	
	Existing Terrain	SMH 63001	SMH 63001	142				444								10,440	3,654	3,654	4.37									
	PH Site Phase 1 Discharge to Long Ping Road (System P2)	SMH 66001	SMH 66001	170	UC	900			500	0.723	2.31	0.313	Proposed	0.6	Hillside	3	10,440	3,654	3,654	1.00	2.20	3.20	296.38	1.29	OK	0.301	32%	OK
		SMH 66002	SMH 69001	131	UC	450			100	0.181	1.16	0.156	Proposed	0.6	Hillside	0	7,149	2,502	2,502	1.00	1.47	2.47	309.52	1.48	OK	0.215	80%	OK
SMH 66002		SMH 69001	51	UC	450			200	0.181	1.16	0.156	Proposed	0.6	Hillside	2	3,863	1,352	1,352	1.00	0.66	1.66	326.85	1.28	OK	0.123	53%	OK	
SMH 68001		SMH 69001	123	Pipe	1050			400	0.866	3.30	0.263	Proposed	0.6	PH Site	5	10,653	8,042	15,350	4.37	1.19	5.56	263.86	1.72	OK	1.125	76%	OK	
SMH 68001		SMH 65001	132	Pipe	1350			500	1.431	4.24	0.338	Proposed	0.6	PH Site	5	10,653	8,042	27,246	5.56	1.23	6.79	251.05	1.79	OK	1.900	74%	OK	
SMH 68001		SMH 65001	93	UC	450			200	0.181	1.16	0.156	Proposed	0.6	Hillside	1	3,222	1,128	1,128	1.00	1.21	2.21	314.85	1.28	OK	0.099	43%	OK	
SMH 63001		SMH 82001	23	Pipe	1500			500	1.767	4.71	0.375	Proposed	0.6	PH Site	0	0	36,851	36,851	6.79	0.20	6.99	249.15	1.91	OK	2.550	76%	OK	
SMH 7001		SMH 70002	74	Pipe	1050			400	0.866	3.30	0.263	Proposed	0.6	PH Site	7	19,774	15,819	15,819	3.00	0.72	3.72	288.09	1.72	OK	1.266	85%	OK	
SMH 7002		SMH 81001	265	Pipe	1350			550	1.431	4.24	0.338	Proposed	0.6	PH Site	6	14,620	11,696	27,515	3.72	2.59	6.30	255.84	1.71	OK	1.955	80%	OK	
SMH 81001		SMH 1026952	140	Pipe	1500			500	1.767	4.71	0.375	Proposed	0.6	PH Site	0	0	27,515	27,515	6.30	1.22	7.53	244.30	1.91	OK	1.867	55%	OK	
Proposed Drainage System along Long Ping Road	SMH 1026952	SMH 81002	80	Pipe	1500			500	1.767	4.71	0.375	Proposed	0.6	PH Site	0	0	27,515	27,515	7.53	0.70	8.22	238.44	1.91	OK	1.822	54%	OK	
	SMH 81002	SMH 82001	170	BC	3500			1000	5.250	6.50	0.808	Proposed	0.6	Existing Urban	2	76,851	73,008	106,524	7.53	1.65	9.18	231.14	1.71	OK	6.454	72%	OK	
	SMH 82001	SGJ 1006888	112	BC	3500			2000	10.500	9.50	1.105	Proposed	0.6	Existing Urban	0	0	137,374	137,374	9.18	0.88	10.06	225.01	2.11	OK	8.386	39%	OK	
	SGJ 1006888	SNF1004264 (Shan Pui River)	389	BC	3500			2000	10.500	9.50	1.105	Existing	0.016	Existing Urban	1	59,000	56,050	193,424	10.06	2.37	12.44	210.92	2.73	OK	11.333	40%	OK	
	SNF1004264 (Shan Pui River)	Existing Terrain	595					12,666							115,125	40,294	40,294	17.75										
	SMH 67001	SMH 67002	61	UC	450			200	0.181	1.16	0.156	Proposed	0.6	Hillside	10	6,850	2,398	2,398	5.00	0.79	5.79	261.27	1.28	OK	0.174	75%	OK	
	SMH 67003	SMH 67002	230	UC	600			200	0.321	1.54	0.208	Proposed	0.6	Hillside	5	6,850	2,398	2,398	5.00	2.47	3.47	292.00	1.55	OK	0.433	87%	OK	
	SMH 90001	SMH 90001	98	Pipe	1200			200	1.131	3.77	0.300	Proposed	0.6	Hillside	6	15,242	5,335	5,335	1.00	0.62	1.62	185.56	2.64	OK	2.475	83%	OK	
	SMH 90001	SMH 90002	94	Pipe	1200			200	1.131	3.77	0.300	Proposed	0.6	Hillside	0	0	48,026	48,026	17.15	0.59	18.37	183.55	2.64	OK	2.449	82%	OK	
	SMH 90002	SMH 90003	108	Pipe	1350			300	1.431	4.24	0.338	Proposed	0.6	Hillside	4	12,664	4,452	52,458	18.96	0.78	19.74	181.02	2.32	OK	2.638	80%	OK	

Summary results from InfoWorks ICM Simulation - Case 1

WC 50R 10T.prn

Produced on 15/11/2013 at 14:27

configured for MS windows

Start of run

Infoworks ICM SIM

Summary results from Simulation

Version 4.0.0.8004 (Win32) dated July 2013

Licence Number - WS33330158PM

Message 253: Run finished for event 1.
 Model network_1 (version 238) (Scenario Planned + WC S9) Event - 1 WS33330158PM Produced 15/11/2013 Pg 1
 Summary results for event 1 - Planned + WC S9 M0-240
 Started at 0000000000000. Run for 300.00 min. (Requested simulation time 300.00 min)

Files used:
 Network: ...planned202b20wc20s9.sp Model network_1 (version 238) (scenario Planned + WC S9)
 State: ...
 Runoff: ...planned202b20wc20s9.rp Model network_1 (version 238) (scenario Planned + WC S9) (Infoworks 4.0.0.8004)
 Rainfall: ...sim153event.red M0-240, a=687, b=4.2, c=0.42 x1.00
 DWF:

InfFlows: ...
 Levels: ...sim153event.lev 1
 RTC:
 Results: ...sim153.iwr

Total rainfall = 252174.0 m3
 Total runoff = 161444.5 m3
 Total inflow = 4162844.5 m3
 Total outflow = 4162843.6 m3
 Total lost = 0.0 m3

Model network_1 (version 238) (Scenario Planned + WC S9) Event - 1 WS33330158PM Produced 15/11/2013 Pg 2

***** Node data *****

Node Reference	Ground Level (m AD)	Max Level (m AD)	Flood Volume (m3)	Flood depth (m)	Flood Area (m2)	Max Stored (m3)	Inflow (m3)	Vol Balance (m3)	Vol Balance (%)
SGJ 1018766	4.900	4.609	0.0	0.000	0.0	8.4	0.0	0.000	0.000
SGJ1006888	5.000	4.539	0.0	0.000	0.0	12.5	15134.9	0.000	0.000
SMH 07001	7.200	5.726	0.0	0.000	0.0	2.5	6052.5	-0.000	0.000
SMH 05001	7.000	5.206	0.0	0.000	0.0	1.8	6612.0	-0.000	0.000
SMH 06001	7.000	5.316	0.0	0.000	0.0	0.8	591.0	-0.000	0.000
SMH 06002	7.000	5.316	0.0	0.000	0.0	0.8	591.0	-0.000	0.000
SMH 07001	7.200	4.856	0.0	0.000	0.0	2.6	0.0	-0.000	0.000
SMH 08001	6.700	4.585	0.0	0.000	0.0	7.4	6841.0	-0.000	0.000
SMH 10001	6.700	4.555	0.0	0.000	0.0	8.6	0.0	0.000	0.000
SMH 1026952	4.800	4.759	0.0	0.000	0.0	9.8	0.0	0.000	0.000
SMH 1031687	4.170	4.799	475.5	0.629	2175.6	488.0	13789.5	-0.009	0.000
SMH 11001	6.700	4.539	0.0	0.000	0.0	8.7	0.0	0.000	0.000
SMH 11002	6.700	4.524	0.0	0.000	0.0	8.7	7625.3	-0.000	0.000
SMH 11003	6.700	4.428	0.0	0.000	0.0	8.9	0.0	0.000	0.000
SMH 13000	6.700	5.677	0.0	0.000	0.0	12.3	13311.6	0.000	0.000
SMH 13001	4.600	5.228	0.7	0.628	1.0	11.4	0.0	0.000	0.000
SMH 13002	6.700	4.595	0.0	0.000	0.0	6.5	4176.5	0.000	0.000
SMH 13003	6.700	4.589	0.0	0.000	0.0	7.1	0.0	-0.000	0.000
SMH 13005	4.430	4.638	0.3	0.208	1.0	14.1	0.0	0.000	0.000
SMH 51002	11.000	8.436	0.0	0.000	0.0	2.1	2463.9	-0.000	0.000
SMH 51003	11.000	8.304	0.0	0.000	0.0	3.7	12409.8	-0.000	0.000
SMH 54001	9.000	6.328	0.0	0.000	0.0	3.4	10806.1	-0.000	0.000

Link Reference	D/S Node	Pipe Len (m)	Pipe Hgt (mm)	Sed Dpth (mm)	P.Full Flow (m3/s)	Invert Level (m AD)	Max Depth (m)	Max Flow (m3/s)	Max Vel (m/s)	Total Flow (m3)	Upstream	Downstream	Total Flow (m3)
SMH 55000	11.000	8.121	0.0	0.0	0.0	0.000	0.0	3.6	0.0	0.0	-0.000	0.000	0.000
SMH 55001	10.000	7.983	0.0	0.0	0.0	0.000	0.0	3.8	0.0	3539.0	-0.000	0.000	0.000
SMH 58001	8.200	5.208	0.0	0.0	0.0	0.000	0.0	10.9	10.9	8180.9	-0.000	0.000	0.000
SMH 59001	9.000	6.453	0.0	0.0	0.0	0.000	0.0	2.3	2.3	3886.7	-0.000	0.000	0.000
SMH 61003	10.000	5.159	0.0	0.0	0.0	0.000	0.0	1.6	1.6	1177.2	-0.000	0.000	0.000
SMH 63001	6.800	4.773	0.0	0.0	0.0	0.000	0.0	3.8	3.8	1116.2	-0.000	0.000	0.000
SMH 63002	5.900	4.665	0.0	0.0	0.0	0.000	0.0	4.2	4.2	0.0	-0.000	0.000	0.000
SMH 65001	5.700	4.640	0.0	0.0	0.0	0.000	0.0	9.8	9.8	310.7	-0.000	0.000	0.000
SMH 68001	13.000	8.841	0.0	0.0	0.0	0.000	0.0	2.4	2.4	4632.8	-0.000	0.000	0.000
SMH 69001	10.000	7.675	0.0	0.0	0.0	0.000	0.0	2.9	2.9	3306.5	-0.000	0.000	0.000
SMH 69002	9.000	6.069	0.0	0.0	0.0	0.000	0.0	2.9	2.9	0.0	-0.000	0.000	0.000
SMH 69003	8.000	5.099	0.0	0.0	0.0	0.000	0.0	2.8	2.8	0.0	-0.000	0.000	0.000
SMH 69004	7.000	4.699	0.0	0.0	0.0	0.000	0.0	5.5	5.5	0.0	-0.000	0.000	0.000
SMH 70001	15.000	13.703	0.0	0.0	0.0	0.000	0.0	2.6	2.6	3224.4	-0.000	0.000	0.000
SMH 70002	15.000	13.641	0.0	0.0	0.0	0.000	0.0	3.1	3.1	4237.5	-0.000	0.000	0.000
SMH 70003	14.000	8.753	0.0	0.0	0.0	0.000	0.0	2.6	2.6	0.0	-0.000	0.000	0.000
SMH 70004	10.000	7.574	0.0	0.0	0.0	0.000	0.0	2.5	2.5	0.0	-0.000	0.000	0.000
SMH 70005	9.000	4.949	0.0	0.0	0.0	0.000	0.0	7.5	7.5	0.0	-0.000	0.000	0.000
SMH 71001	5.700	4.979	0.0	0.0	0.0	0.000	0.0	14.8	14.8	5747.3	-0.000	0.000	0.000
SMH 81001	5.800	4.879	0.0	0.0	0.0	0.000	0.0	9.2	9.2	0.0	-0.000	0.000	0.000
SMH 81002	5.000	4.696	0.0	0.0	0.0	0.000	0.0	11.5	11.5	18834.5	-0.000	0.000	0.000
SMH 87001	5.700	4.583	0.0	0.0	0.0	0.000	0.0	83.8	83.8	0.0	-0.000	0.000	0.000
SNF_I006140	4.900	4.637	0.0	0.0	0.0	0.000	0.0	7.3	7.3	2845.9	-0.000	0.000	0.000
SNF_I004264 (SHAN PUI RIVER)	4.000	4.287	1.0	1.0	0.287	0.287	1.9	14.2	14.2	4001400.0	-0.000	0.000	0.000

A % indicates water lost from the system.

Model network_1 (version 238) (Scenario Planned + WC S9) Event - 1 WS33330158PM Produced 15/11/2013 Pg 3

***** Link data *****

Link Reference	D/S Node	Pipe Len (m)	Pipe Hgt (mm)	Sed Dpth (mm)	P.Full Flow (m3/s)	Invert Level (m AD)	Max Depth (m)	Max Flow (m3/s)	Max Vel (m/s)	Total Flow (m3)	Upstream	Downstream	Total Flow (m3)
SGJ 1018766.1	SMH 10001	125	1200	0	1.123	2.200	2.405	0.789	0.658	2845.9x	2.110	2.445	0.788
SGJ1006888.1	SMH 10001	392	2000	0	13.177	0.980	3.550	7.036	0.954	25987.2x	0.330	3.958	7.044
SGJ1006888.2	SMH 10001	392	2000	0	13.177	0.980	3.550	7.036	0.954	25987.2x	0.330	3.958	7.044
SMH 02001.1	SMH 07001	58	900	0	1.356	5.000	0.707	1.325	2.475	6052.5	4.730	0.683	1.325
SMH 05001.1	SMH 11003	81	2000	0	7.000	4.700	0.506	1.453	1.441	6612.0	4.540	1.449	1.835
SMH 06001.1	SMH 11001	64	600	0	0.485	5.100	0.216	0.133	1.462	591.0	4.940	0.133	1.457
SMH 06002.1	SMH 11002	31	600	0	0.486	5.100	0.216	0.133	1.462	591.0	4.940	0.133	1.457
SMH 07001.1	SMH 08001	133	1200	0	1.897	4.110	0.742	1.324	1.840	6052.5	3.840	0.746	1.460
SMH 08001.1	SMH 10001	50	2000	0	9.445	2.480	2.101	4.375	0.866	17069.9x	2.380	2.175	4.398
SMH 10001.1	SMH 11001	47	2500	0	11.844	2.110	2.443	5.164	0.713	19915.8	2.060	2.479	5.206
SMH 1026952.1	SMH 11002	81	1500	0	3.363	1.971	2.780	1.999	1.074	7461.8x	1.810	2.887	2.002
SMH 1031687.1	SMH 13005	170	2000	0	8.345	0.600	4.186	9.087	1.228	37104.9+	0.487	4.053	9.091
SMH 1031687.2	SMH 13005	170	2000	0	8.382	0.700	4.086	9.062	1.226	37029.2+	0.586	4.053	9.066
SMH 11001.1	SMH 11002	41	2500	0	9.823	2.060	2.477	5.338	0.733	20506.8	2.030	2.494	5.398
SMH 11002.1	SMH 11003	164	2500	0	10.610	2.030	2.489	7.535	1.023	28723.0	1.890	2.538	7.636
SMH 11003.1	(POINT G)	106	2500	0	10.361	1.890	2.531	9.059	1.211	35335.0x	1.800	2.541	9.073
SMH 13000.1	SMH 13001	227	1650	0	4.388	2.150	3.504	3.698	1.621	13311.6x	1.580	3.650	3.696
SMH 13001.1	SMH 1031687	230	1650	0	4.359	1.550	3.658	3.695	1.621	13311.6x	0.980	3.821	3.691
SMH 13002.1	SMH 13003	33	2000	0	9.445	2.750	1.845	1.159	0.251	4176.5	2.550	2.039	1.234
SMH 13003.1	SMH 08001	33	2000	0	9.727	2.550	2.039	1.237	0.251	4176.5x	2.480	2.105	0.251
SMH 13005.1	SMH 13005	387	2000	0	8.357	0.487	4.137	9.084	1.229	37082.8+	0.229	4.060	9.088
SMH 13005.2	SMH 13005	387	2000	0	8.357	0.487	4.137	9.084	1.229	37082.8+	0.229	4.060	9.088
SMH 51002.1	SMH 51003	69	750	0	0.756	7.850	0.580	0.526	1.606	37051.3+	3.328	3.961	9.076
SMH 51003.1	SMH 55000	65	1500	0	3.746	7.250	1.042	3.161	2.448	14873.7	7.090	1.327	3.137
SMH 54001.1	SMH 55001	286	1650	0	4.321	5.350	0.974	3.002	2.317	10806.1	4.780	0.850	2.455
SMH 55000.1	SMH 55001	70	1650	0	4.913	7.090	1.024	3.135	2.283	14873.5	6.910	1.074	3.125
SMH 55001.1	SMH 59001	165	1800	0	5.516	6.910	1.067	3.865	2.477	18412.3	6.570	0.970	3.837
SMH 58001.1	SMH 71001	138	2000	0	12.016	2.100	3.077	9.670	1.541	41285.7x	1.820	3.162	9.670
SMH 59001.1	SMH 58001	109	1200	0	1.705	5.800	0.651	1.079	1.774	3886.7	5.580	0.560	2.043
SMH 61003.1	SMH 63001	192	600	0	0.396	4.700	0.454	0.346	1.615	1177.2	4.060	0.714	1.489
SMH 63001.1	SMH 63002	90	900	0	0.992	3.685	1.080	0.648	0.986	2293.3x	3.460	1.206	0.651
SMH 63002.1	SMH 65001	17	900	0	0.962	3.460	1.198	0.655	0.988	2293.3x	3.420	1.221	0.655
SMH 65001.1	SMH 82001	23	1500	0	3.375	1.846	2.774	2.835	1.521	10543.3x	1.800	2.785	2.836

Model	Event	WC 50R	10T	prn	68001.1	69001.1	69002.1	69003.1	69004.1	70001.1	70002.1	70003.1	70004.1	70005.1	70005.1	71001.1	81001.1	81002.1	82001.1	82001.2	1006140.1	1004264	(SHAN PUI RIVER).1	Scenario	Planned	+ WC S9)	Produced	15/11/2013	Pg 4			
SMH 68001.1	0	1.491	8.150	0.684	1.191	2.013	4632.8	7.840	0.612	1.162	2.216	4632.8	7.840	0.612	1.162	2.216	4632.8	7.840	0.612	1.162	2.216	4632.8	7.840	0.612	1.162	2.216	4632.8	7.840	0.612	1.162	2.216	4632.8
SMH 69001.1	0	2.542	6.840	0.829	2.125	2.307	7939.3	6.752	0.774	2.109	2.484	7939.3	6.752	0.774	2.109	2.484	7939.3	6.752	0.774	2.109	2.484	7939.3	6.752	0.774	2.109	2.484	7939.3	6.752	0.774	2.109	2.484	7939.3
SMH 69002.1	0	2.542	5.252	0.811	2.107	2.346	7939.3	5.190	0.771	2.092	2.476	7939.3	5.190	0.771	2.092	2.476	7939.3	5.190	0.771	2.092	2.476	7939.3	5.190	0.771	2.092	2.476	7939.3	5.190	0.771	2.092	2.476	7939.3
SMH 69003.1	0	2.542	4.290	0.803	2.090	2.363	7939.3	4.241	0.770	2.087	2.474	7939.3	4.241	0.770	2.087	2.474	7939.3	4.241	0.770	2.087	2.474	7939.3	4.241	0.770	2.087	2.474	7939.3	4.241	0.770	2.087	2.474	7939.3
SMH 69004.1	0	2.542	3.141	1.544	2.091	1.413	7939.3x	3.080	1.561	2.096	1.414	7939.3x	3.080	1.561	2.096	1.414	7939.3x	3.080	1.561	2.096	1.414	7939.3x	3.080	1.561	2.096	1.414	7939.3x	3.080	1.561	2.096	1.414	7939.3x
SMH 70001.1	0	1.485	12.950	0.749	0.894	1.415	3224.4	12.765	0.877	0.869	1.155	3224.4	12.765	0.877	0.869	1.155	3224.4	12.765	0.877	0.869	1.155	3224.4	12.765	0.877	0.869	1.155	3224.4	12.765	0.877	0.869	1.155	3224.4
SMH 70002.1	0	2.444	12.765	0.870	2.025	2.111	7461.7	12.510	0.752	1.995	2.434	7461.7	12.510	0.752	1.995	2.434	7461.7	12.510	0.752	1.995	2.434	7461.7	12.510	0.752	1.995	2.434	7461.7	12.510	0.752	1.995	2.434	7461.7
SMH 70003.1	0	4.127	8.002	0.750	1.993	2.106	7461.8	7.889	0.704	1.967	2.263	7461.8	7.889	0.704	1.967	2.263	7461.8	7.889	0.704	1.967	2.263	7461.8	7.889	0.704	1.967	2.263	7461.8	7.889	0.704	1.967	2.263	7461.8
SMH 70004.1	0	4.099	6.848	0.726	1.966	2.181	7461.8	6.806	0.703	1.970	2.265	7461.8	6.806	0.703	1.970	2.265	7461.8	6.806	0.703	1.970	2.265	7461.8	6.806	0.703	1.970	2.265	7461.8	6.806	0.703	1.970	2.265	7461.8
SMH 70005.1	0	2.442	2.822	2.109	1.977	1.371	7461.8x	2.750	2.131	1.979	1.322	7461.8x	2.750	2.131	1.979	1.322	7461.8x	2.750	2.131	1.979	1.322	7461.8x	2.750	2.131	1.979	1.322	7461.8x	2.750	2.131	1.979	1.322	7461.8x
SMH 71001.1	0	11.930	0.760	4.190	11.216	1.769	47033.0x	0.600	4.202	11.216	1.768	47033.0x	0.600	4.202	11.216	1.768	47033.0x	0.600	4.202	11.216	1.768	47033.0x	0.600	4.202	11.216	1.768	47033.0x	0.600	4.202	11.216	1.768	47033.0x
SMH 81001.1	0	3.363	2.250	2.618	1.986	1.070	7461.8x	1.971	2.789	1.993	1.071	7461.8x	1.971	2.789	1.993	1.071	7461.8x	1.971	2.789	1.993	1.071	7461.8x	1.971	2.789	1.993	1.071	7461.8x	1.971	2.789	1.993	1.071	7461.8x
SMH 81002.1	0	10.281	1.400	3.286	7.054	0.963	26296.2x	1.230	3.354	7.071	0.964	26296.2x	1.230	3.354	7.071	0.964	26296.2x	1.230	3.354	7.071	0.964	26296.2x	1.230	3.354	7.071	0.964	26296.2x	1.230	3.354	7.071	0.964	26296.2x
SMH 82001.1	0	10.144	1.230	3.349	4.967	0.677	18419.8x	1.120	3.420	4.976	0.678	18419.8x	1.120	3.420	4.976	0.678	18419.8x	1.120	3.420	4.976	0.678	18419.8x	1.120	3.420	4.976	0.678	18419.8x	1.120	3.420	4.976	0.678	18419.8x
SMH 82001.2	0	10.144	1.230	3.349	4.967	0.677	18419.8x	1.120	3.420	4.976	0.678	18419.8x	1.120	3.420	4.976	0.678	18419.8x	1.120	3.420	4.976	0.678	18419.8x	1.120	3.420	4.976	0.678	18419.8x	1.120	3.420	4.976	0.678	18419.8x
SNF 1006140.1	0	0.753	2.220	2.413	0.790	0.659	2845.9+	2.200	2.409	0.790	0.659	2845.9+	2.200	2.409	0.790	0.659	2845.9+	2.200	2.409	0.790	0.659	2845.9+	2.200	2.409	0.790	0.659	2845.9+	2.200	2.409	0.790	0.659	2845.9+
SNF1004264 (SHAN PUI RIVER).1	0	1102.51	0.229	4.052	253.979	1.090	4127508.6x	0.228	4.053	253.979	1.090	4127508.6x	0.228	4.053	253.979	1.090	4127508.6x	0.228	4.053	253.979	1.090	4127508.6x	0.228	4.053	253.979	1.090	4127508.6x	0.228	4.053	253.979	1.090	4127508.6x

Model network_1 (version 238) (Scenario Planned + WC S9) Event - 1 WS33330158PM Produced 15/11/2013 Pg 4

+ after total flow indicates a conduit surcharged by flow and depth at that end.
x after total flow indicates a conduit surcharged by depth only at that end.

NOTE :
(i) Maximum elevations, depths, volumes, velocities and discharges are selected from the values at each time increment and will be in general more extreme than the maximum values in the time varying results.
(ii) Maximum elevations, velocities and discharges are not necessarily calculated at the same time.
(iii) Maximum velocity is not calculated for a conduit unless the depth exceeds the base flow depth (by default, this is 5% of height for slopes <= 0.01, 10% otherwise, subject to a minimum of 0.02 m).

End of run 0 mins (elapsed) Produced on 15/11/2013 Last page

Summary results from InfoWorks ICM Simulation - Case 2

WC 10R 50T.prn

Produced on 15/11/2013 at 14:27

configured for MS windows

InfoWorks ICM SIM

Summary results from Simulation

version 4.0.0.8004 (Win32) dated July 2013

Licence Number - WS33330158PM

Message 253: Run finished for event 1.

Model network_1 (version 238) (Scenario Planned + WC S9) Event - 1 WS33330158PM Produced 15/11/2013 Pg 1

Summary results for event 1 - Planned + WC S9 MO-240
 Started at 00000000000000. Run for 300.00 min. (Requested simulation time 300.00 min)

Files used:

Network: ...planned202b20wc20s9.sp Model network_1 (version 238) (scenario Planned + WC S9)
 State: ...planned202b20wc20s9.sp Model network_1 (version 238) (scenario Planned + WC S9)
 Runoff: ...planned202b20wc20s9.sp Model network_1 (version 238) (scenario Planned + WC S9) (InfoWorks 4.0.0.8004)
 Rainfall: ...sim151event.red MO-240, a=603, b=4.4, c=0.44 x1.00
 DWF:

InfFlows: ...sim151event.lev 1
 Levels: ...sim151.iwr
 RTC:
 Results: ...sim151.iwr

Total rainfall = 198236.9 m3
 Total runoff = 126913.4 m3
 Total inflow = 4128313.4 m3
 Total outflow = 4128312.6 m3
 Total lost = 0.0 m3

Model network_1 (version 238) (Scenario Planned + WC S9) Event - 1 WS33330158PM Produced 15/11/2013 Pg 2

***** Node data *****

Node Reference	Ground Level (m AD)	Max Level (m AD)	Flood Volume (m3)	Flood Depth (m)	Flood Area (m2)	Max Stored (m3)	Inflow (m3)	Vo1 Balance (m3)	Vo1 Balance (%)
SGJ 1018766	4.900	4.709	0.0	0.000	0.0	8.8	0.0	0.000	0.000
SGJ1006888	5.000	4.548	0.0	0.000	0.0	12.5	11897.7	-0.000	0.000
SMH 02001	7.200	5.619	0.0	0.000	0.0	2.2	4757.9	-0.000	0.000
SMH 03001	7.000	5.147	0.0	0.000	0.0	1.6	5197.8	-0.000	0.000
SMH 06001	7.000	5.293	0.0	0.000	0.0	0.7	464.6	-0.000	0.000
SMH 06002	7.000	5.293	0.0	0.000	0.0	2.5	464.6	-0.000	0.000
SMH 07001	7.200	4.834	0.0	0.000	0.0	7.7	0.0	-0.000	0.000
SMH 08001	6.700	4.694	0.0	0.000	0.0	9.0	5377.8	-0.000	0.000
SMH 10001	6.700	4.671	0.0	0.000	0.0	9.6	0.0	-0.000	0.000
SMH 1026952	4.800	4.704	0.0	0.000	0.0	366.4	0.0	-0.000	0.000
SMH 1031687	4.170	4.738	353.9	0.568	1786.8	9.1	10840.1	-0.017	0.000
SMH 11001	6.700	4.658	0.0	0.000	0.0	9.2	0.0	-0.000	0.000
SMH 11002	6.700	4.646	0.0	0.000	0.0	9.4	5994.3	-0.000	0.000
SMH 11003	6.700	4.575	0.0	0.000	0.0	11.2	0.0	-0.000	0.000
SMH 13000	6.700	5.350	0.0	0.000	0.0	11.2	10464.4	-0.000	0.000
SMH 13001	4.600	5.038	0.6	0.438	1.0	6.8	0.0	0.000	0.000
SMH 13002	6.700	4.703	0.0	0.000	0.0	7.5	3283.2	0.000	0.000
SMH 13003	6.700	4.697	0.0	0.000	0.0	14.1	0.0	0.000	0.000
SMH 13005	4.430	4.621	0.3	0.191	1.0	1.6	0.0	0.000	0.000
SMH 51002	11.000	8.306	0.0	0.000	0.0	1.6	1936.9	-0.000	0.000
SMH 51003	11.000	8.157	0.0	0.000	0.0	3.2	9753.5	0.000	0.000
SMH 54001	9.000	6.218	0.0	0.000	0.0	3.0	8494.8	-0.000	0.000

Link Reference	D/S Node	Pipe Len (m)	Pipe Hgt (mm)	Sed Dpth (mm)	P. Full Flow (m ³ /s)	Invert Level (m AD)	Max Depth (m)	Upstream Max Flow (m ³ /s)	Max Vel (m/s)	Total Flow (m ³)	Downstream Max Flow (m ³ /s)	Max Vel (m/s)	Total Flow (m ³)
SMH 55000	7.984	0.0	0.0	0.000	0.000	3.1	0.0	0.0	0.0	-0.000	0.000	0.000	0.000
SMH 55001	7.853	0.0	0.0	0.000	0.000	3.3	0.0	2782.0	0.540	-0.000	0.000	0.000	0.000
SMH 58001	5.015	0.0	0.0	0.000	0.000	10.2	0.0	6431.1	0.540	0.000	0.000	0.000	0.000
SMH 59001	6.385	0.0	0.0	0.000	0.000	2.0	0.0	3055.4	0.787	-0.000	0.000	0.000	0.000
SMH 61003	5.085	0.0	0.0	0.000	0.000	1.4	0.0	925.4	0.787	-0.000	0.000	0.000	0.000
SMH 63001	4.715	0.0	0.0	0.000	0.000	3.6	0.0	877.4	0.787	0.000	0.000	0.000	0.000
SMH 63002	4.637	0.0	0.0	0.000	0.000	4.1	0.0	0.0	0.0	0.000	0.000	0.000	0.000
SMH 65001	4.619	0.0	0.0	0.000	0.000	2.1	0.0	244.3	0.0	-0.000	0.000	0.000	0.000
SMH 68001	8.756	0.0	0.0	0.000	0.000	2.1	0.0	3641.9	0.0	0.000	0.000	0.000	0.000
SMH 69001	7.585	0.0	0.0	0.000	0.000	2.6	0.0	2599.3	0.0	-0.000	0.000	0.000	0.000
SMH 69002	5.982	0.0	0.0	0.000	0.000	2.6	0.0	0.0	0.0	-0.000	0.000	0.000	0.000
SMH 69003	5.016	0.0	0.0	0.000	0.000	2.5	0.0	0.0	0.0	-0.000	0.000	0.000	0.000
SMH 69004	4.659	0.0	0.0	0.000	0.000	5.3	0.0	0.0	0.0	0.000	0.000	0.000	0.000
SMH 70001	13.596	0.0	0.0	0.000	0.000	2.3	0.0	2534.7	0.0	0.000	0.000	0.000	0.000
SMH 70002	13.542	0.0	0.0	0.000	0.000	2.7	0.0	3331.1	0.0	-0.000	0.000	0.000	0.000
SMH 70003	8.679	0.0	0.0	0.000	0.000	2.4	0.0	0.0	0.0	0.000	0.000	0.000	0.000
SMH 70004	7.504	0.0	0.0	0.000	0.000	2.3	0.0	0.0	0.0	-0.000	0.000	0.000	0.000
SMH 70005	4.832	0.0	0.0	0.000	0.000	7.0	0.0	0.0	0.0	0.000	0.000	0.000	0.000
SMH 71001	4.860	0.0	0.0	0.000	0.000	14.4	0.0	4518.0	0.0	-0.000	0.000	0.000	0.000
SMH 81001	4.784	0.0	0.0	0.000	0.000	8.9	0.0	0.0	0.0	-0.000	0.000	0.000	0.000
SMH 81002	4.660	0.0	0.0	0.000	0.000	11.4	0.0	14806.0	0.0	-0.000	0.000	0.000	0.000
SMH 82001	4.580	0.0	0.0	0.000	0.000	83.8	0.0	0.0	0.0	0.000	0.000	0.000	0.000
SNF1006140	4.900	4.728	0.0	0.000	0.000	1.0	7.6	2237.2	7.6	-0.000	0.000	0.000	0.000
SNF1004264 (SHAN PUI RIVER)	4.000	4.367	0.0	1.1	0.367	1.0	14.3	4001400.0	14.3	0.000	0.000	0.000	0.000

A % indicates water lost from the system.

Model network_1 (version 238) (Scenario Planned + WC S9) Event - 1 WS33330158PM Produced 15/11/2013 Pg 3

***** Link data *****

Link Reference	D/S Node	Pipe Len (m)	Pipe Hgt (mm)	Sed Dpth (mm)	P. Full Flow (m ³ /s)	Invert Level (m AD)	Max Depth (m)	Upstream Max Flow (m ³ /s)	Max Vel (m/s)	Total Flow (m ³)	Downstream Max Flow (m ³ /s)	Max Vel (m/s)	Total Flow (m ³)
SGJ 1018766.1	SMH 10001	125	1200	0	1.123	2.200	2.506	0.649	0.540	2237.2x	0.649	0.539	2237.2x
SGJ1006888.1	SMH 10001	392	2000	0	13.177	0.980	3.562	5.786	0.787	20428.8x	5.797	0.785	20428.8x
SGJ1006888.2	SMH 10001	392	2000	0	13.177	0.980	3.562	5.786	0.787	20428.8x	5.797	0.785	20428.8x
SMH 02001.1	SMH 07001	58	900	0	1.356	5.000	0.608	1.071	2.348	4757.9	1.068	2.336	4757.9
SMH 05001.1	SMH 11003	81	2000	0	7.000	4.700	0.447	1.175	1.315	5197.8	1.168	1.690	5197.8
SMH 06001.1	SMH 11001	64	600	0	0.485	5.100	0.193	0.108	1.376	464.6	0.108	1.372	464.6
SMH 06002.1	SMH 11002	31	600	0	0.897	4.110	0.722	1.068	1.602	4757.9	1.147	1.557	4757.9
SMH 07001.1	SMH 08001	133	1200	0	1.844	2.480	2.211	3.639	0.705	13418.9x	3.646	0.703	13418.9x
SMH 08001.1	SMH 10001	47	2500	0	11.844	2.110	2.559	4.288	0.572	15656.1x	4.328	0.572	15656.1x
SMH 1026952.1	SMH 81002	81	1500	0	3.363	1.971	2.728	1.640	0.881	5865.7x	1.642	0.881	5865.7x
SMH 1031687.1	SMH 13005	170	2000	0	8.345	0.600	4.129	7.581	1.024	29168.1x	7.586	1.024	29168.1x
SMH 1031687.2	SMH 13005	170	2000	0	8.382	0.700	4.028	7.561	1.024	29168.1x	7.586	1.024	29168.1x
SMH 11001.1	SMH 11002	41	2500	0	9.823	2.060	2.596	4.435	0.586	16120.6x	4.464	0.587	16120.6x
SMH 11002.1	SMH 11003	164	2500	0	10.610	2.030	2.613	6.269	0.825	22579.5x	6.333	0.823	22579.5x
SMH 11003.1	(POINT G)	106	2500	0	10.581	1.890	2.679	7.474	0.972	27777.3x	7.483	0.968	27777.3x
SMH 13001.1	SMH 13001	227	1650	0	4.388	2.150	3.181	3.035	1.341	10464.4x	3.034	1.335	10464.4x
SMH 13001.1	SMH 1031687	230	1650	0	4.359	1.550	3.472	3.033	1.334	10464.4x	3.030	1.328	10464.4x
SMH 13002.1	SMH 13003	100	2000	0	9.445	2.750	1.953	0.952	1.016	3283.2x	1.029	0.201	3283.2x
SMH 13003.1	SMH 08001	33	2000	0	9.727	2.550	2.147	1.031	0.201	3283.2x	1.044	0.202	3283.2x
SMH 13005.1	SMH PUI RIVER	387	2000	0	8.357	0.487	4.124	7.581	1.025	29151.0x	7.585	1.026	29151.0x
SMH 13005.2	SMH PUI RIVER	387	2000	0	8.357	0.586	4.025	7.571	1.025	29126.7x	7.576	1.025	29126.7x
SMH 51002.1	SMH 51003	69	750	0	3.746	7.850	0.453	0.425	1.623	1936.9	0.421	1.476	1936.9
SMH 51003.1	SMH 55000	65	1500	0	3.746	7.250	0.901	2.546	3.326	11692.4	2.531	3.332	11692.4
SMH 54001.1	SMH 58001	286	1650	0	4.321	5.350	0.867	2.463	2.195	8494.8	2.332	2.390	8494.8
SMH 55000.1	SMH 55001	70	1650	0	4.913	7.090	0.892	2.531	2.172	11692.2	2.519	1.998	11692.2
SMH 55001.1	SMH 58001	165	1800	0	5.516	6.910	0.941	3.118	2.328	14474.1	3.098	2.552	14473.8
SMH 58001.1	SMH 71001	138	2000	0	12.016	2.100	2.895	7.847	1.253	32455.1x	7.853	1.252	32455.1x
SMH 59001.1	SMH 58001	109	1200	0	1.705	5.800	0.585	0.885	1.625	3055.4	0.868	1.918	3055.4
SMH 61003.1	SMH 63001	192	600	0	0.396	4.700	0.382	0.285	1.551	925.4	0.314	1.225	925.4
SMH 63001.1	SMH 63002	90	900	0	0.992	3.685	1.025	0.554	0.843	1802.8x	0.557	0.841	1802.8x
SMH 63002.1	SMH 65001	17	900	0	0.962	3.460	1.172	0.560	0.845	1802.8x	0.560	0.845	1802.8x
SMH 65001.1	SMH 82001	23	1500	0	3.375	1.846	2.760	2.360	1.263	8288.2x	2.356	1.263	8288.2x

SMH	68001.1	123	1050	0	1.491	8.150	0.603	0.975	1.907	3641.9	7.840	0.552	0.952	2.063	3641.9
SMH	69001.1	44	1350	0	2.542	6.840	0.742	1.741	2.160	6241.2	6.752	0.697	1.723	2.312	6241.2
SMH	69002.1	31	1350	0	2.542	5.252	0.728	1.721	2.191	6241.2	5.190	0.695	1.714	2.308	6241.2
SMH	69003.1	24	1350	0	2.542	4.290	0.723	1.714	2.204	6241.2	4.241	0.696	1.717	2.309	6241.2
SMH	69004.1	31	1350	0	2.542	3.141	1.509	1.720	1.165	6241.2x	3.080	1.540	1.725	1.164	6241.2x
SMH	70001.1	74	1050	0	1.485	12.950	0.644	0.733	1.385	2534.7	12.765	0.777	0.713	1.037	2534.6
SMH	70002.1	140	1350	0	2.444	12.765	0.774	1.653	1.993	5865.7	12.510	0.677	1.629	2.269	5865.7
SMH	70003.1	62	1650	0	4.127	8.002	0.677	1.628	1.981	5865.7	7.889	0.636	1.618	2.129	5865.7
SMH	70004.1	23	1650	0	4.099	6.848	0.656	1.618	2.044	5865.7	6.806	0.636	1.618	2.129	5865.7
SMH	70005.1	39	1350	0	2.442	2.822	1.997	1.623	1.086	5865.7x	2.750	2.035	1.625	1.086	5865.7x
SMH	71001.1	80	2000	0	11.930	0.760	4.080	9.114	1.439	36973.2x	0.600	4.140	9.114	1.438	36973.2x
SMH	81001.1	140	1500	0	3.363	2.250	2.526	1.630	0.878	5865.7x	1.971	2.733	1.635	0.879	5865.7x
SMH	81002.1	168	2000	0	10.281	1.400	3.254	5.799	0.791	20671.7x	1.230	3.351	5.812	0.792	20671.7x
SMH	82001.1	112	2000	0	10.144	1.230	3.347	4.094	0.558	14480.0x	1.120	3.429	4.101	0.559	14480.0x
SMH	82001.2	112	2000	0	10.144	1.230	3.347	4.094	0.558	14480.0x	1.120	3.429	4.101	0.559	14480.0x
SNF	1006140.1	50	1200	0	0.753	2.220	2.506	0.649	0.540	2237.2x	2.200	2.509	0.649	0.540	2237.2x
SNF	1004264 (SHAN PUI RIVER).1	1	4000	0	1102.51	0.229	4.132	248.587	1.045	4100535.3x	0.228	4.133	248.587	1.045	4100535.3x

Model network_1 (version 238) (Scenario Planned + WC S9) Event - 1 WS33330158PM Produced 15/11/2013 Pg 4

+ after total flow indicates a conduit surcharged by flow and depth at that end.
x after total flow indicates a conduit surcharged by depth only at that end.

NOTE :
(i) Maximum elevations, depths, volumes and discharges are selected from the values at each time increment and will be in general more extreme than the maximum values in the time varying results.
(ii) Maximum elevations, velocities and discharges are not necessarily calculated at the same time.
(iii) Maximum velocity is not calculated for a conduit unless the depth exceeds the base flow depth (by default, this is 5% of height for slopes <= 0.01, 10% otherwise, subject to a minimum of 0.02 m).

End of run 0 mins (elapsed) Produced on 15/11/2013 Last page

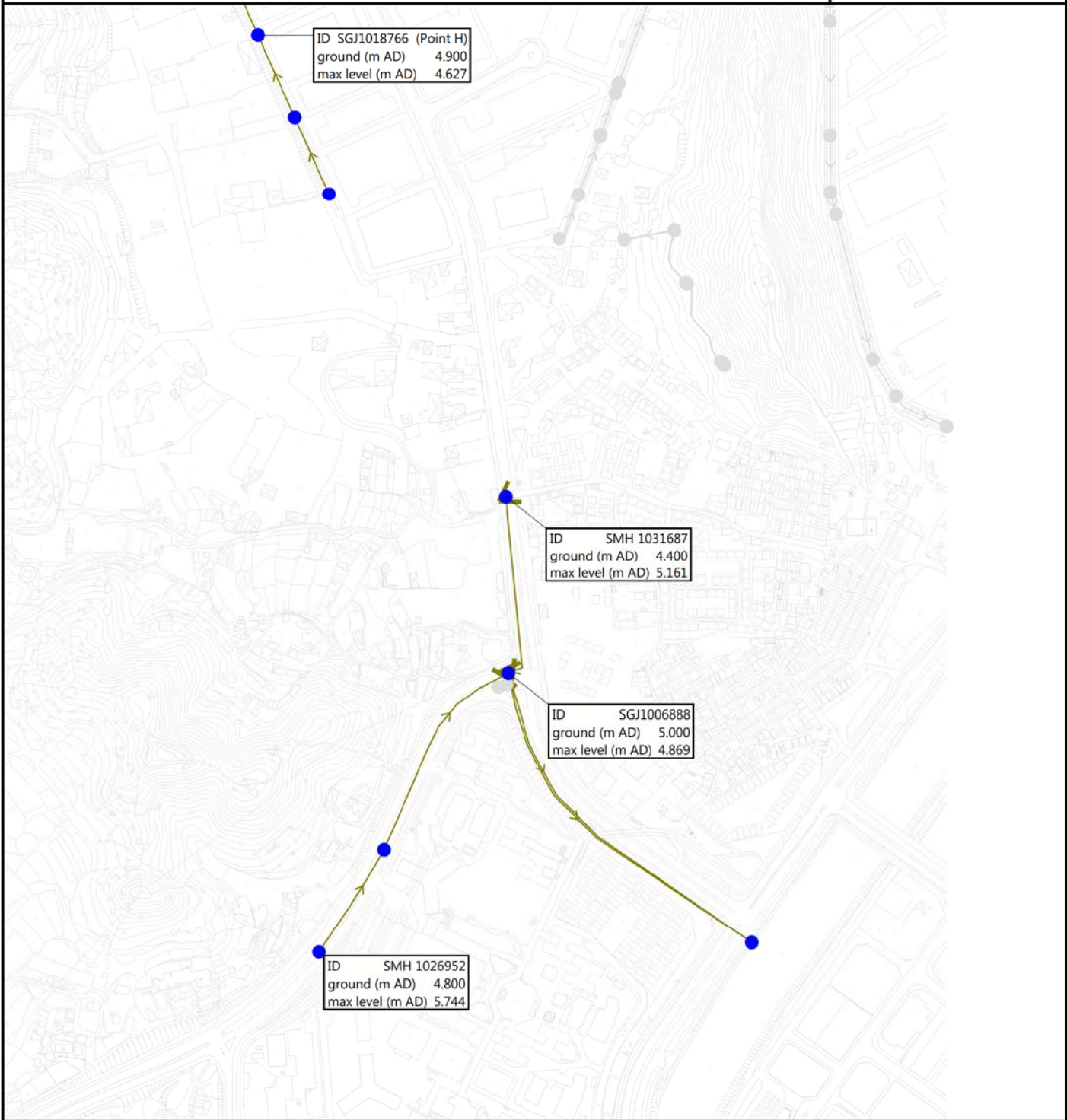
Network - Model network_1

Run - Existing - 10R 50T

Simulation - Existing M0-240 at 00 00:00:00

Scenario: Existing, Case 1 (10 year rainfall + 50 year sea level)

Map Centre Coords
x: 820573, y: 834957
Date Printed: 12/11/2013
Scale 1:5800



ID SGJ1018766 (Point H)
ground (m AD) 4.900
max level (m AD) 4.627

ID SMH 1031687
ground (m AD) 4.400
max level (m AD) 5.161

ID SGJ1006888
ground (m AD) 5.000
max level (m AD) 4.869

ID SMH 1026952
ground (m AD) 4.800
max level (m AD) 5.744

- Node [11]
- Flood Level : sim.max_flooddepth (m)
- ▣ Conduit [10]
- ▣ Subcatchment [11]
- ☒ Colour
- < -0.3000001 (Freeboard complies with DSD standard)
- >= -0.3000001 (Freeboard does not comply with DSD standard)

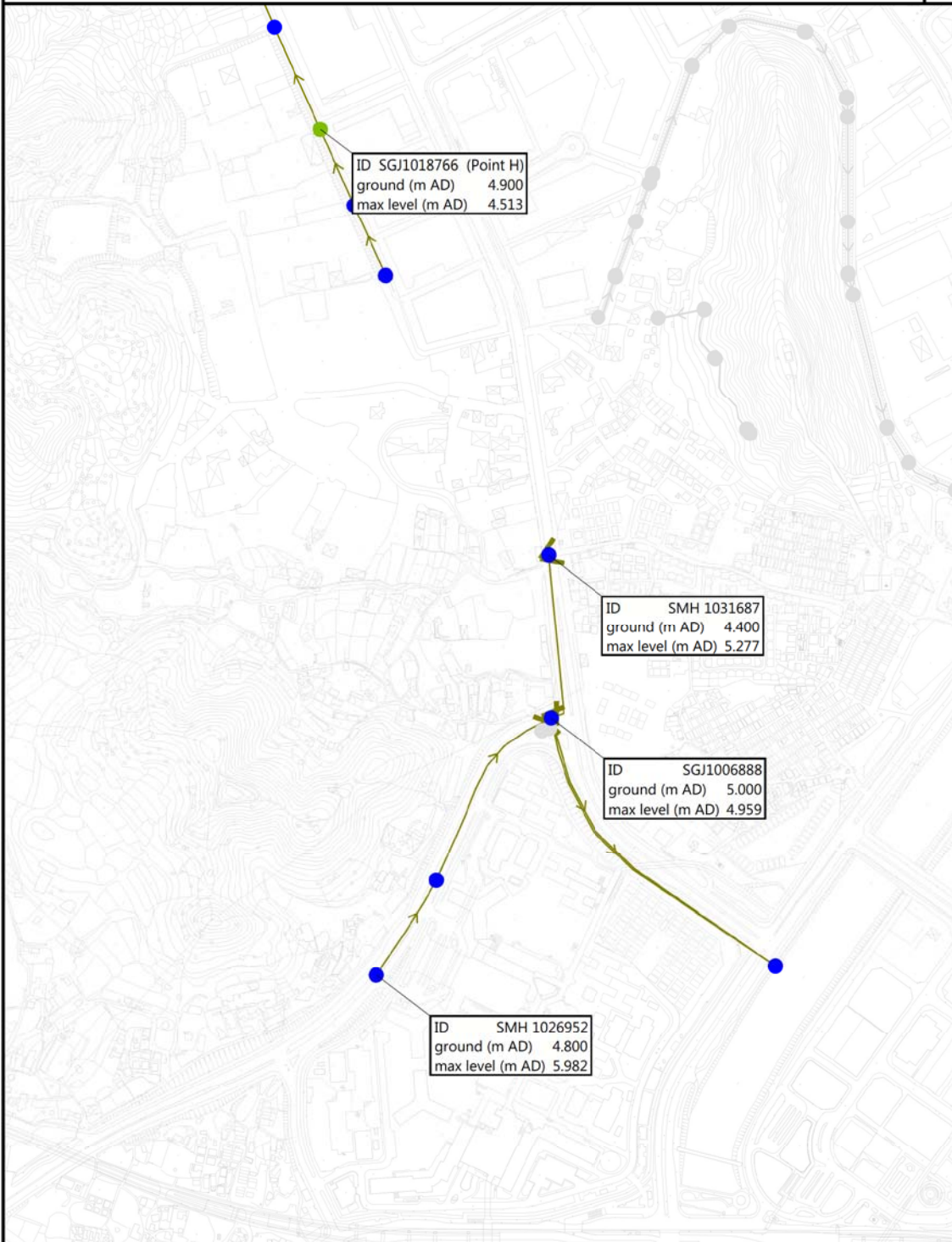
Network - Model network_1

Run - Existing - 50R 10T

Simulation - Existing M0-240 at 00 00:00:00

Scenario: Existing, Case 1 (50 year rainfall + 10 year sea level)

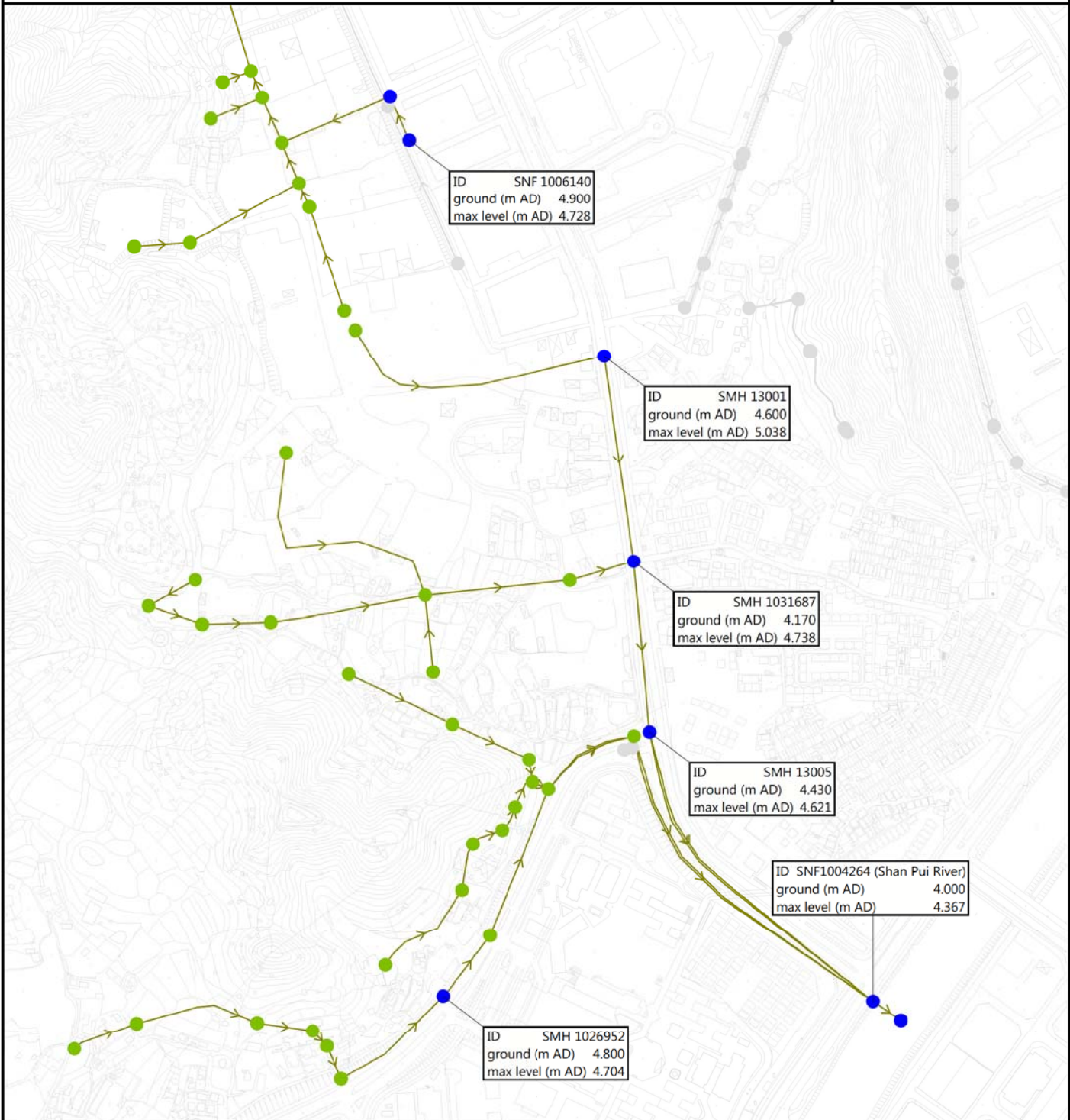
Map Centre Coords
x: 820596, y: 834945
Date Printed: 12/11/2013
Scale 1:7000



- Node [11]
- Flood Level : sim.max_flooddepth (m)
- ▣ Colour
- < -0.30000001 (Freeboard complies with DSD standard)
- >= -0.30000001 (Freeboard does not comply with DSD standard)
- Conduit [10]
- ▣ Subcatchment [11]

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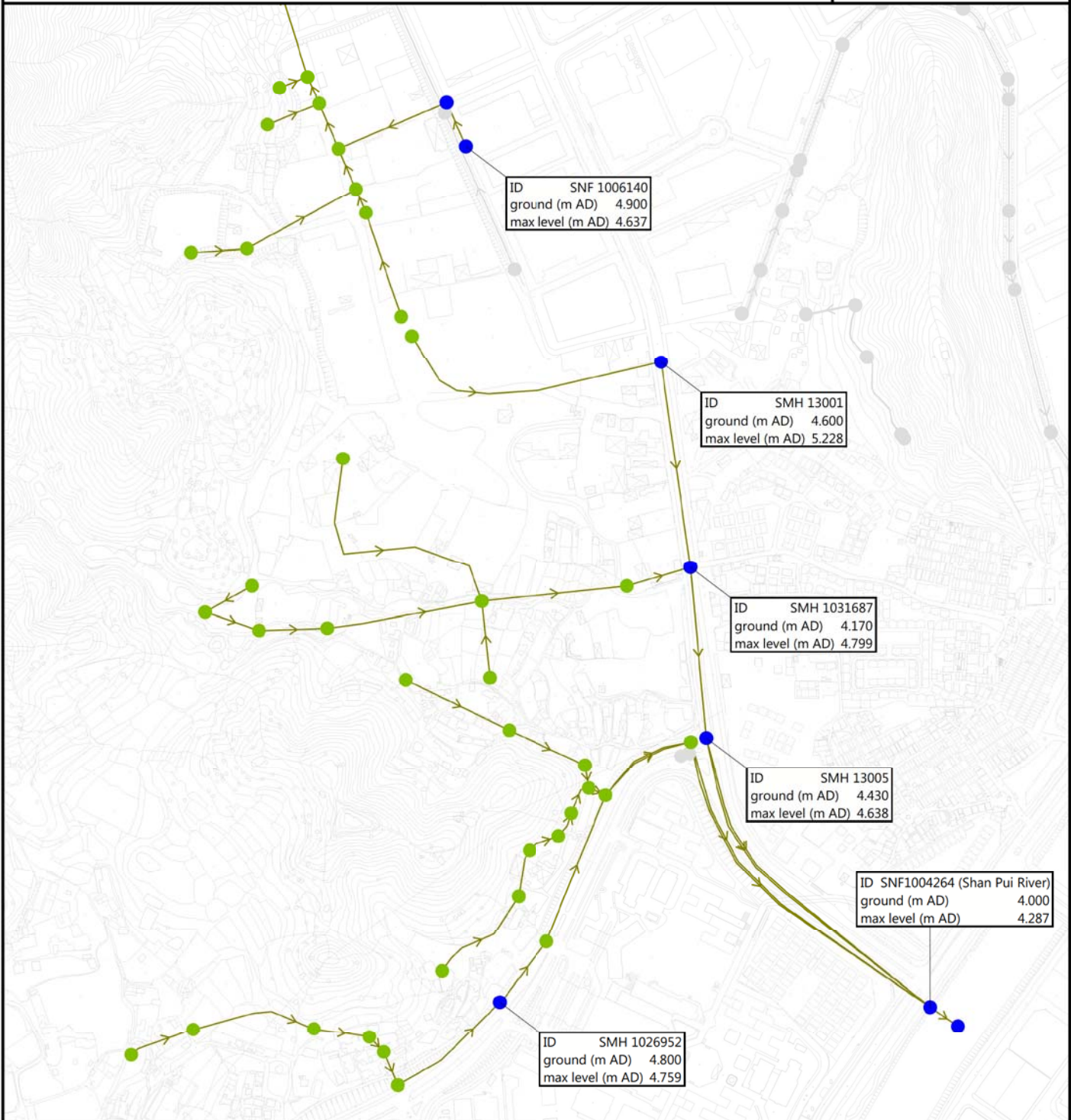
InfoWorks[®]



- Node [48]
- Flood Level : sim.max_flooddepth (m)
- ☒ Colour
- < -0.30000001 (Freeboard complies with DSD standard)
- >= -0.30000001 (Freeboard does not comply with DSD standard)
- Conduit [50]
- Subcatchment [26]

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- Node [48]
- Flood Level : sim.max_flooddepth (m)
- ☒ Colour
 - < -0.30000001 (Freeboard complies with DSD standard)
 - >= -0.30000001 (Freeboard does not comply with DSD standard)
- Conduit [50]
- Subcatchment [26]

Powered by



Appendix B

Notes of Meeting on Stormwater

Drainage Impacts

**Planning and Engineering Study
for the Public Housing Site and
Yuen Long Industrial Estate Extension at Wang Chau
Agreement No. CB20120293**

Notes of Meeting on Stormwater Drainage Impacts

Date: 8 Feb 2012 (Friday)

Time: 4:00 p.m.

Venue: 11/F conference room, Kowloon Government Offices, 405 Nathan Road, Kowloon

Present: ██████████ ██████████) **Housing Department**
 ██████████ ██████████) **(HD)**

 ██████████ ██████████) **Drainage Services**
 ██████████ ██████████) **Department (DSD)**
 ██████████ ██████████)

 ██████████ ██████████) **Ove Arup & Partners**
 ██████████ ██████████) **Hong Kong Ltd. (Arup)**
 ██████████ ██████████)
 ██████████ ██████████)

Absent Nil

Circulation Those present + absent

1.0 Project Background

1.1 HD introduced the background of the subject Planning and Engineering Study (Study) and the proposed Wang Chau developments. It is a government entrusted project and joint venture with Innovation and Technology Commission/HKSTP. Any improvement works identified by the Study will be implemented by other government departments such as CEDD and/or HyD and will be handed over to relevant government departments for maintenance. Thus it is necessary to seek agreement by departments on the way forward and arrangement for the mitigation measures to mitigate the stormwater drainage impacts arising from the proposed developments in Project site.

2.0 Discussion on Key Issues / Preliminary Findings

2.1 Potential Stormwater Drainage Impacts

Arup made a powerpoint presentation (refer to **Enclosure 1**) and stated that there were preliminarily 4 potential stormwater drainage impacts arising from the proposed developments at Wang Chau:

- Increase in flood protection requirement from 1 in 10yr to 1 in 50yr due to the change of landuse from rural to urban;
- Increase in peak runoff from the site due to the increase in paved areas;
- Diversion of existing 6m wide channel in adjacent to the existing YLIE to increase the flexibility of landuse planning within the Project site;
- Diversion of existing watercourses across the Project site to increase the flexibility of landuse planning within the Project site.

2.2 Potential Mitigation Measures

Arup stated that there were preliminarily 2 kinds of mitigation measures to mitigate the stormwater drainage impacts arising from the proposed developments in Project site:

- Increase the site formation level within Project site;
- New / Upgrading of existing downstream stormwater drainage system.

3.0 Way Forward

3.1 DSD advised that they have no objection, in principle, to the proposed drainage improvement works subject to the results of hydraulic assessments. Arup advised that the preliminary hydraulic calculations for those drainage improvement works will be included in Technical Report No. 2 and the corresponding preliminary hydraulic modeling results (using InfoWorks ICM) will be included in Technical

Report No. 3. Arup would approach DSD for the information required for forming hydraulic model.

3.2 DSD requested Arup to complete and sign the Form “Undertakings by Consultants in the Use of Computer Models and Data Files Provided by Drainage Services Department” with supplement by the appointment letter from HD prior to obtaining the hydraulic model data. Arup noted and followed up.

3.3 DSD advised Arup to check if there will be any utility diversion required for implementation of those drainage improvement works.

4.0 A.O.B.

4.1 There was no other business and the meeting adjourned at 5:15 p.m.

--- END ---

Enclosures:

- [1] Arup’s Presentation on Stormwater Drainage Schemes for the Proposed Wang Chau Developments