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V   V   I   SSSSS   U   U   A   L           (v 6.2.2006)
V   V   I   SS      U   U   A A   L
V   V   I   SS      U   U   AAAAA L
V   V   I   SS      U   U   A   A   L
V   V   I   SSSSS   UUUUU   A   A   LLLLL

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000   TTTT   TTTT   H   H   Y   Y   M   M   000   TM
0   0   T   T   H   H   Y   Y   MM MM   0   0
0   0   T   T   H   H   Y   M   M   0   0
000   T   T   H   H   Y   M   M   000

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***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
Output filename: C:\Users\PYung\AppData\Local\Civica\XH5\531e1913-0e12-4e2e-9684-e2ef03acaa05\b5289c08-6883-40b7-aa04-3040798a8483\scenar
Summary filename: C:\Users\PYung\AppData\Local\Civica\XH5\531e1913-0e12-4e2e-9684-e2ef03acaa05\b5289c08-6883-40b7-aa04-3040798a8483\scenar

DATE: 03/04/2022 TIME: 04:39:08

USER:

COMMENTS: _____

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*****
** SIMULATION : timmins **
*****

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| READ STORM | File: C:\Users\PYung\AppData\Local\Temp\1878d80f-7ce1-493c-b246-0e972f8707cd\ea6aa533a
| Ptotal=193.00 mm | Comments: timmins
-----

```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	15.00	3.25	3.00	6.25	43.00	9.25	13.00
0.50	15.00	3.50	3.00	6.50	43.00	9.50	13.00
0.75	15.00	3.75	3.00	6.75	43.00	9.75	13.00
1.00	15.00	4.00	3.00	7.00	43.00	10.00	13.00
1.25	20.00	4.25	5.00	7.25	20.00	10.25	13.00
1.50	20.00	4.50	5.00	7.50	20.00	10.50	13.00
1.75	20.00	4.75	5.00	7.75	20.00	10.75	13.00
2.00	20.00	5.00	5.00	8.00	20.00	11.00	13.00
2.25	10.00	5.25	20.00	8.25	23.00	11.25	8.00
2.50	10.00	5.50	20.00	8.50	23.00	11.50	8.00
2.75	10.00	5.75	20.00	8.75	23.00	11.75	8.00
3.00	10.00	6.00	20.00	9.00	23.00	12.00	8.00

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-----
| CALIB | Area (ha)= 15.49 Curve Number (CN)= 58.0
| NASHYD ( 0402) |

```

[ID= 1 DT= 5.0 min | Ia (mm)= 8.60 # of Linear Res.(N)= 3.00
----- U.H. Tp(hrs)= 0.31

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

--- TRANSFORMED HYETOGRAPH ---			
TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	15.00	3.083	3.00
0.167	15.00	3.167	3.00
0.250	15.00	3.250	3.00
0.333	15.00	3.333	3.00
0.417	15.00	3.417	3.00
0.500	15.00	3.500	3.00
0.583	15.00	3.583	3.00
0.667	15.00	3.667	3.00
0.750	15.00	3.750	3.00
0.833	15.00	3.833	3.00
0.917	15.00	3.917	3.00
1.000	15.00	4.000	3.00
1.083	20.00	4.083	5.00
1.167	20.00	4.167	5.00
1.250	20.00	4.250	5.00
1.333	20.00	4.333	5.00
1.417	20.00	4.417	5.00
1.500	20.00	4.500	5.00
1.583	20.00	4.583	5.00
1.667	20.00	4.667	5.00
1.750	20.00	4.750	5.00
1.833	20.00	4.833	5.00
1.917	20.00	4.917	5.00
2.000	20.00	5.000	5.00
2.083	10.00	5.083	20.00
2.167	10.00	5.167	20.00
2.250	10.00	5.250	20.00
2.333	10.00	5.333	20.00
2.417	10.00	5.417	20.00
2.500	10.00	5.500	20.00
2.583	10.00	5.583	20.00
2.667	10.00	5.667	20.00
2.750	10.00	5.750	20.00
2.833	10.00	5.833	20.00
2.917	10.00	5.917	20.00
3.000	10.00	6.000	20.00

Unit Hyd Qpeak (cms)= 1.909

PEAK FLOW (cms)= 0.992 (i)
TIME TO PEAK (hrs)= 7.000
RUNOFF VOLUME (mm)= 92.286
TOTAL RAINFALL (mm)= 193.000
RUNOFF COEFFICIENT = 0.478

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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-----
| CALIB | Area (ha)= 23.90 Curve Number (CN)= 59.0
| NASHYD ( 0403) | Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
| ID= 1 DT= 5.0 min | U.H. Tp(hrs)= 0.36
-----

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NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

--- TRANSFORMED HYETOGRAPH ---			
TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	15.00	3.083	3.00
0.167	15.00	3.167	3.00
0.250	15.00	3.250	3.00
0.333	15.00	3.333	3.00
0.417	15.00	3.417	3.00
0.500	15.00	3.500	3.00
0.583	15.00	3.583	3.00
0.667	15.00	3.667	3.00
0.750	15.00	3.750	3.00
0.833	15.00	3.833	3.00
0.917	15.00	3.917	3.00
1.000	15.00	4.000	3.00
1.083	20.00	4.083	5.00
1.167	20.00	4.167	5.00
1.250	20.00	4.250	5.00
1.333	20.00	4.333	5.00
1.417	20.00	4.417	5.00
1.500	20.00	4.500	5.00
1.583	20.00	4.583	5.00
1.667	20.00	4.667	5.00
1.750	20.00	4.750	5.00
1.833	20.00	4.833	5.00
1.917	20.00	4.917	5.00
2.000	20.00	5.000	5.00
2.083	10.00	5.083	20.00
2.167	10.00	5.167	20.00
2.250	10.00	5.250	20.00
2.333	10.00	5.333	20.00
2.417	10.00	5.417	20.00
2.500	10.00	5.500	20.00
2.583	10.00	5.583	20.00
2.667	10.00	5.667	20.00
2.750	10.00	5.750	20.00
2.833	10.00	5.833	20.00
2.917	10.00	5.917	20.00
3.000	10.00	6.000	20.00

0.167	15.00	3.167	3.00	6.167	43.00	9.17	13.00
0.250	15.00	3.250	3.00	6.250	43.00	9.25	13.00
0.333	15.00	3.333	3.00	6.333	43.00	9.33	13.00
0.417	15.00	3.417	3.00	6.417	43.00	9.42	13.00
0.500	15.00	3.500	3.00	6.500	43.00	9.50	13.00
0.583	15.00	3.583	3.00	6.583	43.00	9.58	13.00
0.667	15.00	3.667	3.00	6.667	43.00	9.67	13.00
0.750	15.00	3.750	3.00	6.750	43.00	9.75	13.00
0.833	15.00	3.833	3.00	6.833	43.00	9.83	13.00
0.917	15.00	3.917	3.00	6.917	43.00	9.92	13.00
1.000	15.00	4.000	3.00	7.000	43.00	10.00	13.00
1.083	20.00	4.083	5.00	7.083	20.00	10.08	13.00
1.167	20.00	4.167	5.00	7.167	20.00	10.17	13.00
1.250	20.00	4.250	5.00	7.250	20.00	10.25	13.00
1.333	20.00	4.333	5.00	7.333	20.00	10.33	13.00
1.417	20.00	4.417	5.00	7.417	20.00	10.42	13.00
1.500	20.00	4.500	5.00	7.500	20.00	10.50	13.00
1.583	20.00	4.583	5.00	7.583	20.00	10.58	13.00
1.667	20.00	4.667	5.00	7.667	20.00	10.67	13.00
1.750	20.00	4.750	5.00	7.750	20.00	10.75	13.00
1.833	20.00	4.833	5.00	7.833	20.00	10.83	13.00
1.917	20.00	4.917	5.00	7.917	20.00	10.92	13.00
2.000	20.00	5.000	5.00	8.000	20.00	11.00	13.00
2.083	10.00	5.083	20.00	8.083	23.00	11.08	8.00
2.167	10.00	5.167	20.00	8.167	23.00	11.17	8.00
2.250	10.00	5.250	20.00	8.250	23.00	11.25	8.00
2.333	10.00	5.333	20.00	8.333	23.00	11.33	8.00
2.417	10.00	5.417	20.00	8.417	23.00	11.42	8.00
2.500	10.00	5.500	20.00	8.500	23.00	11.50	8.00
2.583	10.00	5.583	20.00	8.583	23.00	11.58	8.00
2.667	10.00	5.667	20.00	8.667	23.00	11.67	8.00
2.750	10.00	5.750	20.00	8.750	23.00	11.75	8.00
2.833	10.00	5.833	20.00	8.833	23.00	11.83	8.00
2.917	10.00	5.917	20.00	8.917	23.00	11.92	8.00
3.000	10.00	6.000	20.00	9.000	23.00	12.00	8.00

Unit Hyd Qpeak (cms)= 2.536

PEAK FLOW (cms)= 1.559 (i)
 TIME TO PEAK (hrs)= 7.083
 RUNOFF VOLUME (mm)= 96.945
 TOTAL RAINFALL (mm)= 193.000
 RUNOFF COEFFICIENT = 0.502

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	
STANDHYD (0401)	
ID= 1 DT= 5.0 min	

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	17.34	11.56
Dep. Storage	(mm)=	2.00	5.00
Average Slope	(%)=	2.00	2.00
Length	(m)=	438.94	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	15.00	3.083	3.00	6.083	43.00	9.08	13.00
0.167	15.00	3.167	3.00	6.167	43.00	9.17	13.00
0.250	15.00	3.250	3.00	6.250	43.00	9.25	13.00
0.333	15.00	3.333	3.00	6.333	43.00	9.33	13.00
0.417	15.00	3.417	3.00	6.417	43.00	9.42	13.00

0.500	15.00	3.500	3.00	6.500	43.00	9.50	13.00
0.583	15.00	3.583	3.00	6.583	43.00	9.58	13.00
0.667	15.00	3.667	3.00	6.667	43.00	9.67	13.00
0.750	15.00	3.750	3.00	6.750	43.00	9.75	13.00
0.833	15.00	3.833	3.00	6.833	43.00	9.83	13.00
0.917	15.00	3.917	3.00	6.917	43.00	9.92	13.00
1.000	15.00	4.000	3.00	7.000	43.00	10.00	13.00
1.083	20.00	4.083	5.00	7.083	20.00	10.08	13.00
1.167	20.00	4.167	5.00	7.167	20.00	10.17	13.00
1.250	20.00	4.250	5.00	7.250	20.00	10.25	13.00
1.333	20.00	4.333	5.00	7.333	20.00	10.33	13.00
1.417	20.00	4.417	5.00	7.417	20.00	10.42	13.00
1.500	20.00	4.500	5.00	7.500	20.00	10.50	13.00
1.583	20.00	4.583	5.00	7.583	20.00	10.58	13.00
1.667	20.00	4.667	5.00	7.667	20.00	10.67	13.00
1.750	20.00	4.750	5.00	7.750	20.00	10.75	13.00
1.833	20.00	4.833	5.00	7.833	20.00	10.83	13.00
1.917	20.00	4.917	5.00	7.917	20.00	10.92	13.00
2.000	20.00	5.000	5.00	8.000	20.00	11.00	13.00
2.083	10.00	5.083	20.00	8.083	23.00	11.08	8.00
2.167	10.00	5.167	20.00	8.167	23.00	11.17	8.00
2.250	10.00	5.250	20.00	8.250	23.00	11.25	8.00
2.333	10.00	5.333	20.00	8.333	23.00	11.33	8.00
2.417	10.00	5.417	20.00	8.417	23.00	11.42	8.00
2.500	10.00	5.500	20.00	8.500	23.00	11.50	8.00
2.583	10.00	5.583	20.00	8.583	23.00	11.58	8.00
2.667	10.00	5.667	20.00	8.667	23.00	11.67	8.00
2.750	10.00	5.750	20.00	8.750	23.00	11.75	8.00
2.833	10.00	5.833	20.00	8.833	23.00	11.83	8.00
2.917	10.00	5.917	20.00	8.917	23.00	11.92	8.00
3.000	10.00	6.000	20.00	9.000	23.00	12.00	8.00

Max.Eff.Inten.(mm/hr)= 43.00 37.48
 over (min) 5.00 20.00
 Storage Coeff. (min)= 7.06 (ii) 17.52 (ii)
 Unit Hyd. Tpeak (min)= 5.00 20.00
 Unit Hyd. peak (cms)= 0.17 0.06

TOTALS

PEAK FLOW (cms)= 1.55 1.10 2.652 (iii)
 TIME TO PEAK (hrs)= 7.00 7.00 7.00
 RUNOFF VOLUME (mm)= 191.00 101.53 141.79
 TOTAL RAINFALL (mm)= 193.00 193.00 193.00
 RUNOFF COEFFICIENT = 0.99 0.53 0.73

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 CN* = 53.0 Ia = Dep. Storage (Above)
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

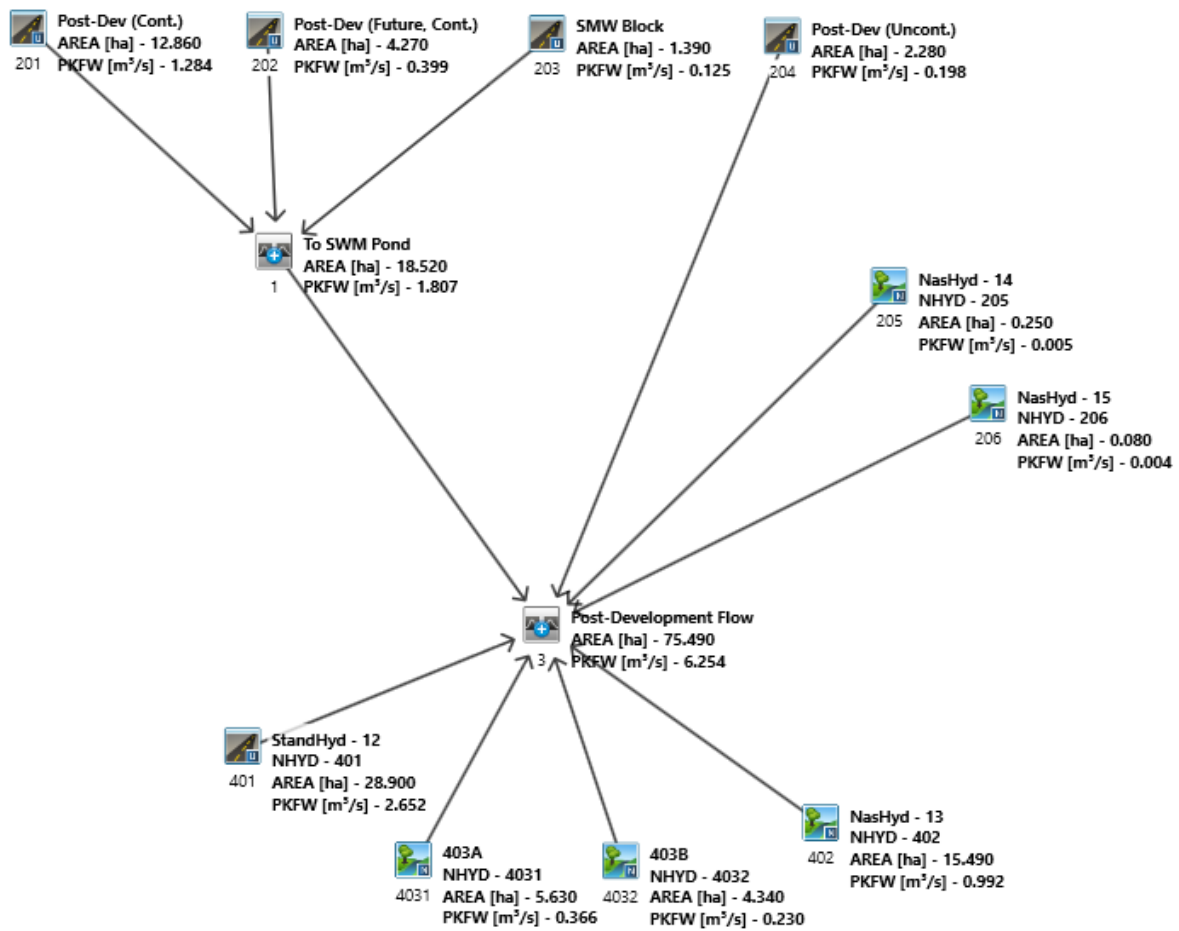
ADD HYD (0004)				
1 + 2 = 3				
	AREA	QPEAK	TPEAK	R.V.
	(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0401):	28.90	2.652	7.00	141.79
+ ID2= 2 (0402):	15.49	0.992	7.00	92.29
=====				
ID = 3 (0004):	44.39	3.644	7.00	124.52

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0004)				
3 + 2 = 1				
	AREA	QPEAK	TPEAK	R.V.
	(ha)	(cms)	(hrs)	(mm)
ID1= 3 (0004):	44.39	3.644	7.00	124.52

```
+ ID2= 2 ( 0403):    23.90    1.559    7.08    96.95
=====
ID = 1 ( 0004):    68.29    5.187    7.00   114.87
```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.



VO5 Model Schematic – Post-Development Floodplain Drainage Area

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V   V   I   SSSSS   U   U   A   L           (v 6.2.2006)
V   V   I   SS      U   U   A A   L
V   V   I   SS      U   U   AAAAA L
V   V   I   SS      U   U   A   A   L
V   V   I   SSSSS   UUUUU   A   A   LLLLL

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000   TTTT   TTTT   H   H   Y   Y   M   M   000   TM
0 0   T   T   H   H   Y   Y   MM MM 0 0
0 0   T   T   H   H   Y   M   M   0 0
000   T   T   H   H   Y   M   M   000

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***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
Output filename: C:\Users\PYung\AppData\Local\Civica\XH5\531e1913-0e12-4e2e-9684-e2ef03acaa05\208daafe-36d4-4518-98d6-47f6b0b7ec8b\scenar
Summary filename: C:\Users\PYung\AppData\Local\Civica\XH5\531e1913-0e12-4e2e-9684-e2ef03acaa05\208daafe-36d4-4518-98d6-47f6b0b7ec8b\scenar

DATE: 03/10/2022 TIME: 11:38:00

USER:

COMMENTS: _____

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*****
** SIMULATION : timmins **
*****

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-----
| READ STORM | File: C:\Users\PYung\AppData\Local\Temp\
|            | bc99fa23-d99b-4e55-8cbb-ca2fba7be293\ea6aa533a
| Ptotal=193.00 mm | Comments: timmins
-----

```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	15.00	3.25	3.00	6.25	43.00	9.25	13.00
0.50	15.00	3.50	3.00	6.50	43.00	9.50	13.00
0.75	15.00	3.75	3.00	6.75	43.00	9.75	13.00
1.00	15.00	4.00	3.00	7.00	43.00	10.00	13.00
1.25	20.00	4.25	5.00	7.25	20.00	10.25	13.00
1.50	20.00	4.50	5.00	7.50	20.00	10.50	13.00
1.75	20.00	4.75	5.00	7.75	20.00	10.75	13.00
2.00	20.00	5.00	5.00	8.00	20.00	11.00	13.00
2.25	10.00	5.25	20.00	8.25	23.00	11.25	8.00
2.50	10.00	5.50	20.00	8.50	23.00	11.50	8.00
2.75	10.00	5.75	20.00	8.75	23.00	11.75	8.00
3.00	10.00	6.00	20.00	9.00	23.00	12.00	8.00

```

-----
| CALIB | Area (ha)= 15.49 Curve Number (CN)= 58.0
| NASHYD ( 0402) |

```

[ID= 1 DT= 5.0 min | Ia (mm)= 8.60 # of Linear Res.(N)= 3.00
----- U.H. Tp(hrs)= 0.31

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	15.00	3.083	3.00	6.083	43.00	9.08	13.00
0.167	15.00	3.167	3.00	6.167	43.00	9.17	13.00
0.250	15.00	3.250	3.00	6.250	43.00	9.25	13.00
0.333	15.00	3.333	3.00	6.333	43.00	9.33	13.00
0.417	15.00	3.417	3.00	6.417	43.00	9.42	13.00
0.500	15.00	3.500	3.00	6.500	43.00	9.50	13.00
0.583	15.00	3.583	3.00	6.583	43.00	9.58	13.00
0.667	15.00	3.667	3.00	6.667	43.00	9.67	13.00
0.750	15.00	3.750	3.00	6.750	43.00	9.75	13.00
0.833	15.00	3.833	3.00	6.833	43.00	9.83	13.00
0.917	15.00	3.917	3.00	6.917	43.00	9.92	13.00
1.000	15.00	4.000	3.00	7.000	43.00	10.00	13.00
1.083	20.00	4.083	5.00	7.083	20.00	10.08	13.00
1.167	20.00	4.167	5.00	7.167	20.00	10.17	13.00
1.250	20.00	4.250	5.00	7.250	20.00	10.25	13.00
1.333	20.00	4.333	5.00	7.333	20.00	10.33	13.00
1.417	20.00	4.417	5.00	7.417	20.00	10.42	13.00
1.500	20.00	4.500	5.00	7.500	20.00	10.50	13.00
1.583	20.00	4.583	5.00	7.583	20.00	10.58	13.00
1.667	20.00	4.667	5.00	7.667	20.00	10.67	13.00
1.750	20.00	4.750	5.00	7.750	20.00	10.75	13.00
1.833	20.00	4.833	5.00	7.833	20.00	10.83	13.00
1.917	20.00	4.917	5.00	7.917	20.00	10.92	13.00
2.000	20.00	5.000	5.00	8.000	20.00	11.00	13.00
2.083	10.00	5.083	20.00	8.083	23.00	11.08	8.00
2.167	10.00	5.167	20.00	8.167	23.00	11.17	8.00
2.250	10.00	5.250	20.00	8.250	23.00	11.25	8.00
2.333	10.00	5.333	20.00	8.333	23.00	11.33	8.00
2.417	10.00	5.417	20.00	8.417	23.00	11.42	8.00
2.500	10.00	5.500	20.00	8.500	23.00	11.50	8.00
2.583	10.00	5.583	20.00	8.583	23.00	11.58	8.00
2.667	10.00	5.667	20.00	8.667	23.00	11.67	8.00
2.750	10.00	5.750	20.00	8.750	23.00	11.75	8.00
2.833	10.00	5.833	20.00	8.833	23.00	11.83	8.00
2.917	10.00	5.917	20.00	8.917	23.00	11.92	8.00
3.000	10.00	6.000	20.00	9.000	23.00	12.00	8.00

Unit Hyd Qpeak (cms)= 1.909

PEAK FLOW (cms)= 0.992 (i)
TIME TO PEAK (hrs)= 7.000
RUNOFF VOLUME (mm)= 92.286
TOTAL RAINFALL (mm)= 193.000
RUNOFF COEFFICIENT = 0.478

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB | Area (ha)= 0.25 Curve Number (CN)= 53.0
| NASHYD ( 0205) | Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
| ID= 1 DT= 5.0 min | U.H. Tp(hrs)= 0.03
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NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	15.00	3.083	3.00	6.083	43.00	9.08	13.00

0.167	15.00	3.167	3.00	6.167	43.00	9.17	13.00
0.250	15.00	3.250	3.00	6.250	43.00	9.25	13.00
0.333	15.00	3.333	3.00	6.333	43.00	9.33	13.00
0.417	15.00	3.417	3.00	6.417	43.00	9.42	13.00
0.500	15.00	3.500	3.00	6.500	43.00	9.50	13.00
0.583	15.00	3.583	3.00	6.583	43.00	9.58	13.00
0.667	15.00	3.667	3.00	6.667	43.00	9.67	13.00
0.750	15.00	3.750	3.00	6.750	43.00	9.75	13.00
0.833	15.00	3.833	3.00	6.833	43.00	9.83	13.00
0.917	15.00	3.917	3.00	6.917	43.00	9.92	13.00
1.000	15.00	4.000	3.00	7.000	43.00	10.00	13.00
1.083	20.00	4.083	5.00	7.083	20.00	10.08	13.00
1.167	20.00	4.167	5.00	7.167	20.00	10.17	13.00
1.250	20.00	4.250	5.00	7.250	20.00	10.25	13.00
1.333	20.00	4.333	5.00	7.333	20.00	10.33	13.00
1.417	20.00	4.417	5.00	7.417	20.00	10.42	13.00
1.500	20.00	4.500	5.00	7.500	20.00	10.50	13.00
1.583	20.00	4.583	5.00	7.583	20.00	10.58	13.00
1.667	20.00	4.667	5.00	7.667	20.00	10.67	13.00
1.750	20.00	4.750	5.00	7.750	20.00	10.75	13.00
1.833	20.00	4.833	5.00	7.833	20.00	10.83	13.00
1.917	20.00	4.917	5.00	7.917	20.00	10.92	13.00
2.000	20.00	5.000	5.00	8.000	20.00	11.00	13.00
2.083	10.00	5.083	20.00	8.083	23.00	11.08	8.00
2.167	10.00	5.167	20.00	8.167	23.00	11.17	8.00
2.250	10.00	5.250	20.00	8.250	23.00	11.25	8.00
2.333	10.00	5.333	20.00	8.333	23.00	11.33	8.00
2.417	10.00	5.417	20.00	8.417	23.00	11.42	8.00
2.500	10.00	5.500	20.00	8.500	23.00	11.50	8.00
2.583	10.00	5.583	20.00	8.583	23.00	11.58	8.00
2.667	10.00	5.667	20.00	8.667	23.00	11.67	8.00
2.750	10.00	5.750	20.00	8.750	23.00	11.75	8.00
2.833	10.00	5.833	20.00	8.833	23.00	11.83	8.00
2.917	10.00	5.917	20.00	8.917	23.00	11.92	8.00
3.000	10.00	6.000	20.00	9.000	23.00	12.00	8.00

Unit Hyd Qpeak (cms)= 0.318

PEAK FLOW (cms)= 0.005 (i)
 TIME TO PEAK (hrs)= 7.000
 RUNOFF VOLUME (mm)= 28.790
 TOTAL RAINFALL (mm)= 193.000
 RUNOFF COEFFICIENT = 0.149

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB							
NASHYD (0206)	Area	(ha)=	0.08	Curve Number	(CN)=	48.0	
ID= 1 DT= 5.0 min	Ia	(mm)=	10.00	# of Linear Res.(N)=	3.00		
	U.H. Tp(hrs)=	0.06					

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	15.00	3.083	3.00	6.083	43.00	9.08	13.00
0.167	15.00	3.167	3.00	6.167	43.00	9.17	13.00
0.250	15.00	3.250	3.00	6.250	43.00	9.25	13.00
0.333	15.00	3.333	3.00	6.333	43.00	9.33	13.00
0.417	15.00	3.417	3.00	6.417	43.00	9.42	13.00
0.500	15.00	3.500	3.00	6.500	43.00	9.50	13.00
0.583	15.00	3.583	3.00	6.583	43.00	9.58	13.00
0.667	15.00	3.667	3.00	6.667	43.00	9.67	13.00
0.750	15.00	3.750	3.00	6.750	43.00	9.75	13.00
0.833	15.00	3.833	3.00	6.833	43.00	9.83	13.00
0.917	15.00	3.917	3.00	6.917	43.00	9.92	13.00

1.000	15.00	4.000	3.00	7.000	43.00	10.00	13.00
1.083	20.00	4.083	5.00	7.083	20.00	10.08	13.00
1.167	20.00	4.167	5.00	7.167	20.00	10.17	13.00
1.250	20.00	4.250	5.00	7.250	20.00	10.25	13.00
1.333	20.00	4.333	5.00	7.333	20.00	10.33	13.00
1.417	20.00	4.417	5.00	7.417	20.00	10.42	13.00
1.500	20.00	4.500	5.00	7.500	20.00	10.50	13.00
1.583	20.00	4.583	5.00	7.583	20.00	10.58	13.00
1.667	20.00	4.667	5.00	7.667	20.00	10.67	13.00
1.750	20.00	4.750	5.00	7.750	20.00	10.75	13.00
1.833	20.00	4.833	5.00	7.833	20.00	10.83	13.00
1.917	20.00	4.917	5.00	7.917	20.00	10.92	13.00
2.000	20.00	5.000	5.00	8.000	20.00	11.00	13.00
2.083	10.00	5.083	20.00	8.083	23.00	11.08	8.00
2.167	10.00	5.167	20.00	8.167	23.00	11.17	8.00
2.250	10.00	5.250	20.00	8.250	23.00	11.25	8.00
2.333	10.00	5.333	20.00	8.333	23.00	11.33	8.00
2.417	10.00	5.417	20.00	8.417	23.00	11.42	8.00
2.500	10.00	5.500	20.00	8.500	23.00	11.50	8.00
2.583	10.00	5.583	20.00	8.583	23.00	11.58	8.00
2.667	10.00	5.667	20.00	8.667	23.00	11.67	8.00
2.750	10.00	5.750	20.00	8.750	23.00	11.75	8.00
2.833	10.00	5.833	20.00	8.833	23.00	11.83	8.00
2.917	10.00	5.917	20.00	8.917	23.00	11.92	8.00
3.000	10.00	6.000	20.00	9.000	23.00	12.00	8.00

Unit Hyd Qpeak (cms)= 0.051

PEAK FLOW (cms)= 0.004 (i)
 TIME TO PEAK (hrs)= 7.000
 RUNOFF VOLUME (mm)= 62.718
 TOTAL RAINFALL (mm)= 193.000
 RUNOFF COEFFICIENT = 0.325

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB							
NASHYD (4031)	Area	(ha)=	5.63	Curve Number	(CN)=	56.0	
ID= 1 DT= 5.0 min	Ia	(mm)=	7.40	# of Linear Res.(N)=	3.00		
	U.H. Tp(hrs)=	0.21					

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	15.00	3.083	3.00	6.083	43.00	9.08	13.00
0.167	15.00	3.167	3.00	6.167	43.00	9.17	13.00
0.250	15.00	3.250	3.00	6.250	43.00	9.25	13.00
0.333	15.00	3.333	3.00	6.333	43.00	9.33	13.00
0.417	15.00	3.417	3.00	6.417	43.00	9.42	13.00
0.500	15.00	3.500	3.00	6.500	43.00	9.50	13.00
0.583	15.00	3.583	3.00	6.583	43.00	9.58	13.00
0.667	15.00	3.667	3.00	6.667	43.00	9.67	13.00
0.750	15.00	3.750	3.00	6.750	43.00	9.75	13.00
0.833	15.00	3.833	3.00	6.833	43.00	9.83	13.00
0.917	15.00	3.917	3.00	6.917	43.00	9.92	13.00
1.000	15.00	4.000	3.00	7.000	43.00	10.00	13.00
1.083	20.00	4.083	5.00	7.083	20.00	10.08	13.00
1.167	20.00	4.167	5.00	7.167	20.00	10.17	13.00
1.250	20.00	4.250	5.00	7.250	20.00	10.25	13.00
1.333	20.00	4.333	5.00	7.333	20.00	10.33	13.00
1.417	20.00	4.417	5.00	7.417	20.00	10.42	13.00
1.500	20.00	4.500	5.00	7.500	20.00	10.50	13.00
1.583	20.00	4.583	5.00	7.583	20.00	10.58	13.00
1.667	20.00	4.667	5.00	7.667	20.00	10.67	13.00
1.750	20.00	4.750	5.00	7.750	20.00	10.75	13.00

1.833	20.00	4.833	5.00	7.833	20.00	10.83	13.00
1.917	20.00	4.917	5.00	7.917	20.00	10.92	13.00
2.000	20.00	5.000	5.00	8.000	20.00	11.00	13.00
2.083	10.00	5.083	20.00	8.083	23.00	11.08	8.00
2.167	10.00	5.167	20.00	8.167	23.00	11.17	8.00
2.250	10.00	5.250	20.00	8.250	23.00	11.25	8.00
2.333	10.00	5.333	20.00	8.333	23.00	11.33	8.00
2.417	10.00	5.417	20.00	8.417	23.00	11.42	8.00
2.500	10.00	5.500	20.00	8.500	23.00	11.50	8.00
2.583	10.00	5.583	20.00	8.583	23.00	11.58	8.00
2.667	10.00	5.667	20.00	8.667	23.00	11.67	8.00
2.750	10.00	5.750	20.00	8.750	23.00	11.75	8.00
2.833	10.00	5.833	20.00	8.833	23.00	11.83	8.00
2.917	10.00	5.917	20.00	8.917	23.00	11.92	8.00
3.000	10.00	6.000	20.00	9.000	23.00	12.00	8.00

Unit Hyd Qpeak (cms)= 1.024

PEAK FLOW (cms)= 0.366 (i)
 TIME TO PEAK (hrs)= 7.000
 RUNOFF VOLUME (mm)= 89.293
 TOTAL RAINFALL (mm)= 193.000
 RUNOFF COEFFICIENT = 0.463

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	
NASHYD (4032)	Area (ha)= 4.34
ID= 1 DT= 5.0 min	Ia (mm)= 9.80
	U.H. Tp(hrs)= 0.21
	Curve Number (CN)= 48.0
	# of Linear Res.(N)= 3.00

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	15.00	3.083	3.00	6.083	43.00	9.08	13.00
0.167	15.00	3.167	3.00	6.167	43.00	9.17	13.00
0.250	15.00	3.250	3.00	6.250	43.00	9.25	13.00
0.333	15.00	3.333	3.00	6.333	43.00	9.33	13.00
0.417	15.00	3.417	3.00	6.417	43.00	9.42	13.00
0.500	15.00	3.500	3.00	6.500	43.00	9.50	13.00
0.583	15.00	3.583	3.00	6.583	43.00	9.58	13.00
0.667	15.00	3.667	3.00	6.667	43.00	9.67	13.00
0.750	15.00	3.750	3.00	6.750	43.00	9.75	13.00
0.833	15.00	3.833	3.00	6.833	43.00	9.83	13.00
0.917	15.00	3.917	3.00	6.917	43.00	9.92	13.00
1.000	15.00	4.000	3.00	7.000	43.00	10.00	13.00
1.083	20.00	4.083	5.00	7.083	20.00	10.08	13.00
1.167	20.00	4.167	5.00	7.167	20.00	10.17	13.00
1.250	20.00	4.250	5.00	7.250	20.00	10.25	13.00
1.333	20.00	4.333	5.00	7.333	20.00	10.33	13.00
1.417	20.00	4.417	5.00	7.417	20.00	10.42	13.00
1.500	20.00	4.500	5.00	7.500	20.00	10.50	13.00
1.583	20.00	4.583	5.00	7.583	20.00	10.58	13.00
1.667	20.00	4.667	5.00	7.667	20.00	10.67	13.00
1.750	20.00	4.750	5.00	7.750	20.00	10.75	13.00
1.833	20.00	4.833	5.00	7.833	20.00	10.83	13.00
1.917	20.00	4.917	5.00	7.917	20.00	10.92	13.00
2.000	20.00	5.000	5.00	8.000	20.00	11.00	13.00
2.083	10.00	5.083	20.00	8.083	23.00	11.08	8.00
2.167	10.00	5.167	20.00	8.167	23.00	11.17	8.00
2.250	10.00	5.250	20.00	8.250	23.00	11.25	8.00
2.333	10.00	5.333	20.00	8.333	23.00	11.33	8.00
2.417	10.00	5.417	20.00	8.417	23.00	11.42	8.00
2.500	10.00	5.500	20.00	8.500	23.00	11.50	8.00
2.583	10.00	5.583	20.00	8.583	23.00	11.58	8.00

2.667	10.00	5.667	20.00	8.667	23.00	11.67	8.00
2.750	10.00	5.750	20.00	8.750	23.00	11.75	8.00
2.833	10.00	5.833	20.00	8.833	23.00	11.83	8.00
2.917	10.00	5.917	20.00	8.917	23.00	11.92	8.00
3.000	10.00	6.000	20.00	9.000	23.00	12.00	8.00

Unit Hyd Qpeak (cms)= 0.789

PEAK FLOW (cms)= 0.230 (i)
 TIME TO PEAK (hrs)= 7.000
 RUNOFF VOLUME (mm)= 73.106
 TOTAL RAINFALL (mm)= 193.000
 RUNOFF COEFFICIENT = 0.379

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	
STANDHYD (0201)	Area (ha)= 12.86
ID= 1 DT= 5.0 min	Total Imp(%)= 70.00
	Dir. Conn.(%)= 60.00
	IMPERVIOUS
Surface Area (ha)=	9.00
Dep. Storage (mm)=	2.00
Average Slope (%)=	5.00
Length (m)=	292.00
Mannings n	= 0.013
	PERVIOUS (i)
	3.86
	5.00
	2.00
	40.00
	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	15.00	3.083	3.00	6.083	43.00	9.08	13.00
0.167	15.00	3.167	3.00	6.167	43.00	9.17	13.00
0.250	15.00	3.250	3.00	6.250	43.00	9.25	13.00
0.333	15.00	3.333	3.00	6.333	43.00	9.33	13.00
0.417	15.00	3.417	3.00	6.417	43.00	9.42	13.00
0.500	15.00	3.500	3.00	6.500	43.00	9.50	13.00
0.583	15.00	3.583	3.00	6.583	43.00	9.58	13.00
0.667	15.00	3.667	3.00	6.667	43.00	9.67	13.00
0.750	15.00	3.750	3.00	6.750	43.00	9.75	13.00
0.833	15.00	3.833	3.00	6.833	43.00	9.83	13.00
0.917	15.00	3.917	3.00	6.917	43.00	9.92	13.00
1.000	15.00	4.000	3.00	7.000	43.00	10.00	13.00
1.083	20.00	4.083	5.00	7.083	20.00	10.08	13.00
1.167	20.00	4.167	5.00	7.167	20.00	10.17	13.00
1.250	20.00	4.250	5.00	7.250	20.00	10.25	13.00
1.333	20.00	4.333	5.00	7.333	20.00	10.33	13.00
1.417	20.00	4.417	5.00	7.417	20.00	10.42	13.00
1.500	20.00	4.500	5.00	7.500	20.00	10.50	13.00
1.583	20.00	4.583	5.00	7.583	20.00	10.58	13.00
1.667	20.00	4.667	5.00	7.667	20.00	10.67	13.00
1.750	20.00	4.750	5.00	7.750	20.00	10.75	13.00
1.833	20.00	4.833	5.00	7.833	20.00	10.83	13.00
1.917	20.00	4.917	5.00	7.917	20.00	10.92	13.00
2.000	20.00	5.000	5.00	8.000	20.00	11.00	13.00
2.083	10.00	5.083	20.00	8.083	23.00	11.08	8.00
2.167	10.00	5.167	20.00	8.167	23.00	11.17	8.00
2.250	10.00	5.250	20.00	8.250	23.00	11.25	8.00
2.333	10.00	5.333	20.00	8.333	23.00	11.33	8.00
2.417	10.00	5.417	20.00	8.417	23.00	11.42	8.00
2.500	10.00	5.500	20.00	8.500	23.00	11.50	8.00
2.583	10.00	5.583	20.00	8.583	23.00	11.58	8.00
2.667	10.00	5.667	20.00	8.667	23.00	11.67	8.00
2.750	10.00	5.750	20.00	8.750	23.00	11.75	8.00
2.833	10.00	5.833	20.00	8.833	23.00	11.83	8.00
2.917	10.00	5.917	20.00	8.917	23.00	11.92	8.00

	3.000	10.00	6.000	20.00	9.000	23.00	12.00	8.00
Max.Eff.Inten.(mm/hr)=	43.00		35.82					
over (min)	5.00		15.00					
Storage Coeff. (min)=	4.21 (ii)		14.85 (ii)					
Unit Hyd. Tpeak (min)=	5.00		15.00					
Unit Hyd. peak (cms)=	0.24		0.08					
					TOTALS			
PEAK FLOW (cms)=	0.92		0.36		1.284 (iii)			
TIME TO PEAK (hrs)=	6.92		7.00		7.00			
RUNOFF VOLUME (mm)=	191.00		99.99		154.60			
TOTAL RAINFALL (mm)=	193.00		193.00		193.00			
RUNOFF COEFFICIENT =	0.99		0.52		0.80			

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 CN* = 53.0 Ia = Dep. Storage (Above)
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
STANDHYD (0202)	Area (ha)=	4.27	
ID= 1 DT= 5.0 min	Total Imp(%)=	60.00	Dir. Conn.(%)= 45.00
	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	2.56	1.71	
Dep. Storage (mm)=	2.00	5.00	
Average Slope (%)=	5.00	2.00	
Length (m)=	168.72	40.00	
Mannings n =	0.013	0.250	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	15.00	3.083	3.00	6.083	43.00	9.08	13.00
0.167	15.00	3.167	3.00	6.167	43.00	9.17	13.00
0.250	15.00	3.250	3.00	6.250	43.00	9.25	13.00
0.333	15.00	3.333	3.00	6.333	43.00	9.33	13.00
0.417	15.00	3.417	3.00	6.417	43.00	9.42	13.00
0.500	15.00	3.500	3.00	6.500	43.00	9.50	13.00
0.583	15.00	3.583	3.00	6.583	43.00	9.58	13.00
0.667	15.00	3.667	3.00	6.667	43.00	9.67	13.00
0.750	15.00	3.750	3.00	6.750	43.00	9.75	13.00
0.833	15.00	3.833	3.00	6.833	43.00	9.83	13.00
0.917	15.00	3.917	3.00	6.917	43.00	9.92	13.00
1.000	15.00	4.000	3.00	7.000	43.00	10.00	13.00
1.083	20.00	4.083	5.00	7.083	20.00	10.08	13.00
1.167	20.00	4.167	5.00	7.167	20.00	10.17	13.00
1.250	20.00	4.250	5.00	7.250	20.00	10.25	13.00
1.333	20.00	4.333	5.00	7.333	20.00	10.33	13.00
1.417	20.00	4.417	5.00	7.417	20.00	10.42	13.00
1.500	20.00	4.500	5.00	7.500	20.00	10.50	13.00
1.583	20.00	4.583	5.00	7.583	20.00	10.58	13.00
1.667	20.00	4.667	5.00	7.667	20.00	10.67	13.00
1.750	20.00	4.750	5.00	7.750	20.00	10.75	13.00
1.833	20.00	4.833	5.00	7.833	20.00	10.83	13.00
1.917	20.00	4.917	5.00	7.917	20.00	10.92	13.00
2.000	20.00	5.000	5.00	8.000	20.00	11.00	13.00
2.083	10.00	5.083	20.00	8.083	23.00	11.08	8.00
2.167	10.00	5.167	20.00	8.167	23.00	11.17	8.00
2.250	10.00	5.250	20.00	8.250	23.00	11.25	8.00
2.333	10.00	5.333	20.00	8.333	23.00	11.33	8.00
2.417	10.00	5.417	20.00	8.417	23.00	11.42	8.00

2.500	10.00	5.500	20.00	8.500	23.00	11.50	8.00
2.583	10.00	5.583	20.00	8.583	23.00	11.58	8.00
2.667	10.00	5.667	20.00	8.667	23.00	11.67	8.00
2.750	10.00	5.750	20.00	8.750	23.00	11.75	8.00
2.833	10.00	5.833	20.00	8.833	23.00	11.83	8.00
2.917	10.00	5.917	20.00	8.917	23.00	11.92	8.00
3.000	10.00	6.000	20.00	9.000	23.00	12.00	8.00

Max.Eff.Inten.(mm/hr)=	43.00	37.48	
over (min)	5.00	15.00	
Storage Coeff. (min)=	3.02 (ii)	13.47 (ii)	
Unit Hyd. Tpeak (min)=	5.00	15.00	
Unit Hyd. peak (cms)=	0.27	0.08	
			TOTALS
PEAK FLOW (cms)=	0.23	0.17	0.399 (iii)
TIME TO PEAK (hrs)=	6.75	7.00	7.00
RUNOFF VOLUME (mm)=	191.00	101.53	141.79
TOTAL RAINFALL (mm)=	193.00	193.00	193.00
RUNOFF COEFFICIENT =	0.99	0.53	0.73

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 CN* = 53.0 Ia = Dep. Storage (Above)
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
STANDHYD (0203)	Area (ha)=	1.39	
ID= 1 DT= 5.0 min	Total Imp(%)=	50.00	Dir. Conn.(%)= 50.00
	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	0.69	0.69	
Dep. Storage (mm)=	2.00	5.00	
Average Slope (%)=	5.00	2.00	
Length (m)=	96.26	40.00	
Mannings n =	0.013	0.250	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	15.00	3.083	3.00	6.083	43.00	9.08	13.00
0.167	15.00	3.167	3.00	6.167	43.00	9.17	13.00
0.250	15.00	3.250	3.00	6.250	43.00	9.25	13.00
0.333	15.00	3.333	3.00	6.333	43.00	9.33	13.00
0.417	15.00	3.417	3.00	6.417	43.00	9.42	13.00
0.500	15.00	3.500	3.00	6.500	43.00	9.50	13.00
0.583	15.00	3.583	3.00	6.583	43.00	9.58	13.00
0.667	15.00	3.667	3.00	6.667	43.00	9.67	13.00
0.750	15.00	3.750	3.00	6.750	43.00	9.75	13.00
0.833	15.00	3.833	3.00	6.833	43.00	9.83	13.00
0.917	15.00	3.917	3.00	6.917	43.00	9.92	13.00
1.000	15.00	4.000	3.00	7.000	43.00	10.00	13.00
1.083	20.00	4.083	5.00	7.083	20.00	10.08	13.00
1.167	20.00	4.167	5.00	7.167	20.00	10.17	13.00
1.250	20.00	4.250	5.00	7.250	20.00	10.25	13.00
1.333	20.00	4.333	5.00	7.333	20.00	10.33	13.00
1.417	20.00	4.417	5.00	7.417	20.00	10.42	13.00
1.500	20.00	4.500	5.00	7.500	20.00	10.50	13.00
1.583	20.00	4.583	5.00	7.583	20.00	10.58	13.00
1.667	20.00	4.667	5.00	7.667	20.00	10.67	13.00
1.750	20.00	4.750	5.00	7.750	20.00	10.75	13.00
1.833	20.00	4.833	5.00	7.833	20.00	10.83	13.00
1.917	20.00	4.917	5.00	7.917	20.00	10.92	13.00

2.000	20.00	5.000	5.00	8.000	20.00	11.00	13.00
2.083	10.00	5.083	20.00	8.083	23.00	11.08	8.00
2.167	10.00	5.167	20.00	8.167	23.00	11.17	8.00
2.250	10.00	5.250	20.00	8.250	23.00	11.25	8.00
2.333	10.00	5.333	20.00	8.333	23.00	11.33	8.00
2.417	10.00	5.417	20.00	8.417	23.00	11.42	8.00
2.500	10.00	5.500	20.00	8.500	23.00	11.50	8.00
2.583	10.00	5.583	20.00	8.583	23.00	11.58	8.00
2.667	10.00	5.667	20.00	8.667	23.00	11.67	8.00
2.750	10.00	5.750	20.00	8.750	23.00	11.75	8.00
2.833	10.00	5.833	20.00	8.833	23.00	11.83	8.00
2.917	10.00	5.917	20.00	8.917	23.00	11.92	8.00
3.000	10.00	6.000	20.00	9.000	23.00	12.00	8.00

Max.Eff.Inten.(mm/hr)= 43.00 23.07
 over (min) 5.00 15.00
 Storage Coeff. (min)= 2.16 (ii) 14.85 (ii)
 Unit Hyd. Tpeak (min)= 5.00 15.00
 Unit Hyd. peak (cms)= 0.31 0.08

PEAK FLOW (cms)= 0.08 0.04 0.125 (iii)
 TIME TO PEAK (hrs)= 6.75 7.00 7.00
 RUNOFF VOLUME (mm)= 191.00 85.53 138.26
 TOTAL RAINFALL (mm)= 193.00 193.00 193.00
 RUNOFF COEFFICIENT = 0.99 0.44 0.72

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PVIOUS LOSSES:
 CN* = 53.0 Ia = Dep. Storage (Above)
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0001)	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3				
ID1= 1 (0201):	12.86	1.284	7.00	154.60
+ ID2= 2 (0202):	4.27	0.399	7.00	141.79
ID = 3 (0001):	17.13	1.682	7.00	151.40

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0001)	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
3 + 2 = 1				
ID1= 3 (0001):	17.13	1.682	7.00	151.40
+ ID2= 2 (0203):	1.39	0.125	7.00	138.26
ID = 1 (0001):	18.52	1.807	7.00	150.42

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB	Area (ha)=	2.28
STANDHYD (0204)	Total Imp(%)=	50.00
ID= 1 DT= 5.0 min	Dir. Conn.(%)=	30.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	1.14	1.14
Dep. Storage (mm)=	2.00	5.00
Average Slope (%)=	5.00	2.00
Length (m)=	123.29	40.00
Mannings n	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

--- TRANSFORMED HYETOGRAPH ---							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	15.00	3.083	3.00	6.083	43.00	9.08	13.00
0.167	15.00	3.167	3.00	6.167	43.00	9.17	13.00
0.250	15.00	3.250	3.00	6.250	43.00	9.25	13.00
0.333	15.00	3.333	3.00	6.333	43.00	9.33	13.00
0.417	15.00	3.417	3.00	6.417	43.00	9.42	13.00
0.500	15.00	3.500	3.00	6.500	43.00	9.50	13.00
0.583	15.00	3.583	3.00	6.583	43.00	9.58	13.00
0.667	15.00	3.667	3.00	6.667	43.00	9.67	13.00
0.750	15.00	3.750	3.00	6.750	43.00	9.75	13.00
0.833	15.00	3.833	3.00	6.833	43.00	9.83	13.00
0.917	15.00	3.917	3.00	6.917	43.00	9.92	13.00
1.000	15.00	4.000	3.00	7.000	43.00	10.00	13.00
1.083	20.00	4.083	5.00	7.083	20.00	10.08	13.00
1.167	20.00	4.167	5.00	7.167	20.00	10.17	13.00
1.250	20.00	4.250	5.00	7.250	20.00	10.25	13.00
1.333	20.00	4.333	5.00	7.333	20.00	10.33	13.00
1.417	20.00	4.417	5.00	7.417	20.00	10.42	13.00
1.500	20.00	4.500	5.00	7.500	20.00	10.50	13.00
1.583	20.00	4.583	5.00	7.583	20.00	10.58	13.00
1.667	20.00	4.667	5.00	7.667	20.00	10.67	13.00
1.750	20.00	4.750	5.00	7.750	20.00	10.75	13.00
1.833	20.00	4.833	5.00	7.833	20.00	10.83	13.00
1.917	20.00	4.917	5.00	7.917	20.00	10.92	13.00
2.000	20.00	5.000	5.00	8.000	20.00	11.00	13.00
2.083	10.00	5.083	20.00	8.083	23.00	11.08	8.00
2.167	10.00	5.167	20.00	8.167	23.00	11.17	8.00
2.250	10.00	5.250	20.00	8.250	23.00	11.25	8.00
2.333	10.00	5.333	20.00	8.333	23.00	11.33	8.00
2.417	10.00	5.417	20.00	8.417	23.00	11.42	8.00
2.500	10.00	5.500	20.00	8.500	23.00	11.50	8.00
2.583	10.00	5.583	20.00	8.583	23.00	11.58	8.00
2.667	10.00	5.667	20.00	8.667	23.00	11.67	8.00
2.750	10.00	5.750	20.00	8.750	23.00	11.75	8.00
2.833	10.00	5.833	20.00	8.833	23.00	11.83	8.00
2.917	10.00	5.917	20.00	8.917	23.00	11.92	8.00
3.000	10.00	6.000	20.00	9.000	23.00	12.00	8.00

Max.Eff.Inten.(mm/hr)= 43.00 38.49
 over (min) 5.00 15.00
 Storage Coeff. (min)= 2.51 (ii) 12.85 (ii)
 Unit Hyd. Tpeak (min)= 5.00 15.00
 Unit Hyd. peak (cms)= 0.29 0.08

PEAK FLOW (cms)= 0.08 0.12 0.198 (iii)
 TIME TO PEAK (hrs)= 6.75 7.00 7.00
 RUNOFF VOLUME (mm)= 191.00 102.43 129.00
 TOTAL RAINFALL (mm)= 193.00 193.00 193.00
 RUNOFF COEFFICIENT = 0.99 0.53 0.67

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PVIOUS LOSSES:
 CN* = 53.0 Ia = Dep. Storage (Above)
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	Area (ha)=	28.90
STANDHYD (0401)	Total Imp(%)=	60.00
ID= 1 DT= 5.0 min	Dir. Conn.(%)=	45.00

Surface Area	(ha)=	17.34	11.56
Dep. Storage	(mm)=	2.00	5.00
Average Slope	(%)=	2.00	2.00
Length	(m)=	438.94	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	15.00	3.083	3.00	6.083	43.00	9.08	13.00
0.167	15.00	3.167	3.00	6.167	43.00	9.17	13.00
0.250	15.00	3.250	3.00	6.250	43.00	9.25	13.00
0.333	15.00	3.333	3.00	6.333	43.00	9.33	13.00
0.417	15.00	3.417	3.00	6.417	43.00	9.42	13.00
0.500	15.00	3.500	3.00	6.500	43.00	9.50	13.00
0.583	15.00	3.583	3.00	6.583	43.00	9.58	13.00
0.667	15.00	3.667	3.00	6.667	43.00	9.67	13.00
0.750	15.00	3.750	3.00	6.750	43.00	9.75	13.00
0.833	15.00	3.833	3.00	6.833	43.00	9.83	13.00
0.917	15.00	3.917	3.00	6.917	43.00	9.92	13.00
1.000	15.00	4.000	3.00	7.000	43.00	10.00	13.00
1.083	20.00	4.083	5.00	7.083	20.00	10.08	13.00
1.167	20.00	4.167	5.00	7.167	20.00	10.17	13.00
1.250	20.00	4.250	5.00	7.250	20.00	10.25	13.00
1.333	20.00	4.333	5.00	7.333	20.00	10.33	13.00
1.417	20.00	4.417	5.00	7.417	20.00	10.42	13.00
1.500	20.00	4.500	5.00	7.500	20.00	10.50	13.00
1.583	20.00	4.583	5.00	7.583	20.00	10.58	13.00
1.667	20.00	4.667	5.00	7.667	20.00	10.67	13.00
1.750	20.00	4.750	5.00	7.750	20.00	10.75	13.00
1.833	20.00	4.833	5.00	7.833	20.00	10.83	13.00
1.917	20.00	4.917	5.00	7.917	20.00	10.92	13.00
2.000	20.00	5.000	5.00	8.000	20.00	11.00	13.00
2.083	10.00	5.083	20.00	8.083	23.00	11.08	8.00
2.167	10.00	5.167	20.00	8.167	23.00	11.17	8.00
2.250	10.00	5.250	20.00	8.250	23.00	11.25	8.00
2.333	10.00	5.333	20.00	8.333	23.00	11.33	8.00
2.417	10.00	5.417	20.00	8.417	23.00	11.42	8.00
2.500	10.00	5.500	20.00	8.500	23.00	11.50	8.00
2.583	10.00	5.583	20.00	8.583	23.00	11.58	8.00
2.667	10.00	5.667	20.00	8.667	23.00	11.67	8.00
2.750	10.00	5.750	20.00	8.750	23.00	11.75	8.00
2.833	10.00	5.833	20.00	8.833	23.00	11.83	8.00
2.917	10.00	5.917	20.00	8.917	23.00	11.92	8.00
3.000	10.00	6.000	20.00	9.000	23.00	12.00	8.00

Max.Eff.Inten.(mm/hr)=	43.00	37.48
over (min)	5.00	20.00
Storage Coeff. (min)=	7.06 (ii)	17.52 (ii)
Unit Hyd. Tpeak (min)=	5.00	20.00
Unit Hyd. peak (cms)=	0.17	0.06

TOTALS

PEAK FLOW (cms)=	1.55	1.10	2.652 (iii)
TIME TO PEAK (hrs)=	7.00	7.00	7.00
RUNOFF VOLUME (mm)=	191.00	101.53	141.79
TOTAL RAINFALL (mm)=	193.00	193.00	193.00
RUNOFF COEFFICIENT =	0.99	0.53	0.73

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 CN* = 53.0 Ia = Dep. Storage (Above)
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0003)				
1 + 2 = 3				
	AREA	QPEAK	TPEAK	R.V.
	(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0001):	18.52	1.807	7.00	150.42
+ ID2= 2 (0204):	2.28	0.198	7.00	129.00
=====				
ID = 3 (0003):	20.80	2.005	7.00	148.07

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0003)				
3 + 2 = 1				
	AREA	QPEAK	TPEAK	R.V.
	(ha)	(cms)	(hrs)	(mm)
ID1= 3 (0003):	20.80	2.005	7.00	148.07
+ ID2= 2 (0205):	0.25	0.005	7.00	28.79
=====				
ID = 1 (0003):	21.05	2.011	7.00	146.65

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0003)				
1 + 2 = 3				
	AREA	QPEAK	TPEAK	R.V.
	(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0003):	21.05	2.011	7.00	146.65
+ ID2= 2 (0206):	0.08	0.004	7.00	62.72
=====				
ID = 3 (0003):	21.13	2.015	7.00	146.34

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0003)				
3 + 2 = 1				
	AREA	QPEAK	TPEAK	R.V.
	(ha)	(cms)	(hrs)	(mm)
ID1= 3 (0003):	21.13	2.015	7.00	146.34
+ ID2= 2 (0401):	28.90	2.652	7.00	141.79
=====				
ID = 1 (0003):	50.03	4.667	7.00	143.71

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0003)				
1 + 2 = 3				
	AREA	QPEAK	TPEAK	R.V.
	(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0003):	50.03	4.667	7.00	143.71
+ ID2= 2 (0402):	15.49	0.992	7.00	92.29
=====				
ID = 3 (0003):	65.52	5.659	7.00	131.55

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0003)				
3 + 2 = 1				
	AREA	QPEAK	TPEAK	R.V.
	(ha)	(cms)	(hrs)	(mm)
ID1= 3 (0003):	65.52	5.659	7.00	131.55
+ ID2= 2 (4031):	5.63	0.366	7.00	89.29
=====				
ID = 1 (0003):	71.15	6.024	7.00	128.21

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```
-----
| ADD HYD ( 0003) |
| 1 + 2 = 3      |
|-----|
| ID1= 1 ( 0003): 71.15  6.024  7.00  128.21
| + ID2= 2 ( 4032): 4.34  0.230  7.00  73.11
|=====|
| ID = 3 ( 0003): 75.49  6.254  7.00  125.04
```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

APPENDIX “F”

Stormwater Management Calculations

VALDOR ENGINEERING INC.

Project: Millbrook East

File: 19121

Date: March 2022

Table F.1: Existing Condition - VO Model Parameters								
Catchment	Area (ha)	VO5 Routine	TIMP	XIMP	CN II	CN*	IA (mm)	Tp (hr)
101	11.77	NasHyd	-	-	67	64	7.6	0.18
102	2.94	NasHyd	-	-	56	50	9.5	0.15
103	4.27	NasHyd	-	-	62	56	7.0	0.21
Total	18.98							

VALDOR ENGINEERING INC.

Project: Millbrook East

File: 19121

Date: March 2022

Table F.2: Proposed Condition - VO Model Parameters								
Catchment	Area (ha)	VO5 Routine	TIMP	XIMP	CN II	CN*	IA (mm)	Tp (hr)
201	12.86	StandHyd	0.70	0.60	61	53	5.0	-
202	4.27	StandHyd	0.60	0.45	61	53	5.0	-
203	1.39	StandHyd	0.50	0.50	61	53	5.0	-
204	2.28	StandHyd	0.50	0.30	61	53	5.0	-
205	0.25	NashHyd	-	-	61	53	5.0	0.03
Total	21.05							

Table F.3: Calculation of CN Values, Initial Abstractions and Runoff Coefficients										
Catchment	Area (ha)	Land Use and Land Cover		CN II	Area Weighted CN II	CN*	IA (mm)	Area Weighted IA (mm)	C-Value	Area Weighted C-Value
		Type	Area (ha)							
101	11.77	Forest (HSG 'B')	0.91	55	67	64	10	7.6	0.30	0.42
		Meadow (HSG 'B')	4.56	58			8		0.40	
		Row Crops (HSG 'B')	6.28	75			7		0.45	
		Open Space (HSG 'B')	0.00	61			5		0.25	
		Other Impervious	0.02	98			2		0.95	
102	2.94	Forest (HSG 'B')	2.20	55	56	50	10	9.5	0.30	0.33
		Meadow (HSG 'B')	0.74	58			8		0.40	
		Row Crops (HSG 'B')	0.00	75			7		0.45	
		Open Space (HSG 'B')	0.00	61			5		0.25	
		Other Impervious	0.00	98			2		0.95	
103	4.27	Forest (HSG 'B')	1.43	55	62	56	10	7.0	0.30	0.37
		Meadow (HSG 'B')	0.89	58			8		0.40	
		Row Crops (HSG 'B')	0.00	75			7		0.45	
		Open Space (HSG 'B')	1.52	61			5		0.25	
		Other Impervious	0.43	98			2		0.95	
205	0.25	Forest (HSG 'B')	0.00	55	61	53	10	5.0	0.30	0.25
		Meadow (HSG 'B')	0.00	58			8		0.40	
		Row Crops (HSG 'B')	0.00	75			7		0.45	
		Open Space (HSG 'B')	0.25	61			5		0.25	
		Other Impervious	0.00	98			2		0.95	

VALDOR ENGINEERING INC.

Project: Millbrook East

File: 19121

Date: March 2022

Table F.4: SWM Analysis - Calculation of Time to Peak

Catchment	A Area (ha)	C Runoff Coefficient (Area Weighted)	L (m) Catchment Length	Highest Elevation (m)	Lowest Elevation (m)	S (%) Catchment Slope	^{1,2} T _c Method	T _c (min)	^{1,2} T _p (hr)
101	11.77	0.42	540	254.50	215.00	7.31	Bransby-Williams	16.2	0.18
102	2.94	0.33	300	216.50	211.00	1.83	Airport	13.6	0.15
103	4.27	0.37	285	243.50	216.50	9.47	Airport	19.2	0.21
205	0.25	0.25	63	219.00	215.50	5.56	Airport	2.9	0.03

Notes:1) T_p calculation for catchments with C < 0.40 is based on the Airport Formula:

$$T_c = 3.26 \times (1.1 - C) \times L^{0.5} / S_w^{0.33}$$

2) T_p calculation for catchments with C > 0.40 is based on the Bransby-Williams Formula:

$$T_c = (0.057)(L) / (S_w)^{0.2}(A)^{0.1}$$

$$T_p = 0.67 T_c$$

Stage Storage Curve						Outlet Structure						Comments:
Elevation	Sec Area	Avg Area	Sec Volume	Cumulative Volume	Volume Above NWL	Invert Elevation (m) Diameter (mm)/Length (m) Height (m) Orifice Area (m ²)	Stage Active (m)	1Discharge m ³ /s				
(m)	(m ²)	(m ²)	(m ³)	(m ³)	(m ³)			Orifice #1	Weir #1	Spillway	Total	
								212.50	213.20	214.00	Flow	
								140	1.20	6.00		
						-	-	-				
						0.0154	-	-				
Forebay Below NWL						Bottom of Forebay						Weir Equation: Q=1.837xLxH ^{1.5} Orifice Eq'n: Q = 0.6A(2gH) ^{0.5} Spillway Design: Q=1.67xLxH ^{1.5}
210.50	434	-	-	0								
211.50	791	613	613	613								
211.90	956	874	349	962								
212.50	1,337	1,147	688	1,650	NWL							
Main Cell Below NWL						Bottom of Main Cell						
211.00	1,692	-	-	0								
211.50	2,055	1,874	937	937								
211.90	2,359	2,207	883	1,820								
212.50	3,066	2,713	1,627	3,447	NWL							
Forebay & Main Cell Above NWL						NWL	0.00	0.000			0.000	Permanent Pool Provided
212.50	4,403	-	-	5,097	0							
212.70	4,804	4,604	921	6,018	921							
212.90	5,206	5,005	1,001	7,019	1,922							
213.10	5,607	5,406	1,081	8,100	3,003							
213.20	5,792	5,699	570	8,670	3,573							
213.30	5,977	5,884	588	9,258	4,161							
213.40	6,162	6,069	607	9,865	4,768							
213.50	6,347	6,254	625	10,491	5,394							
213.60	6,503	6,425	643	11,133	6,036							
213.70	6,660	6,581	658	11,791	6,694							
213.80	6,816	6,738	674	12,465	7,368							
213.90	6,972	6,894	689	13,154	8,058							
214.00	7,128	7,050	705	13,860	8,763	Emergency Spillway	1.50	0.049	1.434	0.000	1.483	100-year Storage Provided
214.10	7,285	7,207	721	14,580	9,483		1.60	0.051	1.711	0.317	2.079	
214.20	7,441	7,363	736	15,316	10,220		1.70	0.052	2.004	0.896	2.952	
214.30	7,597	7,519	752	16,068	10,972		1.80	0.054	2.312	1.646	4.012	
214.40	7,754	7,676	768	16,836	11,739		1.90	0.055	2.634	2.535	5.225	
214.50	7,910	7,832	783	17,619	12,522		2.00	0.057	2.970	3.543	6.570	
214.70	8,203	8,057	1,611	19,230	14,134	2.20	0.060	3.682	5.868	9.610	Top of Berm	
215.00	8,643	8,423	2,527	21,757	16,661	2.50	0.064	4.840	10.020	14.923		

Table F.6: Permanent Pool Volume Requirements

Protection Level	SWMP Type	Storage Volume (m ³ /ha) for			
		Impervious Level			
		35%	55%	70%	85%
Level 1	<i>Infiltration</i>	25	30	35	40
	<i>Wetlands</i> ²	80	105	120	140
	<i>Wet Pond</i> ²	140	190	225	250
	<i>Hybrid Wet Pond/Wetland</i> ⁴	110	150	175	195
Level 2	<i>Infiltration</i>	20	20	25	30
	<i>Wetlands</i>	60	70	80	90
	<i>Wet Pond</i>	90	110	130	150
	<i>Hybrid Wet Pond/Wetland</i>	75	90	105	120
Level 3	<i>Infiltration</i>	20	20	20	20
	<i>Wetlands</i>	60	60	60	60
	<i>Wet Pond</i>	60	75	85	95
	<i>Hybrid Wet Pond/Wetland</i>	60	70	75	80
	<i>Dry Pond</i>	90	150	200	240

Source: Stormwater Management Planning and Design Manual (Table 3.2),
Ministry of the Environment, Ontario, March 2003

- Table 3.2 was based on specific design parameters (depth, length to width ratio) for each type of end-of-pipe stormwater management facility. The values of these parameters are provided in Appendix I of the Manual. All values in Table 4.1 are based on a 24 hour detention.
- For wetlands, wet ponds and hybrid ponds, all of the storage, except 40 m³/ha, in Table 3.2 represents the permanent pool volume. The 40 m³/ha represents the extended detention storage.
- For hybrid ponds, 50% to 60% of the permanent pool volume shall be contained in deeper portions of the facility.

PERMANENT POOL VOLUME CALCULATOR			
SWMP Type:	WET POND	(IN - infiltration, WET - wetlands, WP - wet pond, HYB - hybrid wet pond/wetland, DP - dry pond)	
Protection Level:	1	(1 - 80% TSS, 2 - 70% TSS, 3 - 60% TSS)	
Average Imperviousness:	75.0 %		
Volume Level:	193.3 m ³ /ha	Excluding Extended Detention	
Area:	18.52 ha		
Total Required Volume:	3,581 m ³		

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Date: March 2022

Table F.7: Extended Detention Requirements

Event	Area (ha)	R.V. (mm)	Required Ext. Det. Volume (m ³)	Provided Ext. Det. Volume (m ³)
25mm 4-hour Chicago Storm	18.52	13.88	2,571	3,573

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File: 19121

Date: March 2022

Table F.8: Extended Detention Drawdown Time

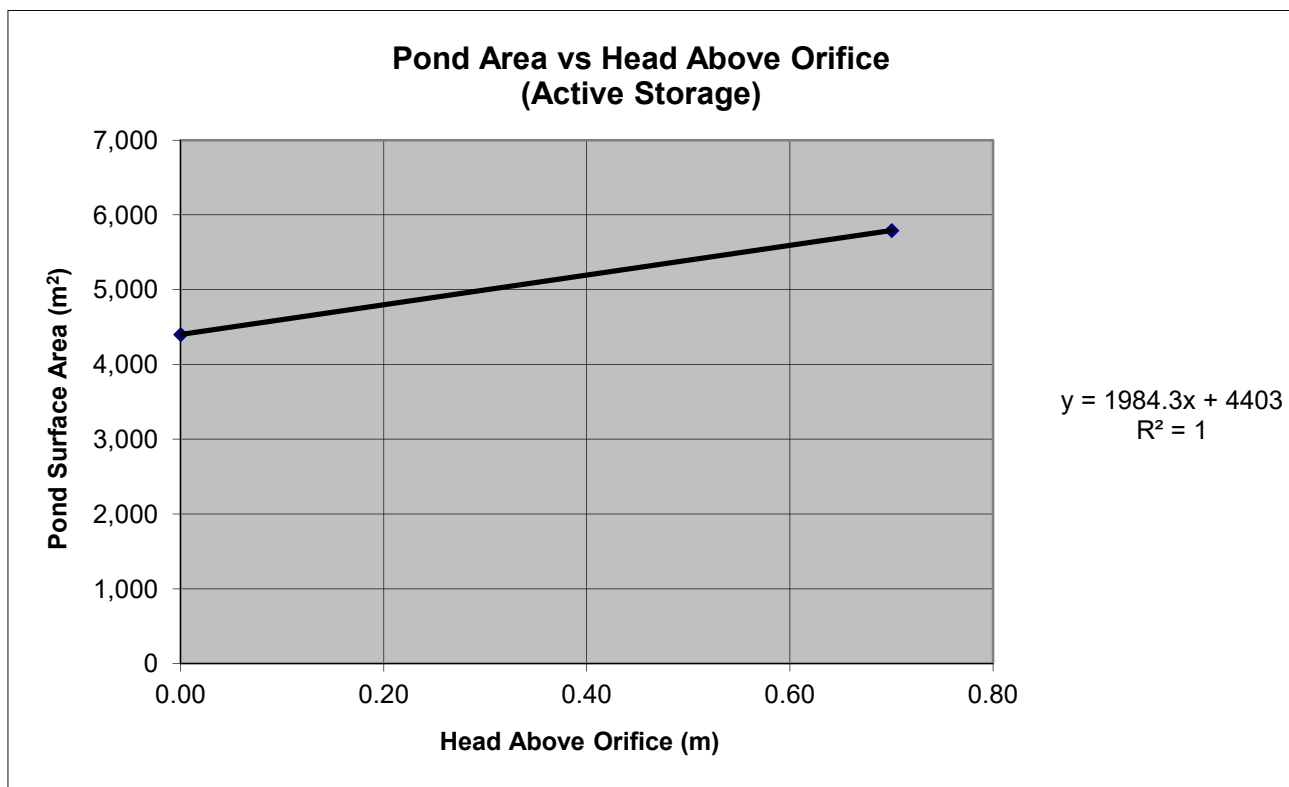
Extended Detention - SWM Pond

Orifice Sizing	
Orifice Size	140 mm
Orifice Inve	212.50 m
Orifice Area	0.015393804 sq. m
¹ EDL _{erosion}	213.20 m
NWL	212.50 m
C ₂	1984.3
C ₃	4403.0
h	0.6300 m
Drawdown τ	50.2 hr

$$y = mx + b$$

$$C_2 = m$$

$$C_3 = b$$



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File: 19121

Date: March 2022

Table F.9: Critical Storm Analysis

Storm Distribution	Theoretical 100-year Storage Volume Required (m ³)	Note
6-hour AES	7,145	Critical Storm
12-hour AES	7,000	
24-hour AES	6,373	
6-hour SCS	7,137	
12-hour SCS	6,590	
24-hour SCS	6,004	
4-hour Chicago	7,105	

SWM Pond: Forebay Weir

Project Description

Solve For Discharge

Input Data

Headwater Elevation		213.20	m
Crest Elevation		212.50	m
Tailwater Elevation		212.50	m
Crest Surface Type	Gravel		
Crest Breadth		8.00	m
Crest Length		4.00	m

Results

Discharge	3.88	m³/s
Headwater Height Above Crest	0.70	m
Tailwater Height Above Crest	0.00	m
Weir Coefficient	1.66	SI
Submergence Factor	1.00	
Adjusted Weir Coefficient	1.66	SI
Flow Area	2.80	m²
Velocity	1.39	m/s
Wetted Perimeter	5.40	m
Top Width	4.00	m

Culvert Calculator Report

SWM Pond: Outlet Pipe, 100yr Cont.

Solve For: Headwater Elevation

Culvert Summary			
Allowable HW Elevation	0.00 m	Headwater Depth/Height	1.12
Computed Headwater Elevation	212.54 m	Discharge	0.8820 m³/s
Inlet Control HW Elev.	212.50 m	Tailwater Elevation	211.41 m
Outlet Control HW Elev.	212.54 m	Control Type	Outlet Control
Grades			
Upstream Invert	211.60 m	Downstream Invert	211.15 m
Length	86.00 m	Constructed Slope	0.005233 m/m
Hydraulic Profile			
Profile	M2	Depth, Downstream	0.57 m
Slope Type	Mild	Normal Depth	0.57 m
Flow Regime	Subcritical	Critical Depth	0.57 m
Velocity Downstream	2.22 m/s	Critical Slope	0.005451 m/m
Section			
Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	0.84 m
Section Size	825 mm	Rise	0.84 m
Number Sections	1		
Outlet Control Properties			
Outlet Control HW Elev.	212.54 m	Upstream Velocity Head	0.24 m
Ke	0.50	Entrance Loss	0.12 m
Inlet Control Properties			
Inlet Control HW Elev.	212.50 m	Flow Control	Unsubmerged
Inlet Type	Square edge w/headwall	Area Full	0.6 m²
K	0.00980	HDS 5 Chart	1
M	2.00000	HDS 5 Scale	1
C	0.03980	Equation Form	1
Y	0.67000		

Worksheet for SWM Pond: Emergency Spillway, 100yr Uncont.

Project Description

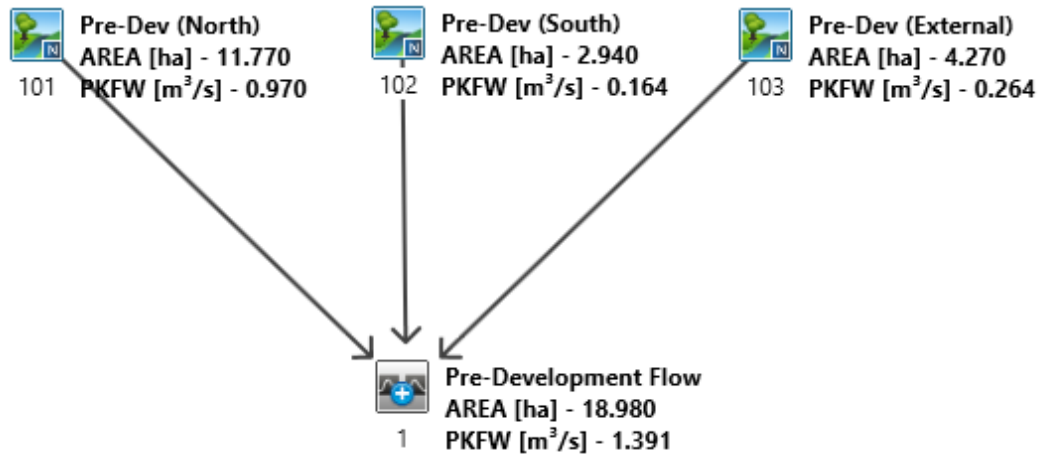
Solve For Headwater Elevation

Input Data

Discharge		2.93	m ³ /s
Crest Elevation		214.00	m
Tailwater Elevation		214.00	m
Crest Surface Type	Gravel		
Crest Breadth		40.00	m
Crest Length		6.00	m

Results

Headwater Elevation	214.45	m
Headwater Height Above Crest	0.45	m
Tailwater Height Above Crest	0.00	m
Weir Coefficient	1.61	SI
Submergence Factor	1.00	
Adjusted Weir Coefficient	1.61	SI
Flow Area	2.71	m ²
Velocity	1.08	m/s
Wetted Perimeter	6.90	m
Top Width	6.00	m



VO5 Model Schematic – Pre-Development

=====

```

V   V   I   SSSS   U   U   A   L   (v 6.2.2006)
V   V   I   SS    U   U   A   A   L
V   V   I   SS    U   U   AAAAA L
V   V   I   SS    U   U   A   A   L
V   V   I   SSSS   UUUU   A   A   LLLLL

```

```

000  TTTT  TTTT  H  H  Y  Y  M  M  000  TM
0 0  T  T  H  H  Y  Y  MM MM 0 0
0 0  T  T  H  H  Y  M  M  0 0
000  T  T  H  H  Y  M  M  000

```

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***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
Output filename: C:\Users\Pyung\AppData\Local\Civica\XH5\531e1913-0e12-4e2e-9684-e2ef03acaa05\04637ea8-636a-43b2-9e52-0cb577eed906\scenar
Summary filename: C:\Users\Pyung\AppData\Local\Civica\XH5\531e1913-0e12-4e2e-9684-e2ef03acaa05\04637ea8-636a-43b2-9e52-0cb577eed906\scenar

DATE: 03/10/2022 TIME: 09:58:12

USER:

COMMENTS: _____

```

-----
*****
** SIMULATION : AES_06hr_002yr **
*****

```

```

-----
| READ STORM | Filename: C:\Users\Pyung\AppData\Local\Temp\
|            | 937c625c-632b-4056-a8b5-419ce138f7fc\69f2813f
| Ptotal= 38.69 mm | Comments: AES_06hr_002yr
-----

```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	0.00	2.00	13.16	3.75	5.42	5.50	0.77
0.50	0.77	2.25	13.16	4.00	3.10	5.75	0.77
0.75	0.77	2.50	35.60	4.25	3.10	6.00	0.77
1.00	0.77	2.75	35.60	4.50	1.55	6.25	0.77
1.25	0.77	3.00	10.06	4.75	1.55		
1.50	4.64	3.25	10.06	5.00	0.77		
1.75	4.64	3.50	5.42	5.25	0.77		

```

-----
| CALIB |
| NASHYD ( 0101) | Area (ha)= 11.77 Curve Number (CN)= 64.0
| ID= 1 DT= 5.0 min | Ia (mm)= 7.60 # of Linear Res.(N)= 3.00
| U.H. Tp(hrs)= 0.18
-----

```

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

```

----- TRANSFORMED HYETOGRAPH -----
TIME RAIN TIME RAIN TIME RAIN TIME RAIN
hrs mm/hr hrs mm/hr hrs mm/hr hrs mm/hr
0.083 0.00 1.667 4.64 3.250 10.06 4.83 0.77
0.167 0.00 1.750 4.64 3.333 5.42 4.92 0.77
0.250 0.00 1.833 13.16 3.417 5.42 5.00 0.77
0.333 0.77 1.917 13.16 3.500 5.42 5.08 0.77
0.417 0.77 2.000 13.16 3.583 5.42 5.17 0.77
0.500 0.77 2.083 13.16 3.667 5.42 5.25 0.77
0.583 0.77 2.167 13.16 3.750 5.42 5.33 0.77
0.667 0.77 2.250 13.16 3.833 3.10 5.42 0.77
0.750 0.77 2.333 35.60 3.917 3.10 5.50 0.77
0.833 0.77 2.417 35.60 4.000 3.10 5.58 0.77
0.917 0.77 2.500 35.60 4.083 3.10 5.67 0.77
1.000 0.77 2.583 35.60 4.167 3.10 5.75 0.77
1.083 0.77 2.667 35.60 4.250 3.10 5.83 0.77
1.167 0.77 2.750 35.60 4.333 1.55 5.92 0.77
1.250 0.77 2.833 10.06 4.417 1.55 6.00 0.77
1.333 4.64 2.917 10.06 4.500 1.55 6.08 0.77
1.417 4.64 3.000 10.06 4.583 1.55 6.17 0.77
1.500 4.64 3.083 10.06 4.667 1.55 6.25 0.77
1.583 4.64 3.167 10.06 4.750 1.55

```

Unit Hyd Qpeak (cms)= 2.498

PEAK FLOW (cms)= 0.171 (i)
TIME TO PEAK (hrs)= 2.833
RUNOFF VOLUME (mm)= 5.540
TOTAL RAINFALL (mm)= 38.690
RUNOFF COEFFICIENT = 0.143

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```

-----
| CALIB |
| NASHYD ( 0102) | Area (ha)= 2.94 Curve Number (CN)= 50.0
| ID= 1 DT= 5.0 min | Ia (mm)= 9.60 # of Linear Res.(N)= 3.00
| U.H. Tp(hrs)= 0.15
-----

```

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

```

----- TRANSFORMED HYETOGRAPH -----
TIME RAIN TIME RAIN TIME RAIN TIME RAIN
hrs mm/hr hrs mm/hr hrs mm/hr hrs mm/hr
0.083 0.00 1.667 4.64 3.250 10.06 4.83 0.77
0.167 0.00 1.750 4.64 3.333 5.42 4.92 0.77
0.250 0.00 1.833 13.16 3.417 5.42 5.00 0.77
0.333 0.77 1.917 13.16 3.500 5.42 5.08 0.77
0.417 0.77 2.000 13.16 3.583 5.42 5.17 0.77
0.500 0.77 2.083 13.16 3.667 5.42 5.25 0.77
0.583 0.77 2.167 13.16 3.750 5.42 5.33 0.77
0.667 0.77 2.250 13.16 3.833 3.10 5.42 0.77
0.750 0.77 2.333 35.60 3.917 3.10 5.50 0.77
0.833 0.77 2.417 35.60 4.000 3.10 5.58 0.77
0.917 0.77 2.500 35.60 4.083 3.10 5.67 0.77
1.000 0.77 2.583 35.60 4.167 3.10 5.75 0.77
1.083 0.77 2.667 35.60 4.250 3.10 5.83 0.77
1.167 0.77 2.750 35.60 4.333 1.55 5.92 0.77
1.250 0.77 2.833 10.06 4.417 1.55 6.00 0.77
1.333 4.64 2.917 10.06 4.500 1.55 6.08 0.77
1.417 4.64 3.000 10.06 4.583 1.55 6.17 0.77
1.500 4.64 3.083 10.06 4.667 1.55 6.25 0.77
1.583 4.64 3.167 10.06 4.750 1.55

```

Unit Hyd Qpeak (cms)= 0.749

PEAK FLOW (cms)= 0.024 (i)

TIME TO PEAK (hrs)= 2.750
 RUNOFF VOLUME (mm)= 2.972
 TOTAL RAINFALL (mm)= 38.690
 RUNOFF COEFFICIENT = 0.077

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 | CALIB |
 | NASHYD (0103) | Area (ha)= 4.27 Curve Number (CN)= 56.0
 | ID= 1 DT= 5.0 min | Ia (mm)= 7.00 # of Linear Res.(N)= 3.00
 |-----| U.H. Tp(hrs)= 0.21

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	1.667	4.64	3.250	10.06	4.83	0.77
0.167	0.00	1.750	4.64	3.333	5.42	4.92	0.77
0.250	0.00	1.833	13.16	3.417	5.42	5.00	0.77
0.333	0.77	1.917	13.16	3.500	5.42	5.08	0.77
0.417	0.77	2.000	13.16	3.583	5.42	5.17	0.77
0.500	0.77	2.083	13.16	3.667	5.42	5.25	0.77
0.583	0.77	2.167	13.16	3.750	5.42	5.33	0.77
0.667	0.77	2.250	13.16	3.833	3.10	5.42	0.77
0.750	0.77	2.333	35.60	3.917	3.10	5.50	0.77
0.833	0.77	2.417	35.60	4.000	3.10	5.58	0.77
0.917	0.77	2.500	35.60	4.083	3.10	5.67	0.77
1.000	0.77	2.583	35.60	4.167	3.10	5.75	0.77
1.083	0.77	2.667	35.60	4.250	3.10	5.83	0.77
1.167	0.77	2.750	35.60	4.333	1.55	5.92	0.77
1.250	0.77	2.833	10.06	4.417	1.55	6.00	0.77
1.333	4.64	2.917	10.06	4.500	1.55	6.08	0.77
1.417	4.64	3.000	10.06	4.583	1.55	6.17	0.77
1.500	4.64	3.083	10.06	4.667	1.55	6.25	0.77
1.583	4.64	3.167	10.06	4.750	1.55		

Unit Hyd Qpeak (cms)= 0.777

PEAK FLOW (cms)= 0.046 (i)
 TIME TO PEAK (hrs)= 2.833
 RUNOFF VOLUME (mm)= 4.336
 TOTAL RAINFALL (mm)= 38.690
 RUNOFF COEFFICIENT = 0.112

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 | ADD HYD (0001) |
1 + 2 = 3
ID1= 1 (0101):
+ ID2= 2 (0102):

ID = 3 (0001):

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 | ADD HYD (0001) |
3 + 2 = 1
ID1= 3 (0001):
+ ID2= 2 (0103):

=====

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

=====

V	V	I	SSSS	U	U	A	L	(v 6.2.2006)
V	V	I	SS	U	U	A	L	
V	V	I	SS	U	U	AAAA	L	
V	V	I	SS	U	U	A	L	
VV	I	SSSS	UUUU	A	A	LLLL		

000	TTTT	TTTT	H	H	Y	Y	M	M	000	TM	
0	0	T	T	H	H	Y	Y	MM	MM	0	0
0	0	T	T	H	H	Y	M	M	0	0	
000	T	T	H	H	Y	M	M	000			

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***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
 Output filename: C:\Users\Pyung\AppData\Local\Civica\531e1913-0e12-4e2e-9684-e2ef03acaa05\da7a4dcd-dece-4842-be1f-484753ea90ff\scenar
 Summary filename: C:\Users\Pyung\AppData\Local\Civica\531e1913-0e12-4e2e-9684-e2ef03acaa05\da7a4dcd-dece-4842-be1f-484753ea90ff\scenar

DATE: 03/10/2022

TIME: 09:58:12

USER:

COMMENTS: _____

 ** SIMULATION : AES_06hr_005yr

READ STORM	Filename: C:\Users\Pyung\AppData\Local\Temp\937c625c-632b-4056-a8b5-419ce138f7fc\af37ed82
Ptotal= 52.41 mm	Comments: AES_06hr_005yr

TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.25	0.00	2.00	17.82	3.75	7.34	5.50	1.05
0.50	1.05	2.25	17.82	4.00	4.19	5.75	1.05
0.75	1.05	2.50	48.21	4.25	4.19	6.00	1.05
1.00	1.05	2.75	48.21	4.50	2.10	6.25	1.05
1.25	1.05	3.00	13.62	4.75	2.10		
1.50	6.29	3.25	13.62	5.00	1.05		
1.75	6.29	3.50	7.34	5.25	1.05		

 | CALIB |
 | NASHYD (0101) | Area (ha)= 11.77 Curve Number (CN)= 64.0

ID= 1 DT= 5.0 min | Ia (mm)= 7.60 # of Linear Res.(N)= 3.00
 ----- U.H. Tp(hrs)= 0.18

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	1.667	6.29	3.250	13.62	4.83	1.05
0.167	0.00	1.750	6.29	3.333	7.34	4.92	1.05
0.250	0.00	1.833	17.82	3.417	7.34	5.00	1.05
0.333	1.05	1.917	17.82	3.500	7.34	5.08	1.05
0.417	1.05	2.000	17.82	3.583	7.34	5.17	1.05
0.500	1.05	2.083	17.82	3.667	7.34	5.25	1.05
0.583	1.05	2.167	17.82	3.750	7.34	5.33	1.05
0.667	1.05	2.250	17.82	3.833	4.19	5.42	1.05
0.750	1.05	2.333	48.21	3.917	4.19	5.50	1.05
0.833	1.05	2.417	48.21	4.000	4.19	5.58	1.05
0.917	1.05	2.500	48.21	4.083	4.19	5.67	1.05
1.000	1.05	2.583	48.21	4.167	4.19	5.75	1.05
1.083	1.05	2.667	48.21	4.250	4.19	5.83	1.05
1.167	1.05	2.750	48.21	4.333	2.10	5.92	1.05
1.250	1.05	2.833	13.62	4.417	2.10	6.00	1.05
1.333	6.29	2.917	13.62	4.500	2.10	6.08	1.05
1.417	6.29	3.000	13.62	4.583	2.10	6.17	1.05
1.500	6.29	3.083	13.62	4.667	2.10	6.25	1.05
1.583	6.29	3.167	13.62	4.750	2.10		

Unit Hyd Qpeak (cms)= 2.498

PEAK FLOW (cms)= 0.334 (i)
 TIME TO PEAK (hrs)= 2.750
 RUNOFF VOLUME (mm)= 10.668
 TOTAL RAINFALL (mm)= 52.410
 RUNOFF COEFFICIENT = 0.204

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 | CALIB |
 | NASHYD (0102) | Area (ha)= 2.94 Curve Number (CN)= 50.0
 | ID= 1 DT= 5.0 min | Ia (mm)= 9.60 # of Linear Res.(N)= 3.00
 ----- U.H. Tp(hrs)= 0.15

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	1.667	6.29	3.250	13.62	4.83	1.05
0.167	0.00	1.750	6.29	3.333	7.34	4.92	1.05
0.250	0.00	1.833	17.82	3.417	7.34	5.00	1.05
0.333	1.05	1.917	17.82	3.500	7.34	5.08	1.05
0.417	1.05	2.000	17.82	3.583	7.34	5.17	1.05
0.500	1.05	2.083	17.82	3.667	7.34	5.25	1.05
0.583	1.05	2.167	17.82	3.750	7.34	5.33	1.05
0.667	1.05	2.250	17.82	3.833	4.19	5.42	1.05
0.750	1.05	2.333	48.21	3.917	4.19	5.50	1.05
0.833	1.05	2.417	48.21	4.000	4.19	5.58	1.05
0.917	1.05	2.500	48.21	4.083	4.19	5.67	1.05
1.000	1.05	2.583	48.21	4.167	4.19	5.75	1.05
1.083	1.05	2.667	48.21	4.250	4.19	5.83	1.05
1.167	1.05	2.750	48.21	4.333	2.10	5.92	1.05
1.250	1.05	2.833	13.62	4.417	2.10	6.00	1.05
1.333	6.29	2.917	13.62	4.500	2.10	6.08	1.05
1.417	6.29	3.000	13.62	4.583	2.10	6.17	1.05
1.500	6.29	3.083	13.62	4.667	2.10	6.25	1.05
1.583	6.29	3.167	13.62	4.750	2.10		

1.583 6.29 | 3.167 13.62 | 4.750 2.10 |

Unit Hyd Qpeak (cms)= 0.749

PEAK FLOW (cms)= 0.051 (i)
 TIME TO PEAK (hrs)= 2.750
 RUNOFF VOLUME (mm)= 6.139
 TOTAL RAINFALL (mm)= 52.410
 RUNOFF COEFFICIENT = 0.117

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 | CALIB |
 | NASHYD (0103) | Area (ha)= 4.27 Curve Number (CN)= 56.0
 | ID= 1 DT= 5.0 min | Ia (mm)= 7.00 # of Linear Res.(N)= 3.00
 ----- U.H. Tp(hrs)= 0.21

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	1.667	6.29	3.250	13.62	4.83	1.05
0.167	0.00	1.750	6.29	3.333	7.34	4.92	1.05
0.250	0.00	1.833	17.82	3.417	7.34	5.00	1.05
0.333	1.05	1.917	17.82	3.500	7.34	5.08	1.05
0.417	1.05	2.000	17.82	3.583	7.34	5.17	1.05
0.500	1.05	2.083	17.82	3.667	7.34	5.25	1.05
0.583	1.05	2.167	17.82	3.750	7.34	5.33	1.05
0.667	1.05	2.250	17.82	3.833	4.19	5.42	1.05
0.750	1.05	2.333	48.21	3.917	4.19	5.50	1.05
0.833	1.05	2.417	48.21	4.000	4.19	5.58	1.05
0.917	1.05	2.500	48.21	4.083	4.19	5.67	1.05
1.000	1.05	2.583	48.21	4.167	4.19	5.75	1.05
1.083	1.05	2.667	48.21	4.250	4.19	5.83	1.05
1.167	1.05	2.750	48.21	4.333	2.10	5.92	1.05
1.250	1.05	2.833	13.62	4.417	2.10	6.00	1.05
1.333	6.29	2.917	13.62	4.500	2.10	6.08	1.05
1.417	6.29	3.000	13.62	4.583	2.10	6.17	1.05
1.500	6.29	3.083	13.62	4.667	2.10	6.25	1.05
1.583	6.29	3.167	13.62	4.750	2.10		

Unit Hyd Qpeak (cms)= 0.777

PEAK FLOW (cms)= 0.090 (i)
 TIME TO PEAK (hrs)= 2.833
 RUNOFF VOLUME (mm)= 8.404
 TOTAL RAINFALL (mm)= 52.410
 RUNOFF COEFFICIENT = 0.160

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 | ADD HYD (0001) |
 | 1 + 2 = 3 | AREA (ha) QPEAK (cms) TPEAK (hrs) R.V. (mm)
 ID1= 1 (0101): 11.77 0.334 2.75 10.67
 + ID2= 2 (0102): 2.94 0.051 2.75 6.14
 =====
 ID = 3 (0001): 14.71 0.386 2.75 9.76

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```

| ADD HYD ( 0001) |
| 3 + 2 = 1 |
-----
ID1= 3 ( 0001): 14.71 0.386 2.75 9.76
+ ID2= 2 ( 0103): 4.27 0.090 2.83 8.40
=====
ID = 1 ( 0001): 18.98 0.472 2.83 9.46

```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

FINISH

```

=====
=====
=====
V V I SSSS U U A L (v 6.2.2006)
V V I SS U U A A L
V V I SS U U A A A A L
V V I SS U U A A L
V V I SSSS UUUU A A LLLL

```

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000 TTTT TTTT H H Y Y M M 000 TM
0 0 T T H H Y Y MM MM 0 0
0 0 T T H H Y M M 0 0
000 T T H H Y M M 000

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***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voindat
Output filename: C:\Users\PYUNG\AppData\Local\Civica\VO5\531e1913-0e12-4e2e-9684-e2ef03acaa05c20ecb39-822c-4776-b17e-5502bc06d379\scenar
Summary filename: C:\Users\PYUNG\AppData\Local\Civica\VO5\531e1913-0e12-4e2e-9684-e2ef03acaa05c20ecb39-822c-4776-b17e-5502bc06d379\scenar

DATE: 03/10/2022

TIME: 09:58:12

USER:

COMMENTS:

```

-----
*****
** SIMULATION : AES_06hr_010yr **
*****

```

```

-----
| READ STORM | Filename: C:\Users\PYUNG\AppData\Local\Temp\
|            | 937c625c-632b-4056-a8b5-419ce138f7fc\b0a61c61
| Ptotal= 61.50 mm | Comments: AES_06hr_010yr
-----
TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
0.25 0.00 | 2.00 20.91 | 3.75 8.61 | 5.50 1.23
0.50 1.23 | 2.25 20.91 | 4.00 4.92 | 5.75 1.23
0.75 1.23 | 2.50 56.58 | 4.25 4.92 | 6.00 1.23

```

```

1.00 1.23 | 2.75 56.58 | 4.50 2.46 | 6.25 1.23
1.25 1.23 | 3.00 15.99 | 4.75 2.46 |
1.50 7.38 | 3.25 15.99 | 5.00 1.23 |
1.75 7.38 | 3.50 8.61 | 5.25 1.23 |

```

```

-----
| CALIB |
| NASHYD ( 0101) | Area (ha)= 11.77 Curve Number (CN)= 64.0
| ID= 1 DT= 5.0 min | Ia (mm)= 7.60 # of Linear Res.(N)= 3.00
-----
U.H. Tp(hrs)= 0.18

```

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

```

----- TRANSFORMED HYETOGRAPH -----
TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
0.083 0.00 | 1.667 7.38 | 3.250 15.99 | 4.83 1.23
0.167 0.00 | 1.750 7.38 | 3.333 8.61 | 4.92 1.23
0.250 0.00 | 1.833 20.91 | 3.417 8.61 | 5.00 1.23
0.333 1.23 | 1.917 20.91 | 3.500 8.61 | 5.08 1.23
0.417 1.23 | 2.000 20.91 | 3.583 8.61 | 5.17 1.23
0.500 1.23 | 2.083 20.91 | 3.667 8.61 | 5.25 1.23
0.583 1.23 | 2.167 20.91 | 3.750 8.61 | 5.33 1.23
0.667 1.23 | 2.250 20.91 | 3.833 4.92 | 5.42 1.23
0.750 1.23 | 2.333 56.58 | 3.917 4.92 | 5.50 1.23
0.833 1.23 | 2.417 56.58 | 4.000 4.92 | 5.58 1.23
0.917 1.23 | 2.500 56.58 | 4.083 4.92 | 5.67 1.23
1.000 1.23 | 2.583 56.58 | 4.167 4.92 | 5.75 1.23
1.083 1.23 | 2.667 56.58 | 4.250 4.92 | 5.83 1.23
1.167 1.23 | 2.750 56.58 | 4.333 2.46 | 5.92 1.23
1.250 1.23 | 2.833 15.99 | 4.417 2.46 | 6.00 1.23
1.333 7.38 | 2.917 15.99 | 4.500 2.46 | 6.08 1.23
1.417 7.38 | 3.000 15.99 | 4.583 2.46 | 6.17 1.23
1.500 7.38 | 3.083 15.99 | 4.667 2.46 | 6.25 1.23
1.583 7.38 | 3.167 15.99 | 4.750 2.46 |

```

Unit Hyd Qpeak (cms)= 2.498

PEAK FLOW (cms)= 0.467 (i)
TIME TO PEAK (hrs)= 2.750
RUNOFF VOLUME (mm)= 14.722
TOTAL RAINFALL (mm)= 61.500
RUNOFF COEFFICIENT = 0.239

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```

-----
| CALIB |
| NASHYD ( 0102) | Area (ha)= 2.94 Curve Number (CN)= 50.0
| ID= 1 DT= 5.0 min | Ia (mm)= 9.60 # of Linear Res.(N)= 3.00
-----
U.H. Tp(hrs)= 0.15

```

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

```

----- TRANSFORMED HYETOGRAPH -----
TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
0.083 0.00 | 1.667 7.38 | 3.250 15.99 | 4.83 1.23
0.167 0.00 | 1.750 7.38 | 3.333 8.61 | 4.92 1.23
0.250 0.00 | 1.833 20.91 | 3.417 8.61 | 5.00 1.23
0.333 1.23 | 1.917 20.91 | 3.500 8.61 | 5.08 1.23
0.417 1.23 | 2.000 20.91 | 3.583 8.61 | 5.17 1.23
0.500 1.23 | 2.083 20.91 | 3.667 8.61 | 5.25 1.23
0.583 1.23 | 2.167 20.91 | 3.750 8.61 | 5.33 1.23
0.667 1.23 | 2.250 20.91 | 3.833 4.92 | 5.42 1.23

```

0.750	1.23	2.333	56.58	3.917	4.92	5.50	1.23
0.833	1.23	2.417	56.58	4.000	4.92	5.58	1.23
0.917	1.23	2.500	56.58	4.083	4.92	5.67	1.23
1.000	1.23	2.583	56.58	4.167	4.92	5.75	1.23
1.083	1.23	2.667	56.58	4.250	4.92	5.83	1.23
1.167	1.23	2.750	56.58	4.333	2.46	5.92	1.23
1.250	1.23	2.833	15.99	4.417	2.46	6.00	1.23
1.333	7.38	2.917	15.99	4.500	2.46	6.08	1.23
1.417	7.38	3.000	15.99	4.583	2.46	6.17	1.23
1.500	7.38	3.083	15.99	4.667	2.46	6.25	1.23
1.583	7.38	3.167	15.99	4.750	2.46		

Unit Hyd Qpeak (cms)= 0.749

PEAK FLOW (cms)= 0.074 (i)
 TIME TO PEAK (hrs)= 2.750
 RUNOFF VOLUME (mm)= 8.755
 TOTAL RAINFALL (mm)= 61.500
 RUNOFF COEFFICIENT = 0.142

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
NASHYD (0103)			
ID= 1 DT= 5.0 min	Area (ha)= 4.27	Curve Number (CN)= 56.0	
	Ia (mm)= 7.00	# of Linear Res.(N)= 3.00	
	U.H. Tp(hrs)= 0.21		

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	1.667	7.38	3.250	15.99	4.83	1.23
0.167	0.00	1.750	7.38	3.333	8.61	4.92	1.23
0.250	0.00	1.833	20.91	3.417	8.61	5.00	1.23
0.333	1.23	1.917	20.91	3.500	8.61	5.08	1.23
0.417	1.23	2.000	20.91	3.583	8.61	5.17	1.23
0.500	1.23	2.083	20.91	3.667	8.61	5.25	1.23
0.583	1.23	2.167	20.91	3.750	8.61	5.33	1.23
0.667	1.23	2.250	20.91	3.833	4.92	5.42	1.23
0.750	1.23	2.333	56.58	3.917	4.92	5.50	1.23
0.833	1.23	2.417	56.58	4.000	4.92	5.58	1.23
0.917	1.23	2.500	56.58	4.083	4.92	5.67	1.23
1.000	1.23	2.583	56.58	4.167	4.92	5.75	1.23
1.083	1.23	2.667	56.58	4.250	4.92	5.83	1.23
1.167	1.23	2.750	56.58	4.333	2.46	5.92	1.23
1.250	1.23	2.833	15.99	4.417	2.46	6.00	1.23
1.333	7.38	2.917	15.99	4.500	2.46	6.08	1.23
1.417	7.38	3.000	15.99	4.583	2.46	6.17	1.23
1.500	7.38	3.083	15.99	4.667	2.46	6.25	1.23
1.583	7.38	3.167	15.99	4.750	2.46		

Unit Hyd Qpeak (cms)= 0.777

PEAK FLOW (cms)= 0.126 (i)
 TIME TO PEAK (hrs)= 2.833
 RUNOFF VOLUME (mm)= 11.672
 TOTAL RAINFALL (mm)= 61.500
 RUNOFF COEFFICIENT = 0.190

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0001)			
1 + 2 = 3			
AREA	QPEAK	TPEAK	R.V.

	(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0101):	11.77	0.467	2.75	14.72
+ ID2= 2 (0102):	2.94	0.074	2.75	8.75
=====				
ID = 3 (0001):	14.71	0.541	2.75	13.53

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0001)				
3 + 2 = 1				
AREA	QPEAK	TPEAK	R.V.	
(ha)	(cms)	(hrs)	(mm)	
ID1= 3 (0001):	14.71	0.541	2.75	13.53
+ ID2= 2 (0103):	4.27	0.126	2.83	11.67
=====				
ID = 1 (0001):	18.98	0.661	2.75	13.11

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

V	V	I	SSSS	U	U	A	L	(v 6.2.2006)
V	V	I	SS	U	U	A	A	L
V	V	I	SS	U	U	AAAA	L	
V	V	I	SS	U	U	A	A	L
V	V	I	SSSS	UUUU	A	A	LLLL	

000	TTTT	TTTT	H	H	Y	Y	M	M	000	TM	
0	0	T	T	H	H	Y	Y	MM	MM	0	0
0	0	T	T	H	H	Y	M	M	0	0	
000	T	T	H	H	Y	M	M	M	000		

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***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
 Output filename: C:\Users\PYung\AppData\Local\Civica\XH5\531e1913-0e12-4e2e-9684-e2ef03acaa05\50fd2681-1f64-4a49-8197-7f7a552026a4\scenar
 Summary filename: C:\Users\PYung\AppData\Local\Civica\XH5\531e1913-0e12-4e2e-9684-e2ef03acaa05\50fd2681-1f64-4a49-8197-7f7a552026a4\scenar

DATE: 03/10/2022

TIME: 09:58:12

USER:

COMMENTS:

 ** SIMULATION : AES_06hr_025yr **

READ STORM	Filename: C:\Users\PYung\AppData\Local\Temp\937c625c-632b-4056-a8b5-419ce138f7fc\ea9f6f15
Ptotal= 72.91 mm	Comments: AES_06hr_025yr

TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.25	0.00	2.00	24.79	3.75	10.21	5.50	1.46
0.50	1.46	2.25	24.79	4.00	5.83	5.75	1.46
0.75	1.46	2.50	67.07	4.25	5.83	6.00	1.46
1.00	1.46	2.75	67.07	4.50	2.92	6.25	1.46
1.25	1.46	3.00	18.95	4.75	2.92		
1.50	8.75	3.25	18.95	5.00	1.46		
1.75	8.75	3.50	10.21	5.25	1.46		

```

-----
| CALIB |
| NASHYD ( 0101) | Area (ha)= 11.77 Curve Number (CN)= 64.0
| ID= 1 DT= 5.0 min | Ia (mm)= 7.60 # of Linear Res.(N)= 3.00
|-----| U.H. Tp(hrs)= 0.18

```

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	1.667	8.75	3.250	18.95	4.83	1.46
0.167	0.00	1.750	8.75	3.333	10.21	4.92	1.46
0.250	0.00	1.833	24.79	3.417	10.21	5.00	1.46
0.333	1.46	1.917	24.79	3.500	10.21	5.08	1.46
0.417	1.46	2.000	24.79	3.583	10.21	5.17	1.46
0.500	1.46	2.083	24.79	3.667	10.21	5.25	1.46
0.583	1.46	2.167	24.79	3.750	10.21	5.33	1.46
0.667	1.46	2.250	24.79	3.833	5.83	5.42	1.46
0.750	1.46	2.333	67.07	3.917	5.83	5.50	1.46
0.833	1.46	2.417	67.07	4.000	5.83	5.58	1.46
0.917	1.46	2.500	67.07	4.083	5.83	5.67	1.46
1.000	1.46	2.583	67.07	4.167	5.83	5.75	1.46
1.083	1.46	2.667	67.07	4.250	5.83	5.83	1.46
1.167	1.46	2.750	67.07	4.333	2.92	5.92	1.46
1.250	1.46	2.833	18.95	4.417	2.92	6.00	1.46
1.333	8.75	2.917	18.95	4.500	2.92	6.08	1.46
1.417	8.75	3.000	18.95	4.583	2.92	6.17	1.46
1.500	8.75	3.083	18.95	4.667	2.92	6.25	1.46
1.583	8.75	3.167	18.95	4.750	2.92		

Unit Hyd Qpeak (cms)= 2.498

```

PEAK FLOW (cms)= 0.654 (i)
TIME TO PEAK (hrs)= 2.750
RUNOFF VOLUME (mm)= 20.430
TOTAL RAINFALL (mm)= 72.910
RUNOFF COEFFICIENT = 0.280

```

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```

-----
| CALIB |
| NASHYD ( 0102) | Area (ha)= 2.94 Curve Number (CN)= 50.0
| ID= 1 DT= 5.0 min | Ia (mm)= 9.60 # of Linear Res.(N)= 3.00
|-----| U.H. Tp(hrs)= 0.15

```

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	1.667	8.75	3.250	18.95	4.83	1.46
0.167	0.00	1.750	8.75	3.333	10.21	4.92	1.46
0.250	0.00	1.833	24.79	3.417	10.21	5.00	1.46

0.333	1.46	1.917	24.79	3.500	10.21	5.08	1.46
0.417	1.46	2.000	24.79	3.583	10.21	5.17	1.46
0.500	1.46	2.083	24.79	3.667	10.21	5.25	1.46
0.583	1.46	2.167	24.79	3.750	10.21	5.33	1.46
0.667	1.46	2.250	24.79	3.833	5.83	5.42	1.46
0.750	1.46	2.333	67.07	3.917	5.83	5.50	1.46
0.833	1.46	2.417	67.07	4.000	5.83	5.58	1.46
0.917	1.46	2.500	67.07	4.083	5.83	5.67	1.46
1.000	1.46	2.583	67.07	4.167	5.83	5.75	1.46
1.083	1.46	2.667	67.07	4.250	5.83	5.83	1.46
1.167	1.46	2.750	67.07	4.333	2.92	5.92	1.46
1.250	1.46	2.833	18.95	4.417	2.92	6.00	1.46
1.333	8.75	2.917	18.95	4.500	2.92	6.08	1.46
1.417	8.75	3.000	18.95	4.583	2.92	6.17	1.46
1.500	8.75	3.083	18.95	4.667	2.92	6.25	1.46
1.583	8.75	3.167	18.95	4.750	2.92		

Unit Hyd Qpeak (cms)= 0.749

```

PEAK FLOW (cms)= 0.107 (i)
TIME TO PEAK (hrs)= 2.750
RUNOFF VOLUME (mm)= 12.559
TOTAL RAINFALL (mm)= 72.910
RUNOFF COEFFICIENT = 0.172

```

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```

-----
| CALIB |
| NASHYD ( 0103) | Area (ha)= 4.27 Curve Number (CN)= 56.0
| ID= 1 DT= 5.0 min | Ia (mm)= 7.00 # of Linear Res.(N)= 3.00
|-----| U.H. Tp(hrs)= 0.21

```

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	1.667	8.75	3.250	18.95	4.83	1.46
0.167	0.00	1.750	8.75	3.333	10.21	4.92	1.46
0.250	0.00	1.833	24.79	3.417	10.21	5.00	1.46
0.333	1.46	1.917	24.79	3.500	10.21	5.08	1.46
0.417	1.46	2.000	24.79	3.583	10.21	5.17	1.46
0.500	1.46	2.083	24.79	3.667	10.21	5.25	1.46
0.583	1.46	2.167	24.79	3.750	10.21	5.33	1.46
0.667	1.46	2.250	24.79	3.833	5.83	5.42	1.46
0.750	1.46	2.333	67.07	3.917	5.83	5.50	1.46
0.833	1.46	2.417	67.07	4.000	5.83	5.58	1.46
0.917	1.46	2.500	67.07	4.083	5.83	5.67	1.46
1.000	1.46	2.583	67.07	4.167	5.83	5.75	1.46
1.083	1.46	2.667	67.07	4.250	5.83	5.83	1.46
1.167	1.46	2.750	67.07	4.333	2.92	5.92	1.46
1.250	1.46	2.833	18.95	4.417	2.92	6.00	1.46
1.333	8.75	2.917	18.95	4.500	2.92	6.08	1.46
1.417	8.75	3.000	18.95	4.583	2.92	6.17	1.46
1.500	8.75	3.083	18.95	4.667	2.92	6.25	1.46
1.583	8.75	3.167	18.95	4.750	2.92		

Unit Hyd Qpeak (cms)= 0.777

```

PEAK FLOW (cms)= 0.177 (i)
TIME TO PEAK (hrs)= 2.833
RUNOFF VOLUME (mm)= 16.337
TOTAL RAINFALL (mm)= 72.910
RUNOFF COEFFICIENT = 0.224

```

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```

-----
| ADD HYD ( 0001)|
| 1 + 2 = 3 |
-----
ID1= 1 ( 0101): 11.77 0.654 2.75 20.43
+ ID2= 2 ( 0102): 2.94 0.107 2.75 12.56
=====
ID = 3 ( 0001): 14.71 0.761 2.75 18.86

```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```

-----
| ADD HYD ( 0001)|
| 3 + 2 = 1 |
-----
ID1= 3 ( 0001): 14.71 0.761 2.75 18.86
+ ID2= 2 ( 0103): 4.27 0.177 2.83 16.34
=====
ID = 1 ( 0001): 18.98 0.932 2.75 18.29

```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

TOTAL RAINFALL (mm)= 81.410
 RUNOFF COEFFICIENT = 0.248

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```

-----
| ADD HYD ( 0001)|
| 1 + 2 = 3 |
-----
ID1= 1 ( 0101): 11.77 0.807 2.75 25.07
+ ID2= 2 ( 0102): 2.94 0.134 2.75 15.74
=====
ID = 3 ( 0001): 14.71 0.942 2.75 23.20

```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```

-----
| ADD HYD ( 0001)|
| 3 + 2 = 1 |
-----
ID1= 3 ( 0001): 14.71 0.942 2.75 23.20
+ ID2= 2 ( 0103): 4.27 0.219 2.83 20.18
=====
ID = 1 ( 0001): 18.98 1.154 2.75 22.52

```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```

=====
V V I SSSS U U A L (v 6.2.2006)
V V I SS U U A A L
V V I SS U U A A A A L
V V I SS U U A A L
VV I SSSS UUUU A A LLLL

```

```

000 TTTT TTTT H H Y Y M M 000 TM
0 0 T T H H Y Y MM MM 0 0
0 0 T T H H Y M M 0 0
000 T T H H Y M M 000

```

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***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
 Output filename: C:\Users\PYung\AppData\Local\Civica\XH5\531e1913-0e12-4e2e-9684-e2ef03acaa05\8f90c0da-2c51-41af-bf26-0b08f13e6b04\scenar
 Summary filename: C:\Users\PYung\AppData\Local\Civica\XH5\531e1913-0e12-4e2e-9684-e2ef03acaa05\8f90c0da-2c51-41af-bf26-0b08f13e6b04\scenar

DATE: 03/10/2022

TIME: 09:58:12

USER:

COMMENTS:

 ** SIMULATION : AES_06hr_050yr **

```

-----
| READ STORM |
| Ptotal= 81.41 mm |
-----

```

Filename: C:\Users\PYung\AppData\Local\Temp\937c625c-632b-4056-a8b5-419ce138f7fc\12dd90ee
 Comments: AES_06hr_050yr

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	0.00	2.00	27.68	3.75	11.40	5.50	1.63
0.50	1.63	2.25	27.68	4.00	6.51	5.75	1.63
0.75	1.63	2.50	74.89	4.25	6.51	6.00	1.63
1.00	1.63	2.75	74.89	4.50	3.26	6.25	1.63
1.25	1.63	3.00	21.16	4.75	3.26		
1.50	9.77	3.25	21.16	5.00	1.63		
1.75	9.77	3.50	11.40	5.25	1.63		

```

-----
| CALIB |
| NASHYD ( 0101) |
| ID= 1 DT= 5.0 min |
-----

```

Area (ha)= 11.77 Curve Number (CN)= 64.0
 Ia (mm)= 7.60 # of Linear Res.(N)= 3.00
 U.H. Tp(hrs)= 0.18

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

```

-----
TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
0.083 0.00 | 1.667 9.77 | 3.250 21.16 | 4.83 1.63
0.167 0.00 | 1.750 9.77 | 3.333 11.40 | 4.92 1.63
0.250 0.00 | 1.833 27.68 | 3.417 11.40 | 5.00 1.63
0.333 1.63 | 1.917 27.68 | 3.500 11.40 | 5.08 1.63
0.417 1.63 | 2.000 27.68 | 3.583 11.40 | 5.17 1.63
0.500 1.63 | 2.083 27.68 | 3.667 11.40 | 5.25 1.63
0.583 1.63 | 2.167 27.68 | 3.750 11.40 | 5.33 1.63
0.667 1.63 | 2.250 27.68 | 3.833 6.51 | 5.42 1.63
0.750 1.63 | 2.333 74.89 | 3.917 6.51 | 5.50 1.63
0.833 1.63 | 2.417 74.89 | 4.000 6.51 | 5.58 1.63
0.917 1.63 | 2.500 74.89 | 4.083 6.51 | 5.67 1.63

```


TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	1.667	9.77	3.250	21.16	4.83	1.63
0.167	0.00	1.750	9.77	3.333	11.40	4.92	1.63
0.250	0.00	1.833	27.68	3.417	11.40	5.00	1.63
0.333	1.63	1.917	27.68	3.500	11.40	5.08	1.63
0.417	1.63	2.000	27.68	3.583	11.40	5.17	1.63
0.500	1.63	2.083	27.68	3.667	11.40	5.25	1.63
0.583	1.63	2.167	27.68	3.750	11.40	5.33	1.63
0.667	1.63	2.250	27.68	3.833	6.51	5.42	1.63
0.750	1.63	2.333	74.89	3.917	6.51	5.50	1.63
0.833	1.63	2.417	74.89	4.000	6.51	5.58	1.63
0.917	1.63	2.500	74.89	4.083	6.51	5.67	1.63
1.000	1.63	2.583	74.89	4.167	6.51	5.75	1.63
1.083	1.63	2.667	74.89	4.250	6.51	5.83	1.63
1.167	1.63	2.750	74.89	4.333	3.26	5.92	1.63
1.250	1.63	2.833	21.16	4.417	3.26	6.00	1.63
1.333	9.77	2.917	21.16	4.500	3.26	6.08	1.63
1.417	9.77	3.000	21.16	4.583	3.26	6.17	1.63
1.500	9.77	3.083	21.16	4.667	3.26	6.25	1.63
1.583	9.77	3.167	21.16	4.750	3.26		

Unit Hyd Qpeak (cms)= 2.498

PEAK FLOW (cms)= 0.807 (i)
 TIME TO PEAK (hrs)= 2.750
 RUNOFF VOLUME (mm)= 25.070
 TOTAL RAINFALL (mm)= 81.410
 RUNOFF COEFFICIENT = 0.308

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	Area (ha)	Curve Number (CN)
NASHYD (0102)	2.94	50.0
ID= 1 DT= 5.0 min	Ia (mm)= 9.60	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.15	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	1.667	9.77	3.250	21.16	4.83	1.63
0.167	0.00	1.750	9.77	3.333	11.40	4.92	1.63
0.250	0.00	1.833	27.68	3.417	11.40	5.00	1.63
0.333	1.63	1.917	27.68	3.500	11.40	5.08	1.63
0.417	1.63	2.000	27.68	3.583	11.40	5.17	1.63
0.500	1.63	2.083	27.68	3.667	11.40	5.25	1.63
0.583	1.63	2.167	27.68	3.750	11.40	5.33	1.63
0.667	1.63	2.250	27.68	3.833	6.51	5.42	1.63
0.750	1.63	2.333	74.89	3.917	6.51	5.50	1.63
0.833	1.63	2.417	74.89	4.000	6.51	5.58	1.63
0.917	1.63	2.500	74.89	4.083	6.51	5.67	1.63
1.000	1.63	2.583	74.89	4.167	6.51	5.75	1.63
1.083	1.63	2.667	74.89	4.250	6.51	5.83	1.63
1.167	1.63	2.750	74.89	4.333	3.26	5.92	1.63
1.250	1.63	2.833	21.16	4.417	3.26	6.00	1.63
1.333	9.77	2.917	21.16	4.500	3.26	6.08	1.63
1.417	9.77	3.000	21.16	4.583	3.26	6.17	1.63
1.500	9.77	3.083	21.16	4.667	3.26	6.25	1.63
1.583	9.77	3.167	21.16	4.750	3.26		

Unit Hyd Qpeak (cms)= 0.749

PEAK FLOW (cms)= 0.134 (i)
 TIME TO PEAK (hrs)= 2.750
 RUNOFF VOLUME (mm)= 15.736
 TOTAL RAINFALL (mm)= 81.410
 RUNOFF COEFFICIENT = 0.193

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	Area (ha)	Curve Number (CN)
NASHYD (0103)	4.27	56.0
ID= 1 DT= 5.0 min	Ia (mm)= 7.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.21	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	1.667	9.77	3.250	21.16	4.83	1.63
0.167	0.00	1.750	9.77	3.333	11.40	4.92	1.63
0.250	0.00	1.833	27.68	3.417	11.40	5.00	1.63
0.333	1.63	1.917	27.68	3.500	11.40	5.08	1.63
0.417	1.63	2.000	27.68	3.583	11.40	5.17	1.63
0.500	1.63	2.083	27.68	3.667	11.40	5.25	1.63
0.583	1.63	2.167	27.68	3.750	11.40	5.33	1.63
0.667	1.63	2.250	27.68	3.833	6.51	5.42	1.63
0.750	1.63	2.333	74.89	3.917	6.51	5.50	1.63
0.833	1.63	2.417	74.89	4.000	6.51	5.58	1.63
0.917	1.63	2.500	74.89	4.083	6.51	5.67	1.63
1.000	1.63	2.583	74.89	4.167	6.51	5.75	1.63
1.083	1.63	2.667	74.89	4.250	6.51	5.83	1.63
1.167	1.63	2.750	74.89	4.333	3.26	5.92	1.63
1.250	1.63	2.833	21.16	4.417	3.26	6.00	1.63
1.333	9.77	2.917	21.16	4.500	3.26	6.08	1.63
1.417	9.77	3.000	21.16	4.583	3.26	6.17	1.63
1.500	9.77	3.083	21.16	4.667	3.26	6.25	1.63
1.583	9.77	3.167	21.16	4.750	3.26		

Unit Hyd Qpeak (cms)= 0.777

PEAK FLOW (cms)= 0.219 (i)
 TIME TO PEAK (hrs)= 2.833
 RUNOFF VOLUME (mm)= 20.177
 TOTAL RAINFALL (mm)= 81.410
 RUNOFF COEFFICIENT = 0.248

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0001)	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3				
ID1= 1 (0101):	11.77	0.807	2.75	25.07
+ ID2= 2 (0102):	2.94	0.134	2.75	15.74
ID = 3 (0001):	14.71	0.942	2.75	23.20

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0001)	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
3 + 2 = 1				
ID1= 3 (0001):	14.71	0.942	2.75	23.20
+ ID2= 2 (0103):	4.27	0.219	2.83	20.18
ID = 1 (0001):	18.98	1.154	2.75	22.52

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

V V I SSSSS U U A L (v 6.2.2006)
 V V I SS U U A A L
 V V I SS U U A A A A L
 V V I SS U U A A L
 V V I SSSSS UUUUU A A LLLLL

000 TTTT TTTT H H Y Y M M 000 TM

| CALIB

```

| NASHYD ( 0103) | Area (ha)= 4.27 Curve Number (CN)= 56.0
| ID= 1 DT= 5.0 min | Ia (mm)= 7.00 # of Linear Res.(N)= 3.00
-----
| U.H. Tp(hrs)= 0.21

```

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

```

----- TRANSFORMED HYETOGRAPH -----
TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
0.083 0.00 | 1.667 10.79 | 3.250 23.37 | 4.83 1.80
0.167 0.00 | 1.750 10.79 | 3.333 12.59 | 4.92 1.80
0.250 0.00 | 1.833 30.57 | 3.417 12.59 | 5.00 1.80
0.333 1.80 | 1.917 30.57 | 3.500 12.59 | 5.08 1.80
0.417 1.80 | 2.000 30.57 | 3.583 12.59 | 5.17 1.80
0.500 1.80 | 2.083 30.57 | 3.667 12.59 | 5.25 1.80
0.583 1.80 | 2.167 30.57 | 3.750 12.59 | 5.33 1.80
0.667 1.80 | 2.250 30.57 | 3.833 7.19 | 5.42 1.80
0.750 1.80 | 2.333 82.71 | 3.917 7.19 | 5.50 1.80
0.833 1.80 | 2.417 82.71 | 4.000 7.19 | 5.58 1.80
0.917 1.80 | 2.500 82.71 | 4.083 7.19 | 5.67 1.80
1.000 1.80 | 2.583 82.71 | 4.167 7.19 | 5.75 1.80
1.083 1.80 | 2.667 82.71 | 4.250 7.19 | 5.83 1.80
1.167 1.80 | 2.750 82.71 | 4.333 3.60 | 5.92 1.80
1.250 1.80 | 2.833 23.37 | 4.417 3.60 | 6.00 1.80
1.333 10.79 | 2.917 23.37 | 4.500 3.60 | 6.08 1.80
1.417 10.79 | 3.000 23.37 | 4.583 3.60 | 6.17 1.80
1.500 10.79 | 3.083 23.37 | 4.667 3.60 | 6.25 1.80
1.583 10.79 | 3.167 23.37 | 4.750 3.60 |

```

Unit Hyd Qpeak (cms)= 0.777

```

PEAK FLOW (cms)= 0.264 (i)
TIME TO PEAK (hrs)= 2.833
RUNOFF VOLUME (mm)= 24.296
TOTAL RAINFALL (mm)= 89.910
RUNOFF COEFFICIENT = 0.270

```

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```

-----
| ADD HYD ( 0001) |
| 1 + 2 = 3 |
-----
AREA QPEAK TPEAK R.V.
(ha) (cms) (hrs) (mm)
ID1= 1 ( 0101): 11.77 0.970 2.75 30.00
+ ID2= 2 ( 0102): 2.94 0.164 2.75 19.18
=====
ID = 3 ( 0001): 14.71 1.134 2.75 27.84

```

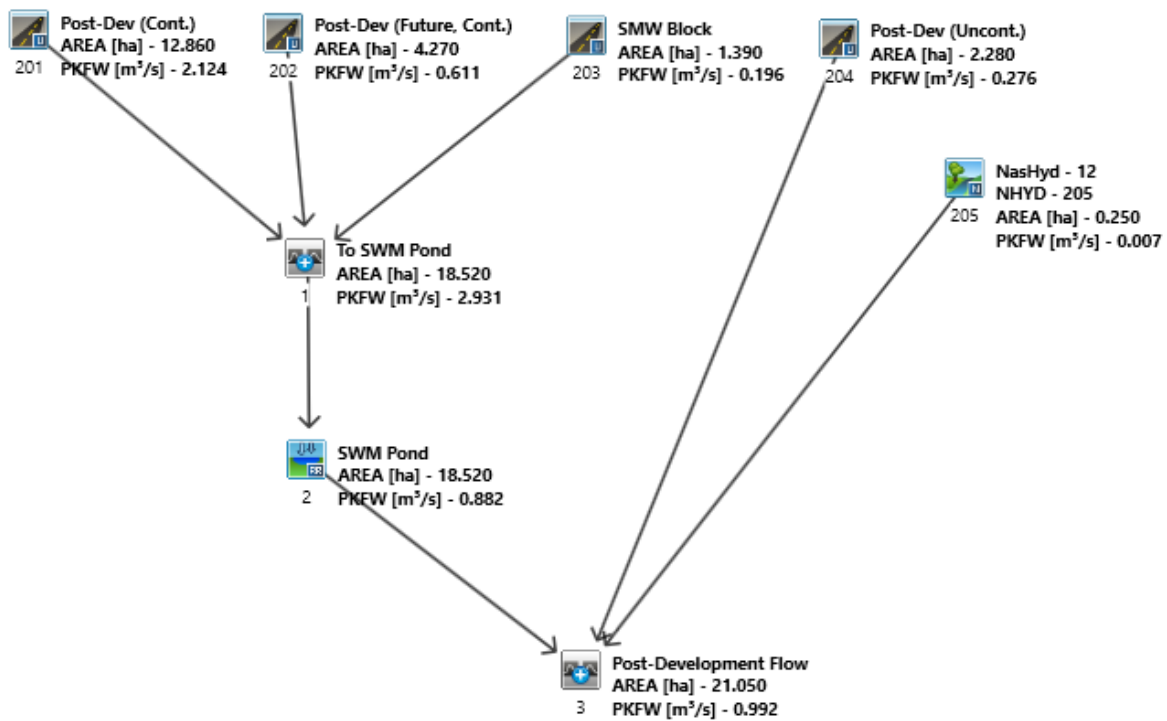
NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```

-----
| ADD HYD ( 0001) |
| 3 + 2 = 1 |
-----
AREA QPEAK TPEAK R.V.
(ha) (cms) (hrs) (mm)
ID1= 3 ( 0001): 14.71 1.134 2.75 27.84
+ ID2= 2 ( 0103): 4.27 0.264 2.83 24.30
=====
ID = 1 ( 0001): 18.98 1.391 2.75 27.04

```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.



VO5 Model Schematic – Post-Development

```

=====
V   V   I   SSSSS   U   U   A   L   (v 6.2.2006)
V   V   I   SS      U   U   A   A   L
V   V   I   SS      U   U   AAAAA L
V   V   I   SS      U   U   A   A   L
V   V   I   SSSSS   UUUUU   A   A   LLLLL
000   TTTT   TTTT   H   H   Y   Y   M   M   000   TM
0   0   T   T   H   H   Y   Y   MM   MM   0   0
0   0   T   T   H   H   Y   M   M   0   0
000   T   T   H   H   Y   M   M   000
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```

***** D E T A I L E D O U T P U T *****

```

Input  filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
Output filename: C:\Users\PYung\AppData\Local\Civica\XH5\531e1913-0e12-4e2e-9684-
e2ef03acaa05\fid7867a-3ea6-4a2c-88c8-033814afaac7\scenar
Summary filename: C:\Users\PYung\AppData\Local\Civica\XH5\531e1913-0e12-4e2e-9684-
e2ef03acaa05\fid7867a-3ea6-4a2c-88c8-033814afaac7\scenar

```

DATE: 03/10/2022 TIME: 10:00:32

USER:

COMMENTS: _____

```

*****
** SIMULATION : 1-Chicago_25mm **
*****

```

```

-----
| READ STORM |      Filename: C:\Users\PYung\AppData\Local\Temp\
|             |      34abe0e9-1b72-402d-8c5e-c0fdd428aacc\d5485b0b
| Ptotal= 25.02 mm |      Comments: Chicago_25mm
-----

```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.17	2.17	1.17	6.20	2.17	5.62	3.17	2.95
0.33	2.38	1.33	12.18	2.33	4.80	3.33	2.76
0.50	2.66	1.50	41.67	2.50	4.21	3.50	2.62
0.67	3.03	1.67	15.28	2.67	3.78	3.67	2.47
0.83	3.58	1.83	9.22	2.83	3.45	3.83	2.35
1.00	4.47	2.00	6.88	3.00	3.18	4.00	2.23

```

-----
| CALIB |
| NASHYD ( 0205) | Area (ha)= 0.25 Curve Number (CN)= 53.0
| ID= 1 DT= 5.0 min | Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
|             | U.H. Tp(hrs)= 0.03
-----

```

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

```

----- TRANSFORMED HYETOGRAPH -----
TIME RAIN TIME RAIN TIME RAIN TIME RAIN
hrs mm/hr hrs mm/hr hrs mm/hr hrs mm/hr
0.083 2.17 1.083 6.20 2.083 5.62 3.08 2.95
0.167 2.17 1.167 6.20 2.167 5.62 3.17 2.95
0.250 2.38 1.250 12.18 2.250 4.80 3.25 2.76
0.333 2.38 1.333 12.18 2.333 4.80 3.33 2.76
0.417 2.66 1.417 41.67 2.417 4.21 3.42 2.62
0.500 2.66 1.500 41.67 2.500 4.21 3.50 2.62
0.583 3.03 1.583 15.28 2.583 3.78 3.58 2.47
0.667 3.03 1.667 15.28 2.667 3.78 3.67 2.47
0.750 3.58 1.750 9.22 2.750 3.45 3.75 2.35
0.833 3.58 1.833 9.22 2.833 3.45 3.83 2.35
0.917 4.47 1.917 6.88 2.917 3.18 3.92 2.23
1.000 4.47 2.000 6.88 3.000 3.18 4.00 2.23

```

Unit Hyd Qpeak (cms)= 0.318

PEAK FLOW (cms)= 0.001 (i)
TIME TO PEAK (hrs)= 1.500
RUNOFF VOLUME (mm)= 0.550
TOTAL RAINFALL (mm)= 25.023
RUNOFF COEFFICIENT = 0.022

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```

-----
| CALIB |
| STANDHYD ( 0201) | Area (ha)= 12.86
| ID= 1 DT= 5.0 min | Total Imp(%)= 70.00 Dir. Conn.(%)= 60.00
-----

```

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	9.00	3.86
Dep. Storage (mm)=	2.00	5.00
Average Slope (%)=	5.00	2.00
Length (m)=	292.80	40.00
Mannings n	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

```

----- TRANSFORMED HYETOGRAPH -----
TIME RAIN TIME RAIN TIME RAIN TIME RAIN
hrs mm/hr hrs mm/hr hrs mm/hr hrs mm/hr
0.083 2.17 1.083 6.20 2.083 5.62 3.08 2.95
0.167 2.17 1.167 6.20 2.167 5.62 3.17 2.95
0.250 2.38 1.250 12.18 2.250 4.80 3.25 2.76
0.333 2.38 1.333 12.18 2.333 4.80 3.33 2.76
0.417 2.66 1.417 41.67 2.417 4.21 3.42 2.62
0.500 2.66 1.500 41.67 2.500 4.21 3.50 2.62
0.583 3.03 1.583 15.28 2.583 3.78 3.58 2.47
0.667 3.03 1.667 15.28 2.667 3.78 3.67 2.47
0.750 3.58 1.750 9.22 2.750 3.45 3.75 2.35
0.833 3.58 1.833 9.22 2.833 3.45 3.83 2.35
0.917 4.47 1.917 6.88 2.917 3.18 3.92 2.23
1.000 4.47 2.000 6.88 3.000 3.18 4.00 2.23

```

Max.Eff.Inten.(mm/hr)= 41.67 2.36
over (min) 5.00 40.00
Storage Coeff. (min)= 4.26 (ii) 35.84 (ii)
Unit Hyd. Tpeak (min)= 5.00 40.00
Unit Hyd. peak (cms)= 0.23 0.03

TOTALS
PEAK FLOW (cms)= 0.83 0.01 0.833 (iii)
TIME TO PEAK (hrs)= 1.50 2.33 1.50
RUNOFF VOLUME (mm)= 23.02 2.38 14.76
TOTAL RAINFALL (mm)= 25.02 25.02 25.02
RUNOFF COEFFICIENT = 0.92 0.10 0.59

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PVIOUS LOSSES:
CN* = 53.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

| CALIB |
| STANDHYD (0202) | Area (ha)= 4.27
| ID= 1 DT= 5.0 min | Total Imp(%)= 60.00 Dir. Conn.(%)= 45.00

IMPERVIOUS PVIOUS (i)
Surface Area (ha)= 2.56 1.71
Dep. Storage (mm)= 2.00 5.00
Average Slope (%)= 5.00 2.00
Length (m)= 168.72 40.00
Mannings n = 0.013 0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

----- TRANSFORMED HYETOGRAPH -----
TIME RAIN TIME RAIN TIME RAIN TIME RAIN
hrs mm/hr hrs mm/hr ' hrs mm/hr hrs mm/hr
0.083 2.17 1.083 6.20 2.083 5.62 3.08 2.95
0.167 2.17 1.167 6.20 2.167 5.62 3.17 2.95
0.250 2.38 1.250 12.18 2.250 4.80 3.25 2.76
0.333 2.38 1.333 12.18 2.333 4.80 3.33 2.76
0.417 2.66 1.417 41.67 2.417 4.21 3.42 2.62
0.500 2.66 1.500 41.67 2.500 4.21 3.50 2.62
0.583 3.03 1.583 15.28 2.583 3.78 3.58 2.47
0.667 3.03 1.667 15.28 2.667 3.78 3.67 2.47
0.750 3.58 1.750 9.22 2.750 3.45 3.75 2.35
0.833 3.58 1.833 9.22 2.833 3.45 3.83 2.35
0.917 4.47 1.917 6.88 2.917 3.18 3.92 2.23
1.000 4.47 2.000 6.88 3.000 3.18 4.00 2.23

Max.Eff.Inten.(mm/hr)= 41.67 2.73
over (min) 5.00 35.00
Storage Coeff. (min)= 3.06 (ii) 32.88 (ii)
Unit Hyd. Tpeak (min)= 5.00 35.00
Unit Hyd. peak (cms)= 0.27 0.03

PEAK FLOW (cms)= 0.22 0.01 0.217 (iii)
TIME TO PEAK (hrs)= 1.50 2.17 1.50
RUNOFF VOLUME (mm)= 23.02 2.47 11.71
TOTAL RAINFALL (mm)= 25.02 25.02 25.02
RUNOFF COEFFICIENT = 0.92 0.10 0.47

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PVIOUS LOSSES:
CN* = 53.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

| CALIB |
| STANDHYD (0203) | Area (ha)= 1.39
| ID= 1 DT= 5.0 min | Total Imp(%)= 50.00 Dir. Conn.(%)= 50.00

IMPERVIOUS PVIOUS (i)
Surface Area (ha)= 0.69 0.69
Dep. Storage (mm)= 2.00 5.00
Average Slope (%)= 5.00 2.00

Length (m)= 96.26 40.00
Mannings n = 0.013 0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

----- TRANSFORMED HYETOGRAPH -----
TIME RAIN TIME RAIN TIME RAIN TIME RAIN
hrs mm/hr hrs mm/hr ' hrs mm/hr hrs mm/hr
0.083 2.17 1.083 6.20 2.083 5.62 3.08 2.95
0.167 2.17 1.167 6.20 2.167 5.62 3.17 2.95
0.250 2.38 1.250 12.18 2.250 4.80 3.25 2.76
0.333 2.38 1.333 12.18 2.333 4.80 3.33 2.76
0.417 2.66 1.417 41.67 2.417 4.21 3.42 2.62
0.500 2.66 1.500 41.67 2.500 4.21 3.50 2.62
0.583 3.03 1.583 15.28 2.583 3.78 3.58 2.47
0.667 3.03 1.667 15.28 2.667 3.78 3.67 2.47
0.750 3.58 1.750 9.22 2.750 3.45 3.75 2.35
0.833 3.58 1.833 9.22 2.833 3.45 3.83 2.35
0.917 4.47 1.917 6.88 2.917 3.18 3.92 2.23
1.000 4.47 2.000 6.88 3.000 3.18 4.00 2.23

Max.Eff.Inten.(mm/hr)= 41.67 1.05
over (min) 5.00 50.00
Storage Coeff. (min)= 2.19 (ii) 45.89 (ii)
Unit Hyd. Tpeak (min)= 5.00 50.00
Unit Hyd. peak (cms)= 0.31 0.02

PEAK FLOW (cms)= 0.08 0.00 0.080 (iii)
TIME TO PEAK (hrs)= 1.50 2.67 1.50
RUNOFF VOLUME (mm)= 23.02 1.63 12.31
TOTAL RAINFALL (mm)= 25.02 25.02 25.02
RUNOFF COEFFICIENT = 0.92 0.07 0.49

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PVIOUS LOSSES:
CN* = 53.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

| ADD HYD (0001) |
1 + 2 = 3
ID1= 1 (0201): AREA QPEAK TPEAK R.V.
(ha) (cms) (hrs) (mm)
+ ID2= 2 (0202): 12.86 0.833 1.50 14.76
4.27 0.217 1.50 11.71
=====

ID = 3 (0001): 17.13 1.050 1.50 14.00

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

| ADD HYD (0001) |
3 + 2 = 1
ID1= 3 (0001): AREA QPEAK TPEAK R.V.
(ha) (cms) (hrs) (mm)
+ ID2= 2 (0203): 17.13 1.050 1.50 14.00
1.39 0.080 1.50 12.31
=====

ID = 1 (0001): 18.52 1.130 1.50 13.88

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

| RESERVOIR(0002) | OVERFLOW IS OFF
IN= 2--> OUT= 1

```

| DT= 5.0 min |
-----
OUTFLOW STORAGE | OUTFLOW STORAGE
(cms) (ha.m.) | (cms) (ha.m.)
0.0000 0.0000 | 0.9767 0.7368
0.0148 0.0921 | 1.2208 0.8058
0.0235 0.1922 | 1.4829 0.8763
0.0298 0.3003 | 2.0785 0.9483
0.0325 0.3573 | 2.9524 1.0220
0.0983 0.4161 | 4.0123 1.0972
0.2165 0.4768 | 5.2246 1.1739
0.3687 0.5394 | 6.5698 1.2522
0.5485 0.6036 | 9.6096 1.4134
0.7520 0.6694 | 14.9233 1.6661

AREA QPEAK TPEAK R.V.
(ha) (cms) (hrs) (mm)
INFLOW : ID= 2 ( 0001) 18.520 1.130 1.50 13.88
OUTFLOW: ID= 1 ( 0002) 18.520 0.026 4.08 13.79

PEAK FLOW REDUCTION [Qout/Qin](%)= 2.28
TIME SHIFT OF PEAK FLOW (min)=155.00
MAXIMUM STORAGE USED (ha.m.)= 0.2307

```

```

-----
| CALIB |
| STANDHYD ( 0204) |
| ID= 1 DT= 5.0 min |
-----
Area (ha)= 2.28
Total Imp(%)= 50.00 Dir. Conn.(%)= 30.00

IMPERVIOUS PERVIOUS (i)
Surface Area (ha)= 1.14 1.14
Dep. Storage (mm)= 2.00 5.00
Average Slope (%)= 5.00 2.00
Length (m)= 123.29 40.00
Mannings n = 0.013 0.250

```

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

```

----- TRANSFORMED HYETOGRAPH -----
TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
0.083 2.17 | 1.083 6.20 | 2.083 5.62 | 3.08 2.95
0.167 2.17 | 1.167 6.20 | 2.167 5.62 | 3.17 2.95
0.250 2.38 | 1.250 12.18 | 2.250 4.80 | 3.25 2.76
0.333 2.38 | 1.333 12.18 | 2.333 4.80 | 3.33 2.76
0.417 2.66 | 1.417 41.67 | 2.417 4.21 | 3.42 2.62
0.500 2.66 | 1.500 41.67 | 2.500 4.21 | 3.50 2.62
0.583 3.03 | 1.583 15.28 | 2.583 3.78 | 3.58 2.47
0.667 3.03 | 1.667 15.28 | 2.667 3.78 | 3.67 2.47
0.750 3.58 | 1.750 9.22 | 2.750 3.45 | 3.75 2.35
0.833 3.58 | 1.833 9.22 | 2.833 3.45 | 3.83 2.35
0.917 4.47 | 1.917 6.88 | 2.917 3.18 | 3.92 2.23
1.000 4.47 | 2.000 6.88 | 3.000 3.18 | 4.00 2.23

Max.Eff.Inten.(mm/hr)= 41.67 2.84
over (min) 5.00 35.00
Storage Coeff. (min)= 2.54 (ii) 31.85 (ii)
Unit Hyd. Tpeak (min)= 5.00 35.00
Unit Hyd. peak (cms)= 0.29 0.03

*TOTALS*
PEAK FLOW (cms)= 0.08 0.01 0.079 (iii)
TIME TO PEAK (hrs)= 1.50 2.17 1.50
RUNOFF VOLUME (mm)= 23.02 2.52 8.67
TOTAL RAINFALL (mm)= 25.02 25.02 25.02
RUNOFF COEFFICIENT = 0.92 0.10 0.35

```

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 53.0 Ia = Dep. Storage (Above)

(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```

-----
| ADD HYD ( 0003) |
| 1 + 2 = 3 |
-----
ID1= 1 ( 0002): 18.52 0.026 4.08 13.79
+ ID2= 2 ( 0204): 2.28 0.079 1.50 8.67
=====
ID = 3 ( 0003): 20.80 0.092 1.50 13.23

```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```

-----
| ADD HYD ( 0003) |
| 3 + 2 = 1 |
-----
ID1= 3 ( 0003): 20.80 0.092 1.50 13.23
+ ID2= 2 ( 0205): 0.25 0.001 1.50 0.55
=====
ID = 1 ( 0003): 21.05 0.093 1.50 13.08

```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```

=====
V V I SSSS U U A L (v 6.2.2006)
V V I SS U U A A L
V V I SS U U A A A A L
V V I SS U U A A L
VV I SSSS UUUU A A LLLL

000 TTTT TTTT H H Y Y M M 000 TM
0 0 T T H H Y Y MM MM 0 0
0 0 T T H H Y M M 0 0
000 T T H H Y M M 000

```

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***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
Output filename: C:\Users\Pyung\AppData\Local\Civica\531e1913-0e12-4e2e-9684-e2ef03acaa05\23f44255-71e9-48cb-a278-a505d53fe45d\scenar
Summary filename: C:\Users\Pyung\AppData\Local\Civica\531e1913-0e12-4e2e-9684-e2ef03acaa05\23f44255-71e9-48cb-a278-a505d53fe45d\scenar

DATE: 03/10/2022 TIME: 10:00:32

USER:

COMMENTS: _____

** SIMULATION : AES_06hr_002yr **

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

----- TRANSFORMED HYPOTHOGRAPH -----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	1.667	4.64	3.250	10.00	4.83	0.77
0.167	0.00	1.750	4.64	3.333	5.42	4.92	0.77
0.250	0.00	1.833	13.16	3.417	5.42	5.00	0.77
0.333	0.77	1.917	13.16	3.500	5.42	5.08	0.77
0.417	0.77	2.000	13.16	3.583	5.42	5.17	0.77
0.500	0.77	2.083	13.16	3.667	5.42	5.25	0.77
0.583	0.77	2.167	13.16	3.750	5.42	5.33	0.77
0.667	0.77	2.250	13.16	3.833	3.10	5.42	0.77
0.750	0.77	2.333	35.60	3.917	3.10	5.50	0.77
0.833	0.77	2.417	35.60	4.000	3.10	5.58	0.77
0.917	0.77	2.500	35.60	4.083	3.10	5.67	0.77
1.000	0.77	2.583	35.60	4.167	3.10	5.75	0.77
1.083	0.77	2.667	35.60	4.250	3.10	5.83	0.77
1.167	0.77	2.750	35.60	4.333	1.55	5.92	0.77
1.250	0.77	2.833	10.06	4.417	1.55	6.00	0.77
1.333	4.64	2.917	10.06	4.500	1.55	6.08	0.77
1.417	4.64	3.000	10.06	4.583	1.55	6.17	0.77
1.500	4.64	3.083	10.06	4.667	1.55	6.25	0.77
1.583	4.64	3.167	10.06	4.750	1.55		

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

--- TRANSFORMED HYETOGRAPH ---							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	1.667	4.64	3.250	10.06	4.83	0.77
0.167	0.00	1.750	4.64	3.333	5.42	4.92	0.77
0.250	0.00	1.833	13.16	3.417	5.42	5.00	0.77
0.333	0.77	1.917	13.16	3.500	5.42	5.08	0.77
0.417	0.77	2.000	13.16	3.583	5.42	5.17	0.77
0.500	0.77	2.083	13.16	3.667	5.42	5.25	0.77
0.583	0.77	2.167	13.16	3.750	5.42	5.33	0.77
0.667	0.77	2.250	13.16	3.833	3.10	5.42	0.77
0.750	0.77	2.333	35.60	3.917	3.10	5.50	0.77
0.833	0.77	2.417	35.60	4.000	3.10	5.58	0.77
0.917	0.77	2.500	35.60	4.083	3.10	5.67	0.77
1.000	0.77	2.583	35.60	4.167	3.10	5.75	0.77
1.083	0.77	2.667	35.60	4.250	3.10	5.83	0.77
1.167	0.77	2.750	35.60	4.333	1.55	5.92	0.77
1.250	0.77	2.833	10.06	4.417	1.55	6.00	0.77
1.333	4.64	2.917	10.06	4.500	1.55	6.08	0.77
1.417	4.64	3.000	10.06	4.583	1.55	6.17	0.77
1.500	4.64	3.083	10.06	4.667	1.55	6.25	0.77
1.583	4.64	3.167	10.06	4.750	1.55		

PEAK FLOW	(cms)=	0.001 (i)
TIME TO PEAK	(hrs)=	2.750
RUNOFF VOLUME	(mm)=	1.475
TOTAL RAINFALL	(mm)=	38.690
RUNOFF COEFFICIENT	=	0.038

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
STANDHYD (0201)	Area (ha)=	12.86	
ID= 1 DT= 5.0 min	Total Imp(%)=	70.00	Dir. Conn.(%)= 60.00

IMPERVIOUS PERVIOUS (i)

Max. Eff. Inten. (mm/hr)=	35.60	8.57	
over (min)	5.00	25.00	
Storage Coeff. (min)=	4.54	(ii) 23.39	(ii)
Unit Hyd. Tpeak (min)=	5.00	25.00	
Unit Hyd. peak (cms)=	0.23	0.05	
			TOTALS
PEAK FLOW (cms)=	0.76	0.06	0.801 (iii)
TIME TO PEAK (hrs)=	2.75	3.00	2.75
RUNOFF VOLUME (mm)=	36.69	5.99	24.41
TOTAL RAINFALL (mm)=	38.69	38.69	38.69
RUNOFF COEFFICIENT =	0.95	0.15	0.63

```
***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
```

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 53.0 Ia = Dep. Storage (Above)
- (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
- (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
STANDHYD (0202)	Area (ha)=	4.27	
ID= 1 DT= 5.0 min	Total Imp(%)=	60.00	Dir. Conn.(%)= 45.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	2.56	1.71
Dep. Storage	(mm)=	2.00	5.00
Average Slope	(%)=	5.00	2.00
Length	(m)=	168.72	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

```

      ---- TRANSFORMED HYETOGRAPH ----
TIME  RAIN |  TIME  RAIN |'  TIME  RAIN |  TIME  RAIN

```


hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	1.667	4.64	3.250	10.06	4.83	0.77
0.167	0.00	1.750	4.64	3.333	5.42	4.92	0.77
0.250	0.00	1.833	13.16	3.417	5.42	5.00	0.77
0.333	0.77	1.917	13.16	3.500	5.42	5.08	0.77
0.417	0.77	2.000	13.16	3.583	5.42	5.17	0.77
0.500	0.77	2.083	13.16	3.667	5.42	5.25	0.77
0.583	0.77	2.167	13.16	3.750	5.42	5.33	0.77
0.667	0.77	2.250	13.16	3.833	3.10	5.42	0.77
0.750	0.77	2.333	35.60	3.917	3.10	5.50	0.77
0.833	0.77	2.417	35.60	4.000	3.10	5.58	0.77
0.917	0.77	2.500	35.60	4.083	3.10	5.67	0.77
1.000	0.77	2.583	35.60	4.167	3.10	5.75	0.77
1.083	0.77	2.667	35.60	4.250	3.10	5.83	0.77
1.167	0.77	2.750	35.60	4.333	1.55	5.92	0.77
1.250	0.77	2.833	10.06	4.417	1.55	6.00	0.77
1.333	4.64	2.917	10.06	4.500	1.55	6.08	0.77
1.417	4.64	3.000	10.06	4.583	1.55	6.17	0.77
1.500	4.64	3.083	10.06	4.667	1.55	6.25	0.77
1.583	4.64	3.167	10.06	4.750	1.55		

Max.Eff.Inten.(mm/hr)= 35.60 9.13
 over (min) 5.00 25.00
 Storage Coeff. (min)= 3.26 (ii) 21.65 (ii)
 Unit Hyd. Tpeak (min)= 5.00 25.00
 Unit Hyd. peak (cms)= 0.27 0.05

TOTALS
 PEAK FLOW (cms)= 0.19 0.03 0.209 (iii)
 TIME TO PEAK (hrs)= 2.75 3.00 2.75
 RUNOFF VOLUME (mm)= 36.69 6.18 19.91
 TOTAL RAINFALL (mm)= 38.69 38.69 38.69
 RUNOFF COEFFICIENT = 0.95 0.16 0.51

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 CN* = 53.0 Ia = Dep. Storage (Above)
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	STANDHYD (0203)	Area (ha)=	1.39	Dir. Conn.(%)=	50.00
ID= 1 DT= 5.0 min		Total Imp(%)=	50.00		
		IMPERVIOUS	PERVIOUS (i)		
Surface Area	(ha)=	0.69	0.69		
Dep. Storage	(mm)=	2.00	5.00		
Average Slope	(%)=	5.00	2.00		
Length	(m)=	96.26	40.00		
Mannings n	=	0.013	0.250		

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	1.667	4.64	3.250	10.06	4.83	0.77
0.167	0.00	1.750	4.64	3.333	5.42	4.92	0.77
0.250	0.00	1.833	13.16	3.417	5.42	5.00	0.77
0.333	0.77	1.917	13.16	3.500	5.42	5.08	0.77
0.417	0.77	2.000	13.16	3.583	5.42	5.17	0.77
0.500	0.77	2.083	13.16	3.667	5.42	5.25	0.77
0.583	0.77	2.167	13.16	3.750	5.42	5.33	0.77
0.667	0.77	2.250	13.16	3.833	3.10	5.42	0.77
0.750	0.77	2.333	35.60	3.917	3.10	5.50	0.77
0.833	0.77	2.417	35.60	4.000	3.10	5.58	0.77

0.917	0.77	2.500	35.60	4.083	3.10	5.67	0.77
1.000	0.77	2.583	35.60	4.167	3.10	5.75	0.77
1.083	0.77	2.667	35.60	4.250	3.10	5.83	0.77
1.167	0.77	2.750	35.60	4.333	1.55	5.92	0.77
1.250	0.77	2.833	10.06	4.417	1.55	6.00	0.77
1.333	4.64	2.917	10.06	4.500	1.55	6.08	0.77
1.417	4.64	3.000	10.06	4.583	1.55	6.17	0.77
1.500	4.64	3.083	10.06	4.667	1.55	6.25	0.77
1.583	4.64	3.167	10.06	4.750	1.55		

Max.Eff.Inten.(mm/hr)= 35.60 4.29
 over (min) 5.00 30.00
 Storage Coeff. (min)= 2.33 (ii) 27.20 (ii)
 Unit Hyd. Tpeak (min)= 5.00 30.00
 Unit Hyd. peak (cms)= 0.30 0.04

TOTALS
 PEAK FLOW (cms)= 0.07 0.01 0.071 (iii)
 TIME TO PEAK (hrs)= 2.75 3.17 2.75
 RUNOFF VOLUME (mm)= 36.69 4.38 20.53
 TOTAL RAINFALL (mm)= 38.69 38.69 38.69
 RUNOFF COEFFICIENT = 0.95 0.11 0.53

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 CN* = 53.0 Ia = Dep. Storage (Above)
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0001)	AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3	(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0201):	12.86	0.801	2.75	24.41
+ ID2= 2 (0202):	4.27	0.209	2.75	19.91
ID = 3 (0001):	17.13	1.010	2.75	23.29

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0001)	AREA	QPEAK	TPEAK	R.V.
3 + 2 = 1	(ha)	(cms)	(hrs)	(mm)
ID1= 3 (0001):	17.13	1.010	2.75	23.29
+ ID2= 2 (0203):	1.39	0.071	2.75	20.53
ID = 1 (0001):	18.52	1.082	2.75	23.08

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0002)	OUTFLOW	STORAGE	OUTFLOW	STORAGE
IN= 2--> OUT= 1	(cms)	(ha.m.)	(cms)	(ha.m.)
DT= 5.0 min	0.0000	0.0000	0.9767	0.7368
	0.0148	0.0921	1.2208	0.8058
	0.0235	0.1922	1.4829	0.8763
	0.0298	0.3003	2.0785	0.9483
	0.0325	0.3573	2.9524	1.0220
	0.0983	0.4161	4.0123	1.0972
	0.2165	0.4768	5.2246	1.1739
	0.3687	0.5394	6.5698	1.2522
	0.5485	0.6036	9.6096	1.4134
	0.7520	0.6694	14.9233	1.6661

```

          AREA      QPEAK      TPEAK      R.V.
          (ha)      (cms)      (hrs)      (mm)
INFLOW : ID= 2 ( 0001) 18.520    1.082    2.75    23.08
OUTFLOW: ID= 1 ( 0002) 18.520    0.054    4.83    22.99

      PEAK FLOW REDUCTION [Qout/Qin](%)= 4.96
      TIME SHIFT OF PEAK FLOW (min)=125.00
      MAXIMUM STORAGE USED (ha.m.)= 0.3763

```

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-----
| CALIB |
| STANDHYD ( 0204) |
| ID= 1 DT= 5.0 min |
-----
          Area (ha)= 2.28
          Total Imp(%)= 50.00 Dir. Conn.(%)= 30.00

          IMPERVIOUS      PERVIOUS (i)
          (ha)            (mm)
Surface Area (ha)= 1.14 1.14
Dep. Storage (mm)= 2.00 5.00
Average Slope (%)= 5.00 2.00
Length (m)= 123.29 40.00
Mannings n = 0.013 0.250

```

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

```

----- TRANSFORMED HYETOGRAPH -----
      TIME RAIN TIME RAIN TIME RAIN TIME RAIN
      hrs mm/hr hrs mm/hr hrs mm/hr hrs mm/hr
0.083 0.00 1.667 4.64 3.250 10.06 4.83 0.77
0.167 0.00 1.750 4.64 3.333 5.42 4.92 0.77
0.250 0.00 1.833 13.16 3.417 5.42 5.00 0.77
0.333 0.77 1.917 13.16 3.500 5.42 5.08 0.77
0.417 0.77 2.000 13.16 3.583 5.42 5.17 0.77
0.500 0.77 2.083 13.16 3.667 5.42 5.25 0.77
0.583 0.77 2.167 13.16 3.750 5.42 5.33 0.77
0.667 0.77 2.250 13.16 3.833 3.10 5.42 0.77
0.750 0.77 2.333 35.60 3.917 3.10 5.50 0.77
0.833 0.77 2.417 35.60 4.000 3.10 5.58 0.77
0.917 0.77 2.500 35.60 4.083 3.10 5.67 0.77
1.000 0.77 2.583 35.60 4.167 3.10 5.75 0.77
1.083 0.77 2.667 35.60 4.250 3.10 5.83 0.77
1.167 0.77 2.750 35.60 4.333 1.55 5.92 0.77
1.250 0.77 2.833 10.06 4.417 1.55 6.00 0.77
1.333 4.64 2.917 10.06 4.500 1.55 6.08 0.77
1.417 4.64 3.000 10.06 4.583 1.55 6.17 0.77
1.500 4.64 3.083 10.06 4.667 1.55 6.25 0.77
1.583 4.64 3.167 10.06 4.750 1.55 6.25 0.77

Max.Eff.Inten.(mm/hr)= 35.60 9.47
over (min) 5.00 25.00
Storage Coeff. (min)= 2.70 (ii) 20.82 (ii)
Unit Hyd. Tpeak (min)= 5.00 25.00
Unit Hyd. peak (cms)= 0.29 0.05

          *TOTALS*
PEAK FLOW (cms)= 0.07 0.02 0.081 (iii)
TIME TO PEAK (hrs)= 2.75 3.00 2.75
RUNOFF VOLUME (mm)= 36.69 6.29 15.41
TOTAL RAINFALL (mm)= 38.69 38.69 38.69
RUNOFF COEFFICIENT = 0.95 0.16 0.40

```

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 53.0 Ia = Dep. Storage (Above)
- (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
- (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```

-----
| ADD HYD ( 0003) |
| 1 + 2 = 3 |
-----
          AREA      QPEAK      TPEAK      R.V.
          (ha)      (cms)      (hrs)      (mm)
ID1= 1 ( 0002): 18.52 0.054 4.83 22.99
+ ID2= 2 ( 0204): 2.28 0.081 2.75 15.41
=====
ID = 3 ( 0003): 20.80 0.107 2.75 22.16

```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```

-----
| ADD HYD ( 0003) |
| 3 + 2 = 1 |
-----
          AREA      QPEAK      TPEAK      R.V.
          (ha)      (cms)      (hrs)      (mm)
ID1= 3 ( 0003): 20.80 0.107 2.75 22.16
+ ID2= 2 ( 0205): 0.25 0.001 2.75 1.48
=====
ID = 1 ( 0003): 21.05 0.109 2.75 21.92

```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```

=====
V V I SSSS U U A L (v 6.2.2006)
V V I SS U U A A L
V V I SS U U A A A A L
V V I SS U U A A L
V V I SSSS UUUU A A LLLL

000 TTTT TTTT H H Y Y M M 000 TM
0 0 T T H H Y Y MM MM 0 0
0 0 T T H H Y M M 0 0
000 T T H H Y M M 000

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***** D E T A I L E D O U T P U T *****

```

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
Output filename: C:\Users\PYung\AppData\Local\Civica\531e1913-0e12-4e2e-9684-
e2ef03acaa05\855f20eb-f569-45b5-b34e-c4b1b22ceb1a\scenar
Summary filename: C:\Users\PYung\AppData\Local\Civica\531e1913-0e12-4e2e-9684-
e2ef03acaa05\855f20eb-f569-45b5-b34e-c4b1b22ceb1a\scenar

```

DATE: 03/10/2022

TIME: 10:00:32

USER:

COMMENTS: _____

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*****
** SIMULATION : AES_06hr_005yr **
*****

```

| READ STORM | Filename: C:\Users\PYung\AppData

ata\Local\Temp\
34abe0e9-1b72-402d-8c5e-c0fdd428aacc\af37ed82
Ptotal= 52.41 mm Comments: AES_06hr_005yr

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	0.00	2.00	17.82	3.75	7.34	5.50	1.05
0.50	1.05	2.25	17.82	4.00	4.19	5.75	1.05
0.75	1.05	2.50	48.21	4.25	4.19	6.00	1.05
1.00	1.05	2.75	48.21	4.50	2.10	6.25	1.05
1.25	1.05	3.00	13.62	4.75	2.10		
1.50	6.29	3.25	13.62	5.00	1.05		
1.75	6.29	3.50	7.34	5.25	1.05		

CALIB (0205)
NASHYD (0205)
ID= 1 DT= 5.0 min
Area (ha)= 0.25
Ia (mm)= 5.00
U.H. Tp(hrs)= 0.03
Curve Number (CN)= 53.0
of Linear Res.(N)= 3.00

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	6.29	3.250	13.62	4.83	1.05
0.167	0.00	1.750	6.29	3.333	7.34	4.92	1.05
0.250	0.00	1.833	17.82	3.417	7.34	5.00	1.05
0.333	1.05	1.917	17.82	3.500	7.34	5.08	1.05
0.417	1.05	2.000	17.82	3.583	7.34	5.17	1.05
0.500	1.05	2.083	17.82	3.667	7.34	5.25	1.05
0.583	1.05	2.167	17.82	3.750	7.34	5.33	1.05
0.667	1.05	2.250	17.82	3.833	4.19	5.42	1.05
0.750	1.05	2.333	48.21	3.917	4.19	5.50	1.05
0.833	1.05	2.417	48.21	4.000	4.19	5.58	1.05
0.917	1.05	2.500	48.21	4.083	4.19	5.67	1.05
1.000	1.05	2.583	48.21	4.167	4.19	5.75	1.05
1.083	1.05	2.667	48.21	4.250	4.19	5.83	1.05
1.167	1.05	2.750	48.21	4.333	2.10	5.92	1.05
1.250	1.05	2.833	13.62	4.417	2.10	6.00	1.05
1.333	6.29	2.917	13.62	4.500	2.10	6.08	1.05
1.417	6.29	3.000	13.62	4.583	2.10	6.17	1.05
1.500	6.29	3.083	13.62	4.667	2.10	6.25	1.05
1.583	6.29	3.167	13.62	4.750	2.10		

Unit Hyd Qpeak (cms)= 0.318

PEAK FLOW (cms)= 0.003 (i)
TIME TO PEAK (hrs)= 2.750
RUNOFF VOLUME (mm)= 2.775
TOTAL RAINFALL (mm)= 52.410
RUNOFF COEFFICIENT = 0.053

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB
STANDHYD (0201)
ID= 1 DT= 5.0 min
Area (ha)= 12.86
Total Imp(%)= 70.00
Dir. Conn.(%)= 60.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	9.00	3.86
Dep. Storage (mm)=	2.00	5.00
Average Slope (%)=	5.00	2.00
Length (m)=	292.00	40.00
Mannings n =	0.013	0.250

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	6.29	3.250	13.62	4.83	1.05
0.167	0.00	1.750	6.29	3.333	7.34	4.92	1.05
0.250	0.00	1.833	17.82	3.417	7.34	5.00	1.05
0.333	1.05	1.917	17.82	3.500	7.34	5.08	1.05
0.417	1.05	2.000	17.82	3.583	7.34	5.17	1.05
0.500	1.05	2.083	17.82	3.667	7.34	5.25	1.05
0.583	1.05	2.167	17.82	3.750	7.34	5.33	1.05
0.667	1.05	2.250	17.82	3.833	4.19	5.42	1.05
0.750	1.05	2.333	48.21	3.917	4.19	5.50	1.05
0.833	1.05	2.417	48.21	4.000	4.19	5.58	1.05
0.917	1.05	2.500	48.21	4.083	4.19	5.67	1.05
1.000	1.05	2.583	48.21	4.167	4.19	5.75	1.05
1.083	1.05	2.667	48.21	4.250	4.19	5.83	1.05
1.167	1.05	2.750	48.21	4.333	2.10	5.92	1.05
1.250	1.05	2.833	13.62	4.417	2.10	6.00	1.05
1.333	6.29	2.917	13.62	4.500	2.10	6.08	1.05
1.417	6.29	3.000	13.62	4.583	2.10	6.17	1.05
1.500	6.29	3.083	13.62	4.667	2.10	6.25	1.05
1.583	6.29	3.167	13.62	4.750	2.10		

Max.Eff.Inten.(mm/hr)= 48.21
over (min)= 5.00
Storage Coeff. (min)= 4.02 (ii)
Unit Hyd. Tpeak (min)= 5.00
Unit Hyd. peak (cms)= 0.24

PEAK FLOW (cms)= 1.03
TIME TO PEAK (hrs)= 2.75
RUNOFF VOLUME (mm)= 50.41
TOTAL RAINFALL (mm)= 52.41
RUNOFF COEFFICIENT = 0.96

TOTALS
1.129 (iii)
2.75
34.60
52.41
0.66

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 53.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB
STANDHYD (0202)
ID= 1 DT= 5.0 min
Area (ha)= 4.27
Total Imp(%)= 60.00
Dir. Conn.(%)= 45.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	2.56	1.71
Dep. Storage (mm)=	2.00	5.00
Average Slope (%)=	5.00	2.00
Length (m)=	168.72	40.00
Mannings n =	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	6.29	3.250	13.62	4.83	1.05
0.167	0.00	1.750	6.29	3.333	7.34	4.92	1.05
0.250	0.00	1.833	17.82	3.417	7.34	5.00	1.05
0.333	1.05	1.917	17.82	3.500	7.34	5.08	1.05

0.417	1.05	2.000	17.82	3.583	7.34	5.17	1.05
0.500	1.05	2.083	17.82	3.667	7.34	5.25	1.05
0.583	1.05	2.167	17.82	3.750	7.34	5.33	1.05
0.667	1.05	2.250	17.82	3.833	4.19	5.42	1.05
0.750	1.05	2.333	48.21	3.917	4.19	5.50	1.05
0.833	1.05	2.417	48.21	4.000	4.19	5.58	1.05
0.917	1.05	2.500	48.21	4.083	4.19	5.67	1.05
1.000	1.05	2.583	48.21	4.167	4.19	5.75	1.05
1.083	1.05	2.667	48.21	4.250	4.19	5.83	1.05
1.167	1.05	2.750	48.21	4.333	2.10	5.92	1.05
1.250	1.05	2.833	13.62	4.417	2.10	6.00	1.05
1.333	6.29	2.917	13.62	4.500	2.10	6.08	1.05
1.417	6.29	3.000	13.62	4.583	2.10	6.17	1.05
1.500	6.29	3.083	13.62	4.667	2.10	6.25	1.05
1.583	6.29	3.167	13.62	4.750	2.10		

Max.Eff.Inten.(mm/hr)= 48.21 17.66
 over (min) 5.00 20.00
 Storage Coeff. (min)= 2.89 (ii) 17.01 (ii)
 Unit Hyd. Tpeak (min)= 5.00 20.00
 Unit Hyd. peak (cms)= 0.28 0.06

TOTALS

PEAK FLOW (cms)= 0.26 0.06 0.305 (iii)
 TIME TO PEAK (hrs)= 2.75 2.92 2.75
 RUNOFF VOLUME (mm)= 50.41 11.19 28.84
 TOTAL RAINFALL (mm)= 52.41 52.41 52.41
 RUNOFF COEFFICIENT = 0.96 0.21 0.55

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PVIOUS LOSSES:
 CN* = 53.0 Ia = Dep. Storage (Above)
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB		STANDHYD (0203)		ID= 1 DT= 5.0 min	
Area (ha)=	1.39	Dir. Conn.(%)=	50.00		
Total Imp(%)=	50.00				
IMPERVIOUS PERVIOUS (i)					
Surface Area (ha)=	0.69	0.69			
Dep. Storage (mm)=	2.00	5.00			
Average Slope (%)=	5.00	2.00			
Length (m)=	96.26	40.00			
Mannings n	0.013	0.250			

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	1.667	6.29	3.250	13.62	4.83	1.05
0.167	0.00	1.750	6.29	3.333	7.34	4.92	1.05
0.250	0.00	1.833	17.82	3.417	7.34	5.00	1.05
0.333	1.05	1.917	17.82	3.500	7.34	5.08	1.05
0.417	1.05	2.000	17.82	3.583	7.34	5.17	1.05
0.500	1.05	2.083	17.82	3.667	7.34	5.25	1.05
0.583	1.05	2.167	17.82	3.750	7.34	5.33	1.05
0.667	1.05	2.250	17.82	3.833	4.19	5.42	1.05
0.750	1.05	2.333	48.21	3.917	4.19	5.50	1.05
0.833	1.05	2.417	48.21	4.000	4.19	5.58	1.05
0.917	1.05	2.500	48.21	4.083	4.19	5.67	1.05
1.000	1.05	2.583	48.21	4.167	4.19	5.75	1.05
1.083	1.05	2.667	48.21	4.250	4.19	5.83	1.05
1.167	1.05	2.750	48.21	4.333	2.10	5.92	1.05
1.250	1.05	2.833	13.62	4.417	2.10	6.00	1.05

1.333	6.29	2.917	13.62	4.500	2.10	6.08	1.05
1.417	6.29	3.000	13.62	4.583	2.10	6.17	1.05
1.500	6.29	3.083	13.62	4.667	2.10	6.25	1.05
1.583	6.29	3.167	13.62	4.750	2.10		

Max.Eff.Inten.(mm/hr)= 48.21 8.85
 over (min) 5.00 25.00
 Storage Coeff. (min)= 2.06 (ii) 20.68 (ii)
 Unit Hyd. Tpeak (min)= 5.00 25.00
 Unit Hyd. peak (cms)= 0.31 0.05

TOTALS

PEAK FLOW (cms)= 0.09 0.01 0.101 (iii)
 TIME TO PEAK (hrs)= 2.75 3.00 2.75
 RUNOFF VOLUME (mm)= 50.41 8.24 29.32
 TOTAL RAINFALL (mm)= 52.41 52.41 52.41
 RUNOFF COEFFICIENT = 0.96 0.16 0.56

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PVIOUS LOSSES:
 CN* = 53.0 Ia = Dep. Storage (Above)
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0001)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0201):	12.86	1.129	2.75	34.60
+ ID2= 2 (0202):	4.27	0.305	2.75	28.84
=====				
ID = 3 (0001):	17.13	1.434	2.75	33.16

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0001)				
3 + 2 = 1	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0001):	17.13	1.434	2.75	33.16
+ ID2= 2 (0203):	1.39	0.101	2.75	29.32
=====				
ID = 1 (0001):	18.52	1.535	2.75	32.87

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0002)					OVERFLOW IS OFF			
IN= 2--> OUT= 1					DT= 5.0 min			
					OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
					0.0000	0.0000	0.9767	0.7368
					0.0148	0.0921	1.2208	0.8058
					0.0235	0.1922	1.4829	0.8763
					0.0298	0.3003	2.0785	0.9483
					0.0325	0.3573	2.9524	1.0220
					0.0983	0.4161	4.0123	1.0972
					0.2165	0.4768	5.2246	1.1739
					0.3687	0.5394	6.5698	1.2522
					0.5485	0.6036	9.6096	1.4134
					0.7520	0.6694	14.9233	1.6661
					AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0001)					18.520	1.535	2.75	32.87
OUTFLOW: ID= 1 (0002)					18.520	0.211	3.83	32.79

PEAK FLOW REDUCTION [Qout/Qin](%)= 13.72
 TIME SHIFT OF PEAK FLOW (min)= 65.00
 MAXIMUM STORAGE USED (ha.m.)= 0.4739

CALIB
 STANDHYD (0204)
 ID= 1 DT= 5.0 min

Area (ha)= 2.28
 Total Imp(%)= 50.00 Dir. Conn.(%)= 30.00

IMPERVIOUS PERVIOUS (i)
 Surface Area (ha)= 1.14 1.14
 Dep. Storage (mm)= 2.00 5.00
 Average Slope (%)= 5.00 2.00
 Length (m)= 123.29 40.00
 Mannings n = 0.013 0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	6.29	3.250	13.62	4.83	1.05
0.167	0.00	1.750	6.29	3.333	7.34	4.92	1.05
0.250	0.00	1.833	17.82	3.417	7.34	5.00	1.05
0.333	1.05	1.917	17.82	3.500	7.34	5.08	1.05
0.417	1.05	2.000	17.82	3.583	7.34	5.17	1.05
0.500	1.05	2.083	17.82	3.667	7.34	5.25	1.05
0.583	1.05	2.167	17.82	3.750	7.34	5.33	1.05
0.667	1.05	2.250	17.82	3.833	4.19	5.42	1.05
0.750	1.05	2.333	48.21	3.917	4.19	5.50	1.05
0.833	1.05	2.417	48.21	4.000	4.19	5.58	1.05
0.917	1.05	2.500	48.21	4.083	4.19	5.67	1.05
1.000	1.05	2.583	48.21	4.167	4.19	5.75	1.05
1.083	1.05	2.667	48.21	4.250	4.19	5.83	1.05
1.167	1.05	2.750	48.21	4.333	2.10	5.92	1.05
1.250	1.05	2.833	13.62	4.417	2.10	6.00	1.05
1.333	6.29	2.917	13.62	4.500	2.10	6.08	1.05
1.417	6.29	3.000	13.62	4.583	2.10	6.17	1.05
1.500	6.29	3.083	13.62	4.667	2.10	6.25	1.05
1.583	6.29	3.167	13.62	4.750	2.10		

Max.Eff.Inten.(mm/hr)= 48.21 18.27
 over (min)= 5.00 20.00
 Storage Coeff. (min)= 2.39 (ii) 16.32 (ii)
 Unit Hyd. Tpeak (min)= 5.00 20.00
 Unit Hyd. peak (cms)= 0.30 0.06

TOTALS
 PEAK FLOW (cms)= 0.09 0.04 0.125 (iii)
 TIME TO PEAK (hrs)= 2.75 2.92 2.75
 RUNOFF VOLUME (mm)= 50.41 11.37 23.08
 TOTAL RAINFALL (mm)= 52.41 52.41 52.41
 RUNOFF COEFFICIENT = 0.96 0.22 0.44

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 CN* = 53.0 Ia = Dep. Storage (Above)
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0003)
 1 + 2 = 3

AREA QPEAK TPEAK R.V.
 (ha) (cms) (hrs) (mm)

ID1= 1 (0002): 18.52 0.211 3.83 32.79
 + ID2= 2 (0204): 2.28 0.125 2.75 23.08
 ID = 3 (0003): 20.80 0.238 3.75 31.72

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0003)
 3 + 2 = 1

AREA QPEAK TPEAK R.V.
 (ha) (cms) (hrs) (mm)

ID1= 3 (0003): 20.80 0.238 3.75 31.72
 + ID2= 2 (0205): 0.25 0.003 2.75 2.77
 ID = 1 (0003): 21.05 0.238 3.75 31.38

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

V V I SSSS U U A L (v 6.2.2006)
 V V I SS U U A A L
 V V I SS U U A A L
 V V I SS U U A A L
 VV I SSSS UUUU A A LLLL

000 TTTT TTTT H H Y Y M M 000 TM
 0 0 T T H H Y Y MM MM 0 0
 0 0 T T H H Y M M 0 0
 000 T T H H Y M M 000

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***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
 Output filename: C:\Users\PYUNG\AppData\Local\Civica\531e1913-0e12-4e2e-9684-e2ef03acaa05\36af06f8-e4e9-4e89-86d7-f320de46ddb9\scenar
 Summary filename: C:\Users\PYUNG\AppData\Local\Civica\531e1913-0e12-4e2e-9684-e2ef03acaa05\36af06f8-e4e9-4e89-86d7-f320de46ddb9\scenar

DATE: 03/10/2022 TIME: 10:00:32

USER:

COMMENTS:

 ** SIMULATION : AES_06hr_010yr **

READ STORM Filename: C:\Users\PYUNG\AppData\Local\Temp\34abe0e9-1b72-402d-8c5e-c0fdd428aacc\b0a61c61
 Ptotal= 61.50 mm Comments: AES_06hr_010yr

TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN

hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.25	0.00	2.00	20.91	3.75	8.61	5.50	1.23
0.50	1.23	2.25	20.91	4.00	4.92	5.75	1.23
0.75	1.23	2.50	56.58	4.25	4.92	6.00	1.23
1.00	1.23	2.75	56.58	4.50	2.46	6.25	1.23
1.25	1.23	3.00	15.99	4.75	2.46		
1.50	7.38	3.25	15.99	5.00	1.23		
1.75	7.38	3.50	8.61	5.25	1.23		

CALIB			
NASHYD (0205)	Area (ha)=	0.25	Curve Number (CN)= 53.0
ID= 1 DT= 5.0 min	Ia (mm)=	5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	0.03	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	1.667	7.38	3.250	15.99	4.83	1.23
0.167	0.00	1.750	7.38	3.333	8.61	4.92	1.23
0.250	0.00	1.833	20.91	3.417	8.61	5.00	1.23
0.333	1.23	1.917	20.91	3.500	8.61	5.08	1.23
0.417	1.23	2.000	20.91	3.583	8.61	5.17	1.23
0.500	1.23	2.083	20.91	3.667	8.61	5.25	1.23
0.583	1.23	2.167	20.91	3.750	8.61	5.33	1.23
0.667	1.23	2.250	20.91	3.833	4.92	5.42	1.23
0.750	1.23	2.333	56.58	3.917	4.92	5.50	1.23
0.833	1.23	2.417	56.58	4.000	4.92	5.58	1.23
0.917	1.23	2.500	56.58	4.083	4.92	5.67	1.23
1.000	1.23	2.583	56.58	4.167	4.92	5.75	1.23
1.083	1.23	2.667	56.58	4.250	4.92	5.83	1.23
1.167	1.23	2.750	56.58	4.333	2.46	5.92	1.23
1.250	1.23	2.833	15.99	4.417	2.46	6.00	1.23
1.333	7.38	2.917	15.99	4.500	2.46	6.08	1.23
1.417	7.38	3.000	15.99	4.583	2.46	6.17	1.23
1.500	7.38	3.083	15.99	4.667	2.46	6.25	1.23
1.583	7.38	3.167	15.99	4.750	2.46		

Unit Hyd Qpeak (cms)= 0.318

PEAK FLOW (cms)= 0.003 (i)
 TIME TO PEAK (hrs)= 2.750
 RUNOFF VOLUME (mm)= 3.814
 TOTAL RAINFALL (mm)= 61.500
 RUNOFF COEFFICIENT = 0.062

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
STANDHYD (0201)	Area (ha)=	12.86	
ID= 1 DT= 5.0 min	Total Imp(%)=	70.00	Dir. Conn.(%)= 60.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	9.00	3.86
Dep. Storage (mm)=	2.00	5.00
Average Slope (%)=	5.00	2.00
Length (m)=	292.80	40.00
Mannings n =	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	1.667	7.38	3.250	15.99	4.83	1.23
0.167	0.00	1.750	7.38	3.333	8.61	4.92	1.23
0.250	0.00	1.833	20.91	3.417	8.61	5.00	1.23
0.333	1.23	1.917	20.91	3.500	8.61	5.08	1.23
0.417	1.23	2.000	20.91	3.583	8.61	5.17	1.23
0.500	1.23	2.083	20.91	3.667	8.61	5.25	1.23
0.583	1.23	2.167	20.91	3.750	8.61	5.33	1.23
0.667	1.23	2.250	20.91	3.833	4.92	5.42	1.23
0.750	1.23	2.333	56.58	3.917	4.92	5.50	1.23
0.833	1.23	2.417	56.58	4.000	4.92	5.58	1.23
0.917	1.23	2.500	56.58	4.083	4.92	5.67	1.23
1.000	1.23	2.583	56.58	4.167	4.92	5.75	1.23
1.083	1.23	2.667	56.58	4.250	4.92	5.83	1.23
1.167	1.23	2.750	56.58	4.333	2.46	5.92	1.23
1.250	1.23	2.833	15.99	4.417	2.46	6.00	1.23
1.333	7.38	2.917	15.99	4.500	2.46	6.08	1.23
1.417	7.38	3.000	15.99	4.583	2.46	6.17	1.23
1.500	7.38	3.083	15.99	4.667	2.46	6.25	1.23
1.583	7.38	3.167	15.99	4.750	2.46		

Max.Eff.Inten.(mm/hr)= 56.58 22.49
 over (min) 5.00 20.00
 Storage Coeff. (min)= 3.77 (ii) 16.59 (iii)
 Unit Hyd. Tpeak (min)= 5.00 20.00
 Unit Hyd. peak (cms)= 0.25 0.06

TOTALS
 PEAK FLOW (cms)= 1.21 0.16 1.352 (iii)
 TIME TO PEAK (hrs)= 2.75 2.92 2.75
 RUNOFF VOLUME (mm)= 59.50 14.71 41.58
 TOTAL RAINFALL (mm)= 61.50 61.50 61.50
 RUNOFF COEFFICIENT = 0.97 0.24 0.68

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 CN* = 53.0 Ia = Dep. Storage (Above)
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
STANDHYD (0202)	Area (ha)=	4.27	
ID= 1 DT= 5.0 min	Total Imp(%)=	60.00	Dir. Conn.(%)= 45.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	2.56	1.71
Dep. Storage (mm)=	2.00	5.00
Average Slope (%)=	5.00	2.00
Length (m)=	168.72	40.00
Mannings n =	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	1.667	7.38	3.250	15.99	4.83	1.23
0.167	0.00	1.750	7.38	3.333	8.61	4.92	1.23
0.250	0.00	1.833	20.91	3.417	8.61	5.00	1.23
0.333	1.23	1.917	20.91	3.500	8.61	5.08	1.23
0.417	1.23	2.000	20.91	3.583	8.61	5.17	1.23
0.500	1.23	2.083	20.91	3.667	8.61	5.25	1.23
0.583	1.23	2.167	20.91	3.750	8.61	5.33	1.23
0.667	1.23	2.250	20.91	3.833	4.92	5.42	1.23
0.750	1.23	2.333	56.58	3.917	4.92	5.50	1.23

0.833	1.23	2.417	56.58	4.000	4.92	5.58	1.23
0.917	1.23	2.500	56.58	4.083	4.92	5.67	1.23
1.000	1.23	2.583	56.58	4.167	4.92	5.75	1.23
1.083	1.23	2.667	56.58	4.250	4.92	5.83	1.23
1.167	1.23	2.750	56.58	4.333	2.46	5.92	1.23
1.250	1.23	2.833	15.99	4.417	2.46	6.00	1.23
1.333	7.38	2.917	15.99	4.500	2.46	6.08	1.23
1.417	7.38	3.000	15.99	4.583	2.46	6.17	1.23
1.500	7.38	3.083	15.99	4.667	2.46	6.25	1.23
1.583	7.38	3.167	15.99	4.750	2.46		

Max.Eff.Inten.(mm/hr)=	56.58	23.81
over (min)	5.00	20.00
Storage Coeff. (min)=	2.71 (ii)	15.24 (ii)
Unit Hyd. Tpeak (min)=	5.00	20.00
Unit Hyd. peak (cms)=	0.29	0.07

PEAK FLOW (cms)=	0.30	0.08	0.370 (iii)
TIME TO PEAK (hrs)=	2.75	2.92	2.75
RUNOFF VOLUME (mm)=	59.50	15.10	35.08
TOTAL RAINFALL (mm)=	61.50	61.50	61.50
RUNOFF COEFFICIENT =	0.97	0.25	0.57

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PVIOUS LOSSES:
CN* = 53.0 Ia = Dep. Storage (Above)
- (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
- (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	
STANDHYD (0203)	
ID= 1 DT= 5.0 min	

Area (ha)=	1.39
Total Imp(%)=	50.00
Dir. Conn.(%)=	50.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	0.69	0.69
Dep. Storage (mm)=	2.00	5.00
Average Slope (%)=	5.00	2.00
Length (m)=	96.26	40.00
Mannings n	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	1.667	7.38	3.250	15.99	4.83	1.23
0.167	0.00	1.750	7.38	3.333	8.61	4.92	1.23
0.250	0.00	1.833	20.91	3.417	8.61	5.00	1.23
0.333	1.23	1.917	20.91	3.500	8.61	5.08	1.23
0.417	1.23	2.000	20.91	3.583	8.61	5.17	1.23
0.500	1.23	2.083	20.91	3.667	8.61	5.25	1.23
0.583	1.23	2.167	20.91	3.750	8.61	5.33	1.23
0.667	1.23	2.250	20.91	3.833	4.92	5.42	1.23
0.750	1.23	2.333	56.58	3.917	4.92	5.50	1.23
0.833	1.23	2.417	56.58	4.000	4.92	5.58	1.23
0.917	1.23	2.500	56.58	4.083	4.92	5.67	1.23
1.000	1.23	2.583	56.58	4.167	4.92	5.75	1.23
1.083	1.23	2.667	56.58	4.250	4.92	5.83	1.23
1.167	1.23	2.750	56.58	4.333	2.46	5.92	1.23
1.250	1.23	2.833	15.99	4.417	2.46	6.00	1.23
1.333	7.38	2.917	15.99	4.500	2.46	6.08	1.23
1.417	7.38	3.000	15.99	4.583	2.46	6.17	1.23
1.500	7.38	3.083	15.99	4.667	2.46	6.25	1.23
1.583	7.38	3.167	15.99	4.750	2.46		

Max.Eff.Inten.(mm/hr)=	56.58	12.19
over (min)	5.00	20.00
Storage Coeff. (min)=	1.93 (ii)	18.31 (ii)
Unit Hyd. Tpeak (min)=	5.00	20.00
Unit Hyd. peak (cms)=	0.31	0.06

PEAK FLOW (cms)=	0.11	0.02	0.123 (iii)
TIME TO PEAK (hrs)=	2.75	2.92	2.75
RUNOFF VOLUME (mm)=	59.50	11.33	35.41
TOTAL RAINFALL (mm)=	61.50	61.50	61.50
RUNOFF COEFFICIENT =	0.97	0.18	0.58

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PVIOUS LOSSES:
CN* = 53.0 Ia = Dep. Storage (Above)
- (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
- (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0001)				
	AREA	QPEAK	TPEAK	R.V.
	(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0201):	12.86	1.352	2.75	41.58
+ ID2= 2 (0202):	4.27	0.370	2.75	35.08
=====				
ID = 3 (0001):	17.13	1.722	2.75	39.96

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0001)				
	AREA	QPEAK	TPEAK	R.V.
	(ha)	(cms)	(hrs)	(mm)
ID1= 3 (0001):	17.13	1.722	2.75	39.96
+ ID2= 2 (0203):	1.39	0.123	2.75	35.41
=====				
ID = 1 (0001):	18.52	1.845	2.75	39.62

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0002)				
IN= 2----> OUT= 1				
DT= 5.0 min				
OVERFLOW IS OFF				
OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)	
0.0000	0.0000	0.9767	0.7368	
0.0148	0.0921	1.2208	0.8058	
0.0235	0.1922	1.4829	0.8763	
0.0298	0.3003	2.0785	0.9483	
0.0325	0.3573	2.9524	1.0220	
0.0983	0.4161	4.0123	1.0972	
0.2165	0.4768	5.2246	1.1739	
0.3687	0.5394	6.5698	1.2522	
0.5485	0.6036	9.6096	1.4134	
0.7520	0.6694	14.9233	1.6661	

	AREA	QPEAK	TPEAK	R.V.
	(ha)	(cms)	(hrs)	(mm)
INFLOW : ID= 2 (0001)	18.520	1.845	2.75	39.62
OUTFLOW: ID= 1 (0002)	18.520	0.345	3.75	39.54

PEAK FLOW REDUCTION [Qout/Qin](%)=	18.71
TIME SHIFT OF PEAK FLOW (min)=	60.00
MAXIMUM STORAGE USED (ha.m.)=	0.5298

```

-----
| CALIB |
| STANDHYD ( 0204) | Area (ha)= 2.28
| ID= 1 DT= 5.0 min | Total Imp(%)= 50.00 Dir. Conn.(%)= 30.00
-----

          IMPERVIOUS    PERVIOUS (i)
Surface Area (ha)= 1.14 1.14
Dep. Storage (mm)= 2.00 5.00
Average Slope (%)= 5.00 2.00
Length (m)= 123.29 40.00
Mannings n = 0.013 0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

          ---- TRANSFORMED HYETOGRAPH ----
          TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
          hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
0.083 0.00 | 1.667 7.38 | 3.250 15.99 | 4.83 1.23
0.167 0.00 | 1.750 7.38 | 3.333 8.61 | 4.92 1.23
0.250 0.00 | 1.833 20.91 | 3.417 8.61 | 5.00 1.23
0.333 1.23 | 1.917 20.91 | 3.500 8.61 | 5.08 1.23
0.417 1.23 | 2.000 20.91 | 3.583 8.61 | 5.17 1.23
0.500 1.23 | 2.083 20.91 | 3.667 8.61 | 5.25 1.23
0.583 1.23 | 2.167 20.91 | 3.750 8.61 | 5.33 1.23
0.667 1.23 | 2.250 20.91 | 3.833 4.92 | 5.42 1.23
0.750 1.23 | 2.333 56.58 | 3.917 4.92 | 5.50 1.23
0.833 1.23 | 2.417 56.58 | 4.000 4.92 | 5.58 1.23
0.917 1.23 | 2.500 56.58 | 4.083 4.92 | 5.67 1.23
1.000 1.23 | 2.583 56.58 | 4.167 4.92 | 5.75 1.23
1.083 1.23 | 2.667 56.58 | 4.250 4.92 | 5.83 1.23
1.167 1.23 | 2.750 56.58 | 4.333 2.46 | 5.92 1.23
1.250 1.23 | 2.833 15.99 | 4.417 2.46 | 6.00 1.23
1.333 7.38 | 2.917 15.99 | 4.500 2.46 | 6.08 1.23
1.417 7.38 | 3.000 15.99 | 4.583 2.46 | 6.17 1.23
1.500 7.38 | 3.083 15.99 | 4.667 2.46 | 6.25 1.23
1.583 7.38 | 3.167 15.99 | 4.750 2.46 |

Max.Eff.Inten.(mm/hr)= 56.58 24.61
over (min) 5.00 15.00
Storage Coeff. (min)= 2.24 (ii) 14.61 (ii)
Unit Hyd. Tpeak (min)= 5.00 15.00
Unit Hyd. peak (cms)= 0.30 0.08

          *TOTALS*
PEAK FLOW (cms)= 0.11 0.06 0.161 (iii)
TIME TO PEAK (hrs)= 2.75 2.83 2.75
RUNOFF VOLUME (mm)= 59.50 15.34 28.58
TOTAL RAINFALL (mm)= 61.50 61.50 61.50
RUNOFF COEFFICIENT = 0.97 0.25 0.46

```

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 CN* = 53.0 Ia = Dep. Storage (Above)
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```

-----
| ADD HYD ( 0003) |
| 1 + 2 = 3 |
-----

          AREA    QPEAK    TPEAK    R.V.
          (ha)    (cms)    (hrs)    (mm)
ID1= 1 ( 0002): 18.52 0.345 3.75 39.54
+ ID2= 2 ( 0204): 2.28 0.161 2.75 28.58
=====
ID = 3 ( 0003): 20.80 0.382 3.58 38.33

```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```

-----
| ADD HYD ( 0003) |
| 3 + 2 = 1 |
-----

          AREA    QPEAK    TPEAK    R.V.
          (ha)    (cms)    (hrs)    (mm)
ID1= 3 ( 0003): 20.80 0.382 3.58 38.33
+ ID2= 2 ( 0205): 0.25 0.003 2.75 3.81
=====
ID = 1 ( 0003): 21.05 0.382 3.58 37.92

```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```

=====
V V I SSSS U U A L (v 6.2.2006)
V V I SS U U A A L
V V I SS U U A A A L
V V I SS U U A A L
VV I SSSS UUUU A A LLLL

000 TTTT TTTT H H Y Y M M 000 TM
0 0 T T H H Y Y MM MM 0 0
0 0 T T H H Y M M 0 0
000 T T H H Y M M 000

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***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
 Output filename: C:\Users\PYung\AppData\Local\Civica\XH5\531e1913-0e12-4e2e-9684-e2ef03acaa05\8f9b1644-02ba-4d1f-932a-12bed054710c\scenar
 Summary filename: C:\Users\PYung\AppData\Local\Civica\XH5\531e1913-0e12-4e2e-9684-e2ef03acaa05\8f9b1644-02ba-4d1f-932a-12bed054710c\scenar

DATE: 03/10/2022

TIME: 10:00:32

USER:

COMMENTS:

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*****
** SIMULATION : AES_06hr_025yr **
*****

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-----
| READ STORM |
| Ptotal= 72.91 mm |
-----

Filename: C:\Users\PYung\AppData\Local\Temp\34abe0e9-1b72-402d-8c5e-c0fdd428aacc\ea9f6f15
Comments: AES_06hr_025yr

```

```

          TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
          hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
0.25 0.00 | 2.00 24.79 | 3.75 10.21 | 5.50 1.46
0.50 1.46 | 2.25 24.79 | 4.00 5.83 | 5.75 1.46
0.75 1.46 | 2.50 67.07 | 4.25 5.83 | 6.00 1.46
1.00 1.46 | 2.75 67.07 | 4.50 2.92 | 6.25 1.46

```


1.25	1.46	3.00	18.95	4.75	2.92
1.50	8.75	3.25	18.95	5.00	1.46
1.75	8.75	3.50	10.21	5.25	1.46

CALIB					
NASHYD (0205)	Area (ha)=	0.25	Curve Number (CN)=	53.0	
ID= 1 DT= 5.0 min	Ia (mm)=	5.00	# of Linear Res.(N)=	3.00	
	U.H. Tp(hrs)=	0.03			

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	1.667	8.75	3.250	18.95	4.83	1.46
0.167	0.00	1.750	8.75	3.333	10.21	4.92	1.46
0.250	0.00	1.833	24.79	3.417	10.21	5.00	1.46
0.333	1.46	1.917	24.79	3.500	10.21	5.08	1.46
0.417	1.46	2.000	24.79	3.583	10.21	5.17	1.46
0.500	1.46	2.083	24.79	3.667	10.21	5.25	1.46
0.583	1.46	2.167	24.79	3.750	10.21	5.33	1.46
0.667	1.46	2.250	24.79	3.833	5.83	5.42	1.46
0.750	1.46	2.333	67.07	3.917	5.83	5.50	1.46
0.833	1.46	2.417	67.07	4.000	5.83	5.58	1.46
0.917	1.46	2.500	67.07	4.083	5.83	5.67	1.46
1.000	1.46	2.583	67.07	4.167	5.83	5.75	1.46
1.083	1.46	2.667	67.07	4.250	5.83	5.83	1.46
1.167	1.46	2.750	67.07	4.333	2.92	5.92	1.46
1.250	1.46	2.833	18.95	4.417	2.92	6.00	1.46
1.333	8.75	2.917	18.95	4.500	2.92	6.08	1.46
1.417	8.75	3.000	18.95	4.583	2.92	6.17	1.46
1.500	8.75	3.083	18.95	4.667	2.92	6.25	1.46
1.583	8.75	3.167	18.95	4.750	2.92		

Unit Hyd Qpeak (cms)= 0.318

PEAK FLOW (cms)=	0.005 (i)
TIME TO PEAK (hrs)=	2.750
RUNOFF VOLUME (mm)=	5.295
TOTAL RAINFALL (mm)=	72.910
RUNOFF COEFFICIENT	= 0.073

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB					
STANDHYD (0201)	Area (ha)=	12.86			
ID= 1 DT= 5.0 min	Total Imp(%)=	70.00	Dir. Conn.(%)=	60.00	

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	9.00	3.86
Dep. Storage (mm)=	2.00	5.00
Average Slope (%)=	5.00	2.00
Length (m)=	292.80	40.00
Mannings n	= 0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	1.667	8.75	3.250	18.95	4.83	1.46
0.167	0.00	1.750	8.75	3.333	10.21	4.92	1.46
0.250	0.00	1.833	24.79	3.417	10.21	5.00	1.46

0.333	1.46	1.917	24.79	3.500	10.21	5.08	1.46
0.417	1.46	2.000	24.79	3.583	10.21	5.17	1.46
0.500	1.46	2.083	24.79	3.667	10.21	5.25	1.46
0.583	1.46	2.167	24.79	3.750	10.21	5.33	1.46
0.667	1.46	2.250	24.79	3.833	5.83	5.42	1.46
0.750	1.46	2.333	67.07	3.917	5.83	5.50	1.46
0.833	1.46	2.417	67.07	4.000	5.83	5.58	1.46
0.917	1.46	2.500	67.07	4.083	5.83	5.67	1.46
1.000	1.46	2.583	67.07	4.167	5.83	5.75	1.46
1.083	1.46	2.667	67.07	4.250	5.83	5.83	1.46
1.167	1.46	2.750	67.07	4.333	2.92	5.92	1.46
1.250	1.46	2.833	18.95	4.417	2.92	6.00	1.46
1.333	8.75	2.917	18.95	4.500	2.92	6.08	1.46
1.417	8.75	3.000	18.95	4.583	2.92	6.17	1.46
1.500	8.75	3.083	18.95	4.667	2.92	6.25	1.46
1.583	8.75	3.167	18.95	4.750	2.92		

Max.Eff.Inten.(mm/hr)=	67.07	30.66
over (min)	5.00	15.00
Storage Coeff. (min)=	3.52 (ii)	14.85 (ii)
Unit Hyd. Tpeak (min)=	5.00	15.00
Unit Hyd. peak (cms)=	0.26	0.08
PEAK FLOW (cms)=	1.44	0.24
TIME TO PEAK (hrs)=	2.75	2.83
RUNOFF VOLUME (mm)=	70.91	20.09
TOTAL RAINFALL (mm)=	72.91	72.91
RUNOFF COEFFICIENT	= 0.97	0.28

TOTALS

1.664 (iii)

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:

CN* = 53.0 Ia = Dep. Storage (Above)

(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.

(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB					
STANDHYD (0202)	Area (ha)=	4.27			
ID= 1 DT= 5.0 min	Total Imp(%)=	60.00	Dir. Conn.(%)=	45.00	

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	2.56	1.71
Dep. Storage (mm)=	2.00	5.00
Average Slope (%)=	5.00	2.00
Length (m)=	168.72	40.00
Mannings n	= 0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	1.667	8.75	3.250	18.95	4.83	1.46
0.167	0.00	1.750	8.75	3.333	10.21	4.92	1.46
0.250	0.00	1.833	24.79	3.417	10.21	5.00	1.46
0.333	1.46	1.917	24.79	3.500	10.21	5.08	1.46
0.417	1.46	2.000	24.79	3.583	10.21	5.17	1.46
0.500	1.46	2.083	24.79	3.667	10.21	5.25	1.46
0.583	1.46	2.167	24.79	3.750	10.21	5.33	1.46
0.667	1.46	2.250	24.79	3.833	5.83	5.42	1.46
0.750	1.46	2.333	67.07	3.917	5.83	5.50	1.46
0.833	1.46	2.417	67.07	4.000	5.83	5.58	1.46
0.917	1.46	2.500	67.07	4.083	5.83	5.67	1.46
1.000	1.46	2.583	67.07	4.167	5.83	5.75	1.46
1.083	1.46	2.667	67.07	4.250	5.83	5.83	1.46
1.167	1.46	2.750	67.07	4.333	2.92	5.92	1.46

1.250	1.46	2.833	18.95	4.417	2.92	6.00	1.46
1.333	8.75	2.917	18.95	4.500	2.92	6.08	1.46
1.417	8.75	3.000	18.95	4.583	2.92	6.17	1.46
1.500	8.75	3.083	18.95	4.667	2.92	6.25	1.46
1.583	8.75	3.167	18.95	4.750	2.92		

Max.Eff.Inten.(mm/hr)=	67.07	32.40
over (min)	5.00	15.00
Storage Coeff. (min)=	2.53 (ii)	13.61 (ii)
Unit Hyd. Tpeak (min)=	5.00	15.00
Unit Hyd. peak (cms)=	0.29	0.08

PEAK FLOW (cms)=	0.36	0.12	*TOTALS*
TIME TO PEAK (hrs)=	2.75	2.83	0.468 (iii)
RUNOFF VOLUME (mm)=	70.91	20.59	43.23
TOTAL RAINFALL (mm)=	72.91	72.91	72.91
RUNOFF COEFFICIENT =	0.97	0.28	0.59

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PVIOUS LOSSES:
CN* = 53.0 Ia = Dep. Storage (Above)
- (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
- (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	
STANDHYD (0203)	
ID= 1 DT= 5.0 min	

Area (ha)=	1.39
Total Imp(%)=	50.00
Dir. Conn.(%)=	50.00

IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	0.69
Dep. Storage (mm)=	2.00
Average Slope (%)=	5.00
Length (m)=	96.26
Mannings n	0.013

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.667	8.75	3.250	18.95	4.83	1.46
0.167	0.00	1.750	8.75	3.333	10.21	4.92	1.46
0.250	0.00	1.833	24.79	3.417	10.21	5.00	1.46
0.333	1.46	1.917	24.79	3.500	10.21	5.08	1.46
0.417	1.46	2.000	24.79	3.583	10.21	5.17	1.46
0.500	1.46	2.083	24.79	3.667	10.21	5.25	1.46
0.583	1.46	2.167	24.79	3.750	10.21	5.33	1.46
0.667	1.46	2.250	24.79	3.833	5.83	5.42	1.46
0.750	1.46	2.333	67.07	3.917	5.83	5.50	1.46
0.833	1.46	2.417	67.07	4.000	5.83	5.58	1.46
0.917	1.46	2.500	67.07	4.083	5.83	5.67	1.46
1.000	1.46	2.583	67.07	4.167	5.83	5.75	1.46
1.083	1.46	2.667	67.07	4.250	5.83	5.83	1.46
1.167	1.46	2.750	67.07	4.333	2.92	5.92	1.46
1.250	1.46	2.833	18.95	4.417	2.92	6.00	1.46
1.333	8.75	2.917	18.95	4.500	2.92	6.08	1.46
1.417	8.75	3.000	18.95	4.583	2.92	6.17	1.46
1.500	8.75	3.083	18.95	4.667	2.92	6.25	1.46
1.583	8.75	3.167	18.95	4.750	2.92		

Max.Eff.Inten.(mm/hr)=	67.07	18.06
over (min)	5.00	20.00
Storage Coeff. (min)=	1.81 (ii)	15.80 (ii)
Unit Hyd. Tpeak (min)=	5.00	20.00
Unit Hyd. peak (cms)=	0.32	0.07

PEAK FLOW (cms)=	0.13	0.02	*TOTALS*
TIME TO PEAK (hrs)=	2.75	2.92	0.150 (iii)
RUNOFF VOLUME (mm)=	70.91	15.73	2.75
TOTAL RAINFALL (mm)=	72.91	72.91	43.31
RUNOFF COEFFICIENT =	0.97	0.22	72.91
			0.59

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PVIOUS LOSSES:
CN* = 53.0 Ia = Dep. Storage (Above)
- (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
- (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0001)				
1 + 2 = 3				

AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0201):	12.86	1.664	2.75
+ ID2= 2 (0202):	4.27	0.468	2.75
ID = 3 (0001):	17.13	2.132	2.75
			48.75

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0001)				
3 + 2 = 1				

AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0001):	17.13	2.132	2.75
+ ID2= 2 (0203):	1.39	0.150	2.75
ID = 1 (0001):	18.52	2.282	2.75
			48.34

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0002)				
IN= 2--> OUT= 1				
DT= 5.0 min				

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.9767	0.7368
0.0148	0.0921	1.2208	0.8058
0.0235	0.1922	1.4829	0.8763
0.0298	0.3003	2.0785	0.9483
0.0325	0.3573	2.9524	1.0220
0.0983	0.4161	4.0123	1.0972
0.2165	0.4768	5.2246	1.1739
0.3687	0.5394	6.5698	1.2522
0.5485	0.6036	9.6096	1.4134
0.7520	0.6694	14.9233	1.6661

AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0001)	18.520	2.282	2.75
OUTFLOW: ID= 1 (0002)	18.520	0.544	3.33
			48.26

PEAK FLOW REDUCTION [Qout/Qin](%)= 23.85
TIME SHIFT OF PEAK FLOW (min)= 35.00
MAXIMUM STORAGE USED (ha.m.)= 0.6023

CALIB	
STANDHYD (0204)	
ID= 1 DT= 5.0 min	

Area (ha)=	2.28
Total Imp(%)=	50.00
Dir. Conn.(%)=	30.00

```

-----
Surface Area      (ha)=      IMPERVIOUS      PERVIOUS (i)
Dep. Storage      (mm)=      1.14
Average Slope      (%)=      2.00
Length            (m)=      5.00
Mannings n        =      123.29
                   =      40.00
                   =      0.013
                   =      0.250

```

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

```

----- TRANSFORMED HYETOGRAPH -----
TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
0.083 0.00 | 1.667 8.75 | 3.250 18.95 | 4.83 1.46
0.167 0.00 | 1.750 8.75 | 3.333 10.21 | 4.92 1.46
0.250 0.00 | 1.833 24.79 | 3.417 10.21 | 5.00 1.46
0.333 1.46 | 1.917 24.79 | 3.500 10.21 | 5.08 1.46
0.417 1.46 | 2.000 24.79 | 3.583 10.21 | 5.17 1.46
0.500 1.46 | 2.083 24.79 | 3.667 10.21 | 5.25 1.46
0.583 1.46 | 2.167 24.79 | 3.750 10.21 | 5.33 1.46
0.667 1.46 | 2.250 24.79 | 3.833 5.83 | 5.42 1.46
0.750 1.46 | 2.333 67.07 | 3.917 5.83 | 5.50 1.46
0.833 1.46 | 2.417 67.07 | 4.000 5.83 | 5.58 1.46
0.917 1.46 | 2.500 67.07 | 4.083 5.83 | 5.67 1.46
1.000 1.46 | 2.583 67.07 | 4.167 5.83 | 5.75 1.46
1.083 1.46 | 2.667 67.07 | 4.250 5.83 | 5.83 1.46
1.167 1.46 | 2.750 67.07 | 4.333 2.92 | 5.92 1.46
1.250 1.46 | 2.833 18.95 | 4.417 2.92 | 6.00 1.46
1.333 8.75 | 2.917 18.95 | 4.500 2.92 | 6.08 1.46
1.417 8.75 | 3.000 18.95 | 4.583 2.92 | 6.17 1.46
1.500 8.75 | 3.083 18.95 | 4.667 2.92 | 6.25 1.46
1.583 8.75 | 3.167 18.95 | 4.750 2.92 |

```

```

Max.Eff.Inten.(mm/hr)= 67.07 33.45
over (min) = 5.00 15.00
Storage Coeff. (min)= 2.10 (ii) 13.03 (ii)
Unit Hyd. Tpeak (min)= 5.00 15.00
Unit Hyd. peak (cms)= 0.31 0.08

```

```

*TOTALS*
PEAK FLOW (cms)= 0.13 0.08 0.205 (iii)
TIME TO PEAK (hrs)= 2.75 2.83 2.75
RUNOFF VOLUME (mm)= 70.91 20.88 35.89
TOTAL RAINFALL (mm)= 72.91 72.91 72.91
RUNOFF COEFFICIENT = 0.97 0.29 0.49

```

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 53.0 Ia = Dep. Storage (Above)
- (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
- (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```

-----
| ADD HYD ( 0003) |
| 1 + 2 = 3 |
AREA QPEAK TPEAK R.V.
(ha) (cms) (hrs) (mm)
ID1= 1 ( 0002): 18.52 0.544 3.33 48.26
+ ID2= 2 ( 0204): 2.28 0.205 2.75 35.89
=====
ID = 3 ( 0003): 20.80 0.615 3.25 46.90

```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

| ADD HYD (0003) |

```

| 3 + 2 = 1 | AREA QPEAK TPEAK R.V.
(ha) (cms) (hrs) (mm)
ID1= 3 ( 0003): 20.80 0.615 3.25 46.90
+ ID2= 2 ( 0205): 0.25 0.005 2.75 5.30
=====
ID = 1 ( 0003): 21.05 0.617 3.25 46.41

```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```

V V I SSSSS U U A L (v 6.2.2006)
V V I SS U U A A L
V V I SS U U A A L
V V I SS U U A A L
VV I SSSSS UUUU A A LLLL

```

```

000 TTTT TTTT H H Y Y M M 000 TM
0 0 T T H H Y Y MM MM 0 0
0 0 T T H H Y M M 0 0
000 T T H H Y M M 000

```

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***** DETAILED OUTPUT *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
Output filename: C:\Users\PYung\AppData\Local\Civica\531e1913-0e12-4e2e-9684-e2ef03acaa05\4fd6c071-ca0c-40ec-891d-69e0991c9ada\scenar
Summary filename: C:\Users\PYung\AppData\Local\Civica\531e1913-0e12-4e2e-9684-e2ef03acaa05\4fd6c071-ca0c-40ec-891d-69e0991c9ada\scenar

DATE: 03/10/2022

TIME: 10:00:32

USER:

COMMENTS: _____

```

*****
** SIMULATION : AES_06hr_050yr **
*****

```

```

READ STORM | Filename: C:\Users\PYung\AppData
            | ata\Local\Temp\
            | 34abe0e9-1b72-402d-8c5e-c0fdd428aacc\12dd90ee
Ptotal= 81.41 mm | Comments: AES_06hr_050yr

```

```

TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
0.25 0.00 | 2.00 27.68 | 3.75 11.40 | 5.50 1.63
0.50 1.63 | 2.25 27.68 | 4.00 6.51 | 5.75 1.63
0.75 1.63 | 2.50 74.89 | 4.25 6.51 | 6.00 1.63
1.00 1.63 | 2.75 74.89 | 4.50 3.26 | 6.25 1.63
1.25 1.63 | 3.00 21.16 | 4.75 3.26 |
1.50 9.77 | 3.25 21.16 | 5.00 1.63 |
1.75 9.77 | 3.50 11.40 | 5.25 1.63 |

```

```

-----
| CALIB |
| NASHYD ( 0205) | Area (ha)= 0.25 Curve Number (CN)= 53.0
| ID= 1 DT= 5.0 min | Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
|-----|
| U.H. Tp(hrs)= 0.03

```

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

```

----- TRANSFORMED HYETOGRAPH -----
TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
0.083 0.00 | 1.667 9.77 | 3.250 21.16 | 4.83 1.63
0.167 0.00 | 1.750 9.77 | 3.333 11.40 | 4.92 1.63
0.250 0.00 | 1.833 27.68 | 3.417 11.40 | 5.00 1.63
0.333 1.63 | 1.917 27.68 | 3.500 11.40 | 5.08 1.63
0.417 1.63 | 2.000 27.68 | 3.583 11.40 | 5.17 1.63
0.500 1.63 | 2.083 27.68 | 3.667 11.40 | 5.25 1.63
0.583 1.63 | 2.167 27.68 | 3.750 11.40 | 5.33 1.63
0.667 1.63 | 2.250 27.68 | 3.833 6.51 | 5.42 1.63
0.750 1.63 | 2.333 74.89 | 3.917 6.51 | 5.50 1.63
0.833 1.63 | 2.417 74.89 | 4.000 6.51 | 5.58 1.63
0.917 1.63 | 2.500 74.89 | 4.083 6.51 | 5.67 1.63
1.000 1.63 | 2.583 74.89 | 4.167 6.51 | 5.75 1.63
1.083 1.63 | 2.667 74.89 | 4.250 6.51 | 5.83 1.63
1.167 1.63 | 2.750 74.89 | 4.333 3.26 | 5.92 1.63
1.250 1.63 | 2.833 21.16 | 4.417 3.26 | 6.00 1.63
1.333 9.77 | 2.917 21.16 | 4.500 3.26 | 6.08 1.63
1.417 9.77 | 3.000 21.16 | 4.583 3.26 | 6.17 1.63
1.500 9.77 | 3.083 21.16 | 4.667 3.26 | 6.25 1.63
1.583 9.77 | 3.167 21.16 | 4.750 3.26 |

```

Unit Hyd Qpeak (cms)= 0.318

```

PEAK FLOW (cms)= 0.006 (i)
TIME TO PEAK (hrs)= 2.750
RUNOFF VOLUME (mm)= 6.515
TOTAL RAINFALL (mm)= 81.410
RUNOFF COEFFICIENT = 0.080

```

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```

-----
| CALIB |
| STANDHYD ( 0201) | Area (ha)= 12.86
| ID= 1 DT= 5.0 min | Total Imp(%)= 70.00 Dir. Conn.(%)= 60.00
|-----|

```

```

IMPERVIOUS PERVIOUS (i)
Surface Area (ha)= 9.00 3.86
Dep. Storage (mm)= 2.00 5.00
Average Slope (%)= 5.00 2.00
Length (m)= 292.80 40.00
Mannings n = 0.013 0.250

```

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

```

----- TRANSFORMED HYETOGRAPH -----
TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
0.083 0.00 | 1.667 9.77 | 3.250 21.16 | 4.83 1.63
0.167 0.00 | 1.750 9.77 | 3.333 11.40 | 4.92 1.63
0.250 0.00 | 1.833 27.68 | 3.417 11.40 | 5.00 1.63
0.333 1.63 | 1.917 27.68 | 3.500 11.40 | 5.08 1.63
0.417 1.63 | 2.000 27.68 | 3.583 11.40 | 5.17 1.63
0.500 1.63 | 2.083 27.68 | 3.667 11.40 | 5.25 1.63
0.583 1.63 | 2.167 27.68 | 3.750 11.40 | 5.33 1.63
0.667 1.63 | 2.250 27.68 | 3.833 6.51 | 5.42 1.63

```

```

0.750 1.63 | 2.333 74.89 | 3.917 6.51 | 5.50 1.63
0.833 1.63 | 2.417 74.89 | 4.000 6.51 | 5.58 1.63
0.917 1.63 | 2.500 74.89 | 4.083 6.51 | 5.67 1.63
1.000 1.63 | 2.583 74.89 | 4.167 6.51 | 5.75 1.63
1.083 1.63 | 2.667 74.89 | 4.250 6.51 | 5.83 1.63
1.167 1.63 | 2.750 74.89 | 4.333 3.26 | 5.92 1.63
1.250 1.63 | 2.833 21.16 | 4.417 3.26 | 6.00 1.63
1.333 9.77 | 2.917 21.16 | 4.500 3.26 | 6.08 1.63
1.417 9.77 | 3.000 21.16 | 4.583 3.26 | 6.17 1.63
1.500 9.77 | 3.083 21.16 | 4.667 3.26 | 6.25 1.63
1.583 9.77 | 3.167 21.16 | 4.750 3.26 |

```

```

Max.Eff.Inten.(mm/hr)= 74.89 37.29
over (min) = 5.00 15.00
Storage Coeff. (min)= 3.37 (ii) 13.84 (ii)
Unit Hyd. Tpeak (min)= 5.00 15.00
Unit Hyd. peak (cms)= 0.26 0.08

```

TOTALS

```

PEAK FLOW (cms)= 1.61 0.30 1.891 (iii)
TIME TO PEAK (hrs)= 2.75 2.83 2.75
RUNOFF VOLUME (mm)= 79.41 24.46 57.43
TOTAL RAINFALL (mm)= 81.41 81.41 81.41
RUNOFF COEFFICIENT = 0.98 0.30 0.71

```

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

```

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 53.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```

```

-----
| CALIB |
| STANDHYD ( 0202) | Area (ha)= 4.27
| ID= 1 DT= 5.0 min | Total Imp(%)= 60.00 Dir. Conn.(%)= 45.00
|-----|

```

```

IMPERVIOUS PERVIOUS (i)
Surface Area (ha)= 2.56 1.71
Dep. Storage (mm)= 2.00 5.00
Average Slope (%)= 5.00 2.00
Length (m)= 168.72 40.00
Mannings n = 0.013 0.250

```

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

```

----- TRANSFORMED HYETOGRAPH -----
TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
0.083 0.00 | 1.667 9.77 | 3.250 21.16 | 4.83 1.63
0.167 0.00 | 1.750 9.77 | 3.333 11.40 | 4.92 1.63
0.250 0.00 | 1.833 27.68 | 3.417 11.40 | 5.00 1.63
0.333 1.63 | 1.917 27.68 | 3.500 11.40 | 5.08 1.63
0.417 1.63 | 2.000 27.68 | 3.583 11.40 | 5.17 1.63
0.500 1.63 | 2.083 27.68 | 3.667 11.40 | 5.25 1.63
0.583 1.63 | 2.167 27.68 | 3.750 11.40 | 5.33 1.63
0.667 1.63 | 2.250 27.68 | 3.833 6.51 | 5.42 1.63
0.750 1.63 | 2.333 74.89 | 3.917 6.51 | 5.50 1.63
0.833 1.63 | 2.417 74.89 | 4.000 6.51 | 5.58 1.63
0.917 1.63 | 2.500 74.89 | 4.083 6.51 | 5.67 1.63
1.000 1.63 | 2.583 74.89 | 4.167 6.51 | 5.75 1.63
1.083 1.63 | 2.667 74.89 | 4.250 6.51 | 5.83 1.63
1.167 1.63 | 2.750 74.89 | 4.333 3.26 | 5.92 1.63
1.250 1.63 | 2.833 21.16 | 4.417 3.26 | 6.00 1.63
1.333 9.77 | 2.917 21.16 | 4.500 3.26 | 6.08 1.63
1.417 9.77 | 3.000 21.16 | 4.583 3.26 | 6.17 1.63
1.500 9.77 | 3.083 21.16 | 4.667 3.26 | 6.25 1.63
1.583 9.77 | 3.167 21.16 | 4.750 3.26 |

```

```

Max.Eff.Inten.(mm/hr)= 74.89 39.35
                        over (min) 5.00 15.00
Storage Coeff. (min)= 2.42 (ii) 12.67 (ii)
Unit Hyd. Tpeak (min)= 5.00 15.00
Unit Hyd. peak (cms)= 0.30 0.08

PEAK FLOW (cms)= 0.40 0.15 *TOTALS*
TIME TO PEAK (hrs)= 2.75 2.83 0.538 (iii)
RUNOFF VOLUME (mm)= 79.41 25.04 49.50
TOTAL RAINFALL (mm)= 81.41 81.41 81.41
RUNOFF COEFFICIENT = 0.98 0.31 0.61

```

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

```

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
    CN* = 53.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
    THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```

```

| CALIB |
| STANDHYD ( 0203) | Area (ha)= 1.39
| ID= 1 DT= 5.0 min | Total Imp(%)= 50.00 Dir. Conn.(%)= 50.00
|-----|
| Surface Area (ha)= 0.69 IMPERVIOUS PERVIOUS (i)
| Dep. Storage (mm)= 2.00 5.00
| Average Slope (%)= 5.00 2.00
| Length (m)= 96.26 40.00
| Mannings n = 0.013 0.250

```

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

```

----- TRANSFORMED HYETOGRAPH -----
TIME RAIN TIME RAIN TIME RAIN TIME RAIN
hrs mm/hr hrs mm/hr ' hrs mm/hr hrs mm/hr
0.083 0.00 1.667 9.77 3.250 21.16 4.83 1.63
0.167 0.00 1.750 9.77 3.333 11.40 4.92 1.63
0.250 0.00 1.833 27.68 3.417 11.40 5.00 1.63
0.333 1.63 1.917 27.68 3.500 11.40 5.08 1.63
0.417 1.63 2.000 27.68 3.583 11.40 5.17 1.63
0.500 1.63 2.083 27.68 3.667 11.40 5.25 1.63
0.583 1.63 2.167 27.68 3.750 11.40 5.33 1.63
0.667 1.63 2.250 27.68 3.833 6.51 5.42 1.63
0.750 1.63 2.333 74.89 3.917 6.51 5.50 1.63
0.833 1.63 2.417 74.89 4.000 6.51 5.58 1.63
0.917 1.63 2.500 74.89 4.083 6.51 5.67 1.63
1.000 1.63 2.583 74.89 4.167 6.51 5.75 1.63
1.083 1.63 2.667 74.89 4.250 6.51 5.83 1.63
1.167 1.63 2.750 74.89 4.333 3.26 5.92 1.63
1.250 1.63 2.833 21.16 4.417 3.26 6.00 1.63
1.333 9.77 2.917 21.16 4.500 3.26 6.08 1.63
1.417 9.77 3.000 21.16 4.583 3.26 6.17 1.63
1.500 9.77 3.083 21.16 4.667 3.26 6.25 1.63
1.583 9.77 3.167 21.16 4.750 3.26

```

```

Max.Eff.Inten.(mm/hr)= 74.89 22.19
                        over (min) 5.00 15.00
Storage Coeff. (min)= 1.73 (ii) 14.62 (ii)
Unit Hyd. Tpeak (min)= 5.00 15.00
Unit Hyd. peak (cms)= 0.32 0.08

PEAK FLOW (cms)= 0.14 0.03 *TOTALS*
TIME TO PEAK (hrs)= 2.75 2.83 0.174 (iii)
RUNOFF VOLUME (mm)= 79.41 19.35 49.38
TOTAL RAINFALL (mm)= 81.41 81.41 81.41

```

RUNOFF COEFFICIENT = 0.98 0.24 0.61

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

```

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
    CN* = 53.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
    THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```

```

| ADD HYD ( 0001) |
| 1 + 2 = 3 | AREA (ha) QPEAK (cms) TPEAK (hrs) R.V. (mm)
ID1= 1 ( 0201): 12.86 1.891 2.75 57.43
+ ID2= 2 ( 0202): 4.27 0.538 2.75 49.50
ID = 3 ( 0001): 17.13 2.429 2.75 55.45

```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```

| ADD HYD ( 0001) |
| 3 + 2 = 1 | AREA (ha) QPEAK (cms) TPEAK (hrs) R.V. (mm)
ID1= 3 ( 0001): 17.13 2.429 2.75 55.45
+ ID2= 2 ( 0203): 1.39 0.174 2.75 49.38
ID = 1 ( 0001): 18.52 2.603 2.75 55.00

```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```

| RESERVOIR( 0002) | OVERFLOW IS OFF
| IN= 2--> OUT= 1 |
| DT= 5.0 min |
|-----|
| OUTFLOW (cms) STORAGE (ha.m.) OUTFLOW (cms) STORAGE (ha.m.)
0.0000 0.0000 0.9767 0.7368
0.0148 0.0921 1.2208 0.8058
0.0235 0.1922 1.4829 0.8763
0.0298 0.3003 2.0785 0.9483
0.0325 0.3573 2.9524 1.0220
0.0983 0.4161 4.0123 1.0972
0.2165 0.4768 5.2246 1.1739
0.3687 0.5394 6.5698 1.2522
0.5485 0.6036 9.6096 1.4134
0.7520 0.6694 14.9233 1.6661
|-----|
| AREA (ha) QPEAK (cms) TPEAK (hrs) R.V. (mm)
INFLOW : ID= 2 ( 0001) 18.520 2.603 2.75 55.00
OUTFLOW: ID= 1 ( 0002) 18.520 0.711 3.33 54.91
|-----|
| PEAK FLOW REDUCTION [Qout/Qin](%)= 27.31
| TIME SHIFT OF PEAK FLOW (min)= 35.00
| MAXIMUM STORAGE USED (ha.m.)= 0.6573

```

```

| CALIB |
| STANDHYD ( 0204) | Area (ha)= 2.28
| ID= 1 DT= 5.0 min | Total Imp(%)= 50.00 Dir. Conn.(%)= 30.00
|-----|
| Surface Area (ha)= 1.14 IMPERVIOUS PERVIOUS (i)
| Dep. Storage (mm)= 2.00 5.00
| Average Slope (%)= 5.00 2.00

```

Length (m)= 123.29 40.00
 Mannings n = 0.013 0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

```

      ---- TRANSFORMED HYETOGRAPH ----
      TIME    RAIN    TIME    RAIN    TIME    RAIN    TIME    RAIN
      hrs    mm/hr   hrs    mm/hr   hrs    mm/hr   hrs    mm/hr
0.083    0.00    1.667    9.77    3.250    21.16    4.83    1.63
0.167    0.00    1.750    9.77    3.333    11.40    4.92    1.63
0.250    0.00    1.833    27.68    3.417    11.40    5.00    1.63
0.333    1.63    1.917    27.68    3.500    11.40    5.08    1.63
0.417    1.63    2.000    27.68    3.583    11.40    5.17    1.63
0.500    1.63    2.083    27.68    3.667    11.40    5.25    1.63
0.583    1.63    2.167    27.68    3.750    11.40    5.33    1.63
0.667    1.63    2.250    27.68    3.833    6.51    5.42    1.63
0.750    1.63    2.333    74.89    3.917    6.51    5.50    1.63
0.833    1.63    2.417    74.89    4.000    6.51    5.58    1.63
0.917    1.63    2.500    74.89    4.083    6.51    5.67    1.63
1.000    1.63    2.583    74.89    4.167    6.51    5.75    1.63
1.083    1.63    2.667    74.89    4.250    6.51    5.83    1.63
1.167    1.63    2.750    74.89    4.333    3.26    5.92    1.63
1.250    1.63    2.833    21.16    4.417    3.26    6.00    1.63
1.333    9.77    2.917    21.16    4.500    3.26    6.08    1.63
1.417    9.77    3.000    21.16    4.583    3.26    6.17    1.63
1.500    9.77    3.083    21.16    4.667    3.26    6.25    1.63
1.583    9.77    3.167    21.16    4.750    3.26    6.33    1.63

Max.Eff.Inten.(mm/hr)= 74.89 42.59
                        over (min) 5.00 15.00
Storage Coeff. (min)= 2.01 (ii) 11.94 (ii)
Unit Hyd. Tpeak (min)= 5.00 15.00
Unit Hyd. peak (cms)= 0.31 0.09

                        *TOTALS*
PEAK FLOW (cms)= 0.14 0.10 0.240 (iii)
TIME TO PEAK (hrs)= 2.75 2.83 2.75
RUNOFF VOLUME (mm)= 79.41 25.38 41.59
TOTAL RAINFALL (mm)= 81.41 81.41 81.41
RUNOFF COEFFICIENT = 0.98 0.31 0.51

```

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PVIOUS LOSSES:
 CN* = 53.0 Ia = Dep. Storage (Above)
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```

| ADD HYD ( 0003) |
| 1 + 2 = 3 |
|-----|
| ID1= 1 ( 0002): 18.52 0.711 3.33 54.91 |
| + ID2= 2 ( 0204): 2.28 0.240 2.75 41.59 |
|-----|
| ID = 3 ( 0003): 20.80 0.800 3.25 53.45 |

```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```

| ADD HYD ( 0003) |
| 3 + 2 = 1 |
|-----|
| ID1= 3 ( 0003): 20.80 0.800 3.25 53.45 |
| + ID2= 2 ( 0205): 0.25 0.006 2.75 6.51 |
|-----|

```

ID = 1 (0003): 21.05 0.802 3.25 52.89

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```

=====
V V I SSSS U U A L (v 6.2.2006)
V V I SS U U A A L
V V I SS U U A A L
V V I SS U U A A L
V V I SSSS UUUU A A LLLL

000 TTTT TTTT H H Y Y M M 000 TM
0 0 T T H H Y Y MM MM 0 0
0 0 T T H H Y Y M M 0 0
000 T T H H Y Y M M 000

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```

***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
 Output filename: C:\Users\PYung\AppData\Local\Civica\531e1913-0e12-4e2e-9684-e2ef03acaa05\341b89af-c95d-45b3-a9b8-cc0f7699e01f\scenar
 Summary filename: C:\Users\PYung\AppData\Local\Civica\531e1913-0e12-4e2e-9684-e2ef03acaa05\341b89af-c95d-45b3-a9b8-cc0f7699e01f\scenar

DATE: 03/10/2022

TIME: 10:00:32

USER:

COMMENTS: _____

```

*****
** SIMULATION : AES_06hr_100yr **
*****

```

```

| READ STORM | Filename: C:\Users\PYung\AppData\Local\Temp\
| 34abe0e9-1b72-402d-8c5e-c0fdd428aacc\1ec3a0e5 |
| Ptotal= 89.91 mm | Comments: AES_06hr_100yr

```

```

      TIME    RAIN    TIME    RAIN    TIME    RAIN    TIME    RAIN
      hrs    mm/hr   hrs    mm/hr   hrs    mm/hr   hrs    mm/hr
0.25    0.00    2.00    30.57    3.75    12.59    5.50    1.80
0.50    1.80    2.25    30.57    4.00    7.19    5.75    1.80
0.75    1.80    2.50    82.71    4.25    7.19    6.00    1.80
1.00    1.80    2.75    82.71    4.50    3.60    6.25    1.80
1.25    1.80    3.00    23.37    4.75    3.60    6.50    1.80
1.50    10.79    3.25    23.37    5.00    1.80    6.75    1.80
1.75    10.79    3.50    12.59    5.25    1.80    7.00    1.80

```

```

| CALIB |
| NASHYD ( 0205) | Area (ha)= 0.25 Curve Number (CN)= 53.0
| ID= 1 DT= 5.0 min | Ia (mm)= 5.00 # of Linear Res.(N)= 3.00

```

----- U.H. Tp(hrs)= 0.03

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	1.667	10.79	3.250	23.37	4.83	1.80
0.167	0.00	1.750	10.79	3.333	12.59	4.92	1.80
0.250	0.00	1.833	30.57	3.417	12.59	5.00	1.80
0.333	1.80	1.917	30.57	3.500	12.59	5.08	1.80
0.417	1.80	2.000	30.57	3.583	12.59	5.17	1.80
0.500	1.80	2.083	30.57	3.667	12.59	5.25	1.80
0.583	1.80	2.167	30.57	3.750	12.59	5.33	1.80
0.667	1.80	2.250	30.57	3.833	7.19	5.42	1.80
0.750	1.80	2.333	82.71	3.917	7.19	5.50	1.80
0.833	1.80	2.417	82.71	4.000	7.19	5.58	1.80
0.917	1.80	2.500	82.71	4.083	7.19	5.67	1.80
1.000	1.80	2.583	82.71	4.167	7.19	5.75	1.80
1.083	1.80	2.667	82.71	4.250	7.19	5.83	1.80
1.167	1.80	2.750	82.71	4.333	3.60	5.92	1.80
1.250	1.80	2.833	23.37	4.417	3.60	6.00	1.80
1.333	10.79	2.917	23.37	4.500	3.60	6.08	1.80
1.417	10.79	3.000	23.37	4.583	3.60	6.17	1.80
1.500	10.79	3.083	23.37	4.667	3.60	6.25	1.80
1.583	10.79	3.167	23.37	4.750	3.60		

Unit Hyd Qpeak (cms)= 0.318

PEAK FLOW (cms)= 0.007 (i)
 TIME TO PEAK (hrs)= 2.750
 RUNOFF VOLUME (mm)= 7.824
 TOTAL RAINFALL (mm)= 89.910
 RUNOFF COEFFICIENT = 0.087

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	Area (ha)=	Dir. Conn.(%)=
STANDHYD (0201)	12.86	60.00
ID= 1 DT= 5.0 min	Total Imp(%)= 70.00	

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	9.00	3.86
Dep. Storage (mm)=	2.00	5.00
Average Slope (%)=	5.00	2.00
Length (m)=	292.80	40.00
Mannings n	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	1.667	10.79	3.250	23.37	4.83	1.80
0.167	0.00	1.750	10.79	3.333	12.59	4.92	1.80
0.250	0.00	1.833	30.57	3.417	12.59	5.00	1.80
0.333	1.80	1.917	30.57	3.500	12.59	5.08	1.80
0.417	1.80	2.000	30.57	3.583	12.59	5.17	1.80
0.500	1.80	2.083	30.57	3.667	12.59	5.25	1.80
0.583	1.80	2.167	30.57	3.750	12.59	5.33	1.80
0.667	1.80	2.250	30.57	3.833	7.19	5.42	1.80
0.750	1.80	2.333	82.71	3.917	7.19	5.50	1.80
0.833	1.80	2.417	82.71	4.000	7.19	5.58	1.80
0.917	1.80	2.500	82.71	4.083	7.19	5.67	1.80
1.000	1.80	2.583	82.71	4.167	7.19	5.75	1.80
1.083	1.80	2.667	82.71	4.250	7.19	5.83	1.80

1.167	1.80	2.750	82.71	4.333	3.60	5.92	1.80
1.250	1.80	2.833	23.37	4.417	3.60	6.00	1.80
1.333	10.79	2.917	23.37	4.500	3.60	6.08	1.80
1.417	10.79	3.000	23.37	4.583	3.60	6.17	1.80
1.500	10.79	3.083	23.37	4.667	3.60	6.25	1.80
1.583	10.79	3.167	23.37	4.750	3.60		

Max.Eff.Inten.(mm/hr)= 82.71 46.43
 over (min)= 5.00 15.00
 Storage Coeff. (min)= 3.24 (ii) 12.83 (iii)
 Unit Hyd. Tpeak (min)= 5.00 15.00
 Unit Hyd. peak (cms)= 0.27 0.08
 PEAK FLOW (cms)= 1.77 0.37
 TIME TO PEAK (hrs)= 2.75 2.83
 RUNOFF VOLUME (mm)= 87.91 29.10
 TOTAL RAINFALL (mm)= 89.91 89.91
 RUNOFF COEFFICIENT = 0.98 0.32

TOTALS

2.124 (iii)

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 CN* = 53.0 Ia = Dep. Storage (Above)
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	Area (ha)=	Dir. Conn.(%)=
STANDHYD (0202)	4.27	45.00
ID= 1 DT= 5.0 min	Total Imp(%)= 60.00	

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	2.56	1.71
Dep. Storage (mm)=	2.00	5.00
Average Slope (%)=	5.00	2.00
Length (m)=	168.72	40.00
Mannings n	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	1.667	10.79	3.250	23.37	4.83	1.80
0.167	0.00	1.750	10.79	3.333	12.59	4.92	1.80
0.250	0.00	1.833	30.57	3.417	12.59	5.00	1.80
0.333	1.80	1.917	30.57	3.500	12.59	5.08	1.80
0.417	1.80	2.000	30.57	3.583	12.59	5.17	1.80
0.500	1.80	2.083	30.57	3.667	12.59	5.25	1.80
0.583	1.80	2.167	30.57	3.750	12.59	5.33	1.80
0.667	1.80	2.250	30.57	3.833	7.19	5.42	1.80
0.750	1.80	2.333	82.71	3.917	7.19	5.50	1.80
0.833	1.80	2.417	82.71	4.000	7.19	5.58	1.80
0.917	1.80	2.500	82.71	4.083	7.19	5.67	1.80
1.000	1.80	2.583	82.71	4.167	7.19	5.75	1.80
1.083	1.80	2.667	82.71	4.250	7.19	5.83	1.80
1.167	1.80	2.750	82.71	4.333	3.60	5.92	1.80
1.250	1.80	2.833	23.37	4.417	3.60	6.00	1.80
1.333	10.79	2.917	23.37	4.500	3.60	6.08	1.80
1.417	10.79	3.000	23.37	4.583	3.60	6.17	1.80
1.500	10.79	3.083	23.37	4.667	3.60	6.25	1.80
1.583	10.79	3.167	23.37	4.750	3.60		

Max.Eff.Inten.(mm/hr)= 82.71 48.92
 over (min)= 5.00 15.00
 Storage Coeff. (min)= 2.33 (ii) 11.72 (iii)
 Unit Hyd. Tpeak (min)= 5.00 15.00

```

Unit Hyd. peak (cms)=      0.30      0.09
                                     *TOTALS*
PEAK FLOW      (cms)=      0.44      0.18      0.611 (iii)
TIME TO PEAK   (hrs)=      2.75      2.83      2.75
RUNOFF VOLUME  (mm)=     87.91     29.76     55.93
TOTAL RAINFALL (mm)=     89.91     89.91     89.91
RUNOFF COEFFICIENT =      0.98      0.33      0.62

```

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

```

(i) CN PROCEDURE SELECTED FOR PVIOUS LOSSES:
    CN* = 53.0   Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
    THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```

```

-----
| CALIB |
| STANDHYD ( 0203) |
| ID= 1 DT= 5.0 min |
-----
Area (ha)= 1.39
Total Imp(%)= 50.00 Dir. Conn.(%)= 50.00

IMPERVIOUS    PERVIOUS (i)
Surface Area (ha)= 0.69    0.69
Dep. Storage (mm)= 2.00    5.00
Average Slope (%)= 5.00    2.00
Length (m)= 96.26    40.00
Mannings n = 0.013    0.250

```

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

```

----- TRANSFORMED HYETOGRAPH -----
TIME RAIN TIME RAIN TIME RAIN TIME RAIN
hrs mm/hr hrs mm/hr hrs mm/hr hrs mm/hr
0.083 0.00 1.667 10.79 3.250 23.37 4.83 1.80
0.167 0.00 1.750 10.79 3.333 12.59 4.92 1.80
0.250 0.00 1.833 30.57 3.417 12.59 5.00 1.80
0.333 1.00 1.917 30.57 3.500 12.59 5.08 1.80
0.417 1.00 2.000 30.57 3.583 12.59 5.17 1.80
0.500 1.00 2.083 30.57 3.667 12.59 5.25 1.80
0.583 1.00 2.167 30.57 3.750 12.59 5.33 1.80
0.667 1.00 2.250 30.57 3.833 7.19 5.42 1.80
0.750 1.00 2.333 82.71 3.917 7.19 5.50 1.80
0.833 1.00 2.417 82.71 4.000 7.19 5.58 1.80
0.917 1.00 2.500 82.71 4.083 7.19 5.67 1.80
1.000 1.00 2.583 82.71 4.167 7.19 5.75 1.80
1.083 1.00 2.667 82.71 4.250 7.19 5.83 1.80
1.167 1.00 2.750 82.71 4.333 3.60 5.92 1.80
1.250 1.00 2.833 23.37 4.417 3.60 6.00 1.80
1.333 10.79 2.917 23.37 4.500 3.60 6.08 1.80
1.417 10.79 3.000 23.37 4.583 3.60 6.17 1.80
1.500 10.79 3.083 23.37 4.667 3.60 6.25 1.80
1.583 10.79 3.167 23.37 4.750 3.60

```

```

Max.Eff.Inten.(mm/hr)= 82.71    26.63
over (min)= 5.00    15.00
Storage Coeff. (min)= 1.66 (ii) 13.64 (ii)
Unit Hyd. Tpeak (min)= 5.00    15.00
Unit Hyd. peak (cms)= 0.32    0.08

```

```

                                     *TOTALS*
PEAK FLOW      (cms)= 0.16    0.04    0.196 (iii)
TIME TO PEAK   (hrs)= 2.75    2.83    2.75
RUNOFF VOLUME  (mm)= 87.91    23.25    55.57
TOTAL RAINFALL (mm)= 89.91    89.91    89.91
RUNOFF COEFFICIENT = 0.98    0.26    0.62

```

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PVIOUS LOSSES:

```

CN* = 53.0   Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
    THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```

```

-----
| ADD HYD ( 0001) |
| 1 + 2 = 3 |
-----
AREA QPEAK TPEAK R.V.
(ha) (cms) (hrs) (mm)
ID1= 1 ( 0201): 12.86 2.124 2.75 64.39
+ ID2= 2 ( 0202): 4.27 0.611 2.75 55.93
=====
ID = 3 ( 0001): 17.13 2.735 2.75 62.28

```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```

-----
| ADD HYD ( 0001) |
| 3 + 2 = 1 |
-----
AREA QPEAK TPEAK R.V.
(ha) (cms) (hrs) (mm)
ID1= 3 ( 0001): 17.13 2.735 2.75 62.28
+ ID2= 2 ( 0203): 1.39 0.196 2.75 55.57
=====
ID = 1 ( 0001): 18.52 2.931 2.75 61.77

```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```

-----
| RESERVOIR( 0002) |
| IN= 2--> OUT= 1 |
| DT= 5.0 min |
-----
OVERFLOW IS OFF

OUTFLOW STORAGE | OUTFLOW STORAGE
(cms) (ha.m.) | (cms) (ha.m.)
0.0000 0.0000 | 0.9767 0.7368
0.0148 0.0921 | 1.2208 0.8058
0.0235 0.1922 | 1.4829 0.8763
0.0298 0.3003 | 2.0785 0.9483
0.0325 0.3573 | 2.9524 1.0220
0.0983 0.4161 | 4.0123 1.0972
0.2165 0.4768 | 5.2246 1.1739
0.3687 0.5394 | 6.5698 1.2522
0.5485 0.6036 | 9.6096 1.4134
0.7520 0.6694 | 14.9233 1.6661

AREA QPEAK TPEAK R.V.
(ha) (cms) (hrs) (mm)
INFLOW : ID= 2 ( 0001) 18.520 2.931 2.75 61.77
OUTFLOW: ID= 1 ( 0002) 18.520 0.882 3.25 61.69

```

```

PEAK FLOW REDUCTION [Qout/Qin](%)= 30.10
TIME SHIFT OF PEAK FLOW (min)= 30.00
MAXIMUM STORAGE USED (ha.m.)= 0.7101

```

```

-----
| CALIB |
| STANDHYD ( 0204) |
| ID= 1 DT= 5.0 min |
-----
Area (ha)= 2.28
Total Imp(%)= 50.00 Dir. Conn.(%)= 30.00

IMPERVIOUS    PERVIOUS (i)
Surface Area (ha)= 1.14    1.14
Dep. Storage (mm)= 2.00    5.00
Average Slope (%)= 5.00    2.00
Length (m)= 123.29    40.00
Mannings n = 0.013    0.250

```

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	1.667	10.79	3.250	23.37	4.83	1.80
0.167	0.00	1.750	10.79	3.333	12.59	4.92	1.80
0.250	0.00	1.833	30.57	3.417	12.59	5.00	1.80
0.333	1.80	1.917	30.57	3.500	12.59	5.08	1.80
0.417	1.80	2.000	30.57	3.583	12.59	5.17	1.80
0.500	1.80	2.083	30.57	3.667	12.59	5.25	1.80
0.583	1.80	2.167	30.57	3.750	12.59	5.33	1.80
0.667	1.80	2.250	30.57	3.833	7.19	5.42	1.80
0.750	1.80	2.333	82.71	3.917	7.19	5.50	1.80
0.833	1.80	2.417	82.71	4.000	7.19	5.58	1.80
0.917	1.80	2.500	82.71	4.083	7.19	5.67	1.80
1.000	1.80	2.583	82.71	4.167	7.19	5.75	1.80
1.083	1.80	2.667	82.71	4.250	7.19	5.83	1.80
1.167	1.80	2.750	82.71	4.333	3.60	5.92	1.80
1.250	1.80	2.833	23.37	4.417	3.60	6.00	1.80
1.333	10.79	2.917	23.37	4.500	3.60	6.08	1.80
1.417	10.79	3.000	23.37	4.583	3.60	6.17	1.80
1.500	10.79	3.083	23.37	4.667	3.60	6.25	1.80
1.583	10.79	3.167	23.37	4.750	3.60		

Max.Eff.Inten.(mm/hr)= 82.71 50.43
 over (min) 5.00 15.00
 Storage Coeff. (min)= 1.93 (ii) 11.21 (ii)
 Unit Hyd. Tpeak (min)= 5.00 15.00
 Unit Hyd. peak (cms)= 0.31 0.09

TOTALS

PEAK FLOW (cms)= 0.16 0.12 0.276 (iii)
 TIME TO PEAK (hrs)= 2.75 2.83 2.75
 RUNOFF VOLUME (mm)= 87.91 30.15 47.48
 TOTAL RAINFALL (mm)= 89.91 89.91 89.91
 RUNOFF COEFFICIENT = 0.98 0.34 0.53

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PVIOUS LOSSES:
 CN* = 53.0 Ia = Dep. Storage (Above)
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0003)					
1 + 2 = 3					
	AREA	QPEAK	TPEAK	R.V.	
	(ha)	(cms)	(hrs)	(mm)	
ID1= 1 (0002):	18.52	0.882	3.25	61.69	
+ ID2= 2 (0204):	2.28	0.276	2.75	47.48	
=====					
ID = 3 (0003):	20.80	0.989	3.25	60.13	

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0003)					
3 + 2 = 1					
	AREA	QPEAK	TPEAK	R.V.	
	(ha)	(cms)	(hrs)	(mm)	
ID1= 3 (0003):	20.80	0.989	3.25	60.13	
+ ID2= 2 (0205):	0.25	0.007	2.75	7.82	
=====					
ID = 1 (0003):	21.05	0.992	3.25	59.51	

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

FINISH

```
=====
=====
=====
```

```
V V I SSSS U U A L (v 6.2.2006)
V V I SS U U A A L
V V I SS U U A A A A L
V V I SS U U A A L
V V I SSSS UUUU A A LLLL
```

```
000 TTTT TTTT H H Y Y M M 000 TM
0 0 T T H H Y Y MM MM 0 0
0 0 T T H H Y M M 0 0
000 T T H H Y M M 000
```

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***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
 Output filename: C:\Users\PYung\AppData\Local\Civica\531e1913-0e12-4e2e-9684-e2ef03acaa05\345de98e-f053-418f-9bed-81f22e84d47b\scenar
 Summary filename: C:\Users\PYung\AppData\Local\Civica\531e1913-0e12-4e2e-9684-e2ef03acaa05\345de98e-f053-418f-9bed-81f22e84d47b\scenar

DATE: 03/10/2022

TIME: 10:00:32

USER:

COMMENTS: _____

```
** SIMULATION : TIMMINS **
*****
```

READ STORM	Filename: C:\Users\PYung\AppData\Local\Temp\34abe0e9-1b72-402d-8c5e-c0fdd428aacc\2f835815
Ptotal=193.00 mm	Comments: TIMMINS

TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.25	15.00	3.25	3.00	6.25	43.00	9.25	13.00
0.50	15.00	3.50	3.00	6.50	43.00	9.50	13.00
0.75	15.00	3.75	3.00	6.75	43.00	9.75	13.00
1.00	15.00	4.00	3.00	7.00	43.00	10.00	13.00
1.25	20.00	4.25	5.00	7.25	20.00	10.25	13.00
1.50	20.00	4.50	5.00	7.50	20.00	10.50	13.00
1.75	20.00	4.75	5.00	7.75	20.00	10.75	13.00
2.00	20.00	5.00	5.00	8.00	20.00	11.00	13.00
2.25	10.00	5.25	20.00	8.25	23.00	11.25	8.00
2.50	10.00	5.50	20.00	8.50	23.00	11.50	8.00
2.75	10.00	5.75	20.00	8.75	23.00	11.75	8.00
3.00	10.00	6.00	20.00	9.00	23.00	12.00	8.00

```

-----
| CALIB
| NASHYD ( 0205) |
| ID= 1 DT= 5.0 min |
|-----
Area (ha)= 0.25 Curve Number (CN)= 53.0
Ia (mm)= 5.00 # of Linear Res. (N)= 3.00
U.H. Tp(hrs)= 0.03

```

Mannings n = 0.013 0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

```

-----
|--- TRANSFORMED HYETOGRAPH ---|
| TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN |
| hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr |
|-----|-----|-----|-----|
0.083 15.00 3.083 3.00 6.083 43.00 9.08 13.00
0.167 15.00 3.167 3.00 6.167 43.00 9.17 13.00
0.250 15.00 3.250 3.00 6.250 43.00 9.25 13.00
0.333 15.00 3.333 3.00 6.333 43.00 9.33 13.00
0.417 15.00 3.417 3.00 6.417 43.00 9.42 13.00
0.500 15.00 3.500 3.00 6.500 43.00 9.50 13.00
0.583 15.00 3.583 3.00 6.583 43.00 9.58 13.00
0.667 15.00 3.667 3.00 6.667 43.00 9.67 13.00
0.750 15.00 3.750 3.00 6.750 43.00 9.75 13.00
0.833 15.00 3.833 3.00 6.833 43.00 9.83 13.00
0.917 15.00 3.917 3.00 6.917 43.00 9.92 13.00
1.000 15.00 4.000 3.00 7.000 43.00 10.00 13.00
1.083 20.00 4.083 5.00 7.083 20.00 10.08 13.00
1.167 20.00 4.167 5.00 7.167 20.00 10.17 13.00
1.250 20.00 4.250 5.00 7.250 20.00 10.25 13.00
1.333 20.00 4.333 5.00 7.333 20.00 10.33 13.00
1.417 20.00 4.417 5.00 7.417 20.00 10.42 13.00
1.500 20.00 4.500 5.00 7.500 20.00 10.50 13.00
1.583 20.00 4.583 5.00 7.583 20.00 10.58 13.00
1.667 20.00 4.667 5.00 7.667 20.00 10.67 13.00
1.750 20.00 4.750 5.00 7.750 20.00 10.75 13.00
1.833 20.00 4.833 5.00 7.833 20.00 10.83 13.00
1.917 20.00 4.917 5.00 7.917 20.00 10.92 13.00
2.000 20.00 5.000 5.00 8.000 20.00 11.00 13.00
2.083 10.00 5.083 20.00 8.083 23.00 11.08 8.00
2.167 10.00 5.167 20.00 8.167 23.00 11.17 8.00
2.250 10.00 5.250 20.00 8.250 23.00 11.25 8.00
2.333 10.00 5.333 20.00 8.333 23.00 11.33 8.00
2.417 10.00 5.417 20.00 8.417 23.00 11.42 8.00
2.500 10.00 5.500 20.00 8.500 23.00 11.50 8.00
2.583 10.00 5.583 20.00 8.583 23.00 11.58 8.00
2.667 10.00 5.667 20.00 8.667 23.00 11.67 8.00
2.750 10.00 5.750 20.00 8.750 23.00 11.75 8.00
2.833 10.00 5.833 20.00 8.833 23.00 11.83 8.00
2.917 10.00 5.917 20.00 8.917 23.00 11.92 8.00
3.000 10.00 6.000 20.00 9.000 23.00 12.00 8.00

```

Unit Hyd Qpeak (cms)= 0.318

```

PEAK FLOW (cms)= 0.005 (i)
TIME TO PEAK (hrs)= 7.000
RUNOFF VOLUME (mm)= 28.790
TOTAL RAINFALL (mm)= 193.000
RUNOFF COEFFICIENT = 0.149

```

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```

-----
| CALIB
| STANDHYD ( 0201) |
| ID= 1 DT= 5.0 min |
|-----
Area (ha)= 12.86
Total Imp(%)= 70.00 Dir. Conn.(%)= 60.00

```

```

IMPERVIOUS PVIOUS (i)
Surface Area (ha)= 9.00 3.86
Dep. Storage (mm)= 2.00 5.00
Average Slope (%)= 5.00 2.00
Length (m)= 292.80 40.00

```

```

-----
|--- TRANSFORMED HYETOGRAPH ---|
| TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN |
| hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr |
|-----|-----|-----|-----|
0.083 15.00 3.083 3.00 6.083 43.00 9.08 13.00
0.167 15.00 3.167 3.00 6.167 43.00 9.17 13.00
0.250 15.00 3.250 3.00 6.250 43.00 9.25 13.00
0.333 15.00 3.333 3.00 6.333 43.00 9.33 13.00
0.417 15.00 3.417 3.00 6.417 43.00 9.42 13.00
0.500 15.00 3.500 3.00 6.500 43.00 9.50 13.00
0.583 15.00 3.583 3.00 6.583 43.00 9.58 13.00
0.667 15.00 3.667 3.00 6.667 43.00 9.67 13.00
0.750 15.00 3.750 3.00 6.750 43.00 9.75 13.00
0.833 15.00 3.833 3.00 6.833 43.00 9.83 13.00
0.917 15.00 3.917 3.00 6.917 43.00 9.92 13.00
1.000 15.00 4.000 3.00 7.000 43.00 10.00 13.00
1.083 20.00 4.083 5.00 7.083 20.00 10.08 13.00
1.167 20.00 4.167 5.00 7.167 20.00 10.17 13.00
1.250 20.00 4.250 5.00 7.250 20.00 10.25 13.00
1.333 20.00 4.333 5.00 7.333 20.00 10.33 13.00
1.417 20.00 4.417 5.00 7.417 20.00 10.42 13.00
1.500 20.00 4.500 5.00 7.500 20.00 10.50 13.00
1.583 20.00 4.583 5.00 7.583 20.00 10.58 13.00
1.667 20.00 4.667 5.00 7.667 20.00 10.67 13.00
1.750 20.00 4.750 5.00 7.750 20.00 10.75 13.00
1.833 20.00 4.833 5.00 7.833 20.00 10.83 13.00
1.917 20.00 4.917 5.00 7.917 20.00 10.92 13.00
2.000 20.00 5.000 5.00 8.000 20.00 11.00 13.00
2.083 10.00 5.083 20.00 8.083 23.00 11.08 8.00
2.167 10.00 5.167 20.00 8.167 23.00 11.17 8.00
2.250 10.00 5.250 20.00 8.250 23.00 11.25 8.00
2.333 10.00 5.333 20.00 8.333 23.00 11.33 8.00
2.417 10.00 5.417 20.00 8.417 23.00 11.42 8.00
2.500 10.00 5.500 20.00 8.500 23.00 11.50 8.00
2.583 10.00 5.583 20.00 8.583 23.00 11.58 8.00
2.667 10.00 5.667 20.00 8.667 23.00 11.67 8.00
2.750 10.00 5.750 20.00 8.750 23.00 11.75 8.00
2.833 10.00 5.833 20.00 8.833 23.00 11.83 8.00
2.917 10.00 5.917 20.00 8.917 23.00 11.92 8.00
3.000 10.00 6.000 20.00 9.000 23.00 12.00 8.00

```

```

Max.Eff.Inten.(mm/hr)= 43.00 35.82
over (min)= 5.00 15.00
Storage Coeff. (min)= 4.21 (ii) 14.85 (ii)
Unit Hyd. Tpeak (min)= 5.00 15.00
Unit Hyd. peak (cms)= 0.24 0.08

```

```

*TOTALS*
PEAK FLOW (cms)= 0.92 0.36 1.284 (iii)
TIME TO PEAK (hrs)= 6.92 7.00 7.00
RUNOFF VOLUME (mm)= 191.00 99.99 154.60
TOTAL RAINFALL (mm)= 193.00 193.00 193.00
RUNOFF COEFFICIENT = 0.99 0.52 0.80

```

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

```

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 53.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```

```

-----
| CALIB
| STANDHYD ( 0202) |
| ID= 1 DT= 5.0 min |
|-----
Area (ha)= 4.27
Total Imp(%)= 60.00 Dir. Conn.(%)= 45.00

```

```

-----
Surface Area      (ha)=      2.56      1.71
Dep. Storage      (mm)=      2.00      5.00
Average Slope      (%)=      5.00      2.00
Length            (m)=     168.72     40.00
Mannings n        =      0.013      0.250

```

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

```

-----
          TIME RAIN      TIME RAIN      TIME RAIN      TIME RAIN
          hrs mm/hr      hrs mm/hr      hrs mm/hr      hrs mm/hr
0.083 15.00 3.083 3.00 6.083 43.00 9.08 13.00
0.167 15.00 3.167 3.00 6.167 43.00 9.17 13.00
0.250 15.00 3.250 3.00 6.250 43.00 9.25 13.00
0.333 15.00 3.333 3.00 6.333 43.00 9.33 13.00
0.417 15.00 3.417 3.00 6.417 43.00 9.42 13.00
0.500 15.00 3.500 3.00 6.500 43.00 9.50 13.00
0.583 15.00 3.583 3.00 6.583 43.00 9.58 13.00
0.667 15.00 3.667 3.00 6.667 43.00 9.67 13.00
0.750 15.00 3.750 3.00 6.750 43.00 9.75 13.00
0.833 15.00 3.833 3.00 6.833 43.00 9.83 13.00
0.917 15.00 3.917 3.00 6.917 43.00 9.92 13.00
1.000 15.00 4.000 3.00 7.000 43.00 10.00 13.00
1.083 20.00 4.083 5.00 7.083 20.00 10.08 13.00
1.167 20.00 4.167 5.00 7.167 20.00 10.17 13.00
1.250 20.00 4.250 5.00 7.250 20.00 10.25 13.00
1.333 20.00 4.333 5.00 7.333 20.00 10.33 13.00
1.417 20.00 4.417 5.00 7.417 20.00 10.42 13.00
1.500 20.00 4.500 5.00 7.500 20.00 10.50 13.00
1.583 20.00 4.583 5.00 7.583 20.00 10.58 13.00
1.667 20.00 4.667 5.00 7.667 20.00 10.67 13.00
1.750 20.00 4.750 5.00 7.750 20.00 10.75 13.00
1.833 20.00 4.833 5.00 7.833 20.00 10.83 13.00
1.917 20.00 4.917 5.00 7.917 20.00 10.92 13.00
2.000 20.00 5.000 5.00 8.000 20.00 11.00 13.00
2.083 10.00 5.083 20.00 8.083 23.00 11.08 8.00
2.167 10.00 5.167 20.00 8.167 23.00 11.17 8.00
2.250 10.00 5.250 20.00 8.250 23.00 11.25 8.00
2.333 10.00 5.333 20.00 8.333 23.00 11.33 8.00
2.417 10.00 5.417 20.00 8.417 23.00 11.42 8.00
2.500 10.00 5.500 20.00 8.500 23.00 11.50 8.00
2.583 10.00 5.583 20.00 8.583 23.00 11.58 8.00
2.667 10.00 5.667 20.00 8.667 23.00 11.67 8.00
2.750 10.00 5.750 20.00 8.750 23.00 11.75 8.00
2.833 10.00 5.833 20.00 8.833 23.00 11.83 8.00
2.917 10.00 5.917 20.00 8.917 23.00 11.92 8.00
3.000 10.00 6.000 20.00 9.000 23.00 12.00 8.00

```

```

Max.Eff.Inten.(mm/hr)= 43.00 37.48
over (min)            = 5.00 15.00
Storage Coeff. (min)= 3.02 (ii) 13.47 (ii)
Unit Hyd. Tpeak (min)= 5.00 15.00
Unit Hyd. peak (cms)= 0.27 0.08

```

```

          *TOTALS*
PEAK FLOW (cms)= 0.23 0.17 0.399 (iii)
TIME TO PEAK (hrs)= 6.75 7.00 7.00
RUNOFF VOLUME (mm)= 191.00 101.53 141.79
TOTAL RAINFALL (mm)= 193.00 193.00 193.00
RUNOFF COEFFICIENT = 0.99 0.53 0.73

```

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

```

(i) CN PROCEDURE SELECTED FOR PVIOUS LOSSES:
CN* = 53.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
    THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```

```

-----
| CALIB |
| STANDHYD ( 0203) |
| ID= 1 DT= 5.0 min |
-----
Area (ha)= 1.39
Total Imp(%)= 50.00 Dir. Conn.(%)= 50.00

```

```

-----
          IMPERVIOUS      PVIOUS (i)
          (ha)=      0.69      0.69
          (mm)=      2.00      5.00
          (%)=      5.00      2.00
          (m)=     96.26     40.00
          Mannings n        =      0.013      0.250

```

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

```

-----
          TIME RAIN      TIME RAIN      TIME RAIN      TIME RAIN
          hrs mm/hr      hrs mm/hr      hrs mm/hr      hrs mm/hr
0.083 15.00 3.083 3.00 6.083 43.00 9.08 13.00
0.167 15.00 3.167 3.00 6.167 43.00 9.17 13.00
0.250 15.00 3.250 3.00 6.250 43.00 9.25 13.00
0.333 15.00 3.333 3.00 6.333 43.00 9.33 13.00
0.417 15.00 3.417 3.00 6.417 43.00 9.42 13.00
0.500 15.00 3.500 3.00 6.500 43.00 9.50 13.00
0.583 15.00 3.583 3.00 6.583 43.00 9.58 13.00
0.667 15.00 3.667 3.00 6.667 43.00 9.67 13.00
0.750 15.00 3.750 3.00 6.750 43.00 9.75 13.00
0.833 15.00 3.833 3.00 6.833 43.00 9.83 13.00
0.917 15.00 3.917 3.00 6.917 43.00 9.92 13.00
1.000 15.00 4.000 3.00 7.000 43.00 10.00 13.00
1.083 20.00 4.083 5.00 7.083 20.00 10.08 13.00
1.167 20.00 4.167 5.00 7.167 20.00 10.17 13.00
1.250 20.00 4.250 5.00 7.250 20.00 10.25 13.00
1.333 20.00 4.333 5.00 7.333 20.00 10.33 13.00
1.417 20.00 4.417 5.00 7.417 20.00 10.42 13.00
1.500 20.00 4.500 5.00 7.500 20.00 10.50 13.00
1.583 20.00 4.583 5.00 7.583 20.00 10.58 13.00
1.667 20.00 4.667 5.00 7.667 20.00 10.67 13.00
1.750 20.00 4.750 5.00 7.750 20.00 10.75 13.00
1.833 20.00 4.833 5.00 7.833 20.00 10.83 13.00
1.917 20.00 4.917 5.00 7.917 20.00 10.92 13.00
2.000 20.00 5.000 5.00 8.000 20.00 11.00 13.00
2.083 10.00 5.083 20.00 8.083 23.00 11.08 8.00
2.167 10.00 5.167 20.00 8.167 23.00 11.17 8.00
2.250 10.00 5.250 20.00 8.250 23.00 11.25 8.00
2.333 10.00 5.333 20.00 8.333 23.00 11.33 8.00
2.417 10.00 5.417 20.00 8.417 23.00 11.42 8.00
2.500 10.00 5.500 20.00 8.500 23.00 11.50 8.00
2.583 10.00 5.583 20.00 8.583 23.00 11.58 8.00
2.667 10.00 5.667 20.00 8.667 23.00 11.67 8.00
2.750 10.00 5.750 20.00 8.750 23.00 11.75 8.00
2.833 10.00 5.833 20.00 8.833 23.00 11.83 8.00
2.917 10.00 5.917 20.00 8.917 23.00 11.92 8.00
3.000 10.00 6.000 20.00 9.000 23.00 12.00 8.00

```

```

Max.Eff.Inten.(mm/hr)= 43.00 23.07
over (min)            = 5.00 15.00
Storage Coeff. (min)= 2.16 (ii) 14.85 (ii)
Unit Hyd. Tpeak (min)= 5.00 15.00
Unit Hyd. peak (cms)= 0.31 0.08

```

```

          *TOTALS*
PEAK FLOW (cms)= 0.08 0.04 0.125 (iii)
TIME TO PEAK (hrs)= 6.75 7.00 7.00
RUNOFF VOLUME (mm)= 191.00 85.53 138.26
TOTAL RAINFALL (mm)= 193.00 193.00 193.00
RUNOFF COEFFICIENT = 0.99 0.44 0.72

```

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 CN* = 53.0 Ia = Dep. Storage (Above)
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

```

-----
| ADD HYD ( 0001) |
| 1 + 2 = 3 |
-----
ID1= 1 ( 0201): 12.86 1.284 7.00 154.60
+ ID2= 2 ( 0202): 4.27 0.399 7.00 141.79
=====
ID = 3 ( 0001): 17.13 1.682 7.00 151.40
  
```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```

-----
| ADD HYD ( 0001) |
| 3 + 2 = 1 |
-----
ID1= 3 ( 0001): 17.13 1.682 7.00 151.40
+ ID2= 2 ( 0203): 1.39 0.125 7.00 138.26
=====
ID = 1 ( 0001): 18.52 1.807 7.00 150.42
  
```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```

-----
| RESERVOIR( 0002) |
| IN= 2--> OUT= 1 |
| DT= 5.0 min |
-----
OVERFLOW IS OFF

OUTFLOW STORAGE | OUTFLOW STORAGE
(cms) (ha.m.) | (cms) (ha.m.)
0.0000 0.0000 | 0.9767 0.7368
0.0148 0.0921 | 1.2208 0.8058
0.0235 0.1922 | 1.4829 0.8763
0.0298 0.3003 | 2.0785 0.9483
0.0325 0.3573 | 2.9524 1.0220
0.0983 0.4161 | 4.0123 1.0972
0.2165 0.4768 | 5.2246 1.1739
0.3687 0.5394 | 6.5698 1.2522
0.5485 0.6036 | 9.6096 1.4134
0.7520 0.6694 | 14.9233 1.6661

AREA QPEAK TPEAK R.V.
(ha) (cms) (hrs) (mm)
INFLOW : ID= 2 ( 0001) 18.520 1.807 7.00 150.42
OUTFLOW: ID= 1 ( 0002) 18.520 1.352 7.00 150.33
  
```

PEAK FLOW REDUCTION [Qout/Qin](%)= 74.80
 TIME SHIFT OF PEAK FLOW (min)= 5.00
 MAXIMUM STORAGE USED (ha.m.)= 0.8416

```

-----
| CALIB |
| STANDHYD ( 0204) |
| ID= 1 DT= 5.0 min |
-----
Area (ha)= 2.28
Total Imp(%)= 50.00 Dir. Conn.(%)= 30.00
  
```

```

-----
IMPERVIOUS PERVIOUS (i)
Surface Area (ha)= 1.14 1.14
Dep. Storage (mm)= 2.00 5.00
Average Slope (%)= 5.00 2.00
Length (m)= 123.29 40.00
Mannings n = 0.013 0.250
  
```

```

----- TRANSFORMED HYETOGRAPH -----
TIME RAIN TIME RAIN TIME RAIN TIME RAIN
hrs mm/hr hrs mm/hr hrs mm/hr hrs mm/hr
0.083 15.00 3.083 3.00 6.083 43.00 9.08 13.00
0.167 15.00 3.167 3.00 6.167 43.00 9.17 13.00
0.250 15.00 3.250 3.00 6.250 43.00 9.25 13.00
0.333 15.00 3.333 3.00 6.333 43.00 9.33 13.00
0.417 15.00 3.417 3.00 6.417 43.00 9.42 13.00
0.500 15.00 3.500 3.00 6.500 43.00 9.50 13.00
0.583 15.00 3.583 3.00 6.583 43.00 9.58 13.00
0.667 15.00 3.667 3.00 6.667 43.00 9.67 13.00
0.750 15.00 3.750 3.00 6.750 43.00 9.75 13.00
0.833 15.00 3.833 3.00 6.833 43.00 9.83 13.00
0.917 15.00 3.917 3.00 6.917 43.00 9.92 13.00
1.000 15.00 4.000 3.00 7.000 43.00 10.00 13.00
1.083 20.00 4.083 5.00 7.083 20.00 10.08 13.00
1.167 20.00 4.167 5.00 7.167 20.00 10.17 13.00
1.250 20.00 4.250 5.00 7.250 20.00 10.25 13.00
1.333 20.00 4.333 5.00 7.333 20.00 10.33 13.00
1.417 20.00 4.417 5.00 7.417 20.00 10.42 13.00
1.500 20.00 4.500 5.00 7.500 20.00 10.50 13.00
1.583 20.00 4.583 5.00 7.583 20.00 10.58 13.00
1.667 20.00 4.667 5.00 7.667 20.00 10.67 13.00
1.750 20.00 4.750 5.00 7.750 20.00 10.75 13.00
1.833 20.00 4.833 5.00 7.833 20.00 10.83 13.00
1.917 20.00 4.917 5.00 7.917 20.00 10.92 13.00
2.000 20.00 5.000 5.00 8.000 20.00 11.00 13.00
2.083 10.00 5.083 20.00 8.083 23.00 11.08 8.00
2.167 10.00 5.167 20.00 8.167 23.00 11.17 8.00
2.250 10.00 5.250 20.00 8.250 23.00 11.25 8.00
2.333 10.00 5.333 20.00 8.333 23.00 11.33 8.00
2.417 10.00 5.417 20.00 8.417 23.00 11.42 8.00
2.500 10.00 5.500 20.00 8.500 23.00 11.50 8.00
2.583 10.00 5.583 20.00 8.583 23.00 11.58 8.00
2.667 10.00 5.667 20.00 8.667 23.00 11.67 8.00
2.750 10.00 5.750 20.00 8.750 23.00 11.75 8.00
2.833 10.00 5.833 20.00 8.833 23.00 11.83 8.00
2.917 10.00 5.917 20.00 8.917 23.00 11.92 8.00
3.000 10.00 6.000 20.00 9.000 23.00 12.00 8.00
  
```

Max.Eff.Inten.(mm/hr)= 43.00 38.49
 over (min)= 5.00 15.00
 Storage Coeff. (min)= 2.51 (ii) 12.85 (ii)
 Unit Hyd. Tpeak (min)= 5.00 15.00
 Unit Hyd. peak (cms)= 0.29 0.08

TOTALS
 PEAK FLOW (cms)= 0.08 0.12 0.198 (iii)
 TIME TO PEAK (hrs)= 6.75 7.00 7.00
 RUNOFF VOLUME (mm)= 191.00 102.43 129.00
 TOTAL RAINFALL (mm)= 193.00 193.00 193.00
 RUNOFF COEFFICIENT = 0.99 0.53 0.67

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 CN* = 53.0 Ia = Dep. Storage (Above)
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```

-----
| ADD HYD ( 0003) |
| 1 + 2 = 3 |
-----
ID1= 1 ( 0002): 18.52 1.352 7.00 150.33
  
```

```
+ ID2= 2 ( 0204):    2.28    0.198    7.00   129.00
=====
ID = 3 ( 0003):    20.80    1.525    7.00   147.99
```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```
-----
| ADD HYD ( 0003)|
| 3 + 2 = 1 |
|-----|
| ID1= 3 ( 0003):    20.80    1.525    7.00   147.99
+ ID2= 2 ( 0205):    0.25    0.005    7.00    28.79
=====
ID = 1 ( 0003):    21.05    1.531    7.00   146.58
```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CN* Calculation				
CN II:	67			
P_100yr	89.91 mm	(Usually 100-yr 12-hr Total Rainfall)		
Ia=	7.6 mm			
CNIII=	83			
S=	25400	254	52.02	
Ia=	10.40	abstraction		
Q=	48.06			
S*=	58.66			
CN III*:	81	81.2		
CN II*:	64			

CN* Calculation				
CN II:	56			
P_100yr	89.91 mm	(Usually 100-yr 12-hr Total Rainfall)		
Ia=	9.6 mm			
CNIII=	75			
S=	25400	254	84.67	
Ia=	16.93	abstraction		
Q=	33.78			
S*=	110.61			
CN III*:	70	69.7		
CN II*:	50			

CN* Calculation				
CN II:	62			
P_100yr	89.91 mm	(Usually 100-yr 12-hr Total Rainfall)		
Ia=	7 mm			
CNIII=	79			
S=	25400	254	67.52	
Ia=	13.50	abstraction		
Q=	40.56			
S*=	86.56			
CN III*:	75	74.6		
CN II*:	56			

CN* Calculation				
CN II:	55			
P_100yr	89.91 mm	(Usually 100-yr 12-hr Total Rainfall)		
Ia=	9.8 mm			
CNIII=	74			
S=	25400	254	89.24	
Ia=	17.85	abstraction		
Q=	32.19			
S*=	119.24			
CN III*:	68	68.1		
CN II*:	48			

CN* Calculation				
CN II:	63			
P_100yr	89.91 mm	(Usually 100-yr 12-hr Total Rainfall)		
Ia=	8 mm			
CNIII=	80			
S=	25400	254	63.50	
Ia=	12.70	abstraction		
Q=	42.37			
S*=	76.45			
CN III*:	77	76.9		
CN II*:	59			

CN* Calculation				
CN II:	62			
P_100yr	89.91 mm	(Usually 100-yr 12-hr Total Rainfall)		
Ia=	8.6 mm			
CNIII=	79			
S=	25400	254	67.52	
Ia=	13.50	abstraction		
Q=	40.56			
S*=	81.68			
CN III*:	76	75.7		
CN II*:	58			

CN* Calculation				
CN II:	61			
P_100yr	89.91 mm	(Usually 100-yr 12-hr Total Rainfall)		
Ia=	5 mm			
CNIII=	78			
S=	25400	254	71.64	
Ia=	14.33	abstraction		
Q=	38.80			
S*=	100.90			
CN III*:	72	71.6		
CN II*:	53			

CN* Calculation				
CN II:	62			
P_100yr	89.91 mm	(Usually 100-yr 12-hr Total Rainfall)		
Ia=	7.4 mm			
CNIII=	79			
S=	25400	254	67.52	
Ia=	13.50	abstraction		
Q=	40.56			
S*=	85.33			
CN III*:	75	74.9		
CN II*:	56			



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info@valdor-engineering.com www.valdor-engineering.com

Table F.10: Infiltration Trench Calculation

Project No: 19121
Date: March 04 2022

<i>Total Req'd Annual Infiltration Volume to Achieve Target (m³)</i>	<i>Total Actual Annual Infiltration Volume per Design (m³)</i>	<i>Soil Infiltration Rate (mm/h)</i>	<i>Equivalent Drainage Area (ha)</i>	<i>Maximum Trench Length per Site Plan (m)</i>	<i>Initial Abstraction (Trench Drainage Area) (mm)</i>	<i>Retention Time (hr)</i>	<i>Total Annual Rainfall Depth (Per 1981-2010 Climate Normals for Peterborough Airport) (mm)</i>	<i>Total Rainfall Depth Available for Infiltration Per Rainfall Analysis Assuming Ia=3.0mm (Refer to Table F.5) (mm)</i>	<i>Annual Rainfall Depth Needed to Achieve Target Infiltration (mm)</i>	<i>¹ Req'd Design Storm Depth to Achieve Annual Infiltration Requirements</i>	<i>Req'd Event-Based Runoff Volume to be Infiltrated (Based on Req'd Design Storm Depth) (m³)</i>
6,990	7,309	30	2.01	-	3.0	48	749.0	364.22	348.3	15.0	240.8

Total annual infiltration volume provided (m³/yr): **7,309**

Maximum Allowable Depth	
P, Soil Infiltration Rate (mm/h):	30
T, Drawdown Time (hr):	48
d, Maximum Allowable Depth (m):	1.44

Minimum Bottom Area	
V, Runoff Volume to Infiltrated (m ³):	241
P, Soil Infiltration Rate (mm/h):	30.0
n, Void Ratio (clear stone):	0.40
Δt, Drawdown Time (hr):	48
A, Minimum Bottom Area (m ²):	418

$$d = \frac{P \cdot T}{1000} \quad \text{Equation 4.2, Stormwater Management Planning and Design Manual, MOE, 2003}$$

$$A = \frac{1000 \cdot V}{P \cdot n \cdot \Delta t} \quad \text{Equation 4.3, Stormwater Management Planning and Design Manual, MOE, 2003}$$

Infiltration Trench Design									
Infiltration Trench Location	Drainage Area (ha)	Available Infiltration Volume (m ³)	Length (m)	Width (m)	³ Design Depth (m)	Bottom Area (m ²)	Void Ratio	Storage Volume Provided (m ³)	Lesser of Available Infiltration Volume or Storage Volume Provided (m ³)
PHASE 1A									
Infiltration Trench	4.32	-	430.0	1.0	1.40	430	0.40	240.8	240.8
Total Drainage Area (ha): 4.32 Total Bottom Area Provided (m ²): 430 Total Infiltration Volume Used (m ³): 240.8									Total: 240.80

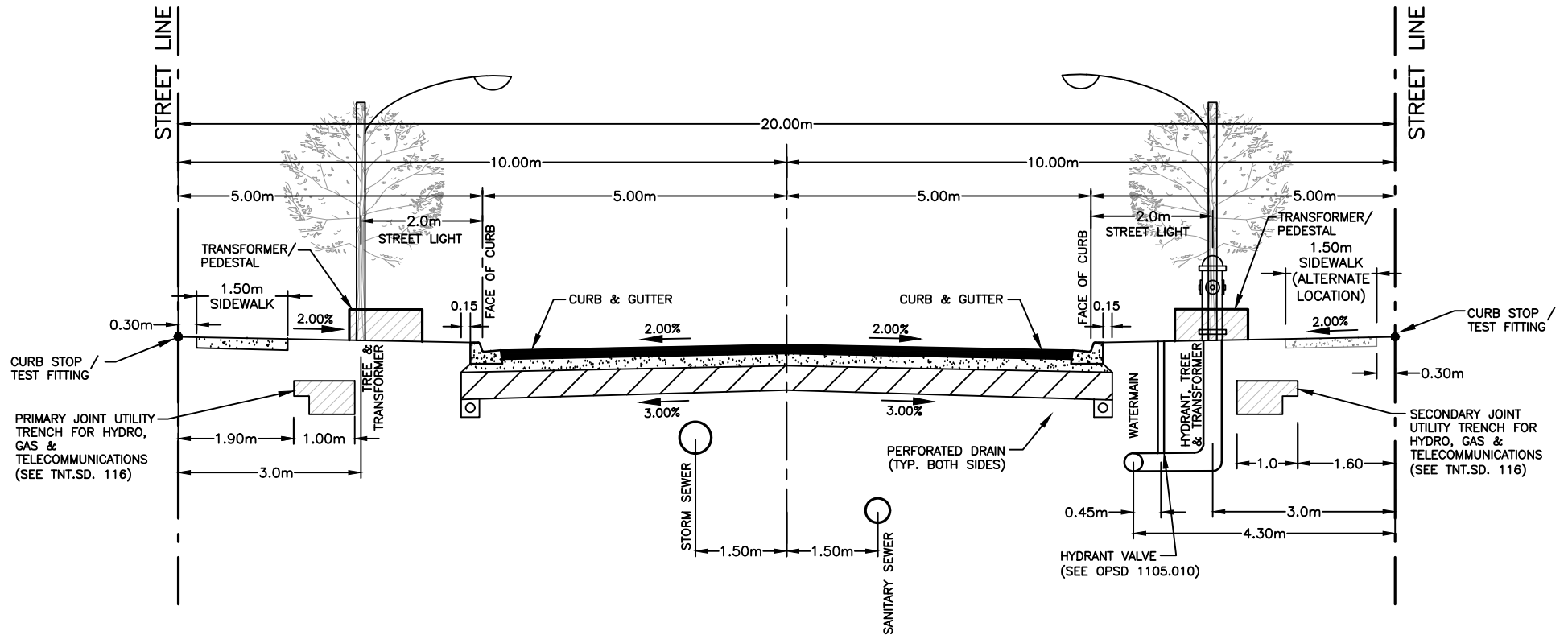
Notes:

Infiltration facilities are sized based on the following criteria (SWMPDM, MOE, 2003) and/or assumptions:

- (1) Infiltration trench volume should be sized based on the runoff generated by a 4-hr 15-mm event or smaller.
- (2) The drainage area to each infiltration trench should be sufficient to provide required runoff quantity.
- (3) The maximum allowable depth of the infiltration facility is based on the soil infiltrate rate and the retention time.
- (4) It is feasible to convey the runoff to the infiltration facility.
- (5) The seasonal high water table should be at least 1 m below the infiltration trench.

APPENDIX “G”

Standard Road & Sidewalk Cross Sections



MILLBROOK SOUTH EAST SUBDIVISION

URBAN LOCAL
20.0m RIGHT-OF-WAY (10.0m ROAD)

SCALE: N.T.S.

DATE: Feb. 2022

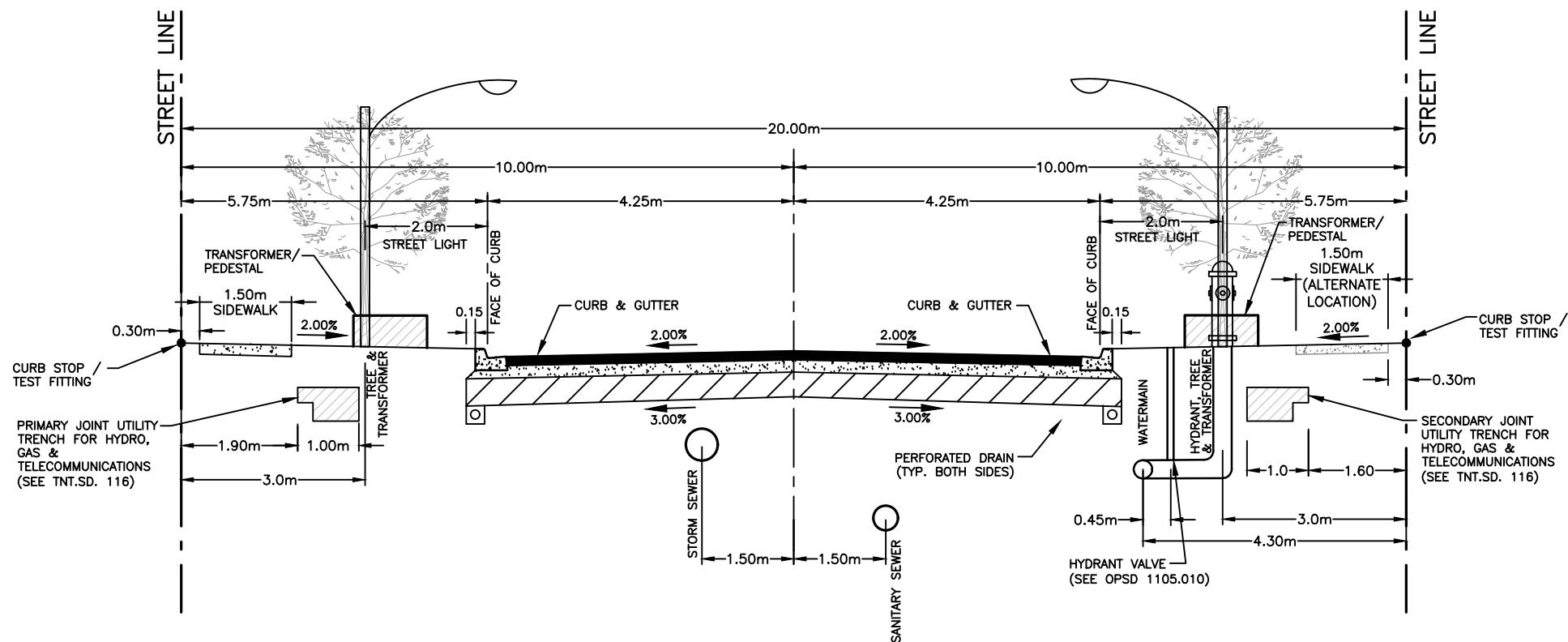
FIGURE G1

NO.

REVISIONS

DATE

APR'D



MILLBROOK SOUTH EAST SUBDIVISION

URBAN LOCAL
20.0m RIGHT-OF-WAY (8.50m ROAD)

				SCALE: N.T.S.
				DATE: Feb. 2022
				FIGURE G2
NO.	REVISIONS	DATE	APR'D	

FIGURE G2

APPENDIX “H”

Excerpts from the Geotechnical Investigation Report



Updated Geotechnical Investigation Report

**Proposed Residential and Commercial
Development – Part Lot 13, Concession 5,
Millbrook, Ontario**

Vargas Properties Inc.

11 March 2022

➔ **The Power of Commitment**



- the area annually recharges a volume of water to the underlying aquifer that is 55% or more of the volume determined by subtracting the annual evapotranspiration for the whole of the related groundwater recharge area from the annual precipitation for the whole of the related groundwater recharge area.

The majority of the developable area is located outside of SGRAs as shown on Figure 10. The SGRA is located at the bottom of the slope and the area of the Baxter Creek tributary and has a score of 2. The development will consider maintaining pre-development infiltration. Therefore, no impacts are expected to the SGRA.

6. Conclusions and Recommendations

Supporting data upon which our recommendations are based have been presented in the foregoing sections of this report. The following recommendations are governed by the physical properties of the subsurface materials that were encountered at the Site and assume that they are representative of the overall site conditions. It should be noted that these conclusions and recommendations are intended for use by the designers only. Contractors bidding on or undertaking any work at the Site should examine the factual results of the investigation, satisfy themselves as to the adequacy of the information for construction, and make their own interpretation of this factual data as it affects their proposed construction techniques, equipment capabilities, costs, sequencing, and the like.

Comments, techniques, or recommendations pertaining to construction should not be construed as instructions to the contractor. It should be noted that where the Municipality has design standards that apply to specific aspects of this project, such standards shall take precedence over any corresponding dissimilar recommendations contained herein.

Based on the results of the geotechnical investigation, it is our professional opinion that the Site is suitable for the proposed residential and commercial development and there is low potential for groundwater impact as a result of developing the Site. It is recommended that good construction and mitigation techniques must be used to minimize the potential for impact. Detailed conclusions and recommendations are presented in the following sections regarding the water balance and potential impacts to groundwater and surface water resources. Details regarding the Geotechnical Investigation including conclusions and recommendations are provided beginning in Section 6.2.

6.1 Hydrogeology

6.1.1 Updated Water Balance Evaluation

An updated evaluation of the water balance was completed based upon the Conceptual Master Plan to compute the potential impacts that may occur in the recharge/ discharge characteristics related to the proposed development.

The objective of the water balance calculations is to illustrate that post-development infiltration can meet or be close to pre-development values from a conceptual perspective. The computations have used detailed parameters such as precipitation, regional evapotranspiration, infiltration and runoff. Weather data from Peterborough A was selected as it was the closest weather station to the Site (~10.2km to the northeast). The detailed calculations can be reviewed in Appendix E. The total Site area is 29.57 ha based on information provided. The following is a summary of the expected pre-development water balance values for the proposed residential and commercial development based on the updated information.

6.1.1.1 Pre-Development Water Balance

The pre-development water balance incorporated the existing soils, slope and ground cover areas. The infiltration factor for the area was calculated from the table of values presented in the “Land Development Guidelines” (MOEE, 1995). It is based on three sub-factors which are:

- Topography sub-factor;
- Soil sub-factor; and
- Cover sub-factor.

The slope of the Site will be considered as “hilly” (slope of 28 m to 47 m per km) to rolling (slope of 2.8 to 3.8 m per km). The soils are generally comprised of sandy silt till or silty clay material and will be considered a medium combination of clay and loam as per the water balance calculations. Table 6 summarizes the expected updated pre-development water balance values for the Site.

Table 6 Updated Pre-Development Summary

Total Precipitation (Peterborough A)	- 855 mm/year
Regional Evapotranspiration	- 561 mm/year
Recharge Available	- 299 mm/year
Area of Recharge Available	- 295,700 m ²
Total Water Surplus	- 88,465 m ³ /year
Total Estimated Infiltration	- 43,579 m ³ /year
Total Estimated Runoff	- 44,887 m ³ /year

Based upon these values, the Site infiltrates on the order of 43,579 m³ per year (147 mm/year).

6.1.1.2 Updated Post-Development Water Balance (No Enhancements)

The computation of the water budget was repeated and updated for the proposed development assuming no mitigation techniques, that is, runoff from impervious surfaces is unrecoverable and not infiltrated into the ground. The anticipated impact of the development is related to increased runoff from impervious surfaces, such as asphalt surface for the proposed access roads and the building rooftops. These are assumed to be impervious surfaces with zero infiltration capacity in this model. A summary of the updated computations is provided in Table 7.

Table 7 Post-Development Summary (No Enhancements)

Area of Site	- 295,700 m ²
Impervious Surfaces	- 101,505 m ²
Area Available for Infiltration	- 194,195 m ²
Total Water Surplus	- 127,560 m ³ /year
Total Estimated Infiltration	- 31,665 m ³ /year
Infiltration % Difference (pre- vs. post-)	- (-27%) Decrease
Total Estimated Runoff	- 95,895 m ³ /year
Runoff % Difference (pre- vs. post-)	- 114% Increase

The impermeable surface area of proposed paved areas, concrete sidewalks and building rooftops was estimated based on the design concept plan presented in Figure 4 and information provided by the Client. Under this scenario, the total infiltration volume decreased by 27% and runoff volume increased by 114%. Within the areas evaluated, the infiltration has reduced and the runoff increased versus the pre-development values. Groundwater base flow would be expected to decrease over time in this scenario. However, recharge via infiltration through the underlying till and silty clay to the lower aquifer from these lands is expected to be minor. Based upon this scenario, mitigative strategies are required to minimize infiltration losses and reduce storm water runoff. The following section discusses the water balance after considering the enhanced infiltration option of directing rooftop stormwater runoff to sodded or vegetated / naturalized areas for infiltration.

6.1.1.3 Updated Post-Development Water Balance (Downspout Disconnection)

The post-construction water budget computations were repeated and updated considering enhanced infiltration options which are also known as Low Impact Development (LID) technologies. These technologies include and are not restricted to rainwater harvesting, downspout disconnection, infiltration trenches, vegetated filter strips, bioretention, permeable pavement, enhanced grass swales, dry swales and perforated pipe systems in order to balance the water budget and maintain any wetland features including nearby creeks. The shallow subsurface soils are sandy silt over silty clay and/or glacial till material. It is noted that LIDs can work in any soil type. The

primary enhancement for this Site is to promote infiltration of rooftop runoff and to move water from impervious surfaces to sodded or vegetated areas where infiltration can occur naturally.

The post-development water balance was modelled to include the disconnection of downspouts from storm sewers and directing water from the building roof tops to sodded areas or undeveloped grass areas which can be enhanced with increased topsoil depths or levelled to further encourage infiltration. A summary of the post-construction updated water budget with enhancements for infiltration is presented in Table 8.

Table 8 Updated Post-Development Summary with Downspout Disconnection LID Strategy

Area of Site	- 295,700 m ²
Total Water Surplus	- 127,560 m ³ /year
Total Estimated Infiltration	- 43,579 m ³ /year
Infiltration % Difference (pre- vs. post-)	- (0%) No change
Total Estimated Runoff	- 83,981 m ³ /year
Runoff % Difference (pre- vs. post-)	- 87% Increase

Under this scenario, the total infiltration volume is maintained and runoff volume increased by 87% compared to pre-development values. Within the areas evaluated, the infiltration and runoff amounts have improved compared to post-development (no mitigation) numbers. Runoff increase compared with the pre-development conditions will need to be managed as per the storm water management plan.

It is expected that recharge via infiltration through the till to the lower aquifers is a small component and impacts to the groundwater aquifer are expected to be insignificant. It is our professional opinion that there would be minimal impact to the local groundwater regime and minimal impact to the downgradient surface water regime from a quantity perspective.

6.1.2 Impact on Groundwater Baseflow

The importance of the groundwater baseflow is that it provides discharge to water bodies, wells and may have some hydraulic functionality with the on-site features. Water balance calculations suggest that conceptually the infiltration to the subsurface can be kept near pre-development values if appropriate LID technologies are used. It is GHD's professional opinion that there is not expected to be a significant impact to the shallow groundwater baseflow that may be supplying baseflow to the downgradient Baxter Creek.

6.1.3 Impact on Surface Water Bodies

The impacts to surface water bodies are related to the reduction of the groundwater baseflow and water quality concerns related to human activities such as salting of paved areas, minor fuel and oil leaks, fertilizer application, etc. It is expected that there will be minor impacts to groundwater and neighbouring surface water bodies. Runoff from the development will be collected by an internal storm sewer system and treated using a stormwater management pond or other LID strategies. Further details are provided within the Functional Servicing Report regarding the stormwater management.

6.1.4 Mitigation Measures

Several mitigative techniques have been recommended in order to address concerns relating to the potential for impact to the base flow. The impact and mitigation measures can be arranged into two (2) distinct categories: construction phase and operational phase. Prior to construction, storm water management techniques should be incorporated to control additional surface water runoff and permit enhanced infiltration into the surrounding ground. Storm water management techniques will minimize the potential for groundwater impact and also minimize the amount of silt or other fine-grained soil particles becoming mobile and entering into down-gradient areas.

The installation of strategically placed silt fences will filter any excess storm water runoff prior to entering the infiltration areas.

During the operational phase of the development, it is expected that storm water excess will be controlled as indicated in the Functional Servicing Report. It is recommended that all roof leader drains of the future residential buildings be allowed to drain onto the ground surface for infiltration. Swales may be required in some areas to

Appendix A

Soil Exploration Data



BOREHOLE No.: BH-1

ELEVATION: 250.3 m

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Vargas Properties

PROJECT: Proposed Residential and Commercial Development

LOGGED BY: Jamie McEachern

DATE: 13 March 2020

DRILLING COMPANY: Strong Soil Search

METHOD: Solid Stem Augers and Spilt Spoons

Ground surface elevation interpolated from Topographic plan prepared by IBW Surveyors, File Name "P-0400 Topo v4.dwg" dated

NOTES: Jan. 14, 2020

LEGEND

	SS	- SPLIT SPOON
	AS	- AUGER SAMPLE
	ST	- SHELBY TUBE
	CS	- CORE SAMPLE
		- WATER LEVEL

[illegible]

BOREHOLE LOG GEOTECH (MULTIPLE DRILLERS) 11209539-01-DWG-20-06-01, VARGAS BOREHOLE LOGS. JM, EW.GPJ GEOLOGIC.GDT 15/6/20



BOREHOLE No.: BH-2

ELEVATION: 248.6 m

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Vargas Properties

PROJECT: Proposed Residential and Commercial Development

LOGGED BY: Jamie McEachern

DATE: 13 March 2020

DRILLING COMPANY: Strong Soil Search

METHOD: Solid Stem Augers and Spilt Spoons

NOTES: Ground surface elevation interpolated from Topographic plan prepared by IBW Surveyors, File Name "P-0400 Topo_v4.dwg" dated Jan. 14, 2020

LEGEND

- SS - SPLIT SPOON
 AS - AUGER SAMPLE
 ST - SHELBY TUBE
 CS - CORE SAMPLE
 W - WATER LEVEL

Depth	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery	Moisture Content	Blows per 6 in. / 15 cm	Penetration Index	Shear test (Cu) Sensitivity (S) Water content (%) Atterberg limits (%) "N" Value (blows / 0.3 m)	Field Lab RQD CONE	COMMENTS
ft	m	0.0	GROUND SURFACE		%	%		N	10 20 30 40 50 60 70 80 90		
			TOPSOIL (300 mm)								
1	0.3		SANDY SILT - Reddish Brown Sandy Silt, Moist to Wet, Loose	SS-1A	71	27	1	4			
2	0.5			SS-1B		26	2				
3	1.0		TILL - Light Brown Clayey Silt, Trace Sand, Moist to Wet, Compact	SS-2	78	22	6	25			
4							10				
5	1.5		With Gravel, Moist				15				
6	2.0			SS-3	100	10	7	15			
7							8				
8				SS-4	72	8	5	22			
9							8				
10	3.0		Light Brown Silty Sand with Gravel, Trace Clay, Moist, Very Dense	SS-5	44	10	20	75			
11							41				
12							34				
13	4.0										
14											
15				SS-6	94	7	12	61			
16	5.0						28				
17							33				
18											
19											
20	6.0		Grey, Dense	SS-7	78		8	45			
21	6.1						17				
22	6.6		END OF BOREHOLE				28				
23	7.0										
24											
25											
26	8.0										
27											

 WL - 2.3 m immediately after drilling
 First encounter of groundwater seepage at 2.4 m

Borehole Caving to 5.3 m at completion on drilling

BOREHOLE LOG GEOTECH (MULTIPLE DRILLERS), 11209539-01-DWG-20-06-01, VARGAS BOREHOLE LOGS, JM, EW, GPJ, GEOLOGIC.GDT, 15/6/20



BOREHOLE No.: BH-3

ELEVATION: 246.5 m

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Vargas Properties

PROJECT: Proposed Residential and Commercial Development

LOGGED BY: E. Wierdsma

DATE: 15 April 2020

DRILLING COMPANY: Landshark Drilling

METHOD: Solid Stem Augers and Spilt Spoons

NOTES: Ground surface elevation interpolated from Topographic plan prepared by IBW Surveyors, File Name "P-0400 Topo_v4.dwg" dated Jan. 14, 2020

LEGEND

- ☒ SS - SPLIT SPOON
☒ AS - AUGER SAMPLE
☒ ST - SHELBY TUBE
☒ CS - CORE SAMPLE
 - WATER LEVEL

Depth	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery	Moisture Content	Blows per 6 in. / 15 cm	Penetration Index	Shear test (Cu) Sensitivity (S) Water content (%) Atterberg limits (%) "N" Value (blows / 0.3 m)	Field Lab RQD CONE	COMMENTS
ft	m	0.0	GROUND SURFACE		%	%		N	10 20 30 40 50 60 70 80 90		
			TOPSOIL (300 mm)				1				
1	0.3		SANDY SILT - Brown Sandy Silt, Moist, Loose	SS-1	40	7	2	5	X		
2							3				
3	1.0	1.1	TILL - Light Brown Sandy Silt with Clay and Gravel, Moist, Compact	SS-2	100	31	4	13	X	O	
4							6				
5							7				
6	2.0			SS-3	50	12	4	18	O	X	
7							7				
8							11				
9				SS-4	100	12	6	25	O	X	
10	3.0	3.0	Dense				11				
11				SS-5	100	10	3	48	O	X	
12	3.7	3.7	Cobble (Inferred From Augers Grinding)				18				
13							30				
14	4.0						22				
15	4.6	4.6	Very Dense	SS-6	100	8	50=4"	100+	O		X
16	5.0										
17											
18											
19											
20	6.0			SS-7	100	11	26	50	O	X	
21	6.4	6.4	Wet				24				
22	6.6	6.6	END OF BOREHOLE				26				
23	7.0										
24											
25											
26	8.0										
27											

Grain Size Data
 SS-4:
 13% Gravel
 29% Sand
 58% Silt and
 Clay-sized
 Particles
 33% Between 5-75
 um

End of borehole
 open and dry upon
 completion of
 drilling



BOREHOLE No.: BH-4

ELEVATION: 244.2 m

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Vargas Properties

PROJECT: Proposed Residential and Commercial Development

LOGGED BY: Jamie McEachern

DATE: 13 March 2020

DRILLING COMPANY: Strong Soil Search

METHOD: Solid Stem Augers and Spilt Spoons

NOTES: Ground surface elevation interpolated from Topographic plan prepared by IBW Surveyors, File Name "P-0400 Topo_v4.dwg" dated Jan. 14, 2020

LEGEND

	SS	- SPLIT SPOON
	AS	- AUGER SAMPLE
	ST	- SHELBY TUBE
	CS	- CORE SAMPLE
		- WATER LEVEL

 - WATER LEVEL

NOTES: Jan. 14, 2020

[illegible]



BOREHOLE No.: BH-5

ELEVATION: 253.6 m

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Vargas Properties

PROJECT: Proposed Residential and Commercial Development

LOGGED BY: Jamie McEachern

DATE: 12 March 2020

DRILLING COMPANY: Strong Soil Search

METHOD: Solid Stem Augers and Spilt Spoons

NOTES: Ground surface elevation interpolated from Topographic plan prepared by IBW Surveyors, File Name "P-0400 Topo_v4.dwg" dated Jan. 14, 2020

LEGEND

- ☒ SS - SPLIT SPOON
☒ AS - AUGER SAMPLE
☒ ST - SHELBY TUBE
☒ CS - CORE SAMPLE
 - WATER LEVEL

Depth	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery	Moisture Content	Blows per 6 in. / 15 cm	Penetration Index	Shear test (Cu) Sensitivity (S) Water content (%) Atterberg limits (%) "N" Value (blows / 0.3 m)	Field Lab RQD CONE	COMMENTS
ft	m	0.0	GROUND SURFACE		%	%		N	10 20 30 40 50 60 70 80 90		
		0.3	TOPSOIL (300 mm)								
1			SANDY SILT - Reddish Brown Sandy Silt, Trace Clay, Moist to Wet, Loose	SS-1	42	17	1 2 4 7	6	X O		Borehole remained open and dry throughout drilling activities
2		0.8	TILL - Light Brown Silty Sand With Gravel, Trace Clay, Moist to Wet, Loose to Compact	SS-2	50	14	2 6 5	11	X O		
3	1.0										
4											
5											
6	2.0			SS-3	100	15	3 2 3	5	X O		
7											
8			- Reddish Brown 75mm Sand Seam at 2.6m	SS-4	78	13	8 8 12	20	O X		
9											
10	3.0	3.0	Moist, Very Dense	SS-5	72	9	16 29 36	65	O	X	
11											
12											
13	4.0										
14											
15											
16	5.0			SS-6	100	6	20 30 32	64	O	X	
17											
18											
19											
20	6.0										
21				SS-7	100	8	26 30 38	64	O	X	
22	6.6		END OF BOREHOLE								
23	7.0										
24											
25											
26	8.0										
27											



BOREHOLE No.: BH-6

ELEVATION: 247.1 m

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Vargas Properties

PROJECT: Proposed Residential and Commercial Development

LOGGED BY: Jamie McEachern

DATE: 13 March 2020

DRILLING COMPANY: Strong Soil Search

METHOD: Solid Stem Augers and Spilt Spoons

NOTES: Ground surface elevation interpolated from Topographic plan prepared by IBW Surveyors, File Name "P-0400 Topo_v4.dwg" dated Jan. 14, 2020

LEGEND

- ☒ SS - SPLIT SPOON
☒ AS - AUGER SAMPLE
☒ ST - SHELBY TUBE
☒ CS - CORE SAMPLE
 - WATER LEVEL

Depth	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery	Moisture Content	Blows per 6 in. / 15 cm	Penetration Index	Shear test (Cu) Sensitivity (S) Water content (%) Atterberg limits (%) "N" Value (blows / 0.3 m)	Field Lab RQD CONE	COMMENTS
ft	m	0.0	GROUND SURFACE		%	%		N	10 20 30 40 50 60 70 80 90		
		0.3	TOPSOIL (300 mm)				3				
1	0.3		SANDY SILT - Reddish Brown Sandy Silt, Trace Clay, Moist to Wet, Loose	SS-1	67	22	4	8	X		
2	0.6						4				
3	0.9		TILL - Light Brown Silty Sand with Gravel, Trace Clay, Moist to Wet, Compact / Moist	SS-2	100	9	3	20			
4	1.0						9				
5							11				
6	2.0			SS-3	72	10	13	26			
7							14				
8				SS-4	94	7	4	25			
9							10				
10	3.0		Very Dense	SS-5	100	4	11	100+			
11							30				
12							50=4"				
13	4.0										
14											
15				SS-6	100	5	45	100+			
16	5.0						50=4"				
17											
18											
19											
20	6.0			SS-7	100	5	12	52			
21							19				
22	6.6		END OF BOREHOLE				33				
23	7.0										
24											
25											
26	8.0										
27											

BOREHOLE LOG GEOTECH (MULTIPLE DRILLERS) 11209539-01-DWG-20-06-01, VARGAS BOREHOLE LOGS, JM, EW, GP, J. GEOLOGIC.GDT 15/6/20

Borehole remained open and dry throughout drilling activities



BOREHOLE No.: BH-7
ELEVATION: 238.8 m

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Vargas Properties

PROJECT: Proposed Residential and Commercial Development

LOGGED BY: Jamie McEachern

DATE: 12 March 2020

DRILLING COMPANY: Strong Soil Search

METHOD: Solid Stem Augers and Spilt Spoons

NOTES: Ground surface elevation interpolated from Topographic plan prepared by IBW Surveyors, File Name "P-0400 Topo_v4.dwg" dated Jan. 14, 2020

LEGEND

- SS - SPLIT SPOON
- AS - AUGER SAMPLE
- ST - SHELBY TUBE
- CS - CORE SAMPLE
- WATER LEVEL

Depth		m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery	Moisture Content	Blows per 6 in. / 15 cm	Penetration Index	Shear test (Cu)		Sensitivity (S)		Water content (%)		Atterberg limits (%)		"N" Value (blows / 0.3 m)		Field		Lab		COMMENTS
ft	m									w _p	w _L	Δ	□	○	×	◇	⊙	△	□					
		0.0		GROUND SURFACE		%	%		N	10	20	30	40	50	60	70	80	90						
				TOPSOIL (300 mm)																			Grain Size Data SS-1: 4% Gravel 33% Sand 63% Silt and Clay-sized Particles 48% Between 5-75 um	
1	0.3			SANDY SILT - Reddish Brown Sandy Silt, Trace Clay, Moist to Wet, Soft	SS-1	58	18	1	3	×	○													
2	0.6																						Shallow piezometer installed to 1.5 m. Piezometer measured dry on 05/19/2020	
3	1.0			TILL - Light Brown Silty Sand With Gravel, Trace Clay, Moist to Wet, Compact	SS-2	100	12	3	7		○	×												
4								11	18														WL - Dry 05/19/2020 and 03/19/2020	
5	1.5			Clayey	SS-3	100	15	2	4		×	○												
6	2.0								10														Borehole remained open and dry throughout drilling activities	
7																								
8	2.6			Trace Clay, Moist, Very Dense	SS-4A		10	6				○												
9					SS-4B	100	4	16	50		○													
10	3.0																							
11					SS-5	83	6	12	64		○					×								
12																								
13	4.0																							
14																								
15																								
16	5.0				SS-6	100	8	18	100+		○										×			
17								42																
18								50=4"																
19																								
20	6.0																							
21	6.3			END OF BOREHOLE	SS-7	100	10	28	100+		○										×			
22								50=3"																
23	7.0																							
24																								
25																								
26	8.0																							
27																								

Borehole remained open and dry throughout drilling activities

BOREHOLE LOG GEOTECH (MULTIPLE DRILLERS) 11209539-01-DWG-20-06-01, VARGAS BOREHOLE LOGS, JM, EW, GP, J, GEOLOGIC.GDT 15/6/20



BOREHOLE No.: BH-8

ELEVATION: 231.0 m

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Vargas Properties

PROJECT: Proposed Residential and Commercial Development

LOGGED BY: E. Wierdsma

DATE: 15 April 2020

DRILLING COMPANY: Landshark Drilling

METHOD: Solid Stem Augers and Spilt Spoons

NOTES: Ground surface elevation interpolated from Topographic plan prepared by IBW Surveyors, File Name "P-0400 Topo_v4.dwg" dated Jan. 14, 2020

LEGEND

- ☒ SS - SPLIT SPOON
☒ AS - AUGER SAMPLE
☒ ST - SHELBY TUBE
☒ CS - CORE SAMPLE
 - WATER LEVEL

Depth	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Recovery	Moisture Content	Blows per 6 in. / 15 cm	Penetration Index	Shear test (Cu) Sensitivity (S) Water content (%) Atterberg limits (%) "N" Value (blows / 0.3 m)	Field Lab RQD CONE	COMMENTS
ft	m	0.0	GROUND SURFACE		%	%		N	10 20 30 40 50 60 70 80 90		
		0.3	TOPSOIL (300 mm)				1				
1		0.3	SANDY SILT - Brown Sandy Silt, Moist, Very Loose	SS-1	25	33	1	2	X		
2		0.8	TILL - Light Brown Sandy Silt With Clay and Gravel, Moist, Loose	SS-2	60	10	2				
3	1.0	0.8	Cobble (Inferred From Augers Grinding)				3				
4		1.2	Clayey Silt with Sand and Gravel, Mottled, Moist, Compact to Dense	SS-3	50	13	5	8	X		
5		1.5					7				
6	2.0	1.5					4				
7		2.6	Grey	SS-4	60	9	20	39			
8		2.6					19				
9		3.0	Wet	SS-5	60	11	34				
10	3.0	3.0					7				
11		3.0					10				
12		4.6	Grey Sandy Silt with Clay and Gravel, Moist, Dense	SS-6	50	9	12	31			
13	4.0	4.6					19				
14		4.6					17				
15	5.0	4.6					19				
16		6.7		SS-7	50	9	14	38			
17		6.7					16				
18	6.0	6.7					22				
19		6.7					10				
20		6.7	END OF BOREHOLE								
21	7.0	6.7									
22		6.7									
23		6.7									
24	8.0	6.7									
25		6.7									
26		6.7									
27		6.7									

First encounter of groundwater seepage at 3.0 m Water up to 3.4 m upon completion

Borehole cave-in up to 4.3 m upon completion