Dambreak Analysis for the Hiles Mill Pond Dam

City of Hiles
Forest County, State of Wisconsin
Chequamegon Nicolet National Forests

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Brief History of Hiles Mill Pond Dam:

Hiles Mill Pond dam it thought to have been originally built in 1890. The dam and the adjoining property are owned by the City of Hiles; but the reservoir is mostly surrounded by Forest Service land. The City and the Forest Service have an MOU (memorandum of understanding) dating back to 1992 on constructing, operating, and maintaining the dam. The Forest Service designed and constructed a new dam in 1993. At the time, the dam was rated as a low hazard, though there was little documentation of why.

Due to the City ownership of the dam, the State of Wisconsin dam regulations must be followed, rather than Forest Service or federal dam regulations. Because of the dam's location in the town of Hiles, the Wisconsin DNR has asked the City of Hiles to do a dam break analysis to more properly determine the hazard rating of the dam to properly protect public health and safety. Due to the MOU, the Forest Service has agreed to inspect and do any engineering work that may be needed on the dam, including the requested dam break analysis and hazard determination.

Hiles Mill Pon Dam Description:

- Location: Forest County; T37N, R12E, Sec 3; 45°42.6'N, 88°58.5'W; NID # WI00624
- Type: earthen embankment, 200 feet long and 35 feet wide with a local road traversing the crest. The controls structure is a 5' reinforced concrete pipe with concrete drop inlet box/weir on the lakeside.
- The area of the reservoir at normal elevations 1643' is 326 acres. Maximum elevation during a 100 year flood is 1644.6 and an area of 575 acres.
- Normal hydraulic height is 6', structural height is 10'. Normal water elevation is 1643'. The crest of the dike is at 1647'. Normal volume is 650 ac-ft.
- Size is a FS Class C.
- The area of the watershed is 7.0 mi. sq.

Hydrologic and Hydraulic Analysis (H&H)

Storm Hydrograph:

There are no gauging stations on the watershed. Therefore, an input hydrograph for a 100 year storm events was computed with the SCS synthetic hydrograph method that uses the area of the watershed area, rainfall, the abstraction rate and the time lag.

Rainfall:

The Wisconsin NR333 regulation requires an analysis of the regional flood flows which is defined as a100 year storm. The 100 yr.-24 hr storm is 5". Modeling was also done to route the following storms through Hiles dam: the 500 yr-24 hr storm (5.7"); the 50 yr-24 hr storm (4.7"); and the 10 yr-24 hour storm (3.7"), as determined with the Weather Bureau's TP40 and extrapolation for the 500 year storm. An hyetograph was determined by embedding the peak storms of less than 24 hour duration into the 24 hour storm. P MP and that highest rainfall is with the local storm PMP. See appendix. It should be noted that 6-hr and 1-hr precipitations from

TP40 were embedded into the hyetograph is a more conservative approach than averaging the 24 hr storm into equal hourly amounts.

Abstraction Rate:

All the rain that falls on an area does not run off—some soaks into the ground and that is called abstraction. The abstraction rate was determined by using TR55, the SCS soil run-off method that uses run-off curve numbers (RCN). This method uses the hydrologic grouping of soils in conjunctions with the land use to empirically determine how much water will actually run off during a storm flow. The antecedent abstraction rate (saturation of the soil before the 100 yr. storm) was assumed to be the standard SCS rate with no previous storms. Soils hydrologic grouping were determined with the NRCS Web Soil Survey.

Hydrologic Soil Group	%	Land use cover	RCN	Composite RCN
A	0	na	Na	69
B	49	Forest, good	55	
C	4	Forest, good	70	
D	40	Meadow, good	78	
Lakes	6	water	100	

Time of Concentration (Tc) and Lag Time (LT):

The steeper the watershed is the faster the water will run off. The flatter the watershed is, the slower it will run off. To determine a storm hydrograph, you must determine the time base. Tc is defined as the time for the water to travel from the most distant point on the watershed to the dam. LT is the time from an inflection point in the rainfall to be reflected in an inflection point in the storm hydrograph. This watershed has a low gradient, and all the flow going into the reservoir is sheet flow with no apparent concentrated flow. The reservoir is long and runs most the length of the watershed.

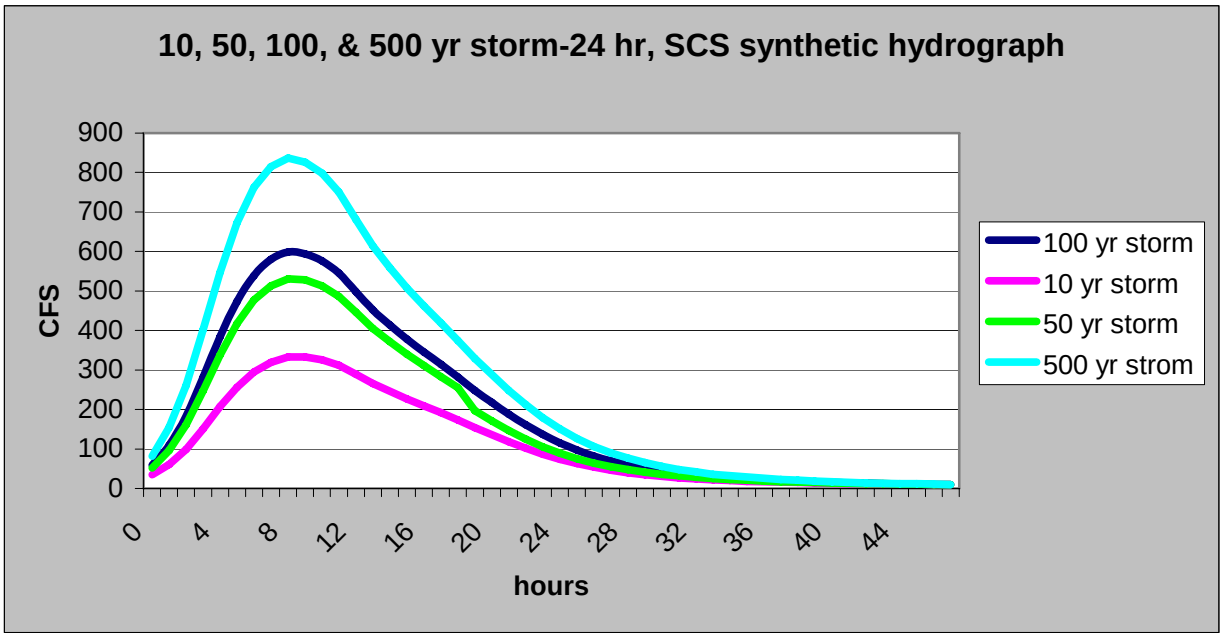
Water Flow	Velocity (fps)	Time Lag
Sheet	.2	8.3 hours
Reservoir flow	9.5	

The total distance from the dam to the watershed divide is 4.4 miles.

Input Hydrographs:

The input hydrograph for storm events were computed with the aid of the Army Corp of Engineers' HEC-1 computer program. The 100 year peak flow was computed at 599 CFS and this was used for the regional flood to model the dam break. The 50 and 500 year storm events were also computed and routed through the

dam with HEC-1 to compute the reservoir elevations to compare to the significant hazard requirements of NF333.07(1) and (2).



Hiles Mill Pond Dam Control Structure:

The control structure of the dam is drop inlet with a 5' RCP conduit through the dam. At low flows, the inlet weir controls the flow, but a higher level, the conduit controls the flows. The weir flow was modeled with the standard weir formulas with a weir coefficient of 2.6 and the RCP conduit was modeled with the aid of culvert nomographs using Chart 8B in the "Hydraulic Design of Highway culverts".

Elevation (MSL)	1643	1644	1645	1646	<1646
Total Outflow (CFS)	0	57	162	200	200

Dam Break Modeling

The dam break was modeled using the Army Corp of Engineers' HEC-RAS River Analysis System computer model. The unsteady flow mode was used with the dam modeled as an inline structure. The Hwy 32 culvert was modeled as a culvert. Cross sections and elevations at key locations and residences were field determined. Other cross sections below Hwy 32 were determined from USGS quad maps. The dam break was modeled as a piping failure with a 100 year storm. Routing this storm only raises the reservoir by a maximum of 1.6', which is 2.4' below the crest of the dam.

The breach was formed in one hour and the width of the breach was put at 25' with a .5:1 side slopes. The breach was started when the reservoir reaches its maximum height during the regional flood. Manning's "n" was estimated to range from .03 to .07. The control structure was modeled in HEC-RAS as a gate with a stage/flow regime matching the computed control structure flow.

Wisconsin NR333 was followed with three modelings: 1) regional flood with dam break; 2) regional flood without dambreak; and 3) regional flood with dam non-existent.

Flow regime	Max. Outflow at Hiles Mill Pond Dam (CFS)
100 yr flood, dam break	1300
100 yr flood , no dam break	140
100 yr flood , dam non existent	599

The following table shows the results at the building cross section and at several points downstream where the flow is shown to be attenuating. See the maps in the Appendix for the building locations

Location and Point of interest	Flow Regime	Elevation of max. water (MSL)	Width of the hydraulic shadow
Hiles Mill Pond Dam Crest el. 1647.0	100 yr fld w/o dambrk	1644.6	na
	100 yr fld w/ dambrk	1644.6	na
	100 yr fld w/o dam	na	na
Garage F, el. 1640.7	100 yr fld w/o dambrk	1638.7	840
	100 yr fld w/ dambrk	1642.2	940
	100 yr fld w/o dam	1641.5	940
Residence E, el. 1645.4 Residence D, el. 1645.1 Garage G, el. 1640.1	100 yr fld w/o dambrk	1638.7	450
	100 yr fld w/ dambrk	1642.2	950
	100 yr fld w/o dam	1641.6	850
Hwy 32, el. 1641.0	100 yr fld w/o dambrk	1638.7	0
	100 yr fld w/ dambrk	1642.2	675
	100 yr fld w/o dam	1641.6	425
Residence A, el. 1638.7 Residence C, el. 1638.3 Travel Trailer B, el. 1636.8	100 yr fld w/o dambrk	1636.1	250
	100 yr fld w/ dambrk	1640.4	1500
	100 yr fld w/o dam	1637.5	460

Conclusions:

Hazard rating

The can be seen in the above table, several building are in the hydraulic shadow of the dam break. Garage G is not occupied. Residences E and D are year around residences. Residences A and C and Travel Trailer B are thought to be summer residences. Travel Trailer B's given elevation is on the ground, not the living space. The other residences given elevation are at the estimated floors of the living space. See the appendix for pictures of these residences. Hwy 35 will likely wash out as there is over 1' of water going over the highway.

As this dam is owned by the City of Hiles, the hazard rating must follow Wisconsin regulations. Note that these regulations are significantly different from what it would be if Forest Service regulations would apply. The following are the Wisconsin regulations on dam hazard ratings:

NR 333.06 Dam hazard ratings. (1) A hazard rating of low, significant or high for all existing and proposed dams shall be determined in accordance with the following criteria:

(a) *Low hazard.* A low hazard rating shall be assigned to those dams that have no development unrelated to allowable open space use in the hydraulic shadow where the failure or mis−operation of the dam would result in no probable loss of human life, low economic losses (losses are principally limited to the owners property), low environmental damage, no significant disruption of lifeline facilities, and have land use controls in place to restrict future development in the hydraulic shadow.

(b) *Significant hazard.* A significant hazard rating shall be assigned to those dams that have no existing development in the hydraulic shadow that would be inundated to a depth greater than 2 feet and have land use controls in place to restrict future development in the hydraulic shadow. Potential for loss of human life during failure must be unlikely. Failure or mis−operation of the dam would result in no probable loss of human life but can cause economic loss, environmental damage, or disruption of lifeline facilities.

(c) *High hazard.* A high hazard rating shall be assigned to those dams that have existing development in the hydraulic shadow that will be inundated to a depth greater than 2 feet or do not have land use controls in place to restrict future development in the hydraulic shadow. This rating must be assigned if loss of human life during failure or mis−operation of the dam is probable.

Using NR333, it appears that the Hiles Mill Pond dam would be rated a significant hazard because it exceeds the Low hazard criteria of "no development in the hydraulic shadow"; and there will be no more than 2' of water in some of the residences.

NR333 also requires that there be land use controls in place to restrict future development. Without such land use controls in place, the DNR will likely rate this dam as a high hazard. Land use control (zoning) must be implemented by Forest County before the Wisconsin rating will be lower than high hazard.

Spillway capacity:

NR333 requires a minimum spillway capacity for a given hazard rating. For a significant hazard dam, this would require the principal spillway to be able to pass a Q50, and the total capacity to be a Q500 which exceeds the Hiles Mill Pond dam spillway capacity. The capacity of the Hiles Mill Pond dam principal spillway is 200 cfs, but the Q50 is 531 cfs. There is no other spillways on the dam so the total spillway capacity is still 200 cfs, which compares to a required Q500 of 837 cfs.

But NR333.07 (2)(b) allows for reduced requirements:

(b) Any owner may provide documentation to justify a different spillway capacity from that specified in Table I. The department shall review such documentation and may approve the spillway capacity proposed by the owner if it determines that such capacity will not result in an additional hazard to life, health or property when compared to the capacity specified in Table I.

This H&H analysis shows that the dam can contain the 100 yr flood with 2.4' of freeboard; therefore the dam with its existing spillway capacity will not result in an additional hazard to life or property compared to the Q500 spillway capacity requirement.

The Town can request that the DNR approve the existing spillway capacity of the dam. If the DNR does not approve it, the dam will have to be totally rebuilt.

Emergency Action Plan

NR333.06(3) requires that an adequate emergency action plan (EAP) be prepared for the area downstream of the dam. This must involve the division of emergency government and be approved by the DNR. This H&H analysis will be required for development of such EAP.

Other H&H method comparisons:

The original FS design from 1992 has significantly different analysis than this report. Some of the differences are the RCN, the lag time, the computation of the input hydrograph, area of reservoir, volume of reservoir, capacity of the control structure, and computational methodologies. There is neither documentation nor references as to what design method was used to generate the numbers. Due to the lack of documentation, it is not thought that the original calculations are valid.

Another method of computing the 100 year flood is to use the USGS regression equations. This method computes a significantly lower peak flow (157 CFS) that did the SCS synthetic hydrograph generation by this report (599 CFS). It is thought that the SCS hydrograph is the most appropriate method to use because the USGS equations does not generate a hydrograph; the SCS uses additional empirical data about land use and soil characteristics; and NR 116.07 (3)(b)6 requires the use of a hydrograph and routing of the hydrograph through the dam system. Also, the input hydrograph is of less importance in determining the hydraulic shadow than is the actual dam failure.

References:

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Chow, Maidment, Mays; *Applied Hydrology*, 1988.
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USGS quad maps, Argonne and Alvin SW quadrangles, 1:24,000

APPENDIXES

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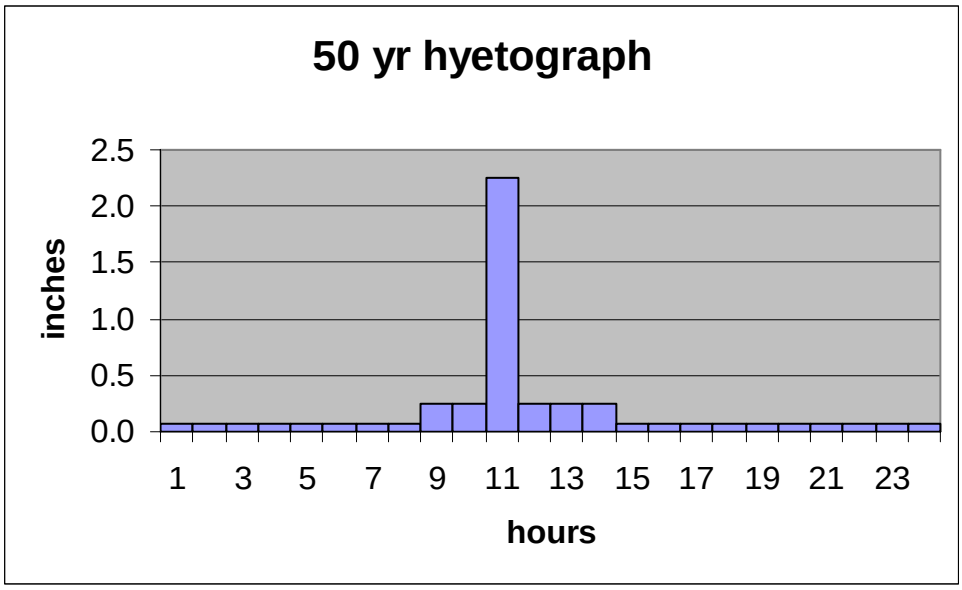
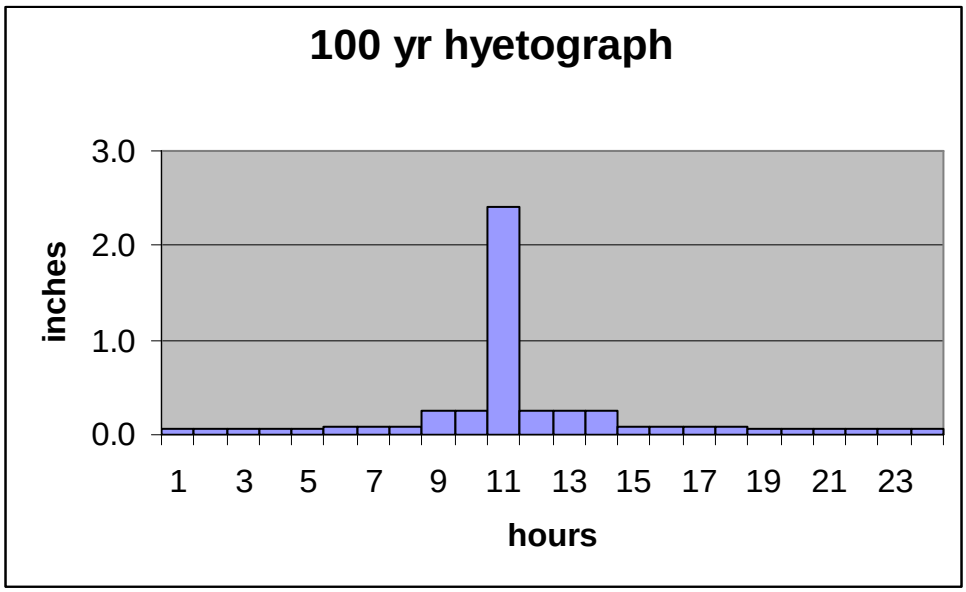

50 yr hyetograph
inches
2.5
2.0
1.5
1.0
0.5
0.0
1 3 5 7 9 11 13 15 17 19 21 23
hours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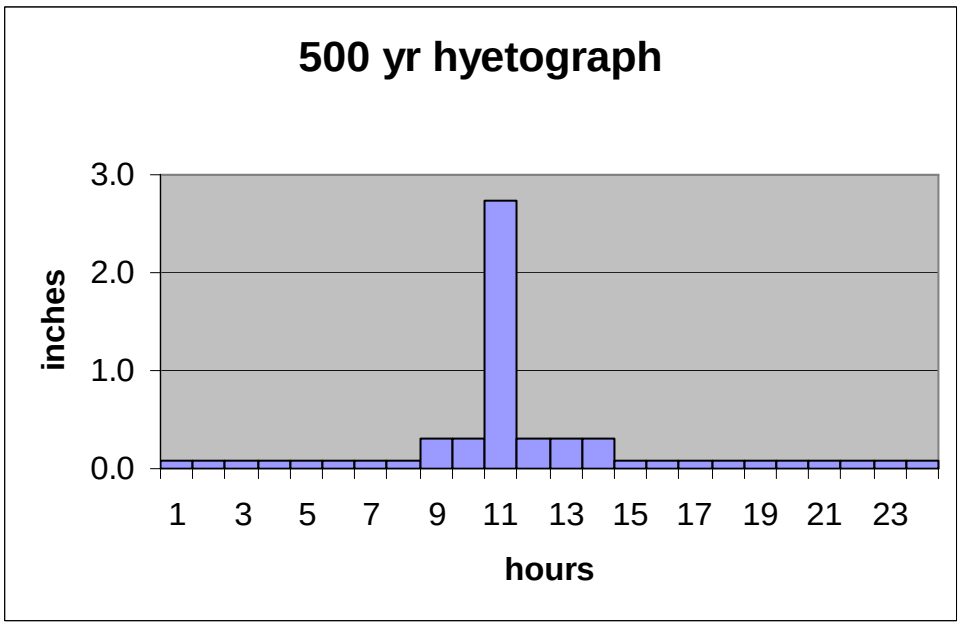
hours

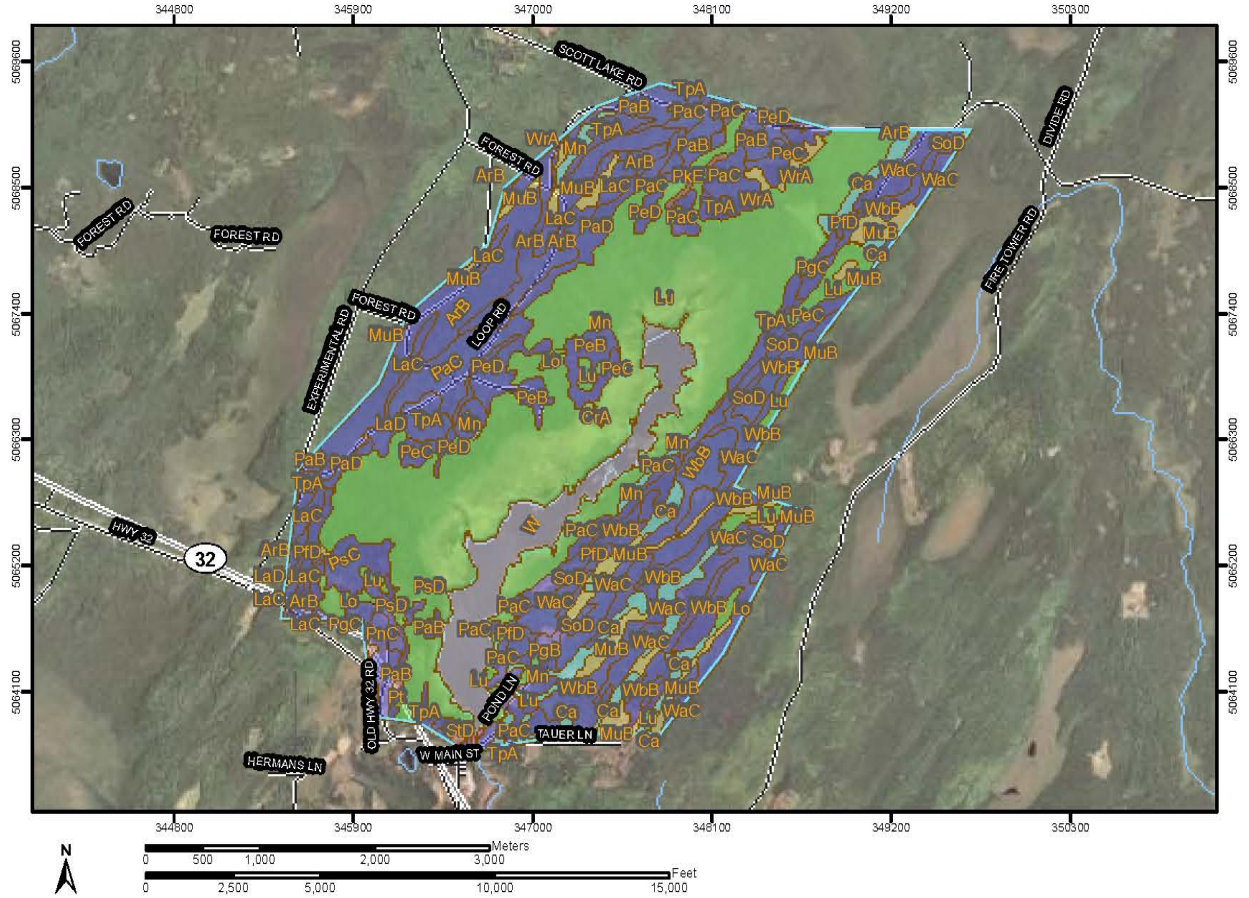

500 yr hyetograph
inches
3.0
2.0
1.0
0.0
1 3 5 7 9 11 13 15 17 19 21 23
hours

Composite Soil Runoff Number

River:	Hiles				Art Johnston	11/06/08
Rain(in):	5.3	Recur interval(yrs):		25	Area(mi^2):	7
Hour:	24					

Soils Group	%	Land Use	%	RCN	sq.mi.-in	
A	0		0	50	0.00	24
			100	30	0.00	
			0	65	0.00	
-	-	-	-	-	-	
B	47	Forest	100	55	3.73	
			0	48	0.00	
			0	51	0.00	
-	-	-	-	-	-	
C	5	Forest	100	70	0.79	
			0	50	0.00	
			0	50	0.00	
-	-	-	-	-	-	
D	43	Meadow	100	78	8.93	
			0	70	0.00	
			0	85	0.00	
Lakes	5		100	100	1.86	
SUM %	100					

Total mi^2-in:	15.31
Avg run off(in)	2.19
Comp RCN	69



USDA Natural Resources Conservation Service

Web Soil Survey 2.0
National Cooperative Soil Survey

11/5/2008
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Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
ArB	Argonne-Sarwet sandy loams, 1 to 6 percent slopes, very stony	B	271.6	5.60%
Ca	Capitola muck, 0 to 2 percent slopes, very stony	B/D	159.7	3.30%
CrA	Croswell loamy sand, 0 to 3 percent slopes	A	2.4	0.00%
Fm	Fordum loam, 0 to 2 percent slopes	D	2.8	0.10%
LaC	Laona-Sarona sandy loams, 6 to 15 percent slopes, very stony	B	197	4.00%
LaD	Laona-Sarona sandy loams, 15 to 35 percent slopes, very stony	B	7	0.10%
Lo	Loxley, Beseman, and Dawson peats, 0 to 1 percent slopes	A/D	37.7	0.80%
Lu	Lupton, Cathro, and Markey mucks, 0 to 1 percent slopes	A/D	1,719.70	35.20%
Mn	Minocqua muck, 0 to 2 percent slopes	B/D	45.6	0.90%
MuB	Mudlake silt loam, 1 to 6 percent slopes, very stony	C	173.3	3.50%
PaB	Padus sandy loam, 0 to 6 percent slopes	B	139.1	2.80%
PaC	Padus sandy loam, 6 to 15 percent slopes	B	315.5	6.50%
PaD	Padus sandy loam, 15 to 35 percent slopes	B	77	1.60%
PeB	Padus-Pence sandy loams, 0 to 6 percent slopes	B	64.1	1.30%
PeC	Padus-Pence sandy loams, 6 to 15 percent slopes	B	57.9	1.20%
PeD	Padus-Pence sandy loams, 15 to 35 percent slopes	B	34	0.70%
PfD	Padus-Soperton silt loams, 15 to 35 percent slopes, very stony	B	87.2	1.80%
PgB	Padus-Wabeno silt loams, 1 to 6 percent slopes, very stony	B	17.7	0.40%
PgC	Padus-Wabeno silt loams, 6 to 15 percent slopes, very stony	B	60.7	1.20%

PkE	Pelissier gravelly sandy loam, 20 to 45 percent slopes, stony	A	8.7	0.20%
PnC	Pence sandy loam, 6 to 15 percent slopes	B	16.8	0.30%
PsC	Pence-Vilas complex, 6 to 15 percent slopes	B	49.5	1.00%
PsD	Pence-Vilas complex, 15 to 35 percent slopes	B	26.6	0.50%
Pt	Pits, gravel	A	9.2	0.20%
SoD	Soperton-Goodman silt loams, 15 to 35 percent slopes, very stony	B	97.2	2.00%
StB	Stambaugh silt loam, 0 to 6 percent slopes	B	2.8	0.10%
StD	Stambaugh silt loam, 15 to 25 percent slopes	B	7.5	0.20%
TpA	Tipler sandy loam, 0 to 3 percent slopes	B	139.7	2.90%
W	Water		311.4	6.40%
WaC	Wabeno-Goodman silt loams, 6 to 15 percent slopes, very stony	B	299.4	6.10%
WbB	Wabeno-Goodwit silt loams, 1 to 6 percent slopes, very stony	B	428.1	8.80%
WrA	Worcester sandy loam, 0 to 3 percent slopes	C	21.9	0.40%
Totals for Area of Interest (AOI)			4,888.80	100.00%

Group A			20.3	0.4%
Group B			2396.4	49.0%
Group C			195.2	4.0%
Gropup D			2.8	0.1%
Group A/D			1,757.40	35.9%
Group B/D			205.3	4.2%
Water			311.4	6.4%
total			4888.8	100.0%

Lag Time

River:	Shuree				Art Johnston		11/06/08
Flow Type	Length(ft)	Change in Elev. (ft)	Slope (%)	Velocity (fps)	t(c) (hr)	Total t(.c)	Time lag (hr)
Channel	1	1	100%	21.00	0.00		
Channel	1	1	100%	21.00	0.00		
Waterway	1	1	100%	12.00	0.00		
Waterway	1	1	100%	12.00	0.00		
Sheet	1	1	100%	4.80	0.00		
Sheet	7800	10	0%	0.17	12.61		
Reservior flow		Avg. depth					
	13700	2.8		9.50	0.40	13.01	8.30
total miles:	4.1						

Reservior elevation/area

elev.	acres
1643	310
1650	1600

Elevation/outflow

elev	CFS
weir =	1643
1643	0
1643.5	20
1644	57
1644.5	105
1645	162
1645.5	200
1646	200
1646.5	200
1647	200

weir cooefficient= 2.7 Max flow thru 5' pipe =
Length of weir = 21.25 200

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1****************************************                                                                    ****************************************
 *                                      *                                                                    *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                                                                    *    U.S. ARMY CORPS OF ENGINEERS      *
 *              JUN   1998              *                                                                    *    HYDROLOGIC ENGINEERING CENTER     *
 *           VERSION 4.1                *                                                                    *          609 SECOND STREET           *
 *                                      *                                                                    *       DAVIS, CALIFORNIA 95616        *
 *  RUN DATE   04FEB09  TIME  16:52:32  *                                                                    *           (916) 756-1104             *
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                                                X     X  XXXXXXX   XXXXX           X
                                                X     X  X        X     X         XX
                                                X     X  X        X                X
                                                XXXXXXX  XXXX     X        XXXXX   X
                                                X     X  X        X                X
                                                X     X  X        X     X          X
                                                X     X  XXXXXXX   XXXXX         XXX


          THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

          THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
          THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
          NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
          DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
          KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM


1                                                   HEC-1 INPUT                                                PAGE  1

          LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

            1           ID   Hile Mill Pond Dam
            2           ID   SCS 100 YEAR=1.0, 10 yr = .74, 50 yr= .94, 500 yr=1.15
            3           ID
            4           IT      60 17MAR88    1200      75
            5           IO       0       0
                        * **********
            6           JR    PREC     .74     .94     1.0    1.20

            7           KK       1
            8           KM   Basin runoff calculation for      Hiles Mill Pond
            9           BA     7.0     0.0     0.0
           10           BF     10.     10.      1.
           11           PB     0.0
           12           IN      60            1100
           13           PI     .07     .07     .07     .07     .07     .08     .08     .08     .26     .26
           14           PI     2.4     .26     .26     .26     .08     .08     .08     .08     .07     .07
           15           PI     .07     .07     .07     .07
           16           LS      .0     69.      0.
           17           UD     8.3
                        * **********

           18           KK      1A
           19           KM   ROUTING HYDROGRAPH THRU Hiles mill pond IMPOUNDMENT
           20           KO       1
           21           RS       1    ELEV  1643.5
           22           SA     310     390     469     679     862

           23           SE    1643  1643.5    1644    1645    1646
           24           SQ       0      20      57     162     200
                        * ********
           25           ZZ
1****************************************                                                                    ****************************************
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 *              JUN   1998              *                                                                    *    HYDROLOGIC ENGINEERING CENTER     *
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                                 Hile Mill Pond Dam
                                 SCS 100 YEAR=1.0, 10 yr = .74, 50 yr= .94, 500 yr=1.15


    5 IO          OUTPUT CONTROL VARIABLES
                        IPRNT           0  PRINT CONTROL
                        IPLOT           0  PLOT CONTROL
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                    QSCAL          0.  HYDROGRAPH PLOT SCALE

    IT          HYDROGRAPH TIME DATA
                     NMIN         60  MINUTES IN COMPUTATION INTERVAL
                    IDATE     17MAR88  STARTING DATE
                    ITIME        1200  STARTING TIME
                       NQ          75  NUMBER OF HYDROGRAPH ORDINATES
                   NDDATE     20MAR88  ENDING DATE
                   NDTIME        1400  ENDING TIME
                    ICENT          19  CENTURY MARK

                 COMPUTATION INTERVAL    1.00 HOURS
                      TOTAL TIME BASE   74.00 HOURS

         ENGLISH UNITS
              DRAINAGE AREA         SQUARE MILES
              PRECIPITATION DEPTH   INCHES
              LENGTH, ELEVATION     FEET
              FLOW                  CUBIC FEET PER SECOND
              STORAGE VOLUME        ACRE-FEET
              SURFACE AREA          ACRES
              TEMPERATURE           DEGREES FAHRENHEIT

    JP          MULTI-PLAN OPTION
                    NPLAN           1  NUMBER OF PLANS

    JR          MULTI-RATIO OPTION
                   RATIOS OF PRECIPITATION
                   .74       .94      1.00      1.20


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


            **************
            *            *
  7 KK      *         1  *
            *            *
            **************
                           Basin runoff calculation for      Hiles Mill Pond

 12 IN          TIME DATA FOR INPUT TIME SERIES
                     JXMIN         60  TIME INTERVAL IN MINUTES
                   JXDATE     17MAR88  STARTING DATE
                   JXTIME        1200  STARTING TIME

              SUBBASIN RUNOFF DATA

  9 BA          SUBBASIN CHARACTERISTICS
                     TAREA       7.00  SUBBASIN AREA

 10 BF          BASE FLOW CHARACTERISTICS
                     STRTQ      10.00  INITIAL FLOW
                     QRCSN      10.00  BEGIN BASE FLOW RECESSION
                     RTIOR    1.00000  RECESSION CONSTANT

                PRECIPITATION DATA

 11 PB               STORM       5.03  BASIN TOTAL PRECIPITATION

 13 PI            INCREMENTAL PRECIPITATION PATTERN
                     .07       .07       .07       .07       .07       .08       .08       .08       .26       .26
                    2.40       .26       .26       .26       .08       .08       .08       .08       .07       .07
                     .07       .07       .07       .07

 16 LS          SCS LOSS RATE
                     STRTL        .90  INITIAL ABSTRACTION
                    CRVNBR      69.00  CURVE NUMBER
                     RTIMP        .00  PERCENT IMPERVIOUS AREA

 17 UD          SCS DIMENSIONLESS UNITGRAPH
                      TLAG       8.30  LAG

                                                          ***

                                                     UNIT HYDROGRAPH
                                                 44 END-OF-PERIOD ORDINATES
              15.       48.       92.      153.      230.      304.      355.      381.      383.      372.
             344.      311.      270.      219.      176.      146.      121.      101.       85.       71.
              58.       49.       40.       34.       28.       23.       19.       16.       13.       11.
               9.        8.        6.        5.        4.        4.        3.        3.        2.        2.
               1.        1.        0.        0.
*****************************************************************************************************************************

                                                  HYDROGRAPH AT STATION        1

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DA MON HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q	*	DA MON HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q
						*						
17 MAR 1200	1	.00	.00	.00	10.	*	19 MAR 0200	39	.00	.00	.00	82.
17 MAR 1300	2	.07	.07	.00	10.	*	19 MAR 0300	40	.00	.00	.00	70.
17 MAR 1400	3	.07	.07	.00	10.	*	19 MAR 0400	41	.00	.00	.00	60.
17 MAR 1500	4	.07	.07	.00	10.	*	19 MAR 0500	42	.00	.00	.00	52.
17 MAR 1600	5	.07	.07	.00	10.	*	19 MAR 0600	43	.00	.00	.00	45.
17 MAR 1700	6	.07	.07	.00	10.	*	19 MAR 0700	44	.00	.00	.00	39.
17 MAR 1800	7	.08	.08	.00	10.	*	19 MAR 0800	45	.00	.00	.00	34.
17 MAR 1900	8	.08	.08	.00	10.	*	19 MAR 0900	46	.00	.00	.00	30.
17 MAR 2000	9	.08	.08	.00	10.	*	19 MAR 1000	47	.00	.00	.00	27.
17 MAR 2100	10	.26	.26	.00	10.	*	19 MAR 1100	48	.00	.00	.00	24.
17 MAR 2200	11	.26	.25	.01	10.	*	19 MAR 1200	49	.00	.00	.00	22.
17 MAR 2300	12	2.40	1.45	.95	25.	*	19 MAR 1300	50	.00	.00	.00	20.
18 MAR 0000	13	.26	.10	.16	59.	*	19 MAR 1400	51	.00	.00	.00	18.
18 MAR 0100	14	.26	.09	.17	109.	*	19 MAR 1500	52	.00	.00	.00	16.
18 MAR 0200	15	.26	.09	.17	183.	*	19 MAR 1600	53	.00	.00	.00	15.
18 MAR 0300	16	.08	.03	.05	281.	*	19 MAR 1700	54	.00	.00	.00	14.
18 MAR 0400	17	.08	.03	.05	384.	*	19 MAR 1800	55	.00	.00	.00	13.
18 MAR 0500	18	.08	.02	.06	473.	*	19 MAR 1900	56	.00	.00	.00	12.
18 MAR 0600	19	.08	.02	.06	539.	*	19 MAR 2000	57	.00	.00	.00	12.
18 MAR 0700	20	.07	.02	.05	580.	*	19 MAR 2100	58	.00	.00	.00	11.
18 MAR 0800	21	.07	.02	.05	599.	*	19 MAR 2200	59	.00	.00	.00	11.
18 MAR 0900	22	.07	.02	.05	594.	*	19 MAR 2300	60	.00	.00	.00	11.
18 MAR 1000	23	.07	.02	.05	576.	*	20 MAR 0000	61	.00	.00	.00	11.
18 MAR 1100	24	.07	.02	.05	545.	*	20 MAR 0100	62	.00	.00	.00	10.
18 MAR 1200	25	.07	.02	.05	498.	*	20 MAR 0200	63	.00	.00	.00	10.
18 MAR 1300	26	.00	.00	.00	452.	*	20 MAR 0300	64	.00	.00	.00	10.
18 MAR 1400	27	.00	.00	.00	414.	*	20 MAR 0400	65	.00	.00	.00	10.
18 MAR 1500	28	.00	.00	.00	378.	*	20 MAR 0500	66	.00	.00	.00	10.
18 MAR 1600	29	.00	.00	.00	345.	*	20 MAR 0600	67	.00	.00	.00	10.
18 MAR 1700	30	.00	.00	.00	314.	*	20 MAR 0700	68	.00	.00	.00	10.
18 MAR 1800	31	.00	.00	.00	282.	*	20 MAR 0800	69	.00	.00	.00	10.
18 MAR 1900	32	.00	.00	.00	248.	*	20 MAR 0900	70	.00	.00	.00	10.
18 MAR 2000	33	.00	.00	.00	218.	*	20 MAR 1000	71	.00	.00	.00	10.
18 MAR 2100	34	.00	.00	.00	188.	*	20 MAR 1100	72	.00	.00	.00	10.
18 MAR 2200	35	.00	.00	.00	161.	*	20 MAR 1200	73	.00	.00	.00	10.
18 MAR 2300	36	.00	.00	.00	137.	*	20 MAR 1300	74	.00	.00	.00	10.
19 MAR 0000	37	.00	.00	.00	115.	*	20 MAR 1400	75	.00	.00	.00	10.
19 MAR 0100	38	.00	.00	.00	97.	*						
						*						

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TOTAL RAINFALL = 5.03, TOTAL LOSS = 3.05, TOTAL EXCESS = 1.98

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	74.00-HR
+ (CFS)	(HR)					
		(CFS)				
+ 599.	20.00		569.	359.	134.	131.
		(INCHES)	.755	1.905	2.139	2.143
		(AC-FT)	282.	711.	798.	800.

CUMULATIVE AREA = 7.00 SQ MI

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HYDROGRAPH AT STATION 1
PLAN 1, RATIO = .74

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DA MON HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q	*	DA MON HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q
						*						
17 MAR 1200	1	.00	.00	.00	10.	*	19 MAR 0200	39	.00	.00	.00	53.
17 MAR 1300	2	.05	.05	.00	10.	*	19 MAR 0300	40	.00	.00	.00	46.
17 MAR 1400	3	.05	.05	.00	10.	*	19 MAR 0400	41	.00	.00	.00	40.
17 MAR 1500	4	.05	.05	.00	10.	*	19 MAR 0500	42	.00	.00	.00	35.
17 MAR 1600	5	.05	.05	.00	10.	*	19 MAR 0600	43	.00	.00	.00	31.
17 MAR 1700	6	.05	.05	.00	10.	*	19 MAR 0700	44	.00	.00	.00	27.
17 MAR 1800	7	.06	.06	.00	10.	*	19 MAR 0800	45	.00	.00	.00	24.
17 MAR 1900	8	.06	.06	.00	10.	*	19 MAR 0900	46	.00	.00	.00	22.
17 MAR 2000	9	.06	.06	.00	10.	*	19 MAR 1000	47	.00	.00	.00	20.
17 MAR 2100	10	.19	.19	.00	10.	*	19 MAR 1100	48	.00	.00	.00	18.
17 MAR 2200	11	.19	.19	.00	10.	*	19 MAR 1200	49	.00	.00	.00	17.
17 MAR 2300	12	1.78	1.31	.47	17.	*	19 MAR 1300	50	.00	.00	.00	16.
18 MAR 0000	13	.19	.10	.09	34.	*	19 MAR 1400	51	.00	.00	.00	15.
18 MAR 0100	14	.19	.09	.10	59.	*	19 MAR 1500	52	.00	.00	.00	14.
18 MAR 0200	15	.19	.09	.11	96.	*	19 MAR 1600	53	.00	.00	.00	13.
18 MAR 0300	16	.06	.03	.03	146.	*	19 MAR 1700	54	.00	.00	.00	12.
18 MAR 0400	17	.06	.03	.03	200.	*	19 MAR 1800	55	.00	.00	.00	12.
18 MAR 0500	18	.06	.02	.03	249.	*	19 MAR 1900	56	.00	.00	.00	11.
18 MAR 0600	19	.06	.02	.03	286.	*	19 MAR 2000	57	.00	.00	.00	11.
18 MAR 0700	20	.05	.02	.03	310.	*	19 MAR 2100	58	.00	.00	.00	11.
18 MAR 0800	21	.05	.02	.03	323.	*	19 MAR 2200	59	.00	.00	.00	11.
18 MAR 0900	22	.05	.02	.03	324.	*	19 MAR 2300	60	.00	.00	.00	11.
18 MAR 1000	23	.05	.02	.03	317.	*	20 MAR 0000	61	.00	.00	.00	10.
18 MAR 1100	24	.05	.02	.03	304.	*	20 MAR 0100	62	.00	.00	.00	10.
18 MAR 1200	25	.05	.02	.03	282.	*	20 MAR 0200	63	.00	.00	.00	10.

18 MAR 1300	26	.00	.00	.00	259.	*	20 MAR 0300	64	.00	.00	.00	10.
18 MAR 1400	27	.00	.00	.00	240.	*	20 MAR 0400	65	.00	.00	.00	10.
18 MAR 1500	28	.00	.00	.00	221.	*	20 MAR 0500	66	.00	.00	.00	10.
18 MAR 1600	29	.00	.00	.00	204.	*	20 MAR 0600	67	.00	.00	.00	10.
18 MAR 1700	30	.00	.00	.00	187.	*	20 MAR 0700	68	.00	.00	.00	10.
18 MAR 1800	31	.00	.00	.00	169.	*	20 MAR 0800	69	.00	.00	.00	10.
18 MAR 1900	32	.00	.00	.00	150.	*	20 MAR 0900	70	.00	.00	.00	10.
18 MAR 2000	33	.00	.00	.00	133.	*	20 MAR 1000	71	.00	.00	.00	10.
18 MAR 2100	34	.00	.00	.00	115.	*	20 MAR 1100	72	.00	.00	.00	10.
18 MAR 2200	35	.00	.00	.00	100.	*	20 MAR 1200	73	.00	.00	.00	10.
18 MAR 2300	36	.00	.00	.00	85.	*	20 MAR 1300	74	.00	.00	.00	10.
19 MAR 0000	37	.00	.00	.00	73.	*	20 MAR 1400	75	.00	.00	.00	10.
19 MAR 0100	38	.00	.00	.00	62.	*						
						*						

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TOTAL RAINFALL = 3.72, TOTAL LOSS = 2.63, TOTAL EXCESS = 1.09

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	74.00-HR
+		(CFS)				
+ 324.	21.00		310.	201.	78.	77.
		(INCHES)	.412	1.070	1.249	1.254
		(AC-FT)	154.	399.	466.	468.

CUMULATIVE AREA = 7.00 SQ MI

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HYDROGRAPH AT STATION 1
PLAN 1, RATIO = .94

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DA MON HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q	*	DA MON HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q
17 MAR 1200	1	.00	.00	.00	10.	*	19 MAR 0200	39	.00	.00	.00	75.
17 MAR 1300	2	.07	.07	.00	10.	*	19 MAR 0300	40	.00	.00	.00	64.
17 MAR 1400	3	.07	.07	.00	10.	*	19 MAR 0400	41	.00	.00	.00	55.
17 MAR 1500	4	.07	.07	.00	10.	*	19 MAR 0500	42	.00	.00	.00	48.
17 MAR 1600	5	.07	.07	.00	10.	*	19 MAR 0600	43	.00	.00	.00	41.
17 MAR 1700	6	.07	.07	.00	10.	*	19 MAR 0700	44	.00	.00	.00	36.
17 MAR 1800	7	.08	.08	.00	10.	*	19 MAR 0800	45	.00	.00	.00	32.
17 MAR 1900	8	.08	.08	.00	10.	*	19 MAR 0900	46	.00	.00	.00	28.
17 MAR 2000	9	.08	.08	.00	10.	*	19 MAR 1000	47	.00	.00	.00	25.
17 MAR 2100	10	.24	.24	.00	10.	*	19 MAR 1100	48	.00	.00	.00	23.
17 MAR 2200	11	.24	.24	.00	10.	*	19 MAR 1200	49	.00	.00	.00	21.
17 MAR 2300	12	2.26	1.42	.83	23.	*	19 MAR 1300	50	.00	.00	.00	19.
18 MAR 0000	13	.24	.10	.14	52.	*	19 MAR 1400	51	.00	.00	.00	17.
18 MAR 0100	14	.24	.09	.15	96.	*	19 MAR 1500	52	.00	.00	.00	16.
18 MAR 0200	15	.24	.09	.16	161.	*	19 MAR 1600	53	.00	.00	.00	15.
18 MAR 0300	16	.08	.03	.05	247.	*	19 MAR 1700	54	.00	.00	.00	14.
18 MAR 0400	17	.08	.03	.05	338.	*	19 MAR 1800	55	.00	.00	.00	13.
18 MAR 0500	18	.08	.02	.05	417.	*	19 MAR 1900	56	.00	.00	.00	12.
18 MAR 0600	19	.08	.02	.05	477.	*	19 MAR 2000	57	.00	.00	.00	12.
18 MAR 0700	20	.07	.02	.04	513.	*	19 MAR 2100	58	.00	.00	.00	11.
18 MAR 0800	21	.07	.02	.05	531.	*	19 MAR 2200	59	.00	.00	.00	11.
18 MAR 0900	22	.07	.02	.05	528.	*	19 MAR 2300	60	.00	.00	.00	11.
18 MAR 1000	23	.07	.02	.05	513.	*	20 MAR 0000	61	.00	.00	.00	11.
18 MAR 1100	24	.07	.02	.05	486.	*	20 MAR 0100	62	.00	.00	.00	10.
18 MAR 1200	25	.07	.02	.05	446.	*	20 MAR 0200	63	.00	.00	.00	10.
18 MAR 1300	26	.00	.00	.00	405.	*	20 MAR 0300	64	.00	.00	.00	10.
18 MAR 1400	27	.00	.00	.00	372.	*	20 MAR 0400	65	.00	.00	.00	10.
18 MAR 1500	28	.00	.00	.00	340.	*	20 MAR 0500	66	.00	.00	.00	10.
18 MAR 1600	29	.00	.00	.00	311.	*	20 MAR 0600	67	.00	.00	.00	10.
18 MAR 1700	30	.00	.00	.00	283.	*	20 MAR 0700	68	.00	.00	.00	10.
18 MAR 1800	31	.00	.00	.00	255.	*	20 MAR 0800	69	.00	.00	.00	10.
18 MAR 1900	32	.00	.00	.00	225.	*	20 MAR 0900	70	.00	.00	.00	10.
18 MAR 2000	33	.00	.00	.00	197.	*	20 MAR 1000	71	.00	.00	.00	10.
18 MAR 2100	34	.00	.00	.00	171.	*	20 MAR 1100	72	.00	.00	.00	10.
18 MAR 2200	35	.00	.00	.00	147.	*	20 MAR 1200	73	.00	.00	.00	10.
18 MAR 2300	36	.00	.00	.00	125.	*	20 MAR 1300	74	.00	.00	.00	10.
19 MAR 0000	37	.00	.00	.00	105.	*	20 MAR 1400	75	.00	.00	.00	10.
19 MAR 0100	38	.00	.00	.00	89.	*						
						*						

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TOTAL RAINFALL = 4.73, TOTAL LOSS = 2.97, TOTAL EXCESS = 1.76

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	74.00-HR
+		(CFS)				
+ 531.	20.00		505.	320.	121.	118.
		(INCHES)	.671	1.701	1.922	1.926
		(AC-FT)	251.	635.	717.	719.

CUMULATIVE AREA = 7.00 SQ MI

HYDROGRAPH AT STATION 1
PLAN 1, RATIO = 1.00

DA MON HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q	DA MON HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q
17 MAR 1200	1	.00	.00	.00	10.	19 MAR 0200	39	.00	.00	.00	82.
17 MAR 1300	2	.07	.07	.00	10.	19 MAR 0300	40	.00	.00	.00	70.
17 MAR 1400	3	.07	.07	.00	10.	19 MAR 0400	41	.00	.00	.00	60.
17 MAR 1500	4	.07	.07	.00	10.	19 MAR 0500	42	.00	.00	.00	52.
17 MAR 1600	5	.07	.07	.00	10.	19 MAR 0600	43	.00	.00	.00	45.
17 MAR 1700	6	.07	.07	.00	10.	19 MAR 0700	44	.00	.00	.00	39.
17 MAR 1800	7	.08	.08	.00	10.	19 MAR 0800	45	.00	.00	.00	34.
17 MAR 1900	8	.08	.08	.00	10.	19 MAR 0900	46	.00	.00	.00	30.
17 MAR 2000	9	.08	.08	.00	10.	19 MAR 1000	47	.00	.00	.00	27.
17 MAR 2100	10	.26	.26	.00	10.	19 MAR 1100	48	.00	.00	.00	24.
17 MAR 2200	11	.26	.25	.01	10.	19 MAR 1200	49	.00	.00	.00	22.
17 MAR 2300	12	2.40	1.45	.95	25.	19 MAR 1300	50	.00	.00	.00	20.
18 MAR 0000	13	.26	.10	.16	59.	19 MAR 1400	51	.00	.00	.00	18.
18 MAR 0100	14	.26	.09	.17	109.	19 MAR 1500	52	.00	.00	.00	16.
18 MAR 0200	15	.26	.09	.17	183.	19 MAR 1600	53	.00	.00	.00	15.
18 MAR 0300	16	.08	.03	.05	281.	19 MAR 1700	54	.00	.00	.00	14.
18 MAR 0400	17	.08	.03	.05	384.	19 MAR 1800	55	.00	.00	.00	13.
18 MAR 0500	18	.08	.02	.06	473.	19 MAR 1900	56	.00	.00	.00	12.
18 MAR 0600	19	.08	.02	.06	539.	19 MAR 2000	57	.00	.00	.00	12.
18 MAR 0700	20	.07	.02	.05	580.	19 MAR 2100	58	.00	.00	.00	11.
18 MAR 0800	21	.07	.02	.05	599.	19 MAR 2200	59	.00	.00	.00	11.
18 MAR 0900	22	.07	.02	.05	594.	19 MAR 2300	60	.00	.00	.00	11.
18 MAR 1000	23	.07	.02	.05	576.	20 MAR 0000	61	.00	.00	.00	11.
18 MAR 1100	24	.07	.02	.05	545.	20 MAR 0100	62	.00	.00	.00	10.
18 MAR 1200	25	.07	.02	.05	498.	20 MAR 0200	63	.00	.00	.00	10.
18 MAR 1300	26	.00	.00	.00	452.	20 MAR 0300	64	.00	.00	.00	10.
18 MAR 1400	27	.00	.00	.00	414.	20 MAR 0400	65	.00	.00	.00	10.
18 MAR 1500	28	.00	.00	.00	378.	20 MAR 0500	66	.00	.00	.00	10.
18 MAR 1600	29	.00	.00	.00	345.	20 MAR 0600	67	.00	.00	.00	10.
18 MAR 1700	30	.00	.00	.00	314.	20 MAR 0700	68	.00	.00	.00	10.
18 MAR 1800	31	.00	.00	.00	282.	20 MAR 0800	69	.00	.00	.00	10.
18 MAR 1900	32	.00	.00	.00	248.	20 MAR 0900	70	.00	.00	.00	10.
18 MAR 2000	33	.00	.00	.00	218.	20 MAR 1000	71	.00	.00	.00	10.
18 MAR 2100	34	.00	.00	.00	188.	20 MAR 1100	72	.00	.00	.00	10.
18 MAR 2200	35	.00	.00	.00	161.	20 MAR 1200	73	.00	.00	.00	10.
18 MAR 2300	36	.00	.00	.00	137.	20 MAR 1300	74	.00	.00	.00	10.
19 MAR 0000	37	.00	.00	.00	115.	20 MAR 1400	75	.00	.00	.00	10.
19 MAR 0100	38	.00	.00	.00	97.						

TOTAL RAINFALL = 5.03, TOTAL LOSS = 3.05, TOTAL EXCESS = 1.98

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	74.00-HR
+ (CFS)	(HR)	(CFS)				
+ 599.	20.00		569.	359.	134.	131.
		(INCHES)	.755	1.905	2.139	2.143
		(AC-FT)	282.	711.	798.	800.

CUMULATIVE AREA = 7.00 SQ MI

HYDROGRAPH AT STATION 1
PLAN 1, RATIO = 1.20

DA MON HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q	DA MON HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q
17 MAR 1200	1	.00	.00	.00	10.	19 MAR 0200	39	.00	.00	.00	106.
17 MAR 1300	2	.08	.08	.00	10.	19 MAR 0300	40	.00	.00	.00	90.
17 MAR 1400	3	.08	.08	.00	10.	19 MAR 0400	41	.00	.00	.00	77.
17 MAR 1500	4	.08	.08	.00	10.	19 MAR 0500	42	.00	.00	.00	66.
17 MAR 1600	5	.08	.08	.00	10.	19 MAR 0600	43	.00	.00	.00	56.
17 MAR 1700	6	.08	.08	.00	10.	19 MAR 0700	44	.00	.00	.00	48.
17 MAR 1800	7	.10	.10	.00	10.	19 MAR 0800	45	.00	.00	.00	42.
17 MAR 1900	8	.10	.10	.00	10.	19 MAR 0900	46	.00	.00	.00	36.
17 MAR 2000	9	.10	.10	.00	10.	19 MAR 1000	47	.00	.00	.00	32.
17 MAR 2100	10	.31	.31	.00	10.	19 MAR 1100	48	.00	.00	.00	29.
17 MAR 2200	11	.31	.28	.03	11.	19 MAR 1200	49	.00	.00	.00	26.
17 MAR 2300	12	2.88	1.51	1.37	33.	19 MAR 1300	50	.00	.00	.00	23.
18 MAR 0000	13	.31	.10	.21	82.	19 MAR 1400	51	.00	.00	.00	21.
18 MAR 0100	14	.31	.09	.22	155.	19 MAR 1500	52	.00	.00	.00	19.
18 MAR 0200	15	.31	.09	.23	261.	19 MAR 1600	53	.00	.00	.00	17.
18 MAR 0300	16	.10	.03	.07	402.	19 MAR 1700	54	.00	.00	.00	15.

18 MAR 0400	17	.10	.02	.07	547.	*	19 MAR 1800	55	.00	.00	.00	14.
18 MAR 0500	18	.10	.02	.07	672.	*	19 MAR 1900	56	.00	.00	.00	13.
18 MAR 0600	19	.10	.02	.07	762.	*	19 MAR 2000	57	.00	.00	.00	12.
18 MAR 0700	20	.08	.02	.06	815.	*	19 MAR 2100	58	.00	.00	.00	12.
18 MAR 0800	21	.08	.02	.06	837.	*	19 MAR 2200	59	.00	.00	.00	11.
18 MAR 0900	22	.08	.02	.06	826.	*	19 MAR 2300	60	.00	.00	.00	11.
18 MAR 1000	23	.08	.02	.06	798.	*	20 MAR 0000	61	.00	.00	.00	11.
18 MAR 1100	24	.08	.02	.07	750.	*	20 MAR 0100	62	.00	.00	.00	11.
18 MAR 1200	25	.08	.02	.07	681.	*	20 MAR 0200	63	.00	.00	.00	10.
18 MAR 1300	26	.00	.00	.00	614.	*	20 MAR 0300	64	.00	.00	.00	10.
18 MAR 1400	27	.00	.00	.00	559.	*	20 MAR 0400	65	.00	.00	.00	10.
18 MAR 1500	28	.00	.00	.00	508.	*	20 MAR 0500	66	.00	.00	.00	10.
18 MAR 1600	29	.00	.00	.00	462.	*	20 MAR 0600	67	.00	.00	.00	10.
18 MAR 1700	30	.00	.00	.00	419.	*	20 MAR 0700	68	.00	.00	.00	10.
18 MAR 1800	31	.00	.00	.00	374.	*	20 MAR 0800	69	.00	.00	.00	10.
18 MAR 1900	32	.00	.00	.00	329.	*	20 MAR 0900	70	.00	.00	.00	10.
18 MAR 2000	33	.00	.00	.00	288.	*	20 MAR 1000	71	.00	.00	.00	10.
18 MAR 2100	34	.00	.00	.00	248.	*	20 MAR 1100	72	.00	.00	.00	10.
18 MAR 2200	35	.00	.00	.00	212.	*	20 MAR 1200	73	.00	.00	.00	10.
18 MAR 2300	36	.00	.00	.00	179.	*	20 MAR 1300	74	.00	.00	.00	10.
19 MAR 0000	37	.00	.00	.00	151.	*	20 MAR 1400	75	.00	.00	.00	10.
19 MAR 0100	38	.00	.00	.00	126.	*						
						*						

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TOTAL RAINFALL = 6.04, TOTAL LOSS = 3.30, TOTAL EXCESS = 2.74

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	74.00-HR
		(CFS)				
837.	20.00		792.	493.	182.	177.
		(INCHES)	1.051	2.620	2.900	2.905
		(AC-FT)	393.	978.	1083.	1084.

CUMULATIVE AREA = 7.00 SQ MI

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            **************
            *            *
  18 KK     *        1A  *
            *            *
            **************
                          ROUTING HYDROGRAPH THRU Hiles mill pond IMPOUNDMENT

  20 KO          OUTPUT CONTROL VARIABLES
                       IPRNT           1  PRINT CONTROL
                       IPLOT           0  PLOT CONTROL
                       QSCAL          0.  HYDROGRAPH PLOT SCALE

               HYDROGRAPH ROUTING DATA

  21 RS          STORAGE ROUTING
                       NSTPS           1  NUMBER OF SUBREACHES
                        ITYP        ELEV  TYPE OF INITIAL CONDITION
                      RSVRIC     1643.50  INITIAL CONDITION
                           X         .00 WORKING R AND D COEFFICIENT

  22 SA               AREA       310.0     390.0     469.0     679.0     862.0

  23 SE          ELEVATION     1643.00   1643.50   1644.00   1645.00   1646.00

  24 SQ          DISCHARGE          0.       20.       57.      162.      200.
                                                                 ***

                                                  COMPUTED STORAGE-ELEVATION DATA

            STORAGE        .00    174.62    389.06    959.84   1728.52
          ELEVATION    1643.00   1643.50   1644.00   1645.00   1646.00
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HYDROGRAPH AT STATION 1A
PLAN 1, RATIO = .74

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DA MON HRMN	ORD	OUTFLOW	STORAGE	STAGE	*	DA MON HRMN	ORD	OUTFLOW	STORAGE	STAGE	*	DA MON HRMN	ORD	OUTFLOW	STORAGE	STAGE
17 MAR 1200	1	20.	174.6	1643.5	*	18 MAR 1300	26	56.	382.1	1644.0	*	19 MAR 1400	51	64.	426.1	1644.1
17 MAR 1300	2	20.	173.8	1643.5	*	18 MAR 1400	27	59.	398.0	1644.0	*	19 MAR 1500	52	63.	422.1	1644.1
17 MAR 1400	3	20.	173.0	1643.5	*	18 MAR 1500	28	61.	412.1	1644.0	*	19 MAR 1600	53	62.	418.0	1644.1
17 MAR 1500	4	20.	172.2	1643.5	*	18 MAR 1600	29	64.	424.5	1644.1	*	19 MAR 1700	54	62.	413.9	1644.0
17 MAR 1600	5	20.	171.4	1643.5	*	18 MAR 1700	30	66.	435.3	1644.1	*	19 MAR 1800	55	61.	409.9	1644.0

17	MAR	1700	6	20.	170.6	1643.5	*	18	MAR	1800	31	67.	444.5	1644.1	*	19	MAR	1900	56	60.	405.8	1644.0
17	MAR	1800	7	19.	169.8	1643.5	*	18	MAR	1900	32	69.	452.1	1644.1	*	19	MAR	2000	57	59.	401.8	1644.0
17	MAR	1900	8	19.	169.0	1643.5	*	18	MAR	2000	33	70.	458.1	1644.1	*	19	MAR	2100	58	59.	397.9	1644.0
17	MAR	2000	9	19.	168.3	1643.5	*	18	MAR	2100	34	71.	462.6	1644.1	*	19	MAR	2200	59	58.	393.9	1644.0
17	MAR	2100	10	19.	167.5	1643.5	*	18	MAR	2200	35	71.	465.6	1644.1	*	19	MAR	2300	60	57.	390.1	1644.0
17	MAR	2200	11	19.	166.7	1643.5	*	18	MAR	2300	36	71.	467.3	1644.1	*	20	MAR	0000	61	57.	386.2	1644.0
17	MAR	2300	12	19.	166.3	1643.5	*	19	MAR	0000	37	72.	468.0	1644.1	*	20	MAR	0100	62	56.	382.4	1644.0
18	MAR	0000	13	19.	166.8	1643.5	*	19	MAR	0100	38	71.	467.6	1644.1	*	20	MAR	0200	63	55.	378.7	1644.0
18	MAR	0100	14	19.	169.0	1643.5	*	19	MAR	0200	39	71.	466.4	1644.1	*	20	MAR	0300	64	55.	375.0	1644.0
18	MAR	0200	15	20.	173.8	1643.5	*	19	MAR	0300	40	71.	464.6	1644.1	*	20	MAR	0400	65	54.	371.3	1644.0
18	MAR	0300	16	21.	182.1	1643.5	*	19	MAR	0400	41	70.	462.3	1644.1	*	20	MAR	0500	66	53.	367.7	1644.0
18	MAR	0400	17	23.	194.6	1643.5	*	19	MAR	0500	42	70.	459.6	1644.1	*	20	MAR	0600	67	53.	364.2	1643.9
18	MAR	0500	18	26.	211.1	1643.6	*	19	MAR	0600	43	69.	456.5	1644.1	*	20	MAR	0700	68	52.	360.7	1643.9
18	MAR	0600	19	30.	230.9	1643.6	*	19	MAR	0700	44	69.	453.2	1644.1	*	20	MAR	0800	69	52.	357.2	1643.9
18	MAR	0700	20	34.	252.9	1643.7	*	19	MAR	0800	45	68.	449.6	1644.1	*	20	MAR	0900	70	51.	353.8	1643.9
18	MAR	0800	21	38.	276.1	1643.7	*	19	MAR	0900	46	67.	445.9	1644.1	*	20	MAR	1000	71	50.	350.5	1643.9
18	MAR	0900	22	42.	299.6	1643.8	*	19	MAR	1000	47	67.	442.1	1644.1	*	20	MAR	1100	72	50.	347.2	1643.9
18	MAR	1000	23	46.	322.5	1643.8	*	19	MAR	1100	48	66.	438.2	1644.1	*	20	MAR	1200	73	49.	343.9	1643.9
18	MAR	1100	24	49.	344.2	1643.9	*	19	MAR	1200	49	65.	434.2	1644.1	*	20	MAR	1300	74	49.	340.7	1643.9
18	MAR	1200	25	53.	364.2	1643.9	*	19	MAR	1300	50	65.	430.2	1644.1	*	20	MAR	1400	75	48.	337.5	1643.9
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PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	74.00-HR
+ (CFS)	(HR)				
		(CFS)			
+ 72.	36.00	71.	68.	51.	50.
		(INCHES) .095	.362	.808	.817
		(AC-FT) 35.	135.	302.	305.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	74.00-HR
+ (AC-FT)	(HR)				
468.	36.00	466.	450.	351.	346.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	74.00-HR
+ (FEET)	(HR)				
1644.14	36.00	1644.14	1644.11	1643.90	1643.89

CUMULATIVE AREA = 7.00 SQ MI

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HYDROGRAPH AT STATION 1A
PLAN 1, RATIO = .94

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DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	*	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	*	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
17	MAR	1200	1	20.	174.6	1643.5	*	18	MAR	1300	26	83.	531.4	1644.2	*	19	MAR	1400	51	95.	594.9	1644.4
17	MAR	1300	2	20.	173.8	1643.5	*	18	MAR	1400	27	88.	556.5	1644.3	*	19	MAR	1500	52	94.	588.5	1644.3
17	MAR	1400	3	20.	173.0	1643.5	*	18	MAR	1500	28	92.	578.5	1644.3	*	19	MAR	1600	53	92.	582.0	1644.3
17	MAR	1500	4	20.	172.2	1643.5	*	18	MAR	1600	29	95.	597.6	1644.4	*	19	MAR	1700	54	91.	575.6	1644.3
17	MAR	1600	5	20.	171.4	1643.5	*	18	MAR	1700	30	98.	614.2	1644.4	*	19	MAR	1800	55	90.	569.2	1644.3
17	MAR	1700	6	20.	170.6	1643.5	*	18	MAR	1800	31	101.	628.2	1644.4	*	19	MAR	1900	56	89.	562.8	1644.3
17	MAR	1800	7	19.	169.8	1643.5	*	18	MAR	1900	32	103.	639.6	1644.4	*	19	MAR	2000	57	88.	556.5	1644.3
17	MAR	1900	8	19.	169.0	1643.5	*	18	MAR	2000	33	105.	648.5	1644.5	*	19	MAR	2100	58	87.	550.2	1644.3
17	MAR	2000	9	19.	168.3	1643.5	*	18	MAR	2100	34	106.	655.0	1644.5	*	19	MAR	2200	59	86.	544.0	1644.3
17	MAR	2100	10	19.	167.5	1643.5	*	18	MAR	2200	35	107.	659.3	1644.5	*	19	MAR	2300	60	84.	537.9	1644.3
17	MAR	2200	11	19.	166.7	1643.5	*	18	MAR	2300	36	107.	661.7	1644.5	*	20	MAR	0000	61	83.	531.8	1644.3
17	MAR	2300	12	19.	166.5	1643.5	*	19	MAR	0000	37	107.	662.3	1644.5	*	20	MAR	0100	62	82.	525.9	1644.2
18	MAR	0000	13	19.	168.0	1643.5	*	19	MAR	0100	38	107.	661.5	1644.5	*	20	MAR	0200	63	81.	520.0	1644.2
18	MAR	0100	14	20.	172.6	1643.5	*	19	MAR	0200	39	107.	659.4	1644.5	*	20	MAR	0300	64	80.	514.2	1644.2
18	MAR	0200	15	21.	181.5	1643.5	*	19	MAR	0300	40	106.	656.3	1644.5	*	20	MAR	0400	65	79.	508.4	1644.2
18	MAR	0300	16	24.	196.5	1643.6	*	19	MAR	0400	41	105.	652.5	1644.5	*	20	MAR	0500	66	78.	502.8	1644.2
18	MAR	0400	17	28.	218.6	1643.6	*	19	MAR	0500	42	105.	648.1	1644.5	*	20	MAR	0600	67	77.	497.2	1644.2
18	MAR	0500	18	33.	247.3	1643.7	*	19	MAR	0600	43	104.	643.1	1644.4	*	20	MAR	0700	68	76.	491.7	1644.2
18	MAR	0600	19	38.	281.3	1643.7	*	19	MAR	0700	44	103.	637.8	1644.4	*	20	MAR	0800	69	75.	486.3	1644.2
18	MAR	0700	20	45.	318.8	1643.8	*	19	MAR	0800	45	102.	632.1	1644.4	*	20	MAR	0900	70	74.	481.0	1644.2
18	MAR	0800	21	52.	357.9	1643.9	*	19	MAR	0900	46	101.	626.2	1644.4	*	20	MAR	1000	71	73.	475.8	1644.2
18	MAR	0900	22	58.	397.1	1644.0	*	19	MAR	1000	47	100.	620.2	1644.4	*	20	MAR	1100	72	72.	470.6	1644.1
18	MAR	1000	23	65.	435.0	1644.1	*	19	MAR	1100	48	98.	613.9	1644.4	*	20	MAR	1200	73	71.	465.5	1644.1
18	MAR	1100	24	72.	470.6	1644.1	*	19	MAR	1200	49	97.	607.6	1644.4	*	20	MAR	1300	74	70.	460.5	1644.1
18	MAR	1200	25	78.	502.9	1644.2	*	19	MAR	1300	50	96.	601.3	1644.4	*	20	MAR	1400	75	69.	455.6	1644.1
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PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	74.00-HR
+ (CFS)	(HR)				
		(CFS)			
+ 107.	36.00	107.	102.	73.	72.
		(INCHES) .142	.542	1.165	1.173
		(AC-FT) 53.	202.	435.	438.

PEAK STORAGE (AC-FT)	TIME (HR)	MAXIMUM AVERAGE STORAGE 6-HR	24-HR	72-HR	74.00-HR
662.	36.00	660.	634.	473.	465.

PEAK STAGE (FEET)	TIME (HR)	MAXIMUM AVERAGE STAGE 6-HR	24-HR	72-HR	74.00-HR
1644.48	36.00	1644.48	1644.43	1644.12	1644.10

CUMULATIVE AREA = 7.00 SQ MI

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HYDROGRAPH AT STATION 1A
PLAN 1, RATIO = 1.00

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DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
17	MAR	1200	1	20.	174.6	1643.5	18	MAR	1300	26	92.	580.1	1644.3	19	MAR	1400	51	105.	649.2	1644.5
17	MAR	1300	2	20.	173.8	1643.5	18	MAR	1400	27	97.	608.0	1644.4	19	MAR	1500	52	104.	642.0	1644.4
17	MAR	1400	3	20.	173.0	1643.5	18	MAR	1500	28	102.	632.5	1644.4	19	MAR	1600	53	102.	634.8	1644.4
17	MAR	1500	4	20.	172.2	1643.5	18	MAR	1600	29	106.	653.8	1644.5	19	MAR	1700	54	101.	627.6	1644.4
17	MAR	1600	5	20.	171.4	1643.5	18	MAR	1700	30	109.	672.2	1644.5	19	MAR	1800	55	100.	620.4	1644.4
17	MAR	1700	6	20.	170.6	1643.5	18	MAR	1800	31	112.	687.6	1644.5	19	MAR	1900	56	98.	613.3	1644.4
17	MAR	1800	7	19.	169.8	1643.5	18	MAR	1900	32	114.	700.2	1644.5	19	MAR	2000	57	97.	606.2	1644.4
17	MAR	1900	8	19.	169.0	1643.5	18	MAR	2000	33	116.	709.9	1644.6	19	MAR	2100	58	96.	599.2	1644.4
17	MAR	2000	9	19.	168.3	1643.5	18	MAR	2100	34	117.	717.1	1644.6	19	MAR	2200	59	94.	592.3	1644.4
17	MAR	2100	10	19.	167.5	1643.5	18	MAR	2200	35	118.	721.8	1644.6	19	MAR	2300	60	93.	585.4	1644.3
17	MAR	2200	11	19.	166.7	1643.5	18	MAR	2300	36	119.	724.3	1644.6	20	MAR	0000	61	92.	578.7	1644.3
17	MAR	2300	12	19.	166.6	1643.5	19	MAR	0000	37	119.	725.0	1644.6	20	MAR	0100	62	91.	572.0	1644.3
18	MAR	0000	13	19.	168.5	1643.5	19	MAR	0100	38	119.	723.9	1644.6	20	MAR	0200	63	89.	565.4	1644.3
18	MAR	0100	14	20.	173.8	1643.5	19	MAR	0200	39	118.	721.5	1644.6	20	MAR	0300	64	88.	558.9	1644.3
18	MAR	0200	15	22.	184.1	1643.5	19	MAR	0300	40	118.	718.1	1644.6	20	MAR	0400	65	87.	552.5	1644.3
18	MAR	0300	16	25.	201.3	1643.6	19	MAR	0400	41	117.	713.8	1644.6	20	MAR	0500	66	86.	546.2	1644.3
18	MAR	0400	17	29.	226.6	1643.6	19	MAR	0500	42	116.	708.8	1644.6	20	MAR	0600	67	85.	540.0	1644.3
18	MAR	0500	18	35.	259.4	1643.7	19	MAR	0600	43	115.	703.2	1644.6	20	MAR	0700	68	84.	533.9	1644.3
18	MAR	0600	19	41.	298.1	1643.8	19	MAR	0700	44	114.	697.2	1644.5	20	MAR	0800	69	83.	527.8	1644.2
18	MAR	0700	20	49.	340.6	1643.9	19	MAR	0800	45	113.	690.9	1644.5	20	MAR	0900	70	81.	521.9	1644.2
18	MAR	0800	21	56.	384.9	1644.0	19	MAR	0900	46	111.	684.3	1644.5	20	MAR	1000	71	80.	516.0	1644.2
18	MAR	0900	22	64.	429.2	1644.1	19	MAR	1000	47	110.	677.5	1644.5	20	MAR	1100	72	79.	510.2	1644.2
18	MAR	1000	23	72.	471.9	1644.1	19	MAR	1100	48	109.	670.5	1644.5	20	MAR	1200	73	78.	504.6	1644.2
18	MAR	1100	24	80.	511.9	1644.2	19	MAR	1200	49	107.	663.5	1644.5	20	MAR	1300	74	77.	499.0	1644.2
18	MAR	1200	25	86.	548.2	1644.3	19	MAR	1300	50	106.	656.3	1644.5	20	MAR	1400	75	76.	493.4	1644.2

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PEAK FLOW (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	74.00-HR
119.	36.00	118.	113.	80.	79.
	(INCHES)	.157	.600	1.280	1.289
	(AC-FT)	59.	224.	478.	481.

PEAK STORAGE (AC-FT)	TIME (HR)	MAXIMUM AVERAGE STORAGE 6-HR	24-HR	72-HR	74.00-HR
725.	36.00	722.	693.	513.	504.

PEAK STAGE (FEET)	TIME (HR)	MAXIMUM AVERAGE STAGE 6-HR	24-HR	72-HR	74.00-HR
1644.59	36.00	1644.58	1644.53	1644.19	1644.17

CUMULATIVE AREA = 7.00 SQ MI

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HYDROGRAPH AT STATION 1A
PLAN 1, RATIO = 1.20

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DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
17	MAR	1200	1	20.	174.6	1643.5	18	MAR	1300	26	124.	752.3	1644.6	19	MAR	1400	51	140.	839.4	1644.8
17	MAR	1300	2	20.	173.8	1643.5	18	MAR	1400	27	131.	790.3	1644.7	19	MAR	1500	52	138.	829.5	1644.8
17	MAR	1400	3	20.	173.0	1643.5	18	MAR	1500	28	137.	823.3	1644.8	19	MAR	1600	53	136.	819.7	1644.8
17	MAR	1500	4	20.	172.2	1643.5	18	MAR	1600	29	142.	851.9	1644.8	19	MAR	1700	54	134.	809.8	1644.7
17	MAR	1600	5	20.	171.4	1643.5	18	MAR	1700	30	147.	876.4	1644.9	19	MAR	1800	55	133.	800.0	1644.7
17	MAR	1700	6	20.	170.6	1643.5	18	MAR	1800	31	150.	896.9	1644.9	19	MAR	1900	56	131.	790.2	1644.7
17	MAR	1800	7	19.	169.8	1643.5	18	MAR	1900	32	153.	913.4	1644.9	19	MAR	2000	57	129.	780.5	1644.7
17	MAR	1900	8	19.	169.0	1643.5	18	MAR	2000	33	156.	926.1	1644.9	19	MAR	2100	58	127.	770.9	1644.7
17	MAR	2000	9	19.	168.3	1643.5	18	MAR	2100	34	157.	935.3	1645.0	19	MAR	2200	59	125.	761.4	1644.7

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  17 MAR 2100  10      19.    167.5  1643.5 * 18 MAR 2200  35     159.    941.2  1645.0 * 19 MAR 2300  60     124.    752.0  1644.6
  17 MAR 2200  11      19.    166.8  1643.5 * 18 MAR 2300  36     159.    944.3  1645.0 * 20 MAR 0000  61     122.    742.8  1644.6
  17 MAR 2300  12      19.    167.0  1643.5 * 19 MAR 0000  37     159.    944.7  1645.0 * 20 MAR 0100  62     120.    733.6  1644.6
  18 MAR 0000  13      19.    170.1  1643.5 * 19 MAR 0100  38     159.    943.0  1645.0 * 20 MAR 0200  63     119.    724.6  1644.6
  18 MAR 0100  14      21.    178.3  1643.5 * 19 MAR 0200  39     158.    939.5  1645.0 * 20 MAR 0300  64     117.    715.7  1644.6
  18 MAR 0200  15      23.    193.7  1643.5 * 19 MAR 0300  40     157.    934.6  1645.0 * 20 MAR 0400  65     115.    707.0  1644.6
  18 MAR 0300  16      28.    219.0  1643.6 * 19 MAR 0400  41     156.    928.5  1644.9 * 20 MAR 0500  66     114.    698.3  1644.5
  18 MAR 0400  17      34.    255.7  1643.7 * 19 MAR 0500  42     155.    921.5  1644.9 * 20 MAR 0600  67     112.    689.8  1644.5
  18 MAR 0500  18      42.    302.9  1643.8 * 19 MAR 0600  43     154.    913.8  1644.9 * 20 MAR 0700  68     111.    681.4  1644.5
  18 MAR 0600  19      52.    358.2  1643.9 * 19 MAR 0700  44     152.    905.5  1644.9 * 20 MAR 0800  69     109.    673.1  1644.5
  18 MAR 0700  20      62.    418.7  1644.1 * 19 MAR 0800  45     150.    896.7  1644.9 * 20 MAR 0900  70     108.    665.0  1644.5
  18 MAR 0800  21      74.    481.3  1644.2 * 19 MAR 0900  46     149.    887.6  1644.9 * 20 MAR 1000  71     106.    657.0  1644.5
  18 MAR 0900  22      85.    543.5  1644.3 * 19 MAR 1000  47     147.    878.2  1644.9 * 20 MAR 1100  72     105.    649.1  1644.5
  18 MAR 1000  23      96.    603.1  1644.4 * 19 MAR 1100  48     145.    868.7  1644.8 * 20 MAR 1200  73     103.    641.3  1644.4
  18 MAR 1100  24     107.    658.7  1644.5 * 19 MAR 1200  49     143.    859.0  1644.8 * 20 MAR 1300  74     102.    633.7  1644.4
  18 MAR 1200  25     116.    708.7  1644.6 * 19 MAR 1300  50     142.    849.2  1644.8 * 20 MAR 1400  75     101.    626.1  1644.4
                                             *                                             *
 ************************************************************************************************************************************

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR     74.00-HR
+   (CFS)       (HR)
                          (CFS)
+     159.     36.00                159.        151.        106.         103.
                        (INCHES)    .211        .803       1.686        1.695
                         (AC-FT)     79.        300.        630.         633.

 PEAK STORAGE   TIME                         MAXIMUM AVERAGE STORAGE
                                     6-HR       24-HR       72-HR     74.00-HR
+  (AC-FT)      (HR)
      945.     36.00                941.        901.        651.         639.

  PEAK STAGE    TIME                          MAXIMUM AVERAGE STAGE
                                     6-HR       24-HR       72-HR     74.00-HR
+   (FEET)      (HR)
   1644.97     36.00              1644.97     1644.90     1644.43      1644.41

                        CUMULATIVE AREA =    7.00 SQ MI

1

                PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
                                FLOWS IN CUBIC FEET PER SECOND,  AREA IN SQUARE MILES
                                                TIME TO PEAK IN HOURS


                                                                  RATIOS APPLIED TO PRECIPITATION
 OPERATION       STATION     AREA    PLAN            RATIO 1  RATIO 2  RATIO 3  RATIO 4
                                                         .74      .94     1.00     1.20

 HYDROGRAPH AT
+                     1      7.00     1   FLOW         324.     531.     599.     837.
                                           TIME        21.00    20.00    20.00    20.00

 ROUTED TO
+                    1A      7.00     1   FLOW          72.     107.     119.     159.
                                           TIME        36.00    36.00    36.00    36.00

                                      ** PEAK STAGES IN FEET **
                                      1   STAGE     1644.14  1644.48  1644.59  1644.97
                                           TIME        36.00    36.00    36.00    36.00


 *** NORMAL END OF HEC-1 ***
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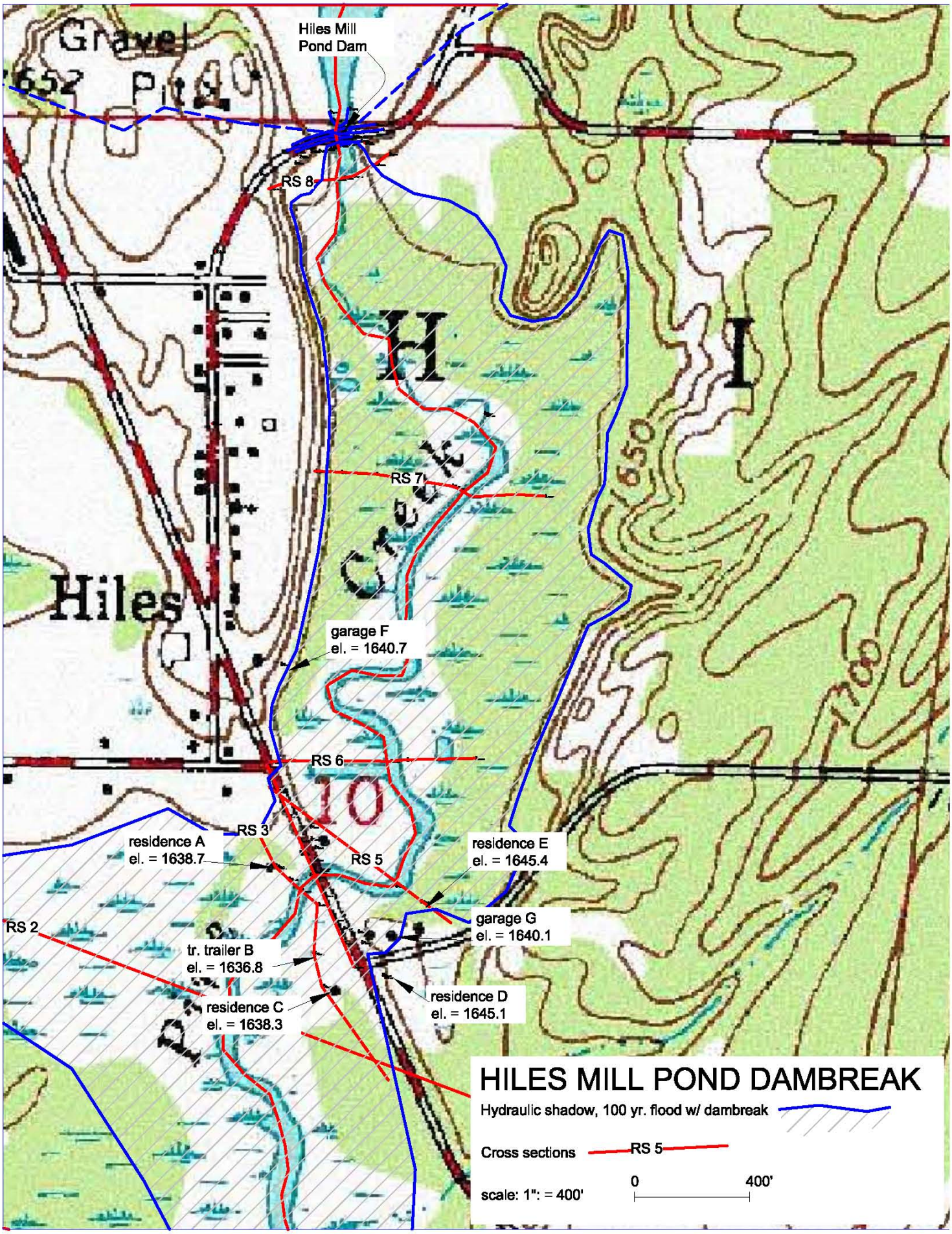
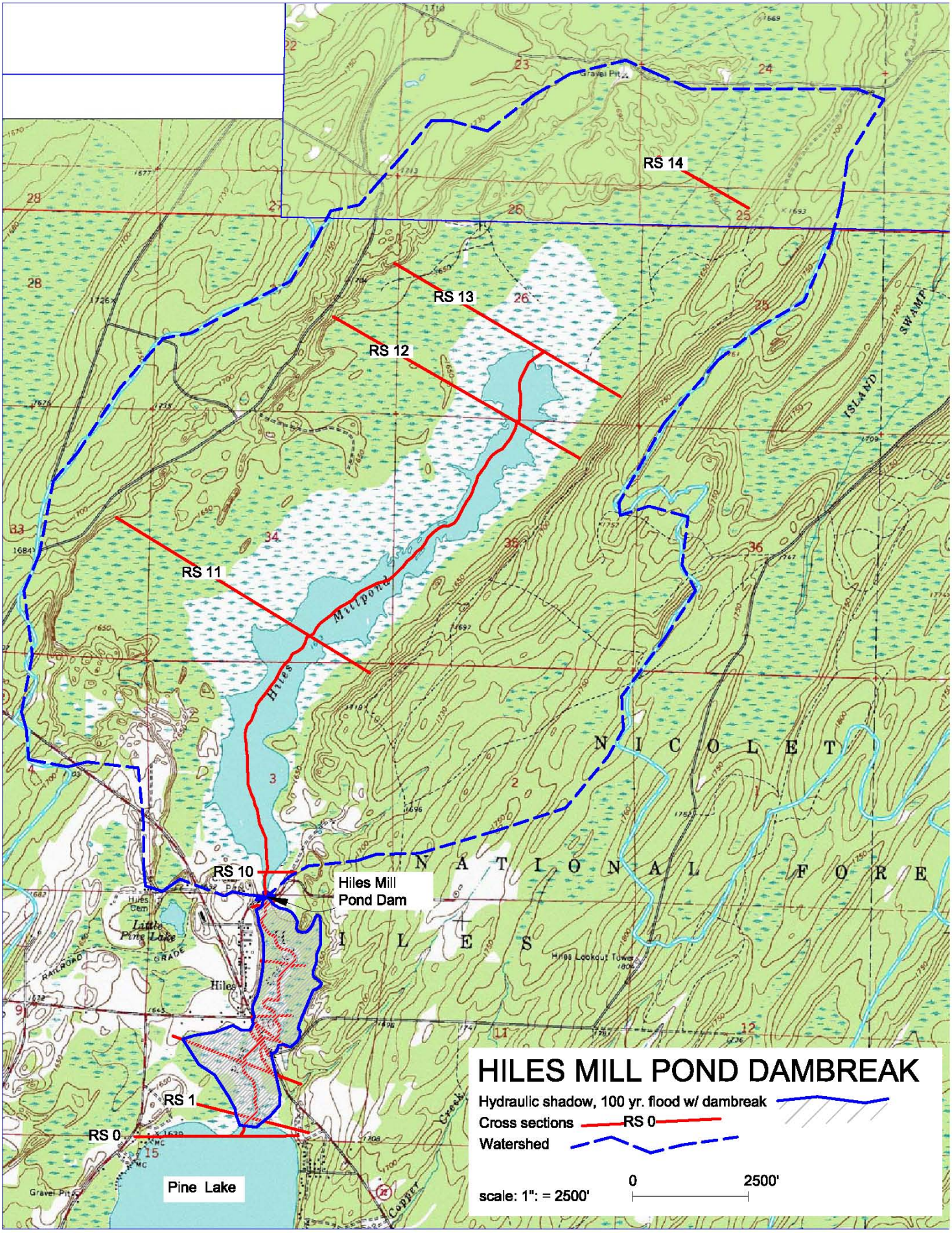

Hiles Mill
Pond Dam
Gravel
Pit
652
RS 8
H
I
RS 7
Creek
Hiles
650
garage F
el. = 1640.7
RS 6
10
RS 3
residence A
el. = 1638.7
RS 5
residence E
el. = 1645.4
garage G
el. = 1640.1
RS 2
tr. trailer B
el. = 1636.8
residence C
el. = 1638.3
residence D
el. = 1645.1
HILES MILL POND DAMBREAK
Hydraulic shadow, 100 yr. flood w/ dambreak
Cross sections
RS 5
scale: 1": = 400'
0
400'


HILES MILL POND DAMBREAK
Hydraulic shadow, 100 yr. flood w/ dambreak
Cross sections
RS 0
Watershed
scale: 1": = 2500'
0
2500'
RS 14
RS 13
RS 12
RS 11
RS 10
RS 1
RS 0
Hiles Mill
Pond Dam
Pine Lake
Hiles
Hiles Mill Pond
Little Pine Lake
Hiles Dam
Hiles Lookout Tower
Gravel Pit
Copper Creek
ISLAND SWAMP
N I C O L E T
N A T I O N A L F O R E
I L E S

Residence A, elevation 1638.7, stoop

Travel Trailer B, elevation 1636.8, ground

Residence C, elevation 1638.3, ground

Residence D, elevation 1645.1, top of steps

Residence E, elevation 1645.4, steps

Garage F, elevation 1640.7

Garage G, elevation 1640.1

Hwy 32 crossing, 5’ culvert, surface elev. = 1641.0

HEC-RAS Stage and Flow at RS 9 and Hiles Mill Pond Dam

	Date		Stage HW - 100 yr wo dmbrk	Stage TW - 100 yr wo dmbrk	Flow - 100 yr wo dmbrk	Gate Flow - Gate #1 - 100 yr wo dmbrk	Stage HW - 100 yr dambrk	Stage TW - 100 yr dambrk	Flow - 100 yr dambrk	Stage HW - dam gone	Stage TW - dam gone	Flow - dam gone
			INST-VAL	INST-VAL	INST-VAL	INST-VAL	INST-VAL	INST-VAL	INST-VAL	INST-VAL	INST-VAL	
			FEET	FEET	CFS	CFS	FEET	FEET	CFS	FEET	FEET	
1.0	01Jan2007	1200	1643.9	1637.4	50.0	50.0	1643.9	1637.4	50.0	1638.2	1637.7	88.2
2.0	01Jan2007	1300	1643.9	1637.4	50.0	50.0	1643.9	1637.4	50.0	1638.3	1637.8	101.5
3.0	01Jan2007	1400	1643.9	1637.4	50.0	50.0	1643.9	1637.4	50.0	1638.5	1638.0	126.0
4.0	01Jan2007	1500	1643.9	1637.4	50.0	50.0	1643.9	1637.4	50.0	1638.5	1638.0	128.0
5.0	01Jan2007	1600	1643.9	1637.4	50.0	50.0	1643.9	1637.4	50.0	1638.5	1638.0	121.6
6.0	01Jan2007	1700	1643.9	1637.4	50.0	50.0	1643.9	1637.4	50.0	1638.4	1638.0	114.9
7.0	01Jan2007	1800	1643.9	1637.4	50.0	50.0	1643.9	1637.4	50.0	1638.4	1638.0	109.7
8.0	01Jan2007	1900	1643.9	1637.4	50.0	50.0	1643.9	1637.4	50.0	1638.3	1638.0	106.1
9.0	01Jan2007	2000	1643.9	1637.4	50.0	50.0	1643.9	1637.4	50.0	1638.3	1638.0	103.6
10.0	01Jan2007	2100	1643.9	1637.4	50.0	50.0	1643.9	1637.4	50.0	1638.3	1638.0	102.0
11.0	01Jan2007	2200	1643.9	1637.4	50.0	50.0	1643.9	1637.4	50.0	1638.3	1638.0	101.0
12.0	01Jan2007	2300	1643.9	1637.4	50.0	50.0	1643.9	1637.4	50.0	1638.3	1638.0	100.4
13.0	01Jan2007	2400	1643.9	1637.4	50.0	50.0	1643.9	1637.4	50.0	1638.4	1638.1	106.1
14.0	02Jan2007	0100	1643.9	1637.4	50.0	50.0	1643.9	1637.4	50.0	1638.6	1638.2	139.4
15.0	02Jan2007	0200	1643.9	1637.4	50.0	50.0	1643.9	1637.4	50.0	1639.0	1638.5	199.7
16.0	02Jan2007	0300	1643.9	1637.4	50.0	50.0	1643.9	1637.4	50.0	1639.3	1638.8	269.0
17.0	02Jan2007	0400	1643.9	1637.4	50.0	50.0	1643.9	1637.4	50.0	1639.6	1639.0	327.1
18.0	02Jan2007	0500	1643.9	1637.4	50.0	50.0	1643.9	1637.4	50.0	1639.8	1639.2	365.7
19.0	02Jan2007	0600	1643.9	1637.4	50.0	50.0	1643.9	1637.4	50.0	1640.0	1639.5	405.2
20.0	02Jan2007	0700	1643.9	1637.4	50.0	50.0	1643.9	1637.4	50.0	1640.2	1639.8	433.4
21.0	02Jan2007	0800	1643.9	1637.4	50.0	50.0	1643.9	1637.4	50.0	1640.4	1640.1	458.2
22.0	02Jan2007	0900	1643.9	1637.4	50.0	50.0	1643.9	1637.4	50.0	1640.6	1640.3	444.9
23.0	02Jan2007	1000	1643.9	1637.4	50.0	50.0	1643.9	1637.4	50.0	1640.8	1640.6	412.7
24.0	02Jan2007	1100	1643.9	1637.4	50.0	50.0	1643.9	1637.4	50.0	1640.9	1640.8	382.9
25.0	02Jan2007	1200	1643.9	1637.4	50.1	50.1	1643.9	1637.4	50.1	1641.1	1641.0	357.6
26.0	02Jan2007	1300	1643.9	1637.4	50.6	50.6	1643.9	1637.4	50.5	1641.2	1641.1	329.0
27.0	02Jan2007	1400	1643.9	1637.5	52.0	52.0	1643.9	1637.5	51.6	1641.3	1641.3	313.1
28.0	02Jan2007	1500	1644.0	1637.5	54.4	54.4	1644.0	1637.5	53.8	1641.4	1641.4	304.8
29.0	02Jan2007	1600	1644.0	1637.5	58.4	58.4	1644.0	1637.5	57.1	1641.5	1641.5	297.1
30.0	02Jan2007	1700	1644.1	1637.6	64.6	64.6	1644.0	1639.1	555.6	1641.6	1641.5	289.6
31.0	02Jan2007	1800	1644.1	1637.7	71.6	71.6	1643.7	1640.4	1286.8	1641.6	1641.6	287.5
32.0	02Jan2007	1900	1644.2	1637.7	79.4	79.4	1643.6	1640.9	1235.6	1641.6	1641.6	280.9
33.0	02Jan2007	2000	1644.3	1637.8	87.4	87.4	1643.5	1641.6	1189.0	1641.6	1641.6	272.0
34.0	02Jan2007	2100	1644.4	1637.8	95.3	95.3	1643.3	1642.2	1135.3	1641.6	1641.6	259.7
35.0	02Jan2007	2200	1644.4	1637.9	102.4	102.4	1643.2	1642.4	1080.4	1641.6	1641.6	244.7
36.0	02Jan2007	2300	1644.5	1637.9	108.5	108.5	1643.1	1642.4	1030.3	1641.6	1641.5	227.1
37.0	02Jan2007	2400	1644.5	1638.0	113.8	113.8	1643.0	1642.3	969.7	1641.5	1641.5	213.8

38.0	03Jan2007	0100	1644.6	1638.0	118.3	118.3	1642.8	1642.3	905.8	1641.5	1641.5	203.1
39.0	03Jan2007	0200	1644.6	1638.0	122.3	122.3	1642.7	1642.3	842.6	1641.5	1641.4	194.6
40.0	03Jan2007	0300	1644.7	1638.1	125.8	125.8	1642.6	1642.2	779.8	1641.4	1641.4	185.9
41.0	03Jan2007	0400	1644.7	1638.1	128.7	128.7	1642.4	1642.2	702.0	1641.4	1641.4	176.7
42.0	03Jan2007	0500	1644.7	1638.2	131.2	131.2	1642.3	1642.1	634.1	1641.3	1641.3	167.2
43.0	03Jan2007	0600	1644.7	1638.2	133.2	133.2	1642.2	1642.0	566.9	1641.3	1641.3	162.3
44.0	03Jan2007	0700	1644.7	1638.3	134.8	134.8	1642.1	1642.0	512.2	1641.2	1641.2	158.5
45.0	03Jan2007	0800	1644.8	1638.3	136.0	136.0	1642.0	1641.9	454.5	1641.2	1641.2	154.9
46.0	03Jan2007	0900	1644.8	1638.3	136.7	136.7	1642.0	1641.9	403.4	1641.2	1641.1	151.8
47.0	03Jan2007	1000	1644.8	1638.4	137.1	137.1	1641.9	1641.8	354.6	1641.1	1641.1	149.0
48.0	03Jan2007	1100	1644.8	1638.4	137.2	137.2	1641.8	1641.8	316.2	1641.1	1641.1	148.1
49.0	03Jan2007	1200	1644.8	1638.5	136.9	136.9	1641.7	1641.7	283.7	1641.0	1641.0	144.6
50.0	03Jan2007	1300	1644.8	1638.5	136.4	136.4	1641.7	1641.6	257.2	1641.0	1641.0	143.8
51.0	03Jan2007	1400	1644.8	1638.5	135.8	135.8	1641.6	1641.6	221.4	1641.0	1640.9	143.3
52.0	03Jan2007	1500	1644.7	1638.6	134.9	134.9	1641.5	1641.5	192.4	1640.9	1640.9	142.7
53.0	03Jan2007	1600	1644.7	1638.6	134.0	134.0	1641.5	1641.5	176.1	1640.9	1640.9	142.3
54.0	03Jan2007	1700	1644.7	1638.6	132.9	132.9	1641.4	1641.4	164.8	1640.8	1640.8	141.7
55.0	03Jan2007	1800	1644.7	1638.6	131.9	131.9	1641.3	1641.3	151.2	1640.8	1640.8	141.1
56.0	03Jan2007	1900	1644.7	1638.7	130.8	130.8	1641.3	1641.3	143.8	1640.8	1640.7	140.7
57.0	03Jan2007	2000	1644.7	1638.7	129.8	129.8	1641.2	1641.2	136.5	1640.7	1640.7	140.2
58.0	03Jan2007	2100	1644.7	1638.7	128.7	128.7	1641.1	1641.1	131.6	1640.7	1640.7	139.8
59.0	03Jan2007	2200	1644.7	1638.7	127.7	127.7	1641.1	1641.1	126.9	1640.6	1640.6	139.2
60.0	03Jan2007	2300	1644.7	1638.7	126.7	126.7	1641.0	1641.0	122.1	1640.6	1640.6	138.5
61.0	03Jan2007	2400	1644.7	1638.8	125.7	125.7	1640.9	1640.9	120.7	1640.6	1640.5	137.9
62.0	04Jan2007	0100	1644.7	1638.8	125.7	125.7	1640.9	1640.9	121.7	1640.5	1640.5	137.4
63.0	04Jan2007	0200	1644.6	1638.8	124.7	124.7	1640.8	1640.8	118.1	1640.5	1640.5	134.1
64.0	04Jan2007	0300	1644.6	1638.8	123.7	123.7	1640.7	1640.7	117.9	1640.4	1640.4	133.1
65.0	04Jan2007	0400	1644.6	1638.8	122.7	122.7	1640.7	1640.7	115.5	1640.4	1640.4	132.4
66.0	04Jan2007	0500	1644.6	1638.8	121.8	121.8	1640.6	1640.6	118.5	1640.4	1640.3	131.9
67.0	04Jan2007	0600	1644.6	1638.8	120.8	120.8	1640.5	1640.5	114.0	1640.3	1640.3	131.3
68.0	04Jan2007	0700	1644.6	1638.8	119.9	119.9	1640.5	1640.5	110.4	1640.3	1640.3	130.7
69.0	04Jan2007	0800	1644.6	1638.8	119.0	119.0	1640.4	1640.4	105.8	1640.3	1640.2	130.1
70.0	04Jan2007	0900	1644.6	1638.8	118.1	118.1	1640.3	1640.3	108.6	1640.2	1640.2	129.4
71.0	04Jan2007	1000	1644.6	1638.8	117.2	117.2	1640.3	1640.2	103.1	1640.2	1640.2	128.8
72.0	04Jan2007	1100	1644.6	1638.8	116.3	116.3	1640.2	1640.2	101.8	1640.1	1640.1	128.2
73.0	04Jan2007	1200	1644.6	1638.8	115.4	115.4	1640.1	1640.1	101.5	1640.1	1640.1	127.5

HEC-RAS RS 4
Culvert @ Hwy 32

	Date		Stage HW - 100 yr wo dmbrk INST-VAL FEET	Stage TW - 100 yr wo dmbrk INST-VAL FEET	Flow - 100 yr wo dmbrk INST-VAL CFS	Stage HW - 100 yr dambrk INST-VAL FEET	Stage TW - 100 yr dambrk INST-VAL FEET	Flow - 100 yr dambrk INST-VAL CFS	Stage HW - dam gone INST-VAL FEET	Stage TW - dam gone INST-VAL FEET	Flow - dam gone INST-VAL CFS
1	01Jan2007	1200	1636.8	1635.3	50.1	1636.8	1635.3	50.1	1636.8	1635.3	50.5
2	01Jan2007	1300	1636.8	1635.3	50.1	1636.8	1635.3	50.1	1636.9	1635.3	52.8
3	01Jan2007	1400	1636.8	1635.3	50.1	1636.8	1635.3	50.1	1637.0	1635.3	56.2
4	01Jan2007	1500	1636.8	1635.3	50.1	1636.8	1635.3	50.1	1637.1	1635.4	60.1
5	01Jan2007	1600	1636.8	1635.3	50.1	1636.8	1635.3	50.1	1637.2	1635.4	63.7
6	01Jan2007	1700	1636.8	1635.3	50.1	1636.8	1635.3	50.1	1637.3	1635.5	66.7
7	01Jan2007	1800	1636.8	1635.3	50.1	1636.8	1635.3	50.1	1637.4	1635.5	69.1
8	01Jan2007	1900	1636.8	1635.3	50.1	1636.8	1635.3	50.1	1637.5	1635.6	71.2
9	01Jan2007	2000	1636.8	1635.3	50.1	1636.8	1635.3	50.1	1637.5	1635.6	73.0
10	01Jan2007	2100	1636.8	1635.3	50.1	1636.8	1635.3	50.1	1637.6	1635.6	74.6
11	01Jan2007	2200	1636.8	1635.3	50.1	1636.8	1635.3	50.1	1637.6	1635.6	76.0
12	01Jan2007	2300	1636.8	1635.3	50.1	1636.8	1635.3	50.1	1637.6	1635.6	77.3
13	01Jan2007	2400	1636.8	1635.3	50.1	1636.8	1635.3	50.1	1637.7	1635.7	78.7
14	02Jan2007	0100	1636.8	1635.3	50.1	1636.8	1635.3	50.1	1637.7	1635.7	81.1
15	02Jan2007	0200	1636.8	1635.3	50.1	1636.8	1635.3	50.1	1637.9	1635.7	86.0
16	02Jan2007	0300	1636.8	1635.3	50.1	1636.8	1635.3	50.1	1638.1	1635.8	93.8
17	02Jan2007	0400	1636.8	1635.3	50.1	1636.8	1635.3	50.1	1638.4	1635.9	104.4
18	02Jan2007	0500	1636.8	1635.3	50.1	1636.8	1635.3	50.1	1638.8	1636.0	116.0
19	02Jan2007	0600	1636.8	1635.3	50.1	1636.8	1635.3	50.1	1639.1	1636.1	128.2
20	02Jan2007	0700	1636.8	1635.3	50.1	1636.8	1635.3	50.1	1639.5	1636.2	139.5
21	02Jan2007	0800	1636.8	1635.3	50.1	1636.8	1635.3	50.1	1639.8	1636.3	150.9
22	02Jan2007	0900	1636.8	1635.3	50.1	1636.8	1635.3	50.1	1640.2	1636.4	163.0
23	02Jan2007	1000	1636.8	1635.3	50.1	1636.8	1635.3	50.1	1640.5	1636.5	170.3
24	02Jan2007	1100	1636.8	1635.3	50.1	1636.8	1635.3	50.1	1640.7	1636.6	175.3
25	02Jan2007	1200	1636.8	1635.3	50.1	1636.8	1635.3	50.1	1640.9	1636.6	179.5
26	02Jan2007	1300	1636.8	1635.3	50.1	1636.8	1635.3	50.1	1641.1	1636.7	183.0
27	02Jan2007	1400	1636.8	1635.3	50.1	1636.8	1635.3	50.1	1641.2	1636.8	201.0
28	02Jan2007	1500	1636.8	1635.3	50.3	1636.8	1635.3	50.2	1641.3	1636.9	215.1
29	02Jan2007	1600	1636.8	1635.3	50.7	1636.8	1635.3	50.5	1641.4	1637.0	226.3
30	02Jan2007	1700	1636.8	1635.3	51.3	1637.1	1635.4	58.6	1641.5	1637.1	237.5
31	02Jan2007	1800	1636.8	1635.3	52.3	1638.7	1635.8	114.9	1641.5	1637.2	258.2
32	02Jan2007	1900	1636.9	1635.3	53.6	1640.1	1636.1	160.9	1641.6	1637.3	267.9
33	02Jan2007	2000	1636.9	1635.3	55.3	1641.3	1636.4	207.1	1641.6	1637.4	270.4
34	02Jan2007	2100	1637.0	1635.4	57.3	1642.0	1637.5	641.4	1641.6	1637.4	267.4
35	02Jan2007	2200	1637.1	1635.4	59.6	1642.2	1638.7	978.1	1641.5	1637.5	259.8

36	02Jan2007	2300	1637.2	1635.4	62.1	1642.2	1639.5	1025.9	1641.5	1637.5	248.6
37	02Jan2007	2400	1637.3	1635.5	64.9	1642.2	1640.0	990.2	1641.5	1637.4	236.0
38	03Jan2007	0100	1637.3	1635.5	67.7	1642.2	1640.3	937.2	1641.5	1637.4	230.3
39	03Jan2007	0200	1637.4	1635.6	70.5	1642.1	1640.4	874.8	1641.4	1637.3	225.8
40	03Jan2007	0300	1637.5	1635.6	73.4	1642.1	1640.4	810.6	1641.4	1637.3	220.8
41	03Jan2007	0400	1637.6	1635.6	76.2	1642.1	1640.3	744.9	1641.3	1637.2	215.2
42	03Jan2007	0500	1637.7	1635.6	79.0	1642.0	1640.2	675.1	1641.3	1637.2	209.1
43	03Jan2007	0600	1637.8	1635.7	81.8	1642.0	1640.0	608.8	1641.3	1637.1	203.1
44	03Jan2007	0700	1637.9	1635.7	84.5	1641.9	1639.9	556.1	1641.2	1637.1	197.2
45	03Jan2007	0800	1637.9	1635.7	87.2	1641.9	1639.7	501.4	1641.2	1637.0	191.6
46	03Jan2007	0900	1638.0	1635.8	89.6	1641.8	1639.4	449.8	1641.1	1637.0	186.4
47	03Jan2007	1000	1638.1	1635.8	92.0	1641.8	1639.2	400.8	1641.1	1636.9	182.3
48	03Jan2007	1100	1638.1	1635.8	94.2	1641.7	1639.0	363.9	1641.1	1636.9	181.9
49	03Jan2007	1200	1638.2	1635.9	96.3	1641.7	1638.8	333.5	1641.0	1636.9	181.1
50	03Jan2007	1300	1638.2	1635.9	98.3	1641.6	1638.6	303.3	1641.0	1636.8	180.3
51	03Jan2007	1400	1638.3	1635.9	100.1	1641.6	1638.3	273.9	1640.9	1636.8	179.5
52	03Jan2007	1500	1638.3	1635.9	101.8	1641.5	1638.1	243.6	1640.9	1636.8	178.7
53	03Jan2007	1600	1638.4	1635.9	103.3	1641.4	1637.9	228.0	1640.8	1636.8	177.9
54	03Jan2007	1700	1638.4	1636.0	104.8	1641.4	1637.7	219.6	1640.8	1636.8	177.1
55	03Jan2007	1800	1638.5	1636.0	106.1	1641.3	1637.5	210.9	1640.8	1636.8	176.4
56	03Jan2007	1900	1638.5	1636.0	107.3	1641.2	1637.4	202.1	1640.7	1636.7	175.6
57	03Jan2007	2000	1638.5	1636.0	108.3	1641.2	1637.3	193.5	1640.7	1636.7	174.8
58	03Jan2007	2100	1638.6	1636.0	109.3	1641.1	1637.1	185.2	1640.6	1636.7	174.0
59	03Jan2007	2200	1638.6	1636.0	110.2	1641.1	1637.0	182.0	1640.6	1636.7	173.3
60	03Jan2007	2300	1638.6	1636.0	110.9	1641.0	1637.0	180.7	1640.6	1636.7	172.5
61	03Jan2007	2400	1638.6	1636.0	111.6	1640.9	1636.9	179.4	1640.5	1636.7	171.7
62	04Jan2007	0100	1638.6	1636.0	112.3	1640.9	1636.9	178.1	1640.5	1636.7	171.0
63	04Jan2007	0200	1638.7	1636.0	112.8	1640.8	1636.8	176.8	1640.5	1636.7	169.9
64	04Jan2007	0300	1638.7	1636.1	113.3	1640.7	1636.8	175.5	1640.4	1636.7	169.0
65	04Jan2007	0400	1638.7	1636.1	113.7	1640.7	1636.8	174.2	1640.4	1636.7	168.0
66	04Jan2007	0500	1638.7	1636.1	114.1	1640.6	1636.7	172.8	1640.3	1636.7	167.0
67	04Jan2007	0600	1638.7	1636.1	114.4	1640.5	1636.7	171.5	1640.3	1636.6	166.0
68	04Jan2007	0700	1638.7	1636.1	114.6	1640.5	1636.7	170.0	1640.2	1636.6	165.1
69	04Jan2007	0800	1638.7	1636.1	114.8	1640.4	1636.7	168.2	1640.2	1636.6	163.8
70	04Jan2007	0900	1638.7	1636.1	115.0	1640.3	1636.7	166.5	1640.2	1636.6	162.7
71	04Jan2007	1000	1638.7	1636.1	115.1	1640.2	1636.6	164.7	1640.1	1636.6	161.5
72	04Jan2007	1100	1638.7	1636.1	115.1	1640.2	1636.6	162.6	1640.1	1636.6	160.3
73	04Jan2007	1200	1638.7	1636.1	115.1	1640.1	1636.6	160.5	1640.1	1636.6	159.2

```
                    HEC-RAS Version 4.0.0 March 2008
                      U.S. Army Corps of Engineers
                     Hydrologic Engineering Center
                           609 Second Street
                           Davis, California


          X     X  XXXXXX    XXXX        XXXX       XX      XXXX
          X     X  X        X    X       X   X     X  X    X
          X     X  X        X            X   X    X    X   X
          XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
          X     X  X        X            X  X     X    X        X
          X     X  X        X    X       X   X    X    X        X
          X     X  XXXXXX    XXXX        X    X   X    X   XXXXX



PROJECT DATA
Project Title: Hiles Mill Pond Dam
Project File : HilesMillPondDam.prj
Run Date and Time: 11/6/2008 8:37:20 AM

Project in English units

Project Description:
1638.716



PLAN DATA

Plan Title: 100 yr hydrograph w/ dam break
Plan File : C:\My Documents\Tech Services\Cheni\Hiles Mill Pond\DamBreak\HilesMillPondDam.p02

           Geometry Title: existing
           Geometry File : C:\My Documents\Tech Services\Cheni\Hiles Mill Pond\DamBreak\HilesMillPondDam.g01

           Flow Title    :
           Flow File     :

Plan Summary Information:
Number of:  Cross Sections =   14    Multiple Openings  =    0
            Culverts       =    1    Inline Structures  =    1
            Bridges        =    0    Lateral Structures =    0

Computational Information
    Water surface calculation tolerance  =  0.01
    Critical depth calculation tolerance =  0.01
    Maximum number of iterations         =  20
    Maximum difference tolerance         =  0.3
    Flow tolerance factor                =  0.001

Computation Options
    Critical depth computed only where necessary
    Conveyance Calculation Method: At breaks in n values only
    Friction Slope Method:         Average Conveyance
    Computational Flow Regime:     Subcritical Flow



GEOMETRY DATA

Geometry Title: existing
Geometry File : C:\My Documents\Tech Services\Cheni\Hiles Mill Pond\DamBreak\HilesMillPondDam.g01

CROSS SECTION


RIVER: Pine Creek
REACH: Hile Mill Pond     RS: 14

INPUT
Description:
Station Elevation Data    num=       4
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
   -1200    1660     -20    1650      20    1650    1200    1660

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
   -1200     .07     -20     .02      20     .07

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           -20      20             2500    2500    2500             .1       .3

CROSS SECTION OUTPUT  Profile #Max WS
```

E.G. Elev (ft)	1651.74	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.44	Wt. n-Val.	0.070	0.020	0.070
W.S. Elev (ft)	1651.30	Reach Len. (ft)	2500.00	2500.00	2500.00
Crit W.S. (ft)	1651.32	Flow Area (sq ft)	99.10	51.84	99.10
E.G. Slope (ft/ft)	0.006006	Area (sq ft)	99.10	51.84	99.10
Q Total (cfs)	599.00	Flow (cfs)	122.08	354.83	122.08
Top Width (ft)	345.86	Top Width (ft)	152.93	40.00	152.93
Vel Total (ft/s)	2.40	Avg. Vel. (ft/s)	1.23	6.84	1.23
Max Chl Dpth (ft)	1.30	Hydr. Depth (ft)	0.65	1.30	0.65
Conv. Total (cfs)	7728.9	Conv. (cfs)	1575.3	4578.4	1575.3
Length Wtd. (ft)	2500.00	Wetted Per. (ft)	152.94	40.00	152.94
Min Ch El (ft)	1650.00	Shear (lb/sq ft)	0.24	0.49	0.24
Alpha	4.94	Stream Power (lb/ft s)	0.30	3.33	0.30
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)	85.13	974.23	260.47
C & E Loss (ft)		Cum SA (acres)	128.89	315.21	338.57

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Pine Creek
REACH: Hile Mill Pond RS: 13

INPUT
Description:
Station Elevation Data num= 4

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-3000	1650	-1100	1643	0	1643	1900	1650

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-3000	.07	-1100	.02	0	.07

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
-1100	0	1670	1670	1670	.1	.3

CROSS SECTION OUTPUT Profile #Max WS

E.G. Elev (ft)	1644.07	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.00	Wt. n-Val.	0.070	0.020	0.070
W.S. Elev (ft)	1644.06	Reach Len. (ft)	1670.00	1670.00	1670.00
Crit W.S. (ft)		Flow Area (sq ft)	153.35	1169.29	153.35
E.G. Slope (ft/ft)	0.000023	Area (sq ft)	153.35	1169.29	153.35
Q Total (cfs)	451.27	Flow (cfs)	10.17	430.92	10.17
Top Width (ft)	1677.05	Top Width (ft)	288.53	1100.00	288.53
Vel Total (ft/s)	0.31	Avg. Vel. (ft/s)	0.07	0.37	0.07
Max Chl Dpth (ft)	1.06	Hydr. Depth (ft)	0.53	1.06	0.53
Conv. Total (cfs)	94755.8	Conv. (cfs)	2135.9	90484.0	2135.9
Length Wtd. (ft)	1670.00	Wetted Per. (ft)	288.53	1100.00	288.53
Min Ch El (ft)	1643.00	Shear (lb/sq ft)	0.00	0.00	0.00
Alpha	1.39	Stream Power (lb/ft s)	0.00	0.00	0.00
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	24.25	727.06	84.43
C & E Loss (ft)		Cum SA (acres)	108.94	282.90	246.82

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Pine Creek
REACH: Hile Mill Pond RS: 12

INPUT
Description:
Station Elevation Data num= 5

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-4800	1650	-3520	1643	-2940	1641	-2650	1643	1860	1650

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-4800	.07	-3520	.02	-2650	.07

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
-3520	-2650	6800	6800	6800	.1	.3

CROSS SECTION OUTPUT Profile #Max WS

E.G. Elev (ft)	1644.04	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.00	Wt. n-Val.	0.070	0.020	0.070
W.S. Elev (ft)	1644.04	Reach Len. (ft)	6800.00	6800.00	6800.00
Crit W.S. (ft)		Flow Area (sq ft)	98.90	1774.83	348.46
E.G. Slope (ft/ft)	0.000004	Area (sq ft)	98.90	1774.83	348.46
Q Total (cfs)	442.81	Flow (cfs)	2.75	430.36	9.71

Top Width (ft)	1730.26	Top Width (ft)	190.18	870.00	670.08
Vel Total (ft/s)	0.20	Avg. Vel. (ft/s)	0.03	0.24	0.03
Max Chl Dpth (ft)	3.04	Hydr. Depth (ft)	0.52	2.04	0.52
Conv. Total (cfs)	218243.0	Conv. (cfs)	1357.5	212102.2	4783.3
Length Wtd. (ft)	6800.00	Wetted Per. (ft)	190.18	870.01	670.08
Min Ch El (ft)	1641.00	Shear (lb/sq ft)	0.00	0.00	0.00
Alpha	1.44	Stream Power (lb/ft s)	0.00	0.00	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	19.42	670.62	74.81
C & E Loss (ft)		Cum SA (acres)	99.76	245.14	228.44

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Pine Creek
REACH: Hile Mill Pond RS: 11

INPUT
Description:
Station Elevation Data num= 5

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-4800	1650	-3860	1643	-3440	1638.4	-2920	1643	1360	1650

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-4800	.07	-3860	.02	-2920	.07

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
-3860	-2920	5670	5670	5670	.1	.3

CROSS SECTION OUTPUT Profile #Max WS

E.G. Elev (ft)	1644.03	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.00	Wt. n-Val.	0.070	0.020	0.070
W.S. Elev (ft)	1644.03	Reach Len. (ft)	5670.00	5670.00	5670.00
Crit W.S. (ft)		Flow Area (sq ft)	71.10	3129.30	323.74
E.G. Slope (ft/ft)	0.000000	Area (sq ft)	71.10	3129.30	323.74
Q Total (cfs)	154.99	Flow (cfs)	0.29	153.40	1.31
Top Width (ft)	1707.38	Top Width (ft)	138.19	940.00	629.19
Vel Total (ft/s)	0.04	Avg. Vel. (ft/s)	0.00	0.05	0.00
Max Chl Dpth (ft)	5.63	Hydr. Depth (ft)	0.51	3.33	0.51
Conv. Total (cfs)	523717.0	Conv. (cfs)	969.1	518335.3	4412.6
Length Wtd. (ft)	5670.00	Wetted Per. (ft)	138.19	940.05	629.19
Min Ch El (ft)	1638.40	Shear (lb/sq ft)	0.00	0.00	0.00
Alpha	1.23	Stream Power (lb/ft s)	0.00	0.00	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	6.15	287.84	22.35
C & E Loss (ft)		Cum SA (acres)	74.13	103.86	127.03

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Pine Creek
REACH: Hile Mill Pond RS: 10

INPUT
Description:
Station Elevation Data num= 7

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-410	1650	-100	1643	10	1637.7	30	1636.1	55	1637.7
180	1643	440	1650						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-410	.07	-100	.02	180	.07

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
-100	180	540	540	540	.1	.3

CROSS SECTION OUTPUT Profile #Max WS

E.G. Elev (ft)	1644.03	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.00	Wt. n-Val.	0.070	0.020	0.070
W.S. Elev (ft)	1644.03	Reach Len. (ft)	540.00	540.00	540.00
Crit W.S. (ft)	1637.12	Flow Area (sq ft)	23.40	1185.08	19.62
E.G. Slope (ft/ft)	0.000000	Area (sq ft)	23.40	1185.08	19.62
Q Total (cfs)	59.74	Flow (cfs)	0.08	59.58	0.07
Top Width (ft)	363.70	Top Width (ft)	45.52	280.00	38.18
Vel Total (ft/s)	0.05	Avg. Vel. (ft/s)	0.00	0.05	0.00
Max Chl Dpth (ft)	7.93	Hydr. Depth (ft)	0.51	4.23	0.51
Conv. Total (cfs)	230769.9	Conv. (cfs)	318.6	230184.0	267.2
Length Wtd. (ft)	540.00	Wetted Per. (ft)	45.54	280.35	38.19
Min Ch El (ft)	1636.10	Shear (lb/sq ft)	0.00	0.00	0.00

```
  Alpha                       1.07    Stream Power (lb/ft s)      0.00       0.00       0.00
  Frctn Loss (ft)                     Cum Volume (acre-ft)                   7.05
  C & E Loss (ft)                     Cum SA (acres)             62.18      24.46      83.59


INLINE STRUCTURE


RIVER: Pine Creek
REACH: Hile Mill Pond     RS: 9.5

INPUT
Description: Hiles Mill Pond Dam
Distance from Upstream XS =     490
Deck/Roadway Width        =      30
Weir Coefficient          =     2.6
 Weir Embankment Coordinates    num =       10
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    -500    1649    -300    1649    -165    1649    -110    1648      14    1648
      30    1647     124    1649     190    1651     300    1651     500    1651

Upstream Embankment side slope              =       2 horiz. to 1.0 vertical
Downstream Embankment side slope            =       2 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =
Weir crest shape                            = Broad Crested

INLINE STRUCTURE GATE    Gate #1
      Height            =       4
      Width             =      15
      Invert            =    1643
      Gate Type         = Radial      Radial Coefficient=
      Trunion Exponent  =       0
      Opening Exponent  =       1
      Head Exponent     =      .5
      Trunion Height    =       0
      Weir Coefficient  =       3
      Weir crest shape  = Broad Crested
Number of Gate Openings =       1
     Sta
      30


INLINE STRUCTURE OUTPUT  Profile #Max WS  Gate Group:  Gate #1

  E.G. Elev (ft)              1644.03    Q Gates (cfs)                 59.74
  W.S. Elev (ft)              1644.03    Q Gate Group (cfs)            59.74
  Q Total (cfs)                 59.74    Gate Open Ht (ft)              4.00
  Q Weir (cfs)                           Gate #Open                        1
  Weir Flow Area (sq ft)                 Gate Area (sq ft)              0.00
  Weir Sta Lft (ft)                      Gate Submerg                   0.00
  Weir Sta Rgt (ft)                      Gate Invert (ft)            1643.00
  Weir Max Depth (ft)                    Gate Weir Coef                0.000
  Weir Avg Depth (ft)
  Weir Coef                      0.000   Q Breach (cfs)                 0.00
  Weir Submerg                           Breach Avg Velocity (ft/s)     0.00
  Min El Weir Flow (ft)       1647.01    Breach Flow Area (sq ft)       0.00
  Wr Top Wdth (ft)


CROSS SECTION


RIVER: Pine Creek
REACH: Hile Mill Pond     RS: 9

INPUT
Description:
Station Elevation Data    num=       9
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    -200  1646.4    -120  1646.4     -70  1637.7     -50  1636.1     -25  1636.7
      20  1644.6      50  1645.3     100  1646.5     150  1644.7

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    -200     .07     -70    .035     -25     .07

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           -70     -25              210     210     210             .1       .3

CROSS SECTION OUTPUT  Profile #Max WS

  E.G. Elev (ft)          1642.54    Element                  Left OB    Channel   Right OB
  Vel Head (ft)              0.16    Wt. n-Val.                0.070      0.035      0.070
  W.S. Elev (ft)          1642.38    Reach Len. (ft)          210.00     210.00     210.00
  Crit W.S. (ft)                     Flow Area (sq ft)         62.91     259.06      91.86
  E.G. Slope (ft/ft)     0.000648    Area (sq ft)              62.91     259.06      91.86
  Q Total (cfs)           1056.08    Flow (cfs)                59.31     898.25      98.52
  Top Width (ft)           104.24    Top Width (ft)            26.89      45.00      32.35
  Vel Total (ft/s)           2.55    Avg. Vel. (ft/s)           0.94       3.47       1.07
```

Max Chl Dpth (ft)	6.28	Hydr. Depth (ft)	2.34	5.76	2.84
Conv. Total (cfs)	41491.3	Conv. (cfs)	2330.3	35290.4	3870.6
Length Wtd. (ft)	210.00	Wetted Per. (ft)	27.30	45.07	32.84
Min Ch El (ft)	1636.10	Shear (lb/sq ft)	0.09	0.23	0.11
Alpha	1.59	Stream Power (lb/ft s)	0.09	0.81	0.12
Frctn Loss (ft)	0.06	Cum Volume (acre-ft)	162.96	54.61	216.33
C & E Loss (ft)		Cum SA (acres)	61.73	22.45	83.16

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Pine Creek
REACH: Hile Mill Pond RS: 8

INPUT
Description:
Station Elevation Data num= 9

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-280	1647.8	-160	1640	-110	1636.5	-50	1636.7	-40	1636
-30	1636.5	80	1638.4	150	1642.5	240	1664		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-280	.07	-50	.035	-30	.07

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
-50	-30	1770	1770	1770	.1	.3

CROSS SECTION OUTPUT Profile #Max WS

E.G. Elev (ft)	1642.39	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.	0.070	0.035	0.070
W.S. Elev (ft)	1642.38	Reach Len. (ft)	1770.00	1770.00	1770.00
Crit W.S. (ft)		Flow Area (sq ft)	596.28	121.52	676.80
E.G. Slope (ft/ft)	0.000157	Area (sq ft)	596.28	121.52	676.80
Q Total (cfs)	1055.73	Flow (cfs)	403.23	214.66	437.85
Top Width (ft)	344.44	Top Width (ft)	146.55	20.00	177.88
Vel Total (ft/s)	0.76	Avg. Vel. (ft/s)	0.68	1.77	0.65
Max Chl Dpth (ft)	6.38	Hydr. Depth (ft)	4.07	6.08	3.80
Conv. Total (cfs)	84384.4	Conv. (cfs)	32230.0	17157.4	34997.1
Length Wtd. (ft)	1770.00	Wetted Per. (ft)	146.75	20.04	178.02
Min Ch El (ft)	1636.00	Shear (lb/sq ft)	0.04	0.06	0.04
Alpha	1.71	Stream Power (lb/ft s)	0.03	0.10	0.02
Frctn Loss (ft)	0.03	Cum Volume (acre-ft)	161.37	53.69	214.48
C & E Loss (ft)		Cum SA (acres)	61.31	22.29	82.65

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Pine Creek
REACH: Hile Mill Pond RS: 7

INPUT
Description:
Station Elevation Data num= 9

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-550	1640	-370	1637.9	-250	1635.9	-30	1635.4	-10	1632.7
10	1635.4	340	1636.1	490	1638.6	540	1640		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-550	.07	-30	.035	10	.07

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
-30	10	1610	1610	1610	.1	.3

CROSS SECTION OUTPUT Profile #Max WS

E.G. Elev (ft)	1642.24	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.00	Wt. n-Val.	0.070	0.035	0.070
W.S. Elev (ft)	1642.24	Reach Len. (ft)	1610.00	1610.00	1610.00
Crit W.S. (ft)		Flow Area (sq ft)	2682.28	327.56	3021.68
E.G. Slope (ft/ft)	0.000006	Area (sq ft)	2682.28	327.56	3021.68
Q Total (cfs)	1028.55	Flow (cfs)	405.63	134.41	488.51
Top Width (ft)	1090.00	Top Width (ft)	520.00	40.00	530.00
Vel Total (ft/s)	0.17	Avg. Vel. (ft/s)	0.15	0.41	0.16
Max Chl Dpth (ft)	9.54	Hydr. Depth (ft)	5.16	8.19	5.70
Conv. Total (cfs)	429768.1	Conv. (cfs)	169488.6	56159.9	204119.6
Length Wtd. (ft)	1610.00	Wetted Per. (ft)	522.27	40.36	532.28
Min Ch El (ft)	1632.70	Shear (lb/sq ft)	0.00	0.00	0.00
Alpha	1.49	Stream Power (lb/ft s)	0.00	0.00	0.00
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	94.76	44.57	139.34

```
  C & E Loss (ft)                     Cum SA (acres)            47.77      21.07      68.27


Warning: The cross-section end points had to be extended vertically for the computed water surface.

CROSS SECTION


RIVER: Pine Creek
REACH: Hile Mill Pond     RS: 6

INPUT
Description:
Station Elevation Data    num=       7
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    -450  1638.9    -286  1637.8    -106  1635.2     -86  1634.2     -66  1635.2
     314  1635.2     364  1645.6

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    -450     .07    -106    .035     -66     .07

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          -106     -66              550     550     550             .1       .3

CROSS SECTION OUTPUT  Profile #Max WS

  E.G. Elev (ft)           1642.23    Element                  Left OB    Channel   Right OB
  Vel Head (ft)               0.00    Wt. n-Val.                0.070      0.035      0.070
  W.S. Elev (ft)           1642.23    Reach Len. (ft)          550.00     550.00     550.00
  Crit W.S. (ft)                      Flow Area (sq ft)       1666.32     301.04    2788.55
  E.G. Slope (ft/ft)      0.000008    Area (sq ft)            1666.32     301.04    2788.55
  Q Total (cfs)            1026.56    Flow (cfs)               286.42     139.61     600.52
  Top Width (ft)            797.78    Top Width (ft)           344.00      40.00     413.78
  Vel Total (ft/s)            0.22    Avg. Vel. (ft/s)           0.17       0.46       0.22
  Max Chl Dpth (ft)           8.03    Hydr. Depth (ft)           4.84       7.53       6.74
  Conv. Total (cfs)       360602.3    Conv. (cfs)            100612.4    49041.8   210948.1

  Length Wtd. (ft)          550.00    Wetted Per. (ft)         347.35      40.05     414.50
  Min Ch El (ft)           1634.20    Shear (lb/sq ft)           0.00       0.00       0.00
  Alpha                       1.39    Stream Power (lb/ft s)     0.00       0.00       0.00
  Frctn Loss (ft)             0.01    Cum Volume (acre-ft)      14.40      32.95      31.97
  C & E Loss (ft)                     Cum SA (acres)            31.80      19.59      50.83


Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
         0.7 or greater than 1.4.  This may indicate the need for additional cross sections.

CROSS SECTION


RIVER: Pine Creek
REACH: Hile Mill Pond     RS: 5

INPUT
Description: house
Station Elevation Data    num=       8
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    -600    1645    -500    1640    -230  1642.8    -130  1635.1    -100  1633.6
     -70  1635.1     400    1640     500    1643

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    -600     .07    -130    .035     -70     .07

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          -130     -70              370     370     370             .1       .3

CROSS SECTION OUTPUT  Profile #Max WS

  E.G. Elev (ft)           1642.22    Element                  Left OB    Channel   Right OB
  Vel Head (ft)               0.00    Wt. n-Val.                0.070      0.035      0.070
  W.S. Elev (ft)           1642.22    Reach Len. (ft)          370.00     370.00     370.00
  Crit W.S. (ft)                      Flow Area (sq ft)        614.66     471.96    2274.84
  E.G. Slope (ft/ft)      0.000020    Area (sq ft)             614.66     471.96    2274.84
  Q Total (cfs)            1025.90    Flow (cfs)               102.61     357.45     565.84
  Top Width (ft)            954.27    Top Width (ft)           350.41      60.00     543.86
  Vel Total (ft/s)            0.31    Avg. Vel. (ft/s)           0.17       0.76       0.25
  Max Chl Dpth (ft)           8.62    Hydr. Depth (ft)           1.75       7.87       4.18
  Conv. Total (cfs)       227264.6    Conv. (cfs)             22731.1    79183.9   125349.6
  Length Wtd. (ft)          370.00    Wetted Per. (ft)         350.75      60.07     543.92
  Min Ch El (ft)           1633.60    Shear (lb/sq ft)           0.00       0.01       0.01
  Alpha                       2.54    Stream Power (lb/ft s)     0.00       0.01       0.00
  Frctn Loss (ft)                     Cum Volume (acre-ft)                 28.07
  C & E Loss (ft)                     Cum SA (acres)            27.42      18.96      44.78


CULVERT
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RIVER: Pine Creek
REACH: Hile Mill Pond     RS: 4

INPUT
Description: Hiway 32
Distance from Upstream XS =     280
Deck/Roadway Width        =      50
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=      10
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
    -700  1642.9            -480  1642.9            -370  1641.4
    -265    1641            -100  1641.3             -30  1641.6
      90  1641.6             190    1642             300    1642
     500    1642

Upstream Bridge Cross Section Data
Station Elevation Data    num=       8
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    -600    1645    -500    1640    -230  1642.8    -130  1635.1    -100  1633.6
     -70  1635.1     400    1640     500    1643

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    -600     .07    -130    .035     -70     .07

Bank Sta: Left   Right    Coeff Contr.   Expan.
          -130     -70             .1       .3

Downstream  Deck/Roadway Coordinates
    num=      11
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
    -600  1642.9            -100  1642.9             120  1642.9
     230  1641.4             335    1641             500  1641.3
     570  1641.6             690  1641.6             790    1642
     900    1642            1100    1642

Downstream Bridge Cross Section Data
Station Elevation Data    num=       9
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    -500    1640      40  1638.3     180  1636.9     480  1634.9     500  1633.6
     520  1634.9     600  1637.9     760    1640    1000    1640


Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    -500     .07     480    .035     520     .07

Bank Sta: Left   Right    Coeff Contr.   Expan.
           480     520             .1       .3

Upstream Embankment side slope              =       2 horiz. to 1.0 vertical
Downstream Embankment side slope            =       2 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  1

Culvert Name     Shape      Rise    Span
Culvert #1      Circular       5
FHWA Chart # 2 - Corrugated Metal Pipe Culvert
FHWA Scale # 3 - Pipe projecting from fill
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
                315      50      .02      .02        0                   .6                 1
Upstream   Elevation =  1633.6
           Centerline Station = -100
Downstream Elevation =  1633.6
           Centerline Station =  500

CROSS SECTION


RIVER: Pine Creek
REACH: Hile Mill Pond     RS: 3

INPUT
Description: house
Station Elevation Data    num=       9
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    -500    1640      40  1638.3     180  1636.9     480  1634.9     500  1633.6
     520  1634.9     600  1637.9     760    1640    1000    1640

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    -500     .07     480    .035     520     .07
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Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           480     520              630     630     630             .1       .3

CROSS SECTION OUTPUT  Profile #Max WS

  E.G. Elev (ft)           1640.38    Element                  Left OB    Channel   Right OB
  Vel Head (ft)               0.00    Wt. n-Val.                0.070      0.035      0.070
  W.S. Elev (ft)           1640.38    Reach Len. (ft)          630.00     630.00     630.00
  Crit W.S. (ft)                      Flow Area (sq ft)       2392.47     245.00     636.00
  E.G. Slope (ft/ft)      0.000035    Area (sq ft)            2392.47     245.00     636.00
  Q Total (cfs)             843.15    Flow (cfs)               542.38     204.87      95.90
  Top Width (ft)           1500.00    Top Width (ft)           980.00      40.00     480.00
  Vel Total (ft/s)            0.26    Avg. Vel. (ft/s)           0.23       0.84       0.15
  Max Chl Dpth (ft)           6.78    Hydr. Depth (ft)           2.44       6.13       1.32
  Conv. Total (cfs)       143101.7    Conv. (cfs)             92054.1    34771.2    16276.4
  Length Wtd. (ft)          630.00    Wetted Per. (ft)         980.39      40.08     480.45
  Min Ch El (ft)           1633.60    Shear (lb/sq ft)           0.01       0.01       0.00
  Alpha                       3.10    Stream Power (lb/ft s)     0.00       0.01       0.00
  Frctn Loss (ft)             0.01    Cum Volume (acre-ft)      52.19      26.79     101.37
  C & E Loss (ft)                     Cum SA (acres)            21.77      18.54      40.43


Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
         0.7 or greater than 1.4.  This may indicate the need for additional cross sections.

CROSS SECTION


RIVER: Pine Creek
REACH: Hile Mill Pond     RS: 2

INPUT
Description:
Station Elevation Data    num=       5
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
   -1500    1642    -760    1635    -740    1632    -720    1635     760    1640

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
   -1500     .04    -760     .04    -720     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          -760    -720             1340    1340    1340             .1       .3

CROSS SECTION OUTPUT  Profile #Max WS

  E.G. Elev (ft)           1640.36    Element                  Left OB    Channel   Right OB
  Vel Head (ft)               0.00    Wt. n-Val.                0.040      0.040      0.060
  W.S. Elev (ft)           1640.36    Reach Len. (ft)         1340.00    1340.00    1340.00
  Crit W.S. (ft)                      Flow Area (sq ft)       1520.29     274.52    4237.30
  E.G. Slope (ft/ft)      0.000005    Area (sq ft)            1520.29     274.52    4237.30
  Q Total (cfs)             835.74    Flow (cfs)               255.10      85.55     495.09
  Top Width (ft)           2086.95    Top Width (ft)           566.95      40.00    1480.00
  Vel Total (ft/s)            0.14    Avg. Vel. (ft/s)           0.17       0.31       0.12
  Max Chl Dpth (ft)           8.36    Hydr. Depth (ft)           2.68       6.86       2.86
  Conv. Total (cfs)       357108.0    Conv. (cfs)            109002.1    36556.8   211549.1
  Length Wtd. (ft)         1340.00    Wetted Per. (ft)         566.98      40.45    1480.37
  Min Ch El (ft)           1632.00    Shear (lb/sq ft)           0.00       0.00       0.00
  Alpha                       1.39    Stream Power (lb/ft s)     0.00       0.00       0.00
  Frctn Loss (ft)             0.03    Cum Volume (acre-ft)      23.89      23.04      66.13
  C & E Loss (ft)                     Cum SA (acres)            10.58      17.96      26.26


Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
         0.7 or greater than 1.4.  This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross
         section.  This may indicate the need for additional cross sections.

CROSS SECTION


RIVER: Pine Creek
REACH: Hile Mill Pond     RS: 1

INPUT
Description:
Station Elevation Data    num=       5
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
   -1600    1640    -770    1635    -720  1632.5    -680    1635     880    1640

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
   -1600     .06    -770     .04    -680     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          -770    -680              450     450     450             .1       .3
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CROSS SECTION OUTPUT Profile #Max WS

E.G. Elev (ft)	1635.86	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.32	Wt. n-Val.	0.060	0.040	0.060
W.S. Elev (ft)	1635.55	Reach Len. (ft)	450.00	450.00	450.00
Crit W.S. (ft)		Flow Area (sq ft)	24.66	161.55	46.34
E.G. Slope (ft/ft)	0.007391	Area (sq ft)	24.66	161.55	46.34
Q Total (cfs)	824.83	Flow (cfs)	22.07	761.29	41.48
Top Width (ft)	350.53	Top Width (ft)	90.48	90.00	170.05
Vel Total (ft/s)	3.55	Avg. Vel. (ft/s)	0.89	4.71	0.89
Max Chl Dpth (ft)	3.05	Hydr. Depth (ft)	0.27	1.80	0.27
Conv. Total (cfs)	9594.0	Conv. (cfs)	256.7	8854.9	482.4
Length Wtd. (ft)	450.00	Wetted Per. (ft)	90.48	90.14	170.05
Min Ch El (ft)	1632.50	Shear (lb/sq ft)	0.13	0.83	0.13
Alpha	1.63	Stream Power (lb/ft s)	0.11	3.90	0.11
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	0.13	16.33	0.24
C & E Loss (ft)		Cum SA (acres)	0.47	15.96	0.88

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Pine Creek
REACH: Hile Mill Pond RS: 0

INPUT
Description: pine lake
Station Elevation Data num= 5

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-2200	1640	-2130	1634	-1030	1632	870	1634	1170	1640

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-2200	.02	-2130	.02	870	.02

Bank Sta: Left	Right	Coeff Contr.	Expan.
-2130	870	.1	.3

CROSS SECTION OUTPUT Profile #Max WS

E.G. Elev (ft)	1634.00	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.00	Wt. n-Val.		0.020	
W.S. Elev (ft)	1634.00	Reach Len. (ft)			
Crit W.S. (ft)	1632.21	Flow Area (sq ft)		3000.00	
E.G. Slope (ft/ft)	0.000000	Area (sq ft)		3000.00	
Q Total (cfs)	50.86	Flow (cfs)		50.86	
Top Width (ft)	3000.00	Top Width (ft)		3000.00	
Vel Total (ft/s)	0.02	Avg. Vel. (ft/s)		0.02	
Max Chl Dpth (ft)	2.00	Hydr. Depth (ft)		1.00	
Conv. Total (cfs)	222887.7	Conv. (cfs)		222887.7	
Length Wtd. (ft)		Wetted Per. (ft)		3000.00	
Min Ch El (ft)	1632.00	Shear (lb/sq ft)		0.00	
Alpha	1.00	Stream Power (lb/ft s)		0.00	
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

SUMMARY OF MANNING'S N VALUES

River:Pine Creek

Reach	River Sta.	n1	n2	n3
Hile Mill Pond	14	.07	.02	.07
Hile Mill Pond	13	.07	.02	.07
Hile Mill Pond	12	.07	.02	.07
Hile Mill Pond	11	.07	.02	.07
Hile Mill Pond	10	.07	.02	.07
Hile Mill Pond	9.5	Inl Struct		
Hile Mill Pond	9	.07	.035	.07
Hile Mill Pond	8	.07	.035	.07
Hile Mill Pond	7	.07	.035	.07
Hile Mill Pond	6	.07	.035	.07
Hile Mill Pond	5	.07	.035	.07
Hile Mill Pond	4	Culvert		
Hile Mill Pond	3	.07	.035	.07
Hile Mill Pond	2	.04	.04	.06
Hile Mill Pond	1	.06	.04	.06
Hile Mill Pond	0	.02	.02	.02

SUMMARY OF REACH LENGTHS

River: Pine Creek

Reach	River Sta.	Left	Channel	Right
Hile Mill Pond	14	2500	2500	2500
Hile Mill Pond	13	1670	1670	1670
Hile Mill Pond	12	6800	6800	6800
Hile Mill Pond	11	5670	5670	5670
Hile Mill Pond	10	540	540	540
Hile Mill Pond	9.5	Inl Struct		
Hile Mill Pond	9	210	210	210
Hile Mill Pond	8	1770	1770	1770
Hile Mill Pond	7	1610	1610	1610
Hile Mill Pond	6	550	550	550
Hile Mill Pond	5	370	370	370
Hile Mill Pond	4	Culvert		
Hile Mill Pond	3	630	630	630
Hile Mill Pond	2	1340	1340	1340
Hile Mill Pond	1	450	450	450
Hile Mill Pond	0			

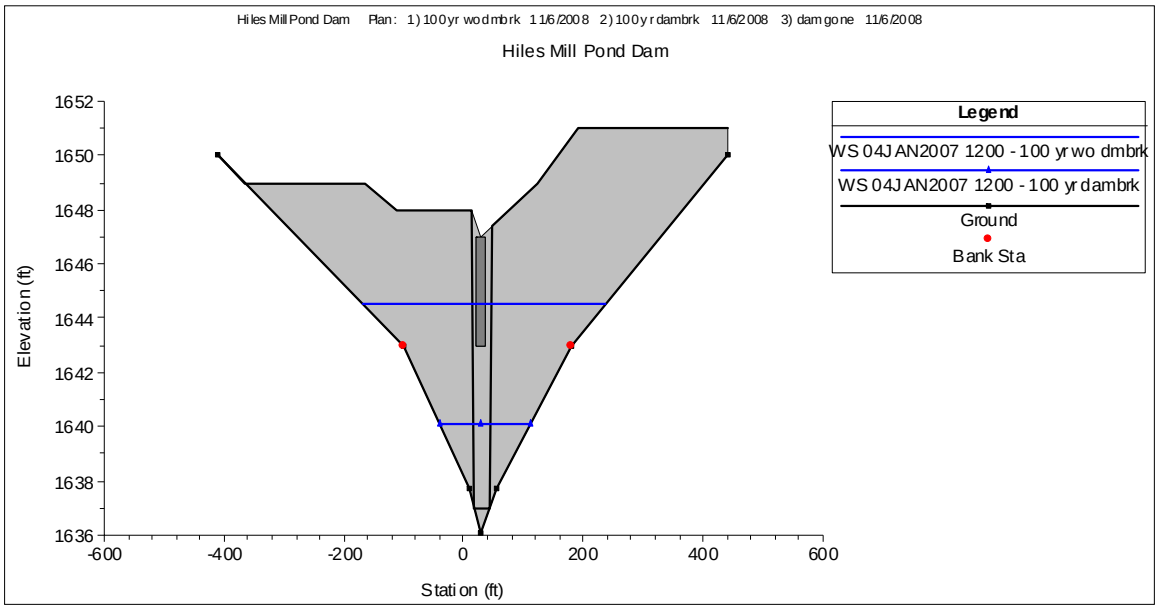
SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Pine Creek

Reach	River Sta.	Contr.	Expan.
Hile Mill Pond	14	.1	.3
Hile Mill Pond	13	.1	.3
Hile Mill Pond	12	.1	.3
Hile Mill Pond	11	.1	.3
Hile Mill Pond	10	.1	.3
Hile Mill Pond	9.5	Inl Struct	
Hile Mill Pond	9	.1	.3
Hile Mill Pond	8	.1	.3
Hile Mill Pond	7	.1	.3
Hile Mill Pond	6	.1	.3
Hile Mill Pond	5	.1	.3
Hile Mill Pond	4	Culvert	
Hile Mill Pond	3	.1	.3
Hile Mill Pond	2	.1	.3
Hile Mill Pond	1	.1	.3
Hile Mill Pond	0	.1	.3

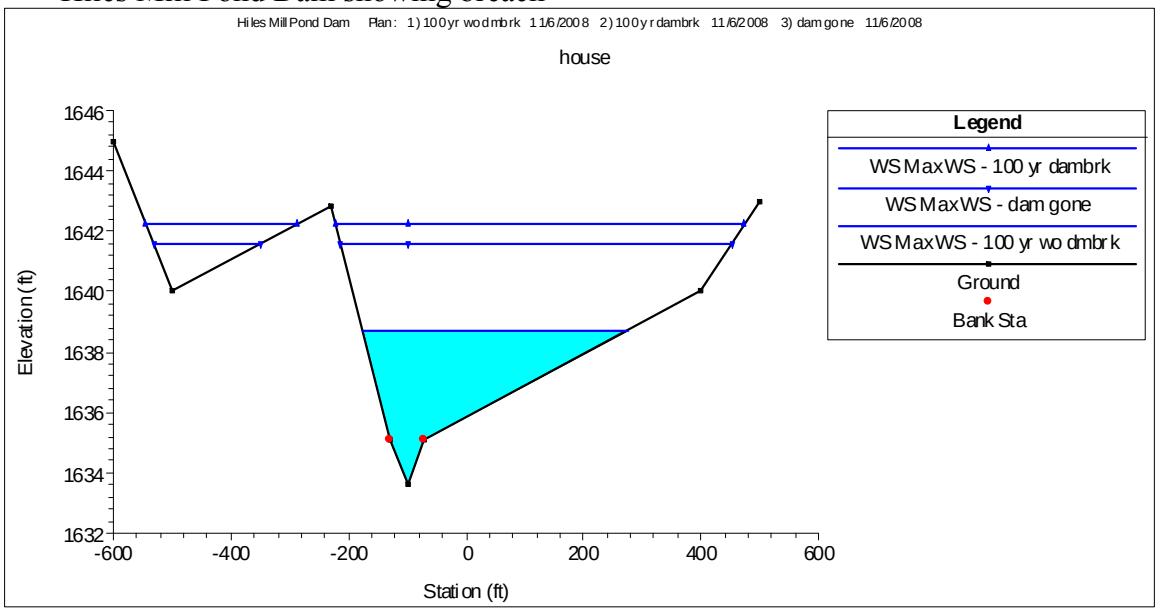
Profile Output Table - Art's

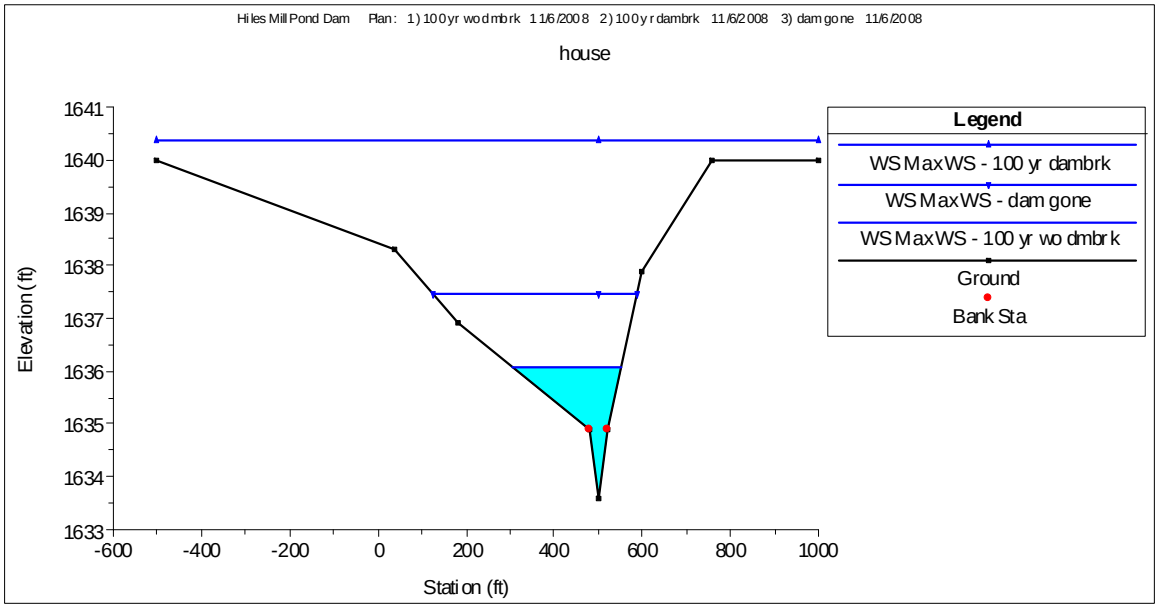
Reach	River Sta	Profile	Plan	Q Total (cfs)	W.S. Elev (ft)	Vel Chnl (ft/s)	Top Width (ft)
Hile Mill Pond	14	Max WS	100 yr wo dmbrk	599.00	1651.30	6.84	345.86
Hile Mill Pond	14	Max WS	100 yr dambrk	599.00	1651.28	7.00	341.14
Hile Mill Pond	14	Max WS	dam gone	50.00	1650.32	3.33	115.77
Hile Mill Pond	13	Max WS	100 yr wo dmbrk	140.64	1644.77	0.07	2058.15
Hile Mill Pond	13	Max WS	100 yr dambrk	451.27	1644.06	0.37	1677.05
Hile Mill Pond	13	Max WS	dam gone	161.21	1643.09	1.59	1149.97
Hile Mill Pond	12	Max WS	100 yr wo dmbrk	140.31	1644.76	0.05	2329.11
Hile Mill Pond	12	Max WS	100 yr dambrk	442.81	1644.04	0.24	1730.26
Hile Mill Pond	12	Max WS	dam gone	49.85	1641.81	0.35	353.23
Hile Mill Pond	11	Max WS	100 yr wo dmbrk	138.30	1644.76	0.04	2255.47
Hile Mill Pond	11	Max WS	100 yr dambrk	154.99	1644.03	0.05	1707.38
Hile Mill Pond	11	Max WS	dam gone	45.77	1641.61	0.04	656.78
Hile Mill Pond	10	Max WS	100 yr wo dmbrk	137.14	1644.76	0.10	423.55
Hile Mill Pond	10	Max WS	100 yr dambrk	59.74	1644.03	0.05	363.70
Hile Mill Pond	10	Max WS	dam gone	42.99	1641.61	0.08	218.46
Hile Mill Pond	9.5	Max WS	100 yr wo dmbrk	137.14	1644.76		
Hile Mill Pond	9.5	Max WS	100 yr dambrk	59.74	1644.03		
Hile Mill Pond	9	Max WS	100 yr wo dmbrk	117.16	1638.81	1.14	63.44
Hile Mill Pond	9	Max WS	100 yr dambrk	1056.08	1642.38	3.47	104.24
Hile Mill Pond	9	Max WS	dam gone	271.99	1641.57	1.07	95.01
Hile Mill Pond	8	Max WS	100 yr wo dmbrk	116.26	1638.79	0.70	229.40
Hile Mill Pond	8	Max WS	100 yr dambrk	1055.73	1642.38	1.77	344.44
Hile Mill Pond	8	Max WS	dam gone	271.98	1641.57	0.56	318.27
Hile Mill Pond	7	Max WS	100 yr wo dmbrk	115.35	1638.73	0.13	935.18
Hile Mill Pond	7	Max WS	100 yr dambrk	1028.55	1642.24	0.41	1090.00
Hile Mill Pond	7	Max WS	dam gone	271.45	1641.55	0.13	1090.00

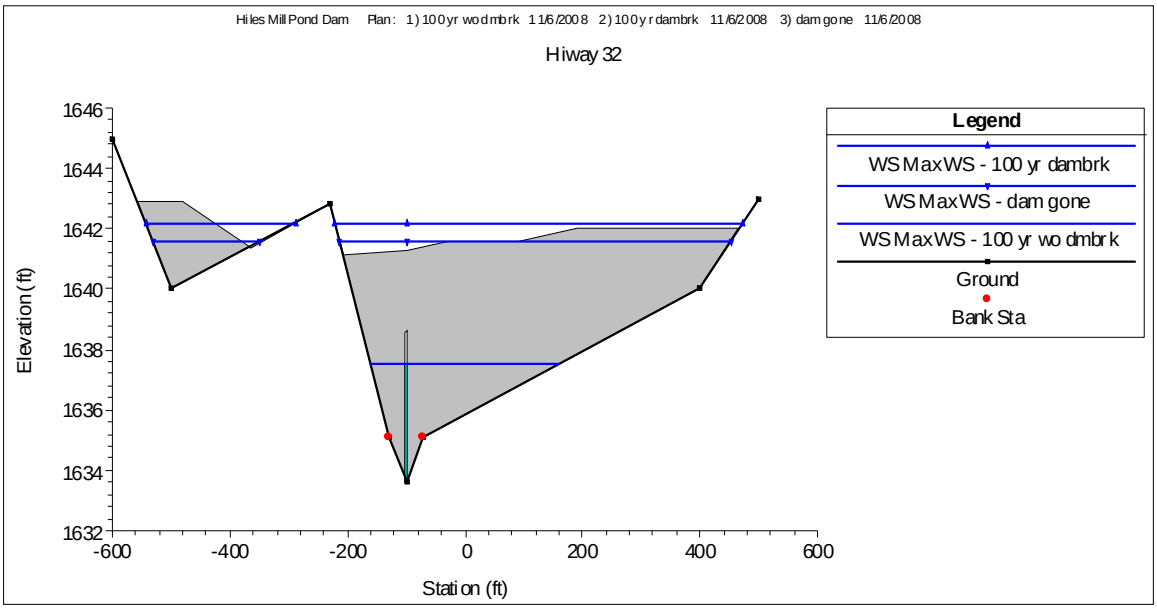
Hile Mill Pond	6	Max WS	100 yr wo dmbrk	115.19	1638.72	0.13	754.55
Hile Mill Pond	6	Max WS	100 yr dambrk	1026.56	1642.23	0.46	797.78
Hile Mill Pond	6	Max WS	dam gone	270.66	1641.55	0.14	794.54
Hile Mill Pond	5	Max WS	100 yr wo dmbrk	115.14	1638.72	0.25	454.34
Hile Mill Pond	5	Max WS	100 yr dambrk	1025.90	1642.22	0.76	954.27
Hile Mill Pond	5	Max WS	dam gone	270.42	1641.55	0.24	846.06
Hile Mill Pond	4	Max WS	100 yr wo dmbrk	115.14			
Hile Mill Pond	4	Max WS	100 yr dambrk	1025.90			
Hile Mill Pond	4	Max WS	dam gone	270.42			
Hile Mill Pond	3	Max WS	100 yr wo dmbrk	115.14	1636.08	1.13	247.57
Hile Mill Pond	3	Max WS	100 yr dambrk	843.15	1640.38	0.84	1500.00
Hile Mill Pond	3	Max WS	dam gone	259.83	1637.46	0.90	463.89
Hile Mill Pond	2	Max WS	100 yr wo dmbrk	115.08	1635.94	0.81	416.80
Hile Mill Pond	2	Max WS	100 yr dambrk	835.74	1640.36	0.31	2086.95
Hile Mill Pond	2	Max WS	dam gone	257.88	1637.42	0.46	1012.95
Hile Mill Pond	1	Max WS	100 yr wo dmbrk	114.98	1634.46	1.67	70.42
Hile Mill Pond	1	Max WS	100 yr dambrk	824.83	1635.55	4.71	350.53
Hile Mill Pond	1	Max WS	dam gone	254.81	1634.84	2.58	84.27
Hile Mill Pond	0	Max WS	100 yr wo dmbrk	50.62	1634.00	0.02	3000.00
Hile Mill Pond	0	Max WS	100 yr dambrk	50.86	1634.00	0.02	3000.00
Hile Mill Pond	0	Max WS	dam gone	51.00	1634.00	0.02	3000.00



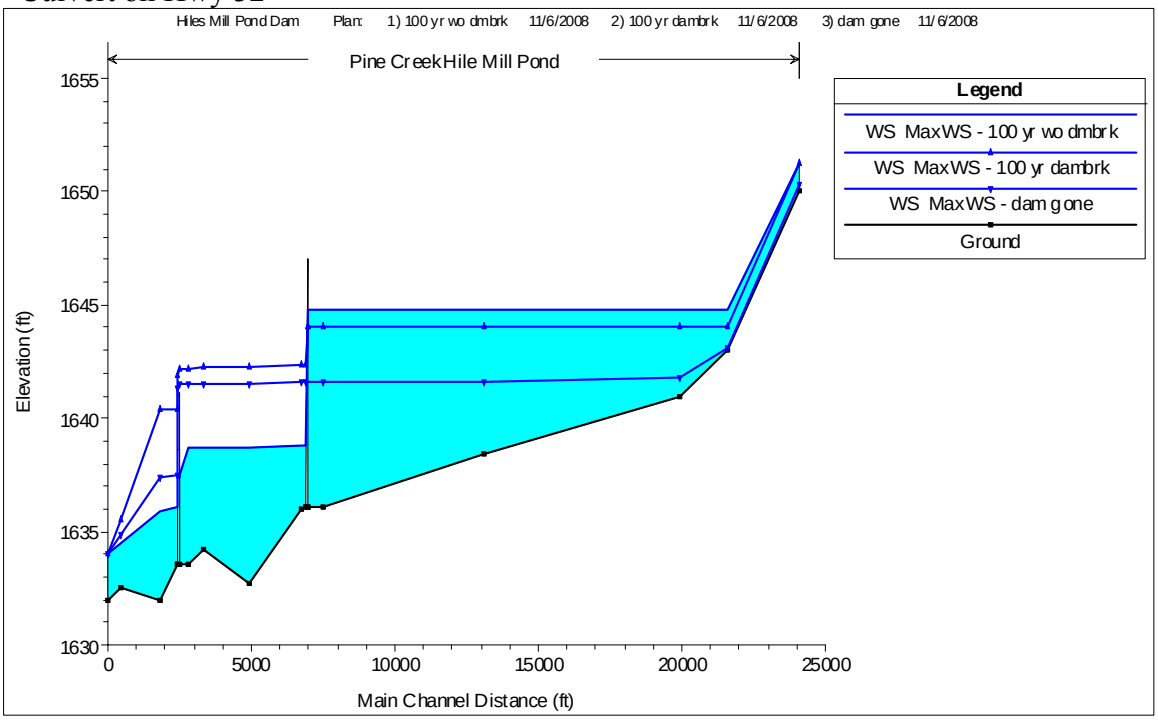
Hiles Mill Pond Dam showing breach



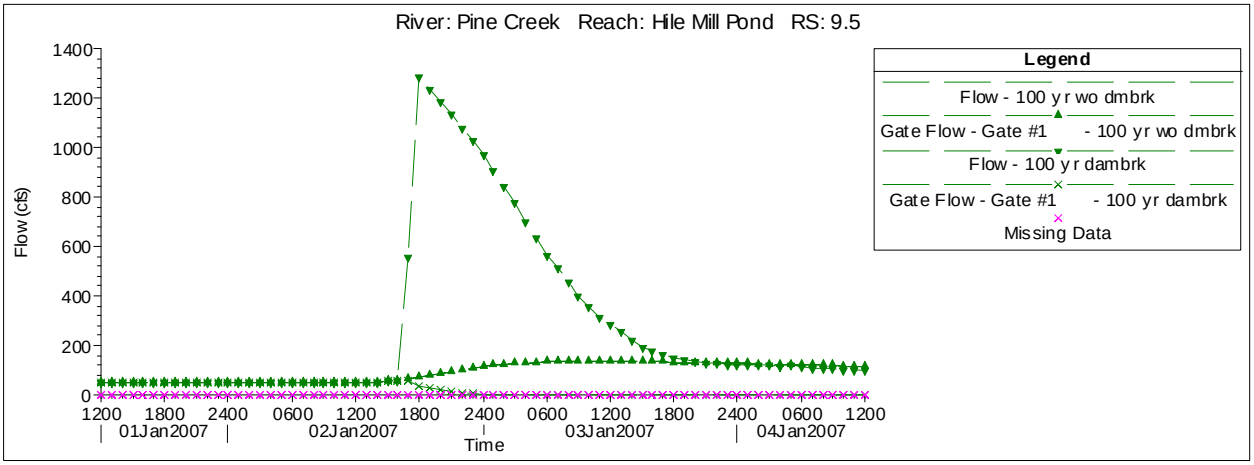




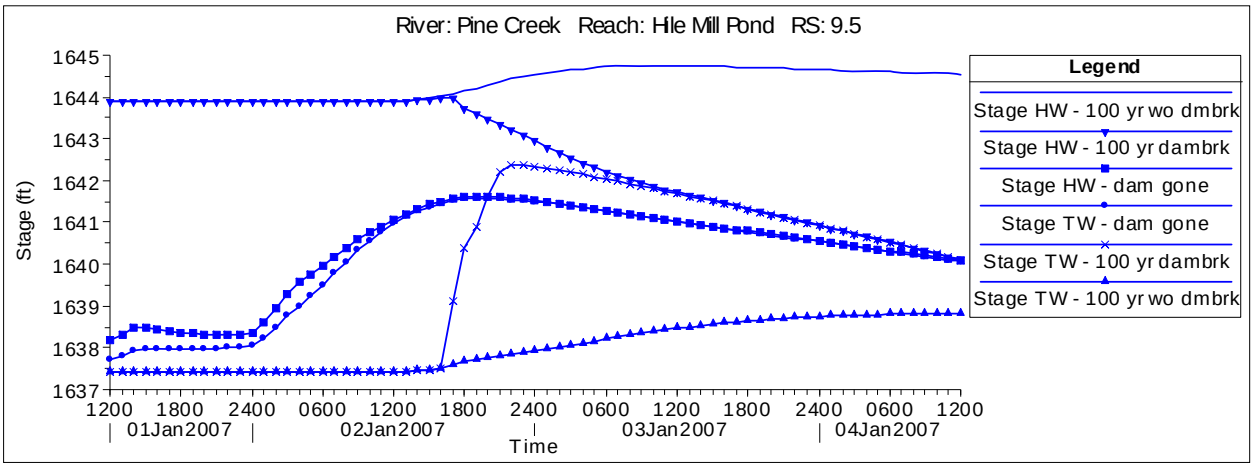
Culvert on Hwy 32



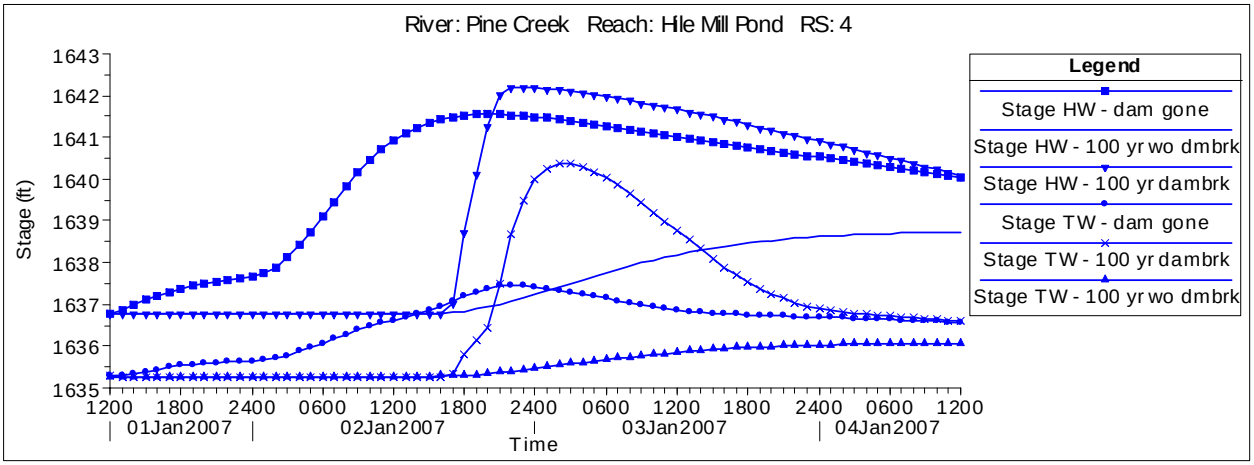
Profile



Hiles Mill Pond Dam



Hiles Mill Pond Dam



Culvert on Hwy 32

National Flood Frequency Program
Version 3.0
Based on Water-Resources Investigations Report 02-4168
Equations from database C:\Program Files\NFF\NFFv3.2_2004-12-14.mdb
Updated by kries 9/22/2004 at 4:03:24 PM fixed decimal place in constant
Equations for Wisconsin developed using English units

Site: HILES MILL POND DAM, Wisconsin
User: ajohnsto
Date: Wednesday, November 05, 2008 05:18 PM

Rural Estimate: HILES MILL POND DAM

Region: Area_3
Drainage_Area = 7.1 mi2
Average_Soil_Permeability = 1.65 in per hr
Percent_Storage = 40 percent (above max value 39.7)
24-Hour_25-Year_Precipitation = 4.24 in

Flood Peak Discharges, in cubic feet per second

Estimate	Recurrence Interval, yrs	Peak, cfs	Standard Error, %	Equivalent Years
HILES MILL POND DAM	2	54.1	37	
	5	77	34	
	10	92.2	34	
	25	112	34	
	50	125	34	
	100	140	34	
	500	173		