The Hong Kong Jockey Club Charities Trust

Central Police Station Conservation and Revitalisation Project

Preliminary Sewerage Impact Assessment (SIA) Report

Revision 1 | October 2010

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

This report takes into account the particular instructions and requirements of our client.

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Job number 209674

ARUP

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1 Introduction

The objective of this Sewerage Impact Assessment (SIA) is to assess the sewerage impact associated with the proposed Central Police Station Conservation and Revitalisation Project.

2 Project Outline and Description

The Central Police Station (CPS) Compound is a valuable heritage site and proposed to be revitalised to become a lively and integral part of the local community which will combine a dynamic arts, heritage and cultural offer with an independent and unique shopping and dining experience.

Project Title	:	Central Police Station Conservation and Revitalisation
Proponent	:	The Hong Kong Jockey Club Charities Trust
Nature and Description	:	Arts and Cultural Facilities with Retail Provision
Site Area	:	14339m^2
Percentage of Paved Area	:	100% (Existing)
Level to be filled up	:	Existing levels to be maintained

3 Site Description

The location of the Site is shown in Figure 1. The Site is bounded by Hollywood Road to the north, Arbuthnot Road to the east, Chancery Lane to the south and Old Bailey Street to the west.

The Site comprises three Declared Monuments designated under the Antiquities and Monuments Ordinance in 1995. They are:

- Central Police Station located at platform level of approx.+45mPD;
- Central Magistracy located at platform level of approx. +45mPD; and
- Victoria Prison Compound located at platform level of approx. +50 to 55mPD.

4 Existing Sewerage System

With reference to DSD drainage record plan, the existing sewers in the vicinity of the Site comprising:

- An existing 225mm diameter sewer running along Hollywood Road with a 150mm diameter connection serving the lower site;
- An existing 225mm diameter sewer running along Arbuthnot Road and then connecting to the existing 225mm diameter sewer running along Hollywood Road;
- Existing 150mm diameter sewers running along Chancery Lane and connecting to the existing 225mm diameter sewers running along Arbuthnot Road and Old Bailey Street; and
- An existing 225mm diameter sewer running along Old Bailey Street with 150mm diameter connections serving the upper site and lower site respectively and then connecting to the existing 225mm diameter sewer along Hollywood Road.

A record of the existing sewerage system in the vicinity of the Site is shown in Figure 2.

5 Proposed Sewage Generation and Sewerage Impact

5.1 Predicted Sewage Generation

The estimate of sewage generation for the proposed development is estimated based on the proposed numbers of sanitary fitments to be installed as advised by our building services consultant and the Method of Discharge Units from Plumbing Engineering Services Design Guide 2002.

The sewage estimation for the proposed development is shown in Table B1 of Appendix B and summarized as Table 5.1 below.

Table 5.1 – Summary of Peak Flow Calculation

Descriptions	Design Peak Flow (L/s)
Lower Platform	24.80
Upper Platform	25.45
Total	50.25

Due to the topographical arrangement of the existing historical buildings including the Central Police Station and Central Magistracy at the lower platform and the Victoria Prison at the upper platform, we proposed to maintain two existing sewerage connection points (FMH7031329 at Hollywood Road for lower

platform buildings and FMH7031357 at Old Bailey Street for upper platform buildings) for the project. Having considered the objective to avoid new sewer laying passing through the existing historical buildings and to minimize excavation works for new sewer laying adjacent to the existing historical buildings, we considered that maintaining at least two existing sewerage connection points are ncecesary.

Due to the absence of the as-built record for the existing sewerage system within the CPS, site investigation will be conducted to identify the existing sewerage arrangement and conditions during the detailed design stage. It is our intention to maintain two sewerage connection points for the project. However, the exact numbers and locations of sewerage connection points should be determined after completion of the site investigation including manholes inspection, CCTV survey etc for subsequent discussion and agreement with DSD and EPD during the detailed design stage.

The capacity calculation for the existing sewerage connection points using Colebrook-White Equation is shown in Table 5.2 below.

The existing sewerage connection points are adequent in capacities to intercept the peak sewage flows from the Site.

Table 5.2 – Capacity checking for the existing sewerage connection points

		Existing Sewer from DSD Record Plan (ks = 1.5mm)					
Existing Upstream Manhole	**Existing Downstream Manhole**	**Pipe Size (mm)**	**Length (m)**	**US IL (mPD)**	**DS IL (mPD)**	**Gradient (1:x)**	**Pipe Capacity (L/s)**
FMH7031329	FMH7031330	150	9.5	36.24	35.05	8	54.9
FMH7031330	FMH7031331	150	5.0	35.05	34.43	8	54.9
FMH7031357	Existing 225mm sewer	150	5	47.30	46.55	7	58.7

5.2 Capacity Checking of Existing Public Sewers

In order to assess the impact on the existing sewers associated with the development, the software "HydroWorks" was used for hydraulic analysis of the existing public sewers.

The estimation of sewage generation in the vicinity of the Site is based on the assumptions as below:

1) The projected population (2016) as based on the latest Territorial Population and Employment Data Matrix (TPEDM) 2006;

2) Flow factor for projected population is assumed to be 370L/person/day as per DSD Sewerage Manual Table 2;

3) Global peaking factor with stormwater allowance is adopted as per DSD Sewerage Manual Table 3.

The projected population (2016) and the resulted sewage estimation are shown in Table B2, B3 and Figure 4 of Appendix B.

The hydraulic performance of the existing sewers under design flows of 2016 is shown in the HydroWorks results in Appendix B and summarised in Table 5.3 as follows.

1. The predicted hydraulic gradeline level for the existing sewer is below the soffit level of the sewer except at the existing pipes (between Manhole FMH7029914 to FMH7031327) along Hollywood Road.
2. There is no flooding under the peak flow condition because sufficient freeboard of over 300mm is allowed in the sewers.

Table 5.3 – Freeboard at Various Sewerage Manhole Locations

Node Reference	Ground Level (m AD)	Max Level (m AD)	Free-board (m)
FMH7029541	35.35	32.68	2.67
FMH7029914	35.47	34.17	1.30
FMH7029949	35.06	34.32	0.74
FMH7029915	35.83	34.75	1.08
FMH7031331	36.49	35.46	1.03
FMH7031328	37.91	36.40	1.51
FMH7031327	38.81	37.28	1.53
FMH7031325	44.77	43.04	1.73
FMH7031323	46.89	44.80	2.09
FMH7031322	47.54	46.03	1.51
FMH7031321	49.57	47.74	1.83
FMH7031320	51.73	50.14	1.59
FMH7031319	54.12	53.15	0.97
FMH7031318	56.83	55.86	0.97
FMH7031316	59.68	58.58	1.10
FMH7031315	59.94	58.95	0.99
FMH7031313	60.15	59.10	1.06
FMH7031471	60.39	59.21	1.18
FMH7031472	60.56	59.30	1.26
FMH7031312	61.25	59.65	1.61
FMH7031449	50.04	48.17	1.87
FMH7031301	50.75	49.05	1.70
FMH7031519	52.34	50.88	1.46
FMH7031457	52.48	51.01	1.47
FMH7031295	53.10	51.79	1.31
FMH7031294	53.20	51.87	1.33
FMH7031293	54.29	52.82	1.48
FMH7041287	57.07	54.74	2.33
FMH7041286	60.59	58.59	2.00
FMH7041309	61.41	59.03	2.38
FMH7031368	62.97	61.67	1.30

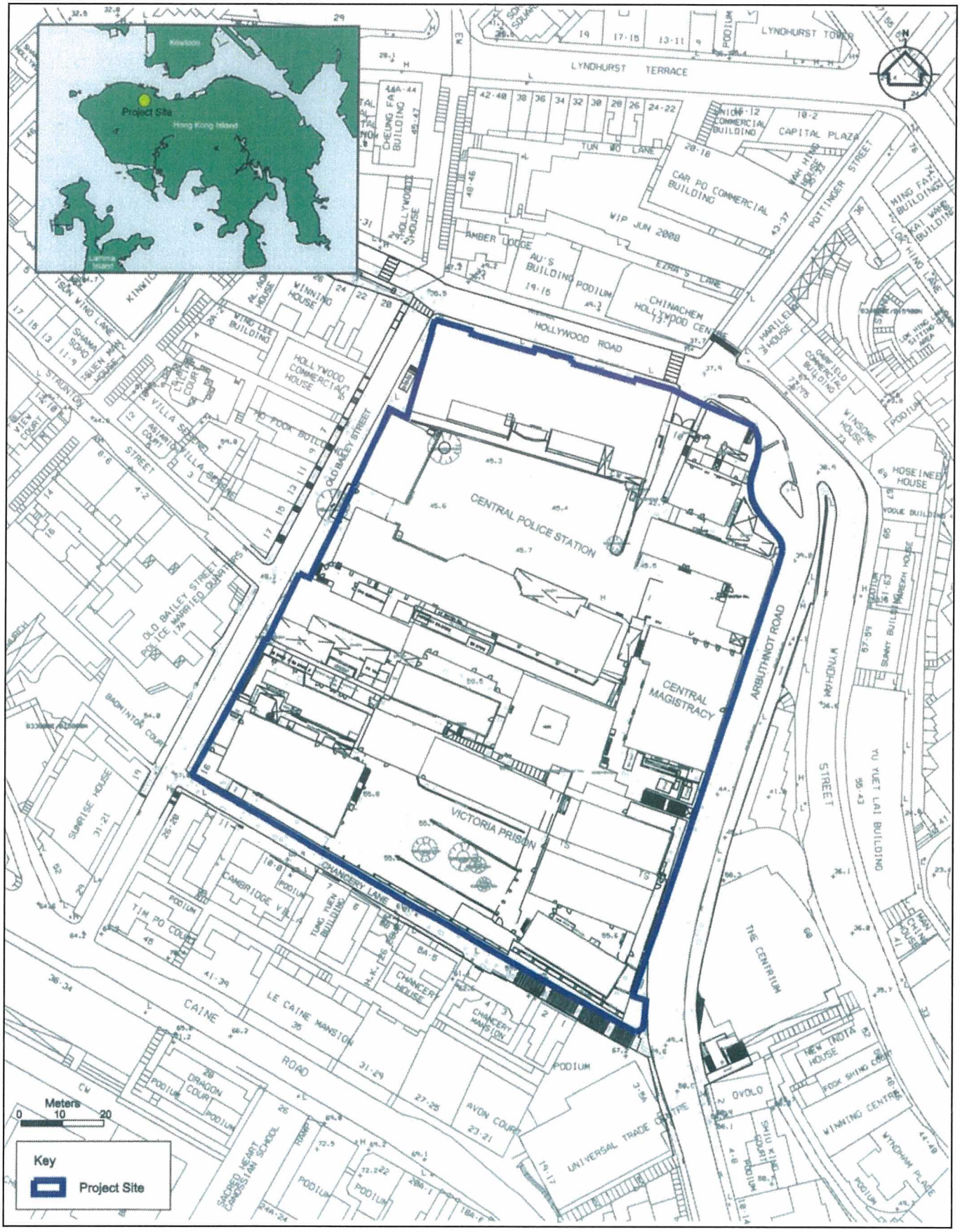
Node Reference	Ground Level (m AD)	Max Level (m AD)	Free-board (m)
FMH7031367	64.63	63.33	1.30
FMH7031366	65.18	64.01	1.17
FMH7031365	67.91	66.65	1.26
FMH7031364	68.20	67.56	0.64
FMH7031363	68.35	67.76	0.59
FMH7031361	68.81	68.17	0.64
FMH7029979	35.48	33.90	1.58
FMH7029540	35.81	34.64	1.17
FMH7031358	41.25	40.18	1.07
FMH7031509	42.72	41.65	1.07
FMH7031508	43.21	42.22	0.99
FMH7031510	44.02	43.03	0.99
FMH7031356	48.26	47.11	1.15
FMH7031354	52.65	51.19	1.46
FMH7031353	55.39	54.67	0.72
FMH7031352	56.67	54.98	1.69
FMH7031351	56.82	55.19	1.64
FMH7031350	57.16	55.93	1.23
FMH7031349	57.85	57.36	0.49
FMH7031348	58.18	57.67	0.51
FMH7031347	58.58	58.12	0.46
FMH7031346	59.61	58.69	0.92
FMH7031345	62.25	60.06	2.19
FMH7031344	56.93	55.24	1.69
FMH7031338	60.36	58.94	1.42
FMH7031337	62.35	60.96	1.39
FMH7046963	56.82	55.70	1.12
FMH7031341	58.05	56.70	1.35
FMH7031340	58.69	57.60	1.09
FMH7031339	61.09	60.20	0.89
FMH7031448	61.1	60.38	0.72

6 Conclusion

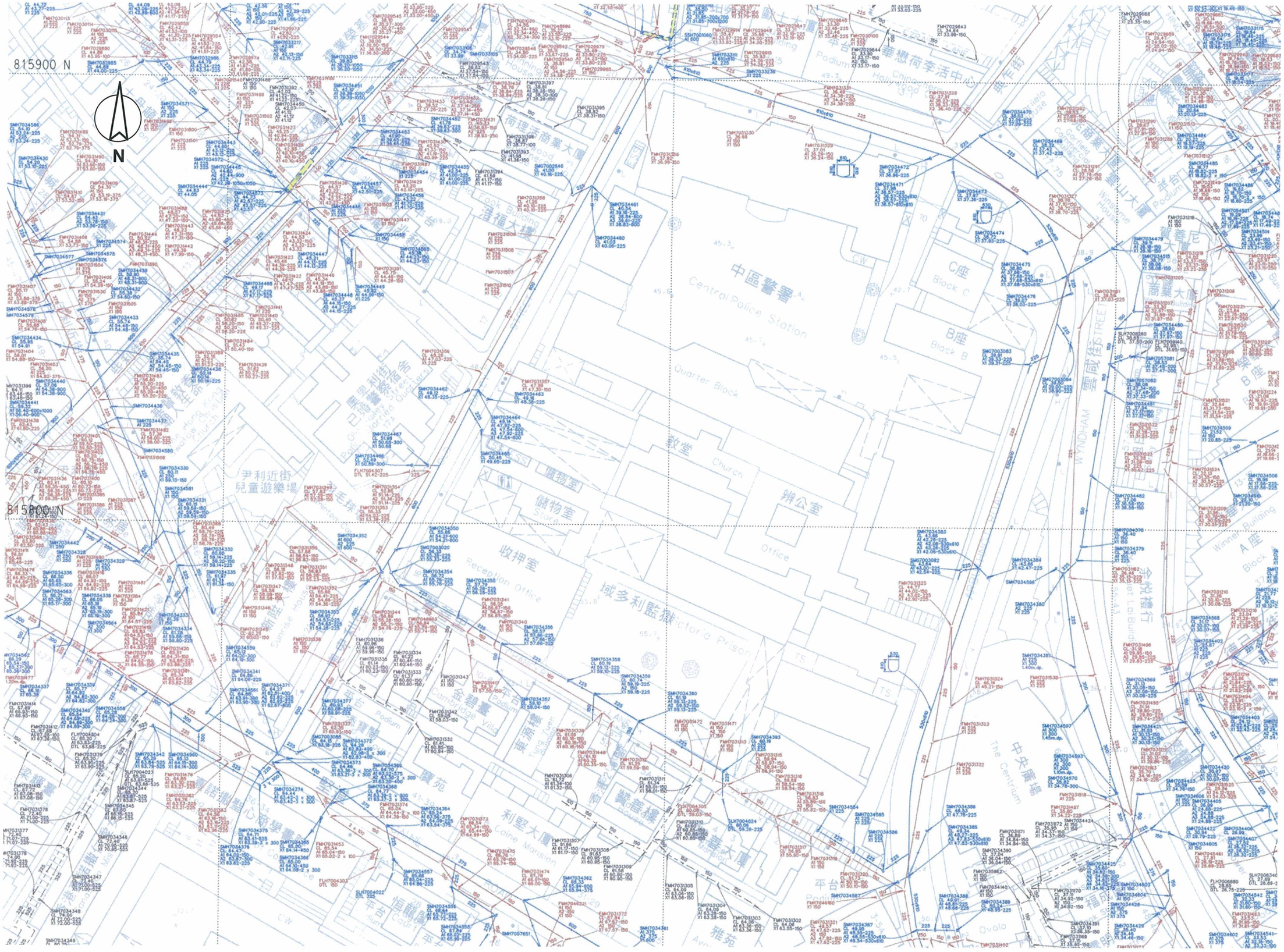
The proposed development will generate a peak flow of 50.25L/s. The hydraulic analysis concluded that there is sufficient freeboard allowed in the existing 225mm diameter public sewers along Hollywood Road, Old Bailey Road and Arbuthnot Road and no improvement to the existing public sewer is required as a result of the proposed development. Thus no adverse sewerage impact is anticipated to be resulted from the Project.

Appendix A

Figures

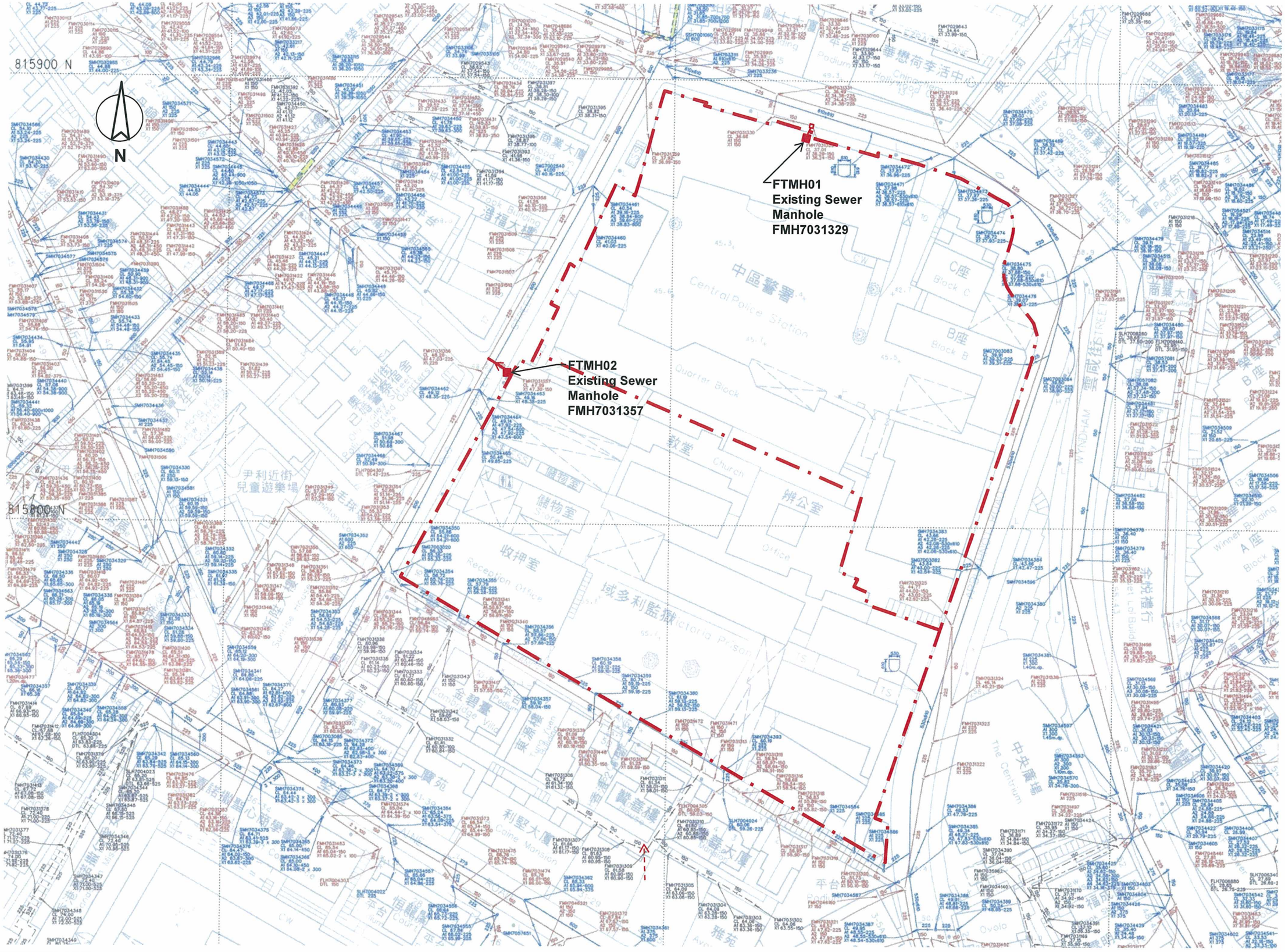


Site Location Plan **Figure 1**



Existing Drainage and Sewerage System

Figure 2



Proposed Sewerage Connection Points

Figure 3

Appendix B

Calculation

Project : Central Police Station Compound Conservation and Revitalization

Table B1 - Estimation of Sewage Discharge Flow (Based on Sanitary Fittings and Method of Discharge Unit)

1) The peak design flow is assessed by applying a frequency of use K factor to the total sum of the discharge units and by using the following equation.

Peak Design Flow $Q = K\sqrt{\sum DU}$ (From Plumbing Engineering Services Design Guide 2002)

Where
Q = Peak Design Flow (l/s)
K = Frequency of use = 1.0 (From Table 6 of Plumbing Engineering Services Design Guide 2002 for Congested Usage)
∑DU = Sum of discharge units (From Table 5 of Plumbing Engineering Services Design Guide 2002)

The preliminary estimation of sewage discharge flow and schedule of sanitary fitment for each buildings are listed below.

2) Schedule of Sanitary Fitment and Estimation of Peak Design Flow

Location	Level/Total No. of Sanitary Fitment	W.C.	Wash Hand Basin	Urinal	Sink	Cleansing Point	Remark
Building 1	L/G Floor 2	6	6	2	-	2	
(Lower Platform)	L/G Floor 1	3	4	2	25	2	Sinks were allowed for Lounge & Restaurant
	G/F	-	-	-	10	2	Sinks were allowed for Café Bar
	1/F	6	8	4	-	2	
Building 2	G/F	4	2	1	-	2	
(Lower Platform)							
Building 3	1/F	9	7	2	-	2	
(Lower Platform)	2/F	9	7	2	-	2	
	3/F	9	7	2	-	2	
Building 4		-	-	-	-	-	No Sanitary Fitment provided in the Building
(Lower Platform)							
Building 6	G/F	1	1	-	-	1	
(Lower Platform)	1/F	1	1	-	-	1	
Building 7	1/F	1	1	-	-	1	
(Lower Platform)							
Building 8	G/F	4	2	-	-	2	
(Lower Platform)							
Building 9	L/G	4	4	-	-	2	
(Lower Platform)	G/F	9	9	3	-	2	
	1/F	5	4	-	-	2	
	2/F	6	7	2	-	2	
Total		77	70	20	35	29	
Discharge Unit, DU		1.8	0.3	0.4	1.3	0.2	
Sub-total Discharge Unit		138.6	21	8	45.5	5.8	
Total Discharge Unit ∑DU		218.9					
Peak Design Flow for Lower Platform, Q (l/s)		14.80					
Pump Flow for Central Plant (L/s)		10					
Total Peak Design Flow for Lower Platform (l/s)		***24.80***					
Building 10 & 13	1/F	7	5	2	5	2	Sinks were allowed for Gallery/Café
(Upper Platform)	2/F	3	3	-	-	-	
Building 11	G/F	4	4	-	-	2	
(Upper Platform)	1/F	2	2	-	-	2	
Building 12 (Upper Platform)		-	-	-	-	-	No Sanitary Fitment provided in the Building
Building 14	Level 50.6	9	9	3	-	-	
(Upper Platform)	Level 55.6	8	9	2	-	-	
	Level 62.5	4	4	-	-	-	
Building 15	Level 50.6	-	-	-	-	-	
(Upper Platform)	Level 55.6	3	3	1	-	-	
	Level 62.5	3	3	1	-	-	
Arbuthnot Wing	Level 50.15	10	10	4	-	-	
(Upper Platform)	Level 55.49	4	4	-	-	-	
F Hall	Level 56.2	8	6	3	-	-	
(Upper Platform)	Level 61.0	13	13	4	-	-	
Old Bailey Wing	Level 50.6	8	8	2	6	-	
(Upper Platform)	Level 55.6	6	6	3	-	-	
	Level 62.5	9	9	5	-	-	
Total		101	98	30	11	6	
Discharge Unit, DU		1.8	0.3	0.4	1.3	0.2	
Sub-total Discharge Unit		181.8	29.4	12	14.3	1.2	
Total Discharge Unit ∑DU		238.7					
Peak Design Flow for Upper Platform, Q (l/s)		15.45					
Pump Flow for Central Plant (L/s)		10					
Total Peak Design Flow for Upper Platform (l/s)		***25.45***					

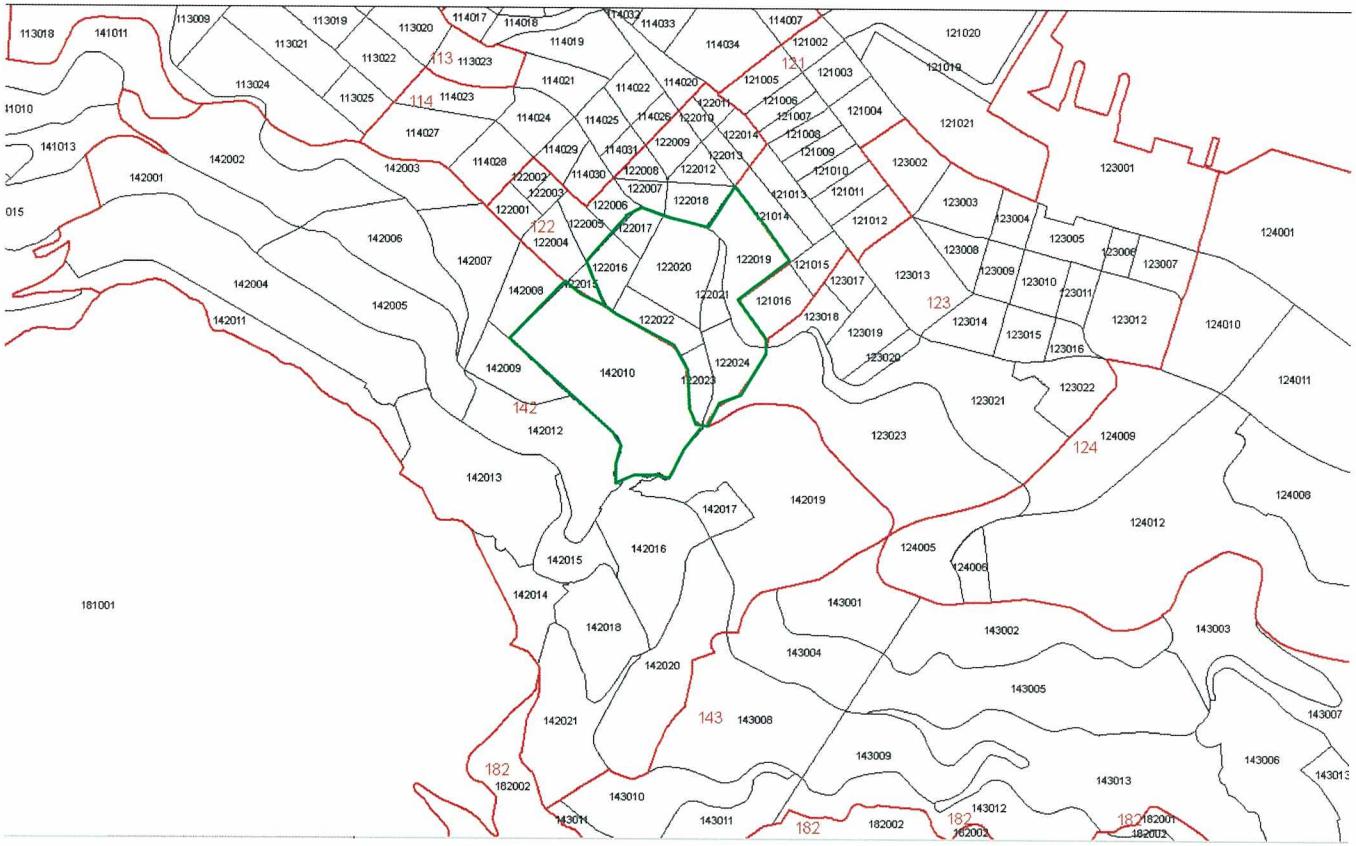
Table B2 **Sewage Flows Estimation in the vicinity of CPS to Year 2016**
(Based on TPDEM 2006)

Manhole	GFA of Zone to Manhole	Total GFA of Zone	Percentage of GFA	Total Population of Zone @2016	Street Block Number	Population	Cumulate Population	Flow Factor (l/h/day)	ADWF (l/d)	ADWF (l/s)	Peak Factor	Peak Flow (l/s)	Peak Flow (m3/s)
7031361	2910	237625	1.2%	5384	142010	66	66	370	24395	0.28	8	2.26	0.002
7031363	3206	237625	1.3%	5384	142010	73	139	370	26877	0.31	8	2.49	0.002
7041309	13960	237625	5.9%	5384	142010	316	455	370	117031	1.35	8	10.84	0.011
7041286	5681.5	237625	2.4%	5384	142010	129	584	370	47630	0.55	8	4.41	0.004
7041287	464	21704	2.1%	739	122023	16	599	370	5846	0.07	8	0.54	0.001
7031293	3956	21704	18.2%	739	122023	135	734	370	49838	0.58	8	4.61	0.005
7031295	5118	21704	23.6%	739	122023	174	908	370	64477	0.75	8	5.97	0.006
7031519	4706	21704	21.7%	739	122023	160	1069	370	59287	0.69	8	5.49	0.005
7031301	7460	21704	34.4%	739	122023	254	1323	370	93982	1.09	8	8.70	0.009
7031312	13827	50078	27.6%	774	122022	214	214	370	79072	0.92	8	7.32	0.007
7031315	2393	50078	4.8%	774	122022	37	251	370	13685	0.16	8	1.27	0.001
7031319	709	50078	1.4%	774	122022	11	262	370	4055	0.05	8	0.38	0.000
7031321	22664	50078	45.3%	774	122022	350	1935	370	129608	1.50	8	12.00	0.012
7031325	19478.5	38957	50.0%	104	122021	52	1987	370	19240	0.22	8	1.78	0.002
7031327	5820	76466	7.6%	104	122019	8	1994	370	2929	0.03	8	0.27	0.000
7031331	Sewage Flow from CPS Site Lower Platform											24.80	0.025
7031448	2454	50078	4.9%	774	122022	38	38	370	14034	0.16	8	1.30	0.001
7031341	3084	50078	6.2%	774	122022	48	86	370	17636	0.20	8	1.63	0.002
7031337	3081	50078	6.2%	774	122022	48	48	370	17619	0.20	8	1.63	0.002
7031338	1866	50078	3.7%	774	122022	29	76	370	10671	0.12	8	0.99	0.001
7031345	11817	33708	35.1%	448	122016	157	157	370	58110	0.67	8	5.38	0.005
7031354	12463	33708	37.0%	448	122016	166	485	370	61287	0.71	8	5.67	0.006
7031508	3865	17511	22.1%	448	122017	99	584	370	36586	0.42	8	3.39	0.003
7029979	1282	17511	7.3%	448	122017	33	616	370	12135	0.14	8	1.12	0.001
7031356	Sewage Flow from CPS Site Upper Platform											25.45	0.025

Notes:

1) Projected population @ year 2016 for each street block number refers to Table B3.
2) Gross Floor Area (GFA) for each existing buildings refers to Figure 4.
3) Flow factors refer to DSD Sewerage Manual Table 2.
4) Peak factor with stormwater allowance refer to DSD Sewerage Manual Table 3.

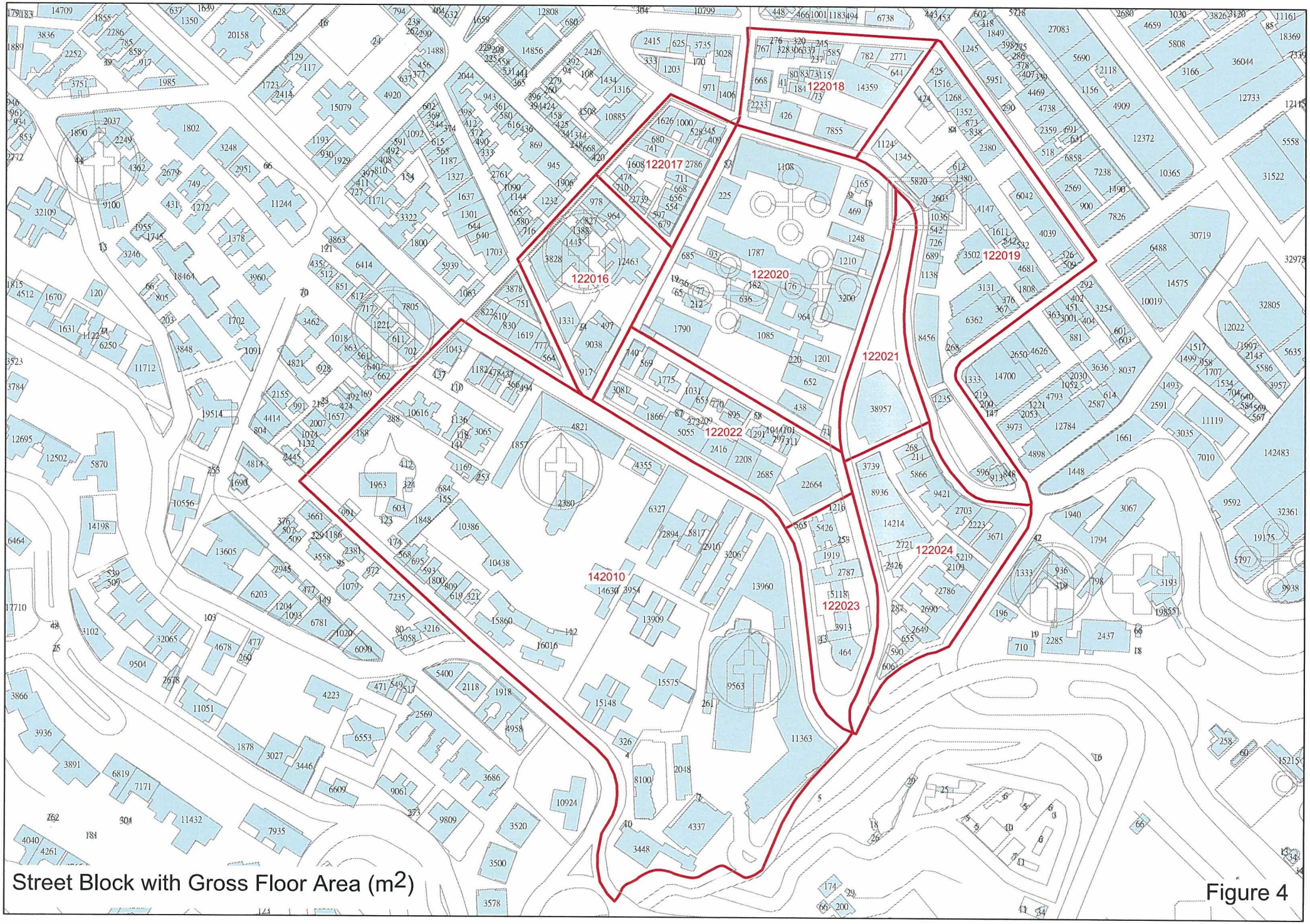
Table B3 - TPU Zone Map with Projected Population



Source : TPDEM 2006

TPU zone boundary
Street block zone boundary
Your selected zone

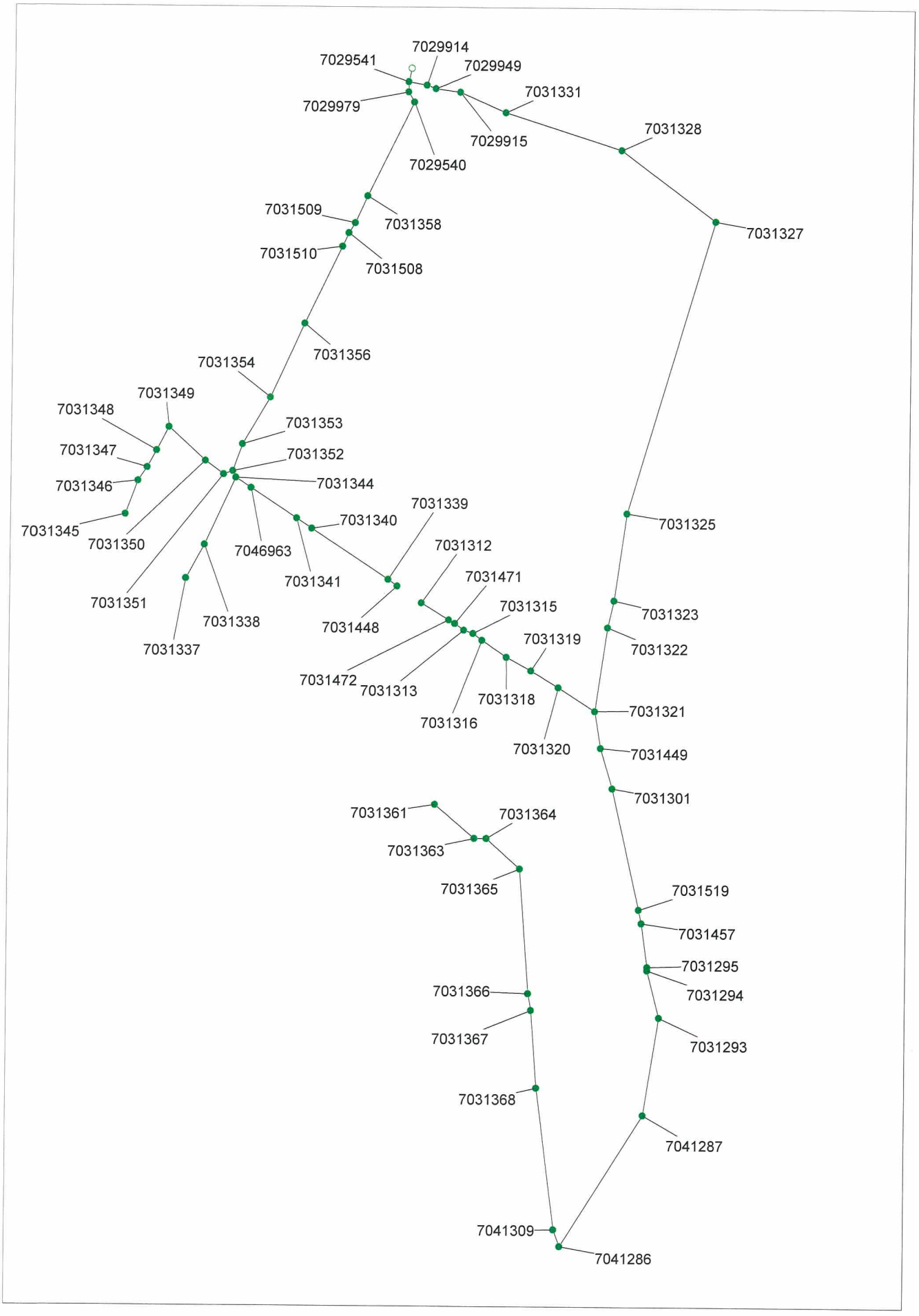
Street Block No.	Population				
	2006	Annual Growth Rate	2006 - 2011	Annual Growth Rate	2011 - 2016
122016	382	2.5%	432	0.7%	448
122017	382	2.5%	432	0.7%	448
122019	89	2.5%	101	0.7%	104
122020	89	2.5%	101	0.7%	104
122021	89	2.5%	101	0.7%	104
122022	660	2.5%	746	0.7%	774
122023	630	2.5%	712	0.7%	739
122024	749	2.5%	847	0.7%	879
142010	5230	0.4%	5333	0.2%	5384



Street Block with Gross Floor Area (m^2)

Figure 4

Date : 18:35:11 20/10/10 | File : g:\chrisc~1\cps209~1\cpsnic~1\nicole\hydrow~1\cps\r0000025.spr (cps.ds



Start of run configured for MS Windows Produced on 20/10/2010 at 18:23

HydroWorks(tm) SIM

Summary results from Simulation

Version 5.1.075 dated September 2000

Licence Number - WS02520001PM

♀

Message 253: Run finished for event 1.

♀

Summary results for event 1 - CPS (2009-11-16)
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Files used:
Network: ...\cps.dsd CPS
State:
Runoff:
Rainfall:
DWF:
Inflows: ...\cps.qin Constant point inflow - duration 60 min.
Levels:
RTC:
Results: ...\r0000025.spr

Using Wallingford Procedure runoff routing model.

Total rainfall = 0.0 m3
Total runoff = 0.0 m3
Total inflow = 2028.6 m3
Total outflow = 2028.6 m3
Total lost = 0.0 m3

♀

********** 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)
7029541	35.350	32.679	0.0	0.000	0.0	0.1	0.0	0.000
7029914	35.470	34.172	0.0	0.000	0.0	0.4	0.0	0.000
7029949	35.060	34.322	0.0	0.000	0.0	0.3	0.0	0.000
7029915	35.830	34.750	0.0	0.000	0.0	0.5	0.0	0.000
7031331	36.490	35.455	0.0	0.000	0.0	1.1	367.5	0.000
7031328	37.910	36.402	0.0	0.000	0.0	0.2	0.0	0.000
7031327	38.810	37.276	0.0	0.000	0.0	0.5	0.0	0.000
7031325	44.770	43.036	0.0	0.000	0.0	0.1	29.4	0.000
7031323	46.890	44.802	0.0	0.000	0.0	0.1	0.0	0.000
7031322	47.540	46.032	0.0	0.000	0.0	0.1	0.0	0.000
7031321	49.570	47.742	0.0	0.000	0.0	0.1	176.4	0.000
7031320	51.730	50.142	0.0	0.000	0.0	0.0	0.0	0.000

7031319	54.120	53.147	0.0	0.000	0.0	0.0	0.0	0.000
7031318	56.830	55.857	0.0	0.000	0.0	0.0	0.0	0.000
7031316	59.680	58.577	0.0	0.000	0.0	0.0	0.0	0.000
7031315	59.940	58.954	0.0	0.000	0.0	0.0	14.7	0.000
7031313	60.150	59.095	0.0	0.000	0.0	0.1	0.0	0.000
7031471	60.390	59.213	0.0	0.000	0.0	0.1	0.0	0.000
7031472	60.560	59.301	0.0	0.000	0.0	0.1	0.0	0.000
7031312	61.250	59.645	0.0	0.000	0.0	0.1	102.9	0.000
7031449	50.040	48.174	0.0	0.000	0.0	0.1	0.0	0.000
7031301	50.750	49.048	0.0	0.000	0.0	0.1	132.3	0.000
7031519	52.340	50.876	0.0	0.000	0.0	0.1	73.5	0.000
7031457	52.480	51.010	0.0	0.000	0.0	0.1	0.0	0.000
7031295	53.100	51.794	0.0	0.000	0.0	0.1	88.2	0.000
7031294	53.200	51.869	0.0	0.000	0.0	0.1	0.0	0.000
7031293	54.290	52.815	0.0	0.000	0.0	0.1	73.5	0.000
7041287	57.070	54.736	0.0	0.000	0.0	0.1	14.7	0.000
7041286	60.590	58.592	0.0	0.000	0.0	0.1	58.8	0.000
7041309	61.410	59.027	0.0	0.000	0.0	0.1	161.7	0.000
7031368	62.970	61.671	0.0	0.000	0.0	0.0	0.0	0.000
7031367	64.630	63.328	0.0	0.000	0.0	0.0	0.0	0.000
7031366	65.180	64.013	0.0	0.000	0.0	0.0	0.0	0.000
7031365	67.910	66.647	0.0	0.000	0.0	0.0	0.0	0.000
7031364	68.200	67.557	0.0	0.000	0.0	0.0	0.0	0.000
7031363	68.350	67.760	0.0	0.000	0.0	0.0	29.4	0.000
7031361	68.810	68.165	0.0	0.000	0.0	0.0	29.4	0.000
7029979	35.480	33.897	0.0	0.000	0.0	0.1	14.7	0.000
7029540	35.810	34.636	0.0	0.000	0.0	0.1	0.0	0.000
7031358	41.250	40.178	0.0	0.000	0.0	0.1	0.0	0.000
7031509	42.720	41.649	0.0	0.000	0.0	0.1	0.0	0.000
7031508	43.210	42.216	0.0	0.000	0.0	0.1	44.1	0.000
7031510	44.020	43.026	0.0	0.000	0.0	0.1	0.0	0.000
7031356	48.260	47.106	0.0	0.000	0.0	0.1	367.5	0.000
7031354	52.650	51.191	0.0	0.000	0.0	0.1	88.2	0.000
7031353	55.390	54.671	0.0	0.000	0.0	0.0	0.0	0.000
7031352	56.670	54.978	0.0	0.000	0.0	0.1	0.0	0.000
7031351	56.820	55.185	0.0	0.000	0.0	0.0	0.0	0.000
7031350	57.160	55.928	0.0	0.000	0.0	0.0	0.0	0.000
7031349	57.850	57.358	0.0	0.000	0.0	0.0	0.0	0.000
7031348	58.180	57.666	0.0	0.000	0.0	0.0	0.0	0.000
7031347	58.580	58.120	0.0	0.000	0.0	0.0	0.0	0.000
7031346	59.610	58.687	0.0	0.000	0.0	0.0	0.0	0.000

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)
7031345	62.250	60.056	0.0	0.000	0.0	0.0	73.5	0.000
7031344	56.930	55.238	0.0	0.000	0.0	0.0	0.0	0.000
7031338	60.360	58.940	0.0	0.000	0.0	0.0	14.7	0.000
7031337	62.350	60.957	0.0	0.000	0.0	0.0	29.4	0.000
7046963	56.820	55.704	0.0	0.000	0.0	0.0	0.0	0.000
7031341	58.050	56.704	0.0	0.000	0.0	0.0	29.4	0.000
7031340	58.690	57.604	0.0	0.000	0.0	0.0	0.0	0.000
7031339	61.090	60.204	0.0	0.000	0.0	0.0	0.0	0.000
7031448	61.100	60.376	0.0	0.000	0.0	0.0	14.7	0.000

A %% indicates water lost from the system.

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

Link Reference	D/S Node	Pipe Len (m)	Pipe Hgt (mm)	Sed Dpth (mm)	P.Full Flow (m3/s)	Upstream < Invert Level (m AD)	Max Depth (m)	Max Flow (m3/s)	Max Vel (m/s)	Total Flow (m3) >	Downstream < Invert Level (m AD)	Max Depth (m)	Max Flow (m3/s)	Max Vel (m/s)	Total Flow (m3) >
7029541.1	OF	3	600	0	3.516	32.580	0.099	0.138	4.503	2028.6	31.600	0.099	0.138	4.503	2028.6
7029914.1	7029541	6	225	0	0.077	33.820	0.283	0.092	2.222	1352.4+	33.650	0.202	0.092	2.441	1352.4
7029949.1	7029914	2	225	0	0.056	34.000	0.256	0.092	2.228	1352.4+	33.970	0.202	0.092	2.441	1352.4
7029915.1	7029949	9	225	0	0.078	34.260	0.445	0.092	2.183	1352.4+	34.000	0.329	0.092	2.211	1352.4+
7031331.1	7029915	16	225	0	0.040	34.380	1.034	0.092	2.054	1352.4+	34.260	0.495	0.092	2.172	1352.4+
7031328.1	7031331	40	225	0	0.098	36.230	0.164	0.067	2.151	984.9	34.380	1.077	0.067	1.490	984.9x
7031327.1	7031328	37	225	0	0.055	36.760	0.494	0.067	1.582	984.9+	36.230	0.202	0.067	1.778	984.9
7031325.1	7031327	92	225	0	0.118	42.910	0.124	0.067	2.971	984.9	36.840	0.439	0.067	1.591	984.9x
7031323.1	7031325	26	225	0	0.120	44.680	0.121	0.065	2.982	955.5	42.910	0.126	0.065	2.824	955.5
7031322.1	7031323	18	225	0	0.120	45.910	0.121	0.065	2.986	955.5	44.680	0.122	0.065	2.938	955.5
7031321.1	7031322	25	225	0	0.120	47.620	0.121	0.065	2.987	955.5	45.910	0.122	0.065	2.943	955.5
7031320.1	7031321	14	150	0	0.061	50.100	0.042	0.008	2.000	117.6	47.920	0.042	0.008	2.000	117.6
7031319.1	7031320	10	150	0	0.085	53.110	0.037	0.008	2.381	117.6	50.100	0.042	0.008	1.999	117.6
7031318.1	7031319	9	150	0	0.085	55.820	0.037	0.008	2.381	117.6	53.110	0.037	0.008	2.380	117.6
7031316.1	7031318	9	150	0	0.085	58.540	0.037	0.008	2.367	117.6	55.890	0.037	0.008	2.367	117.6
7031315.1	7031316	3	150	0	0.055	58.910	0.044	0.008	1.873	117.6	58.540	0.044	0.008	1.873	117.6
7031313.1	7031315	3	150	0	0.028	59.040	0.055	0.007	1.199	102.9	58.940	0.055	0.007	1.199	102.9
7031471.1	7031313	3	150	0	0.031	59.160	0.053	0.007	1.269	102.9	59.040	0.055	0.007	1.199	102.9
7031472.1	7031471	2	150	0	0.033	59.250	0.051	0.007	1.315	102.9	59.160	0.053	0.007	1.268	102.9
7031312.1	7031472	10	150	0	0.029	59.590	0.055	0.007	1.207	102.9	59.250	0.051	0.007	1.315	102.9
7031449.1	7031321	11	225	0	0.092	48.060	0.114	0.045	2.222	661.5	47.620	0.122	0.045	2.040	661.5
7031301.1	7031449	13	225	0	0.120	48.950	0.098	0.045	2.691	661.5	48.060	0.114	0.045	2.217	661.5
7031519.1	7031301	38	225	0	0.100	50.780	0.096	0.036	2.225	529.2	48.950	0.098	0.036	2.151	529.2
7031457.1	7031519	3	225	0	0.099	50.920	0.090	0.031	2.095	455.7	50.780	0.096	0.031	1.915	455.7
7031295.1	7031457	13	225	0	0.113	51.710	0.084	0.031	2.300	455.7	50.920	0.090	0.031	2.094	455.7
7031294.1	7031295	1	225	0	0.137	51.800	0.069	0.025	2.399	367.5	51.710	0.084	0.025	1.854	367.5
7031293.1	7031294	15	225	0	0.115	52.740	0.075	0.025	2.163	367.5	51.800	0.075	0.025	2.163	367.5
7041287.1	7031293	29	225	0	0.118	54.670	0.066	0.020	2.039	294.0	52.740	0.075	0.020	1.730	294.0
7041286.1	7041287	48	225	0	0.129	58.530	0.062	0.019	2.111	279.3	54.750	0.062	0.019	2.111	279.3
7041309.1	7041286	6	225	0	0.124	58.970	0.057	0.015	1.886	220.5	58.530	0.062	0.015	1.666	220.5
7031368.1	7041309	42	150	0	0.031	61.630	0.041	0.004	1.009	58.8	59.930	0.041	0.004	1.009	58.8
7031367.1	7031368	28	150	0	0.038	63.290	0.038	0.004	1.119	58.8	61.630	0.041	0.004	1.009	58.8
7031366.1	7031367	5	150	0	0.058	63.980	0.033	0.004	1.377	58.8	63.290	0.038	0.004	1.118	58.8
7031365.1	7031366	38	150	0	0.041	66.610	0.037	0.004	1.164	58.8	63.980	0.033	0.004	1.376	58.8
7031364.1	7031365	13	150	0	0.041	67.520	0.037	0.004	1.168	58.8	66.610	0.037	0.004	1.164	58.8
7031363.1	7031364	4	150	0	0.035	67.720	0.040	0.004	1.069	58.8	67.520	0.037	0.004	1.168	58.8
7031361.1	7031363	16	150	0	0.025	68.130	0.035	0.002	0.641	29.4	67.720	0.040	0.002	0.535	29.4
7029979.1	7029541	2	225	0	0.125	33.800	0.097	0.046	2.797	676.2	33.650	0.097	0.046	2.797	676.2
7029540.1	7029979	4	225	0	0.200	34.560	0.076	0.045	3.811	661.5	33.800	0.097	0.045	2.734	661.5
7031358.1	7029540	32	225	0	0.191	40.100	0.078	0.045	3.696	661.5	34.560	0.076	0.045	3.807	661.5
7031509.1	7031358	9	225	0	0.185	41.570	0.079	0.045	3.625	661.5	40.100	0.078	0.045	3.691	661.5
7031508.1	7031509	3	225	0	0.200	42.140	0.076	0.045	3.812	661.5	41.570	0.079	0.045	3.620	661.5
7031510.1	7031508	5	225	0	0.185	42.950	0.076	0.042	3.532	617.4	42.140	0.076	0.042	3.553	617.4
7031356.1	7031510	25	225	0	0.185	47.030	0.076	0.042	3.541	617.4	42.950	0.076	0.042	3.528	617.4
7031354.1	7031356	25	225	0	0.186	51.140	0.051	0.017	2.521	249.9	47.030	0.076	0.017	1.432	249.9
7031353.1	7031354	16	225	0	0.214	54.630	0.041	0.011	2.228	161.7	51.140	0.051	0.011	1.631	161.7
7031352.1	7031353	8	225	0	0.087	54.920	0.058	0.011	1.347	161.7	54.630	0.058	0.011	1.347	161.7
7031351.1	7031352	2	225	0	0.155	55.150	0.035	0.005	1.258	73.5	54.920	0.058	0.005	0.612	73.5
7031350.1	7031351	8	150	0	0.047	55.890	0.038	0.005	1.398	73.5	55.150	0.035	0.005	1.582	73.5
7031349.1	7031350	15	150	0	0.048	57.320	0.038	0.005	1.409	73.5	55.890	0.038	0.005	1.398	73.5
7031348.1	7031349	8	150	0	0.030	57.620	0.046	0.005	1.088	73.5	57.320	0.046	0.005	1.088	73.5
7031347.1	7031348	6	150	0	0.043	58.080	0.040	0.005	1.330	73.5	57.620	0.046	0.005	1.088	73.5
7031346.1	7031347	5	150	0	0.053	58.650	0.037	0.005	1.476	73.5	58.080	0.040	0.005	1.330	73.5

Link Reference	D/S Node	Pipe Len (m)	Pipe Hgt (mm)	Sed Dpth (mm)	P.Full Flow (m3/s)	Upstream < Invert Level (m AD)	Upstream Max Depth (m)	Upstream Max Flow (m3/s)	Upstream Max Vel (m/s)	Upstream > Total Flow (m3)	Downstream < Invert Level (m AD)	Downstream Max Depth (m)	Downstream Max Flow (m3/s)	Downstream Max Vel (m/s)	Downstream > Total Flow (m3)
7031345.1	7031346	11	150	0	0.055	60.020	0.036	0.005	1.509	73.5	58.650	0.037	0.005	1.475	73.5
7031344.1	7031352	3	225	0	0.140	55.200	0.038	0.006	1.327	88.2	54.920	0.058	0.006	0.735	88.2
7031338.1	7031344	21	150	0	0.065	58.910	0.030	0.003	1.221	44.1	55.300	0.030	0.003	1.221	44.1
7031337.1	7031338	12	150	0	0.064	60.930	0.027	0.002	0.936	29.4	58.910	0.030	0.002	0.814	29.4
7046963.1	7031344	6	150	0	0.039	55.670	0.034	0.003	0.978	44.1	55.300	0.034	0.003	0.978	44.1
7031341.1	7046963	16	150	0	0.039	56.670	0.034	0.003	0.981	44.1	55.670	0.034	0.003	0.978	44.1
7031340.1	7031341	6	150	0	0.061	57.580	0.024	0.001	0.554	14.7	56.670	0.034	0.001	0.327	14.7
7031339.1	7031340	18	150	0	0.059	60.180	0.024	0.001	0.551	14.7	57.580	0.024	0.001	0.554	14.7
7031448.1	7031339	3	150	0	0.037	60.350	0.026	0.001	0.489	14.7	60.180	0.024	0.001	0.551	14.7

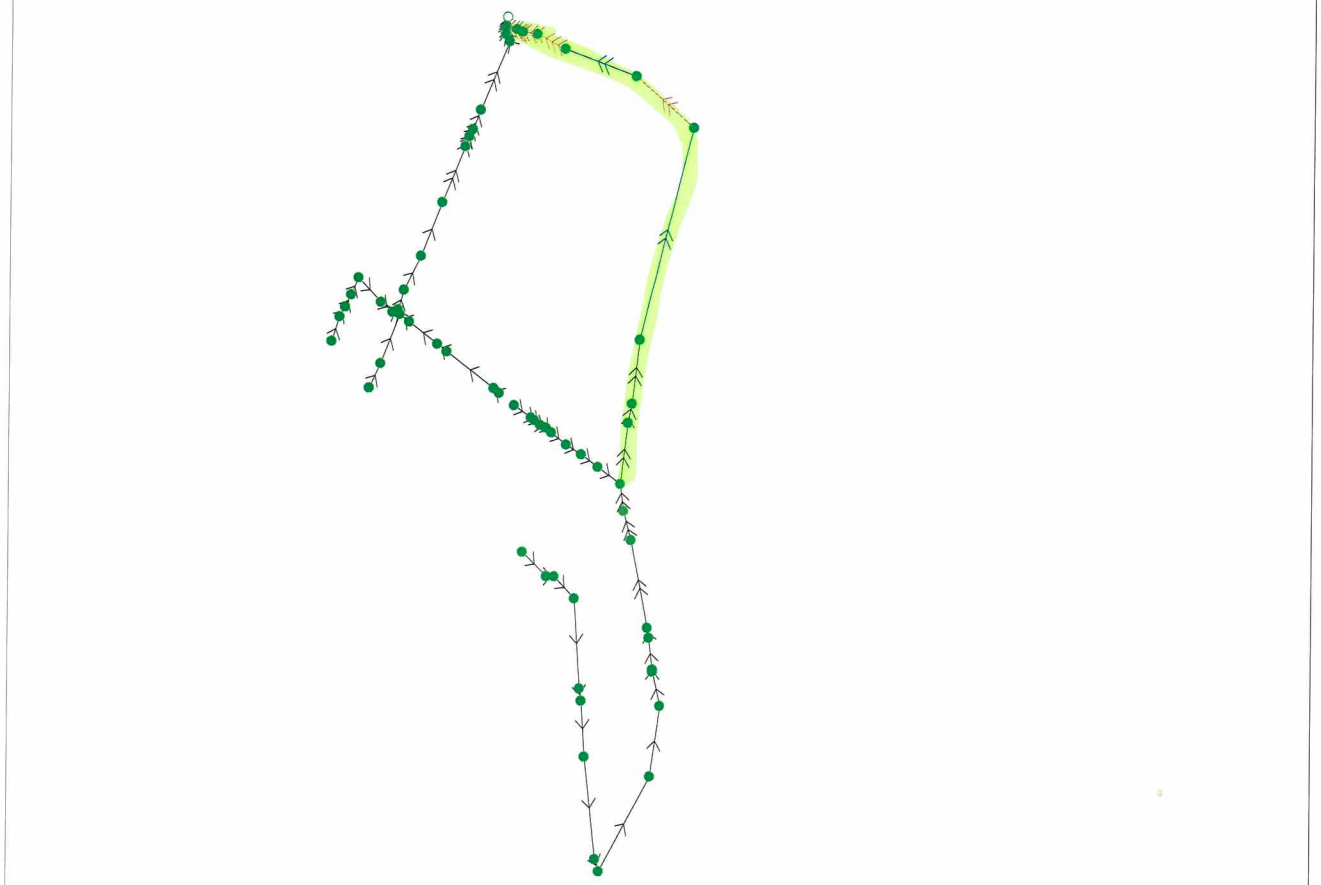
+ after total flow indicates a pipe/channel surcharged by flow and depth at that end.
x after total flow indicates a pipe/channel surcharged by depth only at that end.

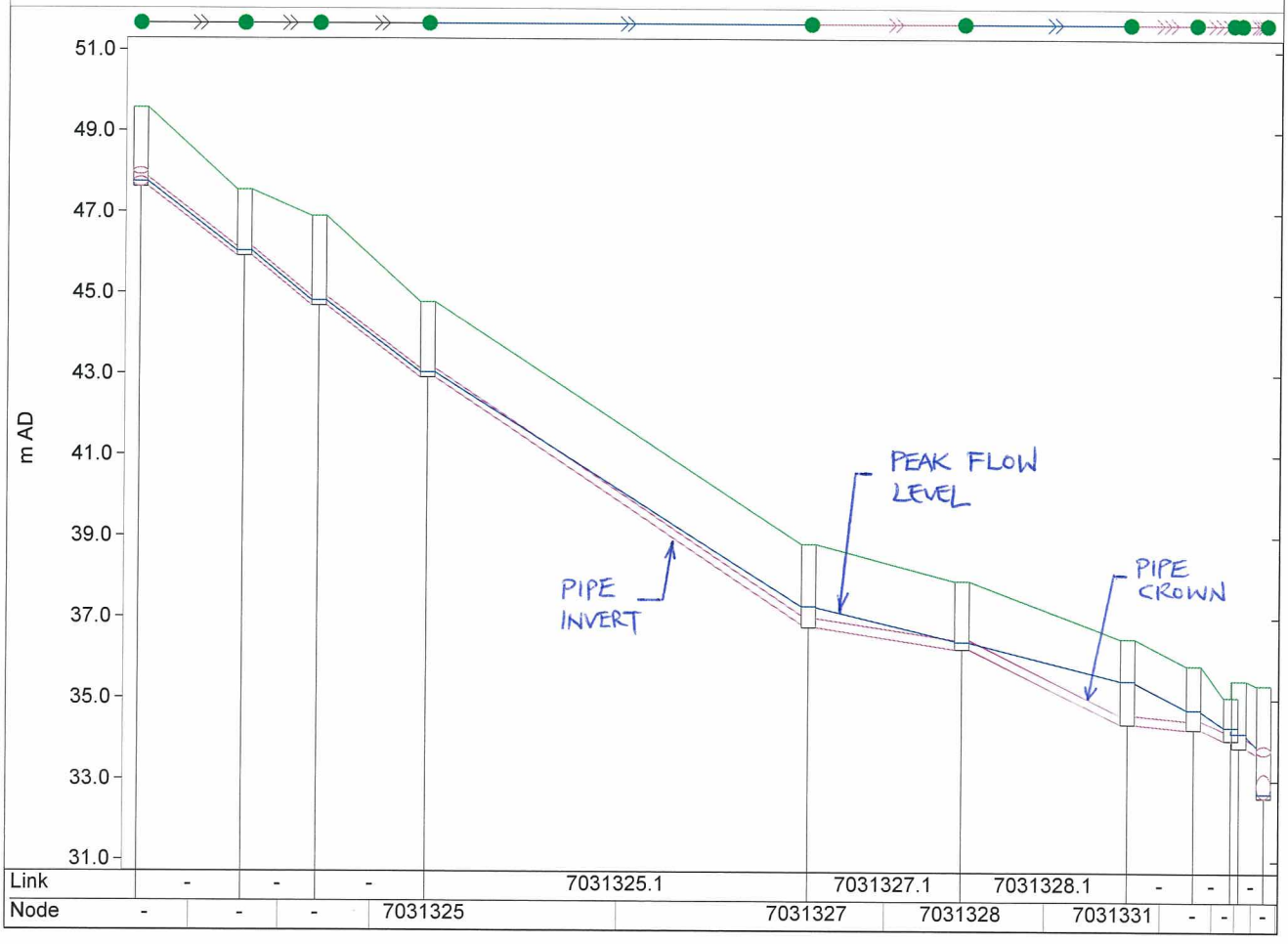
NOTE :
(i) maximum elevations, depths, volumes, velocities and discharges are selected from the values at each time increment and will be in general more extreme than the maximum values in the hydrograph files.
(ii) maximum elevations, velocities and discharges are not necessarily calculated at the same time.
(iii) max. velocity is not calculated for a pipe if either the water level does not exceed 5% of the pipe depth or the discharge is less than 0.001 m3/s.

End of run 0 mins (elapsed) Produced on 20/10/2010 Last page

Date : 14:40:44 21/10/10 | File : g:\chrisc~1\cps209~1\cpsnic~1\nicole\hydrow~1\cps\r0000025.spr (cps.ds

Time (hr) 0:00:00





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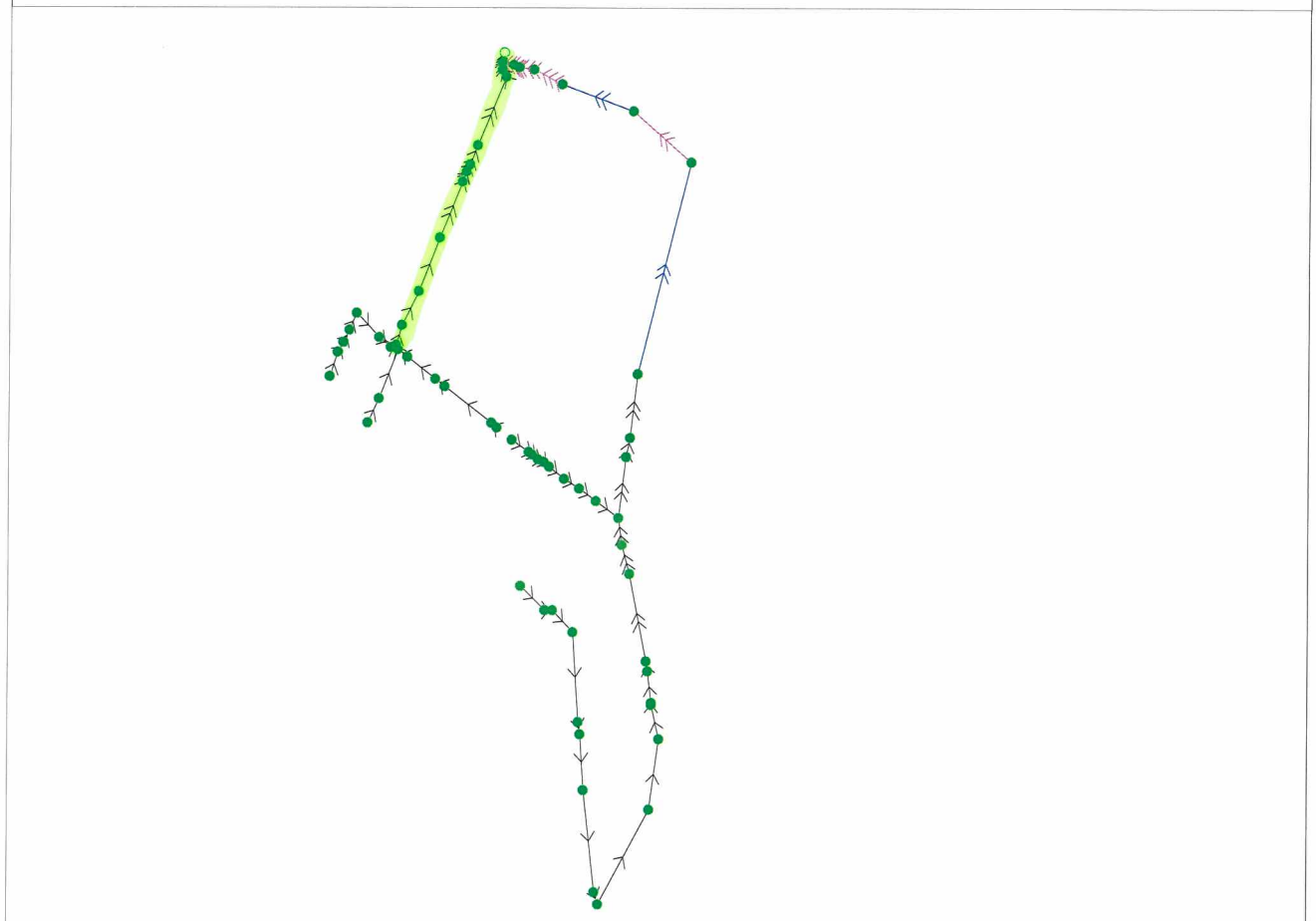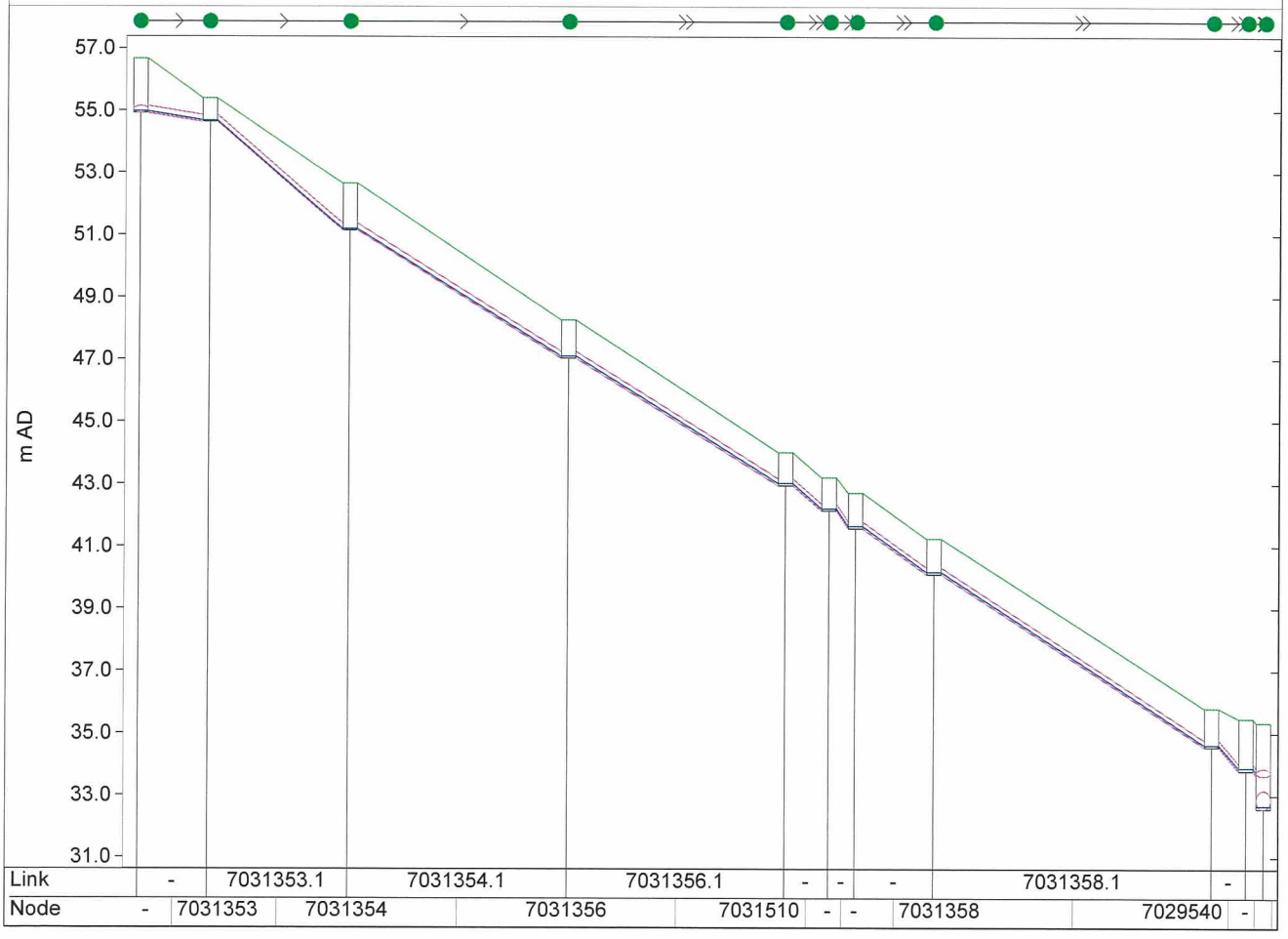
Maxima