HAWKESBURY CITY COUNCIL

Hobartville Evacuation Route Options Study

March 2011

Bewsher

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EXECUTIVE SUMMARY

Within the Hawkesbury-Nepean Floodplain Management Strategy, Hobartville was one of a number of population centres which were identified as needing improved local evacuation routes to ensure effectiveness of the regional evacuation routes.

In 2008, hydrologic and hydraulic modelling of design events ranging between 20 year average recurrence interval (ARI) and the probable maximum flood (PMF) found that many of the low points along the Hobartville local flood evacuation routes were problematic in major storm events.

This study expands on those earlier report findings by undertaking more sophisticated flood modelling of the low points.

The model results which are presented in this report serve to not only better quantify the extent of local evacuation route flooding but will also provide the SES and Council with the best available information to help with the planning of evacuations.

Since both the low point inundation issues and associated impacts on flood-time evacuation are very substantial, the report recommends further consideration of a range of potential options such as utilisation of existing laneways (in order to serve as alternative evacuation routes) and drainage infrastructure modifications/upgrades.

1. INTRODUCTION

Bewsher Consulting undertook the 2008 Hobartville Evacuation Route Study (**Reference 1**) which focussed on low point flooding along the various local evacuation routes which then connect to the Hawkesbury-Nepean regional evacuation route. Details regarding public consultation and documentation of historical flood observations as well as low point flood modelling can be found in that report.

Figure 1 defines the SES-identified Hobartville local area evacuation routes and their accompanying low point locations.

This study expands on the 2008 report findings by undertaking more sophisticated flood modelling of the low points in order to both better quantify the extent of local evacuation route flooding and to provide the SES and Council with the best available information to help with the planning of evacuations. As such the study looks at not only the evacuation constraints but also the evacuation improvement opportunities such as potential utilisation of laneways and local culvert/road upgrades.

As commissioned, the assessment involves a range of design events ranging between 20 year average recurrence interval (ARI) and the probable maximum flood (PMF) for the area shown in **Figure 1**.

Both studies are being undertaken by Hawkesbury City Council as part of it's preparation of a Local Floodplain Risk Management Plan for Hobartville.

The study was undertaken under the guidance of a Technical Working Group (TWG) which comprised representatives from the Department of Environment, Climate Change & Water (DECCW), the State Emergency Service (SES) and Hawkesbury City Council (HCC).

0 200 400
metres

NORTH

LEGEND

- Stormwater network
- BP1 — Hobartville point of interest
- Direction of Flood Evacuation Traffic
- Current Flood Evacuation Route

H1 H2 H3 H4 H7 H8 H9 H10 H11 H12 H13 H14 H15 H16 H17 H18

Study Aeea

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Hobartville Evacuation Route Options Study

Figure 1:
Study Area

2. MODELLING APPROACH

Figure 2 shows the network of sub-catchments which are dominated by drainage associated with two principal catchments. The "Western" catchment outlet is the trunk pipe system under the Castlereagh Road in the north-western corner of the study area, and the "Eastern" catchment outlet is the open channel adjacent to College Street in the south-eastern corner of the study area.

Both catchments feature significant swale systems which share a common upstream end, at Laurence Street. The Western catchment swale conveys flows north from Laurence Street before also receiving the tributary swale flows from the direction of Powell Street. The flows then pass through culverts under Valder Street and Douglas Street before reaching the inlet of twin 1200mm diameter pipes which convey the flows under the Castlereagh Road and the northern portion of Hobartville. The Eastern catchment swale conveys flows through culverts under Harold Street before reaching the inlet of the 750mm diameter pipe at East Market Street. Those piped flows then combine with other trunk system pipe flows before spilling into the open channel adjacent to College Street.

The 2008 study used a combination of RAFTS (hydrologic) software and TUFLOW (2D hydraulic) software to examine street low point flooding in the study area and this commission called for:

- Utilisation of the 2008 RAFTS models for assessment of 20 year ARI, 50 year ARI, 100 year ARI, 200 year ARI, 500 year ARI and PMF event flows; and
- Refinement and expansion of the 2008 TUFLOW model to assess flood levels and related hazard along urban neighbourhood flow paths and trunk system swales, etc (e.g. **Photographs 1** and **2**).

With the focus of the study being on overland flow issues, the analysis has not included an assessment of the capacity of local stormwater pipe systems. While the bulk of the modelling has not included the pipe systems, the sensitivity of making an allowance for their capacities has been tested.

2.1 HYDROLOGIC MODELLING

With the aid of airborne laser scanning (ALS) data provided by Council, the 2008 study's sub-catchments were refined and the resultant adjusted watershed boundaries are presented in **Figure 2**. Routing lag times in the model were also adjusted (i.e. increased) to more closely reflect the flow velocities calculated in the hydraulic model.

Table 1 lists the 'existing conditions' sub-catchment details. The design rainfall IFD data, losses, RAFTS B_x value and RAFTS PERN values are all consistent with that used in 2008.

The revised RAFTS models were run over a series of storm durations for each of the design flood events. While the individual sub-catchment flows were, as expected, very similar to those

Photo 2: Swale crossing (H12) at Valder Avenue

Photo 1: Sag point location (H9) at East Market Street.

0 200 400
metres

NORTH

LEGEND

- Stormwater network
- H10 — Hobartville point of interest
- H10 — RAFTS Catchment ID
- Eastern catchment subcatchment
- Western catchment subcatchment
- Other catchment
- General flow direction

H17 D1.0 H16 C.1.0 H15 A6.0 A3.0 H18 H14 H13 H1 B2.0 A1.4 A1.4 A1.3 A3.1 E1.3 H12 H2 H11 E1.2 E2.2 H9 E4.0 H8 B1.0 A5.0 A1.2 E2.1 H7 A1.1 H10 E1.1 H3 A1.1a E2.0 E1.0 E3.0 E1.4 A4.0 H4 E2.0a E3.0a A1.0 A2.0 F1.0

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Hobartville Evacuation Route Options Study

Figure 2:
RAFTS Catchment Plan

reported in the 2008 Evacuation Route Study report (**Reference 1**) the progressive total peak flows are typically smaller (which reflects the changes made in lag times). It is important to note that only the series of individual sub-catchment hydrographs are imported into the hydraulic model and hence those hydrologic inputs are very similar to the 2008 study inputs. **Table 2** lists the resulting flows and summary 100 year and 500year ARI outputs from the model are reproduced in **Appendix A**. **Table 2** shows that the critical storm duration is typically 90 minutes for the 20 year ARI to 500 year ARI events and 15 minutes for the PMF event.

TABLE 1: SUB-CATCHMENT DETAILS

Sub-Catchment Id	Sub-Catchment (Hectares)	RAFTS CATCHMENT DEFINITION	
		Split Catchment 100% Impervious	Catchment Pervious (with 5% Impervious defn)
A1.0	3.55	N/A	3.55
A1.1	4.36	1.91	2.45
A1.1a	6.55	2.88	3.67
A1.2	6.77	2.56	4.21
A1.3	14.20	7.19	7.01
A1.4	6.40	2.78	3.62
A2.0	5.93	3.26	2.67
A3.0	5.27	2.90	2.37
A3.1	10.15	4.91	5.24
A4.0	9.79	N/A	9.79
A5.0	1.99	1.09	0.90
A6.0	1.71	0.94	0.77
B1.0	6.49	0.93	5.56
B2.0	8.82	1.23	7.59
C1.0	4.11	2.26	1.85
D1.0	0.84	0.47	0.37
E1.0	4.12	2.27	1.85
E1.1	3.17	1.74	1.43
E1.2	5.70	1.67	4.03
E1.3	13.90	6.26	7.74
E1.4	30.87	3.10	27.77
E2.0a	4.33	2.38	1.95
E2.0	4.60	1.98	2.62
E2.1	4.18	1.89	2.29
E2.2	8.08	3.92	4.16
E3.0a	2.11	1.16	0.95
E3.0	5.07	2.79	2.28
E4.0	1.02	0.56	0.46

N.B. All urban (developed) areas have a 55% impervious fraction.

TABLE 2: SUMMARY OF RAFTS FLOWS (EXISTING CONDITIONS)

20 Yr ARI Flows (m3/s)

RAFTS Node	Duration 25	60	90	120	180	270	360	540	720	Max
A5.0	0.6	0.6	**0.7**	0.6	0.4	0.4	0.3	0.2	0.2	0.7
A6.0	0.5	0.5	**0.6**	0.5	0.4	0.3	0.2	0.2	0.2	0.6
H15	0.5	0.5	**0.6**	0.5	0.4	0.3	0.2	0.2	0.2	0.6
A3.0	1.5	1.3	**1.5**	1.4	0.9	0.8	0.7	0.6	0.7	1.5
H18	1.5	1.3	**1.5**	1.4	0.9	0.8	0.7	0.6	0.7	1.5
A3.1	3.1	3.1	**3.2**	3.0	2.4	2.3	2.0	1.7	1.8	3.2
A2.0	1.8	1.7	**2.0**	1.8	1.2	1.1	0.8	0.7	0.7	2.0
A4.0	0.6	1.0	1.0	1.1	1.0	**1.1**	1.0	0.9	0.9	1.1
A1.0	0.9	1.4	1.4	1.5	1.3	**1.6**	1.4	1.3	1.3	1.6
A1.1a	1.7	2.1	2.2	2.3	2.0	**2.4**	2.1	1.9	1.9	2.4
A1.1	3.8	4.1	**4.8**	4.6	3.6	3.8	3.4	3.0	3.1	4.8
A1.2	7.5	7.6	**8.4**	8.1	6.7	6.9	6.1	5.4	5.5	8.4
A1.3	8.9	9.8	**10.3**	10.3	8.2	8.9	7.8	7.0	7.0	10.3
A1.4	9.2	10.6	**11.0**	11.0	8.8	9.6	8.4	7.6	7.5	11.0
B2.0	0.9	1.0	**1.2**	1.1	1.0	1.2	1.0	0.9	0.9	1.2
B1.0	0.6	0.7	**0.8**	0.8	0.7	0.8	0.7	0.6	0.7	0.8
H1_H2	1.5	1.7	**2.0**	1.9	1.6	2.0	1.7	1.5	1.6	2.0
F1.0	0.2	0.3	0.3	**0.4**	0.3	0.2	0.2	0.2	0.2	0.4
E3.0a	0.6	0.7	**0.8**	0.8	0.6	0.6	0.5	0.4	0.4	0.8
E3.0	1.7	1.7	**1.7**	1.6	1.3	1.3	1.2	1.0	1.0	1.7
E4.0	0.3	0.3	**0.3**	0.3	0.2	0.2	0.1	0.1	0.1	0.3
E2.0a	1.2	1.1	**1.3**	1.2	0.8	0.7	0.6	0.5	0.5	1.3
E2.0	2.2	2.1	**2.4**	2.2	1.5	1.4	1.2	1.0	1.1	2.4
E2.1	2.7	2.7	2.9	**3.0**	2.1	2.0	1.7	1.5	1.5	3.0
E2.2	4.0	4.0	4.1	**4.4**	3.4	3.1	2.8	2.4	2.5	4.4
E1.0	1.3	1.3	**1.4**	1.3	0.9	0.8	0.6	0.5	0.5	1.4
E1.1	2.1	1.9	**2.2**	2.0	1.4	1.2	1.0	0.9	0.9	2.2
E1.2	6.1	6.3	6.5	**7.0**	5.3	5.1	4.4	3.9	3.9	7.0
H9	6.1	6.3	6.5	**7.0**	5.3	5.1	4.4	3.9	3.9	7.0
E1.3	7.3	7.9	8.2	**8.6**	6.7	7.1	6.0	5.3	5.5	8.6
H7	8.3	9.2	9.6	**9.9**	7.8	8.4	7.1	6.2	6.5	9.9
E1.4	8.9	10.5	10.9	**11.3**	9.1	10.0	8.8	8.3	8.5	11.3
C1.0	1.1	1.0	**1.2**	1.1	0.7	0.7	0.6	0.5	0.5	1.2
H16	1.1	1.0	**1.2**	1.1	0.7	0.7	0.6	0.5	0.5	1.2
D1.0	0.3	0.3	**0.3**	0.3	0.2	0.2	0.1	0.1	0.1	0.3
H17	0.3	0.3	**0.3**	0.3	0.2	0.2	0.1	0.1	0.1	0.3

TABLE 2: SUMMARY OF RAFTS FLOWS (EXISTING CONDITIONS)

50 Yr ARI Flows (m3/s)

RAFTS Node	Duration 25	60	90	120	180	270	360	540	720	Max
A5.0	0.7	0.7	**0.8**	0.7	0.5	0.4	0.3	0.3	0.3	0.8
A6.0	0.6	0.6	**0.6**	0.6	0.4	0.3	0.3	0.2	0.2	0.6
H15	0.6	0.6	**0.6**	0.6	0.4	0.3	0.3	0.2	0.2	0.6
A3.0	1.6	1.5	**1.7**	1.5	1.1	1.0	0.8	0.7	0.7	1.7
H18	1.6	1.5	**1.7**	1.5	1.1	1.0	0.8	0.7	0.7	1.7
A3.1	3.5	3.5	**3.7**	3.4	2.8	2.6	2.2	1.9	2.0	3.7
A2.0	2.0	2.0	**2.2**	2.0	1.4	1.2	0.9	0.8	0.8	2.2
A4.0	0.8	1.2	1.3	**1.3**	1.2	1.3	1.1	1.0	1.1	1.3
A1.0	1.2	1.8	1.8	**1.9**	1.6	1.8	1.6	1.4	1.5	1.9
A1.1a	2.0	2.7	2.7	**2.8**	2.3	2.8	2.4	2.1	2.2	2.8
A1.1	4.4	5.0	**5.6**	5.4	4.2	4.3	3.8	3.4	3.5	5.6
A1.2	8.5	9.0	**9.8**	9.7	7.8	7.8	6.9	6.1	6.1	9.8
A1.3	10.5	11.7	12.2	**12.2**	9.6	10.2	8.7	7.8	7.9	12.2
A1.4	10.9	12.7	13.0	**13.0**	10.3	11.0	9.4	8.5	8.5	13.0
B2.0	1.0	1.3	**1.4**	1.4	1.1	1.3	1.2	1.0	1.1	1.4
B1.0	0.7	0.9	**1.0**	0.9	0.8	0.9	0.8	0.7	0.8	1.0
H1_H2	1.8	2.2	**2.4**	2.3	1.9	2.3	2.0	1.7	1.8	2.4
F1.0	0.3	0.4	0.4	**0.4**	0.3	0.3	0.2	0.2	0.2	0.4
E3.0a	0.7	0.8	**1.0**	0.9	0.7	0.6	0.5	0.5	0.5	1.0
E3.0	1.8	1.9	**2.0**	1.8	1.5	1.5	1.3	1.1	1.1	2.0
E4.0	0.3	0.3	**0.4**	0.3	0.2	0.2	0.2	0.1	0.1	0.4
E2.0a	1.3	1.3	**1.4**	1.3	0.9	0.8	0.6	0.6	0.6	1.4
E2.0	2.4	2.4	**2.7**	2.5	1.8	1.6	1.3	1.2	1.2	2.7
E2.1	3.0	3.1	3.4	**3.4**	2.4	2.2	1.9	1.7	1.7	3.4
E2.2	4.5	4.7	4.8	**5.1**	3.9	3.6	3.1	2.7	2.8	5.1
E1.0	1.5	1.5	**1.6**	1.5	1.0	0.8	0.6	0.6	0.6	1.6
E1.1	2.2	2.2	**2.5**	2.3	1.6	1.4	1.1	1.0	1.0	2.5
E1.2	7.0	7.5	7.6	**8.2**	6.1	5.8	4.9	4.3	4.4	8.2
H9	7.0	7.5	7.6	**8.2**	6.1	5.8	4.9	4.3	4.4	8.2
E1.3	8.7	9.5	9.6	**10.2**	7.8	8.1	6.7	5.9	6.1	10.2
H7	10.1	11.1	11.3	**11.7**	9.1	9.5	8.0	6.9	7.3	11.7
E1.4	11.0	12.8	13.1	**13.5**	10.7	11.6	10.0	9.4	9.6	13.5
C1.0	1.2	1.2	**1.3**	1.2	0.8	0.7	0.6	0.5	0.5	1.3
H16	1.2	1.2	**1.3**	1.2	0.8	0.7	0.6	0.5	0.5	1.3
D1.0	0.3	0.3	**0.3**	0.3	0.2	0.2	0.1	0.1	0.1	0.3
H17	0.3	0.3	**0.3**	0.3	0.2	0.2	0.1	0.1	0.1	0.3

TABLE 2: SUMMARY OF RAFTS FLOWS (EXISTING CONDITIONS)

100 Yr ARI Flows (m3/s)

RAFTS Node	Duration 25	60	90	120	180	270	360	540	720	Max
A5.0	0.8	0.8	**0.9**	0.8	0.5	0.5	0.3	0.3	0.3	0.9
A6.0	0.7	0.7	**0.7**	0.7	0.4	0.4	0.3	0.3	0.3	0.7
H15	0.7	0.7	**0.7**	0.7	0.4	0.4	0.3	0.3	0.3	0.7
A3.0	1.8	1.7	**1.9**	1.7	1.2	1.1	0.9	0.8	0.9	1.9
H18	1.8	1.7	**1.9**	1.7	1.2	1.1	0.9	0.8	0.9	1.9
A3.1	4.0	4.0	**4.2**	3.9	3.2	2.9	2.5	2.2	2.3	4.2
A2.0	2.3	2.3	**2.5**	2.3	1.5	1.3	1.0	0.9	0.9	2.5
A4.0	1.0	1.5	1.5	**1.6**	1.3	1.5	1.3	1.2	1.2	1.6
A1.0	1.5	2.1	2.1	**2.2**	1.8	2.1	1.8	1.6	1.7	2.2
A1.1a	2.5	3.1	3.2	**3.3**	2.7	3.2	2.7	2.4	2.5	3.3
A1.1	5.2	5.8	**6.5**	6.3	4.9	4.9	4.4	3.9	3.9	6.5
A1.2	9.7	10.5	**11.4**	11.2	9.1	8.9	7.8	6.9	6.9	11.4
A1.3	12.1	13.6	**14.1**	14.1	11.1	11.7	9.9	8.8	8.9	14.1
A1.4	12.6	14.7	**15.0**	15.0	11.8	12.5	10.7	9.6	9.5	15.0
B2.0	1.2	1.6	**1.7**	1.7	1.4	1.5	1.3	1.1	1.2	1.7
B1.0	0.9	1.1	**1.2**	1.1	0.9	1.1	0.9	0.8	0.9	1.2
H1_H2	2.1	2.6	**2.9**	2.8	2.3	2.6	2.2	1.9	2.1	2.9
F1.0	0.4	0.4	**0.5**	0.5	0.4	0.3	0.3	0.2	0.2	0.5
E3.0a	0.8	0.9	**1.1**	1.1	0.8	0.7	0.6	0.5	0.5	1.1
E3.0	2.1	2.2	**2.3**	2.1	1.8	1.6	1.4	1.3	1.3	2.3
E4.0	0.4	0.4	**0.4**	0.4	0.3	0.2	0.2	0.2	0.2	0.4
E2.0a	1.5	1.4	**1.6**	1.5	1.0	0.9	0.7	0.6	0.7	1.6
E2.0	2.8	2.7	**3.1**	2.8	2.0	1.8	1.5	1.3	1.3	3.1
E2.1	3.4	3.6	3.9	**4.0**	2.8	2.5	2.1	1.9	1.9	4.0
E2.2	5.1	5.4	5.5	**5.9**	4.5	4.0	3.4	3.0	3.1	5.9
E1.0	1.7	1.7	**1.8**	1.7	1.1	0.9	0.7	0.6	0.6	1.8
E1.1	2.5	2.6	**2.9**	2.6	1.8	1.5	1.2	1.1	1.1	2.9
E1.2	8.0	8.6	8.8	**9.5**	7.1	6.5	5.5	4.8	4.9	9.5
H9	8.0	8.6	8.8	**9.5**	7.1	6.5	5.5	4.8	4.9	9.5
E1.3	10.0	11.0	11.1	**11.7**	9.0	9.1	7.5	6.7	6.9	11.7
H7	11.7	12.8	13.0	**13.5**	10.4	10.7	8.9	7.8	8.1	13.5
E1.4	12.7	14.9	15.2	**15.8**	12.3	13.3	11.3	10.6	10.8	15.8
C1.0	1.4	1.3	**1.5**	1.4	0.9	0.8	0.7	0.6	0.6	1.5
H16	1.4	1.3	**1.5**	1.4	0.9	0.8	0.7	0.6	0.6	1.5
D1.0	0.4	0.4	**0.4**	0.4	0.2	0.2	0.1	0.1	0.1	0.4
H17	0.4	0.4	**0.4**	0.4	0.2	0.2	0.1	0.1	0.1	0.4

TABLE 2: SUMMARY OF RAFTS FLOWS (EXISTING CONDITIONS)

200 Yr ARI Flows (m3/s)

RAFTS Node	Duration 25	60	90	120	180	270	360	540	720	Max
A5.0	0.9	0.9	**0.9**	0.8	0.6	0.5	0.4	0.3	0.3	0.9
A6.0	0.7	0.7	**0.8**	0.7	0.5	0.4	0.3	0.3	0.3	0.8
H15	0.7	0.7	**0.8**	0.7	0.5	0.4	0.3	0.3	0.3	0.8
A3.0	1.9	1.9	**2.1**	1.9	1.3	1.1	1.0	1.0	1.0	2.1
H18	1.9	1.9	**2.1**	1.9	1.3	1.1	1.0	1.0	1.0	2.1
A3.1	4.3	4.4	**4.6**	4.3	3.5	3.1	2.7	2.4	2.5	4.6
A2.0	2.6	2.5	**2.8**	2.5	1.7	1.4	1.1	1.0	1.0	2.8
A4.0	1.1	1.7	1.7	**1.7**	1.5	1.6	1.4	1.3	1.3	1.7
A1.0	1.8	2.4	2.4	**2.5**	2.0	2.3	2.0	1.8	1.8	2.5
A1.1a	2.8	3.5	3.5	**3.6**	3.0	3.4	3.0	2.6	2.7	3.6
A1.1	5.8	6.4	**7.2**	6.9	5.4	5.3	4.8	4.2	4.2	7.2
A1.2	10.8	11.5	**12.5**	12.3	10.0	9.5	8.5	7.5	7.5	12.5
A1.3	13.4	15.0	**15.5**	15.5	12.3	12.4	10.8	9.6	9.6	15.5
A1.4	13.9	16.1	**16.5**	16.5	13.0	13.4	11.7	10.4	10.3	16.5
B2.0	1.4	1.7	**1.9**	1.9	1.5	1.6	1.4	1.2	1.3	1.9
B1.0	1.0	1.2	**1.3**	1.2	1.0	1.2	1.0	0.9	0.9	1.3
H1_H2	2.4	2.9	**3.2**	3.1	2.6	2.8	2.5	2.1	2.2	3.2
F1.0	0.4	0.5	**0.6**	0.5	0.4	0.3	0.3	0.2	0.2	0.6
E3.0a	0.9	1.0	**1.2**	1.2	0.9	0.8	0.7	0.6	0.6	1.2
E3.0	2.3	2.4	**2.6**	2.3	2.0	1.7	1.6	1.4	1.4	2.6
E4.0	0.4	0.4	**0.5**	0.4	0.3	0.2	0.2	0.2	0.2	0.5
E2.0a	1.6	1.6	**1.8**	1.6	1.1	1.0	0.8	0.7	0.7	1.8
E2.0	3.0	3.0	**3.4**	3.1	2.2	1.9	1.6	1.4	1.4	3.4
E2.1	3.7	3.9	4.3	**4.4**	3.2	2.7	2.3	2.0	2.1	4.4
E2.2	5.6	5.9	6.0	**6.5**	4.9	4.3	3.8	3.3	3.3	6.5
E1.0	1.9	1.9	**2.0**	1.8	1.2	1.0	0.8	0.7	0.7	2.0
E1.1	2.8	2.8	**3.1**	2.8	2.0	1.6	1.3	1.2	1.2	3.1
E1.2	8.8	9.4	9.7	**10.4**	7.8	6.9	6.0	5.2	5.2	10.4
H9	8.8	9.4	9.7	**10.4**	7.8	6.9	6.0	5.2	5.2	10.4
E1.3	11.1	12.1	12.2	**12.9**	9.9	9.7	8.2	7.2	7.4	12.9
H7	12.9	14.1	14.3	**14.8**	11.5	11.4	9.8	8.5	8.8	14.8
E1.4	14.1	16.4	16.8	**17.4**	13.7	14.1	12.4	11.5	11.6	17.4
C1.0	1.5	1.5	**1.7**	1.5	1.0	0.9	0.7	0.7	0.7	1.7
H16	1.5	1.5	**1.7**	1.5	1.0	0.9	0.7	0.7	0.7	1.7
D1.0	0.4	0.4	**0.4**	0.4	0.2	0.2	0.2	0.1	0.1	0.4
H17	0.4	0.4	**0.4**	0.4	0.2	0.2	0.2	0.1	0.1	0.4

TABLE 2: SUMMARY OF RAFTS FLOWS (EXISTING CONDITIONS)

500 Yr ARI Flows (m3/s)

RAFTS Node	Duration 25	60	90	120	180	270	360	540	720	Max
A5.0	1.0	1.0	**1.1**	1.0	0.6	0.5	0.4	0.4	0.4	1.1
A6.0	0.8	0.8	**0.9**	0.8	0.5	0.5	0.4	0.3	0.3	0.9
H15	0.8	0.8	**0.9**	0.8	0.5	0.5	0.4	0.3	0.3	0.9
A3.0	2.2	2.2	**2.4**	2.2	1.5	1.3	1.1	1.2	1.2	2.4
H18	2.2	2.2	**2.4**	2.2	1.5	1.3	1.1	1.2	1.2	2.4
A3.1	4.9	5.0	**5.2**	4.9	4.0	3.5	3.0	2.8	2.9	5.2
A2.0	2.9	2.9	**3.1**	2.8	1.9	1.6	1.2	1.1	1.1	3.1
A4.0	1.3	2.0	2.0	**2.0**	1.7	1.9	1.6	1.4	1.5	2.0
A1.0	2.1	2.8	2.8	**2.9**	2.3	2.6	2.3	2.0	2.0	2.9
A1.1a	3.3	4.1	4.1	**4.2**	3.5	3.9	3.4	3.0	3.0	4.2
A1.1	6.6	7.4	**8.3**	8.0	6.2	6.0	5.4	4.7	4.8	8.3
A1.2	12.3	13.3	**14.4**	14.1	11.5	10.7	9.5	8.5	8.5	14.4
A1.3	15.4	17.2	**17.8**	17.7	14.0	14.1	12.2	10.9	10.8	17.8
A1.4	15.9	18.5	**18.9**	18.8	14.9	15.1	13.2	11.8	11.6	18.9
B2.0	1.6	2.0	**2.2**	2.2	1.8	1.8	1.6	1.4	1.5	2.2
B1.0	1.1	1.4	**1.5**	1.5	1.2	1.3	1.2	1.0	1.0	1.5
H1_H2	2.8	3.4	**3.7**	3.7	3.0	3.2	2.8	2.4	2.5	3.7
F1.0	0.5	0.6	**0.6**	0.6	0.5	0.4	0.3	0.3	0.3	0.6
E3.0a	1.1	1.2	**1.4**	1.3	1.1	0.8	0.7	0.7	0.7	1.4
E3.0	2.6	2.7	**2.9**	2.7	2.3	1.9	1.7	1.5	1.5	2.9
E4.0	0.5	0.5	**0.5**	0.5	0.3	0.3	0.2	0.2	0.2	0.5
E2.0a	1.8	1.8	**2.0**	1.8	1.3	1.1	0.9	0.8	0.8	2.0
E2.0	3.4	3.4	**3.9**	3.5	2.6	2.2	1.8	1.6	1.6	3.9
E2.1	4.3	4.5	4.9	**5.0**	3.6	3.1	2.6	2.3	2.3	5.0
E2.2	6.3	6.8	6.9	**7.4**	5.7	4.9	4.2	3.7	3.7	7.4
E1.0	2.1	2.1	**2.2**	2.0	1.3	1.1	0.9	0.8	0.8	2.2
E1.1	3.2	3.2	**3.5**	3.2	2.2	1.8	1.5	1.3	1.3	3.5
E1.2	10.0	10.9	11.0	**11.8**	8.9	7.9	6.7	5.9	5.9	11.8
H9	10.0	10.9	11.0	**11.8**	8.9	7.9	6.7	5.9	5.9	11.8
E1.3	12.6	13.9	14.0	**14.7**	11.3	10.9	9.2	8.1	8.3	14.7
H7	14.7	16.2	16.4	**16.9**	13.2	12.8	10.9	9.5	9.8	16.9
E1.4	16.2	18.9	19.3	**19.9**	15.7	16.0	14.0	12.9	13.1	19.9
C1.0	1.7	1.7	**1.9**	1.7	1.2	1.0	0.8	0.7	0.7	1.9
H16	1.7	1.7	**1.9**	1.7	1.2	1.0	0.8	0.7	0.7	1.9
D1.0	**0.5**	0.4	0.5	0.4	0.3	0.2	0.2	0.2	0.2	0.5
H17	**0.5**	0.4	0.5	0.4	0.3	0.2	0.2	0.2	0.2	0.5

TABLE 2: SUMMARY OF RAFTS FLOWS (EXISTING CONDITIONS)

PMF Flows (m3/s)

RAFTS Node	Duration 15	30	45	60	90	120	150	180	Max
A5.0	**4.2**	3.5	3.2	2.9	2.5	2.3	2.0	1.8	4.2
A6.0	**3.4**	3.0	2.6	2.5	2.2	2.0	1.7	1.6	3.4
H15	**3.4**	3.0	2.6	2.5	2.2	2.0	1.7	1.6	3.4
A3.0	8.9	9.2	9.1	**9.2**	8.2	7.7	7.0	6.4	9.2
H18	8.9	9.2	9.1	**9.2**	8.2	7.7	7.0	6.4	9.2
A3.1	**21.3**	21.2	20.5	20.6	20.0	18.3	16.7	15.6	21.3
A2.0	**11.8**	10.5	9.2	8.7	7.5	6.8	6.0	5.5	11.8
A4.0	8.2	11.2	**11.7**	11.6	11.0	10.2	9.4	8.7	11.7
A1.0	12.2	15.4	**15.9**	15.8	14.9	14.0	12.8	11.9	15.9
A1.1a	15.8	20.9	22.6	**22.7**	21.8	20.7	18.9	17.6	22.7
A1.1	31.7	34.2	34.3	**34.4**	33.2	31.0	28.6	26.8	34.4
A1.2	58.0	**62.9**	62.3	62.0	59.7	55.7	51.5	48.3	62.9
A1.3	65.3	78.5	**79.5**	79.0	76.3	72.6	66.0	62.4	79.5
A1.4	65.8	81.0	85.1	**85.5**	81.9	78.4	71.9	67.3	85.5
B2.0	9.2	**11.5**	11.3	11.1	10.2	9.6	8.7	8.0	11.5
B1.0	6.2	7.9	**8.0**	8.0	7.5	7.0	6.3	5.9	8.0
H1_H2	15.4	**19.4**	19.2	19.0	17.7	16.5	15.0	13.9	19.4
F1.0	**3.0**	2.6	2.3	2.2	1.9	1.7	1.5	1.4	3.0
E3.0a	5.2	**5.7**	5.5	5.1	4.5	4.1	3.6	3.3	5.7
E3.0	10.1	11.2	**11.5**	11.3	10.4	9.5	8.6	7.9	11.5
E4.0	**1.9**	1.7	1.6	1.5	1.3	1.2	1.0	0.9	1.9
E2.0a	**7.5**	6.8	6.5	6.0	5.4	4.9	4.4	4.0	7.5
E2.0	**14.4**	13.5	12.7	12.0	11.0	10.1	9.0	8.2	14.4
E2.1	**20.8**	19.5	18.4	17.4	16.0	14.7	13.1	12.1	20.8
E2.2	**32.0**	30.7	29.1	28.3	25.5	23.5	21.1	19.4	32.0
E1.0	**8.7**	7.4	6.6	6.1	5.2	4.7	4.2	3.8	8.7
E1.1	**13.9**	12.2	10.9	10.4	9.2	8.3	7.4	6.7	13.9
E1.2	**51.7**	50.2	46.8	45.2	41.0	37.9	34.0	31.3	51.7
H9	**51.7**	50.2	46.8	45.2	41.0	37.9	34.0	31.3	51.7
E1.3	59.2	**65.8**	64.8	63.4	58.6	53.7	48.4	44.6	65.8
H7	66.1	**76.6**	76.1	74.4	68.9	63.2	56.9	52.4	76.6
E1.4	75.1	93.5	97.9	**98.7**	93.8	88.0	80.4	75.7	98.7
C1.0	**7.0**	6.3	6.0	5.7	5.1	4.6	4.1	3.8	7.0
H16	**7.0**	6.3	6.0	5.7	5.1	4.6	4.1	3.8	7.0
D1.0	**1.9**	1.5	1.4	1.2	1.1	1.0	0.9	0.8	1.9
H17	**1.9**	1.5	1.4	1.2	1.1	1.0	0.9	0.8	1.9

2.2 HYDRAULIC MODELLING

In the 2008 study a coarse DEM was developed to facilitate the use of TUFLOW software to define inundation regimes along most of the local flood evacuation routes. For this study, that model has been (a) refined by the development and adoption of a new digital elevation model (DEM) based on a combination of ALS data supplied by Council and the 2008 streetscape field survey information, and (b) enlarged such that it provides better coverage of the study area.

2.2.1 TUFLOW Features

Incorporating the new explicitly detailed DEM, the upgraded TUFLOW model (operating on a two metre grid) includes the following features:

- Inflows: These consist of the RAFTS-generated hydrographs (including as-appropriate proportioning of some hydrographs to reflect separate minor flowpath regimes);
- Downstream boundary conditions: The same approach used for design tailwater conditions in the 2008 study was adopted, as follows.

Table 3 itemises the coincident Hawkesbury-Nepean flood events used for the various local catchment model runs.

TABLE 3: DESIGN DOWNSTREAM BOUNDARY CONDITIONS

Hobartville local catchment ARI storm	Coincident Hawkesbury-Nepean ARI flood peak
20 year	5 year
50 year	10 year
100 year	20 year
200 & 500 year	50 year
PMF	100 year

Table 4 lists the corresponding Hawkesbury-Nepean River flood levels which were adopted at the model's downstream boundaries. The North Richmond levels were adopted for the northward flowing catchments and the Windsor levels were adopted for the eastward flowing catchments (since they all drain to Rickabys Creek whose outlet is close to Windsor).

Where it was found that the Hawkesbury-Nepean backwater levels were not dominant, boundary conditions were assessed using 'uniform flow' calculations;

TABLE 4: HAWKESBURY-NEPEAN RIVER FLOOD LEVELS

ARI (years)	RL at North Richmond (m AHD)	RL at Windsor (m AHD)
5	12.5	11.1
10	14.0	12.3
20	15.3	13.7
50	16.4	15.7
100	17.5	17.3
200	18.9	18.7
500	20.4	20.2
PMF	26.5	26.4

- Allotment modelling: Dwellings are modelled by 'raising' the ALS ground level by 500mm (to reflect the typical timber-floor-on-supporting-pier houses) and assigning a very high hydraulic roughness to the footprint. Allotment curtilage areas have been assigned a composite hydraulic roughness to allow for minor flow obstructions such as garden sheds, landscape features and boundary fences, etc. as well as lawn areas;

- Culverts: All culvert crossings of the Western and Eastern swales plus the trunk pipe system outlets of the Western and Eastern swales are included in the model;

- Hydraulic roughness parameters: The general roughness parameters used in the model are as listed in **Table 5** while open channels were modelled with the same roughness parameters as used in the 2008 hydraulic modelling.

TABLE 5: TUFLOW Model Manning's n Roughnesses

Surface Type (Material)	Manning's n
Urban property curtilage area	0.10
Roads and paved/concrete areas	0.02
Short grass / bare earth	0.03
Thick vegetation	0.06
Building footprints	20

A range of storm durations were tested in TUFLOW and based on those results enveloping of the results for the two hour and 4 ½ hour storms were used to assess the 20 year to 500 year ARI events while the two hour storm duration flows were used to assess the PMF event.

2.2.2 Blockage Scenarios

The TUFLOW model was run with two blockage regimes; 0% and 50% blockage applied to all culverts and trunk drainage pipes.

2.2.3 Sensitivity Trials

The flood modelling includes the following sensitivity trials associated with the 100 year ARI base case (unblocked) model:

- Firstly, recognising that full blockage of stormwater pipes is conservative, the analysis has been adjusted to make an allowance for the stormwater pipe systems. Based on the broad assumption that the pipes have a 2 year ARI flow capacity, the surface flow hydrographs for all the urban neighbourhood catchments were modified by subtracting all flows which are smaller than the 2 year ARI storm peak flow. The modified hydrographs (which then approximate the remnant surface flows) were then utilized in the TUFLOW model. However in addition where these catchment flows are conveyed to either of the swales, the truncated 'pipe flow' portions of the hydrographs have been separately imported at the respective locations in order to preserve the total flow volume at those locations;

- Secondly, the potential impacts of climate change were examined. The TWG considered that an appropriate upper limit for design rainfall intensity increases would be 20% and therefore the 100 year ARI storm intensities were increased by that amount. The resultant hydrographs were utilized in the TUFLOW model.

3. FLOOD MODEL RESULTS

Electronic TUFLOW output for all six design events (for both 0% and 50% culvert blockage scenarios) have been provided to HCC.

The following maps are presented in this report:

- 100 year ARI extent of inundation maps (for both 0% and 50% blockage conditions), see **Figures 3** and **4** respectively;
- PMF extent of inundation maps (for both 0% and 50% blockage conditions), see **Figures 5** and **6** respectively;
- 100 year ARI Provisional Hazard Map (based on unblocked conditions) where the hazard categories are consistent with Figure L.2 of Appendix L of the Floodplain Development Manual (**Reference 3**), see **Figure 7**; and
- The two 100 year 'sensitivity' impact maps (based on unblocked conditions): These are **Figure 8** which defines the changes in water level after conceptual allowance for pipe system capacities and **Figure 9** which reflects the increases in water levels which would be associated with a 20% increase in rainfall intensities.

The maps are supplemented by a series of graphs (**Figures 11** to **25**) which define the 'unblocked' water level and flow hydrographs at each of the low points shown in **Figure 10**. (It is important to note that the ground level shown in the water level graphs is consistent with the DEM level at the 'marker' location shown in **Figure 10**. Since the DEM does not replicate the definitive low point at sag point locations, the maximum sag point depths listed in the text below are relative to the field surveyed sag point level rather than the DEM level. Hence the listed depths often differ from the values which would be read from the corresponding graph.)

3.1 100 YEAR ARI AND PMF EXTENTS OF INUNDATION

Figures 3 and **4** provide near identical pictures of 100 year ARI inundation since the only difference between the two models is consideration of blockage at the various trunk drainage structures. Since depths of inundation of less than 0.1 metres can be considered to represent only very minor flow regimes, areas experiencing such inundation have not been mapped. One consequence of this is that it can be seen from the figures that the elimination of areas experiencing such shallow inundation results in non-continuous flow patterns in some areas.

The two figures show that in most urban neighbourhood locations, the flowpaths are predominantly in roadways. However where the roadway depths are significant, there is some inundation of adjoining private properties.

The figures also show that there are two areas where the flowpaths are predominantly not following road alignments and hence there are broader scale private property inundation issues. These two neighbourhoods are:

- Southee Road/Potts Street/Cornwell Avenue and Rutherglen Avenue (that is, downslope of H3 and H4); and

- East Market Street/Brentwood Avenue/Gibson Street/Bayly Court (that is, in the general vicinity of H8 and H9).

The area located north-east of Teviot Street and Grose Street has been shaded as an area of "low confidence" because in that area the TUFLOW model is predicting inundation spreading into areas which are beyond the limit of the hydrologic modelling footprint. That is, in those areas local runoff is not included in the hydraulic model and therefore the resultant inundation picture is less accurate.

Figure 7 shows that essentially all of the urban neighbourhood and roadway overland flow areas only experience low hazard conditions in the 100 year ARI event. Medium and high hazard conditions are almost totally confined to the swales and the open channel adjacent to College Street.

Figure 8 shows how 100 year ARI water depths would change after making (hydrologic) allowances in the TUFLOW model to conceptually replicate stormwater pipe systems having 2 year ARI event capacities.

Figure 9 shows how 100 year ARI water levels would change if the 100 year ARI rainfall intensities were to increase by twenty percent. It can be seen that there are small water level increases (that is, typically less than 0.05 metres) in those private properties which lie within overland flowpaths and slightly larger increases, of up to 0.10 metres, on roads (and adjoining properties) in Douglas Street (H15) and the East Market Street/Brentwood Avenue/Gibson Street area (near H9).

In the PMF event, **Figures 5** and **6** also provide near identical pictures of inundation. Flowpath areas are much broader than in the 100 year ARI event especially in the Eastern catchment where there is very broad southern overbank spill from the Eastern swale towards and through Luttrell Street and Londonderry Road.

As discussed earlier with regard to the eastern part of the 100 year ARI inundation map, the PMF model similarly predicted overland flows spilling beyond the hydrologic modelling footprint; that is, north-east through the Gibson Street neighbourhood to Lennox Street. At Lennox Street the flow continued to spill in both northerly and easterly directions with the northerly flows being quite shallow. Since (a) the local topography north of Lennox Street is very flat and (b) the RAFTS model does not include local runoff for the Lennox Street area it follows that the PMF model is less accurate in this area.

NORTH

0 200 400
metres

LEGEND
Water Depth (m)

- 0.1 to 0.2
- 0.2 to 0.4
- 0.4 to 0.6
- 0.6 to 0.8
- 0.8 to 1.0
- 1.0 to 1.5
- 1.5 to 2.0
- > 2.0
- Direction of flow

NOTES
Areas with modelled flood depth less than 0.1 metre are considered to be of minor nature and are not shown in this map.

Area of low confidence in model results

Bewsher

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Date: 2 Nov 2010

Hobartville Evacuation Route Options Study

Figure 3:
100 Year ARI Flood
(0% Blockage)

NORTH

0 200 400
metres

LEGEND
Water Depth (m)

- 0.1 to 0.2
- 0.2 to 0.4
- 0.4 to 0.6
- 0.6 to 0.8
- 0.8 to 1.0
- 1.0 to 1.5
- 1.5 to 2.0
- > 2.0
- Direction of flow

NOTES
Areas with modelled flood depth less than 0.1 metre are considered to be of minor nature and are not shown in this map.

Area of low confidence in model results

WILLIAM COX DR
GRAND FLANEUR AV
TIM WHIFFLER PL
SCUTHEE ST
HUGHES AV
TARRAGEN AV
HOLBORROW AV
BELL AV
CLARKE AV
RUTHERGLEN AV
CORNWELL AV
POTTS ST
ANDERSON AV
MICHIM AV
LUTTREL ST
SMITH AV
DAY AV
SARDONYX AV
DICKER AV
LAURENCE ST
HAROLD AV
REYNOLDS AV
SLOPER AV
ONUS AV
CAMERON ST
LONDONDERRY RD
COLLEGE DR
COLLEGE ST
MORAY ST
BLACKTOWN RD
ANNETTE PL
BRENTWOOD AV
BAYLY CT
TEVIOT ST
BOUGHTON ST
RIDGE PL
CONRAD ST
RICHARD ST
JOSEPH ST
BOURKE ST
PAGE ST
GIBSON ST
EAST MARKET ST
GROSE ST
WEST MARKET ST
LENNOX ST
WINDSOR ST
TOXANA ST
FRANCIS ST
BURGESS ST
EASTMARKET ST
MARCH ST
BOSWORTH ST
JOHN TEBBUTT PL
STARLIGHT PL
ANDREWTOWN PL
SEGENHOE PL
HEREFORD ST
CASTLEREAGH RD
POWELL ST
LONG ST
DOUGLAS ST
MASON AV
TOWN ST
KATRINA CL
THOMPSON AV
VALDER AV
CATCHPOLE AV

Bewsher

Job No: J1736
File: Fig4_Hbv_Exg100y_01
Date: 2 Nov 2010

Hobartville Evacuation Route Options Study

Figure 4:
100 Year ARI Flood
(50% Blockage)

NORTH

0 200 400
metres

LEGEND
Water Depth (m)

- 0.1 to 0.2
- 0.2 to 0.4
- 0.4 to 0.6
- 0.6 to 0.8
- 0.8 to 1.0
- 1.0 to 1.5
- 1.5 to 2.0
- > 2.0
- Direction of flow

NOTES
Areas with modelled flood depth less than 0.1 metre are considered to be of minor nature and are not shown in this map.

Area of low confidence in model results

Bewsher

Job No: J1736
File: Fig5_Hbv_ExgPMF_01
Date: 2 Nov 2010

Hobartville Evacuation Route Options Study

Figure 5:
Probable Maximum Flood
(0% Blockage)

NORTH

0 200 400
metres

LEGEND
Water Depth (m)

- 0.1 to 0.2
- 0.2 to 0.4
- 0.4 to 0.6
- 0.6 to 0.8
- 0.8 to 1.0
- 1.0 to 1.5
- 1.5 to 2.0
- > 2.0
- Direction of flow

NOTES
Areas with modelled flood depth less than 0.1 metre are considered to be of minor nature and are not shown in this map.

Area of low confidence in model results

Bewsher

Job No: J1736
File: Fig6_Hbv_ExgBPMF_01.wor
Date: 2 Nov 2010

Hobartville Evacuation Route Options Study

Figure 6:
Probable Maximum Flood
(50% Blockage)

NORTH

0 200 400
metres

LEGEND

Hydraulic Hazard Categories
Based on 2005 Floodplain Development Manual Appendix L Figure L2

- Low hydraulic Hazard
- Medium hydraulic Hazard
- High hydraulic Hazard

Area of low confidence in model results

MARCH ST
BOSWORTH ST
LENNOX ST
WEST MARKET ST
EASTMARKET ST
WINDSOR ST
TOXANA ST
FRANCIS ST
BURGESS ST
JOHN TEBBUTT PL
STARLIGHT PL
ANDREWTOWN PL
SEGENHOE PL
WILLIAM COX DR
GRAND PLANEUR AV
HEREFORD ST
CASTLEREAGH RD
TIM WHIFFLER PL
LONG ST
DOUGLAS ST
POWELL ST
MASON AV
GROSE ST
EAST MARKET ST
GIBSON ST
PAGE ST
RICHARD ST
JOSEPH ST
BOURKE ST
RIDGE PL
CONRAD ST
BAYLY CT
BRENTWOOD AV
BOUGHTON ST
TEVIOT ST
BLACKTOWN RD
COLLEGE ST
MORAY ST
ANNETTE PL
SCUTHEE ST
HUGHES AV
HOLBORROW AV
TARRAGEN AV
THOMPSON AV
VALDER AV
CATCHPOLE AV
TOWN ST
KATRINA CL
BELL AV
CLARKE AV
RUTHERGLEN AV
CORNWELL AV
ONUS AV
SLOPER AV
REYNOLDS AV
CAMERON ST
HAROLD AV
LAURENCE ST
DUCKER AV
POTTS ST
MICHIM AV
SARDONYX AV
DAY AV
ANDERSON AV
LUTTREL ST
SMITH AV
LONDONDERRY RD
COLLEGE DR

Bewsher

Job No: J1736
File: Fig7_Hbv_Haz_Exg100y_01
Date: 10 Jan 2011

Hobartville Evacuation Route Options Study

Figure 7:
100 Year ARI Flood Provisional Hazard Map

NORTH

0 200 400
metres

LEGEND
Change in flood level from Existing conditions (m)

- Less than -0.5
- -0.5 to -0.25
- -0.25 to -0.1
- -0.1 to -0.05
- -0.05 to -0.02
- -0.02 to 0.02
- 0.02 to 0.05
- 0.05 to 0.10
- 0.10 to 0.25
- 0.25 to 0.50
- Greater than 0.5

Area of low confidence in model results

NOTES
Stormwater drainage system is assumed to have capacity equivalent to approximately 2 year ARI flow.

Bewsher

Job No: J1736
File: Fig8_Hbv_PS_Exg100y_01.wor
Date: 2 Nov 2010

Hobartville Evacuation Route Options Study

Figure 8:
Allowance for Pipe Drainage System 100 Year ARI Flood

NORTH

0 200 400
metres

LEGEND
Change in flood level from Existing conditions (m)

- Less than -0.5
- -0.5 to -0.25
- -0.25 to -0.1
- -0.1 to -0.05
- -0.05 to -0.02
- -0.02 to 0.02
- 0.02 to 0.05
- 0.05 to 0.10
- 0.10 to 0.25
- 0.25 to 0.50
- Greater than 0.5

NOTES
For climate change scenario, rain intensity is increased by 20%.

Area of low confidence in model results

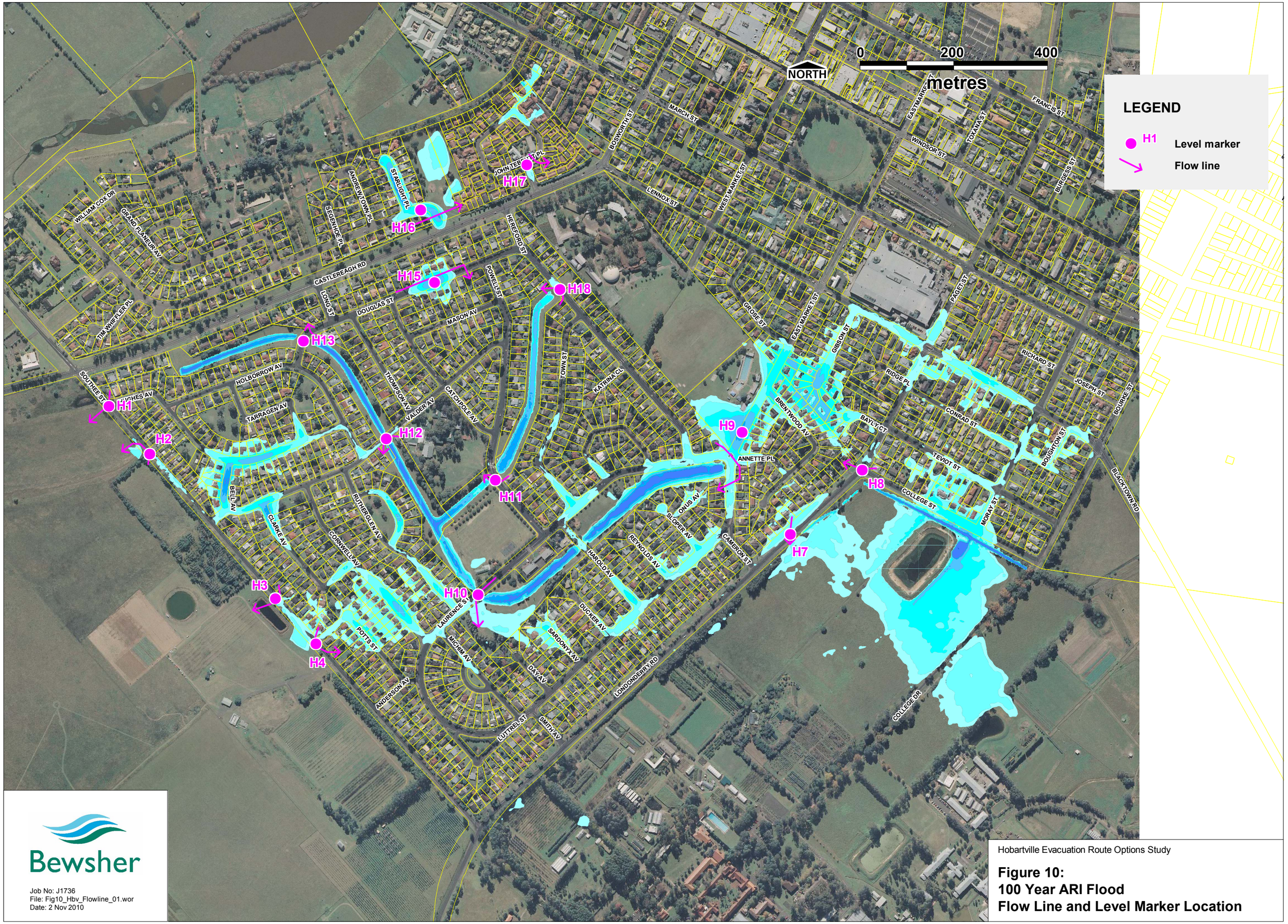
WILLIAM COX DR
GRAND FLANEUR AV
TIM WHIFFLER PL
SCUTHEE ST
HUGHES AV
HOLBORROW AV
TARRAGEN AV
BELL AV
CLARKE AV
RUTHERGLEN AV
CORNWELL AV
POTTS ST
ANDERSON AV
LAURENCE ST
MICHIM AV
LUTTREL ST
SMITH AV
DAY AV
SARDONYX AV
DICKER AV
LONDONDERRY RD
HAROLD AV
REYNOLDS AV
SLOPER AV
ONUS AV
CAMERON ST
COLLEGE DR
ANDREWTOWN PL
STARLIGHT PL
JOHN TEBBUTT PL
SEGENHOE PL
CASTLEREAGH RD
LONG ST
DOUGLAS ST
MASON AV
THOMPSON AV
VALDER AV
CATCHPOLE AV
TOWN ST
KATRINA CL
POWELL ST
HEREFORD ST
BOSWORTH ST
MARCH ST
LENNOX ST
WEST MARKET ST
EAST MARKET ST
GROSE ST
GIBSON ST
RIDGE PL
BAYLY CT
ANNETTE PL
BRENTWOOD AV
COLLEGE ST
TEVIOT ST
CONRAD ST
RICHARD ST
JOSEPH ST
BOUGHTON ST
BOURKE ST
BLACKTOWN RD
PAGE ST
WINDSOR ST
TOXANA ST
FRANCIS ST
BURGESS ST
MORAY ST

Bewsher

Job No: J1736
File: Fig9_Hbv_CC_Exg100y_01
Date: 2 Nov 2010

Hobartville Evacuation Route Options Study

Figure 9:
Impact of 20% Rainfall Increase
100 Year ARI Flood



Bewsher

Job No: J1736
File: Fig10_Hbv_Flowline_01.wor
Date: 2 Nov 2010

Hobartville Evacuation Route Options Study

Figure 10:
100 Year ARI Flood
Flow Line and Level Marker Location

Figure 11 : Water Elevation Hydrograph at Point H1

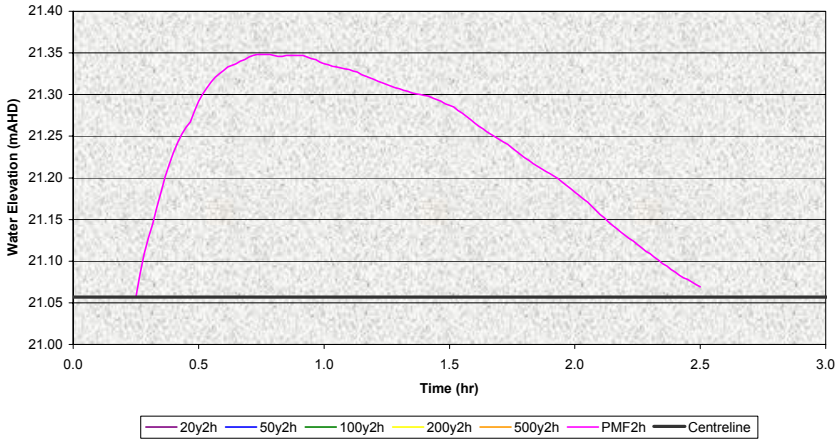


Figure 12 : Water Elevation Hydrograph at Point H2

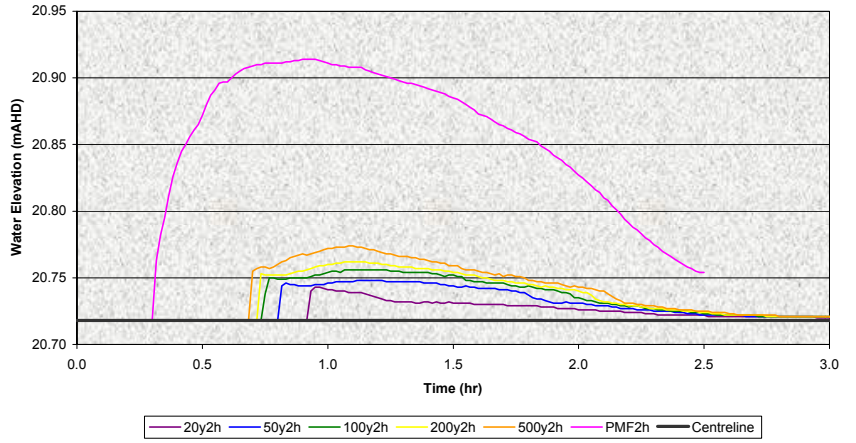


Figure 13 : Water Elevation Hydrograph at Point H3

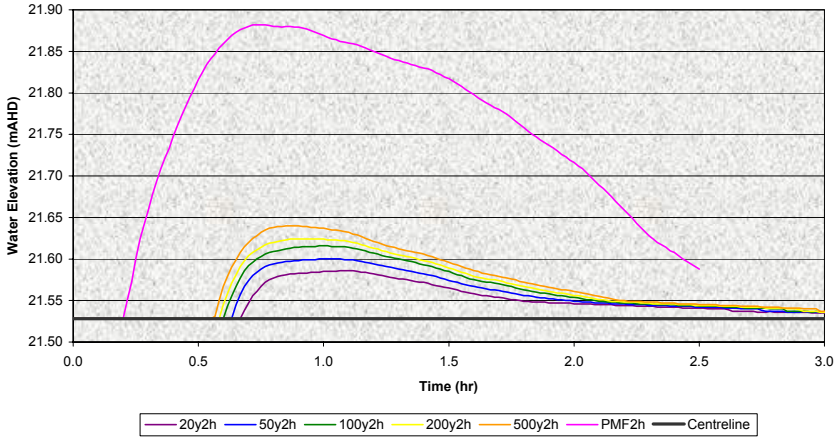


Figure 14 : Water Elevation Hydrograph at Point H4

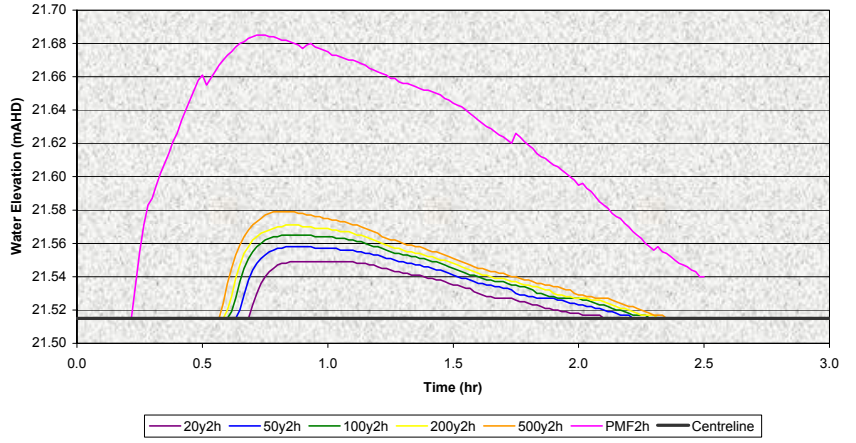


Figure 11a : Flow Hydrograph at Point H1

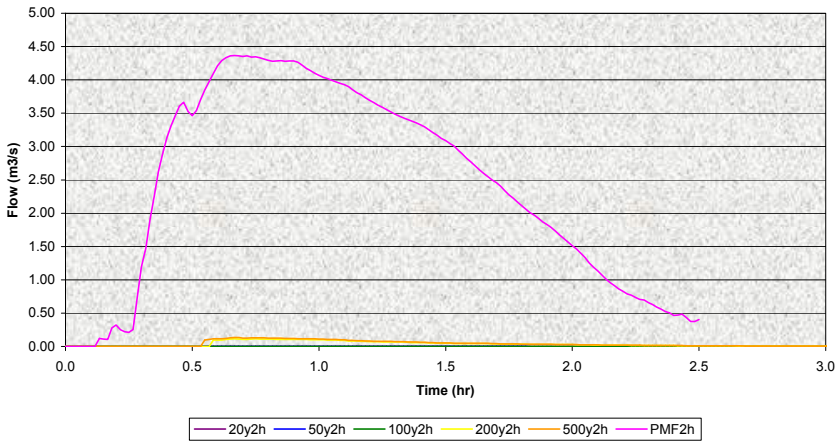


Figure 12a : Flow Hydrograph at Point H2

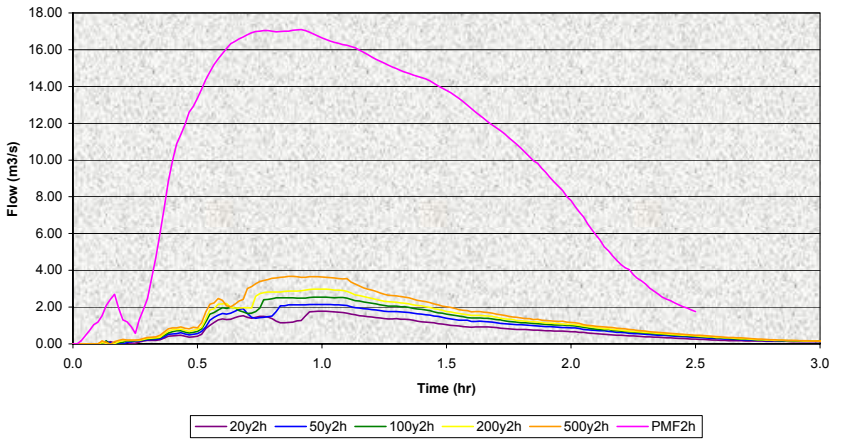


Figure 13a : Flow Hydrograph at Point H3

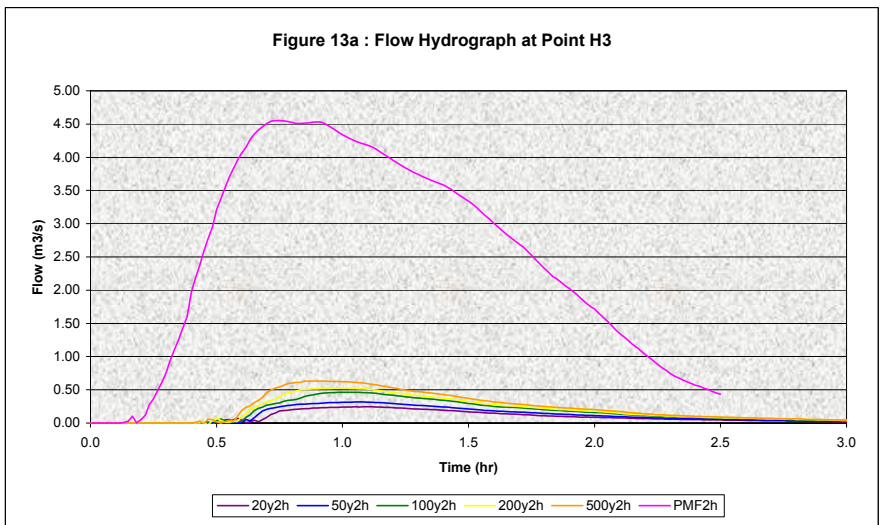


Figure 14a : Flow Hydrograph at Point H4

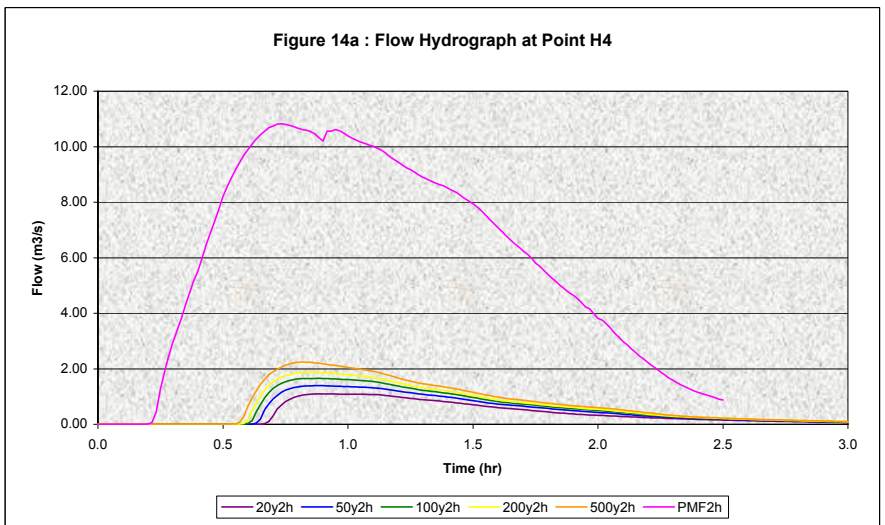


Figure 15 : Water Elevation Hydrograph at Point H7

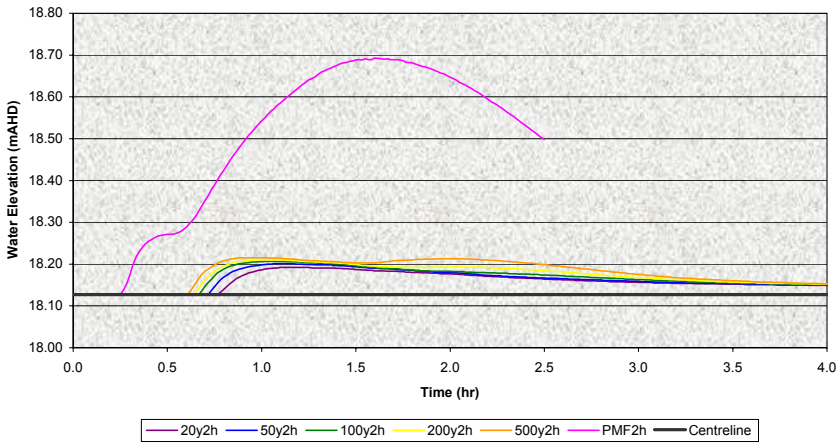


Figure 16 : Water Elevation Hydrograph at Point H8

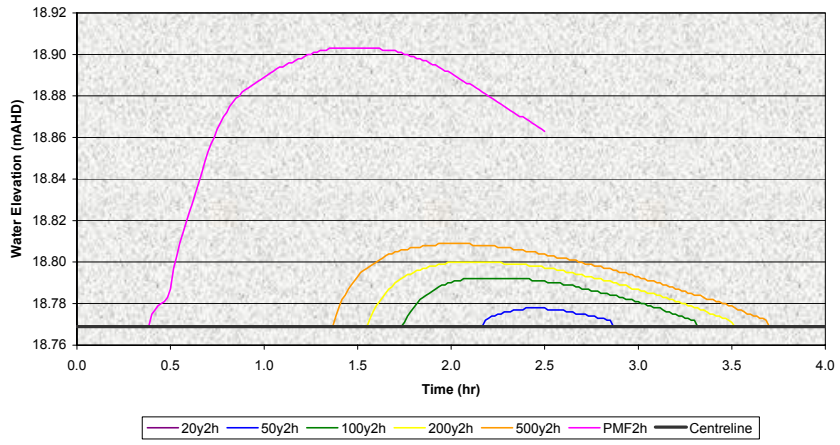


Figure 17 : Water Elevation Hydrograph at Point H9

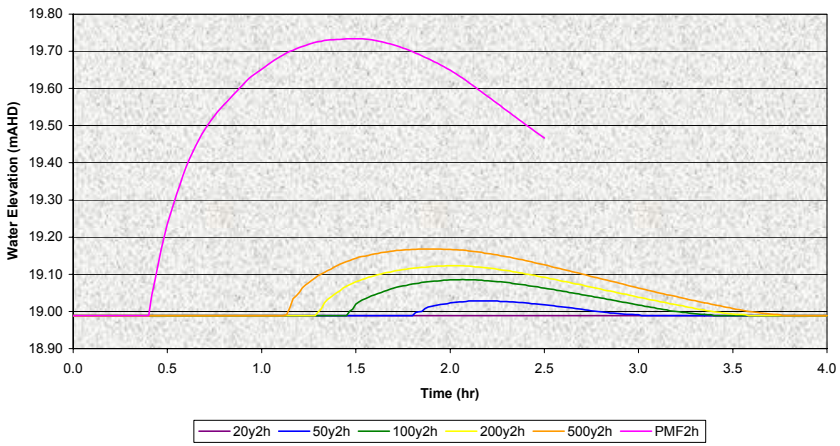
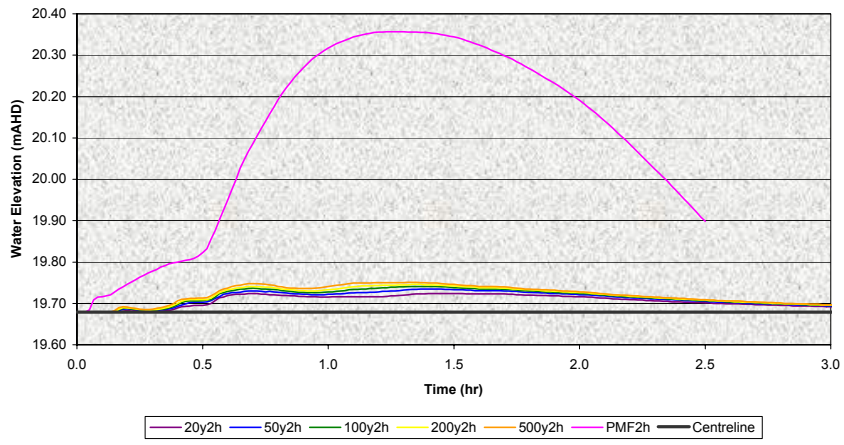


Figure 18 : Water Elevation Hydrograph at Point H10



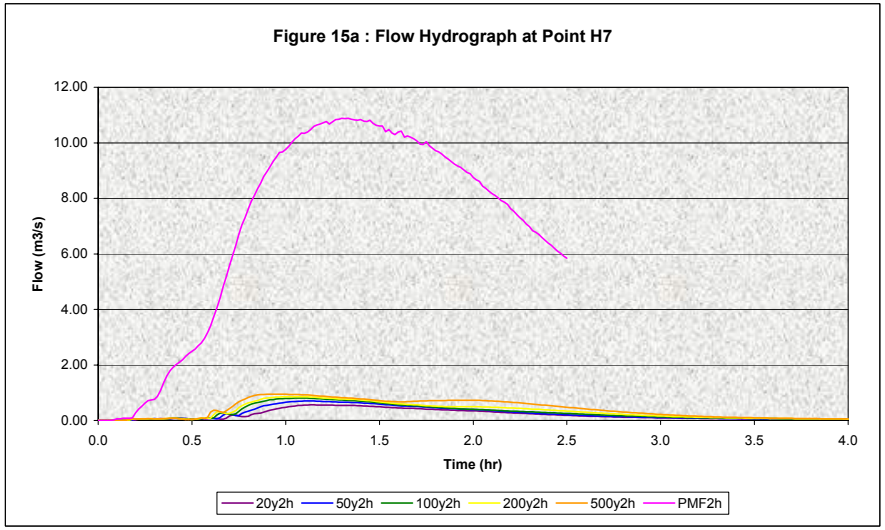


Figure 15a : Flow Hydrograph at Point H7
Flow (m3/s)
12.00
10.00
8.00
6.00
4.00
2.00
0.00
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
Time (hr)
20y2h
50y2h
100y2h
200y2h
500y2h
PMF2h

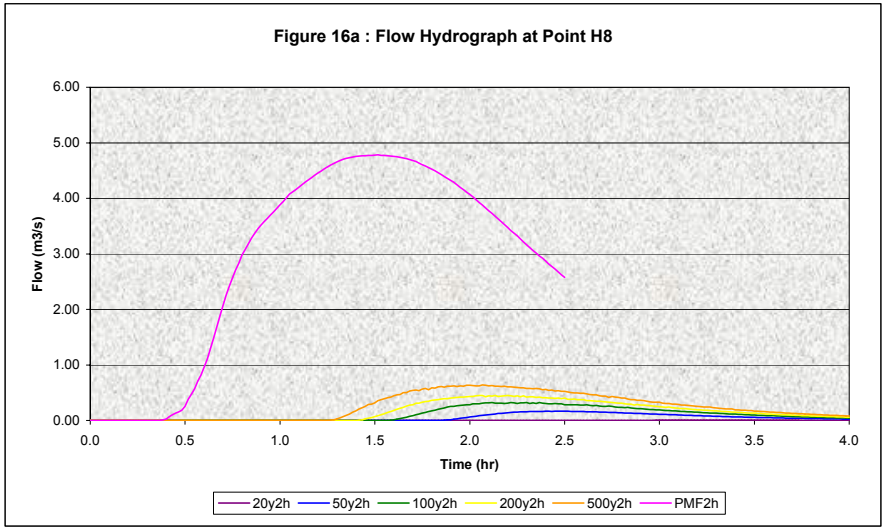


Figure 16a : Flow Hydrograph at Point H8
Flow (m3/s)
6.00
5.00
4.00
3.00
2.00
1.00
0.00
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
Time (hr)
20y2h
50y2h
100y2h
200y2h
500y2h
PMF2h

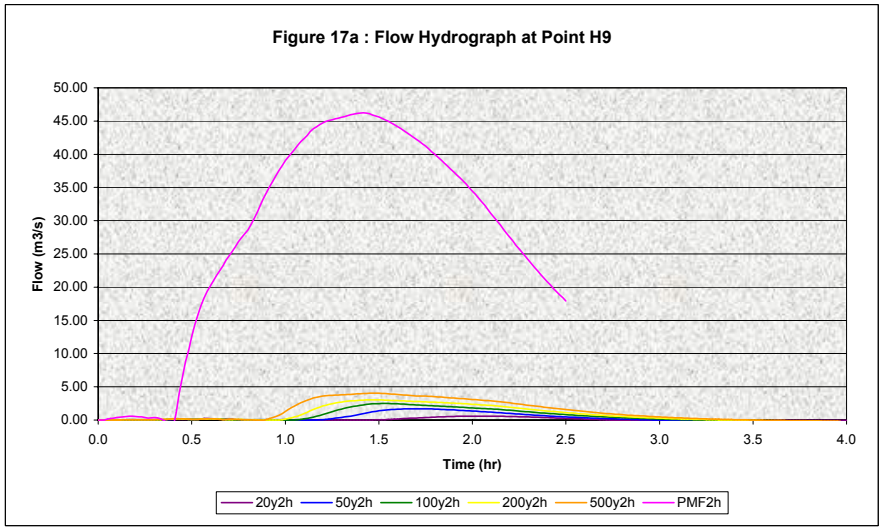


Figure 17a : Flow Hydrograph at Point H9
Flow (m3/s)
50.00
45.00
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
Time (hr)
20y2h
50y2h
100y2h
200y2h
500y2h
PMF2h

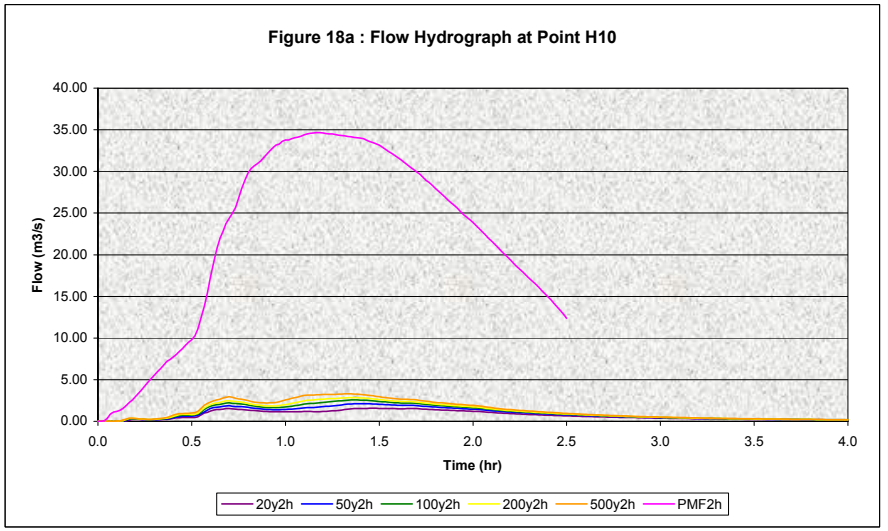


Figure 18a : Flow Hydrograph at Point H10
Flow (m3/s)
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
Time (hr)
20y2h
50y2h
100y2h
200y2h
500y2h
PMF2h

Figure 19 : Water Elevation Hydrograph at Point H11

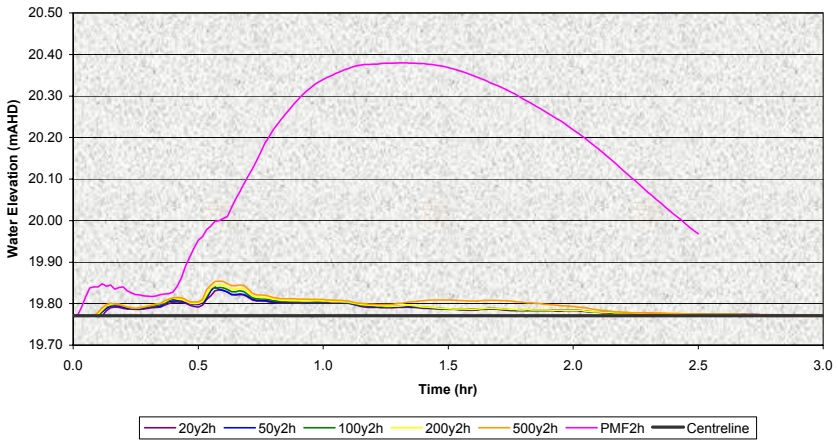


Figure 20 : Water Elevation Hydrograph at Point H12

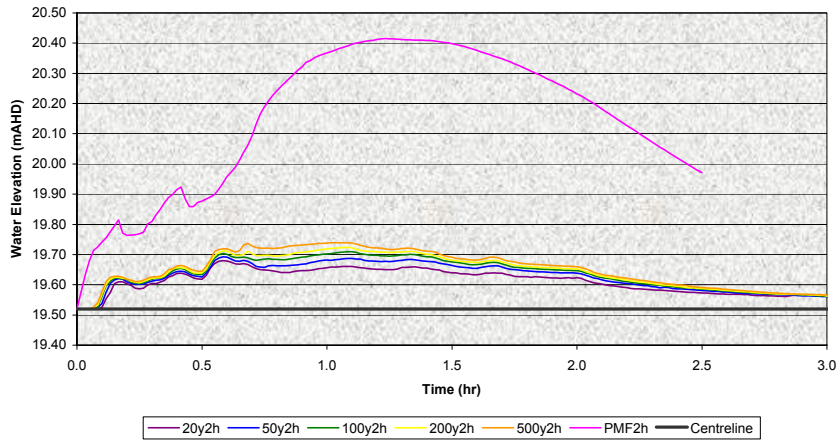


Figure 21 : Water Elevation Hydrograph at Point H13

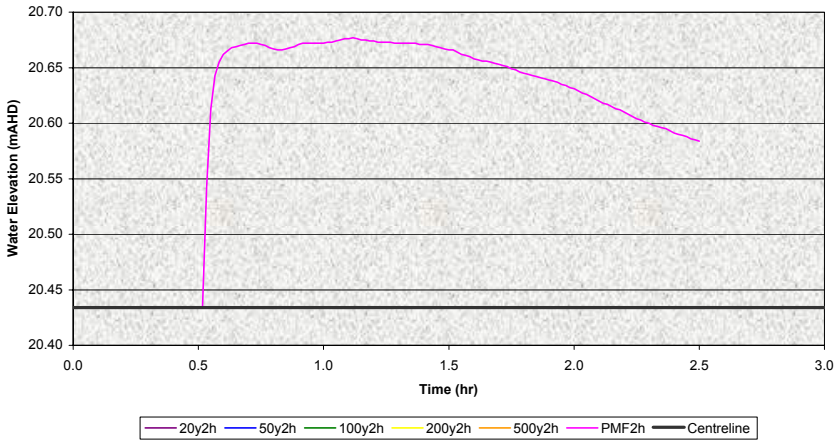
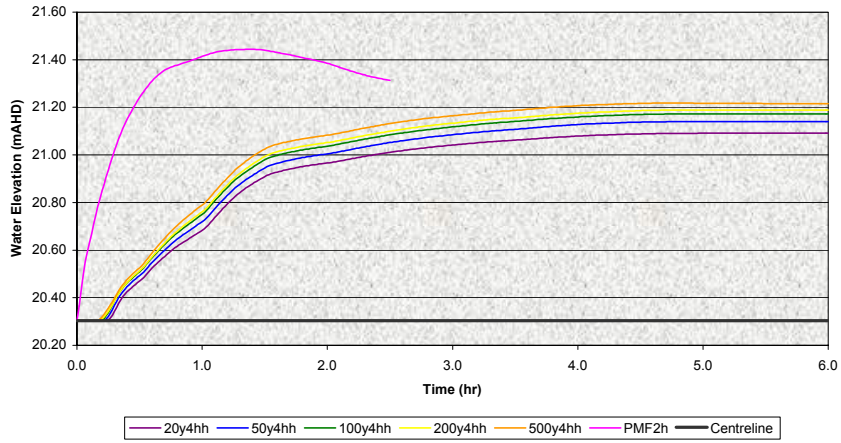


Figure 22 : Water Elevation Hydrograph at Point H15



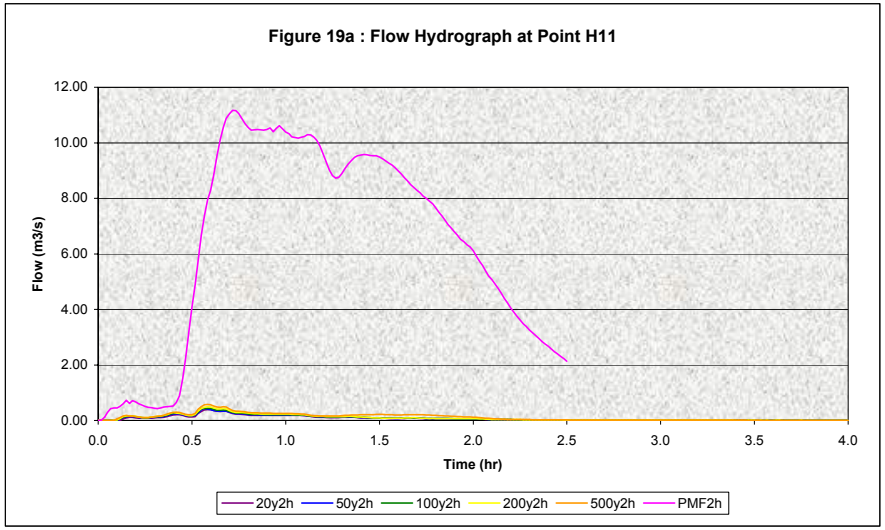


Figure 19a : Flow Hydrograph at Point H11
Flow (m3/s)
12.00
10.00
8.00
6.00
4.00
2.00
0.00
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
Time (hr)
20y2h
50y2h
100y2h
200y2h
500y2h
PMF2h

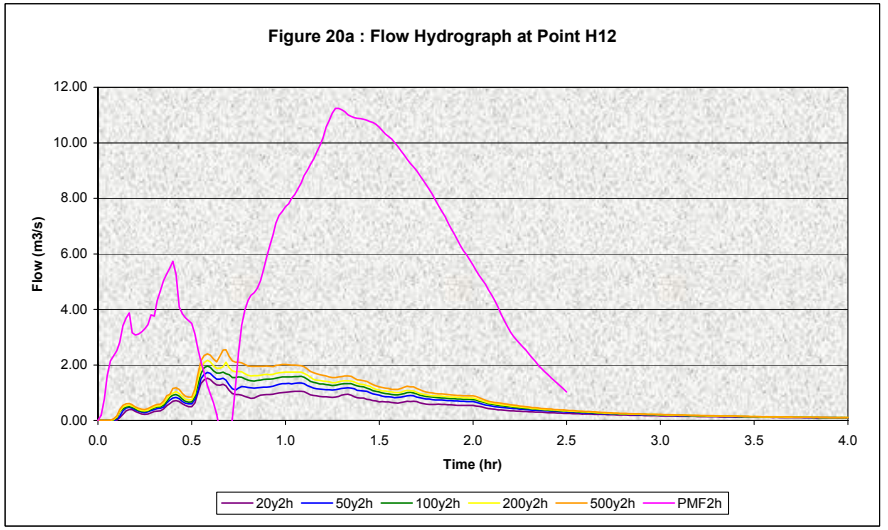


Figure 20a : Flow Hydrograph at Point H12
Flow (m3/s)
12.00
10.00
8.00
6.00
4.00
2.00
0.00
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
Time (hr)
20y2h
50y2h
100y2h
200y2h
500y2h
PMF2h

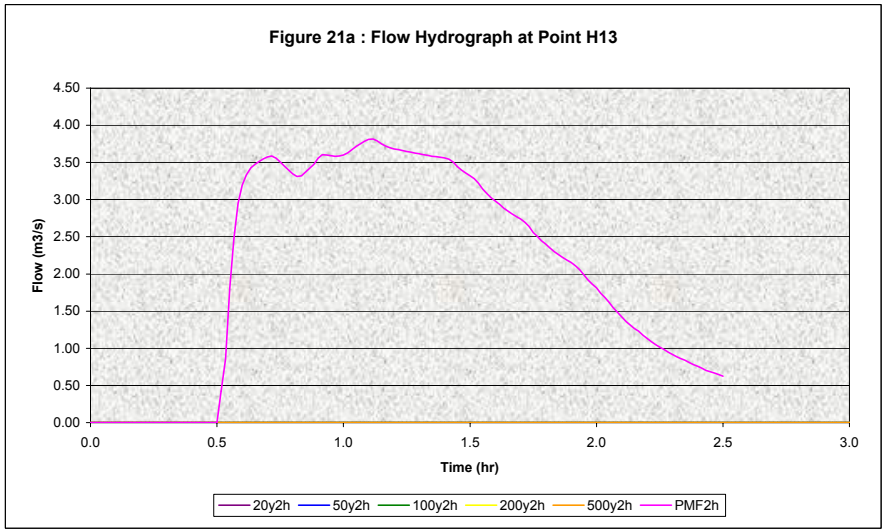


Figure 21a : Flow Hydrograph at Point H13
Flow (m3/s)
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
0.0
0.5
1.0
1.5
2.0
2.5
3.0
Time (hr)
20y2h
50y2h
100y2h
200y2h
500y2h
PMF2h

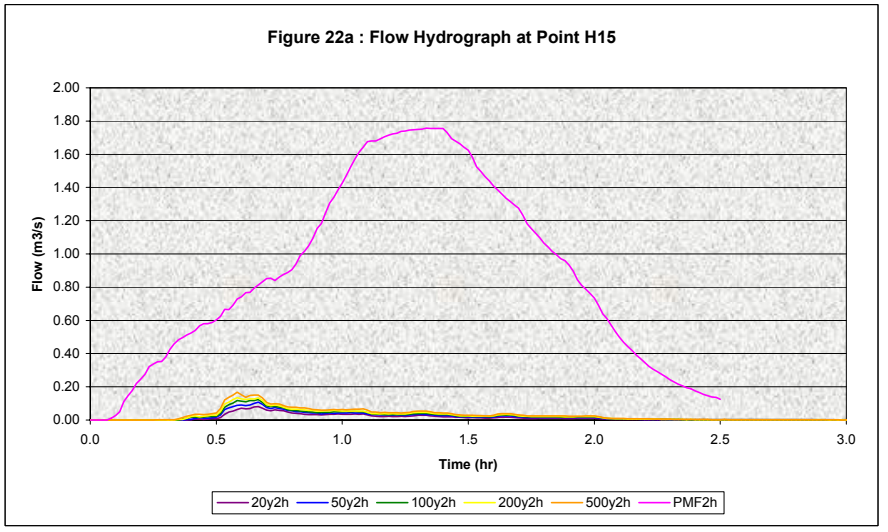


Figure 22a : Flow Hydrograph at Point H15
Flow (m3/s)
2.00
1.80
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
0.0
0.5
1.0
1.5
2.0
2.5
3.0
Time (hr)
20y2h
50y2h
100y2h
200y2h
500y2h
PMF2h

Figure 23 : Water Elevation Hydrograph at Point H16

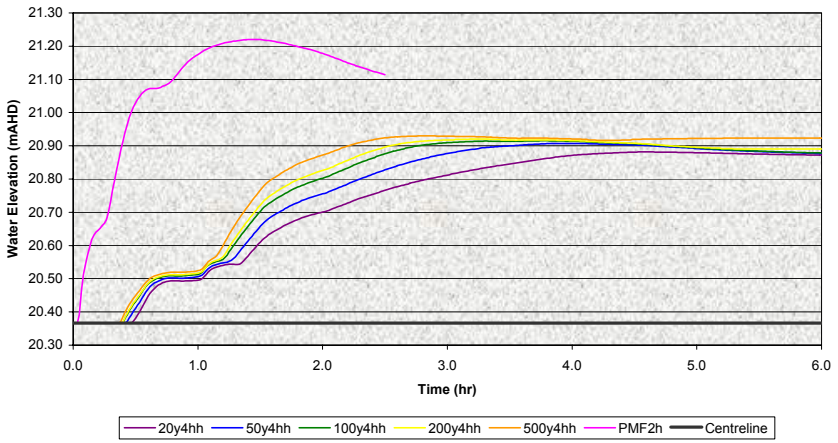


Figure 24 : Water Elevation Hydrograph at Point H17

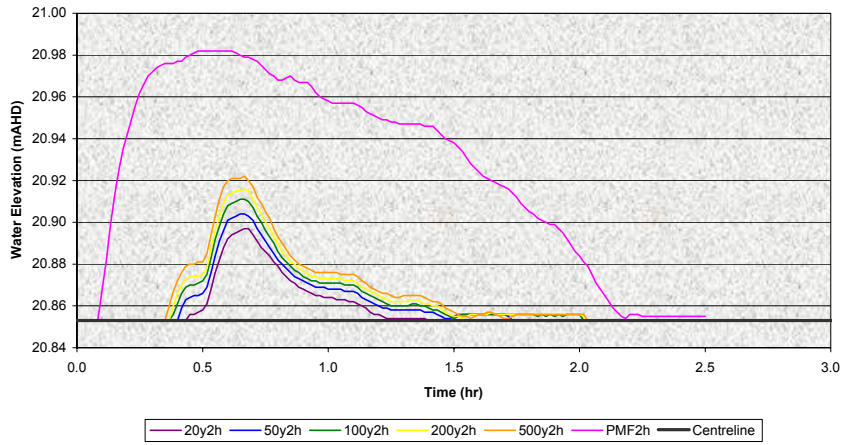
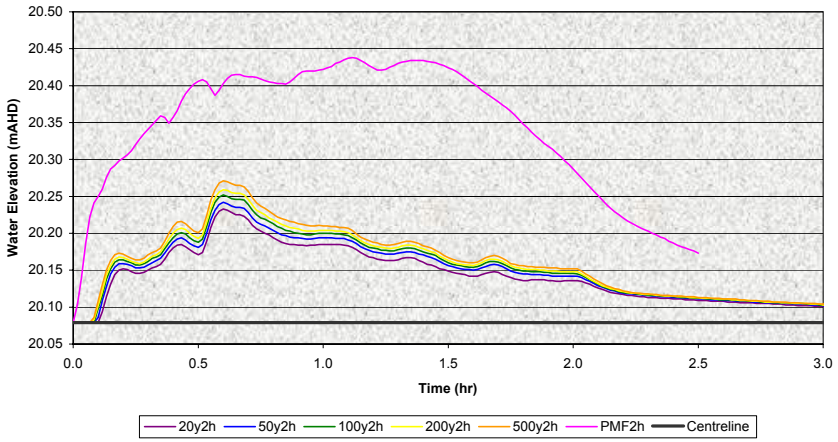


Figure 25 : Water Elevation Hydrograph at Point H18



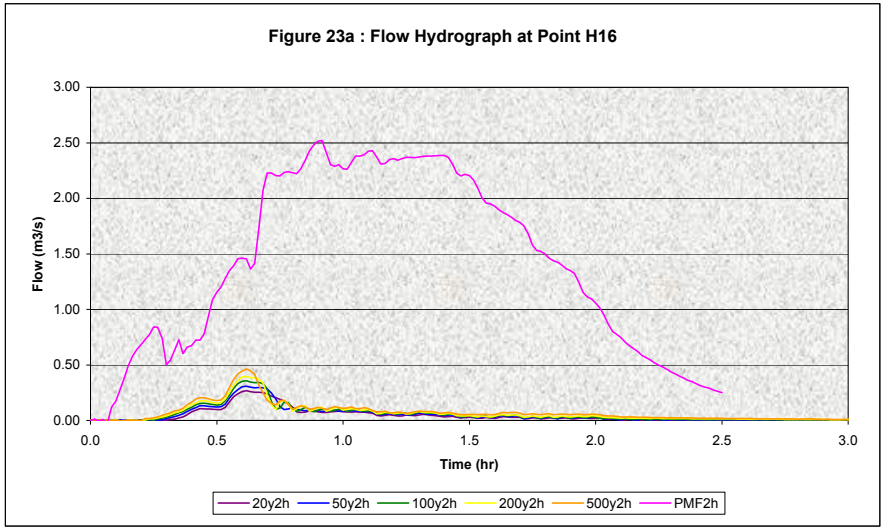


Figure 23a : Flow Hydrograph at Point H16
Flow (m3/s)
3.00
2.50
2.00
1.50
1.00
0.50
0.00
0.0
0.5
1.0
1.5
2.0
2.5
3.0
Time (hr)
20y2h
50y2h
100y2h
200y2h
500y2h
PMF2h

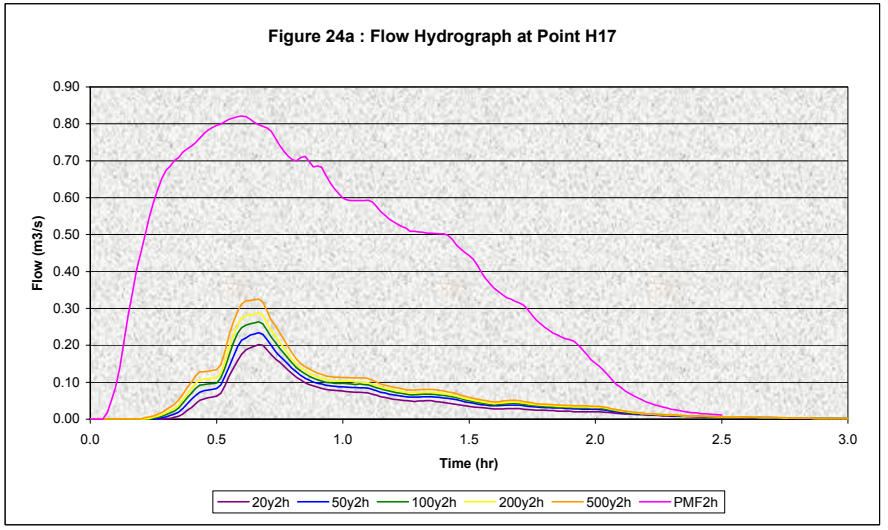


Figure 24a : Flow Hydrograph at Point H17
Flow (m3/s)
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0.0
0.5
1.0
1.5
2.0
2.5
3.0
Time (hr)
20y2h
50y2h
100y2h
200y2h
500y2h
PMF2h

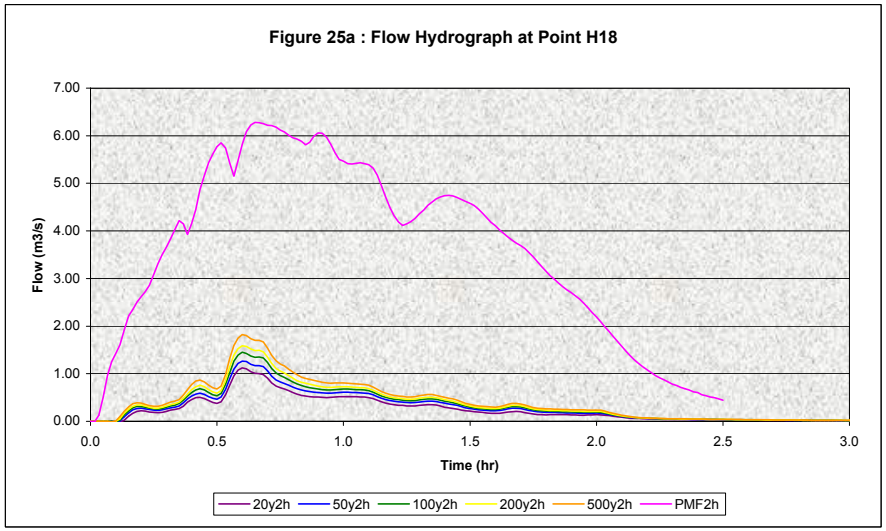


Figure 25a : Flow Hydrograph at Point H18
Flow (m3/s)
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
0.0
0.5
1.0
1.5
2.0
2.5
3.0
Time (hr)
20y2h
50y2h
100y2h
200y2h
500y2h
PMF2h

3.2 LOW POINT INUNDATION REGIMES

The following sections document the ranges of road centreline depths. The depths listed in the text are based on the difference between the modelled water level and the ground-truthed road level. Since the accompanying reference figures include the 'approximate' roadway level (as per the TUFLOW grid) the scaling of water depths from the figures will often generate a slightly different water depth. Due to the referencing against ground truthed levels, it follows that the depths listed within the text are the more accurate values.

3.2.1 Southee Road (H1 and H2)

The H1 catchment lies west of Southee Road and its flows spill onto the roadway after routing through a small farm dam. Detailed survey confirms that Southee Road falls in a southerly direction at this point and so the runoff follows the roadway to the sag point at H2. While **Figure 12** shows that there is flow in the roadway in all design events, **Figure 11** shows that the road centreline is only inundated in the PMF event. Most of the PMF regime is originating from spill out of the nearby western swale.

The majority of the H2 catchment also lies west of Southee Road and the model predicts that these flows will spill both northwards along Southee Road and into Valder Avenue.

Centreline depths of water at both H2 and generally along Southee Road (as far as Valder Avenue) are less than 100mm over the range of 20 year to 500 year ARI events.

The spilling of water into Valder Avenue combines with local runoff to produce relatively significant ponding in Bell Avenue and Clarke Avenue. In Bell Avenue, the maximum centreline depths over the range of 20 year to 500 year events is 980mm to 1040mm while in Clarke Avenue the corresponding depth range is 890mm to 940mm

3.2.2 Southee Road (H3 and H4)

The H3 catchment lies west of Southee Road and its flows spill onto the roadway after routing through one or two farm dams. Detailed survey confirms that Southee Road falls in a southerly direction at this point and the runoff both follows the roadway to the sag point at H4 and spills into adjoining properties whose levels are lower than the roadway. The latter flows then cross Potts Street, Cornwall Avenue and Rutherglen Avenue.

As shown in **Figure 13** the Southee Road centreline depths of inundation vary between about 60mm and 110mm for the range of 20 year to 500 year ARI. Flow depths in Southee Road south of H3 are similar to those at H3.

The H4 catchment also lies west of Southee Road and the flows spill onto the roadway and are conveyed north to H4 which corresponds to the intersection with Hill Avenue. At the intersection, the depths of water relative to the Southee Road centreline are similar but shallower than at H3 (see **Figure 14**).

3.2.3 Londonderry Road (formerly H5 and H6)

There are no inundation issues at these two locations since there are no sag points and the flow magnitudes are very small.

3.2.4 Londonderry Road (H7 and H8)

H8 corresponds to a minor sag point in Paget Street just east of its intersection with College Street. Although it is adjacent to where a Council trunk stormwater pipe crosses Paget Street, the flood model shows that most of the overland flow associated with that pipe's catchment spills in a south-westerly direction towards H7 before reaching Paget Street itself. Consequently as shown in **Figure 16** the roadway centreline depths at H8 are not significant.

H7 corresponds to the definitive low point in the Londonderry Road flood evacuation route. While the model confirms that there would be significant depths of inundation in the adjoining low lying properties, the fact that the roadway is higher and that the low point is longitudinally 'flat' means that the depth of roadway inundation is not significant. **Figure 15** shows that the centreline depths at the sag point vary between 70 and 100mm for the range of 20 year to 500 year ARI events.

3.2.5 East Market Street (H9)

The East Market Street roundabout is adjacent to where the Eastern swale ends and the flows enter a trunk conduit which is a 750mm diameter concrete pipe. At the roundabout itself the centreline depths vary between 250 and 380mm for the range of 20 year to 500 year ARI events. However at the definitive sag point located just east of the roundabout the corresponding depths are significantly greater and vary between 720 and 860mm.

There is a second low point in East Market Street located north of the intersection with Brentwood Avenue and at that location the centreline depths vary between 430mm and 590mm for the range of 20 year to 500 year ARI events.

3.2.6 Laurence Street (H10 and near Hereford Street)

H10 corresponds to the sag point where Laurence Street crosses the upstream limit of both the Western and Eastern catchment swales. The crossing conduits are twin 600mm diameter concrete pipes (with a third 600mm diameter pipe on the north side directing local street water into the swale). The roadway is overtopped in all the design events (see **Figure 18**) and the centreline depth varies between 80 and 110mm for the range of 20 year to 500 year ARI events.

3.2.7 Powell Street (H11)

H11 corresponds to the crossing of the Western catchment tributary swale where flows are travelling in a southerly direction. The crossing conduits are twin 600mm diameter concrete pipes. The roadway is only overtopped by swale flows in the PMF event and the shallow depths associated with the other design events, as shown in **Figure 19**, only relate to minor local runoff being conveyed to the definitive sag point.

3.2.8 Valder Street (H12)

H12 corresponds to the crossing of the Western catchment main swale where flows are travelling in a northerly direction. The crossing conduits are twin 1050mm diameter concrete pipes. The roadway is only overtopped by swale flows in the PMF event and the shallow depths associated with the other design events, as shown in **Figure 20**, only relate to minor local runoff being conveyed to the definitive sag point.

The centreline depths vary between 90 and 160mm for the range of 20 year to 500 year events.

3.2.9 Douglas Street (H13)

H13 corresponds to the crossing of the Western catchment main swale where flows are travelling in a westerly direction. The crossing conduits are twin 1200mm diameter concrete pipes. As shown in **Figure 21**, the roadway is only overtopped by swale flows in the PMF event.

3.2.10 Castlereagh Road (H14)

Here the Western swale ends and the flows enter a trunk conduit system which consists of twin 1200mm diameter pipes.

The 2007 TUFLOW modelling showed that spill could occur across Castlereagh Road at this location due to the road levels being high relative to other locations. This refined TUFLOW modelling has confirmed this scenario and shows that floodwaters only spill out of the local swale corridor in the PMF event via a defacto flowpath involving Holborrow Avenue, Hughes Avenue and Southee Road (as also described in **Section 3.2.1**).

3.2.11 Douglas Street (H15)

H15 corresponds to a trapped low point in Douglas Street. Once the low point is filled the relieving flowpath is east along the roadway although in the PMF event there is also some spill occurring north towards Castlereagh Road.

Not surprisingly the maximum depths at the trapped low point itself are very significant and depths vary between 800 and 930mm over the range of 20 year to 500 year ARI events. Being a trapped low point situation with associated pipe capacity ignored, the modelled water levels remain elevated (see **Figure 22**).

3.2.12 William Cox Drive (H16)

Local runoff volumes pond in the trapped low point in neighbouring Starlight Place such that there are also substantial water depths at H16. Only in the PMF event, is there additional flow volumes conveyed into William Cox Drive from the direction of Castlereagh Road as a result of spill originating from Douglas Street/Hereford Street. Due to the trapped low point situation, the water levels remain elevated (see **Figure 23**). At the definitive sag point the centreline depths

vary between 780 to 830mm over the range of 20 year to 500 year ARI events. In all the events, relieving spill finally occurs through the adjoining Andrew Town Park reserve.

3.2.13 John Tebbut Place (H17)

At the definitive H17 sag point the roadway centreline (not median strip) depths vary between approximately 200 to 220mm over the range of 20 year to 500 year ARI events. In the PMF event the ponding at H17 is impacted by spill occurring across Castlereagh Road from the direction of Hereford Street.

3.2.15 Hereford Street (H18)

H18 corresponds to the local low point in Hereford Street that is adjacent to the start of the Western catchment tributary swale. The centreline sag point depths vary between 170mm and 210mm over the range of 20 year to 500 year ARI events.

In the PMF event, Hereford Street itself also serves as an overland flowpath beyond the intersection with Town Street. Since Hereford Street continues to fall towards its intersection with Laurence Street, these Western catchment PMF flows are spilling into the Eastern catchment.

3.2.16 Castlereagh Road

In only the PMF event there are minor flows crossing Castlereagh Road at two locations; adjacent to the intersections with William Cox Drive (see also **Sub Section 3.2.12**) and John Tebbut Place (see also **Sub Section 3.2.13**).

3.2.17 Harold Avenue

There are two low points in Harold Avenue. The first, which has the lesser flood depths, corresponds to the crossing of the Eastern catchment main swale where flows are travelling in an easterly direction. The crossing conduits are twin 525mm diameter concrete pipes. The centreline sag point depths which vary between 120mm and 230mm over the range of 20 year to 500 year ARI events are all related to swale flows overtopping the road.

The second low point is adjacent to the intersection with Luttrell Street. It lies within the flowpath that sees floodwaters spilling out of the Eastern catchment swale behind Sardonyx Avenue and travelling in an easterly direction towards Londonderry Road (at H7). The centreline sag point depths vary between 550mm and 590mm over the range of 20 year to 500 year ARI events.

3.2.18 Luttrell Street

There are a series of low points in Luttrell Street. While these would probably exhibit significant flood depths just due to local catchment runoff, the depths are larger again because of the spill

regime that is conveying Eastern catchment swale flows from behind Sardonyx Avenue and travelling in an easterly direction towards Londonderry Road (at H7).

While the maximum local centreline depths are in Harold Avenue and Sloper Avenue just adjacent to Luttrell Street, the worst centreline depths in Luttrell Street itself vary between 350mm and 390mm over the range of 20 year to 500 year ARI events.

3.2.19 Review of Sag Point 500 year ARI Regimes

While this study has a local area flood perspective, it is noted that the regional Hawkesbury-Nepean flood evacuation routes are assessed relative to their flood proneness in the 500 year ARI event.

The Hobartville 500 year ARI depths presented in **Sections 3.2.1-3.2.18** vary across a wide range (as summarised in **Table 6**). From an SES perspective, any centreline depth which exceeds 100mm is critical from the viewpoint of trafficability and in **Table 6** it can be seen that many exceed that depth.

However it is also the combination of potential duration of problematic inundation as well as maximum depth that may impact on the overall hazard scenario and to that end **Table 6** also includes comments about likely duration.

The relative ranking of each sag point location (where 1 represents the worst ranking) is then assessed in **Table 6** after taking account of the current Hobartville evacuation route network. While the relative rankings are essentially qualitative they are seen to represent priorities for either works to be undertaken to address their seriousness or consideration of alternative routes (which would serve to bypass the problem location).

TABLE 6: SUMMARY OF 500 YEAR ARI SAG POINT DEPTHS

Sag Point Location	Road Centreline Depth (mm)	Does Depth Exceed 100mm?	Inundation Duration Comment	Overall Problem Ranking Relative to Current Evacuation Route Strategy
Southee Road (H1)	0	No	No centreline inundation issues however roadway issues likely to be short term	N/A
Southee Road (H2)	<100	No	Likely short duration problem	3
Southee Road (H3)	110	Yes	Likely short duration problem	3
Southee Road (H4)	<100	Yes?	Likely short duration problem	3
Londonderry Road (H7)	100	No	Likely longer term duration problem (due to spill regime from Eastern Swale)	2
Londonderry Road (H8)	<100	No	Likely longer term duration problem (due to spill regime from Eastern Swale)	2
East Market Street (H9 sag point)	590	Yes	Likely longer term duration problem (due to spill from Eastern Swale)	1
Laurence Street (H10)	110	Yes	Likely longer duration problem (due to flow regimes in both Western and Eastern Swales)	2
Powell Street (H11)	<100	No	Likely short duration problem	3
Valder Street (H12)	160	Yes	Likely long duration problem (due to flow regime within Western Swale)	2
Douglas Street (H13)	0	No	N/A	N/A
Castlereagh Road (H14)	0	No	N/A	N/A
Douglas Street (H15)	930	Yes	Likely long duration problem (due to trapped low point ponding)	3
William Cox Drive (H16)	830	Yes	Likely long duration problem (due to neighbourhood trapped low point ponding)	1
John Tebbut Place (H17)	220	Yes	Likely short duration problem	2
Hereford Street (H18)	210	Yes	Likely short duration problem	2
Castlereagh Road	0	No	N/A	N/A
Harold Avenue (near swale)	230	Yes	Likely longer term duration problem (due to spill from Eastern Swale)	2
Harold Avenue (near Luttrell Street)	590	Yes	Likely longer term duration problem (due to spill from Eastern Swale)	2
Luttrell Street	390	Yes	Likely longer term duration problem (due to spill from Eastern Swale)	1

4. POTENTIAL WORKS OPTIONS

This chapter provides some initial guidance on works which might be considered to address the problems associated with the low point inundations. They include an assessment of the current network of pedestrian laneways (which might serve to provide alternative evacuation routes) and site-specific drainage infrastructure options (which would serve to reduce the roadway inundation depths).

4.1 LANEWAY ASSESSMENT

There are nine laneways in Hobartville which provide pedestrian access between residential streets as shown in **Figure 26**. As can be seen in **Figure 26** three of them (Nos. 5, 8 and 9) also have stormwater pipe systems laid beneath them.

This section of the report looks at whether some of the laneways might potentially be modified to provide an alternate route in times of Hawkesbury-Nepean related flood evacuation if or when the formally designated Hobartville streets were impassable or otherwise unable to be used.

One factor which would impact on their potential use for such evacuation purposes would be the likely depths of inundation in the laneways themselves.

Now the RAFTS and TUFLOW analyses are based on lumped catchment analysis – that is, the analysis does not assess surface inundation flows and depths along every stormwater pipe system – and the lumped catchment analysis itself does not cover the whole of Hobartville. Hence it follows that there are some laneways for which there are no modelled inundation depths. In order to provide input to their possible evacuation usage, the TUFLOW results were interrogated in order to extract the 100 year ARI event flow depths and the corresponding 'bold font' maximum and mean flood depths are presented in **Table 7**.

In order to complete the picture of laneway inundation depths, a broad comparison was made between catchment sizes for those laneways which were located within the TUFLOW model footprint and those which were not, and on that basis the TUFLOW results were extrapolated to provide indicative depth information for the 'non-modelled' laneways. Those indicative depths are also presented in **Table 7**.

It is important to note that the **Table 7** modelled depths – and hence also the estimated depths - are only approximate values. This is because:

- the TULFOW 2D analysis is based on a 2 metre grid and therefore relatively small variations in ground levels both in the typically narrow laneways and between the laneways and adjoining properties cannot be accurately reflected in the model; and
- The model also does not explicitly take account of flow obstructions such as 'solid' fences and property furniture (e.g. BBQs) in adjoining properties, etc and these features too would potentially impact on laneway flow depths.

Since the above factors may impact on the modelling of shallow local overland flow regimes it follows that the tabulated depths should not be regarded as precise. Hence it follows that if consideration is to be given to modifying laneways to form alternative trafficable routes and

0 200 400
metres

NORTH

LEGEND

- Laneway
- Flood evacuation route
- Potential early evacuation route
- Catchment boundary
- Stormwater pipe network
- 4 Laneway ID
- 5 Preserve laneway for pedestrian access
- Potential direction of flood evacuation traffic

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Date: 3 Mar 2011

Hobartville Evacuation Route Options Study

Figure 26:
Network of Laneways and Potential Revised Excavation Routes (with 100 year flood extent)

Table 7: Hobartville Laneway Assessment

Laneway ID (see Figure 26)	Is Stormwater Pipe laid in Laneway?	100y Maximum Depth (metres)	100y Mean Depth (metres)	Cadastre lane width (metres)	Available lane width at narrowest point (metres)	Preserve laneway, for access to stormwater pipe?	Preserve laneway, for flood evacuation purposes?	Potential works /measures to improve flood evacuation role
1		0.1	<0.1	4.0	3.7		Not required	
2		0.1	<0.1	3.7	3.4 (1.2 at gate)		Yes, for potential pedestrian access into the school	Access to key to open school security gate
3		0.1	<0.1	3.7	3.3		Not required	
4		0.1	<0.1	3.7	3.5		Not required	
5	Yes	0.1	0.1	3.7	2.3	Yes	Yes, to provide pedestrian route for Sardonyx Ave neighbourhood residents	nil
6		0.1	<0.1	3.7	2.8		Yes, to provide pedestrian route for Ducker Ave neighbourhood residents	nil
7		0.1	<0.1	3.7	3.0		Yes, to provide pedestrian route for Reynolds Ave neighbourhood residents	nil
8	Yes	0.2	0.1	3.7	2.7	Yes	Yes, to provide pedestrian route for Sloper Ave & Onus Ave neighbourhood residents	nil
9	Yes	0.1	0.1	3.7	2.8 (at bend)	Yes	Yes, to provide pedestrian route for Brentwood Ave & Annette Place neighbourhood residents	nil

Note: Bold font values reflect TUFLOW output

potential maximum depths of inundation were an important factor in the decision making, more detailed depth assessments may need to be undertaken.

However whilst keeping in mind the above comments about the lack of absolute accuracy in the **Table 7** depths, it is noted that all of the laneways have, or have been assessed to have, shallow depths of inundation in the 100 year ARI event.

The potential to utilize some of the laneways as flood evacuation routes has been assessed by examining which ones might serve to provide bypasses of flood evacuation route problem locations (reference **Table 6**) and/or provide exit routes from potential neighbourhood flood inundation problems. The resultant findings are:

- On the basis of the investigations undertaken as part of this report, Laneways 1, 3 and 4 would potentially not be required to provide alternative flood-time access.

- Laneway 2 currently provides access into the local school. It is recommended that this capacity be preserved for potential flood-time use. Since the school has a high security fence system (which includes the gate in Laneway 2) it follows that an issue which may impact on its flood time use is that the gate may be locked.

- Since the northern ends of Laneways 5-8 are immediately adjacent to the Eastern Swale would initially suggest that they do not have any potential to serve as alternative flood access routes. However it is important to note that all four are located at the high and cul-de-sac end of residential roads grading down to Luttrell Street which as shown in the various flood inundation maps (see **Figures 3-6**) potentially has substantial inundation issues. Since the model results (for example, see **Figures 3** & **4**) indicate that the Luttrell Street ponding will be problematic when the various connecting cul-de-sac streets themselves have only limited inundation issues there are likely to be circumstances whereby trafficable access via Luttrell Street is not possible. Moreover given the low lying position of Luttrell Street it is considered most likely that the ponding problems in that street would be prolonged. In such circumstances it may be untenable to have local traffic delayed for extended periods of time in which case the provision of alternative access via a trafficable route along each of the cul-de-sac laneways would be desirable. However residents evacuating may well be moving into potentially hazardous flood conditions in the reserve to the north. Given this risk, it is seen to be undesirable for such an evacuation route to be trafficable. Rather the laneways should be preserved as at present – that is, able to provide pedestrian access.

- Laneway 9 appears to have potential since it follows rising land away from the floodprone East Market Street/Brentwood Avenue neighbourhood. Similar to the works for Laneways 5-8 it is envisaged that Laneway 9 should be preserved for pedestrian access.

Aside from the above proposed usage of Laneways 5, 8 and 9, it is recommended that the three laneways be retained since they contain Council stormwater pipes.

Combining all of the above criteria for preserving various laneways, it follows that six of the nine laneways – being Laneways 2 & 5-9 – should be preserved.

4.2 DRAINAGE WORKS OPTIONS

As presented in **Table 6** the highest hazard rankings have been assigned to East Market Street (H9), William Cox Drive (H16) and Luttrell Street. The following paragraphs focus on those locations.

East Market Street has substantial inundation issues (as shown in **Figures 3**-**6**) which are a function of it and several adjoining streets lying within what can be regarded as a very large 'trapped low point'. Since such inundation regimes can only be addressed through very substantial trunk pipe system upgrades it follows that it would be very costly to solve the inundation problems and so keep the road open for flood-time access. While East Market Street may potentially serve as an early flood evacuation route, it is recommended that the option of sending local traffic in a northerly direction either up Hereford Street or Powell Street be explored (as shown in **Figure 26**).

The William Cox Drive ponding depths detailed in **Section 3.2** are very hazardous. While they are seen to be conservative (due principally to the fact that the hydraulic model does not include provision for pipe system capacities), **Figure 8** intimates that there would still be substantial problems in major events even if an allowance was made for those capacities. It is recommended that the potential to substantially lower ground levels in neighbouring Andrew Town Park reserve – so as to provide a relief path for the ponding at H16 – be explored. If this is found to not to be feasible another option would be the installation of a new stormwater pipe through and downstream of the same reserve (which would also require negotiation of a new easement downslope of the reserve).

As shown in **Figure 26**, Luttrell Street does not form part of the currently defined local flood evacuation route network. Nonetheless the assessment of local flooding in **Section 3.2** shows that potentially there are substantial problems in that neighbourhood. While the problems have been partly discussed in **Section 4.1**, that discussion only centred on consideration of a laneway-based option to potentially provide residents living north-west of Luttrell Street with alternative pedestrian access. Such works would not provide relief for those residents of Luttrell Street who live adjacent to the worst ponding locations. It is envisaged that the works required to alleviate the Luttrell Street ponding may necessitate a new pipe system which compliments the current Luttrell Street pipe system but then follows the Cameron Street and Londonderry Road alignments before discharging on the southern side of Londonderry Road.

Subject to further consideration of evacuation plan requirements, roadway inundation issues at three of the '2' ranked locations in **Table 6**; that is, Laurence Street (H10), Valder Street (H12) and Harold Avenue (near the Eastern Swale) could be potentially addressed through increasing the capacity of the respective culvert crossings.

An additional works option might be consideration of increasing the capacity of the 750mm diameter pipe system outlet of the Eastern Swale (which is adjacent to the East Market Street roundabout). While it would serve to reduce the problems at and adjacent to the roundabout hence reducing local problems in East Market Street, Laurence Street, Hereford Street and Annette Place, the work (involving 300-400 metres of pipework) would be very costly. It is noted that a review which confirmed the potential to make greater use of Hereford Street and/or Powell Street (as flagged earlier) would obviate the need for such works.

5. CONCLUSIONS

Following on from the recommendations of the 2008 report, this study has seen the development of a significantly enhanced TUFLOW model. While the general pattern of overland flows is broadly similar to that calculated in 2008, the use of a comprehensive ground level data set, together with the inclusion of building footprints, has produced an improved picture of flowpaths and flow depths. The results have confirmed that a number of the low points along the currently identified flood evacuation routes are problematic in very major storm events.

Relative to the regional Hawkesbury-Nepean flood evacuation design standard of roads being 300mm higher than the 500 year local flood event water level, this study has identified that a number of the modelled low points would have very significant inundation problems in that same design event.

Since both the inundation issues and associated impacts on flood-time evacuation are very substantial, it is recommended that the implications be very carefully addressed. To assist with that assessment, a potential range of options are presented in **Chapter 4**. A number of the options relate to Hobartville laneways and it has been found that six of the nine laneways – being Laneways 2 & 5-9 – should be preserved.

In this study both the reporting of a range of significant flood regimes and the canvassing of potential options with regard to flood evacuation are seen to represent useful data that would inform the SES's preparation of detailed flood evacuation plans for Hobartville.

While the focus of the study has been on the flood evacuation low points, the flood model results also confirm the following:

- In the Western catchment the swale system has sufficient capacity however there are some pockets of roadway and private property inundation as local catchment surface flows are conveyed towards the swale; and

- In the Eastern catchment the swale system has relatively less capacity and hence there is some spill occurring into adjoining urban neighbourhoods.

While the modelling shows that there are areas of private property inundation and some of the local roads potentially serve as de-facto flowpaths, it is important to note in areas away from the flood evacuation routes that the model results (including associated inundation mapping) are only seen to represent approximations of local flow regimes.

6. REFERENCES

1. Bewsher Consulting (2008). "*Hobartville Evacuation Route Study"*. August. Commissioned by Hawkesbury City Council. Bewsher Consulting Job Number J1434.

2. BMT WBM Pty Ltd (2006). "*TUFLOW and Estry Reference Manual. GIS Based 2D/1D Hydrodynamic Modelling".*

3. NSW Government (2005). *"Floodplain Development Manual".* ISBN 0 7347 5476 0.

7. GLOSSARY

Note that terms shown in bold are described elsewhere in this Glossary.

100 year flood	A **flood** that occurs on average once every 100 years. Also known as a 1% flood. See **annual exceedence probability (AEP)** and **average recurrence interval (ARI)**.
50 year flood	A **flood** that occurs on average once every 50 years. Also known as a 2% flood. See **annual exceedence probability (AEP)** and **average recurrence interval (ARI)**.
20 year flood	A **flood** that occurs on average once every 20 years. Also known as a 5% flood. See **annual exceedence probability (AEP)** and **average recurrence interval (ARI)**.
afflux	The increase in flood level upstream of a constriction of flood flows. A road culvert, a pipe or a narrowing of the stream channel could cause the constriction.
annual exceedence probability (AEP)	AEP (measured as a percentage) is a term used to describe **flood** size. It is a means of describing how likely a flood is to occur in a given year. For example, a 1% AEP flood is a **flood** that has a 1% chance of occurring, or being exceeded, in any one year. It is also referred to as the '100 year flood' or 1 in 100 year flood'. The terms **100 year flood**, **50 year flood**, **20 year flood** etc, have been used in this study. See also **average recurrence interval (ARI)**.
Australian Height Datum (AHD)	A common national plane of level approximately equivalent to the height above sea level. All **flood levels**, floor levels and ground levels in this study have been provided in metres AHD.
average recurrence interval (ARI)	ARI (measured in years) is a term used to describe **flood** size. It is the long-term average number of years between floods of a certain magnitude. For example, a 100 year ARI flood is a flood that occurs or is exceeded on average once every 100 years. The terms **100 year flood**, **50 year flood**, **20 year flood** etc, have been used in this study. See also **annual exceedence probability (AEP)**.
catchment	The land draining through the main stream, as well as tributary streams.
Development Control Plan (DCP)	A DCP is a plan prepared in accordance with Section 72 of the *Environmental Planning and Assessment Act, 1979* that provides detailed guidelines for the assessment of development applications.

DECCW	Department of Environment, Climate Change & Water, formerly the Department of Natural Resources.
discharge	The rate of flow of water measured in terms of volume per unit time, for example, **cubic metres per second (m^3/s)**. Discharge is different from the speed or **velocity** of flow, which is a measure of how fast the water is moving.
extreme flood	An estimate of the **probable maximum flood (PMF)**, which is the largest flood likely to occur.
flood	A relatively high stream flow that overtops the natural or artificial banks in any part of a stream, river, estuary, lake or dam, and/or local overland flooding associated with major drainage before entering a watercourse, and/or coastal inundation resulting from super-elevated sea levels and/or waves overtopping coastline defences excluding tsunami.
flood level	The height of the **flood** measured with reference to a specified datum such as **Australian Height Datum** (e.g. the flood level was 7.8m AHD). Terms also used include **stage** and **water level**.
flood liable land	Land susceptible to flooding up to the **probable maximum flood (PMF)**. Also called **flood prone land**. Note that the term 'flood liable land' now covers the whole of the **floodplain**, not just that part below the **flood planning level (FPL)**.
flood study	A study that investigates flood behaviour, including identification of flood extents, **flood levels** and flood velocities for a range of flood sizes.
floodplain	The area of land that is subject to inundation by floods up to and including the probable maximum flood event, that is, **flood prone land** or **flood liable land**.
Floodplain Risk Management Plan	A management plan developed in accordance with the principles and guidelines in the *Floodplain Development Manual* (NSW Government, 2005). (Note that the term 'risk' is often dropped in common usage and 'Floodplain Risk Management Plans' are referred to as 'Floodplain Management Plans').
Floodplain Risk Management Study	A study carried out in accordance with the principles and guidelines in the *Floodplain Development Manual* (NSW Government, 2005) that assess options for minimising the danger to life and property during **floods**. These measures, referred to as 'floodplain management measures/options' aim to achieve an equitable balance between environmental, social, economic, financial and engineering considerations. (Note that the term 'risk' is often dropped in common usage and 'Floodplain Risk Management Studies' are referred to as 'Floodplain Management Studies').

floodway	Those areas of the **floodplain** where a significant discharge of water occurs during **floods**. Floodways are often aligned with naturally defined channels. Floodways are areas that, even if only partially blocked, would cause a significant redistribution of flood flow, or a significant increase in **flood levels**.
flow	See **discharge**
hazard	A source of potential harm or a situation with a potential to cause loss. In relation to this study the hazard is flooding which has the potential to cause damage to the community. See **high hazard** and **low hazard**.
high hazard	Possible danger to personal safety; evacuation by trucks difficult; able-bodied adults would have difficulty in wading to safety; potential for significant structural damage to buildings.
hydraulics	Term given to the study of water flow in waterways; in particular, the evaluation of flow parameters such as water level and **velocity**.
hydrograph	A graph which shows how the **discharge** or stage/flood level at any particular location varies with time during a flood.
hydrology	Term given to the study of the rainfall and runoff process; in particular, the evaluation of **peak discharges**, flow volumes and the derivation of **hydrographs** for a range of floods.
low hazard	Should it be necessary, truck could evacuate people and their possessions; able-bodied adults would have little difficulty in wading to safety.
m AHD	Metres **Australian Height Datum (AHD)**.
m/s	Metres per second. Unit used to describe the **velocity** of floodwaters.
m^3/s	Cubic metres per second or 'cumecs'. A unit of measurement for creek or river flows or **discharges**. It the rate of flow of water measured in terms of volume per unit time.
overland flow	The component of **flow** which is not carried by the underground pipe system.
overland flowpath	The path that floodwaters can follow as they are conveyed towards the main flow channel or if they leave the confines of the main flow channel. Overland flow paths can occur through private property or along roads.
peak discharge	The maximum **flow** or **discharge** during a flood.

probable maximum flood (PMF)	The largest flood that could conceivably occur at a particular location, usually estimated from probable maximum precipitation coupled with the worst flood producing catchment conditions. Generally, it is not physically or economically possible to provide complete protection against this event. The PMF defines the extent of **flood prone land**, that is, the **floodplain**.
risk	Chance of something happening that will have an impact. It is measured in terms of consequences and likelihood. In the context of this study, it is the likelihood of consequences arising from the interaction of floods, communities and the environment.
runoff	The amount of rainfall that ends up as flow in a stream, also known as rainfall excess.
SES	State Emergency Service of New South Wales.
stage	Equivalent to **water level** (both measured with reference to a specified datum). See **flood level**.
velocity	The term used to describe the speed of floodwaters, usually in **m/s**.
water level	Equivalent to **stage** (both measured with reference to a specified datum). See **flood level**.
water surface profile	A graph showing the height of the **flood** (**stage**, **water level** or **flood level**) at any given location along a watercourse at a particular time.

APPENDIX A

RAFTS MODEL OUTPUTS

100 YEAR ARI OUTPUT

HOBARTVILLE 100YEAR OUTPUT

##
Hobartville-100y

Results for period from 0: 0.0 1/ 1/1990
                    to 5: 0.0 1/ 1/1990
##

ROUTING INCREMENT (MINS) =   1.00
STORM DURATION (MINS)   =   25.
RETURN PERIOD (YRS)   =   100.
BX   =   0.8500
TOTAL OF FIRST SUB-AREAS (ha) =   120.52
TOTAL OF SECOND SUB-AREAS (ha) =   65.18
TOTAL OF ALL SUB-AREAS (ha)   =   185.70

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link Label	Catch. Area (ha) #1	#2	Slope (%) #1	#2	% Impervious (%) #1	#2	Pern #1	#2	B #1	#2	Link No.
A5.0	0.9000	1.090	1.100	1.100	5.000	100.0	.025	.015	.0160	.0013	1.000
A6.0	0.7700	0.9400	.8000	.8000	5.000	100.0	.025	.015	.0173	.0014	2.000
H15	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	2.001
A3.0	2.370	2.900	.5000	.5000	5.000	100.0	.025	.015	.0393	.0031	2.002
H18	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	2.003
A3.1	5.240	4.910	.6000	.6000	5.000	100.0	.025	.015	.0543	.0037	2.004
A2.0	2.670	3.260	1.500	1.500	5.000	100.0	.025	.015	.0242	.0019	3.000
A4.0	9.790	0.000	1.100	0.000	5.000	0.000	.050	0.00	.0925	0.000	4.000
A1.0	3.550	0.000	1.700	0.000	5.000	0.000	.050	0.00	.0439	0.000	4.001
A1.1a	3.670	2.880	1.000	1.000	5.000	100.0	.025	.015	.0349	.0022	4.002
A1.1	2.450	1.910	1.000	1.000	5.000	100.0	.025	.015	.0283	.0018	3.001
A1.2	4.210	2.560	.6000	.6000	5.000	100.0	.025	.015	.0484	.0027	2.005
A1.3	7.010	7.190	.5000	.5000	5.000	100.0	.025	.015	.0691	.0050	1.001
A1.4	3.620	2.780	1.900	1.900	5.000	100.0	.025	.015	.0252	.0016	1.002
B2.0	7.590	1.230	1.500	1.500	5.000	100.0	.050	.015	.0694	.0012	5.000
B1.0	5.560	0.9300	1.100	1.100	5.000	100.0	.050	.015	.0689	.0012	6.000
H1_H2	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	5.001
F1.0	1.370	0.1500	1.000	1.000	5.000	100.0	.025	.015	.0209	.0005	7.000
E3.0a	0.9500	1.160	.7000	.7000	5.000	100.0	.025	.015	.0207	.0016	7.001
E3.0	2.280	2.790	.7000	.7000	5.000	100.0	.025	.015	.0326	.0026	7.002
E4.0	0.4600	0.5600	.5000	.5000	5.000	100.0	.025	.015	.0168	.0013	8.000
E2.0a	1.950	2.380	.6000	.6000	5.000	100.0	.025	.015	.0325	.0026	9.000
E2.0	2.620	1.980	.6000	.6000	5.000	100.0	.025	.015	.0378	.0023	9.001
E2.1	2.290	1.890	.6000	.6000	5.000	100.0	.025	.015	.0353	.0023	9.002
E2.2	4.160	3.920	.9000	.9000	5.000	100.0	.025	.015	.0393	.0027	9.003
E1.0	1.850	2.270	1.700	1.700	5.000	100.0	.025	.015	.0188	.0015	10.00
E1.1	1.430	1.740	.5000	.5000	5.000	100.0	.025	.015	.0303	.0024	10.00
E1.2	4.030	1.670	.5000	.5000	5.000	100.0	.025	.015	.0518	.0023	9.004
H9	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	9.005
E1.3	7.740	6.260	.5000	.5000	5.000	100.0	.025	.015	.0728	.0046	8.001
H7	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	7.003
E1.4	27.770	3.100	.5000	.5000	5.000	100.0	.050	.015	.2358	.0032	7.004
C1.0	1.850	2.260	.5000	.5000	5.000	100.0	.025	.015	.0346	.0027	11.00
H16	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	11.00
D1.0	0.3700	0.4700	1.000	1.000	5.000	100.0	.025	.015	.0106	.0009	12.00
H17	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	12.00
Arb_Out	.00001	0.000	.0010	0.000	5.000	0.000	.025	0.00	.0014	0.000	1.003

Link Label	Average Intensity (mm/h)	Init. Loss #1 (mm)	#2	Cont. Loss #1 (mm/h)	#2	Excess Rain #1 (mm)	#2	Peak Inflow (m^3/s)	Time to Peak	Link Lag mins
A5.0	108.30	10.00	1.500	2.500	0.000	34.292	43.625	0.7995	15.00	6.000
A6.0	108.30	10.00	1.500	2.500	0.000	34.292	43.625	0.6617	15.00	0.000
H15	108.30	10.00	0.000	2.500	0.000	34.292	0.000	0.6617	15.00	6.000
A3.0	108.30	10.00	1.500	2.500	0.000	34.292	43.625	1.775	15.00	0.000
H18	108.30	10.00	0.000	2.500	0.000	34.292	0.000	1.775	15.00	9.000
A3.1	108.30	10.00	1.500	2.500	0.000	34.292	43.625	3.971	15.00	5.400

A2.0	108.30	10.00	1.500	2.500	0.000	34.292	43.625	2.312	15.00	4.500
A4.0	108.30	10.00	0.000	2.500	0.000	34.292	0.000	0.9505	26.00	2.600
A1.0	108.30	10.00	0.000	2.500	0.000	34.292	0.000	1.523	29.00	3.900
A1.1a	108.30	10.00	1.500	2.500	0.000	34.292	43.625	2.471	25.00	3.100
A1.1	108.30	10.00	1.500	2.500	0.000	34.292	43.625	5.159	18.00	3.600
A1.2	108.30	10.00	1.500	2.500	0.000	34.292	43.625	9.725	20.00	4.600
A1.3	108.30	10.00	1.500	2.500	0.000	34.292	43.625	12.123	25.00	5.000
A1.4	108.30	10.00	1.500	2.500	0.000	34.292	43.625	12.588	30.00	10.00
B2.0	108.30	10.00	1.500	2.500	0.000	34.292	43.625	1.238	15.00	2.100
B1.0	108.30	10.00	1.500	2.500	0.000	34.292	43.625	0.8539	15.00	1.500
H1_H2	108.30	10.00	0.000	2.500	0.000	34.292	0.000	2.092	17.00	10.00
F1.0	108.30	10.00	15.00	2.500	2.500	34.292	29.375	0.3626	21.00	6.200
E3.0a	108.30	10.00	1.500	2.500	0.000	34.292	43.625	0.8481	15.00	9.500
E3.0	108.30	10.00	1.500	2.500	0.000	34.292	43.625	2.077	15.00	0.000
E4.0	108.30	10.00	1.500	2.500	0.000	34.292	43.625	0.3707	15.00	2.300
E2.0a	108.30	10.00	1.500	2.500	0.000	34.292	43.625	1.490	15.00	1.500
E2.0	108.30	10.00	1.500	2.500	0.000	34.292	43.625	2.770	15.00	3.300
E2.1	108.30	10.00	1.500	2.500	0.000	34.292	43.625	3.410	15.00	4.300
E2.2	108.30	10.00	1.500	2.500	0.000	34.292	43.625	5.096	15.00	3.000
E1.0	108.30	10.00	1.500	2.500	0.000	34.292	43.625	1.720	15.00	3.000
E1.1	108.30	10.00	1.500	2.500	0.000	34.292	43.625	2.547	15.00	5.000
E1.2	108.30	10.00	1.500	2.500	0.000	34.292	43.625	8.002	19.00	0.000
H9	108.30	10.00	0.000	2.500	0.000	34.292	0.000	8.002	19.00	5.000
E1.3	108.30	10.00	1.500	2.500	0.000	34.292	43.625	10.028	24.00	0.000
H7	108.30	10.00	0.000	2.500	0.000	34.292	0.000	11.681	24.00	6.500
E1.4	108.30	10.00	1.500	2.500	0.000	34.292	43.625	12.741	32.00	10.00
C1.0	108.30	10.00	1.500	2.500	0.000	34.292	43.625	1.397	15.00	0.000
H16	108.30	10.00	0.000	2.500	0.000	34.292	0.000	1.397	15.00	10.00
D1.0	108.30	10.00	1.500	2.500	0.000	34.292	43.625	0.3664	15.00	0.000
H17	108.30	10.00	0.000	2.500	0.000	34.292	0.000	0.3664	15.00	10.00
Arb_Out	108.30	10.00	0.000	2.500	0.000	34.292	0.000	27.134	40.00	0.000

##
Hobartville-100y

Results for period from 0: 0.0 1/ 1/1990
                    to 5: 0.0 1/ 1/1990
##

ROUTING INCREMENT (MINS) = 1.00
STORM DURATION (MINS)   = 60.
RETURN PERIOD (YRS)   = 100.
BX   = 0.8500
TOTAL OF FIRST SUB-AREAS (ha) = 120.52
TOTAL OF SECOND SUB-AREAS (ha) = 65.18
TOTAL OF ALL SUB-AREAS (ha)   = 185.70

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link Label	Catch. Area #1 (ha)	Catch. Area #2 (ha)	Slope #1 (%)	Slope #2 (%)	% Impervious #1	% Impervious #2	Pern #1	Pern #2	B #1	B #2	Link No.
A5.0	0.9000	1.090	1.100	1.100	5.000	100.0	.025	.015	.0160	.0013	1.000
A6.0	0.7700	0.9400	.8000	.8000	5.000	100.0	.025	.015	.0173	.0014	2.000
H15	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	2.001
A3.0	2.370	2.900	.5000	.5000	5.000	100.0	.025	.015	.0393	.0031	2.002
H18	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	2.003
A3.1	5.240	4.910	.6000	.6000	5.000	100.0	.025	.015	.0543	.0037	2.004
A2.0	2.670	3.260	1.500	1.500	5.000	100.0	.025	.015	.0242	.0019	3.000
A4.0	9.790	0.000	1.100	0.000	5.000	0.000	.050	0.00	.0925	0.000	4.000
A1.0	3.550	0.000	1.700	0.000	5.000	0.000	.050	0.00	.0439	0.000	4.001
A1.1a	3.670	2.880	1.000	1.000	5.000	100.0	.025	.015	.0349	.0022	4.002
A1.1	2.450	1.910	1.000	1.000	5.000	100.0	.025	.015	.0283	.0018	3.001
A1.2	4.210	2.560	.6000	.6000	5.000	100.0	.025	.015	.0484	.0027	2.005
A1.3	7.010	7.190	.5000	.5000	5.000	100.0	.025	.015	.0691	.0050	1.001
A1.4	3.620	2.780	1.900	1.900	5.000	100.0	.025	.015	.0252	.0016	1.002
B2.0	7.590	1.230	1.500	1.500	5.000	100.0	.050	.015	.0694	.0012	5.000

B1.0	5.560	0.9300	1.100	1.100	5.000	100.0	.050	.015	.0689	.0012	6.000
H1_H2	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	5.001
F1.0	1.370	0.1500	1.000	1.000	5.000	100.0	.025	.015	.0209	.0005	7.000
E3.0a	0.9500	1.160	.7000	.7000	5.000	100.0	.025	.015	.0207	.0016	7.001
E3.0	2.280	2.790	.7000	.7000	5.000	100.0	.025	.015	.0326	.0026	7.002
E4.0	0.4600	0.5600	.5000	.5000	5.000	100.0	.025	.015	.0168	.0013	8.000
E2.0a	1.950	2.380	.6000	.6000	5.000	100.0	.025	.015	.0325	.0026	9.000
E2.0	2.620	1.980	.6000	.6000	5.000	100.0	.025	.015	.0378	.0023	9.001
E2.1	2.290	1.890	.6000	.6000	5.000	100.0	.025	.015	.0353	.0023	9.002
E2.2	4.160	3.920	.9000	.9000	5.000	100.0	.025	.015	.0393	.0027	9.003
E1.0	1.850	2.270	1.700	1.700	5.000	100.0	.025	.015	.0188	.0015	10.00
E1.1	1.430	1.740	.5000	.5000	5.000	100.0	.025	.015	.0303	.0024	10.00
E1.2	4.030	1.670	.5000	.5000	5.000	100.0	.025	.015	.0518	.0023	9.004
H9	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	9.005
E1.3	7.740	6.260	.5000	.5000	5.000	100.0	.025	.015	.0728	.0046	8.001
H7	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	7.003
E1.4	27.770	3.100	.5000	.5000	5.000	100.0	.050	.015	.2358	.0032	7.004
C1.0	1.850	2.260	.5000	.5000	5.000	100.0	.025	.015	.0346	.0027	11.00
H16	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	11.00
D1.0	0.3700	0.4700	1.000	1.000	5.000	100.0	.025	.015	.0106	.0009	12.00
H17	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	12.00
Arb_Out	.00001	0.000	.0010	0.000	5.000	0.000	.025	0.00	.0014	0.000	1.003

Link Label	Average Intensity (mm/h)	Init. Loss #1 (mm)	Init. Loss #2 (mm)	Cont. Loss #1 (mm/h)	Cont. Loss #2 (mm/h)	Excess Rain #1 (mm)	Excess Rain #2 (mm)	Peak Inflow (m^3/s)	Time to Peak	Link Lag mins
A5.0	66.800	10.00	1.500	2.500	0.000	54.758	65.300	0.7899	25.00	6.000
A6.0	66.800	10.00	1.500	2.500	0.000	54.758	65.300	0.6557	25.00	0.000
H15	66.800	10.00	0.000	2.500	0.000	54.758	0.000	0.6557	25.00	6.000
A3.0	66.800	10.00	1.500	2.500	0.000	54.758	65.300	1.719	25.00	0.000
H18	66.800	10.00	0.000	2.500	0.000	54.758	0.000	1.719	25.00	9.000
A3.1	66.800	10.00	1.500	2.500	0.000	54.758	65.300	4.040	24.00	5.400
A2.0	66.800	10.00	1.500	2.500	0.000	54.758	65.300	2.325	25.00	4.500
A4.0	66.800	10.00	0.000	2.500	0.000	54.758	0.000	1.491	46.00	2.600
A1.0	66.800	10.00	0.000	2.500	0.000	54.758	0.000	2.115	45.00	3.900
A1.1a	66.800	10.00	1.500	2.500	0.000	54.758	65.300	3.129	40.00	3.100
A1.1	66.800	10.00	1.500	2.500	0.000	54.758	65.300	5.785	28.00	3.600
A1.2	66.800	10.00	1.500	2.500	0.000	54.758	65.300	10.486	30.00	4.600
A1.3	66.800	10.00	1.500	2.500	0.000	54.758	65.300	13.599	35.00	5.000
A1.4	66.800	10.00	1.500	2.500	0.000	54.758	65.300	14.687	40.00	10.00
B2.0	66.800	10.00	1.500	2.500	0.000	54.758	65.300	1.551	40.00	2.100
B1.0	66.800	10.00	1.500	2.500	0.000	54.758	65.300	1.056	45.00	1.500
H1_H2	66.800	10.00	0.000	2.500	0.000	54.758	0.000	2.599	43.00	10.00
F1.0	66.800	10.00	15.00	2.500	2.500	54.758	49.842	0.4279	29.00	6.200
E3.0a	66.800	10.00	1.500	2.500	0.000	54.758	65.300	0.9471	25.00	9.500
E3.0	66.800	10.00	1.500	2.500	0.000	54.758	65.300	2.181	25.00	0.000
E4.0	66.800	10.00	1.500	2.500	0.000	54.758	65.300	0.3821	25.00	2.300
E2.0a	66.800	10.00	1.500	2.500	0.000	54.758	65.300	1.448	25.00	1.500
E2.0	66.800	10.00	1.500	2.500	0.000	54.758	65.300	2.730	25.00	3.300
E2.1	66.800	10.00	1.500	2.500	0.000	54.758	65.300	3.578	28.00	4.300
E2.2	66.800	10.00	1.500	2.500	0.000	54.758	65.300	5.386	32.00	3.000
E1.0	66.800	10.00	1.500	2.500	0.000	54.758	65.300	1.698	25.00	3.000
E1.1	66.800	10.00	1.500	2.500	0.000	54.758	65.300	2.569	25.00	5.000
E1.2	66.800	10.00	1.500	2.500	0.000	54.758	65.300	8.592	33.00	0.000
H9	66.800	10.00	0.000	2.500	0.000	54.758	0.000	8.592	33.00	5.000
E1.3	66.800	10.00	1.500	2.500	0.000	54.758	65.300	10.996	38.00	0.000
H7	66.800	10.00	0.000	2.500	0.000	54.758	0.000	12.801	35.00	6.500
E1.4	66.800	10.00	1.500	2.500	0.000	54.758	65.300	14.861	43.00	10.00
C1.0	66.800	10.00	1.500	2.500	0.000	54.758	65.300	1.340	25.00	0.000
H16	66.800	10.00	0.000	2.500	0.000	54.758	0.000	1.340	25.00	10.00
D1.0	66.800	10.00	1.500	2.500	0.000	54.758	65.300	0.3604	25.00	0.000
H17	66.800	10.00	0.000	2.500	0.000	54.758	0.000	0.3604	25.00	10.00
Arb_Out	66.800	10.00	0.000	2.500	0.000	54.758	0.000	32.495	51.00	0.000

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################################################################################################
Hobartville-100y

Results for period from  0: 0.0  1/ 1/1990
                   to  6:40.0  1/ 1/1990
################################################################################################
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ROUTING INCREMENT (MINS)	1.00
STORM DURATION (MINS)	90.
RETURN PERIOD (YRS)	100.
BX	0.8500
TOTAL OF FIRST SUB-AREAS (ha)	120.52
TOTAL OF SECOND SUB-AREAS (ha)	65.18
TOTAL OF ALL SUB-AREAS (ha)	185.70

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link Label	Catch. Area #1 (ha)	Catch. Area #2 (ha)	Slope #1 (%)	Slope #2 (%)	% Impervious #1	% Impervious #2	Pern #1	Pern #2	B #1	B #2	Link No.
A5.0	0.9000	1.090	1.100	1.100	5.000	100.0	.025	.015	.0160	.0013	1.000
A6.0	0.7700	0.9400	.8000	.8000	5.000	100.0	.025	.015	.0173	.0014	2.000
H15	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	2.001
A3.0	2.370	2.900	.5000	.5000	5.000	100.0	.025	.015	.0393	.0031	2.002
H18	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	2.003
A3.1	5.240	4.910	.6000	.6000	5.000	100.0	.025	.015	.0543	.0037	2.004
A2.0	2.670	3.260	1.500	1.500	5.000	100.0	.025	.015	.0242	.0019	3.000
A4.0	9.790	0.000	1.100	0.000	5.000	0.000	.050	0.00	.0925	0.000	4.000
A1.0	3.550	0.000	1.700	0.000	5.000	0.000	.050	0.00	.0439	0.000	4.001
A1.1a	3.670	2.880	1.000	1.000	5.000	100.0	.025	.015	.0349	.0022	4.002
A1.1	2.450	1.910	1.000	1.000	5.000	100.0	.025	.015	.0283	.0018	3.001
A1.2	4.210	2.560	.6000	.6000	5.000	100.0	.025	.015	.0484	.0027	2.005
A1.3	7.010	7.190	.5000	.5000	5.000	100.0	.025	.015	.0691	.0050	1.001
A1.4	3.620	2.780	1.900	1.900	5.000	100.0	.025	.015	.0252	.0016	1.002
B2.0	7.590	1.230	1.500	1.500	5.000	100.0	.050	.015	.0694	.0012	5.000
B1.0	5.560	0.9300	1.100	1.100	5.000	100.0	.050	.015	.0689	.0012	6.000
H1_H2	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	5.001
F1.0	1.370	0.1500	1.000	1.000	5.000	100.0	.025	.015	.0209	.0005	7.000
E3.0a	0.9500	1.160	.7000	.7000	5.000	100.0	.025	.015	.0207	.0016	7.001
E3.0	2.280	2.790	.7000	.7000	5.000	100.0	.025	.015	.0326	.0026	7.002
E4.0	0.4600	0.5600	.5000	.5000	5.000	100.0	.025	.015	.0168	.0013	8.000
E2.0a	1.950	2.380	.6000	.6000	5.000	100.0	.025	.015	.0325	.0026	9.000
E2.0	2.620	1.980	.6000	.6000	5.000	100.0	.025	.015	.0378	.0023	9.001
E2.1	2.290	1.890	.6000	.6000	5.000	100.0	.025	.015	.0353	.0023	9.002
E2.2	4.160	3.920	.9000	.9000	5.000	100.0	.025	.015	.0393	.0027	9.003
E1.0	1.850	2.270	1.700	1.700	5.000	100.0	.025	.015	.0188	.0015	10.00
E1.1	1.430	1.740	.5000	.5000	5.000	100.0	.025	.015	.0303	.0024	10.00
E1.2	4.030	1.670	.5000	.5000	5.000	100.0	.025	.015	.0518	.0023	9.004
H9	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	9.005
E1.3	7.740	6.260	.5000	.5000	5.000	100.0	.025	.015	.0728	.0046	8.001
H7	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	7.003
E1.4	27.770	3.100	.5000	.5000	5.000	100.0	.050	.015	.2358	.0032	7.004
C1.0	1.850	2.260	.5000	.5000	5.000	100.0	.025	.015	.0346	.0027	11.00
H16	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	11.00
D1.0	0.3700	0.4700	1.000	1.000	5.000	100.0	.025	.015	.0106	.0009	12.00
H17	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	12.00
Arb_Out	.00001	0.000	.0010	0.000	5.000	0.000	.025	0.00	.0014	0.000	1.003

Link Label	Average Intensity (mm/h)	Init. Loss #1 (mm)	Init. Loss #2 (mm)	Cont. Loss #1 (mm/h)	Cont. Loss #2 (mm/h)	Excess Rain #1 (mm)	Excess Rain #2 (mm)	Peak Inflow (m^3/s)	Time to Peak	Link Lag mins
A5.0	52.600	10.00	1.500	2.500	0.000	65.608	77.400	0.8576	30.00	6.000
A6.0	52.600	10.00	1.500	2.500	0.000	65.608	77.400	0.7169	30.00	0.000
H15	52.600	10.00	0.000	2.500	0.000	65.608	0.000	0.7169	30.00	6.000
A3.0	52.600	10.00	1.500	2.500	0.000	65.608	77.400	1.941	30.00	0.000
H18	52.600	10.00	0.000	2.500	0.000	65.608	0.000	1.941	30.00	9.000
A3.1	52.600	10.00	1.500	2.500	0.000	65.608	77.400	4.183	30.00	5.400

A2.0	52.600	10.00	1.500	2.500	0.000	65.608	77.400	2.541	30.00	4.500
A4.0	52.600	10.00	0.000	2.500	0.000	65.608	0.000	1.496	53.00	2.600
A1.0	52.600	10.00	0.000	2.500	0.000	65.608	0.000	2.112	46.00	3.900
A1.1a	52.600	10.00	1.500	2.500	0.000	65.608	77.400	3.182	40.00	3.100
A1.1	52.600	10.00	1.500	2.500	0.000	65.608	77.400	6.510	33.00	3.600
A1.2	52.600	10.00	1.500	2.500	0.000	65.608	77.400	11.394	35.00	4.600
A1.3	52.600	10.00	1.500	2.500	0.000	65.608	77.400	14.087	40.00	5.000
A1.4	52.600	10.00	1.500	2.500	0.000	65.608	77.400	15.000	45.00	10.00
B2.0	52.600	10.00	1.500	2.500	0.000	65.608	77.400	1.701	30.00	2.100
B1.0	52.600	10.00	1.500	2.500	0.000	65.608	77.400	1.160	30.00	1.500
H1_H2	52.600	10.00	0.000	2.500	0.000	65.608	0.000	2.860	32.00	10.00
F1.0	52.600	10.00	15.00	2.500	2.500	65.608	60.692	0.4948	30.00	6.200
E3.0a	52.600	10.00	1.500	2.500	0.000	65.608	77.400	1.103	30.00	9.500
E3.0	52.600	10.00	1.500	2.500	0.000	65.608	77.400	2.326	30.00	0.000
E4.0	52.600	10.00	1.500	2.500	0.000	65.608	77.400	0.4245	30.00	2.300
E2.0a	52.600	10.00	1.500	2.500	0.000	65.608	77.400	1.643	30.00	1.500
E2.0	52.600	10.00	1.500	2.500	0.000	65.608	77.400	3.128	30.00	3.300
E2.1	52.600	10.00	1.500	2.500	0.000	65.608	77.400	3.940	33.00	4.300
E2.2	52.600	10.00	1.500	2.500	0.000	65.608	77.400	5.524	37.00	3.000
E1.0	52.600	10.00	1.500	2.500	0.000	65.608	77.400	1.822	30.00	3.000
E1.1	52.600	10.00	1.500	2.500	0.000	65.608	77.400	2.888	30.00	5.000
E1.2	52.600	10.00	1.500	2.500	0.000	65.608	77.400	8.812	38.00	0.000
H9	52.600	10.00	0.000	2.500	0.000	65.608	0.000	8.812	38.00	5.000
E1.3	52.600	10.00	1.500	2.500	0.000	65.608	77.400	11.096	43.00	0.000
H7	52.600	10.00	0.000	2.500	0.000	65.608	0.000	13.023	40.00	6.500
E1.4	52.600	10.00	1.500	2.500	0.000	65.608	77.400	15.214	47.00	10.00
C1.0	52.600	10.00	1.500	2.500	0.000	65.608	77.400	1.500	30.00	0.000
H16	52.600	10.00	0.000	2.500	0.000	65.608	0.000	1.500	30.00	10.00
D1.0	52.600	10.00	1.500	2.500	0.000	65.608	77.400	0.3814	30.00	0.000
H17	52.600	10.00	0.000	2.500	0.000	65.608	0.000	0.3814	30.00	10.00
Arb_Out	52.600	10.00	0.000	2.500	0.000	65.608	0.000	33.220	56.00	0.000

##
Hobartville-100y

Results for period from 0: 0.0 1/ 1/1990
                    to 8:20.0 1/ 1/1990
##

ROUTING INCREMENT (MINS) = 1.00
STORM DURATION (MINS)   = 120.
RETURN PERIOD (YRS)   = 100.
BX   = 0.8500
TOTAL OF FIRST SUB-AREAS (ha) = 120.52
TOTAL OF SECOND SUB-AREAS (ha) = 65.18
TOTAL OF ALL SUB-AREAS (ha)   = 185.70

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link	Catch. Area		Slope		% Impervious		Pern		B		Link
Label	#1	#2	#1	#2	#1	#2	#1	#2	#1	#2	No.
	(ha)		(%)		(%)						
A5.0	0.9000	1.090	1.100	1.100	5.000	100.0	.025	.015	.0160	.0013	1.000
A6.0	0.7700	0.9400	.8000	.8000	5.000	100.0	.025	.015	.0173	.0014	2.000
H15	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	2.001
A3.0	2.370	2.900	.5000	.5000	5.000	100.0	.025	.015	.0393	.0031	2.002
H18	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	2.003
A3.1	5.240	4.910	.6000	.6000	5.000	100.0	.025	.015	.0543	.0037	2.004
A2.0	2.670	3.260	1.500	1.500	5.000	100.0	.025	.015	.0242	.0019	3.000
A4.0	9.790	0.000	1.100	0.000	5.000	0.000	.050	0.00	.0925	0.000	4.000
A1.0	3.550	0.000	1.700	0.000	5.000	0.000	.050	0.00	.0439	0.000	4.001
A1.1a	3.670	2.880	1.000	1.000	5.000	100.0	.025	.015	.0349	.0022	4.002
A1.1	2.450	1.910	1.000	1.000	5.000	100.0	.025	.015	.0283	.0018	3.001
A1.2	4.210	2.560	.6000	.6000	5.000	100.0	.025	.015	.0484	.0027	2.005
A1.3	7.010	7.190	.5000	.5000	5.000	100.0	.025	.015	.0691	.0050	1.001
A1.4	3.620	2.780	1.900	1.900	5.000	100.0	.025	.015	.0252	.0016	1.002
B2.0	7.590	1.230	1.500	1.500	5.000	100.0	.050	.015	.0694	.0012	5.000
B1.0	5.560	0.9300	1.100	1.100	5.000	100.0	.050	.015	.0689	.0012	6.000

H1_H2	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	5.001
F1.0	1.370	0.1500	1.000	1.000	5.000	100.0	.025	.015	.0209	.0005	7.000
E3.0a	0.9500	1.160	.7000	.7000	5.000	100.0	.025	.015	.0207	.0016	7.001
E3.0	2.280	2.790	.7000	.7000	5.000	100.0	.025	.015	.0326	.0026	7.002
E4.0	0.4600	0.5600	.5000	.5000	5.000	100.0	.025	.015	.0168	.0013	8.000
E2.0a	1.950	2.380	.6000	.6000	5.000	100.0	.025	.015	.0325	.0026	9.000
E2.0	2.620	1.980	.6000	.6000	5.000	100.0	.025	.015	.0378	.0023	9.001
E2.1	2.290	1.890	.6000	.6000	5.000	100.0	.025	.015	.0353	.0023	9.002
E2.2	4.160	3.920	.9000	.9000	5.000	100.0	.025	.015	.0393	.0027	9.003
E1.0	1.850	2.270	1.700	1.700	5.000	100.0	.025	.015	.0188	.0015	10.00
E1.1	1.430	1.740	.5000	.5000	5.000	100.0	.025	.015	.0303	.0024	10.00
E1.2	4.030	1.670	.5000	.5000	5.000	100.0	.025	.015	.0518	.0023	9.004
H9	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	9.005
E1.3	7.740	6.260	.5000	.5000	5.000	100.0	.025	.015	.0728	.0046	8.001
H7	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	7.003
E1.4	27.770	3.100	.5000	.5000	5.000	100.0	.050	.015	.2358	.0032	7.004
C1.0	1.850	2.260	.5000	.5000	5.000	100.0	.025	.015	.0346	.0027	11.00
H16	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	11.00
D1.0	0.3700	0.4700	1.000	1.000	5.000	100.0	.025	.015	.0106	.0009	12.00
H17	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	12.00
Arb_Out	.00001	0.000	.0010	0.000	5.000	0.000	.025	0.00	.0014	0.000	1.003

Link Label	Average Intensity (mm/h)	Init. Loss #1 (mm)	Init. Loss #2 (mm)	Cont. Loss #1 (mm/h)	Cont. Loss #2 (mm/h)	Excess Rain #1 (mm)	Excess Rain #2 (mm)	Peak Inflow (m^3/s)	Time to Peak	Link Lag mins
A5.0	44.200	10.00	1.500	2.500	0.000	74.025	86.900	0.7809	35.00	6.000
A6.0	44.200	10.00	1.500	2.500	0.000	74.025	86.900	0.6553	35.00	0.000
H15	44.200	10.00	0.000	2.500	0.000	74.025	0.000	0.6553	35.00	6.000
A3.0	44.200	10.00	1.500	2.500	0.000	74.025	86.900	1.738	34.00	0.000
H18	44.200	10.00	0.000	2.500	0.000	74.025	0.000	1.738	34.00	9.000
A3.1	44.200	10.00	1.500	2.500	0.000	74.025	86.900	3.929	41.00	5.400
A2.0	44.200	10.00	1.500	2.500	0.000	74.025	86.900	2.323	35.00	4.500
A4.0	44.200	10.00	0.000	2.500	0.000	74.025	0.000	1.567	61.00	2.600
A1.0	44.200	10.00	0.000	2.500	0.000	74.025	0.000	2.198	50.00	3.900
A1.1a	44.200	10.00	1.500	2.500	0.000	74.025	86.900	3.267	46.00	3.100
A1.1	44.200	10.00	1.500	2.500	0.000	74.025	86.900	6.265	40.00	3.600
A1.2	44.200	10.00	1.500	2.500	0.000	74.025	86.900	11.214	46.00	4.600
A1.3	44.200	10.00	1.500	2.500	0.000	74.025	86.900	14.081	46.00	5.000
A1.4	44.200	10.00	1.500	2.500	0.000	74.025	86.900	14.999	51.00	10.00
B2.0	44.200	10.00	1.500	2.500	0.000	74.025	86.900	1.650	40.00	2.100
B1.0	44.200	10.00	1.500	2.500	0.000	74.025	86.900	1.111	40.00	1.500
H1_H2	44.200	10.00	0.000	2.500	0.000	74.025	0.000	2.761	42.00	10.00
F1.0	44.200	10.00	15.00	2.500	2.500	74.025	69.233	0.4946	40.00	6.200
E3.0a	44.200	10.00	1.500	2.500	0.000	74.025	86.900	1.058	40.00	9.500
E3.0	44.200	10.00	1.500	2.500	0.000	74.025	86.900	2.127	35.00	0.000
E4.0	44.200	10.00	1.500	2.500	0.000	74.025	86.900	0.3838	35.00	2.300
E2.0a	44.200	10.00	1.500	2.500	0.000	74.025	86.900	1.461	35.00	1.500
E2.0	44.200	10.00	1.500	2.500	0.000	74.025	86.900	2.810	35.00	3.300
E2.1	44.200	10.00	1.500	2.500	0.000	74.025	86.900	3.966	39.00	4.300
E2.2	44.200	10.00	1.500	2.500	0.000	74.025	86.900	5.897	41.00	3.000
E1.0	44.200	10.00	1.500	2.500	0.000	74.025	86.900	1.677	35.00	3.000
E1.1	44.200	10.00	1.500	2.500	0.000	74.025	86.900	2.602	35.00	5.000
E1.2	44.200	10.00	1.500	2.500	0.000	74.025	86.900	9.463	43.00	0.000
H9	44.200	10.00	0.000	2.500	0.000	74.025	0.000	9.463	43.00	5.000
E1.3	44.200	10.00	1.500	2.500	0.000	74.025	86.900	11.730	48.00	0.000
H7	44.200	10.00	0.000	2.500	0.000	74.025	0.000	13.507	48.00	6.500
E1.4	44.200	10.00	1.500	2.500	0.000	74.025	86.900	15.752	56.00	10.00
C1.0	44.200	10.00	1.500	2.500	0.000	74.025	86.900	1.362	35.00	0.000
H16	44.200	10.00	0.000	2.500	0.000	74.025	0.000	1.362	35.00	10.00
D1.0	44.200	10.00	1.500	2.500	0.000	74.025	86.900	0.3541	35.00	0.000
H17	44.200	10.00	0.000	2.500	0.000	74.025	0.000	0.3541	35.00	10.00
Arb_Out	44.200	10.00	0.000	2.500	0.000	74.025	0.000	33.465	66.00	0.000

##
Hobartville-100y

Results for period from 0: 0.0 1/ 1/1990
                    to 13:20.0 1/ 1/1990
##

ROUTING INCREMENT (MINS) =   1.00
STORM DURATION (MINS)   =   180.
RETURN PERIOD (YRS)   =   100.
BX   =   0.8500
TOTAL OF FIRST SUB-AREAS (ha) =   120.52
TOTAL OF SECOND SUB-AREAS (ha) =   65.18
TOTAL OF ALL SUB-AREAS (ha)   =   185.70

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link Label	Catch. Area #1 (ha)	Catch. Area #2 (ha)	Slope #1 (%)	Slope #2 (%)	% Impervious #1	% Impervious #2	Pern #1	Pern #2	B #1	B #2	Link No.
A5.0	0.9000	1.090	1.100	1.100	5.000	100.0	.025	.015	.0160	.0013	1.000
A6.0	0.7700	0.9400	.8000	.8000	5.000	100.0	.025	.015	.0173	.0014	2.000
H15	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	2.001
A3.0	2.370	2.900	.5000	.5000	5.000	100.0	.025	.015	.0393	.0031	2.002
H18	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	2.003
A3.1	5.240	4.910	.6000	.6000	5.000	100.0	.025	.015	.0543	.0037	2.004
A2.0	2.670	3.260	1.500	1.500	5.000	100.0	.025	.015	.0242	.0019	3.000
A4.0	9.790	0.000	1.100	0.000	5.000	0.000	.050	0.00	.0925	0.000	4.000
A1.0	3.550	0.000	1.700	0.000	5.000	0.000	.050	0.00	.0439	0.000	4.001
A1.1a	3.670	2.880	1.000	1.000	5.000	100.0	.025	.015	.0349	.0022	4.002
A1.1	2.450	1.910	1.000	1.000	5.000	100.0	.025	.015	.0283	.0018	3.001
A1.2	4.210	2.560	.6000	.6000	5.000	100.0	.025	.015	.0484	.0027	2.005
A1.3	7.010	7.190	.5000	.5000	5.000	100.0	.025	.015	.0691	.0050	1.001
A1.4	3.620	2.780	1.900	1.900	5.000	100.0	.025	.015	.0252	.0016	1.002
B2.0	7.590	1.230	1.500	1.500	5.000	100.0	.050	.015	.0694	.0012	5.000
B1.0	5.560	0.9300	1.100	1.100	5.000	100.0	.050	.015	.0689	.0012	6.000
H1_H2	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	5.001
F1.0	1.370	0.1500	1.000	1.000	5.000	100.0	.025	.015	.0209	.0005	7.000
E3.0a	0.9500	1.160	.7000	.7000	5.000	100.0	.025	.015	.0207	.0016	7.001
E3.0	2.280	2.790	.7000	.7000	5.000	100.0	.025	.015	.0326	.0026	7.002
E4.0	0.4600	0.5600	.5000	.5000	5.000	100.0	.025	.015	.0168	.0013	8.000
E2.0a	1.950	2.380	.6000	.6000	5.000	100.0	.025	.015	.0325	.0026	9.000
E2.0	2.620	1.980	.6000	.6000	5.000	100.0	.025	.015	.0378	.0023	9.001
E2.1	2.290	1.890	.6000	.6000	5.000	100.0	.025	.015	.0353	.0023	9.002
E2.2	4.160	3.920	.9000	.9000	5.000	100.0	.025	.015	.0393	.0027	9.003
E1.0	1.850	2.270	1.700	1.700	5.000	100.0	.025	.015	.0188	.0015	10.00
E1.1	1.430	1.740	.5000	.5000	5.000	100.0	.025	.015	.0303	.0024	10.00
E1.2	4.030	1.670	.5000	.5000	5.000	100.0	.025	.015	.0518	.0023	9.004
H9	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	9.005
E1.3	7.740	6.260	.5000	.5000	5.000	100.0	.025	.015	.0728	.0046	8.001
H7	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	7.003
E1.4	27.770	3.100	.5000	.5000	5.000	100.0	.050	.015	.2358	.0032	7.004
C1.0	1.850	2.260	.5000	.5000	5.000	100.0	.025	.015	.0346	.0027	11.00
H16	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	11.00
D1.0	0.3700	0.4700	1.000	1.000	5.000	100.0	.025	.015	.0106	.0009	12.00
H17	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	12.00
Arb_Out	.00001	0.000	.0010	0.000	5.000	0.000	.025	0.00	.0014	0.000	1.003

Link Label	Average Intensity (mm/h)	Init. Loss #1 (mm)	Init. Loss #2	Cont. Loss #1 (mm/h)	Cont. Loss #2	Excess Rain #1 (mm)	Excess Rain #2	Peak Inflow (m^3/s)	Time to Peak	Link Lag mins
A5.0	34.500	10.00	1.500	2.500	0.000	86.750	102.00	0.5199	45.00	6.000
A6.0	34.500	10.00	1.500	2.500	0.000	86.750	102.00	0.4418	45.00	0.000
H15	34.500	10.00	0.000	2.500	0.000	86.750	0.000	0.4418	45.00	6.000
A3.0	34.500	10.00	1.500	2.500	0.000	86.750	102.00	1.212	45.00	0.000
H18	34.500	10.00	0.000	2.500	0.000	86.750	0.000	1.212	45.00	9.000
A3.1	34.500	10.00	1.500	2.500	0.000	86.750	102.00	3.172	45.00	5.400
A2.0	34.500	10.00	1.500	2.500	0.000	86.750	102.00	1.542	45.00	4.500

A4.0	34.500	10.00	0.000	2.500	0.000	86.750	0.000	1.342	72.00	2.600	
A1.0	34.500	10.00	0.000	2.500	0.000	86.750	0.000	1.800	73.00	3.900	
A1.1a	34.500	10.00	1.500	2.500	0.000	86.750	102.00	2.700	45.00	3.100	
A1.1	34.500	10.00	1.500	2.500	0.000	86.750	102.00	4.940	48.00	3.600	
A1.2	34.500	10.00	1.500	2.500	0.000	86.750	102.00	9.063	50.00	4.600	
A1.3	34.500	10.00	1.500	2.500	0.000	86.750	102.00	11.147	55.00	5.000	
A1.4	34.500	10.00	1.500	2.500	0.000	86.750	102.00	11.848	60.00	10.00	
B2.0	34.500	10.00	1.500	2.500	0.000	86.750	102.00	1.367	45.00	2.100	
B1.0	34.500	10.00	1.500	2.500	0.000	86.750	102.00	0.9245	63.00	1.500	
H1_H2	34.500	10.00	0.000	2.500	0.000	86.750	0.000	2.289	47.00	10.00	
F1.0	34.500	10.00	15.00	2.500	2.500	86.750	81.917	0.3723	45.00	6.200	
E3.0a	34.500	10.00	1.500	2.500	0.000	86.750	102.00	0.8427	45.00	9.500	
E3.0	34.500	10.00	1.500	2.500	0.000	86.750	102.00	1.811	45.00	0.000	
E4.0	34.500	10.00	1.500	2.500	0.000	86.750	102.00	0.2616	45.00	2.300	
E2.0a	34.500	10.00	1.500	2.500	0.000	86.750	102.00	1.029	45.00	1.500	
E2.0	34.500	10.00	1.500	2.500	0.000	86.750	102.00	2.034	45.00	3.300	
E2.1	34.500	10.00	1.500	2.500	0.000	86.750	102.00	2.840	45.00	4.300	
E2.2	34.500	10.00	1.500	2.500	0.000	86.750	102.00	4.465	45.00	3.000	
E1.0	34.500	10.00	1.500	2.500	0.000	86.750	102.00	1.085	45.00	3.000	
E1.1	34.500	10.00	1.500	2.500	0.000	86.750	102.00	1.812	45.00	5.000	
E1.2	34.500	10.00	1.500	2.500	0.000	86.750	102.00	7.073	48.00	0.000	
H9	34.500	10.00	0.000	2.500	0.000	86.750	0.000	7.073	48.00	5.000	
E1.3	34.500	10.00	1.500	2.500	0.000	86.750	102.00	8.964	53.00	0.000	
H7	34.500	10.00	0.000	2.500	0.000	86.750	0.000	10.446	53.00	6.500	
E1.4	34.500	10.00	1.500	2.500	0.000	86.750	102.00	12.349	61.00	10.00	
C1.0	34.500	10.00	1.500	2.500	0.000	86.750	102.00	0.9446	45.00	0.000	
H16	34.500	10.00	0.000	2.500	0.000	86.750	0.000	0.9446	45.00	10.00	
D1.0	34.500	10.00	1.500	2.500	0.000	86.750	102.00	0.2224	45.00	0.000	
H17	34.500	10.00	0.000	2.500	0.000	86.750	0.000	0.2224	45.00	10.00	
Arb_Out	34.500	10.00	0.000	2.500	0.000	86.750	0.000	26.926	70.00	0.000	

##
Hobartville-100y

Results for period from 0: 0.0 1/ 1/1990
                    to 20: 0.0 1/ 1/1990
##

ROUTING INCREMENT (MINS) = 2.00
STORM DURATION (MINS)   = 360.
RETURN PERIOD (YRS)   = 100.
BX   = 0.8500
TOTAL OF FIRST SUB-AREAS (ha) = 120.52
TOTAL OF SECOND SUB-AREAS (ha) = 65.18
TOTAL OF ALL SUB-AREAS (ha)   = 185.70

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link	Catch. Area		Slope		% Impervious		Pern		B		Link
Label	#1	#2	#1	#2	#1	#2	#1	#2	#1	#2	No.
	(ha)		(%)		(%)						
A5.0	0.9000	1.090	1.100	1.100	5.000	100.0	.025	.015	.0160	.0013	1.000
A6.0	0.7700	0.9400	.8000	.8000	5.000	100.0	.025	.015	.0173	.0014	2.000
H15	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	2.001
A3.0	2.370	2.900	.5000	.5000	5.000	100.0	.025	.015	.0393	.0031	2.002
H18	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	2.003
A3.1	5.240	4.910	.6000	.6000	5.000	100.0	.025	.015	.0543	.0037	2.004
A2.0	2.670	3.260	1.500	1.500	5.000	100.0	.025	.015	.0242	.0019	3.000
A4.0	9.790	0.000	1.100	0.000	5.000	0.000	.050	0.00	.0925	0.000	4.000
A1.0	3.550	0.000	1.700	0.000	5.000	0.000	.050	0.00	.0439	0.000	4.001
A1.1a	3.670	2.880	1.000	1.000	5.000	100.0	.025	.015	.0349	.0022	4.002
A1.1	2.450	1.910	1.000	1.000	5.000	100.0	.025	.015	.0283	.0018	3.001
A1.2	4.210	2.560	.6000	.6000	5.000	100.0	.025	.015	.0484	.0027	2.005
A1.3	7.010	7.190	.5000	.5000	5.000	100.0	.025	.015	.0691	.0050	1.001
A1.4	3.620	2.780	1.900	1.900	5.000	100.0	.025	.015	.0252	.0016	1.002
B2.0	7.590	1.230	1.500	1.500	5.000	100.0	.050	.015	.0694	.0012	5.000
B1.0	5.560	0.9300	1.100	1.100	5.000	100.0	.050	.015	.0689	.0012	6.000
H1_H2	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	5.001

F1.0	1.370	0.1500	1.000	1.000	5.000	100.0	.025	.015	.0209	.0005	7.000
E3.0a	0.9500	1.160	.7000	.7000	5.000	100.0	.025	.015	.0207	.0016	7.001
E3.0	2.280	2.790	.7000	.7000	5.000	100.0	.025	.015	.0326	.0026	7.002
E4.0	0.4600	0.5600	.5000	.5000	5.000	100.0	.025	.015	.0168	.0013	8.000
E2.0a	1.950	2.380	.6000	.6000	5.000	100.0	.025	.015	.0325	.0026	9.000
E2.0	2.620	1.980	.6000	.6000	5.000	100.0	.025	.015	.0378	.0023	9.001
E2.1	2.290	1.890	.6000	.6000	5.000	100.0	.025	.015	.0353	.0023	9.002
E2.2	4.160	3.920	.9000	.9000	5.000	100.0	.025	.015	.0393	.0027	9.003
E1.0	1.850	2.270	1.700	1.700	5.000	100.0	.025	.015	.0188	.0015	10.00
E1.1	1.430	1.740	.5000	.5000	5.000	100.0	.025	.015	.0303	.0024	10.00
E1.2	4.030	1.670	.5000	.5000	5.000	100.0	.025	.015	.0518	.0023	9.004
H9	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	9.005
E1.3	7.740	6.260	.5000	.5000	5.000	100.0	.025	.015	.0728	.0046	8.001
H7	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	7.003
E1.4	27.770	3.100	.5000	.5000	5.000	100.0	.050	.015	.2358	.0032	7.004
C1.0	1.850	2.260	.5000	.5000	5.000	100.0	.025	.015	.0346	.0027	11.00
H16	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	11.00
D1.0	0.3700	0.4700	1.000	1.000	5.000	100.0	.025	.015	.0106	.0009	12.00
H17	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	12.00
Arb_Out	.00001	0.000	.0010	0.000	5.000	0.000	.025	0.00	.0014	0.000	1.003

Link Label	Average Intensity (mm/h)	Init. Loss #1 (mm)	Init. Loss #2 (mm)	Cont. Loss #1 (mm/h)	Cont. Loss #2 (mm/h)	Excess Rain #1 (mm)	Excess Rain #2 (mm)	Peak Inflow (m^3/s)	Time to Peak	Link Lag mins
A5.0	22.500	10.00	1.500	2.500	0.000	111.75	133.50	0.3413	118.0	6.000
A6.0	22.500	10.00	1.500	2.500	0.000	111.75	133.50	0.2929	118.0	0.000
H15	22.500	10.00	0.000	2.500	0.000	111.75	0.000	0.2930	118.0	6.000
A3.0	22.500	10.00	1.500	2.500	0.000	111.75	133.50	0.8935	120.0	0.000
H18	22.500	10.00	0.000	2.500	0.000	111.75	0.000	0.8935	120.0	9.000
A3.1	22.500	10.00	1.500	2.500	0.000	111.75	133.50	2.486	120.0	5.400
A2.0	22.500	10.00	1.500	2.500	0.000	111.75	133.50	1.016	120.0	4.500
A4.0	22.500	10.00	0.000	2.500	0.000	111.75	0.000	1.302	130.0	2.600
A1.0	22.500	10.00	0.000	2.500	0.000	111.75	0.000	1.821	124.0	3.900
A1.1a	22.500	10.00	1.500	2.500	0.000	111.75	133.50	2.744	120.0	3.100
A1.1	22.500	10.00	1.500	2.500	0.000	111.75	133.50	4.354	122.0	3.600
A1.2	22.500	10.00	1.500	2.500	0.000	111.75	133.50	7.755	126.0	4.600
A1.3	22.500	10.00	1.500	2.500	0.000	111.75	133.50	9.863	122.0	5.000
A1.4	22.500	10.00	1.500	2.500	0.000	111.75	133.50	10.678	128.0	10.00
B2.0	22.500	10.00	1.500	2.500	0.000	111.75	133.50	1.307	120.0	2.100
B1.0	22.500	10.00	1.500	2.500	0.000	111.75	133.50	0.9258	120.0	1.500
H1_H2	22.500	10.00	0.000	2.500	0.000	111.75	0.000	2.233	122.0	10.00
F1.0	22.500	10.00	15.00	2.500	2.500	111.75	107.33	0.2533	120.0	6.200
E3.0a	22.500	10.00	1.500	2.500	0.000	111.75	133.50	0.6087	120.0	9.500
E3.0	22.500	10.00	1.500	2.500	0.000	111.75	133.50	1.422	120.0	0.000
E4.0	22.500	10.00	1.500	2.500	0.000	111.75	133.50	0.1745	118.0	2.300
E2.0a	22.500	10.00	1.500	2.500	0.000	111.75	133.50	0.7270	120.0	1.500
E2.0	22.500	10.00	1.500	2.500	0.000	111.75	133.50	1.482	120.0	3.300
E2.1	22.500	10.00	1.500	2.500	0.000	111.75	133.50	2.143	120.0	4.300
E2.2	22.500	10.00	1.500	2.500	0.000	111.75	133.50	3.439	120.0	3.000
E1.0	22.500	10.00	1.500	2.500	0.000	111.75	133.50	0.7065	120.0	3.000
E1.1	22.500	10.00	1.500	2.500	0.000	111.75	133.50	1.237	120.0	5.000
E1.2	22.500	10.00	1.500	2.500	0.000	111.75	133.50	5.473	122.0	0.000
H9	22.500	10.00	0.000	2.500	0.000	111.75	0.000	5.473	122.0	5.000
E1.3	22.500	10.00	1.500	2.500	0.000	111.75	133.50	7.518	120.0	0.000
H7	22.500	10.00	0.000	2.500	0.000	111.75	0.000	8.940	120.0	6.500
E1.4	22.500	10.00	1.500	2.500	0.000	111.75	133.50	11.340	136.0	10.00
C1.0	22.500	10.00	1.500	2.500	0.000	111.75	133.50	0.6843	120.0	0.000
H16	22.500	10.00	0.000	2.500	0.000	111.75	0.000	0.6843	120.0	10.00
D1.0	22.500	10.00	1.500	2.500	0.000	111.75	133.50	0.1446	118.0	0.000
H17	22.500	10.00	0.000	2.500	0.000	111.75	0.000	0.1446	118.0	10.00
Arb_Out	22.500	10.00	0.000	2.500	0.000	111.75	0.000	24.820	138.0	0.000

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################################################################################################
Hobartville-100y

Results for period from  0: 0.0  1/ 1/1990
                   to  9:20.0  2/ 1/1990
################################################################################################
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ROUTING INCREMENT (MINS)	= 2.00
STORM DURATION (MINS)	= 540.
RETURN PERIOD (YRS)	= 100.
BX	= 0.8500
TOTAL OF FIRST SUB-AREAS (ha)	= 120.52
TOTAL OF SECOND SUB-AREAS (ha)	= 65.18
TOTAL OF ALL SUB-AREAS (ha)	= 185.70

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link Label	Catch. Area #1 (ha)	Catch. Area #2 (ha)	Slope #1 (%)	Slope #2 (%)	% Impervious #1	% Impervious #2	Pern #1	Pern #2	B #1	B #2	Link No.
A5.0	0.9000	1.090	1.100	1.100	5.000	100.0	.025	.015	.0160	.0013	1.000
A6.0	0.7700	0.9400	.8000	.8000	5.000	100.0	.025	.015	.0173	.0014	2.000
H15	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	2.001
A3.0	2.370	2.900	.5000	.5000	5.000	100.0	.025	.015	.0393	.0031	2.002
H18	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	2.003
A3.1	5.240	4.910	.6000	.6000	5.000	100.0	.025	.015	.0543	.0037	2.004
A2.0	2.670	3.260	1.500	1.500	5.000	100.0	.025	.015	.0242	.0019	3.000
A4.0	9.790	0.000	1.100	0.000	5.000	0.000	.050	0.00	.0925	0.000	4.000
A1.0	3.550	0.000	1.700	0.000	5.000	0.000	.050	0.00	.0439	0.000	4.001
A1.1a	3.670	2.880	1.000	1.000	5.000	100.0	.025	.015	.0349	.0022	4.002
A1.1	2.450	1.910	1.000	1.000	5.000	100.0	.025	.015	.0283	.0018	3.001
A1.2	4.210	2.560	.6000	.6000	5.000	100.0	.025	.015	.0484	.0027	2.005
A1.3	7.010	7.190	.5000	.5000	5.000	100.0	.025	.015	.0691	.0050	1.001
A1.4	3.620	2.780	1.900	1.900	5.000	100.0	.025	.015	.0252	.0016	1.002
B2.0	7.590	1.230	1.500	1.500	5.000	100.0	.050	.015	.0694	.0012	5.000
B1.0	5.560	0.9300	1.100	1.100	5.000	100.0	.050	.015	.0689	.0012	6.000
H1_H2	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	5.001
F1.0	1.370	0.1500	1.000	1.000	5.000	100.0	.025	.015	.0209	.0005	7.000
E3.0a	0.9500	1.160	.7000	.7000	5.000	100.0	.025	.015	.0207	.0016	7.001
E3.0	2.280	2.790	.7000	.7000	5.000	100.0	.025	.015	.0326	.0026	7.002
E4.0	0.4600	0.5600	.5000	.5000	5.000	100.0	.025	.015	.0168	.0013	8.000
E2.0a	1.950	2.380	.6000	.6000	5.000	100.0	.025	.015	.0325	.0026	9.000
E2.0	2.620	1.980	.6000	.6000	5.000	100.0	.025	.015	.0378	.0023	9.001
E2.1	2.290	1.890	.6000	.6000	5.000	100.0	.025	.015	.0353	.0023	9.002
E2.2	4.160	3.920	.9000	.9000	5.000	100.0	.025	.015	.0393	.0027	9.003
E1.0	1.850	2.270	1.700	1.700	5.000	100.0	.025	.015	.0188	.0015	10.00
E1.1	1.430	1.740	.5000	.5000	5.000	100.0	.025	.015	.0303	.0024	10.00
E1.2	4.030	1.670	.5000	.5000	5.000	100.0	.025	.015	.0518	.0023	9.004
H9	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	9.005
E1.3	7.740	6.260	.5000	.5000	5.000	100.0	.025	.015	.0728	.0046	8.001
H7	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	7.003
E1.4	27.770	3.100	.5000	.5000	5.000	100.0	.050	.015	.2358	.0032	7.004
C1.0	1.850	2.260	.5000	.5000	5.000	100.0	.025	.015	.0346	.0027	11.00
H16	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	11.00
D1.0	0.3700	0.4700	1.000	1.000	5.000	100.0	.025	.015	.0106	.0009	12.00
H17	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	12.00
Arb_Out	.00001	0.000	.0010	0.000	5.000	0.000	.025	0.00	.0014	0.000	1.003

Link Label	Average Intensity (mm/h)	Init. Loss #1 (mm)	Init. Loss #2 (mm)	Cont. Loss #1 (mm/h)	Cont. Loss #2 (mm/h)	Excess Rain #1 (mm)	Excess Rain #2 (mm)	Peak Inflow (m^3/s)	Time to Peak	Link Lag mins
A5.0	17.700	10.00	1.500	2.500	0.000	128.80	157.80	0.3038	298.0	6.000
A6.0	17.700	10.00	1.500	2.500	0.000	128.80	157.80	0.2606	298.0	0.000
H15	17.700	10.00	0.000	2.500	0.000	128.80	0.000	0.2606	298.0	6.000
A3.0	17.700	10.00	1.500	2.500	0.000	128.80	157.80	0.8370	300.0	0.000
H18	17.700	10.00	0.000	2.500	0.000	128.80	0.000	0.8370	300.0	9.000
A3.1	17.700	10.00	1.500	2.500	0.000	128.80	157.80	2.187	300.0	5.400

A2.0	17.700	10.00	1.500	2.500	0.000	128.80	157.80	0.9031	300.0	4.500
A4.0	17.700	10.00	0.000	2.500	0.000	128.80	0.000	1.175	320.0	2.600
A1.0	17.700	10.00	0.000	2.500	0.000	128.80	0.000	1.610	314.0	3.900
A1.1a	17.700	10.00	1.500	2.500	0.000	128.80	157.80	2.403	308.0	3.100
A1.1	17.700	10.00	1.500	2.500	0.000	128.80	157.80	3.859	304.0	3.600
A1.2	17.700	10.00	1.500	2.500	0.000	128.80	157.80	6.876	306.0	4.600
A1.3	17.700	10.00	1.500	2.500	0.000	128.80	157.80	8.845	310.0	5.000
A1.4	17.700	10.00	1.500	2.500	0.000	128.80	157.80	9.585	316.0	10.00
B2.0	17.700	10.00	1.500	2.500	0.000	128.80	157.80	1.127	300.0	2.100
B1.0	17.700	10.00	1.500	2.500	0.000	128.80	157.80	0.7977	300.0	1.500
H1_H2	17.700	10.00	0.000	2.500	0.000	128.80	0.000	1.925	302.0	10.00
F1.0	17.700	10.00	15.00	2.500	2.500	128.80	124.47	0.2242	300.0	6.200
E3.0a	17.700	10.00	1.500	2.500	0.000	128.80	157.80	0.5391	300.0	9.500
E3.0	17.700	10.00	1.500	2.500	0.000	128.80	157.80	1.253	300.0	0.000
E4.0	17.700	10.00	1.500	2.500	0.000	128.80	157.80	0.1534	298.0	2.300
E2.0a	17.700	10.00	1.500	2.500	0.000	128.80	157.80	0.6412	300.0	1.500
E2.0	17.700	10.00	1.500	2.500	0.000	128.80	157.80	1.303	300.0	3.300
E2.1	17.700	10.00	1.500	2.500	0.000	128.80	157.80	1.880	300.0	4.300
E2.2	17.700	10.00	1.500	2.500	0.000	128.80	157.80	3.022	300.0	3.000
E1.0	17.700	10.00	1.500	2.500	0.000	128.80	157.80	0.6283	300.0	3.000
E1.1	17.700	10.00	1.500	2.500	0.000	128.80	157.80	1.096	300.0	5.000
E1.2	17.700	10.00	1.500	2.500	0.000	128.80	157.80	4.836	304.0	0.000
H9	17.700	10.00	0.000	2.500	0.000	128.80	0.000	4.836	304.0	5.000
E1.3	17.700	10.00	1.500	2.500	0.000	128.80	157.80	6.662	310.0	0.000
H7	17.700	10.00	0.000	2.500	0.000	128.80	0.000	7.825	310.0	6.500
E1.4	17.700	10.00	1.500	2.500	0.000	128.80	157.80	10.619	316.0	10.00
C1.0	17.700	10.00	1.500	2.500	0.000	128.80	157.80	0.6031	300.0	0.000
H16	17.700	10.00	0.000	2.500	0.000	128.80	0.000	0.6031	300.0	10.00
D1.0	17.700	10.00	1.500	2.500	0.000	128.80	157.80	0.1283	298.0	0.000
H17	17.700	10.00	0.000	2.500	0.000	128.80	0.000	0.1283	298.0	10.00
Arb_Out	17.700	10.00	0.000	2.500	0.000	128.80	0.000	22.703	326.0	0.000

##
Hobartville-100y

Results for period from 0: 0.0 1/ 1/1990
                    to 17:40.0 2/ 1/1990
##

ROUTING INCREMENT (MINS) = 5.00
STORM DURATION (MINS)   = 720.
RETURN PERIOD (YRS)   = 100.
BX   = 0.8500
TOTAL OF FIRST SUB-AREAS (ha) = 120.52
TOTAL OF SECOND SUB-AREAS (ha) = 65.18
TOTAL OF ALL SUB-AREAS (ha)   = 185.70

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link Label	Catch. Area #1 (ha)	Catch. Area #2 (ha)	Slope #1 (%)	Slope #2 (%)	% Impervious #1 (%)	% Impervious #2 (%)	Pern #1	Pern #2	B #1	B #2	Link No.
A5.0	0.9000	1.090	1.100	1.100	5.000	100.0	.025	.015	.0160	.0013	1.000
A6.0	0.7700	0.9400	.8000	.8000	5.000	100.0	.025	.015	.0173	.0014	2.000
H15	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	2.001
A3.0	2.370	2.900	.5000	.5000	5.000	100.0	.025	.015	.0393	.0031	2.002
H18	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	2.003
A3.1	5.240	4.910	.6000	.6000	5.000	100.0	.025	.015	.0543	.0037	2.004
A2.0	2.670	3.260	1.500	1.500	5.000	100.0	.025	.015	.0242	.0019	3.000
A4.0	9.790	0.000	1.100	0.000	5.000	0.000	.050	0.00	.0925	0.000	4.000
A1.0	3.550	0.000	1.700	0.000	5.000	0.000	.050	0.00	.0439	0.000	4.001
A1.1a	3.670	2.880	1.000	1.000	5.000	100.0	.025	.015	.0349	.0022	4.002
A1.1	2.450	1.910	1.000	1.000	5.000	100.0	.025	.015	.0283	.0018	3.001
A1.2	4.210	2.560	.6000	.6000	5.000	100.0	.025	.015	.0484	.0027	2.005
A1.3	7.010	7.190	.5000	.5000	5.000	100.0	.025	.015	.0691	.0050	1.001
A1.4	3.620	2.780	1.900	1.900	5.000	100.0	.025	.015	.0252	.0016	1.002
B2.0	7.590	1.230	1.500	1.500	5.000	100.0	.050	.015	.0694	.0012	5.000
B1.0	5.560	0.9300	1.100	1.100	5.000	100.0	.050	.015	.0689	.0012	6.000

H1_H2	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	5.001
F1.0	1.370	0.1500	1.000	1.000	5.000	100.0	.025	.015	.0209	.0005	7.000
E3.0a	0.9500	1.160	.7000	.7000	5.000	100.0	.025	.015	.0207	.0016	7.001
E3.0	2.280	2.790	.7000	.7000	5.000	100.0	.025	.015	.0326	.0026	7.002
E4.0	0.4600	0.5600	.5000	.5000	5.000	100.0	.025	.015	.0168	.0013	8.000
E2.0a	1.950	2.380	.6000	.6000	5.000	100.0	.025	.015	.0325	.0026	9.000
E2.0	2.620	1.980	.6000	.6000	5.000	100.0	.025	.015	.0378	.0023	9.001
E2.1	2.290	1.890	.6000	.6000	5.000	100.0	.025	.015	.0353	.0023	9.002
E2.2	4.160	3.920	.9000	.9000	5.000	100.0	.025	.015	.0393	.0027	9.003
E1.0	1.850	2.270	1.700	1.700	5.000	100.0	.025	.015	.0188	.0015	10.00
E1.1	1.430	1.740	.5000	.5000	5.000	100.0	.025	.015	.0303	.0024	10.00
E1.2	4.030	1.670	.5000	.5000	5.000	100.0	.025	.015	.0518	.0023	9.004
H9	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	9.005
E1.3	7.740	6.260	.5000	.5000	5.000	100.0	.025	.015	.0728	.0046	8.001
H7	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	7.003
E1.4	27.770	3.100	.5000	.5000	5.000	100.0	.050	.015	.2358	.0032	7.004
C1.0	1.850	2.260	.5000	.5000	5.000	100.0	.025	.015	.0346	.0027	11.00
H16	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	11.00
D1.0	0.3700	0.4700	1.000	1.000	5.000	100.0	.025	.015	.0106	.0009	12.00
H17	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	12.00
Arb_Out	.00001	0.000	.0010	0.000	5.000	0.000	.025	0.00	.0014	0.000	1.003

Link Label	Average Intensity (mm/h)	Init. Loss #1 (mm)	Init. Loss #2 (mm)	Cont. Loss #1 (mm/h)	Cont. Loss #2 (mm/h)	Excess Rain #1 (mm)	Excess Rain #2 (mm)	Peak Inflow (m^3/s)	Time to Peak	Link Lag mins
A5.0	14.900	10.00	1.500	2.500	0.000	141.98	177.30	0.3070	420.0	6.000
A6.0	14.900	10.00	1.500	2.500	0.000	141.98	177.30	0.2628	420.0	0.000
H15	14.900	10.00	0.000	2.500	0.000	141.98	0.000	0.2628	420.0	6.000
A3.0	14.900	10.00	1.500	2.500	0.000	141.98	177.30	0.8922	420.0	0.000
H18	14.900	10.00	0.000	2.500	0.000	141.98	0.000	0.8922	420.0	9.000
A3.1	14.900	10.00	1.500	2.500	0.000	141.98	177.30	2.263	420.0	5.400
A2.0	14.900	10.00	1.500	2.500	0.000	141.98	177.30	0.9160	420.0	4.500
A4.0	14.900	10.00	0.000	2.500	0.000	141.98	0.000	1.191	420.0	2.600
A1.0	14.900	10.00	0.000	2.500	0.000	141.98	0.000	1.650	425.0	3.900
A1.1a	14.900	10.00	1.500	2.500	0.000	141.98	177.30	2.506	420.0	3.100
A1.1	14.900	10.00	1.500	2.500	0.000	141.98	177.30	3.906	420.0	3.600
A1.2	14.900	10.00	1.500	2.500	0.000	141.98	177.30	6.916	425.0	4.600
A1.3	14.900	10.00	1.500	2.500	0.000	141.98	177.30	8.871	420.0	5.000
A1.4	14.900	10.00	1.500	2.500	0.000	141.98	177.30	9.489	425.0	10.00
B2.0	14.900	10.00	1.500	2.500	0.000	141.98	177.30	1.198	420.0	2.100
B1.0	14.900	10.00	1.500	2.500	0.000	141.98	177.30	0.8560	420.0	1.500
H1_H2	14.900	10.00	0.000	2.500	0.000	141.98	0.000	2.054	420.0	10.00
F1.0	14.900	10.00	15.00	2.500	2.500	141.98	137.94	0.2269	420.0	6.200
E3.0a	14.900	10.00	1.500	2.500	0.000	141.98	177.30	0.5463	420.0	9.500
E3.0	14.900	10.00	1.500	2.500	0.000	141.98	177.30	1.283	420.0	0.000
E4.0	14.900	10.00	1.500	2.500	0.000	141.98	177.30	0.1571	420.0	2.300
E2.0a	14.900	10.00	1.500	2.500	0.000	141.98	177.30	0.6513	420.0	1.500
E2.0	14.900	10.00	1.500	2.500	0.000	141.98	177.30	1.332	420.0	3.300
E2.1	14.900	10.00	1.500	2.500	0.000	141.98	177.30	1.915	420.0	4.300
E2.2	14.900	10.00	1.500	2.500	0.000	141.98	177.30	3.078	420.0	3.000
E1.0	14.900	10.00	1.500	2.500	0.000	141.98	177.30	0.6377	420.0	3.000
E1.1	14.900	10.00	1.500	2.500	0.000	141.98	177.30	1.102	415.0	5.000
E1.2	14.900	10.00	1.500	2.500	0.000	141.98	177.30	4.862	420.0	0.000
H9	14.900	10.00	0.000	2.500	0.000	141.98	0.000	4.862	420.0	5.000
E1.3	14.900	10.00	1.500	2.500	0.000	141.98	177.30	6.865	420.0	0.000
H7	14.900	10.00	0.000	2.500	0.000	141.98	0.000	8.148	420.0	6.500
E1.4	14.900	10.00	1.500	2.500	0.000	141.98	177.30	10.781	425.0	10.00
C1.0	14.900	10.00	1.500	2.500	0.000	141.98	177.30	0.6143	420.0	0.000
H16	14.900	10.00	0.000	2.500	0.000	141.98	0.000	0.6143	420.0	10.00
D1.0	14.900	10.00	1.500	2.500	0.000	141.98	177.30	0.1305	420.0	0.000
H17	14.900	10.00	0.000	2.500	0.000	141.98	0.000	0.1305	420.0	10.00
Arb_Out	14.900	10.00	0.000	2.500	0.000	141.98	0.000	22.781	430.0	0.000

500 YEAR ARI OUTPUT

HOBARTVILLE 500 YEAR OUTPUT

##
Hobartville-500y

Results for period from 0: 0.0 1/ 1/1990

##

ROUTING INCREMENT (MINS) = 1.00
STORM DURATION (MINS)   = 25.
RETURN PERIOD (YRS)   = 500.
BX   = 0.8500
TOTAL OF FIRST SUB-AREAS (ha) = 120.52
TOTAL OF SECOND SUB-AREAS (ha) = 65.18
TOTAL OF ALL SUB-AREAS (ha)   = 185.70

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link Label	Catch. Area (ha) #1	Catch. Area (ha) #2	Slope (%) #1	Slope (%) #2	% Impervious #1	% Impervious #2	Pern #1	Pern #2	B #1	B #2	Link No.
A5.0	0.9000	1.090	1.100	1.100	5.000	100.0	.025	.015	.0160	.0013	1.000
A6.0	0.7700	0.9400	.8000	.8000	5.000	100.0	.025	.015	.0173	.0014	2.000
H15	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	2.001
A3.0	2.370	2.900	.5000	.5000	5.000	100.0	.025	.015	.0393	.0031	2.002
H18	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	2.003
A3.1	5.240	4.910	.6000	.6000	5.000	100.0	.025	.015	.0543	.0037	2.004
A2.0	2.670	3.260	1.500	1.500	5.000	100.0	.025	.015	.0242	.0019	3.000
A4.0	9.790	0.000	1.100	0.000	5.000	0.000	.050	0.00	.0925	0.000	4.000
A1.0	3.550	0.000	1.700	0.000	5.000	0.000	.050	0.00	.0439	0.000	4.001
A1.1a	3.670	2.880	1.000	1.000	5.000	100.0	.025	.015	.0349	.0022	4.002
A1.1	2.450	1.910	1.000	1.000	5.000	100.0	.025	.015	.0283	.0018	3.001
A1.2	4.210	2.560	.6000	.6000	5.000	100.0	.025	.015	.0484	.0027	2.005
A1.3	7.010	7.190	.5000	.5000	5.000	100.0	.025	.015	.0691	.0050	1.001
A1.4	3.620	2.780	1.900	1.900	5.000	100.0	.025	.015	.0252	.0016	1.002
B2.0	7.590	1.230	1.500	1.500	5.000	100.0	.050	.015	.0694	.0012	5.000
B1.0	5.560	0.9300	1.100	1.100	5.000	100.0	.050	.015	.0689	.0012	6.000
H1_H2	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	5.001
F1.0	1.370	0.1500	1.000	1.000	5.000	100.0	.025	.015	.0209	.0005	7.000
E3.0a	0.9500	1.160	.7000	.7000	5.000	100.0	.025	.015	.0207	.0016	7.001
E3.0	2.280	2.790	.7000	.7000	5.000	100.0	.025	.015	.0326	.0026	7.002
E4.0	0.4600	0.5600	.5000	.5000	5.000	100.0	.025	.015	.0168	.0013	8.000
E2.0a	1.950	2.380	.6000	.6000	5.000	100.0	.025	.015	.0325	.0026	9.000
E2.0	2.620	1.980	.6000	.6000	5.000	100.0	.025	.015	.0378	.0023	9.001
E2.1	2.290	1.890	.6000	.6000	5.000	100.0	.025	.015	.0353	.0023	9.002
E2.2	4.160	3.920	.9000	.9000	5.000	100.0	.025	.015	.0393	.0027	9.003
E1.0	1.850	2.270	1.700	1.700	5.000	100.0	.025	.015	.0188	.0015	10.00
E1.1	1.430	1.740	.5000	.5000	5.000	100.0	.025	.015	.0303	.0024	10.00
E1.2	4.030	1.670	.5000	.5000	5.000	100.0	.025	.015	.0518	.0023	9.004
H9	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	9.005
E1.3	7.740	6.260	.5000	.5000	5.000	100.0	.025	.015	.0728	.0046	8.001
H7	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	7.003
E1.4	27.770	3.100	.5000	.5000	5.000	100.0	.050	.015	.2358	.0032	7.004
C1.0	1.850	2.260	.5000	.5000	5.000	100.0	.025	.015	.0346	.0027	11.00
H16	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	11.00
D1.0	0.3700	0.4700	1.000	1.000	5.000	100.0	.025	.015	.0106	.0009	12.00
H17	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	12.00
Arb_Out	.00001	0.000	.0010	0.000	5.000	0.000	.025	0.00	.0014	0.000	1.003

Link Label	Average Intensity (mm/h)	Init. Loss #1 (mm)	Init. Loss #2 (mm)	Cont. Loss #1 (mm/h)	Cont. Loss #2 (mm/h)	Excess Rain #1 (mm)	Excess Rain #2 (mm)	Peak Inflow (m^3/s)	Time to Peak	Link Lag mins
A5.0	130.10	10.00	1.500	2.500	0.000	43.375	52.708	0.9963	15.00	6.000
A6.0	130.10	10.00	1.500	2.500	0.000	43.375	52.708	0.8210	15.00	0.000
H15	130.10	10.00	0.000	2.500	0.000	43.375	0.000	0.8210	15.00	6.000
A3.0	130.10	10.00	1.500	2.500	0.000	43.375	52.708	2.178	15.00	0.000
H18	130.10	10.00	0.000	2.500	0.000	43.375	0.000	2.178	15.00	9.000

A3.1	130.10	10.00	1.500	2.500	0.000	43.375	52.708	4.877	15.00	5.400
A2.0	130.10	10.00	1.500	2.500	0.000	43.375	52.708	2.902	15.00	4.500
A4.0	130.10	10.00	0.000	2.500	0.000	43.375	0.000	1.305	26.00	2.600
A1.0	130.10	10.00	0.000	2.500	0.000	43.375	0.000	2.055	28.00	3.900
A1.1a	130.10	10.00	1.500	2.500	0.000	43.375	52.708	3.285	25.00	3.100
A1.1	130.10	10.00	1.500	2.500	0.000	43.375	52.708	6.628	18.00	3.600
A1.2	130.10	10.00	1.500	2.500	0.000	43.375	52.708	12.314	20.00	4.600
A1.3	130.10	10.00	1.500	2.500	0.000	43.375	52.708	15.372	25.00	5.000
A1.4	130.10	10.00	1.500	2.500	0.000	43.375	52.708	15.931	30.00	10.00
B2.0	130.10	10.00	1.500	2.500	0.000	43.375	52.708	1.610	15.00	2.100
B1.0	130.10	10.00	1.500	2.500	0.000	43.375	52.708	1.144	15.00	1.500
H1_H2	130.10	10.00	0.000	2.500	0.000	43.375	0.000	2.754	17.00	10.00
F1.0	130.10	10.00	15.00	2.500	2.500	43.375	38.417	0.5017	16.00	6.200
E3.0a	130.10	10.00	1.500	2.500	0.000	43.375	52.708	1.112	15.00	9.500
E3.0	130.10	10.00	1.500	2.500	0.000	43.375	52.708	2.583	15.00	0.000
E4.0	130.10	10.00	1.500	2.500	0.000	43.375	52.708	0.4790	15.00	2.300
E2.0a	130.10	10.00	1.500	2.500	0.000	43.375	52.708	1.836	15.00	1.500
E2.0	130.10	10.00	1.500	2.500	0.000	43.375	52.708	3.437	15.00	3.300
E2.1	130.10	10.00	1.500	2.500	0.000	43.375	52.708	4.296	18.00	4.300
E2.2	130.10	10.00	1.500	2.500	0.000	43.375	52.708	6.332	15.00	3.000
E1.0	130.10	10.00	1.500	2.500	0.000	43.375	52.708	2.145	15.00	3.000
E1.1	130.10	10.00	1.500	2.500	0.000	43.375	52.708	3.166	15.00	5.000
E1.2	130.10	10.00	1.500	2.500	0.000	43.375	52.708	9.988	19.00	0.000
H9	130.10	10.00	0.000	2.500	0.000	43.375	0.000	9.988	19.00	5.000
E1.3	130.10	10.00	1.500	2.500	0.000	43.375	52.708	12.612	24.00	0.000
H7	130.10	10.00	0.000	2.500	0.000	43.375	0.000	14.734	24.00	6.500
E1.4	130.10	10.00	1.500	2.500	0.000	43.375	52.708	16.189	32.00	10.00
C1.0	130.10	10.00	1.500	2.500	0.000	43.375	52.708	1.718	15.00	0.000
H16	130.10	10.00	0.000	2.500	0.000	43.375	0.000	1.718	15.00	10.00
D1.0	130.10	10.00	1.500	2.500	0.000	43.375	52.708	0.4599	15.00	0.000
H17	130.10	10.00	0.000	2.500	0.000	43.375	0.000	0.4599	15.00	10.00
Arb_Out	130.10	10.00	0.000	2.500	0.000	43.375	0.000	34.476	40.00	0.000

##
Hobartville-500y

Results for period from 0: 0.0 1/ 1/1990
to 5: 0.0 1/ 1/1990
##

ROUTING INCREMENT (MINS) = 1.00
STORM DURATION (MINS) = 60.
RETURN PERIOD (YRS) = 500.
BX = 0.8500
TOTAL OF FIRST SUB-AREAS (ha) = 120.52
TOTAL OF SECOND SUB-AREAS (ha) = 65.18
TOTAL OF ALL SUB-AREAS (ha) = 185.70

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link Label	Catch. Area #1 (ha)	Catch. Area #2 (ha)	Slope #1 (%)	Slope #2 (%)	% Impervious #1	% Impervious #2	Pern #1	Pern #2	B #1	B #2	Link No.
A5.0	0.9000	1.090	1.100	1.100	5.000	100.0	.025	.015	.0160	.0013	1.000
A6.0	0.7700	0.9400	.8000	.8000	5.000	100.0	.025	.015	.0173	.0014	2.000
H15	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	2.001
A3.0	2.370	2.900	.5000	.5000	5.000	100.0	.025	.015	.0393	.0031	2.002
H18	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	2.003
A3.1	5.240	4.910	.6000	.6000	5.000	100.0	.025	.015	.0543	.0037	2.004
A2.0	2.670	3.260	1.500	1.500	5.000	100.0	.025	.015	.0242	.0019	3.000
A4.0	9.790	0.000	1.100	0.000	5.000	0.000	.050	0.00	.0925	0.000	4.000
A1.0	3.550	0.000	1.700	0.000	5.000	0.000	.050	0.00	.0439	0.000	4.001
A1.1a	3.670	2.880	1.000	1.000	5.000	100.0	.025	.015	.0349	.0022	4.002
A1.1	2.450	1.910	1.000	1.000	5.000	100.0	.025	.015	.0283	.0018	3.001
A1.2	4.210	2.560	.6000	.6000	5.000	100.0	.025	.015	.0484	.0027	2.005
A1.3	7.010	7.190	.5000	.5000	5.000	100.0	.025	.015	.0691	.0050	1.001
A1.4	3.620	2.780	1.900	1.900	5.000	100.0	.025	.015	.0252	.0016	1.002

B2.0	7.590	1.230	1.500	1.500	5.000	100.0	.050	.015	.0694	.0012	5.000
B1.0	5.560	0.9300	1.100	1.100	5.000	100.0	.050	.015	.0689	.0012	6.000
H1_H2	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	5.001
F1.0	1.370	0.1500	1.000	1.000	5.000	100.0	.025	.015	.0209	.0005	7.000
E3.0a	0.9500	1.160	.7000	.7000	5.000	100.0	.025	.015	.0207	.0016	7.001
E3.0	2.280	2.790	.7000	.7000	5.000	100.0	.025	.015	.0326	.0026	7.002
E4.0	0.4600	0.5600	.5000	.5000	5.000	100.0	.025	.015	.0168	.0013	8.000
E2.0a	1.950	2.380	.6000	.6000	5.000	100.0	.025	.015	.0325	.0026	9.000
E2.0	2.620	1.980	.6000	.6000	5.000	100.0	.025	.015	.0378	.0023	9.001
E2.1	2.290	1.890	.6000	.6000	5.000	100.0	.025	.015	.0353	.0023	9.002
E2.2	4.160	3.920	.9000	.9000	5.000	100.0	.025	.015	.0393	.0027	9.003
E1.0	1.850	2.270	1.700	1.700	5.000	100.0	.025	.015	.0188	.0015	10.00
E1.1	1.430	1.740	.5000	.5000	5.000	100.0	.025	.015	.0303	.0024	10.00
E1.2	4.030	1.670	.5000	.5000	5.000	100.0	.025	.015	.0518	.0023	9.004
H9	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	9.005
E1.3	7.740	6.260	.5000	.5000	5.000	100.0	.025	.015	.0728	.0046	8.001
H7	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	7.003
E1.4	27.770	3.100	.5000	.5000	5.000	100.0	.050	.015	.2358	.0032	7.004
C1.0	1.850	2.260	.5000	.5000	5.000	100.0	.025	.015	.0346	.0027	11.00
H16	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	11.00
D1.0	0.3700	0.4700	1.000	1.000	5.000	100.0	.025	.015	.0106	.0009	12.00
H17	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	12.00
Arb_Out	.00001	0.000	.0010	0.000	5.000	0.000	.025	0.00	.0014	0.000	1.003

Link Label	Average Intensity (mm/h)	Init. Loss #1 (mm)	Init. Loss #2 (mm)	Cont. Loss #1 (mm/h)	Cont. Loss #2 (mm/h)	Excess Rain #1 (mm)	Excess Rain #2 (mm)	Peak Inflow (m^3/s)	Time to Peak	Link Lag mins
A5.0	80.000	10.00	1.500	2.500	0.000	67.917	78.500	0.9811	25.00	6.000
A6.0	80.000	10.00	1.500	2.500	0.000	67.917	78.500	0.8072	25.00	0.000
H15	80.000	10.00	0.000	2.500	0.000	67.917	0.000	0.8072	25.00	6.000
A3.0	80.000	10.00	1.500	2.500	0.000	67.917	78.500	2.156	25.00	0.000
H18	80.000	10.00	0.000	2.500	0.000	67.917	0.000	2.156	25.00	9.000
A3.1	80.000	10.00	1.500	2.500	0.000	67.917	78.500	5.005	25.00	5.400
A2.0	80.000	10.00	1.500	2.500	0.000	67.917	78.500	2.892	25.00	4.500
A4.0	80.000	10.00	0.000	2.500	0.000	67.917	0.000	1.985	45.00	2.600
A1.0	80.000	10.00	0.000	2.500	0.000	67.917	0.000	2.791	43.00	3.900
A1.1a	80.000	10.00	1.500	2.500	0.000	67.917	78.500	4.099	35.00	3.100
A1.1	80.000	10.00	1.500	2.500	0.000	67.917	78.500	7.380	28.00	3.600
A1.2	80.000	10.00	1.500	2.500	0.000	67.917	78.500	13.302	30.00	4.600
A1.3	80.000	10.00	1.500	2.500	0.000	67.917	78.500	17.234	35.00	5.000
A1.4	80.000	10.00	1.500	2.500	0.000	67.917	78.500	18.515	40.00	10.00
B2.0	80.000	10.00	1.500	2.500	0.000	67.917	78.500	2.045	35.00	2.100
B1.0	80.000	10.00	1.500	2.500	0.000	67.917	78.500	1.385	40.00	1.500
H1_H2	80.000	10.00	0.000	2.500	0.000	67.917	0.000	3.424	37.00	10.00
F1.0	80.000	10.00	15.00	2.500	2.500	67.917	63.000	0.5750	26.00	6.200
E3.0a	80.000	10.00	1.500	2.500	0.000	67.917	78.500	1.198	25.00	9.500
E3.0	80.000	10.00	1.500	2.500	0.000	67.917	78.500	2.721	25.00	0.000
E4.0	80.000	10.00	1.500	2.500	0.000	67.917	78.500	0.4708	25.00	2.300
E2.0a	80.000	10.00	1.500	2.500	0.000	67.917	78.500	1.837	25.00	1.500
E2.0	80.000	10.00	1.500	2.500	0.000	67.917	78.500	3.447	25.00	3.300
E2.1	80.000	10.00	1.500	2.500	0.000	67.917	78.500	4.540	28.00	4.300
E2.2	80.000	10.00	1.500	2.500	0.000	67.917	78.500	6.805	32.00	3.000
E1.0	80.000	10.00	1.500	2.500	0.000	67.917	78.500	2.091	25.00	3.000
E1.1	80.000	10.00	1.500	2.500	0.000	67.917	78.500	3.229	25.00	5.000
E1.2	80.000	10.00	1.500	2.500	0.000	67.917	78.500	10.852	33.00	0.000
H9	80.000	10.00	0.000	2.500	0.000	67.917	0.000	10.852	33.00	5.000
E1.3	80.000	10.00	1.500	2.500	0.000	67.917	78.500	13.936	38.00	0.000
H7	80.000	10.00	0.000	2.500	0.000	67.917	0.000	16.174	35.00	6.500
E1.4	80.000	10.00	1.500	2.500	0.000	67.917	78.500	18.914	43.00	10.00
C1.0	80.000	10.00	1.500	2.500	0.000	67.917	78.500	1.678	25.00	0.000
H16	80.000	10.00	0.000	2.500	0.000	67.917	0.000	1.678	25.00	10.00
D1.0	80.000	10.00	1.500	2.500	0.000	67.917	78.500	0.4366	25.00	0.000
H17	80.000	10.00	0.000	2.500	0.000	67.917	0.000	0.4366	25.00	10.00
Arb_Out	80.000	10.00	0.000	2.500	0.000	67.917	0.000	41.321	51.00	0.000

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################################################################################################
Hobartville-500y

Results for period from  0: 0.0  1/ 1/1990
                   to  6:40.0  1/ 1/1990
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ROUTING INCREMENT (MINS)	= 1.00
STORM DURATION (MINS)	= 90.
RETURN PERIOD (YRS)	= 500.
BX	= 0.8500
TOTAL OF FIRST SUB-AREAS (ha)	= 120.52
TOTAL OF SECOND SUB-AREAS (ha)	= 65.18
TOTAL OF ALL SUB-AREAS (ha)	= 185.70

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link Label	Catch. Area #1 (ha)	Catch. Area #2 (ha)	Slope #1 (%)	Slope #2 (%)	% Impervious #1	% Impervious #2	Perm #1	Perm #2	B #1	B #2	Link No.
A5.0	0.9000	1.090	1.100	1.100	5.000	100.0	.025	.015	.0160	.0013	1.000
A6.0	0.7700	0.9400	.8000	.8000	5.000	100.0	.025	.015	.0173	.0014	2.000
H15	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	2.001
A3.0	2.370	2.900	.5000	.5000	5.000	100.0	.025	.015	.0393	.0031	2.002
H18	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	2.003
A3.1	5.240	4.910	.6000	.6000	5.000	100.0	.025	.015	.0543	.0037	2.004
A2.0	2.670	3.260	1.500	1.500	5.000	100.0	.025	.015	.0242	.0019	3.000
A4.0	9.790	0.000	1.100	0.000	5.000	0.000	.050	0.00	.0925	0.000	4.000
A1.0	3.550	0.000	1.700	0.000	5.000	0.000	.050	0.00	.0439	0.000	4.001
A1.1a	3.670	2.880	1.000	1.000	5.000	100.0	.025	.015	.0349	.0022	4.002
A1.1	2.450	1.910	1.000	1.000	5.000	100.0	.025	.015	.0283	.0018	3.001
A1.2	4.210	2.560	.6000	.6000	5.000	100.0	.025	.015	.0484	.0027	2.005
A1.3	7.010	7.190	.5000	.5000	5.000	100.0	.025	.015	.0691	.0050	1.001
A1.4	3.620	2.780	1.900	1.900	5.000	100.0	.025	.015	.0252	.0016	1.002
B2.0	7.590	1.230	1.500	1.500	5.000	100.0	.050	.015	.0694	.0012	5.000
B1.0	5.560	0.9300	1.100	1.100	5.000	100.0	.050	.015	.0689	.0012	6.000
H1_H2	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	5.001
F1.0	1.370	0.1500	1.000	1.000	5.000	100.0	.025	.015	.0209	.0005	7.000
E3.0a	0.9500	1.160	.7000	.7000	5.000	100.0	.025	.015	.0207	.0016	7.001
E3.0	2.280	2.790	.7000	.7000	5.000	100.0	.025	.015	.0326	.0026	7.002
E4.0	0.4600	0.5600	.5000	.5000	5.000	100.0	.025	.015	.0168	.0013	8.000
E2.0a	1.950	2.380	.6000	.6000	5.000	100.0	.025	.015	.0325	.0026	9.000
E2.0	2.620	1.980	.6000	.6000	5.000	100.0	.025	.015	.0378	.0023	9.001
E2.1	2.290	1.890	.6000	.6000	5.000	100.0	.025	.015	.0353	.0023	9.002
E2.2	4.160	3.920	.9000	.9000	5.000	100.0	.025	.015	.0393	.0027	9.003
E1.0	1.850	2.270	1.700	1.700	5.000	100.0	.025	.015	.0188	.0015	10.00
E1.1	1.430	1.740	.5000	.5000	5.000	100.0	.025	.015	.0303	.0024	10.00
E1.2	4.030	1.670	.5000	.5000	5.000	100.0	.025	.015	.0518	.0023	9.004
H9	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	9.005
E1.3	7.740	6.260	.5000	.5000	5.000	100.0	.025	.015	.0728	.0046	8.001
H7	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	7.003
E1.4	27.770	3.100	.5000	.5000	5.000	100.0	.050	.015	.2358	.0032	7.004
C1.0	1.850	2.260	.5000	.5000	5.000	100.0	.025	.015	.0346	.0027	11.00
H16	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	11.00
D1.0	0.3700	0.4700	1.000	1.000	5.000	100.0	.025	.015	.0106	.0009	12.00
H17	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	12.00
Arb_Out	.00001	0.000	.0010	0.000	5.000	0.000	.025	0.00	.0014	0.000	1.003

Link Label	Average Intensity (mm/h)	Init. Loss #1 (mm)	Init. Loss #2 (mm)	Cont. Loss #1 (mm/h)	Cont. Loss #2 (mm/h)	Excess Rain #1 (mm)	Excess Rain #2 (mm)	Peak Inflow (m^3/s)	Time to Peak	Link Lag mins
A5.0	63.000	10.00	1.500	2.500	0.000	81.167	93.000	1.051	30.00	6.000
A6.0	63.000	10.00	1.500	2.500	0.000	81.167	93.000	0.8771	30.00	0.000
H15	63.000	10.00	0.000	2.500	0.000	81.167	0.000	0.8771	30.00	6.000
A3.0	63.000	10.00	1.500	2.500	0.000	81.167	93.000	2.398	30.00	0.000
H18	63.000	10.00	0.000	2.500	0.000	81.167	0.000	2.398	30.00	9.000
A3.1	63.000	10.00	1.500	2.500	0.000	81.167	93.000	5.190	30.00	5.400

A2.0	63.000	10.00	1.500	2.500	0.000	81.167	93.000	3.094	30.00	4.500
A4.0	63.000	10.00	0.000	2.500	0.000	81.167	0.000	1.979	46.00	2.600
A1.0	63.000	10.00	0.000	2.500	0.000	81.167	0.000	2.797	44.00	3.900
A1.1a	63.000	10.00	1.500	2.500	0.000	81.167	93.000	4.137	40.00	3.100
A1.1	63.000	10.00	1.500	2.500	0.000	81.167	93.000	8.267	33.00	3.600
A1.2	63.000	10.00	1.500	2.500	0.000	81.167	93.000	14.416	35.00	4.600
A1.3	63.000	10.00	1.500	2.500	0.000	81.167	93.000	17.801	40.00	5.000
A1.4	63.000	10.00	1.500	2.500	0.000	81.167	93.000	18.881	45.00	10.00
B2.0	63.000	10.00	1.500	2.500	0.000	81.167	93.000	2.206	30.00	2.100
B1.0	63.000	10.00	1.500	2.500	0.000	81.167	93.000	1.530	30.00	1.500
H1_H2	63.000	10.00	0.000	2.500	0.000	81.167	0.000	3.736	32.00	10.00
F1.0	63.000	10.00	15.00	2.500	2.500	81.167	76.250	0.6371	30.00	6.200
E3.0a	63.000	10.00	1.500	2.500	0.000	81.167	93.000	1.390	30.00	9.500
E3.0	63.000	10.00	1.500	2.500	0.000	81.167	93.000	2.945	30.00	0.000
E4.0	63.000	10.00	1.500	2.500	0.000	81.167	93.000	0.5145	30.00	2.300
E2.0a	63.000	10.00	1.500	2.500	0.000	81.167	93.000	2.049	30.00	1.500
E2.0	63.000	10.00	1.500	2.500	0.000	81.167	93.000	3.910	30.00	3.300
E2.1	63.000	10.00	1.500	2.500	0.000	81.167	93.000	4.929	33.00	4.300
E2.2	63.000	10.00	1.500	2.500	0.000	81.167	93.000	6.887	37.00	3.000
E1.0	63.000	10.00	1.500	2.500	0.000	81.167	93.000	2.214	30.00	3.000
E1.1	63.000	10.00	1.500	2.500	0.000	81.167	93.000	3.534	30.00	5.000
E1.2	63.000	10.00	1.500	2.500	0.000	81.167	93.000	11.011	38.00	0.000
H9	63.000	10.00	0.000	2.500	0.000	81.167	0.000	11.011	38.00	5.000
E1.3	63.000	10.00	1.500	2.500	0.000	81.167	93.000	13.967	39.00	0.000
H7	63.000	10.00	0.000	2.500	0.000	81.167	0.000	16.431	39.00	6.500
E1.4	63.000	10.00	1.500	2.500	0.000	81.167	93.000	19.274	47.00	10.00
C1.0	63.000	10.00	1.500	2.500	0.000	81.167	93.000	1.898	30.00	0.000
H16	63.000	10.00	0.000	2.500	0.000	81.167	0.000	1.898	30.00	10.00
D1.0	63.000	10.00	1.500	2.500	0.000	81.167	93.000	0.4597	30.00	0.000
H17	63.000	10.00	0.000	2.500	0.000	81.167	0.000	0.4597	30.00	10.00
Arb_Out	63.000	10.00	0.000	2.500	0.000	81.167	0.000	42.042	56.00	0.000

##
Hobartville-500y

Results for period from 0: 0.0 1/ 1/1990
                    to 8:20.0 1/ 1/1990
##

ROUTING INCREMENT (MINS) = 1.00
STORM DURATION (MINS)   = 120.
RETURN PERIOD (YRS)   = 500.
BX   = 0.8500
TOTAL OF FIRST SUB-AREAS (ha) = 120.52
TOTAL OF SECOND SUB-AREAS (ha) = 65.18
TOTAL OF ALL SUB-AREAS (ha)   = 185.70

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link	Catch. Area		Slope		% Impervious		Pern		B		Link
Label	#1	#2	#1	#2	#1	#2	#1	#2	#1	#2	No.
	(ha)		(%)		(%)						
A5.0	0.9000	1.090	1.100	1.100	5.000	100.0	.025	.015	.0160	.0013	1.000
A6.0	0.7700	0.9400	.8000	.8000	5.000	100.0	.025	.015	.0173	.0014	2.000
H15	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	2.001
A3.0	2.370	2.900	.5000	.5000	5.000	100.0	.025	.015	.0393	.0031	2.002
H18	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	2.003
A3.1	5.240	4.910	.6000	.6000	5.000	100.0	.025	.015	.0543	.0037	2.004
A2.0	2.670	3.260	1.500	1.500	5.000	100.0	.025	.015	.0242	.0019	3.000
A4.0	9.790	0.000	1.100	0.000	5.000	0.000	.050	0.00	.0925	0.000	4.000
A1.0	3.550	0.000	1.700	0.000	5.000	0.000	.050	0.00	.0439	0.000	4.001
A1.1a	3.670	2.880	1.000	1.000	5.000	100.0	.025	.015	.0349	.0022	4.002
A1.1	2.450	1.910	1.000	1.000	5.000	100.0	.025	.015	.0283	.0018	3.001
A1.2	4.210	2.560	.6000	.6000	5.000	100.0	.025	.015	.0484	.0027	2.005
A1.3	7.010	7.190	.5000	.5000	5.000	100.0	.025	.015	.0691	.0050	1.001
A1.4	3.620	2.780	1.900	1.900	5.000	100.0	.025	.015	.0252	.0016	1.002
B2.0	7.590	1.230	1.500	1.500	5.000	100.0	.050	.015	.0694	.0012	5.000
B1.0	5.560	0.9300	1.100	1.100	5.000	100.0	.050	.015	.0689	.0012	6.000

H1_H2	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	5.001
F1.0	1.370	0.1500	1.000	1.000	5.000	100.0	.025	.015	.0209	.0005	7.000
E3.0a	0.9500	1.160	.7000	.7000	5.000	100.0	.025	.015	.0207	.0016	7.001
E3.0	2.280	2.790	.7000	.7000	5.000	100.0	.025	.015	.0326	.0026	7.002
E4.0	0.4600	0.5600	.5000	.5000	5.000	100.0	.025	.015	.0168	.0013	8.000
E2.0a	1.950	2.380	.6000	.6000	5.000	100.0	.025	.015	.0325	.0026	9.000
E2.0	2.620	1.980	.6000	.6000	5.000	100.0	.025	.015	.0378	.0023	9.001
E2.1	2.290	1.890	.6000	.6000	5.000	100.0	.025	.015	.0353	.0023	9.002
E2.2	4.160	3.920	.9000	.9000	5.000	100.0	.025	.015	.0393	.0027	9.003
E1.0	1.850	2.270	1.700	1.700	5.000	100.0	.025	.015	.0188	.0015	10.00
E1.1	1.430	1.740	.5000	.5000	5.000	100.0	.025	.015	.0303	.0024	10.00
E1.2	4.030	1.670	.5000	.5000	5.000	100.0	.025	.015	.0518	.0023	9.004
H9	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	9.005
E1.3	7.740	6.260	.5000	.5000	5.000	100.0	.025	.015	.0728	.0046	8.001
H7	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	7.003
E1.4	27.770	3.100	.5000	.5000	5.000	100.0	.050	.015	.2358	.0032	7.004
C1.0	1.850	2.260	.5000	.5000	5.000	100.0	.025	.015	.0346	.0027	11.00
H16	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	11.00
D1.0	0.3700	0.4700	1.000	1.000	5.000	100.0	.025	.015	.0106	.0009	12.00
H17	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	12.00
Arb_Out	.00001	0.000	.0010	0.000	5.000	0.000	.025	0.00	.0014	0.000	1.003

Link Label	Average Intensity (mm/h)	Init. Loss #1 (mm)	Init. Loss #2 (mm)	Cont. Loss #1 (mm/h)	Cont. Loss #2 (mm/h)	Excess Rain #1 (mm)	Excess Rain #2 (mm)	Peak Inflow (m^3/s)	Time to Peak	Link Lag mins
A5.0	53.000	10.00	1.500	2.500	0.000	91.500	104.50	0.9600	35.00	6.000
A6.0	53.000	10.00	1.500	2.500	0.000	91.500	104.50	0.7992	35.00	0.000
H15	53.000	10.00	0.000	2.500	0.000	91.500	0.000	0.7992	35.00	6.000
A3.0	53.000	10.00	1.500	2.500	0.000	91.500	104.50	2.187	35.00	0.000
H18	53.000	10.00	0.000	2.500	0.000	91.500	0.000	2.187	35.00	9.000
A3.1	53.000	10.00	1.500	2.500	0.000	91.500	104.50	4.906	41.00	5.400
A2.0	53.000	10.00	1.500	2.500	0.000	91.500	104.50	2.847	35.00	4.500
A4.0	53.000	10.00	0.000	2.500	0.000	91.500	0.000	2.012	53.00	2.600
A1.0	53.000	10.00	0.000	2.500	0.000	91.500	0.000	2.923	49.00	3.900
A1.1a	53.000	10.00	1.500	2.500	0.000	91.500	104.50	4.230	45.00	3.100
A1.1	53.000	10.00	1.500	2.500	0.000	91.500	104.50	7.955	40.00	3.600
A1.2	53.000	10.00	1.500	2.500	0.000	91.500	104.50	14.060	46.00	4.600
A1.3	53.000	10.00	1.500	2.500	0.000	91.500	104.50	17.725	46.00	5.000
A1.4	53.000	10.00	1.500	2.500	0.000	91.500	104.50	18.803	51.00	10.00
B2.0	53.000	10.00	1.500	2.500	0.000	91.500	104.50	2.180	40.00	2.100
B1.0	53.000	10.00	1.500	2.500	0.000	91.500	104.50	1.472	40.00	1.500
H1_H2	53.000	10.00	0.000	2.500	0.000	91.500	0.000	3.652	42.00	10.00
F1.0	53.000	10.00	15.00	2.500	2.500	91.500	86.750	0.6161	40.00	6.200
E3.0a	53.000	10.00	1.500	2.500	0.000	91.500	104.50	1.331	40.00	9.500
E3.0	53.000	10.00	1.500	2.500	0.000	91.500	104.50	2.692	35.00	0.000
E4.0	53.000	10.00	1.500	2.500	0.000	91.500	104.50	0.4724	35.00	2.300
E2.0a	53.000	10.00	1.500	2.500	0.000	91.500	104.50	1.848	35.00	1.500
E2.0	53.000	10.00	1.500	2.500	0.000	91.500	104.50	3.517	35.00	3.300
E2.1	53.000	10.00	1.500	2.500	0.000	91.500	104.50	4.964	39.00	4.300
E2.2	53.000	10.00	1.500	2.500	0.000	91.500	104.50	7.408	41.00	3.000
E1.0	53.000	10.00	1.500	2.500	0.000	91.500	104.50	2.043	35.00	3.000
E1.1	53.000	10.00	1.500	2.500	0.000	91.500	104.50	3.233	35.00	5.000
E1.2	53.000	10.00	1.500	2.500	0.000	91.500	104.50	11.845	43.00	0.000
H9	53.000	10.00	0.000	2.500	0.000	91.500	0.000	11.845	43.00	5.000
E1.3	53.000	10.00	1.500	2.500	0.000	91.500	104.50	14.730	48.00	0.000
H7	53.000	10.00	0.000	2.500	0.000	91.500	0.000	16.932	48.00	6.500
E1.4	53.000	10.00	1.500	2.500	0.000	91.500	104.50	19.882	56.00	10.00
C1.0	53.000	10.00	1.500	2.500	0.000	91.500	104.50	1.693	35.00	0.000
H16	53.000	10.00	0.000	2.500	0.000	91.500	0.000	1.693	35.00	10.00
D1.0	53.000	10.00	1.500	2.500	0.000	91.500	104.50	0.4263	35.00	0.000
H17	53.000	10.00	0.000	2.500	0.000	91.500	0.000	0.4263	35.00	10.00
Arb_Out	53.000	10.00	0.000	2.500	0.000	91.500	0.000	41.960	66.00	0.000

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################################################################################################
Hobartville-500y

Results for period from  0: 0.0  1/ 1/1990
                    to 13:20.0  1/ 1/1990
################################################################################################
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ROUTING INCREMENT (MINS) = 1.00
STORM DURATION (MINS) = 180.
RETURN PERIOD (YRS) = 500.
BX = 0.8500
TOTAL OF FIRST SUB-AREAS (ha) = 120.52
TOTAL OF SECOND SUB-AREAS (ha) = 65.18
TOTAL OF ALL SUB-AREAS (ha) = 185.70

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link Label	Catch. Area #1 (ha)	Catch. Area #2 (ha)	Slope #1 (%)	Slope #2 (%)	% Impervious #1 (%)	% Impervious #2 (%)	Pern #1	Pern #2	B #1	B #2	Link No.
A5.0	0.9000	1.090	1.100	1.100	5.000	100.0	.025	.015	.0160	.0013	1.000
A6.0	0.7700	0.9400	.8000	.8000	5.000	100.0	.025	.015	.0173	.0014	2.000
H15	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	2.001
A3.0	2.370	2.900	.5000	.5000	5.000	100.0	.025	.015	.0393	.0031	2.002
H18	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	2.003
A3.1	5.240	4.910	.6000	.6000	5.000	100.0	.025	.015	.0543	.0037	2.004
A2.0	2.670	3.260	1.500	1.500	5.000	100.0	.025	.015	.0242	.0019	3.000
A4.0	9.790	0.000	1.100	0.000	5.000	0.000	.050	0.00	.0925	0.000	4.000
A1.0	3.550	0.000	1.700	0.000	5.000	0.000	.050	0.00	.0439	0.000	4.001
A1.1a	3.670	2.880	1.000	1.000	5.000	100.0	.025	.015	.0349	.0022	4.002
A1.1	2.450	1.910	1.000	1.000	5.000	100.0	.025	.015	.0283	.0018	3.001
A1.2	4.210	2.560	.6000	.6000	5.000	100.0	.025	.015	.0484	.0027	2.005
A1.3	7.010	7.190	.5000	.5000	5.000	100.0	.025	.015	.0691	.0050	1.001
A1.4	3.620	2.780	1.900	1.900	5.000	100.0	.025	.015	.0252	.0016	1.002
B2.0	7.590	1.230	1.500	1.500	5.000	100.0	.050	.015	.0694	.0012	5.000
B1.0	5.560	0.9300	1.100	1.100	5.000	100.0	.050	.015	.0689	.0012	6.000
H1_H2	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	5.001
F1.0	1.370	0.1500	1.000	1.000	5.000	100.0	.025	.015	.0209	.0005	7.000
E3.0a	0.9500	1.160	.7000	.7000	5.000	100.0	.025	.015	.0207	.0016	7.001
E3.0	2.280	2.790	.7000	.7000	5.000	100.0	.025	.015	.0326	.0026	7.002
E4.0	0.4600	0.5600	.5000	.5000	5.000	100.0	.025	.015	.0168	.0013	8.000
E2.0a	1.950	2.380	.6000	.6000	5.000	100.0	.025	.015	.0325	.0026	9.000
E2.0	2.620	1.980	.6000	.6000	5.000	100.0	.025	.015	.0378	.0023	9.001
E2.1	2.290	1.890	.6000	.6000	5.000	100.0	.025	.015	.0353	.0023	9.002
E2.2	4.160	3.920	.9000	.9000	5.000	100.0	.025	.015	.0393	.0027	9.003
E1.0	1.850	2.270	1.700	1.700	5.000	100.0	.025	.015	.0188	.0015	10.00
E1.1	1.430	1.740	.5000	.5000	5.000	100.0	.025	.015	.0303	.0024	10.00
E1.2	4.030	1.670	.5000	.5000	5.000	100.0	.025	.015	.0518	.0023	9.004
H9	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	9.005
E1.3	7.740	6.260	.5000	.5000	5.000	100.0	.025	.015	.0728	.0046	8.001
H7	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	7.003
E1.4	27.770	3.100	.5000	.5000	5.000	100.0	.050	.015	.2358	.0032	7.004
C1.0	1.850	2.260	.5000	.5000	5.000	100.0	.025	.015	.0346	.0027	11.00
H16	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	11.00
D1.0	0.3700	0.4700	1.000	1.000	5.000	100.0	.025	.015	.0106	.0009	12.00
H17	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	12.00
Arb_Out	.00001	0.000	.0010	0.000	5.000	0.000	.025	0.00	.0014	0.000	1.003

Link Label	Average Intensity (mm/h)	Init. Loss #1 (mm)	Init. Loss #2 (mm)	Cont. Loss #1 (mm/h)	Cont. Loss #2 (mm/h)	Excess Rain #1 (mm)	Excess Rain #2 (mm)	Peak Inflow (m^3/s)	Time to Peak	Link Lag mins
A5.0	41.400	10.00	1.500	2.500	0.000	107.41	122.70	0.6280	45.00	6.000
A6.0	41.400	10.00	1.500	2.500	0.000	107.41	122.70	0.5350	45.00	0.000
H15	41.400	10.00	0.000	2.500	0.000	107.41	0.000	0.5351	45.00	6.000
A3.0	41.400	10.00	1.500	2.500	0.000	107.41	122.70	1.525	45.00	0.000
H18	41.400	10.00	0.000	2.500	0.000	107.41	0.000	1.525	45.00	9.000

A3.1	41.400	10.00	1.500	2.500	0.000	107.41	122.70	3.981	45.00	5.400
A2.0	41.400	10.00	1.500	2.500	0.000	107.41	122.70	1.867	45.00	4.500
A4.0	41.400	10.00	0.000	2.500	0.000	107.41	0.000	1.687	67.00	2.600
A1.0	41.400	10.00	0.000	2.500	0.000	107.41	0.000	2.322	55.00	3.900
A1.1a	41.400	10.00	1.500	2.500	0.000	107.41	122.70	3.517	45.00	3.100
A1.1	41.400	10.00	1.500	2.500	0.000	107.41	122.70	6.246	48.00	3.600
A1.2	41.400	10.00	1.500	2.500	0.000	107.41	122.70	11.455	50.00	4.600
A1.3	41.400	10.00	1.500	2.500	0.000	107.41	122.70	14.043	55.00	5.000
A1.4	41.400	10.00	1.500	2.500	0.000	107.41	122.70	14.877	60.00	10.00
B2.0	41.400	10.00	1.500	2.500	0.000	107.41	122.70	1.809	45.00	2.100
B1.0	41.400	10.00	1.500	2.500	0.000	107.41	122.70	1.232	45.00	1.500
H1_H2	41.400	10.00	0.000	2.500	0.000	107.41	0.000	3.041	47.00	10.00
F1.0	41.400	10.00	15.00	2.500	2.500	107.41	102.53	0.4598	45.00	6.200
E3.0a	41.400	10.00	1.500	2.500	0.000	107.41	122.70	1.051	45.00	9.500
E3.0	41.400	10.00	1.500	2.500	0.000	107.41	122.70	2.263	45.00	0.000
E4.0	41.400	10.00	1.500	2.500	0.000	107.41	122.70	0.3169	45.00	2.300
E2.0a	41.400	10.00	1.500	2.500	0.000	107.41	122.70	1.289	45.00	1.500
E2.0	41.400	10.00	1.500	2.500	0.000	107.41	122.70	2.555	45.00	3.300
E2.1	41.400	10.00	1.500	2.500	0.000	107.41	122.70	3.603	45.00	4.300
E2.2	41.400	10.00	1.500	2.500	0.000	107.41	122.70	5.662	45.00	3.000
E1.0	41.400	10.00	1.500	2.500	0.000	107.41	122.70	1.307	45.00	3.000
E1.1	41.400	10.00	1.500	2.500	0.000	107.41	122.70	2.218	45.00	5.000
E1.2	41.400	10.00	1.500	2.500	0.000	107.41	122.70	8.923	48.00	0.000
H9	41.400	10.00	0.000	2.500	0.000	107.41	0.000	8.923	48.00	5.000
E1.3	41.400	10.00	1.500	2.500	0.000	107.41	122.70	11.330	53.00	0.000
H7	41.400	10.00	0.000	2.500	0.000	107.41	0.000	13.184	45.00	6.500
E1.4	41.400	10.00	1.500	2.500	0.000	107.41	122.70	15.714	61.00	10.00
C1.0	41.400	10.00	1.500	2.500	0.000	107.41	122.70	1.192	45.00	0.000
H16	41.400	10.00	0.000	2.500	0.000	107.41	0.000	1.192	45.00	10.00
D1.0	41.400	10.00	1.500	2.500	0.000	107.41	122.70	0.2676	45.00	0.000
H17	41.400	10.00	0.000	2.500	0.000	107.41	0.000	0.2676	45.00	10.00
Arb_Out	41.400	10.00	0.000	2.500	0.000	107.41	0.000	34.042	70.00	0.000

##
Hobartville-500y

Results for period from 0: 0.0 1/ 1/1990
                    to 20: 0.0 1/ 1/1990
##

ROUTING INCREMENT (MINS) = 2.00
STORM DURATION (MINS)   = 360.
RETURN PERIOD (YRS)   = 500.
BX   = 0.8500
TOTAL OF FIRST SUB-AREAS (ha) = 120.52
TOTAL OF SECOND SUB-AREAS (ha) = 65.18
TOTAL OF ALL SUB-AREAS (ha)   = 185.70

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link Label	Catch. Area #1 (ha)	Catch. Area #2 (ha)	Slope #1 (%)	Slope #2 (%)	% Impervious #1	% Impervious #2	Pern #1	Pern #2	B #1	B #2	Link No.
A5.0	0.9000	1.090	1.100	1.100	5.000	100.0	.025	.015	.0160	.0013	1.000
A6.0	0.7700	0.9400	.8000	.8000	5.000	100.0	.025	.015	.0173	.0014	2.000
H15	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	2.001
A3.0	2.370	2.900	.5000	.5000	5.000	100.0	.025	.015	.0393	.0031	2.002
H18	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	2.003
A3.1	5.240	4.910	.6000	.6000	5.000	100.0	.025	.015	.0543	.0037	2.004
A2.0	2.670	3.260	1.500	1.500	5.000	100.0	.025	.015	.0242	.0019	3.000
A4.0	9.790	0.000	1.100	0.000	5.000	0.000	.050	0.00	.0925	0.000	4.000
A1.0	3.550	0.000	1.700	0.000	5.000	0.000	.050	0.00	.0439	0.000	4.001
A1.1a	3.670	2.880	1.000	1.000	5.000	100.0	.025	.015	.0349	.0022	4.002
A1.1	2.450	1.910	1.000	1.000	5.000	100.0	.025	.015	.0283	.0018	3.001
A1.2	4.210	2.560	.6000	.6000	5.000	100.0	.025	.015	.0484	.0027	2.005
A1.3	7.010	7.190	.5000	.5000	5.000	100.0	.025	.015	.0691	.0050	1.001
A1.4	3.620	2.780	1.900	1.900	5.000	100.0	.025	.015	.0252	.0016	1.002
B2.0	7.590	1.230	1.500	1.500	5.000	100.0	.050	.015	.0694	.0012	5.000

B1.0	5.560	0.9300	1.100	1.100	5.000	100.0	.050	.015	.0689	.0012	6.000
H1_H2	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	5.001
F1.0	1.370	0.1500	1.000	1.000	5.000	100.0	.025	.015	.0209	.0005	7.000
E3.0a	0.9500	1.160	.7000	.7000	5.000	100.0	.025	.015	.0207	.0016	7.001
E3.0	2.280	2.790	.7000	.7000	5.000	100.0	.025	.015	.0326	.0026	7.002
E4.0	0.4600	0.5600	.5000	.5000	5.000	100.0	.025	.015	.0168	.0013	8.000
E2.0a	1.950	2.380	.6000	.6000	5.000	100.0	.025	.015	.0325	.0026	9.000
E2.0	2.620	1.980	.6000	.6000	5.000	100.0	.025	.015	.0378	.0023	9.001
E2.1	2.290	1.890	.6000	.6000	5.000	100.0	.025	.015	.0353	.0023	9.002
E2.2	4.160	3.920	.9000	.9000	5.000	100.0	.025	.015	.0393	.0027	9.003
E1.0	1.850	2.270	1.700	1.700	5.000	100.0	.025	.015	.0188	.0015	10.00
E1.1	1.430	1.740	.5000	.5000	5.000	100.0	.025	.015	.0303	.0024	10.00
E1.2	4.030	1.670	.5000	.5000	5.000	100.0	.025	.015	.0518	.0023	9.004
H9	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	9.005
E1.3	7.740	6.260	.5000	.5000	5.000	100.0	.025	.015	.0728	.0046	8.001
H7	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	7.003
E1.4	27.770	3.100	.5000	.5000	5.000	100.0	.050	.015	.2358	.0032	7.004
C1.0	1.850	2.260	.5000	.5000	5.000	100.0	.025	.015	.0346	.0027	11.00
H16	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	11.00
D1.0	0.3700	0.4700	1.000	1.000	5.000	100.0	.025	.015	.0106	.0009	12.00
H17	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	12.00
Arb_Out	.00001	0.000	.0010	0.000	5.000	0.000	.025	0.00	.0014	0.000	1.003

Link Label	Average Intensity (mm/h)	Init. Loss #1 (mm)	Init. Loss #2 (mm)	Cont. Loss #1 (mm/h)	Cont. Loss #2 (mm/h)	Excess Rain #1 (mm)	Excess Rain #2 (mm)	Peak Inflow (m^3/s)	Time to Peak	Link Lag mins
A5.0	27.100	10.00	1.500	2.500	0.000	139.10	161.10	0.4123	120.0	6.000
A6.0	27.100	10.00	1.500	2.500	0.000	139.10	161.10	0.3541	120.0	0.000
H15	27.100	10.00	0.000	2.500	0.000	139.10	0.000	0.3541	120.0	6.000
A3.0	27.100	10.00	1.500	2.500	0.000	139.10	161.10	1.089	120.0	0.000
H18	27.100	10.00	0.000	2.500	0.000	139.10	0.000	1.089	120.0	9.000
A3.1	27.100	10.00	1.500	2.500	0.000	139.10	161.10	3.042	120.0	5.400
A2.0	27.100	10.00	1.500	2.500	0.000	139.10	161.10	1.229	118.0	4.500
A4.0	27.100	10.00	0.000	2.500	0.000	139.10	0.000	1.623	126.0	2.600
A1.0	27.100	10.00	0.000	2.500	0.000	139.10	0.000	2.284	124.0	3.900
A1.1a	27.100	10.00	1.500	2.500	0.000	139.10	161.10	3.409	120.0	3.100
A1.1	27.100	10.00	1.500	2.500	0.000	139.10	161.10	5.357	122.0	3.600
A1.2	27.100	10.00	1.500	2.500	0.000	139.10	161.10	9.515	126.0	4.600
A1.3	27.100	10.00	1.500	2.500	0.000	139.10	161.10	12.159	122.0	5.000
A1.4	27.100	10.00	1.500	2.500	0.000	139.10	161.10	13.167	126.0	10.00
B2.0	27.100	10.00	1.500	2.500	0.000	139.10	161.10	1.616	120.0	2.100
B1.0	27.100	10.00	1.500	2.500	0.000	139.10	161.10	1.161	120.0	1.500
H1_H2	27.100	10.00	0.000	2.500	0.000	139.10	0.000	2.777	122.0	10.00
F1.0	27.100	10.00	15.00	2.500	2.500	139.10	134.60	0.3079	120.0	6.200
E3.0a	27.100	10.00	1.500	2.500	0.000	139.10	161.10	0.7392	120.0	9.500
E3.0	27.100	10.00	1.500	2.500	0.000	139.10	161.10	1.731	120.0	0.000
E4.0	27.100	10.00	1.500	2.500	0.000	139.10	161.10	0.2112	120.0	2.300
E2.0a	27.100	10.00	1.500	2.500	0.000	139.10	161.10	0.8841	120.0	1.500
E2.0	27.100	10.00	1.500	2.500	0.000	139.10	161.10	1.808	120.0	3.300
E2.1	27.100	10.00	1.500	2.500	0.000	139.10	161.10	2.626	120.0	4.300
E2.2	27.100	10.00	1.500	2.500	0.000	139.10	161.10	4.208	120.0	3.000
E1.0	27.100	10.00	1.500	2.500	0.000	139.10	161.10	0.8538	118.0	3.000
E1.1	27.100	10.00	1.500	2.500	0.000	139.10	161.10	1.497	120.0	5.000
E1.2	27.100	10.00	1.500	2.500	0.000	139.10	161.10	6.683	122.0	0.000
H9	27.100	10.00	0.000	2.500	0.000	139.10	0.000	6.683	122.0	5.000
E1.3	27.100	10.00	1.500	2.500	0.000	139.10	161.10	9.194	120.0	0.000
H7	27.100	10.00	0.000	2.500	0.000	139.10	0.000	10.925	120.0	6.500
E1.4	27.100	10.00	1.500	2.500	0.000	139.10	161.10	14.030	128.0	10.00
C1.0	27.100	10.00	1.500	2.500	0.000	139.10	161.10	0.8328	120.0	0.000
H16	27.100	10.00	0.000	2.500	0.000	139.10	0.000	0.8328	120.0	10.00
D1.0	27.100	10.00	1.500	2.500	0.000	139.10	161.10	0.1752	118.0	0.000
H17	27.100	10.00	0.000	2.500	0.000	139.10	0.000	0.1752	118.0	10.00
Arb_Out	27.100	10.00	0.000	2.500	0.000	139.10	0.000	30.599	138.0	0.000

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################################################################################################
Hobartville-500y

Results for period from  0: 0.0  1/ 1/1990
                   to  9:20.0  2/ 1/1990
################################################################################################
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ROUTING INCREMENT (MINS)	= 2.00
STORM DURATION (MINS)	= 540.
RETURN PERIOD (YRS)	= 500.
BX	= 0.8500
TOTAL OF FIRST SUB-AREAS (ha)	= 120.52
TOTAL OF SECOND SUB-AREAS (ha)	= 65.18
TOTAL OF ALL SUB-AREAS (ha)	= 185.70

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link Label	Catch. Area #1 (ha)	Catch. Area #2 (ha)	Slope #1 (%)	Slope #2 (%)	% Impervious #1	% Impervious #2	Pern #1	Pern #2	B #1	B #2	Link No.
A5.0	0.9000	1.090	1.100	1.100	5.000	100.0	.025	.015	.0160	.0013	1.000
A6.0	0.7700	0.9400	.8000	.8000	5.000	100.0	.025	.015	.0173	.0014	2.000
H15	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	2.001
A3.0	2.370	2.900	.5000	.5000	5.000	100.0	.025	.015	.0393	.0031	2.002
H18	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	2.003
A3.1	5.240	4.910	.6000	.6000	5.000	100.0	.025	.015	.0543	.0037	2.004
A2.0	2.670	3.260	1.500	1.500	5.000	100.0	.025	.015	.0242	.0019	3.000
A4.0	9.790	0.000	1.100	0.000	5.000	0.000	.050	0.00	.0925	0.000	4.000
A1.0	3.550	0.000	1.700	0.000	5.000	0.000	.050	0.00	.0439	0.000	4.001
A1.1a	3.670	2.880	1.000	1.000	5.000	100.0	.025	.015	.0349	.0022	4.002
A1.1	2.450	1.910	1.000	1.000	5.000	100.0	.025	.015	.0283	.0018	3.001
A1.2	4.210	2.560	.6000	.6000	5.000	100.0	.025	.015	.0484	.0027	2.005
A1.3	7.010	7.190	.5000	.5000	5.000	100.0	.025	.015	.0691	.0050	1.001
A1.4	3.620	2.780	1.900	1.900	5.000	100.0	.025	.015	.0252	.0016	1.002
B2.0	7.590	1.230	1.500	1.500	5.000	100.0	.050	.015	.0694	.0012	5.000
B1.0	5.560	0.9300	1.100	1.100	5.000	100.0	.050	.015	.0689	.0012	6.000
H1_H2	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	5.001
F1.0	1.370	0.1500	1.000	1.000	5.000	100.0	.025	.015	.0209	.0005	7.000
E3.0a	0.9500	1.160	.7000	.7000	5.000	100.0	.025	.015	.0207	.0016	7.001
E3.0	2.280	2.790	.7000	.7000	5.000	100.0	.025	.015	.0326	.0026	7.002
E4.0	0.4600	0.5600	.5000	.5000	5.000	100.0	.025	.015	.0168	.0013	8.000
E2.0a	1.950	2.380	.6000	.6000	5.000	100.0	.025	.015	.0325	.0026	9.000
E2.0	2.620	1.980	.6000	.6000	5.000	100.0	.025	.015	.0378	.0023	9.001
E2.1	2.290	1.890	.6000	.6000	5.000	100.0	.025	.015	.0353	.0023	9.002
E2.2	4.160	3.920	.9000	.9000	5.000	100.0	.025	.015	.0393	.0027	9.003
E1.0	1.850	2.270	1.700	1.700	5.000	100.0	.025	.015	.0188	.0015	10.00
E1.1	1.430	1.740	.5000	.5000	5.000	100.0	.025	.015	.0303	.0024	10.00
E1.2	4.030	1.670	.5000	.5000	5.000	100.0	.025	.015	.0518	.0023	9.004
H9	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	9.005
E1.3	7.740	6.260	.5000	.5000	5.000	100.0	.025	.015	.0728	.0046	8.001
H7	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	7.003
E1.4	27.770	3.100	.5000	.5000	5.000	100.0	.050	.015	.2358	.0032	7.004
C1.0	1.850	2.260	.5000	.5000	5.000	100.0	.025	.015	.0346	.0027	11.00
H16	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	11.00
D1.0	0.3700	0.4700	1.000	1.000	5.000	100.0	.025	.015	.0106	.0009	12.00
H17	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	12.00
Arb_Out	.00001	0.000	.0010	0.000	5.000	0.000	.025	0.00	.0014	0.000	1.003

Link Label	Average Intensity (mm/h)	Init. Loss #1 (mm)	Init. Loss #2 (mm)	Cont. Loss #1 (mm/h)	Cont. Loss #2 (mm/h)	Excess Rain #1 (mm)	Excess Rain #2 (mm)	Peak Inflow (m^3/s)	Time to Peak	Link Lag mins
A5.0	21.200	10.00	1.500	2.500	0.000	160.05	189.30	0.3648	298.0	6.000
A6.0	21.200	10.00	1.500	2.500	0.000	160.05	189.30	0.3132	298.0	0.000
H15	21.200	10.00	0.000	2.500	0.000	160.05	0.000	0.3132	298.0	6.000
A3.0	21.200	10.00	1.500	2.500	0.000	160.05	189.30	1.166	300.0	0.000
H18	21.200	10.00	0.000	2.500	0.000	160.05	0.000	1.166	300.0	9.000
A3.1	21.200	10.00	1.500	2.500	0.000	160.05	189.30	2.768	300.0	5.400

A2.0	21.200	10.00	1.500	2.500	0.000	160.05	189.30	1.086	300.0	4.500
A4.0	21.200	10.00	0.000	2.500	0.000	160.05	0.000	1.441	316.0	2.600
A1.0	21.200	10.00	0.000	2.500	0.000	160.05	0.000	1.978	310.0	3.900
A1.1a	21.200	10.00	1.500	2.500	0.000	160.05	189.30	2.952	308.0	3.100
A1.1	21.200	10.00	1.500	2.500	0.000	160.05	189.30	4.695	304.0	3.600
A1.2	21.200	10.00	1.500	2.500	0.000	160.05	189.30	8.486	306.0	4.600
A1.3	21.200	10.00	1.500	2.500	0.000	160.05	189.30	10.868	310.0	5.000
A1.4	21.200	10.00	1.500	2.500	0.000	160.05	189.30	11.756	316.0	10.00
B2.0	21.200	10.00	1.500	2.500	0.000	160.05	189.30	1.387	300.0	2.100
B1.0	21.200	10.00	1.500	2.500	0.000	160.05	189.30	0.9859	300.0	1.500
H1_H2	21.200	10.00	0.000	2.500	0.000	160.05	0.000	2.373	302.0	10.00
F1.0	21.200	10.00	15.00	2.500	2.500	160.05	155.63	0.2713	300.0	6.200
E3.0a	21.200	10.00	1.500	2.500	0.000	160.05	189.30	0.6509	300.0	9.500
E3.0	21.200	10.00	1.500	2.500	0.000	160.05	189.30	1.515	300.0	0.000
E4.0	21.200	10.00	1.500	2.500	0.000	160.05	189.30	0.1864	300.0	2.300
E2.0a	21.200	10.00	1.500	2.500	0.000	160.05	189.30	0.7768	300.0	1.500
E2.0	21.200	10.00	1.500	2.500	0.000	160.05	189.30	1.585	300.0	3.300
E2.1	21.200	10.00	1.500	2.500	0.000	160.05	189.30	2.288	300.0	4.300
E2.2	21.200	10.00	1.500	2.500	0.000	160.05	189.30	3.668	300.0	3.000
E1.0	21.200	10.00	1.500	2.500	0.000	160.05	189.30	0.7554	298.0	3.000
E1.1	21.200	10.00	1.500	2.500	0.000	160.05	189.30	1.321	300.0	5.000
E1.2	21.200	10.00	1.500	2.500	0.000	160.05	189.30	5.866	304.0	0.000
H9	21.200	10.00	0.000	2.500	0.000	160.05	0.000	5.866	304.0	5.000
E1.3	21.200	10.00	1.500	2.500	0.000	160.05	189.30	8.082	310.0	0.000
H7	21.200	10.00	0.000	2.500	0.000	160.05	0.000	9.480	310.0	6.500
E1.4	21.200	10.00	1.500	2.500	0.000	160.05	189.30	12.920	316.0	10.00
C1.0	21.200	10.00	1.500	2.500	0.000	160.05	189.30	0.7304	300.0	0.000
H16	21.200	10.00	0.000	2.500	0.000	160.05	0.000	0.7304	300.0	10.00
D1.0	21.200	10.00	1.500	2.500	0.000	160.05	189.30	0.1553	298.0	0.000
H17	21.200	10.00	0.000	2.500	0.000	160.05	0.000	0.1553	298.0	10.00
Arb_Out	21.200	10.00	0.000	2.500	0.000	160.05	0.000	27.703	326.0	0.000

##
Hobartville-500y

Results for period from 0: 0.0 1/ 1/1990
                    to 17:40.0 2/ 1/1990
##

ROUTING INCREMENT (MINS) = 5.00
STORM DURATION (MINS)   = 720.
RETURN PERIOD (YRS)   = 500.
BX   = 0.8500
TOTAL OF FIRST SUB-AREAS (ha) = 120.52
TOTAL OF SECOND SUB-AREAS (ha) = 65.18
TOTAL OF ALL SUB-AREAS (ha)   = 185.70

SUMMARY OF CATCHMENT AND RAINFALL DATA

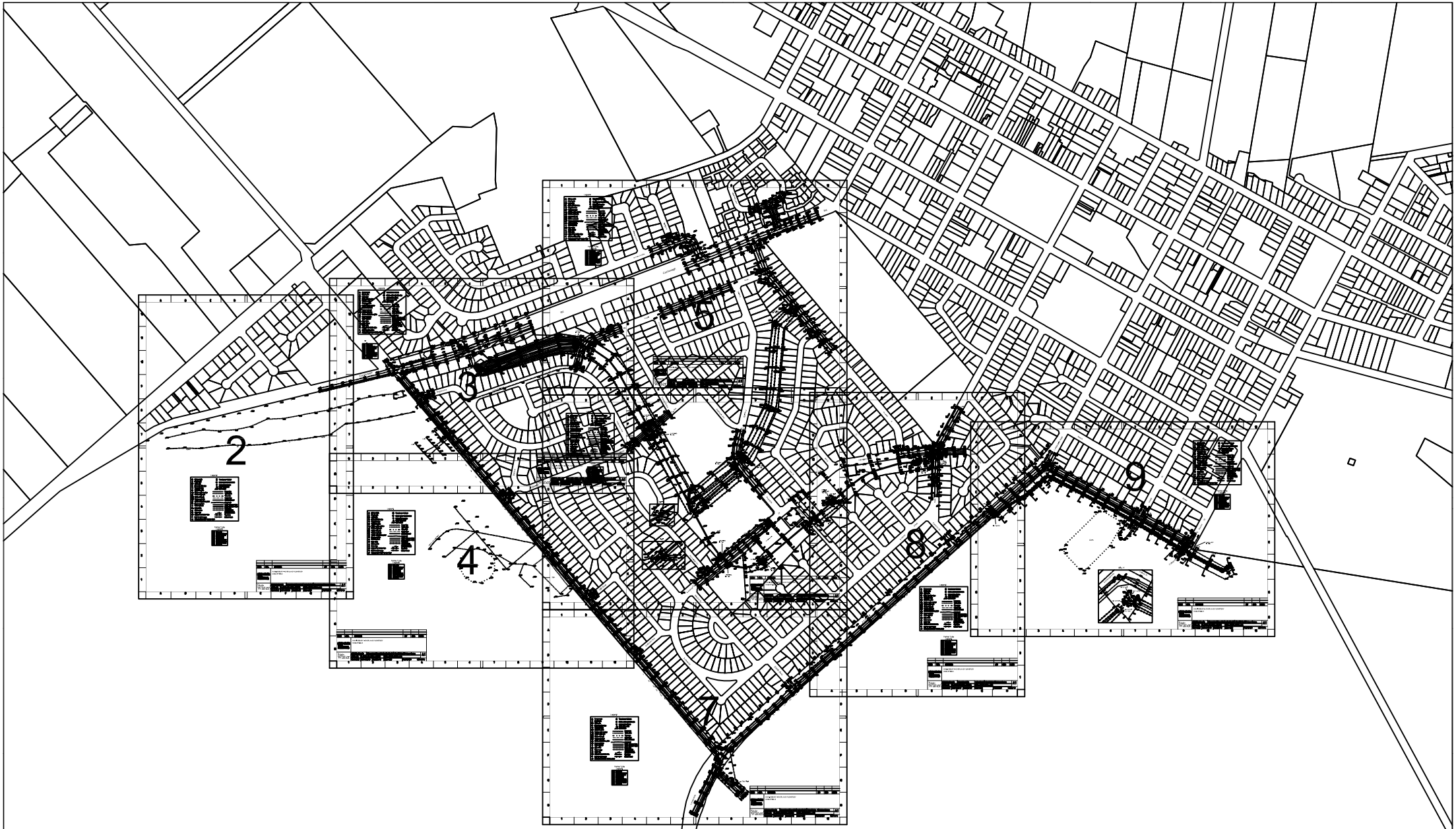
Link Label	Catch. Area (ha) #1	Catch. Area (ha) #2	Slope (%) #1	Slope (%) #2	% Impervious #1	% Impervious #2	Pern #1	Pern #2	B #1	B #2	Link No.
A5.0	0.9000	1.090	1.100	1.100	5.000	100.0	.025	.015	.0160	.0013	1.000
A6.0	0.7700	0.9400	.8000	.8000	5.000	100.0	.025	.015	.0173	.0014	2.000
H15	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	2.001
A3.0	2.370	2.900	.5000	.5000	5.000	100.0	.025	.015	.0393	.0031	2.002
H18	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	2.003
A3.1	5.240	4.910	.6000	.6000	5.000	100.0	.025	.015	.0543	.0037	2.004
A2.0	2.670	3.260	1.500	1.500	5.000	100.0	.025	.015	.0242	.0019	3.000
A4.0	9.790	0.000	1.100	0.000	5.000	0.000	.050	0.00	.0925	0.000	4.000
A1.0	3.550	0.000	1.700	0.000	5.000	0.000	.050	0.00	.0439	0.000	4.001
A1.1a	3.670	2.880	1.000	1.000	5.000	100.0	.025	.015	.0349	.0022	4.002
A1.1	2.450	1.910	1.000	1.000	5.000	100.0	.025	.015	.0283	.0018	3.001
A1.2	4.210	2.560	.6000	.6000	5.000	100.0	.025	.015	.0484	.0027	2.005
A1.3	7.010	7.190	.5000	.5000	5.000	100.0	.025	.015	.0691	.0050	1.001
A1.4	3.620	2.780	1.900	1.900	5.000	100.0	.025	.015	.0252	.0016	1.002
B2.0	7.590	1.230	1.500	1.500	5.000	100.0	.050	.015	.0694	.0012	5.000
B1.0	5.560	0.9300	1.100	1.100	5.000	100.0	.050	.015	.0689	.0012	6.000

H1_H2	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	5.001
F1.0	1.370	0.1500	1.000	1.000	5.000	100.0	.025	.015	.0209	.0005	7.000
E3.0a	0.9500	1.160	.7000	.7000	5.000	100.0	.025	.015	.0207	.0016	7.001
E3.0	2.280	2.790	.7000	.7000	5.000	100.0	.025	.015	.0326	.0026	7.002
E4.0	0.4600	0.5600	.5000	.5000	5.000	100.0	.025	.015	.0168	.0013	8.000
E2.0a	1.950	2.380	.6000	.6000	5.000	100.0	.025	.015	.0325	.0026	9.000
E2.0	2.620	1.980	.6000	.6000	5.000	100.0	.025	.015	.0378	.0023	9.001
E2.1	2.290	1.890	.6000	.6000	5.000	100.0	.025	.015	.0353	.0023	9.002
E2.2	4.160	3.920	.9000	.9000	5.000	100.0	.025	.015	.0393	.0027	9.003
E1.0	1.850	2.270	1.700	1.700	5.000	100.0	.025	.015	.0188	.0015	10.00
E1.1	1.430	1.740	.5000	.5000	5.000	100.0	.025	.015	.0303	.0024	10.00
E1.2	4.030	1.670	.5000	.5000	5.000	100.0	.025	.015	.0518	.0023	9.004
H9	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	9.005
E1.3	7.740	6.260	.5000	.5000	5.000	100.0	.025	.015	.0728	.0046	8.001
H7	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	7.003
E1.4	27.770	3.100	.5000	.5000	5.000	100.0	.050	.015	.2358	.0032	7.004
C1.0	1.850	2.260	.5000	.5000	5.000	100.0	.025	.015	.0346	.0027	11.00
H16	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	11.00
D1.0	0.3700	0.4700	1.000	1.000	5.000	100.0	.025	.015	.0106	.0009	12.00
H17	.00001	0.000	.0010	0.000	0.000	0.000	.025	0.00	.0017	0.000	12.00
Arb_Out	.00001	0.000	.0010	0.000	5.000	0.000	.025	0.00	.0014	0.000	1.003

Link Label	Average Intensity (mm/h)	Init. Loss #1 (mm)	Init. Loss #2 (mm)	Cont. Loss #1 (mm/h)	Cont. Loss #2 (mm/h)	Excess Rain #1 (mm)	Excess Rain #2 (mm)	Peak Inflow (m^3/s)	Time to Peak	Link Lag mins
A5.0	17.800	10.00	1.500	2.500	0.000	175.87	212.10	0.3688	420.0	6.000
A6.0	17.800	10.00	1.500	2.500	0.000	175.87	212.10	0.3158	420.0	0.000
H15	17.800	10.00	0.000	2.500	0.000	175.87	0.000	0.3158	420.0	6.000
A3.0	17.800	10.00	1.500	2.500	0.000	175.87	212.10	1.205	420.0	0.000
H18	17.800	10.00	0.000	2.500	0.000	175.87	0.000	1.205	420.0	9.000
A3.1	17.800	10.00	1.500	2.500	0.000	175.87	212.10	2.878	420.0	5.400
A2.0	17.800	10.00	1.500	2.500	0.000	175.87	212.10	1.096	420.0	4.500
A4.0	17.800	10.00	0.000	2.500	0.000	175.87	0.000	1.463	420.0	2.600
A1.0	17.800	10.00	0.000	2.500	0.000	175.87	0.000	2.032	425.0	3.900
A1.1a	17.800	10.00	1.500	2.500	0.000	175.87	212.10	3.040	420.0	3.100
A1.1	17.800	10.00	1.500	2.500	0.000	175.87	212.10	4.750	420.0	3.600
A1.2	17.800	10.00	1.500	2.500	0.000	175.87	212.10	8.522	425.0	4.600
A1.3	17.800	10.00	1.500	2.500	0.000	175.87	212.10	10.845	420.0	5.000
A1.4	17.800	10.00	1.500	2.500	0.000	175.87	212.10	11.594	425.0	10.00
B2.0	17.800	10.00	1.500	2.500	0.000	175.87	212.10	1.452	420.0	2.100
B1.0	17.800	10.00	1.500	2.500	0.000	175.87	212.10	1.048	420.0	1.500
H1_H2	17.800	10.00	0.000	2.500	0.000	175.87	0.000	2.500	420.0	10.00
F1.0	17.800	10.00	15.00	2.500	2.500	175.87	171.49	0.2741	420.0	6.200
E3.0a	17.800	10.00	1.500	2.500	0.000	175.87	212.10	0.6583	420.0	9.500
E3.0	17.800	10.00	1.500	2.500	0.000	175.87	212.10	1.545	420.0	0.000
E4.0	17.800	10.00	1.500	2.500	0.000	175.87	212.10	0.1887	420.0	2.300
E2.0a	17.800	10.00	1.500	2.500	0.000	175.87	212.10	0.7869	420.0	1.500
E2.0	17.800	10.00	1.500	2.500	0.000	175.87	212.10	1.613	420.0	3.300
E2.1	17.800	10.00	1.500	2.500	0.000	175.87	212.10	2.316	420.0	4.300
E2.2	17.800	10.00	1.500	2.500	0.000	175.87	212.10	3.724	420.0	3.000
E1.0	17.800	10.00	1.500	2.500	0.000	175.87	212.10	0.7662	420.0	3.000
E1.1	17.800	10.00	1.500	2.500	0.000	175.87	212.10	1.326	415.0	5.000
E1.2	17.800	10.00	1.500	2.500	0.000	175.87	212.10	5.868	420.0	0.000
H9	17.800	10.00	0.000	2.500	0.000	175.87	0.000	5.868	420.0	5.000
E1.3	17.800	10.00	1.500	2.500	0.000	175.87	212.10	8.283	420.0	0.000
H7	17.800	10.00	0.000	2.500	0.000	175.87	0.000	9.828	420.0	6.500
E1.4	17.800	10.00	1.500	2.500	0.000	175.87	212.10	13.084	425.0	10.00
C1.0	17.800	10.00	1.500	2.500	0.000	175.87	212.10	0.7409	420.0	0.000
H16	17.800	10.00	0.000	2.500	0.000	175.87	0.000	0.7409	420.0	10.00
D1.0	17.800	10.00	1.500	2.500	0.000	175.87	212.10	0.1569	420.0	0.000
H17	17.800	10.00	0.000	2.500	0.000	175.87	0.000	0.1569	420.0	10.00
Arb_Out	17.800	10.00	0.000	2.500	0.000	175.87	0.000	27.650	430.0	0.000

APPENDIX B

GROUND SURVEY PLANS



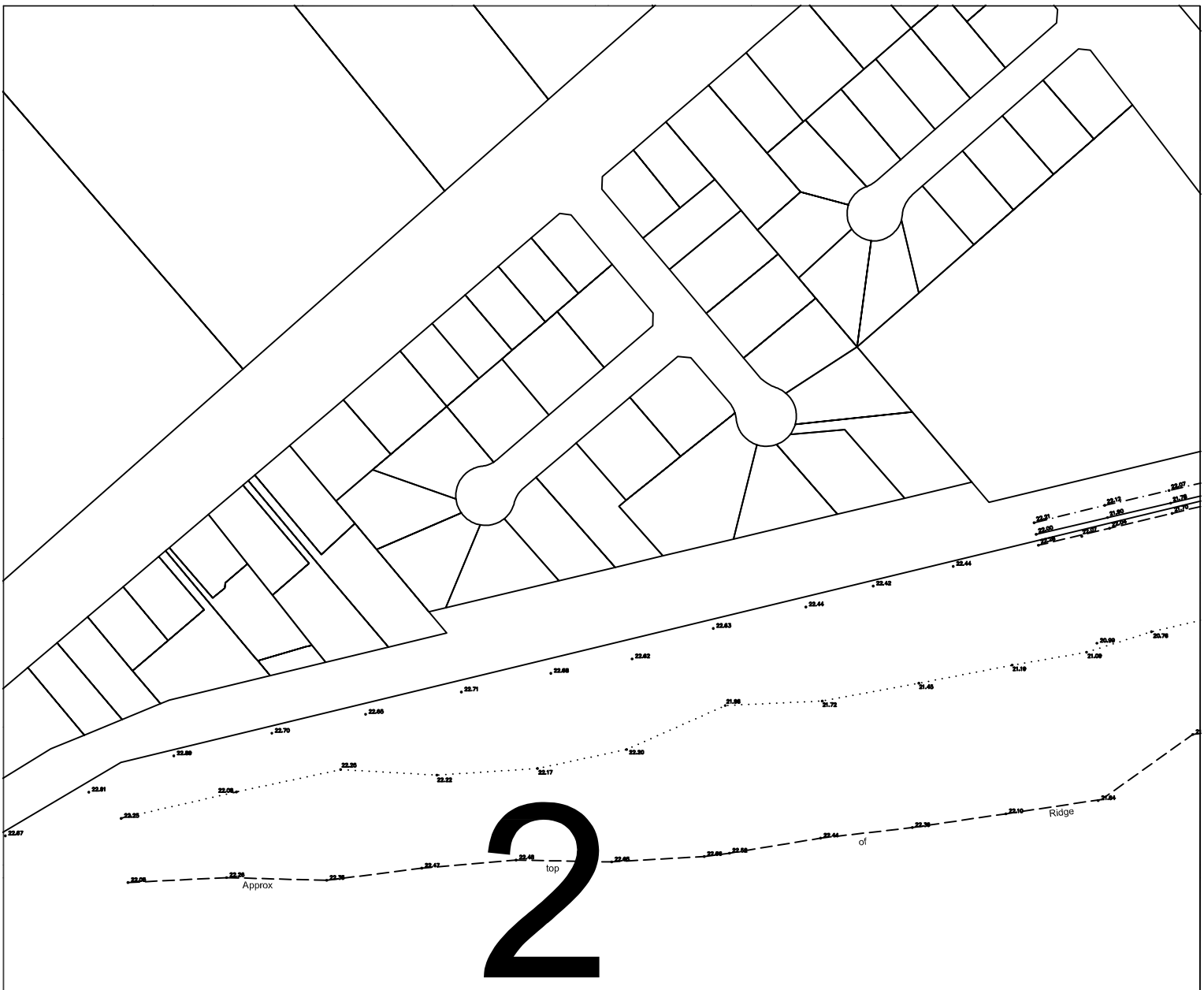
ZONE	REF.	REVISION	BY	CKD	DATE

SURVEY SERVICES
LEVEL 5
10 VALENTINE AVE
PARRAMATTA 2150

HAWKESBURY - OVERLAND FLOW STUDY
Hobartville

State water

SURVEYED: PG & JRS	FIELD BOOK: FB238 & FB240	DATE: 3/06/05	DRAWING FILE: 2071-Hobartville.dwg	A1
DATUM: AHD	RL ORIGIN: SSM 61300 & SSM61321		COORD. SYSTEM: ISG Zone 56/1	
DRAWN: CMcC	DATE: 15/07/05	EXAMINED: PG	SCALE: 1:1000	PLAN NO: 2071 SHT. 1 OF 18



Legend

- Survey mark
- Power pole
- Light pole
- Elect. junction box
- Telephone Box
- Telephone pole
- Telstra cable marker
- Telstra single pit
- Telstra twin pit
- Telstra main pit
- Telstra distribution pillar
- Sewer manhole
- Water hydrant
- Stop valve
- Water meter
- Water Tap
- Gully Pit at Gutter Line
- Inlet to drain sump
- Underground Power Service Pillar
- Transformer Cabinet
- Storm water junction box
- Unidentified service
- Water level point
- 17.89 Spot height
- Power line
- Table drain
- Tree area
- Centre line
- Edge pavement
- Guard rail
- Major contours 1.0m
- Minor contours 0.2m
- Fence line
- Cross Section
- Culvert showing direction of flow
- Top Bank
- Bottom Bank

Fence Type Legend

- Brick Wall
- Colourbond Fence
- Kopper Log Wall
- Picket Fence
- Paling Fence
- Sleeper Ret. Wall
- Steel Tube Fence
- Wire Mesh Fence
- No Fence

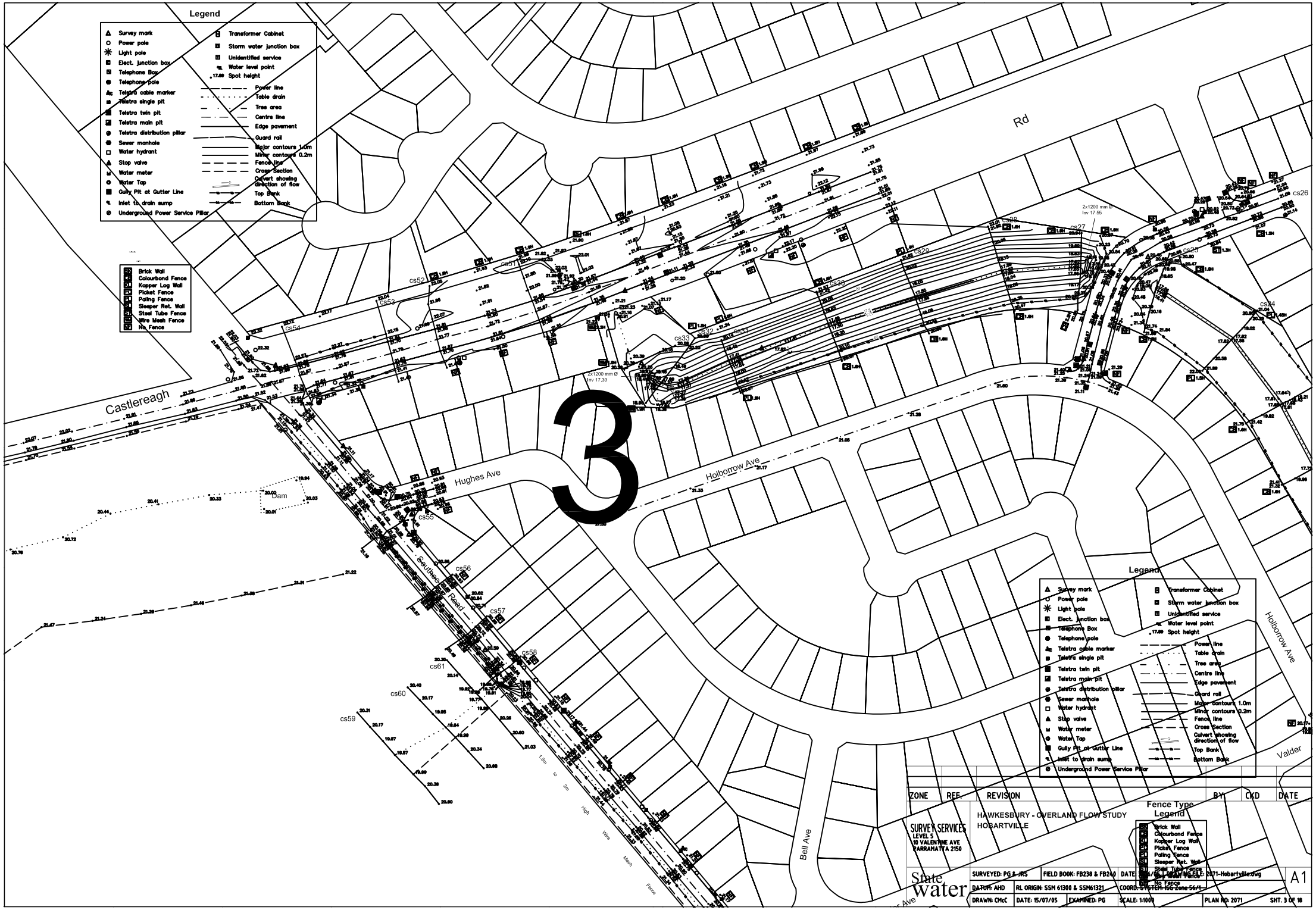
ZONE	REF.	REVISION	BY	CKD	DATE

SURVEY SERVICES
LEVEL 5
10 VALENTINE AVE
PARRAMATTA 2150

HAWKESBURY - OVERLAND FLOW STUDY
HOBARTVILLE

State water

SURVEYED: PG & JRS	FIELD BOOK: FB238 & FB240	DATE: 20/07/05	DRAWING FILE: 2071-Hobartville.dwg	A1
DATUM: AHD	RL ORIGIN: SSM 61300 & SSM61321		COORD. SYSTEM: ISG Zone 56/1	
DRAWN: CMcC	DATE: 15/07/05	EXAMINED: PG	SCALE: 1:1000	PLAN NO: 2071 SHT. 2 OF 18


Legend
Survey mark
Power pole
Light pole
Elect. junction box
Telephone Box
Telephone pole
Telstra cable marker
Telstra single pit
Telstra twin pit
Telstra main pit
Telstra distribution pillar
Sewer manhole
Water hydrant
Stop valve
Water meter
Water Tap
Gully Pit at Gutter Line
Inlet to drain sump
Underground Power Service Pillar
Transformer Cabinet
Storm water junction box
Unidentified service
Water level point
Spot height
Power line
Table drain
Tree area
Centre line
Edge pavement
Guard rail
Major contours 1.0m
Minor contours 0.2m
Fence line
Cross Section
Culvert showing direction of flow
Top Bank
Bottom Bank
Brick Wall
Colourbond Fence
Kopper Log Wall
Picket Fence
Paling Fence
Sleeper Ret. Wall
Steel Tube Fence
Wire Mesh Fence
No Fence
Castlereagh
Rd
Hughes Ave
Holborrow Ave
Southee Road
Bell Ave
Valder
Dam
2x1200 mm ø Inv 17.55
2x1200 mm ø Inv 17.30
3
ZONE
REF.
REVISION
BY
CKD
DATE
SURVEY SERVICES
LEVEL 5
10 VALENTINE AVE
PARRAMATTA 2150
HAWKESBURY - OVERLAND FLOW STUDY
HOBARTVILLE
Fence Type Legend
Brick Wall
Colourbond Fence
Kopper Log Wall
Picket Fence
Paling Fence
Sleeper Ret. Wall
Steel Tube Fence
Wire Mesh Fence
No Fence
State water
SURVEYED: PG & JRS
FIELD BOOK: FB238 & FB240
DATE:
DRAWING FILE: 2071-Hobartville.dwg
DATUM: AHD
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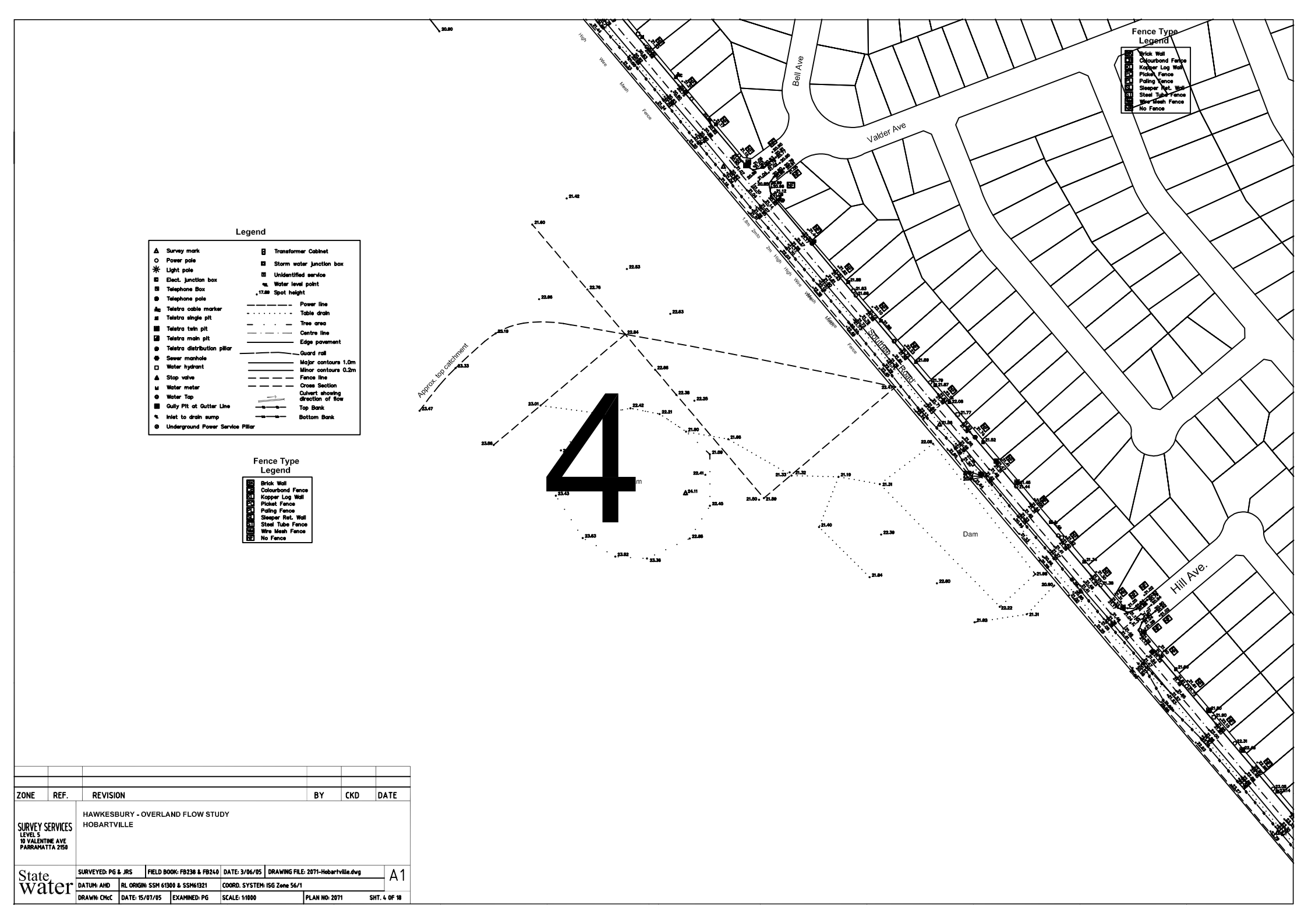
COORD. SYSTEM: MGA Zone 56/1
DRAWN: CMcC
DATE: 15/07/05
EXAMINED: PG
SCALE: 1:1000
PLAN NO: 2071
SHT. 3 OF 18
A1



ZONE	REF.	REVISION	BY	CKD	DATE

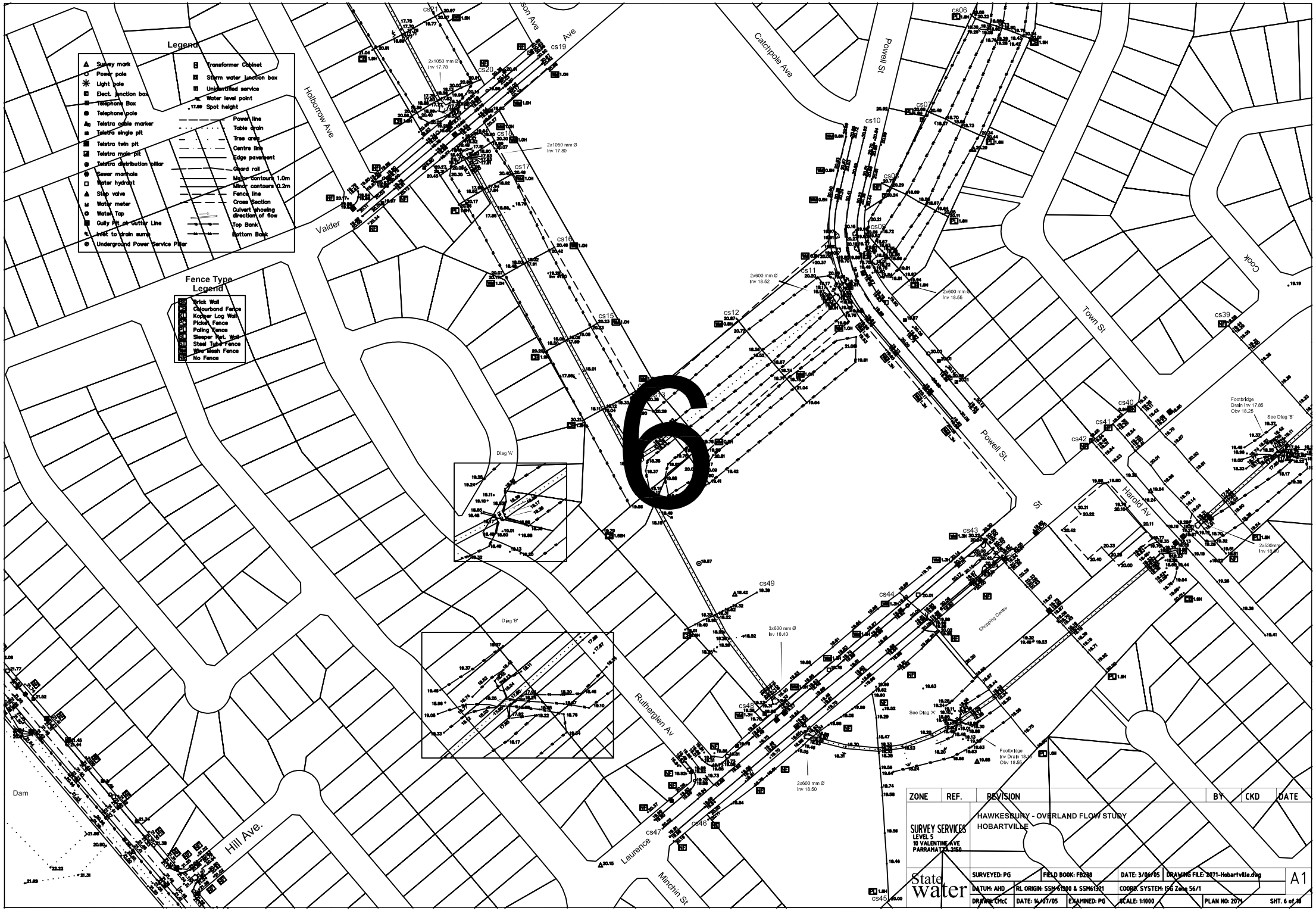
SURVEY SERVICES
LEVEL 5
10 VALENTINE AVE
PARRAMATTA 2150

HAWKESBURY - OVERLAND FLOW STUDY
HOBARTVILLE

State water

SURVEYED: PG & JRS	FIELD BOOK: FB238 & FB240	DATE: 3/06/05	DRAWING FILE: 2071-Hobartville.dwg	A1
DATUM: AHD	RL ORIGIN: SSM 61300 & SSM61321		COORD. SYSTEM: ISG Zone 56/1	
DRAWN: CMcC	DATE: 15/07/05	EXAMINED: PG	SCALE: 1:1000	PLAN NO: 2071 SHT. 4 OF 18


Legend
Survey mark
Power pole
Light pole
Elect. junction box
Telephone Box
Telephone pole
Telstra cable marker
Telstra single pit
Telstra twin pit
Telstra main pit
Telstra distribution pillar
Sewer manhole
Water hydrant
Stop valve
Water meter
Water Tap
Gully Pit at Gutter Line
Inlet to drain sump
Underground Power Service Pillar
Transformer Cabinet
Storm water junction box
Unidentified service
Water level point
Spot height
Power line
Table drain
Tree area
Centre line
Edge pavement
Guard rail
Major contours 1.0m
Minor contours 0.2m
Fence line
Cross Section
Culvert showing direction of flow
Top Bank
Bottom Bank
Fence Type Legend
Brick Wall
Colourbond Fence
Koppel Log Wall
Picket Fence
Paling Fence
Sleeper Ret. Wall
Steel Tube Fence
Wire Mesh Fence
No Fence
Andrew Town Pl
Starlight Pl
John Tebbutt Place
William Cox Drive
Castlereagh
Rd
Hereford
Street
Powell St
Douglas
Catchpole Ave
cs01
cs02
cs03
cs04
cs22
cs23
cs24
cs25
cs26
cs27
cs28
2x1200 mm Ø Inv 17.55
1x500 mm Ø Inv 19.05 AHD
1x375 mm Ø Inv 19.65 AHD
5
ZONE
REF.
REVISION
BY
CKD
DATE
SURVEY SERVICES
LEVEL 5
10 VALENTINE AVE
PARRAMATTA 2150
HAWKESBURY - OVERLAND FLOW STUDY
HOBARTVILLE
State water
SURVEYED: PG
FIELD BOOK: FB238
DATE: 3/06/05
DRAWING FILE: 2071_Hobartville.dwg
A1
DATUM: AHD
RL ORIGIN: SSM 61300 & SSM61321
COORD. SYSTEM: ISG Zone 56/1
DRAWN: CMC
DATE: 15/07/05
EXAMINED: PG
SCALE: 1:1000
PLAN NO: 2071
SHT. 5 OF 38


Legend
Survey mark
Power pole
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Telephone pole
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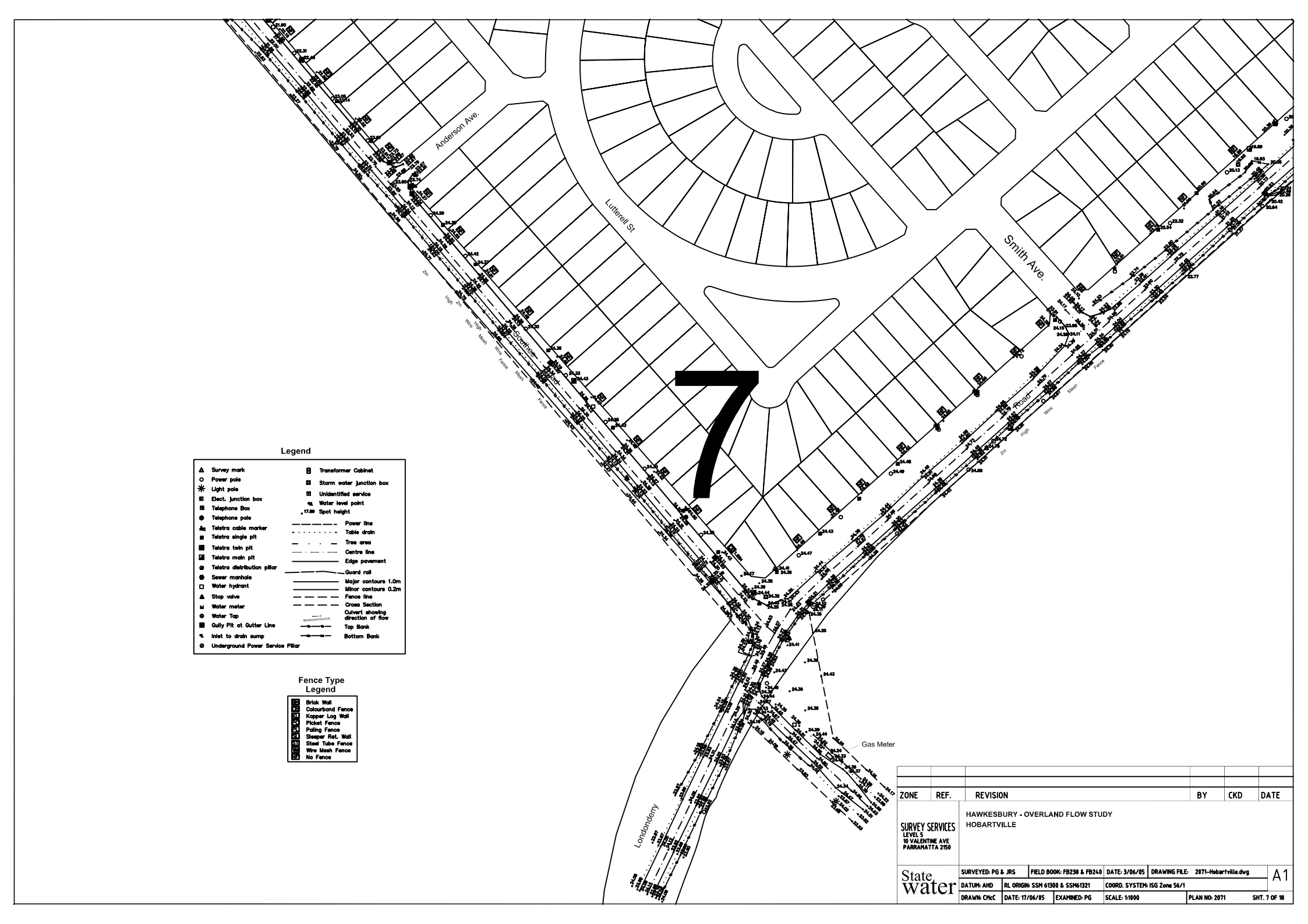
Water level point
Spot height
Power line
Table drain
Tree area
Centre line
Edge pavement
Guard rail
Major contours 1.0m
Minor contours 0.2m
Fence line
Cross Section
Culvert showing direction of flow
Top Bank
Bottom Bank
Fence Type Legend
Brick Wall
Colourbond Fence
Konpier Log Wall
Picket Fence
Paling Fence
Sleeper Ret. Wall
Steel Tube Fence
Wire Mesh Fence
No Fence
Holborrow Ave
Valder
Catchpole Ave
Powell St
Town St
Cook
Harold Av
Ruthergien Av
Laurence
Minchin St
Hill Ave.
Dam
Shopping Centre
Dlag 'A'
Dlag 'B'
2x1050 mm Ø Inv 17.78
2x1050 mm Ø Inv 17.80
2x600 mm Ø Inv 18.52
2x600 mm Ø Inv 18.55
3x600 mm Ø Inv 18.40
2x600 mm Ø Inv 18.50
Footbridge Drain Inv 17.85 Obv 18.25
Footbridge Drain Inv 18.15 Obv 18.55
2x530mm Inv 18.40
See Dlag 'A'
See Dlag 'B'
6
ZONE
REF.
REVISION
BY
CKD
DATE
SURVEY SERVICES
LEVEL 5
10 VALENTINE AVE
PARRAMATTA 2150
HAWKESBURY - OVERLAND FLOW STUDY
HOBARTVILLE
State water
SURVEYED: PG
FIELD BOOK: FB238
DATE: 3/06/05
DRAWING FILE: 2071-Hobartville.dng
A1
DATUM: AHD
RL ORIGIN: SSM 61300 & SSM61321
COORD. SYSTEM: ISG Zone 56/1
DRAWN: CMcC
DATE: 14/07/05
EXAMINED: PG
SCALE: 1:1000
PLAN NO: 2071
SHT. 6 of 10



Legend

- Survey mark
- Power pole
- Light pole
- Elect. junction box
- Telephone Box
- Telephone pole
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- Telstra single pit
- Telstra twin pit
- Telstra main pit
- Telstra distribution pillar
- Sewer manhole
- Water hydrant
- Stop valve
- Water meter
- Water Tap
- Gully Pit at Gutter Line
- Inlet to drain sump
- Underground Power Service Pillar
- Transformer Cabinet
- Storm water junction box
- Unidentified service
- Water level point
- Spot height
- Power line
- Table drain
- Tree area
- Centre line
- Edge pavement
- Guard rail
- Major contours 1.0m
- Minor contours 0.2m
- Fence line
- Cross Section
- Culvert showing direction of flow
- Top Bank
- Bottom Bank

Fence Type Legend

- Brick Wall
- Colourbond Fence
- Kapper Log Wall
- Picket Fence
- Paling Fence
- Sleeper Ret. Wall
- Steel Tube Fence
- Wire Mesh Fence
- No Fence

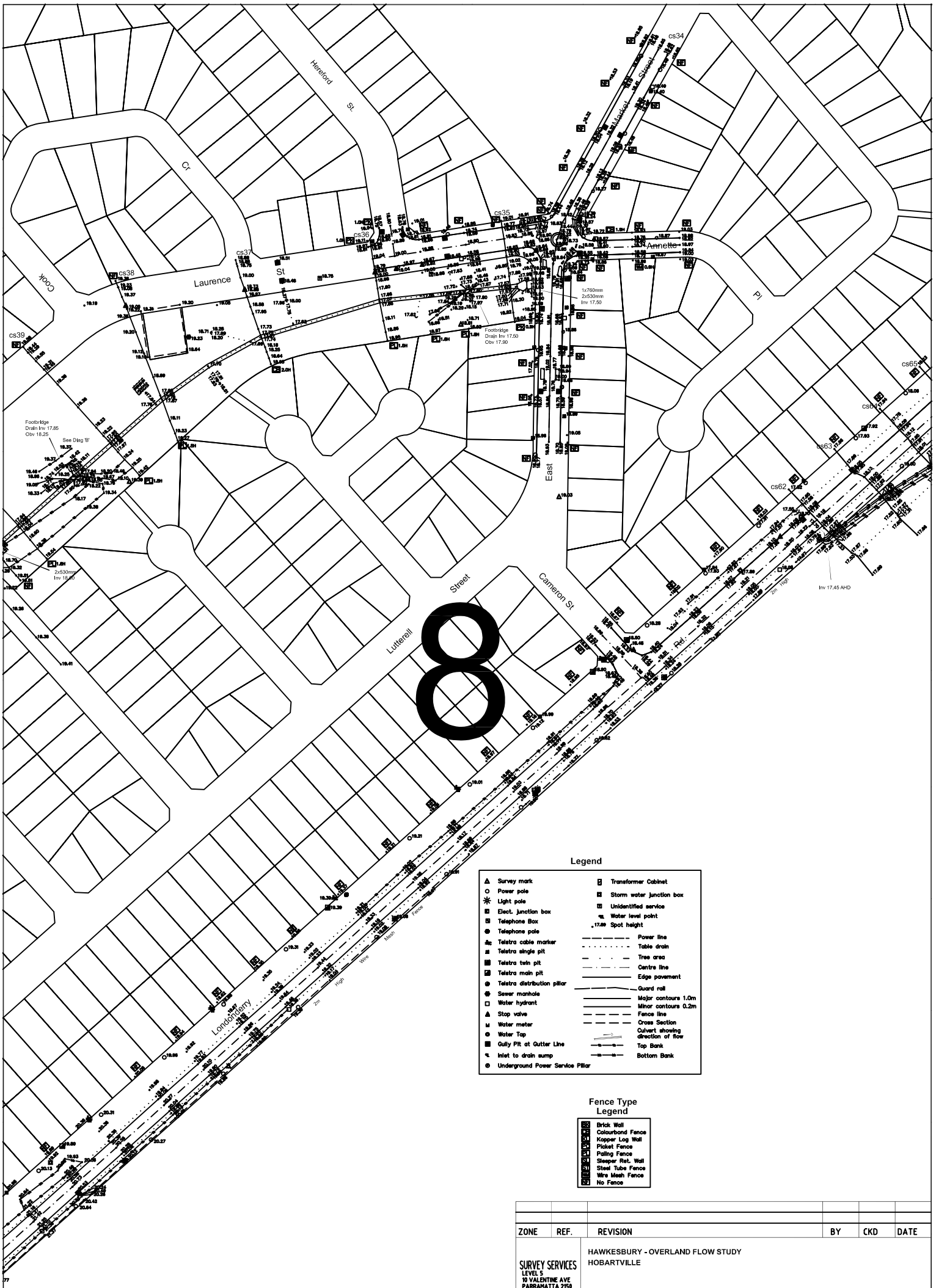
ZONE	REF.	REVISION	BY	CKD	DATE

SURVEY SERVICES
LEVEL 5
10 VALENTINE AVE
PARRAMATTA 2150

HAWKESBURY - OVERLAND FLOW STUDY
HOBARTVILLE

State water

SURVEYED: PG & JRS	FIELD BOOK: FB238 & FB240	DATE: 3/06/05	DRAWING FILE: 2071-Hobartville.dwg	A1
DATUM: AHD	RL ORIGIN: SSM 61300 & SSM61321		COORD. SYSTEM: ISG Zone 56/1	
DRAWN: CMcC	DATE: 17/06/05	EXAMINED: PG	SCALE: 1:1000	PLAN NO: 2071 SHT. 7 OF 18



Legend

Survey mark	Transformer Cabinet
Power pole	Storm water junction box
Light pole	Unidentified service
Elect. junction box	Water level point
Telephone Box	Spot height
Telephone pole	Power line
Telstra cable marker	Table drain
Telstra single pit	Tree area
Telstra twin pit	Centre line
Telstra main pit	Edge pavement
Telstra distribution pillar	Guard rail
Sewer manhole	Major contours 1.0m
Water hydrant	Minor contours 0.2m
Stop valve	Fence line
Water meter	Cross Section
Water Tap	Culvert showing direction of flow
Gully Pit at Gutter Line	Top Bank
Inlet to drain sump	Bottom Bank
Underground Power Service Pillar	

Fence Type Legend

BW	Brick Wall
CF	Colourbond Fence
KW	Kopper Log Wall
PF	Picket Fence
PAL	Paling Fence
SR	Steeper Ret. Wall
ST	Steel Tube Fence
WM	Wire Mesh Fence
NF	No Fence

ZONE	REF.	REVISION	BY	CKD	DATE

SURVEY SERVICES
LEVEL 5
10 VALENTINE AVE
PARRAMATTA 2150

HAWKESBURY - OVERLAND FLOW STUDY
HOBARTVILLE

State water

SURVEYED: PG & JRS	FIELD BOOK: FB238	DATE: 3/06/05	DRAWING FILE: 2071-Hebartville.dwg	A1
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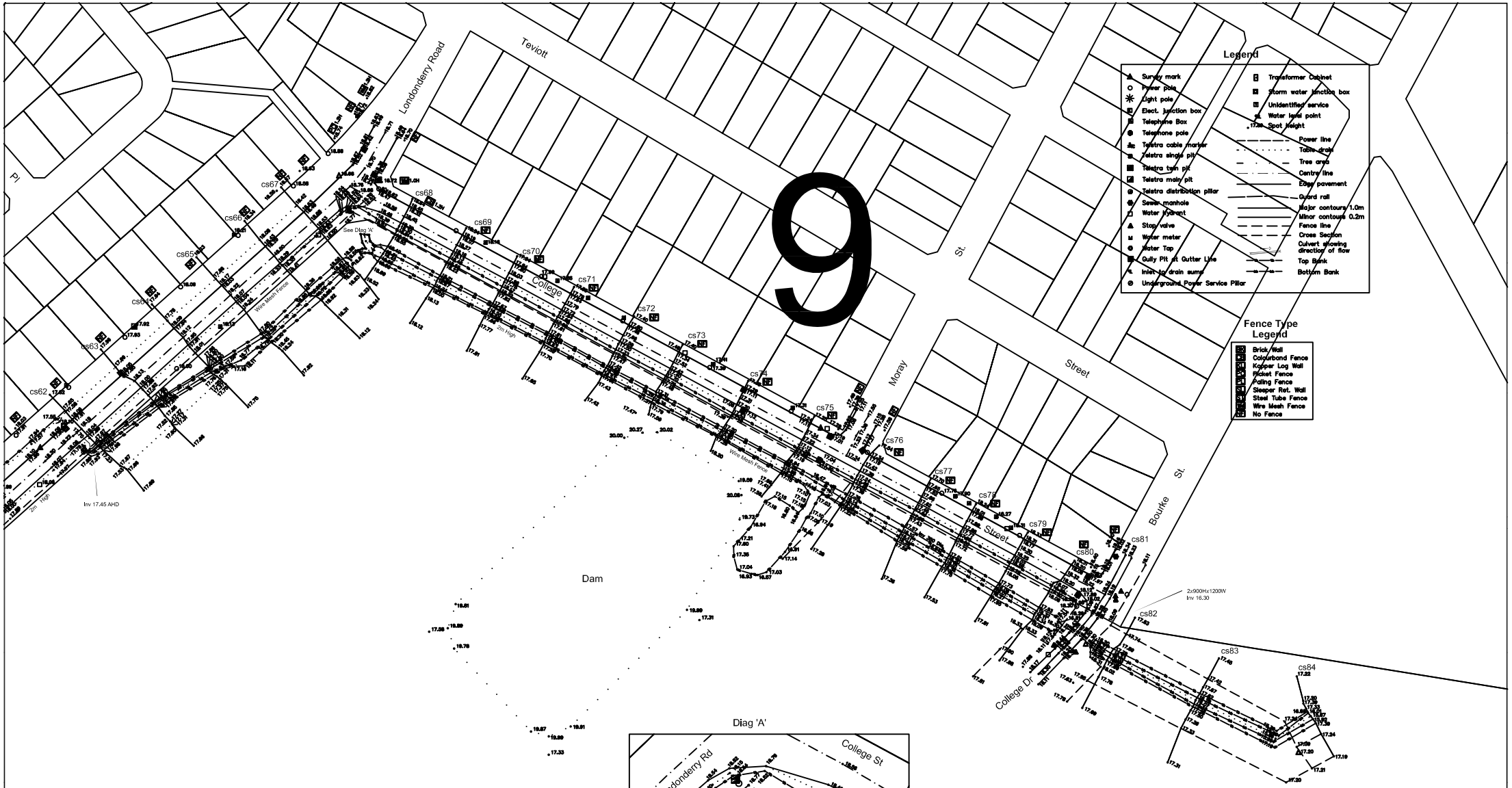
DRAWN: CMcC	DATE: 14/07/05	EXAMINED: PG	SCALE: 1:1000	PLAN NO:2071 SHT. 8 OF 18



ZONE	REF.	REVISION	BY	CKD	DATE

SURVEY SERVICES
LEVEL 5
10 VALENTINE AVE
PARRAMATTA 2150

HAWKESBURY - OVERLAND FLOW STUDY
HOBARTVILLE

State water

SURVEYED: PG & JRS	FIELD BOOK: FB230 & FB240	DATE: 3/06/05	DRAWING FILE: 2071-Hobartville.dwg	A1
DATUM: AHD	RL ORIGIN: SSM 61300 & SSM61321		COORD. SYSTEM: ISG Zone 56/1	
DRAWN: CMcC	DATE: 14/07/05	EXAMINED: PG	SCALE: 1:1000	PLAN NO: 2071 SHT. 9 OF 18

APPENDIX C

STUDY AREA PHOTOGRAPHS

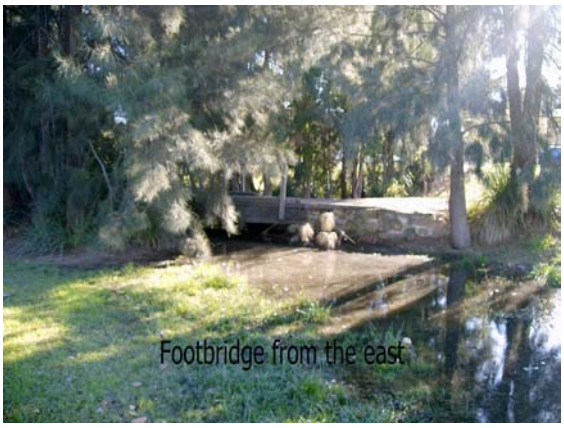

Annette Pl from East Market St


West along the waterway
from East Market St


North along East Market St


Culvert under East Market St


South along East Market St


Footbridge from the east


West along Laurence St


Footbridge from the west


West from Cross section 36


Footbridge from Cross section 39


Sydney Water Site on Laurence St


Footbridge from west

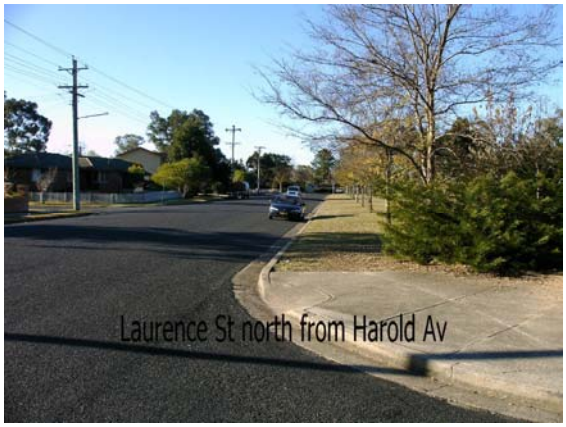

South from Sydney Water Site


Footbridge from Cross section 40


Waterway South from Sydney Water Site


Waterway south from footbridge


Culvert North side of Harold St

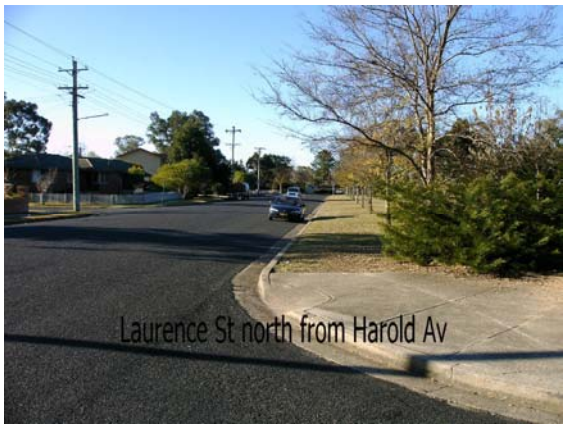

Laurence St north from Harold Av


Culvert Southside of Harold Av


Laurence St south from Harold Av


Harold St from Laurence St


Daycare Centre from Laurence St


Laurence St north from Harold Av


South along Laurence St


Car Park Enterance From Laurence St

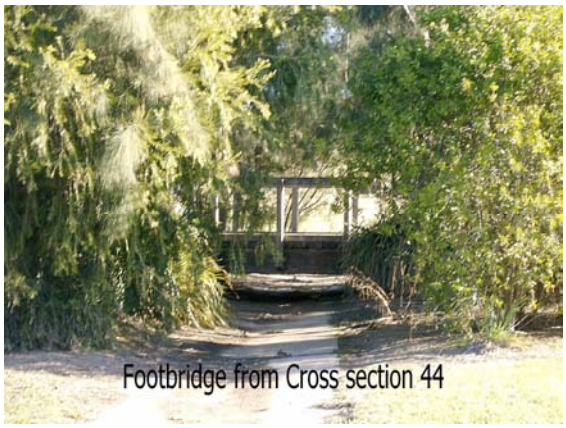

Footbridge from south


Waterway South from Harold St


Waterway south from Footbridge


Car Park at rear of Shopping Centre


Laurence St culvert East side


Footbridge from Cross section 44


Laurence St south from culvert


Laurence St north from culvert


Waterway west from Cross section 49


Laurence St culvert west side


Junction of Waterways


Waterway from Laurence St


North towards Powell St


Tamplin Field from cross section 49


Culvert southside of Powell St


North along Powell St


South from Hereford St


South along Powell St


Culvert at Hereford St


Culvert northside Powell St


South along Hereford St


North from Powell St


North along Hereford St


Douglas St from Hereford St


Waterway south from Valder St


East along Douglas St from site


East along Valder St


West along Douglas St from site


50
West along Valder St


Culvert Southside Valder St


North from Valder St


Culvert Northside of Valder St


Culvert West side of Douglas St


South along Douglas St towards HolborroeAv


Waterway west of Douglas St


North along Douglas St


End of Waterway at Castlereagh Rd


Culvert East side of Douglas St


Culvert under Castlereagh Rd


West towards Castlereagh Rd


North along Castlereagh Rd

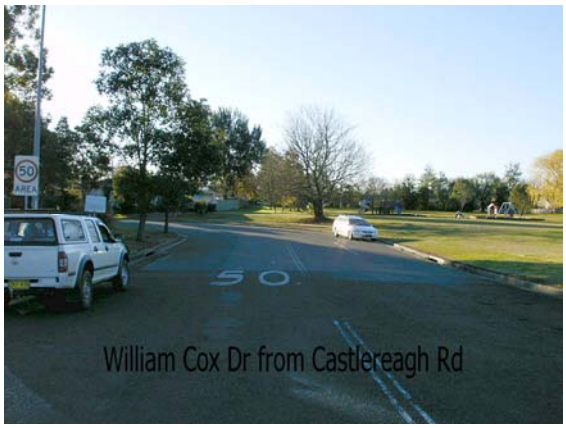

South along Castlereagh Rd


North from William Cox Dr


Looking across Castleagh Rd


South from William Cox Dr


Looking south towards Waterway


50
50
AREA
William Cox Dr from Castlereagh Rd


West along William Cox Dr


John Tebbut Pl west from intersection


North from John tebbut Pl


John Tebbut Pl looking towards Castlereagh Rd


Castlereagh Rd South from John Tebbut Pl


Dam and Catchment at H1


John tebbut Pl East from intersection


Southee Rd from Castlereagh Rd


Outlet at H2


Southee Rd at H4


Southee St at H2


Londerry Rd north at H5

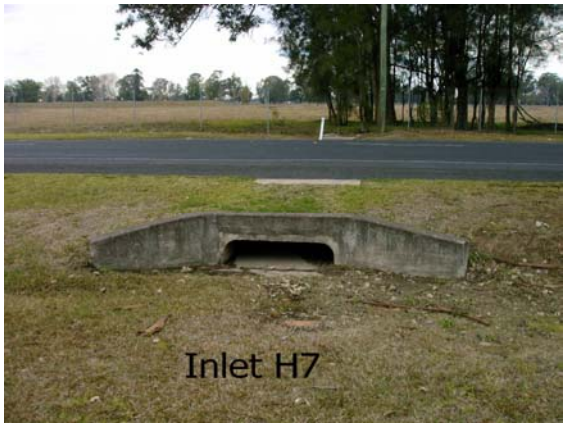

Dam and catchment at H3


SoutheeRd from Londonderry Rd


Inlet H4


Inlet H5


Londonderry Rd south from Southee Rd


Inlet H7


Londonderry Rd north from H6


Outlet H7


Inlet H6


Intersection of Colledge St and Londonerry Rd


Londonderry Rd north from H6


Colledge St from Londonerry Rd


Drainage Channel from Londonderry Rd


Channel upstream of Bourke St


University enterance


Channel downstream of Bourke St

APPENDIX D

LANEWAY PHOTOGRAPHS

Photo L1-1
View of L1 from Grand Flaneur Avenue

Photo L1-2
View of L1 from William Cox Drive

Photo L2-1
View of L2 from Hereford Street

Photo L2-2
View of L2 from school grounds

Photo L3-1
View of L3 from reserve

Photo L3-2
View of L3 from Town Street

Photo L4-1
View of L4 from Day Avenue

Photo L4-2
View of L4 from reserve

Photo L5-1
View of L5 from Sardonyx Ave

Photo L5-2
View of L5 from reserve

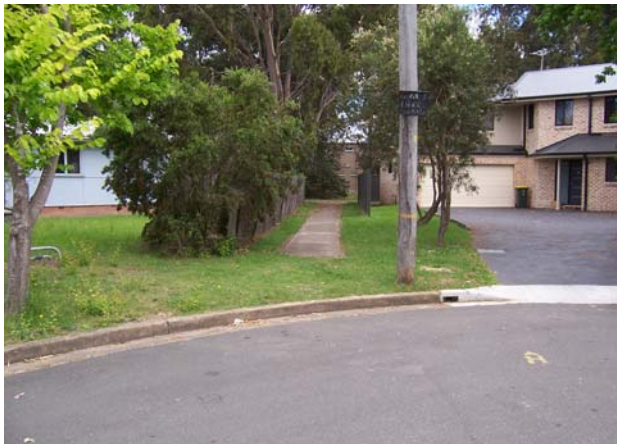


Photo L6-1
View of L6 from Ducker Avenue

Photo L6-2
View of L6 from reserve

Photo L7-1
View of L7 from Reynolds Avenue

Photo L7-2
View of L7 from reserve

Photo L8-1
View of L8 from Sloper Avenue

Photo L8-2
View of L8 from reserve

Photo L9-1
View of L9 bend and inlet pit

Photo L9-2
View of L9 from Brentwood Avenue

Photo L9-3
View of L9 from Londonderry Road