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September 30, 2019 Project Number: P1581

David Schaeffer Engineering

120 Iber Road, Unit 103

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Attention: Mr. Steve Pichette P.Eng

Subject: Proposed Redevelopment of Kanata Golf and Country Club: SWM Pond Sizing

J.F Sabourin and Associates (JFSA) were commissioned to complete a Storm Water Management (SWM) pond sizing for the proposed development at the site of the existing Kanata Golf and Country Club at 7000 Campeau Drive, Ottawa. The modelling work outlined in this memo builds on the 2017 Mississippi Valley Conservation Authority (MVCA) Watts Creek hydrologic model. The MVCA 2017 model was updated to reflect the proposed development based on the plan provided in August 2019 by David Schaefer Engineering Limited (DSEL). Using this plan, SWM ponds were sized to mitigate the proposed development's impacts on the operations of the Beaver Pond or the downstream watercourses (Kizell Drain and Watts Creek). The following memo outlines the impacts of the proposed development on both the operations of the existing Beaver Pond and downstream watercourses.

Note that there have been various 100-year target release rates set for the Beaver Pond over the past few years. The following outlines the various maximum allowable release rates for the pond and their sources:

- Environmental Compliance Approval (2008) - 0.96 m^3/s
- AECOM Study (2011-2015) - 1.20 m^3/s
- MVCA Floodplain Mapping study (2017) - 1.02 m^3/s
- AJ Robinson (quoted in the 2017 MVCA study) - 1.35 m^3/s

Using the 2017 MVCA model of record as a starting point, various model parameters were adjusted to produce hydrographs that more accurately reflected those observed at the field monitoring locations within the storm sewer system of Kanata Lakes. Full details of this calibration process are documented in JFSA's September 2019 report titled "Kanata Golf and Country Club 2018-2019 Monitoring and Model Calibration". This calibrated model, for existing conditions, was considered the baseline for the various scenarios assessed in this memo. Note that for any future development scenarios, City of Ottawa default hydrologic parameters were used for those areas.

The following is a brief description of the scenarios assessed in this study:

- **Existing Conditions-** *(Ex-Calib):*

  Reflective of the current conditions (2019) with various model parameters adjusted to more accurately reflect the field-collected data.

- **The Kanata Golf and Country Club Development with SWM controls-** (Ex-Calib + KGCC+SWM):

  Reflective of existing conditions with the proposed redevelopment of the Kanata Golf and Country Club in place with Storm Water Management (SWM) ponds conceptually sized to mitigate impacts downstream.

- **KNL Development -** (Ex-Calib+KNL):

  Reflective of existing conditions with the inclusion of the KNL Developments Stages 7, 8 & 9 in place as per MVCA's floodplain mapping study.

- **The Kanata Golf and Country Club Development with SWM controls + KNL Development -** (Ex-Calib + KGCC+SWM+KNL):

  Reflective of existing conditions with the KNL Development Stages 7, 8 & 9 in place and the proposed redevelopment of the Kanata Golf and Country Club with Storm Water Management (SWM) ponds.

The various scenarios discussed above were assessed using a range of design storms. Table 1 outlines the peak flows into and out of the Beaver Pond as well as at the critical erosion site identified approximately 500 m downstream of the pond outlet. To provide some context to the calibration process, the results from the 2017 MVCA existing conditions model have also been provided. Note that the updated model calibration process, which also removed the two underground storage routing commands that were previously inserted in the model to provide a better fit with measured pond levels, resulted in the peak flows out of the Beaver Pond under existing conditions to increase by anywhere from 0.190 m^3/s (for the 100-year flow) to 0.310 m^3/s (for the 10-year flow), when compared to the flows computed by the 2017 MVCA's existing conditions model. Consequently, the updated calibrated existing conditions model was considered to set the targets for matching post-development flows for the purposes of this analysis. Accordingly, the SWM ponds within this development were sized to ensure that these targets are met.

Comparing the results of the existing calibrated model to the scenario where the Kanata Golf and Country Club is redeveloped with SWM ponds in place, the peak flows out of the Beaver Pond, as well as further downstream, are not increased from existing conditions. From this analysis, it was found that a total on-site storage volume of 53,600 m^3 will need to be provided within the Kanata Golf and Country Club Development to ensure that peak flows out of the Beaver Pond are not increased once the development is in place. Table 2 below provides a break down of the storage volume required at each of the proposed SWM ponds. Note in this analysis, a required storage volume has not been provided for Pond 3 (which will control 9.38 ha of parklands) as the required storage volume and release rates for this pond were substantially smaller than the 4 other proposed SWM ponds.

Table 1: Peak Flow Summary - Watts Creek / Kizell Drain SWMHYMO Model
September 2019

Inflow to Beaver Pond

Scenario Name	Peak Flow (m^3/s)					
	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year
MVCA-EX	0.409	1.132	3.052	6.265	9.474	13.141
EX-Calib	5.454	8.553	11.588	16.374	24.209	30.042
KGCC+SWM	3.040	4.815	6.282	9.368	15.150	19.388
KNL	12.385	21.416	28.036	37.158	43.739	49.953
Ex-Calib + KGCC+SWM +KNL	10.196	17.695	22.735	29.313	34.433	39.292

KNL - Kanata North Lakes
KGCC - Kanata Golf & Country Club

Outflow from Beaver Pond to Kizell Drain
(Flow Location 9)

Scenario Name	Peak Flow (m^3/s)					
	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year
MVCA-EX	0.223	0.318	0.440	0.646	0.730	0.815
EX-Calib	0.484	0.667	0.750	0.876	0.940	1.005
KGCC+SWM	0.475	0.654	0.741	0.866	0.936	1.003
KNL	0.674	0.830	0.932	1.046	1.127	1.207
Ex-Calib + KGCC+SWM +KNL	0.665	0.813	0.923	1.039	1.124	1.206

KNL - Kanata North Lakes
KGCC - Kanata Golf & Country Club

Kizell Drain - Downstream of Station Road

Scenario Name	Peak Flow (m^3/s)					
	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year
MVCA-EX	0.225	0.323	0.473	0.729	0.835	0.935
EX-Calib	0.553	0.874	1.074	1.351	1.551	1.758
KGCC+SWM	0.498	0.742	0.941	1.244	1.433	1.626
KNL	0.694	0.859	1.064	1.390	1.558	1.725
Ex-Calib + KGCC+SWM +KNL	0.673	0.816	0.973	1.318	1.480	1.647

KNL - Kanata North Lakes
KGCC - Kanata Golf & Country Club

The operation and configuration of the proposed SWM ponds may be further optimized during the detailed design stage, and the analysis provided in this memo should be considered primarily as a proof of concept.

Table 2: Kanata Golf & Country Club Required SWM Pond Volumes

Name	Required SWM Pond Volume (m^3)
Pond 1	20,000
Pond 2	12,700
Pond 3	N/A
Pond 4	16,100
Pond 5	4,850
Total	**53,650**

Based on MVCA's model, portions of the proposed KNL Development Stages 7, 8 & 9 will also drain to the existing Beaver Pond. Additional scenarios have been generated, where the Kanata Lakes lands are fully developed and where both Kanata Lakes and Kanata Golf and Country Club are developed. For this analysis, it has been assumed that no quantity controls will be implemented on the KNL Development. Based on model simulations of the KNL Development (excluding the Kanata Golf and Country Club Redevelopment) it was found that the peak flows out of the Beaver Pond will increase by anywhere from 0.163 m^3/s (for the 5-year event) to 0.202 m^3/s (for the 100-year event) above existing conditions. As the Kanata Golf and Country Club Redevelopment should not be required to offset the impacts of the KNL Development, the flows under the condition when KNL is fully developed have been considered the new target, for the scenario when the both KNL and Kanata Golf and Country Club are developed. Applying the SWM ponds outlined above to the Kanata Golf and Country Club lands with the KNL Development in place, it was found that peak flows out of the Beaver Pond will be very similar to when only the KNL Development is in place. All models discussed in this report are provided in Attachment A.

Matrix Solutions identified a critical erosion location on the Kizell Drain approximately 500 m downstream of the Beaver Pond outlet. From their geomorphological analysis, it was determined that this location has a critical shear stress of 20 N/m^2, which corresponds to a critical flow of 0.500 m^3/s. To assess the potential erosive impacts that the proposed developments may have on the creek, various scenarios were simulated using 39 years of hourly historical rainfall data taken from the Ottawa Airport. For each scenario, the total simulated erosive hours, cumulative work index and erosive volumes were calculated. This analysis was completed using both the critical shear stress and the critical flow determined by Matrix solutions for this location. Table 3 provides a full summary of these results using the provided critical shear stress. Table 4 provides a summary using the provided critical flow.

Table 3: Critical Shear Exceedance (20 pa) - Kizell Drain - Downstream of Station Road (Critical Erosion Location) - September 2019
Continuous Simulation (1967-2007)†

Scenario Name	Description	Drainage Area (ha)	Average Annual Flow (m^3/s)	Max Average Annual Flow (m^3/s)	Total Erosive Hours ˣ (Hrs)	Total Volume Exceedance (m^3)	Total Cumulative Work (pa.m)	Average Annual Erosive Hours (Hrs/Year)	Average Annual Volume Exceedance (m^3/Year)	Average Annual Cumulative Work (pa.m/Year)
MVCA-EX	MVCA's Official model converted back to existing conditions	444.5	0.030	0.051	240	4,731	228,308	6	121	5,854
EX-Calib	Existing conditions calibrated based on field data.	444.5	0.031	0.053	395	7,130	327,233	10	183	8,391
KGCC	Existing conditions with KGCC developed with SWM controls	444.0	0.034	0.057	498	8,385	389,152	13	215	9,978
KNL	Existing conditions with KNL Developed*	578.4	0.039	0.065	1027	14,289	661,250	26	366	16,955
KNL + KGCC	Existing conditions with KGCC developed with SWM controls and KNL Developed*	578.0	0.042	0.069	1296	17,281	800,302	33	443	20,521

KNL - Kanata Lakes North
KGCC - Kanata Golf & Country Club
Erosive analysis based on a critical flow of 20 pa
*Analysis assumes no SWM controls
† Continuous simulation exclude the years 2001 and 2005
ˣ Based on 39 years of continuous simulations

Table 4: Critical Flow Exceedance (500 L/s) - Kizell Drain - Downstream of Station Road (Critical Erosion Location) - September 2019

Scenario Name	Description	Drainage Area (ha)	Average Annual Flow (m^3/s)	Max Average Annual Flow (m^3/s)	Total Erosive Hours ˣ (Hrs)	Total Volume Exceedance (m^3)	Average Annual Erosive Hours (Hrs)	Average Annaul Volume Exceedance (m^3)
MVCA-EX	MVCA's Official model converted back to existing conditions	444.5	0.030	0.051	300	7,756	8	199
EX-Calib	Existing conditions calibrated based on field data.	444.5	0.031	0.053	650	12,799	17	328
KGCC+SWM	Existing conditions with KGCC developed with SWM controls	444.0	0.034	0.057	906	15,802	23	405
KNL	Existing conditions with KNL Developed*	578.4	0.039	0.065	1964	31,037	50	796
Ex-Calib + KGCC+SWM +KNL	Existing conditions with KGCC developed with SWM controls and KNL Developed*	578.0	0.042	0.069	2534	38,866	65	997

KNL - Kanata Lakes North
KGCC - Kanata Golf & Country Club
Erosive analysis based on a critical flow of 500 L/s
*Analysis assumes no SWM controls
† Continuous simulation exclude the years 2001 and 2005
ˣ Based on 39 years of continuous simulations

From these tables, it was found that the redevelopment of the Kanata Golf and Country Club will result in the annual erosive hours on the creek to increase by only 7 hours per year (based on critical flow). This corresponds to an average annual increase in erosive volume of 77 m^3/year (based on critical flow) and an increase in average annual cumulative work of 1,588 pa.m/year. To provide some context to these numbers, when only the KNL Development is implemented the average annual erosive hours are increased by 34 hours a year, which corresponds to an annual volume exceedance of 468 m^3 and an annual cumulative work increase of 8,565 pa.m above existing conditions.

Considering the KNL Development as the new baseline, and then implementing the Kanata Golf and Country Club Redevelopment with SWM Ponds, this results in the annual average erosive hours to increase by 15 hours, which corresponds to an annual volume exceedance of 201 m^3 and an annual cumulative work increase of 3,565 pa.m above the new baseline conditions. This analysis indicates that the increases in potential erosion due to the inclusion of the Kanata Golf and Country club are minimal and manageable.

From this analysis, it was found that the proposed redevelopment of the Kanata Golf and Country Club can be implemented with SWM measures in place to ensure no adverse impacts to peak flows out of the existing Beaver Pond and on the downstream watercourse. It was determined that a total of approximately 53,000 m^3 of on-site storage will need to be provided within the Kanata Golf and Country Club Development to ensure that these targets are met. A detailed erosion analysis was completed for each of the scenarios using 39 years of historical data. Increases in erosion due to the Kanata Golf and Country Club Redevelopment have been quantified and were found to be negligible and manageable.

Yours truly,

J.F Sabourin and Associates Inc.

Jonathon Burnett, P.Eng

Water Resources Engineer, JFSA

cc: J.F Sabourin, M.Eng, P.Eng

Director of Water Resources Projects

Table 1: Peak Flow Summary - Watts Creek / Kizell Drain SWMHYMO model

Table 2: Kanata Golf & Country Club Required SWM Pond Volumes

Table 3: Critical Shear Stress Analysis - Kizell Drain

Table 4: Critical Flow Analysis - Kizell Drain

Attachment A: SWMHYMO Model - MVCA Existing Conditions Model

Attachment B: SWMHYMO Model – Existing Conditions Calibrated

Attachment C: SWMHYMO Model – Redeveloped Kanata Golf & Country Club with SWM

Attachment D: SWMHYMO Model – KNL Development

Attachment E: SWMHYMO Model - Redeveloped Kanata Golf and Country Club with SWM & Kanata Lakes Development

JFSA
WATER RESOURCES AND ENVIRONMENTAL CONSULTANTS

Project Ref #:1581
Client: David Schaeffer Engineering

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Attachment A

SWMHYMO Model:

MVCA 2017 Existing Conditions Model

```
2     Metric units
*#*************************************************************************
*#  Project Name: [Shirley's Brook and Watt's Creek Phase 2 SWM Study]    Project Number: [60264539]
*#  Future Conditions Model for the Watts Creek/Kizell Drain Flood Plain Mapping Study
*#  Date        : 2014-12-31
*#  Modeller    : [Olivia Chung]  John Price MVCA
*#  Company     : AECOM Canada
*#  License #   :  2988504
*#*************************************************************************
*
*#========================================================================
*# WATTS CREEK SUBWATERSHED
*# MODEL CONVERTED FROM QUALHYMO MODEL (DILLON, 2009)
*# DECEMBER 2014
*#========================================================================
*# Model updated by JFSA (June 2019)to allow for continuous simulations to complete
*# preliminary erosion assessment.
*# Model reverted back to existing conditions using parameters as documented in
*# MVCA's Watts Creek Final Report November 2017
*#========================================================================
*#                                  KIZELL DRAIN
*#========================================================================
* Area Tributary to Beaver Pond and Kizell Cell
*#========================================================================
*#========================================================================
*# Derived from Scenario 20 of Phase 1 SWM Study
*# AECOM MODEL + GOLF COURSE DETENTION PONDS
*# AMC II Condition
*# RAINFALL - BEAVER POND RAIN GAUGE (POINT RAINFALL)
*# DESIGN EVENTS
*#========================================================================
*                               DESIGN STORMS
*#========================================================================
*%-----------------|-------------------------------------------------------|
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[0002]
                    2y12hr.stm
READ STORM          STORM_FILENAME=["storm.001"]
*%-----------------|-------------------------------------------------------|
*#========================================================================
*                               CONTINUOUS SIMULATIONS
*#========================================================================
*START               TZERO=[1967.0719],  METOUT=[2],  NSTORM=[0],  NRUN=[1967]
*%                   [""] <--storm filename, one per line for NSTORM time
*%-----------------|-------------------------------------------------------|
*# Ottawa International Airport - 19 July 1967 to 01 Nov 2007
*READ AES DATA       AES_FILENAME=["YOW_1967_2007.123"],
*                    IELEM=[123], START_DATE=[0], END_DATE=[-364]
*%-----------------|-------------------------------------------------------|
*%-----------------|-------------------------------------------------------|
COMPUTE API         APII=[40], APIK=[0.8]/day,
*%-----------------|-------------------------------------------------------|
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                    SCS curve number CN=[61],
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.2](%),
                                         LGI=[242](m), MNI=[0.025], SCI=[0](min),
                    Continuous simulation parameters:
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                    SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.01]/(mm),
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```
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                    XIMP=[0.31], TIMP=[0.41], DWF=[0](cms), LOSS=[2],
                    SCS curve number CN=[64],
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.2](%),
                                         LGI=[1760](m), MNI=[0.025], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[4](hrs),
                    SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.01]/(mm),
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                    DWF=[0](cms),  CN=[62], IA=[7.0](mm),
                    N=[1.1], TP=[0.55]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.01]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[10](mm), GWResK=[0.93](mm/day/mm),
                    VHydCond=[0.02](mm/hr), END=-1
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*#==============================================================================
*
ADD HYD             IDsum=[3], NHYD=[000321], IDs to add=[10+2]
*%-----------------|-------------------------------------------------------------|
*#==============================================================================
*# DA 5A
*#==============================================================================
ROUTE RESERVOIR     IDout=[2],   NHYD=[000100],  IDin=[3],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                    (cms) - (ha-m)
                                   [   0.0 ,  0.0 ]
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                                   [  0.76 ,  0.0438 ]
                                   [  0.86 ,  0.1887 ]
                                   [  0.95 ,  0.5613 ]
                                   [  0.98 ,  0.8197 ]
                                   [200.00 ,  0.9017 ]
                                   [   -1  ,  -1  ]  (max twenty pts)
                          IDovf=[   ], NHYDovf=[   ]
*%-----------------|-------------------------------------------------------------|
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*#==============================================================================
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*
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CONTINUOUS NASHYD        ID=[1], NHYD=["000100"], DT=[1]min, AREA=[2.27](ha),
                    DWF=[0](cms),  CN=[67], IA=[7.0](mm),
                    N=[1.1], TP=[0.37]hrs,
                    Continuous simulation parameters:
```

```
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.01]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[10](mm), GWResK=[0.93](mm/day/mm),
                    VHydCond=[0.02](mm/hr), END=-1
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*
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                    DWF=[0](cms),  CN=[67], IA=[7.0](mm),
                    N=[1.1], TP=[0.64]hrs,
                    Continuous simulation parameters:
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                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[10](mm), GWResK=[0.93](mm/day/mm),
                    VHydCond=[0.02](mm/hr), END=-1
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*#=============================================================================
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*
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                    SCS curve number CN=[60],
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                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.2](%),
                                         LGI=[858](m), MNI=[0.025], SCI=[0](min),
                    Continuous simulation parameters:
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*
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                    DWF=[0](cms),  CN=[66], IA=[7.0](mm),
                    N=[1.1], TP=[0.443]hrs,
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                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.01]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[10](mm), GWResK=[0.93](mm/day/mm),
                    VHydCond=[0.02](mm/hr), END=-1
*%-----------------|-------------------------------------------------------------|
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*
*#=============================================================================
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*#=============================================================================
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                    RDT=[1](min),
```

```
                            TABLE of ( OUTFLOW-STORAGE ) values
                                       (cms) - (ha-m)
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                                     [   0.0 ,  0.0240 ]
                                     [   0.9 ,  0.4127 ]
                                     [  2.25 ,  0.4798 ]
                                     [  4.16 ,  0.5507 ]
                                     [ 10.00 ,  0.6058 ]
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*
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                    SCS curve number CN=[61],
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                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.2](%),
                                         LGI=[498](m), MNI=[0.025], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[4](hrs),
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                    InterEventTime=[12](hrs), END=-1
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*%-----------------|-------------------------------------------------------------|
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*#=============================================================================
*# AREA 2B-2 (GOLF PORTION OF Area North of Campeau Drive) TO DA 4
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                    DWF=[0](cms),  CN=[63], IA=[7.0](mm),
                    N=[1.1], TP=[0.837]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.01]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[10](mm), GWResK=[0.93](mm/day/mm),
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*#=============================================================================
*# DA 4
*#=============================================================================
ROUTE RESERVOIR     IDout=[2],   NHYD=[000100],  IDin=[6],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                       (cms) - (ha-m)
                                     [   0.0 ,  0.0 ]
                                     [  1.47 ,  0.00001 ]
                                     [  2.42 ,  0.0080 ]
                                     [  3.09 ,  0.0650 ]
                                     [  3.63 ,  0.3459 ]
                                     [  3.86 ,  0.8899 ]
                                     [  4.09 ,  1.6418 ]
                                     [  4.25 ,  3.6976 ]
                                     [ 200.0 ,  4.0674 ]
                                     [   -1  ,  -1  ]  (max twenty pts)
                            IDovf=[   ], NHYDovf=[   ]
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# ADD AREA 3A-2 TO OUTFLOW OF DA 4
*#=============================================================================
```

```
*
ADD HYD             IDsum=[5], NHYD=[000321], IDs to add=[2+10]
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# AREA 1C (URBAN PORTION of Area North of Campeau Drive)
*#=============================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["000100"], DT=[1](min), AREA=[17.8](ha),
                    XIMP=[0.38], TIMP=[0.51], DWF=[0](cms), LOSS=[2],
                    SCS curve number CN=[61],
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.2](%),
                                         LGI=[474](m), MNI=[0.025], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[4](hrs),
                    SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.01]/(mm),
                    InterEventTime=[12](hrs), END=-1
*%-----------------|-------------------------------------------------------------|
*
*#=============================================================================
*# AREA 1B (GOLF PORTION OF Area North of Campeau Drive)
*#=============================================================================
CONTINUOUS NASHYD        ID=[2], NHYD=["000100"], DT=[1]min, AREA=[9.3](ha),
                    DWF=[0](cms),  CN=[61], IA=[7.0](mm),
                    N=[1.1], TP=[0.81]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.01]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[10](mm), GWResK=[0.93](mm/day/mm),
                    VHydCond=[0.02](mm/hr), END=-1
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# ADD 1C TO 1B
*#=============================================================================
ADD HYD             IDsum=[3], NHYD=[000321], IDs to add=[1+2]
*%-----------------|-------------------------------------------------------------|
*
*#=============================================================================
*# AREA 1A (INSTITUTION BLOCK)
*#=============================================================================
CONTINUOUS NASHYD        ID=[4], NHYD=["000100"], DT=[1]min, AREA=[11.4](ha),
                    DWF=[0](cms),  CN=[61], IA=[7.0](mm),
                    N=[1.1], TP=[0.56]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.01]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[10](mm), GWResK=[0.93](mm/day/mm),
                    VHydCond=[0.02](mm/hr), END=-1
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# AREA 1D (URBAN PORTION of Area North of Campeau Drive)
*#=============================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["000100"], DT=[1](min), AREA=[15.8](ha),
                    XIMP=[0.41], TIMP=[0.55], DWF=[0](cms), LOSS=[2],
                    SCS curve number CN=[65],
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.2](%),
                                         LGI=[915](m), MNI=[0.025], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[4](hrs),
                    SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.01]/(mm),
                    InterEventTime=[12](hrs), END=-1
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
```

```
*# MAJOR FLOW TO 5B - MINOR FLOW TO 5C
*# 85 L/S/HA * 15.8 HA = 1.343 L/S
*#==============================================================================
COMPUTE DUALHYD     IDin=[1], CINLET=[1.343](cms), NINLET=[1],
                    MAJID=[7], MajNHYD=[000100],
                    MINID=[8], MinNHYD=[000100],
                    TMJSTO=[0](cu-m)
*%-----------------|------------------------------------------------------------|
*#==============================================================================
*# ADD 1A AND 1B TO 1D MINOR
*#==============================================================================
ADD HYD             IDsum=[6], NHYD=[000321], IDs to add=[4+3+8]
*%-----------------|------------------------------------------------------------|
*
*#==============================================================================
*# AREA 5A (URBAN PORTION OF Area North of Knudson Drive)
*#==============================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["000100"], DT=[1](min), AREA=[2.5](ha),
                    XIMP=[0.37], TIMP=[0.50], DWF=[0](cms), LOSS=[2],
                    SCS curve number CN=[61],
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.2](%),
                                         LGI=[146](m), MNI=[0.025], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[4](hrs),
                    SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.01]/(mm),
                    InterEventTime=[12](hrs), END=-1
*%-----------------|------------------------------------------------------------|
*
*#==============================================================================
*# AREA 5B (GOLF PORTION OF Area North of Knudson Drive)
*#==============================================================================
CONTINUOUS NASHYD        ID=[2], NHYD=["000100"], DT=[1]min, AREA=[9.5](ha),
                    DWF=[0](cms),  CN=[62], IA=[7.0](mm),
                    N=[1.1], TP=[0.67]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.01]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[10](mm), GWResK=[0.93](mm/day/mm),
                    VHydCond=[0.02](mm/hr), END=-1
*%-----------------|------------------------------------------------------------|
*#==============================================================================
*# ADD 5A AND 1D MAJOR TO 5B
*#==============================================================================
ADD HYD             IDsum=[4], NHYD=[000321], IDs to add=[1+7+2]
*%-----------------|------------------------------------------------------------|
*
*#==============================================================================
*# AREA 5C (URBAN PORTION OF Area North of Knudson Drive)
*#==============================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["000100"], DT=[1](min), AREA=[6.2](ha),
                    XIMP=[0.38], TIMP=[0.50], DWF=[0](cms), LOSS=[2],
                    SCS curve number CN=[61],
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.2](%),
                                         LGI=[309](m), MNI=[0.025], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[4](hrs),
                    SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.01]/(mm),
                    InterEventTime=[12](hrs), END=-1
*%-----------------|------------------------------------------------------------|
*#==============================================================================
*# MAJOR FLOW TO 5B - MINOR FLOW TO 6A
*# 85 L/S/HA * 6.2 HA = 0.527 L/S
```

```
*#=============================================================================
COMPUTE DUALHYD      IDin=[1], CINLET=[0.527](cms), NINLET=[1],
                     MAJID=[2], MajNHYD=[000100],
                     MINID=[8], MinNHYD=[000100],
                     TMJSTO=[0](cu-m)
*%-----------------|-----------------------------------------------------------|
*#=============================================================================
*# ADD 5C MAJOR TO 5B
*#=============================================================================
ADD HYD              IDsum=[7], NHYD=[000321], IDs to add=[2+4]
*%-----------------|-----------------------------------------------------------|
*
*#=============================================================================
*# DA 8
*# WITH UPDATED DISCHARGE RATING CURVE BASED ON FIELD SURVEY INFORMATION
*#=============================================================================
ROUTE RESERVOIR      IDout=[3],   NHYD=[000100],  IDin=[7],
                     RDT=[1](min),
                           TABLE of ( OUTFLOW-STORAGE ) values
                                     (cms) - (ha-m)
                                   [   0.0 ,  0.0 ]
                                   [  0.18 ,0.0004 ]
                                   [  0.22 ,0.0023 ]
                                   [  0.25 ,0.0092 ]
                                   [  0.28 ,0.0250 ]
                                   [  0.30 ,0.0580 ]
                                   [  0.33 ,0.1272 ]
                                   [  0.35 ,0.2435 ]
                                   [  0.37 ,0.4650 ]
                                   [ 200.0 ,0.5115 ]
                                   [   -1  ,  -1   ]  (max twenty pts)
                           IDovf=[   ], NHYDovf=[   ]
*%-----------------|-----------------------------------------------------------|
*#=============================================================================
*# ADD 1D MINOR AND OUTLET OF DA 8 TO 5C MINOR
*#=============================================================================
ADD HYD              IDsum=[2], NHYD=[000321], IDs to add=[6+3+8]
*%-----------------|-----------------------------------------------------------|
*#=============================================================================
*# ADD 3A TO 5C
*#=============================================================================
ADD HYD              IDsum=[5], NHYD=[000321], IDs to add=[5+2]
*%-----------------|-----------------------------------------------------------|
*%SHIFT HYD was removed as it was not being used and was crashing the model
*%SHIFT HYD           IDout=[5], NHYD=[000100], IDin=[4], TLAG=[0](min)
*%-----------------|-----------------------------------------------------------|
*
*#=============================================================================
*# AREA 6A (URBAN PORTION OF Area North of Knudson Drive)
*#=============================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["000100"], DT=[1](min), AREA=[4.1](ha),
                     XIMP=[0.39], TIMP=[0.52], DWF=[0](cms), LOSS=[2],
                     SCS curve number CN=[61],
                     Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                          LGP=[40](m), MNP=[0.25], SCP=[0](min),
                     Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.2](%),
                                          LGI=[238](m), MNI=[0.025], SCI=[0](min),
                     Continuous simulation parameters:
                     IaRECper=[6](hrs),  IaRECimp=[4](hrs),
                     SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.01]/(mm),
                     InterEventTime=[12](hrs), END=-1
*%-----------------|-----------------------------------------------------------|
*
*#=============================================================================
*# AREA 6B (GOLF PORTION OF Area North of Knudson Drive)
*#=============================================================================
CONTINUOUS NASHYD        ID=[2], NHYD=["000100"], DT=[1]min, AREA=[5.9](ha),
```

```
                    DWF=[0](cms),  CN=[61], IA=[7.0](mm),
                    N=[1.1], TP=[0.87]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.01]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[10](mm), GWResK=[0.93](mm/day/mm),
                    VHydCond=[0.02](mm/hr), END=-1
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# ADD 6A TO 6B
*#=============================================================================
ADD HYD             IDsum=[3], NHYD=[000321], IDs to add=[1+2]
*%-----------------|-------------------------------------------------------------|
*
*#=============================================================================
*# AREA 6C (URBAN PORTION OF Area North of Knudson Drive)
*#=============================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["000100"], DT=[1](min), AREA=[5.3](ha),
                    XIMP=[0.38], TIMP=[0.50], DWF=[0](cms), LOSS=[2],
                    SCS curve number CN=[61],
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.2](%),
                                         LGI=[297](m), MNI=[0.025], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[4](hrs),
                    SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.01]/(mm),
                    InterEventTime=[12](hrs), END=-1
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# MAJOR FLOW TO 6B - MINOR FLOW TO 7
*# 85 L/S/HA * 5.3 HA = 0.4505 L/S
*#=============================================================================
COMPUTE DUALHYD     IDin=[1], CINLET=[0.451](cms), NINLET=[1],
                    MAJID=[2], MajNHYD=[000100],
                    MINID=[6], MinNHYD=[000100],
                    TMJSTO=[0](cu-m)
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# ADD 6C MAJOR TO 6B
*#=============================================================================
ADD HYD             IDsum=[4], NHYD=[000321], IDs to add=[2+3]
*#=============================================================================
*# DA 9
*# WITH UPDATED DISCHARGE RATING CURVE BASED ON FIELD SURVEY INFORMATION
*#=============================================================================
ROUTE RESERVOIR     IDout=[3],   NHYD=[000100],  IDin=[4],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                     (cms) - (ha-m)
                                   [   0.0 ,  0.0 ]
                                   [  0.25 ,0.00003 ]
                                   [  0.31 ,0.0039 ]
                                   [  0.36 ,0.0285 ]
                                   [  0.40 ,0.0901 ]
                                   [  0.44 ,0.2499 ]
                                   [  0.47 ,0.6154 ]
                                   [  0.48 ,0.7609 ]
                                   [200.00 ,0.8370 ]
                                   [   -1  ,  -1  ]  (max twenty pts)
                          IDovf=[   ], NHYDovf=[   ]
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# ADD DA 9 OUTFLOW TO 6C MINOR
*#=============================================================================
ADD HYD             IDsum=[2], NHYD=[000321], IDs to add=[3+6]
```

```
*%-----------------|---------------------------------------------------------|
*#=========================================================================
*# ADD 5C TO 6C
*#=========================================================================
ADD HYD             IDsum=[5], NHYD=[000321], IDs to add=[5+2]
*%-----------------|---------------------------------------------------------|
*SHIFT HYD was removed as it was not being used and was crashing the model
*SHIFT HYD           IDout=[5], NHYD=[00100], IDin=[4], TLAG=[0](min)
*%-----------------|---------------------------------------------------------|
*
*#=========================================================================
*# AREA 14 (GOLF PORTION OF Area East of Knudson Drive - DA 11)
*#=========================================================================
CONTINUOUS NASHYD        ID=[2], NHYD=["000100"], DT=[1]min, AREA=[2.38](ha),
                    DWF=[0](cms),  CN=[61], IA=[7.0](mm),
                    N=[1.1], TP=[0.40]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.01]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[10](mm), GWResK=[0.93](mm/day/mm),
                    VHydCond=[0.02](mm/hr), END=-1
*%-----------------|---------------------------------------------------------|
*#=========================================================================
*# DA 11
*# RATING CURVE BASED ON FIELD SURVEY INFORMATION
*#=========================================================================
ROUTE RESERVOIR     IDout=[4],   NHYD=[000100],  IDin=[2],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                     (cms) - (ha-m)
                                   [   0.0 ,  0.0 ]
                                   [  0.09 ,0.0019 ]
                                   [  0.12 ,0.0735 ]
                                   [ 0.145 ,0.2234 ]
                                   [ 0.146 ,0.2349 ]
                                   [200.00 ,0.2584 ]
                                   [   -1  ,  -1  ]  (max twenty pts)
                          IDovf=[   ], NHYDovf=[   ]
*%-----------------|---------------------------------------------------------|
*#=========================================================================
*# ADD OUTFLOW OF DA 11 TO 6C
*#=========================================================================
ADD HYD             IDsum=[2], NHYD=[000321], IDs to add=[5+4]
*%-----------------|---------------------------------------------------------|
*
*#=========================================================================
*# AREA 15 (GOLF PORTION OF Area South of Walden Drive - DA 10B)
*#=========================================================================
CONTINUOUS NASHYD        ID=[4], NHYD=["000100"], DT=[1]min, AREA=[2.5](ha),
                    DWF=[0](cms),  CN=[50], IA=[7.0](mm),
                    N=[1.1], TP=[0.20]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.01]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[10](mm), GWResK=[0.93](mm/day/mm),
                    VHydCond=[0.02](mm/hr), END=-1
*%-----------------|---------------------------------------------------------|
*#=========================================================================
*# DA 10B
*# RATING CURVE BASED ON FIELD SURVEY INFORMATION
*#=========================================================================
ROUTE RESERVOIR     IDout=[5],   NHYD=[000100],  IDin=[4],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                     (cms) - (ha-m)
```

```
                                    [   0.0 ,  0.0 ]
                                    [  0.32 ,0.0018 ]
                                    [  0.34 ,0.0093 ]
                                    [  0.36 ,0.0309 ]
                                    [  0.38 ,0.1597 ]
                                    [  0.40 ,0.3353 ]
                                    [200.00 ,0.3688 ]
                                    [   -1  ,  -1   ]  (max twenty pts)
                          IDovf=[   ], NHYDovf=[   ]
*%-----------------|-------------------------------------------------------------|
*
*#=============================================================================
*# AREA 7 (Adjacent to Beaver Pond)
*#=============================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["000204"], DT=[1](min), AREA=[19.6](ha),
                    XIMP=[0.33], TIMP=[0.44], DWF=[0](cms), LOSS=[2],
                    SCS curve number CN=[60],
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.2](%),
                                         LGI=[778](m), MNI=[0.025], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[4](hrs),
                    SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.01]/(mm),
                    InterEventTime=[12](hrs), END=-1
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# ADD OUTFLOW OF DA 10B AND 6C TO 7
*# TOTAL FLOW - AT EXISTING 2700 MM OUTLET
*#=============================================================================
ADD HYD             IDsum=[10], NHYD=[000321], IDs to add=[5+2+1]
*%-----------------|-------------------------------------------------------------|
*
*#=============================================================================
*# AREA 4C
*#=============================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["000204"], DT=[1](min), AREA=[5.8](ha),
                    XIMP=[0.40], TIMP=[0.53], DWF=[0](cms), LOSS=[2],
                    SCS curve number CN=[63],
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.2](%),
                                         LGI=[260](m), MNI=[0.025], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[4](hrs),
                    SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.01]/(mm),
                    InterEventTime=[12](hrs), END=-1
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# MAJOR FLOW TO 4B - MINOR FLOW TO 4A
*# 85 L/S/HA * 5.8 HA = 493 L/S
*#=============================================================================
COMPUTE DUALHYD     IDin=[1], CINLET=[0.493](cms), NINLET=[1],
                    MAJID=[5], MajNHYD=[000100],
                    MINID=[6], MinNHYD=[100100],
                    TMJSTO=[0](cu-m)
*%-----------------|-------------------------------------------------------------|
*
*#=============================================================================
*# AREA 4A - FLOW THROUGH AREA 4
*#=============================================================================
CONTINUOUS STANDHYD      ID=[3], NHYD=["000204"], DT=[1](min), AREA=[15.8](ha),
                    XIMP=[0.50], TIMP=[0.66], DWF=[0](cms), LOSS=[2],
                    SCS curve number CN=[58],
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.2](%),
```

```
                                        LGI=[580](m), MNI=[0.025], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[4](hrs),
                    SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.01]/(mm),
                    InterEventTime=[12](hrs), END=-1
*%-----------------|-------------------------------------------------------------|
*
*#============================================================================
*# ADDITION OF 4C MINOR TO 4A
*#============================================================================
*
ADD HYD             IDsum=[4], NHYD=[000231], IDs to add=[3+6]
*%-----------------|-------------------------------------------------------------|
*#============================================================================
*# AREA 4B - ROUTE THROUGH ON SITE STORAGE
*#============================================================================
CONTINUOUS STANDHYD      ID=[3], NHYD=["000204"], DT=[1](min), AREA=[6.2](ha),
                    XIMP=[0.57], TIMP=[0.57], DWF=[0](cms), LOSS=[2],
                    SCS curve number CN=[61],
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.2](%),
                                         LGI=[272](m), MNI=[0.025], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[4](hrs),
                    SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.01]/(mm),
                    InterEventTime=[12](hrs), END=-1
*%-----------------|-------------------------------------------------------------|
*#============================================================================
*# ADDITION OF MAJOR FLOW AT 4C TO AREA 4B
*#============================================================================
ADD HYD             IDsum=[6], NHYD=[000231], IDs to add=[5+3]
*%-----------------|-------------------------------------------------------------|
*#============================================================================
*# ON-SITE STORAGE IN AREA 4B
*# 85L/S/HA
*#============================================================================
*
ROUTE RESERVOIR     IDout=[3],   NHYD=[000100],  IDin=[6],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                     (cms) - (ha-m)
                                   [   0.0 ,  0.0 ]
                                   [ 0.527, 0.2840]
                                   [   -1  ,  -1  ]  (max twenty pts)
                          IDovf=[], NHYDovf=[]
*%-----------------|-------------------------------------------------------------|
*#============================================================================
*# ADDITION OF ROUTED 4B TO AREA 4A
*#============================================================================
ADD HYD             IDsum=[8], NHYD=[000231], IDs to add=[4+3]
*%-----------------|-------------------------------------------------------------|
*
*#============================================================================
*# AREA 4 (Adjacent to Beaver Pond)
*#============================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["000204"], DT=[1](min), AREA=[21.2](ha),
                    XIMP=[0.29], TIMP=[0.38], DWF=[0](cms), LOSS=[2],
                    SCS curve number CN=[60],
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.2](%),
                                         LGI=[950](m), MNI=[0.025], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[4](hrs),
                    SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.01]/(mm),
                    InterEventTime=[12](hrs), END=-1
```

```
*%-----------------|---------------------------------------------------------|
*#=========================================================================
*# ADDITION OF MINOR FLOW AT 4A TO AREA 4
*#=========================================================================
ADD HYD             IDsum=[3], NHYD=[000231], IDs to add=[8+1]
*%-----------------|---------------------------------------------------------|
ADD HYD             IDsum=[7], NHYD=[000231], IDs to add=[10+3]
*%-----------------|---------------------------------------------------------|
*#=========================================================================
*# AREA 9 (RURAL)
*#=========================================================================
CONTINUOUS NASHYD        ID=[2], NHYD=["000100"], DT=[1]min, AREA=[18.9](ha),
                    DWF=[0](cms),  CN=[75], IA=[7.0](mm),
                    N=[1.1], TP=[0.37]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.01]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[10](mm), GWResK=[0.93](mm/day/mm),
                    VHydCond=[0.02](mm/hr), END=-1
*%-----------------|---------------------------------------------------------|
ADD HYD             IDsum=[6], NHYD=[000321], IDs to add=[7+2]
*%-----------------|---------------------------------------------------------|
*
*#=========================================================================
*# GOULDBOURN FORCED ROAD - KANATA AVENUE TO AREA 10 BOUNDARY
*# (ARTERIAL ROAD 10 YEAR 10 MN INLET TIME)
*#=========================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["000204"], DT=[1](min), AREA=[1.6](ha),
                    XIMP=[0.71], TIMP=[0.71], DWF=[0](cms), LOSS=[2],
                    SCS curve number CN=[65],
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.2](%),
                                         LGI=[358](m), MNI=[0.025], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[4](hrs),
                    SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.01]/(mm),
                    InterEventTime=[12](hrs), END=-1
*%-----------------|---------------------------------------------------------|
*#=========================================================================
*# MAJOR FLOW TO BEAVER POND - MINOR FLOW TO AREA 10 STORM SYSTEM
*# 237.69 L/S/HA * 1.66 HA = 394.6 L/S
*#=========================================================================
COMPUTE DUALHYD     IDin=[1], CINLET=[0.395](cms), NINLET=[1],
                    MAJID=[2], MajNHYD=[000100],
                    MINID=[7], MinNHYD=[100100],
                    TMJSTO=[0](cu-m)
*%-----------------|---------------------------------------------------------|
*#=========================================================================
*# BEAVER POND PORTION #1
*#=========================================================================
*
ADD HYD             IDsum=[9], NHYD=[000321], IDs to add=[6+2]
*%-----------------|---------------------------------------------------------|
*
*#=========================================================================
*# KANATA AVENUE - GOULBOURN FORCED ROAD TO AREA 10 BOUNDARY
*# (ARTERIAL ROAD 10 YEAR 10 MIN INLET TIME)
*#=========================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["000204"], DT=[1](min), AREA=[2.8](ha),
                    XIMP=[0.32], TIMP=[0.32], DWF=[0](cms), LOSS=[2],
                    SCS curve number CN=[61],
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.2](%),
                                         LGI=[370](m), MNI=[0.025], SCI=[0](min),
```

```
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[4](hrs),
                    SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.01]/(mm),
                    InterEventTime=[12](hrs), END=-1
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# MAJOR FLOW TOWARDS TFD - MINOR FLOW TO AREA 10 STORM SYSTEM
*# 237.69 L/S/HA * 1.8 HA = 427.8 L/S
* JFSA correction based on above drainage area of 2.8 ha
* Capture in DUALHYD below 237.69 L/s/ha * 2.8 ha = 665.5 L/s
*#=============================================================================
COMPUTE DUALHYD     IDin=[1], CINLET=[0.6655](cms), NINLET=[1],
                    MAJID=[10], MajNHYD=[000100],
                    MINID=[2], MinNHYD=[100100],
                    TMJSTO=[0](cu-m)
*%-----------------|-------------------------------------------------------------|
*
*#=============================================================================
*# DRAINAGE AGREA 10 - TOTAL 43.6 HA - DIVIDED UP FOR HGL ANALYSIS
*# (INCLUDES AREA 10-4, 10-1, 10-2 AND 10-3)
*#=============================================================================
*
*#=============================================================================
*# AREA 10-4 - DRAINS INTO S-5 - MAJOR FLOW CASCADES
*#=============================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["000204"], DT=[1](min), AREA=[13.9](ha),
                    XIMP=[0.39], TIMP=[0.51], DWF=[0](cms), LOSS=[2],
                    SCS curve number CN=[61],
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.2](%),
                                         LGI=[285](m), MNI=[0.025], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[4](hrs),
                    SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.01]/(mm),
                    InterEventTime=[12](hrs), END=-1
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# MINOR FLOW INTO SYSTEM
*# 85 L/S/HA * 14 = 1190 L/S
*JFSA correction based on above drainage area of 13.9 ha
* Capture in DUALHYD below 85 L/s/ha * 13.9 ha = 1181 L/s
*#=============================================================================
COMPUTE DUALHYD     IDin=[1], CINLET=[1.181](cms), NINLET=[1],
                    MAJID=[8], MajNHYD=[000100],
                    MINID=[6], MinNHYD=[100100],
                    TMJSTO=[0](cu-m)
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# ADD KANATA AVENUE AND AREA 10-4 - MH S-5
*#=============================================================================
*
ADD HYD             IDsum=[5], NHYD=[000101], IDs to add=[6+2]
*%-----------------|-------------------------------------------------------------|
*
*#=============================================================================
*# AREA 10-1 - DRAINS INTO S-4 - MAJOR FLOW CASCADES
*#=============================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["000204"], DT=[1](min), AREA=[9.8](ha),
                    XIMP=[0.42], TIMP=[0.51], DWF=[0](cms), LOSS=[2],
                    SCS curve number CN=[70],
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.2](%),
                                         LGI=[256](m), MNI=[0.025], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[4](hrs),
```

```
                    SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.01]/(mm),
                    InterEventTime=[12](hrs), END=-1
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# MINOR FLOW INTO SYSTEM
*# 85 L/S/HA * 9.5 = 807.5 L/S
*JFSA correction based on above drainage area of 9.8 ha
* Capture in DUALHYD below 85 L/s/ha * 9.8 ha = 833 L/s
*#=============================================================================
COMPUTE DUALHYD     IDin=[1], CINLET=[0.833](cms), NINLET=[1],
                    MAJID=[4], MajNHYD=[000100],
                    MINID=[6], MinNHYD=[100100],
                    TMJSTO=[0](cu-m)
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# ADD GOULBOURN FORCED ROAD AND AREA 10-1 - MH S-3
*#=============================================================================
*
ADD HYD             IDsum=[3], NHYD=[000101], IDs to add=[6+7]
*%-----------------|-------------------------------------------------------------|
ADD HYD             IDsum=[7], NHYD=[000102], IDs to add=[3+5]
*%-----------------|-------------------------------------------------------------|
*
*#=============================================================================
*# AREA 10-3 - DRAINS INTO S-2 - MAJOR FLOW CASCADES
*#=============================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["000204"], DT=[1](min), AREA=[4.3](ha),
                    XIMP=[0.41], TIMP=[0.55], DWF=[0](cms), LOSS=[2],
                    SCS curve number CN=[78],
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.2](%),
                                         LGI=[161](m), MNI=[0.025], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[4](hrs),
                    SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.01]/(mm),
                    InterEventTime=[12](hrs), END=-1
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# MINOR FLOW INTO SYSTEM
*# 85 L/S/HA * 3.9 = 331.5 L/S
*JFSA correction based on above drainage area of 4.3 ha
* Capture in DUALHYD below 85 L/s/ha * 4.3 ha = 365 L/s
*#=============================================================================
COMPUTE DUALHYD     IDin=[1], CINLET=[0.365](cms), NINLET=[1],
                    MAJID=[5], MajNHYD=[000100],
                    MINID=[2], MinNHYD=[100100],
                    TMJSTO=[0](cu-m)
*%-----------------|-------------------------------------------------------------|
ADD HYD             IDsum=[10], NHYD=[000103], IDs to add=[2+7]
*%-----------------|-------------------------------------------------------------|
*
*#=============================================================================
*# AREA 10-2 - DRAINS INTO S-6 - MAJOR FLOW CASCADES
*#=============================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["000204"], DT=[1](min), AREA=[18.6](ha),
                    XIMP=[0.38], TIMP=[0.51], DWF=[0](cms), LOSS=[2],
                    SCS curve number CN=[61],
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.2](%),
                                         LGI=[354](m), MNI=[0.025], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[4](hrs),
                    SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.01]/(mm),
                    InterEventTime=[12](hrs), END=-1
*%-----------------|-------------------------------------------------------------|
```

```
*#=============================================================================
*# MINOR FLOW INTO SYSTEM
*# 85 L/S/HA * 16.2 = 1377 L/S
*JFSA correction based on above drainage area of 18.6 ha
* Capture in DUALHYD below 85 L/s/ha * 18.6 ha = 1581 L/s
*#=============================================================================
COMPUTE DUALHYD     IDin=[1], CINLET=[1.581](cms), NINLET=[1],
                    MAJID=[2], MajNHYD=[000100],
                    MINID=[6], MinNHYD=[100100],
                    TMJSTO=[0](cu-m)
*%-----------------|-------------------------------------------------------|
*
*#=============================================================================
*# AREA 10A - MINOR FLOW TO AREA 10, MAJOR FLOW TO CARP RIVER WATERSHED
*#=============================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["000204"], DT=[1](min), AREA=[9.9](ha),
                    XIMP=[0.33], TIMP=[0.44], DWF=[0](cms), LOSS=[2],
                    SCS curve number CN=[65],
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.2](%),
                                         LGI=[246](m), MNI=[0.025], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[4](hrs),
                    SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.01]/(mm),
                    InterEventTime=[12](hrs), END=-1
*%-----------------|-------------------------------------------------------|
*#=============================================================================
*# SPLIT OF MAJOR AND MINOR FLOW AT 85 L/S/HA
*# 85 * 7.0 = 595 L/S
*JFSA correction based on above drainage area of 9.9 ha
* Capture in DUALHYD below 85 L/s/ha * 9.9 ha = 841 L/s
*#=============================================================================
COMPUTE DUALHYD     IDin=[1], CINLET=[0.841](cms), NINLET=[1],
                    MAJID=[3], MajNHYD=[000100],
                    MINID=[7], MinNHYD=[100100],
                    TMJSTO=[0](cu-m)
*%-----------------|-------------------------------------------------------|
ADD HYD             IDsum=[1], NHYD=[000104], IDs to add=[7+6]
*%-----------------|-------------------------------------------------------|
*#=============================================================================
*# TOTAL MINOR FLOW AT OUTLET
*#=============================================================================
ADD HYD             IDsum=[6], NHYD=[000105], IDs to add=[1+10]
*%-----------------|-------------------------------------------------------|
*#=============================================================================
*# TOTAL MAJOR FLOW FOR DRAINAGE AREA 10 AT OUTLET
*#=============================================================================
ADD HYD             IDsum=[7], NHYD=[000106], IDs to add=[8+4+5+2]
*%-----------------|-------------------------------------------------------|
*#=============================================================================
*# AREA 11 (RURAL) - Increased Area for Existing Conditions
*#=============================================================================
CONTINUOUS NASHYD        ID=[2], NHYD=["000100"], DT=[1]min, AREA=[46.2](ha),
                    DWF=[0](cms),  CN=[62], IA=[7.0](mm),
                    N=[1.1], TP=[0.75]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.01]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[10](mm), GWResK=[0.93](mm/day/mm),
                    VHydCond=[0.02](mm/hr), END=-1
*%-----------------|-------------------------------------------------------|
ADD HYD             IDsum=[3], NHYD=[000317], IDs to add=[7+2]
*%-----------------|-------------------------------------------------------|
*#=============================================================================
*# TOTAL FLOW TO KIZELL POND (U/S CELL)
```

```
*#==============================================================================
ADD HYD             IDsum=[10], NHYD=[000317], IDs to add=[3+6]
*%-----------------|------------------------------------------------------------|
*
*#==============================================================================
*# SYSTEM STORAGE REPRESENTATION (KIZELL POND)
*# RATING CURVE PROVIDED BY IBI
*#==============================================================================
ROUTE RESERVOIR     IDout=[3],   NHYD=["KP-R"],  IDin=[10],
                    RDT=[5](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                    (cms) - (ha-m)
                                [   0.0 ,  0.0 ]
                                [ 0.058 ,  0.3024]
                                [ 0.089 ,  0.4604]
                                [ 0.179 ,  0.9293]
                                [ 0.235 ,  1.5450]
                                [   -1  ,  -1  ]  (max twenty pts)
                          IDovf=[4], NHYDovf=["OVF-KP"]
*#==============================================================================
*# ADD SYSTEM STORAGE OUTFLOW, OVERFLOW AND BYPASS (KIZELL)
*#==============================================================================
ADD HYD             IDsum=[10], NHYD=["KP-COM"], IDs to add=[3+4]
*#==============================================================================
*
* Kanata Lakes Stage 7 - Catchment removed from Model under existing conditions
*
*#==============================================================================
*CONTINUOUS STANDHYD      ID=[1], NHYD=["Stage 7"], DT=[1](min), AREA=[73.1](ha),
*                    XIMP=[0.375], TIMP=[0.50], DWF=[0](cms), LOSS=[2],
*                    SCS curve number CN=[57],
*                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
*                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
*                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.2](%),
*                                         LGI=[16445](m), MNI=[0.025], SCI=[0](min),
*                    Continuous simulation parameters:
*                    IaRECper=[6](hrs),  IaRECimp=[4](hrs),
*                    SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.01]/(mm),
*                    InterEventTime=[12](hrs), END=-1
*#==============================================================================
*
* Kanata Lakes Stage 8 - Catchment removed from Model under existing conditions
*
*#==============================================================================
*CONTINUOUS STANDHYD      ID=[2], NHYD=["Stage 8"], DT=[1](min), AREA=[65.7](ha),
*                    XIMP=[0.375], TIMP=[0.50], DWF=[0](cms), LOSS=[2],
*                    SCS curve number CN=[57],
*                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
*                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
*                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.2](%),
*                                         LGI=[14785](m), MNI=[0.025], SCI=[0](min),
*                    Continuous simulation parameters:
*                    IaRECper=[6](hrs),  IaRECimp=[4](hrs),
*                    SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.01]/(mm),
*                    InterEventTime=[12](hrs), END=-1
*#==============================================================================
*# Only Minor system flow to Kizell Cell - Command removed from Model
*#==============================================================================
*COMPUTE DUALHYD     IDin=[2], CINLET=[0.8](cms), NINLET=[1],
*                    MAJID=[3], MajNHYD=[000100],
*                    MINID=[7], MinNHYD=[100100],
*                    TMJSTO=[0](cu-m)
*#==============================================================================
* Total flow into Kizell Cell
*#==============================================================================
*#ADD HYD             IDsum=[8], NHYD=["KP-COM"], IDs to add=[10+1]
*#==============================================================================
```

```
*#=============================================================================
* ROUTE THROUGH THE KIZELL CELL
*
ROUTE RESERVOIR     IDout=[5],   NHYD=["Kizell Cell"],  IDin=[10],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                    (cms) - (ha-m)
                                [   0.0 ,  0.0 ]
                                [ 0.100 ,  0.016]
                                [ 0.200 ,  0.033]
                                [ 0.300 ,  0.055]
                                [ 0.400 ,  0.079]
                                [ 0.500 ,  0.121]
                                [ 0.700 ,  0.188]
                                [ 0.800 ,  0.281]
                                [ 0.950 ,  0.433]
                                [ 1.050 ,  0.658]
                                [ 1.200 ,  0.919]
                                [   -1  ,  -1  ]  (max twenty pts)
                           IDovf=[4], NHYDovf=["OVF-Kizell Cell"]
*#=============================================================================
*# ADD OUTFLOW AND OVERFLOW
*#=============================================================================
ADD HYD             IDsum=[8], NHYD=["KP-COM"], IDs to add=[5+4]
*#=============================================================================
*#=============================================================================
*# SYSTEM STORAGE REPRESENTATION (BEAVER POND)
*# RATING CURVE PROVIDED BY IBI
*#=============================================================================
ROUTE RESERVOIR     IDout=[3],   NHYD=["BP-R"],  IDin=[9],
                    RDT=[5](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                    (cms) - (ha-m)
                                [   0.0 ,  0.0 ]
                                [ 0.091 ,  1.3560]
                                [ 0.179 ,  2.6800]
                                [ 0.184 ,  2.8250]
                                [ 0.264 ,  5.3600]
                                [ 0.270 ,  5.6350]
                                [   -1  ,  -1  ]  (max twenty pts)
                           IDovf=[4], NHYDovf=["OVF-BP"]
*#=============================================================================
*# ADD SYSTEM STORAGE OUTFLOW, OVERFLOW AND BYPASS (BEAVER)
*#=============================================================================
ADD HYD             IDsum=[9], NHYD=["BP-COM"], IDs to add=[3+4]
*#=============================================================================
*
* Kanata Lakes Stage 9 - Replaced by subcatchment 8 under existing conditions
*
*#=============================================================================
CONTINUOUS NASHYD        ID=[1], NHYD=["8"], DT=[1]min, AREA=[9.2](ha),
                    DWF=[0](cms),  CN=[56], IA=[7.0](mm),
                    N=[1.1], TP=[0.21]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.01]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[10](mm), GWResK=[0.93](mm/day/mm),
                    VHydCond=[0.02](mm/hr), END=-1
*#=============================================================================
*# TOTAL HYDROGRAPH INTO BEAVER POND
*
ADD HYD             IDsum=[6], NHYD=["BP-TOTAL"], IDs to add=[9+8+1]
*
*#=============================================================================
SAVE HYD            ID=[6],  # OF PCYCLES=[-1],  ICASEsh=[-1]
                    HYD_FILENAME=["BP_In"]
```

```
                    HYD_COMMENT=["Total inflow to the Beaver Pond"]
*#=============================================================================
*# TOTAL FLOW FROM BEAVER POND
*#=============================================================================
* ROUTE THROUGH BEAVER POND
* Overflow option removed to allow for linear extrapolation of flows out of the
* pond when simulated volumes exceed volumes provided in the curve below.
ROUTE RESERVOIR     IDout=[1],   NHYD=["BP-OUT"],  IDin=[6],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                     (cms) - (ha-m)
                                   [   0.0 ,  0.0 ]
                                   [ 0.592 ,  4.573]
                                   [ 0.686 ,  6.569]
                                   [ 0.769 ,  8.840]
                                   [ 0.879 ,  11.467]
                                   [ 1.007 ,  16.103]
                                   [ 1.040 ,  17.339]
                                   [   -1  ,  -1  ]  (max twenty pts)
                       IDovf=[], NHYDovf=[""]
*#=============================================================================
SAVE HYD            ID=[1],  # OF PCYCLES=[-1],  ICASEsh=[-1]
                    HYD_FILENAME=["BP_Out"]
                    HYD_COMMENT=["Total Outflow from the Beaver Pond"]
*#=============================================================================
*# ROUTE KD-1 THROUGH KD-2A
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 10018.26
*#=============================================================================
ROUTE CHANNEL       IDout=[3], NHYD=["KD-1"], IDin=[1],
                    RDT=[1](min),
                    CHLGTH=[277](m),  CHSLOPE=[1.08](%),
                                        FPSLOPE=[1.08](%),
                    SECNUM=[10018],       NSEG=[4]
                    ( SEGROUGH, SEGDIST (m))=[0.08,30.63 -0.03,34.69 0.08,49.66
                    0.04,70.77] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 94.54 ]
                                                   [ 7.12,  93.2 ]
                                                   [11.07,  92.3 ]
                                                   [15.31,  91.8 ]
                                                   [17.16, 91.35 ]
                                                   [20.56,  90.8 ]
                                                   [25.12, 89.58 ]
                                                   [28.15,  88.5 ]
                                                   [30.63,  87.8 ]
                                                   [31.957, 87.854 ]
                                                   [ 34.4,  88.5 ]
                                                   [34.69, 88.61 ]
                                                   [ 36.5, 89.23 ]
                                                   [38.48,  90.2 ]
                                                   [41.14,  91.1 ]
                                                   [ 45.4, 91.66 ]
                                                   [49.66, 91.96 ]
                                                   [53.06,  92.3 ]
                                                   [67.16, 92.43 ]
                                                   [70.77, 92.52 ]
*#=============================================================================
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 9854.606
*#=============================================================================
ROUTE CHANNEL       IDout=[2], NHYD=["KD-1"], IDin=[3],
                    RDT=[1](min),
                    CHLGTH=[186](m),  CHSLOPE=[1.97](%),
                                        FPSLOPE=[1.97](%),
                    SECNUM=[9854],       NSEG=[5]
                    ( SEGROUGH, SEGDIST (m))=[0.08,29.81 0.05,34.304 -0.03,38.24
                    0.05,47.73 0.08,105.39] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 90.07 ]
                                                   [ 6.86,  89.4 ]
```

```
                                                    [13.24,  89.2 ]
                                                    [17.79, 88.48 ]
                                                    [22.46,  87.2 ]
                                                    [29.81, 86.04 ]
                                                    [32.17, 85.72 ]
                                                    [34.304, 85.612 ]
                                                    [36.137, 85.654 ]
                                                    [37.46, 85.69 ]
                                                    [38.24, 85.72 ]
                                                    [44.98,  85.9 ]
                                                    [47.73, 86.32 ]
                                                    [51.27,  87.3 ]
                                                    [55.17,    88 ]
                                                    [87.02, 88.79 ]
                                                    [90.72,  88.7 ]
                                                    [93.96,    89 ]
                                                    [99.45,  90.8 ]
                                                    [105.39, 91.81 ]
*#=============================================================================
*# KD-2A-1 - RURAL - Increased Area for Existing Conditions
*#=============================================================================
CONTINUOUS NASHYD        ID=[1], NHYD=["KD-2A-1"], DT=[1]min, AREA=[28.6](ha),
                    DWF=[0](cms),  CN=[57], IA=[7](mm),
                    N=[1.1], TP=[0.91]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.01]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[10](mm), GWResK=[0.93](mm/day/mm),
                    VHydCond=[0.02](mm/hr), END=-1
*#=============================================================================
*# ADD KD-2A-1 AND KD-1
*#=============================================================================
ADD HYD             IDsum=[3], NHYD=["KFP2"], IDs to add=[1+2]
*PRINT HYD           ID=[3],   # OF PCYCLES=[1]
*#=============================================================================
*# ROUTE THROUGH KD-2A-2
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 9743.627
*#=============================================================================
ROUTE CHANNEL       IDout=[1], NHYD=["KD-1"], IDin=[3],
                    RDT=[1](min),
                    CHLGTH=[408](m),  CHSLOPE=[0.84](%),
                                        FPSLOPE=[0.84](%),
                    SECNUM=[9743],       NSEG=[5]
                    ( SEGROUGH, SEGDIST (m))=[0.05,42.45 -0.03,44.28 -0.05,46.07
                    0.05,63.17 0.08,111.15] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0,  86.7 ]
                                                    [ 7.01,  86.7 ]
                                                    [15.57,  86.2 ]
                                                    [21.06, 85.58 ]
                                                    [25.69, 84.76 ]
                                                    [31.55, 83.42 ]
                                                    [40.62,  82.7 ]
                                                    [42.45,  82.5 ]
                                                    [44.28, 82.561 ]
                                                    [ 44.6, 82.59 ]
                                                    [46.07,  82.7 ]
                                                    [48.58, 82.76 ]
                                                    [59.09, 82.59 ]
                                                    [63.17, 83.94 ]
                                                    [67.14,  85.3 ]
                                                    [71.84,  85.8 ]
                                                    [82.08,  85.8 ]
                                                    [89.16,  86.2 ]
                                                    [106.01,  86.6 ]
                                                    [111.15, 86.65 ]
*#=============================================================================
```

```
SAVE HYD            ID=[1],  # OF PCYCLES=[-1],  ICASEsh=[-1]
                    HYD_FILENAME=["KD-1"]
                    HYD_COMMENT=["KD-1-Channel where Erosion analysis was completed"]
*#=============================================================================
*# Erosion Analysis on Kizell Drain (Requires SWMHYMO v5.5)
*#=============================================================================
*# Erosion Index/critical shear stress calculated for flows through the critical
*# section of on Kizell Drain as determined by Matrix Solutions (May 2019)
*#=============================================================================
EROSION INDEX       INDEX_METHOD=[2], SHEARC =[20](Pa), No of Hyds=[1],
                    NHYDsErosion=[1]
                    RATING_CURVE_METHOD = [1], user entered channel shape
                    Channel section parameters
                    Section No["XS1"]
                    CHSLOPE=[0.84](%), FPSLOPE=[0.84](%),
                    NSEG=[5]
                    ( SEGROUGH, SEGDIST (m))=[0.05,42.45 -0.03,44.28 -0.05,46.07
                    0.05,63.17 0.08,111.15] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0,  86.7 ]
                                                  [ 7.01,  86.7 ]
                                                  [15.57,  86.2 ]
                                                  [21.06, 85.58 ]
                                                  [25.69, 84.76 ]
                                                  [31.55, 83.42 ]
                                                  [40.62,  82.7 ]
                                                  [42.45,  82.5 ]
                                                  [44.28, 82.561 ]
                                                  [ 44.6, 82.59 ]
                                                  [46.07,  82.7 ]
                                                  [48.58, 82.76 ]
                                                  [59.09, 82.59 ]
                                                  [63.17, 83.94 ]
                                                  [67.14,  85.3 ]
                                                  [71.84,  85.8 ]
                                                  [82.08,  85.8 ]
                                                  [89.16,  86.2 ]
                                                  [106.01,  86.6 ]
                                                  [111.15, 86.65 ]
*#=============================================================================
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 9338.062
*# MINIMUM SLOPE ASSUMED 0.1%
*#=============================================================================
ROUTE CHANNEL       IDout=[2], NHYD=["KD-1"], IDin=[1],
                    RDT=[1](min),
                    CHLGTH=[111](m),  CHSLOPE=[0.1](%),
                                        FPSLOPE=[0.1](%),
                    SECNUM=[9338],       NSEG=[5]
                    ( SEGROUGH, SEGDIST (m))=[0.04,78.47 0.06,82.78 -0.03,87.28
                    0.06,107.69 0.04,120.16] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0,  82.8 ]
                                                  [ 6.26, 82.86 ]
                                                  [   23,  82.4 ]
                                                  [57.46, 82.11 ]
                                                  [75.38,  82.1 ]
                                                  [78.47, 81.06 ]
                                                  [ 81.6,  79.7 ]
                                                  [82.78,  79.3 ]
                                                  [87.28, 79.28 ]
                                                  [ 88.3,  79.7 ]
                                                  [91.41,  81.1 ]
                                                  [94.81,  81.7 ]
                                                  [107.69,  82.1 ]
                                                  [120.16,  82.2 ]
*#=============================================================================
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 9131.887
*#=============================================================================
ROUTE CHANNEL       IDout=[1], NHYD=["KD-1"], IDin=[2],
```

```
                    RDT=[1](min),
                    CHLGTH=[248](m),  CHSLOPE=[0.28](%),
                                        FPSLOPE=[0.28](%),
                    SECNUM=[9131],       NSEG=[5]
                    ( SEGROUGH, SEGDIST (m))=[0.04,70.64 -0.03,72.865 0.04,74.61
                    0.05,77.65 0.04,191.67] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0,  81.6 ]
                                                   [ 7.35,  81.6 ]
                                                   [ 26.3,  80.9 ]
                                                   [48.53, 80.87 ]
                                                   [58.55, 80.01 ]
                                                   [65.66,    80 ]
                                                   [69.22,    79 ]
                                                   [70.64, 78.65 ]
                                                   [72.865,  78.7 ]
                                                   [74.25, 78.96 ]
                                                   [74.61,  79.1 ]
                                                   [77.65, 79.92 ]
                                                   [93.59,  79.9 ]
                                                   [103.2,  78.7 ]
                                                   [108.05,  79.9 ]
                                                   [115.92,  80.2 ]
                                                   [132.65,  80.2 ]
                                                   [159.72, 80.73 ]
                                                   [176.71, 82.61 ]
                                                   [191.67, 82.63 ]
*#===============================================================================
*# KD-2A-2 - URBAN/RURAL NORTH OF RAILRAOD
*#===============================================================================
CONTINUOUS STANDHYD      ID=[2], NHYD=["KD-2A-2"], DT=[1](min), AREA=[44.99](ha),
                    XIMP=[0.28], TIMP=[0.28], DWF=[0](cms), LOSS=[2],
                    SCS curve number CN=[70],
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.2](%),
                                         LGI=[2232](m), MNI=[0.025], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[4](hrs),
                    SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.01]/(mm),
                    InterEventTime=[12](hrs), END=-1
*#===============================================================================
*# ADD KD-2A-1 AND KD-2A-2
*# CREST GAUGE LOCATION KD-2 -KIZELL DRAIN AT MARCH ROAD
*#===============================================================================
ADD HYD             IDsum=[3], NHYD=["KFP3"], IDs to add=[1+2]
*PRINT HYD           ID=[3],   # OF PCYCLES=[1]
*#===============================================================================
*# KD-2A-3 - URBAN SOUTH OF RAILROAD
*#===============================================================================
CONTINUOUS STANDHYD      ID=[2], NHYD=["KD-2A-3"], DT=[1](min), AREA=[48.56](ha),
                    XIMP=[0.28], TIMP=[0.31], DWF=[0](cms), LOSS=[2],
                    SCS curve number CN=[74],
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.2](%),
                                         LGI=[2074](m), MNI=[0.025], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[4](hrs),
                    SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.01]/(mm),
                    InterEventTime=[12](hrs), END=-1
*#===============================================================================
*# ADD KD-2A-2 AND KD-2A-3 D/S OF MARCH ROAD
*#===============================================================================
ADD HYD             IDsum=[4], NHYD=["KD-2A-3"], IDs to add=[3+2]
*#===============================================================================
*# ROUTE KD-2A THROUGH KD-2B
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 8942.456
```

```
*#=============================================================================
ROUTE CHANNEL       IDout=[1], NHYD=["KD-2A"], IDin=[4],
                    RDT=[1](min),
                    CHLGTH=[254](m),  CHSLOPE=[0.55](%),
                                        FPSLOPE=[0.55](%),
                    SECNUM=[8942],       NSEG=[5]
                    ( SEGROUGH, SEGDIST (m))=[0.04,17.24 0.05,28.26 -0.03,31.51
                    0.05,61.08 0.04,68.63] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 80.58 ]
                                                   [ 1.57,  80.5 ]
                                                   [ 8.77,  80.5 ]
                                                   [10.84, 80.23 ]
                                                   [17.24, 80.03 ]
                                                   [20.76,    79 ]
                                                   [23.59,  78.9 ]
                                                   [26.81, 78.17 ]
                                                   [28.26,  77.9 ]
                                                   [30.06,  77.9 ]
                                                   [30.71, 78.01 ]
                                                   [31.51,  78.2 ]
                                                   [32.21, 78.39 ]
                                                   [ 37.7,  78.4 ]
                                                   [44.07,  78.5 ]
                                                   [48.95,  78.7 ]
                                                   [57.53, 79.33 ]
                                                   [61.08, 79.95 ]
                                                   [64.61, 80.71 ]
                                                   [68.63, 81.15 ]
*#=============================================================================
*# KD-2B-6 - URBAN
*#=============================================================================
CONTINUOUS STANDHYD      ID=[2], NHYD=["KD-2B-6"], DT=[1](min), AREA=[7.73](ha),
                    XIMP=[0.61], TIMP=[0.61], DWF=[0](cms), LOSS=[2],
                    SCS curve number CN=[62],
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.2](%),
                                         LGI=[1106](m), MNI=[0.025], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[4](hrs),
                    SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.01]/(mm),
                    InterEventTime=[12](hrs), END=-1
*#=============================================================================
*# ROUTE KD-2B-6 THROUGH SWM POND SOUTH OF SOLANDT ROAD
*# ASSUME 5-YEAR CONTROL ACCORDING TO CITY GUIDELINES
*#=============================================================================
ROUTE RESERVOIR     IDout=[4],   NHYD=["KD-2B-6"],  IDin=[2],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                     (cms) - (ha-m)
                                  [   0.0 ,  0.0 ]
                                  [ 0.407 ,  0.095]
                                  [   -1  ,  -1  ]  (max twenty pts)
                          IDovf=[5], NHYDovf=["OVF-2B6"]
*#=============================================================================
*# ADD OUTFLOW, OVERFLOW AND KD-2A
*#=============================================================================
ADD HYD             IDsum=[6], NHYD=["KD-2B-6"], IDs to add=[4+5+1]
*#=============================================================================
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 8329.198
*#=============================================================================
ROUTE CHANNEL       IDout=[2], NHYD=["KD-2A"], IDin=[6],
                    RDT=[1](min),
                    CHLGTH=[747](m),  CHSLOPE=[0.36](%),
                                        FPSLOPE=[0.36](%),
                    SECNUM=[8329],       NSEG=[4]
                    ( SEGROUGH, SEGDIST (m))=[0.08,81.34 0.05,88.266 -0.03,97.72
```

```
                        0.08,109.09] NSEG times
1467                    ( DISTANCE (m), ELEVATION (m))=[    0,  78.3 ]
1468                                                  [56.66,  78.2 ]
1469                                                  [67.31,  78.2 ]
1470                                                  [72.25,    78 ]
1471                                                  [79.85,    78 ]
1472                                                  [81.34, 77.66 ]
1473                                                  [87.28, 75.87 ]
1474                                                  [88.266, 75.728 ]
1475                                                  [90.51, 75.759 ]
1476                                                  [90.57, 75.77 ]
1477                                                  [91.47, 75.88 ]
1478                                                  [97.72, 76.64 ]
1479                                                  [109.09,  78.5 ]
1480    *#============================================================================
1481    *# KD-2B-3 - Converted to NASHYD under existing conditions
1482    *#============================================================================
1483    CONTINUOUS NASHYD       ID=[1], NHYD=["KD-2B-3"], DT=[1]min, AREA=[7.40](ha),
1484                        DWF=[0](cms),  CN=[65], IA=[7.0](mm),
1485                        N=[1.1], TP=[0.49]hrs,
1486                        Continuous simulation parameters:
1487                        IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.01]/(mm),
1488                        InterEventTime=[12](hrs),
1489                        Baseflow simulation parameters:
1490                        BaseFlowOption=[1] , InitGWResVol=[10](mm), GWResK=[0.93](mm/day/mm),
1491                        VHydCond=[0.02](mm/hr), END=-1
1492    *#============================================================================
1493    *# 5 YEAR CONTROL - 89L/s
1494    *# MAJOR FLOWS TO KIZELL DRAIN
1495    *# MINOR FLOWS TO GOLF COURSE POND #2
1496    *#============================================================================
1497    COMPUTE DUALHYD     IDin=[1], CINLET=[0.089](cms), NINLET=[1],
1498                        MAJID=[3], MajNHYD=["2B3MAJ"],
1499                        MINID=[4], MinNHYD=["2B3MIN"],
1500                        TMJSTO=[0](cu-m)
1501    *#============================================================================
1502    *# KD-2B-4 Converted to NASHYD under existing conditions
1503    *#============================================================================
1504    CONTINUOUS NASHYD       ID=[5], NHYD=["KD-2B-4"], DT=[1]min, AREA=[23.59](ha),
1505                        DWF=[0](cms),  CN=[63], IA=[7.0](mm),
1506                        N=[1.1], TP=[0.62]hrs,
1507                        Continuous simulation parameters:
1508                        IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.01]/(mm),
1509                        InterEventTime=[12](hrs),
1510                        Baseflow simulation parameters:
1511                        BaseFlowOption=[1] , InitGWResVol=[10](mm), GWResK=[0.93](mm/day/mm),
1512                        VHydCond=[0.02](mm/hr), END=-1
1513    *#============================================================================
1514    *# ADD KD-2B-3 MINOR AND KD-2B-4
1515    *#============================================================================
1516    ADD HYD             IDsum=[6], NHYD=["KD-2B-4"], IDs to add=[4+5]
1517    *#============================================================================
1518    *# ROUTE KD-2B-4 THROUGH GOLF COURSE POND #2
1519    *#============================================================================
1520    ROUTE RESERVOIR     IDout=[4],   NHYD=["KD-2B-4"],  IDin=[6],
1521                        RDT=[1](min),
1522                              TABLE of ( OUTFLOW-STORAGE ) values
1523                                        (cms) - (ha-m)
1524                                      [   0.0 ,  0.0 ]
1525                                      [ 0.229, 1.5695]
1526                                      [ 0.251, 1.8191]
1527                                      [ 0.328, 2.9421]
1528                                      [   -1  ,  -1  ]  (max twenty pts)
1529                              IDovf=[5], NHYDovf=["OVF-2B6"]
1530    *#============================================================================
1531    *# ADD OUTFLOW, OVERFLOW AND KD-2A
1532    *#============================================================================
```

```
ADD HYD             IDsum=[6], NHYD=["KD-2B-6"], IDs to add=[4+5]
*#==============================================================================
*# ADD KD-2B-3 MAJOR, KD-2B-4 AND KD-2B-6
*#==============================================================================
ADD HYD             IDsum=[4], NHYD=["KD-2B-4"], IDs to add=[3+6+2]
*#==============================================================================
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 7691.759
*#==============================================================================
ROUTE CHANNEL       IDout=[2], NHYD=["KD-2A"], IDin=[4],
                    RDT=[1](min),
                    CHLGTH=[408](m),  CHSLOPE=[0.11](%),
                                        FPSLOPE=[0.11](%),
                    SECNUM=[7691],       NSEG=[3]
                    ( SEGROUGH, SEGDIST (m))=[0.06,16.78 -0.03,19.003 0.06,24.49] NSEG
                    times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 76.75 ]
                                                   [ 0.66,  76.6 ]
                                                   [ 3.57, 75.74 ]
                                                   [ 4.99, 75.24 ]
                                                   [ 5.76,  75.1 ]
                                                   [ 7.69,    75 ]
                                                   [ 8.56,  74.9 ]
                                                   [ 9.95,  74.9 ]
                                                   [12.21,  74.8 ]
                                                   [12.99, 74.69 ]
                                                   [ 15.2,  74.3 ]
                                                   [16.78,  74.1 ]
                                                   [17.38,  73.8 ]
                                                   [18.38,  73.8 ]
                                                   [19.003, 74.147]
                                                   [19.94, 74.21 ]
                                                   [20.51, 74.31 ]
                                                   [21.52,  74.6 ]
                                                   [22.72, 75.04 ]
                                                   [24.49,  75.5 ]
*#==============================================================================
*# KD-2B-2 - URBAN RESIDENTIAL - Converted to NASHYD under existing conditions
*#==============================================================================
CONTINUOUS NASHYD       ID=[3], NHYD=["KD-2B-2"], DT=[1]min, AREA=[3.35](ha),
                    DWF=[0](cms),  CN=[63], IA=[7.0](mm),
                    N=[1.1], TP=[0.32]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.01]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[10](mm), GWResK=[0.93](mm/day/mm),
                    VHydCond=[0.02](mm/hr), END=-1
*#==============================================================================
*# ROUTE KD-2B-2 THROUGH POND #3 NORTH OF FARRAR ROAD
*#==============================================================================
ROUTE RESERVOIR     IDout=[5],   NHYD=["KD-2B-2"],  IDin=[3],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                     (cms) - (ha-m)
                                   [   0.0 ,  0.0 ]
                                   [ 0.260 , 0.616]
                                   [ 0.282 ,0.7115]
                                   [ 0.374 ,1.2301]
                                   [   -1  ,  -1  ]  (max twenty pts)
                          IDovf=[6], NHYDovf=["OVF-2B3"]
*#==============================================================================
*# ADD OUTFLOW, OVERFLOW AND KD-2B-4
*#==============================================================================
ADD HYD             IDsum=[1], NHYD=["KD-2B-4"], IDs to add=[5+6+2]
*#==============================================================================
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 7386.879
*#==============================================================================
```

```
ROUTE CHANNEL       IDout=[2], NHYD=["KD-2A-4"], IDin=[1],
                    RDT=[1](min),
                    CHLGTH=[315](m),  CHSLOPE=[0.11](%),
                                        FPSLOPE=[0.11](%),
                    SECNUM=[7386],       NSEG=[5]
                    ( SEGROUGH, SEGDIST (m))=[0.08,21.18 0.05,62.87 -0.06,80.43
                    0.06,90.36 0.05,143.24] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 77.07 ]
                                                   [ 5.11,  76.8 ]
                                                   [21.18,  76.7 ]
                                                   [34.27,  76.7 ]
                                                   [43.48,  76.3 ]
                                                   [62.87,  74.8 ]
                                                   [68.48, 74.28 ]
                                                   [70.32,  73.5 ]
                                                   [73.346, 73.437 ]
                                                   [75.588, 73.466 ]
                                                   [75.62, 73.47 ]
                                                   [80.43,  74.3 ]
                                                   [85.13, 75.18 ]
                                                   [90.36, 75.69 ]
                                                   [101.28,  75.4 ]
                                                   [115.17,  75.3 ]
                                                   [121.38,  75.4 ]
                                                   [128.52, 74.95 ]
                                                   [137.68,  75.3 ]
                                                   [143.24, 76.97 ]
*#=============================================================================
*# KD-2B-7 - RURAL EAST OF HERZBERG ROAD
*#=============================================================================
CONTINUOUS NASHYD       ID=[4], NHYD=["KD-2B-7"], DT=[1]min, AREA=[20.11](ha),
                    DWF=[0](cms),  CN=[63], IA=[7](mm),
                    N=[1.1], TP=[1.50]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.01]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[10](mm), GWResK=[0.93](mm/day/mm),
                    VHydCond=[0.02](mm/hr), END=-1
*#=============================================================================
*# ADD KD-2B-4 AND KD-2B-7
*#=============================================================================
ADD HYD             IDsum=[3], NHYD=["KD-2B-4"], IDs to add=[2+4]
*#=============================================================================
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 7058.454
*#=============================================================================
ROUTE CHANNEL       IDout=[1], NHYD=["KD-2A-4"], IDin=[3],
                    RDT=[1](min),
                    CHLGTH=[297](m),  CHSLOPE=[0.38](%),
                                        FPSLOPE=[0.38](%),
                    SECNUM=[7058],       NSEG=[3]
                    ( SEGROUGH, SEGDIST (m))=[0.05,206.86 -0.06,216.95 0.04,295.48]
                    NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0,  75.7 ]
                                                   [165.24,  75.2 ]
                                                   [198.14,  75.2 ]
                                                   [206.37,  73.8 ]
                                                   [206.86, 73.69 ]
                                                   [209.66,    73 ]
                                                   [211.86,    73 ]
                                                   [213.07, 73.07 ]
                                                   [215.16,  73.8 ]
                                                   [216.95, 74.14 ]
                                                   [247.08,  74.8 ]
                                                   [267.4,  74.8 ]
                                                   [295.48, 76.05 ]
*#=============================================================================
```

```
*# KD-2B-5 - URBAN
*#==============================================================================
CONTINUOUS STANDHYD      ID=[2], NHYD=["KD-2B-5"], DT=[1](min), AREA=[4.74](ha),
                    XIMP=[0.50], TIMP=[0.50], DWF=[0](cms), LOSS=[2],
                    SCS curve number CN=[79],
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.2](%),
                                         LGI=[498](m), MNI=[0.025], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[4](hrs),
                    SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.01]/(mm),
                    InterEventTime=[12](hrs), END=-1
*#==============================================================================
*# ON-SITE STORAGE
*# RATING CURVE SOURCE - plan2.pdf IN 13616-Richardson Side_Eagleson
*#==============================================================================
ROUTE RESERVOIR     IDout=[4],   NHYD=["KD-2B-5"],  IDin=[2],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                     (cms) - (ha-m)
                                   [   0.0 ,  0.0 ]
                                   [0.1458, 0.01283]
                                   [0.1458, 0.03881]
                                   [   -1  ,  -1  ]  (max twenty pts)
                          IDovf=[5], NHYDovf=["OVF-2B5"]
*#==============================================================================
*# KD-2B-1 - URBAN
*#==============================================================================
CONTINUOUS STANDHYD      ID=[3], NHYD=["KD-2B-1"], DT=[1](min), AREA=[134.85](ha),
                    XIMP=[0.40], TIMP=[0.41], DWF=[0](cms), LOSS=[2],
                    SCS curve number CN=[70],
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.2](%),
                                         LGI=[3642](m), MNI=[0.025], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[4](hrs),
                    SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.01]/(mm),
                    InterEventTime=[12](hrs), END=-1
*#==============================================================================
*# ADD OUTFLOW, OVERFLOW AND KD-2B-1
*#==============================================================================
ADD HYD             IDsum=[6], NHYD=["KD-2B-1"], IDs to add=[4+5+3]
*#==============================================================================
*# ADD KD-2B-4 AND KD-2B-1
*# CREST GAUGE LOCATION KD-1 - KIZELL DRAIN AT HERTZBERG ROAD
*#==============================================================================
ADD HYD             IDsum=[3], NHYD=["KFP4"], IDs to add=[1+6]
*PRINT HYD           ID=[3],   # OF PCYCLES=[1]
*#==============================================================================
*# ROUTE KD-2B THROUGH KD-2C
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 6705.311
*# MINIMUM SLOPE ASSUMED 0.1%
*#==============================================================================
ROUTE CHANNEL       IDout=[1], NHYD=["KD-2B"], IDin=[3],
                    RDT=[1](min),
                    CHLGTH=[600](m),  CHSLOPE=[0.1](%),
                                      FPSLOPE=[0.1](%),
                    SECNUM=[6705],       NSEG=[4]
                    ( SEGROUGH, SEGDIST (m))=[0.05,162.749 -0.04,168.035 -0.05,168.35
                    0.05,373.63] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 75.65 ]
                                                   [ 24.7,  75.1 ]
                                                   [61.29, 73.42 ]
                                                   [90.72,  72.7 ]
                                                   [119.02, 72.95 ]
```

```
                                                    [131.71,  72.8 ]
                                                    [160.55,  72.9 ]
                                                    [162.46, 72.46 ]
                                                    [162.749, 72.403 ]
                                                    [168.035, 72.369 ]
                                                    [168.35, 72.39 ]
                                                    [168.6, 72.43 ]
                                                    [171.08,  72.8 ]
                                                    [203.12,  72.8 ]
                                                    [231.66,  73.3 ]
                                                    [255.58,  73.2 ]
                                                    [300.16,  73.6 ]
                                                    [326.75,  74.3 ]
                                                    [347.02,  75.2 ]
                                                    [373.63, 76.05 ]
*#==============================================================================
*# KD-3A - URBAN WEST OF HERZBERG ROAD
*#==============================================================================
CONTINUOUS STANDHYD      ID=[3], NHYD=["KD-3A"], DT=[1](min), AREA=[206.16](ha),
                    XIMP=[0.30], TIMP=[0.34], DWF=[0](cms), LOSS=[2],
                    SCS curve number CN=[78],
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.2](%),
                                         LGI=[3876](m), MNI=[0.025], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[4](hrs),
                    SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.01]/(mm),
                    InterEventTime=[12](hrs), END=-1
*#==============================================================================
*# KTC-2B - URBAN - UPSTREAM LIMIT TO HWY 417, NORTH OF CAMPEAU DRIVE
*# LAND USES WITHIN AREA: OFFICE/RECREATIONAL
*#==============================================================================
CONTINUOUS STANDHYD      ID=[2], NHYD=["KTC-2B"], DT=[1](min), AREA=[20.79](ha),
                    XIMP=[0.23], TIMP=[0.24], DWF=[0.0](cms), LOSS=[2],
                    SCS curve number CN=[69],
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.2](%),
                                         LGI=[1900](m), MNI=[0.025], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[4](hrs),
                    SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.01]/(mm),
                    InterEventTime=[12](hrs), END=-1
*#==============================================================================
*# 5 YEAR CONTROL - 1155L/s
*# MAJOR FLOWS TO KD-3A
*# MINOR FLOWS TO SWF-1205
*#==============================================================================
COMPUTE DUALHYD      IDin=[2], CINLET=[1.155](cms), NINLET=[1],
                     MAJID=[7], MajNHYD=["KTC2BMAJ"],
                     MINID=[10], MinNHYD=["KTC2BMIN"],
                     TMJSTO=[0](cu-m)
*#==============================================================================
*# ADD KTC-2B MAJOR AND KD-3A - TRIBUTARY 1 AT HERTZBERG ROAD
*#==============================================================================
ADD HYD              IDsum=[5], NHYD=["KD-3A"], IDs to add=[7+3]
*#==============================================================================
*# ROUTE KD-3A THROUGH KD-3B
*# CHANNEL CROSS-SECTION DATA TAKEN FROM LiDAR
*#==============================================================================
ROUTE CHANNEL        IDout=[4], NHYD=["KD-3A"], IDin=[5],
                     RDT=[1](min),
                     CHLGTH=[253](m),  CHSLOPE=[0.13](%),
                                         FPSLOPE=[0.13](%),
                     SECNUM=[1],       NSEG=[3]
                     ( SEGROUGH, SEGDIST (m))=[0.05,27.94 -0.035,38.92 0.08,64.87] NSEG
```

```
                    times
1797                ( DISTANCE (m), ELEVATION (m))=[    0, 78.90]
1798                                              [12.97, 78.12]
1799                                              [15.97, 77.81]
1800                                              [19.96, 77.51]
1801                                              [23.95, 77.36]
1802                                              [24.95, 77.34]
1803                                              [25.95, 77.34]
1804                                              [26.94, 77.36]
1805                                              [27.94, 77.30]
1806                                              [30.94, 76.79]
1807                                              [31.93, 76.73]
1808                                              [32.93, 76.73]
1809                                              [33.93, 76.70]
1810                                              [34.94, 76.76]
1811                                              [38.92, 77.29]
1812                                              [42.91, 77.34]
1813                                              [58.88, 78.52]
1814                                              [64.87, 78.97]
1815  ROUTE CHANNEL     IDout=[5], NHYD=["KD-3A"], IDin=[4],
1816                    RDT=[1](min),
1817                    CHLGTH=[344](m),  CHSLOPE=[0.56](%),
1818                                        FPSLOPE=[0.56](%),
1819                    SECNUM=[2],       NSEG=[3]
1820                    ( SEGROUGH, SEGDIST (m))=[0.05,20.89 -0.035,76.49 0.08,88.52] NSEG ↵
                    times
1821                ( DISTANCE (m), ELEVATION (m))=[    0, 77.38]
1822                                              [13.92, 77.02]
1823                                              [20.89, 76.69]
1824                                              [26.85, 76.09]
1825                                              [29.84, 76.03]
1826                                              [44.76, 76.15]
1827                                              [56.69, 75.91]
1828                                              [59.68, 76.10]
1829                                              [61.67, 76.05]
1830                                              [71.61, 76.31]
1831                                              [76.49, 76.69]
1832                                              [82.55, 77.16]
1833                                              [88.52, 77.40]
1834  ROUTE CHANNEL     IDout=[4], NHYD=["KD-3A"], IDin=[5],
1835                    RDT=[1](min),
1836                    CHLGTH=[324](m),  CHSLOPE=[0.72](%),
1837                                        FPSLOPE=[0.72](%),
1838                    SECNUM=[1],       NSEG=[3]
1839                    ( SEGROUGH, SEGDIST (m))=[0.05,97.588 -0.035,109.575 0.05,143.405] ↵
                    NSEG times
1840                ( DISTANCE (m), ELEVATION (m))=[    0, 75.2777 ]
1841                                              [39.664, 74.805 ]
1842                                              [74.612, 74.8767 ]
1843                                              [79.607, 74.8037 ]
1844                                              [ 86.6, 74.7914 ]
1845                                              [90.595, 74.6388 ]
1846                                              [95.59, 74.6899 ]
1847                                              [97.588, 74.8802 ]
1848                                              [101.584, 74.7293 ]
1849                                              [103.582, 74.4039 ]
1850                                              [106.578, 74.4818 ]
1851                                              [109.575, 74.9123 ]
1852                                              [111.573, 74.8318 ]
1853                                              [116.568, 74.8294 ]
1854                                              [120.563, 74.7426 ]
1855                                              [121.562, 74.7398 ]
1856                                              [124.559, 74.8464 ]
1857                                              [130.553, 74.8391 ]
1858                                              [132.54, 74.777 ]
1859                                              [143.405, 75.255 ]
1860  *#============================================================================
```

```
*# KD-2C - RURAL
*#==============================================================================
CONTINUOUS NASHYD        ID=[2], NHYD=["KD-2C"], DT=[1]min, AREA=[59.10](ha),
                    DWF=[0](cms),  CN=[83], IA=[7](mm),
                    N=[1.1], TP=[0.60]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.01]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[10](mm), GWResK=[0.93](mm/day/mm),
                    VHydCond=[0.02](mm/hr), END=-1
*#==============================================================================
*# ADD KD-2B AND KD-2C
*#==============================================================================
ADD HYD             IDsum=[5], NHYD=["KFP5"], IDs to add=[1+2]
*PRINT HYD           ID=[5],   # OF PCYCLES=[1]
*#==============================================================================
*# ADD KD-2C AND KD-3A
*#==============================================================================
ADD HYD             IDsum=[3], NHYD=["KD-2C"], IDs to add=[5+4]
*#==============================================================================
*# ROUTE KD-1+KD-2 THROUGH KD-3B-1
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 6104.633
*# MINIMUM SLOPE ASSUMED 0.1%
*#==============================================================================
ROUTE CHANNEL       IDout=[1], NHYD=["KD-2C"], IDin=[3],
                    RDT=[1](min),
                    CHLGTH=[952](m),  CHSLOPE=[0.1](%),
                                        FPSLOPE=[0.1](%),
                    SECNUM=[6104],       NSEG=[3]
                    ( SEGROUGH, SEGDIST (m))=[0.08,175.904 -0.04,179.184 0.08,185.91]
                    NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 77.06 ]
                                                   [ 9.16,  77.1 ]
                                                   [23.37,  76.7 ]
                                                   [56.09,  76.5 ]
                                                   [67.63,  76.2 ]
                                                   [80.81,  75.6 ]
                                                   [83.87,  75.6 ]
                                                   [98.45,  74.5 ]
                                                   [103.07,  74.3 ]
                                                   [115.78,  74.3 ]
                                                   [134.4,  73.6 ]
                                                   [149.63,  73.7 ]
                                                   [163.83,  73.6 ]
                                                   [173.16,  72.7 ]
                                                   [175.83,    72 ]
                                                   [175.904, 71.992 ]
                                                   [179.184, 71.968 ]
                                                   [179.27,    72 ]
                                                   [183.86,  73.7 ]
                                                   [185.91,    74 ]
*#==============================================================================
*# KD-3B - RURAL EAST OF HERZBERG ROAD
*#==============================================================================
CONTINUOUS NASHYD        ID=[4], NHYD=["KD-23B"], DT=[1]min, AREA=[112.07](ha),
                    DWF=[0](cms),  CN=[66], IA=[7](mm),
                    N=[1.1], TP=[1.20]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.01]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[10](mm), GWResK=[0.93](mm/day/mm),
                    VHydCond=[0.02](mm/hr), END=-1
*#==============================================================================
*# ADD KD-2C,KD-3A AND KD-3B - KIZELL DRAIN AT CONFLUENCE WITH WATTS CREEK
*#==============================================================================
```

```
ADD HYD             IDsum=[3], NHYD=["KFP6"], IDs to add=[1+4]
*PRINT HYD           ID=[3],   # OF PCYCLES=[1]
*#==============================================================================
*#                          WATTS CREEK SUBWATERSHED
*#==============================================================================
*#==============================================================================
*# KANATA TOWN CENTRE-1 - URBAN - UPSTREAM LIMIT TO HWY 417
*# Imperviousness decreased under existing conditions
*#==============================================================================
CONTINUOUS STANDHYD      ID=[2], NHYD=["KTC-1"], DT=[1](min), AREA=[60.23](ha),
                    XIMP=[0.34], TIMP=[0.34], DWF=[0](cms), LOSS=[2],
                    SCS curve number CN=[70],
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.2](%),
                                         LGI=[2758](m), MNI=[0.025], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[4](hrs),
                    SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.01]/(mm),
                    InterEventTime=[12](hrs), END=-1
*#==============================================================================
*# 5 YEAR CONTROL - 2963L/s
*# MAJOR FLOWS TO WC-1
*# MINOR FLOWS TO SWF-1206
*#==============================================================================
COMPUTE DUALHYD     IDin=[2], CINLET=[2.963](cms), NINLET=[1],
                    MAJID=[7], MajNHYD=["KTC1MAJ"],
                    MINID=[8], MinNHYD=["KTC1MIN"],
                    TMJSTO=[0](cu-m)
*#==============================================================================
*# SWMF-1206
*# STORAGE WAS ESTIMATED FROM AVAILABLE DRAWING
*# DISCHARGE WAS TAKEN FROM R-1564
*#==============================================================================
ROUTE RESERVOIR     IDout=[4],   NHYD=["KTC-1"],  IDin=[8],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                     (cms) - (ha-m)
                                   [   0.0 ,  0.0 ]
                                   [ 0.955 , 0.2854]
                                   [ 1.436 , 3.9725]
                                   [   -1  ,  -1  ]  (max twenty pts)
                          IDovf=[5], NHYDovf=["OVF-KTC1"]
*#==============================================================================
*# ADD OUTFLOW, OVERFLOW AND KTC-1 MAJOR
*#==============================================================================
ADD HYD             IDsum=[2], NHYD=["KTC-1"], IDs to add=[4+5+7]
*#==============================================================================
*# WC-1 - RURAL/URBAN EXISTING AREA
*#==============================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["WC-1"], DT=[1](min), AREA=[403.47](ha),
                    XIMP=[0.30], TIMP=[0.34], DWF=[0](cms), LOSS=[2],
                    SCS curve number CN=[68],
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.2](%),
                                         LGI=[5150](m), MNI=[0.025], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[4](hrs),
                    SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.01]/(mm),
                    InterEventTime=[12](hrs), END=-1
*#==============================================================================
*# ADD WC-1 AND KTC-1 - WATTS CREEK AT HIGHWAY 417
*#==============================================================================
ADD HYD             IDsum=[5], NHYD=["WC-1"], IDs to add=[1+2]
*#==============================================================================
*# KTC-2A - URBAN - UPSTREAM LIMIT TO HWY 417, SOUTH OF CAMPEAU DRIVE
```

```
*# LAND USES WITHIN AREA: TOWN CENTRE/URBAN RES
*#==============================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["KTC-2A"], DT=[1](min), AREA=[34.34](ha),
                    XIMP=[0.36], TIMP=[0.42], DWF=[0.0](cms), LOSS=[2],
                    SCS curve number CN=[75],
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.2](%),
                                         LGI=[2152](m), MNI=[0.025], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[4](hrs),
                    SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.01]/(mm),
                    InterEventTime=[12](hrs), END=-1
*#==============================================================================
*# ADD KTC-2A AND KTC-2B MINOR
*#==============================================================================
ADD HYD             IDsum=[4], NHYD=["KTC-2"], IDs to add=[1+10]
*#==============================================================================
*# ROUTE KTC-2 THROUGH KANATA TOWN CENTRE PHASE I POND
*# STAGE-STORAGE-DISCHARGE CURVE OBTAINED FROM:
*# KANATA TOWN CENTRE PHASE i - STORMWATER MANAGEMENT REPORT
*# J.L. RICHARDS & ASSOCIATES LTD. 1996
*# SWF-1205
*# STORAGE WAS ESTIMATED WITH AVAILABLE DRAWING
*# DISCHARGE WAS TAKEN FROM R-1563
*#==============================================================================
ROUTE RESERVOIR     IDout=[1],   NHYD=["KTC-2"],  IDin=[4],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                    (cms) - (ha-m)
                                  [   0.0 ,  0.0 ]
                                  [  0.79, 0.6939]
                                  [  4.70, 1.4350]
                                  [   -1  ,  -1  ]  (max twenty pts)
                          IDovf=[2], NHYDovf=["OVF-KTC2"]
*#==============================================================================
*# ADD OUTFLOW AND OVERFLOW
*#==============================================================================
ADD HYD             IDsum=[4], NHYD=["KTC-2"], IDs to add=[1+2]
*#==============================================================================
*# ADD WC-1 AND KTC-2
*#==============================================================================
ADD HYD             IDsum=[2], NHYD=["KTC-2"], IDs to add=[5+4]
*%----------------|------------------------------------------------------------|
*#==============================================================================
*# WC-3 - URBAN/RURAL
*#==============================================================================
CONTINUOUS NASHYD        ID=[1], NHYD=["WC-3"], DT=[1]min, AREA=[204.06](ha),
                    DWF=[0](cms),  CN=[66], IA=[7](mm),
                    N=[1.1], TP=[1.28]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.01]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[10](mm), GWResK=[0.93](mm/day/mm),
                    VHydCond=[0.02](mm/hr), END=-1
*#==============================================================================
*# ADD WC-1+KTC AND WC-3
*#==============================================================================
ADD HYD             IDsum=[4], NHYD=["WC-3"], IDs to add=[2+1]
*#==============================================================================
*# ROUTE WC-1+KTC+WC-3 THROUGH WC-4A
*# CHANNEL CROSS-SECTION DATA TAKEN FROM LIDAR
*#==============================================================================
ROUTE CHANNEL       IDout=[1], NHYD=["WC-3"], IDin=[4],
                    RDT=[1](min),
                    CHLGTH=[744](m),  CHSLOPE=[1.29](%),
```

```
                                        FPSLOPE=[1.29](%),
                    SECNUM=[1],       NSEG=[3]
                    ( SEGROUGH, SEGDIST (m))=[0.05,25.86 -0.035,40.77 0.05,72.60] NSEG
                    times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 90.87]
                                                  [ 1.99, 90.66]
                                                  [ 7.96, 90.10]
                                                  [16.91, 85.80]
                                                  [18.90, 85.49]
                                                  [21.88, 85.42]
                                                  [25.86, 85.56]
                                                  [26.85, 25.50]
                                                  [29.83, 84.06]
                                                  [31.82, 84.06]
                                                  [34.81, 85.10]
                                                  [40.77, 85.59]
                                                  [48.73, 85.85]
                                                  [52.71, 86.80]
                                                  [55.59, 87.80]
                                                  [60.66, 90.40]
                                                  [64.64, 90.77]
                                                  [72.60, 90.97]
*#=============================================================================
*# CHANNEL CROSS-SECTION DATA TAKEN FROM LIDAR
*#=============================================================================
ROUTE CHANNEL       IDout=[2], NHYD=["WC-3"], IDin=[1],
                    RDT=[1](min),
                    CHLGTH=[2295](m),  CHSLOPE=[0.45](%),
                                        FPSLOPE=[0.45](%),
                    SECNUM=[2],       NSEG=[3]
                    ( SEGROUGH, SEGDIST (m))=[0.05,12.98 -0.035,20.97 0.05,51.94] NSEG
                    times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 85.79]
                                                  [ 1.00, 85.75]
                                                  [11.99, 83.71]
                                                  [12.98, 83.36]
                                                  [14.98, 82.49]
                                                  [15.98, 82.44]
                                                  [16.98, 82.45]
                                                  [20.97, 83.51]
                                                  [22.97, 83.46]
                                                  [23.97, 83.51]
                                                  [26.97, 83.55]
                                                  [27.97, 83.55]
                                                  [31.96, 83.51]
                                                  [32.96, 83.45]
                                                  [33.96, 83.45]
                                                  [34.96, 83.50]
                                                  [51.94, 85.81]
*#=============================================================================
*# CHANNEL CROSS-SECTION DATA TAKEN FROM LIDAR
*#=============================================================================
ROUTE CHANNEL       IDout=[1], NHYD=["WC-3"], IDin=[2],
                    RDT=[1](min),
                    CHLGTH=[487](m),  CHSLOPE=[0.23](%),
                                        FPSLOPE=[0.23](%),
                    SECNUM=[3],       NSEG=[3]
                    ( SEGROUGH, SEGDIST (m))=[0.05,6.97 -0.035,25.87 0.05,29.85] NSEG
                    times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 75.60]
                                                  [    1, 75.54]
                                                  [ 1.99, 75.42]
                                                  [ 6.97, 73.09]
                                                  [11.94, 72.70]
                                                  [14.93, 72.66]
                                                  [17.91, 72.27]
                                                  [23.88, 72.25]
```

```
                                                    [25.87, 73.03]
                                                    [28.86, 74.06]
                                                    [29.85, 74.23]
*#==============================================================================
*# WC-4A - RURAL - HIGHWAY 417 TO CNR
*#==============================================================================
CONTINUOUS NASHYD        ID=[2] NHYD=["WC-4A"], DT=[1]min, AREA=[126.29](ha),
                    DWF=[0](cms),  CN=[82], IA=[7](mm),
                    N=[1.1], TP=[2.30]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.01]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[10](mm), GWResK=[0.93](mm/day/mm),
                    VHydCond=[0.02](mm/hr), END=-1
*#==============================================================================
*# ADD WC-1+KTC+WC-3 AND WC-4A
*# CREST GAUGE LOCATION WC-1 - WATTS CREEK AT CONFLUENCE WITH KIZELL DRAIN
*#==============================================================================
ADD HYD             IDsum=[6], NHYD=["WFP1"], IDs to add=[1+2]
*PRINT HYD           ID=[6],   # OF PCYCLES=[1]
*#==============================================================================
*# WC-4B - RURAL - HIGHWAY 417 TO CNR
*#==============================================================================
CONTINUOUS NASHYD        ID=[4] NHYD=["WC-4B"], DT=[1]min, AREA=[145.27](ha),
                    DWF=[0](cms),  CN=[73], IA=[7](mm),
                    N=[1.1], TP=[1.22]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.01]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[10](mm), GWResK=[0.93](mm/day/mm),
                    VHydCond=[0.02](mm/hr), END=-1
*#==============================================================================
*# ADD WC-4A AND KIZELL
*#==============================================================================
ADD HYD             IDsum=[1], NHYD=["WFP2"], IDs to add=[6+3]
*PRINT HYD           ID=[1],   # OF PCYCLES=[1]
*#==============================================================================
*# ADD WC-4A AND WC-4B
*#==============================================================================
ADD HYD             IDsum=[5], NHYD=["WFP3"], IDs to add=[1+4]
*PRINT HYD           ID=[5],   # OF PCYCLES=[1]
*#==============================================================================
*# ROUTE KIZELL AND WC-1+KTC+WC-3+WC-4 THROUGH WC-5A
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 4677.806
*#==============================================================================
ROUTE CHANNEL       IDout=[2], NHYD=["WC-4"], IDin=[5],
                    RDT=[1](min),
                    CHLGTH=[636](m),  CHSLOPE=[0.16](%),
                                        FPSLOPE=[0.16](%),
                    SECNUM=[4677],       NSEG=[3]
                    ( SEGROUGH, SEGDIST (m))=[0.08,95.801 -0.04,102.955 0.08,167.28]
                    NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0,  75.4 ]
                                                    [ 11.4,  74.3 ]
                                                    [ 31.7,  73.6 ]
                                                    [51.08,  72.8 ]
                                                    [60.69,  72.6 ]
                                                    [ 74.1,  71.6 ]
                                                    [77.61,  70.8 ]
                                                    [84.14,    71 ]
                                                    [93.83,    71 ]
                                                    [95.801, 70.73 ]
                                                    [97.18,  70.5 ]
                                                    [  101,  70.5 ]
                                                    [102.955, 70.989 ]
```

```
                                                    [111.37,  74.5 ]
                                                    [121.02, 76.45 ]
                                                    [128.96,  77.6 ]
                                                    [139.85,  78.3 ]
                                                    [151.67, 80.09 ]
                                                    [158.82, 80.63 ]
                                                    [167.28, 81.57 ]
*#=============================================================================
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 4446.172
*#=============================================================================
ROUTE CHANNEL       IDout=[1], NHYD=["WC-4"], IDin=[2],
                    RDT=[1](min),
                    CHLGTH=[443](m),  CHSLOPE=[0.64](%),
                                        FPSLOPE=[0.64](%),
                    SECNUM=[4446],       NSEG=[4]
                    ( SEGROUGH, SEGDIST (m))=[0.08,101.82 0.05,155.499 -0.04,160.804
                    0.08,360.72] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 75.11 ]
                                                    [15.28,  74.3 ]
                                                    [39.39,  73.6 ]
                                                    [55.02,  73.7 ]
                                                    [70.01,  73.1 ]
                                                    [101.82, 72.72 ]
                                                    [123.37, 72.37 ]
                                                    [137.03,  71.7 ]
                                                    [152.53,  68.9 ]
                                                    [155.499, 68.552 ]
                                                    [160.804, 68.559 ]
                                                    [163.78, 68.89 ]
                                                    [172.88,    69 ]
                                                    [180.76, 72.03 ]
                                                    [191.21,  72.8 ]
                                                    [208.93, 72.49 ]
                                                    [239.54,  72.4 ]
                                                    [260.28,  72.6 ]
                                                    [291.51,  72.6 ]
                                                    [360.72, 73.06 ]
*#=============================================================================
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 3897.472
*#=============================================================================
ROUTE CHANNEL       IDout=[2], NHYD=["WC-4"], IDin=[1],
                    RDT=[1](min),
                    CHLGTH=[468](m),  CHSLOPE=[0.44](%),
                                        FPSLOPE=[0.44](%),
                    SECNUM=[3897],       NSEG=[4]
                    ( SEGROUGH, SEGDIST (m))=[0.08,161.362 -0.04,164.388 -0.08,164.68
                    0.05,242.03] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 72.01 ]
                                                    [14.79,  71.9 ]
                                                    [26.32,  71.5 ]
                                                    [45.81,  69.5 ]
                                                    [ 52.8,  68.5 ]
                                                    [67.29,  68.1 ]
                                                    [85.91,  68.1 ]
                                                    [94.25,  67.9 ]
                                                    [116.16, 67.78 ]
                                                    [142.44,  67.4 ]
                                                    [159.77,  66.1 ]
                                                    [161.362, 65.677 ]
                                                    [164.388, 65.577 ]
                                                    [164.68, 65.61 ]
                                                    [166.02,  66.1 ]
                                                    [167.47,  66.5 ]
                                                    [201.22,  66.8 ]
                                                    [208.26,  66.7 ]
                                                    [216.93, 67.19 ]
                                                    [242.03,  67.3 ]
```

```
*#==============================================================================
*# WC-5A - RURAL - CNR TO CARLING AVE
*#==============================================================================
CONTINUOUS NASHYD        ID=[1] NHYD=["WC-5A"], DT=[1]min, AREA=[59.54](ha),
                    DWF=[0](cms),  CN=[73], IA=[7](mm),
                    N=[1.1], TP=[0.79]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.01]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[10](mm), GWResK=[0.93](mm/day/mm),
                    VHydCond=[0.02](mm/hr), END=-1
*#==============================================================================
*# ADD WC-5A AND WC-5A UPSTREAM
*# CALIBRATION LOCATION - WATTS CREEK AT CARLING AVENUE
*#==============================================================================
ADD HYD             IDsum=[3], NHYD=["WFP4"], IDs to add=[1+2]
*PRINT HYD           ID=[3],   # OF PCYCLES=[1]
*#==============================================================================
*# ROUTE WC-5B UPSTREAM THROUGH WC-5B
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 3469.421
*# MINIMUM SLOPE ASSUMED 0.1%
*#==============================================================================
ROUTE CHANNEL       IDout=[2], NHYD=["WC-5B"], IDin=[3],
                    RDT=[1](min),
                    CHLGTH=[485](m),  CHSLOPE=[0.1](%),
                                        FPSLOPE=[0.1](%),
                    SECNUM=[3469],       NSEG=[4]
                    ( SEGROUGH, SEGDIST (m))=[0.08,127.46 0.06,131.6 -0.03,141.59 ↵
                    0.08,308.37] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 68.08 ]
                                                  [16.71,  67.1 ]
                                                  [48.15,  66.8 ]
                                                  [75.65,  66.3 ]
                                                  [107.54,  66.2 ]
                                                  [117.33,  66.3 ]
                                                  [127.46, 65.54 ]
                                                  [129.21,  65.3 ]
                                                  [131.6,  64.9 ]
                                                  [136.836, 64.972 ]
                                                  [139.19,  65.3 ]
                                                  [141.59, 65.65 ]
                                                  [161.72,  65.6 ]
                                                  [171.42,  66.1 ]
                                                  [187.05,  66.3 ]
                                                  [224.24,  66.3 ]
                                                  [246.7,  66.1 ]
                                                  [286.52, 66.07 ]
                                                  [304.07,  66.3 ]
                                                  [308.37,  66.7 ]
*#==============================================================================
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 2981.379
*#==============================================================================
ROUTE CHANNEL       IDout=[1], NHYD=["WC-5B"], IDin=[2],
                    RDT=[1](min),
                    CHLGTH=[307](m),  CHSLOPE=[0.40](%),
                                        FPSLOPE=[0.40](%),
                    SECNUM=[2981],       NSEG=[4]
                    ( SEGROUGH, SEGDIST (m))=[0.08,9.006 -0.03,14.347 -0.06,14.85 ↵
                    0.08,30.25] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 64.35 ]
                                                  [ 2.07,  64.3 ]
                                                  [ 4.58,  64.2 ]
                                                  [  5.7,  64.1 ]
                                                  [ 6.83,  63.8 ]
                                                  [ 7.91, 63.37 ]
                                                  [9.006, 63.169 ]
```

```
                                                    [ 9.64,  62.8 ]
                                                    [13.64,  62.8 ]
                                                    [14.24,  63.1 ]
                                                    [14.347, 63.315 ]
                                                    [14.85, 63.35 ]
                                                    [15.35,  63.4 ]
                                                    [16.49, 63.69 ]
                                                    [18.19, 64.21 ]
                                                    [21.41,  64.2 ]
                                                    [25.06, 64.05 ]
                                                    [27.14, 64.06 ]
                                                    [28.41,  64.2 ]
                                                    [30.25, 64.28 ]
*#=============================================================================
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 1585.543
*#=============================================================================
ROUTE CHANNEL       IDout=[2], NHYD=["WC-5B"], IDin=[1],
                    RDT=[1](min),
                    CHLGTH=[2876](m),  CHSLOPE=[0.16](%),
                                        FPSLOPE=[0.16](%),
                    SECNUM=[1585],       NSEG=[4]
                    ( SEGROUGH, SEGDIST (m))=[0.08,56.84 0.05,124.41 -0.035,128.78
                    0.08,255.15] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 64.07 ]
                                                    [21.74,  63.8 ]
                                                    [40.53,  63.5 ]
                                                    [56.84, 61.82 ]
                                                    [74.07,  61.6 ]
                                                    [98.29,  61.7 ]
                                                    [104.39, 61.43 ]
                                                    [117.32,  61.8 ]
                                                    [124.32,  60.8 ]
                                                    [124.41, 60.79 ]
                                                    [124.519, 60.783 ]
                                                    [127.785, 60.75 ]
                                                    [  128, 60.83 ]
                                                    [128.78, 61.17 ]
                                                    [130.97,  61.8 ]
                                                    [149.66, 61.32 ]
                                                    [170.74,  61.4 ]
                                                    [191.12,  63.6 ]
                                                    [219.28, 64.08 ]
                                                    [255.15,  64.1 ]
*#=============================================================================
*# WC-5B - RURAL - CARLING AVE TO OUTLET
*#=============================================================================
CONTINUOUS NASHYD       ID=[4] NHYD=["WC-5B"], DT=[1]min, AREA=[379.59](ha),
                    DWF=[0](cms),  CN=[73], IA=[7](mm),
                    N=[1.1], TP=[3.28]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.01]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[10](mm), GWResK=[0.93](mm/day/mm),
                    VHydCond=[0.02](mm/hr), END=-1
*#=============================================================================
*# ADD WC-5B AND WC-5B UPSTREAM
*# WATTS CREEK AT OUTLET TO OTTAWA RIVER
*#=============================================================================
ADD HYD             IDsum=[1], NHYD=["WFP5"], IDs to add=[4+2]
*PRINT HYD           ID=[1],   # OF PCYCLES=[1]
*%-----------------|-------------------------------------------------------|
SAVE HYD            ID=[1],  # OF PCYCLES=[-1],  ICASEsh=[-1]
                    HYD_FILENAME=["WFP5"]
                    HYD_COMMENT=["WATTS CREEK AT OUTLET TO OTTAWA RIVER"]
*%-----------------|-------------------------------------------------------|
*#=============================================================================
```

```
*                                DESIGN STORMS
*#==============================================================================

START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[0005]
                    5y12hr.stm
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[0010]
                    10y12hr.stm
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[0025]
                    25y12hr.stm
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[0050]
                    50y12hr.stm
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[0100]
                    100y12hr.stm
FINISH
*#==============================================================================
*                              CONTINUOUS SIMULATIONS
*#==============================================================================
*START               TZERO=[1968.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1968]
*START               TZERO=[1969.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1969]
*START               TZERO=[1970.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1970]
*START               TZERO=[1971.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1971]
*START               TZERO=[1972.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1972]
*START               TZERO=[1973.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1973]
*START               TZERO=[1974.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1974]
*START               TZERO=[1975.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1975]
*START               TZERO=[1976.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1976]
*START               TZERO=[1977.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1977]
*START               TZERO=[1978.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1978]
*START               TZERO=[1979.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1979]
*START               TZERO=[1980.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1980]
*START               TZERO=[1981.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1981]
*START               TZERO=[1982.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1982]
*START               TZERO=[1983.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1983]
*START               TZERO=[1984.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1984]
*START               TZERO=[1985.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1985]
*START               TZERO=[1986.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1986]
*START               TZERO=[1987.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1987]
*START               TZERO=[1988.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1988]
*START               TZERO=[1989.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1989]
*START               TZERO=[1990.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1990]
*START               TZERO=[1991.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1991]
*START               TZERO=[1992.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1992]
*START               TZERO=[1993.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1993]
*START               TZERO=[1994.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1994]
*START               TZERO=[1995.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1995]
*START               TZERO=[1996.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1996]
*START               TZERO=[1997.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1997]
*START               TZERO=[1998.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1998]
*START               TZERO=[1999.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1999]
*START               TZERO=[2000.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[2000]
*START               TZERO=[2002.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[2002]
*START               TZERO=[2003.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[2003]
*START               TZERO=[2004.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[2004]
*START               TZERO=[2006.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[2006]
*START               TZERO=[2007.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[2007]
*FINISH
```

JFSA
WATER RESOURCES AND ENVIRONMENTAL CONSULTANTS

Project Ref #:1581
Client: David Schaeffer Engineering

Ottawa. ON
Paris. ON
Gatineau. QB
Montréal. QB
Québec. QB

Attachment B

SWMHYMO Model:

Existing Conditions – Calibrated

```
2     Metric units
*#*************************************************************************
*#  Project Name: [Shirley's Brook and Watt's Creek Phase 2 SWM Study]    Project Number: [60264539]
*#  Future Conditions Model for the Watts Creek/Kizell Drain Flood Plain Mapping Study
*#  Date        : 2014-12-31
*#  Modeller    : [Olivia Chung]  John Price MVCA
*#  Company     : AECOM Canada
*#  License #   :  2988504
*#*************************************************************************
*# September 2019, model parameters further updated by JFSAinc
*# with use of rainfall and flow monitoring data collected in 2019
*#
*# - all N values in NASHYDS changed from N=1.1 to N=2
*# - all MNI values in existing conditions STANDHYDs changed from 0.025 to 0.013
*# - all SLOPI values in STANDHYDs changed from 0.02 to 1.0
*# - change STANDHYD infiltration method from SCS to Horton with
*# - Horton: Fo=[125](mm/hr), Fc=[25](mm/hr), DCAY=[2.0](/hr), F=[0](mm)
*# - set XIMP to a fix value of 0.25 for all existing residential catchments
*# - use COMPUTE API         APII=[40], APIK=[0.8]/day,
*# - continuous NASHYDs, use BaseFlowOption=[1] , InitGWResVol=[12], GWResK=[0.85], VHydCond=[.001]
*# - all golf course NASHYDs, use CN=50
*# - XIMP=[0.250], for all existing not draining through the grass areas of the golf course
*#
*# - Areas draining across the golf course:
*# - those specific STANDHYD commands converted to NASHYDs so that the infiltrated water could come back into the system.  This allowed a much better volume comparison through the Beaver Pond.
*# - The CN and IA values for those NASHYDs were weighted averages of CN=90 for TIMP and CN=50 for grass areas, and the IA was based on weighted average of IA=1.5 for TIMP and IA=5.0 for grass areas.
*# - The Tp value was simply calculated by using the (LGI/0.3 * 2/3) / 3600, where the value of 0.3 was my assumed flow velocity.  Note, there are 4 catchments to which this was done, for a total of 48.3 ha representing just over 11% of the total drainage area to the Beaver Pond.
*# - removed  the two IBI Route Reservoirs that were previously inserted to account for some hidden system storage.
*#=========================================================================
*# WATTS CREEK SUBWATERSHED
*# MODEL CONVERTED FROM QUALHYMO MODEL (DILLON, 2009)
*# DECEMBER 2014
*#=========================================================================
*# Model updated by JFSA (June 2019)to allow for continuous simulations to complete
*# preliminary erosion assessment.
*# Model reverted back to existing conditions using parameters as documented in
*# MVCA's Watts Creek Final Report November 2017
*#=========================================================================
*#                                KIZELL DRAIN
*#=========================================================================
* Area Tributary to Beaver Pond and Kizell Cell
*#=========================================================================
*#=========================================================================
*# Derived from Scenario 20 of Phase 1 SWM Study
*# AECOM MODEL + GOLF COURSE DETENTION PONDS
*# AMC II Condition
*# RAINFALL - BEAVER POND RAIN GAUGE (POINT RAINFALL)
*# DESIGN EVENTS
*#=========================================================================
*                              DESIGN STORMS
*#=========================================================================
*%----------------|-------------------------------------------------------|
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[0002]
*                    "2y12hr.stm"
READ STORM          STORM_FILENAME=["storm.001"]
*%----------------|-------------------------------------------------------|
```

```
*#=============================================================================
*                              CALIBRATION EVENT
*#=============================================================================
*%-----------------|-------------------------------------------------------|
*START                TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[2019]
*                    "P4June6-2019.stm"
*
*READ STORM           STORM_FILENAME=["storm.001"]
*%-----------------|-------------------------------------------------------|
*#=============================================================================
*                              CONTINUOUS SIMULATIONS
*#=============================================================================
*START                TZERO=[1967.0719],  METOUT=[2],  NSTORM=[0],  NRUN=[1967]
*%                    [""] <--storm filename, one per line for NSTORM time
*%-----------------|-------------------------------------------------------|
*# Ottawa International Airport - 19 July 1967 to 01 Nov 2007
*READ AES DATA        AES_FILENAME=["YOW_1967_2007.123"],
*                     IELEM=[123], START_DATE=[0], END_DATE=[-364]
*%-----------------|-------------------------------------------------------|
COMPUTE API          APII=[40], APIK=[0.8]/day,
*%-----------------|-------------------------------------------------------|
*#=============================================================================
*# AREA 3A-1 (URBAN PORTION of Area North of Campeau Drive) TO DA 5A
*#=============================================================================
*# XIMP reduced to 0.05 since area drains across the golf course
CONTINUOUS STANDHYD      ID=[10], NHYD=["000100"], DT=[1](min), AREA=[2.7](ha),
                     XIMP=[0.05], TIMP=[0.47], DWF=[0](cms),
                     LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                     DCAY=[2.0](/hr), F=[0](mm),
                     Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                          LGP=[40](m), MNP=[0.25], SCP=[0](min),
                     Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                          LGI=[2134](m), MNI=[0.013], SCI=[0](min),
                     Continuous simulation parameters:
                     IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                     InterEventTime=[12](hrs), END=-1
*%-----------------|-------------------------------------------------------|
*# Previous command replaced by a NASHYD to account for the fact that the drainage goes
*# over golf course and we want to recapture the baseflow
CONTINUOUS NASHYD    ID=[10], NHYD=["000100"], DT=[1](min), AREA=[2.7](ha)
                     DWF=[0](cms),  CN/C=[68.8], IA=[3.38](mm), N=[2], TP=[1.32](hrs),
                     Continuous simulation parameters:
                     IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                     InterEventTime=[12](hrs),
                     Baseflow simulation parameters:
                     BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                     VHydCond=[.001](mm/hr), END=-1
*%-----------------|-------------------------------------------------------|
*#=============================================================================
*# AREA 3A-2 (URBAN PORTION of Area North of Campeau Drive)
*#=============================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["000100"], DT=[1](min), AREA=[33.4](ha),
                     XIMP=[0.250], TIMP=[0.41], DWF=[0](cms),
                     LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                     DCAY=[2.0](/hr), F=[0](mm),
                     Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                          LGP=[40](m), MNP=[0.25], SCP=[0](min),
                     Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                          LGI=[471](m), MNI=[0.013], SCI=[0](min),
                     Continuous simulation parameters:
                     IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                     InterEventTime=[12](hrs), END=-1
*%-----------------|-------------------------------------------------------|
*
*#=============================================================================
*# AREA 3B (GOLF PORTION of Area North of Campeau Drive) TO DA 5A
```

```
*#=============================================================================
* Original CN=62
CONTINUOUS NASHYD         ID=[2], NHYD=["000100"], DT=[1]min, AREA=[6.3](ha),
                     DWF=[0](cms),  CN=[50], IA=[5.0](mm),
                     N=[2.0], TP=[0.55]hrs,
                     Continuous simulation parameters:
                     IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                     InterEventTime=[12](hrs),
                     Baseflow simulation parameters:
                     BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                     VHydCond=[.001](mm/hr), END=-1
*%----------------|-------------------------------------------------------------|
*#=============================================================================
*# ADDED AREA 3A-1 TO 3B
*#=============================================================================
*
ADD HYD              IDsum=[3], NHYD=[000321], IDs to add=[10+2]
*%----------------|-------------------------------------------------------------|
*#=============================================================================
*# DA 5A
*#=============================================================================
ROUTE RESERVOIR      IDout=[2],   NHYD=[000100],  IDin=[3],
                     RDT=[1](min),
                           TABLE of ( OUTFLOW-STORAGE ) values
                                      (cms) - (ha-m)
                                    [   0.0 ,  0.0 ]
                                    [  0.51 ,  0.00005 ]
                                    [  0.65 ,  0.0040 ]
                                    [  0.76 ,  0.0438 ]
                                    [  0.86 ,  0.1887 ]
                                    [  0.95 ,  0.5613 ]
                                    [  0.98 ,  0.8197 ]
                                    [200.00 ,  0.9017 ]
                                    [   -1  ,  -1  ]  (max twenty pts)
                           IDovf=[   ], NHYDovf=[   ]
*%----------------|-------------------------------------------------------------|
*#=============================================================================
*# ADDED OUTFLOW FROM DA 5A TO 3A-2
*#=============================================================================
*
ADD HYD              IDsum=[3], NHYD=[000321], IDs to add=[1+2]
*%----------------|-------------------------------------------------------------|
*
*#=============================================================================
*# AREA 12 (GOLF PORTION OF Area East of Knudson Drive - DA 6B)
*#=============================================================================
CONTINUOUS NASHYD         ID=[1], NHYD=["000100"], DT=[1]min, AREA=[2.27](ha),
                     DWF=[0](cms),  CN=[50], IA=[5.0](mm),
                     N=[2.0], TP=[0.37]hrs,
                     Continuous simulation parameters:
                     IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                     InterEventTime=[12](hrs),
                     Baseflow simulation parameters:
                     BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                     VHydCond=[.001](mm/hr), END=-1
*%----------------|-------------------------------------------------------------|
*
*#=============================================================================
*# AREA 13 (GOLF PORTION OF Area East of Knudson Drive - DA 6A)
*#=============================================================================
CONTINUOUS NASHYD         ID=[2], NHYD=["000100"], DT=[1]min, AREA=[2.9](ha),
                     DWF=[0](cms),  CN=[50], IA=[5.0](mm),
                     N=[2.0], TP=[0.64]hrs,
                     Continuous simulation parameters:
                     IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                     InterEventTime=[12](hrs),
                     Baseflow simulation parameters:
```

```
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# ADDED AREA 13 AND AREA 12 TO 3A-2
*#=============================================================================
*
ADD HYD             IDsum=[10], NHYD=[000321], IDs to add=[1+2+3]
*%-----------------|-------------------------------------------------------------|
*
*#=============================================================================
*# AREA 2A (URBAN PORTION OF Area North of Campeau Drive)
*#=============================================================================
*#  ORIGINAL AREA 2A COMMAND FOLLOWS, WITH REDUCED AREA FOR THE PURPOSE OF GAUGE
*#  ON CAMPEAU DRIVE, THEN REINSERTED FOR OVERALL MODEL
**CONTINUOUS STANDHYD      ID=[1], NHYD=["000100"], DT=[1](min), AREA=[29.3](ha),
**                    XIMP=[0.250], TIMP=[0.45], DWF=[0](cms), LOSS=[2],
**                    SCS curve number CN=[60],
**                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
**                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
**                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
**                                         LGI=[858](m), MNI=[0.013], SCI=[0](min),
**                    Continuous simulation parameters:
**                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
**                    SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
**                    InterEventTime=[12](hrs), END=-1
*%-----------------|-------------------------------------------------------------|
* Estimated at 22.6 ha to measuring point off GeoOttawa - not exact
CONTINUOUS STANDHYD      ID=[1], NHYD=["000100"], DT=[1](min), AREA=[22.6](ha),
                    XIMP=[0.250], TIMP=[0.45], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.5](mm), SLPI=[1](%),
                                         LGI=[388](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[3](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%-----------------|-------------------------------------------------------------|
SAVE HYD            ID=[1],  # OF PCYCLES=[-1],  ICASEsh=[-1]
                    HYD_FILENAME=["Campeau.hyd"]
                    HYD_COMMENT=["Campeau Drive monitoring site"]
*%-----------------|-------------------------------------------------------------
----------------------------|
*# Area re-ntroduced to model completeness, but XIMP reduced to 0.05 since area drains
across golf course
CONTINUOUS STANDHYD      ID=[1], NHYD=["000100"], DT=[1](min), AREA=[29.3](ha),
                    XIMP=[0.05], TIMP=[0.45], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.5](mm), SLPI=[1](%),
                                         LGI=[441](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[3](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%-----------------|-------------------------------------------------------------
----------------------------|
*# Previous command replaced by a NASHYD to account for the fact that the drainage goes
*# over golf course and we want to recapture the baseflow
CONTINUOUS NASHYD   ID=[1], NHYD=["000100"], DT=[1](min), AREA=[29.3](ha)
                    DWF=[0](cms),  CN/C=[68], IA=[3.4](mm),
                    N=[2], TP=[0.27](hrs),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
```

```
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*
*#=============================================================================
*# AREA 2B-1 (GOLF PORTION OF Area North of Campeau Drive) TO DA 3
*#=============================================================================
* 0riginal CN=66
CONTINUOUS NASHYD       ID=[4], NHYD=["000100"], DT=[1]min, AREA=[13](ha),
                    DWF=[0](cms),  CN=[50], IA=[5.0](mm),
                    N=[2.0], TP=[0.443]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*%-----------------|-------------------------------------------------------|
*#=============================================================================
*# ADD 2A TO 2B-1
*#=============================================================================
ADD HYD             IDsum=[2], NHYD=[000321], IDs to add=[1+4]
*%-----------------|-------------------------------------------------------|
*
*#=============================================================================
*# DA 3
*#=============================================================================
ROUTE RESERVOIR     IDout=[4],   NHYD=[000100],  IDin=[2],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                    (cms) - (ha-m)
                                [   0.0 ,  0.0 ]
                                [   0.0 ,  0.0240 ]
                                [   0.9 ,  0.4127 ]
                                [  2.25 ,  0.4798 ]
                                [  4.16 ,  0.5507 ]
                                [ 10.00 ,  0.6058 ]
                                [   -1  ,  -1  ]  (max twenty pts)
                          IDovf=[   ], NHYDovf=[   ]
*%-----------------|-------------------------------------------------------|
*
*#=============================================================================
*# AREA 2C (URBAN PORTION OF Area North of Campeau Drive)
*#=============================================================================
*# XIMP reduced to 0.05 since area drains across the golf course
CONTINUOUS STANDHYD     ID=[1], NHYD=["000100"], DT=[1](min), AREA=[13.8](ha),
                    XIMP=[0.05], TIMP=[0.52], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[303](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%-----------------|-------------------------------------------------------|
*# Previous command replaced by a NASHYD to account for the fact that the drainage goes
*# over golf course and we want to recapture the baseflow
CONTINUOUS NASHYD   ID=[1], NHYD=["000100"], DT=[1](min), AREA=[13.8](ha)
                    DWF=[0](cms),  CN/C=[70.8], IA=[3.18](mm), N=[2], TP=[0.187](hrs),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
```

```
                    VHydCond=[.001](mm/hr), END=-1
*%-------------------------------------------------------------------------------
--
ADD HYD             IDsum=[2], NHYD=[000321], IDs to add=[1+4]
*%-----------------|-------------------------------------------------------------|
*
*#=============================================================================
*# AREA 2B-2 (GOLF PORTION OF Area North of Campeau Drive) TO DA 4
*#=============================================================================
* Original CN=63
CONTINUOUS NASHYD        ID=[5], NHYD=["000100"], DT=[1]min, AREA=[15.7](ha),
                    DWF=[0](cms),  CN=[50], IA=[5.0](mm),
                    N=[2.0], TP=[0.837]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*%-----------------|-------------------------------------------------------------|
ADD HYD             IDsum=[6], NHYD=[000321], IDs to add=[2+5]
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# DA 4
*#=============================================================================
ROUTE RESERVOIR     IDout=[2],   NHYD=[000100],  IDin=[6],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                    (cms) - (ha-m)
                                  [   0.0 ,  0.0 ]
                                  [  1.47 ,  0.00001 ]
                                  [  2.42 ,  0.0080 ]
                                  [  3.09 ,  0.0650 ]
                                  [  3.63 ,  0.3459 ]
                                  [  3.86 ,  0.8899 ]
                                  [  4.09 ,  1.6418 ]
                                  [  4.25 ,  3.6976 ]
                                  [ 200.0 ,  4.0674 ]
                                  [   -1  ,  -1  ]  (max twenty pts)
                          IDovf=[   ], NHYDovf=[   ]
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# ADD AREA 3A-2 TO OUTFLOW OF DA 4
*#=============================================================================
*# (JFS: THIS ADD HYD IS PART OF WHAT FLOWS TO THE WESLOCK GAUGE)
ADD HYD             IDsum=[5], NHYD=[000321], IDs to add=[2+10]
*%-----------------|-------------------------------------------------------------|
SAVE HYD            ID=[5],  # OF PCYCLES=[-1],  ICASEsh=[-1]
                    HYD_FILENAME=["WESLOCK-A.HYD"]
                    HYD_COMMENT=["PART A OF WHAT FLOWS THROUGH GAUGE ON WESLOCK"]
*%-----------------|-------------------------------------------------------------
-----------------------------|
*#=============================================================================
*# AREA 1C (URBAN PORTION of Area North of Campeau Drive)
*#=============================================================================
*# This area is piped through the golf course, so no change in XIMP
CONTINUOUS STANDHYD      ID=[1], NHYD=["000100"], DT=[1](min), AREA=[17.8](ha),
                    XIMP=[0.250], TIMP=[0.51], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[344](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
```

```
*%----------------|-------------------------------------------------------------|
*
*#==============================================================================
*# AREA 1B (GOLF PORTION OF Area North of Campeau Drive)
*#==============================================================================
* Original CN=61
CONTINUOUS NASHYD        ID=[2], NHYD=["000100"], DT=[1]min, AREA=[9.3](ha),
                    DWF=[0](cms),  CN=[50], IA=[5.0](mm),
                    N=[2.0], TP=[0.81]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*%----------------|-------------------------------------------------------------|
*#==============================================================================
*# ADD 1C TO 1B
*#==============================================================================
ADD HYD             IDsum=[3], NHYD=[000321], IDs to add=[1+2]
*%----------------|-------------------------------------------------------------|
*
*#==============================================================================
*# AREA 1A (INSTITUTION BLOCK)
*#==============================================================================
CONTINUOUS NASHYD        ID=[4], NHYD=["000100"], DT=[1]min, AREA=[11.4](ha),
                    DWF=[0](cms),  CN=[61], IA=[5.0](mm),
                    N=[2.0], TP=[0.56]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*%----------------|-------------------------------------------------------------|
*#==============================================================================
*# AREA 1D (URBAN PORTION of Area North of Campeau Drive)
*#==============================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["000100"], DT=[1](min), AREA=[15.8](ha),
                    XIMP=[0.250], TIMP=[0.55], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[324](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%----------------|-------------------------------------------------------------|
*#==============================================================================
*# FROM AREA 1D, MAJOR FLOW TO 5B - MINOR FLOW TO 5C
*# 85 L/S/HA * 15.8 HA = 1.343 L/S
*#==============================================================================
COMPUTE DUALHYD     IDin=[1], CINLET=[1.343](cms), NINLET=[1],
                    MAJID=[7], MajNHYD=[000100],
                    MINID=[8], MinNHYD=[000100],
                    TMJSTO=[0](cu-m)
*%----------------|-------------------------------------------------------------|
*#==============================================================================
*# ADD 1A AND 1B TO 1D MINOR
*#==============================================================================
*# (JFS:  THIS ADD HYD IS PART OF WHAT FLOWS AT THE WESLOCK GAUGE)
ADD HYD             IDsum=[6], NHYD=[000321], IDs to add=[4+3+8]
*%----------------|-------------------------------------------------------------|
SAVE HYD            ID=[6],  # OF PCYCLES=[-1],  ICASEsh=[-1]
                    HYD_FILENAME=["WESLOCK-B.HYD"]
```

```
                          HYD_COMMENT=["PART B OF FLOWS AT WESLOCK"]
*%-----------------|---------------------------------------------------------------------
-------------------------------|
*
*#=====================================================================================
*# AREA 5A (URBAN PORTION OF Area North of Knudson Drive)
*#=====================================================================================
*# XIMP reduced to 0.05 since area drains across the golf course
CONTINUOUS STANDHYD        ID=[1], NHYD=["000100"], DT=[1](min), AREA=[2.5](ha),
                          XIMP=[0.05], TIMP=[0.50], DWF=[0](cms),
                          LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                          DCAY=[2.0](/hr), F=[0](mm),
                          Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                               LGP=[40](m), MNP=[0.25], SCP=[0](min),
                          Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                               LGI=[129](m), MNI=[0.013], SCI=[0](min),
                          Continuous simulation parameters:
                          IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                          InterEventTime=[12](hrs), END=-1
*%-----------------|--------------------------------------------------------------|
*# Previous command replaced by a NASHYD to account for the fact that the drainage goes
*# over golf course and we want to recapture the baseflow
CONTINUOUS NASHYD         ID=[1], NHYD=["000100"], DT=[1](min), AREA=[2.5](ha)
                          DWF=[0](cms),  CN/C=[45.25], IA=[3.25](mm), N=[2], TP=[0.08](hrs),
                          Continuous simulation parameters:
                          IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                          InterEventTime=[12](hrs),
                          Baseflow simulation parameters:
                          BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                          VHydCond=[.001](mm/hr), END=-1
*
*#=====================================================================================
*# AREA 5B (GOLF PORTION OF Area North of Knudson Drive)
*#=====================================================================================
CONTINUOUS NASHYD          ID=[2], NHYD=["000100"], DT=[1]min, AREA=[9.5](ha),
                          DWF=[0](cms),  CN=[50], IA=[5.0](mm),
                          N=[2.0], TP=[0.67]hrs,
                          Continuous simulation parameters:
                          IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                          InterEventTime=[12](hrs),
                          Baseflow simulation parameters:
                          BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                          VHydCond=[.001](mm/hr), END=-1
*%-----------------|--------------------------------------------------------------|
*#=====================================================================================
*# ADD 5A AND 1D MAJOR TO 5B
*#=====================================================================================
ADD HYD                   IDsum=[4], NHYD=[000321], IDs to add=[1+7+2]
*%-----------------|--------------------------------------------------------------|
*
*#=====================================================================================
*# AREA 5C (URBAN PORTION OF Area North of Knudson Drive)
*#=====================================================================================
CONTINUOUS STANDHYD        ID=[1], NHYD=["000100"], DT=[1](min), AREA=[6.2](ha),
                          XIMP=[0.250], TIMP=[0.50], DWF=[0](cms),
                          LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                          DCAY=[2.0](/hr), F=[0](mm),
                          Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                               LGP=[40](m), MNP=[0.25], SCP=[0](min),
                          Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                               LGI=[203](m), MNI=[0.013], SCI=[0](min),
                          Continuous simulation parameters:
                          IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                          InterEventTime=[12](hrs), END=-1
*%-----------------|--------------------------------------------------------------|
*#=====================================================================================
*# MAJOR FLOW TO 5B - MINOR FLOW TO 6A
```

```
*# 85 L/S/HA * 6.2 HA = 0.527 L/S
*#==============================================================================
COMPUTE DUALHYD     IDin=[1], CINLET=[0.527](cms), NINLET=[1],
                    MAJID=[2], MajNHYD=[000100],
                    MINID=[8], MinNHYD=[000100],
                    TMJSTO=[0](cu-m)
*%-----------------|------------------------------------------------------------|
*#==============================================================================
*# ADD 5C MAJOR TO 5B
*#==============================================================================
ADD HYD             IDsum=[7], NHYD=[000321], IDs to add=[2+4]
*%-----------------|------------------------------------------------------------|
*
*#==============================================================================
*# DA 8
*# WITH UPDATED DISCHARGE RATING CURVE BASED ON FIELD SURVEY INFORMATION
*#==============================================================================
ROUTE RESERVOIR     IDout=[3],   NHYD=[000100],  IDin=[7],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                     (cms) - (ha-m)
                                   [   0.0 ,  0.0 ]
                                   [  0.18 ,0.0004 ]
                                   [  0.22 ,0.0023 ]
                                   [  0.25 ,0.0092 ]
                                   [  0.28 ,0.0250 ]
                                   [  0.30 ,0.0580 ]
                                   [  0.33 ,0.1272 ]
                                   [  0.35 ,0.2435 ]
                                   [  0.37 ,0.4650 ]
                                   [ 200.0 ,0.5115 ]
                                   [   -1  ,  -1   ]  (max twenty pts)
                          IDovf=[   ], NHYDovf=[   ]
*%-----------------|------------------------------------------------------------|
*#==============================================================================
*# ADD 1D MINOR AND OUTLET OF DA 8 TO 5C MINOR
*#==============================================================================
ADD HYD             IDsum=[2], NHYD=[000321], IDs to add=[6+3+8]
*%-----------------|------------------------------------------------------------|
*#==============================================================================
*# ADD 3A TO 5C
*#==============================================================================
ADD HYD             IDsum=[5], NHYD=[000321], IDs to add=[5+2]
*%-----------------|------------------------------------------------------------|
*%SHIFT HYD was removed as it was not being used and was crashing the model
*%SHIFT HYD           IDout=[5], NHYD=[000100], IDin=[4], TLAG=[0](min)
*%-----------------|------------------------------------------------------------|
*
*#==============================================================================
*# AREA 6A (URBAN PORTION OF Area North of Knudson Drive)
*#==============================================================================
*# XIMP reduced to 0.05 since area drains across the golf course
CONTINUOUS STANDHYD      ID=[1], NHYD=["000100"], DT=[1](min), AREA=[4.1](ha),
                    XIMP=[0.050], TIMP=[0.52], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[165](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%-----------------|------------------------------------------------------------|
*
*#==============================================================================
*# AREA 6B (GOLF PORTION OF Area North of Knudson Drive)
```

```
*#=============================================================================
CONTINUOUS NASHYD        ID=[2], NHYD=["000100"], DT=[1]min, AREA=[5.9](ha),
                     DWF=[0](cms),  CN=[50], IA=[5.0](mm),
                     N=[2.0], TP=[0.87]hrs,
                     Continuous simulation parameters:
                     IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                     InterEventTime=[12](hrs),
                     Baseflow simulation parameters:
                     BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                     VHydCond=[.001](mm/hr), END=-1
*%----------------|-------------------------------------------------------|
*#=============================================================================
*# ADD 6A TO 6B
*#=============================================================================
ADD HYD              IDsum=[3], NHYD=[000321], IDs to add=[1+2]
*%----------------|-------------------------------------------------------|
*
*#=============================================================================
*# AREA 6C (URBAN PORTION OF Area North of Knudson Drive)
*#=============================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["000100"], DT=[1](min), AREA=[5.3](ha),
                     XIMP=[0.250], TIMP=[0.50], DWF=[0](cms),
                     LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                     DCAY=[2.0](/hr), F=[0](mm),
                     Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                          LGP=[40](m), MNP=[0.25], SCP=[0](min),
                     Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                          LGI=[187](m), MNI=[0.013], SCI=[0](min),
                     Continuous simulation parameters:
                     IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                     InterEventTime=[12](hrs), END=-1
*%----------------|-------------------------------------------------------|
*#=============================================================================
*# MAJOR FLOW TO 6B - MINOR FLOW TO 7
*# 85 L/S/HA * 5.3 HA = 0.4505 L/S
*#=============================================================================
COMPUTE DUALHYD      IDin=[1], CINLET=[0.451](cms), NINLET=[1],
                     MAJID=[2], MajNHYD=[000100],
                     MINID=[6], MinNHYD=[000100],
                     TMJSTO=[0](cu-m)
*%----------------|-------------------------------------------------------|
*#=============================================================================
*# ADD 6C MAJOR TO 6B
*#=============================================================================
ADD HYD              IDsum=[4], NHYD=[000321], IDs to add=[2+3]
*#=============================================================================
*# DA 9
*# WITH UPDATED DISCHARGE RATING CURVE BASED ON FIELD SURVEY INFORMATION
*#=============================================================================
ROUTE RESERVOIR      IDout=[3],   NHYD=[000100],  IDin=[4],
                     RDT=[1](min),
                           TABLE of ( OUTFLOW-STORAGE ) values
                                      (cms) - (ha-m)
                                    [   0.0 ,  0.0 ]
                                    [  0.25 ,0.00003 ]
                                    [  0.31 ,0.0039 ]
                                    [  0.36 ,0.0285 ]
                                    [  0.40 ,0.0901 ]
                                    [  0.44 ,0.2499 ]
                                    [  0.47 ,0.6154 ]
                                    [  0.48 ,0.7609 ]
                                    [200.00 ,0.8370 ]
                                    [   -1  ,  -1   ]  (max twenty pts)
                           IDovf=[   ], NHYDovf=[   ]
*%----------------|-------------------------------------------------------|
*#=============================================================================
*# ADD DA 9 OUTFLOW TO 6C MINOR
```

```
*#==========================================================================
ADD HYD             IDsum=[2], NHYD=[000321], IDs to add=[3+6]
*%----------------|-----------------------------------------------------------|
*#==========================================================================
*# ADD 5C TO 6C
*#==========================================================================
ADD HYD             IDsum=[5], NHYD=[000321], IDs to add=[5+2]
*%----------------|-----------------------------------------------------------|
*SHIFT HYD was removed as it was not being used and was crashing the model
*SHIFT HYD           IDout=[5], NHYD=[00100], IDin=[4], TLAG=[0](min)
*%----------------|-----------------------------------------------------------|
*
*#==========================================================================
*# AREA 14 (GOLF PORTION OF Area East of Knudson Drive - DA 11)
*#==========================================================================
CONTINUOUS NASHYD        ID=[2], NHYD=["000100"], DT=[1]min, AREA=[2.38](ha),
                    DWF=[0](cms),  CN=[50], IA=[5.0](mm),
                    N=[2.0], TP=[0.40]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*%----------------|-----------------------------------------------------------|
*#==========================================================================
*# DA 11
*# RATING CURVE BASED ON FIELD SURVEY INFORMATION
*#==========================================================================
ROUTE RESERVOIR     IDout=[4],   NHYD=[000100],  IDin=[2],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                     (cms) - (ha-m)
                                   [   0.0 ,  0.0 ]
                                   [  0.09 ,0.0019 ]
                                   [  0.12 ,0.0735 ]
                                   [ 0.145 ,0.2234 ]
                                   [ 0.146 ,0.2349 ]
                                   [200.00 ,0.2584 ]
                                   [   -1  ,  -1   ]  (max twenty pts)
                          IDovf=[   ], NHYDovf=[   ]
*%----------------|-----------------------------------------------------------|
*#==========================================================================
*# ADD OUTFLOW OF DA 11 TO 6C
*#==========================================================================
ADD HYD             IDsum=[2], NHYD=[000321], IDs to add=[5+4]
*%----------------|-----------------------------------------------------------|
*
*#==========================================================================
*# AREA 15 (GOLF PORTION OF Area South of Walden Drive - DA 10B)
*#==========================================================================
CONTINUOUS NASHYD        ID=[4], NHYD=["000100"], DT=[1]min, AREA=[2.5](ha),
                    DWF=[0](cms),  CN=[50], IA=[5.0](mm),
                    N=[2.0], TP=[0.20]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*%----------------|-----------------------------------------------------------|
*#==========================================================================
*# DA 10B
*# RATING CURVE BASED ON FIELD SURVEY INFORMATION
*#==========================================================================
ROUTE RESERVOIR     IDout=[5],   NHYD=[000100],  IDin=[4],
                    RDT=[1](min),
```

```
                            TABLE of ( OUTFLOW-STORAGE ) values
                                       (cms) - (ha-m)
                                     [   0.0 ,  0.0 ]
                                     [  0.32 ,0.0018 ]
                                     [  0.34 ,0.0093 ]
                                     [  0.36 ,0.0309 ]
                                     [  0.38 ,0.1597 ]
                                     [  0.40 ,0.3353 ]
                                     [200.00 ,0.3688 ]
                                     [   -1  ,  -1   ]  (max twenty pts)
                            IDovf=[   ], NHYDovf=[   ]
*%----------------|-------------------------------------------------------|
*
*#=============================================================================
*# AREA 7 (Adjacent to Beaver Pond)
*#=============================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["000204"], DT=[1](min), AREA=[19.6](ha),
                    XIMP=[0.250], TIMP=[0.44], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[361](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%----------------|-------------------------------------------------------|
*#=============================================================================
*# ADD OUTFLOW OF DA 10B AND 6C TO 7
*# TOTAL FLOW - AT EXISTING 2700 MM OUTLET
*#=============================================================================
ADD HYD             IDsum=[10], NHYD=[000321], IDs to add=[5+2+1]
*%----------------|-------------------------------------------------------|
*
*#=============================================================================
*# AREA 4C
*#=============================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["000204"], DT=[1](min), AREA=[5.8](ha),
                    XIMP=[0.250], TIMP=[0.53], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[196](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%----------------|-------------------------------------------------------|
*#=============================================================================
*# MAJOR FLOW TO 4B - MINOR FLOW TO 4A
*# 85 L/S/HA * 5.8 HA = 493 L/S
*#=============================================================================
COMPUTE DUALHYD     IDin=[1], CINLET=[0.493](cms), NINLET=[1],
                    MAJID=[5], MajNHYD=[000100],
                    MINID=[6], MinNHYD=[100100],
                    TMJSTO=[0](cu-m)
*%----------------|-------------------------------------------------------|
*
*#=============================================================================
*# AREA 4A - FLOW THROUGH AREA 4
*#=============================================================================
CONTINUOUS STANDHYD      ID=[3], NHYD=["000204"], DT=[1](min), AREA=[15.8](ha),
                    XIMP=[0.250], TIMP=[0.66], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
```

```
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[324](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%-----------------|-------------------------------------------------------------|
*
*#=============================================================================
*# ADDITION OF 4C MINOR TO 4A
*#=============================================================================
*
ADD HYD             IDsum=[4], NHYD=[000231], IDs to add=[3+6]
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# AREA 4B - ROUTE THROUGH ON SITE STORAGE
*#=============================================================================
CONTINUOUS STANDHYD      ID=[3], NHYD=["000204"], DT=[1](min), AREA=[6.2](ha),
                    XIMP=[0.250], TIMP=[0.57], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[203](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# ADDITION OF MAJOR FLOW AT 4C TO AREA 4B
*#=============================================================================
ADD HYD             IDsum=[6], NHYD=[000231], IDs to add=[5+3]
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# ON-SITE STORAGE IN AREA 4B
*# 85L/S/HA
*#=============================================================================
*
ROUTE RESERVOIR     IDout=[3],   NHYD=[000100],  IDin=[6],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                     (cms) - (ha-m)
                                [   0.0 ,  0.0 ]
                                [ 0.527, 0.2840]
                                [   -1  ,  -1  ]  (max twenty pts)
                          IDovf=[], NHYDovf=[]
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# ADDITION OF ROUTED 4B TO AREA 4A
*#=============================================================================
ADD HYD             IDsum=[8], NHYD=[000231], IDs to add=[4+3]
*%-----------------|-------------------------------------------------------------|
*
*#=============================================================================
*# AREA 4 (Adjacent to Beaver Pond)
*#=============================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["000204"], DT=[1](min), AREA=[21.2](ha),
                    XIMP=[0.250], TIMP=[0.38], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[375](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
```

```
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# ADDITION OF MINOR FLOW AT 4A TO AREA 4
*#=============================================================================
ADD HYD             IDsum=[3], NHYD=[000231], IDs to add=[8+1]
*%-----------------|-------------------------------------------------------------|
ADD HYD             IDsum=[7], NHYD=[000231], IDs to add=[10+3]
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# AREA 9 (RURAL - includes Beaver Pond itself)
*#=============================================================================
CONTINUOUS NASHYD   ID=[2], NHYD=["000100"], DT=[1]min, AREA=[18.9](ha),
                    DWF=[0](cms),  CN=[75], IA=[5.0](mm),
                    N=[2.0], TP=[0.37]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*%-----------------|-------------------------------------------------------------|
ADD HYD             IDsum=[6], NHYD=[000321], IDs to add=[7+2]
*%-----------------|-------------------------------------------------------------|
*
*#=============================================================================
*# GOULDBOURN FORCED ROAD - KANATA AVENUE TO AREA 10 BOUNDARY
*# (ARTERIAL ROAD 10 YEAR 10 MN INLET TIME)
*#=============================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["000204"], DT=[1](min), AREA=[1.6](ha),
                    XIMP=[0.71], TIMP=[0.71], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[103](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# MAJOR FLOW TO BEAVER POND - MINOR FLOW TO AREA 10 STORM SYSTEM
*# 237.69 L/S/HA * 1.66 HA = 394.6 L/S
*#=============================================================================
COMPUTE DUALHYD     IDin=[1], CINLET=[0.395](cms), NINLET=[1],
                    MAJID=[2], MajNHYD=[000100],
                    MINID=[7], MinNHYD=[100100],
                    TMJSTO=[0](cu-m)
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# BEAVER POND PORTION #1
*#=============================================================================
*
ADD HYD             IDsum=[9], NHYD=[000321], IDs to add=[6+2]
*%-----------------|-------------------------------------------------------------|
*
*#=============================================================================
*# KANATA AVENUE - GOULBOURN FORCED ROAD TO AREA 10 BOUNDARY
*# (ARTERIAL ROAD 10 YEAR 10 MIN INLET TIME)
*#=============================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["000204"], DT=[1](min), AREA=[2.8](ha),
                    XIMP=[0.32], TIMP=[0.32], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
```

```
                                        LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                        LGI=[136](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# MAJOR FLOW TOWARDS TFD - MINOR FLOW TO AREA 10 STORM SYSTEM
*# 237.69 L/S/HA * 1.8 HA = 427.8 L/S
* JFSA correction based on above drainage area of 2.8 ha
* Capture in DUALHYD below 237.69 L/s/ha * 2.8 ha = 665.5 L/s
*#=============================================================================
COMPUTE DUALHYD     IDin=[1], CINLET=[0.6655](cms), NINLET=[1],
                    MAJID=[10], MajNHYD=[000100],
                    MINID=[2], MinNHYD=[100100],
                    TMJSTO=[0](cu-m)
*%-----------------|-------------------------------------------------------------|
*
*#=============================================================================
*# DRAINAGE AGREA 10 - TOTAL 43.6 HA - DIVIDED UP FOR HGL ANALYSIS
*# (INCLUDES AREA 10-4, 10-1, 10-2 AND 10-3)
*#=============================================================================
*
*#=============================================================================
*# AREA 10-4 - DRAINS INTO S-5 - MAJOR FLOW CASCADES
*#=============================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["000204"], DT=[1](min), AREA=[13.9](ha),
                    XIMP=[0.250], TIMP=[0.51], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
                                        LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                        LGI=[304](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# MINOR FLOW INTO SYSTEM
*# 85 L/S/HA * 14 = 1190 L/S
*JFSA correction based on above drainage area of 13.9 ha
* Capture in DUALHYD below 85 L/s/ha * 13.9 ha = 1181 L/s
*#=============================================================================
COMPUTE DUALHYD     IDin=[1], CINLET=[1.181](cms), NINLET=[1],
                    MAJID=[8], MajNHYD=[000100],
                    MINID=[6], MinNHYD=[100100],
                    TMJSTO=[0](cu-m)
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# ADD KANATA AVENUE AND AREA 10-4 - MH S-5
*#=============================================================================
*
ADD HYD             IDsum=[5], NHYD=[000101], IDs to add=[6+2]
*%-----------------|-------------------------------------------------------------|
*
*#=============================================================================
*# AREA 10-1 - DRAINS INTO S-4 - MAJOR FLOW CASCADES
*#=============================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["000204"], DT=[1](min), AREA=[9.8](ha),
                    XIMP=[0.250], TIMP=[0.51], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
                                        LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
```

```
                                        LGI=[255](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%----------------|-------------------------------------------------------------|
*#=============================================================================
*# MINOR FLOW INTO SYSTEM
*# 85 L/S/HA * 9.5 = 807.5 L/S
*JFSA correction based on above drainage area of 9.8 ha
* Capture in DUALHYD below 85 L/s/ha * 9.8 ha = 833 L/s
*#=============================================================================
COMPUTE DUALHYD     IDin=[1], CINLET=[0.833](cms), NINLET=[1],
                    MAJID=[4], MajNHYD=[000100],
                    MINID=[6], MinNHYD=[100100],
                    TMJSTO=[0](cu-m)
*%----------------|-------------------------------------------------------------|
*#=============================================================================
*# ADD GOULBOURN FORCED ROAD AND AREA 10-1 - MH S-3
*#=============================================================================
*
ADD HYD             IDsum=[3], NHYD=[000101], IDs to add=[6+7]
*%----------------|-------------------------------------------------------------|
ADD HYD             IDsum=[7], NHYD=[000102], IDs to add=[3+5]
*%----------------|-------------------------------------------------------------|
*
*#=============================================================================
*# AREA 10-3 - DRAINS INTO S-2 - MAJOR FLOW CASCADES
*#=============================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["000204"], DT=[1](min), AREA=[4.3](ha),
                    XIMP=[0.250], TIMP=[0.55], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[169](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%----------------|-------------------------------------------------------------|
*#=============================================================================
*# MINOR FLOW INTO SYSTEM
*# 85 L/S/HA * 3.9 = 331.5 L/S
*JFSA correction based on above drainage area of 4.3 ha
* Capture in DUALHYD below 85 L/s/ha * 4.3 ha = 365 L/s
*#=============================================================================
COMPUTE DUALHYD     IDin=[1], CINLET=[0.365](cms), NINLET=[1],
                    MAJID=[5], MajNHYD=[000100],
                    MINID=[2], MinNHYD=[100100],
                    TMJSTO=[0](cu-m)
*%----------------|-------------------------------------------------------------|
ADD HYD             IDsum=[10], NHYD=[000103], IDs to add=[2+7]
*%----------------|-------------------------------------------------------------|
*
*#=============================================================================
*# AREA 10-2 - DRAINS INTO S-6 - MAJOR FLOW CASCADES
*#=============================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["000204"], DT=[1](min), AREA=[18.6](ha),
                    XIMP=[0.250], TIMP=[0.51], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[352](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
```

```
                    InterEventTime=[12](hrs), END=-1
*%----------------|-------------------------------------------------------------|
*#=============================================================================
*# MINOR FLOW INTO SYSTEM
*# 85 L/S/HA * 16.2 = 1377 L/S
*JFSA correction based on above drainage area of 18.6 ha
* Capture in DUALHYD below 85 L/s/ha * 18.6 ha = 1581 L/s
*#=============================================================================
COMPUTE DUALHYD     IDin=[1], CINLET=[1.581](cms), NINLET=[1],
                    MAJID=[2], MajNHYD=[000100],
                    MINID=[6], MinNHYD=[100100],
                    TMJSTO=[0](cu-m)
*%----------------|-------------------------------------------------------------|
*
*#=============================================================================
*# AREA 10A - MINOR FLOW TO AREA 10, MAJOR FLOW TO CARP RIVER WATERSHED
*#=============================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["000204"], DT=[1](min), AREA=[9.9](ha),
                    XIMP=[0.250], TIMP=[0.44], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[256](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%----------------|-------------------------------------------------------------|
*#=============================================================================
*# SPLIT OF MAJOR AND MINOR FLOW AT 85 L/S/HA
*# 85 * 7.0 = 595 L/S
*JFSA correction based on above drainage area of 9.9 ha
* Capture in DUALHYD below 85 L/s/ha * 9.9 ha = 841 L/s
*#=============================================================================
COMPUTE DUALHYD     IDin=[1], CINLET=[0.841](cms), NINLET=[1],
                    MAJID=[3], MajNHYD=[000100],
                    MINID=[7], MinNHYD=[100100],
                    TMJSTO=[0](cu-m)
*%----------------|-------------------------------------------------------------|
ADD HYD             IDsum=[1], NHYD=[000104], IDs to add=[7+6]
*%----------------|-------------------------------------------------------------|
*#=============================================================================
*# TOTAL MINOR FLOW AT OUTLET
*#=============================================================================
ADD HYD             IDsum=[6], NHYD=[000105], IDs to add=[1+10]
*%----------------|-------------------------------------------------------------|
*#=============================================================================
*# TOTAL MAJOR FLOW FOR DRAINAGE AREA 10 AT OUTLET
*#=============================================================================
ADD HYD             IDsum=[7], NHYD=[000106], IDs to add=[8+4+5+2]
*%----------------|-------------------------------------------------------------|
*#=============================================================================
*# AREA 11 (RURAL) - Increased Area for Existing Conditions
*#=============================================================================
CONTINUOUS NASHYD        ID=[2], NHYD=["000100"], DT=[1]min, AREA=[46.2](ha),
                    DWF=[0](cms),  CN=[62], IA=[5.0](mm),
                    N=[2.0], TP=[0.75]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*%----------------|-------------------------------------------------------------|
ADD HYD             IDsum=[3], NHYD=[000317], IDs to add=[7+2]
*%----------------|-------------------------------------------------------------|
```

```
*#=============================================================================
*# TOTAL FLOW TO KIZELL POND (U/S CELL)
*#=============================================================================
ADD HYD             IDsum=[10], NHYD=[000317], IDs to add=[3+6]
*%----------------|-------------------------------------------------------|
*
*#=============================================================================
*# SYSTEM STORAGE REPRESENTATION (KIZELL POND)
*# RATING CURVE PROVIDED BY IBI
*#=============================================================================
*# modify the ROUTE RESERVOIR to negate the effect of this underground storage
ROUTE RESERVOIR     IDout=[3],   NHYD=["KP-R"],  IDin=[10],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                    (cms) - (ha-m)
                                [   0.0 ,  0.0 ]
                                [ 99.   ,  0.09]
                                [   -1  ,  -1  ]  (max twenty pts)
                          IDovf=[4], NHYDovf=["OVF-KP"]
*#=============================================================================
*# ADD SYSTEM STORAGE OUTFLOW, OVERFLOW AND BYPASS (KIZELL)
*#=============================================================================
ADD HYD             IDsum=[10], NHYD=["KP-COM"], IDs to add=[3+4]
*#=============================================================================
*
* Kanata Lakes Stage 7 - Catchment removed from Model under existing conditions
*
*#=============================================================================
*CONTINUOUS STANDHYD      ID=[1], NHYD=["Stage 7"], DT=[1](min), AREA=[73.1](ha),
*                    XIMP=[0.250], TIMP=[0.50], DWF=[0](cms), LOSS=[2],
*                    SCS curve number CN=[57],
*                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
*                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
*                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
*                                         LGI=[698](m), MNI=[0.013], SCI=[0](min),
*                    Continuous simulation parameters:
*                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),*
*                    InterEventTime=[12](hrs), END=-1
*#=============================================================================
*
* Kanata Lakes Stage 8 - Catchment removed from Model under existing conditions
*
*#=============================================================================
*CONTINUOUS STANDHYD      ID=[2], NHYD=["Stage 8"], DT=[1](min), AREA=[65.7](ha),
*                    XIMP=[0.250], TIMP=[0.50], DWF=[0](cms),
*                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
DCAY=[2.0](/hr), F=[0](mm),
*                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
*                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
*                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
*                                         LGI=[661](m), MNI=[0.013], SCI=[0](min),
*                    Continuous simulation parameters:
*                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
*                    InterEventTime=[12](hrs), END=-1
*#=============================================================================
*# Only Minor system flow to Kizell Cell - Command removed from Model
*#=============================================================================
*COMPUTE DUALHYD     IDin=[2], CINLET=[0.8](cms), NINLET=[1],
*                    MAJID=[3], MajNHYD=[000100],
*                    MINID=[7], MinNHYD=[100100],
*                    TMJSTO=[0](cu-m)
*#=============================================================================
* Total flow into Kizell Cell
*#=============================================================================
*#ADD HYD             IDsum=[8], NHYD=["KP-COM"], IDs to add=[10+1]
*#=============================================================================
*#=============================================================================
```

```
* ROUTE THROUGH THE KIZELL CELL
*
ROUTE RESERVOIR     IDout=[5],   NHYD=["Kizell Cell"],  IDin=[10],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                     (cms) - (ha-m)
                                   [   0.0 ,  0.0 ]
                                   [ 0.100 ,  0.016]
                                   [ 0.200 ,  0.033]
                                   [ 0.300 ,  0.055]
                                   [ 0.400 ,  0.079]
                                   [ 0.500 ,  0.121]
                                   [ 0.700 ,  0.188]
                                   [ 0.800 ,  0.281]
                                   [ 0.950 ,  0.433]
                                   [ 1.050 ,  0.658]
                                   [ 1.200 ,  0.919]
                                   [   -1  ,  -1  ]  (max twenty pts)
                             IDovf=[4], NHYDovf=["OVF-Kizell Cell"]
*#=============================================================================
*# ADD OUTFLOW AND OVERFLOW
*#=============================================================================
ADD HYD             IDsum=[8], NHYD=["KP-COM"], IDs to add=[5+4]
*#=============================================================================
*#=============================================================================
*# SYSTEM STORAGE REPRESENTATION (BEAVER POND)
*# RATING CURVE PROVIDED BY IBI
*#=============================================================================
* modify the ROUTE RESERVOIR to negate the effects of the underground storage
ROUTE RESERVOIR     IDout=[3],   NHYD=["BP-R"],  IDin=[9],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                     (cms) - (ha-m)
                                   [   0.0 ,  0.0 ]
                                   [ 99.0 ,  0.09]
                                   [   -1  ,  -1  ]  (max twenty pts)
                             IDovf=[4], NHYDovf=["OVF-BP"]
*#=============================================================================
*# ADD SYSTEM STORAGE OUTFLOW, OVERFLOW AND BYPASS (BEAVER)
*#=============================================================================
ADD HYD             IDsum=[9], NHYD=["BP-COM"], IDs to add=[3+4]
*#=============================================================================
*
* Kanata Lakes Stage 9 - Replaced by subcatchment 8 under existing conditions
*
*#=============================================================================
CONTINUOUS NASHYD        ID=[1], NHYD=["8"], DT=[1]min, AREA=[9.2](ha),
                    DWF=[0](cms),  CN=[56], IA=[5.0](mm),
                    N=[2.0], TP=[0.21]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*#=============================================================================
*# TOTAL HYDROGRAPH INTO BEAVER POND
*
ADD HYD             IDsum=[6], NHYD=["BP-TOTAL"], IDs to add=[9+8+1]
*
*#=============================================================================
SAVE HYD            ID=[6],  # OF PCYCLES=[-1],  ICASEsh=[-1]
                    HYD_FILENAME=["BP_In"]
                    HYD_COMMENT=["Total inflow to the Beaver Pond"]
*#=============================================================================
*# TOTAL FLOW FROM BEAVER POND
*#=============================================================================
```

```
* ROUTE THROUGH BEAVER POND
* Overflow option removed to allow for linear extrapolation of flows out of the
* pond when simulated volumes exceed volumes provided in the curve below.
ROUTE RESERVOIR     IDout=[1],   NHYD=["BP-OUT"],  IDin=[6],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                     (cms) - (ha-m)
                                   [   0.0 ,  0.0 ]
                                   [ 0.592 ,  4.573]
                                   [ 0.686 ,  6.569]
                                   [ 0.769 ,  8.840]
                                   [ 0.879 ,  11.467]
                                   [ 1.007 ,  16.103]
                                   [ 1.040 ,  17.339]
                                   [   -1  ,  -1  ]  (max twenty pts)
                       IDovf=[], NHYDovf=[""]
*#=============================================================================
SAVE HYD            ID=[1],  # OF PCYCLES=[-1],  ICASEsh=[-1]
                    HYD_FILENAME=["BP_Out"]
                    HYD_COMMENT=["Total Outflow from the Beaver Pond"]
*#=============================================================================
*# ROUTE KD-1 THROUGH KD-2A
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 10018.26
*#=============================================================================
ROUTE CHANNEL       IDout=[3], NHYD=["KD-1"], IDin=[1],
                    RDT=[1](min),
                    CHLGTH=[277](m),  CHSLOPE=[1.08](%),
                                        FPSLOPE=[1.08](%),
                    SECNUM=[10018],       NSEG=[4]
                    ( SEGROUGH, SEGDIST (m))=[0.08,30.63 -0.03,34.69 0.08,49.66
                    0.04,70.77] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 94.54 ]
                                                   [ 7.12,  93.2 ]
                                                   [11.07,  92.3 ]
                                                   [15.31,  91.8 ]
                                                   [17.16, 91.35 ]
                                                   [20.56,  90.8 ]
                                                   [25.12, 89.58 ]
                                                   [28.15,  88.5 ]
                                                   [30.63,  87.8 ]
                                                   [31.957, 87.854 ]
                                                   [ 34.4,  88.5 ]
                                                   [34.69, 88.61 ]
                                                   [ 36.5, 89.23 ]
                                                   [38.48,  90.2 ]
                                                   [41.14,  91.1 ]
                                                   [ 45.4, 91.66 ]
                                                   [49.66, 91.96 ]
                                                   [53.06,  92.3 ]
                                                   [67.16, 92.43 ]
                                                   [70.77, 92.52 ]
*#=============================================================================
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 9854.606
*#=============================================================================
ROUTE CHANNEL       IDout=[2], NHYD=["KD-1"], IDin=[3],
                    RDT=[1](min),
                    CHLGTH=[186](m),  CHSLOPE=[1.97](%),
                                        FPSLOPE=[1.97](%),
                    SECNUM=[9854],       NSEG=[5]
                    ( SEGROUGH, SEGDIST (m))=[0.08,29.81 0.05,34.304 -0.03,38.24
                    0.05,47.73 0.08,105.39] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 90.07 ]
                                                   [ 6.86,  89.4 ]
                                                   [13.24,  89.2 ]
                                                   [17.79, 88.48 ]
                                                   [22.46,  87.2 ]
                                                   [29.81, 86.04 ]
```

```
                                                    [32.17, 85.72 ]
                                                    [34.304, 85.612 ]
                                                    [36.137, 85.654 ]
                                                    [37.46, 85.69 ]
                                                    [38.24, 85.72 ]
                                                    [44.98,  85.9 ]
                                                    [47.73, 86.32 ]
                                                    [51.27,  87.3 ]
                                                    [55.17,    88 ]
                                                    [87.02, 88.79 ]
                                                    [90.72,  88.7 ]
                                                    [93.96,    89 ]
                                                    [99.45,  90.8 ]
                                                    [105.39, 91.81 ]
*#==============================================================================
*# KD-2A-1 - RURAL - Increased Area for Existing Conditions
*#==============================================================================
CONTINUOUS NASHYD        ID=[1], NHYD=["KD-2A-1"], DT=[1]min, AREA=[28.6](ha),
                    DWF=[0](cms),  CN=[57], IA=[7](mm),
                    N=[2.0], TP=[0.91]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*#==============================================================================
*# ADD KD-2A-1 AND KD-1
*#==============================================================================
ADD HYD             IDsum=[3], NHYD=["KFP2"], IDs to add=[1+2]
*PRINT HYD           ID=[3],   # OF PCYCLES=[1]
*#==============================================================================
*# ROUTE THROUGH KD-2A-2
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 9743.627
*#==============================================================================
ROUTE CHANNEL       IDout=[1], NHYD=["KD-1"], IDin=[3],
                    RDT=[1](min),
                    CHLGTH=[408](m),  CHSLOPE=[0.84](%),
                                        FPSLOPE=[0.84](%),
                    SECNUM=[9743],       NSEG=[5]
                    ( SEGROUGH, SEGDIST (m))=[0.05,42.45 -0.03,44.28 -0.05,46.07
                    0.05,63.17 0.08,111.15] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0,  86.7 ]
                                                    [ 7.01,  86.7 ]
                                                    [15.57,  86.2 ]
                                                    [21.06, 85.58 ]
                                                    [25.69, 84.76 ]
                                                    [31.55, 83.42 ]
                                                    [40.62,  82.7 ]
                                                    [42.45,  82.5 ]
                                                    [44.28, 82.561 ]
                                                    [ 44.6, 82.59 ]
                                                    [46.07,  82.7 ]
                                                    [48.58, 82.76 ]
                                                    [59.09, 82.59 ]
                                                    [63.17, 83.94 ]
                                                    [67.14,  85.3 ]
                                                    [71.84,  85.8 ]
                                                    [82.08,  85.8 ]
                                                    [89.16,  86.2 ]
                                                    [106.01,  86.6 ]
                                                    [111.15, 86.65 ]
*#==============================================================================
SAVE HYD            ID=[1],  # OF PCYCLES=[-1],  ICASEsh=[-1]
                    HYD_FILENAME=["KD-1"]
                    HYD_COMMENT=["KD-1-Channel where Erosion analysis was completed"]
*#==============================================================================
```

```
*# Erosion Analysis on Kizell Drain (Requires SWMHYMO v5.5)
*#============================================================================
*# Erosion Index/critical shear stress calculated for flows through the critical
*# section of on Kizell Drain as determined by Matrix Solutions (May 2019)
*#============================================================================
EROSION INDEX       INDEX_METHOD=[1], QCE =[0.50](cms), NHYDsErosion=[1]
*#============================================================================
EROSION INDEX       INDEX_METHOD=[2], SHEARC =[20](Pa), No of Hyds=[1],
                    NHYDsErosion=[1]
                    RATING_CURVE_METHOD = [1], user entered channel shape
                    Channel section parameters
                    Section No["XS1"]
                    CHSLOPE=[0.84](%), FPSLOPE=[0.84](%),
                    NSEG=[5]
                    ( SEGROUGH, SEGDIST (m))=[0.05,42.45 -0.03,44.28 -0.05,46.07 ↵
                    0.05,63.17 0.08,111.15] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0,  86.7 ]
                                                  [ 7.01,  86.7 ]
                                                  [15.57,  86.2 ]
                                                  [21.06, 85.58 ]
                                                  [25.69, 84.76 ]
                                                  [31.55, 83.42 ]
                                                  [40.62,  82.7 ]
                                                  [42.45,  82.5 ]
                                                  [44.28, 82.561 ]
                                                  [ 44.6, 82.59 ]
                                                  [46.07,  82.7 ]
                                                  [48.58, 82.76 ]
                                                  [59.09, 82.59 ]
                                                  [63.17, 83.94 ]
                                                  [67.14,  85.3 ]
                                                  [71.84,  85.8 ]
                                                  [82.08,  85.8 ]
                                                  [89.16,  86.2 ]
                                                  [106.01,  86.6 ]
                                                  [111.15, 86.65 ]
*#============================================================================
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 9338.062
*# MINIMUM SLOPE ASSUMED 0.1%
*#============================================================================
ROUTE CHANNEL       IDout=[2], NHYD=["KD-1"], IDin=[1],
                    RDT=[1](min),
                    CHLGTH=[111](m),  CHSLOPE=[0.1](%),
                                        FPSLOPE=[0.1](%),
                    SECNUM=[9338],       NSEG=[5]
                    ( SEGROUGH, SEGDIST (m))=[0.04,78.47 0.06,82.78 -0.03,87.28 ↵
                    0.06,107.69 0.04,120.16] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0,  82.8 ]
                                                  [ 6.26, 82.86 ]
                                                  [   23,  82.4 ]
                                                  [57.46, 82.11 ]
                                                  [75.38,  82.1 ]
                                                  [78.47, 81.06 ]
                                                  [ 81.6,  79.7 ]
                                                  [82.78,  79.3 ]
                                                  [87.28, 79.28 ]
                                                  [ 88.3,  79.7 ]
                                                  [91.41,  81.1 ]
                                                  [94.81,  81.7 ]
                                                  [107.69,  82.1 ]
                                                  [120.16,  82.2 ]
*#============================================================================
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 9131.887
*#============================================================================
ROUTE CHANNEL       IDout=[1], NHYD=["KD-1"], IDin=[2],
                    RDT=[1](min),
                    CHLGTH=[248](m),  CHSLOPE=[0.28](%),
```

```
                                        FPSLOPE=[0.28](%),
                    SECNUM=[9131],       NSEG=[5]
                    ( SEGROUGH, SEGDIST (m))=[0.04,70.64 -0.03,72.865 0.04,74.61
                    0.05,77.65 0.04,191.67] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0,  81.6 ]
                                                   [ 7.35,  81.6 ]
                                                   [ 26.3,  80.9 ]
                                                   [48.53, 80.87 ]
                                                   [58.55, 80.01 ]
                                                   [65.66,    80 ]
                                                   [69.22,    79 ]
                                                   [70.64, 78.65 ]
                                                   [72.865,  78.7 ]
                                                   [74.25, 78.96 ]
                                                   [74.61,  79.1 ]
                                                   [77.65, 79.92 ]
                                                   [93.59,  79.9 ]
                                                   [103.2,  78.7 ]
                                                   [108.05,  79.9 ]
                                                   [115.92,  80.2 ]
                                                   [132.65,  80.2 ]
                                                   [159.72, 80.73 ]
                                                   [176.71, 82.61 ]
                                                   [191.67, 82.63 ]
*#=============================================================================
*# KD-2A-2 - URBAN/RURAL NORTH OF RAILRAOD
*#=============================================================================
CONTINUOUS STANDHYD      ID=[2], NHYD=["KD-2A-2"], DT=[1](min), AREA=[44.99](ha),
                    XIMP=[0.250], TIMP=[0.28], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[547](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*#=============================================================================
*# ADD KD-2A-1 AND KD-2A-2
*# CREST GAUGE LOCATION KD-2 -KIZELL DRAIN AT MARCH ROAD
*#=============================================================================
ADD HYD             IDsum=[3], NHYD=["KFP3"], IDs to add=[1+2]
*PRINT HYD           ID=[3],   # OF PCYCLES=[1]
*#=============================================================================
*# KD-2A-3 - URBAN SOUTH OF RAILROAD
*#=============================================================================
CONTINUOUS STANDHYD      ID=[2], NHYD=["KD-2A-3"], DT=[1](min), AREA=[48.56](ha),
                    XIMP=[0.250], TIMP=[0.31], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[568](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*#=============================================================================
*# ADD KD-2A-2 AND KD-2A-3 D/S OF MARCH ROAD
*#=============================================================================
ADD HYD             IDsum=[4], NHYD=["KD-2A-3"], IDs to add=[3+2]
*#=============================================================================
*# ROUTE KD-2A THROUGH KD-2B
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 8942.456
*#=============================================================================
ROUTE CHANNEL       IDout=[1], NHYD=["KD-2A"], IDin=[4],
```

```
                    RDT=[1](min),
                    CHLGTH=[254](m),  CHSLOPE=[0.55](%),
                                        FPSLOPE=[0.55](%),
                    SECNUM=[8942],       NSEG=[5]
                    ( SEGROUGH, SEGDIST (m))=[0.04,17.24 0.05,28.26 -0.03,31.51 0.05,61.08 0.04,68.63] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 80.58 ]
                                                   [ 1.57,  80.5 ]
                                                   [ 8.77,  80.5 ]
                                                   [10.84, 80.23 ]
                                                   [17.24, 80.03 ]
                                                   [20.76,    79 ]
                                                   [23.59,  78.9 ]
                                                   [26.81, 78.17 ]
                                                   [28.26,  77.9 ]
                                                   [30.06,  77.9 ]
                                                   [30.71, 78.01 ]
                                                   [31.51,  78.2 ]
                                                   [32.21, 78.39 ]
                                                   [ 37.7,  78.4 ]
                                                   [44.07,  78.5 ]
                                                   [48.95,  78.7 ]
                                                   [57.53, 79.33 ]
                                                   [61.08, 79.95 ]
                                                   [64.61, 80.71 ]
                                                   [68.63, 81.15 ]
*#==============================================================================
*# KD-2B-6 - URBAN
*#==============================================================================
CONTINUOUS STANDHYD      ID=[2], NHYD=["KD-2B-6"], DT=[1](min), AREA=[7.73](ha),
                    XIMP=[0.61], TIMP=[0.61], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr), DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[227](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*#==============================================================================
*# ROUTE KD-2B-6 THROUGH SWM POND SOUTH OF SOLANDT ROAD
*# ASSUME 5-YEAR CONTROL ACCORDING TO CITY GUIDELINES
*#==============================================================================
ROUTE RESERVOIR     IDout=[4],   NHYD=["KD-2B-6"],  IDin=[2],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                     (cms) - (ha-m)
                                  [   0.0 ,  0.0 ]
                                  [ 0.407 ,  0.095]
                                  [   -1  ,  -1  ]  (max twenty pts)
                          IDovf=[5], NHYDovf=["OVF-2B6"]
*#==============================================================================
*# ADD OUTFLOW, OVERFLOW AND KD-2A
*#==============================================================================
ADD HYD             IDsum=[6], NHYD=["KD-2B-6"], IDs to add=[4+5+1]
*#==============================================================================
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 8329.198
*#==============================================================================
ROUTE CHANNEL       IDout=[2], NHYD=["KD-2A"], IDin=[6],
                    RDT=[1](min),
                    CHLGTH=[747](m),  CHSLOPE=[0.36](%),
                                        FPSLOPE=[0.36](%),
                    SECNUM=[8329],       NSEG=[4]
                    ( SEGROUGH, SEGDIST (m))=[0.08,81.34 0.05,88.266 -0.03,97.72 0.08,109.09] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0,  78.3 ]
```

```
                                                    [56.66,  78.2 ]
                                                    [67.31,  78.2 ]
                                                    [72.25,    78 ]
                                                    [79.85,    78 ]
                                                    [81.34, 77.66 ]
                                                    [87.28, 75.87 ]
                                                    [88.266, 75.728 ]
                                                    [90.51, 75.759 ]
                                                    [90.57, 75.77 ]
                                                    [91.47, 75.88 ]
                                                    [97.72, 76.64 ]
                                                    [109.09,  78.5 ]
*#=============================================================================
*# KD-2B-3 - Converted to NASHYD under existing conditions
*#=============================================================================
CONTINUOUS NASHYD        ID=[1], NHYD=["KD-2B-3"], DT=[1]min, AREA=[7.40](ha),
                    DWF=[0](cms),  CN=[65], IA=[5.0](mm),
                    N=[2.0], TP=[0.49]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*#=============================================================================
*# 5 YEAR CONTROL - 89L/s
*# MAJOR FLOWS TO KIZELL DRAIN
*# MINOR FLOWS TO GOLF COURSE POND #2
*#=============================================================================
COMPUTE DUALHYD     IDin=[1], CINLET=[0.089](cms), NINLET=[1],
                    MAJID=[3], MajNHYD=["2B3MAJ"],
                    MINID=[4], MinNHYD=["2B3MIN"],
                    TMJSTO=[0](cu-m)
*#=============================================================================
*# KD-2B-4 Converted to NASHYD under existing conditions
*#=============================================================================
CONTINUOUS NASHYD        ID=[5], NHYD=["KD-2B-4"], DT=[1]min, AREA=[23.59](ha),
                    DWF=[0](cms),  CN=[63], IA=[5.0](mm),
                    N=[2.0], TP=[0.62]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*#=============================================================================
*# ADD KD-2B-3 MINOR AND KD-2B-4
*#=============================================================================
ADD HYD             IDsum=[6], NHYD=["KD-2B-4"], IDs to add=[4+5]
*#=============================================================================
*# ROUTE KD-2B-4 THROUGH GOLF COURSE POND #2
*#=============================================================================
ROUTE RESERVOIR     IDout=[4],   NHYD=["KD-2B-4"],  IDin=[6],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                    (cms) - (ha-m)
                                [   0.0 ,  0.0 ]
                                [ 0.229, 1.5695]
                                [ 0.251, 1.8191]
                                [ 0.328, 2.9421]
                                [   -1  ,  -1  ]  (max twenty pts)
                          IDovf=[5], NHYDovf=["OVF-2B6"]
*#=============================================================================
*# ADD OUTFLOW, OVERFLOW AND KD-2A
*#=============================================================================
ADD HYD             IDsum=[6], NHYD=["KD-2B-6"], IDs to add=[4+5]
*#=============================================================================
```

```
*# ADD KD-2B-3 MAJOR, KD-2B-4 AND KD-2B-6
*#=============================================================================
ADD HYD             IDsum=[4], NHYD=["KD-2B-4"], IDs to add=[3+6+2]
*#=============================================================================
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 7691.759
*#=============================================================================
ROUTE CHANNEL       IDout=[2], NHYD=["KD-2A"], IDin=[4],
                    RDT=[1](min),
                    CHLGTH=[408](m),  CHSLOPE=[0.11](%),
                                        FPSLOPE=[0.11](%),
                    SECNUM=[7691],       NSEG=[3]
                    ( SEGROUGH, SEGDIST (m))=[0.06,16.78 -0.03,19.003 0.06,24.49] NSEG
                    times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 76.75 ]
                                                   [ 0.66,  76.6 ]
                                                   [ 3.57, 75.74 ]
                                                   [ 4.99, 75.24 ]
                                                   [ 5.76,  75.1 ]
                                                   [ 7.69,    75 ]
                                                   [ 8.56,  74.9 ]
                                                   [ 9.95,  74.9 ]
                                                   [12.21,  74.8 ]
                                                   [12.99, 74.69 ]
                                                   [ 15.2,  74.3 ]
                                                   [16.78,  74.1 ]
                                                   [17.38,  73.8 ]
                                                   [18.38,  73.8 ]
                                                   [19.003, 74.147]
                                                   [19.94, 74.21 ]
                                                   [20.51, 74.31 ]
                                                   [21.52,  74.6 ]
                                                   [22.72, 75.04 ]
                                                   [24.49,  75.5 ]
*#=============================================================================
*# KD-2B-2 - URBAN RESIDENTIAL - Converted to NASHYD under existing conditions
*#=============================================================================
CONTINUOUS NASHYD       ID=[3], NHYD=["KD-2B-2"], DT=[1]min, AREA=[3.35](ha),
                    DWF=[0](cms),  CN=[63], IA=[5.0](mm),
                    N=[2.0], TP=[0.32]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*#=============================================================================
*# ROUTE KD-2B-2 THROUGH POND #3 NORTH OF FARRAR ROAD
*#=============================================================================
ROUTE RESERVOIR     IDout=[5],   NHYD=["KD-2B-2"],  IDin=[3],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                     (cms) - (ha-m)
                                   [   0.0 ,  0.0 ]
                                   [ 0.260 , 0.616]
                                   [ 0.282 ,0.7115]
                                   [ 0.374 ,1.2301]
                                   [   -1  ,  -1  ]  (max twenty pts)
                          IDovf=[6], NHYDovf=["OVF-2B3"]
*#=============================================================================
*# ADD OUTFLOW, OVERFLOW AND KD-2B-4
*#=============================================================================
ADD HYD             IDsum=[1], NHYD=["KD-2B-4"], IDs to add=[5+6+2]
*#=============================================================================
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 7386.879
*#=============================================================================
ROUTE CHANNEL       IDout=[2], NHYD=["KD-2A-4"], IDin=[1],
                    RDT=[1](min),
```

```
                    CHLGTH=[315](m),  CHSLOPE=[0.11](%),
                                        FPSLOPE=[0.11](%),
                    SECNUM=[7386],       NSEG=[5]
                    ( SEGROUGH, SEGDIST (m))=[0.08,21.18 0.05,62.87 -0.06,80.43 0.06,90.36 0.05,143.24] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 77.07 ]
                                                   [ 5.11,  76.8 ]
                                                   [21.18,  76.7 ]
                                                   [34.27,  76.7 ]
                                                   [43.48,  76.3 ]
                                                   [62.87,  74.8 ]
                                                   [68.48, 74.28 ]
                                                   [70.32,  73.5 ]
                                                   [73.346, 73.437 ]
                                                   [75.588, 73.466 ]
                                                   [75.62, 73.47 ]
                                                   [80.43,  74.3 ]
                                                   [85.13, 75.18 ]
                                                   [90.36, 75.69 ]
                                                   [101.28,  75.4 ]
                                                   [115.17,  75.3 ]
                                                   [121.38,  75.4 ]
                                                   [128.52, 74.95 ]
                                                   [137.68,  75.3 ]
                                                   [143.24, 76.97 ]
*#=============================================================================
*# KD-2B-7 - RURAL EAST OF HERZBERG ROAD
*#=============================================================================
CONTINUOUS NASHYD        ID=[4], NHYD=["KD-2B-7"], DT=[1]min, AREA=[20.11](ha),
                    DWF=[0](cms),  CN=[63], IA=[7](mm),
                    N=[2.0], TP=[1.50]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*#=============================================================================
*# ADD KD-2B-4 AND KD-2B-7
*#=============================================================================
ADD HYD             IDsum=[3], NHYD=["KD-2B-4"], IDs to add=[2+4]
*#=============================================================================
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 7058.454
*#=============================================================================
ROUTE CHANNEL       IDout=[1], NHYD=["KD-2A-4"], IDin=[3],
                    RDT=[1](min),
                    CHLGTH=[297](m),  CHSLOPE=[0.38](%),
                                        FPSLOPE=[0.38](%),
                    SECNUM=[7058],       NSEG=[3]
                    ( SEGROUGH, SEGDIST (m))=[0.05,206.86 -0.06,216.95 0.04,295.48] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0,  75.7 ]
                                                   [165.24,  75.2 ]
                                                   [198.14,  75.2 ]
                                                   [206.37,  73.8 ]
                                                   [206.86, 73.69 ]
                                                   [209.66,    73 ]
                                                   [211.86,    73 ]
                                                   [213.07, 73.07 ]
                                                   [215.16,  73.8 ]
                                                   [216.95, 74.14 ]
                                                   [247.08,  74.8 ]
                                                   [267.4,  74.8 ]
                                                   [295.48, 76.05 ]
*#=============================================================================
*# KD-2B-5 - URBAN
*#=============================================================================
```

```
CONTINUOUS STANDHYD      ID=[2], NHYD=["KD-2B-5"], DT=[1](min), AREA=[4.74](ha),
                    XIMP=[0.50], TIMP=[0.50], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[177](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*#==============================================================================
*# ON-SITE STORAGE
*# RATING CURVE SOURCE - plan2.pdf IN 13616-Richardson Side_Eagleson
*#==============================================================================
ROUTE RESERVOIR     IDout=[4],   NHYD=["KD-2B-5"],  IDin=[2],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                     (cms) - (ha-m)
                                   [   0.0 ,  0.0 ]
                                   [0.1458, 0.01283]
                                   [0.1458, 0.03881]
                                   [   -1  ,  -1  ]  (max twenty pts)
                          IDovf=[5], NHYDovf=["OVF-2B5"]
*#==============================================================================
*# KD-2B-1 - URBAN
*#==============================================================================
CONTINUOUS STANDHYD      ID=[3], NHYD=["KD-2B-1"], DT=[1](min), AREA=[134.85](ha),
                    XIMP=[0.40], TIMP=[0.41], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[948](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*#==============================================================================
*# ADD OUTFLOW, OVERFLOW AND KD-2B-1
*#==============================================================================
ADD HYD             IDsum=[6], NHYD=["KD-2B-1"], IDs to add=[4+5+3]
*#==============================================================================
*# ADD KD-2B-4 AND KD-2B-1
*# CREST GAUGE LOCATION KD-1 - KIZELL DRAIN AT HERTZBERG ROAD
*#==============================================================================
ADD HYD             IDsum=[3], NHYD=["KFP4"], IDs to add=[1+6]
*PRINT HYD           ID=[3],   # OF PCYCLES=[1]
*#==============================================================================
*# ROUTE KD-2B THROUGH KD-2C
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 6705.311
*# MINIMUM SLOPE ASSUMED 0.1%
*#==============================================================================
ROUTE CHANNEL       IDout=[1], NHYD=["KD-2B"], IDin=[3],
                    RDT=[1](min),
                    CHLGTH=[600](m),  CHSLOPE=[0.1](%),
                                      FPSLOPE=[0.1](%),
                    SECNUM=[6705],       NSEG=[4]
                    ( SEGROUGH, SEGDIST (m))=[0.05,162.749 -0.04,168.035 -0.05,168.35
                    0.05,373.63] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 75.65 ]
                                                   [ 24.7,  75.1 ]
                                                   [61.29, 73.42 ]
                                                   [90.72,  72.7 ]
                                                   [119.02, 72.95 ]
                                                   [131.71,  72.8 ]
                                                   [160.55,  72.9 ]
```

```
                                                    [162.46, 72.46 ]
                                                    [162.749, 72.403 ]
                                                    [168.035, 72.369 ]
                                                    [168.35, 72.39 ]
                                                    [168.6, 72.43 ]
                                                    [171.08,  72.8 ]
                                                    [203.12,  72.8 ]
                                                    [231.66,  73.3 ]
                                                    [255.58,  73.2 ]
                                                    [300.16,  73.6 ]
                                                    [326.75,  74.3 ]
                                                    [347.02,  75.2 ]
                                                    [373.63, 76.05 ]
*#==============================================================================
*# KD-3A - URBAN WEST OF HERZBERG ROAD
*#==============================================================================
CONTINUOUS STANDHYD      ID=[3], NHYD=["KD-3A"], DT=[1](min), AREA=[206.16](ha),
                    XIMP=[0.30], TIMP=[0.34], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[1172](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*#==============================================================================
*# KTC-2B - URBAN - UPSTREAM LIMIT TO HWY 417, NORTH OF CAMPEAU DRIVE
*# LAND USES WITHIN AREA: OFFICE/RECREATIONAL
*#==============================================================================
CONTINUOUS STANDHYD      ID=[2], NHYD=["KTC-2B"], DT=[1](min), AREA=[20.79](ha),
                    XIMP=[0.23], TIMP=[0.24], DWF=[0.0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[372](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*#==============================================================================
*# 5 YEAR CONTROL - 1155L/s
*# MAJOR FLOWS TO KD-3A
*# MINOR FLOWS TO SWF-1205
*#==============================================================================
COMPUTE DUALHYD      IDin=[2], CINLET=[1.155](cms), NINLET=[1],
                     MAJID=[7], MajNHYD=["KTC2BMAJ"],
                     MINID=[10], MinNHYD=["KTC2BMIN"],
                     TMJSTO=[0](cu-m)
*#==============================================================================
*# ADD KTC-2B MAJOR AND KD-3A - TRIBUTARY 1 AT HERTZBERG ROAD
*#==============================================================================
ADD HYD              IDsum=[5], NHYD=["KD-3A"], IDs to add=[7+3]
*#==============================================================================
*# ROUTE KD-3A THROUGH KD-3B
*# CHANNEL CROSS-SECTION DATA TAKEN FROM LiDAR
*#==============================================================================
ROUTE CHANNEL        IDout=[4], NHYD=["KD-3A"], IDin=[5],
                     RDT=[1](min),
                     CHLGTH=[253](m),  CHSLOPE=[0.13](%),
                                         FPSLOPE=[0.13](%),
                     SECNUM=[1],        NSEG=[3]
                     ( SEGROUGH, SEGDIST (m))=[0.05,27.94 -0.035,38.92 0.08,64.87] NSEG
                     times
                     ( DISTANCE (m), ELEVATION (m))=[    0, 78.90]
```

```
                                                    [12.97, 78.12]
                                                    [15.97, 77.81]
                                                    [19.96, 77.51]
                                                    [23.95, 77.36]
                                                    [24.95, 77.34]
                                                    [25.95, 77.34]
                                                    [26.94, 77.36]
                                                    [27.94, 77.30]
                                                    [30.94, 76.79]
                                                    [31.93, 76.73]
                                                    [32.93, 76.73]
                                                    [33.93, 76.70]
                                                    [34.94, 76.76]
                                                    [38.92, 77.29]
                                                    [42.91, 77.34]
                                                    [58.88, 78.52]
                                                    [64.87, 78.97]
ROUTE CHANNEL       IDout=[5], NHYD=["KD-3A"], IDin=[4],
                    RDT=[1](min),
                    CHLGTH=[344](m),  CHSLOPE=[0.56](%),
                                        FPSLOPE=[0.56](%),
                    SECNUM=[2],       NSEG=[3]
                    ( SEGROUGH, SEGDIST (m))=[0.05,20.89 -0.035,76.49 0.08,88.52] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 77.38]
                                                    [13.92, 77.02]
                                                    [20.89, 76.69]
                                                    [26.85, 76.09]
                                                    [29.84, 76.03]
                                                    [44.76, 76.15]
                                                    [56.69, 75.91]
                                                    [59.68, 76.10]
                                                    [61.67, 76.05]
                                                    [71.61, 76.31]
                                                    [76.49, 76.69]
                                                    [82.55, 77.16]
                                                    [88.52, 77.40]
ROUTE CHANNEL       IDout=[4], NHYD=["KD-3A"], IDin=[5],
                    RDT=[1](min),
                    CHLGTH=[324](m),  CHSLOPE=[0.72](%),
                                        FPSLOPE=[0.72](%),
                    SECNUM=[1],       NSEG=[3]
                    ( SEGROUGH, SEGDIST (m))=[0.05,97.588 -0.035,109.575 0.05,143.405] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 75.2777 ]
                                                    [39.664, 74.805 ]
                                                    [74.612, 74.8767 ]
                                                    [79.607, 74.8037 ]
                                                    [ 86.6, 74.7914 ]
                                                    [90.595, 74.6388 ]
                                                    [95.59, 74.6899 ]
                                                    [97.588, 74.8802 ]
                                                    [101.584, 74.7293 ]
                                                    [103.582, 74.4039 ]
                                                    [106.578, 74.4818 ]
                                                    [109.575, 74.9123 ]
                                                    [111.573, 74.8318 ]
                                                    [116.568, 74.8294 ]
                                                    [120.563, 74.7426 ]
                                                    [121.562, 74.7398 ]
                                                    [124.559, 74.8464 ]
                                                    [130.553, 74.8391 ]
                                                    [132.54, 74.777 ]
                                                    [143.405, 75.255 ]
*#==========================================================================
*# KD-2C - RURAL
*#==========================================================================
```

```
CONTINUOUS NASHYD         ID=[2], NHYD=["KD-2C"], DT=[1]min, AREA=[59.10](ha),
                     DWF=[0](cms),  CN=[83], IA=[7](mm),
                     N=[2.0], TP=[0.60]hrs,
                     Continuous simulation parameters:
                     IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                     InterEventTime=[12](hrs),
                     Baseflow simulation parameters:
                     BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                     VHydCond=[.001](mm/hr), END=-1
*#=============================================================================
*# ADD KD-2B AND KD-2C
*#=============================================================================
ADD HYD              IDsum=[5], NHYD=["KFP5"], IDs to add=[1+2]
*PRINT HYD            ID=[5],   # OF PCYCLES=[1]
*#=============================================================================
*# ADD KD-2C AND KD-3A
*#=============================================================================
ADD HYD              IDsum=[3], NHYD=["KD-2C"], IDs to add=[5+4]
*#=============================================================================
*# ROUTE KD-1+KD-2 THROUGH KD-3B-1
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 6104.633
*# MINIMUM SLOPE ASSUMED 0.1%
*#=============================================================================
ROUTE CHANNEL        IDout=[1], NHYD=["KD-2C"], IDin=[3],
                     RDT=[1](min),
                     CHLGTH=[952](m),  CHSLOPE=[0.1](%),
                                         FPSLOPE=[0.1](%),
                     SECNUM=[6104],       NSEG=[3]
                     ( SEGROUGH, SEGDIST (m))=[0.08,175.904 -0.04,179.184 0.08,185.91]
                     NSEG times
                     ( DISTANCE (m), ELEVATION (m))=[    0, 77.06 ]
                                                    [ 9.16,  77.1 ]
                                                    [23.37,  76.7 ]
                                                    [56.09,  76.5 ]
                                                    [67.63,  76.2 ]
                                                    [80.81,  75.6 ]
                                                    [83.87,  75.6 ]
                                                    [98.45,  74.5 ]
                                                    [103.07,  74.3 ]
                                                    [115.78,  74.3 ]
                                                    [134.4,  73.6 ]
                                                    [149.63,  73.7 ]
                                                    [163.83,  73.6 ]
                                                    [173.16,  72.7 ]
                                                    [175.83,    72 ]
                                                    [175.904, 71.992 ]
                                                    [179.184, 71.968 ]
                                                    [179.27,    72 ]
                                                    [183.86,  73.7 ]
                                                    [185.91,    74 ]
*#=============================================================================
*# KD-3B - RURAL EAST OF HERZBERG ROAD
*#=============================================================================
CONTINUOUS NASHYD         ID=[4], NHYD=["KD-23B"], DT=[1]min, AREA=[112.07](ha),
                     DWF=[0](cms),  CN=[66], IA=[7](mm),
                     N=[2.0], TP=[1.20]hrs,
                     Continuous simulation parameters:
                     IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                     InterEventTime=[12](hrs),
                     Baseflow simulation parameters:
                     BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                     VHydCond=[.001](mm/hr), END=-1
*#=============================================================================
*# ADD KD-2C,KD-3A AND KD-3B - KIZELL DRAIN AT CONFLUENCE WITH WATTS CREEK
*#=============================================================================
ADD HYD              IDsum=[3], NHYD=["KFP6"], IDs to add=[1+4]
*PRINT HYD            ID=[3],   # OF PCYCLES=[1]
```

```
*#=============================================================================
*#                          WATTS CREEK SUBWATERSHED
*#=============================================================================
*#=============================================================================
*# KANATA TOWN CENTRE-1 - URBAN - UPSTREAM LIMIT TO HWY 417
*# Imperviousness decreased under existing conditions
*#=============================================================================
CONTINUOUS STANDHYD      ID=[2], NHYD=["KTC-1"], DT=[1](min), AREA=[60.23](ha),
                    XIMP=[0.34], TIMP=[0.34], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[633](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*#=============================================================================
*# 5 YEAR CONTROL - 2963L/s
*# MAJOR FLOWS TO WC-1
*# MINOR FLOWS TO SWF-1206
*#=============================================================================
COMPUTE DUALHYD     IDin=[2], CINLET=[2.963](cms), NINLET=[1],
                    MAJID=[7], MajNHYD=["KTC1MAJ"],
                    MINID=[8], MinNHYD=["KTC1MIN"],
                    TMJSTO=[0](cu-m)
*#=============================================================================
*# SWMF-1206
*# STORAGE WAS ESTIMATED FROM AVAILABLE DRAWING
*# DISCHARGE WAS TAKEN FROM R-1564
*#=============================================================================
ROUTE RESERVOIR     IDout=[4],   NHYD=["KTC-1"],  IDin=[8],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                     (cms) - (ha-m)
                                [   0.0 ,  0.0 ]
                                [ 0.955 , 0.2854]
                                [ 1.436 , 3.9725]
                                [   -1  ,  -1  ]  (max twenty pts)
                          IDovf=[5], NHYDovf=["OVF-KTC1"]
*#=============================================================================
*# ADD OUTFLOW, OVERFLOW AND KTC-1 MAJOR
*#=============================================================================
ADD HYD             IDsum=[2], NHYD=["KTC-1"], IDs to add=[4+5+7]
*#=============================================================================
*# WC-1 - RURAL/URBAN EXISTING AREA
*#=============================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["WC-1"], DT=[1](min), AREA=[403.47](ha),
                    XIMP=[0.30], TIMP=[0.34], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[1640](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*#=============================================================================
*# ADD WC-1 AND KTC-1 - WATTS CREEK AT HIGHWAY 417
*#=============================================================================
ADD HYD             IDsum=[5], NHYD=["WC-1"], IDs to add=[1+2]
*#=============================================================================
*# KTC-2A - URBAN - UPSTREAM LIMIT TO HWY 417, SOUTH OF CAMPEAU DRIVE
*# LAND USES WITHIN AREA: TOWN CENTRE/URBAN RES
*#=============================================================================
```

```
CONTINUOUS STANDHYD      ID=[1], NHYD=["KTC-2A"], DT=[1](min), AREA=[34.34](ha),
                    XIMP=[0.36], TIMP=[0.42], DWF=[0.0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[478](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*#=============================================================================
*# ADD KTC-2A AND KTC-2B MINOR
*#=============================================================================
ADD HYD             IDsum=[4], NHYD=["KTC-2"], IDs to add=[1+10]
*#=============================================================================
*# ROUTE KTC-2 THROUGH KANATA TOWN CENTRE PHASE I POND
*# STAGE-STORAGE-DISCHARGE CURVE OBTAINED FROM:
*# KANATA TOWN CENTRE PHASE i - STORMWATER MANAGEMENT REPORT
*# J.L. RICHARDS & ASSOCIATES LTD. 1996
*# SWF-1205
*# STORAGE WAS ESTIMATED WITH AVAILABLE DRAWING
*# DISCHARGE WAS TAKEN FROM R-1563
*#=============================================================================
ROUTE RESERVOIR     IDout=[1],   NHYD=["KTC-2"],  IDin=[4],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                     (cms) - (ha-m)
                                   [   0.0 ,  0.0 ]
                                   [  0.79, 0.6939]
                                   [  4.70, 1.4350]
                                   [   -1  ,  -1  ]  (max twenty pts)
                          IDovf=[2], NHYDovf=["OVF-KTC2"]
*#=============================================================================
*# ADD OUTFLOW AND OVERFLOW
*#=============================================================================
ADD HYD             IDsum=[4], NHYD=["KTC-2"], IDs to add=[1+2]
*#=============================================================================
*# ADD WC-1 AND KTC-2
*#=============================================================================
ADD HYD             IDsum=[2], NHYD=["KTC-2"], IDs to add=[5+4]
*%----------------|-------------------------------------------------------|
*#=============================================================================
*# WC-3 - URBAN/RURAL
*#=============================================================================
CONTINUOUS NASHYD        ID=[1], NHYD=["WC-3"], DT=[1]min, AREA=[204.06](ha),
                    DWF=[0](cms),  CN=[66], IA=[7](mm),
                    N=[2.0], TP=[1.28]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*#=============================================================================
*# ADD WC-1+KTC AND WC-3
*#=============================================================================
ADD HYD             IDsum=[4], NHYD=["WC-3"], IDs to add=[2+1]
*#=============================================================================
*# ROUTE WC-1+KTC+WC-3 THROUGH WC-4A
*# CHANNEL CROSS-SECTION DATA TAKEN FROM LIDAR
*#=============================================================================
ROUTE CHANNEL       IDout=[1], NHYD=["WC-3"], IDin=[4],
                    RDT=[1](min),
                    CHLGTH=[744](m),  CHSLOPE=[1.29](%),
                                        FPSLOPE=[1.29](%),
                    SECNUM=[1],       NSEG=[3]
```

```
                    ( SEGROUGH, SEGDIST (m))=[0.05,25.86 -0.035,40.77 0.05,72.60] NSEG
                    times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 90.87]
                                                   [ 1.99, 90.66]
                                                   [ 7.96, 90.10]
                                                   [16.91, 85.80]
                                                   [18.90, 85.49]
                                                   [21.88, 85.42]
                                                   [25.86, 85.56]
                                                   [26.85, 25.50]
                                                   [29.83, 84.06]
                                                   [31.82, 84.06]
                                                   [34.81, 85.10]
                                                   [40.77, 85.59]
                                                   [48.73, 85.85]
                                                   [52.71, 86.80]
                                                   [55.59, 87.80]
                                                   [60.66, 90.40]
                                                   [64.64, 90.77]
                                                   [72.60, 90.97]
*#=============================================================================
*# CHANNEL CROSS-SECTION DATA TAKEN FROM LIDAR
*#=============================================================================
ROUTE CHANNEL       IDout=[2], NHYD=["WC-3"], IDin=[1],
                    RDT=[1](min),
                    CHLGTH=[2295](m),  CHSLOPE=[0.45](%),
                                        FPSLOPE=[0.45](%),
                    SECNUM=[2],       NSEG=[3]
                    ( SEGROUGH, SEGDIST (m))=[0.05,12.98 -0.035,20.97 0.05,51.94] NSEG
                    times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 85.79]
                                                   [ 1.00, 85.75]
                                                   [11.99, 83.71]
                                                   [12.98, 83.36]
                                                   [14.98, 82.49]
                                                   [15.98, 82.44]
                                                   [16.98, 82.45]
                                                   [20.97, 83.51]
                                                   [22.97, 83.46]
                                                   [23.97, 83.51]
                                                   [26.97, 83.55]
                                                   [27.97, 83.55]
                                                   [31.96, 83.51]
                                                   [32.96, 83.45]
                                                   [33.96, 83.45]
                                                   [34.96, 83.50]
                                                   [51.94, 85.81]
*#=============================================================================
*# CHANNEL CROSS-SECTION DATA TAKEN FROM LIDAR
*#=============================================================================
ROUTE CHANNEL       IDout=[1], NHYD=["WC-3"], IDin=[2],
                    RDT=[1](min),
                    CHLGTH=[487](m),  CHSLOPE=[0.23](%),
                                        FPSLOPE=[0.23](%),
                    SECNUM=[3],       NSEG=[3]
                    ( SEGROUGH, SEGDIST (m))=[0.05,6.97 -0.035,25.87 0.05,29.85] NSEG
                    times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 75.60]
                                                   [    1, 75.54]
                                                   [ 1.99, 75.42]
                                                   [ 6.97, 73.09]
                                                   [11.94, 72.70]
                                                   [14.93, 72.66]
                                                   [17.91, 72.27]
                                                   [23.88, 72.25]
                                                   [25.87, 73.03]
                                                   [28.86, 74.06]
```

```
                                                        [29.85, 74.23]
*#==============================================================================
*# WC-4A - RURAL - HIGHWAY 417 TO CNR
*#==============================================================================
CONTINUOUS NASHYD        ID=[2] NHYD=["WC-4A"], DT=[1]min, AREA=[126.29](ha),
                    DWF=[0](cms),  CN=[82], IA=[7](mm),
                    N=[2.0], TP=[2.30]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*#==============================================================================
*# ADD WC-1+KTC+WC-3 AND WC-4A
*# CREST GAUGE LOCATION WC-1 - WATTS CREEK AT CONFLUENCE WITH KIZELL DRAIN
*#==============================================================================
ADD HYD             IDsum=[6], NHYD=["WFP1"], IDs to add=[1+2]
*PRINT HYD           ID=[6],   # OF PCYCLES=[1]
*#==============================================================================
*# WC-4B - RURAL - HIGHWAY 417 TO CNR
*#==============================================================================
CONTINUOUS NASHYD        ID=[4] NHYD=["WC-4B"], DT=[1]min, AREA=[145.27](ha),
                    DWF=[0](cms),  CN=[73], IA=[7](mm),
                    N=[2.0], TP=[1.22]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*#==============================================================================
*# ADD WC-4A AND KIZELL
*#==============================================================================
ADD HYD             IDsum=[1], NHYD=["WFP2"], IDs to add=[6+3]
*PRINT HYD           ID=[1],   # OF PCYCLES=[1]
*#==============================================================================
*# ADD WC-4A AND WC-4B
*#==============================================================================
ADD HYD             IDsum=[5], NHYD=["WFP3"], IDs to add=[1+4]
*PRINT HYD           ID=[5],   # OF PCYCLES=[1]
*#==============================================================================
*# ROUTE KIZELL AND WC-1+KTC+WC-3+WC-4 THROUGH WC-5A
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 4677.806
*#==============================================================================
ROUTE CHANNEL       IDout=[2], NHYD=["WC-4"], IDin=[5],
                    RDT=[1](min),
                    CHLGTH=[636](m),  CHSLOPE=[0.16](%),
                                        FPSLOPE=[0.16](%),
                    SECNUM=[4677],       NSEG=[3]
                    ( SEGROUGH, SEGDIST (m))=[0.08,95.801 -0.04,102.955 0.08,167.28]
                    NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0,  75.4 ]
                                                  [ 11.4,  74.3 ]
                                                  [ 31.7,  73.6 ]
                                                  [51.08,  72.8 ]
                                                  [60.69,  72.6 ]
                                                  [ 74.1,  71.6 ]
                                                  [77.61,  70.8 ]
                                                  [84.14,    71 ]
                                                  [93.83,    71 ]
                                                  [95.801, 70.73 ]
                                                  [97.18,  70.5 ]
                                                  [  101,  70.5 ]
                                                  [102.955, 70.989 ]
                                                  [111.37,  74.5 ]
                                                  [121.02, 76.45 ]
```

```
                                                    [128.96,  77.6 ]
                                                    [139.85,  78.3 ]
                                                    [151.67, 80.09 ]
                                                    [158.82, 80.63 ]
                                                    [167.28, 81.57 ]
*#=============================================================================
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 4446.172
*#=============================================================================
ROUTE CHANNEL       IDout=[1], NHYD=["WC-4"], IDin=[2],
                    RDT=[1](min),
                    CHLGTH=[443](m),  CHSLOPE=[0.64](%),
                                        FPSLOPE=[0.64](%),
                    SECNUM=[4446],       NSEG=[4]
                    ( SEGROUGH, SEGDIST (m))=[0.08,101.82 0.05,155.499 -0.04,160.804
                    0.08,360.72] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 75.11 ]
                                                    [15.28,  74.3 ]
                                                    [39.39,  73.6 ]
                                                    [55.02,  73.7 ]
                                                    [70.01,  73.1 ]
                                                    [101.82, 72.72 ]
                                                    [123.37, 72.37 ]
                                                    [137.03,  71.7 ]
                                                    [152.53,  68.9 ]
                                                    [155.499, 68.552 ]
                                                    [160.804, 68.559 ]
                                                    [163.78, 68.89 ]
                                                    [172.88,    69 ]
                                                    [180.76, 72.03 ]
                                                    [191.21,  72.8 ]
                                                    [208.93, 72.49 ]
                                                    [239.54,  72.4 ]
                                                    [260.28,  72.6 ]
                                                    [291.51,  72.6 ]
                                                    [360.72, 73.06 ]
*#=============================================================================
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 3897.472
*#=============================================================================
ROUTE CHANNEL       IDout=[2], NHYD=["WC-4"], IDin=[1],
                    RDT=[1](min),
                    CHLGTH=[468](m),  CHSLOPE=[0.44](%),
                                        FPSLOPE=[0.44](%),
                    SECNUM=[3897],       NSEG=[4]
                    ( SEGROUGH, SEGDIST (m))=[0.08,161.362 -0.04,164.388 -0.08,164.68
                    0.05,242.03] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 72.01 ]
                                                    [14.79,  71.9 ]
                                                    [26.32,  71.5 ]
                                                    [45.81,  69.5 ]
                                                    [ 52.8,  68.5 ]
                                                    [67.29,  68.1 ]
                                                    [85.91,  68.1 ]
                                                    [94.25,  67.9 ]
                                                    [116.16, 67.78 ]
                                                    [142.44,  67.4 ]
                                                    [159.77,  66.1 ]
                                                    [161.362, 65.677 ]
                                                    [164.388, 65.577 ]
                                                    [164.68, 65.61 ]
                                                    [166.02,  66.1 ]
                                                    [167.47,  66.5 ]
                                                    [201.22,  66.8 ]
                                                    [208.26,  66.7 ]
                                                    [216.93, 67.19 ]
                                                    [242.03,  67.3 ]
*#=============================================================================
*# WC-5A - RURAL - CNR TO CARLING AVE
```

```
*#==============================================================================
CONTINUOUS NASHYD        ID=[1] NHYD=["WC-5A"], DT=[1]min, AREA=[59.54](ha),
                    DWF=[0](cms),  CN=[73], IA=[7](mm),
                    N=[2.0], TP=[0.79]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*#==============================================================================
*# ADD WC-5A AND WC-5A UPSTREAM
*# CALIBRATION LOCATION - WATTS CREEK AT CARLING AVENUE
*#==============================================================================
ADD HYD             IDsum=[3], NHYD=["WFP4"], IDs to add=[1+2]
*PRINT HYD           ID=[3],   # OF PCYCLES=[1]
*#==============================================================================
*# ROUTE WC-5B UPSTREAM THROUGH WC-5B
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 3469.421
*# MINIMUM SLOPE ASSUMED 0.1%
*#==============================================================================
ROUTE CHANNEL       IDout=[2], NHYD=["WC-5B"], IDin=[3],
                    RDT=[1](min),
                    CHLGTH=[485](m),  CHSLOPE=[0.1](%),
                                        FPSLOPE=[0.1](%),
                    SECNUM=[3469],       NSEG=[4]
                    ( SEGROUGH, SEGDIST (m))=[0.08,127.46 0.06,131.6 -0.03,141.59 ↵
                    0.08,308.37] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 68.08 ]
                                                  [16.71,  67.1 ]
                                                  [48.15,  66.8 ]
                                                  [75.65,  66.3 ]
                                                  [107.54,  66.2 ]
                                                  [117.33,  66.3 ]
                                                  [127.46, 65.54 ]
                                                  [129.21,  65.3 ]
                                                  [131.6,  64.9 ]
                                                  [136.836, 64.972 ]
                                                  [139.19,  65.3 ]
                                                  [141.59, 65.65 ]
                                                  [161.72,  65.6 ]
                                                  [171.42,  66.1 ]
                                                  [187.05,  66.3 ]
                                                  [224.24,  66.3 ]
                                                  [246.7,  66.1 ]
                                                  [286.52, 66.07 ]
                                                  [304.07,  66.3 ]
                                                  [308.37,  66.7 ]
*#==============================================================================
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 2981.379
*#==============================================================================
ROUTE CHANNEL       IDout=[1], NHYD=["WC-5B"], IDin=[2],
                    RDT=[1](min),
                    CHLGTH=[307](m),  CHSLOPE=[0.40](%),
                                        FPSLOPE=[0.40](%),
                    SECNUM=[2981],       NSEG=[4]
                    ( SEGROUGH, SEGDIST (m))=[0.08,9.006 -0.03,14.347 -0.06,14.85 ↵
                    0.08,30.25] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 64.35 ]
                                                  [ 2.07,  64.3 ]
                                                  [ 4.58,  64.2 ]
                                                  [  5.7,  64.1 ]
                                                  [ 6.83,  63.8 ]
                                                  [ 7.91, 63.37 ]
                                                  [9.006, 63.169 ]
                                                  [ 9.64,  62.8 ]
                                                  [13.64,  62.8 ]
```

```
                                                    [14.24,  63.1 ]
                                                    [14.347, 63.315 ]
                                                    [14.85, 63.35 ]
                                                    [15.35,  63.4 ]
                                                    [16.49, 63.69 ]
                                                    [18.19, 64.21 ]
                                                    [21.41,  64.2 ]
                                                    [25.06, 64.05 ]
                                                    [27.14, 64.06 ]
                                                    [28.41,  64.2 ]
                                                    [30.25, 64.28 ]
*#=============================================================================
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 1585.543
*#=============================================================================
ROUTE CHANNEL       IDout=[2], NHYD=["WC-5B"], IDin=[1],
                    RDT=[1](min),
                    CHLGTH=[2876](m),  CHSLOPE=[0.16](%),
                                        FPSLOPE=[0.16](%),
                    SECNUM=[1585],       NSEG=[4]
                    ( SEGROUGH, SEGDIST (m))=[0.08,56.84 0.05,124.41 -0.035,128.78
                    0.08,255.15] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 64.07 ]
                                                    [21.74,  63.8 ]
                                                    [40.53,  63.5 ]
                                                    [56.84, 61.82 ]
                                                    [74.07,  61.6 ]
                                                    [98.29,  61.7 ]
                                                    [104.39, 61.43 ]
                                                    [117.32,  61.8 ]
                                                    [124.32,  60.8 ]
                                                    [124.41, 60.79 ]
                                                    [124.519, 60.783 ]
                                                    [127.785, 60.75 ]
                                                    [  128, 60.83 ]
                                                    [128.78, 61.17 ]
                                                    [130.97,  61.8 ]
                                                    [149.66, 61.32 ]
                                                    [170.74,  61.4 ]
                                                    [191.12,  63.6 ]
                                                    [219.28, 64.08 ]
                                                    [255.15,  64.1 ]
*#=============================================================================
*# WC-5B - RURAL - CARLING AVE TO OUTLET
*#=============================================================================
CONTINUOUS NASHYD       ID=[4] NHYD=["WC-5B"], DT=[1]min, AREA=[379.59](ha),
                    DWF=[0](cms),  CN=[73], IA=[7](mm),
                    N=[2.0], TP=[3.28]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*#=============================================================================
*# ADD WC-5B AND WC-5B UPSTREAM
*# WATTS CREEK AT OUTLET TO OTTAWA RIVER
*#=============================================================================
ADD HYD             IDsum=[1], NHYD=["WFP5"], IDs to add=[4+2]
*PRINT HYD           ID=[1],   # OF PCYCLES=[1]
*%-----------------|-------------------------------------------------------|
SAVE HYD            ID=[1],  # OF PCYCLES=[-1],  ICASEsh=[-1]
                    HYD_FILENAME=["WFP5"]
                    HYD_COMMENT=["WATTS CREEK AT OUTLET TO OTTAWA RIVER"]
*%-----------------|-------------------------------------------------------|
*#=============================================================================
*                            DESIGN STORMS
*#=============================================================================
```

```
START                TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[0005]
*                    "5y12hr.stm"
START                TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[0010]
*                    "10y12hr.stm"
START                TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[0025]
*                    "25y12hr.stm"
START                TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[0050]
*                    "50y12hr.stm"
START                TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[0100]
*                    "100y12hr.stm"
FINISH
*#=============================================================================
*                              CONTINUOUS SIMULATIONS
*#=============================================================================
START                TZERO=[1968.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1968]
START                TZERO=[1969.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1969]
START                TZERO=[1970.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1970]
START                TZERO=[1971.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1971]
START                TZERO=[1972.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1972]
START                TZERO=[1973.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1973]
START                TZERO=[1974.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1974]
START                TZERO=[1975.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1975]
START                TZERO=[1976.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1976]
START                TZERO=[1977.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1977]
START                TZERO=[1978.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1978]
START                TZERO=[1979.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1979]
START                TZERO=[1980.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1980]
START                TZERO=[1981.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1981]
START                TZERO=[1982.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1982]
START                TZERO=[1983.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1983]
START                TZERO=[1984.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1984]
START                TZERO=[1985.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1985]
START                TZERO=[1986.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1986]
START                TZERO=[1987.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1987]
START                TZERO=[1988.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1988]
START                TZERO=[1989.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1989]
START                TZERO=[1990.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1990]
START                TZERO=[1991.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1991]
START                TZERO=[1992.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1992]
START                TZERO=[1993.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1993]
START                TZERO=[1994.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1994]
START                TZERO=[1995.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1995]
START                TZERO=[1996.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1996]
START                TZERO=[1997.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1997]
START                TZERO=[1998.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1998]
START                TZERO=[1999.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1999]
START                TZERO=[2000.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[2000]
START                TZERO=[2002.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[2002]
START                TZERO=[2003.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[2003]
START                TZERO=[2004.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[2004]
START                TZERO=[2006.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[2006]
START                TZERO=[2007.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[2007]
FINISH
```

JFSA
WATER RESOURCES AND ENVIRONMENTAL CONSULTANTS

Project Ref #:1581
Client: David Schaeffer Engineering

Ottawa. ON
Paris. ON
Gatineau. QB
Montréal. QB
Québec. QB

Attachment C

SWMHYMO Model:

Redeveloped Kanata Golf and Country Club with SWM

```
2     Metric units
*#*************************************************************************
*#  Project Name: [Shirley's Brook and Watt's Creek Phase 2 SWM Study]    Project Number: [60264539]
*#  Future Conditions Model for the Watts Creek/Kizell Drain Flood Plain Mapping Study
*#  Date        : 2014-12-31
*#  Modeller    : [Olivia Chung]  John Price MVCA
*#  Company     : AECOM Canada
*#  License #   :  2988504
*#*************************************************************************
*# September 2019, model parameters further updated by JFSAinc
*# with use of rainfall and flow monitoring data collected in 2019
*#
*# - all N values in NASHYDS changed from N=1.1 to N=2
*# - all MNI values in existing conditions STANDHYDs changed from 0.025 to 0.013
*# - all SLOPI values in STANDHYDs changed from 0.02 to 1.0
*# - change STANDHYD infiltration method from SCS to Horton with
*# - Horton: Fo=[125](mm/hr), Fc=[25](mm/hr), DCAY=[2.0](/hr), F=[0](mm)
*# - set XIMP to a fix value of 0.25 for all existing residential catchments
*# - use COMPUTE API         APII=[40], APIK=[0.8]/day,
*# - continuous NASHYDs, use BaseFlowOption=[1] , InitGWResVol=[12], GWResK=[0.85], VHydCond=[.001]
*# - all golf course NASHYDs, use CN=50
*# - XIMP=[0.250], for all existing not draining through the grass areas of the golf course
*#
*# - Areas draining across the golf course:
*# - those specific STANDHYD commands converted to NASHYDs so that the infiltrated water could come back into the system.  This allowed a much better volume comparison through the Beaver Pond.
*# - The CN and IA values for those NASHYDs were weighted averages of CN=90 for TIMP and CN=50 for grass areas, and the IA was based on weighted average of IA=1.5 for TIMP and IA=5.0 for grass areas.
*# - The Tp value was simply calculated by using the (LGI/0.3 * 2/3) / 3600, where the value of 0.3 was my assumed flow velocity.  Note, there are 4 catchments to which this was done, for a total of 48.3 ha representing just over 11% of the total drainage area to the Beaver Pond.
*# - removed  the two IBI Route Reservoirs that were previously inserted to account for some hidden system storage.
*#
*#=========================================================================
*# WATTS CREEK SUBWATERSHED
*# MODEL CONVERTED FROM QUALHYMO MODEL (DILLON, 2009)
*# DECEMBER 2014
*#=========================================================================
*# Model updated by JFSA (June 2019)to allow for continuous simulations to complete
*# preliminary erosion assessment.
*# Model reverted back to existing conditions using parameters as documented in
*# MVCA's Watts Creek Final Report November 2017
*# Model updated to assess the impacts of the redevelopment of the Kanata Golf &
*# Country Club directly.
*# Model updated to reflect the increase in impervious area due to the redevelopment
*# of Kanata Golf & Country Club (KGCC) - All developments assume an imperviousness
*# of 60% with a directly connected imperviousness of 50%
*# All DA's (Detention Areas) have been removed from the model within the Kanata
*# Golf & Country Club
*# model updated to include SWM ponds for KGCC lands
*#=========================================================================
*#                                KIZELL DRAIN
*#=========================================================================
* Area Tributary to Beaver Pond and Kizell Cell
*#=========================================================================
*#=========================================================================
*# Derived from Scenario 20 of Phase 1 SWM Study
*# AECOM MODEL + GOLF COURSE DETENTION PONDS
*# AMC II Condition
*# RAINFALL - BEAVER POND RAIN GAUGE (POINT RAINFALL)
```

```
*# DESIGN EVENTS
*#==============================================================================
*                              DESIGN STORMS
*#==============================================================================
*%-----------------|------------------------------------------------------------|
START                TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[0002]
*                    "2y12hr.stm"
READ STORM           STORM_FILENAME=["storm.001"]
*%-----------------|------------------------------------------------------------|
*#==============================================================================
*                              CONTINUOUS SIMULATIONS
*#==============================================================================
*START                TZERO=[1967.0719],  METOUT=[2],  NSTORM=[0],  NRUN=[1967]
*%                    [""] <--storm filename, one per line for NSTORM time
*%-----------------|------------------------------------------------------------|
*# Ottawa International Airport - 19 July 1967 to 01 Nov 2007
*READ AES DATA        AES_FILENAME=["YOW_1967_2007.123"],
*                     IELEM=[123], START_DATE=[0], END_DATE=[-364]
*%-----------------|------------------------------------------------------------|
*%-----------------|------------------------------------------------------------|
COMPUTE API          APII=[40], APIK=[0.8]/day,
*%-----------------|------------------------------------------------------------|
*#==============================================================================
*                           DRAINAGE TO KGCC POND 1
*#==============================================================================
*#==============================================================================
*# AREA 3A-1 (URBAN PORTION of Area North of Campeau Drive)
*#==============================================================================
*# Previous command replaced by a NASHYD to account for the fact that the drainage goes
*# over golf course and we want to recapture the baseflow
CONTINUOUS NASHYD    ID=[1], NHYD=["AREA 3A-1"], DT=[1](min), AREA=[2.7](ha)
                     DWF=[0](cms),  CN/C=[68.8], IA=[3.38](mm), N=[2], TP=[1.32](hrs),
                     Continuous simulation parameters:
                     IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                     InterEventTime=[12](hrs),
                     Baseflow simulation parameters:
                     BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                     VHydCond=[.001](mm/hr), END=-1
*%-----------------|------------------------------------------------------------|
*#==============================================================================
*# AREA 3B (GOLF PORTION of Area North of Campeau Drive) - Developed
*#==============================================================================
CONTINUOUS STANDHYD      ID=[2], NHYD=["AREA 3B"], DT=[1](min), AREA=[6.3](ha),
                     XIMP=[0.50], TIMP=[0.60], DWF=[0](cms),
                     LOSS=[1]:    Horton: Fo=[76.20](mm/hr), Fc=[13.2](mm/hr),
                     DCAY=[4.14](/hr), F=[0](mm),
                     Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                          LGP=[40](m), MNP=[0.25], SCP=[0](min),
                     Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.2](%),
                                          LGI=[205](m), MNI=[0.025], SCI=[0](min),
                     Continuous simulation parameters:
                     IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                     InterEventTime=[12](hrs), END=-1
*%-----------------|------------------------------------------------------------|
*#==============================================================================
*# AREA 12 (GOLF PORTION OF Area East of Knudson Drive) - Developed
*#==============================================================================
CONTINUOUS STANDHYD      ID=[3], NHYD=["AREA 12"], DT=[1](min), AREA=[2.27](ha),
                     XIMP=[0.50], TIMP=[0.60], DWF=[0](cms),
                     LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                     DCAY=[2.0](/hr), F=[0](mm),
                     Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                          LGP=[40](m), MNP=[0.25], SCP=[0](min),
                     Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.2](%),
                                          LGI=[123](m), MNI=[0.025], SCI=[0](min),
                     Continuous simulation parameters:
                     IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
```

```
                    InterEventTime=[12](hrs), END=-1
*%----------------|-------------------------------------------------------------|
*#=============================================================================
*# AREA 2A (URBAN PORTION OF Area North of Campeau Drive)
*#=============================================================================
*# Previous command replaced by a NASHYD to account for the fact that the drainage goes
*# over golf course and we want to recapture the baseflow
CONTINUOUS NASHYD      ID=[4], NHYD=["AREA 2A"], DT=[1](min), AREA=[29.3](ha),
                    DWF=[0](cms),  CN=[68], IA=[3.4](mm),
                    N=[2.0], TP=[0.27]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*%----------------|-------------------------------------------------------------|
*#=============================================================================
*# AREA 2B-1 (GOLF PORTION OF Area North of Campeau Drive) TO DA 3 - Developed
*#=============================================================================
CONTINUOUS STANDHYD      ID=[5], NHYD=["AREA 2B-1"], DT=[1](min), AREA=[13.0](ha),
                    XIMP=[0.50], TIMP=[0.60], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[76.20](mm/hr), Fc=[13.2](mm/hr),
                    DCAY=[4.14](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.2](%),
                                         LGI=[294](m), MNI=[0.025], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%----------------|-------------------------------------------------------------|
*#=============================================================================
*# ADD All Catchments that Drain to Pond 1
*#=============================================================================
ADD HYD             IDsum=[7], NHYD=["Pond1-IN"], IDs to add=[1+2+3+4+5]
*%----------------|-------------------------------------------------------------|
*#=============================================================================
*# KGCC Pond 1 (Drainage 53.57 ha)
*#=============================================================================
ROUTE RESERVOIR     IDout=[1],   NHYD=["Pond-1"],  IDin=[7],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                     (cms) - (ha-m)
                                   [   0.0 ,  0.0 ]
                                   [  0.201, 0.643 ]
                                   [  0.295, 1.045 ]
                                   [  1.179, 2.0 ]
                                   [   -1  ,  -1  ]  (max twenty pts)
                          IDovf=[   ], NHYDovf=[   ]
*%----------------|-------------------------------------------------------------|
*#=============================================================================
*                         DRAINAGE TO KGCC POND 2
*#=============================================================================
*#=============================================================================
*# AREA 2C (URBAN PORTION OF Area North of Campeau Drive)
*#=============================================================================
*# Previous command replaced by a NASHYD to account for the fact that the drainage goes
*# over golf course and we want to recapture the baseflow
CONTINUOUS NASHYD      ID=[2], NHYD=["AREA 2C"], DT=[1](min), AREA=[13.8](ha)
                    DWF=[0](cms),  CN/C=[70.8], IA=[3.18](mm),
                    [2], TP=[0.187](hrs),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
```

```
                    VHydCond=[.001](mm/hr), END=-1
*%----------------|-------------------------------------------------------------|
*#=============================================================================
*# AREA 2B-2 (GOLF PORTION OF Area North of Campeau Drive) - Developed
*#=============================================================================
CONTINUOUS STANDHYD      ID=[3], NHYD=["AREA 2B-2"], DT=[1](min), AREA=[15.7](ha),
                    XIMP=[0.50], TIMP=[0.60], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[76.20](mm/hr), Fc=[13.2](mm/hr),
                    DCAY=[4.14](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.2](%),
                                         LGI=[324](m), MNI=[0.025], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*#=============================================================================
*# ADD All Catchments that Drain to Pond 2
*#=============================================================================
ADD HYD             IDsum=[4], NHYD=[Pond2-IN], IDs to add=[2+3]
*%----------------|-------------------------------------------------------------|
*#=============================================================================
*# KGCC Pond 2 (Drainage 29.5 ha)
*#=============================================================================
ROUTE RESERVOIR     IDout=[2],   NHYD=["Pond-2"],  IDin=[4],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                     (cms) - (ha-m)
                                   [   0.0 ,  0.0 ]
                                   [  0.111 , 0.417 ]
                                   [  0.162, 0.665 ]
                                   [  0.649, 1.27]
                                   [   -1  ,  -1  ]  (max twenty pts)
                          IDovf=[   ], NHYDovf=[   ]
*%----------------|-------------------------------------------------------------|
*#=============================================================================
*                         DRAINAGE TO KGCC POND 3 (2.90 ha)
*#=============================================================================
*#=============================================================================
*# AREA 13 (GOLF PORTION OF Area East of Knudson Drive - DA 6A) - Developed
*#=============================================================================
CONTINUOUS STANDHYD      ID=[4], NHYD=["AREA 13"], DT=[1](min), AREA=[2.9](ha),
                    XIMP=[0.50], TIMP=[0.60], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[76.20](mm/hr), Fc=[13.2](mm/hr),
                    DCAY=[4.14](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.2](%),
                                         LGI=[139](m), MNI=[0.025], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%----------------|-------------------------------------------------------------|
*#=============================================================================
*# ADD outflows from Pond 1,2 & 3
*#=============================================================================
ADD HYD             IDsum=[10], NHYD=[000321], IDs to add=[1+2+4]
*#=============================================================================
*                       DRAINAGE TO KGCC POND 4 (47.68 ha)
*#=============================================================================
*#=============================================================================
*# AREA 14 (GOLF PORTION OF Area East of Knudson Drive - DA 11) - Developed
*#=============================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["AREA 14"], DT=[1](min), AREA=[2.38](ha),
                    XIMP=[0.50], TIMP=[0.60], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[76.20](mm/hr), Fc=[13.2](mm/hr),
                    DCAY=[4.14](/hr), F=[0](mm),
```

```
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.2](%),
                                         LGI=[126](m), MNI=[0.025], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# AREA 1B (GOLF PORTION OF Area North of Campeau Drive) - Developed
*#=============================================================================
CONTINUOUS STANDHYD      ID=[2], NHYD=["AREA 1B"], DT=[1](min), AREA=[9.3](ha),
                    XIMP=[0.50], TIMP=[0.60], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[76.20](mm/hr), Fc=[13.2](mm/hr),
                    DCAY=[4.14](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.2](%),
                                         LGI=[249](m), MNI=[0.025], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# AREA 1C (URBAN PORTION of Area North of Campeau Drive)
*#=============================================================================
*# This area is piped through the golf course, so no change in XIMP
CONTINUOUS STANDHYD      ID=[3], NHYD=["AREA 1C"], DT=[1](min), AREA=[17.8](ha),
                    XIMP=[0.225], TIMP=[0.51], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[344](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# AREA 5A (URBAN PORTION OF Area North of Knudson Drive)
*#=============================================================================
*# Previous command replaced by a NASHYD to account for the fact that the drainage goes
*# over golf course and we want to recapture the baseflow
CONTINUOUS NASHYD       ID=[4], NHYD=["AREA 5A"], DT=[1](min), AREA=[2.5](ha)
                    DWF=[0](cms),  CN/C=[45.25], IA=[3.25](mm), N=[2], TP=[0.08](hrs),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# AREA 5B (GOLF PORTION OF Area North of Knudson Drive) - Developed
*#=============================================================================
CONTINUOUS STANDHYD      ID=[5], NHYD=["AREA 5B"], DT=[1](min), AREA=[9.5](ha),
                    XIMP=[0.50], TIMP=[0.60], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[76.20](mm/hr), Fc=[13.2](mm/hr),
                    DCAY=[4.14](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.2](%),
                                         LGI=[252](m), MNI=[0.025], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
```

```
*%----------------|---------------------------------------------------------|
*#=========================================================================
*# ADD flows that go directly to Pond 4
*#=========================================================================
ADD HYD             IDsum=[9], NHYD=[000321], IDs to add=[1+2+3+4+5]
*%----------------|---------------------------------------------------------|
*#=========================================================================
*# AREA 1D (URBAN PORTION of Area North of Campeau Drive)
*#=========================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["AREA 1D"], DT=[1](min), AREA=[15.8](ha),
                    XIMP=[0.250], TIMP=[0.55], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[324](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%----------------|---------------------------------------------------------|
*#=========================================================================
*# MAJOR FLOW TO Pond 4 - MINOR FLOW TO Beaver Pond
*# 85 L/S/HA * 15.8 HA = 1.343 L/S
*#=========================================================================
COMPUTE DUALHYD     IDin=[1], CINLET=[1.343](cms), NINLET=[1],
                    MAJID=[2], MajNHYD=[000100],
                    MINID=[3], MinNHYD=[000100],
                    TMJSTO=[0](cu-m)
*%----------------|---------------------------------------------------------|
*#=========================================================================
*# AREA 5C (URBAN PORTION OF Area North of Knudson Drive)
*#=========================================================================
CONTINUOUS STANDHYD      ID=[4], NHYD=["000100"], DT=[1](min), AREA=[6.2](ha),
                    XIMP=[0.250], TIMP=[0.50], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[203](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%----------------|---------------------------------------------------------|
*#=========================================================================
*# MAJOR FLOW TO Pond 4 - MINOR FLOW TO Beaver Pond
*# 85 L/S/HA * 6.2 HA = 0.527 L/S
*#=========================================================================
COMPUTE DUALHYD     IDin=[4], CINLET=[0.527](cms), NINLET=[1],
                    MAJID=[6], MajNHYD=[000100],
                    MINID=[7], MinNHYD=[000100],
                    TMJSTO=[0](cu-m)
*%----------------|---------------------------------------------------------|
*#=========================================================================
*# ADD major flows from 1D and 5C that go to Pond 4
*#=========================================================================
ADD HYD             IDsum=[1], NHYD=[Pond4-IN], IDs to add=[6+2+9]
*%----------------|---------------------------------------------------------|
*#=========================================================================
*# ADD minor flows from 1D and 5C to Beaver Pond
*#=========================================================================
ADD HYD             IDsum=[2], NHYD=[MIN-Beaver-IN], IDs to add=[7+3]
*%----------------|---------------------------------------------------------|

*#=========================================================================
*# KGCC Pond 4 (Drainage 41.48 ha + Major from 1D & 5C)
```

```
*#=============================================================================
ROUTE RESERVOIR     IDout=[4],   NHYD=["Pond-4"],  IDin=[1],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                    (cms) - (ha-m)
                                [   0.0 ,  0.0 ]
                                [  0.156 , 0.480 ]
                                [  0.228, 0.744 ]
                                [  0.913 1.61 ]
                                [   -1  ,  -1  ]  (max twenty pts)
                          IDovf=[   ], NHYDovf=[   ]
*%----------------|-------------------------------------------------------|
*# ADD outflows from Pond 4 to ponds 1,2 & 3 and minor flows
*#=============================================================================
ADD HYD             IDsum=[1], NHYD=[000321], IDs to add=[10+4+2]
*#=============================================================================
*#=============================================================================
*                         DRAINAGE TO KGCC POND 5
*#=============================================================================
*#=============================================================================
*# AREA 6A (URBAN PORTION OF Area North of Knudson Drive)
*#=============================================================================
CONTINUOUS STANDHYD      ID=[2], NHYD=["AREA 6A"], DT=[1](min), AREA=[4.1](ha),
                    XIMP=[0.050], TIMP=[0.52], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[165](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%----------------|-------------------------------------------------------|
*#=============================================================================
*# AREA 6B (GOLF PORTION OF Area North of Knudson Drive) - Developed
*#=============================================================================
CONTINUOUS STANDHYD      ID=[3], NHYD=["AREA 6B"], DT=[1](min), AREA=[5.9](ha),
                    XIMP=[0.50], TIMP=[0.60], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[76.20](mm/hr), Fc=[13.2](mm/hr),
                    DCAY=[4.14](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.2](%),
                                         LGI=[198](m), MNI=[0.025], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%----------------|-------------------------------------------------------|
*#=============================================================================
*# AREA 15 (GOLF PORTION OF Area South of Walden Drive - DA 10B) - Developed
*#=============================================================================
CONTINUOUS STANDHYD      ID=[4], NHYD=["AREA 15"], DT=[1](min), AREA=[2.5](ha),
                    XIMP=[0.50], TIMP=[0.60], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[76.20](mm/hr), Fc=[13.2](mm/hr),
                    DCAY=[4.14](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.2](%),
                                         LGI=[129](m), MNI=[0.025], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%----------------|-------------------------------------------------------|
*#=============================================================================
*# AREA 6C (URBAN PORTION OF Area North of Knudson Drive)
*#=============================================================================
```

```
CONTINUOUS STANDHYD      ID=[5], NHYD=["AREA 6C"], DT=[1](min), AREA=[5.3](ha),
                    XIMP=[0.250], TIMP=[0.50], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[187](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%----------------|-------------------------------------------------------------|
*#=============================================================================
*# MAJOR FLOW TO Pond 5 - MINOR FLOW TO Beaver Pond
*# 85 L/S/HA * 5.3 HA = 0.4505 L/S
*#=============================================================================
COMPUTE DUALHYD      IDin=[5], CINLET=[0.451](cms), NINLET=[1],
                    MAJID=[6], MajNHYD=[000100],
                    MINID=[7], MinNHYD=[000100],
                    TMJSTO=[0](cu-m)
*%----------------|-------------------------------------------------------------|
*#=============================================================================
*# ADD ALL drainage to Pond 5 (12.5 ha)
*#=============================================================================
ADD HYD              IDsum=[8], NHYD=[Pond5-IN], IDs to add=[2+3+4+6]
*%----------------|-------------------------------------------------------------|
*#=============================================================================
ROUTE RESERVOIR      IDout=[4],   NHYD=["Pond-5"],  IDin=[8],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                     (cms) - (ha-m)
                                   [   0.0 ,  0.0 ]
                                   [  0.067 , 0.140]
                                   [  0.098, 0.236]
                                   [  0.392, 0.485 ]
                                   [   -1  ,  -1  ]  (max twenty pts)
                          IDovf=[   ], NHYDovf=[   ]
*%----------------|-------------------------------------------------------------|
*#=============================================================================
*# AREA 3A-2 (URBAN PORTION of Area North of Campeau Drive)
*#=============================================================================
CONTINUOUS STANDHYD      ID=[6], NHYD=["AREA 3A-2"], DT=[1](min), AREA=[33.4](ha),
                    XIMP=[0.250], TIMP=[0.41], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[471](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%----------------|-------------------------------------------------------------|
*#=============================================================================
*# AREA 1A (INSTITUTION BLOCK)
*#=============================================================================
CONTINUOUS NASHYD        ID=[5], NHYD=["AREA 1A"], DT=[1]min, AREA=[11.4](ha),
                    DWF=[0](cms),  CN=[61], IA=[5.0](mm),
                    N=[2.0], TP=[0.56]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*%----------------|-------------------------------------------------------------|
*# ADD outflows from 3A-2, 1A,Pond 5 and minor from 6C to ponds 1,2,3 & 4
```

```
*#==========================================================================
ADD HYD             IDsum=[11], NHYD=[000321], IDs to add=[1+4+7]
*#==========================================================================
*# AREA 7 (Adjacent to Beaver Pond)
*#==========================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["000204"], DT=[1](min), AREA=[19.6](ha),
                    XIMP=[0.250], TIMP=[0.44], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[361](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%-----------------|-----------------------------------------------------------|
*#==========================================================================
*# ADD OUTFLOW OF DA 10B AND 6C TO 7
*# TOTAL FLOW - AT EXISTING 2700 MM OUTLET
*#==========================================================================
ADD HYD             IDsum=[9], NHYD=[000321], IDs to add=[5+2+1]
*%-----------------|-----------------------------------------------------------|
*
*#==========================================================================
*# AREA 4C
*#==========================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["000204"], DT=[1](min), AREA=[5.8](ha),
                    XIMP=[0.250], TIMP=[0.53], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[196](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%-----------------|-----------------------------------------------------------|
*#==========================================================================
*# MAJOR FLOW TO 4B - MINOR FLOW TO 4A
*# 85 L/S/HA * 5.8 HA = 493 L/S
*#==========================================================================
COMPUTE DUALHYD     IDin=[1], CINLET=[0.493](cms), NINLET=[1],
                    MAJID=[5], MajNHYD=[000100],
                    MINID=[6], MinNHYD=[100100],
                    TMJSTO=[0](cu-m)
*%-----------------|-----------------------------------------------------------|
*
*#==========================================================================
*# AREA 4A - FLOW THROUGH AREA 4
*#==========================================================================
CONTINUOUS STANDHYD      ID=[3], NHYD=["000204"], DT=[1](min), AREA=[15.8](ha),
                    XIMP=[0.250], TIMP=[0.66], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[324](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%-----------------|-----------------------------------------------------------|
*
*#==========================================================================
*# ADDITION OF 4C MINOR TO 4A
```

```
*#==============================================================================
*
ADD HYD             IDsum=[4], NHYD=[000231], IDs to add=[3+6]
*%----------------|------------------------------------------------------------|
*#==============================================================================
*# AREA 4B - ROUTE THROUGH ON SITE STORAGE
*#==============================================================================
CONTINUOUS STANDHYD      ID=[3], NHYD=["000204"], DT=[1](min), AREA=[6.2](ha),
                    XIMP=[0.250], TIMP=[0.57], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[203](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%----------------|------------------------------------------------------------|
*#==============================================================================
*# ADDITION OF MAJOR FLOW AT 4C TO AREA 4B
*#==============================================================================
ADD HYD             IDsum=[6], NHYD=[000231], IDs to add=[5+3]
*%----------------|------------------------------------------------------------|
*#==============================================================================
*# ON-SITE STORAGE IN AREA 4B
*# 85L/S/HA
*#==============================================================================
*
ROUTE RESERVOIR     IDout=[3],   NHYD=[000100],  IDin=[6],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                     (cms) - (ha-m)
                                [   0.0 ,  0.0 ]
                                [ 0.527, 0.2840]
                                [   -1  ,  -1  ]  (max twenty pts)
                          IDovf=[], NHYDovf=[]
*%----------------|------------------------------------------------------------|
*#==============================================================================
*# ADDITION OF ROUTED 4B TO AREA 4A
*#==============================================================================
ADD HYD             IDsum=[8], NHYD=[000231], IDs to add=[4+3]
*%----------------|------------------------------------------------------------|
*
*#==============================================================================
*# AREA 4 (Adjacent to Beaver Pond)
*#==============================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["000204"], DT=[1](min), AREA=[21.2](ha),
                    XIMP=[0.250], TIMP=[0.38], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[375](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%----------------|------------------------------------------------------------|
*#==============================================================================
*# ADDITION OF MINOR FLOW AT 4A TO AREA 4
*#==============================================================================
ADD HYD             IDsum=[3], NHYD=[000231], IDs to add=[8+1]
*%----------------|------------------------------------------------------------|
ADD HYD             IDsum=[7], NHYD=[000231], IDs to add=[10+3]
*%----------------|------------------------------------------------------------|
*#==============================================================================
```

```
*# AREA 9 (RURAL)
*#==============================================================================
CONTINUOUS NASHYD   ID=[2], NHYD=["000100"], DT=[1]min, AREA=[18.9](ha),
                    DWF=[0](cms),  CN=[75], IA=[5.0](mm),
                    N=[2.0], TP=[0.37]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*%----------------|------------------------------------------------------------|
ADD HYD             IDsum=[6], NHYD=[000321], IDs to add=[7+2]
*%----------------|------------------------------------------------------------|
*
*#==============================================================================
*# GOULDBOURN FORCED ROAD - KANATA AVENUE TO AREA 10 BOUNDARY
*# (ARTERIAL ROAD 10 YEAR 10 MN INLET TIME)
*#==============================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["000204"], DT=[1](min), AREA=[1.6](ha),
                    XIMP=[0.71], TIMP=[0.71], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[103](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%----------------|------------------------------------------------------------|
*#==============================================================================
*# MAJOR FLOW TO BEAVER POND - MINOR FLOW TO AREA 10 STORM SYSTEM
*# 237.69 L/S/HA * 1.66 HA = 394.6 L/S
*#==============================================================================
COMPUTE DUALHYD     IDin=[1], CINLET=[0.395](cms), NINLET=[1],
                    MAJID=[2], MajNHYD=[000100],
                    MINID=[7], MinNHYD=[100100],
                    TMJSTO=[0](cu-m)
*%----------------|------------------------------------------------------------|
*#==============================================================================
*# BEAVER POND PORTION #1
*#==============================================================================
*
ADD HYD             IDsum=[9], NHYD=[000321], IDs to add=[6+2+11]
*%----------------|------------------------------------------------------------|
*
*#==============================================================================
*# KANATA AVENUE - GOULBOURN FORCED ROAD TO AREA 10 BOUNDARY
*# (ARTERIAL ROAD 10 YEAR 10 MIN INLET TIME)
*#==============================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["000204"], DT=[1](min), AREA=[2.8](ha),
                    XIMP=[0.32], TIMP=[0.32], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[136](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%----------------|------------------------------------------------------------|
*#==============================================================================
*# MAJOR FLOW TOWARDS TFD - MINOR FLOW TO AREA 10 STORM SYSTEM
*# 237.69 L/S/HA * 1.8 HA = 427.8 L/S
* JFSA correction based on above drainage area of 2.8 ha
```

```
* Capture in DUALHYD below 237.69 L/s/ha * 2.8 ha = 665.5 L/s
*#==============================================================================
COMPUTE DUALHYD     IDin=[1], CINLET=[0.6655](cms), NINLET=[1],
                    MAJID=[10], MajNHYD=[000100],
                    MINID=[2], MinNHYD=[100100],
                    TMJSTO=[0](cu-m)
*%-----------------|------------------------------------------------------------|
*
*#==============================================================================
*# DRAINAGE AGREA 10 - TOTAL 43.6 HA - DIVIDED UP FOR HGL ANALYSIS
*# (INCLUDES AREA 10-4, 10-1, 10-2 AND 10-3)
*#==============================================================================
*
*#==============================================================================
*# AREA 10-4 - DRAINS INTO S-5 - MAJOR FLOW CASCADES
*#==============================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["000204"], DT=[1](min), AREA=[13.9](ha),
                    XIMP=[0.250], TIMP=[0.51], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[304](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%-----------------|------------------------------------------------------------|
*#==============================================================================
*# MINOR FLOW INTO SYSTEM
*# 85 L/S/HA * 14 = 1190 L/S
*JFSA correction based on above drainage area of 13.9 ha
* Capture in DUALHYD below 85 L/s/ha * 13.9 ha = 1181 L/s
*#==============================================================================
COMPUTE DUALHYD     IDin=[1], CINLET=[1.181](cms), NINLET=[1],
                    MAJID=[8], MajNHYD=[000100],
                    MINID=[6], MinNHYD=[100100],
                    TMJSTO=[0](cu-m)
*%-----------------|------------------------------------------------------------|
*#==============================================================================
*# ADD KANATA AVENUE AND AREA 10-4 - MH S-5
*#==============================================================================
*
ADD HYD             IDsum=[5], NHYD=[000101], IDs to add=[6+2]
*%-----------------|------------------------------------------------------------|
*
*#==============================================================================
*# AREA 10-1 - DRAINS INTO S-4 - MAJOR FLOW CASCADES
*#==============================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["000204"], DT=[1](min), AREA=[9.8](ha),
                    XIMP=[0.250], TIMP=[0.51], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[255](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%-----------------|------------------------------------------------------------|
*#==============================================================================
*# MINOR FLOW INTO SYSTEM
*# 85 L/S/HA * 9.5 = 807.5 L/S
*JFSA correction based on above drainage area of 9.8 ha
* Capture in DUALHYD below 85 L/s/ha * 9.8 ha = 833 L/s
*#==============================================================================
```

```
769   COMPUTE DUALHYD      IDin=[1], CINLET=[0.833](cms), NINLET=[1],
770                        MAJID=[4], MajNHYD=[000100],
771                        MINID=[6], MinNHYD=[100100],
772                        TMJSTO=[0](cu-m)
773   *%-----------------|-------------------------------------------------------------|
774   *#=============================================================================
775   *# ADD GOULBOURN FORCED ROAD AND AREA 10-1 - MH S-3
776   *#=============================================================================
777   *
778   ADD HYD              IDsum=[3], NHYD=[000101], IDs to add=[6+7]
779   *%-----------------|-------------------------------------------------------------|
780   ADD HYD              IDsum=[7], NHYD=[000102], IDs to add=[3+5]
781   *%-----------------|-------------------------------------------------------------|
782   *
783   *#=============================================================================
784   *# AREA 10-3 - DRAINS INTO S-2 - MAJOR FLOW CASCADES
785   *#=============================================================================
786   CONTINUOUS STANDHYD      ID=[1], NHYD=["000204"], DT=[1](min), AREA=[4.3](ha),
787                        XIMP=[0.250], TIMP=[0.55], DWF=[0](cms),
788                        LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                             DCAY=[2.0](/hr), F=[0](mm),
789                        Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
790                                             LGP=[40](m), MNP=[0.25], SCP=[0](min),
791                        Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
792                                             LGI=[169](m), MNI=[0.013], SCI=[0](min),
793                        Continuous simulation parameters:
794                        IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
795                        InterEventTime=[12](hrs), END=-1
796   *%-----------------|-------------------------------------------------------------|
797   *#=============================================================================
798   *# MINOR FLOW INTO SYSTEM
799   *# 85 L/S/HA * 3.9 = 331.5 L/S
800   *JFSA correction based on above drainage area of 4.3 ha
801   * Capture in DUALHYD below 85 L/s/ha * 4.3 ha = 365 L/s
802   *#=============================================================================
803   COMPUTE DUALHYD      IDin=[1], CINLET=[0.365](cms), NINLET=[1],
804                        MAJID=[5], MajNHYD=[000100],
805                        MINID=[2], MinNHYD=[100100],
806                        TMJSTO=[0](cu-m)
807   *%-----------------|-------------------------------------------------------------|
808   ADD HYD              IDsum=[10], NHYD=[000103], IDs to add=[2+7]
809   *%-----------------|-------------------------------------------------------------|
810   *
811   *#=============================================================================
812   *# AREA 10-2 - DRAINS INTO S-6 - MAJOR FLOW CASCADES
813   *#=============================================================================
814   CONTINUOUS STANDHYD      ID=[1], NHYD=["000204"], DT=[1](min), AREA=[18.6](ha),
815                        XIMP=[0.250], TIMP=[0.51], DWF=[0](cms),
816                        LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                             DCAY=[2.0](/hr), F=[0](mm),
817                        Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
818                                             LGP=[40](m), MNP=[0.25], SCP=[0](min),
819                        Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
820                                             LGI=[352](m), MNI=[0.013], SCI=[0](min),
821                        Continuous simulation parameters:
822                        IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
823                        InterEventTime=[12](hrs), END=-1
824   *%-----------------|-------------------------------------------------------------|
825   *#=============================================================================
826   *# MINOR FLOW INTO SYSTEM
827   *# 85 L/S/HA * 16.2 = 1377 L/S
828   *JFSA correction based on above drainage area of 18.6 ha
829   * Capture in DUALHYD below 85 L/s/ha * 18.6 ha = 1581 L/s
830   *#=============================================================================
831   COMPUTE DUALHYD      IDin=[1], CINLET=[1.581](cms), NINLET=[1],
832                        MAJID=[2], MajNHYD=[000100],
833                        MINID=[6], MinNHYD=[100100],
```

```
                    TMJSTO=[0](cu-m)
*%-----------------|-------------------------------------------------------------|
*
*#=============================================================================
*# AREA 10A - MINOR FLOW TO AREA 10, MAJOR FLOW TO CARP RIVER WATERSHED
*#=============================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["000204"], DT=[1](min), AREA=[9.9](ha),
                    XIMP=[0.250], TIMP=[0.44], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[256](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# SPLIT OF MAJOR AND MINOR FLOW AT 85 L/S/HA
*# 85 * 7.0 = 595 L/S
*JFSA correction based on above drainage area of 9.9 ha
* Capture in DUALHYD below 85 L/s/ha * 9.9 ha = 841 L/s
*#=============================================================================
COMPUTE DUALHYD     IDin=[1], CINLET=[0.841](cms), NINLET=[1],
                    MAJID=[3], MajNHYD=[000100],
                    MINID=[7], MinNHYD=[100100],
                    TMJSTO=[0](cu-m)
*%-----------------|-------------------------------------------------------------|
ADD HYD             IDsum=[1], NHYD=[000104], IDs to add=[7+6]
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# TOTAL MINOR FLOW AT OUTLET
*#=============================================================================
ADD HYD             IDsum=[6], NHYD=[000105], IDs to add=[1+10]
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# TOTAL MAJOR FLOW FOR DRAINAGE AREA 10 AT OUTLET
*#=============================================================================
ADD HYD             IDsum=[7], NHYD=[000106], IDs to add=[8+4+5+2]
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# AREA 11 (RURAL) - Increased Area for Existing Conditions
*#=============================================================================
CONTINUOUS NASHYD        ID=[2], NHYD=["000100"], DT=[1]min, AREA=[46.2](ha),
                    DWF=[0](cms),  CN=[62], IA=[5.0](mm),
                    N=[2.0], TP=[0.75]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*%-----------------|-------------------------------------------------------------|
ADD HYD             IDsum=[3], NHYD=[000317], IDs to add=[7+2]
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# TOTAL FLOW TO KIZELL POND (U/S CELL)
*#=============================================================================
ADD HYD             IDsum=[10], NHYD=[000317], IDs to add=[3+6]
*%-----------------|-------------------------------------------------------------|
*
*#=============================================================================
*# SYSTEM STORAGE REPRESENTATION (KIZELL POND)
*# RATING CURVE PROVIDED BY IBI
*#=============================================================================
*# modify the ROUTE RESERVOIR to negate the effect of this underground storage
```

```
ROUTE RESERVOIR     IDout=[3],   NHYD=["KP-R"],  IDin=[10],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                     (cms) - (ha-m)
                                   [   0.0 ,  0.0 ]
                                   [ 99.   ,  0.09]
                                   [   -1  ,  -1  ]  (max twenty pts)
                          IDovf=[4], NHYDovf=["OVF-KP"]
*#=============================================================================
*# ADD SYSTEM STORAGE OUTFLOW, OVERFLOW AND BYPASS (KIZELL)
*#=============================================================================
ADD HYD             IDsum=[10], NHYD=["KP-COM"], IDs to add=[3+4]
*#=============================================================================
*
* Kanata Lakes Stage 7 - Catchment removed from Model under existing conditions
*
*#=============================================================================
*CONTINUOUS STANDHYD      ID=[1], NHYD=["Stage 7"], DT=[1](min), AREA=[73.1](ha),
*                    XIMP=[0.225], TIMP=[0.50], DWF=[0](cms),
*                    LOSS=[1]:    Horton: Fo=[76.20](mm/hr), Fc=[13.2](mm/hr),
DCAY=[4.14](/hr), F=[0](mm),
*                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
*                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
*                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
*                                         LGI=[16445](m), MNI=[0.013], SCI=[0](min),
*                    Continuous simulation parameters:
*                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
*                    InterEventTime=[12](hrs), END=-1
*#=============================================================================
*
* Kanata Lakes Stage 8 - Catchment removed from Model under existing conditions
*
*#=============================================================================
*CONTINUOUS STANDHYD      ID=[2], NHYD=["Stage 8"], DT=[1](min), AREA=[65.7](ha),
*                    XIMP=[0.225], TIMP=[0.50], DWF=[0](cms),
*                    LOSS=[1]:    Horton: Fo=[76.20](mm/hr), Fc=[13.2](mm/hr),
DCAY=[4.14](/hr), F=[0](mm),
*                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
*                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
*                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
*                                         LGI=[14785](m), MNI=[0.013], SCI=[0](min),
*                    Continuous simulation parameters:
*                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
*                    InterEventTime=[12](hrs), END=-1
*#=============================================================================
*# Only Minor system flow to Kizell Cell - Command removed from Model
*#=============================================================================
*COMPUTE DUALHYD     IDin=[2], CINLET=[0.8](cms), NINLET=[1],
*                    MAJID=[3], MajNHYD=[000100],
*                    MINID=[7], MinNHYD=[100100],
*                    TMJSTO=[0](cu-m)
*#=============================================================================
* Total flow into Kizell Cell
*#=============================================================================
*#ADD HYD             IDsum=[8], NHYD=["KP-COM"], IDs to add=[10+1]
*#=============================================================================
*#=============================================================================
* ROUTE THROUGH THE KIZELL CELL
*
ROUTE RESERVOIR     IDout=[5],   NHYD=["Kizell Cell"],  IDin=[10],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                     (cms) - (ha-m)
                                   [   0.0 ,  0.0 ]
                                   [ 0.100 ,  0.016]
                                   [ 0.200 ,  0.033]
                                   [ 0.300 ,  0.055]
```

```
                                        [ 0.400 ,  0.079]
                                        [ 0.500 ,  0.121]
                                        [ 0.700 ,  0.188]
                                        [ 0.800 ,  0.281]
                                        [ 0.950 ,  0.433]
                                        [ 1.050 ,  0.658]
                                        [ 1.200 ,  0.919]
                                        [   -1  ,  -1  ]  (max twenty pts)
                                IDovf=[4], NHYDovf=["OVF-Kizell Cell"]
*#=============================================================================
*# ADD OUTFLOW AND OVERFLOW
*#=============================================================================
ADD HYD             IDsum=[8], NHYD=["KP-COM"], IDs to add=[5+4]
*#=============================================================================
*#=============================================================================
*# SYSTEM STORAGE REPRESENTATION (BEAVER POND)
*# RATING CURVE PROVIDED BY IBI
*#=============================================================================
* modify the ROUTE RESERVOIR to negate the effects of the underground storage
ROUTE RESERVOIR     IDout=[3],   NHYD=["BP-R"],  IDin=[9],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                     (cms) - (ha-m)
                                   [   0.0 ,  0.0 ]
                                   [ 99.0 ,  0.09]
                                   [   -1  ,  -1  ]  (max twenty pts)
                                   IDovf=[4], NHYDovf=["OVF-BP"]
*#=============================================================================
*# ADD SYSTEM STORAGE OUTFLOW, OVERFLOW AND BYPASS (BEAVER)
*#=============================================================================
ADD HYD             IDsum=[9], NHYD=["BP-COM"], IDs to add=[3+4]
*#=============================================================================
*
* Kanata Lakes Stage 9
*
*#=============================================================================
* Under the latest proposed development conditions these lands will be broken into
* 3 catchment Beaver Pond (19.31 ha), Kizell Drain (6.89 ha) and Shirley's Brook (4.51 ha).
* As per IBI's "Design Brief KNL Stage 9 Kanata Lakes North" (March 2018).
* No on-site controls have been assumed for this area.
*#=============================================================================
*
* Kanata Lakes Stage 9 - Replaced by subcatchment 8 under existing conditions
*
*#=============================================================================
CONTINUOUS NASHYD        ID=[1], NHYD=["8"], DT=[1]min, AREA=[9.2](ha),
                    DWF=[0](cms),  CN=[56], IA=[5.0](mm),
                    N=[2.0], TP=[0.21]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*#=============================================================================
*# TOTAL HYDROGRAPH INTO BEAVER POND
*
ADD HYD             IDsum=[6], NHYD=["BP-TOTAL"], IDs to add=[9+8+1]
*
*#=============================================================================
SAVE HYD            ID=[6],  # OF PCYCLES=[-1],  ICASEsh=[-1]
                    HYD_FILENAME=["BP_In"]
                    HYD_COMMENT=["Total inflow to the Beaver Pond"]
*#=============================================================================
*# TOTAL FLOW FROM BEAVER POND
*#=============================================================================
```

```
* ROUTE THROUGH BEAVER POND
* Overflow option removed to allow for linear extrapolation of flows out of the
* pond when simulated volumes exceed volumes provided in the curve below.
ROUTE RESERVOIR     IDout=[1],   NHYD=["BP-OUT"],  IDin=[6],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                     (cms) - (ha-m)
                                   [   0.0 ,  0.0 ]
                                   [ 0.592 ,  4.573]
                                   [ 0.686 ,  6.569]
                                   [ 0.769 ,  8.840]
                                   [ 0.879 ,  11.467]
                                   [ 1.007 ,  16.103]
                                   [ 1.040 ,  17.339]
                                   [   -1  ,  -1  ]  (max twenty pts)
                       IDovf=[], NHYDovf=[""]
*#=============================================================================
SAVE HYD            ID=[1],  # OF PCYCLES=[-1],  ICASEsh=[-1]
                    HYD_FILENAME=["BP_Out"]
                    HYD_COMMENT=["Total Outflow from the Beaver Pond"]
*#=============================================================================
*# ROUTE KD-1 THROUGH KD-2A
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 10018.26
*#=============================================================================
ROUTE CHANNEL       IDout=[3], NHYD=["KD-1"], IDin=[1],
                    RDT=[1](min),
                    CHLGTH=[277](m),  CHSLOPE=[1.08](%),
                                        FPSLOPE=[1.08](%),
                    SECNUM=[10018],       NSEG=[4]
                    ( SEGROUGH, SEGDIST (m))=[0.08,30.63 -0.03,34.69 0.08,49.66
                    0.04,70.77] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 94.54 ]
                                                   [ 7.12,  93.2 ]
                                                   [11.07,  92.3 ]
                                                   [15.31,  91.8 ]
                                                   [17.16, 91.35 ]
                                                   [20.56,  90.8 ]
                                                   [25.12, 89.58 ]
                                                   [28.15,  88.5 ]
                                                   [30.63,  87.8 ]
                                                   [31.957, 87.854 ]
                                                   [ 34.4,  88.5 ]
                                                   [34.69, 88.61 ]
                                                   [ 36.5, 89.23 ]
                                                   [38.48,  90.2 ]
                                                   [41.14,  91.1 ]
                                                   [ 45.4, 91.66 ]
                                                   [49.66, 91.96 ]
                                                   [53.06,  92.3 ]
                                                   [67.16, 92.43 ]
                                                   [70.77, 92.52 ]
*#=============================================================================
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 9854.606
*#=============================================================================
ROUTE CHANNEL       IDout=[2], NHYD=["KD-1"], IDin=[3],
                    RDT=[1](min),
                    CHLGTH=[186](m),  CHSLOPE=[1.97](%),
                                        FPSLOPE=[1.97](%),
                    SECNUM=[9854],       NSEG=[5]
                    ( SEGROUGH, SEGDIST (m))=[0.08,29.81 0.05,34.304 -0.03,38.24
                    0.05,47.73 0.08,105.39] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 90.07 ]
                                                   [ 6.86,  89.4 ]
                                                   [13.24,  89.2 ]
                                                   [17.79, 88.48 ]
                                                   [22.46,  87.2 ]
                                                   [29.81, 86.04 ]
```

```
                                                    [32.17, 85.72 ]
                                                    [34.304, 85.612 ]
                                                    [36.137, 85.654 ]
                                                    [37.46, 85.69 ]
                                                    [38.24, 85.72 ]
                                                    [44.98,  85.9 ]
                                                    [47.73, 86.32 ]
                                                    [51.27,  87.3 ]
                                                    [55.17,    88 ]
                                                    [87.02, 88.79 ]
                                                    [90.72,  88.7 ]
                                                    [93.96,    89 ]
                                                    [99.45,  90.8 ]
                                                    [105.39, 91.81 ]
*#=============================================================================
*# KD-2A-1 - RURAL - Increased Area for Existing Conditions
*#=============================================================================
CONTINUOUS NASHYD        ID=[1], NHYD=["KD-2A-1"], DT=[1]min, AREA=[28.6](ha),
                    DWF=[0](cms),CN=[57], IA=[7](mm),
                    N=[2.0], TP=[0.91]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[0.001](mm/hr), END=-1
*#=============================================================================
*# ADD KD-2A-1, KD-1 and portion of KNL Stage 9
*#=============================================================================
ADD HYD             IDsum=[3], NHYD=["KFP2"], IDs to add=[1+2]
*PRINT HYD           ID=[3],   # OF PCYCLES=[1]
*#=============================================================================
*# ROUTE THROUGH KD-2A-2
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 9743.627
*#=============================================================================
ROUTE CHANNEL       IDout=[1], NHYD=["KD-1"], IDin=[3],
                    RDT=[1](min),
                    CHLGTH=[408](m),  CHSLOPE=[0.84](%),
                                        FPSLOPE=[0.84](%),
                    SECNUM=[9743],       NSEG=[5]
                    ( SEGROUGH, SEGDIST (m))=[0.05,42.45 -0.03,44.28 -0.05,46.07
                    0.05,63.17 0.08,111.15] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0,  86.7 ]
                                                    [ 7.01,  86.7 ]
                                                    [15.57,  86.2 ]
                                                    [21.06, 85.58 ]
                                                    [25.69, 84.76 ]
                                                    [31.55, 83.42 ]
                                                    [40.62,  82.7 ]
                                                    [42.45,  82.5 ]
                                                    [44.28, 82.561 ]
                                                    [ 44.6, 82.59 ]
                                                    [46.07,  82.7 ]
                                                    [48.58, 82.76 ]
                                                    [59.09, 82.59 ]
                                                    [63.17, 83.94 ]
                                                    [67.14,  85.3 ]
                                                    [71.84,  85.8 ]
                                                    [82.08,  85.8 ]
                                                    [89.16,  86.2 ]
                                                    [106.01,  86.6 ]
                                                    [111.15, 86.65 ]
*#=============================================================================
SAVE HYD            ID=[1],  # OF PCYCLES=[-1],  ICASEsh=[-1]
                    HYD_FILENAME=["KD-1"]
                    HYD_COMMENT=["KD-1-Channel where Erosion analysis was completed"]
*#=============================================================================
```

```
*# Erosion Analysis on Kizell Drain (Requires SWMHYMO v5.5)
*#============================================================================
*# Erosion Index/critical shear stress calculated for flows through the critical
*# section of on Kizell Drain as determined by Matrix Solutions (May 2019)
*#============================================================================
EROSION INDEX       INDEX_METHOD=[1], QCE =[0.50](cms), NHYDsErosion=[1]
*#============================================================================
EROSION INDEX       INDEX_METHOD=[2], SHEARC =[20](Pa), No of Hyds=[1],
                    NHYDsErosion=[1]
                    RATING_CURVE_METHOD = [1], user entered channel shape
                    Channel section parameters
                    Section No["XS1"]
                    CHSLOPE=[0.84](%), FPSLOPE=[0.84](%),
                    NSEG=[5]
                    ( SEGROUGH, SEGDIST (m))=[0.05,42.45 -0.03,44.28 -0.05,46.07 ↵
                    0.05,63.17 0.08,111.15] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0,  86.7 ]
                                                  [ 7.01,  86.7 ]
                                                  [15.57,  86.2 ]
                                                  [21.06, 85.58 ]
                                                  [25.69, 84.76 ]
                                                  [31.55, 83.42 ]
                                                  [40.62,  82.7 ]
                                                  [42.45,  82.5 ]
                                                  [44.28, 82.561 ]
                                                  [ 44.6, 82.59 ]
                                                  [46.07,  82.7 ]
                                                  [48.58, 82.76 ]
                                                  [59.09, 82.59 ]
                                                  [63.17, 83.94 ]
                                                  [67.14,  85.3 ]
                                                  [71.84,  85.8 ]
                                                  [82.08,  85.8 ]
                                                  [89.16,  86.2 ]
                                                  [106.01,  86.6 ]
                                                  [111.15, 86.65 ]
*#============================================================================
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 9338.062
*# MINIMUM SLOPE ASSUMED 0.1%
*#============================================================================
ROUTE CHANNEL       IDout=[2], NHYD=["KD-1"], IDin=[1],
                    RDT=[1](min),
                    CHLGTH=[111](m),  CHSLOPE=[0.1](%),
                                        FPSLOPE=[0.1](%),
                    SECNUM=[9338],       NSEG=[5]
                    ( SEGROUGH, SEGDIST (m))=[0.04,78.47 0.06,82.78 -0.03,87.28 ↵
                    0.06,107.69 0.04,120.16] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0,  82.8 ]
                                                  [ 6.26, 82.86 ]
                                                  [   23,  82.4 ]
                                                  [57.46, 82.11 ]
                                                  [75.38,  82.1 ]
                                                  [78.47, 81.06 ]
                                                  [ 81.6,  79.7 ]
                                                  [82.78,  79.3 ]
                                                  [87.28, 79.28 ]
                                                  [ 88.3,  79.7 ]
                                                  [91.41,  81.1 ]
                                                  [94.81,  81.7 ]
                                                  [107.69,  82.1 ]
                                                  [120.16,  82.2 ]
*#============================================================================
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 9131.887
*#============================================================================
ROUTE CHANNEL       IDout=[1], NHYD=["KD-1"], IDin=[2],
                    RDT=[1](min),
                    CHLGTH=[248](m),  CHSLOPE=[0.28](%),
```

```
                                        FPSLOPE=[0.28](%),
                    SECNUM=[9131],       NSEG=[5]
                    ( SEGROUGH, SEGDIST (m))=[0.04,70.64 -0.03,72.865 0.04,74.61 0.05,77.65 0.04,191.67] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0,  81.6 ]
                                                   [ 7.35,  81.6 ]
                                                   [ 26.3,  80.9 ]
                                                   [48.53, 80.87 ]
                                                   [58.55, 80.01 ]
                                                   [65.66,    80 ]
                                                   [69.22,    79 ]
                                                   [70.64, 78.65 ]
                                                   [72.865,  78.7 ]
                                                   [74.25, 78.96 ]
                                                   [74.61,  79.1 ]
                                                   [77.65, 79.92 ]
                                                   [93.59,  79.9 ]
                                                   [103.2,  78.7 ]
                                                   [108.05,  79.9 ]
                                                   [115.92,  80.2 ]
                                                   [132.65,  80.2 ]
                                                   [159.72, 80.73 ]
                                                   [176.71, 82.61 ]
                                                   [191.67, 82.63 ]
*#==============================================================================
*# KD-2A-2 - URBAN/RURAL NORTH OF RAILRAOD
*#==============================================================================
CONTINUOUS STANDHYD      ID=[2], NHYD=["KD-2A-2"], DT=[1](min), AREA=[44.99](ha),
                    XIMP=[0.250], TIMP=[0.28], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr), DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[547](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*#==============================================================================
*# ADD KD-2A-1 AND KD-2A-2
*# CREST GAUGE LOCATION KD-2 -KIZELL DRAIN AT MARCH ROAD
*#==============================================================================
ADD HYD              IDsum=[3], NHYD=["KFP3"], IDs to add=[1+2]
*PRINT HYD            ID=[3],   # OF PCYCLES=[1]
*#==============================================================================
*# KD-2A-3 - URBAN SOUTH OF RAILROAD
*#==============================================================================
CONTINUOUS STANDHYD      ID=[2], NHYD=["KD-2A-3"], DT=[1](min), AREA=[48.56](ha),
                    XIMP=[0.250], TIMP=[0.31], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr), DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[568](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*#==============================================================================
*# ADD KD-2A-2 AND KD-2A-3 D/S OF MARCH ROAD
*#==============================================================================
ADD HYD              IDsum=[4], NHYD=["KD-2A-3"], IDs to add=[3+2]
*#==============================================================================
*# ROUTE KD-2A THROUGH KD-2B
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 8942.456
*#==============================================================================
ROUTE CHANNEL        IDout=[1], NHYD=["KD-2A"], IDin=[4],
```

```
                    RDT=[1](min),
                    CHLGTH=[254](m),  CHSLOPE=[0.55](%),
                                        FPSLOPE=[0.55](%),
                    SECNUM=[8942],       NSEG=[5]
                    ( SEGROUGH, SEGDIST (m))=[0.04,17.24 0.05,28.26 -0.03,31.51
                    0.05,61.08 0.04,68.63] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 80.58 ]
                                                   [ 1.57,  80.5 ]
                                                   [ 8.77,  80.5 ]
                                                   [10.84, 80.23 ]
                                                   [17.24, 80.03 ]
                                                   [20.76,    79 ]
                                                   [23.59,  78.9 ]
                                                   [26.81, 78.17 ]
                                                   [28.26,  77.9 ]
                                                   [30.06,  77.9 ]
                                                   [30.71, 78.01 ]
                                                   [31.51,  78.2 ]
                                                   [32.21, 78.39 ]
                                                   [ 37.7,  78.4 ]
                                                   [44.07,  78.5 ]
                                                   [48.95,  78.7 ]
                                                   [57.53, 79.33 ]
                                                   [61.08, 79.95 ]
                                                   [64.61, 80.71 ]
                                                   [68.63, 81.15 ]
*#============================================================================
*# KD-2B-6 - URBAN
*#============================================================================
CONTINUOUS STANDHYD      ID=[2], NHYD=["KD-2B-6"], DT=[1](min), AREA=[7.73](ha),
                    XIMP=[0.61], TIMP=[0.61], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[227](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*#============================================================================
*# ROUTE KD-2B-6 THROUGH SWM POND SOUTH OF SOLANDT ROAD
*# ASSUME 5-YEAR CONTROL ACCORDING TO CITY GUIDELINES
*#============================================================================
ROUTE RESERVOIR     IDout=[4],   NHYD=["KD-2B-6"],  IDin=[2],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                     (cms) - (ha-m)
                                   [   0.0 ,  0.0 ]
                                   [ 0.407 ,  0.095]
                                   [   -1  ,  -1  ]  (max twenty pts)
                          IDovf=[5], NHYDovf=["OVF-2B6"]
*#============================================================================
*# ADD OUTFLOW, OVERFLOW AND KD-2A
*#============================================================================
ADD HYD             IDsum=[6], NHYD=["KD-2B-6"], IDs to add=[4+5+1]
*#============================================================================
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 8329.198
*#============================================================================
ROUTE CHANNEL       IDout=[2], NHYD=["KD-2A"], IDin=[6],
                    RDT=[1](min),
                    CHLGTH=[747](m),  CHSLOPE=[0.36](%),
                                        FPSLOPE=[0.36](%),
                    SECNUM=[8329],       NSEG=[4]
                    ( SEGROUGH, SEGDIST (m))=[0.08,81.34 0.05,88.266 -0.03,97.72
                    0.08,109.09] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0,  78.3 ]
```

```
                                                    [56.66,  78.2 ]
                                                    [67.31,  78.2 ]
                                                    [72.25,    78 ]
                                                    [79.85,    78 ]
                                                    [81.34, 77.66 ]
                                                    [87.28, 75.87 ]
                                                    [88.266, 75.728 ]
                                                    [90.51, 75.759 ]
                                                    [90.57, 75.77 ]
                                                    [91.47, 75.88 ]
                                                    [97.72, 76.64 ]
                                                    [109.09,  78.5 ]
*#=============================================================================
*# KD-2B-3 - Converted to NASHYD under existing conditions
*#=============================================================================
CONTINUOUS NASHYD        ID=[1], NHYD=["KD-2B-3"], DT=[1]min, AREA=[7.40](ha),
                    DWF=[0](cms),  CN=[65], IA=[5.0](mm),
                    N=[2.0], TP=[0.49]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*#=============================================================================
*# 5 YEAR CONTROL - 89L/s
*# MAJOR FLOWS TO KIZELL DRAIN
*# MINOR FLOWS TO GOLF COURSE POND #2
*#=============================================================================
COMPUTE DUALHYD     IDin=[1], CINLET=[0.089](cms), NINLET=[1],
                    MAJID=[3], MajNHYD=["2B3MAJ"],
                    MINID=[4], MinNHYD=["2B3MIN"],
                    TMJSTO=[0](cu-m)
*#=============================================================================
*# KD-2B-4 Converted to NASHYD under existing conditions
*#=============================================================================
CONTINUOUS NASHYD        ID=[5], NHYD=["KD-2B-4"], DT=[1]min, AREA=[23.59](ha),
                    DWF=[0](cms),  CN=[63], IA=[5.0](mm),
                    N=[2.0], TP=[0.62]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*#=============================================================================
*# ADD KD-2B-3 MINOR AND KD-2B-4
*#=============================================================================
ADD HYD             IDsum=[6], NHYD=["KD-2B-4"], IDs to add=[4+5]
*#=============================================================================
*# ROUTE KD-2B-4 THROUGH GOLF COURSE POND #2
*#=============================================================================
ROUTE RESERVOIR     IDout=[4],   NHYD=["KD-2B-4"],  IDin=[6],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                    (cms) - (ha-m)
                                [   0.0 ,  0.0 ]
                                [ 0.229, 1.5695]
                                [ 0.251, 1.8191]
                                [ 0.328, 2.9421]
                                [   -1  ,  -1  ]  (max twenty pts)
                          IDovf=[5], NHYDovf=["OVF-2B6"]
*#=============================================================================
*# ADD OUTFLOW, OVERFLOW AND KD-2A
*#=============================================================================
ADD HYD             IDsum=[6], NHYD=["KD-2B-6"], IDs to add=[4+5]
*#=============================================================================
```

```
*# ADD KD-2B-3 MAJOR, KD-2B-4 AND KD-2B-6
*#=============================================================================
ADD HYD             IDsum=[4], NHYD=["KD-2B-4"], IDs to add=[3+6+2]
*#=============================================================================
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 7691.759
*#=============================================================================
ROUTE CHANNEL       IDout=[2], NHYD=["KD-2A"], IDin=[4],
                    RDT=[1](min),
                    CHLGTH=[408](m),  CHSLOPE=[0.11](%),
                                        FPSLOPE=[0.11](%),
                    SECNUM=[7691],       NSEG=[3]
                    ( SEGROUGH, SEGDIST (m))=[0.06,16.78 -0.03,19.003 0.06,24.49] NSEG
                    times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 76.75 ]
                                                   [ 0.66,  76.6 ]
                                                   [ 3.57, 75.74 ]
                                                   [ 4.99, 75.24 ]
                                                   [ 5.76,  75.1 ]
                                                   [ 7.69,    75 ]
                                                   [ 8.56,  74.9 ]
                                                   [ 9.95,  74.9 ]
                                                   [12.21,  74.8 ]
                                                   [12.99, 74.69 ]
                                                   [ 15.2,  74.3 ]
                                                   [16.78,  74.1 ]
                                                   [17.38,  73.8 ]
                                                   [18.38,  73.8 ]
                                                   [19.003, 74.147]
                                                   [19.94, 74.21 ]
                                                   [20.51, 74.31 ]
                                                   [21.52,  74.6 ]
                                                   [22.72, 75.04 ]
                                                   [24.49,  75.5 ]
*#=============================================================================
*# KD-2B-2 - URBAN RESIDENTIAL - Converted to NASHYD under existing conditions
*#=============================================================================
CONTINUOUS NASHYD       ID=[3], NHYD=["KD-2B-2"], DT=[1]min, AREA=[3.35](ha),
                    DWF=[0](cms),  CN=[63], IA=[5.0](mm),
                    N=[2.0], TP=[0.32]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*#=============================================================================
*# ROUTE KD-2B-2 THROUGH POND #3 NORTH OF FARRAR ROAD
*#=============================================================================
ROUTE RESERVOIR     IDout=[5],   NHYD=["KD-2B-2"],  IDin=[3],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                     (cms) - (ha-m)
                                   [   0.0 ,  0.0 ]
                                   [ 0.260 , 0.616]
                                   [ 0.282 ,0.7115]
                                   [ 0.374 ,1.2301]
                                   [   -1  ,  -1  ]  (max twenty pts)
                          IDovf=[6], NHYDovf=["OVF-2B3"]
*#=============================================================================
*# ADD OUTFLOW, OVERFLOW AND KD-2B-4
*#=============================================================================
ADD HYD             IDsum=[1], NHYD=["KD-2B-4"], IDs to add=[5+6+2]
*#=============================================================================
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 7386.879
*#=============================================================================
ROUTE CHANNEL       IDout=[2], NHYD=["KD-2A-4"], IDin=[1],
                    RDT=[1](min),
```

```
                    CHLGTH=[315](m),  CHSLOPE=[0.11](%),
                                        FPSLOPE=[0.11](%),
                    SECNUM=[7386],       NSEG=[5]
                    ( SEGROUGH, SEGDIST (m))=[0.08,21.18 0.05,62.87 -0.06,80.43
                    0.06,90.36 0.05,143.24] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 77.07 ]
                                                   [ 5.11,  76.8 ]
                                                   [21.18,  76.7 ]
                                                   [34.27,  76.7 ]
                                                   [43.48,  76.3 ]
                                                   [62.87,  74.8 ]
                                                   [68.48, 74.28 ]
                                                   [70.32,  73.5 ]
                                                   [73.346, 73.437 ]
                                                   [75.588, 73.466 ]
                                                   [75.62, 73.47 ]
                                                   [80.43,  74.3 ]
                                                   [85.13, 75.18 ]
                                                   [90.36, 75.69 ]
                                                   [101.28,  75.4 ]
                                                   [115.17,  75.3 ]
                                                   [121.38,  75.4 ]
                                                   [128.52, 74.95 ]
                                                   [137.68,  75.3 ]
                                                   [143.24, 76.97 ]
*#=============================================================================
*# KD-2B-7 - RURAL EAST OF HERZBERG ROAD
*#=============================================================================
CONTINUOUS NASHYD        ID=[4], NHYD=["KD-2B-7"], DT=[1]min, AREA=[20.11](ha),
                    DWF=[0](cms),  CN=[63], IA=[7](mm),
                    N=[2.0], TP=[1.50]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*#=============================================================================
*# ADD KD-2B-4 AND KD-2B-7
*#=============================================================================
ADD HYD             IDsum=[3], NHYD=["KD-2B-4"], IDs to add=[2+4]
*#=============================================================================
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 7058.454
*#=============================================================================
ROUTE CHANNEL       IDout=[1], NHYD=["KD-2A-4"], IDin=[3],
                    RDT=[1](min),
                    CHLGTH=[297](m),  CHSLOPE=[0.38](%),
                                        FPSLOPE=[0.38](%),
                    SECNUM=[7058],       NSEG=[3]
                    ( SEGROUGH, SEGDIST (m))=[0.05,206.86 -0.06,216.95 0.04,295.48]
                    NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0,  75.7 ]
                                                   [165.24,  75.2 ]
                                                   [198.14,  75.2 ]
                                                   [206.37,  73.8 ]
                                                   [206.86, 73.69 ]
                                                   [209.66,    73 ]
                                                   [211.86,    73 ]
                                                   [213.07, 73.07 ]
                                                   [215.16,  73.8 ]
                                                   [216.95, 74.14 ]
                                                   [247.08,  74.8 ]
                                                   [267.4,  74.8 ]
                                                   [295.48, 76.05 ]
*#=============================================================================
*# KD-2B-5 - URBAN
*#=============================================================================
```

```
CONTINUOUS STANDHYD      ID=[2], NHYD=["KD-2B-5"], DT=[1](min), AREA=[4.74](ha),
                    XIMP=[0.50], TIMP=[0.50], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[177](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*#==============================================================================
*# ON-SITE STORAGE
*# RATING CURVE SOURCE - plan2.pdf IN 13616-Richardson Side_Eagleson
*#==============================================================================
ROUTE RESERVOIR     IDout=[4],   NHYD=["KD-2B-5"],  IDin=[2],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                    (cms) - (ha-m)
                                  [   0.0 ,  0.0 ]
                                  [0.1458, 0.01283]
                                  [0.1458, 0.03881]
                                  [   -1  ,  -1  ]  (max twenty pts)
                          IDovf=[5], NHYDovf=["OVF-2B5"]
*#==============================================================================
*# KD-2B-1 - URBAN
*#==============================================================================
CONTINUOUS STANDHYD      ID=[3], NHYD=["KD-2B-1"], DT=[1](min), AREA=[134.85](ha),
                    XIMP=[0.40], TIMP=[0.41], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[948](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*#==============================================================================
*# ADD OUTFLOW, OVERFLOW AND KD-2B-1
*#==============================================================================
ADD HYD             IDsum=[6], NHYD=["KD-2B-1"], IDs to add=[4+5+3]
*#==============================================================================
*# ADD KD-2B-4 AND KD-2B-1
*# CREST GAUGE LOCATION KD-1 - KIZELL DRAIN AT HERTZBERG ROAD
*#==============================================================================
ADD HYD             IDsum=[3], NHYD=["KFP4"], IDs to add=[1+6]
*PRINT HYD           ID=[3],   # OF PCYCLES=[1]
*#==============================================================================
*# ROUTE KD-2B THROUGH KD-2C
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 6705.311
*# MINIMUM SLOPE ASSUMED 0.1%
*#==============================================================================
ROUTE CHANNEL       IDout=[1], NHYD=["KD-2B"], IDin=[3],
                    RDT=[1](min),
                    CHLGTH=[600](m),  CHSLOPE=[0.1](%),
                                      FPSLOPE=[0.1](%),
                    SECNUM=[6705],       NSEG=[4]
                    ( SEGROUGH, SEGDIST (m))=[0.05,162.749 -0.04,168.035 -0.05,168.35
                    0.05,373.63] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 75.65 ]
                                                  [ 24.7,  75.1 ]
                                                  [61.29, 73.42 ]
                                                  [90.72,  72.7 ]
                                                  [119.02, 72.95 ]
                                                  [131.71,  72.8 ]
                                                  [160.55,  72.9 ]
```

```
                                                    [162.46, 72.46 ]
                                                    [162.749, 72.403 ]
                                                    [168.035, 72.369 ]
                                                    [168.35, 72.39 ]
                                                    [168.6, 72.43 ]
                                                    [171.08,  72.8 ]
                                                    [203.12,  72.8 ]
                                                    [231.66,  73.3 ]
                                                    [255.58,  73.2 ]
                                                    [300.16,  73.6 ]
                                                    [326.75,  74.3 ]
                                                    [347.02,  75.2 ]
                                                    [373.63, 76.05 ]
*#==============================================================================
*# KD-3A - URBAN WEST OF HERZBERG ROAD
*#==============================================================================
CONTINUOUS STANDHYD      ID=[3], NHYD=["KD-3A"], DT=[1](min), AREA=[206.16](ha),
                    XIMP=[0.30], TIMP=[0.34], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[1172](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*#==============================================================================
*# KTC-2B - URBAN - UPSTREAM LIMIT TO HWY 417, NORTH OF CAMPEAU DRIVE
*# LAND USES WITHIN AREA: OFFICE/RECREATIONAL
*#==============================================================================
CONTINUOUS STANDHYD      ID=[2], NHYD=["KTC-2B"], DT=[1](min), AREA=[20.79](ha),
                    XIMP=[0.23], TIMP=[0.24], DWF=[0.0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[372](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*#==============================================================================
*# 5 YEAR CONTROL - 1155L/s
*# MAJOR FLOWS TO KD-3A
*# MINOR FLOWS TO SWF-1205
*#==============================================================================
COMPUTE DUALHYD      IDin=[2], CINLET=[1.155](cms), NINLET=[1],
                     MAJID=[7], MajNHYD=["KTC2BMAJ"],
                     MINID=[10], MinNHYD=["KTC2BMIN"],
                     TMJSTO=[0](cu-m)
*#==============================================================================
*# ADD KTC-2B MAJOR AND KD-3A - TRIBUTARY 1 AT HERTZBERG ROAD
*#==============================================================================
ADD HYD              IDsum=[5], NHYD=["KD-3A"], IDs to add=[7+3]
*#==============================================================================
*# ROUTE KD-3A THROUGH KD-3B
*# CHANNEL CROSS-SECTION DATA TAKEN FROM LiDAR
*#==============================================================================
ROUTE CHANNEL        IDout=[4], NHYD=["KD-3A"], IDin=[5],
                     RDT=[1](min),
                     CHLGTH=[253](m),  CHSLOPE=[0.13](%),
                                         FPSLOPE=[0.13](%),
                     SECNUM=[1],        NSEG=[3]
                     ( SEGROUGH, SEGDIST (m))=[0.05,27.94 -0.035,38.92 0.08,64.87] NSEG
                     times
                     ( DISTANCE (m), ELEVATION (m))=[    0, 78.90]
```

```
                                                    [12.97, 78.12]
                                                    [15.97, 77.81]
                                                    [19.96, 77.51]
                                                    [23.95, 77.36]
                                                    [24.95, 77.34]
                                                    [25.95, 77.34]
                                                    [26.94, 77.36]
                                                    [27.94, 77.30]
                                                    [30.94, 76.79]
                                                    [31.93, 76.73]
                                                    [32.93, 76.73]
                                                    [33.93, 76.70]
                                                    [34.94, 76.76]
                                                    [38.92, 77.29]
                                                    [42.91, 77.34]
                                                    [58.88, 78.52]
                                                    [64.87, 78.97]
ROUTE CHANNEL       IDout=[5], NHYD=["KD-3A"], IDin=[4],
                    RDT=[1](min),
                    CHLGTH=[344](m),  CHSLOPE=[0.56](%),
                                        FPSLOPE=[0.56](%),
                    SECNUM=[2],       NSEG=[3]
                    ( SEGROUGH, SEGDIST (m))=[0.05,20.89 -0.035,76.49 0.08,88.52] NSEG ↵
                    times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 77.38]
                                                    [13.92, 77.02]
                                                    [20.89, 76.69]
                                                    [26.85, 76.09]
                                                    [29.84, 76.03]
                                                    [44.76, 76.15]
                                                    [56.69, 75.91]
                                                    [59.68, 76.10]
                                                    [61.67, 76.05]
                                                    [71.61, 76.31]
                                                    [76.49, 76.69]
                                                    [82.55, 77.16]
                                                    [88.52, 77.40]
ROUTE CHANNEL       IDout=[4], NHYD=["KD-3A"], IDin=[5],
                    RDT=[1](min),
                    CHLGTH=[324](m),  CHSLOPE=[0.72](%),
                                        FPSLOPE=[0.72](%),
                    SECNUM=[1],       NSEG=[3]
                    ( SEGROUGH, SEGDIST (m))=[0.05,97.588 -0.035,109.575 0.05,143.405] ↵
                    NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 75.2777 ]
                                                    [39.664, 74.805 ]
                                                    [74.612, 74.8767 ]
                                                    [79.607, 74.8037 ]
                                                    [ 86.6, 74.7914 ]
                                                    [90.595, 74.6388 ]
                                                    [95.59, 74.6899 ]
                                                    [97.588, 74.8802 ]
                                                    [101.584, 74.7293 ]
                                                    [103.582, 74.4039 ]
                                                    [106.578, 74.4818 ]
                                                    [109.575, 74.9123 ]
                                                    [111.573, 74.8318 ]
                                                    [116.568, 74.8294 ]
                                                    [120.563, 74.7426 ]
                                                    [121.562, 74.7398 ]
                                                    [124.559, 74.8464 ]
                                                    [130.553, 74.8391 ]
                                                    [132.54, 74.777 ]
                                                    [143.405, 75.255 ]
*#==========================================================================
*# KD-2C - RURAL
*#==========================================================================
```

```
CONTINUOUS NASHYD        ID=[2], NHYD=["KD-2C"], DT=[1]min, AREA=[59.10](ha),
                    DWF=[0](cms),  CN=[83], IA=[7](mm),
                    N=[2.0], TP=[0.60]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*#=============================================================================
*# ADD KD-2B AND KD-2C
*#=============================================================================
ADD HYD             IDsum=[5], NHYD=["KFP5"], IDs to add=[1+2]
*PRINT HYD           ID=[5],   # OF PCYCLES=[1]
*#=============================================================================
*# ADD KD-2C AND KD-3A
*#=============================================================================
ADD HYD             IDsum=[3], NHYD=["KD-2C"], IDs to add=[5+4]
*#=============================================================================
*# ROUTE KD-1+KD-2 THROUGH KD-3B-1
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 6104.633
*# MINIMUM SLOPE ASSUMED 0.1%
*#=============================================================================
ROUTE CHANNEL       IDout=[1], NHYD=["KD-2C"], IDin=[3],
                    RDT=[1](min),
                    CHLGTH=[952](m),  CHSLOPE=[0.1](%),
                                        FPSLOPE=[0.1](%),
                    SECNUM=[6104],       NSEG=[3]
                    ( SEGROUGH, SEGDIST (m))=[0.08,175.904 -0.04,179.184 0.08,185.91]
                    NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 77.06 ]
                                                  [ 9.16,  77.1 ]
                                                  [23.37,  76.7 ]
                                                  [56.09,  76.5 ]
                                                  [67.63,  76.2 ]
                                                  [80.81,  75.6 ]
                                                  [83.87,  75.6 ]
                                                  [98.45,  74.5 ]
                                                  [103.07,  74.3 ]
                                                  [115.78,  74.3 ]
                                                  [134.4,  73.6 ]
                                                  [149.63,  73.7 ]
                                                  [163.83,  73.6 ]
                                                  [173.16,  72.7 ]
                                                  [175.83,    72 ]
                                                  [175.904, 71.992 ]
                                                  [179.184, 71.968 ]
                                                  [179.27,    72 ]
                                                  [183.86,  73.7 ]
                                                  [185.91,    74 ]
*#=============================================================================
*# KD-3B - RURAL EAST OF HERZBERG ROAD
*#=============================================================================
CONTINUOUS NASHYD        ID=[4], NHYD=["KD-23B"], DT=[1]min, AREA=[112.07](ha),
                    DWF=[0](cms),  CN=[66], IA=[7](mm),
                    N=[2.0], TP=[1.20]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*#=============================================================================
*# ADD KD-2C,KD-3A AND KD-3B - KIZELL DRAIN AT CONFLUENCE WITH WATTS CREEK
*#=============================================================================
ADD HYD             IDsum=[3], NHYD=["KFP6"], IDs to add=[1+4]
*PRINT HYD           ID=[3],   # OF PCYCLES=[1]
```

```
*#==============================================================================
*#                          WATTS CREEK SUBWATERSHED
*#==============================================================================
*#==============================================================================
*# KANATA TOWN CENTRE-1 - URBAN - UPSTREAM LIMIT TO HWY 417
*# Imperviousness decreased under existing conditions
*#==============================================================================
CONTINUOUS STANDHYD      ID=[2], NHYD=["KTC-1"], DT=[1](min), AREA=[60.23](ha),
                    XIMP=[0.34], TIMP=[0.34], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[633](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*#==============================================================================
*# 5 YEAR CONTROL - 2963L/s
*# MAJOR FLOWS TO WC-1
*# MINOR FLOWS TO SWF-1206
*#==============================================================================
COMPUTE DUALHYD      IDin=[2], CINLET=[2.963](cms), NINLET=[1],
                     MAJID=[7], MajNHYD=["KTC1MAJ"],
                     MINID=[8], MinNHYD=["KTC1MIN"],
                     TMJSTO=[0](cu-m)
*#==============================================================================
*# SWMF-1206
*# STORAGE WAS ESTIMATED FROM AVAILABLE DRAWING
*# DISCHARGE WAS TAKEN FROM R-1564
*#==============================================================================
ROUTE RESERVOIR      IDout=[4],   NHYD=["KTC-1"],  IDin=[8],
                     RDT=[1](min),
                           TABLE of ( OUTFLOW-STORAGE ) values
                                     (cms) - (ha-m)
                                  [   0.0 ,  0.0 ]
                                  [ 0.955 , 0.2854]
                                  [ 1.436 , 3.9725]
                                  [   -1  ,  -1  ]  (max twenty pts)
                           IDovf=[5], NHYDovf=["OVF-KTC1"]
*#==============================================================================
*# ADD OUTFLOW, OVERFLOW AND KTC-1 MAJOR
*#==============================================================================
ADD HYD              IDsum=[2], NHYD=["KTC-1"], IDs to add=[4+5+7]
*#==============================================================================
*# WC-1 - RURAL/URBAN EXISTING AREA
*#==============================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["WC-1"], DT=[1](min), AREA=[403.47](ha),
                    XIMP=[0.30], TIMP=[0.34], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[1640](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*#==============================================================================
*# ADD WC-1 AND KTC-1 - WATTS CREEK AT HIGHWAY 417
*#==============================================================================
ADD HYD              IDsum=[5], NHYD=["WC-1"], IDs to add=[1+2]
*#==============================================================================
*# KTC-2A - URBAN - UPSTREAM LIMIT TO HWY 417, SOUTH OF CAMPEAU DRIVE
*# LAND USES WITHIN AREA: TOWN CENTRE/URBAN RES
*#==============================================================================
```

```
CONTINUOUS STANDHYD      ID=[1], NHYD=["KTC-2A"], DT=[1](min), AREA=[34.34](ha),
                    XIMP=[0.36], TIMP=[0.42], DWF=[0.0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[478](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*#=============================================================================
*# ADD KTC-2A AND KTC-2B MINOR
*#=============================================================================
ADD HYD             IDsum=[4], NHYD=["KTC-2"], IDs to add=[1+10]
*#=============================================================================
*# ROUTE KTC-2 THROUGH KANATA TOWN CENTRE PHASE I POND
*# STAGE-STORAGE-DISCHARGE CURVE OBTAINED FROM:
*# KANATA TOWN CENTRE PHASE i - STORMWATER MANAGEMENT REPORT
*# J.L. RICHARDS & ASSOCIATES LTD. 1996
*# SWF-1205
*# STORAGE WAS ESTIMATED WITH AVAILABLE DRAWING
*# DISCHARGE WAS TAKEN FROM R-1563
*#=============================================================================
ROUTE RESERVOIR     IDout=[1],   NHYD=["KTC-2"],  IDin=[4],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                     (cms) - (ha-m)
                                   [   0.0 ,  0.0 ]
                                   [  0.79, 0.6939]
                                   [  4.70, 1.4350]
                                   [   -1  ,  -1  ]  (max twenty pts)
                          IDovf=[2], NHYDovf=["OVF-KTC2"]
*#=============================================================================
*# ADD OUTFLOW AND OVERFLOW
*#=============================================================================
ADD HYD             IDsum=[4], NHYD=["KTC-2"], IDs to add=[1+2]
*#=============================================================================
*# ADD WC-1 AND KTC-2
*#=============================================================================
ADD HYD             IDsum=[2], NHYD=["KTC-2"], IDs to add=[5+4]
*%----------------|-------------------------------------------------------|
*#=============================================================================
*# WC-3 - URBAN/RURAL
*#=============================================================================
CONTINUOUS NASHYD        ID=[1], NHYD=["WC-3"], DT=[1]min, AREA=[204.06](ha),
                    DWF=[0](cms),  CN=[66], IA=[7](mm),
                    N=[2.0], TP=[1.28]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*#=============================================================================
*# ADD WC-1+KTC AND WC-3
*#=============================================================================
ADD HYD             IDsum=[4], NHYD=["WC-3"], IDs to add=[2+1]
*#=============================================================================
*# ROUTE WC-1+KTC+WC-3 THROUGH WC-4A
*# CHANNEL CROSS-SECTION DATA TAKEN FROM LIDAR
*#=============================================================================
ROUTE CHANNEL       IDout=[1], NHYD=["WC-3"], IDin=[4],
                    RDT=[1](min),
                    CHLGTH=[744](m),  CHSLOPE=[1.29](%),
                                        FPSLOPE=[1.29](%),
                    SECNUM=[1],       NSEG=[3]
```

```
                    ( SEGROUGH, SEGDIST (m))=[0.05,25.86 -0.035,40.77 0.05,72.60] NSEG
                    times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 90.87]
                                                   [ 1.99, 90.66]
                                                   [ 7.96, 90.10]
                                                   [16.91, 85.80]
                                                   [18.90, 85.49]
                                                   [21.88, 85.42]
                                                   [25.86, 85.56]
                                                   [26.85, 25.50]
                                                   [29.83, 84.06]
                                                   [31.82, 84.06]
                                                   [34.81, 85.10]
                                                   [40.77, 85.59]
                                                   [48.73, 85.85]
                                                   [52.71, 86.80]
                                                   [55.59, 87.80]
                                                   [60.66, 90.40]
                                                   [64.64, 90.77]
                                                   [72.60, 90.97]
*#=============================================================================
*# CHANNEL CROSS-SECTION DATA TAKEN FROM LIDAR
*#=============================================================================
ROUTE CHANNEL       IDout=[2], NHYD=["WC-3"], IDin=[1],
                    RDT=[1](min),
                    CHLGTH=[2295](m),  CHSLOPE=[0.45](%),
                                        FPSLOPE=[0.45](%),
                    SECNUM=[2],       NSEG=[3]
                    ( SEGROUGH, SEGDIST (m))=[0.05,12.98 -0.035,20.97 0.05,51.94] NSEG
                    times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 85.79]
                                                   [ 1.00, 85.75]
                                                   [11.99, 83.71]
                                                   [12.98, 83.36]
                                                   [14.98, 82.49]
                                                   [15.98, 82.44]
                                                   [16.98, 82.45]
                                                   [20.97, 83.51]
                                                   [22.97, 83.46]
                                                   [23.97, 83.51]
                                                   [26.97, 83.55]
                                                   [27.97, 83.55]
                                                   [31.96, 83.51]
                                                   [32.96, 83.45]
                                                   [33.96, 83.45]
                                                   [34.96, 83.50]
                                                   [51.94, 85.81]
*#=============================================================================
*# CHANNEL CROSS-SECTION DATA TAKEN FROM LIDAR
*#=============================================================================
ROUTE CHANNEL       IDout=[1], NHYD=["WC-3"], IDin=[2],
                    RDT=[1](min),
                    CHLGTH=[487](m),  CHSLOPE=[0.23](%),
                                        FPSLOPE=[0.23](%),
                    SECNUM=[3],       NSEG=[3]
                    ( SEGROUGH, SEGDIST (m))=[0.05,6.97 -0.035,25.87 0.05,29.85] NSEG
                    times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 75.60]
                                                   [    1, 75.54]
                                                   [ 1.99, 75.42]
                                                   [ 6.97, 73.09]
                                                   [11.94, 72.70]
                                                   [14.93, 72.66]
                                                   [17.91, 72.27]
                                                   [23.88, 72.25]
                                                   [25.87, 73.03]
                                                   [28.86, 74.06]
```

```
                                                        [29.85, 74.23]
*#==============================================================================
*# WC-4A - RURAL - HIGHWAY 417 TO CNR
*#==============================================================================
CONTINUOUS NASHYD        ID=[2] NHYD=["WC-4A"], DT=[1]min, AREA=[126.29](ha),
                    DWF=[0](cms),  CN=[82], IA=[7](mm),
                    N=[2.0], TP=[2.30]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*#==============================================================================
*# ADD WC-1+KTC+WC-3 AND WC-4A
*# CREST GAUGE LOCATION WC-1 - WATTS CREEK AT CONFLUENCE WITH KIZELL DRAIN
*#==============================================================================
ADD HYD             IDsum=[6], NHYD=["WFP1"], IDs to add=[1+2]
*PRINT HYD           ID=[6],   # OF PCYCLES=[1]
*#==============================================================================
*# WC-4B - RURAL - HIGHWAY 417 TO CNR
*#==============================================================================
CONTINUOUS NASHYD        ID=[4] NHYD=["WC-4B"], DT=[1]min, AREA=[145.27](ha),
                    DWF=[0](cms),  CN=[73], IA=[7](mm),
                    N=[2.0], TP=[1.22]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*#==============================================================================
*# ADD WC-4A AND KIZELL
*#==============================================================================
ADD HYD             IDsum=[1], NHYD=["WFP2"], IDs to add=[6+3]
*PRINT HYD           ID=[1],   # OF PCYCLES=[1]
*#==============================================================================
*# ADD WC-4A AND WC-4B
*#==============================================================================
ADD HYD             IDsum=[5], NHYD=["WFP3"], IDs to add=[1+4]
*PRINT HYD           ID=[5],   # OF PCYCLES=[1]
*#==============================================================================
*# ROUTE KIZELL AND WC-1+KTC+WC-3+WC-4 THROUGH WC-5A
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 4677.806
*#==============================================================================
ROUTE CHANNEL       IDout=[2], NHYD=["WC-4"], IDin=[5],
                    RDT=[1](min),
                    CHLGTH=[636](m),  CHSLOPE=[0.16](%),
                                        FPSLOPE=[0.16](%),
                    SECNUM=[4677],       NSEG=[3]
                    ( SEGROUGH, SEGDIST (m))=[0.08,95.801 -0.04,102.955 0.08,167.28]
                    NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0,  75.4 ]
                                                  [ 11.4,  74.3 ]
                                                  [ 31.7,  73.6 ]
                                                  [51.08,  72.8 ]
                                                  [60.69,  72.6 ]
                                                  [ 74.1,  71.6 ]
                                                  [77.61,  70.8 ]
                                                  [84.14,    71 ]
                                                  [93.83,    71 ]
                                                  [95.801, 70.73 ]
                                                  [97.18,  70.5 ]
                                                  [  101,  70.5 ]
                                                  [102.955, 70.989 ]
                                                  [111.37,  74.5 ]
                                                  [121.02, 76.45 ]
```

```
                                                    [128.96,  77.6 ]
                                                    [139.85,  78.3 ]
                                                    [151.67, 80.09 ]
                                                    [158.82, 80.63 ]
                                                    [167.28, 81.57 ]
*#=============================================================================
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 4446.172
*#=============================================================================
ROUTE CHANNEL       IDout=[1], NHYD=["WC-4"], IDin=[2],
                    RDT=[1](min),
                    CHLGTH=[443](m),  CHSLOPE=[0.64](%),
                                        FPSLOPE=[0.64](%),
                    SECNUM=[4446],       NSEG=[4]
                    ( SEGROUGH, SEGDIST (m))=[0.08,101.82 0.05,155.499 -0.04,160.804 ↵
                    0.08,360.72] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 75.11 ]
                                                    [15.28,  74.3 ]
                                                    [39.39,  73.6 ]
                                                    [55.02,  73.7 ]
                                                    [70.01,  73.1 ]
                                                    [101.82, 72.72 ]
                                                    [123.37, 72.37 ]
                                                    [137.03,  71.7 ]
                                                    [152.53,  68.9 ]
                                                    [155.499, 68.552 ]
                                                    [160.804, 68.559 ]
                                                    [163.78, 68.89 ]
                                                    [172.88,    69 ]
                                                    [180.76, 72.03 ]
                                                    [191.21,  72.8 ]
                                                    [208.93, 72.49 ]
                                                    [239.54,  72.4 ]
                                                    [260.28,  72.6 ]
                                                    [291.51,  72.6 ]
                                                    [360.72, 73.06 ]
*#=============================================================================
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 3897.472
*#=============================================================================
ROUTE CHANNEL       IDout=[2], NHYD=["WC-4"], IDin=[1],
                    RDT=[1](min),
                    CHLGTH=[468](m),  CHSLOPE=[0.44](%),
                                        FPSLOPE=[0.44](%),
                    SECNUM=[3897],       NSEG=[4]
                    ( SEGROUGH, SEGDIST (m))=[0.08,161.362 -0.04,164.388 -0.08,164.68 ↵
                    0.05,242.03] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 72.01 ]
                                                    [14.79,  71.9 ]
                                                    [26.32,  71.5 ]
                                                    [45.81,  69.5 ]
                                                    [ 52.8,  68.5 ]
                                                    [67.29,  68.1 ]
                                                    [85.91,  68.1 ]
                                                    [94.25,  67.9 ]
                                                    [116.16, 67.78 ]
                                                    [142.44,  67.4 ]
                                                    [159.77,  66.1 ]
                                                    [161.362, 65.677 ]
                                                    [164.388, 65.577 ]
                                                    [164.68, 65.61 ]
                                                    [166.02,  66.1 ]
                                                    [167.47,  66.5 ]
                                                    [201.22,  66.8 ]
                                                    [208.26,  66.7 ]
                                                    [216.93, 67.19 ]
                                                    [242.03,  67.3 ]
*#=============================================================================
*# WC-5A - RURAL - CNR TO CARLING AVE
```

```
*#==============================================================================
CONTINUOUS NASHYD        ID=[1] NHYD=["WC-5A"], DT=[1]min, AREA=[59.54](ha),
                    DWF=[0](cms),  CN=[73], IA=[7](mm),
                    N=[2.0], TP=[0.79]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*#==============================================================================
*# ADD WC-5A AND WC-5A UPSTREAM
*# CALIBRATION LOCATION - WATTS CREEK AT CARLING AVENUE
*#==============================================================================
ADD HYD             IDsum=[3], NHYD=["WFP4"], IDs to add=[1+2]
*PRINT HYD           ID=[3],   # OF PCYCLES=[1]
*#==============================================================================
*# ROUTE WC-5B UPSTREAM THROUGH WC-5B
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 3469.421
*# MINIMUM SLOPE ASSUMED 0.1%
*#==============================================================================
ROUTE CHANNEL       IDout=[2], NHYD=["WC-5B"], IDin=[3],
                    RDT=[1](min),
                    CHLGTH=[485](m),  CHSLOPE=[0.1](%),
                                        FPSLOPE=[0.1](%),
                    SECNUM=[3469],       NSEG=[4]
                    ( SEGROUGH, SEGDIST (m))=[0.08,127.46 0.06,131.6 -0.03,141.59
                    0.08,308.37] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 68.08 ]
                                                  [16.71,  67.1 ]
                                                  [48.15,  66.8 ]
                                                  [75.65,  66.3 ]
                                                  [107.54,  66.2 ]
                                                  [117.33,  66.3 ]
                                                  [127.46, 65.54 ]
                                                  [129.21,  65.3 ]
                                                  [131.6,  64.9 ]
                                                  [136.836, 64.972 ]
                                                  [139.19,  65.3 ]
                                                  [141.59, 65.65 ]
                                                  [161.72,  65.6 ]
                                                  [171.42,  66.1 ]
                                                  [187.05,  66.3 ]
                                                  [224.24,  66.3 ]
                                                  [246.7,  66.1 ]
                                                  [286.52, 66.07 ]
                                                  [304.07,  66.3 ]
                                                  [308.37,  66.7 ]
*#==============================================================================
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 2981.379
*#==============================================================================
ROUTE CHANNEL       IDout=[1], NHYD=["WC-5B"], IDin=[2],
                    RDT=[1](min),
                    CHLGTH=[307](m),  CHSLOPE=[0.40](%),
                                        FPSLOPE=[0.40](%),
                    SECNUM=[2981],       NSEG=[4]
                    ( SEGROUGH, SEGDIST (m))=[0.08,9.006 -0.03,14.347 -0.06,14.85
                    0.08,30.25] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 64.35 ]
                                                  [ 2.07,  64.3 ]
                                                  [ 4.58,  64.2 ]
                                                  [  5.7,  64.1 ]
                                                  [ 6.83,  63.8 ]
                                                  [ 7.91, 63.37 ]
                                                  [9.006, 63.169 ]
                                                  [ 9.64,  62.8 ]
                                                  [13.64,  62.8 ]
```

```
                                                    [14.24,  63.1 ]
                                                    [14.347, 63.315 ]
                                                    [14.85, 63.35 ]
                                                    [15.35,  63.4 ]
                                                    [16.49, 63.69 ]
                                                    [18.19, 64.21 ]
                                                    [21.41,  64.2 ]
                                                    [25.06, 64.05 ]
                                                    [27.14, 64.06 ]
                                                    [28.41,  64.2 ]
                                                    [30.25, 64.28 ]
*#=============================================================================
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 1585.543
*#=============================================================================
ROUTE CHANNEL       IDout=[2], NHYD=["WC-5B"], IDin=[1],
                    RDT=[1](min),
                    CHLGTH=[2876](m),  CHSLOPE=[0.16](%),
                                        FPSLOPE=[0.16](%),
                    SECNUM=[1585],       NSEG=[4]
                    ( SEGROUGH, SEGDIST (m))=[0.08,56.84 0.05,124.41 -0.035,128.78
                    0.08,255.15] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 64.07 ]
                                                    [21.74,  63.8 ]
                                                    [40.53,  63.5 ]
                                                    [56.84, 61.82 ]
                                                    [74.07,  61.6 ]
                                                    [98.29,  61.7 ]
                                                    [104.39, 61.43 ]
                                                    [117.32,  61.8 ]
                                                    [124.32,  60.8 ]
                                                    [124.41, 60.79 ]
                                                    [124.519, 60.783 ]
                                                    [127.785, 60.75 ]
                                                    [  128, 60.83 ]
                                                    [128.78, 61.17 ]
                                                    [130.97,  61.8 ]
                                                    [149.66, 61.32 ]
                                                    [170.74,  61.4 ]
                                                    [191.12,  63.6 ]
                                                    [219.28, 64.08 ]
                                                    [255.15,  64.1 ]
*#=============================================================================
*# WC-5B - RURAL - CARLING AVE TO OUTLET
*#=============================================================================
CONTINUOUS NASHYD       ID=[4] NHYD=["WC-5B"], DT=[1]min, AREA=[379.59](ha),
                    DWF=[0](cms),  CN=[73], IA=[7](mm),
                    N=[2.0], TP=[3.28]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*#=============================================================================
*# ADD WC-5B AND WC-5B UPSTREAM
*# WATTS CREEK AT OUTLET TO OTTAWA RIVER
*#=============================================================================
ADD HYD             IDsum=[1], NHYD=["WFP5"], IDs to add=[4+2]
*PRINT HYD           ID=[1],   # OF PCYCLES=[1]
*%-----------------|-------------------------------------------------------|
SAVE HYD            ID=[1],  # OF PCYCLES=[-1],  ICASEsh=[-1]
                    HYD_FILENAME=["WFP5"]
                    HYD_COMMENT=["WATTS CREEK AT OUTLET TO OTTAWA RIVER"]
*%-----------------|-------------------------------------------------------|
*#=============================================================================
*                             DESIGN STORMS
*#=============================================================================
```

```
*FINISH
START                TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[0005]
*                    "5y12hr.stm"
START                TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[0010]
*                    "10y12hr.stm"
START                TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[0025]
*                    "25y12hr.stm"
START                TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[0050]
*                    "50y12hr.stm"
START                TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[0100]
*                    "100y12hr.stm"
FINISH
*#=============================================================================
*                              CONTINUOUS SIMULATIONS
*#=============================================================================
START                TZERO=[1968.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1968]
START                TZERO=[1969.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1969]
START                TZERO=[1970.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1970]
START                TZERO=[1971.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1971]
START                TZERO=[1972.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1972]
START                TZERO=[1973.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1973]
START                TZERO=[1974.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1974]
START                TZERO=[1975.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1975]
START                TZERO=[1976.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1976]
START                TZERO=[1977.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1977]
START                TZERO=[1978.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1978]
START                TZERO=[1979.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1979]
START                TZERO=[1980.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1980]
START                TZERO=[1981.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1981]
START                TZERO=[1982.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1982]
START                TZERO=[1983.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1983]
START                TZERO=[1984.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1984]
START                TZERO=[1985.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1985]
START                TZERO=[1986.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1986]
START                TZERO=[1987.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1987]
START                TZERO=[1988.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1988]
START                TZERO=[1989.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1989]
START                TZERO=[1990.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1990]
START                TZERO=[1991.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1991]
START                TZERO=[1992.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1992]
START                TZERO=[1993.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1993]
START                TZERO=[1994.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1994]
START                TZERO=[1995.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1995]
START                TZERO=[1996.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1996]
START                TZERO=[1997.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1997]
START                TZERO=[1998.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1998]
START                TZERO=[1999.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1999]
START                TZERO=[2000.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[2000]
START                TZERO=[2002.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[2002]
START                TZERO=[2003.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[2003]
START                TZERO=[2004.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[2004]
START                TZERO=[2006.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[2006]
START                TZERO=[2007.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[2007]
FINISH
```

JFSA
WATER RESOURCES AND ENVIRONMENTAL CONSULTANTS

Project Ref #:1581
Client: David Schaeffer Engineering

Ottawa. ON
Paris. ON
Gatineau. QB
Montréal. QB
Québec. QB

Attachment D

SWMHYMO Model:

Kanata Lakes Development

```
2     Metric units
*#*************************************************************************
*#  Project Name: [Shirley's Brook and Watt's Creek Phase 2 SWM Study]    Project Number: [60264539]
*#  Future Conditions Model for the Watts Creek/Kizell Drain Flood Plain Mapping Study
*#  Date         : 2014-12-31
*#  Modeller     : [Olivia Chung]  John Price MVCA
*#  Company      : AECOM Canada
*#  License #    :  2988504
*#*************************************************************************
*# September 2019, model parameters further updated by JFSAinc
*# with use of rainfall and flow monitoring data collected in 2019
*#
*# - all N values in NASHYDS changed from N=1.1 to N=2
*# - all MNI values in existing conditions STANDHYDs changed from 0.025 to 0.013
*# - all SLOPI values in STANDHYDs changed from 0.02 to 1.0
*# - change STANDHYD infiltration method from SCS to Horton with
*# - Horton: Fo=[125](mm/hr), Fc=[25](mm/hr), DCAY=[2.0](/hr), F=[0](mm)
*# - set XIMP to a fix value of 0.25 for all existing residential catchments
*# - use COMPUTE API         APII=[40], APIK=[0.8]/day,
*# - continuous NASHYDs, use BaseFlowOption=[1] , InitGWResVol=[12], GWResK=[0.85], VHydCond=[.001]
*# - all golf course NASHYDs, use CN=50
*# - XIMP=[0.250], for all existing not draining through the grass areas of the golf course
*#
*# - Areas draining across the golf course:
*# - those specific STANDHYD commands converted to NASHYDs so that the infiltrated water could come back into the system.  This allowed a much better volume comparison through the Beaver Pond.
*# - The CN and IA values for those NASHYDs were weighted averages of CN=90 for TIMP and CN=50 for grass areas, and the IA was based on weighted average of IA=1.5 for TIMP and IA=5.0 for grass areas.
*# - The Tp value was simply calculated by using the (LGI/0.3 * 2/3) / 3600, where the value of 0.3 was my assumed flow velocity.  Note, there are 4 catchments to which this was done, for a total of 48.3 ha representing just over 11% of the total drainage area to the Beaver Pond.
*# - removed  the two IBI Route Reservoirs that were previously inserted to account for some hidden system storage.
*#
*#=========================================================================
*# WATTS CREEK SUBWATERSHED
*# MODEL CONVERTED FROM QUALHYMO MODEL (DILLON, 2009)
*# DECEMBER 2014
*#=========================================================================
*# Model updated by JFSA (June 2019)to allow for continuous simulations to complete
*# preliminary erosion assessment.
*# Model reverted back to existing conditions using parameters as documented in
*# MVCA's Watts Creek Final Report November 2017
*# Model updated to reflect the current design for Kanata Lakes Stage 9 as per IBI's
*# March 2018 Design Brief
*# Kanata Lakes Stages 7 & 8 as per MVCA model
*#=========================================================================
*#                              KIZELL DRAIN
*#=========================================================================
* Area Tributary to Beaver Pond and Kizell Cell
*#=========================================================================
*#=========================================================================
*# Derived from Scenario 20 of Phase 1 SWM Study
*# AECOM MODEL + GOLF COURSE DETENTION PONDS
*# AMC II Condition
*# RAINFALL - BEAVER POND RAIN GAUGE (POINT RAINFALL)
*# DESIGN EVENTS
*#=========================================================================
*                           DESIGN STORMS
*#=========================================================================
*%----------------|-------------------------------------------------------|
```

```
START                TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[0002]
*                     "2y12hr.stm"
READ STORM           STORM_FILENAME=["storm.001"]
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*                              CALIBRATION EVENT
*#=============================================================================
*%-----------------|-------------------------------------------------------------|
*START                TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[2019]
*                    "P4June6-2019.stm"
*
*READ STORM           STORM_FILENAME=["storm.001"]
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*                              CONTINUOUS SIMULATIONS
*#=============================================================================
*START                TZERO=[1967.0719],  METOUT=[2],  NSTORM=[0],  NRUN=[1967]
*%                    [""] <--storm filename, one per line for NSTORM time
*%-----------------|-------------------------------------------------------------|
*# Ottawa International Airport - 19 July 1967 to 01 Nov 2007
*READ AES DATA        AES_FILENAME=["YOW_1967_2007.123"],
*                     IELEM=[123], START_DATE=[0], END_DATE=[-364]
*%-----------------|-------------------------------------------------------------|
*%-----------------|-------------------------------------------------------------|
COMPUTE API          APII=[40], APIK=[0.8]/day,
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# AREA 3A-1 (URBAN PORTION of Area North of Campeau Drive) TO DA 5A
*#=============================================================================
*# XIMP reduced to 0.05 since area drains across the golf course
CONTINUOUS STANDHYD      ID=[10], NHYD=["000100"], DT=[1](min), AREA=[2.7](ha),
                     XIMP=[0.05], TIMP=[0.47], DWF=[0](cms),
                     LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                     DCAY=[2.0](/hr), F=[0](mm),
                     Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                          LGP=[40](m), MNP=[0.25], SCP=[0](min),
                     Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                          LGI=[2134](m), MNI=[0.013], SCI=[0](min),
                     Continuous simulation parameters:
                     IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                     InterEventTime=[12](hrs), END=-1
*%-----------------|-------------------------------------------------------------|
*# Previous command replaced by a NASHYD to account for the fact that the drainage goes
*# over golf course and we want to recapture the baseflow
CONTINUOUS NASHYD    ID=[10], NHYD=["000100"], DT=[1](min), AREA=[2.7](ha)
                     DWF=[0](cms),  CN/C=[68.8], IA=[3.38](mm), N=[2], TP=[1.32](hrs),
                     Continuous simulation parameters:
                     IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                     InterEventTime=[12](hrs),
                     Baseflow simulation parameters:
                     BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                     VHydCond=[.001](mm/hr), END=-1
*%-----------------|-------------------------------------------------------------
------------------------------|
*#=============================================================================
*# AREA 3A-2 (URBAN PORTION of Area North of Campeau Drive)
*#=============================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["000100"], DT=[1](min), AREA=[33.4](ha),
                     XIMP=[0.250], TIMP=[0.41], DWF=[0](cms),
                     LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                     DCAY=[2.0](/hr), F=[0](mm),
                     Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                          LGP=[40](m), MNP=[0.25], SCP=[0](min),
                     Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                          LGI=[471](m), MNI=[0.013], SCI=[0](min),
                     Continuous simulation parameters:
                     IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
```

```
                    InterEventTime=[12](hrs), END=-1
*%----------------|-------------------------------------------------------------|
*
*#==============================================================================
*# AREA 3B (GOLF PORTION of Area North of Campeau Drive) TO DA 5A
*#==============================================================================
* Original CN=62
CONTINUOUS NASHYD       ID=[2], NHYD=["000100"], DT=[1]min, AREA=[6.3](ha),
                    DWF=[0](cms),  CN=[50], IA=[5.0](mm),
                    N=[2.0], TP=[0.55]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*%----------------|-------------------------------------------------------------|
*#==============================================================================
*# ADDED AREA 3A-1 TO 3B
*#==============================================================================
*
ADD HYD             IDsum=[3], NHYD=[000321], IDs to add=[10+2]
*%----------------|-------------------------------------------------------------|
*#==============================================================================
*# DA 5A
*#==============================================================================
ROUTE RESERVOIR     IDout=[2],   NHYD=[000100],  IDin=[3],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                    (cms) - (ha-m)
                                [   0.0 ,  0.0 ]
                                [  0.51 ,  0.00005 ]
                                [  0.65 ,  0.0040 ]
                                [  0.76 ,  0.0438 ]
                                [  0.86 ,  0.1887 ]
                                [  0.95 ,  0.5613 ]
                                [  0.98 ,  0.8197 ]
                                [200.00 ,  0.9017 ]
                                [   -1  ,  -1  ]  (max twenty pts)
                          IDovf=[   ], NHYDovf=[   ]
*%----------------|-------------------------------------------------------------|
*#==============================================================================
*# ADDED OUTFLOW FROM DA 5A TO 3A-2
*#==============================================================================
*
ADD HYD             IDsum=[3], NHYD=[000321], IDs to add=[1+2]
*%----------------|-------------------------------------------------------------|
*
*#==============================================================================
*# AREA 12 (GOLF PORTION OF Area East of Knudson Drive - DA 6B)
*#==============================================================================
CONTINUOUS NASHYD       ID=[1], NHYD=["000100"], DT=[1]min, AREA=[2.27](ha),
                    DWF=[0](cms),  CN=[50], IA=[5.0](mm),
                    N=[2.0], TP=[0.37]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*%----------------|-------------------------------------------------------------|
*
*#==============================================================================
*# AREA 13 (GOLF PORTION OF Area East of Knudson Drive - DA 6A)
*#==============================================================================
CONTINUOUS NASHYD       ID=[2], NHYD=["000100"], DT=[1]min, AREA=[2.9](ha),
                    DWF=[0](cms),  CN=[50], IA=[5.0](mm),
```

```
                    N=[2.0], TP=[0.64]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# ADDED AREA 13 AND AREA 12 TO 3A-2
*#=============================================================================
*
ADD HYD             IDsum=[10], NHYD=[000321], IDs to add=[1+2+3]
*%-----------------|-------------------------------------------------------------|
*
*#=============================================================================
*# AREA 2A (URBAN PORTION OF Area North of Campeau Drive)
*#=============================================================================
*#  ORIGINAL AREA 2A COMMAND FOLLOWS, WITH REDUCED AREA FOR THE PURPOSE OF GAUGE
*#  ON CAMPEAU DRIVE, THEN REINSERTED FOR OVERALL MODEL
**CONTINUOUS STANDHYD      ID=[1], NHYD=["000100"], DT=[1](min), AREA=[29.3](ha),
**                    XIMP=[0.250], TIMP=[0.45], DWF=[0](cms),
*                     LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
DCAY=[2.0](/hr), F=[0](mm),
**                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
**                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
**                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
**                                         LGI=[858](m), MNI=[0.013], SCI=[0](min),
**                    Continuous simulation parameters:
**                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
**                    SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
**                    InterEventTime=[12](hrs), END=-1
*%-----------------|-------------------------------------------------------------|
* Estimated at 22.6 ha to measuring point off GeoOttawa - not exact
CONTINUOUS STANDHYD      ID=[1], NHYD=["000100"], DT=[1](min), AREA=[22.6](ha),
                    XIMP=[0.250], TIMP=[0.45], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.5](mm), SLPI=[1](%),
                                         LGI=[388](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[3](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%-----------------|-------------------------------------------------------------|
SAVE HYD            ID=[1],  # OF PCYCLES=[-1],  ICASEsh=[-1]
                    HYD_FILENAME=["Campeau.hyd"]
                    HYD_COMMENT=["Campeau Drive monitoring site"]
*%-----------------|-------------------------------------------------------------
-----------------------------|
*#READ HYD            ID=[2],NHYD=["Measured"],
*#                    HYD_FILENAME=["Q_CampeauAt5min.hyd"]
*%-----------------|-------------------------------------------------------------
-----------------------------|
*# Area re-ntroduced to model completeness, but XIMP reduced to 0.05 since area drains
across golf course
CONTINUOUS STANDHYD      ID=[1], NHYD=["000100"], DT=[1](min), AREA=[29.3](ha),
                    XIMP=[0.05], TIMP=[0.45], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.5](mm), SLPI=[1](%),
                                         LGI=[441](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[3](hrs),  IaRECimp=[1.5](hrs),
```

```
                    InterEventTime=[12](hrs), END=-1
*%-----------------|-------------------------------------------------------------------------------|
*# Previous command replaced by a NASHYD to account for the fact that the drainage goes
*# over golf course and we want to recapture the baseflow
CONTINUOUS NASHYD   ID=[1], NHYD=["000100"], DT=[1](min), AREA=[29.3](ha)
                    DWF=[0](cms),  CN/C=[68], IA=[3.4](mm),
                    N=[2], TP=[0.27](hrs),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*
*#=============================================================================
*# AREA 2B-1 (GOLF PORTION OF Area North of Campeau Drive) TO DA 3
*#=============================================================================
* 0riginal CN=66
CONTINUOUS NASHYD       ID=[4], NHYD=["000100"], DT=[1]min, AREA=[13](ha),
                    DWF=[0](cms),  CN=[50], IA=[5.0](mm),
                    N=[2.0], TP=[0.443]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# ADD 2A TO 2B-1
*#=============================================================================
ADD HYD             IDsum=[2], NHYD=[000321], IDs to add=[1+4]
*%-----------------|-------------------------------------------------------------|
*
*#=============================================================================
*# DA 3
*#=============================================================================
ROUTE RESERVOIR     IDout=[4],   NHYD=[000100],  IDin=[2],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                      (cms) - (ha-m)
                                    [   0.0 ,  0.0 ]
                                    [   0.0 ,  0.0240 ]
                                    [   0.9 ,  0.4127 ]
                                    [  2.25 ,  0.4798 ]
                                    [  4.16 ,  0.5507 ]
                                    [ 10.00 ,  0.6058 ]
                                    [   -1  ,  -1   ]  (max twenty pts)
                          IDovf=[   ], NHYDovf=[   ]
*%-----------------|-------------------------------------------------------------|
*
*#=============================================================================
*# AREA 2C (URBAN PORTION OF Area North of Campeau Drive)
*#=============================================================================
*# XIMP reduced to 0.05 since area drains across the golf course
CONTINUOUS STANDHYD     ID=[1], NHYD=["000100"], DT=[1](min), AREA=[13.8](ha),
                    XIMP=[0.05], TIMP=[0.52], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[303](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
```

```
*%----------------|-------------------------------------------------------------|
*# Previous command replaced by a NASHYD to account for the fact that the drainage goes
*# over golf course and we want to recapture the baseflow
CONTINUOUS NASHYD   ID=[1], NHYD=["000100"], DT=[1](min), AREA=[13.8](ha)
                    DWF=[0](cms),  CN/C=[70.8], IA=[3.18](mm), N=[2], TP=[0.187](hrs),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*%-------------------------------------------------------------------------------
--
ADD HYD             IDsum=[2], NHYD=[000321], IDs to add=[1+4]
*%----------------|-------------------------------------------------------------|
*
*#==============================================================================
*# AREA 2B-2 (GOLF PORTION OF Area North of Campeau Drive) TO DA 4
*#==============================================================================
* Original CN=63
CONTINUOUS NASHYD        ID=[5], NHYD=["000100"], DT=[1]min, AREA=[15.7](ha),
                    DWF=[0](cms),  CN=[50], IA=[5.0](mm),
                    N=[2.0], TP=[0.837]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*%----------------|-------------------------------------------------------------|
ADD HYD             IDsum=[6], NHYD=[000321], IDs to add=[2+5]
*%----------------|-------------------------------------------------------------|
*#==============================================================================
*# DA 4
*#==============================================================================
ROUTE RESERVOIR     IDout=[2],   NHYD=[000100],  IDin=[6],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                    (cms) - (ha-m)
                                  [   0.0 ,  0.0 ]
                                  [  1.47 ,  0.00001 ]
                                  [  2.42 ,  0.0080 ]
                                  [  3.09 ,  0.0650 ]
                                  [  3.63 ,  0.3459 ]
                                  [  3.86 ,  0.8899 ]
                                  [  4.09 ,  1.6418 ]
                                  [  4.25 ,  3.6976 ]
                                  [ 200.0 ,  4.0674 ]
                                  [   -1  ,  -1  ]  (max twenty pts)
                          IDovf=[   ], NHYDovf=[   ]
*%----------------|-------------------------------------------------------------|
*#==============================================================================
*# ADD AREA 3A-2 TO OUTFLOW OF DA 4
*#==============================================================================
*# (JFS: THIS ADD HYD IS PART OF WHAT FLOWS TO THE WESLOCK GAUGE)
ADD HYD             IDsum=[5], NHYD=[000321], IDs to add=[2+10]
*%----------------|-------------------------------------------------------------|
SAVE HYD            ID=[5],  # OF PCYCLES=[-1],  ICASEsh=[-1]
                    HYD_FILENAME=["WESLOCK-A.HYD"]
                    HYD_COMMENT=["PART A OF WHAT FLOWS THROUGH GAUGE ON WESLOCK"]
*%----------------|-------------------------------------------------------------|
-----------------------------|
*#==============================================================================
*# AREA 1C (URBAN PORTION of Area North of Campeau Drive)
*#==============================================================================
*# This area is piped through the golf course, so no change in XIMP
CONTINUOUS STANDHYD      ID=[1], NHYD=["000100"], DT=[1](min), AREA=[17.8](ha),
```

```
                    XIMP=[0.250], TIMP=[0.51], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[344](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%-----------------|-------------------------------------------------------------|
*
*#=============================================================================
*# AREA 1B (GOLF PORTION OF Area North of Campeau Drive)
*#=============================================================================
* Original CN=61
CONTINUOUS NASHYD        ID=[2], NHYD=["000100"], DT=[1]min, AREA=[9.3](ha),
                    DWF=[0](cms),  CN=[50], IA=[5.0](mm),
                    N=[2.0], TP=[0.81]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# ADD 1C TO 1B
*#=============================================================================
ADD HYD             IDsum=[3], NHYD=[000321], IDs to add=[1+2]
*%-----------------|-------------------------------------------------------------|
*
*#=============================================================================
*# AREA 1A (INSTITUTION BLOCK)
*#=============================================================================
CONTINUOUS NASHYD        ID=[4], NHYD=["000100"], DT=[1]min, AREA=[11.4](ha),
                    DWF=[0](cms),  CN=[61], IA=[5.0](mm),
                    N=[2.0], TP=[0.56]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# AREA 1D (URBAN PORTION of Area North of Campeau Drive)
*#=============================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["000100"], DT=[1](min), AREA=[15.8](ha),
                    XIMP=[0.250], TIMP=[0.55], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[324](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# FROM AREA 1D, MAJOR FLOW TO 5B - MINOR FLOW TO 5C
*# 85 L/S/HA * 15.8 HA = 1.343 L/S
*#=============================================================================
COMPUTE DUALHYD     IDin=[1], CINLET=[1.343](cms), NINLET=[1],
                    MAJID=[7], MajNHYD=[000100],
                    MINID=[8], MinNHYD=[000100],
```

```
                    TMJSTO=[0](cu-m)
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# ADD 1A AND 1B TO 1D MINOR
*#=============================================================================
*# (JFS:  THIS ADD HYD IS PART OF WHAT FLOWS AT THE WESLOCK GAUGE)
ADD HYD             IDsum=[6], NHYD=[000321], IDs to add=[4+3+8]
*%-----------------|-------------------------------------------------------------|
SAVE HYD            ID=[6],  # OF PCYCLES=[-1],  ICASEsh=[-1]
                    HYD_FILENAME=["WESLOCK-B.HYD"]
                    HYD_COMMENT=["PART B OF FLOWS AT WESLOCK"]
*%-----------------|-------------------------------------------------------------
-----------------------------|
*
*#=============================================================================
*# AREA 5A (URBAN PORTION OF Area North of Knudson Drive)
*#=============================================================================
*# XIMP reduced to 0.05 since area drains across the golf course
CONTINUOUS STANDHYD      ID=[1], NHYD=["000100"], DT=[1](min), AREA=[2.5](ha),
                    XIMP=[0.05], TIMP=[0.50], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[129](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%-----------------|-------------------------------------------------------------|
*# Previous command replaced by a NASHYD to account for the fact that the drainage goes
*# over golf course and we want to recapture the baseflow
CONTINUOUS NASHYD   ID=[1], NHYD=["000100"], DT=[1](min), AREA=[2.5](ha)
                    DWF=[0](cms),  CN/C=[45.25], IA=[3.25](mm), N=[2], TP=[0.08](hrs),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*
*#=============================================================================
*# AREA 5B (GOLF PORTION OF Area North of Knudson Drive)
*#=============================================================================
CONTINUOUS NASHYD        ID=[2], NHYD=["000100"], DT=[1]min, AREA=[9.5](ha),
                    DWF=[0](cms),  CN=[50], IA=[5.0](mm),
                    N=[2.0], TP=[0.67]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# ADD 5A AND 1D MAJOR TO 5B
*#=============================================================================
ADD HYD             IDsum=[4], NHYD=[000321], IDs to add=[1+7+2]
*%-----------------|-------------------------------------------------------------|
*
*#=============================================================================
*# AREA 5C (URBAN PORTION OF Area North of Knudson Drive)
*#=============================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["000100"], DT=[1](min), AREA=[6.2](ha),
                    XIMP=[0.250], TIMP=[0.50], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
```

```
                      Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                           LGP=[40](m), MNP=[0.25], SCP=[0](min),
                      Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                           LGI=[203](m), MNI=[0.013], SCI=[0](min),
                      Continuous simulation parameters:
                      IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                      InterEventTime=[12](hrs), END=-1
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# MAJOR FLOW TO 5B - MINOR FLOW TO 6A
*# 85 L/S/HA * 6.2 HA = 0.527 L/S
*#=============================================================================
COMPUTE DUALHYD     IDin=[1], CINLET=[0.527](cms), NINLET=[1],
                    MAJID=[2], MajNHYD=[000100],
                    MINID=[8], MinNHYD=[000100],
                    TMJSTO=[0](cu-m)
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# ADD 5C MAJOR TO 5B
*#=============================================================================
ADD HYD             IDsum=[7], NHYD=[000321], IDs to add=[2+4]
*%-----------------|-------------------------------------------------------------|
*
*#=============================================================================
*# DA 8
*# WITH UPDATED DISCHARGE RATING CURVE BASED ON FIELD SURVEY INFORMATION
*#=============================================================================
ROUTE RESERVOIR     IDout=[3],   NHYD=[000100],  IDin=[7],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                     (cms) - (ha-m)
                                   [   0.0 ,  0.0 ]
                                   [  0.18 ,0.0004 ]
                                   [  0.22 ,0.0023 ]
                                   [  0.25 ,0.0092 ]
                                   [  0.28 ,0.0250 ]
                                   [  0.30 ,0.0580 ]
                                   [  0.33 ,0.1272 ]
                                   [  0.35 ,0.2435 ]
                                   [  0.37 ,0.4650 ]
                                   [ 200.0 ,0.5115 ]
                                   [   -1  ,  -1   ]  (max twenty pts)
                          IDovf=[   ], NHYDovf=[   ]
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# ADD 1D MINOR AND OUTLET OF DA 8 TO 5C MINOR
*#=============================================================================
ADD HYD             IDsum=[2], NHYD=[000321], IDs to add=[6+3+8]
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# ADD 3A TO 5C
*#=============================================================================
ADD HYD             IDsum=[5], NHYD=[000321], IDs to add=[5+2]
*%-----------------|-------------------------------------------------------------|
*%SHIFT HYD was removed as it was not being used and was crashing the model
*%SHIFT HYD           IDout=[5], NHYD=[000100], IDin=[4], TLAG=[0](min)
*%-----------------|-------------------------------------------------------------|
*
*#=============================================================================
*# AREA 6A (URBAN PORTION OF Area North of Knudson Drive)
*#=============================================================================
*# XIMP reduced to 0.05 since area drains across the golf course
CONTINUOUS STANDHYD      ID=[1], NHYD=["000100"], DT=[1](min), AREA=[4.1](ha),
                    XIMP=[0.050], TIMP=[0.52], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
```

```
                                        LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                        LGI=[165](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%----------------|-------------------------------------------------------------|
*
*#==============================================================================
*# AREA 6B (GOLF PORTION OF Area North of Knudson Drive)
*#==============================================================================
CONTINUOUS NASHYD       ID=[2], NHYD=["000100"], DT=[1]min, AREA=[5.9](ha),
                    DWF=[0](cms),  CN=[50], IA=[5.0](mm),
                    N=[2.0], TP=[0.87]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*%----------------|-------------------------------------------------------------|
*#==============================================================================
*# ADD 6A TO 6B
*#==============================================================================
ADD HYD             IDsum=[3], NHYD=[000321], IDs to add=[1+2]
*%----------------|-------------------------------------------------------------|
*
*#==============================================================================
*# AREA 6C (URBAN PORTION OF Area North of Knudson Drive)
*#==============================================================================
CONTINUOUS STANDHYD     ID=[1], NHYD=["000100"], DT=[1](min), AREA=[5.3](ha),
                    XIMP=[0.250], TIMP=[0.50], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                        LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                        LGI=[187](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%----------------|-------------------------------------------------------------|
*#==============================================================================
*# MAJOR FLOW TO 6B - MINOR FLOW TO 7
*# 85 L/S/HA * 5.3 HA = 0.4505 L/S
*#==============================================================================
COMPUTE DUALHYD     IDin=[1], CINLET=[0.451](cms), NINLET=[1],
                    MAJID=[2], MajNHYD=[000100],
                    MINID=[6], MinNHYD=[000100],
                    TMJSTO=[0](cu-m)
*%----------------|-------------------------------------------------------------|
*#==============================================================================
*# ADD 6C MAJOR TO 6B
*#==============================================================================
ADD HYD             IDsum=[4], NHYD=[000321], IDs to add=[2+3]
*#==============================================================================
*# DA 9
*# WITH UPDATED DISCHARGE RATING CURVE BASED ON FIELD SURVEY INFORMATION
*#==============================================================================
ROUTE RESERVOIR     IDout=[3],   NHYD=[000100],  IDin=[4],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                    (cms) - (ha-m)
                                [   0.0 ,  0.0 ]
                                [  0.25 ,0.00003 ]
                                [  0.31 ,0.0039 ]
                                [  0.36 ,0.0285 ]
```

```
                                    [  0.40 ,0.0901 ]
                                    [  0.44 ,0.2499 ]
                                    [  0.47 ,0.6154 ]
                                    [  0.48 ,0.7609 ]
                                    [200.00 ,0.8370 ]
                                    [   -1  ,  -1   ]  (max twenty pts)
                              IDovf=[   ], NHYDovf=[   ]
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# ADD DA 9 OUTFLOW TO 6C MINOR
*#=============================================================================
ADD HYD             IDsum=[2], NHYD=[000321], IDs to add=[3+6]
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# ADD 5C TO 6C
*#=============================================================================
ADD HYD             IDsum=[5], NHYD=[000321], IDs to add=[5+2]
*%-----------------|-------------------------------------------------------------|
*SHIFT HYD was removed as it was not being used and was crashing the model
*SHIFT HYD           IDout=[5], NHYD=[00100], IDin=[4], TLAG=[0](min)
*%-----------------|-------------------------------------------------------------|
*
*#=============================================================================
*# AREA 14 (GOLF PORTION OF Area East of Knudson Drive - DA 11)
*#=============================================================================
CONTINUOUS NASHYD        ID=[2], NHYD=["000100"], DT=[1]min, AREA=[2.38](ha),
                    DWF=[0](cms),  CN=[50], IA=[5.0](mm),
                    N=[2.0], TP=[0.40]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# DA 11
*# RATING CURVE BASED ON FIELD SURVEY INFORMATION
*#=============================================================================
ROUTE RESERVOIR     IDout=[4],   NHYD=[000100],  IDin=[2],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                     (cms) - (ha-m)
                                    [   0.0 ,  0.0 ]
                                    [  0.09 ,0.0019 ]
                                    [  0.12 ,0.0735 ]
                                    [ 0.145 ,0.2234 ]
                                    [ 0.146 ,0.2349 ]
                                    [200.00 ,0.2584 ]
                                    [   -1  ,  -1   ]  (max twenty pts)
                              IDovf=[   ], NHYDovf=[   ]
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# ADD OUTFLOW OF DA 11 TO 6C
*#=============================================================================
ADD HYD             IDsum=[2], NHYD=[000321], IDs to add=[5+4]
*%-----------------|-------------------------------------------------------------|
*
*#=============================================================================
*# AREA 15 (GOLF PORTION OF Area South of Walden Drive - DA 10B)
*#=============================================================================
CONTINUOUS NASHYD        ID=[4], NHYD=["000100"], DT=[1]min, AREA=[2.5](ha),
                    DWF=[0](cms),  CN=[50], IA=[5.0](mm),
                    N=[2.0], TP=[0.20]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
```

```
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*%----------------|-------------------------------------------------------------|
*#=============================================================================
*# DA 10B
*# RATING CURVE BASED ON FIELD SURVEY INFORMATION
*#=============================================================================
ROUTE RESERVOIR     IDout=[5],   NHYD=[000100],  IDin=[4],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                    (cms) - (ha-m)
                                  [   0.0 ,  0.0 ]
                                  [  0.32 ,0.0018 ]
                                  [  0.34 ,0.0093 ]
                                  [  0.36 ,0.0309 ]
                                  [  0.38 ,0.1597 ]
                                  [  0.40 ,0.3353 ]
                                  [200.00 ,0.3688 ]
                                  [   -1  ,  -1   ]  (max twenty pts)
                          IDovf=[   ], NHYDovf=[   ]
*%----------------|-------------------------------------------------------------|
*
*#=============================================================================
*# AREA 7 (Adjacent to Beaver Pond)
*#=============================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["000204"], DT=[1](min), AREA=[19.6](ha),
                    XIMP=[0.250], TIMP=[0.44], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[361](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%----------------|-------------------------------------------------------------|
*#=============================================================================
*# ADD OUTFLOW OF DA 10B AND 6C TO 7
*# TOTAL FLOW - AT EXISTING 2700 MM OUTLET
*#=============================================================================
ADD HYD             IDsum=[10], NHYD=[000321], IDs to add=[5+2+1]
*%----------------|-------------------------------------------------------------|
*
*#=============================================================================
*# AREA 4C
*#=============================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["000204"], DT=[1](min), AREA=[5.8](ha),
                    XIMP=[0.250], TIMP=[0.53], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[196](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%----------------|-------------------------------------------------------------|
*#=============================================================================
*# MAJOR FLOW TO 4B - MINOR FLOW TO 4A
*# 85 L/S/HA * 5.8 HA = 493 L/S
*#=============================================================================
COMPUTE DUALHYD     IDin=[1], CINLET=[0.493](cms), NINLET=[1],
                    MAJID=[5], MajNHYD=[000100],
                    MINID=[6], MinNHYD=[100100],
```

```
                    TMJSTO=[0](cu-m)
*%-----------------|-------------------------------------------------------------|
*
*#=============================================================================
*# AREA 4A - FLOW THROUGH AREA 4
*#=============================================================================
CONTINUOUS STANDHYD      ID=[3], NHYD=["000204"], DT=[1](min), AREA=[15.8](ha),
                    XIMP=[0.250], TIMP=[0.66], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[324](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%-----------------|-------------------------------------------------------------|
*
*#=============================================================================
*# ADDITION OF 4C MINOR TO 4A
*#=============================================================================
*
ADD HYD              IDsum=[4], NHYD=[000231], IDs to add=[3+6]
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# AREA 4B - ROUTE THROUGH ON SITE STORAGE
*#=============================================================================
CONTINUOUS STANDHYD      ID=[3], NHYD=["000204"], DT=[1](min), AREA=[6.2](ha),
                    XIMP=[0.250], TIMP=[0.57], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[203](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# ADDITION OF MAJOR FLOW AT 4C TO AREA 4B
*#=============================================================================
ADD HYD              IDsum=[6], NHYD=[000231], IDs to add=[5+3]
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# ON-SITE STORAGE IN AREA 4B
*# 85L/S/HA
*#=============================================================================
*
ROUTE RESERVOIR      IDout=[3],   NHYD=[000100],  IDin=[6],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                     (cms) - (ha-m)
                                [   0.0 ,  0.0 ]
                                [ 0.527, 0.2840]
                                [   -1  ,  -1  ]  (max twenty pts)
                          IDovf=[], NHYDovf=[]
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# ADDITION OF ROUTED 4B TO AREA 4A
*#=============================================================================
ADD HYD              IDsum=[8], NHYD=[000231], IDs to add=[4+3]
*%-----------------|-------------------------------------------------------------|
*
*#=============================================================================
*# AREA 4 (Adjacent to Beaver Pond)
```

```
*#=============================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["000204"], DT=[1](min), AREA=[21.2](ha),
                    XIMP=[0.250], TIMP=[0.38], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[375](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%----------------|-------------------------------------------------------|
*#=============================================================================
*# ADDITION OF MINOR FLOW AT 4A TO AREA 4
*#=============================================================================
ADD HYD             IDsum=[3], NHYD=[000231], IDs to add=[8+1]
*%----------------|-------------------------------------------------------|
ADD HYD             IDsum=[7], NHYD=[000231], IDs to add=[10+3]
*%----------------|-------------------------------------------------------|
*#=============================================================================
*# AREA 9 (RURAL - includes Beaver Pond itself)
*#=============================================================================
CONTINUOUS NASHYD   ID=[2], NHYD=["000100"], DT=[1]min, AREA=[18.9](ha),
                    DWF=[0](cms),  CN=[75], IA=[5.0](mm),
                    N=[2.0], TP=[0.37]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*%----------------|-------------------------------------------------------|
ADD HYD             IDsum=[6], NHYD=[000321], IDs to add=[7+2]
*%----------------|-------------------------------------------------------|
*
*#=============================================================================
*# GOULDBOURN FORCED ROAD - KANATA AVENUE TO AREA 10 BOUNDARY
*# (ARTERIAL ROAD 10 YEAR 10 MN INLET TIME)
*#=============================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["000204"], DT=[1](min), AREA=[1.6](ha),
                    XIMP=[0.71], TIMP=[0.71], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[103](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%----------------|-------------------------------------------------------|
*#=============================================================================
*# MAJOR FLOW TO BEAVER POND - MINOR FLOW TO AREA 10 STORM SYSTEM
*# 237.69 L/S/HA * 1.66 HA = 394.6 L/S
*#=============================================================================
COMPUTE DUALHYD     IDin=[1], CINLET=[0.395](cms), NINLET=[1],
                    MAJID=[2], MajNHYD=[000100],
                    MINID=[7], MinNHYD=[100100],
                    TMJSTO=[0](cu-m)
*%----------------|-------------------------------------------------------|
*#=============================================================================
*# BEAVER POND PORTION #1
*#=============================================================================
*
ADD HYD             IDsum=[9], NHYD=[000321], IDs to add=[6+2]
*%----------------|-------------------------------------------------------|
```

```
*
*#=============================================================================
*# KANATA AVENUE - GOULBOURN FORCED ROAD TO AREA 10 BOUNDARY
*# (ARTERIAL ROAD 10 YEAR 10 MIN INLET TIME)
*#=============================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["000204"], DT=[1](min), AREA=[2.8](ha),
                    XIMP=[0.32], TIMP=[0.32], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[136](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# MAJOR FLOW TOWARDS TFD - MINOR FLOW TO AREA 10 STORM SYSTEM
*# 237.69 L/S/HA * 1.8 HA = 427.8 L/S
* JFSA correction based on above drainage area of 2.8 ha
* Capture in DUALHYD below 237.69 L/s/ha * 2.8 ha = 665.5 L/s
*#=============================================================================
COMPUTE DUALHYD      IDin=[1], CINLET=[0.6655](cms), NINLET=[1],
                     MAJID=[10], MajNHYD=[000100],
                     MINID=[2], MinNHYD=[100100],
                     TMJSTO=[0](cu-m)
*%-----------------|-------------------------------------------------------------|
*
*#=============================================================================
*# DRAINAGE AGREA 10 - TOTAL 43.6 HA - DIVIDED UP FOR HGL ANALYSIS
*# (INCLUDES AREA 10-4, 10-1, 10-2 AND 10-3)
*#=============================================================================
*
*#=============================================================================
*# AREA 10-4 - DRAINS INTO S-5 - MAJOR FLOW CASCADES
*#=============================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["000204"], DT=[1](min), AREA=[13.9](ha),
                    XIMP=[0.250], TIMP=[0.51], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[304](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# MINOR FLOW INTO SYSTEM
*# 85 L/S/HA * 14 = 1190 L/S
*JFSA correction based on above drainage area of 13.9 ha
* Capture in DUALHYD below 85 L/s/ha * 13.9 ha = 1181 L/s
*#=============================================================================
COMPUTE DUALHYD      IDin=[1], CINLET=[1.181](cms), NINLET=[1],
                     MAJID=[8], MajNHYD=[000100],
                     MINID=[6], MinNHYD=[100100],
                     TMJSTO=[0](cu-m)
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# ADD KANATA AVENUE AND AREA 10-4 - MH S-5
*#=============================================================================
*
ADD HYD              IDsum=[5], NHYD=[000101], IDs to add=[6+2]
*%-----------------|-------------------------------------------------------------|
*
```

```
*#==========================================================================
*# AREA 10-1 - DRAINS INTO S-4 - MAJOR FLOW CASCADES
*#==========================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["000204"], DT=[1](min), AREA=[9.8](ha),
                    XIMP=[0.250], TIMP=[0.51], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[255](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%----------------|-----------------------------------------------------------|
*#==========================================================================
*# MINOR FLOW INTO SYSTEM
*# 85 L/S/HA * 9.5 = 807.5 L/S
*JFSA correction based on above drainage area of 9.8 ha
* Capture in DUALHYD below 85 L/s/ha * 9.8 ha = 833 L/s
*#==========================================================================
COMPUTE DUALHYD     IDin=[1], CINLET=[0.833](cms), NINLET=[1],
                    MAJID=[4], MajNHYD=[000100],
                    MINID=[6], MinNHYD=[100100],
                    TMJSTO=[0](cu-m)
*%----------------|-----------------------------------------------------------|
*#==========================================================================
*# ADD GOULBOURN FORCED ROAD AND AREA 10-1 - MH S-3
*#==========================================================================
*
ADD HYD             IDsum=[3], NHYD=[000101], IDs to add=[6+7]
*%----------------|-----------------------------------------------------------|
ADD HYD             IDsum=[7], NHYD=[000102], IDs to add=[3+5]
*%----------------|-----------------------------------------------------------|
*
*#==========================================================================
*# AREA 10-3 - DRAINS INTO S-2 - MAJOR FLOW CASCADES
*#==========================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["000204"], DT=[1](min), AREA=[4.3](ha),
                    XIMP=[0.250], TIMP=[0.55], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[169](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%----------------|-----------------------------------------------------------|
*#==========================================================================
*# MINOR FLOW INTO SYSTEM
*# 85 L/S/HA * 3.9 = 331.5 L/S
*JFSA correction based on above drainage area of 4.3 ha
* Capture in DUALHYD below 85 L/s/ha * 4.3 ha = 365 L/s
*#==========================================================================
COMPUTE DUALHYD     IDin=[1], CINLET=[0.365](cms), NINLET=[1],
                    MAJID=[5], MajNHYD=[000100],
                    MINID=[2], MinNHYD=[100100],
                    TMJSTO=[0](cu-m)
*%----------------|-----------------------------------------------------------|
ADD HYD             IDsum=[10], NHYD=[000103], IDs to add=[2+7]
*%----------------|-----------------------------------------------------------|
*
*#==========================================================================
*# AREA 10-2 - DRAINS INTO S-6 - MAJOR FLOW CASCADES
*#==========================================================================
```

```
CONTINUOUS STANDHYD      ID=[1], NHYD=["000204"], DT=[1](min), AREA=[18.6](ha),
                    XIMP=[0.250], TIMP=[0.51], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[352](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%----------------|-------------------------------------------------------------|
*#=============================================================================
*# MINOR FLOW INTO SYSTEM
*# 85 L/S/HA * 16.2 = 1377 L/S
*JFSA correction based on above drainage area of 18.6 ha
* Capture in DUALHYD below 85 L/s/ha * 18.6 ha = 1581 L/s
*#=============================================================================
COMPUTE DUALHYD     IDin=[1], CINLET=[1.581](cms), NINLET=[1],
                    MAJID=[2], MajNHYD=[000100],
                    MINID=[6], MinNHYD=[100100],
                    TMJSTO=[0](cu-m)
*%----------------|-------------------------------------------------------------|
*
*#=============================================================================
*# AREA 10A - MINOR FLOW TO AREA 10, MAJOR FLOW TO CARP RIVER WATERSHED
*#=============================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["000204"], DT=[1](min), AREA=[9.9](ha),
                    XIMP=[0.250], TIMP=[0.44], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[256](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%----------------|-------------------------------------------------------------|
*#=============================================================================
*# SPLIT OF MAJOR AND MINOR FLOW AT 85 L/S/HA
*# 85 * 7.0 = 595 L/S
*JFSA correction based on above drainage area of 9.9 ha
* Capture in DUALHYD below 85 L/s/ha * 9.9 ha = 841 L/s
*#=============================================================================
COMPUTE DUALHYD     IDin=[1], CINLET=[0.841](cms), NINLET=[1],
                    MAJID=[3], MajNHYD=[000100],
                    MINID=[7], MinNHYD=[100100],
                    TMJSTO=[0](cu-m)
*%----------------|-------------------------------------------------------------|
ADD HYD             IDsum=[1], NHYD=[000104], IDs to add=[7+6]
*%----------------|-------------------------------------------------------------|
*#=============================================================================
*# TOTAL MINOR FLOW AT OUTLET
*#=============================================================================
ADD HYD             IDsum=[6], NHYD=[000105], IDs to add=[1+10]
*%----------------|-------------------------------------------------------------|
*#=============================================================================
*# TOTAL MAJOR FLOW FOR DRAINAGE AREA 10 AT OUTLET
*#=============================================================================
ADD HYD             IDsum=[7], NHYD=[000106], IDs to add=[8+4+5+2]
*%----------------|-------------------------------------------------------------|
*#=============================================================================
*# AREA 11 (RURAL) - Increased Area for Existing Conditions
*#=============================================================================
CONTINUOUS NASHYD        ID=[2], NHYD=["000100"], DT=[1]min, AREA=[46.2](ha),
                    DWF=[0](cms),  CN=[62], IA=[5.0](mm),
```

```
                    N=[2.0], TP=[0.75]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*%-----------------|-------------------------------------------------------------|
ADD HYD             IDsum=[3], NHYD=[000317], IDs to add=[7+2]
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# TOTAL FLOW TO KIZELL POND (U/S CELL)
*#=============================================================================
ADD HYD             IDsum=[10], NHYD=[000317], IDs to add=[3+6]
*%-----------------|-------------------------------------------------------------|
*
*#=============================================================================
*# SYSTEM STORAGE REPRESENTATION (KIZELL POND)
*# RATING CURVE PROVIDED BY IBI
*#=============================================================================
*# modify the ROUTE RESERVOIR to negate the effect of this underground storage
ROUTE RESERVOIR     IDout=[3],   NHYD=["KP-R"],  IDin=[10],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                     (cms) - (ha-m)
                                   [   0.0 ,  0.0 ]
                                   [ 99.   ,  0.09]
                                   [   -1  ,  -1  ]  (max twenty pts)
                          IDovf=[4], NHYDovf=["OVF-KP"]
*#=============================================================================
*# ADD SYSTEM STORAGE OUTFLOW, OVERFLOW AND BYPASS (KIZELL)
*#=============================================================================
ADD HYD             IDsum=[10], NHYD=["KP-COM"], IDs to add=[3+4]
*#=============================================================================
*
* Kanata Lakes Stage 7
*
*#=============================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["Stage 7"], DT=[1](min), AREA=[73.1](ha),
                    XIMP=[0.40], TIMP=[0.50], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[76.20](mm/hr), Fc=[13.2](mm/hr),
                    DDCAY=[4.14](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.2](%),
                                         LGI=[256](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*#=============================================================================
*
* Kanata Lakes Stage 8
*
*#=============================================================================
CONTINUOUS STANDHYD      ID=[2], NHYD=["Stage 8"], DT=[1](min), AREA=[65.7](ha),
                    XIMP=[0.40], TIMP=[0.50], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[76.20](mm/hr), Fc=[13.2](mm/hr),
                    DCAY=[4.14](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.2](%),
                                         LGI=[661](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*#=============================================================================
*# Only Minor system flow to Kizell Cell
```

```
* JFSA: fFlow split adjusted to reflect new 5-Year runoff rate with corrected LGI
*#============================================================================
COMPUTE DUALHYD     IDin=[2], CINLET=[4.321](cms), NINLET=[1],
                    MAJID=[3], MajNHYD=[000100],
                    MINID=[7], MinNHYD=[100100],
                    TMJSTO=[0](cu-m)
*#============================================================================
* Total flow into Kizell Cell
*#============================================================================
ADD HYD             IDsum=[8], NHYD=["KP-COM"], IDs to add=[10+1+7]
*#============================================================================
*#============================================================================
* ROUTE THROUGH THE KIZELL CELL
*
ROUTE RESERVOIR     IDout=[5],   NHYD=["Kizell Cell"],  IDin=[8],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                    (cms) - (ha-m)
                                [   0.0 ,  0.0 ]
                                [ 0.100 ,  0.016]
                                [ 0.200 ,  0.033]
                                [ 0.300 ,  0.055]
                                [ 0.400 ,  0.079]
                                [ 0.500 ,  0.121]
                                [ 0.700 ,  0.188]
                                [ 0.800 ,  0.281]
                                [ 0.950 ,  0.433]
                                [ 1.050 ,  0.658]
                                [ 1.200 ,  0.919]
                                [   -1  ,  -1  ]  (max twenty pts)
                           IDovf=[4], NHYDovf=["OVF-Kizell Cell"]
*#============================================================================
*# ADD OUTFLOW AND OVERFLOW
*#============================================================================
ADD HYD             IDsum=[8], NHYD=["KP-COM"], IDs to add=[5+4]
*#============================================================================
*#============================================================================
*# SYSTEM STORAGE REPRESENTATION (BEAVER POND)
*# RATING CURVE PROVIDED BY IBI
*#============================================================================
* modify the ROUTE RESERVOIR to negate the effects of the underground storage
ROUTE RESERVOIR     IDout=[3],   NHYD=["BP-R"],  IDin=[9],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                    (cms) - (ha-m)
                                [   0.0 ,  0.0 ]
                                [ 99.0 ,  0.09]
                                [   -1  ,  -1  ]  (max twenty pts)
                          IDovf=[4], NHYDovf=["OVF-BP"]
*#============================================================================
*# ADD SYSTEM STORAGE OUTFLOW, OVERFLOW AND BYPASS (BEAVER)
*#============================================================================
ADD HYD             IDsum=[9], NHYD=["BP-COM"], IDs to add=[3+4]
*#============================================================================
*
* Kanata Lakes Stage 9
*
*#============================================================================
* Under the latest proposed development conditions these lands will be broken into
* 3 catchment Beaver Pond (19.31 ha), Kizell Drain (6.89 ha) and Shirley's Brook (4.51 ha).
* As per IBI's "Design Brief KNL Stage 9 Kanata Lakes North" (March 2018).
* No on-site controls have been assumed for this area.
*#============================================================================
*
* Kanata Lakes Stage 9 - Beaver Pond
*
```

```
*#=============================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["Stage 9-Beaver"], DT=[1](min), AREA=[19.31](ha),
                    XIMP=[0.50], TIMP=[0.60], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[76.20](mm/hr), Fc=[13.2](mm/hr),
                    DCAY=[4.14](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.2](%),
                                         LGI=[359](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*#=============================================================================
*
* Kanata Lakes Stage 9 - Shirley's Brook - Under developed conditions these lands
* discharge to Shirley's Brook and do not drain to the Kizell drain, but this catchment
* has been left in the model as a area closure check.
*
*#=============================================================================
CONTINUOUS STANDHYD      ID=[6], NHYD=["Stage 9-Shirley"], DT=[1](min), AREA=[4.51](ha),
                    XIMP=[0.53], TIMP=[0.63], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[76.20](mm/hr), Fc=[13.2](mm/hr),
                    DCAY=[4.14](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.2](%),
                                         LGI=[173](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*#=============================================================================
*# TOTAL HYDROGRAPH INTO BEAVER POND
*
ADD HYD              IDsum=[6], NHYD=["BP-TOTAL"], IDs to add=[9+8+1]
*
*#=============================================================================
SAVE HYD             ID=[6],  # OF PCYCLES=[-1],  ICASEsh=[-1]
                     HYD_FILENAME=["BP_In"]
                     HYD_COMMENT=["Total inflow to the Beaver Pond"]
*#=============================================================================
*# TOTAL FLOW FROM BEAVER POND
*#=============================================================================
* ROUTE THROUGH BEAVER POND
* Overflow option removed to allow for linear extrapolation of flows out of the
* pond when simulated volumes exceed volumes provided in the curve below.
ROUTE RESERVOIR      IDout=[1],   NHYD=["BP-OUT"],  IDin=[6],
                     RDT=[1](min),
                           TABLE of ( OUTFLOW-STORAGE ) values
                                      (cms) - (ha-m)
                                    [   0.0 ,  0.0 ]
                                    [ 0.592 ,  4.573]
                                    [ 0.686 ,  6.569]
                                    [ 0.769 ,  8.840]
                                    [ 0.879 ,  11.467]
                                    [ 1.007 ,  16.103]
                                    [ 1.040 ,  17.339]
                                    [   -1  ,  -1   ]  (max twenty pts)
                        IDovf=[], NHYDovf=[""]
*#=============================================================================
SAVE HYD             ID=[1],  # OF PCYCLES=[-1],  ICASEsh=[-1]
                     HYD_FILENAME=["BP_Out"]
                     HYD_COMMENT=["Total Outflow from the Beaver Pond"]
*#=============================================================================
*# ROUTE KD-1 THROUGH KD-2A
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 10018.26
*#=============================================================================
ROUTE CHANNEL        IDout=[3], NHYD=["KD-1"], IDin=[1],
```

```
                    RDT=[1](min),
                    CHLGTH=[277](m),  CHSLOPE=[1.08](%),
                                        FPSLOPE=[1.08](%),
                    SECNUM=[10018],       NSEG=[4]
                    ( SEGROUGH, SEGDIST (m))=[0.08,30.63 -0.03,34.69 0.08,49.66 0.04,70.77] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 94.54 ]
                                                   [ 7.12,  93.2 ]
                                                   [11.07,  92.3 ]
                                                   [15.31,  91.8 ]
                                                   [17.16, 91.35 ]
                                                   [20.56,  90.8 ]
                                                   [25.12, 89.58 ]
                                                   [28.15,  88.5 ]
                                                   [30.63,  87.8 ]
                                                   [31.957, 87.854 ]
                                                   [ 34.4,  88.5 ]
                                                   [34.69, 88.61 ]
                                                   [ 36.5, 89.23 ]
                                                   [38.48,  90.2 ]
                                                   [41.14,  91.1 ]
                                                   [ 45.4, 91.66 ]
                                                   [49.66, 91.96 ]
                                                   [53.06,  92.3 ]
                                                   [67.16, 92.43 ]
                                                   [70.77, 92.52 ]
*#=========================================================================
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 9854.606
*#=========================================================================
ROUTE CHANNEL       IDout=[2], NHYD=["KD-1"], IDin=[3],
                    RDT=[1](min),
                    CHLGTH=[186](m),  CHSLOPE=[1.97](%),
                                        FPSLOPE=[1.97](%),
                    SECNUM=[9854],       NSEG=[5]
                    ( SEGROUGH, SEGDIST (m))=[0.08,29.81 0.05,34.304 -0.03,38.24 0.05,47.73 0.08,105.39] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 90.07 ]
                                                   [ 6.86,  89.4 ]
                                                   [13.24,  89.2 ]
                                                   [17.79, 88.48 ]
                                                   [22.46,  87.2 ]
                                                   [29.81, 86.04 ]
                                                   [32.17, 85.72 ]
                                                   [34.304, 85.612 ]
                                                   [36.137, 85.654 ]
                                                   [37.46, 85.69 ]
                                                   [38.24, 85.72 ]
                                                   [44.98,  85.9 ]
                                                   [47.73, 86.32 ]
                                                   [51.27,  87.3 ]
                                                   [55.17,    88 ]
                                                   [87.02, 88.79 ]
                                                   [90.72,  88.7 ]
                                                   [93.96,    89 ]
                                                   [99.45,  90.8 ]
                                                   [105.39, 91.81 ]
*#=========================================================================
*# KD-2A-1 - RURAL - Reduced Area for Future Conditions
*#=========================================================================
CONTINUOUS NASHYD         ID=[1], NHYD=["KD-2A-1"], DT=[1]min, AREA=[6.79](ha),
                    DWF=[0](cms),  CN=[57], IA=[7](mm),
                    N=[2.0], TP=[0.91]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
```

```
                    VHydCond=[.001](mm/hr), END=-1
*#==============================================================================
*
* Kanata Lakes Stage 9 - Kizell Drain
*
*#==============================================================================
CONTINUOUS STANDHYD      ID=[4], NHYD=["Stage 9-Kizell"], DT=[1](min), AREA=[6.89](ha),
                    XIMP=[0.48], TIMP=[0.58], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[76.20](mm/hr), Fc=[13.2](mm/hr),
                    DCAY=[4.14](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.2](%),
                                         LGI=[215](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*#==============================================================================
*# ADD KD-2A-1, KD-1 and portion of KNL Stage 9
*#==============================================================================
ADD HYD             IDsum=[3], NHYD=["KFP2"], IDs to add=[1+2+4]
*#==============================================================================
*# ROUTE THROUGH KD-2A-2
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 9743.627
*#==============================================================================
ROUTE CHANNEL       IDout=[1], NHYD=["KD-1"], IDin=[3],
                    RDT=[1](min),
                    CHLGTH=[408](m),  CHSLOPE=[0.84](%),
                                        FPSLOPE=[0.84](%),
                    SECNUM=[9743],       NSEG=[5]
                    ( SEGROUGH, SEGDIST (m))=[0.05,42.45 -0.03,44.28 -0.05,46.07
                    0.05,63.17 0.08,111.15] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0,  86.7 ]
                                                   [ 7.01,  86.7 ]
                                                   [15.57,  86.2 ]
                                                   [21.06, 85.58 ]
                                                   [25.69, 84.76 ]
                                                   [31.55, 83.42 ]
                                                   [40.62,  82.7 ]
                                                   [42.45,  82.5 ]
                                                   [44.28, 82.561 ]
                                                   [ 44.6, 82.59 ]
                                                   [46.07,  82.7 ]
                                                   [48.58, 82.76 ]
                                                   [59.09, 82.59 ]
                                                   [63.17, 83.94 ]
                                                   [67.14,  85.3 ]
                                                   [71.84,  85.8 ]
                                                   [82.08,  85.8 ]
                                                   [89.16,  86.2 ]
                                                   [106.01,  86.6 ]
                                                   [111.15, 86.65 ]
*#==============================================================================
SAVE HYD            ID=[1],  # OF PCYCLES=[-1],  ICASEsh=[-1]
                    HYD_FILENAME=["KD-1"]
                    HYD_COMMENT=["KD-1-Channel where Erosion analysis was completed"]
*#==============================================================================
*# Erosion Analysis on Kizell Drain (Requires SWMHYMO v5.5)
*#==============================================================================
*# Erosion Index/critical shear stress calculated for flows through the critical
*# section of on Kizell Drain as determined by Matrix Solutions (May 2019)
*#==============================================================================
EROSION INDEX       INDEX_METHOD=[1], QCE =[0.50](cms), NHYDsErosion=[1]
*#==============================================================================
EROSION INDEX       INDEX_METHOD=[2], SHEARC =[20](Pa), No of Hyds=[1],
                    NHYDsErosion=[1]
                    RATING_CURVE_METHOD = [1], user entered channel shape
```

```
                    Channel section parameters
                    Section No["XS1"]
                    CHSLOPE=[0.84](%), FPSLOPE=[0.84](%),
                    NSEG=[5]
                    ( SEGROUGH, SEGDIST (m))=[0.05,42.45 -0.03,44.28 -0.05,46.07
                    0.05,63.17 0.08,111.15] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0,  86.7 ]
                                                   [ 7.01,  86.7 ]
                                                   [15.57,  86.2 ]
                                                   [21.06, 85.58 ]
                                                   [25.69, 84.76 ]
                                                   [31.55, 83.42 ]
                                                   [40.62,  82.7 ]
                                                   [42.45,  82.5 ]
                                                   [44.28, 82.561 ]
                                                   [ 44.6, 82.59 ]
                                                   [46.07,  82.7 ]
                                                   [48.58, 82.76 ]
                                                   [59.09, 82.59 ]
                                                   [63.17, 83.94 ]
                                                   [67.14,  85.3 ]
                                                   [71.84,  85.8 ]
                                                   [82.08,  85.8 ]
                                                   [89.16,  86.2 ]
                                                   [106.01,  86.6 ]
                                                   [111.15, 86.65 ]
*#=============================================================================
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 9338.062
*# MINIMUM SLOPE ASSUMED 0.1%
*#=============================================================================
ROUTE CHANNEL       IDout=[2], NHYD=["KD-1"], IDin=[1],
                    RDT=[1](min),
                    CHLGTH=[111](m),  CHSLOPE=[0.1](%),
                                        FPSLOPE=[0.1](%),
                    SECNUM=[9338],       NSEG=[5]
                    ( SEGROUGH, SEGDIST (m))=[0.04,78.47 0.06,82.78 -0.03,87.28
                    0.06,107.69 0.04,120.16] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0,  82.8 ]
                                                   [ 6.26, 82.86 ]
                                                   [   23,  82.4 ]
                                                   [57.46, 82.11 ]
                                                   [75.38,  82.1 ]
                                                   [78.47, 81.06 ]
                                                   [ 81.6,  79.7 ]
                                                   [82.78,  79.3 ]
                                                   [87.28, 79.28 ]
                                                   [ 88.3,  79.7 ]
                                                   [91.41,  81.1 ]
                                                   [94.81,  81.7 ]
                                                   [107.69,  82.1 ]
                                                   [120.16,  82.2 ]
*#=============================================================================
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 9131.887
*#=============================================================================
ROUTE CHANNEL       IDout=[1], NHYD=["KD-1"], IDin=[2],
                    RDT=[1](min),
                    CHLGTH=[248](m),  CHSLOPE=[0.28](%),
                                        FPSLOPE=[0.28](%),
                    SECNUM=[9131],       NSEG=[5]
                    ( SEGROUGH, SEGDIST (m))=[0.04,70.64 -0.03,72.865 0.04,74.61
                    0.05,77.65 0.04,191.67] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0,  81.6 ]
                                                   [ 7.35,  81.6 ]
                                                   [ 26.3,  80.9 ]
                                                   [48.53, 80.87 ]
                                                   [58.55, 80.01 ]
                                                   [65.66,    80 ]
```

```
                                                    [69.22,    79 ]
                                                    [70.64, 78.65 ]
                                                    [72.865,  78.7 ]
                                                    [74.25, 78.96 ]
                                                    [74.61,  79.1 ]
                                                    [77.65, 79.92 ]
                                                    [93.59,  79.9 ]
                                                    [103.2,  78.7 ]
                                                    [108.05,  79.9 ]
                                                    [115.92,  80.2 ]
                                                    [132.65,  80.2 ]
                                                    [159.72, 80.73 ]
                                                    [176.71, 82.61 ]
                                                    [191.67, 82.63 ]
*#==============================================================================
*# KD-2A-2 - URBAN/RURAL NORTH OF RAILRAOD
*#==============================================================================
CONTINUOUS STANDHYD      ID=[2], NHYD=["KD-2A-2"], DT=[1](min), AREA=[44.99](ha),
                    XIMP=[0.250], TIMP=[0.28], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[547](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*#==============================================================================
*# ADD KD-2A-1 AND KD-2A-2
*# CREST GAUGE LOCATION KD-2 -KIZELL DRAIN AT MARCH ROAD
*#==============================================================================
ADD HYD             IDsum=[3], NHYD=["KFP3"], IDs to add=[1+2]
*PRINT HYD           ID=[3],   # OF PCYCLES=[1]
*#==============================================================================
*# KD-2A-3 - URBAN SOUTH OF RAILROAD
*#==============================================================================
CONTINUOUS STANDHYD      ID=[2], NHYD=["KD-2A-3"], DT=[1](min), AREA=[48.56](ha),
                    XIMP=[0.250], TIMP=[0.31], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[568](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*#==============================================================================
*# ADD KD-2A-2 AND KD-2A-3 D/S OF MARCH ROAD
*#==============================================================================
ADD HYD             IDsum=[4], NHYD=["KD-2A-3"], IDs to add=[3+2]
*#==============================================================================
*# ROUTE KD-2A THROUGH KD-2B
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 8942.456
*#==============================================================================
ROUTE CHANNEL       IDout=[1], NHYD=["KD-2A"], IDin=[4],
                    RDT=[1](min),
                    CHLGTH=[254](m),  CHSLOPE=[0.55](%),
                                        FPSLOPE=[0.55](%),
                    SECNUM=[8942],       NSEG=[5]
                    ( SEGROUGH, SEGDIST (m))=[0.04,17.24 0.05,28.26 -0.03,31.51
                    0.05,61.08 0.04,68.63] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 80.58 ]
                                                    [ 1.57,  80.5 ]
                                                    [ 8.77,  80.5 ]
                                                    [10.84, 80.23 ]
```

```
                                                    [17.24, 80.03 ]
                                                    [20.76,    79 ]
                                                    [23.59,  78.9 ]
                                                    [26.81, 78.17 ]
                                                    [28.26,  77.9 ]
                                                    [30.06,  77.9 ]
                                                    [30.71, 78.01 ]
                                                    [31.51,  78.2 ]
                                                    [32.21, 78.39 ]
                                                    [ 37.7,  78.4 ]
                                                    [44.07,  78.5 ]
                                                    [48.95,  78.7 ]
                                                    [57.53, 79.33 ]
                                                    [61.08, 79.95 ]
                                                    [64.61, 80.71 ]
                                                    [68.63, 81.15 ]
*#==============================================================================
*# KD-2B-6 - URBAN
*#==============================================================================
CONTINUOUS STANDHYD      ID=[2], NHYD=["KD-2B-6"], DT=[1](min), AREA=[7.73](ha),
                    XIMP=[0.61], TIMP=[0.61], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[227](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*#==============================================================================
*# ROUTE KD-2B-6 THROUGH SWM POND SOUTH OF SOLANDT ROAD
*# ASSUME 5-YEAR CONTROL ACCORDING TO CITY GUIDELINES
*#==============================================================================
ROUTE RESERVOIR     IDout=[4],   NHYD=["KD-2B-6"],  IDin=[2],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                     (cms) - (ha-m)
                                   [   0.0 ,  0.0 ]
                                   [ 0.407 ,  0.095]
                                   [   -1  ,  -1  ]  (max twenty pts)
                          IDovf=[5], NHYDovf=["OVF-2B6"]
*#==============================================================================
*# ADD OUTFLOW, OVERFLOW AND KD-2A
*#==============================================================================
ADD HYD             IDsum=[6], NHYD=["KD-2B-6"], IDs to add=[4+5+1]
*#==============================================================================
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 8329.198
*#==============================================================================
ROUTE CHANNEL       IDout=[2], NHYD=["KD-2A"], IDin=[6],
                    RDT=[1](min),
                    CHLGTH=[747](m),  CHSLOPE=[0.36](%),
                                        FPSLOPE=[0.36](%),
                    SECNUM=[8329],        NSEG=[4]
                    ( SEGROUGH, SEGDIST (m))=[0.08,81.34 0.05,88.266 -0.03,97.72
                    0.08,109.09] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0,  78.3 ]
                                                    [56.66,  78.2 ]
                                                    [67.31,  78.2 ]
                                                    [72.25,    78 ]
                                                    [79.85,    78 ]
                                                    [81.34, 77.66 ]
                                                    [87.28, 75.87 ]
                                                    [88.266, 75.728 ]
                                                    [90.51, 75.759 ]
                                                    [90.57, 75.77 ]
                                                    [91.47, 75.88 ]
```

```
                                                        [97.72, 76.64 ]
                                                        [109.09,  78.5 ]
*#==============================================================================
*# KD-2B-3 - Converted to NASHYD under existing conditions
*#==============================================================================
CONTINUOUS NASHYD        ID=[1], NHYD=["KD-2B-3"], DT=[1]min, AREA=[7.40](ha),
                    DWF=[0](cms),  CN=[65], IA=[5.0](mm),
                    N=[2.0], TP=[0.49]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*#==============================================================================
*# 5 YEAR CONTROL - 89L/s
*# MAJOR FLOWS TO KIZELL DRAIN
*# MINOR FLOWS TO GOLF COURSE POND #2
*#==============================================================================
COMPUTE DUALHYD     IDin=[1], CINLET=[0.089](cms), NINLET=[1],
                    MAJID=[3], MajNHYD=["2B3MAJ"],
                    MINID=[4], MinNHYD=["2B3MIN"],
                    TMJSTO=[0](cu-m)
*#==============================================================================
*# KD-2B-4 Converted to NASHYD under existing conditions
*#==============================================================================
CONTINUOUS NASHYD        ID=[5], NHYD=["KD-2B-4"], DT=[1]min, AREA=[23.59](ha),
                    DWF=[0](cms),  CN=[63], IA=[5.0](mm),
                    N=[2.0], TP=[0.62]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*#==============================================================================
*# ADD KD-2B-3 MINOR AND KD-2B-4
*#==============================================================================
ADD HYD             IDsum=[6], NHYD=["KD-2B-4"], IDs to add=[4+5]
*#==============================================================================
*# ROUTE KD-2B-4 THROUGH GOLF COURSE POND #2
*#==============================================================================
ROUTE RESERVOIR     IDout=[4],   NHYD=["KD-2B-4"],  IDin=[6],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                     (cms) - (ha-m)
                                   [   0.0 ,  0.0 ]
                                   [ 0.229, 1.5695]
                                   [ 0.251, 1.8191]
                                   [ 0.328, 2.9421]
                                   [   -1  ,  -1  ]  (max twenty pts)
                          IDovf=[5], NHYDovf=["OVF-2B6"]
*#==============================================================================
*# ADD OUTFLOW, OVERFLOW AND KD-2A
*#==============================================================================
ADD HYD             IDsum=[6], NHYD=["KD-2B-6"], IDs to add=[4+5]
*#==============================================================================
*# ADD KD-2B-3 MAJOR, KD-2B-4 AND KD-2B-6
*#==============================================================================
ADD HYD             IDsum=[4], NHYD=["KD-2B-4"], IDs to add=[3+6+2]
*#==============================================================================
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 7691.759
*#==============================================================================
ROUTE CHANNEL       IDout=[2], NHYD=["KD-2A"], IDin=[4],
                    RDT=[1](min),
                    CHLGTH=[408](m),  CHSLOPE=[0.11](%),
                                      FPSLOPE=[0.11](%),
```

```
                    SECNUM=[7691],       NSEG=[3]
                    ( SEGROUGH, SEGDIST (m))=[0.06,16.78 -0.03,19.003 0.06,24.49] NSEG
                    times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 76.75 ]
                                                   [ 0.66,  76.6 ]
                                                   [ 3.57, 75.74 ]
                                                   [ 4.99, 75.24 ]
                                                   [ 5.76,  75.1 ]
                                                   [ 7.69,    75 ]
                                                   [ 8.56,  74.9 ]
                                                   [ 9.95,  74.9 ]
                                                   [12.21,  74.8 ]
                                                   [12.99, 74.69 ]
                                                   [ 15.2,  74.3 ]
                                                   [16.78,  74.1 ]
                                                   [17.38,  73.8 ]
                                                   [18.38,  73.8 ]
                                                   [19.003, 74.147]
                                                   [19.94, 74.21 ]
                                                   [20.51, 74.31 ]
                                                   [21.52,  74.6 ]
                                                   [22.72, 75.04 ]
                                                   [24.49,  75.5 ]
*#=============================================================================
*# KD-2B-2 - URBAN RESIDENTIAL - Converted to NASHYD under existing conditions
*#=============================================================================
CONTINUOUS NASHYD        ID=[3], NHYD=["KD-2B-2"], DT=[1]min, AREA=[3.35](ha),
                    DWF=[0](cms),  CN=[63], IA=[5.0](mm),
                    N=[2.0], TP=[0.32]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*#=============================================================================
*# ROUTE KD-2B-2 THROUGH POND #3 NORTH OF FARRAR ROAD
*#=============================================================================
ROUTE RESERVOIR     IDout=[5],   NHYD=["KD-2B-2"],  IDin=[3],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                     (cms) - (ha-m)
                                   [   0.0 ,  0.0 ]
                                   [ 0.260 , 0.616]
                                   [ 0.282 ,0.7115]
                                   [ 0.374 ,1.2301]
                                   [   -1  ,  -1  ]  (max twenty pts)
                          IDovf=[6], NHYDovf=["OVF-2B3"]
*#=============================================================================
*# ADD OUTFLOW, OVERFLOW AND KD-2B-4
*#=============================================================================
ADD HYD             IDsum=[1], NHYD=["KD-2B-4"], IDs to add=[5+6+2]
*#=============================================================================
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 7386.879
*#=============================================================================
ROUTE CHANNEL       IDout=[2], NHYD=["KD-2A-4"], IDin=[1],
                    RDT=[1](min),
                    CHLGTH=[315](m),  CHSLOPE=[0.11](%),
                                        FPSLOPE=[0.11](%),
                    SECNUM=[7386],       NSEG=[5]
                    ( SEGROUGH, SEGDIST (m))=[0.08,21.18 0.05,62.87 -0.06,80.43
                    0.06,90.36 0.05,143.24] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 77.07 ]
                                                   [ 5.11,  76.8 ]
                                                   [21.18,  76.7 ]
                                                   [34.27,  76.7 ]
                                                   [43.48,  76.3 ]
```

```
                                                    [62.87,  74.8 ]
                                                    [68.48, 74.28 ]
                                                    [70.32,  73.5 ]
                                                    [73.346, 73.437 ]
                                                    [75.588, 73.466 ]
                                                    [75.62, 73.47 ]
                                                    [80.43,  74.3 ]
                                                    [85.13, 75.18 ]
                                                    [90.36, 75.69 ]
                                                    [101.28,  75.4 ]
                                                    [115.17,  75.3 ]
                                                    [121.38,  75.4 ]
                                                    [128.52, 74.95 ]
                                                    [137.68,  75.3 ]
                                                    [143.24, 76.97 ]
*#=============================================================================
*# KD-2B-7 - RURAL EAST OF HERZBERG ROAD
*#=============================================================================
CONTINUOUS NASHYD        ID=[4], NHYD=["KD-2B-7"], DT=[1]min, AREA=[20.11](ha),
                    DWF=[0](cms),  CN=[63], IA=[7](mm),
                    N=[2.0], TP=[1.50]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*#=============================================================================
*# ADD KD-2B-4 AND KD-2B-7
*#=============================================================================
ADD HYD             IDsum=[3], NHYD=["KD-2B-4"], IDs to add=[2+4]
*#=============================================================================
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 7058.454
*#=============================================================================
ROUTE CHANNEL       IDout=[1], NHYD=["KD-2A-4"], IDin=[3],
                    RDT=[1](min),
                    CHLGTH=[297](m),  CHSLOPE=[0.38](%),
                                        FPSLOPE=[0.38](%),
                    SECNUM=[7058],       NSEG=[3]
                    ( SEGROUGH, SEGDIST (m))=[0.05,206.86 -0.06,216.95 0.04,295.48]
                    NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0,  75.7 ]
                                                    [165.24,  75.2 ]
                                                    [198.14,  75.2 ]
                                                    [206.37,  73.8 ]
                                                    [206.86, 73.69 ]
                                                    [209.66,    73 ]
                                                    [211.86,    73 ]
                                                    [213.07, 73.07 ]
                                                    [215.16,  73.8 ]
                                                    [216.95, 74.14 ]
                                                    [247.08,  74.8 ]
                                                    [267.4,  74.8 ]
                                                    [295.48, 76.05 ]
*#=============================================================================
*# KD-2B-5 - URBAN
*#=============================================================================
CONTINUOUS STANDHYD      ID=[2], NHYD=["KD-2B-5"], DT=[1](min), AREA=[4.74](ha),
                    XIMP=[0.50], TIMP=[0.50], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[177](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
```

```
                    InterEventTime=[12](hrs), END=-1
*#==============================================================================
*# ON-SITE STORAGE
*# RATING CURVE SOURCE - plan2.pdf IN 13616-Richardson Side_Eagleson
*#==============================================================================
ROUTE RESERVOIR     IDout=[4],   NHYD=["KD-2B-5"],  IDin=[2],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                    (cms) - (ha-m)
                                  [   0.0 ,  0.0 ]
                                  [0.1458, 0.01283]
                                  [0.1458, 0.03881]
                                  [   -1  ,  -1  ]  (max twenty pts)
                          IDovf=[5], NHYDovf=["OVF-2B5"]
*#==============================================================================
*# KD-2B-1 - URBAN
*#==============================================================================
CONTINUOUS STANDHYD      ID=[3], NHYD=["KD-2B-1"], DT=[1](min), AREA=[134.85](ha),
                    XIMP=[0.40], TIMP=[0.41], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[948](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*#==============================================================================
*# ADD OUTFLOW, OVERFLOW AND KD-2B-1
*#==============================================================================
ADD HYD             IDsum=[6], NHYD=["KD-2B-1"], IDs to add=[4+5+3]
*#==============================================================================
*# ADD KD-2B-4 AND KD-2B-1
*# CREST GAUGE LOCATION KD-1 - KIZELL DRAIN AT HERTZBERG ROAD
*#==============================================================================
ADD HYD             IDsum=[3], NHYD=["KFP4"], IDs to add=[1+6]
*PRINT HYD           ID=[3],   # OF PCYCLES=[1]
*#==============================================================================
*# ROUTE KD-2B THROUGH KD-2C
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 6705.311
*# MINIMUM SLOPE ASSUMED 0.1%
*#==============================================================================
ROUTE CHANNEL       IDout=[1], NHYD=["KD-2B"], IDin=[3],
                    RDT=[1](min),
                    CHLGTH=[600](m),  CHSLOPE=[0.1](%),
                                        FPSLOPE=[0.1](%),
                    SECNUM=[6705],       NSEG=[4]
                    ( SEGROUGH, SEGDIST (m))=[0.05,162.749 -0.04,168.035 -0.05,168.35
                    0.05,373.63] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 75.65 ]
                                                   [ 24.7,  75.1 ]
                                                   [61.29, 73.42 ]
                                                   [90.72,  72.7 ]
                                                   [119.02, 72.95 ]
                                                   [131.71,  72.8 ]
                                                   [160.55,  72.9 ]
                                                   [162.46, 72.46 ]
                                                   [162.749, 72.403 ]
                                                   [168.035, 72.369 ]
                                                   [168.35, 72.39 ]
                                                   [168.6, 72.43 ]
                                                   [171.08,  72.8 ]
                                                   [203.12,  72.8 ]
                                                   [231.66,  73.3 ]
                                                   [255.58,  73.2 ]
                                                   [300.16,  73.6 ]
```

```
                                                    [326.75,  74.3 ]
                                                    [347.02,  75.2 ]
                                                    [373.63, 76.05 ]
*#==============================================================================
*# KD-3A - URBAN WEST OF HERZBERG ROAD
*#==============================================================================
CONTINUOUS STANDHYD      ID=[3], NHYD=["KD-3A"], DT=[1](min), AREA=[206.16](ha),
                    XIMP=[0.30], TIMP=[0.34], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[1172](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*#==============================================================================
*# KTC-2B - URBAN - UPSTREAM LIMIT TO HWY 417, NORTH OF CAMPEAU DRIVE
*# LAND USES WITHIN AREA: OFFICE/RECREATIONAL
*#==============================================================================
CONTINUOUS STANDHYD      ID=[2], NHYD=["KTC-2B"], DT=[1](min), AREA=[20.79](ha),
                    XIMP=[0.23], TIMP=[0.24], DWF=[0.0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[372](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*#==============================================================================
*# 5 YEAR CONTROL - 1155L/s
*# MAJOR FLOWS TO KD-3A
*# MINOR FLOWS TO SWF-1205
*#==============================================================================
COMPUTE DUALHYD      IDin=[2], CINLET=[1.155](cms), NINLET=[1],
                     MAJID=[7], MajNHYD=["KTC2BMAJ"],
                     MINID=[10], MinNHYD=["KTC2BMIN"],
                     TMJSTO=[0](cu-m)
*#==============================================================================
*# ADD KTC-2B MAJOR AND KD-3A - TRIBUTARY 1 AT HERTZBERG ROAD
*#==============================================================================
ADD HYD              IDsum=[5], NHYD=["KD-3A"], IDs to add=[7+3]
*#==============================================================================
*# ROUTE KD-3A THROUGH KD-3B
*# CHANNEL CROSS-SECTION DATA TAKEN FROM LiDAR
*#==============================================================================
ROUTE CHANNEL        IDout=[4], NHYD=["KD-3A"], IDin=[5],
                     RDT=[1](min),
                     CHLGTH=[253](m),  CHSLOPE=[0.13](%),
                                         FPSLOPE=[0.13](%),
                     SECNUM=[1],       NSEG=[3]
                     ( SEGROUGH, SEGDIST (m))=[0.05,27.94 -0.035,38.92 0.08,64.87] NSEG
                     times
                     ( DISTANCE (m), ELEVATION (m))=[    0, 78.90]
                                                    [12.97, 78.12]
                                                    [15.97, 77.81]
                                                    [19.96, 77.51]
                                                    [23.95, 77.36]
                                                    [24.95, 77.34]
                                                    [25.95, 77.34]
                                                    [26.94, 77.36]
                                                    [27.94, 77.30]
                                                    [30.94, 76.79]
                                                    [31.93, 76.73]
```

```
                                                [32.93, 76.73]
                                                [33.93, 76.70]
                                                [34.94, 76.76]
                                                [38.92, 77.29]
                                                [42.91, 77.34]
                                                [58.88, 78.52]
                                                [64.87, 78.97]
ROUTE CHANNEL       IDout=[5], NHYD=["KD-3A"], IDin=[4],
                    RDT=[1](min),
                    CHLGTH=[344](m),  CHSLOPE=[0.56](%),
                                        FPSLOPE=[0.56](%),
                    SECNUM=[2],       NSEG=[3]
                    ( SEGROUGH, SEGDIST (m))=[0.05,20.89 -0.035,76.49 0.08,88.52] NSEG ↵
                    times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 77.38]
                                                [13.92, 77.02]
                                                [20.89, 76.69]
                                                [26.85, 76.09]
                                                [29.84, 76.03]
                                                [44.76, 76.15]
                                                [56.69, 75.91]
                                                [59.68, 76.10]
                                                [61.67, 76.05]
                                                [71.61, 76.31]
                                                [76.49, 76.69]
                                                [82.55, 77.16]
                                                [88.52, 77.40]
ROUTE CHANNEL       IDout=[4], NHYD=["KD-3A"], IDin=[5],
                    RDT=[1](min),
                    CHLGTH=[324](m),  CHSLOPE=[0.72](%),
                                        FPSLOPE=[0.72](%),
                    SECNUM=[1],       NSEG=[3]
                    ( SEGROUGH, SEGDIST (m))=[0.05,97.588 -0.035,109.575 0.05,143.405] ↵
                    NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 75.2777 ]
                                                [39.664, 74.805 ]
                                                [74.612, 74.8767 ]
                                                [79.607, 74.8037 ]
                                                [ 86.6, 74.7914 ]
                                                [90.595, 74.6388 ]
                                                [95.59, 74.6899 ]
                                                [97.588, 74.8802 ]
                                                [101.584, 74.7293 ]
                                                [103.582, 74.4039 ]
                                                [106.578, 74.4818 ]
                                                [109.575, 74.9123 ]
                                                [111.573, 74.8318 ]
                                                [116.568, 74.8294 ]
                                                [120.563, 74.7426 ]
                                                [121.562, 74.7398 ]
                                                [124.559, 74.8464 ]
                                                [130.553, 74.8391 ]
                                                [132.54, 74.777 ]
                                                [143.405, 75.255 ]
*#=============================================================================
*# KD-2C - RURAL
*#=============================================================================
CONTINUOUS NASHYD         ID=[2], NHYD=["KD-2C"], DT=[1]min, AREA=[59.10](ha),
                    DWF=[0](cms),  CN=[83], IA=[7](mm),
                    N=[2.0], TP=[0.60]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*#=============================================================================
```

```
*# ADD KD-2B AND KD-2C
*#=============================================================================
ADD HYD             IDsum=[5], NHYD=["KFP5"], IDs to add=[1+2]
*PRINT HYD           ID=[5],   # OF PCYCLES=[1]
*#=============================================================================
*# ADD KD-2C AND KD-3A
*#=============================================================================
ADD HYD             IDsum=[3], NHYD=["KD-2C"], IDs to add=[5+4]
*#=============================================================================
*# ROUTE KD-1+KD-2 THROUGH KD-3B-1
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 6104.633
*# MINIMUM SLOPE ASSUMED 0.1%
*#=============================================================================
ROUTE CHANNEL       IDout=[1], NHYD=["KD-2C"], IDin=[3],
                    RDT=[1](min),
                    CHLGTH=[952](m),  CHSLOPE=[0.1](%),
                                        FPSLOPE=[0.1](%),
                    SECNUM=[6104],       NSEG=[3]
                    ( SEGROUGH, SEGDIST (m))=[0.08,175.904 -0.04,179.184 0.08,185.91]
                    NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 77.06 ]
                                                   [ 9.16,  77.1 ]
                                                   [23.37,  76.7 ]
                                                   [56.09,  76.5 ]
                                                   [67.63,  76.2 ]
                                                   [80.81,  75.6 ]
                                                   [83.87,  75.6 ]
                                                   [98.45,  74.5 ]
                                                   [103.07,  74.3 ]
                                                   [115.78,  74.3 ]
                                                   [134.4,  73.6 ]
                                                   [149.63,  73.7 ]
                                                   [163.83,  73.6 ]
                                                   [173.16,  72.7 ]
                                                   [175.83,    72 ]
                                                   [175.904, 71.992 ]
                                                   [179.184, 71.968 ]
                                                   [179.27,    72 ]
                                                   [183.86,  73.7 ]
                                                   [185.91,    74 ]
*#=============================================================================
*# KD-3B - RURAL EAST OF HERZBERG ROAD
*#=============================================================================
CONTINUOUS NASHYD       ID=[4], NHYD=["KD-23B"], DT=[1]min, AREA=[112.07](ha),
                    DWF=[0](cms),  CN=[66], IA=[7](mm),
                    N=[2.0], TP=[1.20]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*#=============================================================================
*# ADD KD-2C,KD-3A AND KD-3B - KIZELL DRAIN AT CONFLUENCE WITH WATTS CREEK
*#=============================================================================
ADD HYD             IDsum=[3], NHYD=["KFP6"], IDs to add=[1+4]
*PRINT HYD           ID=[3],   # OF PCYCLES=[1]
*#=============================================================================
*#                          WATTS CREEK SUBWATERSHED
*#=============================================================================
*#=============================================================================
*# KANATA TOWN CENTRE-1 - URBAN - UPSTREAM LIMIT TO HWY 417
*# Imperviousness decreased under existing conditions
*#=============================================================================
CONTINUOUS STANDHYD     ID=[2], NHYD=["KTC-1"], DT=[1](min), AREA=[60.23](ha),
                    XIMP=[0.34], TIMP=[0.34], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
```

```
                      DCAY=[2.0](/hr), F=[0](mm),
                      Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
                                           LGP=[40](m), MNP=[0.25], SCP=[0](min),
                      Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                           LGI=[633](m), MNI=[0.013], SCI=[0](min),
                      Continuous simulation parameters:
                      IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                      InterEventTime=[12](hrs), END=-1
*#=============================================================================
*# 5 YEAR CONTROL - 2963L/s
*# MAJOR FLOWS TO WC-1
*# MINOR FLOWS TO SWF-1206
*#=============================================================================
COMPUTE DUALHYD       IDin=[2], CINLET=[2.963](cms), NINLET=[1],
                      MAJID=[7], MajNHYD=["KTC1MAJ"],
                      MINID=[8], MinNHYD=["KTC1MIN"],
                      TMJSTO=[0](cu-m)
*#=============================================================================
*# SWMF-1206
*# STORAGE WAS ESTIMATED FROM AVAILABLE DRAWING
*# DISCHARGE WAS TAKEN FROM R-1564
*#=============================================================================
ROUTE RESERVOIR       IDout=[4],   NHYD=["KTC-1"],  IDin=[8],
                      RDT=[1](min),
                            TABLE of ( OUTFLOW-STORAGE ) values
                                       (cms) - (ha-m)
                                     [   0.0 ,  0.0 ]
                                     [ 0.955 , 0.2854]
                                     [ 1.436 , 3.9725]
                                     [   -1  ,  -1  ]  (max twenty pts)
                                  IDovf=[5], NHYDovf=["OVF-KTC1"]
*#=============================================================================
*# ADD OUTFLOW, OVERFLOW AND KTC-1 MAJOR
*#=============================================================================
ADD HYD               IDsum=[2], NHYD=["KTC-1"], IDs to add=[4+5+7]
*#=============================================================================
*# WC-1 - RURAL/URBAN EXISTING AREA
*#=============================================================================
CONTINUOUS STANDHYD       ID=[1], NHYD=["WC-1"], DT=[1](min), AREA=[403.47](ha),
                      XIMP=[0.30], TIMP=[0.34], DWF=[0](cms),
                      LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                      DCAY=[2.0](/hr), F=[0](mm),
                      Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
                                           LGP=[40](m), MNP=[0.25], SCP=[0](min),
                      Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                           LGI=[1640](m), MNI=[0.013], SCI=[0](min),
                      Continuous simulation parameters:
                      IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                      InterEventTime=[12](hrs), END=-1
*#=============================================================================
*# ADD WC-1 AND KTC-1 - WATTS CREEK AT HIGHWAY 417
*#=============================================================================
ADD HYD               IDsum=[5], NHYD=["WC-1"], IDs to add=[1+2]
*#=============================================================================
*# KTC-2A - URBAN - UPSTREAM LIMIT TO HWY 417, SOUTH OF CAMPEAU DRIVE
*# LAND USES WITHIN AREA: TOWN CENTRE/URBAN RES
*#=============================================================================
CONTINUOUS STANDHYD       ID=[1], NHYD=["KTC-2A"], DT=[1](min), AREA=[34.34](ha),
                      XIMP=[0.36], TIMP=[0.42], DWF=[0.0](cms),
                      LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                      DCAY=[2.0](/hr), F=[0](mm),
                      Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
                                           LGP=[40](m), MNP=[0.25], SCP=[0](min),
                      Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                           LGI=[478](m), MNI=[0.013], SCI=[0](min),
                      Continuous simulation parameters:
                      IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
```

```
                    InterEventTime=[12](hrs), END=-1
*#=============================================================================
*# ADD KTC-2A AND KTC-2B MINOR
*#=============================================================================
ADD HYD             IDsum=[4], NHYD=["KTC-2"], IDs to add=[1+10]
*#=============================================================================
*# ROUTE KTC-2 THROUGH KANATA TOWN CENTRE PHASE I POND
*# STAGE-STORAGE-DISCHARGE CURVE OBTAINED FROM:
*# KANATA TOWN CENTRE PHASE i - STORMWATER MANAGEMENT REPORT
*# J.L. RICHARDS & ASSOCIATES LTD. 1996
*# SWF-1205
*# STORAGE WAS ESTIMATED WITH AVAILABLE DRAWING
*# DISCHARGE WAS TAKEN FROM R-1563
*#=============================================================================
ROUTE RESERVOIR     IDout=[1],   NHYD=["KTC-2"],  IDin=[4],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                    (cms) - (ha-m)
                                  [   0.0 ,  0.0 ]
                                  [  0.79, 0.6939]
                                  [  4.70, 1.4350]
                                  [   -1  ,  -1  ]  (max twenty pts)
                          IDovf=[2], NHYDovf=["OVF-KTC2"]
*#=============================================================================
*# ADD OUTFLOW AND OVERFLOW
*#=============================================================================
ADD HYD             IDsum=[4], NHYD=["KTC-2"], IDs to add=[1+2]
*#=============================================================================
*# ADD WC-1 AND KTC-2
*#=============================================================================
ADD HYD             IDsum=[2], NHYD=["KTC-2"], IDs to add=[5+4]
*%----------------|-------------------------------------------------------|
*#=============================================================================
*# WC-3 - URBAN/RURAL
*#=============================================================================
CONTINUOUS NASHYD        ID=[1], NHYD=["WC-3"], DT=[1]min, AREA=[204.06](ha),
                    DWF=[0](cms),  CN=[66], IA=[7](mm),
                    N=[2.0], TP=[1.28]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*#=============================================================================
*# ADD WC-1+KTC AND WC-3
*#=============================================================================
ADD HYD             IDsum=[4], NHYD=["WC-3"], IDs to add=[2+1]
*#=============================================================================
*# ROUTE WC-1+KTC+WC-3 THROUGH WC-4A
*# CHANNEL CROSS-SECTION DATA TAKEN FROM LIDAR
*#=============================================================================
ROUTE CHANNEL       IDout=[1], NHYD=["WC-3"], IDin=[4],
                    RDT=[1](min),
                    CHLGTH=[744](m),  CHSLOPE=[1.29](%),
                                        FPSLOPE=[1.29](%),
                    SECNUM=[1],       NSEG=[3]
                    ( SEGROUGH, SEGDIST (m))=[0.05,25.86 -0.035,40.77 0.05,72.60] NSEG
                    times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 90.87]
                                                  [ 1.99, 90.66]
                                                  [ 7.96, 90.10]
                                                  [16.91, 85.80]
                                                  [18.90, 85.49]
                                                  [21.88, 85.42]
                                                  [25.86, 85.56]
                                                  [26.85, 25.50]
```

```
                                                    [29.83, 84.06]
                                                    [31.82, 84.06]
                                                    [34.81, 85.10]
                                                    [40.77, 85.59]
                                                    [48.73, 85.85]
                                                    [52.71, 86.80]
                                                    [55.59, 87.80]
                                                    [60.66, 90.40]
                                                    [64.64, 90.77]
                                                    [72.60, 90.97]
*#==============================================================================
*# CHANNEL CROSS-SECTION DATA TAKEN FROM LIDAR
*#==============================================================================
ROUTE CHANNEL       IDout=[2], NHYD=["WC-3"], IDin=[1],
                    RDT=[1](min),
                    CHLGTH=[2295](m),  CHSLOPE=[0.45](%),
                                        FPSLOPE=[0.45](%),
                    SECNUM=[2],       NSEG=[3]
                    ( SEGROUGH, SEGDIST (m))=[0.05,12.98 -0.035,20.97 0.05,51.94] NSEG ↵
                    times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 85.79]
                                                    [ 1.00, 85.75]
                                                    [11.99, 83.71]
                                                    [12.98, 83.36]
                                                    [14.98, 82.49]
                                                    [15.98, 82.44]
                                                    [16.98, 82.45]
                                                    [20.97, 83.51]
                                                    [22.97, 83.46]
                                                    [23.97, 83.51]
                                                    [26.97, 83.55]
                                                    [27.97, 83.55]
                                                    [31.96, 83.51]
                                                    [32.96, 83.45]
                                                    [33.96, 83.45]
                                                    [34.96, 83.50]
                                                    [51.94, 85.81]
*#==============================================================================
*# CHANNEL CROSS-SECTION DATA TAKEN FROM LIDAR
*#==============================================================================
ROUTE CHANNEL       IDout=[1], NHYD=["WC-3"], IDin=[2],
                    RDT=[1](min),
                    CHLGTH=[487](m),  CHSLOPE=[0.23](%),
                                        FPSLOPE=[0.23](%),
                    SECNUM=[3],       NSEG=[3]
                    ( SEGROUGH, SEGDIST (m))=[0.05,6.97 -0.035,25.87 0.05,29.85] NSEG ↵
                    times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 75.60]
                                                    [    1, 75.54]
                                                    [ 1.99, 75.42]
                                                    [ 6.97, 73.09]
                                                    [11.94, 72.70]
                                                    [14.93, 72.66]
                                                    [17.91, 72.27]
                                                    [23.88, 72.25]
                                                    [25.87, 73.03]
                                                    [28.86, 74.06]
                                                    [29.85, 74.23]
*#==============================================================================
*# WC-4A - RURAL - HIGHWAY 417 TO CNR
*#==============================================================================
CONTINUOUS NASHYD        ID=[2] NHYD=["WC-4A"], DT=[1]min, AREA=[126.29](ha),
                    DWF=[0](cms),  CN=[82], IA=[7](mm),
                    N=[2.0], TP=[2.30]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
```

```
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*#=============================================================================
*# ADD WC-1+KTC+WC-3 AND WC-4A
*# CREST GAUGE LOCATION WC-1 - WATTS CREEK AT CONFLUENCE WITH KIZELL DRAIN
*#=============================================================================
ADD HYD             IDsum=[6], NHYD=["WFP1"], IDs to add=[1+2]
*PRINT HYD           ID=[6],   # OF PCYCLES=[1]
*#=============================================================================
*# WC-4B - RURAL - HIGHWAY 417 TO CNR
*#=============================================================================
CONTINUOUS NASHYD        ID=[4] NHYD=["WC-4B"], DT=[1]min, AREA=[145.27](ha),
                    DWF=[0](cms),  CN=[73], IA=[7](mm),
                    N=[2.0], TP=[1.22]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*#=============================================================================
*# ADD WC-4A AND KIZELL
*#=============================================================================
ADD HYD             IDsum=[1], NHYD=["WFP2"], IDs to add=[6+3]
*PRINT HYD           ID=[1],   # OF PCYCLES=[1]
*#=============================================================================
*# ADD WC-4A AND WC-4B
*#=============================================================================
ADD HYD             IDsum=[5], NHYD=["WFP3"], IDs to add=[1+4]
*PRINT HYD           ID=[5],   # OF PCYCLES=[1]
*#=============================================================================
*# ROUTE KIZELL AND WC-1+KTC+WC-3+WC-4 THROUGH WC-5A
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 4677.806
*#=============================================================================
ROUTE CHANNEL       IDout=[2], NHYD=["WC-4"], IDin=[5],
                    RDT=[1](min),
                    CHLGTH=[636](m),  CHSLOPE=[0.16](%),
                                        FPSLOPE=[0.16](%),
                    SECNUM=[4677],       NSEG=[3]
                    ( SEGROUGH, SEGDIST (m))=[0.08,95.801 -0.04,102.955 0.08,167.28]
                    NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0,  75.4 ]
                                                  [ 11.4,  74.3 ]
                                                  [ 31.7,  73.6 ]
                                                  [51.08,  72.8 ]
                                                  [60.69,  72.6 ]
                                                  [ 74.1,  71.6 ]
                                                  [77.61,  70.8 ]
                                                  [84.14,    71 ]
                                                  [93.83,    71 ]
                                                  [95.801, 70.73 ]
                                                  [97.18,  70.5 ]
                                                  [  101,  70.5 ]
                                                  [102.955, 70.989 ]
                                                  [111.37,  74.5 ]
                                                  [121.02, 76.45 ]
                                                  [128.96,  77.6 ]
                                                  [139.85,  78.3 ]
                                                  [151.67, 80.09 ]
                                                  [158.82, 80.63 ]
                                                  [167.28, 81.57 ]
*#=============================================================================
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 4446.172
*#=============================================================================
ROUTE CHANNEL       IDout=[1], NHYD=["WC-4"], IDin=[2],
                    RDT=[1](min),
```

```
                    CHLGTH=[443](m),  CHSLOPE=[0.64](%),
                                        FPSLOPE=[0.64](%),
                    SECNUM=[4446],       NSEG=[4]
                    ( SEGROUGH, SEGDIST (m))=[0.08,101.82 0.05,155.499 -0.04,160.804
                    0.08,360.72] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 75.11 ]
                                                   [15.28,  74.3 ]
                                                   [39.39,  73.6 ]
                                                   [55.02,  73.7 ]
                                                   [70.01,  73.1 ]
                                                   [101.82, 72.72 ]
                                                   [123.37, 72.37 ]
                                                   [137.03,  71.7 ]
                                                   [152.53,  68.9 ]
                                                   [155.499, 68.552 ]
                                                   [160.804, 68.559 ]
                                                   [163.78, 68.89 ]
                                                   [172.88,    69 ]
                                                   [180.76, 72.03 ]
                                                   [191.21,  72.8 ]
                                                   [208.93, 72.49 ]
                                                   [239.54,  72.4 ]
                                                   [260.28,  72.6 ]
                                                   [291.51,  72.6 ]
                                                   [360.72, 73.06 ]
*#============================================================================
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 3897.472
*#============================================================================
ROUTE CHANNEL       IDout=[2], NHYD=["WC-4"], IDin=[1],
                    RDT=[1](min),
                    CHLGTH=[468](m),  CHSLOPE=[0.44](%),
                                        FPSLOPE=[0.44](%),
                    SECNUM=[3897],       NSEG=[4]
                    ( SEGROUGH, SEGDIST (m))=[0.08,161.362 -0.04,164.388 -0.08,164.68
                    0.05,242.03] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 72.01 ]
                                                   [14.79,  71.9 ]
                                                   [26.32,  71.5 ]
                                                   [45.81,  69.5 ]
                                                   [ 52.8,  68.5 ]
                                                   [67.29,  68.1 ]
                                                   [85.91,  68.1 ]
                                                   [94.25,  67.9 ]
                                                   [116.16, 67.78 ]
                                                   [142.44,  67.4 ]
                                                   [159.77,  66.1 ]
                                                   [161.362, 65.677 ]
                                                   [164.388, 65.577 ]
                                                   [164.68, 65.61 ]
                                                   [166.02,  66.1 ]
                                                   [167.47,  66.5 ]
                                                   [201.22,  66.8 ]
                                                   [208.26,  66.7 ]
                                                   [216.93, 67.19 ]
                                                   [242.03,  67.3 ]
*#============================================================================
*# WC-5A - RURAL - CNR TO CARLING AVE
*#============================================================================
CONTINUOUS NASHYD        ID=[1] NHYD=["WC-5A"], DT=[1]min, AREA=[59.54](ha),
                    DWF=[0](cms),  CN=[73], IA=[7](mm),
                    N=[2.0], TP=[0.79]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
```

```
*#==============================================================================
*# ADD WC-5A AND WC-5A UPSTREAM
*# CALIBRATION LOCATION - WATTS CREEK AT CARLING AVENUE
*#==============================================================================
ADD HYD             IDsum=[3], NHYD=["WFP4"], IDs to add=[1+2]
*PRINT HYD           ID=[3],   # OF PCYCLES=[1]
*#==============================================================================
*# ROUTE WC-5B UPSTREAM THROUGH WC-5B
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 3469.421
*# MINIMUM SLOPE ASSUMED 0.1%
*#==============================================================================
ROUTE CHANNEL       IDout=[2], NHYD=["WC-5B"], IDin=[3],
                    RDT=[1](min),
                    CHLGTH=[485](m),  CHSLOPE=[0.1](%),
                                        FPSLOPE=[0.1](%),
                    SECNUM=[3469],       NSEG=[4]
                    ( SEGROUGH, SEGDIST (m))=[0.08,127.46 0.06,131.6 -0.03,141.59
                    0.08,308.37] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 68.08 ]
                                                  [16.71,  67.1 ]
                                                  [48.15,  66.8 ]
                                                  [75.65,  66.3 ]
                                                  [107.54,  66.2 ]
                                                  [117.33,  66.3 ]
                                                  [127.46, 65.54 ]
                                                  [129.21,  65.3 ]
                                                  [131.6,  64.9 ]
                                                  [136.836, 64.972 ]
                                                  [139.19,  65.3 ]
                                                  [141.59, 65.65 ]
                                                  [161.72,  65.6 ]
                                                  [171.42,  66.1 ]
                                                  [187.05,  66.3 ]
                                                  [224.24,  66.3 ]
                                                  [246.7,  66.1 ]
                                                  [286.52, 66.07 ]
                                                  [304.07,  66.3 ]
                                                  [308.37,  66.7 ]
*#==============================================================================
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 2981.379
*#==============================================================================
ROUTE CHANNEL       IDout=[1], NHYD=["WC-5B"], IDin=[2],
                    RDT=[1](min),
                    CHLGTH=[307](m),  CHSLOPE=[0.40](%),
                                        FPSLOPE=[0.40](%),
                    SECNUM=[2981],       NSEG=[4]
                    ( SEGROUGH, SEGDIST (m))=[0.08,9.006 -0.03,14.347 -0.06,14.85
                    0.08,30.25] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 64.35 ]
                                                  [ 2.07,  64.3 ]
                                                  [ 4.58,  64.2 ]
                                                  [  5.7,  64.1 ]
                                                  [ 6.83,  63.8 ]
                                                  [ 7.91, 63.37 ]
                                                  [9.006, 63.169 ]
                                                  [ 9.64,  62.8 ]
                                                  [13.64,  62.8 ]
                                                  [14.24,  63.1 ]
                                                  [14.347, 63.315 ]
                                                  [14.85, 63.35 ]
                                                  [15.35,  63.4 ]
                                                  [16.49, 63.69 ]
                                                  [18.19, 64.21 ]
                                                  [21.41,  64.2 ]
                                                  [25.06, 64.05 ]
                                                  [27.14, 64.06 ]
                                                  [28.41,  64.2 ]
```

```
                                                    [30.25, 64.28 ]
*#============================================================================
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 1585.543
*#============================================================================
ROUTE CHANNEL       IDout=[2], NHYD=["WC-5B"], IDin=[1],
                    RDT=[1](min),
                    CHLGTH=[2876](m),  CHSLOPE=[0.16](%),
                                        FPSLOPE=[0.16](%),
                    SECNUM=[1585],       NSEG=[4]
                    ( SEGROUGH, SEGDIST (m))=[0.08,56.84 0.05,124.41 -0.035,128.78
                    0.08,255.15] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 64.07 ]
                                                   [21.74,  63.8 ]
                                                   [40.53,  63.5 ]
                                                   [56.84, 61.82 ]
                                                   [74.07,  61.6 ]
                                                   [98.29,  61.7 ]
                                                   [104.39, 61.43 ]
                                                   [117.32,  61.8 ]
                                                   [124.32,  60.8 ]
                                                   [124.41, 60.79 ]
                                                   [124.519, 60.783 ]
                                                   [127.785, 60.75 ]
                                                   [  128, 60.83 ]
                                                   [128.78, 61.17 ]
                                                   [130.97,  61.8 ]
                                                   [149.66, 61.32 ]
                                                   [170.74,  61.4 ]
                                                   [191.12,  63.6 ]
                                                   [219.28, 64.08 ]
                                                   [255.15,  64.1 ]
*#============================================================================
*# WC-5B - RURAL - CARLING AVE TO OUTLET
*#============================================================================
CONTINUOUS NASHYD       ID=[4] NHYD=["WC-5B"], DT=[1]min, AREA=[379.59](ha),
                    DWF=[0](cms),  CN=[73], IA=[7](mm),
                    N=[2.0], TP=[3.28]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*#============================================================================
*# ADD WC-5B AND WC-5B UPSTREAM
*# WATTS CREEK AT OUTLET TO OTTAWA RIVER
*#============================================================================
ADD HYD             IDsum=[1], NHYD=["WFP5"], IDs to add=[4+2]
*PRINT HYD           ID=[1],   # OF PCYCLES=[1]
*%----------------|-------------------------------------------------------|
SAVE HYD            ID=[1],  # OF PCYCLES=[-1],  ICASEsh=[-1]
                    HYD_FILENAME=["WFP5"]
                    HYD_COMMENT=["WATTS CREEK AT OUTLET TO OTTAWA RIVER"]
*#============================================================================
*                             DESIGN STORMS
*#============================================================================
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[0005]
*                   "5y12hr.stm"
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[0010]
*                   "10y12hr.stm"
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[0025]
*                   "25y12hr.stm"
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[0050]
*                   "50y12hr.stm"
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[0100]
*                   "100y12hr.stm"
FINISH
```

```
*#=============================================================================
*                              CONTINUOUS SIMULATIONS
*#=============================================================================
START               TZERO=[1968.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1968]
START               TZERO=[1969.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1969]
START               TZERO=[1970.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1970]
START               TZERO=[1971.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1971]
START               TZERO=[1972.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1972]
START               TZERO=[1973.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1973]
START               TZERO=[1974.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1974]
START               TZERO=[1975.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1975]
START               TZERO=[1976.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1976]
START               TZERO=[1977.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1977]
START               TZERO=[1978.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1978]
START               TZERO=[1979.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1979]
START               TZERO=[1980.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1980]
START               TZERO=[1981.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1981]
START               TZERO=[1982.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1982]
START               TZERO=[1983.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1983]
START               TZERO=[1984.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1984]
START               TZERO=[1985.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1985]
START               TZERO=[1986.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1986]
START               TZERO=[1987.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1987]
START               TZERO=[1988.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1988]
START               TZERO=[1989.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1989]
START               TZERO=[1990.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1990]
START               TZERO=[1991.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1991]
START               TZERO=[1992.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1992]
START               TZERO=[1993.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1993]
START               TZERO=[1994.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1994]
START               TZERO=[1995.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1995]
START               TZERO=[1996.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1996]
START               TZERO=[1997.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1997]
START               TZERO=[1998.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1998]
START               TZERO=[1999.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1999]
START               TZERO=[2000.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[2000]
START               TZERO=[2002.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[2002]
START               TZERO=[2003.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[2003]
START               TZERO=[2004.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[2004]
START               TZERO=[2006.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[2006]
START               TZERO=[2007.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[2007]
FINISH
```

JFSA
WATER RESOURCES AND ENVIRONMENTAL CONSULTANTS

Project Ref #:1581
Client: David Schaeffer Engineering

Ottawa. ON
Paris. ON
Gatineau. QB
Montréal. QB
Québec. QB

Attachment E

SWMHYMO Model:

The Kanata Golf and Country Club with SWM

+

Kanata Lakes Development

```
2     Metric units
*#*************************************************************************
*#  Project Name: [Shirley's Brook and Watt's Creek Phase 2 SWM Study]    Project Number: [60264539]
*#  Future Conditions Model for the Watts Creek/Kizell Drain Flood Plain Mapping Study
*#  Date        : 2014-12-31
*#  Modeller    : [Olivia Chung]  John Price MVCA
*#  Company     : AECOM Canada
*#  License #   :  2988504
*#*************************************************************************
*# September 2019, model parameters further updated by JFSAinc
*# with use of rainfall and flow monitoring data collected in 2019
*#
*# - all N values in NASHYDS changed from N=1.1 to N=2
*# - all MNI values in existing conditions STANDHYDs changed from 0.025 to 0.013
*# - all SLOPI values in STANDHYDs changed from 0.02 to 1.0
*# - change STANDHYD infiltration method from SCS to Horton with
*# - Horton: Fo=[125](mm/hr), Fc=[25](mm/hr), DCAY=[2.0](/hr), F=[0](mm)
*# - set XIMP to a fix value of 0.25 for all existing residential catchments
*# - use COMPUTE API         APII=[40], APIK=[0.8]/day,
*# - continuous NASHYDs, use BaseFlowOption=[1] , InitGWResVol=[12], GWResK=[0.85], VHydCond=[.001]
*# - all golf course NASHYDs, use CN=50
*# - XIMP=[0.250], for all existing not draining through the grass areas of the golf course
*#
*# - Areas draining across the golf course:
*# - those specific STANDHYD commands converted to NASHYDs so that the infiltrated water could come back into the system.  This allowed a much better volume comparison through the Beaver Pond.
*# - The CN and IA values for those NASHYDs were weighted averages of CN=90 for TIMP and CN=50 for grass areas, and the IA was based on weighted average of IA=1.5 for TIMP and IA=5.0 for grass areas.
*# - The Tp value was simply calculated by using the (LGI/0.3 * 2/3) / 3600, where the value of 0.3 was my assumed flow velocity.  Note, there are 4 catchments to which this was done, for a total of 48.3 ha representing just over 11% of the total drainage area to the Beaver Pond.
*# - removed  the two IBI Route Reservoirs that were previously inserted to account for some hidden system storage.
*#
*#=========================================================================
*# WATTS CREEK SUBWATERSHED
*# MODEL CONVERTED FROM QUALHYMO MODEL (DILLON, 2009)
*# DECEMBER 2014
*#=========================================================================
*# Model updated by JFSA (June 2019)to allow for continuous simulations to complete
*# preliminary erosion assessment.
*# Model reverted back to existing conditions using parameters as documented in
*# MVCA's Watts Creek Final Report November 2017
*# Model updated to assess the impacts of the redevelopment of the Kanata Golf &
*# Country Club directly.
*# Model updated to reflect the increase in impervious area due to the redevelopment
*# of Kanata Golf & Country Club (KGCC) - All developments assume an imperviousness
*# of 60% with a directly connected imperviousness of 50%
*# All DA's (Detention Areas) have been removed from the model within the Kanata
*# Golf & Country Club
*# model updated to include SWM ponds for KGCC lands
*# Model updated to reflect the current design for Kanata Lakes Stage 9 as per IBI's
*# March 2018 Design Brief
*# Kanata Lakes Stages 7 & 8 as per MVCA model
*#=========================================================================
*#                                  KIZELL DRAIN
*#=========================================================================
* Area Tributary to Beaver Pond and Kizell Cell
*#=========================================================================
*#=========================================================================
*# Derived from Scenario 20 of Phase 1 SWM Study
```

```
*# AECOM MODEL + GOLF COURSE DETENTION PONDS
*# AMC II Condition
*# RAINFALL - BEAVER POND RAIN GAUGE (POINT RAINFALL)
*# DESIGN EVENTS
*#===============================================================================
*                              DESIGN STORMS
*#===============================================================================
*%-----------------|-------------------------------------------------------------|
START                TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[0002]
*                    "2y12hr.stm"
READ STORM           STORM_FILENAME=["storm.001"]
*%-----------------|-------------------------------------------------------------|
*#===============================================================================
*                              CONTINUOUS SIMULATIONS
*#===============================================================================
*START                TZERO=[1967.0719],  METOUT=[2],  NSTORM=[0],  NRUN=[1967]
*%                    [""] <--storm filename, one per line for NSTORM time
*%-----------------|-------------------------------------------------------------|
*# Ottawa International Airport - 19 July 1967 to 01 Nov 2007
*READ AES DATA        AES_FILENAME=["YOW_1967_2007.123"],
*                     IELEM=[123], START_DATE=[0], END_DATE=[-364]
*%-----------------|-------------------------------------------------------------|
*%-----------------|-------------------------------------------------------------|
COMPUTE API          APII=[40], APIK=[0.8]/day,
*%-----------------|-------------------------------------------------------------|
*#===============================================================================
*                           DRAINAGE TO KGCC POND 1
*#===============================================================================
*#===============================================================================
*# AREA 3A-1 (URBAN PORTION of Area North of Campeau Drive)
*#===============================================================================
*# Previous command replaced by a NASHYD to account for the fact that the drainage goes
*# over golf course and we want to recapture the baseflow
CONTINUOUS NASHYD    ID=[1], NHYD=["AREA 3A-1"], DT=[1](min), AREA=[2.7](ha)
                     DWF=[0](cms),  CN/C=[68.8], IA=[3.38](mm), N=[2], TP=[1.32](hrs),
                     Continuous simulation parameters:
                     IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                     InterEventTime=[12](hrs),
                     Baseflow simulation parameters:
                     BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                     VHydCond=[.001](mm/hr), END=-1
*%-----------------|-------------------------------------------------------------|
*#===============================================================================
*# AREA 3B (GOLF PORTION of Area North of Campeau Drive) - Developed
*#===============================================================================
CONTINUOUS STANDHYD      ID=[2], NHYD=["AREA 3B"], DT=[1](min), AREA=[6.3](ha),
                     XIMP=[0.50], TIMP=[0.60], DWF=[0](cms),
                     LOSS=[1]:    Horton: Fo=[76.20](mm/hr), Fc=[13.2](mm/hr),
                     DCAY=[4.14](/hr), F=[0](mm),
                     Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                          LGP=[40](m), MNP=[0.25], SCP=[0](min),
                     Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.2](%),
                                          LGI=[205](m), MNI=[0.025], SCI=[0](min),
                     Continuous simulation parameters:
                     IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                     InterEventTime=[12](hrs), END=-1
*%-----------------|-------------------------------------------------------------|
*#===============================================================================
*# AREA 12 (GOLF PORTION OF Area East of Knudson Drive) - Developed
*#===============================================================================
CONTINUOUS STANDHYD      ID=[3], NHYD=["AREA 12"], DT=[1](min), AREA=[2.27](ha),
                     XIMP=[0.50], TIMP=[0.60], DWF=[0](cms),
                     LOSS=[1]:    Horton: Fo=[76.20](mm/hr), Fc=[13.2](mm/hr),
                     DCAY=[4.14](/hr), F=[0](mm),
                     Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                          LGP=[40](m), MNP=[0.25], SCP=[0](min),
                     Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.2](%),
```

```
                                          LGI=[123](m), MNI=[0.025], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# AREA 2A (URBAN PORTION OF Area North of Campeau Drive)
*#=============================================================================
*# Previous command replaced by a NASHYD to account for the fact that the drainage goes
*# over golf course and we want to recapture the baseflow
CONTINUOUS NASHYD      ID=[4], NHYD=["AREA 2A"], DT=[1](min), AREA=[29.3](ha),
                    DWF=[0](cms),  CN=[68], IA=[3.4](mm),
                    N=[2.0], TP=[0.27]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# AREA 2B-1 (GOLF PORTION OF Area North of Campeau Drive) TO DA 3 - Developed
*#=============================================================================
CONTINUOUS STANDHYD      ID=[5], NHYD=["AREA 2B-1"], DT=[1](min), AREA=[13.0](ha),
                    XIMP=[0.50], TIMP=[0.60], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[76.20](mm/hr), Fc=[13.2](mm/hr),
                    DCAY=[4.14](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.2](%),
                                         LGI=[294](m), MNI=[0.025], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# ADD All Catchments that Drain to Pond 1
*#=============================================================================
ADD HYD             IDsum=[7], NHYD=["Pond1-IN"], IDs to add=[1+2+3+4+5]
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# KGCC Pond 1 (Drainage 53.57 ha)
*#=============================================================================
ROUTE RESERVOIR     IDout=[1],   NHYD=["Pond-1"],  IDin=[7],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                     (cms) - (ha-m)
                                   [   0.0 ,  0.0 ]
                                   [  0.201, 0.643 ]
                                   [  0.295, 1.045 ]
                                   [  1.179, 2.0 ]
                                   [   -1  ,  -1  ]  (max twenty pts)
                          IDovf=[   ], NHYDovf=[   ]
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*                         DRAINAGE TO KGCC POND 2
*#=============================================================================
*#=============================================================================
*# AREA 2C (URBAN PORTION OF Area North of Campeau Drive)
*#=============================================================================
*# Previous command replaced by a NASHYD to account for the fact that the drainage goes
*# over golf course and we want to recapture the baseflow
CONTINUOUS NASHYD      ID=[2], NHYD=["AREA 2C"], DT=[1](min), AREA=[13.8](ha)
                    DWF=[0](cms),  CN/C=[70.8], IA=[3.18](mm),
                    [2], TP=[0.187](hrs),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
```

```
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# AREA 2B-2 (GOLF PORTION OF Area North of Campeau Drive) - Developed
*#=============================================================================
CONTINUOUS STANDHYD      ID=[3], NHYD=["AREA 2B-2"], DT=[1](min), AREA=[15.7](ha),
                    XIMP=[0.50], TIMP=[0.60], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[76.20](mm/hr), Fc=[13.2](mm/hr),
                    DCAY=[4.14](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.2](%),
                                         LGI=[324](m), MNI=[0.025], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*#=============================================================================
*# ADD All Catchments that Drain to Pond 2
*#=============================================================================
ADD HYD             IDsum=[4], NHYD=[Pond2-IN], IDs to add=[2+3]
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# KGCC Pond 2 (Drainage 29.5 ha)
*#=============================================================================
ROUTE RESERVOIR     IDout=[2],   NHYD=["Pond-2"],  IDin=[4],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                     (cms) - (ha-m)
                                [   0.0 ,  0.0 ]
                                [  0.111 , 0.417 ]
                                [  0.162, 0.665 ]
                                [  0.649, 1.27]
                                [   -1  ,  -1  ]  (max twenty pts)
                          IDovf=[   ], NHYDovf=[   ]
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*                         DRAINAGE TO KGCC POND 3 (2.90 ha)
*#=============================================================================
*#=============================================================================
*# AREA 13 (GOLF PORTION OF Area East of Knudson Drive - DA 6A) - Developed
*#=============================================================================
CONTINUOUS STANDHYD      ID=[4], NHYD=["AREA 13"], DT=[1](min), AREA=[2.9](ha),
                    XIMP=[0.50], TIMP=[0.60], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[76.20](mm/hr), Fc=[13.2](mm/hr),
                    DCAY=[4.14](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.2](%),
                                         LGI=[139](m), MNI=[0.025], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# ADD outflows from Pond 1,2 & 3
*#=============================================================================
ADD HYD             IDsum=[10], NHYD=[000321], IDs to add=[1+2+4]
*#=============================================================================
*                     DRAINAGE TO KGCC POND 4 (47.68 ha)
*#=============================================================================
*#=============================================================================
*# AREA 14 (GOLF PORTION OF Area East of Knudson Drive - DA 11) - Developed
*#=============================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["AREA 14"], DT=[1](min), AREA=[2.38](ha),
```

```
                    XIMP=[0.50], TIMP=[0.60], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[76.20](mm/hr), Fc=[13.2](mm/hr),
                    DCAY=[4.14](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.2](%),
                                         LGI=[126](m), MNI=[0.025], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# AREA 1B (GOLF PORTION OF Area North of Campeau Drive) - Developed
*#=============================================================================
CONTINUOUS STANDHYD      ID=[2], NHYD=["AREA 1B"], DT=[1](min), AREA=[9.3](ha),
                    XIMP=[0.50], TIMP=[0.60], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[76.20](mm/hr), Fc=[13.2](mm/hr),
                    DCAY=[4.14](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.2](%),
                                         LGI=[249](m), MNI=[0.025], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# AREA 1C (URBAN PORTION of Area North of Campeau Drive)
*#=============================================================================
*# This area is piped through the golf course, so no change in XIMP
CONTINUOUS STANDHYD      ID=[3], NHYD=["AREA 1C"], DT=[1](min), AREA=[17.8](ha),
                    XIMP=[0.225], TIMP=[0.51], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[344](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# AREA 5A (URBAN PORTION OF Area North of Knudson Drive)
*#=============================================================================
*# Previous command replaced by a NASHYD to account for the fact that the drainage goes
*# over golf course and we want to recapture the baseflow
CONTINUOUS NASHYD       ID=[4], NHYD=["AREA 5A"], DT=[1](min), AREA=[2.5](ha)
                    DWF=[0](cms),  CN/C=[45.25], IA=[3.25](mm), N=[2], TP=[0.08](hrs),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# AREA 5B (GOLF PORTION OF Area North of Knudson Drive) - Developed
*#=============================================================================
CONTINUOUS STANDHYD      ID=[5], NHYD=["AREA 5B"], DT=[1](min), AREA=[9.5](ha),
                    XIMP=[0.50], TIMP=[0.60], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[76.20](mm/hr), Fc=[13.2](mm/hr),
                    DCAY=[4.14](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.2](%),
                                         LGI=[252](m), MNI=[0.025], SCI=[0](min),
```

```
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# ADD flows that go directly to Pond 4
*#=============================================================================
ADD HYD             IDsum=[9], NHYD=[000321], IDs to add=[1+2+3+4+5]
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# AREA 1D (URBAN PORTION of Area North of Campeau Drive)
*#=============================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["AREA 1D"], DT=[1](min), AREA=[15.8](ha),
                    XIMP=[0.250], TIMP=[0.55], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[324](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# MAJOR FLOW TO Pond 4 - MINOR FLOW TO Beaver Pond
*# 85 L/S/HA * 15.8 HA = 1.343 L/S
*#=============================================================================
COMPUTE DUALHYD     IDin=[1], CINLET=[1.343](cms), NINLET=[1],
                    MAJID=[2], MajNHYD=[000100],
                    MINID=[3], MinNHYD=[000100],
                    TMJSTO=[0](cu-m)
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# AREA 5C (URBAN PORTION OF Area North of Knudson Drive)
*#=============================================================================
CONTINUOUS STANDHYD      ID=[4], NHYD=["000100"], DT=[1](min), AREA=[6.2](ha),
                    XIMP=[0.250], TIMP=[0.50], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[203](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# MAJOR FLOW TO Pond 4 - MINOR FLOW TO Beaver Pond
*# 85 L/S/HA * 6.2 HA = 0.527 L/S
*#=============================================================================
COMPUTE DUALHYD     IDin=[4], CINLET=[0.527](cms), NINLET=[1],
                    MAJID=[6], MajNHYD=[000100],
                    MINID=[7], MinNHYD=[000100],
                    TMJSTO=[0](cu-m)
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# ADD major flows from 1D and 5C that go to Pond 4
*#=============================================================================
ADD HYD             IDsum=[1], NHYD=[Pond4-IN], IDs to add=[6+2+9]
*%-----------------|-------------------------------------------------------------|
*#=============================================================================
*# ADD minor flows from 1D and 5C to Beaver Pond
*#=============================================================================
ADD HYD             IDsum=[2], NHYD=[MIN-Beaver-IN], IDs to add=[7+3]
*%-----------------|-------------------------------------------------------------|
```

```
*#==============================================================================
*# KGCC Pond 4 (Drainage 41.48 ha + Major from 1D & 5C)
*#==============================================================================
ROUTE RESERVOIR     IDout=[4],   NHYD=["Pond-4"],  IDin=[1],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                (cms) - (ha-m)
                             [   0.0 ,  0.0 ]
                             [  0.156 , 0.480 ]
                             [  0.228, 0.744 ]
                             [  0.913 1.61 ]
                             [   -1  ,  -1  ]  (max twenty pts)
                          IDovf=[   ], NHYDovf=[   ]
*%----------------|------------------------------------------------------------|
*# ADD outflows from Pond 4 to ponds 1,2 & 3 and minor flows
*#==============================================================================
ADD HYD             IDsum=[1], NHYD=[000321], IDs to add=[10+4+2]
*#==============================================================================
*#==============================================================================
*                         DRAINAGE TO KGCC POND 5
*#==============================================================================
*#==============================================================================
*# AREA 6A (URBAN PORTION OF Area North of Knudson Drive)
*#==============================================================================
CONTINUOUS STANDHYD      ID=[2], NHYD=["AREA 6A"], DT=[1](min), AREA=[4.1](ha),
                    XIMP=[0.050], TIMP=[0.52], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[165](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%----------------|------------------------------------------------------------|
*#==============================================================================
*# AREA 6B (GOLF PORTION OF Area North of Knudson Drive) - Developed
*#==============================================================================
CONTINUOUS STANDHYD      ID=[3], NHYD=["AREA 6B"], DT=[1](min), AREA=[5.9](ha),
                    XIMP=[0.50], TIMP=[0.60], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[76.20](mm/hr), Fc=[13.2](mm/hr),
                    DCAY=[4.14](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.2](%),
                                         LGI=[198](m), MNI=[0.025], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%----------------|------------------------------------------------------------|
*#==============================================================================
*# AREA 15 (GOLF PORTION OF Area South of Walden Drive - DA 10B) - Developed
*#==============================================================================
CONTINUOUS STANDHYD      ID=[4], NHYD=["AREA 15"], DT=[1](min), AREA=[2.5](ha),
                    XIMP=[0.50], TIMP=[0.60], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[76.20](mm/hr), Fc=[13.2](mm/hr),
                    DCAY=[4.14](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.2](%),
                                         LGI=[129](m), MNI=[0.025], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%----------------|------------------------------------------------------------|
```

```
*#==============================================================================
*# AREA 6C (URBAN PORTION OF Area North of Knudson Drive)
*#==============================================================================
CONTINUOUS STANDHYD      ID=[5], NHYD=["AREA 6C"], DT=[1](min), AREA=[5.3](ha),
                    XIMP=[0.250], TIMP=[0.50], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[187](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%----------------|-------------------------------------------------------------|
*#==============================================================================
*# MAJOR FLOW TO Pond 5 - MINOR FLOW TO Beaver Pond
*# 85 L/S/HA * 5.3 HA = 0.4505 L/S
*#==============================================================================
COMPUTE DUALHYD      IDin=[5], CINLET=[0.451](cms), NINLET=[1],
                     MAJID=[6], MajNHYD=[000100],
                     MINID=[7], MinNHYD=[000100],
                     TMJSTO=[0](cu-m)
*%----------------|-------------------------------------------------------------|
*#==============================================================================
*# ADD ALL drainage to Pond 5 (12.5 ha)
*#==============================================================================
ADD HYD              IDsum=[8], NHYD=[Pond5-IN], IDs to add=[2+3+4+6]
*%----------------|-------------------------------------------------------------|
*#==============================================================================
ROUTE RESERVOIR      IDout=[4],   NHYD=["Pond-5"],  IDin=[8],
                     RDT=[1](min),
                           TABLE of ( OUTFLOW-STORAGE ) values
                                      (cms) - (ha-m)
                                    [   0.0 ,  0.0 ]
                                    [  0.067 , 0.140]
                                    [  0.098, 0.236]
                                    [  0.392, 0.485 ]
                                    [   -1  ,  -1  ]  (max twenty pts)
                           IDovf=[   ], NHYDovf=[   ]
*%----------------|-------------------------------------------------------------|
*#==============================================================================
*# AREA 3A-2 (URBAN PORTION of Area North of Campeau Drive)
*#==============================================================================
CONTINUOUS STANDHYD      ID=[6], NHYD=["AREA 3A-2"], DT=[1](min), AREA=[33.4](ha),
                    XIMP=[0.250], TIMP=[0.41], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[471](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%----------------|-------------------------------------------------------------|
*#==============================================================================
*# AREA 1A (INSTITUTION BLOCK)
*#==============================================================================
CONTINUOUS NASHYD        ID=[5], NHYD=["AREA 1A"], DT=[1]min, AREA=[11.4](ha),
                    DWF=[0](cms),  CN=[61], IA=[5.0](mm),
                    N=[2.0], TP=[0.56]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
```

```
                    VHydCond=[.001](mm/hr), END=-1
*%----------------|-------------------------------------------------------------|
*# ADD outflows from 3A-2, 1A,Pond 5 and minor from 6C to ponds 1,2,3 & 4
*#=============================================================================
ADD HYD             IDsum=[11], NHYD=[000321], IDs to add=[1+4+7]
*#=============================================================================
*# AREA 7 (Adjacent to Beaver Pond)
*#=============================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["000204"], DT=[1](min), AREA=[19.6](ha),
                    XIMP=[0.250], TIMP=[0.44], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[361](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%----------------|-------------------------------------------------------------|
*#=============================================================================
*# ADD OUTFLOW OF DA 10B AND 6C TO 7
*# TOTAL FLOW - AT EXISTING 2700 MM OUTLET
*#=============================================================================
ADD HYD             IDsum=[9], NHYD=[000321], IDs to add=[5+2+1]
*%----------------|-------------------------------------------------------------|
*
*#=============================================================================
*# AREA 4C
*#=============================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["000204"], DT=[1](min), AREA=[5.8](ha),
                    XIMP=[0.250], TIMP=[0.53], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[196](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%----------------|-------------------------------------------------------------|
*#=============================================================================
*# MAJOR FLOW TO 4B - MINOR FLOW TO 4A
*# 85 L/S/HA * 5.8 HA = 493 L/S
*#=============================================================================
COMPUTE DUALHYD     IDin=[1], CINLET=[0.493](cms), NINLET=[1],
                    MAJID=[5], MajNHYD=[000100],
                    MINID=[6], MinNHYD=[100100],
                    TMJSTO=[0](cu-m)
*%----------------|-------------------------------------------------------------|
*
*#=============================================================================
*# AREA 4A - FLOW THROUGH AREA 4
*#=============================================================================
CONTINUOUS STANDHYD      ID=[3], NHYD=["000204"], DT=[1](min), AREA=[15.8](ha),
                    XIMP=[0.250], TIMP=[0.66], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[324](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%----------------|-------------------------------------------------------------|
```

```
*
*#==============================================================================
*# ADDITION OF 4C MINOR TO 4A
*#==============================================================================
*
ADD HYD              IDsum=[4], NHYD=[000231], IDs to add=[3+6]
*%-----------------|-------------------------------------------------------|
*#==============================================================================
*# AREA 4B - ROUTE THROUGH ON SITE STORAGE
*#==============================================================================
CONTINUOUS STANDHYD      ID=[3], NHYD=["000204"], DT=[1](min), AREA=[6.2](ha),
                     XIMP=[0.250], TIMP=[0.57], DWF=[0](cms),
                     LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                     DCAY=[2.0](/hr), F=[0](mm),
                     Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                          LGP=[40](m), MNP=[0.25], SCP=[0](min),
                     Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                          LGI=[203](m), MNI=[0.013], SCI=[0](min),
                     Continuous simulation parameters:
                     IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                     InterEventTime=[12](hrs), END=-1
*%-----------------|-------------------------------------------------------|
*#==============================================================================
*# ADDITION OF MAJOR FLOW AT 4C TO AREA 4B
*#==============================================================================
ADD HYD              IDsum=[6], NHYD=[000231], IDs to add=[5+3]
*%-----------------|-------------------------------------------------------|
*#==============================================================================
*# ON-SITE STORAGE IN AREA 4B
*# 85L/S/HA
*#==============================================================================
*
ROUTE RESERVOIR      IDout=[3],   NHYD=[000100],  IDin=[6],
                     RDT=[1](min),
                           TABLE of ( OUTFLOW-STORAGE ) values
                                     (cms) - (ha-m)
                                [   0.0 ,  0.0 ]
                                [ 0.527, 0.2840]
                                [   -1  ,  -1  ]  (max twenty pts)
                           IDovf=[], NHYDovf=[]
*%-----------------|-------------------------------------------------------|
*#==============================================================================
*# ADDITION OF ROUTED 4B TO AREA 4A
*#==============================================================================
ADD HYD              IDsum=[8], NHYD=[000231], IDs to add=[4+3]
*%-----------------|-------------------------------------------------------|
*
*#==============================================================================
*# AREA 4 (Adjacent to Beaver Pond)
*#==============================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["000204"], DT=[1](min), AREA=[21.2](ha),
                     XIMP=[0.250], TIMP=[0.38], DWF=[0](cms),
                     LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                     DCAY=[2.0](/hr), F=[0](mm),
                     Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                          LGP=[40](m), MNP=[0.25], SCP=[0](min),
                     Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                          LGI=[375](m), MNI=[0.013], SCI=[0](min),
                     Continuous simulation parameters:
                     IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                     InterEventTime=[12](hrs), END=-1
*%-----------------|-------------------------------------------------------|
*#==============================================================================
*# ADDITION OF MINOR FLOW AT 4A TO AREA 4
*#==============================================================================
ADD HYD              IDsum=[3], NHYD=[000231], IDs to add=[8+1]
*%-----------------|-------------------------------------------------------|
```

```
ADD HYD             IDsum=[7], NHYD=[000231], IDs to add=[10+3]
*%----------------|-------------------------------------------------------------|
*#=============================================================================
*# AREA 9 (RURAL)
*#=============================================================================
CONTINUOUS NASHYD   ID=[2], NHYD=["000100"], DT=[1]min, AREA=[18.9](ha),
                    DWF=[0](cms),  CN=[75], IA=[5.0](mm),
                    N=[2.0], TP=[0.37]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*%----------------|-------------------------------------------------------------|
ADD HYD             IDsum=[6], NHYD=[000321], IDs to add=[7+2]
*%----------------|-------------------------------------------------------------|
*
*#=============================================================================
*# GOULDBOURN FORCED ROAD - KANATA AVENUE TO AREA 10 BOUNDARY
*# (ARTERIAL ROAD 10 YEAR 10 MN INLET TIME)
*#=============================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["000204"], DT=[1](min), AREA=[1.6](ha),
                    XIMP=[0.71], TIMP=[0.71], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[103](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%----------------|-------------------------------------------------------------|
*#=============================================================================
*# MAJOR FLOW TO BEAVER POND - MINOR FLOW TO AREA 10 STORM SYSTEM
*# 237.69 L/S/HA * 1.66 HA = 394.6 L/S
*#=============================================================================
COMPUTE DUALHYD     IDin=[1], CINLET=[0.395](cms), NINLET=[1],
                    MAJID=[2], MajNHYD=[000100],
                    MINID=[7], MinNHYD=[100100],
                    TMJSTO=[0](cu-m)
*%----------------|-------------------------------------------------------------|
*#=============================================================================
*# BEAVER POND PORTION #1
*#=============================================================================
*
ADD HYD             IDsum=[9], NHYD=[000321], IDs to add=[6+2+11]
*%----------------|-------------------------------------------------------------|
*
*#=============================================================================
*# KANATA AVENUE - GOULBOURN FORCED ROAD TO AREA 10 BOUNDARY
*# (ARTERIAL ROAD 10 YEAR 10 MIN INLET TIME)
*#=============================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["000204"], DT=[1](min), AREA=[2.8](ha),
                    XIMP=[0.32], TIMP=[0.32], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[136](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%----------------|-------------------------------------------------------------|
*#=============================================================================
```

```
*# MAJOR FLOW TOWARDS TFD - MINOR FLOW TO AREA 10 STORM SYSTEM
*# 237.69 L/S/HA * 1.8 HA = 427.8 L/S
* JFSA correction based on above drainage area of 2.8 ha
* Capture in DUALHYD below 237.69 L/s/ha * 2.8 ha = 665.5 L/s
*#=============================================================================
COMPUTE DUALHYD     IDin=[1], CINLET=[0.6655](cms), NINLET=[1],
                    MAJID=[10], MajNHYD=[000100],
                    MINID=[2], MinNHYD=[100100],
                    TMJSTO=[0](cu-m)
*%-----------------|-------------------------------------------------------|
*
*#=============================================================================
*# DRAINAGE AGREA 10 - TOTAL 43.6 HA - DIVIDED UP FOR HGL ANALYSIS
*# (INCLUDES AREA 10-4, 10-1, 10-2 AND 10-3)
*#=============================================================================
*
*#=============================================================================
*# AREA 10-4 - DRAINS INTO S-5 - MAJOR FLOW CASCADES
*#=============================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["000204"], DT=[1](min), AREA=[13.9](ha),
                    XIMP=[0.250], TIMP=[0.51], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[304](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%-----------------|-------------------------------------------------------|
*#=============================================================================
*# MINOR FLOW INTO SYSTEM
*# 85 L/S/HA * 14 = 1190 L/S
*JFSA correction based on above drainage area of 13.9 ha
* Capture in DUALHYD below 85 L/s/ha * 13.9 ha = 1181 L/s
*#=============================================================================
COMPUTE DUALHYD     IDin=[1], CINLET=[1.181](cms), NINLET=[1],
                    MAJID=[8], MajNHYD=[000100],
                    MINID=[6], MinNHYD=[100100],
                    TMJSTO=[0](cu-m)
*%-----------------|-------------------------------------------------------|
*#=============================================================================
*# ADD KANATA AVENUE AND AREA 10-4 - MH S-5
*#=============================================================================
*
ADD HYD             IDsum=[5], NHYD=[000101], IDs to add=[6+2]
*%-----------------|-------------------------------------------------------|
*
*#=============================================================================
*# AREA 10-1 - DRAINS INTO S-4 - MAJOR FLOW CASCADES
*#=============================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["000204"], DT=[1](min), AREA=[9.8](ha),
                    XIMP=[0.250], TIMP=[0.51], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[255](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%-----------------|-------------------------------------------------------|
*#=============================================================================
*# MINOR FLOW INTO SYSTEM
*# 85 L/S/HA * 9.5 = 807.5 L/S
```

```
*JFSA correction based on above drainage area of 9.8 ha
* Capture in DUALHYD below 85 L/s/ha * 9.8 ha = 833 L/s
*#==============================================================================
COMPUTE DUALHYD     IDin=[1], CINLET=[0.833](cms), NINLET=[1],
                    MAJID=[4], MajNHYD=[000100],
                    MINID=[6], MinNHYD=[100100],
                    TMJSTO=[0](cu-m)
*%-----------------|------------------------------------------------------------|
*#==============================================================================
*# ADD GOULBOURN FORCED ROAD AND AREA 10-1 - MH S-3
*#==============================================================================
*
ADD HYD             IDsum=[3], NHYD=[000101], IDs to add=[6+7]
*%-----------------|------------------------------------------------------------|
ADD HYD             IDsum=[7], NHYD=[000102], IDs to add=[3+5]
*%-----------------|------------------------------------------------------------|
*
*#==============================================================================
*# AREA 10-3 - DRAINS INTO S-2 - MAJOR FLOW CASCADES
*#==============================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["000204"], DT=[1](min), AREA=[4.3](ha),
                    XIMP=[0.250], TIMP=[0.55], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[169](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%-----------------|------------------------------------------------------------|
*#==============================================================================
*# MINOR FLOW INTO SYSTEM
*# 85 L/S/HA * 3.9 = 331.5 L/S
*JFSA correction based on above drainage area of 4.3 ha
* Capture in DUALHYD below 85 L/s/ha * 4.3 ha = 365 L/s
*#==============================================================================
COMPUTE DUALHYD     IDin=[1], CINLET=[0.365](cms), NINLET=[1],
                    MAJID=[5], MajNHYD=[000100],
                    MINID=[2], MinNHYD=[100100],
                    TMJSTO=[0](cu-m)
*%-----------------|------------------------------------------------------------|
ADD HYD             IDsum=[10], NHYD=[000103], IDs to add=[2+7]
*%-----------------|------------------------------------------------------------|
*
*#==============================================================================
*# AREA 10-2 - DRAINS INTO S-6 - MAJOR FLOW CASCADES
*#==============================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["000204"], DT=[1](min), AREA=[18.6](ha),
                    XIMP=[0.250], TIMP=[0.51], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[352](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*%-----------------|------------------------------------------------------------|
*#==============================================================================
*# MINOR FLOW INTO SYSTEM
*# 85 L/S/HA * 16.2 = 1377 L/S
*JFSA correction based on above drainage area of 18.6 ha
* Capture in DUALHYD below 85 L/s/ha * 18.6 ha = 1581 L/s
*#==============================================================================
```

```
COMPUTE DUALHYD      IDin=[1], CINLET=[1.581](cms), NINLET=[1],
                     MAJID=[2], MajNHYD=[000100],
                     MINID=[6], MinNHYD=[100100],
                     TMJSTO=[0](cu-m)
*%-----------------|-------------------------------------------------------------|
*
*#============================================================================
*# AREA 10A - MINOR FLOW TO AREA 10, MAJOR FLOW TO CARP RIVER WATERSHED
*#============================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["000204"], DT=[1](min), AREA=[9.9](ha),
                     XIMP=[0.250], TIMP=[0.44], DWF=[0](cms),
                     LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                     DCAY=[2.0](/hr), F=[0](mm),
                     Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                          LGP=[40](m), MNP=[0.25], SCP=[0](min),
                     Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                          LGI=[256](m), MNI=[0.013], SCI=[0](min),
                     Continuous simulation parameters:
                     IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                     InterEventTime=[12](hrs), END=-1
*%-----------------|-------------------------------------------------------------|
*#============================================================================
*# SPLIT OF MAJOR AND MINOR FLOW AT 85 L/S/HA
*# 85 * 7.0 = 595 L/S
*JFSA correction based on above drainage area of 9.9 ha
* Capture in DUALHYD below 85 L/s/ha * 9.9 ha = 841 L/s
*#============================================================================
COMPUTE DUALHYD      IDin=[1], CINLET=[0.841](cms), NINLET=[1],
                     MAJID=[3], MajNHYD=[000100],
                     MINID=[7], MinNHYD=[100100],
                     TMJSTO=[0](cu-m)
*%-----------------|-------------------------------------------------------------|
ADD HYD              IDsum=[1], NHYD=[000104], IDs to add=[7+6]
*%-----------------|-------------------------------------------------------------|
*#============================================================================
*# TOTAL MINOR FLOW AT OUTLET
*#============================================================================
ADD HYD              IDsum=[6], NHYD=[000105], IDs to add=[1+10]
*%-----------------|-------------------------------------------------------------|
*#============================================================================
*# TOTAL MAJOR FLOW FOR DRAINAGE AREA 10 AT OUTLET
*#============================================================================
ADD HYD              IDsum=[7], NHYD=[000106], IDs to add=[8+4+5+2]
*%-----------------|-------------------------------------------------------------|
*#============================================================================
*# AREA 11 (RURAL) - Increased Area for Existing Conditions
*#============================================================================
CONTINUOUS NASHYD        ID=[2], NHYD=["000100"], DT=[1]min, AREA=[46.2](ha),
                     DWF=[0](cms),  CN=[62], IA=[5.0](mm),
                     N=[2.0], TP=[0.75]hrs,
                     Continuous simulation parameters:
                     IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                     InterEventTime=[12](hrs),
                     Baseflow simulation parameters:
                     BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                     VHydCond=[.001](mm/hr), END=-1
*%-----------------|-------------------------------------------------------------|
ADD HYD              IDsum=[3], NHYD=[000317], IDs to add=[7+2]
*%-----------------|-------------------------------------------------------------|
*#============================================================================
*# TOTAL FLOW TO KIZELL POND (U/S CELL)
*#============================================================================
ADD HYD              IDsum=[10], NHYD=[000317], IDs to add=[3+6]
*%-----------------|-------------------------------------------------------------|
*
*#============================================================================
*# SYSTEM STORAGE REPRESENTATION (KIZELL POND)
```

```
*# RATING CURVE PROVIDED BY IBI
*#=============================================================================
*# modify the ROUTE RESERVOIR to negate the effect of this underground storage
ROUTE RESERVOIR     IDout=[3],   NHYD=["KP-R"],  IDin=[10],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                     (cms) - (ha-m)
                                   [   0.0 ,  0.0 ]
                                   [ 99.   ,  0.09]
                                   [   -1  ,  -1  ]  (max twenty pts)
                          IDovf=[4], NHYDovf=["OVF-KP"]
*#=============================================================================
*# ADD SYSTEM STORAGE OUTFLOW, OVERFLOW AND BYPASS (KIZELL)
*#=============================================================================
ADD HYD             IDsum=[10], NHYD=["KP-COM"], IDs to add=[3+4]
*#=============================================================================
*
* Kanata Lakes Stage 7
*
*#=============================================================================

CONTINUOUS STANDHYD      ID=[1], NHYD=["Stage 7"], DT=[1](min), AREA=[73.1](ha),
                    XIMP=[0.40], TIMP=[0.50], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[76.20](mm/hr), Fc=[13.2](mm/hr),
                    DDCAY=[4.14](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.2](%),
                                         LGI=[256](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*#=============================================================================
*
* Kanata Lakes Stage 8
*
*#=============================================================================
CONTINUOUS STANDHYD      ID=[2], NHYD=["Stage 8"], DT=[1](min), AREA=[65.7](ha),
                    XIMP=[0.40], TIMP=[0.50], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[76.20](mm/hr), Fc=[13.2](mm/hr),
                    DCAY=[4.14](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.2](%),
                                         LGI=[661](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*#=============================================================================
*# Only Minor system flow to Kizell Cell
* JFSA: fFlow split adjusted to reflect new 5-Year runoff rate with corrected LGI
*#=============================================================================
COMPUTE DUALHYD     IDin=[2], CINLET=[4.321](cms), NINLET=[1],
                    MAJID=[3], MajNHYD=[000100],
                    MINID=[7], MinNHYD=[100100],
                    TMJSTO=[0](cu-m)
*#=============================================================================
* Total flow into Kizell Cell
*#=============================================================================
ADD HYD             IDsum=[8], NHYD=["KP-COM"], IDs to add=[10+1+7]
*#=============================================================================
*#=============================================================================
* ROUTE THROUGH THE KIZELL CELL
*
ROUTE RESERVOIR     IDout=[5],   NHYD=["Kizell Cell"],  IDin=[8],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
```

```
                                        (cms) - (ha-m)
                                     [   0.0 ,  0.0 ]
                                     [ 0.100 ,  0.016]
                                     [ 0.200 ,  0.033]
                                     [ 0.300 ,  0.055]
                                     [ 0.400 ,  0.079]
                                     [ 0.500 ,  0.121]
                                     [ 0.700 ,  0.188]
                                     [ 0.800 ,  0.281]
                                     [ 0.950 ,  0.433]
                                     [ 1.050 ,  0.658]
                                     [ 1.200 ,  0.919]
                                     [   -1  ,  -1   ]  (max twenty pts)
                               IDovf=[4], NHYDovf=["OVF-Kizell Cell"]
*#==============================================================================
*# ADD OUTFLOW AND OVERFLOW
*#==============================================================================
ADD HYD             IDsum=[8], NHYD=["KP-COM"], IDs to add=[5+4]
*#==============================================================================
*#==============================================================================
*# SYSTEM STORAGE REPRESENTATION (BEAVER POND)
*# RATING CURVE PROVIDED BY IBI
*#==============================================================================
* modify the ROUTE RESERVOIR to negate the effects of the underground storage
ROUTE RESERVOIR     IDout=[3],   NHYD=["BP-R"],  IDin=[9],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                        (cms) - (ha-m)
                                     [   0.0 ,  0.0 ]
                                     [ 99.0 ,  0.09]
                                     [   -1  ,  -1   ]  (max twenty pts)
                               IDovf=[4], NHYDovf=["OVF-BP"]
*#==============================================================================
*# ADD SYSTEM STORAGE OUTFLOW, OVERFLOW AND BYPASS (BEAVER)
*#==============================================================================
ADD HYD             IDsum=[9], NHYD=["BP-COM"], IDs to add=[3+4]
*#==============================================================================
*
* Kanata Lakes Stage 9
*
*#==============================================================================
* Under the latest proposed development conditions these lands will be broken into
* 3 catchment Beaver Pond (19.31 ha), Kizell Drain (6.89 ha) and Shirley's Brook (4.51 ha).
* As per IBI's "Design Brief KNL Stage 9 Kanata Lakes North" (March 2018).
* No on-site controls have been assumed for this area.
*#==============================================================================
*
* Kanata Lakes Stage 9 - Beaver Pond
*
*#==============================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["Stage 9-Beaver"], DT=[1](min), AREA=[19.31](ha),
                    XIMP=[0.50], TIMP=[0.60], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[76.20](mm/hr), Fc=[13.2](mm/hr),
                    DCAY=[4.14](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.2](%),
                                         LGI=[359](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*#==============================================================================
*
* Kanata Lakes Stage 9 - Shirley's Brook - Under developed conditions these lands
* discharge to Shirley's Brook and do not drain to the Kizell drain, but this catchment
* has been left in the model as a area closure check.
```

```
*
*#==============================================================================
CONTINUOUS STANDHYD      ID=[6], NHYD=["Stage 9-Shirley"], DT=[1](min), AREA=[4.51](ha),
                    XIMP=[0.53], TIMP=[0.63], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[76.20](mm/hr), Fc=[13.2](mm/hr),
                    DCAY=[4.14](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.2](%),
                                         LGI=[173](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*#==============================================================================
*# TOTAL HYDROGRAPH INTO BEAVER POND
*
ADD HYD             IDsum=[6], NHYD=["BP-TOTAL"], IDs to add=[9+8+1]
*
*#==============================================================================
SAVE HYD            ID=[6],  # OF PCYCLES=[-1],  ICASEsh=[-1]
                    HYD_FILENAME=["BP_In"]
                    HYD_COMMENT=["Total inflow to the Beaver Pond"]
*#==============================================================================
*# TOTAL FLOW FROM BEAVER POND
*#==============================================================================
* ROUTE THROUGH BEAVER POND
* Overflow option removed to allow for linear extrapolation of flows out of the
* pond when simulated volumes exceed volumes provided in the curve below.
ROUTE RESERVOIR     IDout=[1],   NHYD=["BP-OUT"],  IDin=[6],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                     (cms) - (ha-m)
                                   [   0.0 ,  0.0 ]
                                   [ 0.592 ,  4.573]
                                   [ 0.686 ,  6.569]
                                   [ 0.769 ,  8.840]
                                   [ 0.879 ,  11.467]
                                   [ 1.007 ,  16.103]
                                   [ 1.040 ,  17.339]
                                   [   -1  ,  -1   ]  (max twenty pts)
                       IDovf=[], NHYDovf=[""]
*#==============================================================================
SAVE HYD            ID=[1],  # OF PCYCLES=[-1],  ICASEsh=[-1]
                    HYD_FILENAME=["BP_Out"]
                    HYD_COMMENT=["Total Outflow from the Beaver Pond"]
*#==============================================================================
*# ROUTE KD-1 THROUGH KD-2A
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 10018.26
*#==============================================================================
ROUTE CHANNEL       IDout=[3], NHYD=["KD-1"], IDin=[1],
                    RDT=[1](min),
                    CHLGTH=[277](m),  CHSLOPE=[1.08](%),
                                        FPSLOPE=[1.08](%),
                    SECNUM=[10018],       NSEG=[4]
                    ( SEGROUGH, SEGDIST (m))=[0.08,30.63 -0.03,34.69 0.08,49.66
                    0.04,70.77] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 94.54 ]
                                                  [ 7.12,  93.2 ]
                                                  [11.07,  92.3 ]
                                                  [15.31,  91.8 ]
                                                  [17.16, 91.35 ]
                                                  [20.56,  90.8 ]
                                                  [25.12, 89.58 ]
                                                  [28.15,  88.5 ]
                                                  [30.63,  87.8 ]
                                                  [31.957, 87.854 ]
                                                  [ 34.4,  88.5 ]
```

```
                                                    [34.69, 88.61 ]
                                                    [ 36.5, 89.23 ]
                                                    [38.48,  90.2 ]
                                                    [41.14,  91.1 ]
                                                    [ 45.4, 91.66 ]
                                                    [49.66, 91.96 ]
                                                    [53.06,  92.3 ]
                                                    [67.16, 92.43 ]
                                                    [70.77, 92.52 ]
*#==============================================================================
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 9854.606
*#==============================================================================
ROUTE CHANNEL       IDout=[2], NHYD=["KD-1"], IDin=[3],
                    RDT=[1](min),
                    CHLGTH=[186](m),  CHSLOPE=[1.97](%),
                                        FPSLOPE=[1.97](%),
                    SECNUM=[9854],       NSEG=[5]
                    ( SEGROUGH, SEGDIST (m))=[0.08,29.81 0.05,34.304 -0.03,38.24
                    0.05,47.73 0.08,105.39] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 90.07 ]
                                                    [ 6.86,  89.4 ]
                                                    [13.24,  89.2 ]
                                                    [17.79, 88.48 ]
                                                    [22.46,  87.2 ]
                                                    [29.81, 86.04 ]
                                                    [32.17, 85.72 ]
                                                    [34.304, 85.612 ]
                                                    [36.137, 85.654 ]
                                                    [37.46, 85.69 ]
                                                    [38.24, 85.72 ]
                                                    [44.98,  85.9 ]
                                                    [47.73, 86.32 ]
                                                    [51.27,  87.3 ]
                                                    [55.17,    88 ]
                                                    [87.02, 88.79 ]
                                                    [90.72,  88.7 ]
                                                    [93.96,    89 ]
                                                    [99.45,  90.8 ]
                                                    [105.39, 91.81 ]
*#==============================================================================
*# KD-2A-1 - RURAL - Reduced Area for Future Conditions
*#==============================================================================
CONTINUOUS NASHYD       ID=[1], NHYD=["KD-2A-1"], DT=[1]min, AREA=[6.79](ha),
                    DWF=[0](cms),  CN=[57], IA=[7](mm),
                    N=[2.0], TP=[0.91]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*#==============================================================================
*
* Kanata Lakes Stage 9 - Kizell Drain
*
*#==============================================================================
CONTINUOUS STANDHYD     ID=[4], NHYD=["Stage 9-Kizell"], DT=[1](min), AREA=[6.89](ha),
                    XIMP=[0.48], TIMP=[0.58], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[76.20](mm/hr), Fc=[13.2](mm/hr),
                    DCAY=[4.14](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[0.2](%),
                                         LGI=[215](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
```

```
*#=============================================================================
*# ADD KD-2A-1, KD-1 and portion of KNL Stage 9
*#=============================================================================
ADD HYD             IDsum=[3], NHYD=["KFP2"], IDs to add=[1+2+4]
*PRINT HYD           ID=[3],   # OF PCYCLES=[1]
*#=============================================================================
*# ROUTE THROUGH KD-2A-2
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 9743.627
*#=============================================================================
ROUTE CHANNEL       IDout=[1], NHYD=["KD-1"], IDin=[3],
                    RDT=[1](min),
                    CHLGTH=[408](m),  CHSLOPE=[0.84](%),
                                        FPSLOPE=[0.84](%),
                    SECNUM=[9743],       NSEG=[5]
                    ( SEGROUGH, SEGDIST (m))=[0.05,42.45 -0.03,44.28 -0.05,46.07
                    0.05,63.17 0.08,111.15] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0,  86.7 ]
                                                   [ 7.01,  86.7 ]
                                                   [15.57,  86.2 ]
                                                   [21.06, 85.58 ]
                                                   [25.69, 84.76 ]
                                                   [31.55, 83.42 ]
                                                   [40.62,  82.7 ]
                                                   [42.45,  82.5 ]
                                                   [44.28, 82.561 ]
                                                   [ 44.6, 82.59 ]
                                                   [46.07,  82.7 ]
                                                   [48.58, 82.76 ]
                                                   [59.09, 82.59 ]
                                                   [63.17, 83.94 ]
                                                   [67.14,  85.3 ]
                                                   [71.84,  85.8 ]
                                                   [82.08,  85.8 ]
                                                   [89.16,  86.2 ]
                                                   [106.01,  86.6 ]
                                                   [111.15, 86.65 ]
*#=============================================================================
SAVE HYD            ID=[1],  # OF PCYCLES=[-1],  ICASEsh=[-1]
                    HYD_FILENAME=["KD-1"]
                    HYD_COMMENT=["KD-1-Channel where Erosion analysis was completed"]
*#=============================================================================
*# Erosion Analysis on Kizell Drain (Requires SWMHYMO v5.5)
*#=============================================================================
*# Erosion Index/critical shear stress calculated for flows through the critical
*# section of on Kizell Drain as determined by Matrix Solutions (May 2019)
*#=============================================================================
EROSION INDEX       INDEX_METHOD=[1], QCE =[0.50](cms), NHYDsErosion=[1]
*#=============================================================================
EROSION INDEX       INDEX_METHOD=[2], SHEARC =[20](Pa), No of Hyds=[1],
                    NHYDsErosion=[1]
                    RATING_CURVE_METHOD = [1], user entered channel shape
                    Channel section parameters
                    Section No["XS1"]
                    CHSLOPE=[0.84](%), FPSLOPE=[0.84](%),
                    NSEG=[5]
                    ( SEGROUGH, SEGDIST (m))=[0.05,42.45 -0.03,44.28 -0.05,46.07
                    0.05,63.17 0.08,111.15] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0,  86.7 ]
                                                   [ 7.01,  86.7 ]
                                                   [15.57,  86.2 ]
                                                   [21.06, 85.58 ]
                                                   [25.69, 84.76 ]
                                                   [31.55, 83.42 ]
                                                   [40.62,  82.7 ]
                                                   [42.45,  82.5 ]
                                                   [44.28, 82.561 ]
                                                   [ 44.6, 82.59 ]
```

```
                                                    [46.07,  82.7 ]
                                                    [48.58, 82.76 ]
                                                    [59.09, 82.59 ]
                                                    [63.17, 83.94 ]
                                                    [67.14,  85.3 ]
                                                    [71.84,  85.8 ]
                                                    [82.08,  85.8 ]
                                                    [89.16,  86.2 ]
                                                    [106.01,  86.6 ]
                                                    [111.15, 86.65 ]
*#=============================================================================
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 9338.062
*# MINIMUM SLOPE ASSUMED 0.1%
*#=============================================================================
ROUTE CHANNEL       IDout=[2], NHYD=["KD-1"], IDin=[1],
                    RDT=[1](min),
                    CHLGTH=[111](m),  CHSLOPE=[0.1](%),
                                        FPSLOPE=[0.1](%),
                    SECNUM=[9338],       NSEG=[5]
                    ( SEGROUGH, SEGDIST (m))=[0.04,78.47 0.06,82.78 -0.03,87.28 ↵
                    0.06,107.69 0.04,120.16] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0,  82.8 ]
                                                    [ 6.26, 82.86 ]
                                                    [   23,  82.4 ]
                                                    [57.46, 82.11 ]
                                                    [75.38,  82.1 ]
                                                    [78.47, 81.06 ]
                                                    [ 81.6,  79.7 ]
                                                    [82.78,  79.3 ]
                                                    [87.28, 79.28 ]
                                                    [ 88.3,  79.7 ]
                                                    [91.41,  81.1 ]
                                                    [94.81,  81.7 ]
                                                    [107.69,  82.1 ]
                                                    [120.16,  82.2 ]
*#=============================================================================
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 9131.887
*#=============================================================================
ROUTE CHANNEL       IDout=[1], NHYD=["KD-1"], IDin=[2],
                    RDT=[1](min),
                    CHLGTH=[248](m),  CHSLOPE=[0.28](%),
                                        FPSLOPE=[0.28](%),
                    SECNUM=[9131],       NSEG=[5]
                    ( SEGROUGH, SEGDIST (m))=[0.04,70.64 -0.03,72.865 0.04,74.61 ↵
                    0.05,77.65 0.04,191.67] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0,  81.6 ]
                                                    [ 7.35,  81.6 ]
                                                    [ 26.3,  80.9 ]
                                                    [48.53, 80.87 ]
                                                    [58.55, 80.01 ]
                                                    [65.66,    80 ]
                                                    [69.22,    79 ]
                                                    [70.64, 78.65 ]
                                                    [72.865,  78.7 ]
                                                    [74.25, 78.96 ]
                                                    [74.61,  79.1 ]
                                                    [77.65, 79.92 ]
                                                    [93.59,  79.9 ]
                                                    [103.2,  78.7 ]
                                                    [108.05,  79.9 ]
                                                    [115.92,  80.2 ]
                                                    [132.65,  80.2 ]
                                                    [159.72, 80.73 ]
                                                    [176.71, 82.61 ]
                                                    [191.67, 82.63 ]
*#=============================================================================
*# KD-2A-2 - URBAN/RURAL NORTH OF RAILRAOD
```

```
*#==============================================================================
CONTINUOUS STANDHYD      ID=[2], NHYD=["KD-2A-2"], DT=[1](min), AREA=[44.99](ha),
                    XIMP=[0.250], TIMP=[0.28], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[547](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*#==============================================================================
*# ADD KD-2A-1 AND KD-2A-2
*# CREST GAUGE LOCATION KD-2 -KIZELL DRAIN AT MARCH ROAD
*#==============================================================================
ADD HYD             IDsum=[3], NHYD=["KFP3"], IDs to add=[1+2]
*PRINT HYD           ID=[3],   # OF PCYCLES=[1]
*#==============================================================================
*# KD-2A-3 - URBAN SOUTH OF RAILROAD
*#==============================================================================
CONTINUOUS STANDHYD      ID=[2], NHYD=["KD-2A-3"], DT=[1](min), AREA=[48.56](ha),
                    XIMP=[0.250], TIMP=[0.31], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[568](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*#==============================================================================
*# ADD KD-2A-2 AND KD-2A-3 D/S OF MARCH ROAD
*#==============================================================================
ADD HYD             IDsum=[4], NHYD=["KD-2A-3"], IDs to add=[3+2]
*#==============================================================================
*# ROUTE KD-2A THROUGH KD-2B
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 8942.456
*#==============================================================================
ROUTE CHANNEL       IDout=[1], NHYD=["KD-2A"], IDin=[4],
                    RDT=[1](min),
                    CHLGTH=[254](m),  CHSLOPE=[0.55](%),
                                      FPSLOPE=[0.55](%),
                    SECNUM=[8942],       NSEG=[5]
                    ( SEGROUGH, SEGDIST (m))=[0.04,17.24 0.05,28.26 -0.03,31.51
                    0.05,61.08 0.04,68.63] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 80.58 ]
                                                  [ 1.57,  80.5 ]
                                                  [ 8.77,  80.5 ]
                                                  [10.84, 80.23 ]
                                                  [17.24, 80.03 ]
                                                  [20.76,    79 ]
                                                  [23.59,  78.9 ]
                                                  [26.81, 78.17 ]
                                                  [28.26,  77.9 ]
                                                  [30.06,  77.9 ]
                                                  [30.71, 78.01 ]
                                                  [31.51,  78.2 ]
                                                  [32.21, 78.39 ]
                                                  [ 37.7,  78.4 ]
                                                  [44.07,  78.5 ]
                                                  [48.95,  78.7 ]
                                                  [57.53, 79.33 ]
                                                  [61.08, 79.95 ]
                                                  [64.61, 80.71 ]
                                                  [68.63, 81.15 ]
```

```
*#=============================================================================
*# KD-2B-6 - URBAN
*#=============================================================================
CONTINUOUS STANDHYD      ID=[2], NHYD=["KD-2B-6"], DT=[1](min), AREA=[7.73](ha),
                    XIMP=[0.61], TIMP=[0.61], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[227](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*#=============================================================================
*# ROUTE KD-2B-6 THROUGH SWM POND SOUTH OF SOLANDT ROAD
*# ASSUME 5-YEAR CONTROL ACCORDING TO CITY GUIDELINES
*#=============================================================================
ROUTE RESERVOIR     IDout=[4],   NHYD=["KD-2B-6"],  IDin=[2],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                     (cms) - (ha-m)
                                   [   0.0 ,  0.0 ]
                                   [ 0.407 ,  0.095]
                                   [   -1  ,  -1  ]  (max twenty pts)
                          IDovf=[5], NHYDovf=["OVF-2B6"]
*#=============================================================================
*# ADD OUTFLOW, OVERFLOW AND KD-2A
*#=============================================================================
ADD HYD             IDsum=[6], NHYD=["KD-2B-6"], IDs to add=[4+5+1]
*#=============================================================================
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 8329.198
*#=============================================================================
ROUTE CHANNEL       IDout=[2], NHYD=["KD-2A"], IDin=[6],
                    RDT=[1](min),
                    CHLGTH=[747](m),  CHSLOPE=[0.36](%),
                                        FPSLOPE=[0.36](%),
                    SECNUM=[8329],       NSEG=[4]
                    ( SEGROUGH, SEGDIST (m))=[0.08,81.34 0.05,88.266 -0.03,97.72
                    0.08,109.09] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0,  78.3 ]
                                                   [56.66,  78.2 ]
                                                   [67.31,  78.2 ]
                                                   [72.25,    78 ]
                                                   [79.85,    78 ]
                                                   [81.34, 77.66 ]
                                                   [87.28, 75.87 ]
                                                   [88.266, 75.728 ]
                                                   [90.51, 75.759 ]
                                                   [90.57, 75.77 ]
                                                   [91.47, 75.88 ]
                                                   [97.72, 76.64 ]
                                                   [109.09,  78.5 ]
*#=============================================================================
*# KD-2B-3 - Converted to NASHYD under existing conditions
*#=============================================================================
CONTINUOUS NASHYD       ID=[1], NHYD=["KD-2B-3"], DT=[1]min, AREA=[7.40](ha),
                    DWF=[0](cms),  CN=[65], IA=[5.0](mm),
                    N=[2.0], TP=[0.49]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*#=============================================================================
*# 5 YEAR CONTROL - 89L/s
```

```
*# MAJOR FLOWS TO KIZELL DRAIN
*# MINOR FLOWS TO GOLF COURSE POND #2
*#=============================================================================
COMPUTE DUALHYD     IDin=[1], CINLET=[0.089](cms), NINLET=[1],
                    MAJID=[3], MajNHYD=["2B3MAJ"],
                    MINID=[4], MinNHYD=["2B3MIN"],
                    TMJSTO=[0](cu-m)
*#=============================================================================
*# KD-2B-4 Converted to NASHYD under existing conditions
*#=============================================================================
CONTINUOUS NASHYD        ID=[5], NHYD=["KD-2B-4"], DT=[1]min, AREA=[23.59](ha),
                    DWF=[0](cms),  CN=[63], IA=[5.0](mm),
                    N=[2.0], TP=[0.62]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*#=============================================================================
*# ADD KD-2B-3 MINOR AND KD-2B-4
*#=============================================================================
ADD HYD             IDsum=[6], NHYD=["KD-2B-4"], IDs to add=[4+5]
*#=============================================================================
*# ROUTE KD-2B-4 THROUGH GOLF COURSE POND #2
*#=============================================================================
ROUTE RESERVOIR     IDout=[4],   NHYD=["KD-2B-4"],  IDin=[6],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                     (cms) - (ha-m)
                                   [   0.0 ,  0.0 ]
                                   [ 0.229, 1.5695]
                                   [ 0.251, 1.8191]
                                   [ 0.328, 2.9421]
                                   [   -1  ,  -1  ]  (max twenty pts)
                          IDovf=[5], NHYDovf=["OVF-2B6"]
*#=============================================================================
*# ADD OUTFLOW, OVERFLOW AND KD-2A
*#=============================================================================
ADD HYD             IDsum=[6], NHYD=["KD-2B-6"], IDs to add=[4+5]
*#=============================================================================
*# ADD KD-2B-3 MAJOR, KD-2B-4 AND KD-2B-6
*#=============================================================================
ADD HYD             IDsum=[4], NHYD=["KD-2B-4"], IDs to add=[3+6+2]
*#=============================================================================
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 7691.759
*#=============================================================================
ROUTE CHANNEL       IDout=[2], NHYD=["KD-2A"], IDin=[4],
                    RDT=[1](min),
                    CHLGTH=[408](m),  CHSLOPE=[0.11](%),
                                        FPSLOPE=[0.11](%),
                    SECNUM=[7691],       NSEG=[3]
                    ( SEGROUGH, SEGDIST (m))=[0.06,16.78 -0.03,19.003 0.06,24.49] NSEG ↵
                    times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 76.75 ]
                                                  [ 0.66,  76.6 ]
                                                  [ 3.57, 75.74 ]
                                                  [ 4.99, 75.24 ]
                                                  [ 5.76,  75.1 ]
                                                  [ 7.69,    75 ]
                                                  [ 8.56,  74.9 ]
                                                  [ 9.95,  74.9 ]
                                                  [12.21,  74.8 ]
                                                  [12.99, 74.69 ]
                                                  [ 15.2,  74.3 ]
                                                  [16.78,  74.1 ]
                                                  [17.38,  73.8 ]
```

```
                                                    [18.38,  73.8 ]
                                                    [19.003, 74.147]
                                                    [19.94, 74.21 ]
                                                    [20.51, 74.31 ]
                                                    [21.52,  74.6 ]
                                                    [22.72, 75.04 ]
                                                    [24.49,  75.5 ]
*#=============================================================================
*# KD-2B-2 - URBAN RESIDENTIAL - Converted to NASHYD under existing conditions
*#=============================================================================
CONTINUOUS NASHYD        ID=[3], NHYD=["KD-2B-2"], DT=[1]min, AREA=[3.35](ha),
                    DWF=[0](cms),  CN=[63], IA=[5.0](mm),
                    N=[2.0], TP=[0.32]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*#=============================================================================
*# ROUTE KD-2B-2 THROUGH POND #3 NORTH OF FARRAR ROAD
*#=============================================================================
ROUTE RESERVOIR     IDout=[5],   NHYD=["KD-2B-2"],  IDin=[3],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                     (cms) - (ha-m)
                                   [   0.0 ,  0.0 ]
                                   [ 0.260 , 0.616]
                                   [ 0.282 ,0.7115]
                                   [ 0.374 ,1.2301]
                                   [   -1  ,  -1  ]  (max twenty pts)
                          IDovf=[6], NHYDovf=["OVF-2B3"]
*#=============================================================================
*# ADD OUTFLOW, OVERFLOW AND KD-2B-4
*#=============================================================================
ADD HYD             IDsum=[1], NHYD=["KD-2B-4"], IDs to add=[5+6+2]
*#=============================================================================
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 7386.879
*#=============================================================================
ROUTE CHANNEL       IDout=[2], NHYD=["KD-2A-4"], IDin=[1],
                    RDT=[1](min),
                    CHLGTH=[315](m),  CHSLOPE=[0.11](%),
                                        FPSLOPE=[0.11](%),
                    SECNUM=[7386],       NSEG=[5]
                    ( SEGROUGH, SEGDIST (m))=[0.08,21.18 0.05,62.87 -0.06,80.43
                    0.06,90.36 0.05,143.24] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 77.07 ]
                                                    [ 5.11,  76.8 ]
                                                    [21.18,  76.7 ]
                                                    [34.27,  76.7 ]
                                                    [43.48,  76.3 ]
                                                    [62.87,  74.8 ]
                                                    [68.48, 74.28 ]
                                                    [70.32,  73.5 ]
                                                    [73.346, 73.437 ]
                                                    [75.588, 73.466 ]
                                                    [75.62, 73.47 ]
                                                    [80.43,  74.3 ]
                                                    [85.13, 75.18 ]
                                                    [90.36, 75.69 ]
                                                    [101.28,  75.4 ]
                                                    [115.17,  75.3 ]
                                                    [121.38,  75.4 ]
                                                    [128.52, 74.95 ]
                                                    [137.68,  75.3 ]
                                                    [143.24, 76.97 ]
*#=============================================================================
```

```
*# KD-2B-7 - RURAL EAST OF HERZBERG ROAD
*#=============================================================================
CONTINUOUS NASHYD        ID=[4], NHYD=["KD-2B-7"], DT=[1]min, AREA=[20.11](ha),
                    DWF=[0](cms),  CN=[63], IA=[7](mm),
                    N=[2.0], TP=[1.50]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*#=============================================================================
*# ADD KD-2B-4 AND KD-2B-7
*#=============================================================================
ADD HYD             IDsum=[3], NHYD=["KD-2B-4"], IDs to add=[2+4]
*#=============================================================================
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 7058.454
*#=============================================================================
ROUTE CHANNEL       IDout=[1], NHYD=["KD-2A-4"], IDin=[3],
                    RDT=[1](min),
                    CHLGTH=[297](m),  CHSLOPE=[0.38](%),
                                        FPSLOPE=[0.38](%),
                    SECNUM=[7058],       NSEG=[3]
                    ( SEGROUGH, SEGDIST (m))=[0.05,206.86 -0.06,216.95 0.04,295.48]
                    NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0,  75.7 ]
                                                  [165.24,  75.2 ]
                                                  [198.14,  75.2 ]
                                                  [206.37,  73.8 ]
                                                  [206.86, 73.69 ]
                                                  [209.66,    73 ]
                                                  [211.86,    73 ]
                                                  [213.07, 73.07 ]
                                                  [215.16,  73.8 ]
                                                  [216.95, 74.14 ]
                                                  [247.08,  74.8 ]
                                                  [267.4,  74.8 ]
                                                  [295.48, 76.05 ]
*#=============================================================================
*# KD-2B-5 - URBAN
*#=============================================================================
CONTINUOUS STANDHYD      ID=[2], NHYD=["KD-2B-5"], DT=[1](min), AREA=[4.74](ha),
                    XIMP=[0.50], TIMP=[0.50], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[177](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*#=============================================================================
*# ON-SITE STORAGE
*# RATING CURVE SOURCE - plan2.pdf IN 13616-Richardson Side_Eagleson
*#=============================================================================
ROUTE RESERVOIR     IDout=[4],   NHYD=["KD-2B-5"],  IDin=[2],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                     (cms) - (ha-m)
                                   [   0.0 ,  0.0 ]
                                   [0.1458, 0.01283]
                                   [0.1458, 0.03881]
                                   [   -1  ,  -1  ]  (max twenty pts)
                          IDovf=[5], NHYDovf=["OVF-2B5"]
*#=============================================================================
*# KD-2B-1 - URBAN
```

```
*#==============================================================================
CONTINUOUS STANDHYD      ID=[3], NHYD=["KD-2B-1"], DT=[1](min), AREA=[134.85](ha),
                    XIMP=[0.40], TIMP=[0.41], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[948](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*#==============================================================================
*# ADD OUTFLOW, OVERFLOW AND KD-2B-1
*#==============================================================================
ADD HYD             IDsum=[6], NHYD=["KD-2B-1"], IDs to add=[4+5+3]
*#==============================================================================
*# ADD KD-2B-4 AND KD-2B-1
*# CREST GAUGE LOCATION KD-1 - KIZELL DRAIN AT HERTZBERG ROAD
*#==============================================================================
ADD HYD             IDsum=[3], NHYD=["KFP4"], IDs to add=[1+6]
*PRINT HYD           ID=[3],   # OF PCYCLES=[1]
*#==============================================================================
*# ROUTE KD-2B THROUGH KD-2C
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 6705.311
*# MINIMUM SLOPE ASSUMED 0.1%
*#==============================================================================
ROUTE CHANNEL       IDout=[1], NHYD=["KD-2B"], IDin=[3],
                    RDT=[1](min),
                    CHLGTH=[600](m),  CHSLOPE=[0.1](%),
                                        FPSLOPE=[0.1](%),
                    SECNUM=[6705],       NSEG=[4]
                    ( SEGROUGH, SEGDIST (m))=[0.05,162.749 -0.04,168.035 -0.05,168.35
                    0.05,373.63] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 75.65 ]
                                                   [ 24.7,  75.1 ]
                                                   [61.29, 73.42 ]
                                                   [90.72,  72.7 ]
                                                   [119.02, 72.95 ]
                                                   [131.71,  72.8 ]
                                                   [160.55,  72.9 ]
                                                   [162.46, 72.46 ]
                                                   [162.749, 72.403 ]
                                                   [168.035, 72.369 ]
                                                   [168.35, 72.39 ]
                                                   [168.6, 72.43 ]
                                                   [171.08,  72.8 ]
                                                   [203.12,  72.8 ]
                                                   [231.66,  73.3 ]
                                                   [255.58,  73.2 ]
                                                   [300.16,  73.6 ]
                                                   [326.75,  74.3 ]
                                                   [347.02,  75.2 ]
                                                   [373.63, 76.05 ]
*#==============================================================================
*# KD-3A - URBAN WEST OF HERZBERG ROAD
*#==============================================================================
CONTINUOUS STANDHYD      ID=[3], NHYD=["KD-3A"], DT=[1](min), AREA=[206.16](ha),
                    XIMP=[0.30], TIMP=[0.34], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[1172](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
```

```
                    InterEventTime=[12](hrs), END=-1
*#==============================================================================
*# KTC-2B - URBAN - UPSTREAM LIMIT TO HWY 417, NORTH OF CAMPEAU DRIVE
*# LAND USES WITHIN AREA: OFFICE/RECREATIONAL
*#==============================================================================
CONTINUOUS STANDHYD      ID=[2], NHYD=["KTC-2B"], DT=[1](min), AREA=[20.79](ha),
                    XIMP=[0.23], TIMP=[0.24], DWF=[0.0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[372](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*#==============================================================================
*# 5 YEAR CONTROL - 1155L/s
*# MAJOR FLOWS TO KD-3A
*# MINOR FLOWS TO SWF-1205
*#==============================================================================
COMPUTE DUALHYD     IDin=[2], CINLET=[1.155](cms), NINLET=[1],
                    MAJID=[7], MajNHYD=["KTC2BMAJ"],
                    MINID=[10], MinNHYD=["KTC2BMIN"],
                    TMJSTO=[0](cu-m)
*#==============================================================================
*# ADD KTC-2B MAJOR AND KD-3A - TRIBUTARY 1 AT HERTZBERG ROAD
*#==============================================================================
ADD HYD             IDsum=[5], NHYD=["KD-3A"], IDs to add=[7+3]
*#==============================================================================
*# ROUTE KD-3A THROUGH KD-3B
*# CHANNEL CROSS-SECTION DATA TAKEN FROM LiDAR
*#==============================================================================
ROUTE CHANNEL       IDout=[4], NHYD=["KD-3A"], IDin=[5],
                    RDT=[1](min),
                    CHLGTH=[253](m),  CHSLOPE=[0.13](%),
                                        FPSLOPE=[0.13](%),
                    SECNUM=[1],       NSEG=[3]
                    ( SEGROUGH, SEGDIST (m))=[0.05,27.94 -0.035,38.92 0.08,64.87] NSEG
                    times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 78.90]
                                                  [12.97, 78.12]
                                                  [15.97, 77.81]
                                                  [19.96, 77.51]
                                                  [23.95, 77.36]
                                                  [24.95, 77.34]
                                                  [25.95, 77.34]
                                                  [26.94, 77.36]
                                                  [27.94, 77.30]
                                                  [30.94, 76.79]
                                                  [31.93, 76.73]
                                                  [32.93, 76.73]
                                                  [33.93, 76.70]
                                                  [34.94, 76.76]
                                                  [38.92, 77.29]
                                                  [42.91, 77.34]
                                                  [58.88, 78.52]
                                                  [64.87, 78.97]
ROUTE CHANNEL       IDout=[5], NHYD=["KD-3A"], IDin=[4],
                    RDT=[1](min),
                    CHLGTH=[344](m),  CHSLOPE=[0.56](%),
                                        FPSLOPE=[0.56](%),
                    SECNUM=[2],       NSEG=[3]
                    ( SEGROUGH, SEGDIST (m))=[0.05,20.89 -0.035,76.49 0.08,88.52] NSEG
                    times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 77.38]
                                                  [13.92, 77.02]
```

```
                                                    [20.89, 76.69]
                                                    [26.85, 76.09]
                                                    [29.84, 76.03]
                                                    [44.76, 76.15]
                                                    [56.69, 75.91]
                                                    [59.68, 76.10]
                                                    [61.67, 76.05]
                                                    [71.61, 76.31]
                                                    [76.49, 76.69]
                                                    [82.55, 77.16]
                                                    [88.52, 77.40]
ROUTE CHANNEL       IDout=[4], NHYD=["KD-3A"], IDin=[5],
                    RDT=[1](min),
                    CHLGTH=[324](m),  CHSLOPE=[0.72](%),
                                        FPSLOPE=[0.72](%),
                    SECNUM=[1],       NSEG=[3]
                    ( SEGROUGH, SEGDIST (m))=[0.05,97.588 -0.035,109.575 0.05,143.405]
                    NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 75.2777 ]
                                                    [39.664, 74.805 ]
                                                    [74.612, 74.8767 ]
                                                    [79.607, 74.8037 ]
                                                    [ 86.6, 74.7914 ]
                                                    [90.595, 74.6388 ]
                                                    [95.59, 74.6899 ]
                                                    [97.588, 74.8802 ]
                                                    [101.584, 74.7293 ]
                                                    [103.582, 74.4039 ]
                                                    [106.578, 74.4818 ]
                                                    [109.575, 74.9123 ]
                                                    [111.573, 74.8318 ]
                                                    [116.568, 74.8294 ]
                                                    [120.563, 74.7426 ]
                                                    [121.562, 74.7398 ]
                                                    [124.559, 74.8464 ]
                                                    [130.553, 74.8391 ]
                                                    [132.54, 74.777 ]
                                                    [143.405, 75.255 ]
*#=============================================================================
*# KD-2C - RURAL
*#=============================================================================
CONTINUOUS NASHYD       ID=[2], NHYD=["KD-2C"], DT=[1]min, AREA=[59.10](ha),
                    DWF=[0](cms),  CN=[83], IA=[7](mm),
                    N=[2.0], TP=[0.60]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*#=============================================================================
*# ADD KD-2B AND KD-2C
*#=============================================================================
ADD HYD             IDsum=[5], NHYD=["KFP5"], IDs to add=[1+2]
*PRINT HYD           ID=[5],   # OF PCYCLES=[1]
*#=============================================================================
*# ADD KD-2C AND KD-3A
*#=============================================================================
ADD HYD             IDsum=[3], NHYD=["KD-2C"], IDs to add=[5+4]
*#=============================================================================
*# ROUTE KD-1+KD-2 THROUGH KD-3B-1
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 6104.633
*# MINIMUM SLOPE ASSUMED 0.1%
*#=============================================================================
ROUTE CHANNEL       IDout=[1], NHYD=["KD-2C"], IDin=[3],
                    RDT=[1](min),
                    CHLGTH=[952](m),  CHSLOPE=[0.1](%),
```

```
                                          FPSLOPE=[0.1](%),
                    SECNUM=[6104],       NSEG=[3]
                    ( SEGROUGH, SEGDIST (m))=[0.08,175.904 -0.04,179.184 0.08,185.91]
                    NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 77.06 ]
                                                   [ 9.16,  77.1 ]
                                                   [23.37,  76.7 ]
                                                   [56.09,  76.5 ]
                                                   [67.63,  76.2 ]
                                                   [80.81,  75.6 ]
                                                   [83.87,  75.6 ]
                                                   [98.45,  74.5 ]
                                                   [103.07,  74.3 ]
                                                   [115.78,  74.3 ]
                                                   [134.4,  73.6 ]
                                                   [149.63,  73.7 ]
                                                   [163.83,  73.6 ]
                                                   [173.16,  72.7 ]
                                                   [175.83,    72 ]
                                                   [175.904, 71.992 ]
                                                   [179.184, 71.968 ]
                                                   [179.27,    72 ]
                                                   [183.86,  73.7 ]
                                                   [185.91,    74 ]
*#=============================================================================
*# KD-3B - RURAL EAST OF HERZBERG ROAD
*#=============================================================================
CONTINUOUS NASHYD        ID=[4], NHYD=["KD-23B"], DT=[1]min, AREA=[112.07](ha),
                    DWF=[0](cms),  CN=[66], IA=[7](mm),
                    N=[2.0], TP=[1.20]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*#=============================================================================
*# ADD KD-2C,KD-3A AND KD-3B - KIZELL DRAIN AT CONFLUENCE WITH WATTS CREEK
*#=============================================================================
ADD HYD             IDsum=[3], NHYD=["KFP6"], IDs to add=[1+4]
*PRINT HYD           ID=[3],   # OF PCYCLES=[1]
*#=============================================================================
*#                          WATTS CREEK SUBWATERSHED
*#=============================================================================
*#=============================================================================
*# KANATA TOWN CENTRE-1 - URBAN - UPSTREAM LIMIT TO HWY 417
*# Imperviousness decreased under existing conditions
*#=============================================================================
CONTINUOUS STANDHYD      ID=[2], NHYD=["KTC-1"], DT=[1](min), AREA=[60.23](ha),
                    XIMP=[0.34], TIMP=[0.34], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[633](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*#=============================================================================
*# 5 YEAR CONTROL - 2963L/s
*# MAJOR FLOWS TO WC-1
*# MINOR FLOWS TO SWF-1206
*#=============================================================================
COMPUTE DUALHYD     IDin=[2], CINLET=[2.963](cms), NINLET=[1],
                    MAJID=[7], MajNHYD=["KTC1MAJ"],
                    MINID=[8], MinNHYD=["KTC1MIN"],
```

```
                    TMJSTO=[0](cu-m)
*#=============================================================================
*# SWMF-1206
*# STORAGE WAS ESTIMATED FROM AVAILABLE DRAWING
*# DISCHARGE WAS TAKEN FROM R-1564
*#=============================================================================
ROUTE RESERVOIR     IDout=[4],   NHYD=["KTC-1"],  IDin=[8],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                    (cms) - (ha-m)
                                  [   0.0 ,  0.0 ]
                                  [ 0.955 , 0.2854]
                                  [ 1.436 , 3.9725]
                                  [   -1  ,  -1  ]  (max twenty pts)
                          IDovf=[5], NHYDovf=["OVF-KTC1"]
*#=============================================================================
*# ADD OUTFLOW, OVERFLOW AND KTC-1 MAJOR
*#=============================================================================
ADD HYD             IDsum=[2], NHYD=["KTC-1"], IDs to add=[4+5+7]
*#=============================================================================
*# WC-1 - RURAL/URBAN EXISTING AREA
*#=============================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["WC-1"], DT=[1](min), AREA=[403.47](ha),
                    XIMP=[0.30], TIMP=[0.34], DWF=[0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[1640](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*#=============================================================================
*# ADD WC-1 AND KTC-1 - WATTS CREEK AT HIGHWAY 417
*#=============================================================================
ADD HYD             IDsum=[5], NHYD=["WC-1"], IDs to add=[1+2]
*#=============================================================================
*# KTC-2A - URBAN - UPSTREAM LIMIT TO HWY 417, SOUTH OF CAMPEAU DRIVE
*# LAND USES WITHIN AREA: TOWN CENTRE/URBAN RES
*#=============================================================================
CONTINUOUS STANDHYD      ID=[1], NHYD=["KTC-2A"], DT=[1](min), AREA=[34.34](ha),
                    XIMP=[0.36], TIMP=[0.42], DWF=[0.0](cms),
                    LOSS=[1]:    Horton: Fo=[125](mm/hr), Fc=[25](mm/hr),
                    DCAY=[2.0](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[2.0](%),
                                         LGP=[40](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.0](%),
                                         LGI=[478](m), MNI=[0.013], SCI=[0](min),
                    Continuous simulation parameters:
                    IaRECper=[6](hrs),  IaRECimp=[1.5](hrs),
                    InterEventTime=[12](hrs), END=-1
*#=============================================================================
*# ADD KTC-2A AND KTC-2B MINOR
*#=============================================================================
ADD HYD             IDsum=[4], NHYD=["KTC-2"], IDs to add=[1+10]
*#=============================================================================
*# ROUTE KTC-2 THROUGH KANATA TOWN CENTRE PHASE I POND
*# STAGE-STORAGE-DISCHARGE CURVE OBTAINED FROM:
*# KANATA TOWN CENTRE PHASE i - STORMWATER MANAGEMENT REPORT
*# J.L. RICHARDS & ASSOCIATES LTD. 1996
*# SWF-1205
*# STORAGE WAS ESTIMATED WITH AVAILABLE DRAWING
*# DISCHARGE WAS TAKEN FROM R-1563
*#=============================================================================
ROUTE RESERVOIR     IDout=[1],   NHYD=["KTC-2"],  IDin=[4],
                    RDT=[1](min),
```

```
                          TABLE of ( OUTFLOW-STORAGE ) values
                                     (cms) - (ha-m)
                                   [   0.0 ,  0.0 ]
                                   [  0.79, 0.6939]
                                   [  4.70, 1.4350]
                                   [   -1  ,  -1  ]  (max twenty pts)
                          IDovf=[2], NHYDovf=["OVF-KTC2"]
*#==============================================================================
*# ADD OUTFLOW AND OVERFLOW
*#==============================================================================
ADD HYD             IDsum=[4], NHYD=["KTC-2"], IDs to add=[1+2]
*#==============================================================================
*# ADD WC-1 AND KTC-2
*#==============================================================================
ADD HYD             IDsum=[2], NHYD=["KTC-2"], IDs to add=[5+4]
*%----------------|------------------------------------------------------------|
*#==============================================================================
*# WC-3 - URBAN/RURAL
*#==============================================================================
CONTINUOUS NASHYD        ID=[1], NHYD=["WC-3"], DT=[1]min, AREA=[204.06](ha),
                    DWF=[0](cms),  CN=[66], IA=[7](mm),
                    N=[2.0], TP=[1.28]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*#==============================================================================
*# ADD WC-1+KTC AND WC-3
*#==============================================================================
ADD HYD             IDsum=[4], NHYD=["WC-3"], IDs to add=[2+1]
*#==============================================================================
*# ROUTE WC-1+KTC+WC-3 THROUGH WC-4A
*# CHANNEL CROSS-SECTION DATA TAKEN FROM LIDAR
*#==============================================================================
ROUTE CHANNEL       IDout=[1], NHYD=["WC-3"], IDin=[4],
                    RDT=[1](min),
                    CHLGTH=[744](m),  CHSLOPE=[1.29](%),
                                        FPSLOPE=[1.29](%),
                    SECNUM=[1],       NSEG=[3]
                    ( SEGROUGH, SEGDIST (m))=[0.05,25.86 -0.035,40.77 0.05,72.60] NSEG
                    times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 90.87]
                                                   [ 1.99, 90.66]
                                                   [ 7.96, 90.10]
                                                   [16.91, 85.80]
                                                   [18.90, 85.49]
                                                   [21.88, 85.42]
                                                   [25.86, 85.56]
                                                   [26.85, 25.50]
                                                   [29.83, 84.06]
                                                   [31.82, 84.06]
                                                   [34.81, 85.10]
                                                   [40.77, 85.59]
                                                   [48.73, 85.85]
                                                   [52.71, 86.80]
                                                   [55.59, 87.80]
                                                   [60.66, 90.40]
                                                   [64.64, 90.77]
                                                   [72.60, 90.97]
*#==============================================================================
*# CHANNEL CROSS-SECTION DATA TAKEN FROM LIDAR
*#==============================================================================
ROUTE CHANNEL       IDout=[2], NHYD=["WC-3"], IDin=[1],
                    RDT=[1](min),
                    CHLGTH=[2295](m),  CHSLOPE=[0.45](%),
```

```
                                        FPSLOPE=[0.45](%),
                    SECNUM=[2],       NSEG=[3]
                    ( SEGROUGH, SEGDIST (m))=[0.05,12.98 -0.035,20.97 0.05,51.94] NSEG ↵
                    times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 85.79]
                                                  [ 1.00, 85.75]
                                                  [11.99, 83.71]
                                                  [12.98, 83.36]
                                                  [14.98, 82.49]
                                                  [15.98, 82.44]
                                                  [16.98, 82.45]
                                                  [20.97, 83.51]
                                                  [22.97, 83.46]
                                                  [23.97, 83.51]
                                                  [26.97, 83.55]
                                                  [27.97, 83.55]
                                                  [31.96, 83.51]
                                                  [32.96, 83.45]
                                                  [33.96, 83.45]
                                                  [34.96, 83.50]
                                                  [51.94, 85.81]
*#==============================================================================
*# CHANNEL CROSS-SECTION DATA TAKEN FROM LIDAR
*#==============================================================================
ROUTE CHANNEL       IDout=[1], NHYD=["WC-3"], IDin=[2],
                    RDT=[1](min),
                    CHLGTH=[487](m),  CHSLOPE=[0.23](%),
                                        FPSLOPE=[0.23](%),
                    SECNUM=[3],       NSEG=[3]
                    ( SEGROUGH, SEGDIST (m))=[0.05,6.97 -0.035,25.87 0.05,29.85] NSEG ↵
                    times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 75.60]
                                                  [    1, 75.54]
                                                  [ 1.99, 75.42]
                                                  [ 6.97, 73.09]
                                                  [11.94, 72.70]
                                                  [14.93, 72.66]
                                                  [17.91, 72.27]
                                                  [23.88, 72.25]
                                                  [25.87, 73.03]
                                                  [28.86, 74.06]
                                                  [29.85, 74.23]
*#==============================================================================
*# WC-4A - RURAL - HIGHWAY 417 TO CNR
*#==============================================================================
CONTINUOUS NASHYD       ID=[2] NHYD=["WC-4A"], DT=[1]min, AREA=[126.29](ha),
                    DWF=[0](cms),  CN=[82], IA=[7](mm),
                    N=[2.0], TP=[2.30]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*#==============================================================================
*# ADD WC-1+KTC+WC-3 AND WC-4A
*# CREST GAUGE LOCATION WC-1 - WATTS CREEK AT CONFLUENCE WITH KIZELL DRAIN
*#==============================================================================
ADD HYD             IDsum=[6], NHYD=["WFP1"], IDs to add=[1+2]
*PRINT HYD           ID=[6],   # OF PCYCLES=[1]
*#==============================================================================
*# WC-4B - RURAL - HIGHWAY 417 TO CNR
*#==============================================================================
CONTINUOUS NASHYD       ID=[4] NHYD=["WC-4B"], DT=[1]min, AREA=[145.27](ha),
                    DWF=[0](cms),  CN=[73], IA=[7](mm),
                    N=[2.0], TP=[1.22]hrs,
                    Continuous simulation parameters:
```

```
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*#=============================================================================
*# ADD WC-4A AND KIZELL
*#=============================================================================
ADD HYD             IDsum=[1], NHYD=["WFP2"], IDs to add=[6+3]
*PRINT HYD           ID=[1],   # OF PCYCLES=[1]
*#=============================================================================
*# ADD WC-4A AND WC-4B
*#=============================================================================
ADD HYD             IDsum=[5], NHYD=["WFP3"], IDs to add=[1+4]
*PRINT HYD           ID=[5],   # OF PCYCLES=[1]
*#=============================================================================
*# ROUTE KIZELL AND WC-1+KTC+WC-3+WC-4 THROUGH WC-5A
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 4677.806
*#=============================================================================
ROUTE CHANNEL       IDout=[2], NHYD=["WC-4"], IDin=[5],
                    RDT=[1](min),
                    CHLGTH=[636](m),  CHSLOPE=[0.16](%),
                                        FPSLOPE=[0.16](%),
                    SECNUM=[4677],       NSEG=[3]
                    ( SEGROUGH, SEGDIST (m))=[0.08,95.801 -0.04,102.955 0.08,167.28]
                    NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0,  75.4 ]
                                                  [ 11.4,  74.3 ]
                                                  [ 31.7,  73.6 ]
                                                  [51.08,  72.8 ]
                                                  [60.69,  72.6 ]
                                                  [ 74.1,  71.6 ]
                                                  [77.61,  70.8 ]
                                                  [84.14,    71 ]
                                                  [93.83,    71 ]
                                                  [95.801, 70.73 ]
                                                  [97.18,  70.5 ]
                                                  [  101,  70.5 ]
                                                  [102.955, 70.989 ]
                                                  [111.37,  74.5 ]
                                                  [121.02, 76.45 ]
                                                  [128.96,  77.6 ]
                                                  [139.85,  78.3 ]
                                                  [151.67, 80.09 ]
                                                  [158.82, 80.63 ]
                                                  [167.28, 81.57 ]
*#=============================================================================
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 4446.172
*#=============================================================================
ROUTE CHANNEL       IDout=[1], NHYD=["WC-4"], IDin=[2],
                    RDT=[1](min),
                    CHLGTH=[443](m),  CHSLOPE=[0.64](%),
                                        FPSLOPE=[0.64](%),
                    SECNUM=[4446],       NSEG=[4]
                    ( SEGROUGH, SEGDIST (m))=[0.08,101.82 0.05,155.499 -0.04,160.804
                    0.08,360.72] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 75.11 ]
                                                  [15.28,  74.3 ]
                                                  [39.39,  73.6 ]
                                                  [55.02,  73.7 ]
                                                  [70.01,  73.1 ]
                                                  [101.82, 72.72 ]
                                                  [123.37, 72.37 ]
                                                  [137.03,  71.7 ]
                                                  [152.53,  68.9 ]
                                                  [155.499, 68.552 ]
                                                  [160.804, 68.559 ]
```

```
                                                    [163.78, 68.89 ]
                                                    [172.88,    69 ]
                                                    [180.76, 72.03 ]
                                                    [191.21,  72.8 ]
                                                    [208.93, 72.49 ]
                                                    [239.54,  72.4 ]
                                                    [260.28,  72.6 ]
                                                    [291.51,  72.6 ]
                                                    [360.72, 73.06 ]
*#==============================================================================
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 3897.472
*#==============================================================================
ROUTE CHANNEL       IDout=[2], NHYD=["WC-4"], IDin=[1],
                    RDT=[1](min),
                    CHLGTH=[468](m),  CHSLOPE=[0.44](%),
                                        FPSLOPE=[0.44](%),
                    SECNUM=[3897],       NSEG=[4]
                    ( SEGROUGH, SEGDIST (m))=[0.08,161.362 -0.04,164.388 -0.08,164.68
                    0.05,242.03] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 72.01 ]
                                                    [14.79,  71.9 ]
                                                    [26.32,  71.5 ]
                                                    [45.81,  69.5 ]
                                                    [ 52.8,  68.5 ]
                                                    [67.29,  68.1 ]
                                                    [85.91,  68.1 ]
                                                    [94.25,  67.9 ]
                                                    [116.16, 67.78 ]
                                                    [142.44,  67.4 ]
                                                    [159.77,  66.1 ]
                                                    [161.362, 65.677 ]
                                                    [164.388, 65.577 ]
                                                    [164.68, 65.61 ]
                                                    [166.02,  66.1 ]
                                                    [167.47,  66.5 ]
                                                    [201.22,  66.8 ]
                                                    [208.26,  66.7 ]
                                                    [216.93, 67.19 ]
                                                    [242.03,  67.3 ]
*#==============================================================================
*# WC-5A - RURAL - CNR TO CARLING AVE
*#==============================================================================
CONTINUOUS NASHYD       ID=[1] NHYD=["WC-5A"], DT=[1]min, AREA=[59.54](ha),
                    DWF=[0](cms),  CN=[73], IA=[7](mm),
                    N=[2.0], TP=[0.79]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*#==============================================================================
*# ADD WC-5A AND WC-5A UPSTREAM
*# CALIBRATION LOCATION - WATTS CREEK AT CARLING AVENUE
*#==============================================================================
ADD HYD             IDsum=[3], NHYD=["WFP4"], IDs to add=[1+2]
*PRINT HYD           ID=[3],   # OF PCYCLES=[1]
*#==============================================================================
*# ROUTE WC-5B UPSTREAM THROUGH WC-5B
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 3469.421
*# MINIMUM SLOPE ASSUMED 0.1%
*#==============================================================================
ROUTE CHANNEL       IDout=[2], NHYD=["WC-5B"], IDin=[3],
                    RDT=[1](min),
                    CHLGTH=[485](m),  CHSLOPE=[0.1](%),
                                        FPSLOPE=[0.1](%),
                    SECNUM=[3469],       NSEG=[4]
```

```
                    ( SEGROUGH, SEGDIST (m))=[0.08,127.46 0.06,131.6 -0.03,141.59
                    0.08,308.37] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 68.08 ]
                                                  [16.71,  67.1 ]
                                                  [48.15,  66.8 ]
                                                  [75.65,  66.3 ]
                                                  [107.54,  66.2 ]
                                                  [117.33,  66.3 ]
                                                  [127.46, 65.54 ]
                                                  [129.21,  65.3 ]
                                                  [131.6,  64.9 ]
                                                  [136.836, 64.972 ]
                                                  [139.19,  65.3 ]
                                                  [141.59, 65.65 ]
                                                  [161.72,  65.6 ]
                                                  [171.42,  66.1 ]
                                                  [187.05,  66.3 ]
                                                  [224.24,  66.3 ]
                                                  [246.7,  66.1 ]
                                                  [286.52, 66.07 ]
                                                  [304.07,  66.3 ]
                                                  [308.37,  66.7 ]
*#=============================================================================
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 2981.379
*#=============================================================================
ROUTE CHANNEL       IDout=[1], NHYD=["WC-5B"], IDin=[2],
                    RDT=[1](min),
                    CHLGTH=[307](m),  CHSLOPE=[0.40](%),
                                        FPSLOPE=[0.40](%),
                    SECNUM=[2981],       NSEG=[4]
                    ( SEGROUGH, SEGDIST (m))=[0.08,9.006 -0.03,14.347 -0.06,14.85
                    0.08,30.25] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 64.35 ]
                                                  [ 2.07,  64.3 ]
                                                  [ 4.58,  64.2 ]
                                                  [  5.7,  64.1 ]
                                                  [ 6.83,  63.8 ]
                                                  [ 7.91, 63.37 ]
                                                  [9.006, 63.169 ]
                                                  [ 9.64,  62.8 ]
                                                  [13.64,  62.8 ]
                                                  [14.24,  63.1 ]
                                                  [14.347, 63.315 ]
                                                  [14.85, 63.35 ]
                                                  [15.35,  63.4 ]
                                                  [16.49, 63.69 ]
                                                  [18.19, 64.21 ]
                                                  [21.41,  64.2 ]
                                                  [25.06, 64.05 ]
                                                  [27.14, 64.06 ]
                                                  [28.41,  64.2 ]
                                                  [30.25, 64.28 ]
*#=============================================================================
*# CHANNEL CROSS-SECTION DATA TAKEN FROM HEC-RAS MODEL STATION 1585.543
*#=============================================================================
ROUTE CHANNEL       IDout=[2], NHYD=["WC-5B"], IDin=[1],
                    RDT=[1](min),
                    CHLGTH=[2876](m),  CHSLOPE=[0.16](%),
                                         FPSLOPE=[0.16](%),
                    SECNUM=[1585],       NSEG=[4]
                    ( SEGROUGH, SEGDIST (m))=[0.08,56.84 0.05,124.41 -0.035,128.78
                    0.08,255.15] NSEG times
                    ( DISTANCE (m), ELEVATION (m))=[    0, 64.07 ]
                                                  [21.74,  63.8 ]
                                                  [40.53,  63.5 ]
                                                  [56.84, 61.82 ]
                                                  [74.07,  61.6 ]
```

```
                                                    [98.29,  61.7 ]
                                                    [104.39, 61.43 ]
                                                    [117.32,  61.8 ]
                                                    [124.32,  60.8 ]
                                                    [124.41, 60.79 ]
                                                    [124.519, 60.783 ]
                                                    [127.785, 60.75 ]
                                                    [  128, 60.83 ]
                                                    [128.78, 61.17 ]
                                                    [130.97,  61.8 ]
                                                    [149.66, 61.32 ]
                                                    [170.74,  61.4 ]
                                                    [191.12,  63.6 ]
                                                    [219.28, 64.08 ]
                                                    [255.15,  64.1 ]
*#==============================================================================
*# WC-5B - RURAL - CARLING AVE TO OUTLET
*#==============================================================================
CONTINUOUS NASHYD        ID=[4] NHYD=["WC-5B"], DT=[1]min, AREA=[379.59](ha),
                    DWF=[0](cms),  CN=[73], IA=[7](mm),
                    N=[2.0], TP=[3.28]hrs,
                    Continuous simulation parameters:
                    IaRECper=[6](hrs), SMIN=[-1](mm),  SMAX=[-1](mm), SK=[0.03]/(mm),
                    InterEventTime=[12](hrs),
                    Baseflow simulation parameters:
                    BaseFlowOption=[1] , InitGWResVol=[12](mm), GWResK=[0.85](mm/day/mm),
                    VHydCond=[.001](mm/hr), END=-1
*#==============================================================================
*# ADD WC-5B AND WC-5B UPSTREAM
*# WATTS CREEK AT OUTLET TO OTTAWA RIVER
*#==============================================================================
ADD HYD             IDsum=[1], NHYD=["WFP5"], IDs to add=[4+2]
*PRINT HYD           ID=[1],   # OF PCYCLES=[1]
*%----------------|------------------------------------------------------------|
SAVE HYD            ID=[1],  # OF PCYCLES=[-1],  ICASEsh=[-1]
                    HYD_FILENAME=["WFP5"]
                    HYD_COMMENT=["WATTS CREEK AT OUTLET TO OTTAWA RIVER"]
*%----------------|------------------------------------------------------------|
*#==============================================================================
*                              DESIGN STORMS
*#==============================================================================
*FINISH
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[0005]
*                   "5y12hr.stm"
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[0010]
*                   "10y12hr.stm"
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[0025]
*                   "25y12hr.stm"
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[0050]
*                   "50y12hr.stm"
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[0100]
*                   "100y12hr.stm"
FINISH
*#==============================================================================
*                              CONTINUOUS SIMULATIONS
*#==============================================================================
START               TZERO=[1968.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1968]
START               TZERO=[1969.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1969]
START               TZERO=[1970.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1970]
START               TZERO=[1971.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1971]
START               TZERO=[1972.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1972]
START               TZERO=[1973.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1973]
START               TZERO=[1974.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1974]
START               TZERO=[1975.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1975]
START               TZERO=[1976.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1976]
START               TZERO=[1977.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1977]
START               TZERO=[1978.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1978]
```

```
2332   START                TZERO=[1979.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1979]
2333   START                TZERO=[1980.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1980]
2334   START                TZERO=[1981.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1981]
2335   START                TZERO=[1982.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1982]
2336   START                TZERO=[1983.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1983]
2337   START                TZERO=[1984.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1984]
2338   START                TZERO=[1985.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1985]
2339   START                TZERO=[1986.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1986]
2340   START                TZERO=[1987.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1987]
2341   START                TZERO=[1988.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1988]
2342   START                TZERO=[1989.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1989]
2343   START                TZERO=[1990.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1990]
2344   START                TZERO=[1991.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1991]
2345   START                TZERO=[1992.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1992]
2346   START                TZERO=[1993.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1993]
2347   START                TZERO=[1994.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1994]
2348   START                TZERO=[1995.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1995]
2349   START                TZERO=[1996.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1996]
2350   START                TZERO=[1997.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1997]
2351   START                TZERO=[1998.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1998]
2352   START                TZERO=[1999.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[1999]
2353   START                TZERO=[2000.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[2000]
2354   START                TZERO=[2002.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[2002]
2355   START                TZERO=[2003.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[2003]
2356   START                TZERO=[2004.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[2004]
2357   START                TZERO=[2006.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[2006]
2358   START                TZERO=[2007.0101],  METOUT=[2],  NSTORM=[0],  NRUN=[2007]
2359   FINISH
```