Prepared By:

Functional Servicing And Stormwater Management Report

Glen Allan Subdivision
Township of Mapleton

GMBP File: 317033

January 2019

GUELPH | OWEN SOUND | LISTOWEL | KITCHENER |LONDON | HAMILTON | GTA
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GLEN ALLAN SUBDIVISION

FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT

JANUARY 2019

GMBP FILE: 317033

1. INRODUCTION

GM BluePlan Engineering Limited has been retained by the Glen Allan Subdivision ownership group to prepare this Functional Servicing and Stormwater Management Report in support of a Draft Plan of Subdivision application for a residential subdivision in the hamlet of Glen Allan, in the Township of Mapleton.

The subject property is located in the south side of Glen Allan, legally described as Lots 37, 38 and 39 east of Centre Street and south of Hill Street, and Lots 40 and 41 west of Centre Street and south of Hill Street, and Lots 42 and 43 west of Centre Street and north of George Street, and Lots 44, 45 and 46 east of Centre Street and north of George Street, and Lots 62, 63 and 64 west of South Mill Street and south of George Street, and Lots 65, 66 and 67 east of Centre Street and south of George Street, and Lots 68 and 69 west of Centre Street and south of George Street, and Lots 70 and 71 west of Centre Street and north of Wellesley Street, and Lots 72, 73 and 74 east of Centre Street and north of Wellesley Street, and Lots 75, 76 and 77 west of South Mill Street and north of Wellesley Street all being in Donald Sutherland's Survey and Part of Lot 5, Concession 2, Geographic Township of Peel, Township of Mapleton, County of Wellington and also includes the unopened road allowances of Hill Street, George Street, Wellesley Street, South Mill Street, Centre Street. The approximately 4.285 hectare (10.588 acre) site is situated west of South Mill Street and south of Wellington Road 45 with access from George Street. Figure No. 1, Site Location Map, shows the location of the proposed development and the surrounding area.

2. EXISTING CONDITIONS

The property is currently designated for Residential use in the Wellington County Official Plan and zoned as Unserviced Residential and Future Development in Mapleton's current Zoning By-Law. The site is bound by a mixture of land uses, including, residential to the north and east, future development to the south (currently agricultural) and agricultural to the west. The site is currently used as an actively cultivated farm field that splits the drainage so part of the site drains to the northwest and the remainder drains to the southeast. Figure No. 2, Existing Conditions Site Plan, shows the existing site conditions.

3. PROPOSED DEVELOPMENT

The proposed plan of subdivision has been prepared by MHBC Planning. The Draft Plan consists of 11 single family rural estate residential lots, a stormwater management block, a future development block (for a future cul-de-sac on Centre Street) and a road widening along South Mill Street. Approximately 200m of 20.0m wide roads will be constructed covering an area of about 0.548 hectare. It is anticipated that the development will be Draft Approved, Registered and constructed at one time. Figure No. 3 shows the Draft Plan of Subdivision.

3.1 Grading

Based on our review of the site's topography and our preliminary calculation, we consider that the development can be graded to conform to the intent of the Township of Mapleton's Development Standards. The existing

Functional Servicing and Stormwater Management Report Glen Allan Subdivision Township of Mapleton

SITE LOCATION MAP

Figure No. 1

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Scale: N.T.S.

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Functional Servicing and Stormwater Management Report Glen Allan Subdivision Township of Mapleton

7832 WELLINGTON RD. 45

7822 WELLINGTON RD. 45

7820 WELLINGTON RD. 45

CENTRE STREET

CENTRE STREET (UNOPENED ROW)

WELLESLEY STREET (UNOPENED ROW)

GEORGE STREET (UNOPENED ROW)

HILL STREET (UNOPENED ROW)

7 CENTRE ST.

18 SOUTH MILL ST.

8 SOUTH MILL ST.

24 SOUTH MILL ST.

SOUTH MILL STREET

25 SOUTH MILL ST

17 SOUTH MILL ST

11 SOUTH MILL ST

35 SOUTH MILL ST.

HILL STREET

LEGEND:

SITE BOUNDARY

EXISTING DIRECTION OF SURFACE DRAINAGE

N

EXISTING CONDITIONS SITE PLAN

Figure No. 2

BluePlan ENGINEERING

317033
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Scale: 1:1000

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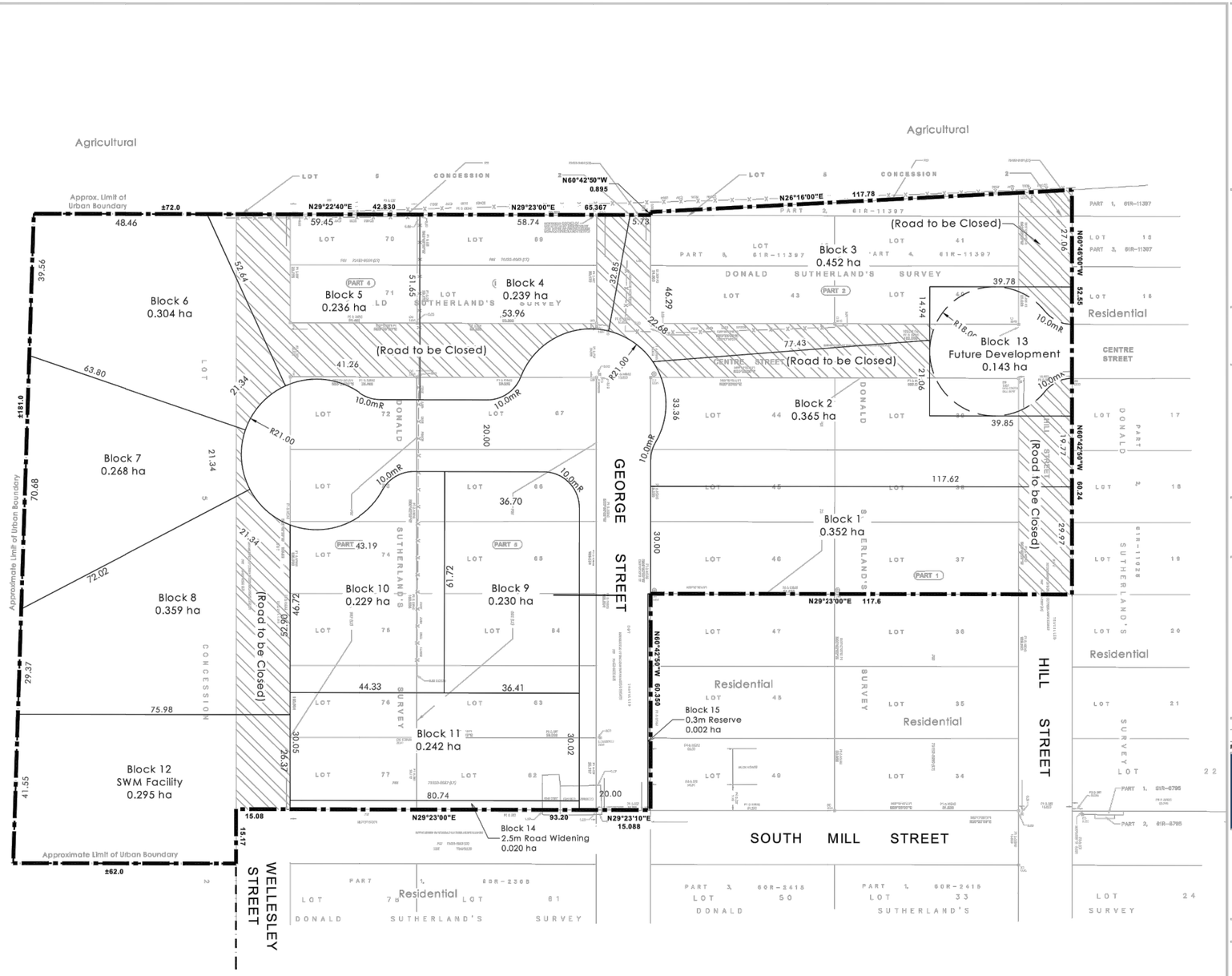

DRAFT PLAN OF SUBDIVISION

Legal Description

LOTS 34-36 WEST OF SOUTH MILL ST AND SOUTH OF HILL ST &
LOTS 37-39 EAST OF CENTRE ST AND SOUTH OF HILL ST &
LOTS 40 AND 41 WEST OF CENTRE ST AND SOUTH OF HILL ST &
LOTS 42 AND 43 WEST OF CENTRE ST AND NORTH OF GEORGE ST &
LOTS 44-46 EAST OF CENTRE ST AND NORTH OF GEORGE ST &
LOTS 62-64 WEST OF SOUTH MILL ST AND SOUTH OF GEORGE ST &
LOTS 65-67 EAST OF CENTRE ST AND SOUTH OF GEORGE ST &
LOTS 68 AND 69 WEST OF CENTRE ST AND SOUTH OF GEORGE ST &
LOTS 70 AND 71 WEST OF CENTRE ST AND NORTH OF WELLESLEY ST &
LOTS 72-74 EAST OF CENTRE ST AND NORTH OF WELLESLEY ST &
LOTS 75-77 WEST OF SOUTH MILL ST AND NORTH OF WELLESLEY ST,
ALL BEING IN DONALD SUTHERLAND'S SURVEY AND
PART OF LOT 5, CONC. 2
(GEOGRAPHIC TOWNSHIP OF PEEL)
TOWNSHIP OF MAPLETON
COUNTY OF WELLINGTON

Owner's Certificate

I HEREBY AUTHORIZE MACNAUGHTON HERMSEN BRITTON CLARKSON PLANNING LIMITED TO SUBMIT THIS PLAN FOR APPROVAL.

DATE:_____ Heather Smith & Steve Guschlbaer

DATE:_____ Steve Sebben

DATE:_____ Murray Martin

Surveyor's Certificate

I HEREBY CERTIFY THAT THE BOUNDARIES OF THE LAND TO BE SUBDIVIDED ON THIS PLAN AND THEIR RELATIONSHIP TO THE ADJACENT LANDS ARE ACCURATELY AND CORRECTLY SHOWN.

DATE:_____ NAME, OLS (COMPANY)

Key Plan

Subject Lands
Urban Boundary

Source: County of Wellington

SCALE: NTS

Additional Information Required Under Section 51(17) of the Planning Act R.S.O. 1990, c.P.13 as Amended

A. AS SHOWN	B. AS SHOWN	C. AS SHOWN
D. RESIDENTIAL	E. AS SHOWN	F. AS SHOWN
G. AS SHOWN	H. MUNICIPAL WATER SUPPLY	I. LOAM
J. AS SHOWN	K. ALL SERVICES REQUIRED	L. AS SHOWN

Area Schedule

Description	Lots/Blocks	Units	Area (ha)
Residential	1-11	11	3.277
Storm Water Management	12		0.295
Future Development	13		0.143
Road Widening	14		0.020
0.3m Reserve	15		0.002
Roads			0.548
Total	**15**	**11**	**4.285**

Notes

1. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE SHOWN.
2. BOUNDARY INFORMATION FROM PLAN OF SURVEY PREPARED BY VAN HARTEN SURVEYING INC., NOV. 6, 2017

Revision No.	Date	Issued / Revision	By
1	Dec. 13, 2018	Remove 6.0m SWM Access	CAC

MHBC PLANNING URBAN DESIGN & LANDSCAPE ARCHITECTURE
200-540 BINGEMANS CENTRE DR. KITCHENER, ON, N2B 3X9 | P: 519.576.3650 F: 519.576.0121 | WWW.MHBCPLAN.COM

Approval Stamp	Date: Dec. 13, 2018
	File No.: 17410A
	Plan Scale: 1:500 (Arch D)
	Drawn By: DGS/CAC
Project: Glen Allan Subdivision	Checked By: PC
Applicants: Heather Smith, Steve Guschlbaer, Steve Sebben & Murray Martin, Mapleton, ON.	north
File Name: DRAFT PLAN	Dwg No.: 1 of 1
Scale Bar: 5 0 25 50m	

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Functional Servicing and Stormwater Management Report
Glen Allan Subdivision
Township of Mapleton

DRAFT PLAN OF SUBDIVISION

Figure No. 3

BluePlan ENGINEERING

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Scale: N.T.S.

topography provides a total vertical relief across the site of approximately17m to the northwest and 13m to the southeast. This will provide adequate opportunity for the majority of the site to drain to the proposed stormwater management facility located in the southeast corner of the site, while maintaining existing drainage patterns and upstream flow paths. The remainder of the site, which under existing conditions drains towards the northeast, will continue to drain there under proposed conditions.

Road and lot grades will be designed to ensure proper drainage and sufficient cover over most municipal storm sewers. Road grades will range from 0.5% to 6.0% across the majority of the site. Lot grading will consist of a mixture of lot types such as back to front drainage, where the lots will drain from the rear of the lot to the front street line and split drainage (including walkout and backsplit lots), where the front of the lots will drain to the front street line and runoff from the rear of the lots will drain towards grassed rear yard swales. Side yard swale grades will range from 2.0% to 6.0%, Houses on Blocks 1-3 are to be located at the minimum front yard setback and all roof leaders are to drain to the front yard. Runoff from roof leaders will be directed to and filtered across grassed surfaces.

The preliminary grades shown on the Conceptual Grading Plan indicate a functional design, however they have not been assessed for efficiency and cut / fill balance and may need to be adjusted accordingly, during the detailed design phase.

During site grading construction, temporary sediment and erosion control measures (such as sediment fencing, sediment ponds, straw bale check dams, etc.) will be implemented for environmental protections. Further details are discussed in Section 3.8. Figure No. 4, Conceptual Grading and Servicing Plan, shows the conceptual site grading.

3.2 Water Supply

There is no existing municipal water distribution system in Glen Allan. Therefore, each lot will have its own private drilled well. Each well is to be installed according to the Ontario Water Resources Act, Regulation 903 (O. Reg. 903) by a licenced MOE Contractor and registered with the MOE. The final location of each well will be determined and approved at the time of building permit application. A MECP D-5-5 drinking water assessment will be completed (under separate cover) to assess the supply and quality of water. Figure No. 4, Conceptual Grading and Servicing Plan, shows a potential location for each private drilled well.

3.3 Sanitary

There is no existing municipal sanitary sewage collection system in Glen Allan. Therefore, each lot will have its own private tertiary on-site sewage treatment system. Each on-site sewage treatment system is to be designed and installed according to the Ontario Building Code by a licenced BCIN (Building Code Identification Number) contractor. The final location of each on-site sewage treatment system will be determined and approved at the time of building permit application. A MECP D-5-4 sewage system assessment will be completed (under separate cover) to assess the potential impact on groundwater caused by on-site sewage systems. Figure No. 4, Conceptual Grading and Servicing Plan, shows a potential location for each the on-site sewage treatment system.

3.4 Storm

There are no existing municipal storm sewers in close proximity to the site. South Mill Street has a rural cross section, using ditches and culverts to convey storm water.

To service this property, municipal storm sewers (300mm – 450mm dia.) will be extended on George Street and South Mill Street. The storm sewers will be sized to convey the runoff generated within the subdivision during a minor design storm event (1 in 5 years) and direct it to the on-site storm water management facility. Catch basins will be spaced according to the Township's standards. Due to the site's topography, it is

APPROX. LOCATION OF PRIVATE DRILLED WELL (TYP.)
FINAL LOCATION TO BE DETERMINED AT THE TIME OF BUILDING PERMIT APPLICATION

APPROX. LOCATION OF PRIVATE ON-SITE TERTIARY SEWAGE TREATMENT SYSTEM (TYP.)
FINAL LOCATION AND SIZE TO BE DETERMINED AT THE TIME OF BUILDING PERMIT APPLICATION

ENVELOPE OF +/- 1,800ft² MAIN FLOOR (PLUS DOUBLE GARAGE) (TYP.)
FINAL LOCATION TO BE DETERMINED AT THE TIME OF BUILDING PERMIT APPLICATION

7832 WELLINGTON RD. 45

MAX. BUILDING ENVELOPE (TYP.)

Functional Servicing and Stormwater Management Report Glen Allan Subdivision Township of Mapleton

BLOCK 1
BLOCK 2
BLOCK 3
BLOCK 4
BLOCK 5
BLOCK 6
BLOCK 7
BLOCK 8
BLOCK 9
BLOCK 10
BLOCK 11
BLOCK 12 SWM FACILITY
BLOCK 13 FUTURE DEVELOPMENT
BLOCK 14 ROAD WIDENING
BLOCK 15 0.3m RESERVE

7822 WELLINGTON RD. 45
7820 WELLINGTON RD. 45
CENTRE STREET
GEORGE STREET
HILL STREET
WELLESLEY STREET
SOUTH MILL STREET
7 CENTRE ST.
8 SOUTH MILL ST.
11 SOUTH MILL ST
17 SOUTH MILL ST
18 SOUTH MILL ST
24 SOUTH MILL ST.
25 SOUTH MILL ST
35 SOUTH MILL ST.

3.0m WIDE OVERFLOW WEIR
MAJOR OVERLAND FLOW ROUTE
OGS UNIT

LEGEND:

- SITE BOUNDARY
- DRAINAGE BREAKLINE / DIVIDE
- PROPOSED DIRECTION OF SURFACE DRAINAGE
- PROPOSED OVERLAND FLOW ROUTE
- ORIGINAL TOPOGRAPHICAL CONTOUR (M.A.S.L.)
- APPROX. PROPOSED ROAD CENTRELINE GRADE
- APPROX. PROPOSED GRADE
- EXISTING GRADE
- EXISTING STORM SEWER
- PROPOSED STORM SEWER (300Ø - 1050Ø)

HOUSES ON BLOCKS 1-3 TO BE LOCATED AT THE MIN. FRONT YARD SET-BACK AND ALL ROOF LEADERS TO DRAIN TO THE FRONT YARD

CONCEPTUAL GRADING AND SERVICING PLAN

Figure No. 4

BluePlan ENGINEERING

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Scale: 1:1000

anticipated that some storm sewers may need to be installed at relatively steep grades, however the maximum allowed full-flow velocities will not be exceeded. Major design storm flows (in excess of the 5-year design storm event) will be conveyed overland and on road surfaces to the stormwater management facility.

Further details regarding stormwater management are discussed in section 3.5. Figure No. 4, Conceptual Grading and Servicing Plan, shows the proposed storm sewer layout.

3.5 Stormwater Management Design

3.5.1 Identification of Drainage Outlets

Based on the existing drainage condition, three (3) drainage outlets were identified as receiving surface runoff from the proposed development area: the easterly, northwesterly and northeasterly outlets.

Easterly Outlet – The easterly outlet represents the confluence of the existing ditch along the east side of South Mill Street (south of George Street), and the existing ditch originating to the south of the subject property and flowing northerly to the un-opened Wellesley Street right-of-way. The confluence is located within the unopened Wellesley Street right-of-way to the east of its intersection with South Mill Street. Downstream of this outlet exists a relatively large private pond located within the 35 South Mill Street property.

Northwesterly Outlet – The northwesterly outlet represents a tributary of the Conestoga River located within the westerly adjacent property (7832 Wellington Road 45). Runoff drains to the northwesterly outlet mostly via overland flow to the westerly adjacent property. Runoff is also believed to drain to the northwesterly outlet via an existing catch basin located in the northwesterly adjacent property (7822 Wellington Road 45) which drains westerly as piped flow.

Northeasterly Outlet – The northeasterly outlet represents the existing storm sewer system located along Wellington Road 45. Runoff draining to the adjacent property to the northeast (7 Centre Street) is expected to drain to the easterly side of the Centre Street right-of-way and be conveyed northerly to the northeasterly outlet.

3.5.2 Stormwater Management Criteria

Based on the existing drainage condition and the requirements of the Township of Mapleton, the SWM criteria used to develop the appropriate SWM approach for the proposed development are as follows.:

a) Post-development peak flow rates discharging from the site to the easterly, northwesterly and northeasterly outlets are to be attenuated to less than, or equal to, existing condition peak flow rates for all design storm events up to, and including, the 100-year design storm event.

b) Enhanced water quality treatment (80% of TSS removal) is to be provided for runoff draining from the subject property prior to discharging from it.

c) The annual runoff volume draining from the site to the easterly outlet under existing condition is to be maintained under post-development condition.

The most recent Mount Forest Intensity-Duration-Frequency (IDF) Curves were used to complete the 2, 5, 10, 25, 50, 100-year design storm analysis. A copy of the calculations for the existing condition and post-development condition analysis using MIDUSS for hydrologic modelling has been provided in Appendix “A”.

The Mount Forest Chicago Distribution rainfall parameters for the 2, 5, 10, 25, 50, and 100-year design storm events, were calculated as follows:

$$I = A / (t+B)^C$$

Where t is the time of concentration, and A, B, and C are defined in the table below.

Table No. 1: Mount Forest Chicago Distribution Rainfall Parameters

Return Period (Year)	A	B	C
2	774.66	7.160	0.8166
5	1012.69	8.094	0.8196
10	1175.42	8.674	0.8215
25	1381.40	9.174	0.8235
50	1535.38	9.533	0.8247
100	1702.25	9.944	0.8269

The Regional Storm (Hurricane Hazel) was also modelled for post-development condition only to demonstrate that site runoff can be sufficiently conveyed to and through the proposed SWM facility.

MIDUSS was used to complete the stormwater management system design and analysis, for both the existing and post-development condition.

3.5.3 Existing Condition Drainage Areas

For the existing condition analysis, the site was analyzed as four (4) drainage catchments (see Figure No. 5, Existing Condition Storm Catchment Areas).

Catchment 10 (2.32-hectares, 0% impervious) represents the majority of the site and the portion of the subject property draining to the easterly outlet. Under existing condition, runoff generated from Catchment 10 generally sheet flows overland to the easterly outlet.

Catchment 11 (0.24-hectares, 25% impervious) represents off-site lands located along South Mill Street and a portion of the property located at 24 South Mill Street that are expected to drain to the proposed SWM facility under post-development condition. Under existing condition, runoff generated from Catchment 11 drains overland to the easterly outlet.

Catchment 20 (1.65-hectares, 0% impervious) represents the northwesterly portion of the subject property. Under existing condition, runoff generated from Catchment 20 drains to the northwesterly outlet via a combination of overland sheet flow and piped flow via the existing catch basin located within the northwesterly adjacent property.

Catchment 30 (0.31-hectares, 0% impervious) represents the northeasterly portion of the subject property. Under existing condition, runoff generated from Catchment 30 generally sheet flows overland to the northeasterly adjacent property (7 Centre Street) and Centre Street, draining ultimately to the northeasterly outlet.

The peak flow rates draining from the site to the easterly, northwesterly and northeasterly outlets under existing condition are summarized in Table No. 2 and represent the allowable peak flow rates draining from the site to the respective outlets under post-development condition.

Functional Servicing and Stormwater Management Report Glen Allan Subdivision Township of Mapleton

7832 WELLINGTON RD. 45

NORTHWESTERLY DRAINAGE OUTLET

7822 WELLINGTON RD. 45

7820 WELLINGTON RD. 45

CENTRE STREET (UNOPENED ROW)

CENTRE STREET

NORTHEASTERLY DRAINAGE OUTLET

WELLESLEY STREET (UNOPENED ROW)

GEORGE STREET (UNOPENED ROW)

HILL STREET (UNOPENED ROW)

7 CENTRE ST.

20 | 1.65 | 0

10 | 2.32 | 0

30 | 0.31 | 0

11 | 0.24 | 25

18 SOUTH MILL ST.

24 SOUTH MILL ST.

8 SOUTH MILL ST.

SOUTH MILL STREET

25 SOUTH MILL ST

17 SOUTH MILL ST

11 SOUTH MILL ST

HILL STREET

35 SOUTH MILL ST.

EASTERLY DRAINAGE OUTLET

LEGEND:

- SITE BOUNDARY
- DRAINAGE AREA BOUNDARY
- CATCHMENT NUMBER
- % IMPERVIOUS
- CATCHMENT AREA IN HECTARES
- ORIGINAL TOPOGRAPHICAL CONTOUR (M.A.S.L.)
- DIRECTION OF SURFACE DRAINAGE

EXISTING CONDITION STORM CATCHMENT AREAS

Figure No. 5

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Table No. 2: Existing Condition/ Allowable Flow Rates

Outlet	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year
Easterly Outlet – Catch. 10, 11 (m^3/s)	0.032	0.062	0.087	0.125	0.155	0.188
Northwesterly Outlet – Catch. 20 (m^3/s)	0.019	0.037	0.052	0.074	0.093	0.114
Northeasterly Outlet – Catch, 30 (m^3/s)	0.005	0.010	0.013	0.019	0.023	0.028

3.5.4 Post-Development Condition Drainage Areas

For the post-development condition analysis, the site was analyzed as four (4) drainage catchments (see Figure No. 6, Post-Development Condition Drainage Area Plan).

Catchment 100 (3.08-hectares, 20% impervious) represents the majority of the site and the portion of the subject property draining to the proposed SWM facility. Under post-development condition, runoff generated from Catchment 100 will drain to the proposed SWM facility via a combination of overland flow and piped flow via the proposed storm sewer system, ultimately draining to the easterly outlet via the SWM facility.

Catchment 101 (0.24-hectares, 35% impervious) represents off-site lands located along South Mill Street and a portion of the property located at 24 South Mill Street expected to drain to the proposed SWM facility. Under post-development condition, runoff generated from Catchment 101 drains to the proposed SWM facility via a combination of overland flow and piped flow via the proposed storm sewer system, ultimately draining to the easterly outlet via the SWM facility.

Catchment 200 (*0.98-hectares, 10% impervious*) represents the northwesterly portion of the subject property including a portion of the future cul-de-sac planned by the Township at the end of Centre Street. Under post-development condition, runoff generated from Catchment 200 drains to the northwesterly outlet via a combination of overland sheet flow and piped flow via the existing catch basin located within the northwesterly adjacent property. A 10% imperviousness is assumed for Catchment 200 in consideration of the future cul-de-sac; approximately corresponding to a 15 m-radius cul-de-sac.

Catchment 300 (0.22-hectares, 10% impervious) represents the northeasterly portion of the subject property including a portion of the future cul-de-sac planned by the Township at the end of Centre Street. Under existing condition, runoff generated from Catchment 300 generally sheet flows overland to the northeasterly adjacent property (7 Centre Street) and Centre Street, draining ultimately to the northeasterly outlet. A 10% imperviousness is assumed for Catchment 300 in consideration of the future construction of a cul-de-sac at the end of Centre Street by the Township.

3.5.5 Stormwater Management System Details

Stormwater runoff discharging from Catchments 100 and 101 will be attenuated via the proposed SWM facility, which has been designed as a dry pond type facility. Flows discharging from the proposed SWM facility will be attenuated via two (2) outlet control structures and one (1) 3 m-wide overflow weir.

Stormwater quality control for the subject property is proposed to be provided primarily by an oil grit separator (OGS) unit installed in-line with the proposed storm sewer system at the intersection of South Mill Street and George Street. The approximately 2.03 ha portion of the subject property expected to drain to the OGS unit, as shown in Figure No. 7, Tributary Area of OGS Unit, has an imperviousness of approximately 20% which generally includes portions of rooftop surfaces within Catchment 100, all proposed driveway surfaces and the proposed George Street roadway. The proposed OGS unit will be sized to provide an Enhanced level of water quality treatment (80% TSS removal) for 90% of the annual runoff draining from the above-described tributary

Functional Servicing and Stormwater Management Report
Glen Allan Subdivision
Township of Mapleton

7832 WELLINGTON RD. 45

NORTHWESTERLY DRAINAGE OUTLET

7822 WELLINGTON RD. 45

7820 WELLINGTON RD. 45

BLOCK 1

BLOCK 2

BLOCK 3

BLOCK 4

BLOCK 5

BLOCK 6

BLOCK 7

BLOCK 8

BLOCK 9

BLOCK 10

BLOCK 11

BLOCK 12
SWM FACILITY

BLOCK 13
FUTURE
DEVELOPMENT

BLOCK 14
ROAD WIDENING

BLOCK 15
0.3m RESERVE

200
0.98 | 10

100
3.08 | 20

300
0.22 | 10

101
0.24 | 35

CENTRE STREET

NORTHEASTERLY DRAINAGE OUTLET

7 CENTRE ST.

GEORGE STREET

HILL STREET

SOUTH MILL STREET

WELLESLEY STREET

18 SOUTH MILL ST.

24 SOUTH MILL ST.

8 SOUTH MILL ST.

25 SOUTH MILL ST

17 SOUTH MILL ST

11 SOUTH MILL ST

35 SOUTH MILL ST.

EASTERLY DRAINAGE OUTLET

LEGEND:

- SITE BOUNDARY
- DRAINAGE AREA BOUNDARY
- 100 / 3.08 | 20 — CATCHMENT NUMBER / % IMPERVIOUS / CATCHMENT AREA IN HECTARES
- ORIGINAL TOPOGRAPHICAL CONTOUR (M.A.S.L.)
- DIRECTION OF SURFACE DRAINAGE

POST-DEVELOPMENT CONDITION STORM CATCHMENT AREAS

Figure No. 6

BluePlan ENGINEERING

317033
January 2019
Scale: 1:1000

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Functional Servicing and Stormwater Management Report
Glen Allan Subdivision
Township of Mapleton

7832 WELLINGTON RD. 45

NORTHWESTERLY DRAINAGE OUTLET

7822 WELLINGTON RD. 45

7820 WELLINGTON RD. 45

BLOCK 3

BLOCK 4

BLOCK 5

BLOCK 6

BLOCK 7

BLOCK 8

BLOCK 9

BLOCK 10

BLOCK 11

BLOCK 12
SWM FACILITY

BLOCK 13
FUTURE
DEVELOPMENT

BLOCK 2

BLOCK 1

BLOCK 15
0.3m RESERVE

BLOCK 14
ROAD WIDENING

OGS
2.03 | 20

CENTRE STREET

NORTHEASTERLY DRAINAGE OUTLET

7 CENTRE ST.

GEORGE STREET

HILL STREET

WELLESLEY STREET

SOUTH MILL STREET

18 SOUTH MILL ST.

8 SOUTH MILL ST.

24 SOUTH MILL ST.

25 SOUTH MILL ST

17 SOUTH MILL ST

11 SOUTH MILL ST

35 SOUTH MILL ST.

OGS UNIT

EASTERLY DRAINAGE OUTLET

LEGEND:

- SITE BOUNDARY
- DRAINAGE AREA BOUNDARY
- OGS 2.03 | 20 — CATCHMENT NUMBER; % IMPERVIOUS; CATCHMENT AREA IN HECTARES
- ORIGINAL TOPOGRAPHICAL CONTOUR (M.A.S.L.)
- DIRECTION OF SURFACE DRAINAGE

TRIBUTARY AREA OF OGS UNIT

Figure No. 7

BluePlan ENGINEERING

317033
January 2019
Scale: 1:1000

FILE:W:\Listowel\2017\317033 Glen Allan Subdivision\5 Work In Progress\Drawings\FSR FGURES\317033-07 PROPOSED STORM-OGS.dwg LAYOUT:PR. STM
LAST SAVED BY:Smacmillan, 1/25/2019 8:42:31 AM PLOTTED BY:Steve MacMillan - GM BluePlan 1/25/2019 8:44:31 AM

area for a fine particle distribution. The Hydro International FD-6HC unit is sufficiently sized to achieve these quality control objectives and its supporting sizing calculations are included in Appendix 'A'.

Within the subject property, the impervious surfaces not expected to drain to the OGS unit consist of portions of proposed rooftop surfaces. Runoff draining from these rooftop surfaces is generally considered to be "clean and receives further filtration as it is conveyed overland to the SWM facility.

As an overland flow route for a majority of the site, the capacity of the proposed westerly roadside swale along South Mill Street must be considered in relation to expected major peak flows. From the MIDUSS modelling included in Appendix A, the 100-year peak flow draining from Catchments 100 and 101 is expected to be approximately 0.404 m^3/s prior to attenuation by the proposed SWM facility; during a Regional storm, an approximately 0.390 m^3/s peak flow is expected prior to attenuation. The proposed roadside swale is conservatively considered to provide sufficient capacity to convey the entirety of this approximately 0.404 m^3/s 100-year peak flow. With the minimum slope of the roadside swale proposed at 0.5%, a minimum cross-sectional flow area of 0.48 m^2 is proposed to ensure a sufficient capacity of approximately 0.409 m^3/s (assuming Manning's n = 0.027 for a maintained grass swale).

Along the westerly side of South Mill Street, south of George Street, the minimum width between the edge of the proposed extension of the South Mill Street roadway and the subject property's easterly boundary is approximately 3.5 m. Assuming that the top of the roadside swale's bank is setback 1 m from the edge of the roadway, a swale having a 0.5 m bottom width, a 0.33 m depth, and 3:1 side slopes is expected to fit within the minimum available width (2.5 m swale top width + 1 m setback from road). These minimum swale dimensions yield a flow area of approximately 0.49 m^2 and a resulting capacity of approximately 0.426 m^3/s.

Under realistic conditions, a portion of this 0.404 m^3/s flow would be expected to drain as piped flow via the proposed storm sewer system and not as overland flow. Additionally, the entirety of Catchment 100 is not expected to drain via this overland flow route as a portion of the peak flow would drain overland to the SWM facility as sheet flow. Therefore, the proposed minimum 0.48 m^2 cross-sectional flow area of the proposed roadside swale is expected to provide sufficient capacity as an overland flow and is considered viable given the minimum available width along South Mill Street.

3.5.6 Routing

The hydrologic model MIDUSS was used to create the design storm runoff hydrographs and to route the hydrographs. A copy of the final printout of the hydrologic modelling is appended in Appendix "A".

The results of the routing analysis are as follows:

Table No. 3: Stormwater Management Facility - Stage/Storage/Discharge Capacities

	Available Capacity			Actual Capacity Used		
	Peak Flow (m^3/s)	**Storage Volume (m^3)**	**Storage Elevation (m)**	**Peak Flow (m^3/s)**	**Storage Volume (m^3)**	**Storage Elevation (m)**
Bottom of Pond & T/G Primary Outlet Control Structure (100 mm Ø orifice)	0	0	394.00	---	---	---
2-Year	---	---	---	0.024	198	394.94
T/G Secondary Outlet Control Structure (150 mm Ø orifice)	0.024	204	394.95	---	---	---
5-Year	---	---	---	0.057	275	395.10
10-Year	---	---	---	0.060	360	395.26
25-Year	---	---	---	0.063	486	395.45
50-Year	---	---	---	0.066	596	395.60
Overflow Weir	0.066	600	395.60	---	---	---
100-Year	---	---	---	0.122	640	395.65
Regional	---	---	---	0.364	734	395.76
Top of Bank	0.493	766	395.79	---	---	---

Table No. 4: Post-Development Condition Flow Rates

Outlet	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year	Regional
Easterly Outlet – Catch. 100, 101 (controlled; m^3/s)	0.024	0.057	0.060	0.063	0.066	0.122	0.364
Northwesterly Outlet – Catch. 200 (uncontrolled; m^3/s)	0.016	0.031	0.041	0.058	0.072	0.086	0.106
Northeasterly Outlet – Catch, 300 (uncontrolled; m^3/s)	0.005	0.009	0.013	0.018	0.021	0.025	0.025

The following table compares the post-development condition flow rates to the allowable release rates for the full range of design storm events.

Table No. 5: Comparison of Allowable Release Rates and Post-Development Condition Flow Rates

Outlet	Condition	2-Yr.	5-Yr.	10-Yr.	25-Yr.	50-Yr.	100-Yr.	Reg.
Easterly Outlet	Allowable Release Rates (m^3/s)	0.032	0.062	0.087	0.125	0.155	0.188	N/A
	Post-Development (m^3/s)	0.024	0.057	0.060	0.063	0.066	0.122	0.364
Northwesterly Outlet	Allowable Release Rates (m^3/s)	0.019	0.037	0.052	0.074	0.093	0.114	N/A
	Post-Development (m^3/s)	0.016	0.031	0.041	0.058	0.072	0.086	0.106
Northeasterly Outlet	Allowable Release Rates (m^3/s)	0.005	0.010	0.013	0.019	0.023	0.028	N/A
	Post-Development (m^3/s)	0.005	0.009	0.013	0.018	0.021	0.025	0.025

Therefore, the post-development peak flow rates from the site to the easterly, northwesterly and northeasterly outlets are expected to be attenuated to less than, or equal to, the allowable release rates for all design storm events up to, and including, the 100-year design storm event.

3.5.7 Maintenance Plan

To ensure that the stormwater management system continues to function as designed and constructed, we recommend that the following inspections and maintenance activities be completed on an annual basis:

1. Is there any noticeable damage to the structures (i.e. outlet structures, overflow weirs)? If yes, complete any necessary repairs and/or installation of replacement structures.
2. Is there any noticeable damage to the asphalt/gravel and grassed swales (i.e. erosion, blockages)? If yes, complete any necessary repairs.
3. Is there any indication of a spill (i.e. frothy water, oily sheen on the water)? If yes, investigate, inform the appropriate agencies and complete the necessary clean-up and restoration.
4. Inspect all catch basins, and manholes. Remove and dispose of any accumulated sediment, trash/litter, debris (i.e. sediment, garbage, leaves, etc.).
5. Inspect all swales and overflow locations. Remove and dispose of any accumulated sediment, trash/litter, debris (i.e. sediment, garbage, leaves. etc.).

Please note that any structures identified during the annual inspection to be worn, missing or damaged are to be repaired or replaced within 48 hours.

3.5.8 Annual Runoff Volumes Draining to the Easterly Outlet

A water balance analysis was completed for lands draining to the easterly outlet to confirm that the existing condition annual runoff volume draining to it is maintained in post-development condition. From the proposed development area, Catchments 10 and 11, and Catchments 100 and 101 are considered to contribute runoff volume to the easterly outlet under existing and post-development conditions, respectively. In addition, with the use of the Ontario Flow Assessment Tool provided by the Ministry of Natural Resources and Forestry, an approximately 6.24 ha portion of southerly off-site lands is expected to drain to the easterly outlet in addition to portions of the proposed development site.

With reference to values provided in Table 3.1 of the Stormwater Management Planning and Design (SWMPD) Guide, published by the Ministry of Environment, Conservation and Parks, existing condition ground cover of the on-site and off-site lands draining to the easterly outlet are considered to be "moderately rooted crops". Under post-development condition, on-site lands are considered to be "urban lawns" and off-site lands are considered to be maintained as "moderately rooted crops". The soil type within the subject property is generally characterized as Huron loam, as per the Wellington County Soils Map (Ontario Soil Survey Report No. 35) published by the Department of Agriculture. Huron loam is known to be of the Hydrological Soil Group (HSG) BC. Therefore, the average of the values provided for an HSG B and C soil in Table 3.1 of the SWMPD Guide is considered for analysis purposes.

The values and methodology outlined by the SWMPD Guide provide the runoff volume expected to drain from a given area generally without consideration of possible runoff volume reduction via conveyance measures.

Under post-development condition, the majority of the proposed surface grading within the portion of the site proposed to drain to the easterly outlet meets the requirements of a "vegetated filter strip" as defined by the Low Impact Development Stormwater Management Planning and Design (LIDSWMP) Guide published by the Credit Valley and Toronto and Region Conservation Authorities. From the LIDSWMP Guide, "a conservative runoff reduction rate for vegetated filter strips is 25% for HSG C and D soils and 50% for HSG A and B soils". As an HSG BC soil, Huron loam is considered to provide a conservative runoff reduction rate of 37.5%. Under post-development condition, approximately 3.01 ha of the site is expected to be conveyed by vegetated filter strips prior to discharging to the easterly outlet.

In consideration of the above discussion, the water balance calculations were completed and are attached in Appendix "A" and as summarized in Table No. 6 below.

Table No. 6: Water Balance Analysis Results

Outlet	Hydrological Component	Annual Existing Volume (m^3)	Annual Post-Development Volume (m^3)	Annual Net Change (m^3)	Annual Net Change as a Percentage of Ex. Condition
Easterly Outlet	Runoff	27,616	28,784	+ 1,168	+ 4%
	Recharge	7,691	7,640	- 52	- 1%
Note: The sum of existing and post-development annual recharge and runoff volumes are not equal as evapotranspiration is not shown.					

From Table No. 6, for the portion of on-site and off-site lands expected to drain to the easterly outlet, it is expected that there will be an increase of approximately 4%, or 1,168 m^3, in annual runoff volume under post-development condition from existing condition. Therefore, a minor increase in the annual runoff volume draining to the easterly outlet is expected which is considered to be relatively negligible given that this volume drains over an annual basis.

3.6 Roadways

George Street will be constructed in general conformance with the Township's typical road cross section as shown in STD.DWG. No 101 of the Township's Standards, including a 20.0m right-of-way, 8.5m wide asphalt carriageway, 13.5m asphalt radius within the cul-de-sac and mountable curb and gutter as per OPSD 600.100. The 8.5m wide asphalt roadway will provide enough room to accommodate parking along one side the street. Typical road grades are anticipated to range from 0.65% to 4.0% with a standard roadway cross fall of 2.0%.

South Mill Street, south of the intersection of George Street, will be reconstructed to match existing conditions as a 6.0m wide gravel roadway. This gravel roadway will act as a maintenance access road to the stormwater management facility as well as the major overland flow route for storms in excess of the 5-year design storm. Due to the existing topography typical road grades are anticipated to range from 0.5% to 6.5% with a standard roadway cross fall of 2.0%. The existing ditch on the east side of the street is to be maintained.

A Future Development Block (Block 13) is shown at the end of Centre Street to allow for the future construction of a cul-de-sac at the end of Centre Street by the Township. The existing topography and vegetation in this area may make construction difficult.

3.7 Utilities and Lighting

Local utility providers include Hydro One Networks, and Bell Canada. Both were contacted for comment regarding the general location and capacity / size of their existing plant at the limits or boundaries of this development and / or the general vicinity, and to provide preliminary comments regarding their desire to service this subdivision and any anticipated opportunities or constraints associated with such servicing.

Hydro One Networks confirmed that there is 3-phase (8.32kV) and 1-phase (4.8kV) power readily available to supply this development and that they don't foresee any issues regarding the station and feeder capacity. That being said, this information is based on the current condition of the distribution system, and can change without notice, so a thorough study will be completed once this development has officially been put into the process.

Bell Canada has existing copper plant along South Mill Street, at the intersection of South Mill Street and Hill Street. Since Bell doesn't place copper cable in new subdivisions any more, it would be fibre to the home or nothing. Bell's process for servicing would be later, following the Draft plan application, and as detailed design proceeds. Bell would then submit a Greenfield Template to the Bell Governance Board to seek approval. Their decision at that time would be to either serve, to not serve, or to serve with a contribution from the Developer. Bell also made note of another small development in a rural community where because the Developer's contribution to install fibre to the home was so high the Developer declined Bell and the subdivision proceeded with no wireline telecom provider.

The Township of Mapleton Development Standards include provisions for street lighting on all new internal streets, at the Developer's cost, which would be coordinated with Hydro One. The Township indicated that in a rural setting the street lighting may not need to be to full urban standards as long as there is sufficient / safe lighting at intersections and dead ends.

All lighting and utility infrastructure located within the cul-de-sac is to maintain a constant offset from the curb, similar to the straight section of road, and not protrude into the street to ensure they are not struck by fire vehicles.

3.8 Sediment and Erosion Control

A silt fence will generally be installed along the property boundary and along any environmentally sensitive buffers/areas of the site. The silt fence will serve to minimize the opportunity for water borne sediments to be transported from the site to the adjacent properties. Temporary straw bale check dams will be installed in swales after the initial grading has been completed to slow flow rates and promote the settlement of water borne sediments before they reach the silt fence.

Upon completion of area grading, any area not subject to active construction within an agreed timeframe will be topsoiled and seeded as per OPSS 570 and 572.

Inspection and maintenance of all silt fencing and straw bale check dams will start after installation is complete. The silt fence and check dams will be inspected on a weekly basis during active construction or after a rainfall event of 13 mm or greater. Maintenance will be carried out, within 48 hours, on any part of the features found to need repair.

Once construction has been substantially completed and the ground surface is stabilized, the silt fence and straw bale check dams will be removed, any accumulated sediment within the limits of the development will be collected and removed and the site restoration will be completed.

After construction of the development, erosion and sediment transport will be minimal.

4. SUMMARY

In our opinion, the foregoing adequately demonstrates that development of the subject property as an urban residential subdivision serviced with private drilled wells, private on-site sewage treatment facilities, municipal storm sewers, a storm water management facility and utility services is achievable.

All of which is respectfully submitted.

GM BLUEPLAN ENGINEERING LIMITED
Per:

Ian Eriksen, P.Eng.
Project Engineer

GM BLUEPLAN ENGINEERING LIMITED
Per:

Steven MacMillan, C.E.T.
Senior Technical Specialist

APPENDIX A:
STORMWATER MANAGEMENT ANALYSIS

Hydro First Defense® - HC

Hydro International

Project Name:	Glen Allan Subdivision	*Report Date:*	1/18/2019
Street:	South Mill Street	*City:*	Township of Mapleton
Province:	Ontario	*Country:*	Canada
Designer:	Alex Wilkinson, E.I.T.	*email:*	alex.wilknson@gmbluepla

Paste

Teatment Parameters:

Structure ID:	OGS Unit	
TSS Goal:	80	% Removal
TSS Particle Size:	Fine	
Area:	2.03	ha
Percent Impervious:	20%	
Rational C value:	0.42	Calc. Cn
Rainfall Station:	Waterloo_Wellington	
Peak Storm Flow:		L/s

RESULTS SUMMARY

Model	TSS	Volume
FD-3HC	63.3%	73.2%
FD-4HC	76.7%	86.4%
FD-6HC	**82.7%**	**91.1%**
FD-8HC	83.5%	91.1%

Model Specification:

Model:	**FD-6HC**	
Diameter:	1800	mm
No Bypass Flow:	62.00	L/s
Peak Flow Capacity:	906.00	L/s
Sediment Storage:	1.22	m^3
Oil Storage:	1878.00	L/s

Installation Configuration:

Placement:	Online		
Outlet Pipe Size:	prelim	mm	*Max. pipe size allowed is 750*
Inlet Pipe 1 Size:	prelim	mm	*Pipe exceeds allowable, reduce size or place offline*
Inlet Pipe 2 Size:		mm	*OK*
Inlet Pipe 3 Size:		mm	*OK*

Rim Level:	prelim	m	Calc Invs.
Outlet Pipe Invert:	prelim	m	
Invert Pipe 1:	prelim	m	*OK!*
Invert Pipe 2:		m	
Invert Pipe 3:		m	

Net Annual Removal Model: FD-6HC

Intensity[1]	Fraction of Rainfall[1]	FD-6HC Removal Efficiency[2]	Weighted Net Annual Efficiency
(mm/hr)	(%)	(%)	(%)
0.50	8.1%	99.8%	8.1%
1.00	10.3%	99.6%	10.3%
1.50	7.9%	99.4%	7.9%
2.00	8.1%	99.2%	8.0%
3.00	12.3%	98.8%	12.2%
4.00	8.4%	98.4%	8.3%
5.00	6.4%	98.0%	6.3%
6.00	7.8%	97.6%	7.6%
7.00	3.9%	97.3%	3.8%
8.00	2.8%	96.9%	2.7%
9.00	2.8%	96.5%	2.7%
10.00	1.0%	96.1%	1.0%
11.00	2.0%	95.7%	1.9%
12.00	1.3%	95.3%	1.2%
15.00	3.3%	94.2%	3.1%
20.00	1.9%	92.3%	1.8%
25.00	1.8%	90.5%	1.6%
30.00	0.3%	88.7%	0.3%
35.00	0.7%	87.0%	0.6%

Net Annual Treatment:	89.2%
60 Minute Rainfall Adjustment Factor[3]:	-6.5%
Total Net Annual Removal Efficiency:	82.7%
Total Runoff Volume Treated:	**91.1%**

1. Rainfall data based on 10 years of rainfall data for Canadian Station 6149387, Waterloo/Wellingotn Airport, ON
2. Based on third party verified data and appoximating the removal of a PSD similar to the STC Fine distribution
3. Adjustment for use of 60 minute time step data with Tc < 30 min.

Designer Notes:

```
"                MIDUSS Output ---------------------------------------------->"
"                MIDUSS version                              Version 2.25  rev. 473"
"                MIDUSS created                           Sunday, February 07, 2010"
"           10   Units used:                                          ie METRIC"
"                Job folder:       \\os-2k8\users_private\awilkinson\Documents\"
"                                                                    MIDUSS\317033"
"                Output filename:                    317033 - Pre 2 yr - Jan19.out"
"                Licensee name:                                             gmbp"
"                Company                                      Hewlett-Packard Company"
"                Date & Time last used:                        1/7/2019 at 6:42:19 PM"
" 31          TIME PARAMETERS"
"       10.000   Time Step"
"      360.000   Max. Storm length"
"     2400.000   Max. Hydrograph"
" 32          STORM Chicago storm"
"           1   Chicago storm"
"      774.890   Coefficient A"
"        7.160   Constant B"
"        0.817   Exponent C"
"        0.375   Fraction R"
"      360.000   Duration"
"        1.000   Time step multiplier"
"             Maximum intensity            74.888    mm/hr"
"             Total depth                  37.317    mm"
"           6   002hyd   Hydrograph extension used in this file"
" 33          CATCHMENT 10"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"          10   Southerly Portion of Subject Property"
"        0.000   % Impervious"
"        2.320   Total Area"
"      160.000   Flow length"
"        7.500   Overland Slope"
"        2.320   Pervious Area"
"      160.000   Pervious length"
"        7.500   Pervious slope"
"        0.000   Impervious Area"
"      160.000   Impervious length"
"        7.500   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       78.000   Pervious SCS Curve No."
"        0.239   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        7.164   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                  0.029     0.000     0.000     0.000 c.m/sec"
"             Catchment 10           Pervious   Impervious Total Area "
"             Surface Area           2.320      0.000      2.320      hectare"
"             Time of concentration  49.407     4.728      49.406     minutes"
"             Time to Centroid       255.850    174.119    255.849    minutes"
"             Rainfall depth         37.317     37.317     37.317     mm"
"             Rainfall volume        865.75     0.00       865.75     c.m"
"             Rainfall losses        28.394     5.471      28.394     mm"
"             Runoff depth           8.923      31.846     8.923      mm"
"             Runoff volume          207.02     0.00       207.02     c.m"
"             Runoff coefficient     0.239      0.000      0.239      "
"             Maximum flow           0.029      0.000      0.029      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                 0.029     0.029     0.000     0.000"
" 33          CATCHMENT 11"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"          11   Easterly Off-Site Lands"
"       25.000   % Impervious"
"        0.240   Total Area"
"       10.000   Flow length"
```



```
"        5.000   Overland Slope"
"        0.180   Pervious Area"
"       10.000   Pervious length"
"        5.000   Pervious slope"
"        0.060   Impervious Area"
"       10.000   Impervious length"
"        5.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       78.000   Pervious SCS Curve No."
"        0.238   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        7.164   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.782   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                  0.012     0.029     0.000     0.000 c.m/sec"
"             Catchment 11           Pervious   Impervious Total Area "
"             Surface Area           0.180      0.060      0.240      hectare"
"             Time of concentration  10.572     1.012      5.576      minutes"
"             Time to Centroid       204.984    169.794    186.594    minutes"
"             Rainfall depth         37.317     37.317     37.317     mm"
"             Rainfall volume        67.17      22.39      89.56      c.m"
"             Rainfall losses        28.427     8.125      23.352     mm"
"             Runoff depth           8.889      29.192     13.965     mm"
"             Runoff volume          16.00      17.52      33.52      c.m"
"             Runoff coefficient     0.238      0.782      0.374      "
"             Maximum flow           0.005      0.010      0.012      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                 0.012     0.032     0.000     0.000"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                 0.012     0.032     0.032     0.000"
" 40          HYDROGRAPH   Combine    1"
"           6   Combine "
"           1   Node #"
"               Easterly Outlet"
"             Maximum flow                  0.032    c.m/sec"
"             Hydrograph volume           240.536    c.m"
"                 0.012     0.032     0.032     0.032"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                 0.012     0.000     0.032     0.032"
" 33          CATCHMENT 20"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"          20   Northwesterly Portion of Subject Property"
"        0.000   % Impervious"
"        1.650   Total Area"
"      200.000   Flow length"
"        7.500   Overland Slope"
"        1.650   Pervious Area"
"      200.000   Pervious length"
"        7.500   Pervious slope"
"        0.000   Impervious Area"
"      200.000   Impervious length"
"        7.500   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       78.000   Pervious SCS Curve No."
"        0.239   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        7.164   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                  0.019     0.000     0.032     0.032 c.m/sec"
"             Catchment 20           Pervious   Impervious Total Area "
"             Surface Area           1.650      0.000      1.650      hectare"
```

```
"            Time of concentration  56.485     5.405     56.484     minutes"
"            Time to Centroid       265.130    175.222   265.130    minutes"
"            Rainfall depth         37.317     37.317    37.317     mm"
"            Rainfall volume        615.73     0.00      615.73     c.m"
"            Rainfall losses        28.393     5.490     28.393     mm"
"            Runoff depth           8.924      31.826    8.924      mm"
"            Runoff volume          147.25     0.00      147.25     c.m"
"            Runoff coefficient     0.239      0.000     0.239      "
"            Maximum flow           0.019      0.000     0.019      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"          4   Add Runoff "
"                 0.019     0.019     0.032     0.032"
" 40         HYDROGRAPH Copy to Outflow"
"          8   Copy to Outflow"
"                 0.019     0.019     0.019     0.032"
" 40         HYDROGRAPH   Combine    2"
"          6   Combine "
"          2   Node #"
"              Northwesterly Outlet"
"            Maximum flow                 0.019    c.m/sec"
"            Hydrograph volume            147.248  c.m"
"                 0.019     0.019     0.019     0.019"
" 40         HYDROGRAPH Start - New Tributary"
"          2   Start - New Tributary"
"                 0.019     0.000     0.019     0.019"
" 33         CATCHMENT 30"
"          1   Triangular SCS"
"          1   Equal length"
"          1   SCS method"
"         30   Northeasterly Portion of Subject Property"
"      0.000   % Impervious"
"      0.310   Total Area"
"     90.000   Flow length"
"      8.000   Overland Slope"
"      0.310   Pervious Area"
"     90.000   Pervious length"
"      8.000   Pervious slope"
"      0.000   Impervious Area"
"     90.000   Impervious length"
"      8.000   Impervious slope"
"      0.250   Pervious Manning 'n'"
"     78.000   Pervious SCS Curve No."
"      0.239   Pervious Runoff coefficient"
"      0.100   Pervious Ia/S coefficient"
"      7.164   Pervious Initial abstraction"
"      0.015   Impervious Manning 'n'"
"     98.000   Impervious SCS Curve No."
"      0.000   Impervious Runoff coefficient"
"      0.100   Impervious Ia/S coefficient"
"      0.518   Impervious Initial abstraction"
"                 0.005     0.000     0.019     0.019 c.m/sec"
"           Catchment 30           Pervious   Impervious Total Area "
"           Surface Area           0.310      0.000     0.310      hectare"
"           Time of concentration  34.312     3.283     34.312     minutes"
"           Time to Centroid       236.029    171.790   236.029    minutes"
"           Rainfall depth         37.317     37.317    37.317     mm"
"           Rainfall volume        115.68     0.00      115.68     c.m"
"           Rainfall losses        28.398     5.516     28.398     mm"
"           Runoff depth           8.919      31.801    8.919      mm"
"           Runoff volume          27.65      0.00      27.65      c.m"
"           Runoff coefficient     0.239      0.000     0.239      "
"           Maximum flow           0.005      0.000     0.005      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"          4   Add Runoff "
"                 0.005     0.005     0.019     0.019"
" 40         HYDROGRAPH Copy to Outflow"
"          8   Copy to Outflow"
"                 0.005     0.005     0.005     0.019"
" 40         HYDROGRAPH   Combine    3"
"          6   Combine "
"          3   Node #"
"              Northeasterly Outlet"
"            Maximum flow                 0.005    c.m/sec"
```



```
"            Hydrograph volume            27.648   c.m"
"                 0.005     0.005     0.005     0.005"
" 38         START/RE-START TOTALS 30"
"          3   Runoff Totals on EXIT"
"            Total Catchment area                        4.520    hectare"
"            Total Impervious area                       0.060    hectare"
"            Total % impervious                          1.328"
" 19         EXIT"
```

```
"               MIDUSS Output ------------------------------------------------>"
"               MIDUSS version                              Version 2.25  rev. 473"
"               MIDUSS created                           Sunday, February 07, 2010"
"          10   Units used:                                              ie METRIC"
"               Job folder:       \\os-2k8\users_private\awilkinson\Documents\"
"                                                                        MIDUSS\317033"
"               Output filename:                    317033 - Pre 5 yr - Jan19.out"
"               Licensee name:                                                gmbp"
"               Company                                       Hewlett-Packard Company"
"               Date & Time last used:                         1/7/2019 at 6:50:57 PM"
" 31          TIME PARAMETERS"
"       10.000   Time Step"
"      360.000   Max. Storm length"
"     2400.000   Max. Hydrograph"
" 32          STORM Chicago storm"
"           1   Chicago storm"
"     1012.690   Coefficient A"
"        8.094   Constant B"
"        0.820   Exponent C"
"        0.375   Fraction R"
"      360.000   Duration"
"        1.000   Time step multiplier"
"              Maximum intensity            93.011    mm/hr"
"              Total depth                  47.926    mm"
"           6   005hyd   Hydrograph extension used in this file"
" 33          CATCHMENT 10"
"             1   Triangular SCS"
"             1   Equal length"
"             1   SCS method"
"            10   Southerly Portion of Subject Property"
"         0.000   % Impervious"
"         2.320   Total Area"
"       160.000   Flow length"
"         7.500   Overland Slope"
"         2.320   Pervious Area"
"       160.000   Pervious length"
"         7.500   Pervious slope"
"         0.000   Impervious Area"
"       160.000   Impervious length"
"         7.500   Impervious slope"
"         0.250   Pervious Manning 'n'"
"        78.000   Pervious SCS Curve No."
"         0.308   Pervious Runoff coefficient"
"         0.100   Pervious Ia/S coefficient"
"         7.164   Pervious Initial abstraction"
"         0.015   Impervious Manning 'n'"
"        98.000   Impervious SCS Curve No."
"         0.000   Impervious Runoff coefficient"
"         0.100   Impervious Ia/S coefficient"
"         0.518   Impervious Initial abstraction"
"                   0.057     0.000     0.000     0.000 c.m/sec"
"              Catchment 10           Pervious   Impervious Total Area "
"              Surface Area           2.320      0.000      2.320      hectare"
"              Time of concentration  39.192     4.289      39.192     minutes"
"              Time to Centroid       240.443    172.271    240.443    minutes"
"              Rainfall depth         47.926     47.926     47.926     mm'
"              Rainfall volume        1111.87    0.00       1111.88    c.m"
"              Rainfall losses        33.168     5.713      33.168     mm'
"              Runoff depth           14.758     42.212     14.758     mm'
"              Runoff volume          342.38     0.00       342.38     c.m"
"              Runoff coefficient     0.308      0.000      0.308      "
"              Maximum flow           0.057      0.000      0.057      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"             4   Add Runoff "
"                   0.057     0.057     0.000     0.000"
" 33          CATCHMENT 11"
"             1   Triangular SCS"
"             1   Equal length"
"             1   SCS method"
"            11   Easterly Off-Site Lands"
"        25.000   % Impervious"
"         0.240   Total Area"
"        10.000   Flow length"
```



```
"         5.000   Overland Slope"
"         0.180   Pervious Area"
"        10.000   Pervious length"
"         5.000   Pervious slope"
"         0.060   Impervious Area"
"        10.000   Impervious length"
"         5.000   Impervious slope"
"         0.250   Pervious Manning 'n'"
"        78.000   Pervious SCS Curve No."
"         0.305   Pervious Runoff coefficient"
"         0.100   Pervious Ia/S coefficient"
"         7.164   Pervious Initial abstraction"
"         0.015   Impervious Manning 'n'"
"        98.000   Impervious SCS Curve No."
"         0.803   Impervious Runoff coefficient"
"         0.100   Impervious Ia/S coefficient"
"         0.518   Impervious Initial abstraction"
"                   0.017     0.057     0.000     0.000 c.m/sec"
"              Catchment 11           Pervious   Impervious Total Area "
"              Surface Area           0.180      0.060      0.240      hectare"
"              Time of concentration  8.386      0.918      4.895      minutes"
"              Time to Centroid       199.210    168.405    184.810    minutes"
"              Rainfall depth         47.926     47.926     47.926     mm"
"              Rainfall volume        86.27      28.76      115.02     c.m"
"              Rainfall losses        33.304     9.425      27.334     mm"
"              Runoff depth           14.621     38.501     20.591     mm"
"              Runoff volume          26.32      23.10      49.42      c.m"
"              Runoff coefficient     0.305      0.803      0.430      "
"              Maximum flow           0.009      0.013      0.017      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"             4   Add Runoff "
"                   0.017     0.062     0.000     0.000"
" 40          HYDROGRAPH Copy to Outflow"
"             8   Copy to Outflow"
"                   0.017     0.062     0.062     0.000"
" 40          HYDROGRAPH   Combine    1"
"             6   Combine "
"             1   Node #"
"                 Easterly Outlet"
"              Maximum flow                 0.062    c.m/sec"
"              Hydrograph volume          391.801    c.m"
"                   0.017     0.062     0.062     0.062"
" 40          HYDROGRAPH Start - New Tributary"
"             2   Start - New Tributary"
"                   0.017     0.000     0.062     0.062"
" 33          CATCHMENT 20"
"             1   Triangular SCS"
"             1   Equal length"
"             1   SCS method"
"            20   Northwesterly Portion of Subject Property"
"         0.000   % Impervious"
"         1.650   Total Area"
"       200.000   Flow length"
"         7.500   Overland Slope"
"         1.650   Pervious Area"
"       200.000   Pervious length"
"         7.500   Pervious slope"
"         0.000   Impervious Area"
"       200.000   Impervious length"
"         7.500   Impervious slope"
"         0.250   Pervious Manning 'n'"
"        78.000   Pervious SCS Curve No."
"         0.308   Pervious Runoff coefficient"
"         0.100   Pervious Ia/S coefficient"
"         7.164   Pervious Initial abstraction"
"         0.015   Impervious Manning 'n'"
"        98.000   Impervious SCS Curve No."
"         0.000   Impervious Runoff coefficient"
"         0.100   Impervious Ia/S coefficient"
"         0.518   Impervious Initial abstraction"
"                   0.037     0.000     0.062     0.062 c.m/sec"
"              Catchment 20           Pervious   Impervious Total Area "
"              Surface Area           1.650      0.000      1.650      hectare"
```

```
"            Time of concentration  44.807     4.903      44.807     minutes"
"            Time to Centroid       248.009    173.300    248.008    minutes"
"            Rainfall depth         47.926     47.926     47.926     mm"
"            Rainfall volume        790.77     0.00       790.77     c.m"
"            Rainfall losses        33.170     5.780      33.170     mm"
"            Runoff depth           14.756     42.146     14.756     mm"
"            Runoff volume          243.47     0.00       243.47     c.m"
"            Runoff coefficient     0.308      0.000      0.308      "
"            Maximum flow           0.037      0.000      0.037      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                  0.037     0.037     0.062     0.062"
" 40         HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                  0.037     0.037     0.037     0.062"
" 40         HYDROGRAPH   Combine    2"
"           6   Combine "
"           2   Node #"
"               Northwesterly Outlet"
"            Maximum flow                  0.037    c.m/sec"
"            Hydrograph volume             243.469    c.m"
"                  0.037     0.037     0.037     0.037"
" 40         HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                  0.037     0.000     0.037     0.037"
" 33         CATCHMENT 30"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"          30   Northeasterly Portion of Subject Property"
"       0.000   % Impervious"
"       0.310   Total Area"
"      90.000   Flow length"
"       8.000   Overland Slope"
"       0.310   Pervious Area"
"      90.000   Pervious length"
"       8.000   Pervious slope"
"       0.000   Impervious Area"
"      90.000   Impervious length"
"       8.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      78.000   Pervious SCS Curve No."
"       0.307   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       7.164   Pervious Initial abstraction"
"       0.015   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.000   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                  0.010     0.000     0.037     0.037 c.m/sec"
"            Catchment 30           Pervious   Impervious Total Area "
"            Surface Area           0.310      0.000      0.310      hectare"
"            Time of concentration  27.219     2.978      27.219     minutes"
"            Time to Centroid       224.392    170.128    224.392    minutes"
"            Rainfall depth         47.926     47.926     47.926     mm"
"            Rainfall volume        148.57     0.00       148.57     c.m"
"            Rainfall losses        33.190     5.894      33.190     mm"
"            Runoff depth           14.735     42.032     14.735     mm"
"            Runoff volume          45.68      0.00       45.68      c.m"
"            Runoff coefficient     0.307      0.000      0.307      "
"            Maximum flow           0.010      0.000      0.010      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                  0.010     0.010     0.037     0.037"
" 40         HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                  0.010     0.010     0.010     0.037"
" 40         HYDROGRAPH   Combine    3"
"           6   Combine "
"           3   Node #"
"               Northeasterly Outlet"
"            Maximum flow                  0.010    c.m/sec"
```



```
"            Hydrograph volume             45.679    c.m"
"                  0.010     0.010     0.010     0.010"
" 38         START/RE-START TOTALS 30"
"           3   Runoff Totals on EXIT"
"            Total Catchment area                          4.520    hectare"
"            Total Impervious area                         0.060    hectare"
"            Total % impervious                            1.328"
" 19         EXIT"
```

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"                MIDUSS version                          Version 2.25  rev. 473"
"                MIDUSS created                       Sunday, February 07, 2010"
"           10   Units used:                                        ie METRIC"
"                Job folder:       \\os-2k8\users_private\awilkinson\Documents\"
"                                                                  MIDUSS\317033"
"                Output filename:                317033 - Pre 10 yr - Jan19.out"
"                Licensee name:                                          gmbp"
"                Company                                  Hewlett-Packard Company"
"                Date & Time last used:                    1/7/2019 at 7:01:57 PM"
" 31          TIME PARAMETERS"
"       10.000   Time Step"
"      360.000   Max. Storm length"
"     2400.000   Max. Hydrograph"
" 32          STORM Chicago storm"
"           1   Chicago storm"
"     1175.420   Coefficient A"
"        8.674   Constant B"
"        0.822   Exponent C"
"        0.375   Fraction R"
"      360.000   Duration"
"        1.000   Time step multiplier"
"              Maximum intensity          104.616    mm/hr"
"              Total depth                 54.935    mm"
"           6   010hyd   Hydrograph extension used in this file"
" 33          CATCHMENT 10"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"          10   Southerly Portion of Subject Property"
"        0.000   % Impervious"
"        2.320   Total Area"
"      160.000   Flow length"
"        7.500   Overland Slope"
"        2.320   Pervious Area"
"      160.000   Pervious length"
"        7.500   Pervious slope"
"        0.000   Impervious Area"
"      160.000   Impervious length"
"        7.500   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       78.000   Pervious SCS Curve No."
"        0.348   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        7.164   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                  0.080     0.000     0.000     0.000 c.m/sec"
"              Catchment 10           Pervious   Impervious Total Area "
"              Surface Area           2.320      0.000      2.320      hectare"
"              Time of concentration  35.033     4.073      35.033     minutes"
"              Time to Centroid       233.645    171.373    233.645    minutes"
"              Rainfall depth         54.935     54.935     54.935     mm"
"              Rainfall volume        1274.49    0.00       1274.49    c.m"
"              Rainfall losses        35.833     5.941      35.833     mm"
"              Runoff depth           19.102     48.994     19.102     mm"
"              Runoff volume          443.16     0.00       443.16     c.m"
"              Runoff coefficient     0.348      0.000      0.348      "
"              Maximum flow           0.080      0.000      0.080      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                 0.080     0.080     0.000     0.000"
" 33          CATCHMENT 11"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"          11   Easterly Off-Site Lands"
"       25.000   % Impervious"
"        0.240   Total Area"
"       10.000   Flow length"
```



```
"        5.000   Overland Slope"
"        0.180   Pervious Area"
"       10.000   Pervious length"
"        5.000   Pervious slope"
"        0.060   Impervious Area"
"       10.000   Impervious length"
"        5.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       78.000   Pervious SCS Curve No."
"        0.340   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        7.164   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.812   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                  0.021     0.080     0.000     0.000 c.m/sec"
"              Catchment 11           Pervious   Impervious Total Area "
"              Surface Area           0.180      0.060      0.240      hectare"
"              Time of concentration  7.496      0.872      4.561      minutes"
"              Time to Centroid       196.710    167.676    183.849    minutes"
"              Rainfall depth         54.935     54.935     54.935     mm"
"              Rainfall volume        98.88      32.96      131.84     c.m"
"              Rainfall losses        36.236     10.323     29.758     mm"
"              Runoff depth           18.698     44.612     25.177     mm"
"              Runoff volume          33.66      26.77      60.42      c.m"
"              Runoff coefficient     0.340      0.812      0.458      "
"              Maximum flow           0.012      0.014      0.021      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                 0.021     0.087     0.000     0.000"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                 0.021     0.087     0.087     0.000"
" 40          HYDROGRAPH   Combine    1"
"           6   Combine "
"           1   Node #"
"               Easterly Outlet"
"              Maximum flow                 0.087    c.m/sec"
"              Hydrograph volume          503.584    c.m"
"                 0.021     0.087     0.087     0.087"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                 0.021     0.000     0.087     0.087"
" 33          CATCHMENT 20"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"          20   Northwesterly Portion of Subject Property"
"        0.000   % Impervious"
"        1.650   Total Area"
"      200.000   Flow length"
"        7.500   Overland Slope"
"        1.650   Pervious Area"
"      200.000   Pervious length"
"        7.500   Pervious slope"
"        0.000   Impervious Area"
"      200.000   Impervious length"
"        7.500   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       78.000   Pervious SCS Curve No."
"        0.348   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        7.164   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                  0.052     0.000     0.087     0.087 c.m/sec"
"              Catchment 20           Pervious   Impervious Total Area "
"              Surface Area           1.650      0.000      1.650      hectare"
```

```
"             Time of concentration  40.052     4.657      40.052     minutes"
"             Time to Centroid       240.513    172.313    240.513    minutes"
"             Rainfall depth         54.935     54.935     54.935     mm"
"             Rainfall volume        906.42     0.00       906.42     c.m"
"             Rainfall losses        35.838     5.873      35.838     mm"
"             Runoff depth           19.096     49.062     19.097     mm"
"             Runoff volume          315.09     0.00       315.09     c.m"
"             Runoff coefficient     0.348      0.000      0.348      "
"             Maximum flow           0.052      0.000      0.052      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                   0.052     0.052     0.087     0.087"
" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                   0.052     0.052     0.052     0.087"
" 40          HYDROGRAPH   Combine    2"
"            6   Combine "
"            2   Node #"
"                Northwesterly Outlet"
"             Maximum flow                  0.052    c.m/sec"
"             Hydrograph volume             315.093  c.m"
"                   0.052     0.052     0.052     0.052"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                   0.052     0.000     0.052     0.052"
" 33          CATCHMENT 30"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"           30   Northeasterly Portion of Subject Property"
"         0.000   % Impervious"
"         0.310   Total Area"
"        90.000   Flow length"
"         8.000   Overland Slope"
"         0.310   Pervious Area"
"        90.000   Pervious length"
"         8.000   Pervious slope"
"         0.000   Impervious Area"
"        90.000   Impervious length"
"         8.000   Impervious slope"
"         0.250   Pervious Manning 'n'"
"        78.000   Pervious SCS Curve No."
"         0.347   Pervious Runoff coefficient"
"         0.100   Pervious Ia/S coefficient"
"         7.164   Pervious Initial abstraction"
"         0.015   Impervious Manning 'n'"
"        98.000   Impervious SCS Curve No."
"         0.000   Impervious Runoff coefficient"
"         0.100   Impervious Ia/S coefficient"
"         0.518   Impervious Initial abstraction"
"                   0.013     0.000     0.052     0.052 c.m/sec"
"                Catchment 30           Pervious   Impervious Total Area "
"             Surface Area              0.310      0.000      0.310      hectare"
"             Time of concentration     24.330     2.829      24.330     minutes"
"             Time to Centroid          219.107    169.341    219.107    minutes"
"             Rainfall depth            54.935     54.935     54.935     mm"
"             Rainfall volume           170.30     0.00       170.30     c.m"
"             Rainfall losses           35.857     6.167      35.857     mm"
"             Runoff depth              19.078     48.768     19.078     mm"
"             Runoff volume             59.14      0.00       59.14      c.m"
"             Runoff coefficient        0.347      0.000      0.347      "
"             Maximum flow              0.013      0.000      0.013      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                   0.013     0.013     0.052     0.052"
" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                   0.013     0.013     0.013     0.052"
" 40          HYDROGRAPH   Combine    3"
"            6   Combine "
"            3   Node #"
"                Northeasterly Outlet"
"             Maximum flow                  0.013    c.m/sec"
```



```
"             Hydrograph volume             59.141   c.m"
"                   0.013     0.013     0.013     0.013"
" 38          START/RE-START TOTALS 30"
"            3   Runoff Totals on EXIT"
"             Total Catchment area                          4.520    hectare"
"             Total Impervious area                         0.060    hectare"
"             Total % impervious                            1.328"
" 19          EXIT"
```

```
"                MIDUSS Output ------------------------------------------------>"
"                MIDUSS version                              Version 2.25  rev. 473"
"                MIDUSS created                           Sunday, February 07, 2010"
"           10   Units used:                                              ie METRIC"
"                Job folder:       \\os-2k8\users_private\awilkinson\Documents\"
"                                                                        MIDUSS\317033"
"                Output filename:                  317033 - Pre 25 yr - Jan19.out"
"                Licensee name:                                             gmbp"
"                Company                                    Hewlett-Packard Company"
"                Date & Time last used:                      1/7/2019 at 7:05:29 PM"
" 31           TIME PARAMETERS"
"       10.000   Time Step"
"      360.000   Max. Storm length"
"     2400.000   Max. Hydrograph"
" 32           STORM Chicago storm"
"           1   Chicago storm"
"     1381.400   Coefficient A"
"        9.174   Constant B"
"        0.823   Exponent C"
"        0.375   Fraction R"
"      360.000   Duration"
"        1.000   Time step multiplier"
"              Maximum intensity           119.599    mm/hr"
"              Total depth                  63.732    mm"
"            6   025hyd   Hydrograph extension used in this file"
" 33           CATCHMENT 10"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"           10   Southerly Portion of Subject Property"
"        0.000   % Impervious"
"        2.320   Total Area"
"      160.000   Flow length"
"        7.500   Overland Slope"
"        2.320   Pervious Area"
"      160.000   Pervious length"
"        7.500   Pervious slope"
"        0.000   Impervious Area"
"      160.000   Impervious length"
"        7.500   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       78.000   Pervious SCS Curve No."
"        0.391   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        7.164   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                  0.114     0.000     0.000     0.000 c.m/sec"
"              Catchment 10           Pervious   Impervious Total Area "
"              Surface Area           2.320      0.000      2.320      hectare"
"              Time of concentration  31.185     3.846      31.185     minutes"
"              Time to Centroid       227.186    170.409    227.186    minutes"
"              Rainfall depth         63.732     63.732     63.732     mm"
"              Rainfall volume        1478.58    0.00       1478.58    c.m"
"              Rainfall losses        38.837     6.122      38.837     mm"
"              Runoff depth           24.895     57.610     24.895     mm"
"              Runoff volume          577.56     0.00       577.56     c.m"
"              Runoff coefficient     0.391      0.000      0.391      "
"              Maximum flow           0.114      0.000      0.114      c.m/sec"
" 40           HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                  0.114     0.114     0.000     0.000"
" 33           CATCHMENT 11"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"           11   Easterly Off-Site Lands"
"       25.000   % Impervious"
"        0.240   Total Area"
"       10.000   Flow length"
```



```
"        5.000   Overland Slope"
"        0.180   Pervious Area"
"       10.000   Pervious length"
"        5.000   Pervious slope"
"        0.060   Impervious Area"
"       10.000   Impervious length"
"        5.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       78.000   Pervious SCS Curve No."
"        0.383   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        7.164   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.820   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                  0.027     0.114     0.000     0.000 c.m/sec"
"              Catchment 11           Pervious   Impervious Total Area "
"              Surface Area           0.180      0.060      0.240      hectare"
"              Time of concentration  6.673      0.823      4.237      minutes"
"              Time to Centroid       193.860    166.867    182.623    minutes"
"              Rainfall depth         63.732     63.732     63.732     mm"
"              Rainfall volume        114.72     38.24      152.96     c.m"
"              Rainfall losses        39.317     11.494     32.362     mm"
"              Runoff depth           24.414     52.238     31.370     mm"
"              Runoff volume          43.95      31.34      75.29      c.m"
"              Runoff coefficient     0.383      0.820      0.492      "
"              Maximum flow           0.016      0.017      0.027      c.m/sec"
" 40           HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                  0.027     0.125     0.000     0.000"
" 40           HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                  0.027     0.125     0.125     0.000"
" 40           HYDROGRAPH   Combine    1"
"            6   Combine "
"            1   Node #"
"                Easterly Outlet"
"              Maximum flow                 0.125    c.m/sec"
"              Hydrograph volume          652.851    c.m"
"                  0.027     0.125     0.125     0.125"
" 40           HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                  0.027     0.000     0.125     0.125"
" 33           CATCHMENT 20"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"           20   Northwesterly Portion of Subject Property"
"        0.000   % Impervious"
"        1.650   Total Area"
"      200.000   Flow length"
"        7.500   Overland Slope"
"        1.650   Pervious Area"
"      200.000   Pervious length"
"        7.500   Pervious slope"
"        0.000   Impervious Area"
"      200.000   Impervious length"
"        7.500   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       78.000   Pervious SCS Curve No."
"        0.391   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        7.164   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                  0.074     0.000     0.125     0.125 c.m/sec"
"              Catchment 20           Pervious   Impervious Total Area "
"              Surface Area           1.650      0.000      1.650      hectare"
```

```
"            Time of concentration  35.652     4.397      35.652     minutes"
"            Time to Centroid       233.265    171.262    233.264    minutes"
"            Rainfall depth         63.732     63.732     63.732     mm"
"            Rainfall volume        1051.57    0.00       1051.57    c.m"
"            Rainfall losses        38.787     6.066      38.787     mm"
"            Runoff depth           24.945     57.666     24.945     mm"
"            Runoff volume          411.59     0.00       411.59     c.m"
"            Runoff coefficient     0.391      0.000      0.391      "
"            Maximum flow           0.074      0.000      0.074      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                  0.074     0.074     0.125     0.125"
" 40         HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                  0.074     0.074     0.074     0.125"
" 40         HYDROGRAPH   Combine    2"
"           6   Combine "
"           2   Node #"
"               Northwesterly Outlet"
"            Maximum flow                  0.074    c.m/sec"
"            Hydrograph volume             411.592  c.m"
"                  0.074     0.074     0.074     0.074"
" 40         HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                  0.074     0.000     0.074     0.074"
" 33         CATCHMENT 30"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"          30   Northeasterly Portion of Subject Property"
"       0.000   % Impervious"
"       0.310   Total Area"
"      90.000   Flow length"
"       8.000   Overland Slope"
"       0.310   Pervious Area"
"      90.000   Pervious length"
"       8.000   Pervious slope"
"       0.000   Impervious Area"
"      90.000   Impervious length"
"       8.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      78.000   Pervious SCS Curve No."
"       0.390   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       7.164   Pervious Initial abstraction"
"       0.015   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.000   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                  0.019     0.000     0.074     0.074 c.m/sec"
"                Catchment 30           Pervious   Impervious Total Area "
"                Surface Area           0.310      0.000      0.310      hectare"
"                Time of concentration  21.657     2.671      21.657     minutes"
"                Time to Centroid       214.049    168.558    214.049    minutes"
"                Rainfall depth         63.732     63.732     63.732     mm"
"                Rainfall volume        197.57     0.00       197.57     c.m"
"                Rainfall losses        38.860     6.448      38.860     mm"
"                Runoff depth           24.872     57.284     24.872     mm"
"                Runoff volume          77.10      0.00       77.10      c.m"
"                Runoff coefficient     0.390      0.000      0.390      "
"                Maximum flow           0.019      0.000      0.019      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                  0.019     0.019     0.074     0.074"
" 40         HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                  0.019     0.019     0.019     0.074"
" 40         HYDROGRAPH   Combine    3"
"           6   Combine "
"           3   Node #"
"               Northeasterly Outlet"
"            Maximum flow                  0.019    c.m/sec"
```



```
"            Hydrograph volume             77.103   c.m"
"                  0.019     0.019     0.019     0.019"
" 38         START/RE-START TOTALS 30"
"           3   Runoff Totals on EXIT"
"            Total Catchment area                          4.520    hectare"
"            Total Impervious area                         0.060    hectare"
"            Total % impervious                            1.328"
" 19         EXIT"
```

```
"                MIDUSS Output ------------------------------------------------>"
"                MIDUSS version                              Version 2.25  rev. 473"
"                MIDUSS created                           Sunday, February 07, 2010"
"           10   Units used:                                              ie METRIC"
"                Job folder:       \\os-2k8\users_private\awilkinson\Documents\"
"                                                                        MIDUSS\317033"
"                Output filename:                  317033 - Pre 50 yr - Jan19.out"
"                Licensee name:                                             gmbp"
"                Company                                    Hewlett-Packard Company"
"                Date & Time last used:                      1/7/2019 at 7:07:44 PM"
" 31           TIME PARAMETERS"
"       10.000   Time Step"
"      360.000   Max. Storm length"
"     2400.000   Max. Hydrograph"
" 32           STORM Chicago storm"
"            1   Chicago storm"
"     1535.380   Coefficient A"
"        9.533   Constant B"
"        0.825   Exponent C"
"        0.375   Fraction R"
"      360.000   Duration"
"        1.000   Time step multiplier"
"             Maximum intensity           130.451    mm/hr"
"             Total depth                  70.279    mm"
"            6   050hyd   Hydrograph extension used in this file"
" 33           CATCHMENT 10"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"           10   Southerly Portion of Subject Property"
"        0.000   % Impervious"
"        2.320   Total Area"
"      160.000   Flow length"
"        7.500   Overland Slope"
"        2.320   Pervious Area"
"      160.000   Pervious length"
"        7.500   Pervious slope"
"        0.000   Impervious Area"
"      160.000   Impervious length"
"        7.500   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       78.000   Pervious SCS Curve No."
"        0.420   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        7.164   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                  0.141     0.000     0.000     0.000 c.m/sec"
"             Catchment 10           Pervious   Impervious Total Area "
"             Surface Area           2.320      0.000      2.320      hectare"
"             Time of concentration  29.017     3.707      29.017     minutes"
"             Time to Centroid       223.344    169.827    223.344    minutes"
"             Rainfall depth         70.279     70.279     70.279     mm"
"             Rainfall volume        1630.46    0.00       1630.46    c.m"
"             Rainfall losses        40.733     6.178      40.733     mm"
"             Runoff depth           29.546     64.101     29.546     mm"
"             Runoff volume          685.46     0.00       685.47     c.m"
"             Runoff coefficient     0.420      0.000      0.420      "
"             Maximum flow           0.141      0.000      0.141      c.m/sec"
" 40           HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                  0.141     0.141     0.000     0.000"
" 33           CATCHMENT 11"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"           11   Easterly Off-Site Lands"
"       25.000   % Impervious"
"        0.240   Total Area"
"       10.000   Flow length"
```



```
"        5.000   Overland Slope"
"        0.180   Pervious Area"
"       10.000   Pervious length"
"        5.000   Pervious slope"
"        0.060   Impervious Area"
"       10.000   Impervious length"
"        5.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       78.000   Pervious SCS Curve No."
"        0.412   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        7.164   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.824   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                  0.032     0.141     0.000     0.000 c.m/sec"
"             Catchment 11           Pervious   Impervious Total Area "
"             Surface Area           0.180      0.060      0.240      hectare"
"             Time of concentration  6.209      0.793      4.042      minutes"
"             Time to Centroid       192.164    166.379    181.847    minutes"
"             Rainfall depth         70.279     70.279     70.279     mm"
"             Rainfall volume        126.50     42.17      168.67     c.m"
"             Rainfall losses        41.353     12.397     34.114     mm"
"             Runoff depth           28.926     57.881     36.165     mm"
"             Runoff volume          52.07      34.73      86.79      c.m"
"             Runoff coefficient     0.412      0.824      0.515      "
"             Maximum flow           0.019      0.018      0.032      c.m/sec"
" 40           HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                  0.032     0.155     0.000     0.000"
" 40           HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                  0.032     0.155     0.155     0.000"
" 40           HYDROGRAPH   Combine    1"
"            6   Combine "
"            1   Node #"
"                Easterly Outlet"
"             Maximum flow                 0.155    c.m/sec"
"             Hydrograph volume          772.261    c.m"
"                  0.032     0.155     0.155     0.155"
" 40           HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                  0.032     0.000     0.155     0.155"
" 33           CATCHMENT 20"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"           20   Northwesterly Portion of Subject Property"
"        0.000   % Impervious"
"        1.650   Total Area"
"      200.000   Flow length"
"        7.500   Overland Slope"
"        1.650   Pervious Area"
"      200.000   Pervious length"
"        7.500   Pervious slope"
"        0.000   Impervious Area"
"      200.000   Impervious length"
"        7.500   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       78.000   Pervious SCS Curve No."
"        0.420   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        7.164   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                  0.093     0.000     0.155     0.155 c.m/sec"
"             Catchment 20           Pervious   Impervious Total Area "
"             Surface Area           1.650      0.000      1.650      hectare"
```

Time of concentration	33.174	4.238	33.174	minutes"	
Time to Centroid	229.175	170.637	229.175	minutes"	
Rainfall depth	70.279	70.279	70.279	mm"	
Rainfall volume	1159.60	0.00	1159.60	c.m"	
Rainfall losses	40.772	6.245	40.772	mm"	
Runoff depth	29.507	64.033	29.507	mm"	
Runoff volume	486.86	0.00	486.86	c.m"	
Runoff coefficient	0.420	0.000	0.420	"	
Maximum flow	0.093	0.000	0.093	c.m/sec"	

```
 40          HYDROGRAPH Add Runoff "
            4   Add Runoff "
                    0.093     0.093     0.155     0.155"
 40          HYDROGRAPH Copy to Outflow"
            8   Copy to Outflow"
                    0.093     0.093     0.093     0.155"
 40          HYDROGRAPH   Combine    2"
            6   Combine "
            2   Node #"
                Northwesterly Outlet"
             Maximum flow                  0.093    c.m/sec"
             Hydrograph volume           486.864    c.m"
                    0.093     0.093     0.093     0.093"
 40          HYDROGRAPH Start - New Tributary"
            2   Start - New Tributary"
                    0.093     0.000     0.093     0.093"
 33          CATCHMENT 30"
            1   Triangular SCS"
            1   Equal length"
            1   SCS method"
           30   Northeasterly Portion of Subject Property"
        0.000   % Impervious"
        0.310   Total Area"
       90.000   Flow length"
        8.000   Overland Slope"
        0.310   Pervious Area"
       90.000   Pervious length"
        8.000   Pervious slope"
        0.000   Impervious Area"
       90.000   Impervious length"
        8.000   Impervious slope"
        0.250   Pervious Manning 'n'"
       78.000   Pervious SCS Curve No."
        0.418   Pervious Runoff coefficient"
        0.100   Pervious Ia/S coefficient"
        7.164   Pervious Initial abstraction"
        0.015   Impervious Manning 'n'"
       98.000   Impervious SCS Curve No."
        0.000   Impervious Runoff coefficient"
        0.100   Impervious Ia/S coefficient"
        0.518   Impervious Initial abstraction"
                    0.023     0.000     0.093     0.093 c.m/sec"
```

Catchment 30	Pervious	Impervious	Total Area	
Surface Area	0.310	0.000	0.310	hectare"
Time of concentration	20.152	2.574	20.152	minutes"
Time to Centroid	211.187	168.094	211.187	minutes"
Rainfall depth	70.279	70.279	70.279	mm"
Rainfall volume	217.86	0.00	217.86	c.m"
Rainfall losses	40.902	6.686	40.902	mm"
Runoff depth	29.376	63.593	29.376	mm"
Runoff volume	91.07	0.00	91.07	c.m"
Runoff coefficient	0.418	0.000	0.418	"
Maximum flow	0.023	0.000	0.023	c.m/sec"

```
 40          HYDROGRAPH Add Runoff "
            4   Add Runoff "
                    0.023     0.023     0.093     0.093"
 40          HYDROGRAPH Copy to Outflow"
            8   Copy to Outflow"
                    0.023     0.023     0.023     0.093"
 40          HYDROGRAPH   Combine    3"
            6   Combine "
            3   Node #"
                Northeasterly Outlet"
             Maximum flow                  0.023    c.m/sec"
```



```
             Hydrograph volume            91.067    c.m"
                    0.023     0.023     0.023     0.023"
 38          START/RE-START TOTALS 30"
            3   Runoff Totals on EXIT"
```

Total Catchment area	4.520	hectare"
Total Impervious area	0.060	hectare"
Total % impervious	1.328"	

```
 19          EXIT"
```

```
"                MIDUSS Output ------------------------------------------------>"
"                MIDUSS version                          Version 2.25  rev. 473"
"                MIDUSS created                       Sunday, February 07, 2010"
"           10   Units used:                                          ie METRIC"
"                Job folder:       \\os-2k8\users_private\awilkinson\Documents\"
"                                                                    MIDUSS\317033"
"                Output filename:               317033 - Pre 100 yr - Jan19.out"
"                Licensee name:                                            gmbp"
"                Company                                  Hewlett-Packard Company"
"                Date & Time last used:                    1/7/2019 at 7:08:38 PM"
" 31           TIME PARAMETERS"
"       10.000   Time Step"
"      360.000   Max. Storm length"
"     2400.000   Max. Hydrograph"
" 32           STORM Chicago storm"
"           1   Chicago storm"
"     1702.250   Coefficient A"
"        9.944   Constant B"
"        0.827   Exponent C"
"        0.375   Fraction R"
"      360.000   Duration"
"        1.000   Time step multiplier"
"              Maximum intensity           141.234    mm/hr"
"              Total depth                  76.839    mm"
"           6   100hyd   Hydrograph extension used in this file"
" 33           CATCHMENT 10"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"          10   Southerly Portion of Subject Property"
"        0.000   % Impervious"
"        2.320   Total Area"
"      160.000   Flow length"
"        7.500   Overland Slope"
"        2.320   Pervious Area"
"      160.000   Pervious length"
"        7.500   Pervious slope"
"        0.000   Impervious Area"
"      160.000   Impervious length"
"        7.500   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       78.000   Pervious SCS Curve No."
"        0.446   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        7.164   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                  0.172     0.000     0.000     0.000 c.m/sec"
"              Catchment 10           Pervious   Impervious Total Area "
"              Surface Area           2.320      0.000      2.320      hectare"
"              Time of concentration  27.236     3.585      27.236     minutes"
"              Time to Centroid       220.053    169.253    220.053    minutes"
"              Rainfall depth         76.839     76.839     76.839     mm"
"              Rainfall volume        1782.67    0.00       1782.67    c.m"
"              Rainfall losses        42.579     6.271      42.579     mm"
"              Runoff depth           34.260     70.568     34.261     mm"
"              Runoff volume          794.84     0.00       794.84     c.m"
"              Runoff coefficient     0.446      0.000      0.446      "
"              Maximum flow           0.172      0.000      0.172      c.m/sec"
" 40           HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                  0.172     0.172     0.000     0.000"
" 33           CATCHMENT 11"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"          11   Easterly Off-Site Lands"
"       25.000   % Impervious"
"        0.240   Total Area"
"       10.000   Flow length"
```



```
"        5.000   Overland Slope"
"        0.180   Pervious Area"
"       10.000   Pervious length"
"        5.000   Pervious slope"
"        0.060   Impervious Area"
"       10.000   Impervious length"
"        5.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       78.000   Pervious SCS Curve No."
"        0.437   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        7.164   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.827   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                  0.037     0.172     0.000     0.000 c.m/sec"
"              Catchment 11           Pervious   Impervious Total Area "
"              Surface Area           0.180      0.060      0.240      hectare"
"              Time of concentration  5.828      0.767      3.872      minutes"
"              Time to Centroid       190.564    165.892    181.029    minutes"
"              Rainfall depth         76.839     76.839     76.839     mm"
"              Rainfall volume        138.31     46.10      184.41     c.m"
"              Rainfall losses        43.234     13.331     35.758     mm"
"              Runoff depth           33.606     63.508     41.081     mm"
"              Runoff volume          60.49      38.10      98.59      c.m"
"              Runoff coefficient     0.437      0.827      0.535      "
"              Maximum flow           0.023      0.020      0.037      c.m/sec"
" 40           HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                  0.037     0.188     0.000     0.000"
" 40           HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                  0.037     0.188     0.188     0.000"
" 40           HYDROGRAPH   Combine    1"
"           6   Combine "
"           1   Node #"
"               Easterly Outlet"
"              Maximum flow                  0.188    c.m/sec"
"              Hydrograph volume           893.439    c.m"
"                  0.037     0.188     0.188     0.188"
" 40           HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                  0.037     0.000     0.188     0.188"
" 33           CATCHMENT 20"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"          20   Northwesterly Portion of Subject Property"
"        0.000   % Impervious"
"        1.650   Total Area"
"      200.000   Flow length"
"        7.500   Overland Slope"
"        1.650   Pervious Area"
"      200.000   Pervious length"
"        7.500   Pervious slope"
"        0.000   Impervious Area"
"      200.000   Impervious length"
"        7.500   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       78.000   Pervious SCS Curve No."
"        0.446   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        7.164   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                  0.114     0.000     0.188     0.188 c.m/sec"
"              Catchment 20           Pervious   Impervious Total Area "
"              Surface Area           1.650      0.000      1.650      hectare"
```

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"                Time of concentration  31.138     4.098      31.138     minutes"
"                Time to Centroid       225.503    170.044    225.503    minutes"
"                Rainfall depth         76.839     76.839     76.839     mm"
"                Rainfall volume        1267.85    0.00       1267.85    c.m"
"                Rainfall losses        42.575     6.377      42.575     mm"
"                Runoff depth           34.264     70.462     34.264     mm"
"                Runoff volume          565.36     0.00       565.36     c.m"
"                Runoff coefficient     0.446      0.000      0.446      "
"                Maximum flow           0.114      0.000      0.114      c.m/sec"
" 40             HYDROGRAPH Add Runoff "
"               4   Add Runoff "
"                       0.114     0.114     0.188     0.188"
" 40             HYDROGRAPH Copy to Outflow"
"               8   Copy to Outflow"
"                       0.114     0.114     0.114     0.188"
" 40             HYDROGRAPH   Combine    2"
"               6   Combine "
"               2   Node #"
"                   Northwesterly Outlet"
"                Maximum flow                    0.114    c.m/sec"
"                Hydrograph volume             565.358    c.m"
"                       0.114     0.114     0.114     0.114"
" 40             HYDROGRAPH Start - New Tributary"
"               2   Start - New Tributary"
"                       0.114     0.000     0.114     0.114"
" 33             CATCHMENT 30"
"               1   Triangular SCS"
"               1   Equal length"
"               1   SCS method"
"              30   Northeasterly Portion of Subject Property"
"            0.000   % Impervious"
"            0.310   Total Area"
"           90.000   Flow length"
"            8.000   Overland Slope"
"            0.310   Pervious Area"
"           90.000   Pervious length"
"            8.000   Pervious slope"
"            0.000   Impervious Area"
"           90.000   Impervious length"
"            8.000   Impervious slope"
"            0.250   Pervious Manning 'n'"
"           78.000   Pervious SCS Curve No."
"            0.445   Pervious Runoff coefficient"
"            0.100   Pervious Ia/S coefficient"
"            7.164   Pervious Initial abstraction"
"            0.015   Impervious Manning 'n'"
"           98.000   Impervious SCS Curve No."
"            0.000   Impervious Runoff coefficient"
"            0.100   Impervious Ia/S coefficient"
"            0.518   Impervious Initial abstraction"
"                       0.028     0.000     0.114     0.114 c.m/sec"
"                Catchment 30           Pervious   Impervious Total Area "
"                Surface Area           0.310      0.000      0.310      hectare"
"                Time of concentration  18.915     2.490      18.915     minutes"
"                Time to Centroid       208.520    167.633    208.520    minutes"
"                Rainfall depth         76.839     76.839     76.839     mm"
"                Rainfall volume        238.20     0.00       238.20     c.m"
"                Rainfall losses        42.617     6.954      42.617     mm"
"                Runoff depth           34.222     69.885     34.222     mm"
"                Runoff volume          106.09     0.00       106.09     c.m"
"                Runoff coefficient     0.445      0.000      0.445      "
"                Maximum flow           0.028      0.000      0.028      c.m/sec"
" 40             HYDROGRAPH Add Runoff "
"               4   Add Runoff "
"                       0.028     0.028     0.114     0.114"
" 40             HYDROGRAPH Copy to Outflow"
"               8   Copy to Outflow"
"                       0.028     0.028     0.028     0.114"
" 40             HYDROGRAPH   Combine    3"
"               6   Combine "
"               3   Node #"
"                   Northeasterly Outlet"
"                Maximum flow                    0.028    c.m/sec"
```



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"                Hydrograph volume             106.088    c.m"
"                       0.028     0.028     0.028     0.028"
" 38             START/RE-START TOTALS 30"
"               3   Runoff Totals on EXIT"
"                Total Catchment area                          4.520    hectare"
"                Total Impervious area                         0.060    hectare"
"                Total % impervious                            1.328"
" 19             EXIT"
```

GLEN ALLAN SUBDIVISION
TOWNSHIP OF MAPLETON
OUR FILE: 317033
JANUARY 2019

SWM FACILITY
DRY POND

ELEV (m)	INC DEPTH (m)	SURFACE AREA (sq m)	AVERAGE AREA (sq m)	INCR. VOL (cu m)	ACCUM STORAGE VOL (cu m)	
394.00	0.00	0	0	0	0	Bottom of Pond; T/G of DICB-12
394.05	0.05	13	7	0	0.3	
394.10	0.10	49	31	2	2	
394.15	0.15	81	65	3	5	
394.20	0.20	111	96	5	10	
394.25	0.25	139	125	6	16	
394.30	0.30	155	147	7	24	
394.35	0.35	172	164	8	32	
394.40	0.40	189	181	9	41	
394.45	0.45	206	198	10	51	
394.50	0.50	225	216	11	61	
394.55	0.55	243	234	12	73	
394.60	0.60	263	253	13	86	
394.65	0.65	284	274	14	99	
394.70	0.70	305	295	15	114	
394.75	0.75	327	316	16	130	
394.80	0.80	348	338	17	147	
394.85	0.85	371	360	18	165	
394.90	0.90	394	383	19	184	
394.95	0.95	419	407	20	204	T/G of DICB-13
395.00	1.00	445	432	22	226	
395.05	1.05	473	459	23	249	
395.10	1.10	501	487	24	273	
395.15	1.15	530	516	26	299	
395.20	1.20	560	545	27	326	
395.25	1.25	590	575	29	355	
395.30	1.30	620	605	30	385	
395.35	1.35	651	636	32	417	
395.40	1.40	682	667	33	450	
395.45	1.45	714	698	35	485	
395.50	1.50	746	730	37	522	
395.55	1.55	779	763	38	560	
395.60	1.60	812	796	40	600	Weir
395.65	1.65	845	829	41	641	Overflow
395.70	1.70	879	862	43	684	Overflow
395.75	1.75	913	896	45	729	Overflow
395.79	1.79	941	927	37	766	Overflow; Min. T/ Pond Elv.

Primary Outlet Orifice

Orifice Dia.:	100	mm
Orifice Area:	0.008	m^2
Coefficient:	0.6	
Invert Elev:	393.60	m

Secondary Outlet Orifice

Orifice Dia.:	150	mm
Orifice Area:	0.018	m^2
Coefficient:	0.6	
Invert Elev:	393.55	m

Overflow Weir

T/ Bank	395.79	m
Overflow Elv	395.60	m
Height of Overflow	0.19	m
2g =	19.612	m/s^2
Length =	3	m
Flow =	0.424	m^3/s

ELEV (m)	STAGE (m)	STORAGE VOLUME (cu m)	DISCHARGE PRIMARY ORIFICE FLOW (cu m/s)	DISCHARGE SECONDARY ORIFICE FLOW (cu m/s)	DISCHARGE OVERFLOW WEIR FLOW (cu m/s)	TOTAL FLOW (cu m/s)	
394.00	0.00	0	0.000	0.000	0.000	0.000	Bottom of Pond; T/G of DICB-12
394.05	0.05	0.3	0.013	0.000	0.000	0.013	
394.10	0.10	2	0.014	0.000	0.000	0.014	
394.15	0.15	5	0.015	0.000	0.000	0.015	
394.20	0.20	10	0.015	0.000	0.000	0.015	
394.25	0.25	16	0.016	0.000	0.000	0.016	
394.30	0.30	24	0.017	0.000	0.000	0.017	
394.35	0.35	32	0.017	0.000	0.000	0.017	
394.40	0.40	41	0.018	0.000	0.000	0.018	
394.45	0.45	51	0.019	0.000	0.000	0.019	
394.50	0.50	61	0.019	0.000	0.000	0.019	
394.55	0.55	73	0.020	0.000	0.000	0.020	
394.60	0.60	86	0.020	0.000	0.000	0.020	
394.65	0.65	99	0.021	0.000	0.000	0.021	
394.70	0.70	114	0.021	0.000	0.000	0.021	
394.75	0.75	130	0.022	0.000	0.000	0.022	
394.80	0.80	147	0.022	0.000	0.000	0.022	
394.85	0.85	165	0.023	0.000	0.000	0.023	
394.90	0.90	184	0.023	0.000	0.000	0.023	
394.95	0.95	204	0.024	0.000	0.000	0.024	T/G of DICB-13
395.00	1.00	226	0.000	0.055	0.000	0.055	
395.05	1.05	249	0.000	0.056	0.000	0.056	
395.10	1.10	273	0.000	0.057	0.000	0.057	
395.15	1.15	299	0.000	0.058	0.000	0.058	
395.20	1.20	326	0.000	0.059	0.000	0.059	
395.25	1.25	355	0.000	0.060	0.000	0.060	
395.30	1.30	385	0.000	0.061	0.000	0.061	
395.35	1.35	417	0.000	0.062	0.000	0.062	
395.40	1.40	450	0.000	0.063	0.000	0.063	
395.45	1.45	485	0.000	0.063	0.000	0.063	
395.50	1.50	522	0.000	0.064	0.000	0.064	
395.55	1.55	560	0.000	0.065	0.000	0.065	
395.60	1.60	600	0.000	0.066	0.000	0.066	Weir
395.65	1.65	641	0.000	0.067	0.057	0.124	Overflow
395.70	1.70	684	0.000	0.068	0.162	0.229	Overflow
395.75	1.75	729	0.000	0.068	0.297	0.366	Overflow
395.79	1.79	766	0.000	0.069	0.424	0.493	Overflow; Min. T/ Pond Elv.

```
"              MIDUSS Output ------------------------------------------------>"
"              MIDUSS version                              Version 2.25  rev. 473"
"              MIDUSS created                           Sunday, February 07, 2010"
"        10    Units used:                                                ie METRIC"
"              Job folder:       \\os-2k8\users_private\awilkinson\Documents\"
"                                                                    MIDUSS\317033"
"              Output filename:                 317033 - Post 2 yr - Jan19.out"
"              Licensee name:                                             gmbp"
"              Company                                    Hewlett-Packard Company"
"              Date & Time last used:                     1/22/2019 at 9:47:39 AM"
" 31        TIME PARAMETERS"
"    10.000    Time Step"
"   360.000    Max. Storm length"
"  2400.000    Max. Hydrograph"
" 32        STORM Chicago storm"
"         1    Chicago storm"
"   774.890    Coefficient A"
"     7.160    Constant B"
"     0.817    Exponent C"
"     0.375    Fraction R"
"   360.000    Duration"
"     1.000    Time step multiplier"
"              Maximum intensity            74.888    mm/hr"
"              Total depth                  37.317    mm"
"         6    002hyd   Hydrograph extension used in this file"
" 33        CATCHMENT 100"
"         1    Triangular SCS"
"         1    Equal length"
"         1    SCS method"
"       100    Southerly Portion of Subject Property"
"    20.000    % Impervious"
"     3.080    Total Area"
"    30.000    Flow length"
"     5.000    Overland Slope"
"     2.464    Pervious Area"
"    30.000    Pervious length"
"     5.000    Pervious slope"
"     0.616    Impervious Area"
"    30.000    Impervious length"
"     5.000    Impervious slope"
"     0.250    Pervious Manning 'n'"
"    78.000    Pervious SCS Curve No."
"     0.238    Pervious Runoff coefficient"
"     0.100    Pervious Ia/S coefficient"
"     7.164    Pervious Initial abstraction"
"     0.015    Impervious Manning 'n'"
"    98.000    Impervious SCS Curve No."
"     0.831    Impervious Runoff coefficient"
"     0.100    Impervious Ia/S coefficient"
"     0.518    Impervious Initial abstraction"
"                 0.109     0.000     0.000     0.000 c.m/sec"
"              Catchment 100          Pervious   Impervious Total Area "
"              Surface Area           2.464      0.616      3.080      hectare"
"              Time of concentration  20.437     1.956      11.828     minutes"
"              Time to Centroid       217.904    169.853    195.523    minutes"
"              Rainfall depth         37.317     37.317     37.317     mm"
"              Rainfall volume        919.49     229.87     1149.36    c.m"
"              Rainfall losses        28.421     6.290      23.994     mm"
"              Runoff depth           8.896      31.027     13.322     mm"
"              Runoff volume          219.20     191.13     410.33     c.m"
"              Runoff coefficient     0.238      0.831      0.357      "
"              Maximum flow           0.051      0.098      0.109      c.m/sec"
" 40        HYDROGRAPH Add Runoff "
"         4    Add Runoff "
"                 0.109     0.109     0.000     0.000"
" 33        CATCHMENT 101"
"         1    Triangular SCS"
"         1    Equal length"
"         1    SCS method"
"       101    Easterly Off-Site Lands"
"    35.000    % Impervious"
"     0.240    Total Area"
"    10.000    Flow length"
```



```
"     5.000    Overland Slope"
"     0.156    Pervious Area"
"    10.000    Pervious length"
"     5.000    Pervious slope"
"     0.084    Impervious Area"
"    10.000    Impervious length"
"     5.000    Impervious slope"
"     0.250    Pervious Manning 'n'"
"    78.000    Pervious SCS Curve No."
"     0.238    Pervious Runoff coefficient"
"     0.100    Pervious Ia/S coefficient"
"     7.164    Pervious Initial abstraction"
"     0.015    Impervious Manning 'n'"
"    98.000    Impervious SCS Curve No."
"     0.782    Impervious Runoff coefficient"
"     0.100    Impervious Ia/S coefficient"
"     0.518    Impervious Initial abstraction"
"                 0.015     0.109     0.000     0.000 c.m/sec"
"              Catchment 101          Pervious   Impervious Total Area "
"              Surface Area           0.156      0.084      0.240      hectare"
"              Time of concentration  10.572     1.012      4.465      minutes"
"              Time to Centroid       204.984    169.794    182.506    minutes"
"              Rainfall depth         37.317     37.317     37.317     mm"
"              Rainfall volume        58.21      31.35      89.56      c.m"
"              Rainfall losses        28.427     8.125      21.321     mm"
"              Runoff depth           8.889      29.192     15.995     mm"
"              Runoff volume          13.87      24.52      38.39      c.m"
"              Runoff coefficient     0.238      0.782      0.429      "
"              Maximum flow           0.004      0.014      0.015      c.m/sec"
" 40        HYDROGRAPH Add Runoff "
"         4    Add Runoff "
"                 0.015     0.124     0.000     0.000"
" 54        POND DESIGN"
"     0.124    Current peak flow    c.m/sec"
"     0.001    Target outflow    c.m/sec"
"     448.7    Hydrograph volume    c.m"
"       37.    Number of stages"
"   394.000    Minimum water level    metre"
"   395.790    Maximum water level    metre"
"   394.000    Starting water level    metre"
"         0    Keep Design Data: 1 = True; 0 = False"
"                Level Discharge    Volume"
"              394.000     0.000     0.000"
"              394.050   0.01320    0.3000"
"              394.100   0.01400     1.900"
"              394.150   0.01480     5.100"
"              394.200   0.01550     9.900"
"              394.250   0.01620    16.200"
"              394.300   0.01680    23.500"
"              394.350   0.01750    31.700"
"              394.400   0.01810    40.700"
"              394.450   0.01870    50.600"
"              394.500   0.01920    61.400"
"              394.550   0.01980    73.100"
"              394.600   0.02030    85.700"
"              394.650   0.02090    99.400"
"              394.700   0.02140   114.100"
"              394.750   0.02190   129.900"
"              394.800   0.02240   146.800"
"              394.850   0.02290   164.800"
"              394.900   0.02330   183.900"
"              394.950   0.02380   204.200"
"              395.000   0.05510   225.800"
"              395.050   0.05610   248.800"
"              395.100   0.05700   273.100"
"              395.150   0.05800   298.900"
"              395.200   0.05890   326.100"
"              395.250   0.05990   354.900"
"              395.300   0.06080   385.200"
"              395.350   0.06170   416.900"
"              395.400   0.06260   450.200"
"              395.450   0.06340   485.100"
"              395.500   0.06430   521.700"
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"              395.550   0.06510   559.800"
"              395.600   0.06600   599.600"
"              395.650    0.1240   641.000"
"              395.700    0.2294   684.100"
"              395.750    0.3656   728.900"
"              395.790    0.4927   766.000"
"           Peak outflow                 0.024    c.m/sec"
"           Maximum level              394.936    metre"
"           Maximum storage            198.445    c.m"
"           Centroidal lag               4.780   hours"
"                0.015     0.124     0.024     0.000 c.m/sec"
" 40        HYDROGRAPH   Combine    1"
"         6   Combine "
"         1   Node #"
"             Easterly Outlet"
"           Maximum flow                 0.024    c.m/sec"
"           Hydrograph volume          451.644    c.m"
"                0.015     0.124     0.024     0.024"
" 40        HYDROGRAPH Start - New Tributary"
"         2   Start - New Tributary"
"                0.015     0.000     0.024     0.024"
" 33        CATCHMENT 200"
"         1   Triangular SCS"
"         1   Equal length"
"         1   SCS method"
"       200   Northwesterly Portion of Subject Property"
"    10.000   % Impervious"
"     0.980   Total Area"
"   120.000   Flow length"
"    10.000   Overland Slope"
"     0.882   Pervious Area"
"   120.000   Pervious length"
"    10.000   Pervious slope"
"     0.098   Impervious Area"
"   120.000   Impervious length"
"    10.000   Impervious slope"
"     0.250   Pervious Manning 'n'"
"    78.000   Pervious SCS Curve No."
"     0.239   Pervious Runoff coefficient"
"     0.100   Pervious Ia/S coefficient"
"     7.164   Pervious Initial abstraction"
"     0.015   Impervious Manning 'n'"
"    98.000   Impervious SCS Curve No."
"     0.852   Impervious Runoff coefficient"
"     0.100   Impervious Ia/S coefficient"
"     0.518   Impervious Initial abstraction"
"                0.016     0.000     0.024     0.024 c.m/sec"

     Catchment 200          Pervious   Impervious Total Area "
     Surface Area           0.882      0.098      0.980      hectare"
     Time of concentration  38.136     3.649      28.343     minutes"
     Time to Centroid       241.085    172.430    221.588    minutes"
     Rainfall depth         37.317     37.317     37.317     mm"
     Rainfall volume        329.13     36.57      365.70     c.m"
     Rainfall losses        28.405     5.506      26.115     mm"
     Runoff depth           8.912      31.811     11.202     mm"
     Runoff volume          78.60      31.17      109.78     c.m"
     Runoff coefficient     0.239      0.852      0.300      "
     Maximum flow           0.013      0.014      0.016      c.m/sec"

" 40        HYDROGRAPH Add Runoff "
"         4   Add Runoff "
"                0.016     0.016     0.024     0.024"
" 40        HYDROGRAPH Copy to Outflow"
"         8   Copy to Outflow"
"                0.016     0.016     0.016     0.024"
" 40        HYDROGRAPH   Combine    2"
"         6   Combine "
"         2   Node #"
"             Northwesterly Outlet"
"           Maximum flow                 0.016    c.m/sec"
"           Hydrograph volume          109.778    c.m"
"                0.016     0.016     0.016     0.016"
" 40        HYDROGRAPH Start - New Tributary"
"         2   Start - New Tributary"
```



```
"                0.016     0.000     0.016     0.016"
" 33        CATCHMENT 300"
"         1   Triangular SCS"
"         1   Equal length"
"         1   SCS method"
"       300   Northeasterly Portion of Subject Property"
"    10.000   % Impervious"
"     0.220   Total Area"
"    50.000   Flow length"
"    10.000   Overland Slope"
"     0.198   Pervious Area"
"    50.000   Pervious length"
"    10.000   Pervious slope"
"     0.022   Impervious Area"
"    50.000   Impervious length"
"    10.000   Impervious slope"
"     0.250   Pervious Manning 'n'"
"    78.000   Pervious SCS Curve No."
"     0.238   Pervious Runoff coefficient"
"     0.100   Pervious Ia/S coefficient"
"     7.164   Pervious Initial abstraction"
"     0.015   Impervious Manning 'n'"
"    98.000   Impervious SCS Curve No."
"     0.837   Impervious Runoff coefficient"
"     0.100   Impervious Ia/S coefficient"
"     0.518   Impervious Initial abstraction"
"                0.005     0.000     0.016     0.016 c.m/sec"

     Catchment 300          Pervious   Impervious Total Area "
     Surface Area           0.198      0.022      0.220      hectare"
     Time of concentration  22.553     2.158      16.829     minutes"
     Time to Centroid       220.641    170.232    206.493    minutes"
     Rainfall depth         37.317     37.317     37.317     mm"
     Rainfall volume        73.89      8.21       82.10      c.m"
     Rainfall losses        28.417     6.067      26.182     mm"
     Runoff depth           8.900      31.250     11.135     mm"
     Runoff volume          17.62      6.87       24.50      c.m"
     Runoff coefficient     0.238      0.837      0.298      "
     Maximum flow           0.004      0.003      0.005      c.m/sec"

" 40        HYDROGRAPH Add Runoff "
"         4   Add Runoff "
"                0.005     0.005     0.016     0.016"
" 40        HYDROGRAPH Copy to Outflow"
"         8   Copy to Outflow"
"                0.005     0.005     0.005     0.016"
" 40        HYDROGRAPH   Combine    3"
"         6   Combine "
"         3   Node #"
"             Northeasterly Outlet"
"           Maximum flow                 0.005    c.m/sec"
"           Hydrograph volume           24.496    c.m"
"                0.005     0.005     0.005     0.005"
" 38        START/RE-START TOTALS 300"
"         3   Runoff Totals on EXIT"
"           Total Catchment area                    4.520    hectare"
"           Total Impervious area                   0.820    hectare"
"           Total % impervious                     18.142"
" 19        EXIT"
```

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"                MIDUSS Output ------------------------------------------------>"
"                MIDUSS version                              Version 2.25  rev. 473"
"                MIDUSS created                          Sunday, February 07, 2010"
"           10   Units used:                                              ie METRIC"
"                Job folder:       \\os-2k8\users_private\awilkinson\Documents\"
"                                                                        MIDUSS\317033"
"                Output filename:                  317033 - Post 5 yr - Jan19.out"
"                Licensee name:                                              gmbp"
"                Company                                    Hewlett-Packard Company"
"                Date & Time last used:                     1/22/2019 at 9:51:33 AM"
" 31           TIME PARAMETERS"
"       10.000   Time Step"
"      360.000   Max. Storm length"
"     2400.000   Max. Hydrograph"
" 32           STORM Chicago storm"
"           1   Chicago storm"
"     1012.690   Coefficient A"
"        8.094   Constant B"
"        0.820   Exponent C"
"        0.375   Fraction R"
"      360.000   Duration"
"        1.000   Time step multiplier"
"              Maximum intensity            93.011    mm/hr"
"              Total depth                  47.926    mm"
"            6   005hyd   Hydrograph extension used in this file"
" 33           CATCHMENT 100"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          100   Southerly Portion of Subject Property"
"       20.000   % Impervious"
"        3.080   Total Area"
"       30.000   Flow length"
"        5.000   Overland Slope"
"        2.464   Pervious Area"
"       30.000   Pervious length"
"        5.000   Pervious slope"
"        0.616   Impervious Area"
"       30.000   Impervious length"
"        5.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       78.000   Pervious SCS Curve No."
"        0.307   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        7.164   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.852   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                  0.162     0.000     0.000     0.000 c.m/sec"
"              Catchment 100          Pervious   Impervious Total Area "
"              Surface Area           2.464      0.616      3.080      hectare"
"              Time of concentration  16.212     1.774      10.301     minutes"
"              Time to Centroid       209.643    168.376    192.750    minutes"
"              Rainfall depth         47.926     47.926     47.926     mm"
"              Rainfall volume        1180.89    295.22     1476.11    c.m"
"              Rainfall losses        33.205     7.113      27.986     mm"
"              Runoff depth           14.721     40.812     19.939     mm"
"              Runoff volume          362.72     251.40     614.13     c.m"
"              Runoff coefficient     0.307      0.852      0.416      "
"              Maximum flow           0.097      0.126      0.162      c.m/sec"
" 40           HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                  0.162     0.162     0.000     0.000"
" 33           CATCHMENT 101"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          101   Easterly Off-Site Lands"
"       35.000   % Impervious"
"        0.240   Total Area"
"       10.000   Flow length"
```



```
"        5.000   Overland Slope"
"        0.156   Pervious Area"
"       10.000   Pervious length"
"        5.000   Pervious slope"
"        0.084   Impervious Area"
"       10.000   Impervious length"
"        5.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       78.000   Pervious SCS Curve No."
"        0.305   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        7.164   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.803   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                  0.022     0.162     0.000     0.000 c.m/sec"
"              Catchment 101          Pervious   Impervious Total Area "
"              Surface Area           0.156      0.084      0.240      hectare"
"              Time of concentration  8.386      0.918      4.006      minutes"
"              Time to Centroid       199.210    168.405    181.145    minutes"
"              Rainfall depth         47.926     47.926     47.926     mm"
"              Rainfall volume        74.76      40.26      115.02     c.m"
"              Rainfall losses        33.304     9.425      24.946     mm"
"              Runoff depth           14.621     38.501     22.979     mm"
"              Runoff volume          22.81      32.34      55.15      c.m"
"              Runoff coefficient     0.305      0.803      0.479      "
"              Maximum flow           0.008      0.018      0.022      c.m/sec"
" 40           HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                  0.022     0.177     0.000     0.000"
" 54           POND DESIGN"
"        0.177   Current peak flow    c.m/sec"
"        0.001   Target outflow    c.m/sec"
"        669.3   Hydrograph volume    c.m"
"          37.   Number of stages"
"      394.000   Minimum water level    metre"
"      395.790   Maximum water level    metre"
"      394.000   Starting water level    metre"
"            0   Keep Design Data: 1 = True; 0 = False"
"                  Level Discharge    Volume"
"                394.000     0.000     0.000"
"                394.050   0.01320     0.3000"
"                394.100   0.01400     1.900"
"                394.150   0.01480     5.100"
"                394.200   0.01550     9.900"
"                394.250   0.01620    16.200"
"                394.300   0.01680    23.500"
"                394.350   0.01750    31.700"
"                394.400   0.01810    40.700"
"                394.450   0.01870    50.600"
"                394.500   0.01920    61.400"
"                394.550   0.01980    73.100"
"                394.600   0.02030    85.700"
"                394.650   0.02090    99.400"
"                394.700   0.02140   114.100"
"                394.750   0.02190   129.900"
"                394.800   0.02240   146.800"
"                394.850   0.02290   164.800"
"                394.900   0.02330   183.900"
"                394.950   0.02380   204.200"
"                395.000   0.05510   225.800"
"                395.050   0.05610   248.800"
"                395.100   0.05700   273.100"
"                395.150   0.05800   298.900"
"                395.200   0.05890   326.100"
"                395.250   0.05990   354.900"
"                395.300   0.06080   385.200"
"                395.350   0.06170   416.900"
"                395.400   0.06260   450.200"
"                395.450   0.06340   485.100"
"                395.500   0.06430   521.700"
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"              395.550   0.06510   559.800"
"              395.600   0.06600   599.600"
"              395.650    0.1240   641.000"
"              395.700    0.2294   684.100"
"              395.750    0.3656   728.900"
"              395.790    0.4927   766.000"
"           Peak outflow                 0.057    c.m/sec"
"           Maximum level              395.103    metre"
"           Maximum storage            274.588    c.m"
"           Centroidal lag               4.581   hours"
"                0.022     0.177     0.057     0.000 c.m/sec"
" 40        HYDROGRAPH   Combine    1"
"         6   Combine "
"         1   Node #"
"             Easterly Outlet"
"           Maximum flow                 0.057    c.m/sec"
"           Hydrograph volume          671.464    c.m"
"                0.022     0.177     0.057     0.057"
" 40        HYDROGRAPH Start - New Tributary"
"         2   Start - New Tributary"
"                0.022     0.000     0.057     0.057"
" 33        CATCHMENT 200"
"         1   Triangular SCS"
"         1   Equal length"
"         1   SCS method"
"       200   Northwesterly Portion of Subject Property"
"    10.000   % Impervious"
"     0.980   Total Area"
"   120.000   Flow length"
"    10.000   Overland Slope"
"     0.882   Pervious Area"
"   120.000   Pervious length"
"    10.000   Pervious slope"
"     0.098   Impervious Area"
"   120.000   Impervious length"
"    10.000   Impervious slope"
"     0.250   Pervious Manning 'n'"
"    78.000   Pervious SCS Curve No."
"     0.308   Pervious Runoff coefficient"
"     0.100   Pervious Ia/S coefficient"
"     7.164   Pervious Initial abstraction"
"     0.015   Impervious Manning 'n'"
"    98.000   Impervious SCS Curve No."
"     0.879   Impervious Runoff coefficient"
"     0.100   Impervious Ia/S coefficient"
"     0.518   Impervious Initial abstraction"
"                0.031     0.000     0.057     0.057 c.m/sec"

     Catchment 200          Pervious   Impervious Total Area "
     Surface Area           0.882      0.098      0.980      hectare"
     Time of concentration  30.252     3.310      23.766     minutes"
     Time to Centroid       228.405    170.715    214.517    minutes"
     Rainfall depth         47.926     47.926     47.926     mm"
     Rainfall volume        422.70     46.97      469.67     c.m"
     Rainfall losses        33.155     5.777      30.417     mm"
     Runoff depth           14.771     42.149     17.508     mm"
     Runoff volume          130.28     41.31      171.58     c.m"
     Runoff coefficient     0.308      0.879      0.365      "
     Maximum flow           0.025      0.018      0.031      c.m/sec"

" 40        HYDROGRAPH Add Runoff "
"         4   Add Runoff "
"                0.031     0.031     0.057     0.057"
" 40        HYDROGRAPH Copy to Outflow"
"         8   Copy to Outflow"
"                0.031     0.031     0.031     0.057"
" 40        HYDROGRAPH   Combine    2"
"         6   Combine "
"         2   Node #"
"             Northwesterly Outlet"
"           Maximum flow                 0.031    c.m/sec"
"           Hydrograph volume          171.582    c.m"
"                0.031     0.031     0.031     0.031"
" 40        HYDROGRAPH Start - New Tributary"
"         2   Start - New Tributary"
```



```
"                0.031     0.000     0.031     0.031"
" 33        CATCHMENT 300"
"         1   Triangular SCS"
"         1   Equal length"
"         1   SCS method"
"       300   Northeasterly Portion of Subject Property"
"    10.000   % Impervious"
"     0.220   Total Area"
"    50.000   Flow length"
"    10.000   Overland Slope"
"     0.198   Pervious Area"
"    50.000   Pervious length"
"    10.000   Pervious slope"
"     0.022   Impervious Area"
"    50.000   Impervious length"
"    10.000   Impervious slope"
"     0.250   Pervious Manning 'n'"
"    78.000   Pervious SCS Curve No."
"     0.307   Pervious Runoff coefficient"
"     0.100   Pervious Ia/S coefficient"
"     7.164   Pervious Initial abstraction"
"     0.015   Impervious Manning 'n'"
"    98.000   Impervious SCS Curve No."
"     0.858   Impervious Runoff coefficient"
"     0.100   Impervious Ia/S coefficient"
"     0.518   Impervious Initial abstraction"
"                0.009     0.000     0.031     0.031 c.m/sec"

     Catchment 300          Pervious   Impervious Total Area "
     Surface Area           0.198      0.022      0.220      hectare"
     Time of concentration  17.891     1.958      14.118     minutes"
     Time to Centroid       211.730    168.723    201.547    minutes"
     Rainfall depth         47.926     47.926     47.926     mm"
     Rainfall volume        94.89      10.54      105.44     c.m"
     Rainfall losses        33.193     6.792      30.553     mm"
     Runoff depth           14.732     41.133     17.373     mm"
     Runoff volume          29.17      9.05       38.22      c.m"
     Runoff coefficient     0.307      0.858      0.362      "
     Maximum flow           0.007      0.004      0.009      c.m/sec"

" 40        HYDROGRAPH Add Runoff "
"         4   Add Runoff "
"                0.009     0.009     0.031     0.031"
" 40        HYDROGRAPH Copy to Outflow"
"         8   Copy to Outflow"
"                0.009     0.009     0.009     0.031"
" 40        HYDROGRAPH   Combine    3"
"         6   Combine "
"         3   Node #"
"             Northeasterly Outlet"
"           Maximum flow                 0.009    c.m/sec"
"           Hydrograph volume           38.220    c.m"
"                0.009     0.009     0.009     0.009"
" 38        START/RE-START TOTALS 300"
"         3   Runoff Totals on EXIT"
"           Total Catchment area                    4.520    hectare"
"           Total Impervious area                   0.820    hectare"
"           Total % impervious                     18.142"
" 19        EXIT"
```

```
"                MIDUSS Output ------------------------------------------------>"
"                MIDUSS version                          Version 2.25  rev. 473"
"                MIDUSS created                       Sunday, February 07, 2010"
"           10   Units used:                                          ie METRIC"
"                Job folder:       \\os-2k8\users_private\awilkinson\Documents\"
"                                                                  MIDUSS\317033"
"                Output filename:               317033 - Post 10 yr - Jan19.out"
"                Licensee name:                                            gmbp"
"                Company                                  Hewlett-Packard Company"
"                Date & Time last used:                1/22/2019 at 10:27:30 AM"
" 31          TIME PARAMETERS"
"       10.000   Time Step"
"      360.000   Max. Storm length"
"     2400.000   Max. Hydrograph"
" 32          STORM Chicago storm"
"           1   Chicago storm"
"     1175.420   Coefficient A"
"        8.674   Constant B"
"        0.822   Exponent C"
"        0.375   Fraction R"
"      360.000   Duration"
"        1.000   Time step multiplier"
"              Maximum intensity           104.616    mm/hr"
"              Total depth                  54.935    mm"
"           6   010hyd   Hydrograph extension used in this file"
" 33          CATCHMENT 100"
"             1   Triangular SCS"
"             1   Equal length"
"             1   SCS method"
"           100   Southerly Portion of Subject Property"
"        20.000   % Impervious"
"         3.080   Total Area"
"        30.000   Flow length"
"         5.000   Overland Slope"
"         2.464   Pervious Area"
"        30.000   Pervious length"
"         5.000   Pervious slope"
"         0.616   Impervious Area"
"        30.000   Impervious length"
"         5.000   Impervious slope"
"         0.250   Pervious Manning 'n'"
"        78.000   Pervious SCS Curve No."
"         0.346   Pervious Runoff coefficient"
"         0.100   Pervious Ia/S coefficient"
"         7.164   Pervious Initial abstraction"
"         0.015   Impervious Manning 'n'"
"        98.000   Impervious SCS Curve No."
"         0.860   Impervious Runoff coefficient"
"         0.100   Impervious Ia/S coefficient"
"         0.518   Impervious Initial abstraction"
"                     0.209     0.000     0.000     0.000 c.m/sec"
"              Catchment 100          Pervious   Impervious Total Area "
"              Surface Area           2.464      0.616      3.080      hectare"
"              Time of concentration  14.491     1.685      9.581      minutes"
"              Time to Centroid       205.935    167.663    191.260    minutes"
"              Rainfall depth         54.935     54.935     54.935     mm"
"              Rainfall volume        1353.59    338.40     1691.99    c.m"
"              Rainfall losses        35.935     7.671      30.282     mm"
"              Runoff depth           19.000     47.264     24.652     mm"
"              Runoff volume          468.15     291.14     759.30     c.m"
"              Runoff coefficient     0.346      0.860      0.449      "
"              Maximum flow           0.136      0.145      0.209      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"             4   Add Runoff "
"                     0.209     0.209     0.000     0.000"
" 33          CATCHMENT 101"
"             1   Triangular SCS"
"             1   Equal length"
"             1   SCS method"
"           101   Easterly Off-Site Lands"
"        35.000   % Impervious"
"         0.240   Total Area"
"        10.000   Flow length"
```



```
"         5.000   Overland Slope"
"         0.156   Pervious Area"
"        10.000   Pervious length"
"         5.000   Pervious slope"
"         0.084   Impervious Area"
"        10.000   Impervious length"
"         5.000   Impervious slope"
"         0.250   Pervious Manning 'n'"
"        78.000   Pervious SCS Curve No."
"         0.340   Pervious Runoff coefficient"
"         0.100   Pervious Ia/S coefficient"
"         7.164   Pervious Initial abstraction"
"         0.015   Impervious Manning 'n'"
"        98.000   Impervious SCS Curve No."
"         0.812   Impervious Runoff coefficient"
"         0.100   Impervious Ia/S coefficient"
"         0.518   Impervious Initial abstraction"
"                     0.026     0.209     0.000     0.000 c.m/sec"
"              Catchment 101          Pervious   Impervious Total Area "
"              Surface Area           0.156      0.084      0.240      hectare"
"              Time of concentration  7.496      0.872      3.771      minutes"
"              Time to Centroid       196.710    167.676    180.384    minutes"
"              Rainfall depth         54.935     54.935     54.935     mm"
"              Rainfall volume        85.70      46.15      131.84     c.m"
"              Rainfall losses        36.236     10.323     27.167     mm"
"              Runoff depth           18.698     44.612     27.768     mm"
"              Runoff volume          29.17      37.47      66.64      c.m"
"              Runoff coefficient     0.340      0.812      0.505      "
"              Maximum flow           0.010      0.020      0.026      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"             4   Add Runoff "
"                     0.026     0.227     0.000     0.000"
" 54          POND DESIGN"
"         0.227   Current peak flow    c.m/sec"
"         0.001   Target outflow    c.m/sec"
"         825.9   Hydrograph volume    c.m"
"           37.   Number of stages"
"       394.000   Minimum water level    metre"
"       395.790   Maximum water level    metre"
"       394.000   Starting water level    metre"
"             0   Keep Design Data: 1 = True; 0 = False"
"                   Level Discharge    Volume"
"                 394.000     0.000     0.000"
"                 394.050   0.01320    0.3000"
"                 394.100   0.01400     1.900"
"                 394.150   0.01480     5.100"
"                 394.200   0.01550     9.900"
"                 394.250   0.01620    16.200"
"                 394.300   0.01680    23.500"
"                 394.350   0.01750    31.700"
"                 394.400   0.01810    40.700"
"                 394.450   0.01870    50.600"
"                 394.500   0.01920    61.400"
"                 394.550   0.01980    73.100"
"                 394.600   0.02030    85.700"
"                 394.650   0.02090    99.400"
"                 394.700   0.02140   114.100"
"                 394.750   0.02190   129.900"
"                 394.800   0.02240   146.800"
"                 394.850   0.02290   164.800"
"                 394.900   0.02330   183.900"
"                 394.950   0.02380   204.200"
"                 395.000   0.05510   225.800"
"                 395.050   0.05610   248.800"
"                 395.100   0.05700   273.100"
"                 395.150   0.05800   298.900"
"                 395.200   0.05890   326.100"
"                 395.250   0.05990   354.900"
"                 395.300   0.06080   385.200"
"                 395.350   0.06170   416.900"
"                 395.400   0.06260   450.200"
"                 395.450   0.06340   485.100"
"                 395.500   0.06430   521.700"
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"              395.550   0.06510   559.800"
"              395.600   0.06600   599.600"
"              395.650    0.1240   641.000"
"              395.700    0.2294   684.100"
"              395.750    0.3656   728.900"
"              395.790    0.4927   766.000"
"           Peak outflow                 0.060    c.m/sec"
"           Maximum level              395.259    metre"
"           Maximum storage            360.225    c.m"
"           Centroidal lag               4.630    hours"
"                0.026     0.227     0.060     0.000 c.m/sec"
" 40        HYDROGRAPH   Combine    1"
"          6   Combine "
"          1   Node #"
"              Easterly Outlet"
"           Maximum flow                 0.060    c.m/sec"
"           Hydrograph volume          819.850    c.m"
"                0.026     0.227     0.060     0.060"
" 40        HYDROGRAPH Start - New Tributary"
"          2   Start - New Tributary"
"                0.026     0.000     0.060     0.060"
" 33        CATCHMENT 200"
"          1   Triangular SCS"
"          1   Equal length"
"          1   SCS method"
"        200   Northwesterly Portion of Subject Property"
"     10.000   % Impervious"
"      0.980   Total Area"
"    120.000   Flow length"
"     10.000   Overland Slope"
"      0.882   Pervious Area"
"    120.000   Pervious length"
"     10.000   Pervious slope"
"      0.098   Impervious Area"
"    120.000   Impervious length"
"     10.000   Impervious slope"
"      0.250   Pervious Manning 'n'"
"     78.000   Pervious SCS Curve No."
"      0.347   Pervious Runoff coefficient"
"      0.100   Pervious Ia/S coefficient"
"      7.164   Pervious Initial abstraction"
"      0.015   Impervious Manning 'n'"
"     98.000   Impervious SCS Curve No."
"      0.891   Impervious Runoff coefficient"
"      0.100   Impervious Ia/S coefficient"
"      0.518   Impervious Initial abstraction"
"                0.041     0.000     0.060     0.060 c.m/sec"
"           Catchment 200          Pervious   Impervious Total Area "
"           Surface Area           0.882      0.098      0.980      hectare"
"           Time of concentration  27.041     3.144      21.734     minutes"
"           Time to Centroid       222.896    169.834    211.112    minutes"
"           Rainfall depth         54.935     54.935     54.935     mm"
"           Rainfall volume        484.52     53.84      538.36     c.m"
"           Rainfall losses        35.888     5.997      32.899     mm"
"           Runoff depth           19.047     48.938     22.036     mm"
"           Runoff volume          168.00     47.96      215.95     c.m"
"           Runoff coefficient     0.347      0.891      0.401      "
"           Maximum flow           0.036      0.021      0.041      c.m/sec"
" 40        HYDROGRAPH Add Runoff "
"          4   Add Runoff "
"                0.041     0.041     0.060     0.060"
" 40        HYDROGRAPH Copy to Outflow"
"          8   Copy to Outflow"
"                0.041     0.041     0.041     0.060"
" 40        HYDROGRAPH   Combine    2"
"          6   Combine "
"          2   Node #"
"              Northwesterly Outlet"
"           Maximum flow                 0.041    c.m/sec"
"           Hydrograph volume          215.955    c.m"
"                0.041     0.041     0.041     0.041"
" 40        HYDROGRAPH Start - New Tributary"
"          2   Start - New Tributary"
```



```
"                0.041     0.000     0.041     0.041"
" 33        CATCHMENT 300"
"          1   Triangular SCS"
"          1   Equal length"
"          1   SCS method"
"        300   Northeasterly Portion of Subject Property"
"     10.000   % Impervious"
"      0.220   Total Area"
"     50.000   Flow length"
"     10.000   Overland Slope"
"      0.198   Pervious Area"
"     50.000   Pervious length"
"     10.000   Pervious slope"
"      0.022   Impervious Area"
"     50.000   Impervious length"
"     10.000   Impervious slope"
"      0.250   Pervious Manning 'n'"
"     78.000   Pervious SCS Curve No."
"      0.346   Pervious Runoff coefficient"
"      0.100   Pervious Ia/S coefficient"
"      7.164   Pervious Initial abstraction"
"      0.015   Impervious Manning 'n'"
"     98.000   Impervious SCS Curve No."
"      0.867   Impervious Runoff coefficient"
"      0.100   Impervious Ia/S coefficient"
"      0.518   Impervious Initial abstraction"
"                0.013     0.000     0.041     0.041 c.m/sec"
"           Catchment 300          Pervious   Impervious Total Area "
"           Surface Area           0.198      0.022      0.220      hectare"
"           Time of concentration  15.992     1.859      12.916     minutes"
"           Time to Centroid       207.933    167.949    199.230    minutes"
"           Rainfall depth         54.935     54.935     54.935     mm"
"           Rainfall volume        108.77     12.09      120.86     c.m"
"           Rainfall losses        35.905     7.283      33.043     mm"
"           Runoff depth           19.030     47.651     21.892     mm"
"           Runoff volume          37.68      10.48      48.16      c.m"
"           Runoff coefficient     0.346      0.867      0.399      "
"           Maximum flow           0.010      0.005      0.013      c.m/sec"
" 40        HYDROGRAPH Add Runoff "
"          4   Add Runoff "
"                0.013     0.013     0.041     0.041"
" 40        HYDROGRAPH Copy to Outflow"
"          8   Copy to Outflow"
"                0.013     0.013     0.013     0.041"
" 40        HYDROGRAPH   Combine    3"
"          6   Combine "
"          3   Node #"
"              Northeasterly Outlet"
"           Maximum flow                 0.013    c.m/sec"
"           Hydrograph volume           48.162    c.m"
"                0.013     0.013     0.013     0.013"
" 38        START/RE-START TOTALS 300"
"          3   Runoff Totals on EXIT"
"           Total Catchment area                     4.520    hectare"
"           Total Impervious area                    0.820    hectare"
"           Total % impervious                      18.142"
" 19        EXIT"
```

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"              MIDUSS Output ------------------------------------------------>"
"              MIDUSS version                              Version 2.25  rev. 473"
"              MIDUSS created                           Sunday, February 07, 2010"
"        10    Units used:                                                ie METRIC"
"              Job folder:       \\os-2k8\users_private\awilkinson\Documents\"
"                                                                    MIDUSS\317033"
"              Output filename:                 317033 - Post 25 yr - Jan19.out"
"              Licensee name:                                              gmbp"
"              Company                                    Hewlett-Packard Company"
"              Date & Time last used:                   1/22/2019 at 10:40:03 AM"
" 31        TIME PARAMETERS"
"    10.000    Time Step"
"   360.000    Max. Storm length"
"  2400.000    Max. Hydrograph"
" 32        STORM Chicago storm"
"         1    Chicago storm"
"  1381.400    Coefficient A"
"     9.174    Constant B"
"     0.823    Exponent C"
"     0.375    Fraction R"
"   360.000    Duration"
"     1.000    Time step multiplier"
"              Maximum intensity          119.599    mm/hr"
"              Total depth                 63.732    mm"
"         6    025hyd   Hydrograph extension used in this file"
" 33        CATCHMENT 100"
"         1    Triangular SCS"
"         1    Equal length"
"         1    SCS method"
"       100    Southerly Portion of Subject Property"
"    20.000    % Impervious"
"     3.080    Total Area"
"    30.000    Flow length"
"     5.000    Overland Slope"
"     2.464    Pervious Area"
"    30.000    Pervious length"
"     5.000    Pervious slope"
"     0.616    Impervious Area"
"    30.000    Impervious length"
"     5.000    Impervious slope"
"     0.250    Pervious Manning 'n'"
"    78.000    Pervious SCS Curve No."
"     0.388    Pervious Runoff coefficient"
"     0.100    Pervious Ia/S coefficient"
"     7.164    Pervious Initial abstraction"
"     0.015    Impervious Manning 'n'"
"    98.000    Impervious SCS Curve No."
"     0.868    Impervious Runoff coefficient"
"     0.100    Impervious Ia/S coefficient"
"     0.518    Impervious Initial abstraction"
"                 0.265     0.000     0.000     0.000 c.m/sec"
"              Catchment 100          Pervious   Impervious Total Area "
"              Surface Area           2.464      0.616      3.080      hectare"
"              Time of concentration  12.899     1.591      8.843      minutes"
"              Time to Centroid       202.348    166.943    189.647    minutes"
"              Rainfall depth         63.732     63.732     63.732     mm"
"              Rainfall volume        1570.35    392.59     1962.94    c.m"
"              Rainfall losses        39.004     8.402      32.883     mm"
"              Runoff depth           24.728     55.330     30.848     mm"
"              Runoff volume          609.30     340.83     950.13     c.m"
"              Runoff coefficient     0.388      0.868      0.484      "
"              Maximum flow           0.182      0.168      0.265      c.m/sec"
" 40        HYDROGRAPH Add Runoff "
"         4    Add Runoff "
"                 0.265     0.265     0.000     0.000"
" 33        CATCHMENT 101"
"         1    Triangular SCS"
"         1    Equal length"
"         1    SCS method"
"       101    Easterly Off-Site Lands"
"    35.000    % Impervious"
"     0.240    Total Area"
"    10.000    Flow length"
```



```
"     5.000    Overland Slope"
"     0.156    Pervious Area"
"    10.000    Pervious length"
"     5.000    Pervious slope"
"     0.084    Impervious Area"
"    10.000    Impervious length"
"     5.000    Impervious slope"
"     0.250    Pervious Manning 'n'"
"    78.000    Pervious SCS Curve No."
"     0.383    Pervious Runoff coefficient"
"     0.100    Pervious Ia/S coefficient"
"     7.164    Pervious Initial abstraction"
"     0.015    Impervious Manning 'n'"
"    98.000    Impervious SCS Curve No."
"     0.820    Impervious Runoff coefficient"
"     0.100    Impervious Ia/S coefficient"
"     0.518    Impervious Initial abstraction"
"                 0.032     0.265     0.000     0.000 c.m/sec"
"              Catchment 101          Pervious   Impervious Total Area "
"              Surface Area           0.156      0.084      0.240      hectare"
"              Time of concentration  6.673      0.823      3.541      minutes"
"              Time to Centroid       193.860    166.867    179.410    minutes"
"              Rainfall depth         63.732     63.732     63.732     mm"
"              Rainfall volume        99.42      53.53      152.96     c.m"
"              Rainfall losses        39.317     11.494     29.579     mm"
"              Runoff depth           24.414     52.238     34.153     mm"
"              Runoff volume          38.09      43.88      81.97      c.m"
"              Runoff coefficient     0.383      0.820      0.536      "
"              Maximum flow           0.014      0.023      0.032      c.m/sec"
" 40        HYDROGRAPH Add Runoff "
"         4    Add Runoff "
"                 0.032     0.288     0.000     0.000"
" 54        POND DESIGN"
"     0.288    Current peak flow    c.m/sec"
"     0.001    Target outflow    c.m/sec"
"    1032.1    Hydrograph volume    c.m"
"       37.    Number of stages"
"   394.000    Minimum water level    metre"
"   395.790    Maximum water level    metre"
"   394.000    Starting water level    metre"
"         0    Keep Design Data: 1 = True; 0 = False"
"                Level Discharge    Volume"
"              394.000     0.000     0.000"
"              394.050   0.01320   0.3000"
"              394.100   0.01400    1.900"
"              394.150   0.01480    5.100"
"              394.200   0.01550    9.900"
"              394.250   0.01620   16.200"
"              394.300   0.01680   23.500"
"              394.350   0.01750   31.700"
"              394.400   0.01810   40.700"
"              394.450   0.01870   50.600"
"              394.500   0.01920   61.400"
"              394.550   0.01980   73.100"
"              394.600   0.02030   85.700"
"              394.650   0.02090   99.400"
"              394.700   0.02140  114.100"
"              394.750   0.02190  129.900"
"              394.800   0.02240  146.800"
"              394.850   0.02290  164.800"
"              394.900   0.02330  183.900"
"              394.950   0.02380  204.200"
"              395.000   0.05510  225.800"
"              395.050   0.05610  248.800"
"              395.100   0.05700  273.100"
"              395.150   0.05800  298.900"
"              395.200   0.05890  326.100"
"              395.250   0.05990  354.900"
"              395.300   0.06080  385.200"
"              395.350   0.06170  416.900"
"              395.400   0.06260  450.200"
"              395.450   0.06340  485.100"
"              395.500   0.06430  521.700"
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"              395.550   0.06510   559.800"
"              395.600   0.06600   599.600"
"              395.650    0.1240   641.000"
"              395.700    0.2294   684.100"
"              395.750    0.3656   728.900"
"              395.790    0.4927   766.000"
"           Peak outflow                  0.063    c.m/sec"
"           Maximum level               395.451    metre"
"           Maximum storage             486.134    c.m"
"           Centroidal lag                4.764    hours"
"                0.032     0.288     0.063     0.000 c.m/sec"
" 40        HYDROGRAPH   Combine    1"
"         6   Combine "
"         1   Node #"
"             Easterly Outlet"
"           Maximum flow                  0.063    c.m/sec"
"           Hydrograph volume          1040.417    c.m"
"                0.032     0.288     0.063     0.063"
" 40        HYDROGRAPH Start - New Tributary"
"         2   Start - New Tributary"
"                0.032     0.000     0.063     0.063"
" 33        CATCHMENT 200"
"         1   Triangular SCS"
"         1   Equal length"
"         1   SCS method"
"       200   Northwesterly Portion of Subject Property"
"    10.000   % Impervious"
"     0.980   Total Area"
"   120.000   Flow length"
"    10.000   Overland Slope"
"     0.882   Pervious Area"
"   120.000   Pervious length"
"    10.000   Pervious slope"
"     0.098   Impervious Area"
"   120.000   Impervious length"
"    10.000   Impervious slope"
"     0.250   Pervious Manning 'n'"
"    78.000   Pervious SCS Curve No."
"     0.391   Pervious Runoff coefficient"
"     0.100   Pervious Ia/S coefficient"
"     7.164   Pervious Initial abstraction"
"     0.015   Impervious Manning 'n'"
"    98.000   Impervious SCS Curve No."
"     0.901   Impervious Runoff coefficient"
"     0.100   Impervious Ia/S coefficient"
"     0.518   Impervious Initial abstraction"
"                0.058     0.000     0.063     0.063 c.m/sec"

"          Catchment 200          Pervious   Impervious Total Area "
"          Surface Area           0.882      0.098      0.980      hectare"
"          Time of concentration  24.071     2.969      19.769     minutes"
"          Time to Centroid       217.346    168.931    207.475    minutes"
"          Rainfall depth         63.732     63.732     63.732     mm"
"          Rainfall volume        562.11     62.46      624.57     c.m"
"          Rainfall losses        38.811     6.291      35.559     mm"
"          Runoff depth           24.921     57.441     28.173     mm"
"          Runoff volume          219.81     56.29      276.10     c.m"
"          Runoff coefficient     0.391      0.901      0.442      "
"          Maximum flow           0.050      0.025      0.058      c.m/sec"

" 40        HYDROGRAPH Add Runoff "
"         4   Add Runoff "
"                0.058     0.058     0.063     0.063"
" 40        HYDROGRAPH Copy to Outflow"
"         8   Copy to Outflow"
"                0.058     0.058     0.058     0.063"
" 40        HYDROGRAPH   Combine    2"
"         6   Combine "
"         2   Node #"
"             Northwesterly Outlet"
"           Maximum flow                  0.058    c.m/sec"
"           Hydrograph volume           276.097    c.m"
"                0.058     0.058     0.058     0.058"
" 40        HYDROGRAPH Start - New Tributary"
"         2   Start - New Tributary"
```



```
"                0.058     0.000     0.058     0.058"
" 33        CATCHMENT 300"
"         1   Triangular SCS"
"         1   Equal length"
"         1   SCS method"
"       300   Northeasterly Portion of Subject Property"
"    10.000   % Impervious"
"     0.220   Total Area"
"    50.000   Flow length"
"    10.000   Overland Slope"
"     0.198   Pervious Area"
"    50.000   Pervious length"
"    10.000   Pervious slope"
"     0.022   Impervious Area"
"    50.000   Impervious length"
"    10.000   Impervious slope"
"     0.250   Pervious Manning 'n'"
"    78.000   Pervious SCS Curve No."
"     0.389   Pervious Runoff coefficient"
"     0.100   Pervious Ia/S coefficient"
"     7.164   Pervious Initial abstraction"
"     0.015   Impervious Manning 'n'"
"    98.000   Impervious SCS Curve No."
"     0.875   Impervious Runoff coefficient"
"     0.100   Impervious Ia/S coefficient"
"     0.518   Impervious Initial abstraction"
"                0.018     0.000     0.058     0.058 c.m/sec"

"          Catchment 300          Pervious   Impervious Total Area "
"          Surface Area           0.198      0.022      0.220      hectare"
"          Time of concentration  14.235     1.756      11.739     minutes"
"          Time to Centroid       204.078    167.139    196.688    minutes"
"          Rainfall depth         63.732     63.732     63.732     mm"
"          Rainfall volume        126.19     14.02      140.21     c.m"
"          Rainfall losses        38.947     7.945      35.847     mm"
"          Runoff depth           24.785     55.787     27.885     mm"
"          Runoff volume          49.07      12.27      61.35      c.m"
"          Runoff coefficient     0.389      0.875      0.438      "
"          Maximum flow           0.015      0.006      0.018      c.m/sec"

" 40        HYDROGRAPH Add Runoff "
"         4   Add Runoff "
"                0.018     0.018     0.058     0.058"
" 40        HYDROGRAPH Copy to Outflow"
"         8   Copy to Outflow"
"                0.018     0.018     0.018     0.058"
" 40        HYDROGRAPH   Combine    3"
"         6   Combine "
"         3   Node #"
"             Northeasterly Outlet"
"           Maximum flow                  0.018    c.m/sec"
"           Hydrograph volume            61.347    c.m"
"                0.018     0.018     0.018     0.018"
" 38        START/RE-START TOTALS 300"
"         3   Runoff Totals on EXIT"
"           Total Catchment area                      4.520    hectare"
"           Total Impervious area                     0.820    hectare"
"           Total % impervious                       18.142"
" 19        EXIT"
```

```
"                MIDUSS Output ------------------------------------------------>"
"                MIDUSS version                              Version 2.25  rev. 473"
"                MIDUSS created                           Sunday, February 07, 2010"
"           10   Units used:                                              ie METRIC"
"                Job folder:       \\os-2k8\users_private\awilkinson\Documents\"
"                                                                        MIDUSS\317033"
"                Output filename:                 317033 - Post 50 yr - Jan19.out"
"                Licensee name:                                              gmbp"
"                Company                                   Hewlett-Packard Company"
"                Date & Time last used:                   1/22/2019 at 10:41:33 AM"
" 31          TIME PARAMETERS"
"       10.000   Time Step"
"      360.000   Max. Storm length"
"     2400.000   Max. Hydrograph"
" 32          STORM Chicago storm"
"           1   Chicago storm"
"     1535.380   Coefficient A"
"        9.533   Constant B"
"        0.825   Exponent C"
"        0.375   Fraction R"
"      360.000   Duration"
"        1.000   Time step multiplier"
"              Maximum intensity           130.451    mm/hr"
"              Total depth                  70.279    mm"
"           6   050hyd   Hydrograph extension used in this file"
" 33          CATCHMENT 100"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         100   Southerly Portion of Subject Property"
"       20.000   % Impervious"
"        3.080   Total Area"
"       30.000   Flow length"
"        5.000   Overland Slope"
"        2.464   Pervious Area"
"       30.000   Pervious length"
"        5.000   Pervious slope"
"        0.616   Impervious Area"
"       30.000   Impervious length"
"        5.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       78.000   Pervious SCS Curve No."
"        0.418   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        7.164   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.873   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                  0.317     0.000     0.000     0.000 c.m/sec"
"               Catchment 100          Pervious   Impervious Total Area "
"               Surface Area           2.464      0.616      3.080      hectare"
"               Time of concentration  12.003     1.533      8.411      minutes"
"               Time to Centroid       200.010    166.561    188.534    minutes"
"               Rainfall depth         70.279     70.279     70.279     mm"
"               Rainfall volume        1731.67    432.92     2164.58    c.m"
"               Rainfall losses        40.925     8.954      34.531     mm"
"               Runoff depth           29.353     61.324     35.748     mm"
"               Runoff volume          723.27     377.76     1101.03    c.m"
"               Runoff coefficient     0.418      0.873      0.509      "
"               Maximum flow           0.227      0.185      0.317      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"             4   Add Runoff "
"                   0.317     0.317     0.000     0.000"
" 33          CATCHMENT 101"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         101   Easterly Off-Site Lands"
"       35.000   % Impervious"
"        0.240   Total Area"
"       10.000   Flow length"
```



```
"        5.000   Overland Slope"
"        0.156   Pervious Area"
"       10.000   Pervious length"
"        5.000   Pervious slope"
"        0.084   Impervious Area"
"       10.000   Impervious length"
"        5.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       78.000   Pervious SCS Curve No."
"        0.412   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        7.164   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.824   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                  0.037     0.317     0.000     0.000 c.m/sec"
"               Catchment 101          Pervious   Impervious Total Area "
"               Surface Area           0.156      0.084      0.240      hectare"
"               Time of concentration  6.209      0.793      3.400      minutes"
"               Time to Centroid       192.164    166.379    178.791    minutes"
"               Rainfall depth         70.279     70.279     70.279     mm"
"               Rainfall volume        109.63     59.03      168.67     c.m"
"               Rainfall losses        41.353     12.397     31.219     mm"
"               Runoff depth           28.926     57.881     39.060     mm"
"               Runoff volume          45.12      48.62      93.74      c.m"
"               Runoff coefficient     0.412      0.824      0.556      "
"               Maximum flow           0.017      0.025      0.037      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"             4   Add Runoff "
"                   0.037     0.344     0.000     0.000"
" 54          POND DESIGN"
"        0.344   Current peak flow    c.m/sec"
"        0.001   Target outflow    c.m/sec"
"       1194.8   Hydrograph volume    c.m"
"          37.   Number of stages"
"      394.000   Minimum water level    metre"
"      395.790   Maximum water level    metre"
"      394.000   Starting water level    metre"
"            0   Keep Design Data: 1 = True; 0 = False"
"                  Level Discharge    Volume"
"                  394.000     0.000     0.000"
"                  394.050   0.01320     0.300"
"                  394.100   0.01400     1.900"
"                  394.150   0.01480     5.100"
"                  394.200   0.01550     9.900"
"                  394.250   0.01620    16.200"
"                  394.300   0.01680    23.500"
"                  394.350   0.01750    31.700"
"                  394.400   0.01810    40.700"
"                  394.450   0.01870    50.600"
"                  394.500   0.01920    61.400"
"                  394.550   0.01980    73.100"
"                  394.600   0.02030    85.700"
"                  394.650   0.02090    99.400"
"                  394.700   0.02140   114.100"
"                  394.750   0.02190   129.900"
"                  394.800   0.02240   146.800"
"                  394.850   0.02290   164.800"
"                  394.900   0.02330   183.900"
"                  394.950   0.02380   204.200"
"                  395.000   0.05510   225.800"
"                  395.050   0.05610   248.800"
"                  395.100   0.05700   273.100"
"                  395.150   0.05800   298.900"
"                  395.200   0.05890   326.100"
"                  395.250   0.05990   354.900"
"                  395.300   0.06080   385.200"
"                  395.350   0.06170   416.900"
"                  395.400   0.06260   450.200"
"                  395.450   0.06340   485.100"
"                  395.500   0.06430   521.700"
```

```
"              395.550   0.06510   559.800"
"              395.600   0.06600   599.600"
"              395.650    0.1240   641.000"
"              395.700    0.2294   684.100"
"              395.750    0.3656   728.900"
"              395.790    0.4927   766.000"
"           Peak outflow                 0.066    c.m/sec"
"           Maximum level              395.596    metre"
"           Maximum storage            596.203    c.m"
"           Centroidal lag               4.947    hours"
"               0.037     0.344     0.066     0.000 c.m/sec"
" 40        HYDROGRAPH   Combine    1"
"         6   Combine "
"         1   Node #"
"             Easterly Outlet"
"           Maximum flow                 0.066    c.m/sec"
"           Hydrograph volume         1200.333    c.m"
"               0.037     0.344     0.066     0.066"
" 40        HYDROGRAPH Start - New Tributary"
"         2   Start - New Tributary"
"               0.037     0.000     0.066     0.066"
" 33        CATCHMENT 200"
"         1   Triangular SCS"
"         1   Equal length"
"         1   SCS method"
"       200   Northwesterly Portion of Subject Property"
"    10.000   % Impervious"
"     0.980   Total Area"
"   120.000   Flow length"
"    10.000   Overland Slope"
"     0.882   Pervious Area"
"   120.000   Pervious length"
"    10.000   Pervious slope"
"     0.098   Impervious Area"
"   120.000   Impervious length"
"    10.000   Impervious slope"
"     0.250   Pervious Manning 'n'"
"    78.000   Pervious SCS Curve No."
"     0.420   Pervious Runoff coefficient"
"     0.100   Pervious Ia/S coefficient"
"     7.164   Pervious Initial abstraction"
"     0.015   Impervious Manning 'n'"
"    98.000   Impervious SCS Curve No."
"     0.908   Impervious Runoff coefficient"
"     0.100   Impervious Ia/S coefficient"
"     0.518   Impervious Initial abstraction"
"               0.072     0.000     0.066     0.066 c.m/sec"

     Catchment 200          Pervious   Impervious Total Area "
     Surface Area           0.882      0.098      0.980      hectare"
     Time of concentration  22.398     2.861      18.616     minutes"
     Time to Centroid       214.171    168.392    205.309    minutes"
     Rainfall depth         70.279     70.279     70.279     mm"
     Rainfall volume        619.86     68.87      688.73     c.m"
     Rainfall losses        40.755     6.497      37.329     mm"
     Runoff depth           29.524     63.782     32.950     mm"
     Runoff volume          260.40     62.51      322.91     c.m"
     Runoff coefficient     0.420      0.908      0.469      "
     Maximum flow           0.062      0.028      0.072      c.m/sec"

" 40        HYDROGRAPH Add Runoff "
"         4   Add Runoff "
"               0.072     0.072     0.066     0.066"
" 40        HYDROGRAPH Copy to Outflow"
"         8   Copy to Outflow"
"               0.072     0.072     0.072     0.066"
" 40        HYDROGRAPH   Combine    2"
"         6   Combine "
"         2   Node #"
"             Northwesterly Outlet"
"           Maximum flow                 0.072    c.m/sec"
"           Hydrograph volume          322.908    c.m"
"               0.072     0.072     0.072     0.072"
" 40        HYDROGRAPH Start - New Tributary"
"         2   Start - New Tributary"
```



```
"               0.072     0.000     0.072     0.072"
" 33        CATCHMENT 300"
"         1   Triangular SCS"
"         1   Equal length"
"         1   SCS method"
"       300   Northeasterly Portion of Subject Property"
"    10.000   % Impervious"
"     0.220   Total Area"
"    50.000   Flow length"
"    10.000   Overland Slope"
"     0.198   Pervious Area"
"    50.000   Pervious length"
"    10.000   Pervious slope"
"     0.022   Impervious Area"
"    50.000   Impervious length"
"    10.000   Impervious slope"
"     0.250   Pervious Manning 'n'"
"    78.000   Pervious SCS Curve No."
"     0.416   Pervious Runoff coefficient"
"     0.100   Pervious Ia/S coefficient"
"     7.164   Pervious Initial abstraction"
"     0.015   Impervious Manning 'n'"
"    98.000   Impervious SCS Curve No."
"     0.880   Impervious Runoff coefficient"
"     0.100   Impervious Ia/S coefficient"
"     0.518   Impervious Initial abstraction"
"               0.021     0.000     0.072     0.072 c.m/sec"

     Catchment 300          Pervious   Impervious Total Area "
     Surface Area           0.198      0.022      0.220      hectare"
     Time of concentration  13.246     1.692      11.049     minutes"
     Time to Centroid       201.933    166.671    195.229    minutes"
     Rainfall depth         70.279     70.279     70.279     mm"
     Rainfall volume        139.15     15.46      154.61     c.m"
     Rainfall losses        41.014     8.449      37.757     mm"
     Runoff depth           29.265     61.830     32.522     mm"
     Runoff volume          57.94      13.60      71.55      c.m"
     Runoff coefficient     0.416      0.880      0.463      "
     Maximum flow           0.017      0.007      0.021      c.m/sec"

" 40        HYDROGRAPH Add Runoff "
"         4   Add Runoff "
"               0.021     0.021     0.072     0.072"
" 40        HYDROGRAPH Copy to Outflow"
"         8   Copy to Outflow"
"               0.021     0.021     0.021     0.072"
" 40        HYDROGRAPH   Combine    3"
"         6   Combine "
"         3   Node #"
"             Northeasterly Outlet"
"           Maximum flow                 0.021    c.m/sec"
"           Hydrograph volume           71.547    c.m"
"               0.021     0.021     0.021     0.021"
" 38        START/RE-START TOTALS 300"
"         3   Runoff Totals on EXIT"
"           Total Catchment area                     4.520    hectare"
"           Total Impervious area                    0.820    hectare"
"           Total % impervious                      18.142"
" 19        EXIT"
```

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"              MIDUSS Output ------------------------------------------------>"
"              MIDUSS version                              Version 2.25  rev. 473"
"              MIDUSS created                           Sunday, February 07, 2010"
"        10    Units used:                                                ie METRIC"
"              Job folder:       \\os-2k8\users_private\awilkinson\Documents\"
"                                                                    MIDUSS\317033"
"              Output filename:                317033 - Post 100 yr - Jan19.out"
"              Licensee name:                                              gmbp"
"              Company                                      Hewlett-Packard Company"
"              Date & Time last used:                    1/22/2019 at 9:53:30 AM"
" 31        TIME PARAMETERS"
"    10.000    Time Step"
"   360.000    Max. Storm length"
"  2400.000    Max. Hydrograph"
" 32        STORM Chicago storm"
"         1    Chicago storm"
"  1702.250    Coefficient A"
"     9.944    Constant B"
"     0.827    Exponent C"
"     0.375    Fraction R"
"   360.000    Duration"
"     1.000    Time step multiplier"
"            Maximum intensity          141.234    mm/hr"
"            Total depth                 76.839    mm"
"         6    100hyd   Hydrograph extension used in this file"
" 33        CATCHMENT 100"
"         1    Triangular SCS"
"         1    Equal length"
"         1    SCS method"
"       100    Southerly Portion of Subject Property"
"    20.000    % Impervious"
"     3.080    Total Area"
"    30.000    Flow length"
"     5.000    Overland Slope"
"     2.464    Pervious Area"
"    30.000    Pervious length"
"     5.000    Pervious slope"
"     0.616    Impervious Area"
"    30.000    Impervious length"
"     5.000    Impervious slope"
"     0.250    Pervious Manning 'n'"
"    78.000    Pervious SCS Curve No."
"     0.444    Pervious Runoff coefficient"
"     0.100    Pervious Ia/S coefficient"
"     7.164    Pervious Initial abstraction"
"     0.015    Impervious Manning 'n'"
"    98.000    Impervious SCS Curve No."
"     0.876    Impervious Runoff coefficient"
"     0.100    Impervious Ia/S coefficient"
"     0.518    Impervious Initial abstraction"
"                 0.372     0.000     0.000     0.000 c.m/sec"
"            Catchment 100          Pervious   Impervious Total Area "
"            Surface Area           2.464      0.616      3.080      hectare"
"            Time of concentration  11.266     1.483      8.033      minutes"
"            Time to Centroid       197.993    166.218    187.491    minutes"
"            Rainfall depth         76.839     76.839     76.839     mm"
"            Rainfall volume        1893.32    473.33     2366.65    c.m"
"            Rainfall losses        42.747     9.519      36.102     mm"
"            Runoff depth           34.092     67.320     40.738     mm"
"            Runoff volume          840.03     414.69     1254.72    c.m"
"            Runoff coefficient     0.444      0.876      0.530      "
"            Maximum flow           0.275      0.201      0.372      c.m/sec"
" 40        HYDROGRAPH Add Runoff "
"         4    Add Runoff "
"                 0.372     0.372     0.000     0.000"
" 33        CATCHMENT 101"
"         1    Triangular SCS"
"         1    Equal length"
"         1    SCS method"
"       101    Easterly Off-Site Lands"
"    35.000    % Impervious"
"     0.240    Total Area"
"    10.000    Flow length"
```



```
"     5.000    Overland Slope"
"     0.156    Pervious Area"
"    10.000    Pervious length"
"     5.000    Pervious slope"
"     0.084    Impervious Area"
"    10.000    Impervious length"
"     5.000    Impervious slope"
"     0.250    Pervious Manning 'n'"
"    78.000    Pervious SCS Curve No."
"     0.437    Pervious Runoff coefficient"
"     0.100    Pervious Ia/S coefficient"
"     7.164    Pervious Initial abstraction"
"     0.015    Impervious Manning 'n'"
"    98.000    Impervious SCS Curve No."
"     0.827    Impervious Runoff coefficient"
"     0.100    Impervious Ia/S coefficient"
"     0.518    Impervious Initial abstraction"
"                 0.042     0.372     0.000     0.000 c.m/sec"
"            Catchment 101          Pervious   Impervious Total Area "
"            Surface Area           0.156      0.084      0.240      hectare"
"            Time of concentration  5.828      0.767      3.275      minutes"
"            Time to Centroid       190.564    165.892    178.121    minutes"
"            Rainfall depth         76.839     76.839     76.839     mm"
"            Rainfall volume        119.87     64.54      184.41     c.m"
"            Rainfall losses        43.234     13.331     32.768     mm"
"            Runoff depth           33.606     63.508     44.071     mm"
"            Runoff volume          52.42      53.35      105.77     c.m"
"            Runoff coefficient     0.437      0.827      0.574      "
"            Maximum flow           0.020      0.028      0.042      c.m/sec"
" 40        HYDROGRAPH Add Runoff "
"         4    Add Runoff "
"                 0.042     0.404     0.000     0.000"
" 54        POND DESIGN"
"     0.404    Current peak flow    c.m/sec"
"     0.001    Target outflow    c.m/sec"
"    1360.5    Hydrograph volume    c.m"
"       37.    Number of stages"
"   394.000    Minimum water level    metre"
"   395.790    Maximum water level    metre"
"   394.000    Starting water level    metre"
"         0    Keep Design Data: 1 = True; 0 = False"
"                Level Discharge    Volume"
"              394.000     0.000     0.000"
"              394.050   0.01320     0.300"
"              394.100   0.01400     1.900"
"              394.150   0.01480     5.100"
"              394.200   0.01550     9.900"
"              394.250   0.01620    16.200"
"              394.300   0.01680    23.500"
"              394.350   0.01750    31.700"
"              394.400   0.01810    40.700"
"              394.450   0.01870    50.600"
"              394.500   0.01920    61.400"
"              394.550   0.01980    73.100"
"              394.600   0.02030    85.700"
"              394.650   0.02090    99.400"
"              394.700   0.02140   114.100"
"              394.750   0.02190   129.900"
"              394.800   0.02240   146.800"
"              394.850   0.02290   164.800"
"              394.900   0.02330   183.900"
"              394.950   0.02380   204.200"
"              395.000   0.05510   225.800"
"              395.050   0.05610   248.800"
"              395.100   0.05700   273.100"
"              395.150   0.05800   298.900"
"              395.200   0.05890   326.100"
"              395.250   0.05990   354.900"
"              395.300   0.06080   385.200"
"              395.350   0.06170   416.900"
"              395.400   0.06260   450.200"
"              395.450   0.06340   485.100"
"              395.500   0.06430   521.700"
```

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"              395.550   0.06510   559.800"
"              395.600   0.06600   599.600"
"              395.650    0.1240   641.000"
"              395.700    0.2294   684.100"
"              395.750    0.3656   728.900"
"              395.790    0.4927   766.000"
"           Peak outflow                 0.122    c.m/sec"
"           Maximum level              395.649    metre"
"           Maximum storage            639.921    c.m"
"           Centroidal lag               4.866    hours"
"               0.042     0.404     0.122     0.000 c.m/sec"
" 40        HYDROGRAPH   Combine    1"
"         6   Combine "
"         1   Node #"
"             Easterly Outlet"
"           Maximum flow                 0.122    c.m/sec"
"           Hydrograph volume         1360.548    c.m"
"               0.042     0.404     0.122     0.122"
" 40        HYDROGRAPH Start - New Tributary"
"         2   Start - New Tributary"
"               0.042     0.000     0.122     0.122"
" 33        CATCHMENT 200"
"         1   Triangular SCS"
"         1   Equal length"
"         1   SCS method"
"       200   Northwesterly Portion of Subject Property"
"    10.000   % Impervious"
"     0.980   Total Area"
"   120.000   Flow length"
"    10.000   Overland Slope"
"     0.882   Pervious Area"
"   120.000   Pervious length"
"    10.000   Pervious slope"
"     0.098   Impervious Area"
"   120.000   Impervious length"
"    10.000   Impervious slope"
"     0.250   Pervious Manning 'n'"
"    78.000   Pervious SCS Curve No."
"     0.445   Pervious Runoff coefficient"
"     0.100   Pervious Ia/S coefficient"
"     7.164   Pervious Initial abstraction"
"     0.015   Impervious Manning 'n'"
"    98.000   Impervious SCS Curve No."
"     0.913   Impervious Runoff coefficient"
"     0.100   Impervious Ia/S coefficient"
"     0.518   Impervious Initial abstraction"
"               0.086     0.000     0.122     0.122 c.m/sec"

"           Catchment 200          Pervious   Impervious Total Area "
"           Surface Area           0.882      0.098      0.980      hectare"
"           Time of concentration  21.023     2.767      17.633     minutes"
"           Time to Centroid       211.435    167.909    203.352    minutes"
"           Rainfall depth         76.839     76.839     76.839     mm"
"           Rainfall volume        677.72     75.30      753.02     c.m"
"           Rainfall losses        42.657     6.676      39.059     mm"
"           Runoff depth           34.183     70.163     37.781     mm"
"           Runoff volume          301.49     68.76      370.25     c.m"
"           Runoff coefficient     0.445      0.913      0.492      "
"           Maximum flow           0.076      0.030      0.086      c.m/sec"
" 40        HYDROGRAPH Add Runoff "
"         4   Add Runoff "
"               0.086     0.086     0.122     0.122"
" 40        HYDROGRAPH Copy to Outflow"
"         8   Copy to Outflow"
"               0.086     0.086     0.086     0.122"
" 40        HYDROGRAPH   Combine    2"
"         6   Combine "
"         2   Node #"
"             Northwesterly Outlet"
"           Maximum flow                 0.086    c.m/sec"
"           Hydrograph volume          370.249    c.m"
"               0.086     0.086     0.086     0.086"
" 40        HYDROGRAPH Start - New Tributary"
"         2   Start - New Tributary"
```



```
"               0.086     0.000     0.086     0.086"
" 33        CATCHMENT 300"
"         1   Triangular SCS"
"         1   Equal length"
"         1   SCS method"
"       300   Northeasterly Portion of Subject Property"
"    10.000   % Impervious"
"     0.220   Total Area"
"    50.000   Flow length"
"    10.000   Overland Slope"
"     0.198   Pervious Area"
"    50.000   Pervious length"
"    10.000   Pervious slope"
"     0.022   Impervious Area"
"    50.000   Impervious length"
"    10.000   Impervious slope"
"     0.250   Pervious Manning 'n'"
"    78.000   Pervious SCS Curve No."
"     0.443   Pervious Runoff coefficient"
"     0.100   Pervious Ia/S coefficient"
"     7.164   Pervious Initial abstraction"
"     0.015   Impervious Manning 'n'"
"    98.000   Impervious SCS Curve No."
"     0.883   Impervious Runoff coefficient"
"     0.100   Impervious Ia/S coefficient"
"     0.518   Impervious Initial abstraction"
"               0.025     0.000     0.086     0.086 c.m/sec"

"           Catchment 300          Pervious   Impervious Total Area "
"           Surface Area           0.198      0.022      0.220      hectare"
"           Time of concentration  12.433     1.636      10.476     minutes"
"           Time to Centroid       199.720    166.237    193.651    minutes"
"           Rainfall depth         76.839     76.839     76.839     mm"
"           Rainfall volume        152.14     16.90      169.05     c.m"
"           Rainfall losses        42.771     8.965      39.390     mm"
"           Runoff depth           34.068     67.874     37.449     mm"
"           Runoff volume          67.46      14.93      82.39      c.m"
"           Runoff coefficient     0.443      0.883      0.487      "
"           Maximum flow           0.021      0.007      0.025      c.m/sec"
" 40        HYDROGRAPH Add Runoff "
"         4   Add Runoff "
"               0.025     0.025     0.086     0.086"
" 40        HYDROGRAPH Copy to Outflow"
"         8   Copy to Outflow"
"               0.025     0.025     0.025     0.086"
" 40        HYDROGRAPH   Combine    3"
"         6   Combine "
"         3   Node #"
"             Northeasterly Outlet"
"           Maximum flow                 0.025    c.m/sec"
"           Hydrograph volume           82.388    c.m"
"               0.025     0.025     0.025     0.025"
" 38        START/RE-START TOTALS 300"
"         3   Runoff Totals on EXIT"
"           Total Catchment area                     4.520    hectare"
"           Total Impervious area                    0.820    hectare"
"           Total % impervious                      18.142"
" 19        EXIT"
```

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"                MIDUSS Output ------------------------------------------------>"
"                MIDUSS version                              Version 2.25  rev. 473"
"                MIDUSS created                           Sunday, February 07, 2010"
"           10   Units used:                                              ie METRIC"
"                Job folder:       \\os-2k8\users_private\awilkinson\Documents\"
"                                                                        MIDUSS\317033"
"                Output filename:                  317033 - Post REG - Jan19.out"
"                Licensee name:                                              gmbp"
"                Company                                    Hewlett-Packard Company"
"                Date & Time last used:                   1/22/2019 at 9:55:58 AM"
" 31          TIME PARAMETERS"
"       60.000   Time Step"
"     2880.000   Max. Storm length"
"     3600.000   Max. Hydrograph"
" 32          STORM Historic"
"           5   Historic"
"     2880.000   Duration"
"       48.000   Rainfall intensity values"
                   2.028     2.028     2.028     2.028     2.028"
                   2.028     2.028     2.028     2.028     2.028"
                   2.028     2.028     2.028     2.028     2.028"
                   2.028     2.028     2.028     2.028     2.028"
                   2.028     2.028     2.028     2.028     2.028"
                   2.028     2.028     2.028     2.028     2.028"
                   2.028     2.028     2.028     2.028     2.028"
                   2.018     6.000     4.000     6.000    13.000"
                  17.000    13.000    23.000    13.000    13.000"
                  53.000    38.000    13.000"
              Maximum intensity           53.000    mm/hr"
              Total depth                284.998    mm"
             6   999hyd   Hydrograph extension used in this file"
" 33          CATCHMENT 100"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          100   Southerly Portion of Subject Property"
"       20.000   % Impervious"
"        3.080   Total Area"
"       30.000   Flow length"
"        5.000   Overland Slope"
"        2.464   Pervious Area"
"       30.000   Pervious length"
"        5.000   Pervious slope"
"        0.616   Impervious Area"
"       30.000   Impervious length"
"        5.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       78.000   Pervious SCS Curve No."
"        0.752   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        7.164   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.845   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
                   0.361     0.000     0.000     0.000 c.m/sec"
             Catchment 100          Pervious   Impervious Total Area "
             Surface Area           2.464      0.616      3.080      hectare"
             Time of concentration  12.097     2.173      9.919      minutes"
             Time to Centroid       2504.237   2292.841   2457.853   minutes"
             Rainfall depth         284.998    284.998    284.998    mm"
             Rainfall volume        7022.35    1755.59    8777.94    c.m"
             Rainfall losses        70.722     44.069     65.391     mm"
             Runoff depth           214.276    240.929    219.607    mm"
             Runoff volume          5279.76    1484.12    6763.88    c.m"
             Runoff coefficient     0.752      0.845      0.771      "
             Maximum flow           0.282      0.079      0.361      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
                   0.361     0.361     0.000     0.000"
" 33          CATCHMENT 101"
"            1   Triangular SCS"
```



```
"            1   Equal length"
"            1   SCS method"
"          101   Easterly Off-Site Lands"
"       35.000   % Impervious"
"        0.240   Total Area"
"       10.000   Flow length"
"        5.000   Overland Slope"
"        0.156   Pervious Area"
"       10.000   Pervious length"
"        5.000   Pervious slope"
"        0.084   Impervious Area"
"       10.000   Impervious length"
"        5.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       78.000   Pervious SCS Curve No."
"        0.693   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        7.164   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.855   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
                   0.029     0.361     0.000     0.000 c.m/sec"
             Catchment 101          Pervious   Impervious Total Area "
             Surface Area           0.156      0.084      0.240      hectare"
             Time of concentration  6.257      1.124      4.208      minutes"
             Time to Centroid       2473.122   2303.773   2405.527   minutes"
             Rainfall depth         284.998    284.998    284.998    mm"
             Rainfall volume        444.60     239.40     684.00     c.m"
             Rainfall losses        87.470     41.306     71.312     mm"
             Runoff depth           197.528    243.692    213.686    mm"
             Runoff volume          308.14     204.70     512.85     c.m"
             Runoff coefficient     0.693      0.855      0.750      "
             Maximum flow           0.018      0.011      0.029      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
                   0.029     0.390     0.000     0.000"
" 54          POND DESIGN"
"        0.390   Current peak flow    c.m/sec"
"        0.287   Target outflow    c.m/sec"
"       7276.7   Hydrograph volume    c.m"
"          37.   Number of stages"
"      394.000   Minimum water level    metre"
"      395.790   Maximum water level    metre"
"      394.000   Starting water level    metre"
"            0   Keep Design Data: 1 = True; 0 = False"
                   Level Discharge    Volume"
                  394.000     0.000     0.000"
                  394.050   0.01320     0.3000"
                  394.100   0.01400     1.900"
                  394.150   0.01480     5.100"
                  394.200   0.01550     9.900"
                  394.250   0.01620    16.200"
                  394.300   0.01680    23.500"
                  394.350   0.01750    31.700"
                  394.400   0.01810    40.700"
                  394.450   0.01870    50.600"
                  394.500   0.01920    61.400"
                  394.550   0.01980    73.100"
                  394.600   0.02030    85.700"
                  394.650   0.02090    99.400"
                  394.700   0.02140   114.100"
                  394.750   0.02190   129.900"
                  394.800   0.02240   146.800"
                  394.850   0.02290   164.800"
                  394.900   0.02330   183.900"
                  394.950   0.02380   204.200"
                  395.000   0.05510   225.800"
                  395.050   0.05610   248.800"
                  395.100   0.05700   273.100"
                  395.150   0.05800   298.900"
                  395.200   0.05890   326.100"
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"              395.250   0.05990   354.900"
"              395.300   0.06080   385.200"
"              395.350   0.06170   416.900"
"              395.400   0.06260   450.200"
"              395.450   0.06340   485.100"
"              395.500   0.06430   521.700"
"              395.550   0.06510   559.800"
"              395.600   0.06600   599.600"
"              395.650    0.1240   641.000"
"              395.700    0.2294   684.100"
"              395.750    0.3656   728.900"
"              395.790    0.4927   766.000"
"          Peak outflow                  0.364    c.m/sec"
"          Maximum level               395.756    metre"
"          Maximum storage             734.121    c.m"
"          Centroidal lag               41.791   hours"
"               0.029     0.390     0.364     0.000 c.m/sec"
" 40       HYDROGRAPH   Combine    1"
"        6   Combine "
"        1   Node #"
"            Easterly Outlet"
"          Maximum flow                  0.364    c.m/sec"
"          Hydrograph volume          7244.684    c.m"
"               0.029     0.390     0.364     0.364"
" 40       HYDROGRAPH Start - New Tributary"
"        2   Start - New Tributary"
"               0.029     0.000     0.364     0.364"
" 33       CATCHMENT 200"
"        1   Triangular SCS"
"        1   Equal length"
"        1   SCS method"
"      200   Northwesterly Portion of Subject Property"
"   10.000   % Impervious"
"    0.980   Total Area"
"  120.000   Flow length"
"   10.000   Overland Slope"
"    0.882   Pervious Area"
"  120.000   Pervious length"
"   10.000   Pervious slope"
"    0.098   Impervious Area"
"  120.000   Impervious length"
"   10.000   Impervious slope"
"    0.250   Pervious Manning 'n'"
"   78.000   Pervious SCS Curve No."
"    0.762   Pervious Runoff coefficient"
"    0.100   Pervious Ia/S coefficient"
"    7.164   Pervious Initial abstraction"
"    0.015   Impervious Manning 'n'"
"   98.000   Impervious SCS Curve No."
"    0.858   Impervious Runoff coefficient"
"    0.100   Impervious Ia/S coefficient"
"    0.518   Impervious Initial abstraction"
"               0.106     0.000     0.364     0.364 c.m/sec"
"          Catchment 200          Pervious   Impervious Total Area "
"          Surface Area           0.882      0.098      0.980      hectare"
"          Time of centroid       22.573     4.055      20.516     minutes"
"          Time to Centroid       2523.593   2260.208   2494.330   minutes"
"          Rainfall depth         284.998    284.998    284.998    mm"
"          Rainfall volume        2513.68    279.30     2792.98    c.m"
"          Rainfall losses        67.716     40.574     65.002     mm"
"          Runoff depth           217.282    244.424    219.996    mm"
"          Runoff volume          1916.43    239.54     2155.96    c.m"
"          Runoff coefficient     0.762      0.858      0.772      "
"          Maximum flow           0.097      0.012      0.106      c.m/sec"
" 40       HYDROGRAPH Add Runoff "
"        4   Add Runoff "
"               0.106     0.106     0.364     0.364"
" 40       HYDROGRAPH Copy to Outflow"
"        8   Copy to Outflow"
"               0.106     0.106     0.106     0.364"
" 40       HYDROGRAPH   Combine    2"
"        6   Combine "
"        2   Node #"
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"            Northwesterly Outlet"
"          Maximum flow                  0.106    c.m/sec"
"          Hydrograph volume          2155.960    c.m"
"               0.106     0.106     0.106     0.106"
" 40       HYDROGRAPH Start - New Tributary"
"        2   Start - New Tributary"
"               0.106     0.000     0.106     0.106"
" 33       CATCHMENT 300"
"        1   Triangular SCS"
"        1   Equal length"
"        1   SCS method"
"      300   Northeasterly Portion of Subject Property"
"   10.000   % Impervious"
"    0.220   Total Area"
"   50.000   Flow length"
"   10.000   Overland Slope"
"    0.198   Pervious Area"
"   50.000   Pervious length"
"   10.000   Pervious slope"
"    0.022   Impervious Area"
"   50.000   Impervious length"
"   10.000   Impervious slope"
"    0.250   Pervious Manning 'n'"
"   78.000   Pervious SCS Curve No."
"    0.758   Pervious Runoff coefficient"
"    0.100   Pervious Ia/S coefficient"
"    7.164   Pervious Initial abstraction"
"    0.015   Impervious Manning 'n'"
"   98.000   Impervious SCS Curve No."
"    0.846   Impervious Runoff coefficient"
"    0.100   Impervious Ia/S coefficient"
"    0.518   Impervious Initial abstraction"
"               0.025     0.000     0.106     0.106 c.m/sec"
"          Catchment 300          Pervious   Impervious Total Area "
"          Surface Area           0.198      0.022      0.220      hectare"
"          Time of concentration  13.350     2.398      12.141     minutes"
"          Time to Centroid       2507.732   2286.984   2483.369   minutes"
"          Rainfall depth         284.998    284.998    284.998    mm"
"          Rainfall volume        564.30     62.70      627.00     c.m"
"          Rainfall losses        68.928     43.749     66.410     mm"
"          Runoff depth           216.070    241.249    218.588    mm"
"          Runoff volume          427.82     53.07      480.89     c.m"
"          Runoff coefficient     0.758      0.846      0.767      "
"          Maximum flow           0.022      0.003      0.025      c.m/sec"
" 40       HYDROGRAPH Add Runoff "
"        4   Add Runoff "
"               0.025     0.025     0.106     0.106"
" 40       HYDROGRAPH Copy to Outflow"
"        8   Copy to Outflow"
"               0.025     0.025     0.025     0.106"
" 40       HYDROGRAPH   Combine    3"
"        6   Combine "
"        3   Node #"
"            Northeasterly Outlet"
"          Maximum flow                  0.025    c.m/sec"
"          Hydrograph volume           480.893    c.m"
"               0.025     0.025     0.025     0.025"
" 38       START/RE-START TOTALS 300"
"        3   Runoff Totals on EXIT"
"          Total Catchment area                      4.520    hectare"
"          Total Impervious area                     0.820    hectare"
"          Total % impervious                       18.142"
" 19       EXIT"
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GLEN ALLAN SUBDIVISION
Municipality of Mapleton
Our File: 317033

January 2019

WATER BUDGET CALCULATIONS

EASTERLY OUTLET

SOIL GROUP BC - HURON LOAM

	Pre-Development Conditions			Post-Development Conditions				
	CATCH. 10, 11 & Off-Site Lands		Pre-Dev. Total	Catch. 100, 101		Off-Site Lands		Post-Dev Total
	Impervious	Pervious		Impervious	Pervious	Impervious	Pervious	
Annual Precipitation (mm)	940	940		940	940	940	940	
Annual Evapotranspiration (mm)	215	541		215	531	215	541	
Available for Recharge & Runoff	725	399		725	410	725	399	
Total Area (ha)	**8.80**			**3.32**		**6.24**		
Area (ha)	0.06	8.74	**8.80**	0.70	2.62	0.00	6.24	**9.56**
Area (m^2)	600	87400	**88000**	7000	26200	0	62400	**95600**
Annual Infiltration:								
Infiltration Component Value (mm)	0	88		0	82	0	88	
Infiltration Volume (m^3)	0	7691	**7691**	0	2148	0	5491	**2148**
Annual Runoff:								
Runoff Component Value (mm)	725	311		725	328	725	311	
Runoff Volume prior to SWM Control Consideration (m^3)	435	27181	**27616**	5075	8581	0	19406	**33062**
Runoff Volume not subject to VFS Reduction (m^3)	435	27181	**27616**	2248	0	0	19406	**21654**
Runoff Volume subject to VFS Reduction (m^3)	0	0	**0**	2828	8581	0	0	**11408**
Runoff Volume Reduction via VFS (~37.5%)	0	0	**0**	1060	3218	0	0	**4278**
Runoff Volume Draining from Site (m^3)	435	27181	**27616**	4015	5363	0	19406	**28784**
								Percent Difference
Summary:								
Total Runoff (m^3/year)	435	27181	**27616**	4015	5363	0	19406	**28784**	**4%**
Total Recharge (m^3/year)	0	7691	**7691**	0	2148	0	5491	**7640**	**-1%**